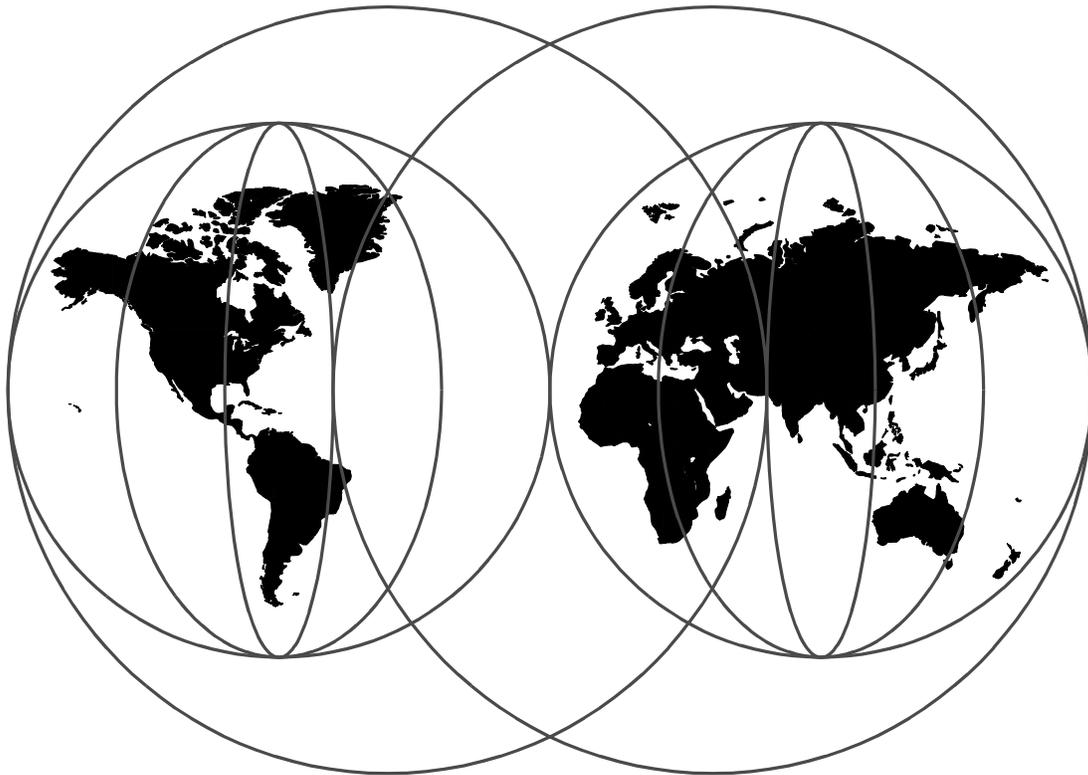


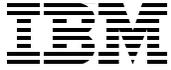
Lotus Domino Release 4.6 on IBM RS/6000: Installation, Customization, and Administration

Andy Hoetzel, Alison Smyth, Sanjay Kapur, Hans-Juergen Kunde, Andreas Stenmark



International Technical Support Organization

<http://www.redbooks.ibm.com>



International Technical Support Organization

SG24-4694-02

**Lotus Domino Release 4.6 on IBM RS/6000
Installation, Customization,
and Administration**

September 1998

Take Note!

Before using this information and the product it supports, be sure to read the general information in Appendix B, "Special Notices" on page 431.

Third Edition (September 1998)

This edition applies to Release 4.6 of Lotus Domino for use with the AIX Operating System.

Comments may be addressed to:
IBM Corporation, International Technical Support Organization
Dept. JN9B Building 045 Internal Zip 2834
11400 Burnet Road
Austin, Texas 78758-3493

When you send information to IBM, you grant IBM a non-exclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

© Copyright International Business Machines Corporation 1998. All rights reserved

Note to U.S Government Users - Documentation related to restricted rights - Use, duplication or disclosure is subject to restrictions set forth in GSA ADP Schedule Contract with IBM Corp.

Contents

Figures	xi
Tables	xix
Preface	xxi
The Team That Wrote This Redbook	xxi
Comments Welcome	xxii
Chapter 1. Introduction	1
1.1 What is Lotus Domino Server and Notes Workstation?	1
1.2 What's New in Lotus Domino Server and Notes Client R4.6?	2
1.2.1 Administration	2
1.2.2 Performance Features	3
1.2.3 Internet Features	3
1.2.4 Mail, Calendar, & Scheduling	3
1.2.5 Advanced Server Features	3
1.2.6 Application Development	3
1.2.7 Database Management Features	4
1.2.8 Document Authoring Features	4
1.2.9 Ease-of-Use Features	4
1.2.10 Mail And Calendar Features	5
1.2.11 Internet and Network Features	5
1.2.12 Security Features	5
1.3 What's New in Lotus Domino Server and Notes Workstation R4.5?	5
1.3.1 Administration	5
1.3.2 Performance Features	6
1.3.3 Security Features	6
1.3.4 Database Maintenance Features	6
1.3.5 Internet Features	7
1.3.6 Mail, Calendar, & Scheduling	7
1.3.7 Advanced Server Features	7
1.3.8 Application Development	7
1.3.9 Database Management Features	8
1.3.10 Document Authoring Features	8
1.3.11 Ease-of-Use Features	8
1.3.12 Mail and Calendar Features	9
1.3.13 Internet and Network Features	9
1.3.14 Security Features	9
1.4 What's New in Lotus Notes Release 4?	9
1.4.1 Ease-of-Use Features	10
1.4.2 Mail Features	10
1.4.3 Mobile Features	11
1.4.4 Document Authoring Features	11
1.4.5 Network Features	12
1.4.6 Printing Features	12
1.4.7 Replication Features	12
1.4.8 Search Features	12
1.4.9 Security Features	13
1.4.10 Workspace Features	13
1.4.11 Application Development/Programming Features	13
1.4.12 Database Management Features	14

1.5 Available Platforms	14
1.5.1 AIX	14
1.5.2 OS/2 Warp (32-bit)	19
1.5.3 Windows 95 (32-bit)	20
1.5.4 Windows NT (32-bit)	21
1.6 Our Lotus Domino Server and Notes Workstation Environment	21
Chapter 2. Installing a Lotus Domino Server	23
2.1 Hardware and Software System Requirements	23
2.1.1 Lotus Domino Servers	24
2.1.2 Notes Workstation Clients	24
2.2 Preparing the Environment for the Installation	24
2.2.1 Create a New Volume Group for the Lotus Domino Server Binaries	25
2.2.2 Create the Logical Volume for the Lotus Domino Server Binaries	26
2.2.3 Create the Logical Volume for Lotus Domino Server Databases	27
2.2.4 The File System for the Lotus Domino Server Binaries	29
2.2.5 The File System for the Lotus Domino Server Databases	30
2.2.6 Setting Up a Local Area Network (LAN)	32
2.3 Starting the Installation	36
2.3.1 Installing on Multiple Hosts	49
2.4 Setting Up the Lotus Domino Server on AIX	51
2.4.1 Lotus Notes Setup Options	55
2.5 Server Setup Program	56
2.5.1 Starting the Server Setup Program	57
2.5.2 Setting Up the First Server in Your Organization	57
2.5.3 Setting Up an Additional Server in Your Organization	65
2.6 Setting Up Network Protocols	72
2.6.1 Setting Up an Additional Network Protocol	73
2.7 Final Settings	73
Chapter 3. Installing a Notes Workstation	75
3.1 Installation of Lotus Notes R4.6 Workstation on AIX	75
3.1.1 Preparing the Environment for the Installation	75
3.1.2 New Volume Group on the Workstation for the Installation Software	76
3.1.3 The Logical Volume on the Workstation for the Installation Software	77
3.1.4 Create the Logical Volume for the User Database	78
3.1.5 Create and Mount the File System on the Workstation	80
3.1.6 The File System for the User Database on the Workstation	81
3.1.7 Setting Up the Lotus Notes R4.6 Workstation on AIX	83
3.1.8 Workstation Setup Program	88
Chapter 4. User and Server Registration	95
4.1 User Registration	95
4.1.1 Certification Log	95
4.1.2 Creating the Certification Log	96
4.1.3 Registering New Lotus Notes Users	96
4.1.4 Creating a User Profile	101
4.1.5 Installing Lotus Notes Clients	102
4.1.6 Registering Multiple Users From a File	102
4.1.7 Examples of Registering a Group of Users	103
4.1.8 Registering Multiple Users from a Text File	103
4.2 Registering Web Users	109
4.2.1 Anonymous Users	110
4.2.2 Allowing Anonymous Users	110

4.2.3	Authenticated Users	111
4.3	Registering Additional Servers	112
4.3.1	Registering New Lotus Domino Server	113
4.3.2	Installing Lotus Domino Servers	116
4.4	Giving Access to Address Book Database	116
4.5	Giving Access to the Certifier ID File	118
Chapter 5.	Connecting Lotus Domino Servers	121
5.1	Choosing a Topology for Replication and Mail Routing	121
5.2	Mail Routing	121
5.2.1	Introduction to Mail Routing	122
5.2.2	Setting Up Mail Routing Connection Documents	122
5.2.3	How Cross Certification Works	126
5.2.4	Cross Certification and Authentication	127
5.3	Replication	131
5.3.1	Introduction to Replication	131
5.3.2	Creating the Connection Document for Replication	131
5.3.3	Required Authorizations in Server Document	133
5.3.4	Creating the Replica on the Spoke Server	134
5.4	Selective Replication	136
5.4.1	Features That Will Not Replicate	141
5.4.2	Database Replica IDs	141
5.4.3	Access Control Lists and Replication	141
Chapter 6.	Configuring Lotus Domino Servers on AIX	143
6.1	Lotus Domino Server Startup	143
6.1.1	Lotus Domino Server Startup from AIX Command Line	143
6.1.2	Starting the Lotus Domino Server using a Startup Script	144
6.1.3	Starting the Lotus Domino Server Automatically	146
6.1.4	Using the AIX alog Facility	146
6.2	Lotus Domino Server Shut Down	150
6.2.1	Shutting Down Lotus Domino Server on Server Console	150
6.2.2	Shutting Down Lotus Domino Server on Remote Console	150
6.2.3	Shutting Down Lotus Domino Server Using AIX Command	153
6.2.4	Shutting Down Lotus Domino Server Using Shell Script	153
6.3	Lotus Domino and NFS	154
6.3.1	Combined Lotus Domino Server and Note Client Hosts	155
6.3.2	Distributing the UNIX Installation Kit	157
6.3.3	Distributing the Lotus Notes Software Directory	160
6.3.4	Distributing the Clients Data Directories	166
6.4	Environment Variables	168
6.4.1	Notes_SHARED_DPOOLSIZE	169
6.4.2	NSORDER	169
6.4.3	DEBUG_ENABLE_CORE	169
Chapter 7.	Setting Up Printers	171
7.1	Installation and Setup of Printers on AIX	171
7.1.1	Add/Configure a Local Attached Printer	171
7.1.2	Add/Configure a Remotely Attached Printer	175
7.2	Setting Up AIX Printers in Lotus Notes	178
7.3	Create a Site-Specific System Printer Setup File	183
7.4	Maintenance of an AIX Printer Subsystem	183
7.4.1	Give a User the Right to Maintain the AIX Printer Subsystem	183
7.4.2	Useful Printer Commands	184

7.5 Understanding the Xpdefaults Printer Setting of Lotus Notes	185
Chapter 8. Security and Lotus Domino	189
8.1 User Security	189
8.1.1 User IDs and Passwords	189
8.1.2 Locking User IDs	190
8.1.3 Local Database Encryption	190
8.2 About Workstation Data Security	192
8.3 Remote User Security	193
8.4 Mail Security	194
8.5 Server Security	196
8.5.1 Restricting Physical Access to Lotus Domino Servers	196
8.5.2 Restricting Access to Lotus Domino Server Consoles	197
8.5.3 Server Access Control Lists (SACL).	197
8.5.4 Certification	200
8.6 Secure Socket Layer (SSL)	201
8.6.1 Enabling SSL on a Server	202
8.7 AIX Security	210
8.7.1 Security Concepts	210
8.7.2 UNIX Passwords	211
8.7.3 Security Logs	211
8.7.4 UNIX File Permissions	212
8.7.5 File System Security	213
8.7.6 Validating the User Environment	214
8.7.7 Documenting Security Policy and Setup.	214
8.7.8 NFS Export Security	214
8.7.9 AIX Security Checklist	215
Chapter 9. Lotus Domino and the World Wide Web	217
9.1 Lotus Domino Server	217
9.1.1 How the Lotus Domino Web Server Works	218
9.1.2 Specify HTTP Settings for the Lotus Domino Web Server	220
9.1.3 Specify Internet Port and Security Settings for the Web Server	224
9.1.4 Starting and Stopping the Lotus Domino Web Server.	226
9.1.5 Accessing the Lotus Domino Web Server from a Browser	228
9.1.6 Restricting Access to the Lotus Domino Web Server	230
9.1.7 Sample SSL Setup Session	231
9.2 Lotus Domino Virtual Server	235
9.2.1 Network Setup	236
9.2.2 Configuring domcfg.nsf	236
9.3 Web Navigator.	242
9.3.1 Personal Web Navigator	242
9.3.2 Setting Up the Personal Web Navigator	243
9.3.3 Web Ahead - Automatically Following Links on Web Pages	246
9.3.4 Managing Database Size (perweb.nsf).	247
9.3.5 Using Page Minder to Keep Track of Changes to Web Pages	247
9.4 Server Web Navigator	249
9.4.1 Setting Up the Server Web Navigator	249
9.4.2 Connecting the Server Web Navigator to the WWW.	250
9.4.3 Specifying Web Retrieval Settings	251
9.4.4 Customizing Basic Settings in the Administration Document	252
9.4.5 Managing the Server Web Navigator Database	254
9.4.6 Providing Access to the Server Web Navigator Database	257

9.4.7	Installing the Server Web Navigator for the Lotus Notes End User	.257
9.5	Server Web Administration Tool	.259
9.6	New WWW Features in Lotus Domino Release 4.6.1	.263
9.6.1	Improving Web Server Performance Using the Command Cache	.263
Chapter 10.	Connectivity and Internet Communications	.265
10.1	SMTP	.265
10.1.1	How the SMTP MTA Works	.266
10.1.2	Configuration of the SMTP MTA	.269
10.1.3	Foreign SMTP Domain	.269
10.1.4	SMTP Connection Document	.270
10.1.5	Server Document	.271
10.1.6	Global Domain Document	.275
10.1.7	Monitoring the SMTP MTA	.279
10.1.8	Running the SMTP MTA	.280
10.2	POP and IMAP	.281
10.2.1	Lotus Domino and Internet Mail	.281
10.2.2	Starting and Stopping the POP3/IMAP4 Servers	.283
10.2.3	Preparation for an Internet Mail Client	.283
10.2.4	Setting Up a POP3 Client	.285
10.2.5	Setting Up an IMAP4 Client	.286
10.3	NNTP	.288
10.3.1	Lotus Domino and NNTP	.289
10.3.2	Installation and Configuration	.289
10.3.3	Starting and Stopping the NNTP Server Task	.290
10.3.4	Creating a Private Newsgroup	.291
10.3.5	Removing a Private Newsgroup	.292
10.3.6	Configuring a Newsfeed	.293
10.3.7	Control Messages	.297
10.3.8	Lotus Domino NNTP and USENET	.299
10.3.9	Setting Up an NNTP Client	.299
10.4	LDAP	.301
10.4.1	Lotus Domino and LDAP	.301
10.4.2	Installation and Configuration	.302
10.4.3	Starting and Stopping the LDAP Server Task	.306
10.4.4	Granting LDAP Server Access	.307
10.4.5	Setting Up an LDAP Client	.307
10.5	Using X.PC for Client Connections	.309
10.5.1	Setting Up the Communication Port (TTY)	.309
10.5.2	Setting Up the Modem on Lotus Domino	.312
10.5.3	Configuring the Windows 95 Client To Use X.PC	.319
10.6	Using PPP for Client Connections	.321
Chapter 11.	Domino Advanced Services	.327
11.1	Domino Advanced Services Environment	.327
11.2	Clustering	.328
11.2.1	Configuration of a Cluster	.329
11.2.2	Overview of Cluster Components	.331
11.2.3	Failover	.331
11.2.4	Monitoring, Logging, and Statistics of the Cluster Processes	.332
11.2.5	Removing a Server From a Cluster	.333
11.2.6	Managing Databases On a Cluster	.333
11.2.7	Restricting Server Access	.334

11.2.8	Load Balancing	334
11.2.9	Summary of the States of Cluster Members	335
11.2.10	Related Settings in notes.ini	335
11.2.11	Cluster Replicator Caveats	336
11.2.12	Use of Private LAN for Cluster Communication	336
11.3	Partitioned Servers	337
11.3.1	Planning a Partitioned Server Deployment	338
11.3.2	Configuring Partitioned Servers	338
11.3.3	Configuring Partitioned Servers for TCP/IP	339
11.3.4	Starting and Stopping Partitioned Servers	340
11.3.5	Starting the Server in the Background	341
11.3.6	Considerations for Internet Server Tasks	345
11.4	Billing	346
11.4.1	Managing Billing	347
11.4.2	Sample Billing Records	347
Chapter 12. High Availability, Scalability, RS/6000 SP		351
12.1	RS/6000 and AIX Issues	351
12.1.1	RS/6000 and AIX Basics	351
12.1.2	Service Processor	352
12.1.3	RS/6000 HA50 cluster server	352
12.2	Middleware Issues	353
12.2.1	HACMP	353
12.2.2	Lotus Notes Recovery Kit (NRK)	353
12.2.3	Lotus Domino Clustering	353
12.3	Scalability and RS/6000 SP	355
12.3.1	RS/6000 SP: Planning	355
12.3.2	RS/6000 SP: Installation	356
12.4	Further Information on High Availability and Scalability	358
Chapter 13. Backup and Recovery		359
13.1	Introduction	359
13.2	Server Backup Using AIX Native Tools	360
13.2.1	Stopping and Starting the Database Server	361
13.2.2	How to Back Up the Lotus Software File System	361
13.2.3	How to Back Up Only One Server	362
13.2.4	Backing Up a Server that Contains User Data	365
13.2.5	Restoring Backup Data	366
13.3	Backup and Recovery of the AIX System	368
13.3.1	Backing Up the AIX System	369
13.3.2	Restoring the AIX System Backup	370
13.4	Other Native AIX Backup Tools	370
13.4.1	tar	370
13.4.2	cpio	372
13.4.3	savevg/restvg	373
13.5	Advanced Backup Solutions	374
13.5.1	Backup of More Than One Server	375
13.5.2	ADSM	382
13.5.3	Legato NetWorker	383
Chapter 14. System Performance Considerations		385
14.1	Performance Monitoring	385
14.1.1	The vmstat Command	386
14.1.2	The iostat Command	388

14.1.3	The sar Command	389
14.1.4	The tprof Command	390
14.1.5	The svmon Command	391
14.1.6	The filemon Command	391
14.1.7	The netpmon Command	392
14.1.8	The Performance Toolbox	392
14.1.9	Monitoring Lotus Notes Servers Using Performance Toolbox	394
14.2	Performance Tuning	396
14.2.1	CPU Related Tuning Tools	396
14.2.2	Memory Related Tuning Tools	399
14.2.3	Network Related Tuning Tools	401
14.3	Optimal File System Performance for the Lotus Domino Server	403
14.3.1	Performance Considerations for the Logical Volume Manager	403
14.3.2	Creating the Volume Group	404
14.3.3	Creating the Logical Volume	404
14.3.4	Performance Considerations for the File System	407
14.3.5	Creating a New Log Device	407
14.3.6	Creating the New File System for the Lotus Notes Databases	408
14.4	Creating a Striped File System for Maximum Database Performance	409
14.4.1	Creating the Striped Logical Volume	409
14.4.2	Creating the Logical Volume for Disk Striping	410
14.4.3	Creating a Striped File System for Lotus Notes Databases	412
14.4.4	Performance Tuning Using Disk Striping	412
14.5	Lotus Domino Server Tuning	413
14.5.1	The NSF_BUFFER_POOL_SIZE Parameter	413
14.5.2	The NIF_POOL_SIZE Parameter	413
14.5.3	The MEMORY_QUOTA Parameter	413
14.5.4	Multiple Name and Address Books	414
14.6	Lotus Notes Configuration Tips	414
14.6.1	Reducing ServerTasks	414
14.6.2	Reducing Mail-Polling Intervals (MinNewMailPoll)	414
14.6.3	Increasing the MailMaxThreads Value	414
14.6.4	Dropping Idle Sessions	414
14.6.5	Enabling Full-Text Indexes	415
14.6.6	Partitioning Data on Servers	415
14.7	Conclusion	415
Chapter 15. Troubleshooting		417
15.1	Performing Copy and Paste	417
15.2	Multiple Lotus Notes Clients on the Same AIX System	417
15.3	Cleaning Lotus Domino Processes	418
15.4	File System Full	420
15.5	Increasing Paging Space	421
15.6	Always Start with the Lotus Notes Setup Screen	423
15.7	Accessing a Server in a Different TCP/IP Domain	423
15.7.1	Setup within Lotus Notes	423
15.7.2	Setup on the Network Layer	424
15.8	Unable to Create the Data Directory during Setup	425
15.9	"Directory is not empty" Error on Installing from CD	425
15.10	Partitioning: File .sgf.notespartition and HACMP	425
15.11	TCP/IP Listener Error without TCPIP_TcpipAddress	426
15.12	Errors at Startup of http Task	426
15.13	Lotus Notes Clients Freezing	427

Appendix A. Using UNIX's vi Editor	429
Appendix B. Special Notices	431
Appendix C. Related Publications	433
C.1 International Technical Support Organization Publications	433
C.2 Redbooks on CD-ROMs	433
C.3 Other Publications	434
How to Get ITSO Redbooks	435
How IBM Employees Can Get ITSO Redbooks	435
How Customers Can Get ITSO Redbooks	436
IBM Redbook Order Form	437
List of Abbreviations	439
Index	441
ITSO Redbook Evaluation	451

Figures

1. Lotus Domino Servers and Notes Workstations Environment in Our Lab	22
2. Isvg rootvg (Free Space: 1140 megabytes = 4 x 285)	25
3. Add a Volume Group Screen	25
4. Add a Logical Volume Screen for Entering Volume Group Name	26
5. Add a Logical Volume Screen	27
6. Add a Logical Volume Screen to Enter Volume Group Name	28
7. Add a Logical Volume Screen	28
8. Add a Journaled File System on a Previously Defined Logical Volume.	29
9. Add a Standard Journaled File System Screen	30
10. Add a Journaled File System on a Previously Defined Logical Volume.	31
11. Add a Standard Journaled File System Screen	31
12. Minimum TCP/IP Configuration for Token Ring Sample	33
13. NetWare NPSConfig File	35
14. Installation Welcome Screen	36
15. Lotus Domino Server Installation Welcome Screen.	37
16. Lotus Notes Software Agreement	38
17. Acceptance of the Terms of the License Agreement	39
18. Install Lotus Domino Server or Workstation Screen	39
19. Install Lotus Domino Advanced Services Screen	40
20. Lotus Domino Advanced Services Installation License Verification Screen . .	40
21. Lotus Domino Advanced Services License Acceptance Screen	41
22. Sun Solaris Server Installation Question	41
23. Install the Optional Online Documentation.	42
24. Install the Software for Use on the Destination Host Screen	43
25. Install on One Computer Screen	43
26. Destination Host Name for the Installation Code	44
27. Default Destination Path for the Installation Code	44
28. Destination Path for the Installation Code	45
29. Current Destination Path Screen	45
30. Specifying the Installation Owner.	46
31. Specifying the Group ID for the Installed Software	46
32. Interview Completion Screen	47
33. Validate Configuration Settings	47
34. Configuration Settings Validated Successfully.	48
35. Installation Completed Successfully.	49
36. Hostlist File: /tmp/notes_install_hostlist	49
37. Install to More Than One Computer.	50
38. Specifying the Hostlist File	51
39. Editing the Hostlist File.	51
40. Lotus Notes Setup Warning Screen.	52
41. First Setup Screen for Lotus Domino Server with Advanced Services	53
42. First Setup Screen for Lotus Domino Server without Advanced Services	54
43. End Setup Screen for AIX	55
44. Starting Lotus Notes.	57
45. First Setup Screen	58
46. Second Setup Screen	59
47. Third Setup Screen	60
48. Fourth Setup Screen	61
49. Host File /etc/hosts.	62
50. Edit Screen (for Making Changes).	62

51. Fourth Setup Screen (Updated)	63
52. Time Zone Setup Screen	63
53. Congratulations!	64
54. Password Verification Screen	65
55. First Setup Screen for Additional Server	66
56. Second Setup Screen for Additional Server	67
57. Third Setup Screen for Additional Server	68
58. Fourth Setup Screen for Additional Server	69
59. Proxy Server Configuration	70
60. Entry Screen for Server's ID Filename	71
61. Congratulations!	72
62. Select Additional Network Protocol	73
63. Network Configuration Screen	74
64. Isvg rootvg (Free Space: 1140 megabytes = 4 x 285)	75
65. Add a Volume Group on the Workstation Screen	76
66. Add a Logical Volume on the Workstation Volume Group Name Screen	77
67. Add a Logical Volume on the Workstation Screen	78
68. Add a Logical Volume on the Workstation to Enter Volume Group Name	79
69. Add a Logical Volume on the Workstation Screen	79
70. Add a Journaled File System on the Workstation	80
71. Add a Standard Journaled File System on the Workstation Screen	81
72. Add a Journaled File System on the Previously Defined Logical Volume.	82
73. Add a Standard Journaled File System on the Workstation Screen	82
74. Warning message screen	85
75. Lotus Notes Setup Screen	86
76. Information Screen	87
77. Lotus Notes Setup Status Screen	87
78. Starting Lotus Notes	88
79. Notes Workstation Configuration Screen	89
80. Network Workstation Setup Screen	89
81. User Password Entry Screen	90
82. Time Zone Setup Screen	91
83. Setup Complete	91
84. Notes Workstation Configuration Screen	92
85. User ID Entry Screen	93
86. Server Administration	97
87. Register Person	98
88. Register Person - Basics.	99
89. Register Person - Mail.	100
90. Register Person - Other	101
91. Choose Text File with Person Information	106
92. Register People from Text File - Basics	106
93. Register People from Text File - Mail	107
94. Register People from Text File - Other	108
95. Shell Script to Convert a UNIX Password File	109
96. UNIX Password File	109
97. Lotus Notes Input File to Register Users	109
98. Register Servers	114
99. Register Servers - Basics	114
100. Register Servers - Other.	115
101. Access Control List.	117
102. Add User.	117
103. Names	118

104.New Server Connection for Mail Routing.	123
105.Lotus Notes - Connection Document in Name & Address Book	125
106.Mail Routing Connection Document for Second Server	126
107.Choose ID File to Examine	127
108.Enter Password	128
109.User ID Management Screen	128
110.Name of the Safe Copy ID File	129
111.Choose Certifier ID Screen	129
112.Choose ID to Cross-Certify Screen	130
113.Cross Certify	130
114.Lotus Notes - New LAN Connection (for Replication)	132
115.Lotus Notes - New Group	133
116.Updating Server Document for Replication Authorization	134
117.Creating a New Replica of a Database	135
118.Advanced Settings for Replication.	137
119.Replicate Selected Fields	138
120.Selecting a Subset of Documents by Formula.	139
121.Replications Settings - Dialog Box.	140
122.Replica ID	141
123.Running the Lotus Domino Server in Background.	144
124.Script to Configure Automatic Start Up (configure.alog)	148
125.Script to Start Up a Lotus Domino Server (startup.alog)	149
126.Show an Alog File	149
127.Change / Show Characteristics of an Alog File	150
128.Lotus Notes - Administration	151
129.Remote Server Console	152
130.Server Response.	152
131.Lotus Domino Server Unix Host	156
132.Lotus Notes Client UNIX Host	157
133.Distributing the Lotus Notes AIX Installation Kit	158
134.Add a Journaled File System.	159
135.Add a Directory to Exports List	160
136.Distributing the Lotus Software Directory	161
137.Distributing the Lotus Domino Software Directory from a Server	162
138.Add a Journaled File System.	163
139.Installation Script Configuration Summary.	164
140.Add a Directory to Exports List	165
141.Add a File System for Mounting.	166
142.Distributing the Clients Data Directories	167
143.smitty's Add a Local Print Queue.	171
144.smitty's Select Printer Type	172
145.smitty's Printer Type	172
146.smitty's Printer Support Not Installed.	173
147.smitty's Printer Type and Interface	174
148.smitty's Parent Adapter	174
149.smitty's Add a Print Queue	175
150.Output of Command Ipstat.	175
151.Output of Ipstat on Remote Host	176
152.smitty's Add a Remote Print Queue.	176
153.smitty's Add a Print Queue	177
154.smitty's Add a Print Queue	177
155.Output of Command Ipstat on Local Host	178
156.File -> Print	178

157.Printer Setup	179
158.Choosing a Port	179
159.Add Printer	180
160.Define New Port	180
161.Select Port to be Edited	181
162.Remove a Printer Queue	181
163.Add Printer	182
164.Remove Selected Printer	182
165.Save/Apply Printer	183
166.smitty's Change User Characteristics of User notes	184
167.Output of Command Ipstat with Running Print Jobs	184
168.Xpdefaults File	186
169.Encrypting a Local Database	191
170.Not Authorized Message for Locally Encrypted Database	191
171.User Preferences ECL	192
172.Encrypting Outgoing and Saved Mail	194
173.Encrypting Incoming Mail	195
174.Delivery Options for Lotus Notes Memo	196
175.Server Document in Edit Mode	198
176.Restricted Access to Server - Error Message	199
177.Edit ID File Password List - Completed	201
178.Server Certificate Administration Navigator Screen	204
179.Create Key Ring	205
180.Creating a Server Certificate Request	206
181.Password Prompt	207
182.Install Trusted Root Certificate	207
183.Merge Certification into Key Ring	208
184.Server Document - Port and Security Configuration Section	210
185.Lotus Domino Server Components	219
186.List of Server Documents	220
187.HTTP Settings: Basics and Mapping	222
188.HTTP Settings: Cache	223
189.HTTP Settings: Logging	223
190.HTTP Settings: Timeouts, Character Set, and Conversion/Display	224
191.SSL Settings in Server Document	225
192.Internet Port Configuration for HTTP in Server Document	226
193.Sample Web Browser Connection to a Lotus Domino Server	229
194.ACL with User Anonymous	230
195.Disabling Anonymous Users from Accessing the Server	231
196.Disabling Anonymous Users from Accessing the Server	231
197.Server Certificate Database	232
198.Create Key Ring Selection	232
199.Self-Certified Certificate	233
200.New Site Certificate Screen	234
201.SSL Secured Browser	235
202.Network Setup	236
203.HTTP Server Settings for Virtual Server	237
204.Internet Port and Security Settings for Virtual Server	237
205.Creation of Database domcfg.nsf	237
206.Virtual Server Administration Database	238
207.Creating Documents in the Virtual Server Database	238
208.Virtual Server Definition	239
209.Redirecting a URL on a Virtual Server	239

210.Resulting Virtual Server View	240
211.Resulting URL Redirections View	240
212.Result for the First Virtual Server.	241
213.Result for the Second Virtual Server	241
214.Result for the Third Virtual Server	242
215.Settings for Location: Office (Local Navigator)	243
216.Proxy Settings for Personal Web Navigator	244
217.Smarticon: Go Up Level.	245
218.Personal Web Navigator Database View.	245
219.Web Ahead Agent Preferences	246
220.Database Purge Options	247
221.Page Minder Agent Preferences	248
222.Servers	250
223.Proxy Configuration	250
224.Web Retriever Management	251
225.ACL for Server Web Navigator Database	252
226.Server Web Navigator Administration Form	253
227.Agent Manager	254
228.Nighttime Parameters	255
229.Refresh Agent Schedule	256
230.Client Location Document for Using Server Web Navigator	258
231.Server Web Navigator Database Icon.	258
232.Server Web Navigator View.	259
233.Lotus Domino Web Administration Example: Server Disk Space	261
234.Lotus Domino Web Administration Example: Server Disk Space	262
235.Lotus Domino Web Administration Example: Mail Monitor	263
236.Overview of How the SMTP MTA Works.	267
237.Foreign SMTP Domain	270
238.SMTP Connection Document	271
239.Internet Message Transfer Agent (SMTP MTA) (Screen 1 of 2)	274
240.Internet Message Transfer Agent (SMTP MTA) (Screen 2 of 2)	275
241.Global Domain Document	277
242.Netscape Navigator Setup (POP)	286
243.Netscape Navigator Setup, More Options... (POP)	286
244.Netscape Navigator Setup (IMAP).	288
245.Netscape Navigator Setup, More Options... (IMAP)	288
246.Create a New Newsgroup Database.	291
247.Edit the New Newsgroup Database Profile	292
248.Confirm or Deny Removal of Database.	293
249.Create a Server Connection for Accepting a Newsfeed	295
250.Create a Server Connection for a Push Newsfeed	297
251.Adding the Control Newsgroups to the Accept Newsfeed.	298
252.Netscape Navigator Groups Server Preferences	300
253.Connection to the Lotus Domino NNTP Server Using Netscape Navigator	301
254.Server Domain Configuration, LDAP Settings	304
255.The Default Global Domain Document	305
256.Creating a Full-Text Index for the Public Address Book	306
257.Add a New Directory Server to Netscape Navigator	308
258.Searching an LDAP Server Using Netscape Navigator.	309
259.smitty's TTY Screen.	310
260.smitty's Select the TTY Port Type	310
261.smitty's Select the Serial Adapter	310
262.Settings of the TTY	311

263.Command Status OK of Creating a TTY	312
264.Output of the Command ls -la /dev/tty0	312
265.Output of the Command ls -la /dev/cua1	312
266.User Preferences	313
267.User Preferences, Serial1 Selected	314
268.Additional Setup of Serial1	314
269.Edit Modem Command File	316
270.Show Status of Connection	317
271.X.PC Connection Established	319
272.Network Connection (TCP/IP, SPX/IPX) Active	319
273.Workstation Setup for DOS/Windows Client	319
274.Remote Workstation Setup.	320
275.Remote Workstation Setup Finished	320
276.Screen Lotus Notes - Workspace on the Client	321
277.smitty's PPP Screen	322
278.smitty's PPP Link Control Configuration Screen.	322
279.smitty's PPP Link Configuration Screen	323
280.PPP Link Configuration File /etc/ppp/lcp_config.	324
281.smitty's PPP IP Interfaces Screen	324
282.smitty's PPP IP Configuration.	324
283.PPP IP Configuration File (/etc/ppp/ip_conf)	325
284.Domino Advanced Server Environment with Unique IP Addresses	328
285.Server\Servers View.	330
286.Session Billing	348
287.Database Billing: Open and Close	348
288.Replication Billing	349
289.Mail Billing	349
290.Agent Billing	350
291.HTTP Request Billing	350
292.Simple Script to Make the Lotus Notes Backup (backtape)	364
293.Crontab for the backtape Script	364
294.Lines To Be Removed	365
295.Lines To Be Added.	366
296.Restoring the names.nsf File	368
297.Back Up the System	369
298.Modified Script to Back Up on Files (backfile)	376
299.Mount the Remote /backup File System Using smitty	377
300.Crontab for the backtape Script	377
301.Script to Dump Backup Files to Tape (dumpfiles)	378
302.Crontab for the dumpfiles Script	378
303.The /.rhosts File for the Tape Server noteserv	379
304.Script to Back Up Several Hosts (backhosts).	381
305./.rhosts File for the Clients	381
306.Crontab for the backtape Script	381
307.Performance Monitoring Flowchart.	385
308.smitty's Add a Volume Group	404
309.smitty's Add a Logical Volume	405
310.smitty's Add a Logical Volume (Continued)	406
311.smitty's Add a New File System Log File	408
312.lsvg -l datavg	409
313.smitty's Add a Volume Group for Disk Striping.	410
314.smitty's Add a Logical Volume for Disk Striping	410
315.smitty's Add a Logical Volume for Disk Striping (Continued)	411

316.Sample Process Screen	419
317.Output of ipcs Command	419
318.Removing of IPC Resources	420
319.Clean Lotus Notes Processes Script - killnotes	420
320.Change/Show Characteristics of a Paging Space	422
321.List Paging Space	422
322.New Server Connection	424
323.Host Names Line	424
324.HTTP Server Basics	426

Tables

1. Available Platforms for Release 4.6	14
2. Patches for AIX V4.1.4	15
3. Patches for AIX V4.1.5	16
4. Patches for AIX V4.2.1	17
5. Patches for AIX V4.3	18
6. Patches for AIX V4.3.1	18
7. AIX PTFs for SPX Support Data Directories	19
8. AIX Connections PTFs for SPX Support	19
9. Disk Space Requirements	23
10. Changes That Will Replicate	142
11. Netscape Navigator Mail and News Preferences (POP)	285
12. Netscape Navigator Mail and News Preferences (IMAP)	287
13. NNTP Control Messages and Corresponding Newsgroups	298
14. Name and Description as Shown in the log.nsf Database	317
15. Lotus Domino Partitioned Server and User Accounts	339
16. Selection of Technology for Availability	354
17. Backup Schedule and Tape Labels	365
18. Client and Server Names	423
19. Useful vi Commands	429

Preface

This redbook is unique in its detailed coverage of Lotus Domino Server Release 4.6 on an RS/6000 AIX operating system platform. Both Lotus Domino Server and Notes Workstations are functionally platform independent; that is, they will look the same to the end user and perform most of the same functions regardless of platform. Clearly, however, there are differences in the underlying operating systems' platforms.

This redbook examines, in detail, the installation and administration of Lotus Domino Server Release 4.6 in the RS/6000 AIX operating system environment. We have also documented AIX functions, commands, and scripts which can greatly help the administrator who is new to the AIX or UNIX world.

This redbook is intended to help the technical professional to install and administer Lotus Domino Server installations where one or more of the Lotus Domino Servers is running on an RS/6000 AIX operating system platform. It also covers administration tasks, security, printers, and performance considerations that support personnel will find informative.

This redbook should make you feel confident in implementing a successful installation of Lotus Domino Servers and Notes Workstations on the RS/6000 AIX operating system.

The Team That Wrote This Redbook

This redbook was produced by a team of specialists from around the world working at the International Technical Support Organization, Austin Center.

Andy Hoetzel is an International Technical Support Specialist for RS/6000, RS/6000 Performance, and Lotus Domino on RS/6000 at the International Technical Support Organization, Austin Center. He writes extensively and teaches IBM classes worldwide on all areas of AIX internals, performance, and tuning as well as Lotus Domino. Andy holds a Master of Science degree in computer science from the University of Texas at El Paso. Before joining the ITSO, Andy worked in the AIX Competence Center in Munich, Germany as an AIX Technical Support Specialist.

Alison Smyth is a Lotus Domino Consultant at Braegen Group Inc., an IBM Premier Partner, in Canada. She has two years experience in Lotus Domino on the IBM RS/6000 and is currently enrolled in a Business Degree program at Ryerson Polytechnic University in Toronto. Her other areas of expertise include AIX System Administrator and Training.

Sanjay Kapur is a Technical Manager in IBM, India. He has over 10 years of experience in Unix and Relational Database System administration. He has been in IBM for three years and has been working on Lotus Domino on AIX since 1997. His other areas of expertise include AIX system management, performance tuning, and HACMP.

Hans-Juergen Kunde is an Advisory Systems Engineer and Business Partner Technical Manager in Germany. He has been with IBM for 11 years and has six years of experience with RS/6000 and AIX. Hans-Juergen is involved with Lotus

Domino on AIX since 1996. His areas of expertise include Internet and PC connectivity, systems management, and sizing of RS/6000 systems for Lotus Domino and Internet solutions as well as teaching workshops on these topics.

Andreas Stenmark is a UNIX Systems Specialist at Alfaskop in Sweden. He has six years of experience in UNIX and relational database system administration on various versions of UNIX, including AIX, HP-UX, and Solaris. His areas of expertise include Internet connectivity solutions on UNIX platforms. He is also a skilled software developer experienced in writing software on UNIX and Windows platforms.

The authors of the second edition of this redbook were:

Dr. Axel Tanner
IBM Switzerland

Peter Hope
IBM United Kingdom

The authors of the first edition of this redbook were:

Thomas W. Hinkel
IBM Austria

Jose Augusto Antonio de Azeredo Reguera
IBM Brazil

Sardar Jafari-Langroudi
IBM United Kingdom

The advisor of the first and second edition of this redbook was:

Joanne Jamison Luedtke
International Technical Support Organization, Austin Center

Thanks to the following people for their invaluable contributions to this project:

Bob Minns
IBM Austin, Texas

Christer Palm
IBM Sweden

Special thanks to the editors for their help in finalizing the text and publishing the redbook:

Elizabeth Barnes
Marcus Brewer
Tara Campbell

Comments Welcome

Your comments are important to us!

We want our redbooks to be as helpful as possible. Please send us your comments about this or other redbooks in one of the following ways:

- Fax the evaluation form found in “ITSO Redbook Evaluation” on page 451 to the fax number shown on the form.
- Use the electronic evaluation form found on the Redbooks Web sites:
 - For Internet users <http://www.redbooks.ibm.com>
 - For IBM Intranet users <http://w3.itso.ibm.com>
- Send us a note at the following address:
redbook@us.ibm.com

Chapter 1. Introduction

This redbook should help with installing and administering a Lotus Domino Server on an AIX platform with clients using different operating system platforms. This publication will discuss our experiences working with Lotus Domino Server Release 4.6 and Notes Workstation Release 4.6 software.

In this chapter, we will briefly explain the functions of Lotus Domino Server Release 4.6 and Lotus Client Release 4.6. The hardware and software used to write this redbook is also described.

1.1 What is Lotus Domino Server and Notes Workstation?

Lotus Domino Server and Notes Workstation is a client/server environment that allows users (or clients) to communicate securely over a local area network or telecommunications link, and create and/or access documents residing on a shared computer (or server). With Lotus Domino Server and Notes Workstation, people can work together regardless of their software or hardware platform or technical, organizational, or geographical boundaries.

Notes Workstation combines an application development environment, a document database and a sophisticated messaging system, giving you the power to create custom applications for improving the quality of everyday business processes in areas such as product development, customer service, sales and account management. At its most basic level, Notes Workstation is a document database, serving as a repository for both textual and other information, for example, images, presentations, and spreadsheets. Lotus Domino Server and Notes Workstation provide the ability to distribute this information throughout an enterprise via replication - yet only those who need to see the information have access to it. In short, the intent is to improve *Communication, Coordination and Collaboration* across any enterprise.

Two primary components compose this solution:

- Lotus Domino Server
 - Provides services to Notes Workstation users and other Lotus Domino servers, including storage and replication of shared databases and mail routing. The Lotus Domino Server can run on PCs under OS/2, Windows NT. It can also run as a NetWare Loadable Modules (NLM), or under UNIX systems, such as IBM AIX, HP-UX and Sun Solaris.
 - TCP/IP (Transmission Control Protocol/Internet Protocol), IPX/SPX (Internetwork Packet eXchange/Sequenced Packet eXchange), IMAP (Internet Message Access Protocol), LDAP (Lightweight Directory Access Protocol), NNTP (News Network Transfer Protocol), HTTP (Hyper Text Transfer Protocol), POP3 (Post Office Protocol), SSL (Secure Socket Layer), and SMTP/MIME MTA (Simple Mail Transfer Protocol) network protocols are supported for Lotus Domino Server Release 4.6 running on AIX.
- Notes Workstation
 - Communicates with one or more Lotus Domino Servers, providing the interface that allows a Lotus Notes user to access shared databases and to read and send mail. The Notes Workstation can run under OS/2, Windows

95, Apple's System 7 and on UNIX graphical workstations such as Xstations.

Shared databases exist on Lotus Domino Servers. Users place icons representing individual databases (for example, the mail file, bulletin boards, and documentation databases) on their workstations in their individual workspaces. By selecting an icon, a user can open a database to perform such actions as accessing an existing document or creating a new document. Users also can maintain local (non-shared) databases and replicate these databases so that users always have access to the latest version of a document. Replication is the process of synchronizing multiple copies of a database so the information is the same on multiple servers.

1.2 What's New in Lotus Domino Server and Notes Client R4.6?

Lotus has continually enhanced the Notes and Domino products over the past year. The 4.6 Release of Lotus Domino adds many new features, and now supports many industry standards for networking protocols, e-mail and the Web.

1.2.1 Administration

Use the Administration Process to complete the following administrative tasks:

- Server setup and administration.
- Browser-based administration tool.
- Enhanced NT integration.
- New protocol support.
- Create mail files during setup.
- Upgrade users and servers to hierarchical naming.
- Rename users.
- Recertify users and servers.
- Delete users, servers, and groups.
- Add resources to and delete them from the Public Address Book when these actions are initiated in the Resource Reservations database.
- Set the Master Address Book field in the Public Address Book to enable directory assistance.
- Create replicas of multiple databases.
- Enable password checking during authentication.
- Add servers and remove servers to and from a cluster.
- Move databases from a cluster server.
- Create search site databases that allow users to search multiple databases for information.
- At the remote server console, select from a list of commands to run and display the remote server response live.
- Include default databases and Internet security settings in a User Setup Profile.
- Use the Collector, a new task, to collect statistics for multiple servers, the Collector task needs to run only on the collecting server.

The Administration Process can only complete these tasks if the IDs in your organization are hierarchical.

In addition to these tasks that you initiate, the Administration Process also automatically copies a server's public key to its server record when you start the

server if the public key is not already there. It also places the servers build number in the Server Document. The Administration Process can do these two tasks in a flat or hierarchical environment.

1.2.2 Performance Features

- Release 4.6 supports partitioned servers on UNIX and Windows NT operating systems.
- Graphic translations from .GIF (Graphical Interchange Format) to .JPEG (Joint Photographic Experts Group).

1.2.3 Internet Features

- Integrated SMTP/MIME MTA
- Native IMAP Mail Protocol Support
- Native LDAP Directory Protocol Support
- Native NNTP Internet News Protocol Support
- SSL 3.0 Internet Security Protocol Support
- HTML Support
- Support for HTTP version 1.1
- New templates:
 - Web mail NNTP discussion
 - Document library -- Notes & Web
- Lotus Domino and Notes include support for the CAPI-compliant native port driver for the ISDN communication standard.

1.2.4 Mail, Calendar, & Scheduling

- Quickly send a message, address a meeting invitation, or launch a Web page from a user's contact list.
- New Calendar entry which creates a new calendar entry which contains the full text of the e-mail.

1.2.5 Advanced Server Features

Server Failover	Lotus Domino clusters provide failover protection for business-critical applications and servers.
Dynamic Load Balancing	Lotus Domino server workload balancing ensures that heavily used servers are able to pass requests to other servers and that work is evenly distributed across the cluster.
Server Partitioning	Server Partitioning allows multiple servers to be hosted on a single machine.
Billing Services	Usage tracking and billing allows customers to track, compile, and analyze system usage.

1.2.6 Application Development

- Powerful Notes objects, such as Navigators and Views, available to Web browsers through menu choices.
- Added support for multiple buttons on a page and ability to use images as buttons.
- Support for circular hotspots in Navigator design.

- Added database property to force Web users to use Secure Socket Layer.
- Customizable default information/message text box.
- Preview pages using leading Web browsers.
- Menu options to insert HTML code into pages.
- Computed text creation of on-the-fly content.
- Insert HTML Anchor links and Horizontal rules.
- Import graphics as page background.
- Optionally treat view and page results as pure HTML.
- Set HTML attributes for pages and fields.
- Support for Java 1.1 virtual machine.
- Develop capability to run Java agents on the server.
- A Java application programming interface to the Lotus Domino Object Services.
- Lotus Notes Designer for Domino is a design client for developing Lotus Domino applications.
- Notes Global Designer offers these benefits:
 - Makes it easier to customize applications for specific countries or languages.
 - Minimizes localization costs and time frames by separating the development and translation processes.
 - Lets users deploy Lotus Domino applications simultaneously worldwide in users' native languages.
 - Gives multilingual users a choice of the language they want to work in.
 - Enables maintenance of multiple language versions of applications with virtually no additional overhead.

1.2.7 Database Management Features

- Bi-directional replication automatically distributes and synchronizes information and applications across geographically dispersed sites.

1.2.8 Document Authoring Features

- A simple checkbox to hide design elements, and even text, depending on which client is accessing the application.
- A designer can specify different behaviors on a database open for Web and Notes users.
- Preview pages using a Notes client or leading Web browsers.
- Over 20 new LotusScript classes, events, and enhancements.

1.2.9 Ease-of-Use Features

- New database template designs including:
 - Discussion 4.6 for Web and Notes
 - Doc Library 4.6 for Web and Notes
 - Domino Samples: Registration
 - Domino Samples: FAQ
 - Domino Samples: Web Pages
 - Domino Samples: Sites 1-3
 - Domino Samples: Frames Template
 - Quick Start guide to a Web site
- Enhanced Lotus SmartSuite and Microsoft Office integration.
- Create mail with an alternate editor, such as MS Word or Lotus Word Pro.

- New contact Management features make using the Personal Address Book even easier.
- Business card view shows all contact information at a glance.
- Dynamic editing of Contact forms allows customized data entry.

1.2.10 Mail And Calendar Features

- "Time Savers" options that help users quickly act on email.
 - Copy into a new calendar entry.
 - Add a new task to a to-do list.
 - Create a new group name.
- Group list using the members of the e-mail To: and cc: fields.

1.2.11 Internet and Network Features

- Users can access and explore the Web using the browser of their choice.
- Release 4.6 enables users to manage the volume of Web pages that are stored locally for off-line access.
- All previously existing Netscape Navigator or Microsoft Internet Explorer bookmarks can be easily imported into the Notes 4.6 Web Navigator for use from within Notes.
- Both Lotus Domino 4.6 server and Notes 4.6 client include a CAPI (Common ISDN Application Programming Interface)-compliant native port driver for the integrated-services digital network (ISDN) communication standard.
 - Higher speed bandwidth than analog modem based solutions
 - Reliable end to end digital transmission
 - Quick connect times to better support LAN and TCP/IP protocols
 - Interpretability with other WAN (wide area network) services, such as X.25
 - Cost-effective solutions to private leased lines

1.2.12 Security Features

- Securely share and route documents created with suite documents using built in workflow.
- SSL 3.0 Internet Security Protocol Support.
- User authentication.
- Digital Signatures.
- Flexible access control and encryption.
- Enables users to extend intranet applications to customers and Business Partners.

1.3 What's New in Lotus Domino Server and Notes Workstation R4.5?

After the very significant changes between Notes Release 3 and Notes Release 4.1.x, Lotus again presents many new features with its Lotus Domino Server Release 4.5 and Notes Workstation Release 4.5, which are summarized in the following sections.

1.3.1 Administration

Use the Administration Process to complete the following administrative tasks:

- Create mail files during setup.

- Delete mail files when you delete users.
- Add scheduling resources to and delete them from the Public Address Book.
- Enable directory assistance on servers.
- Create replicas of multiple databases.
- Enable password checking during authentication.
- Add servers to and remove them from clusters.
- Move databases from clusters.
- Create search site databases that allow users to search multiple databases for information.
- At the remote server console, select from a list of commands to run and display the remote server response live.
- Include default databases and Internet security settings in a User Setup Profile.
- Use the Collector, a new task, to collect statistics for multiple servers; the Collector task needs to run only on the collecting server.

1.3.2 Performance Features

Many of the performance improvements are directly applicable to running and administering multiple Lotus Domino Servers:

- Create clusters of servers; so if one server is unavailable, users can automatically access a replica of a database on another server.
- Use a database cache to allow quicker database access.
- Use a mail delivery thread, separate from the Mail Router thread, that is dedicated to delivering mail on a server.
- Set up additional threads for the Administration Process.

1.3.3 Security Features

- Improve database security by encrypting documents with users' public encryption keys; for example encrypt a remote LAN service Connection document with administrators' public encryption keys so that only administrators can access the document and see the remote server password
- Set an Execution Control List (ECL) through the User Preferences dialog box to limit the actions of other users' formulas or scripts that are run on the workstation
- Use an Administration ECL to set a default ECL for user workstations
- Enable or disable local enforcement of access control lists on multiple databases
- Check for correct passwords during authentication, and optionally require password changes at specified intervals, and lock out IDs that may be compromised

1.3.4 Database Maintenance Features

- Use the new Database Tools option in the administration control panel to manage several databases at once. You can add servers to and remove servers from clusters, select administration servers for databases, enforce a consistent access control list across replicas, create multiple replicas of databases, move databases from a cluster server, enable databases for multi-database searching, use a Notes ID to troubleshoot document problems, and enable and disable replication of databases.

- Create directories and links from within Notes.
- Limit the size of full text indexes by limiting the number of numeric and date fields that are full text indexed in each database on a server or by specifying which numeric and date fields are full text indexed in a specific database.

1.3.5 Internet Features

- Improved browser supporting HTML 3.
- Lotus Domino Web Server.
- Set up a Lotus Domino Server as an HTTP server and allow Web users to access Notes databases on the Lotus Domino Server.
- Allow users to access the World Wide Web directly from Notes using the InterNotes Web Navigator.
- Set up Internet connections to Lotus Domino Servers using the HTTP or SOCKS proxy protocol.
- Set up a Notes POP3 server as a mail drop for POP3-compliant clients such as Netscape Navigator, Eudora Pro, and Microsoft Internet Explorer.

1.3.6 Mail, Calendar, & Scheduling

- Upgrade users' mail files to use the new mail template, which allows users to schedule appointments as well as track other time-dependent events.
- Receive a message when upgrading users' mail databases and workstations with the Upgrade Notification form in the Public Address Book that confirms the upgrade completed successfully.
- Use the directory assistance feature, which uses a Master Address Book to let users easily address mail to users in multiple domains.
- Automatically use a mail delivery thread, separate from the Mail Router thread, that is dedicated to delivering mail on a server.
- Use the Free Time system to let users check the free time of others they invite to meetings.
- Set up a Resource Reservations database to make available meeting resources, such as rooms and equipment.

1.3.7 Advanced Server Features

If you install the Lotus Notes Advanced Server license, you can now:

- Create a cluster of servers; so if a server in the cluster is unavailable or being heavily used, users can automatically access replicas of its databases on another server in the cluster.
- Set up a partitioned server to run multiple Lotus Domino Servers on one computer.
- Use the Billing server task to track specific Notes activities for billing.

1.3.8 Application Development

Many of these new features also correspond to enhancements of the Notes client visible to the application developer and the end user. A short summary is presented here. Application developers can now:

- Specify a database to open when Notes launches.
- Display the preview pane and determine its location when users first open the database.
- Determine whether Notes updates About and Using documents and the database icons when you refresh or replace the database design.

- Encrypt documents with someone's public encryption key, which allows you to secure information in a document without distributing private encryption keys.
- Allow users with No Access or Depositor access to read documents that use a selected form or that appear in a selected view or folder in a database.
- Allow users with No Access or Depositor access to create and modify documents that use a selected form in a database.
- Use bitmaps as the background of a form.
- Use the new date and time pop-ups in Date and Time fields in a layout region.
- Use new Notes LotusScript classes, for example, NotesUIView and NotesTimer.
- Use new @functions and @commands, for example, @CheckAlarms and FindFreeTimeDialog.
- Run LotusScript agents from other agents.
- Change the color and font of text in the programming pane.
- Create script libraries, which let you easily reuse LotusScript programs in multiple programmable objects in a database
- Perform operations on all documents in a database by attaching a formula or script to a database-level event.

1.3.9 Database Management Features

- Create selective replication formulas for fields in a form, which lets you replicate the contents of only the fields you specify instead of all fields.
- Allow only people with Manager and Designer access to view user activity in a database, people with Reader, Author, and Editor access cannot view user activity.
- Create views that allow the Administration Process to update user and server names in the fields displayed in the view.
- Quickly load images stored in documents by displaying information as Notes receives the information.

1.3.10 Document Authoring Features

- Use special effects on text in a document, for example, use shadowed or embossed text.
- Use new table border styles and change the background color of cells in a table merge and split cells in tables.
- Embed Lotus Components or other OLE custom controls in documents.

1.3.11 Ease-of-Use Features

- Detach all attachments in a document without highlighting each attachment.
- Single click doclinks and hotspots in documents.
- Automatically open a database you specify when you start Notes.
- Specify a user ID for a location.
- Create a full text index to search for information in multiple databases simultaneously.
- You can set up a multi-database full text index on a server that others can use or on a workstation for your personal use.
- Use the search bar to enter URLs for Web sites.
- Use a hunt group Connection document to access a group of passthru servers using one telephone number.
- You can also create a name for the hunt group so you can specify the name in Passthru Connection documents.

1.3.12 Mail and Calendar Features

- Create an appointment, event, or anniversary and store it in your calendar.
- Set an alarm to remind you when the appointment, event, or anniversary occurs.
- Schedule meetings and invite others to these meetings.
- Respond to meeting invitations.
- Schedule meetings and invite others to these meetings even when disconnected from a Lotus Domino server.

1.3.13 Internet and Network Features

- Use the Web browser to store Web pages in a local Web Navigator database in addition to Web Navigator databases on the server.
- Improved browser supporting HTML 3.
- Use the search bar to enter URLs for Web sites.
- Use Web Ahead to follow links automatically on a Web page.
- Use Page Minder to keep track of changes to Web pages.
- Use a Web Tour.

1.3.14 Security Features

- Secure your workstation from potential problems by specifying who can run programs embedded in applications on your workstation.
- Control the level of access that hosts running Java applets are allowed on your workstation.
- Access an Internet server that uses the Secure Socket Layer.
- Determine whether people can store forms in documents in a database.
- Allowing the use of stored forms in documents can result in security problems.
- Assign access levels to non-Notes users who gain access to a database, for example, using a Web browser.
- Allow users with No Access or Depositor access to read, create, and modify documents in a database.

1.4 What's New in Lotus Notes Release 4?

With Release 4 of Notes, Lotus had several goals. The new release contains enhancements to address the needs of many groups involved with Lotus Notes, including users, administrators, application developers, and managers. Specifically, the intent was to improve the user's satisfaction by lessening the complexity, making the system more intuitive and improving the mail interface and mobility support aspects. Another goal was to increase the value of Notes applications by providing more design capabilities and easier design facilities. The cost of ownership has been lowered by improving the scalability and robustness, while lessening the requirements for training, support, and administration.

There are many new features available in Notes Release 4. The workstation enhancements in Lotus Notes are significant in this release. They include a major redesign of the user interface, expanded capabilities for mobile users and the powerful LotusScript language.

This redbook will describe the installation, configuration, and administration scenario for Lotus Notes Release 4 in a UNIX environment, specifically IBM's version of UNIX, AIX. We used the Lotus Domino Server for AIX product and also

installed Notes Workstations for AIX, OS/2 Warp, and DOS/Windows 3.11. Please see *Lotus Notes Release 4 in a Multiplatform Environment*, SG24-4649, for more information on installing and administering Lotus Notes across a wide variety of operating system platforms.

In the next few sections, we list the new features that Lotus has incorporated into Release 4 and, where appropriate, explain how to access these functions.

1.4.1 Ease-of-Use Features

Lotus Notes Release 4 offers numerous *ease-of-use* features, including the ability to:

- Update user preferences from a single dialog box. Choose **File -> Tools -> User Preferences**.
- Preview a document in the preview pane. Choose **View -> Document Preview**.
- Mark documents as read when you preview them. Choose **File -> Tools -> User Preferences...** to display the User Preferences dialog box and then check **Mark documents read when opened in preview pane** in the Advanced options section.
- Use the InfoBox (usually fully qualified with the Notes entity, for example, Database Properties or Text Properties InfoBox) to obtain and change information on just about anything. For example, to view the properties of a document, right-click in the document and click on **Document Properties**.
- Change or view more settings from the status bar:
 - See a list of recent messages issued by Notes.
 - See your level of access to a selected or open database.
 - See your current location and change your location if required.
 - Use a pop-up menu for selecting certain mail tasks.
- If using Windows or UNIX, hide the horizontal scrolling bar to display more information in the view or preview panes. Choose **View -> Show -> Horizontal Scroll Bar**.
- Double-click on a document in view mode to enter edit mode.
- Use permanent pen to add comments to a document in a different color. Choose **Text -> Permanent Pen**.
- Click on column headings to resort the view according to that column, if you see an upward or downward triangle.
- Divide a view or a folder into panes (navigation, view, and preview) and specify the locations of the panes. Choose **View -> Arrange Preview...** to specify the locations.
- Resize columns by dragging their borders.
- Use private folders to store documents. Choose **Create -> Folder**.
- Switch views using the navigation pane.
- View an attached file in Notes even though you do not have the application to view it installed on your system.

1.4.2 Mail Features

The following mail features are new with Notes Release 4:

- Improved mail template with action bars and folders.
- A choice of many letterheads for your memos. Choose **Actions -> Mail Tools -> Choose Letterhead....**

- Create stationery for memos whose format and addressee list you want to use again. Choose **Action -> Mail Tools -> Create Stationery**.
- A more user-friendly method of addressing mail using the **Address...** button on the New Memo screen.
- Address memos using Notes' quick-addressing technology, where you start typing the name of the recipient, and Notes completes it for you if it can find the name in the Name and Address Book.
- The ability to assign and track tasks (To Do Lists) using Notes mail. Choose **Create -> Task**.
- Message creation that automatically includes a DocLink. Open the document for which you want to create the link and choose **Create -> Mail -> Special -> Bookmark**.
- The ability to let recipients of your memo know the mood you were in when you sent the memo using mood stamps. Click **Delivery Options...** prior to sending your memo.
- The ability to deter recipients from making public the content of your memo by having Notes disable the clipboard, printing and forwarding functions when the memo is delivered. Check **Prevent copying** from the Delivery Options dialog box.
- The ability to view a discussion thread in your mail database. Choose **Discussion Threads** from the Navigation pane.
- Senders can be added to your own Name and Address book either when you have a memo open, or when you have your mail database open. Select the memo(s) and choose **Actions -> Mail Tools -> Add Sender to Address Book**.
- The ability to instruct Notes to reply to memos when you are out of the office. Choose **Actions -> Mail Tools -> Out of Office...**
- Message archival from your mail database to a special database either on the server or on your own workstation. Click on **Archiving** from the Navigation pane and then click **Setup Archive**, if you have not already done so.

1.4.3 Mobile Features

Notes Release 4's new mobile features allow you to:

- Create "locations" which store communication settings for the specific environment(s) that you use, for example, office and home. You can then choose your location when you log on, and all the communication settings come into effect. Select your Address Book and choose **Create -> Location**.
- Call a passthru server and access multiple servers with the same phone call.
- Use Help Lite while you are travelling. It contains information more specific to the mobile user and takes up less disk space than the original Notes Help database.

1.4.4 Document Authoring Features

The following document authoring features are new with Notes Release 4:

- Add bullets to paragraphs. Highlight the text and choose **Text -> Bullets**.
- Add numbers to lists. Highlight the text and choose **Text -> Numbers**.
- Use the Text Properties InfoBox to change the form of text. Right-click on the highlighted text, and click **Text Properties**.
- Create sections so that readers of your memo/document can collapse and expand the text as they need. Choose **Create -> Section**.

- Create links to views and documents. Choose **Edit -> Copy As Link** while in the document that you want to link to. Then, in the document/memo that you want to make the reference in, choose **Edit -> Paste**.
- Create hotspots that either have pop-up text or take you to another link, perhaps in another database, or even on the Web. Choose **Create -> Hotspot** and then your choice of type of hotspot.
- Include a selected font in a named paragraph style. Highlight the text that you want to save as a style and choose **Text -> Text Properties**. Click on the **Style** tab and then **Create Style**.
- Assign named paragraph styles to a key and cycle through them. Highlight text and press F11 on your keyboard.
- Format one or more rows or columns of a table by selecting them individually.
- Display hidden characters. Choose **View -> Show -> Hidden Characters**.
- If you have an international version of Notes, you can check the spelling in more than one language. Choose **File -> Tools -> User Preferences... -> International** then click on **Spelling Dictionary**.

1.4.5 Network Features

Notes Release 4's new network features allow you to:

- Use the Web Navigator to browse the Web. See Chapter 9, "Lotus Domino and the World Wide Web" on page 217 for details.
- More easily access, monitor, set up, and change port configurations.
- Connect to a remote local area network service.
- Trace a network connection; so if you cannot make a connection, you can see where the problem lies.

1.4.6 Printing Features

Notes Release 4's new printing features allow you to:

- Specify a printer from the File Print dialog box. Choose **File -> Print** and then click **Printer**.
- Specify multi-line headers and footers. Obtain the InfoBox for the document or database and click on the **Printer** tab.
- Print a list of documents in a folder.

1.4.7 Replication Features

Notes Release 4's new replication features allow you to:

- Replicate selected folders and views without having to specify a formula. See 5.4, "Selective Replication" on page 136 for details.
- Replicate databases using the replicator page which makes it easier to replicate databases in the background. Click on the **Replicator** tab on your workspace.
- Shorten long incoming documents in a replica or remove old documents.
- Display replica icons as a single stacked icon. See 5.3.4, "Creating the Replica on the Spoke Server" on page 134 for further information.

1.4.8 Search Features

Notes Release 4's new search features allow you to:

- Search without indexing a database. Choose **View -> Search Bar**.
- Add conditions to a search without having to write a formula.

- Name and save search formulas.

1.4.9 Security Features

Notes Release 4's new security features allow you to:

- Keep local databases secure from unauthorized local or operating system access. Refer to 8.1.3, "Local Database Encryption" on page 190 for further information.
- Restrict who can read selected documents in a database. Display the Document Properties InfoBox (**Edit -> Properties...**) and click on the **Security** tab - the one with the key as its icon. Uncheck **All readers and above** and specify the names of the people to whom you want to give access.
- Create a new public key for your user ID and have Notes certify it.

1.4.10 Workspace Features

Notes Release 4's new workplace features allow you to:

- Add or remove workspace pages. Choose **Create -> Workspace Page** to create and press Delete on your keyboard to remove.
- Keep the workspace behind other windows while you work.
- Compact your workspace file, freeing up the space that is no longer used. Choose **Edit -> Properties...** when on your workspace page, then click on the **Information** tab. Click **% used**. If the value returned is less than 85 percent, then click **Compact**.
- Display the workspace in three dimensions. Choose **File -> Tools -> User Preferences...** then check **Textured Workspace** in the Advanced options section of the dialog box.

1.4.11 Application Development/Programming Features

The following programming/application development features are new with Notes Release 4. For further details on programming with Notes Release 4, refer to the redbook, *Developing Applications with Lotus Notes Release 4*, SG24-4618.

- Agents, which allow you to use more powerful and predefined actions, such as Move to folder or Send document.
- Forms and fields design features which allow you to:
 - Create forms with layout regions.
 - Display access-controlled sections in new ways.
 - Use subforms to store commonly used elements.
 - Write scripts which execute when an event happens.
 - Use new lookup features to generate lists for keywords, names, readers, and authors without writing formulas.
 - Allow author anonymity.
 - Control cursor location and field focus.
 - Design forms that open in edit mode.
 - Automatically merge replication conflicts into a single conflict document.
 - Test a form without leaving the design environment.
 - Create action bars in a form to automate user tasks in forms and subforms.
 - Create forms that display as dialog boxes.
- LotusScript, an object-oriented, cross-platform, BASIC-compatible language.
- New @functions such as @AllChildren and @URLOpen.
- Execution of @functions in the order that they appear.

- Open Database Connectivity (ODBC) options that allow access to non-Notes databases.

1.4.12 Database Management Features

Notes Release 4's new Management features allow you to:

- Analyze database statistics from one centralized location. Select the database and choose **Edit -> Properties**. Click on **User Activity**.
- Create databases that can reach a maximum size. You can choose specific values up to 4 GB. Users will not be able to add any more documents to the database once it reaches this size.
- Start background indexing; so you can create full text indexes in the background.

1.5 Available Platforms

The new release of Lotus Domino server elevates the standard for enterprise messaging, groupware, and Web application development servers. It is available on all Lotus Domino server platforms.

The following table is a summary of the various operating systems platforms that support Lotus Notes Release 4.6.

Table 1. Available Platforms for Release 4.6

Platform	Domino Server Release 4.6	Notes Workstation Release 4.6
UNIX (AIX V4.1.5, AIX V4.2, V4.3, HP-UX 10.01, Solaris 2.51, Solaris 2.6)	Yes	Yes
OS/2 Warp Server V4.0 (32-bit)	Yes	Yes
OS/2 Warp Server 4 - Entry, Warp Server 4 - Advanced, Warp Server 4 with SMP Feature	Yes	Yes
Windows 95	Yes	Yes
NetWare 4.1	Yes	Yes
Windows NT Server 4.0 and Windows NT Workstation 4.0	Yes	Yes
Macintosh System 7.5	Yes	Yes

1.5.1 AIX

Environment(s): AIX V4.1.4, V4.2, and V4.3

Workstation: Yes

Server: Yes

Network protocols available on Workstation:

- NetWare IPX/SPX
- TCP/IP
- X.PC (supplied with Lotus Notes software)

Network protocols available on Server:

- NetWare IPX/SPX
- TCP/IP
- X.PC (supplied with Lotus Notes software)

Disk Space:

- Installation or distribution directory: 200 MB minimum
- Server data directory: 50 MB minimum
- Workstation data directory: 40 MB minimum
- Swap Space: 256 MB minimum
- Additional databases and mail files: 300 MB minimum, 500 MB or greater recommended

Memory Requirements:

- Lotus Domino Server on AIX: 64 MB RAM minimum
128 MB or greater recommended
- Notes Workstation on AIX: 32 MB RAM minimum
64 MB or greater recommended

Patch Requirements:

Some of the base AIX V4.1 filesets must be updated to the following levels on AIX V4.1.4 to run Notes R4.6 for AIX. The PTF (program temporary fix) (U4xxxxx) numbers are provided as a reference when ordering these updates from your IBM Support Center. The updates can also be retrieved from the AIX Fixdist at <http://service.boulder.ibm.com/rs6000>

Table 2. Patches for AIX V4.1.4

Patch Number (APAR/PTF)	Synopsis	Version Number
IX55384/U441186	bos.adt.include	4.1.4.4
IX62509	bos.adt.prof	4.1.4.21
IX58507/U444415	bos.net.tcp.client	4.1.4.16
IX62509	bos.rte.libc	4.1.4.19
IX62509	bos.rte.libc	4.1.4.14
IX55384/U441121	bos.rte.streams	4.1.4.2
IX59142/U444061	bos.rte.tty	4.1.4.13
IX55837/U441583	bos.sysmgmt.serv_aid	4.1.4.5
IX60082/U444377	If installed, the following fileset needs to be updated to the indicated level bos.rte.up	4.1.4.17
IX60082/U444115	If installed, the following fileset needs to be updated to the indicated level bos.rte.mp	4.1.4.17

Patch Number (APAR/PTF)	Synopsis	Version Number
IX55293/U440895	If installed, the following fileset needs to be updated to the indicated level bos.rte.security	4.1.4.2
IX57406/U443030	If installed, the following fileset needs to be updated to the indicated level devices.mca.8ef4	4.1.4.4
IX58009/U443421	If installed, the following fileset needs to be updated to the indicated level devices.mca.ffe1	4.1.4.8
U449238	xIC.rte For Notes 4.1x and 4.5x, use: For Notes 4.6, use:	3.1.3.0 or 3.1.4.0 3.1.4.4
IX60679/U445544	ipx.rte	4.1.4.10
IX61435/U447192	connect.protocols	4.1.4.7 (for AIX connections)
IX60634/U445530	connect.server.nwserve	4.1.4.8 (for AIX connections)
IX56814/U442705	connect.server.com	4.1.4.2 (for AIX connections)

Some of the base AIX V4.1 filesets must be updated to the following levels on AIX V4.1.5 to run Lotus Domino Server or Notes Workstation R4.6 for AIX. The APAR (authorized program analysis report) (IXxxxx) and PTF (U4xxxxx) numbers are provided as a reference when ordering these updates from your IBM Support Center:

Table 3. Patches for AIX V4.1.5

Patch Number (APAR/PTF)	Synopsis	Version Number
U446706	X11.Dt.lib	4.1.5.2
U446812	bos.net.nfs.client	4.1.5.1
U446810	bos.rte.lvm	4.1.5.3
U446245	bos.adt.prof	4.1.5.1
U446855	bos.rte.man	4.1.5.2
U446244	bos.rte.libc	4.1.5.1
U445109	devices.isa_sio.sa.rte	4.1.5.1
U446761	bos.rte.tty	4.1.5.2
U446701	devices.pci.00100100.rte	4.1.5.1
U445116	devices.pci.00100f00.rte	4.1.5.1
U445081	devices.pci.14101800.rte	4.1.5.1

Patch Number (APAR/PTF)	Synopsis	Version Number
U446247	devices.pci.14105400.X11	4.1.5.1
U446708	devices.pci.14105400.rte	4.1.5.2
U445070	devices.pci.14105e00.X11	4.1.5.1
U446745	devices.pci.14105e00.rte	4.1.5.2
U445032	devices.pcmcia.serial.com	4.1.5.1
U449238	xlC.rte For Notes 4.1x and 4.5x use: For Notes 4.6 use:	3.1.3.0 or 3.1.4.0 3.1.4.4
U446817	If installed, the following fileset needs to be updated to the indicated level bos.rte.mp	4.1.5.3
U446869	If installed, the following fileset needs to be updated to the indicated level bos.rte.up	4.1.5.3
U442271	ipx.rte	4.1.5.0
U447411	connect.server.com	4.1.5.3
U447415	connect.protocols	4.1.5.1
U447397	connect.server.nwserve	4.1.5.2
APAR IX72217	Required if using Yellow Pages for name resolution bos.rte.libc	

Some of the base AIX V4.1 filesets must be updated to the following levels on AIX V4.2.1 to run Notes R4.6 for AIX. The PTF (U4xxxxx) numbers are provided as a reference when ordering these updates from your IBM Support Center. The updates can also be retrieved from the AIX Fixdist server at <http://service.boulder.ibm.com/rs6000>

Table 4. Patches for AIX V4.2.1

Patch Number (APAR/PTF)	Synopsis	Version Number
U449238	xlC.rte For Notes 4.1x and 4.5x use: For Notes 4.6 use:	3.1.3.0 or 3.1.4.0 3.1.4.4
U448806	If installed, the following fileset needs to be updated to the indicated level bos.mp	4.2.1.0

Patch Number (APAR/PTF)	Synopsis	Version Number
U448841	If installed, the following filesset needs to be updated to the indicated level bos.up	4.2.1.0
U454693	Needed to fix an NIS bug bos.rte.control	4.2.1.8
U454696	Needed to fix an NIS bug bos.rte.libc	4.2.1.8
U454662	Needed to fix an NIS bug bos.rte.libc	4.2.1.10
U454703	Needed to fix an NIS bug bos.adt.prof	4.2.1.12
U454713	Needed to fix an NIS bug bos.rte.shell	4.2.1.10
APAR IX72217	Required if using Yellow Pages for name resolution bos.rte.libc	

Some of the base AIX V4.3 filesets must be updated to the following levels to run Notes Release 4.6.2 for AIX. The PTF (U4xxxxx) numbers are provided as a reference when ordering these updates from your IBM Support Center. The updates can also be retrieved from the AIX Fixdist server at <http://service.software.ibm.com/www/support/aix>

Table 5. Patches for AIX V4.3

Patch Number (APAR/PTF)	Synopsis	Version Number
U453900 (APAR IX73966)	Needed to fix an NIS bug bos.adt.prof	4.3.0.4
U453844 (APAR IX73966)	Needed to fix an NIS bug bos.64bit	4.3.03
U453892 (APAR IX73966)	Needed to fix an NIS bug bos.rte.libc	4.3.0.4

Some of the base AIX V4.3.1 filesets must be updated to the following levels to run Notes Release 4.6.2 for AIX. The PTF (U4xxxxx) numbers are provided as a reference when ordering these updates from your IBM Support Center. The updates can also be retrieved from the AIX Fixdist server at <http://service.software.ibm.com/www/support/aix>

Table 6. Patches for AIX V4.3.1

Patch Number (APAR/PTF)	Synopsis	Version Number
U457132		

1.5.1.1 Lotus Domino Server on AIX - Supported Network Protocols

Lotus Domino Server on AIX runs with any of the following network protocols:

- TCP/IP (comes with the AIX operating system)
- X.PC (comes with both the Lotus Domino Server and the Notes Workstation software)
- IPX/SPX
 - SPX support for AIX V4 is provided by the fileset ipx.rte, which is shipped on the AIX V4 Server CD, or by the SPX support in AIX Connections. The filesets for SPX support must be updated to the following levels for Notes R4.5:

Table 7. AIX PTFs for SPX Support Data Directories

AIX Server Version	PTF Number	Fileset	Level
AIX V4.1.4	U445764	ipx.rte	4.1.4.11
AIX V4.2	U446067	ipx.rte	4.2.0.3

- For the latest AIX PTFs for SPX support data directories, please look at the Website <http://www.lotus.com>.

If you have AIX Connections installed, then AIX Connections (for AIX V4.1.4 or AIX V4.2) must be updated to the following levels: (Please note that AIX Connections is not required for SPX support. SPX support also comes with the AIX V4 Server code in the fileset ipx.rte.)

Table 8. AIX Connections PTFs for SPX Support

PTF Number	Fileset	Level
U445778 + IX62795	connect.protocols	4.1.4.6
U445530	connect.server.newserve	4.1.4.8
U442705	connect.server.com	4.1.4.2

- For the latest AIX Connection PTFs for SPX support on AIX version 4.3, please look into the website <http://www.lotus.com>.

You can use the following commands to see what level of the filesets, if any, you have installed:

```
lslpp -l ipx.rte
lslpp -l connect.*
```

Important Note

Domino Advanced Services clusters and partitioned server configurations do not support the IPX/SPX protocol in Release 4.6.1a. At this time, Lotus does not plan to provide IPX/SPX network support for future releases of these features.

1.5.2 OS/2 Warp (32-bit)

Server Environment(s): OS/2 Warp, Warp Connect, OS/2 2.11 SMP, OS/2 Warp Server

Workstation Environment(s): OS/2 Warp, Warp Connect

Workstation: Yes

Server: Yes

Network protocols available on Server:

- TCP/IP
- AppleTalk (Not with Warp Server 4 with SMP Feature)
- Banyan VINES (Not with Warp Server 4 with SMP Feature)
- NetBIOS
- NetWare IPX/SPX
- X.PC (supplied with Lotus Notes software)

Network protocols available on Workstation:

- TCP/IP
- Banyan VINES
- NetBIOS
- NetWare IPX/SPX
- X.PC (supplied with Lotus Notes software)

Memory Requirement:

- Lotus Domino Server 32 MB RAM minimum, 48 MB or greater recommended
- Notes Workstation 8 MB RAM minimum, 12 MB or greater recommended

Disk Space - Server:

- Additional databases and mail files: 300 MB minimum, 500 MB or greater recommended
- Disk Swap Space: 16 MB

Disk Space - Workstation:

- 30 MB minimum, 40 MB or greater recommended

1.5.3 Windows 95 (32-bit)

Environment(s): Windows 95 (32-bit)

Workstation: Yes

Server: No

Network protocols available on Workstation:

- Banyan VINES
- NetBIOS
- NetWare IPX/SPX
- TCP/IP
- X.PC (supplied with Lotus Notes software)

Network protocols available on Server:

- Banyan VINES
- NetBIOS
- TCP/IP
- X.PC (supplied with Lotus Notes software)

Memory Requirement:

- Notes Workstation 16 MB minimum, 24 MB or greater recommended

1.5.4 Windows NT (32-bit)

Server Environment(s): Windows NT Server Release 3.51 and 4.0

Workstation Environment(s): Windows NT Workstation Release 3.51 and 4.0

Workstation: Yes

Server: Yes

Network protocols available on Server:

- AppleTalk
- Banyan VINES
- NetBIOS
- NetWare IPX/SPX
- TCP/IP
- X.PC (supplied with Lotus Notes software)

Memory Requirement:

- Windows NT (32-bit) Server: 48 MB minimum, 64 MB or greater recommended
- Windows NT (32-bit) Workstation: 16 MB minimum, 24 MB or greater recommended

1.6 Our Lotus Domino Server and Notes Workstation Environment

We have installed and set up Lotus Domino Servers and Notes Workstations in an environment with many different operating systems and networking protocols. Throughout the rest of this book, we will be explaining our installation in great detail. The following figure shows the various Lotus Domino Servers, Notes Workstations, and networking protocols which we have used.

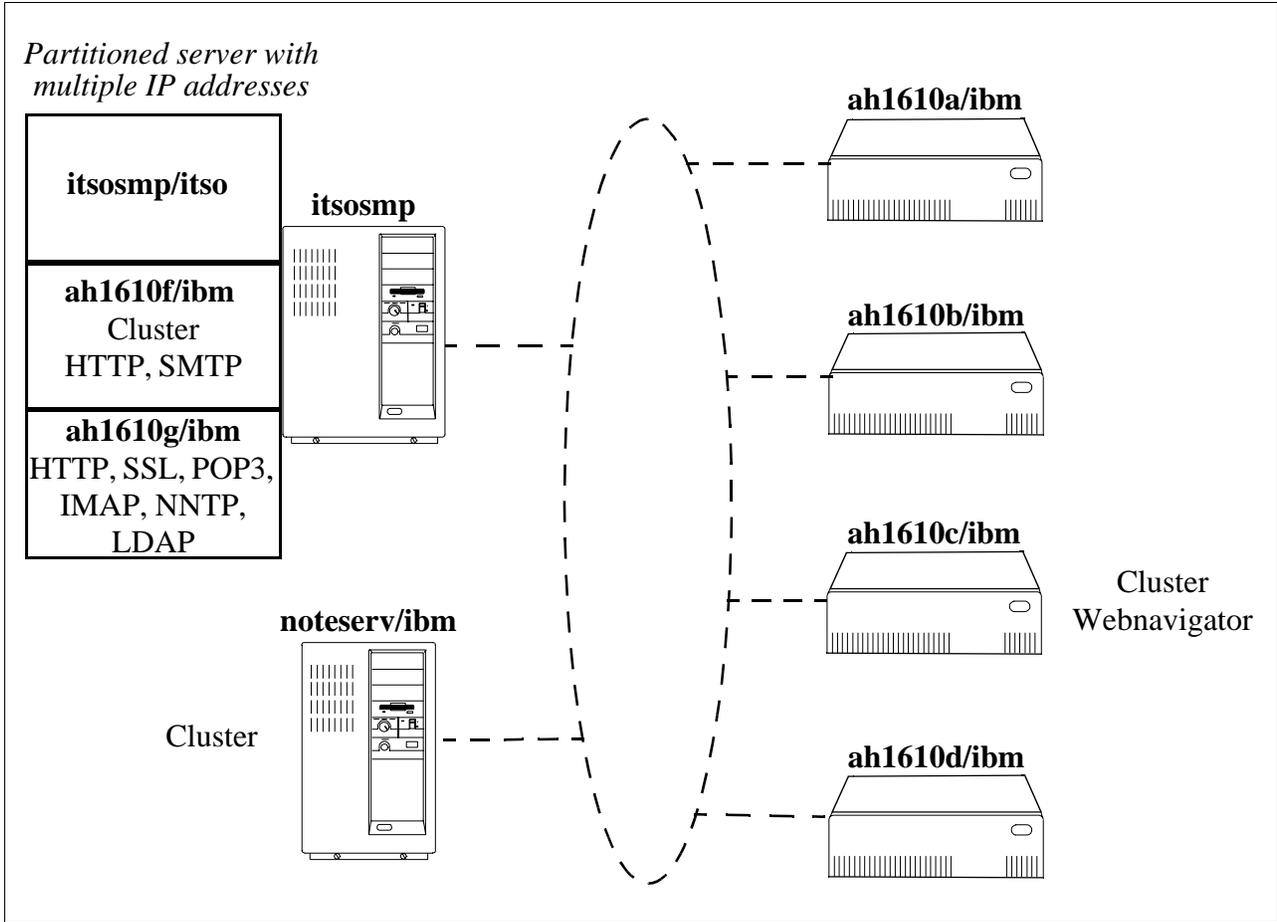


Figure 1. Lotus Domino Servers and Notes Workstations Environment in Our Lab

Chapter 2. Installing a Lotus Domino Server

This chapter outlines how to install a Lotus Domino Server. It also lists the system requirements for the AIX version of the Lotus Domino Server and contains helpful tips for a successful installation.

2.1 Hardware and Software System Requirements

The following information specifically relates to the installation of the Lotus Domino Server on AIX. AIX is IBM's implementation of the UNIX operating system.

The Lotus Domino Release 4.6 Server on AIX requires the following hardware, software, and disk space:

- An IBM RS/6000 running IBM AIX Version 4.1.4, 4.2, 4.3 or greater
- Minimum of 128 MB of RAM required
- Minimum of 256 MB of paging space required
- 200 MB of hard disk space for the installation directory (/usr/domino/lotus)
- 42 MB to 113 MB disk space for data directories

See Table 9, for specific details on the disk space requirements for the data directories.

Table 9. Disk Space Requirements

Data Directories	Disk Space (\$HOME/notesr4)
User Data Files	1 MB
Advanced Services Data Files	1 MB
Domino Server Data Files	24 MB
Notes Workstation Data Files	17 MB
Help Lite Database	11 MB
Help Database	46 MB
Documentation Databases	12 MB
Domino Partition Server	1 MB
TOTAL	113 MB + 200 MB (/usr/domino/lotus) = 313 MB

Note: Disk space for Lotus Notes Data Directories and binaries may differ depending on the features you select to install and upon your specific requirements.

- 300 MB or larger additional hard disk space for Lotus Notes databases (.NSF files) and mail files (a separate disk is best for performance reasons)
- Graphic display supported by IBM AIX Version 4.1.4, 4.2, or 4.3
- Mouse
- Printer supported by IBM AIX Version 4.1.4, 4.2, or 4.3 (optional)
- Modem (only if you plan to dial into the Lotus Domino Server)

2.1.1 Lotus Domino Servers

Lotus Domino Server software has currently been certified to run on the following operating system platforms:

- AIX V4.1.4 or AIX V4.2
- HP-UX 10.01
- NetWare 3.12, NetWare 4.1
- IBM OS/2 Warp Server V4 (Entry, Advanced, and with SMP feature) and OS/2 Warp Connect
- Sun Solaris 2.5 and 2.5.1 (SPARC, UltraSPARC)
- Microsoft Windows 95
- Microsoft Windows NT Server 3.51 and 4.0, Microsoft Windows NT Workstation 3.51 and 4.0

2.1.2 Notes Workstation Clients

Notes Workstation Client software has currently been certified to run on any of the following operating system platforms:

- AIX V4.1.4 or AIX V4.2
- HP-UX 10.01
- Sun Solaris 2.5 and 2.5.1 (SPARC, UltraSPARC)
- IBM OS/2 Warp V3, Warp V4, and Warp Connect
- Apple Macintosh System 7.5
- Microsoft Windows 95
- Microsoft Windows NT Workstation 3.51 and 4.0

2.2 Preparing the Environment for the Installation

The steps for preparing for the installation are listed below. If you are installing Lotus Notes on multiple hosts, you must perform all these steps on each of the target hosts.

1. Log onto the AIX machine as the root user.
2. Check that /usr/sbin is in your default path. Many of the AIX system commands that we'll be using to set up the machine are found in /usr/sbin.

Type in the command `echo $PATH` to see if /usr/sbin is in your default path.

If /usr/sbin is not in your default path, you can add it to your default path by editing the PATH statement in /etc/environment.
3. Check to see if there is enough space on an existing volume group for the installation code. You will need about 200 MB for the installation code in /opt/lotus. You can either use space within an existing volume group, for example, rootvg, or you could create a new volume group, for example called *dominovg*. This new volume group could then contain all your Lotus Domino related files.

Creating a new volume group would allow for easier backup/recovery or migration to a different server. In case of a hardware failure or server upgrade, you would simply export the volume group, put the disk on another machine, and import the volume group again.

To see if you have enough space on an existing volume group, type the command `lsvg <volume_group>`. To check the rootvg, type `lsvg rootvg` (Figure 2).

```

VOLUME GROUP:  rootvg                VG IDENTIFIER:  00612519a6ebe256
VG STATE:      active                PP SIZE:        4 megabyte(s)
VG PERMISSION: read/write           TOTAL PPs:     515 (2060 megabytes)
MAX LVs:       256                   FREE PPs:     285 (1140 megabytes)
LVs:           12                     USED PPs:       230 (920 megabytes)
OPEN LVs:      11                     QUORUM:         2
TOTAL PVs:     1                     VG DESCRIPTORS: 2
STALE PVs:     0                     STALE PPs:      0
ACTIVE PVs:    1                     AUTO ON:        yes
MAX PPs per PV: 1016                 MAX PVs:        32

```

Figure 2. *lsvg rootvg* (Free Space: 1140 megabytes = 4 x 285)

2.2.1 Create a New Volume Group for the Lotus Domino Server Binaries

If you don't want to create a new volume group for the installation code, you can skip to 2.2.2, "Create the Logical Volume for the Lotus Domino Server Binaries" on page 26.

To create a new volume group to contain the installation software, type in the command `smitty mkvg` to display the **Add a Volume Group** screen (Figure 3).

```

                                Add a Volume Group

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

                                [Entry Fields]
VOLUME GROUP name                [dominovg]
Physical partition SIZE in megabytes 4
* PHYSICAL VOLUME names          [hdisk1]
Activate volume group AUTOMATICALLY yes
  at system restart?
Volume Group MAJOR NUMBER         []
Create VG Concurrent Capable?     no +
Auto-varyon in Concurrent Mode?   no +

F1=Help      F2=Refresh    F3=Cancel    F4=List
F5=Reset     F6=Command   F7=Edit      F8=Image
F9=Shell     F10=Exit     Enter=Do

```

Figure 3. *Add a Volume Group* Screen

In our example, we are calling our volume group, *dominovg*, and we are creating it on our hard disk called *hdisk1*. Depending on the size of your hard disk, you may have to specify another (larger) physical partition size.

2.2.2 Create the Logical Volume for the Lotus Domino Server Binaries

In AIX, it is a better practice to create a logical volume and then add the journaled filesystem on this logical volume. By following this procedure, we can place the logical volume and the filesystem at the desired portion of the hard disk, thus improving the system performance.

The following steps and screens will show you how we created the logical volume for the Lotus Domino Server binaries.

Type `smitty mklv` to display the Add a Logical Volume screen (Figure 4).

```

                                     Add a Logical Volume

Type or select a value for the entry field.
Press Enter AFTER making all desired changes.

* VOLUME GROUP name                                     [Entry Fields]
                                                         [dominovg]

F1=Help          F2=Refresh          F3=Cancel          F4=List
F5=Reset          F6=Command          F7=Edit            F8=Image
F9=Shell          F10=Exit           Enter=Do

```

Figure 4. Add a Logical Volume Screen for Entering Volume Group Name

Select the name of the volume group in which you want to place this logical volume. In our example, we select the volume group name `dominovg`.

Create the logical volume for the installation software. In our example, we named it `noteslv`, size: 200 MB.

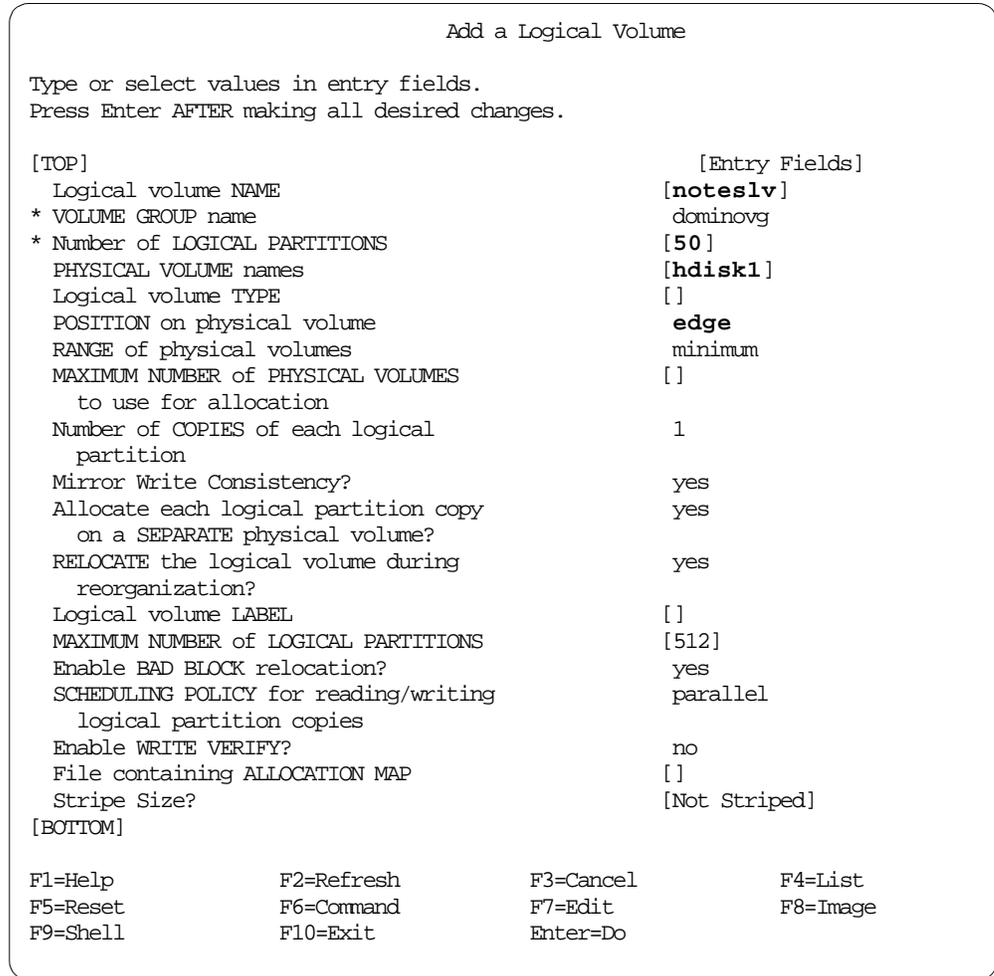


Figure 5. Add a Logical Volume Screen

The placement of data on the disk affects its performance. The closer the data is to the center of the disk the better. This alleviates the problem of disk arm travel. Since your Lotus Domino binaries are read only and only accessed when starting the server or the workstation, you can keep them at the edge of the disk.

2.2.3 Create the Logical Volume for Lotus Domino Server Databases

The following steps and screens will show you how we created the logical volume for the Lotus Domino Server Databases:

1. Type `smitty mklv` to display the Add a Logical Volume screen (see Figure 6 on page 28).

```

Add a Logical Volume

Type or select a value for the entry field.
Press Enter AFTER making all desired changes.

                                     [Entry Fields]
* VOLUME GROUP name                 [dominovg] +

F1=Help          F2=Refresh        F3=Cancel        F4=List
F5=Reset         F6=Command         F7=Edit         F8=Image
F9=Shell         F10=Exit          Enter=Do

```

Figure 6. Add a Logical Volume Screen to Enter Volume Group Name

- Select the name of the volume group in which you want to place this logical volume. In our example, we selected the volume group name dominovg.
2. Create the logical volume for the installation software. In our example, we named it notesdatalv, size: 140 MB.

```

Add a Logical Volume

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

[TOP]                                     [Entry Fields]
Logical volume NAME                       [notesdatalv]
* VOLUME GROUP name                       dominovg
* Number of LOGICAL PARTITIONS            [35]
PHYSICAL VOLUME names                     [hdisk1]
Logical volume TYPE                       []
POSITION on physical volume               center +
RANGE of physical volumes                 minimum
MAXIMUM NUMBER of PHYSICAL VOLUMES       []
to use for allocation
Number of COPIES of each logical          1
partition
Mirror Write Consistency?                 yes
Allocate each logical partition copy      yes
on a SEPARATE physical volume?
RELOCATE the logical volume during        yes
reorganization?
Logical volume LABEL                      []
MAXIMUM NUMBER of LOGICAL PARTITIONS      [512]
Enable BAD BLOCK relocation?              yes
SCHEDULING POLICY for reading/writing     parallel
logical partition copies
Enable WRITE VERIFY?                      no
File containing ALLOCATION MAP              []
Stripe Size?                              [Not Striped]
[BOTTOM]

```

Figure 7. Add a Logical Volume Screen

The placement of data on the disk affects its performance. The closer the data is to the center of the disk the better. This alleviates the problem of disk arm travel.

2.2.4 The File System for the Lotus Domino Server Binaries

If you don't use the default directory where Lotus Notes installs the software (/opt/lotus), the install program creates symbolic links from /opt/lotus to the install directory that you specify. The final directory name of the path must be lotus.

In AIX, we need to create a file system to contain the installation binary code which is copied from the CDROM to the hard disk on your AIX system. The following steps and screens will show you how we created this file system on the logical volume.

1. Create a file system for the installation software. In our example, we called it /usr/domino, size: 200 MB.
 - Type `smitty crjfslv` to display the **Add a Journaled File System on a Previously Defined Logical Volume** screen (see Figure 8).

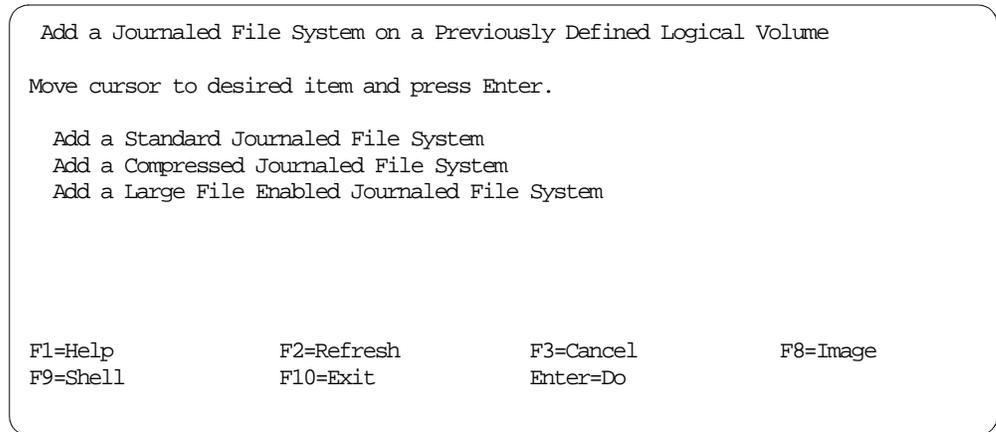


Figure 8. Add a Journaled File System on a Previously Defined Logical Volume

- When you select **Add a Standard Journaled File System** by pressing the **Enter** key, the screen, as shown in Figure 9, is displayed.

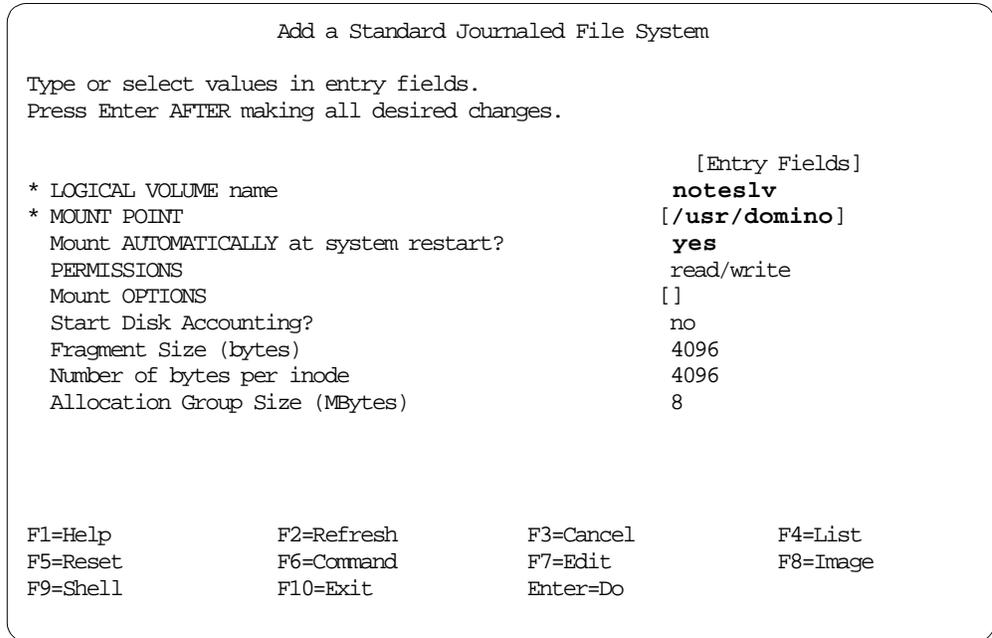


Figure 9. Add a Standard Journaled File System Screen

- Press **Enter** to create the filesystem.
2. Mount the filesystem just created for the Lotus Domino Server Binaries. In our example, it is named `/usr/domino`.
 - `mount /usr/domino`

2.2.5 The File System for the Lotus Domino Server Databases

Note

You do not have to create a separate file system for the Lotus Domino Server databases. This is an optional step. If you choose not to create a file system for the Lotus Domino Server databases, by default, the setup process will put the Lotus Domino Server databases in the notes userid's `$HOME/notesr4` directory, that is, `/home/notes/notesr4`.

If you do choose to create a file system for the Lotus Domino Server databases, for best performance, you should use disk-stripping technology for this file system.

1. Create the file system for the Lotus Domino Server databases. In our example, we called it `/server1`, size: 140 MB.
 - Type `smitty crjfslv` to display the **Add a Journaled filesystem on a Previously Defined Logical Volume** screen (see Figure 10 on page 31).

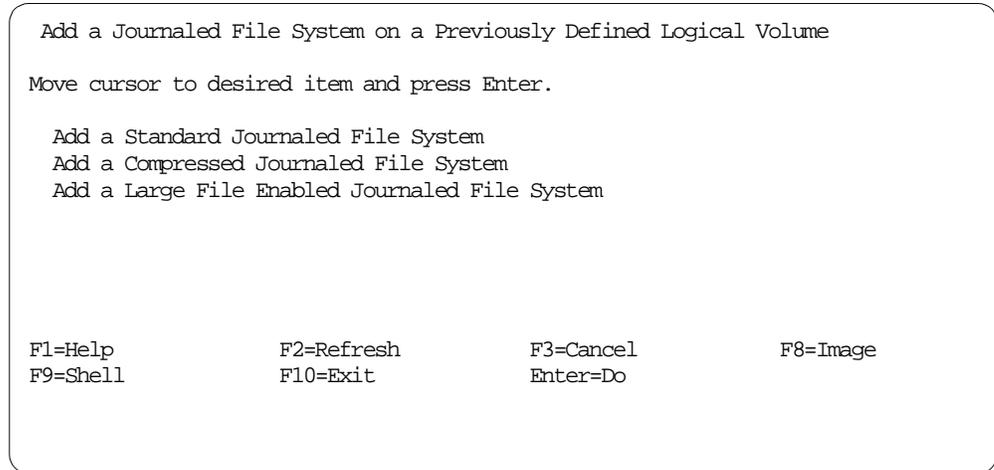


Figure 10. Add a Journalled File System on a Previously Defined Logical Volume

- When you select **Add a Standard Journalled File System** by pressing the **Enter** key, the screen, as shown in Figure 11, is displayed.

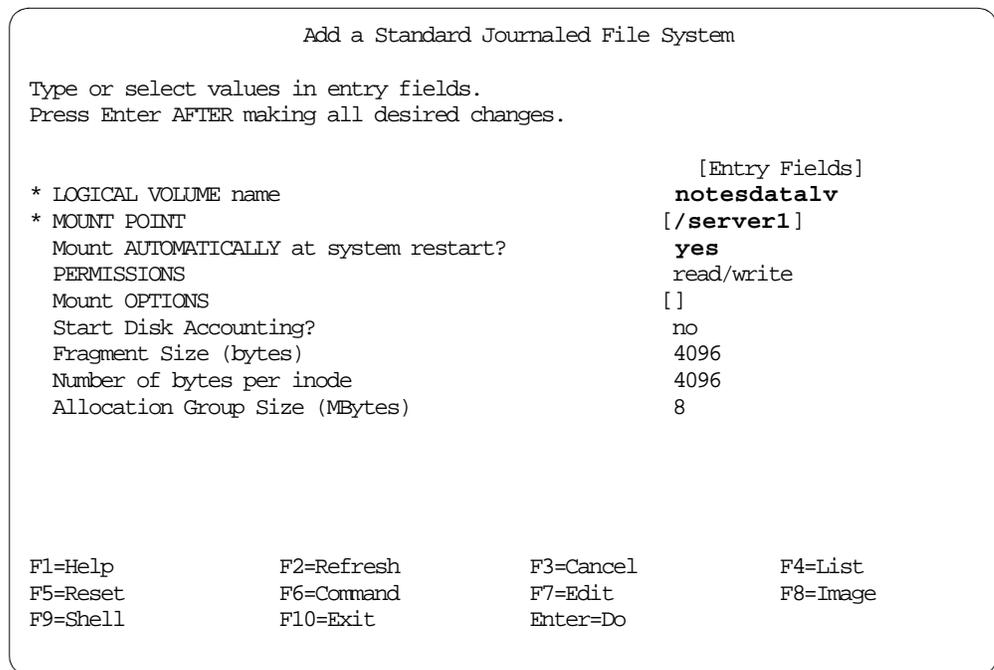


Figure 11. Add a Standard Journalled File System Screen

- Press **Enter** to create the filesystem.
2. Or, create a striped file system (for best performance results) and mount it.

Disk striping is a technique for spreading the data in a logical volume across several disk drives in such a way that the I/O capacity of the disk drives can be used in parallel to access data on the logical volume.

Obviously, at least two physical drives are required. The drives used should have little other activity when the performance-critical sequential I/O is taking place. Some combinations of disk adapter and disk drive will

require dividing the workload of a striped logical volume between two or more adapters.

For example, to create a striped logical volume in the volume group `dominovg` called `notesdatalv`, with 35 logical partitions, and with a stripe size of 64 KB across `hdisk1`, `hdisk2` and `hdisk3`:

1. Type `mklv -y notesdatalv -S 64K dominovg 35 hdisk1 hdisk2 hdisk3`
2. Type `crfs -v jfs -d notesdatalv -m /server1 -A yes -p rw -t no -a frag=4096 -a nbpi=4096 -a compress=no`

Note

For more information on disk striping, please refer to Chapter 14, "System Performance Considerations" on page 385

3. Mount the filesystem just created for the Lotus Domino Server Databases, in our example, it is named `/server1`:

```
mount /server1
```

4. Create an AIX group account for Lotus Notes by issuing the command:

```
mkgroup -A notes
```

5. Create an AIX user account for ownership of the Lotus Notes software by issuing the command:

```
mkuser pgrp=notes groups='staff, notes' home=/server1 gecos="Lotus Notes User" notes
```

6. Define a password for user `notes` by issuing the command:

```
pwdadm notes
```

7. Change ownership of the Lotus Notes `/usr/lpp/lotus` and `/notes` file systems by issuing the command:

```
chown -R notes.notes /usr/domino
```

```
chown -R notes.notes /server1
```

8. To mount the CD-ROM type:

```
mount -r -v cdrfs /dev/<device_name> <cd_mount_point>
```

An example of this is the command

```
mount -r -v cdrfs /dev/cd0 /cdrom
```

where:

`<device_name>` is `cd0` and `<cd_mount_point>` is `/cdrom`

If the `<cd_mount_point>` does not exist, you can create it by using the command `mkdir <cd_mount_point>`, for example, `mkdir /cdrom`.

Note

Refer to 6.3.2, "Distributing the UNIX Installation Kit" on page 157 to see how to mount the installation kit using NFS.

2.2.6 Setting Up a Local Area Network (LAN)

The following sections describe the setup steps for a local area network (LAN).

2.2.6.1 Setting Up a TCP/IP Network

You should have basic knowledge of TCP/IP and also be familiar with the naming conventions of a TCP/IP network, or ask the administrator for the correct parameters for hostname, network address, netmask, and so on.

1. Check to see if the following software is installed by using the command:

```
lslpp -l bos.net.* | pg:
```

2. For AIX V4.1.4:

```
bos.net.tcp.client 4.1.4.16 TCP/IP Client Support
```

3. For AIX V4.2:

```
bos.net.tcp.client 4.2.0.6 TCP/IP Client Support
```

4. For AIX V4.3.1:

```
bos.net.tcp.client 4.3.1.0 TCP/IP Client Support
```

5. Enter `smitty tcpip`.

6. Select **Minimum Configuration & Startup** and press **Enter**.

7. Select the correct Network Interface (token ring, Ethernet, or others) and press **Enter**.

In the Minimum Configuration & Startup screen (see Figure 12), you must enter the configuration information. Here, for example, is the information for a token-ring adapter.

```
Minimum Configuration & Startup

To Delete existing configuration data, please use Further Configuration menus

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

                                [Entry Fields]
* HOSTNAME                       [ah1610d.itsc.austin.ibm.co>
* Internet ADDRESS (dotted decimal) [9.3.1.113]
  Network MASK (dotted decimal)    [255.255.255.0]
* Network INTERFACE               [tr0]
  NAMESERVER
    Internet ADDRESS (dotted decimal) [9.3.1.74]
    DOMAIN Name                     [itsc.austin.ibm.com]
  Default GATEWAY Address          [9.3.1.74]
  (dotted decimal or symbolic name)
  RING Speed                        [autosense]          +
  START Now                          yes                    +

F1=Help      F2=Refresh      F3=Cancel      F4=List
F5=Reset     F6=Command     F7=Edit       F8=Image
F9=Shell     F10=Exit        Enter=Do
```

Figure 12. Minimum TCP/IP Configuration for Token Ring Sample

2.2.6.2 Setting Up a Network Using IPX/SPX

If your network uses the IPX or SPX protocols, you will need to perform the following to insure that you have the correct setup for installing the Lotus Domino Server on AIX.

1. Check to see if the following software is installed by using the command:

```
lslpp -l ipx.* | pg
```

2. For AIX V4.1.4:

```
ipx.rte                4.1.4.11             IPX and SPX Protocol Stacks
```

3. For AIX V4.2:

```
ipx.rte                4.2.0.3             IPX and SPX Protocol Stacks
```

4. For AIX V4.3.1:

```
ipx.rte                4.2.1.0             IPX and SPX Protocol Stacks
```

5. Edit the `/etc/netware/NPSConfig` file and change the `internal_network=<number>` and the adapter information.

Ask the administrator for the correct value for the `lan_1_network` value. In our example, shown in Figure 13, `lan_1_network = "10000045"`.

Please be sure that the value of the `lan_1_network` value matches the other system's `lan_1_network` value in the same domain.

For example, using a token-ring adapter the `/etc/netware/NPSConfig` (Figure 13 on page 35) might look like:

```

/*
 * COMPONENT_NAME: NETWARE
 *
 * (C) COPYRIGHT International Business Machines Corp. 1992,1993
 * All Rights Reserved
 * Licensed Materials - Property of IBM
 * US Government Users Restricted Rights - Use, duplication or
 * disclosure restricted by GSA ADP Schedule Contract with IBM Corp.
 *
 * @(#)36 1.18 src/netware/aix/etc/netware/NPSConfig, netw_admin, netware420,
 * 9613T 3/9/94 13:42:28
 */
/* * Novell Protocol Suite (NPS) configuration/tunables file.
 *
 * "adm/etc/NPSConfig.SRC 1.7 (Novell) 8/14/91"
 */

/* General configuration. */
nvt_server_name = "PORTABLE" /* Set the NVT server name */

track_on = inactive /* Track on active on startup */

spx = active /* have architecture daemon open spx AND
uncomment spx driver in /etc/netware.conf */
nvt = inactive /* have architecture daemon open nvt AND
uncomment nvt driver in /etc/netware.conf */
sap = active /* have architecture daemon start the
Service Advertising Protocol */
netbios = inactive /* have architecture daemon open netbios AND
Note: NetBios is not supported in the current
version of AIX. */

netbios_shim = "nbix"

nvt_getty_entry = "unused"
nvt_init_level = 23
nvt_spawns = 10
nvt_line_disc =

sap_standard_out = "/dev/console"
sap_error_out = "/var/netware/sap.error"
sap_reply_delay = 200

priority = 15
capture_utility = inactive /* default is inactive */

internal_network = "00000045"

lan_1_adapter = "/dev/dlpi/en"
lan_1_adapter_type = "ETHERNET_DLPI"
lan_1_ppa = 0
lan_1_if_name = "en"
lan_1_frame_type = "ETHERNET_II"
lan_1_module = "NULL"
lan_1_network = "10000045"

```

Figure 13. NetWare NPSConfig File

- Kill processes /sapd and /npsd and then restart them with the korn shell script /etc/rc.netware or reboot the system to start IPX/SPX support.

2.3 Starting the Installation

The following steps and screens will take you through the installation of the Lotus Domino Server on AIX.

Note

Make sure the directory /opt exists; otherwise the installation will fail.

1. If /opt doesn't exist, type `mkdir -m 755 /opt`.
2. Change directory to `<cd_mount_point>/<on_cd_path>`, where `<on_cd_path>` is either `unix` or `UNIX`, depending on your system's CD-ROM driver. For example, `cd /cdrom/unix`.

Note

Remove *all* files from /opt/lotus and also the links to /opt/vim and /opt/lotus if you want to completely reinstall Lotus Notes.

3. Type `./install` and press **Enter** (you must still be the root user) to install the code. You will see the Lotus Notes Release 4.5 Installation Welcome screen (Figure 14).

```
=====
                        Lotus Notes Release 4.6.1c Installation
=====

Welcome to the Lotus Notes Install program.

Type h for help on how to use this program.
Press TAB to begin the installation.

-----
Type h for help
Type e to exit installation
Press TAB to continue to the next screen.
-----
```

Figure 14. Installation Welcome Screen

4. Press the **Tab** key to continue to the next screen (Figure 15 on page 37).

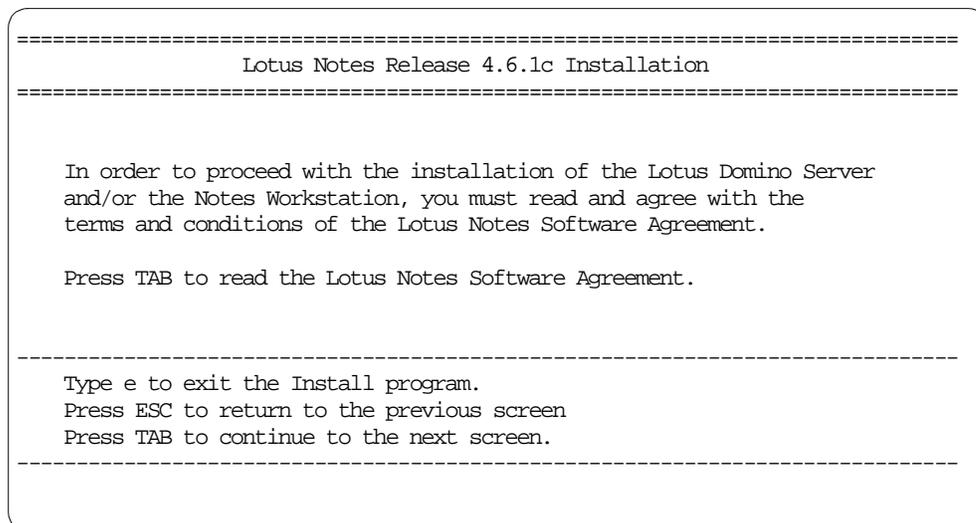


Figure 15. Lotus Domino Server Installation Welcome Screen

5. Press the **Tab** key to continue to the next screen, as shown in Figure 16 on page 38, where you will be asked to read and accept the Lotus Notes Software Agreement.

```

=====
Lotus Notes Release 4.6.1c Installation
=====
LOTUS NOTES SOFTWARE AGREEMENT

IF YOU DO NOT AGREE WITH THESE TERMS AND CONDITIONS,
DO NOT INSTALL THE SOFTWARE.

1. USE

You may use the Lotus software products (individually and collectively, the
"Software"), in the quantities purchased, provided you abide by the terms
and conditions of this Agreement. In addition, you may make one (1) archival
copy of the Software.

FOR TRIAL USE:

You may evaluate the Software for a period of ninety (90) days (the "Trial
Period"). If you wish to continue using the Software, you must purchase a
copy of the Software during the Trial Period in order for your continued use
of the Software to be legal. Multiple Trial Periods are prohibited.

Software acquired for evaluation during a Trial Period is provided on an "AS
IS" basis. Lotus makes no warranty, representation, promise or guarantee,
either express or implied, statutory or otherwise, with respect to the
>>> Press any key to continue <<<
.
.
.
.
.
9. MORE INFORMATION: Should you have any questions concerning this Agreement
or Lotus' software use policies, write to Inside Sales and Service, Lotus
Development Corporation, 55 Cambridge Parkway, Cambridge, MA 02142, or, in
the United States, call 1-800-343-5414.

IF YOU DO NOT AGREE WITH THE ABOVE TERMS AND CONDITIONS, DO NOT
INSTALL THE SOFTWARE.

```

Figure 16. Lotus Notes Software Agreement

6. Press the **TAB** key (or any other key) until you reach the screen shown in Figure 17.

```

=====
Lotus Notes Release 4.6.1c Installation
=====

You may proceed with the installation only if you agree to the
terms and conditions of the Lotus Notes Software Agreement.

-----

Type h for help.
Type e to exit the Install program.
Press ESC to return to the previous screen.
Press the Spacebar to change the setting until you get the one you want.
Press TAB to accept a setting and continue to the next screen.

-----

>>> Do you agree to the terms of the license agreement ? [Yes]

```

Figure 17. Acceptance of the Terms of the License Agreement

7. The default value on this screen is [No]. Press the **Spacebar** to change the value to [Yes] and then press the **Tab** key to accept the setting and display the next screen (Figure 18).
8. The default value on Figure 18 is to Install the [Notes Workstation]. Press the **Spacebar** to change the value to Install the [Domino Server]. When you install the Lotus Domino Server, the workstation code is also installed.

```

=====
Lotus Notes Release 4.6.1c Installation
=====

Do you want to install the Notes Workstation or Domino Server ?

-----

Type h for help.
Type e to exit the Install program.
Press ESC to return to the previous screen.
Press the Spacebar to change the setting until you get the one you want.
Press TAB to accept a setting and continue to the next screen.

-----

>>> Install the [Domino Server ]

```

Figure 18. Install Lotus Domino Server or Workstation Screen

9. Press the **Tab** key to accept the setting of [Domino Server] and to display the next screen, as shown in Figure 19 on page 40.
- The next few screens refer to Lotus Domino Advanced Services. Lotus Domino Advanced Services is a separately licensed feature which includes Lotus Domino server clusters, partitioned servers, and usage tracking. These features are available only if you have purchased the Lotus Domino Advanced Services license.

```
=====
Lotus Notes Release 4.6.1c Installation
=====

A Domino Advanced Services license enables you to extend your
Domino server configuration to include three advanced features.

Do you have a Domino Advanced Services license
and want to install these features ?

-----
Type h for help.
Type e to exit the Install program.
Press ESC to return to the previous screen.
Press the Spacebar to change the setting until you get the one you want.
Press TAB to accept a setting and continue to the next screen.
-----

>>> Install Domino Advanced Services ? [Yes]
```

Figure 19. Install Lotus Domino Advanced Services Screen

The default value for the previous screen, Figure 19, is [No]. If you have purchased the license for Lotus Domino Advanced Services, press the **Spacebar** to change the setting to [Yes]. Then press the **Tab** key to accept that setting and go to the next screen (Figure 20).

If you do not have the license for Lotus Domino Advanced Services, you should press the **Tab** key to accept the setting of [No]. The next screen displayed is shown in Figure 22 on page 41.

```
=====
Lotus Notes Release 4.6.1c Installation
=====

You have chosen to install Advanced Services on your Domino Server.

These features include Domino server clusters, partitioned servers, and
usage tracking, and are available only if you have purchased the Domino
Advanced Services license.

Please verify that you have purchased this license before you continue.
You can verify your purchase by examining your Lotus Notes software package.
If the package includes the "Domino Advanced Services" label, select Yes
when prompted to continue this install.

If you are uncertain, or your organization has not purchased the special
Domino Advanced Services license, you are not entitled to continue
this install.

If you want to purchase the license, visit our Web site (http://www.lotus.com)
for product information and a local sales number.

Press the Escape key to go back to the previous screen
or
Press the Tab key to continue...
```

Figure 20. Lotus Domino Advanced Services Installation License Verification Screen

```
=====
Lotus Notes Release 4.6.1c Installation
=====

Domino Advanced Services are only available to those
who have purchased a special license.

-----

Type h for help.
Type e to exit the Install program.
Press ESC to return to the previous screen.
Press the Spacebar to change the setting until you get the one you want.
Press TAB to accept a setting and continue to the next screen.

-----

>>> Have you purchased the special Domino Advanced Services license ? [Yes]
```

Figure 21. Lotus Domino Advanced Services License Acceptance Screen

If you have purchased the Lotus Domino Advanced Services license, then press the **Tab** key to accept the setting of [Yes] and proceed to the next installation screen.

The next screen is applicable only if you are installing on a Sun Solaris system. The default setting on this screen is [Yes]. Since we are installing Lotus Domino Server on an AIX system, you must change this setting to [No] by pressing the **Spacebar** to display [No] and then pressing the **Tab** key to proceed to the next screen.

```
=====
Lotus Notes Release 4.6.1c Installation
=====

Note: The answer to this question will only affect installations
to Sun Solaris systems.

In order for Domino server tasks to execute as threads in a
single process, the process file descriptor limit needs to be
raised. This requires that the server have root privileges.
After changing this limit, the server no longer runs as root.

Select below whether to enable setuid-root operation
for the Notes server on Sun Solaris.

-----

Type h for help.
Type e to exit the Install program.
Press ESC to return to the previous screen.
Press the Spacebar to change the setting until you get the one you want.
Press TAB to accept a setting and continue to the next screen.

-----

>>> Install the server for Solaris setuid-root ? [No ]
```

Figure 22. Sun Solaris Server Installation Question

The next screen, shown in Figure 23, asks if you want to install the optional documentation. We recommend that you install the optional online documentation on the Lotus Domino Server.

```
=====
                        Lotus Notes Release 4.6.1c Installation
=====

Do you want to install the optional online documentation ?

-----

Type h for help.
Type e to exit the Install program.
Press ESC to return to the previous screen.
Press the Spacebar to change the setting until you get the one you want.
Press TAB to accept a setting and continue to the next screen.

-----

>>> Install optional online documentation ? [Yes]
```

Figure 23. Install the Optional Online Documentation

The next installation screen, shown in Figure 24 on page 43, asks whether the Lotus Domino Server software will be installed on the system which will be running the Lotus Domino Server.

If you install the software to be a network resource, you can use the Lotus Notes software on other computers over the network. You will need to specify the operating systems of the computers which will use the installed software.

If you install the software to be a network resource, other computers can use it to run Lotus Notes by making the installed software available at /opt/lotus. You do this using UNIX filesystem sharing. For example, you could use Network File System (NFS) and export the filesystem.

Note

Lotus strongly recommends that the Lotus Domino server run on the system that you install it on, that is, that you do not use it as a network resource.

Press the **Tab** key to accept the Lotus recommendation.

```
=====
Lotus Notes Release 4.6.1c Installation
=====

You can install the software for use on the destination host(s), or
to be a network resource for use by other hosts.

Caution: Lotus strongly recommends that the Domino server software be
installed for use on the hosts that are to run the server.

-----

Type h for help.
Type e to exit the Install program.
Press ESC to return to the previous screen.
Press the Spacebar to change the setting until you get the one you want.
Press TAB to accept a setting and continue to the next screen.

-----

>>> Install [the software for use on the destination host(s)]
```

Figure 24. Install the Software for Use on the Destination Host Screen

Now you are asked if you want to install to one computer or more than one computer. See 2.3.1, "Installing on Multiple Hosts" on page 49 if you want to install on multiple hosts. Press the **Tab** key to take the default setting and install on only one computer as shown in Figure 25.

```
=====
Lotus Notes Release 4.6.1c Installation
=====

Do you want to install to one computer, or to more than one computer ?

-----

Type h for help.
Type e to exit the Install program.
Press ESC to return to the previous screen.
Press the Spacebar to change the setting until you get the one you want.
Press TAB to accept a setting and continue to the next screen.

-----

>>> Install to [one computer      ]
```

Figure 25. Install on One Computer Screen

The next screen, shown in Figure 26 on page 44, indicates the hostname of the machine on which you want to install the software. By default, it will be the host name of the machine on which you are executing the Installation program. Press the **Tab** key to accept this default setting or the **Enter** key to edit the setting and change the hostname.

```
=====
Lotus Notes Release 4.6.1c Installation
=====

When installing to one computer, you can install to either the local
or a remote host. You do not have to install the software to the
computer on which you are running the Install program.

-----

Type h for help.
Type e to exit the Install program.
Press ESC to return to the previous screen.
Press ENTER to edit a setting.
Press TAB to accept a setting and continue to the next screen.

-----

Current destination hostname :noteserv.itsc.austin.ibm.com
```

Figure 26. Destination Host Name for the Installation Code

10. Press the **Tab** key, and the next screen (Figure 28) asks for the directory name where the Lotus Notes software will be installed. The default installation directory is /opt/lotus.

```
=====
Lotus Notes Release 4.6.1c Installation
=====

The destination path is where the Install program installs the
Notes files. The Install program automatically adds "lotus" to the path.

-----

Type h for help.
Type e to exit the Install program.
Press ESC to return to the previous screen.
Press ENTER to edit a setting.
Press TAB to accept a setting and continue to the next screen.

-----

Current destination path :/opt/lotus
```

Figure 27. Default Destination Path for the Installation Code

11. Press **Enter** to change this default installation directory to the directory defined in the file system created for Lotus Domino Server binaries (/usr/domino), as shown in Figure 28 on page 45.

```
=====
Lotus Notes Release 4.6.1c Installation
=====

The destination path is where the Install program installs the
Notes files. The Install program automatically adds "lotus" to the path.

-----

Press ENTER to retain the current setting
or
Type a new setting and press ENTER.
-----

Current destination path :/opt/lotus

>>> New destination path :/usr/domino
```

Figure 28. Destination Path for the Installation Code

12. Press **Enter** to go to the next screen.

```
=====
Lotus Notes Release 4.6.1c Installation
=====

The destination path is where the Install program installs the
Notes files. The Install program automatically adds "lotus" to the path.

-----

Type h for help.
Type e to exit the Install program.
Press ESC to return to the previous screen.
Press ENTER to edit a setting.
Press TAB to accept a setting and continue to the next screen.
-----

Current destination path :/usr/domino/lotus
```

Figure 29. Current Destination Path Screen

13. Notice that the directory name `lotus` has been automatically added in the filesystem `/usr/domino`. Press **Enter** if you want to change the directory.

14. Press the **Tab** key, and specify the installation owner (Figure 30 on page 46). If the default had been accepted, this value should be `notes`.

```
=====
Lotus Notes Release 4.6.1c Installation
=====

The installation user ID is the UNIX system user ID
that will own the installed software.

Enter an existing UNIX system user ID.

-----

Type h for help.
Type e to exit the Install program.
Press ESC to return to the previous screen.
Press ENTER to edit a setting.
Press TAB to accept a setting and continue to the next screen.

-----

Current installation owner user ID :notes
```

Figure 30. Specifying the Installation Owner

15. Press the **Tab** key, and specify the installation group ID which will own the installed software (Figure 31). Again, if the defaults had been accepted, this value should be `notes`.

```
=====
Lotus Notes Release 4.6.1c Installation
=====

The installation group ID is the UNIX system group ID
that will own the installed software.

Enter an existing UNIX system group ID.

-----

Type h for help.
Type e to exit the Install program.
Press ESC to return to the previous screen.
Press ENTER to edit a setting.
Press TAB to accept a setting and continue to the next screen.

-----

Current installation owner group ID :notes
```

Figure 31. Specifying the Group ID for the Installed Software

16. Press the **Tab** key to display the confirmation screen for the specified parameters (Figure 32 on page 47).

```

=====
Lotus Notes Release 4.6.1c Installation
=====

Your configuration of the Install program is complete.

By continuing, the Install program first verifies that it can perform
the installation(s) as specified.  If there are no errors,
the Install program prompts you to proceed.

-----

Type e to exit the Install program.
Press ESC to return to the previous screen
Press TAB to continue to the next screen.

```

Figure 32. Interview Completion Screen

17. Pressing the **Tab** key will start the verification that leads to the final installation. Figure 33 shows the screen capture from an installation of a Lotus Domino Server on AIX.

18. Check that the configuration settings are correct.

```

Configuration Summary...

Install to single host:          noteserv.itsc.austin.ibm.com

Destination path:               /usr/domino/lotus

Installation type:              Run on Destination

Product options selected:      Notes Workstation
                               Domino Server
                               Domino Advanced Services
                               Documentation

Server on Solaris setuid-root:  No

Installation owner user Id:     notes
Installation owner group Id:    notes

The configuration settings must now be validated, checking that
installation as specified may proceed for each destination.
This may take a while depending on the configuration.
Once completed, confirmation will be required to proceed
with the installation(s)...

Press the Tab key to continue, or the Escape key to reconfigure...

```

Figure 33. Validate Configuration Settings

19. If the configuration settings are correct, press **Tab** to continue.

```
Validating hostnames...
  Ok.

Validating general configuration...
Ok.

Validating configuration for host noteserv.itsc.austin.ibm.com...
WARNING: The operating system version 4.3.1.0 on this host is newer than
        the most recent directly supported version 4.3.
Otherwise Ok.

There are pre-installation validation warnings for all specified hosts.
Installation can still proceed.

End Install Configuration Validation - Fri Jul 24 15:01:41 CDT 1998
*****

Validation log appended to /var/tmp/notes_install_config_validation.log

You may now continue with the installation, or reconfigure your selections.
Press the Tab key to continue, or the Escape key to reconfigure...
```

Figure 34. Configuration Settings Validated Successfully

20. Press the **Tab** key to actually start the installation.

```

*****
Begin Installation - Fri Jul 24 15:04:09 CDT 1998
Lotus Notes Release 4.6.1c

Installing to host noteserv.itsc.austin.ibm.com...
  "Notes Workstation" for IBM AIX
  "Domino Server" for IBM AIX
  "Domino Advanced Services" for IBM AIX
  "Documentation"
  "Notes Workstation Resources" for IBM AIX
  "Common Data Files"
  "Common Data Files Resources"
  "Domino Server Resources" for IBM AIX
  "Domino Advanced Services Resources" for IBM AIX
  "Advanced Services Data Files"
/opt/lotus is already configured.
Support for VIM applications is already configured correctly
  at /opt/vim/lib/ibmpow.
Done.

The installation(s) completed successfully.

Important: Be sure to logout as root before running Notes.
Running Notes or the Domino Server as root is not supported.

End Installation - Fri Jul 24 15:31:31 CDT 1998
*****

Installation log appended to /var/tmp/notes_install.log

```

Figure 35. Installation Completed Successfully

2.3.1 Installing on Multiple Hosts

If you only want to install the Lotus Domino Server on a single host, you can skip this section and continue with 2.4, "Setting Up the Lotus Domino Server on AIX" on page 51.

To install Lotus Notes to multiple hosts in a single installation run, you must first specify the hostname of each destination host in a hostlist file. You can change/edit the hostlist file during the installation.

You must still be logged in as the root user.

1. Our destination hosts for our installation are: ah1610d and ah1610c. Write the hostnames in a file named /tmp/notes_install_hostlist (Figure 36), one hostname for each line.

```

ah1610d.itsc.austin.ibm.com
ah1610c.itsc.austin.ibm.com

```

Figure 36. Hostlist File: /tmp/notes_install_hostlist

2. Create a new line in the file `/.rhosts` on `ah1610c` and on all other installation target hosts:

```
<install_host> root
```

`<install_host>` is the host you are running the installation process on.

For example, the file `/.rhosts` on `ah1610c` contains the line

```
ah1610d.itsc.austin.ibm.com root
```

3. Change permission of `/.rhosts` by issuing the following command:

```
chmod 700 /.rhosts
```

4. In Figure 25 on page 43 press the **Spacebar** to toggle the setting to `Install to [more than one computer]` (Figure 37).

```
=====
                        Lotus Notes Release 4.6.1c Installation
=====

Do you want to install to one computer, or to more than one computer ?

-----

Type h for help.
Type e to exit the Install program.
Press ESC to return to the previous screen.
Press the Spacebar to change the setting until you get the one you want.
Press TAB to accept a setting and continue to the next screen.

-----

>>> Install to [more than one computer]
```

Figure 37. Install to More Than One Computer

5. Press the **Tab** key to display the next screen (Figure 38 on page 51). This screen lets you select the hostlist file.

```

=====
Lotus Notes Release 4.6.1c Installation
=====

To install to more than one computer, you are now asked to specify
the path of a hostlist file. The hostlist file must contain the
hostnames of each computer on which you are installing Notes,
one name per line. The hostlist file may be created before starting
the Install program, or you can create or edit the list after
specifying the path of the hostlist file.

-----
Type h for help.
Type e to exit the Install program.
Press ESC to return to the previous screen.
Press ENTER to edit a setting.
Press TAB to accept a setting and continue to the next screen.
-----

Current hostlist filename :/tmp/notes_install_hostlist

```

Figure 38. Specifying the Hostlist File

6. Press the **Tab** key to display the next screen (Figure 39). This screen lets you escape to a shell if you want to change the hostlist file.

```

=====
Lotus Notes Release 4.6.1c Installation
=====

Specified hostlist filename: /tmp/notes_install_hostlist

If you need to create or edit the hostlist, you can escape to a shell.
When you are finished, exit the shell to return to the Install program.

-----
Type h for help.
Type e to exit the Install program.
Press ESC to return to the previous screen.
Press the Spacebar to change the setting until you get the one you want.
Press TAB to accept a setting and continue to the next screen.
-----

>>> Do you want to escape to a shell or continue ? [Escape to a shell]

```

Figure 39. Editing the Hostlist File

7. Press the **Tab** key, and the installation will continue with the screen shown in Figure 27 on page 44.

2.4 Setting Up the Lotus Domino Server on AIX

After you successfully install Lotus Domino, you must complete the `notes` setup program. During the `notes` setup program, Lotus Domino copies the server files

into the server data directory and creates the default server configuration file notes.ini.

To provide maximum performance and reduced network dependencies, the data directory should reside locally on your server as the default.

Below are the steps for setting up Lotus Domino Server on an AIX machine:

1. You must be on a graphical workstation.
2. If you are on an Xstation, don't forget to export the right `DISPLAY` variable, for example, `DISPLAY= ahl610d.itsc.austin.ibm.com:0.0; export DISPLAY`. Write access to the X-Host is required. For example, you could type the command:

```
xhost +<machinename>
```

where `<machinename>` is the name of the machine where you are running the Lotus Domino Server. In our example, we would type the command:

```
xhost +ahl610d
```

3. Log in as user `notes`.
4. You need to add two directories to the `PATH` statement in `.profile` in the home directory. The first directory is the one where the `notes.ini` file resides. This is usually `$HOME/notesr4`. The second directory you should add to the `PATH` statement is `/opt/lotus/bin`, as shown here:

```
PATH=/usr/bin:/etc.....:$HOME/notesr4:/opt/lotus/bin
```

5. If you are using CDE, please comment out the last line:

```
DTSOURCEPROFILE=true
```

in `.dtprofile`.

6. Change the directory to `/opt/lotus/bin`.

The `notes` setup program automatically starts the first time you type the command `notes`.

NOTE

If you need to rerun Lotus Notes setup, you can do so by typing `./notes -u`

7. Type `./notes`.

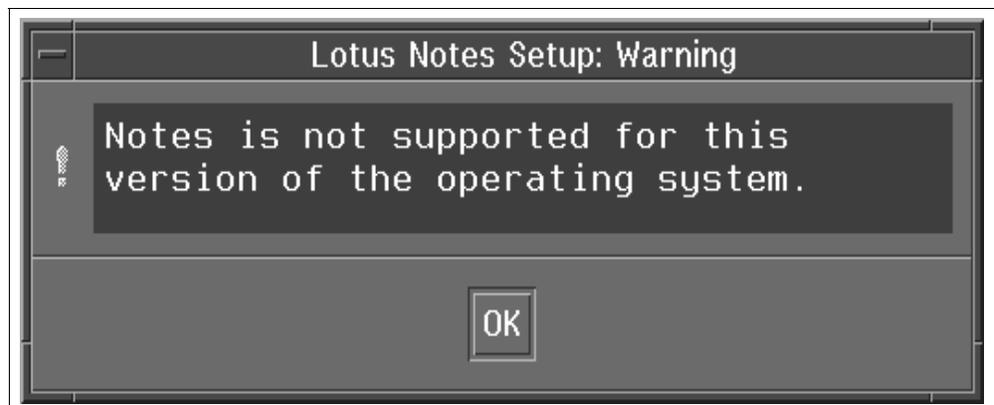


Figure 40. Lotus Notes Setup Warning Screen

8. At the time of writing this redbook, Lotus Domino Server version 4.6.1 is not certified on AIX version 4.3.1 by Lotus Corporation. It is expected to get certified soon. Click on the **OK** button to continue with the installation.

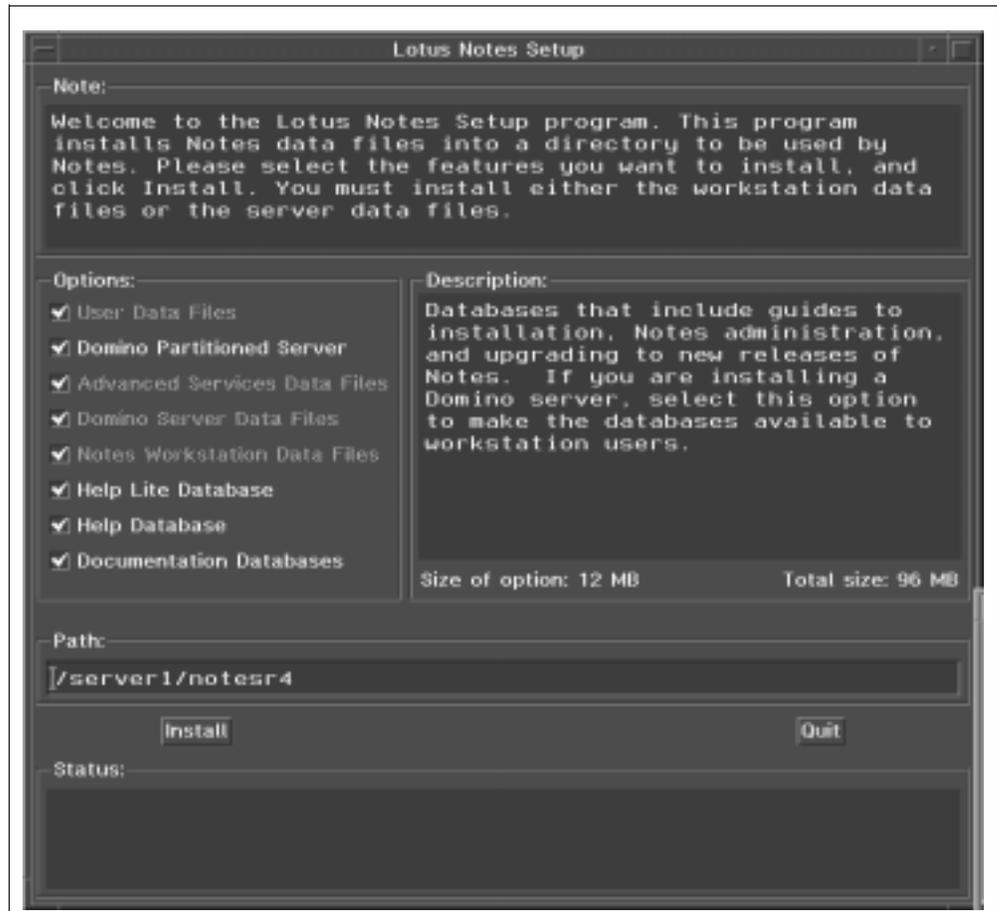


Figure 41. First Setup Screen for Lotus Domino Server with Advanced Services

If you have a license for Advanced Services, as we have, then you would want to select Advanced Services Data Files on the list of options. Your Lotus Notes Setup screen would then look like Figure 41.

In case you do not have the license for Advanced Services, please do not select **Advanced Services Data Files** from the list of options. Your Lotus Notes Setup screen would then look like Figure 42 on page 54.

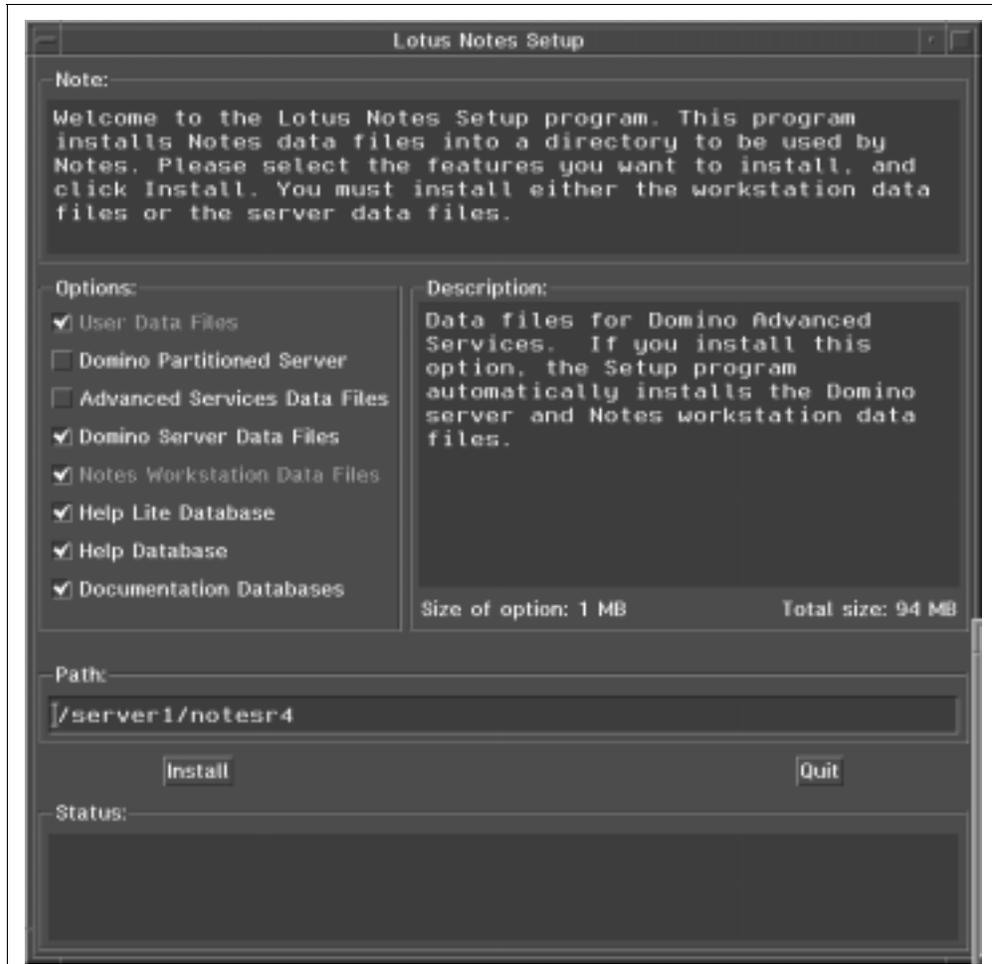


Figure 42. First Setup Screen for Lotus Domino Server without Advanced Services

9. Select the menu items on the Lotus Notes Setup screen (Figure 41) and click on the **Install** button. (See an explanation of these items in 2.4.1, "Lotus Notes Setup Options" on page 55.) After you have finished the setup, the following screen (Figure 43 on page 55) will appear.

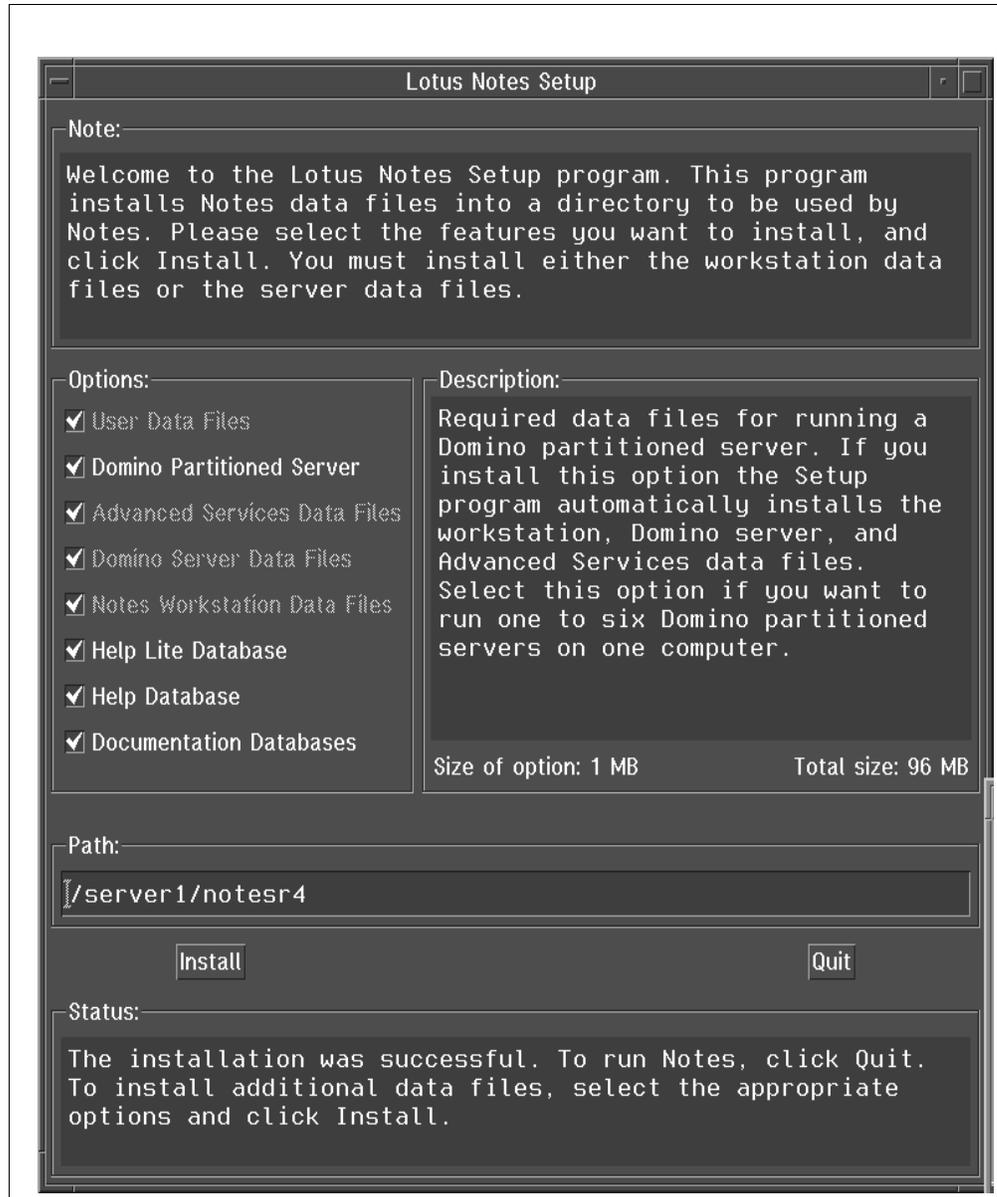


Figure 43. End Setup Screen for AIX

10. Click on the **Quit** button, as shown in Figure 43. The server setup program will start up now, as explained in 2.5, “Server Setup Program” on page 56.

2.4.1 Lotus Notes Setup Options

The following is the description for each of the setup options that you can select to install, as shown in Figure 41.

User Data Files: These files identify you and how you installed Lotus Notes on your host. By default, the setup program selects this option for you.

Domino Partitioned Server: This option allows you to partition your server. If you install this option, the setup program automatically installs the workstation,

Lotus Domino Server, and Domino Advanced Services. Select this option if you want to run one to six Lotus Domino partitioned servers on one computer.

Advanced Services Data Files: Installation of these files will provide you with the Advanced Server features, which include clustering, partitioned servers, and billing.

Domino Server Data Files: These files contain the program, data and template files needed to run the Lotus Domino Server program. These files are a superset of the Notes Workstation Data Files. These files (along with the User Data Files) are the minimum that a Lotus Domino *Server* needs to run.

Notes Workstation Data Files: These are necessary to run Lotus Notes as a workstation only. These files (along with the User Data Files) are the minimum that a Notes Workstation needs to run. If you are installing a Lotus Domino Server, the setup program automatically installs the workstation data files.

Help Lite Database: Select this option to install the Lotus Notes help database that provides context-sensitive information about most Lotus Notes features. If you are installing Lotus Notes on a server, you should install this feature so that workstation users can have access to this database. Help Lite is a part of the Help Database; so you do not need to install both.

Help Database: Select this option to install the Lotus Notes help database that provides complete documentation on Lotus Notes end-user features, as well as documentation on managing databases, creating applications and using LotusScript in Lotus Notes. If you are installing Lotus Domino on a server, you should install this feature so that workstation users can have access to this database.

Documentation Databases: These are databases that provide complete documentation on installing, administering, and upgrading to the new release of Lotus Notes. If you are installing Lotus Domino on a server, you should install this feature so that workstation users can have access to the documentation.

2.5 Server Setup Program

After you successfully installed Lotus Domino and ran the `notes` setup program, you must complete the server setup program. The server setup program starts immediately after the `notes` setup program. Please familiarize yourself with the following terms:

- **Domino Server ID:** Each Lotus Domino Server has a unique name that is maintained in its own ID file. Lotus Notes creates the server ID automatically during first server setup.
- **Notes user ID:** Each Lotus Notes user has a unique name that is maintained in its own ID file. Lotus Notes creates the user ID automatically when you register new users.
- **Notes organization certifier ID:** Each Lotus Notes domain has an organization certifier ID (`cert.id`). You use the organization certifier ID to create and certify additional organization unit certifiers and to register servers and users.

- **Public Address Book:** Each Lotus Notes domain has a Public Address Book. The Public Address Book contains, among other documents, a Server document for each server and a Person document for each user. In addition, you can create Group documents to establish relationships among servers and users for mailing and security purposes and create Connection documents to schedule data transfers among servers.

2.5.1 Starting the Server Setup Program

The server setup program must be completed before working with Lotus Notes. If you exit the setup before it completes, it will restart the next time you start Lotus Notes.

The following screen will appear after clicking on the **Quit** button, as shown in Figure 43 on page 55:

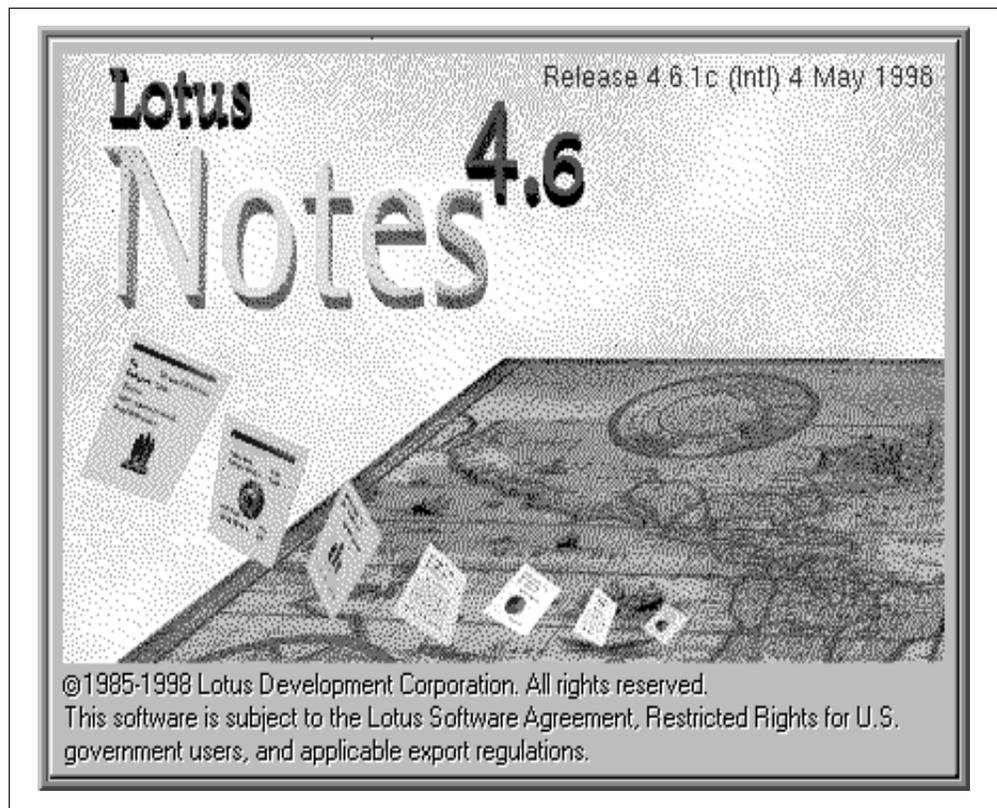


Figure 44. Starting Lotus Notes

Note

If you want to redo the server setup, type `notes -u`

2.5.2 Setting Up the First Server in Your Organization

1. On the Lotus Notes Server Setup screen (Figure 45 on page 58), select **The First Domino Server**, if this is the first server you are setting in your organization or if you are creating a new domain. If this is an additional server

in your organization, then you should go to 2.5.3, “Setting Up an Additional Server in Your Organization” on page 65.

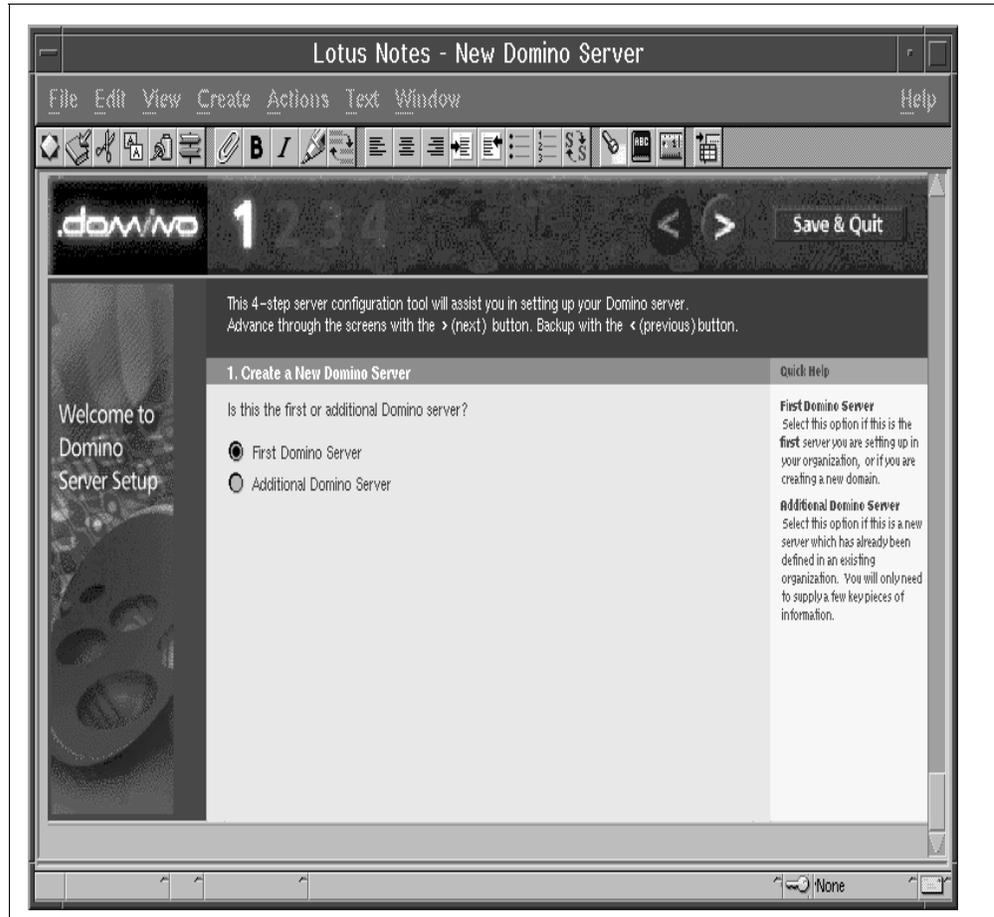


Figure 45. First Setup Screen

Click on the forward arrow (>) to go to the next screen, as shown in Figure 46.

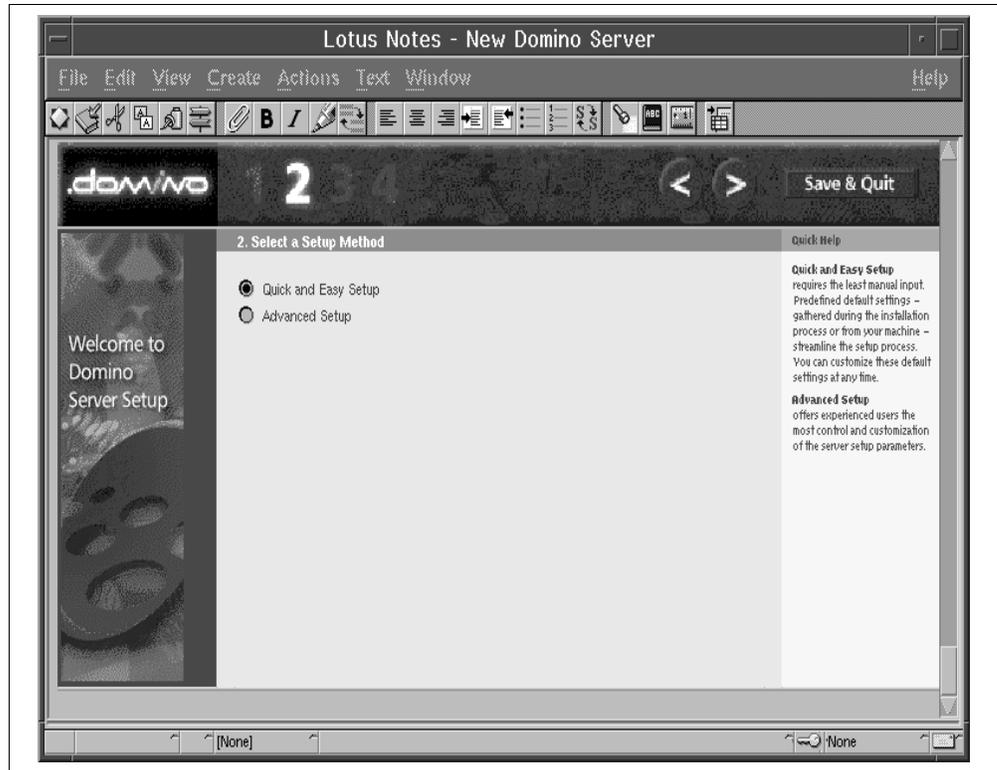


Figure 46. Second Setup Screen

This screen is used to select a setup method. In case you choose the **Quick and Easy setup**, you should later edit the `notes.ini` file to add the server task entries. In our example, we have selected **Quick and Easy Setup** option, as shown in Figure 46. You can refer to 2.5.3, “Setting Up an Additional Server in Your Organization” on page 65 in which we have selected **Advanced Setup** option so that you are familiar with this setup option also.

2. Click on the forward arrow (>) to go to the next screen, as shown in Figure 47.

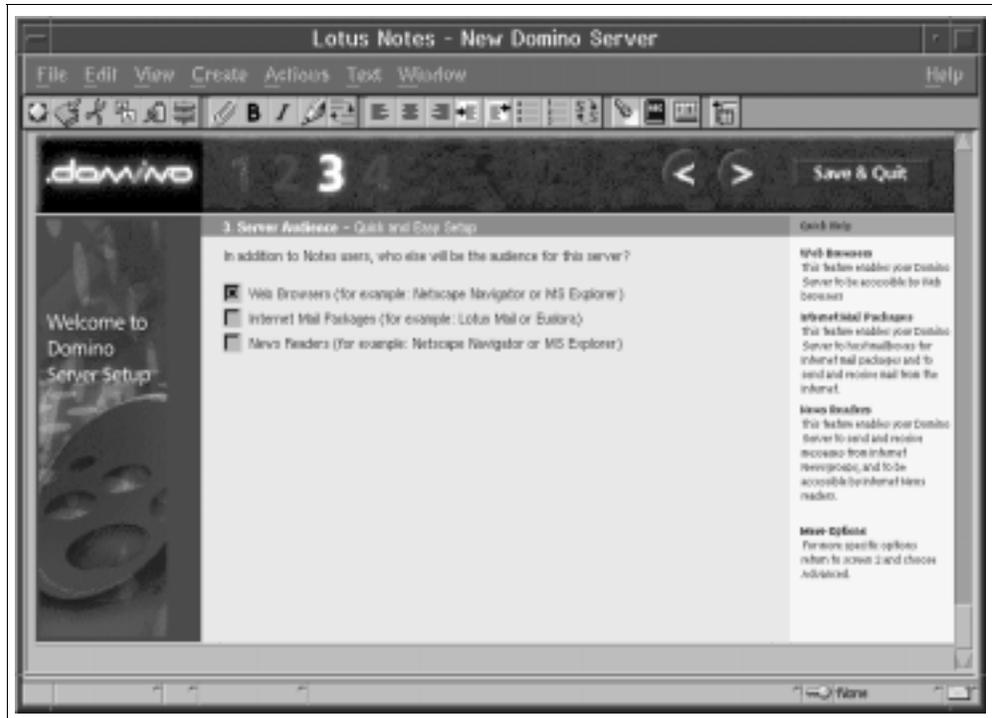


Figure 47. Third Setup Screen

This screen is used to select the Server audience in addition to Lotus Notes users. You can select the options that meet your requirements. In our example, we have selected the **Web Browser** option, as shown in Figure 47.

3. Click on the forward arrow (>) to go to the next screen, as shown in Figure 48.

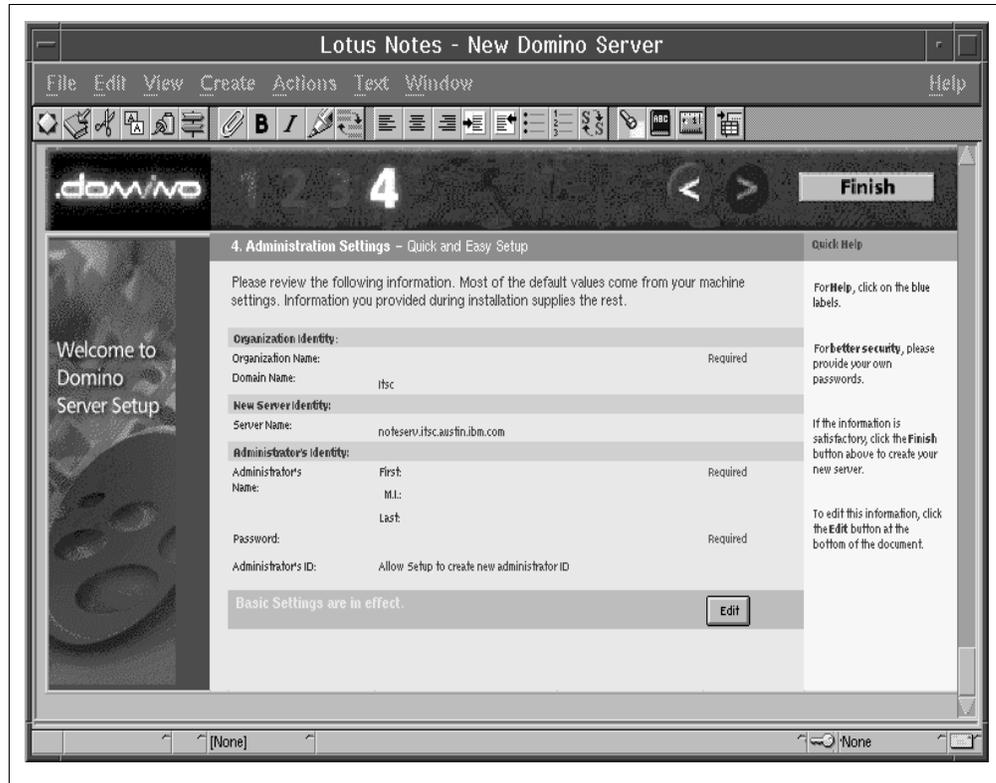


Figure 48. Fourth Setup Screen

This screen displays the system administration settings. Some of the fields such as Domain Name and Server Name are filled out based on the system hostname. The password fields are randomly generated and can be changed by selecting the desired field and typing over it. Enter your own password and don't forget that the Lotus Domino passwords are case-sensitive. For help, click on the blue labels.

Enter the Organization Name. If necessary, change the pre-filled Domain Name and Certifier Name. The Certifier Name becomes part of the hierarchical name of the Servers. It is recommended that the Organization Name and the Certifier Name are the same.

Domains are often confused with certificates. The confusion arises because most organizations use their company name for their domain and the company name also appears in their certificates.

Certificates and domains are two entirely separate concepts. A domain is a logical collection of servers. The servers can be running on multiple networks at multiple sites including international sites. Users within a domain can use different certificates, operating systems, and naming schemes. Certificates are used for authentication and are a security measure. Domains have nothing to do with security. It is possible to protect servers from one another within a single domain. You can change a Domain Name without recertifying users and servers, or recertify users and servers without changing the Domain Name. It is a good practice to create one domain for your production data servers, one domain for your application developers, at least one test domain (three, if you are building an inter-enterprise applications), and an external domain.

Server names are visible to the user and should provide some clue as to the data stored on that particular server. If you are using TCP/IP, your server name should be identical to your TCP/IP hostname. If you do not want the server name to be the same as your machine's network name (hostname), you must enter an alias name into the /etc/hosts file.

For example, if the hostname was ah1610d and the Domain Server name was noteserv, then you must add the following entry to /etc/hosts file, as shown in Figure 49.

```
# Internet Address      Hostname      # Comments
127.0.0.1              loopback localhost      # loopback (lo0) name/address
9.3.1.241              ah1610d.itsc.austin.ibm.com      noteserv
```

Figure 49. Host File /etc/hosts

We recommend that you either make the Lotus Domino server name and the TCP/IP host name the same or make an alias for the Lotus Domino Server name in the TCP/IP Domain Name Server(s) (DNS). This will save you from updating the /etc/hosts file on every Notes Workstation client machine running TCP/IP.

If the hostname is a fully qualified name, change the **Server Name** field to the short TCP/IP name.

Enter the administrator's first name and last name in the appropriate fields and enter your own Administrator Password.

4. Click on the **Edit** button to go to the next screen, as shown in Figure 50.



Figure 50. Edit Screen (for Making Changes)

This screen allows you to make changes in any of the fields shown on this screen and gives you an option to create new Certifier ID, Server ID, and Administrator ID or use the existing IDs.

5. Click on the **OK** button to go to the next screen, as shown in Figure 51.

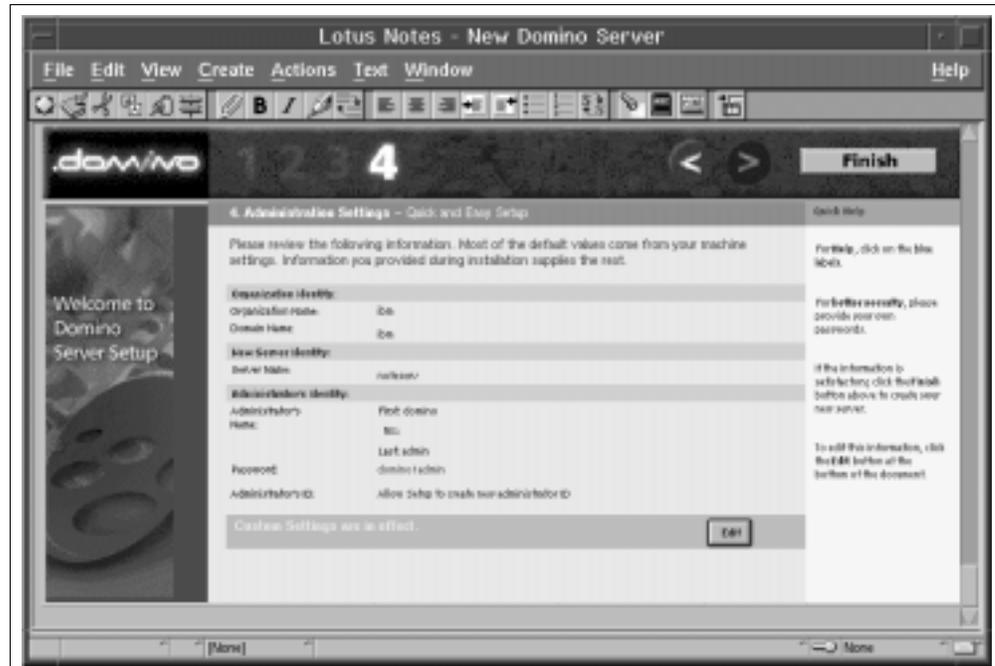


Figure 51. Fourth Setup Screen (Updated)

This screen allows you to review the information you entered.

6. Click on the **Finish** button to go to the next screen, as shown in Figure 52.



Figure 52. Time Zone Setup Screen

This screen allows you to select your time zone. In our example, we have selected the **Central Standard Time** as our time zone.

7. Click on the **OK** button to go to the next screen, as shown in Figure 53 on page 64.



Figure 53. Congratulations!

This screen shows the successful completion of setting up of your Lotus Domino Server. Please ensure to write down the Certifier password and Administrator password as written in this screen. You have three choices to select from:

- **Exit to Workspace** -- The local Notes Workstation for AIX is now running and you can use it for administration.
 - **Launch Domino Server** -- You can start the new server.
 - **Register Users** -- You can start to register Lotus Notes Users.
8. Click on any one of these buttons to end the Lotus Domino Server Setup. In our example, we selected the **Exit to Workspace** option, and the next screen was displayed, as shown in Figure 54 on page 65.



Figure 54. Password Verification Screen

Please ensure that you note the passwords.

9. Click on **Yes** button. Since we had selected the **Exit to Workspace** option earlier, we exited to the workspace.

2.5.3 Setting Up an Additional Server in Your Organization

Once you have your first Lotus Domino Server up and running, you may want to add additional servers within your organization. The following steps will take you through this procedure.

When you press **Quit** button on the screen, shown in Figure 43 on page 55, the screen, as shown in Figure 55 on page 66, is displayed.

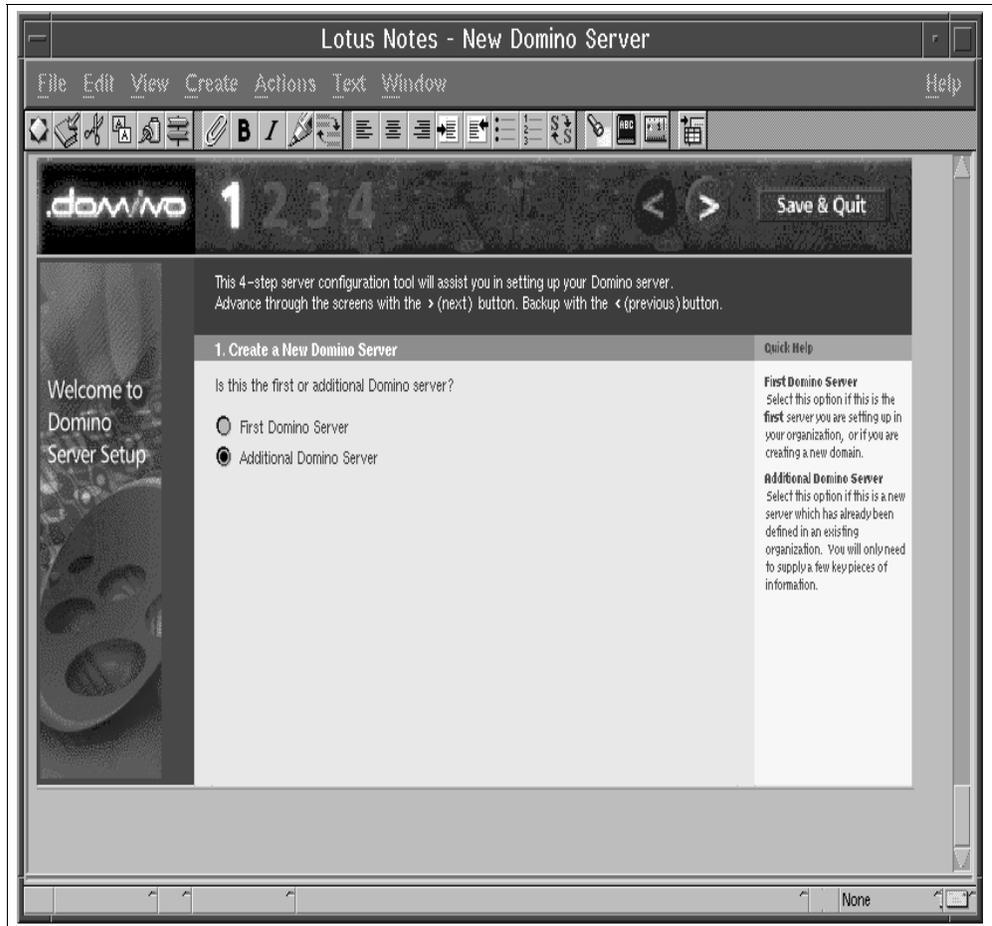


Figure 55. First Setup Screen for Additional Server

1. First, you must create a Lotus Notes user ID on your existing server for the new servers you will be installing (see 4.1, “User Registration” on page 95).
2. Select **Additional Domino Server** on the screen, as shown in Figure 55, since your primary server already exists.
3. Click on the forward arrow (>) to go to the next screen, as shown in Figure 56 on page 67.

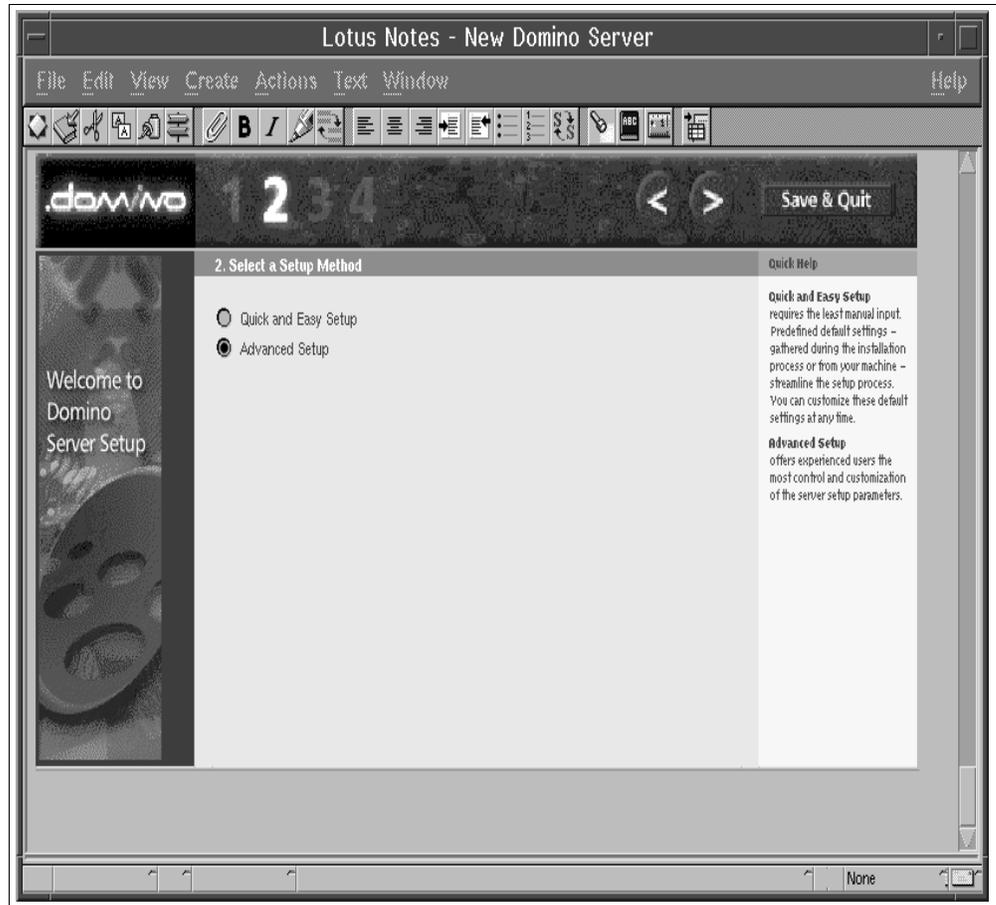


Figure 56. Second Setup Screen for Additional Server

This screen is used to select a setup method. In this example, we have selected the **Advanced Setup** option. Since, in the First Domino Server Setup, we had selected the **Quick and Easy Setup** option, for the Additional Server Configuration, we have selected the **Advanced Setup** option to familiarize you with this option also.

4. Click on the forward arrow (>) to go to the next screen, as shown in Figure 57 on page 68.

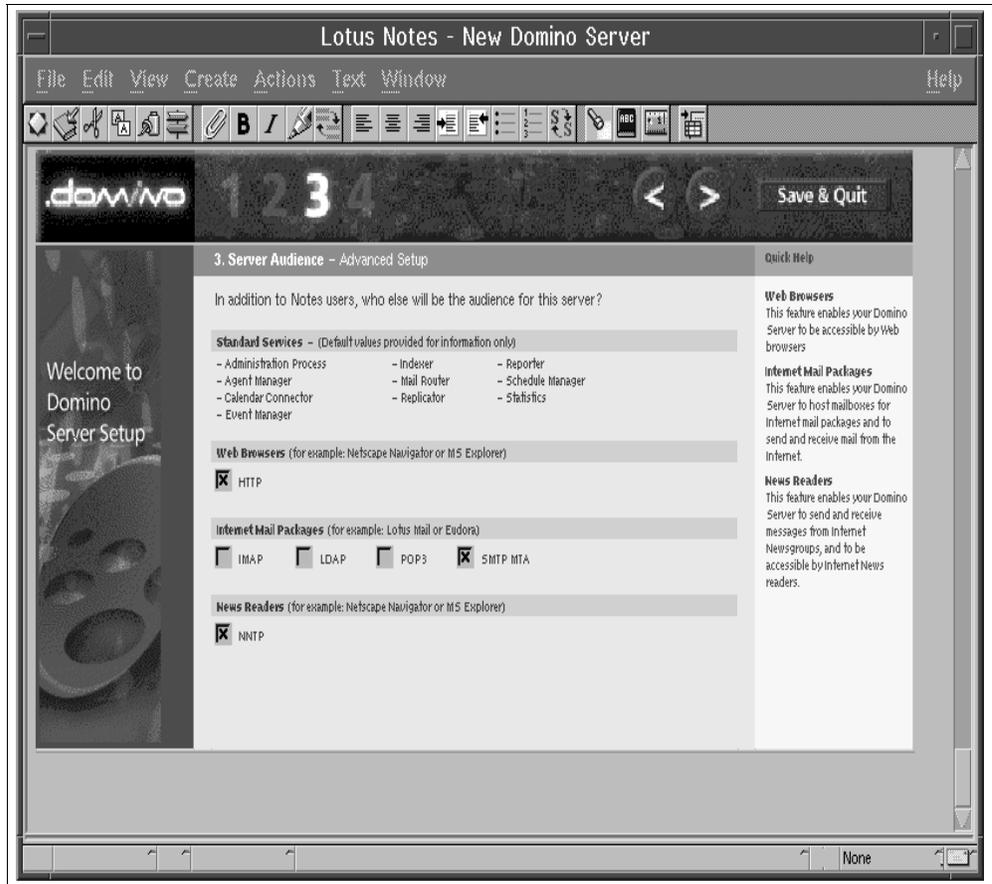


Figure 57. Third Setup Screen for Additional Server

Check the boxes for the server tasks that you need:

- **HTTP** for Web Server
 - **IMAP, LDAP, POP3** and **SMTP MTA** for Internet Mail packages
 - **NNTP** for Internet Newsgroup Services.
5. Click on the forward arrow (➤) to go to the next screen, as shown in Figure 58 on page 69.



Figure 58. Fourth Setup Screen for Additional Server

This screen displays the system administration settings.

Enter the name of the new server. By default, this field is filled out based on the system hostname. You can edit this field, if you want to. If you do not want the server name to be the same as your machine's network name (hostname), you must enter an alias name into the /etc/hosts file.

Enter the location of the Domain Address Book from which the additional server will get the address book. Also select the connection protocol between the additional server and the source of Domain Address Book location.

6. If on the Third Setup Screen for Additional Servers (Figure 57 on page 68), you selected some Internet tasks (HTTP, IMAP, and so forth), you must click on the **Add Proxies** button to configure the proxy server.



Figure 59. Proxy Server Configuration

The screen shown in Figure 59 is displayed when you configure a proxy server by clicking on the **Add Proxies** button on the Fourth Setup Screen for additional Servers (Figure 58 on page 69).

To access the Internet from this server, you should use the proxy and/or SOCKS servers of your organization. Ask your system administrator for the names or the IP addresses of these servers.

7. Type the proxy and/or SOCKS server names and ports in the appropriate fields and click on the **OK** button.
8. Click on the **Finish** button to go to the next screen, as shown in Figure 60 on page 71.

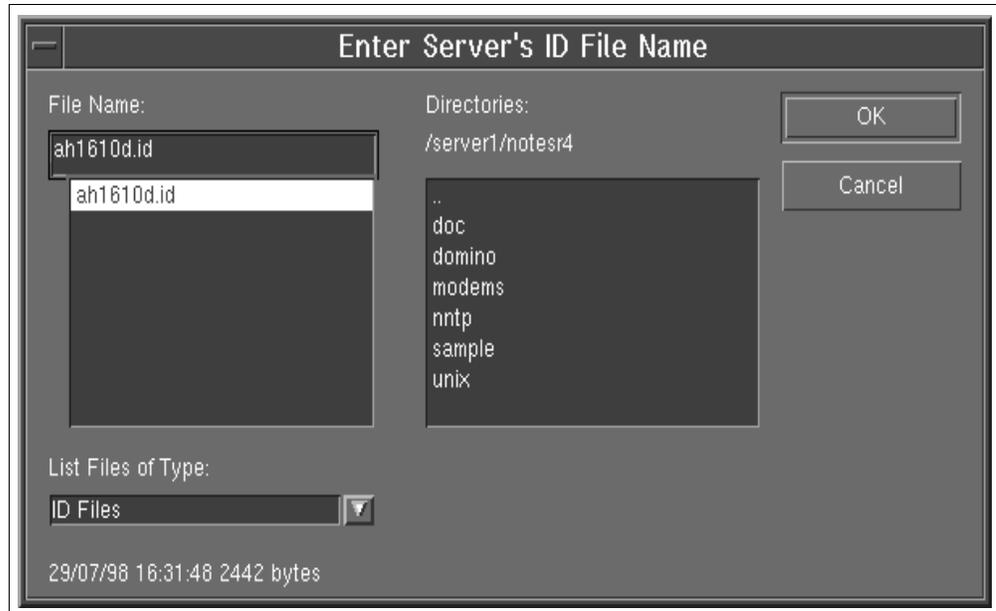


Figure 60. Entry Screen for Server's ID Filename

9. Enter the directory name and the Server's ID file name and click on the **OK** button to go to the next screen, as shown in Figure 61 on page 72.



Figure 61. Congratulations!

This screen shows the successful completion of setting up of your Additional Domino Server. You have three choices to select from:

- **Exit to Workspace** -- The local Notes Workstation for AIX is now running and you can use it for administration.
- **Launch Domino Server** -- You can start the new server.
- **Register Users** -- You can start to register Lotus Notes users on the new server.

10. Click on any one of these buttons to end the Lotus Domino Server Setup. In our example, we selected **Exit to Workspace** option to end the setup program.

2.6 Setting Up Network Protocols

After you have successfully installed Lotus Domino on AIX using a local area network, you may want to install more than one network protocol on an AIX Lotus Domino Server. In any case, you will need to follow the final settings steps.

2.6.1 Setting Up an Additional Network Protocol

In our scenario, we are installing more than one network protocol on an AIX Lotus Domino Server:

1. To set up the additional network on AIX, please refer to ef!EF.
2. Log in as user `notes`.
3. Shut down the Lotus Domino Server if it is running. (This step is very important. The Lotus Domino Server *must* be down before you can successfully add another network protocol.)
4. Start the Notes Workstation by typing the command `notes`.
5. Choose **File -> Tools -> User Preferences**.
6. Select the **Ports** icon (Figure 62).

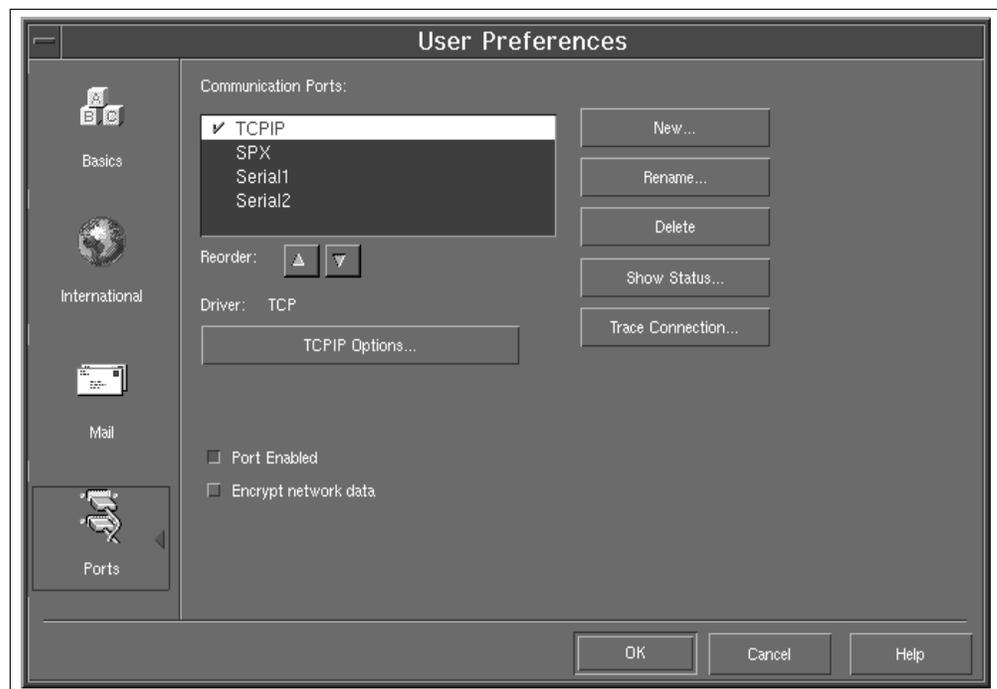


Figure 62. Select Additional Network Protocol

7. Click on the appropriate network protocol and click on **Port Enabled**.
8. Click on **OK**.

2.7 Final Settings

You must perform the following steps *before* you start the server for the *first* time:

1. Start the Workstation as user `notes` with the command `notes`.
2. Select **File -> Tools -> Server Administration**.
3. Select **Servers -> Servers View**.
4. Select the server in the selection list and click on **Edit Server**.
5. Click on **Network Configuration** and change the Port to `TCPIP` or `SPX`.

Note

If you use multiple network protocols, add an additional line, as shown in Figure 63 on page 74



Figure 63. Network Configuration Screen

6. Click on the **Save and Close** button to save these settings and close this screen.
7. Log out and log back in as user notes.
8. Start the server with the command: `server`.

Chapter 3. Installing a Notes Workstation

This chapter outlines how to install and set up Lotus Notes for the AIX client.

3.1 Installation of Lotus Notes R4.6 Workstation on AIX

For system requirements, refer to section 2.1, "Hardware and Software System Requirements" on page 23.

3.1.1 Preparing the Environment for the Installation

The steps for preparing for the installation are listed below. If you are installing Lotus Notes on multiple hosts, you must perform all these steps on each of the target hosts.

1. Log onto the AIX machine as the `root` user.
2. Check that `/usr/sbin` is in your default path. Many of the AIX system commands that we'll be using to set up the machine are found in `/usr/sbin`.

Type in the command `echo $PATH` to see if `/usr/sbin` is in your default path.

If `/usr/sbin` is not in your default path, you can add it to your default path by editing the `PATH` statement in `/etc/environment`.

3. Check to see if there is enough space on an existing volume group for the installation code. You will need about 150 MB for the installation code in `/opt/lotus`. You can either use space within an existing volume group, for example, `rootvg`, or you could create a new volume group, for example, called `dominovg`, specifically for the binary installation code.

Creating a new volume group for the binary code would allow for easier backup/recovery or migration to a different client. In case of a hardware failure or server upgrade, you would simply export the volume group, put the disk on another machine, and import the volume group again.

To see if you have enough space on an existing volume group, type the command `lsvg <volume_group>`. To check the `rootvg`, type `lsvg rootvg` (see Figure 64).

```
VOLUME GROUP:  rootvg                VG IDENTIFIER:  00612519a6ebe256
VG STATE:      active                PP SIZE:       4 megabyte(s)
VG PERMISSION: read/write           TOTAL PPs:    515 (2060 megabytes)
MAX LVs:       256                   FREE PPs:     285 (1140 megabytes)
LVs:          12                      USED PPs:      230 (920 megabytes)
OPEN LVs:     11                      QUORUM:        2
TOTAL PVs:    1                       VG DESCRIPTORS: 2
STALE PVs:    0                       STALE PPs:     0
ACTIVE PVs:   1                       AUTO ON:       yes
MAX PPs per PV: 1016                 MAX PVs:       32
```

Figure 64. `lsvg rootvg` (Free Space: 1140 megabytes = 4 x 285)

3.1.2 New Volume Group on the Workstation for the Installation Software

If you don't want to create a new volume group for the installation code, you can skip to 3.1.3, "The Logical Volume on the Workstation for the Installation Software" on page 77.

To create a new volume group to contain the installation software, type in the command `smitty mkvg` to display the **Add a Volume Group** screen (Figure 65):

```

                                     Add a Volume Group

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

                                     [Entry Fields]
VOLUME GROUP name                    [dominovg]
Physical partition SIZE in megabytes  4
* PHYSICAL VOLUME names                [hdisk1]
Activate volume group AUTOMATICALLY   yes
  at system restart?
Volume Group MAJOR NUMBER              []
Create VG Concurrent Capable?          no +
Auto-varyon in Concurrent Mode?       no +

F1=Help      F2=Refresh      F3=Cancel      F4=List
F5=Reset     F6=Command     F7=Edit       F8=Image
F9=Shell     F10=Exit       Enter=Do
```

Figure 65. Add a Volume Group on the Workstation Screen

In our example, we are calling our Volume Group, `dominovg`, and we are creating it on our hard disk called `hdisk1`. Depending on the size of your hard disk you may have to specify another (larger) physical partition size.

3.1.3 The Logical Volume on the Workstation for the Installation Software

In AIX, it is a better practice to create a logical volume and then add the journaled filesystem on this logical volume. By following this procedure, we can place the logical volume and the filesystem at the desired portion of the hard disk, thus improving the system performance.

The following steps and screens will show you how we created the logical volume for the Installation software:

1. Type `smitty mklv` to display the **Add a Logical Volume** screen (Figure 66).

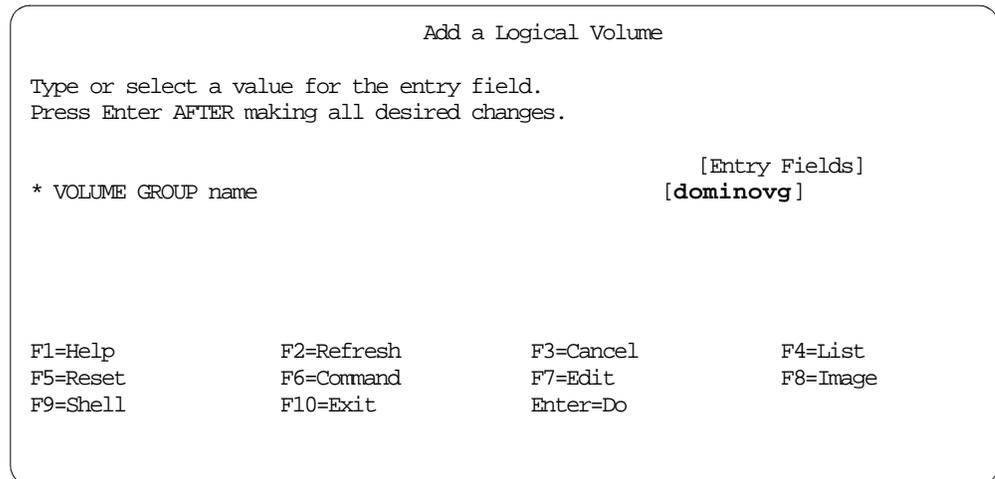


Figure 66. Add a Logical Volume on the Workstation Volume Group Name Screen

2. Select the name of the Volume Group in which you want to place this logical volume. In our example, we select the volume group name `dominovg`.
3. Create the logical volume for the installation software. In our example, we named it `noteslv`, size: 160 MB.

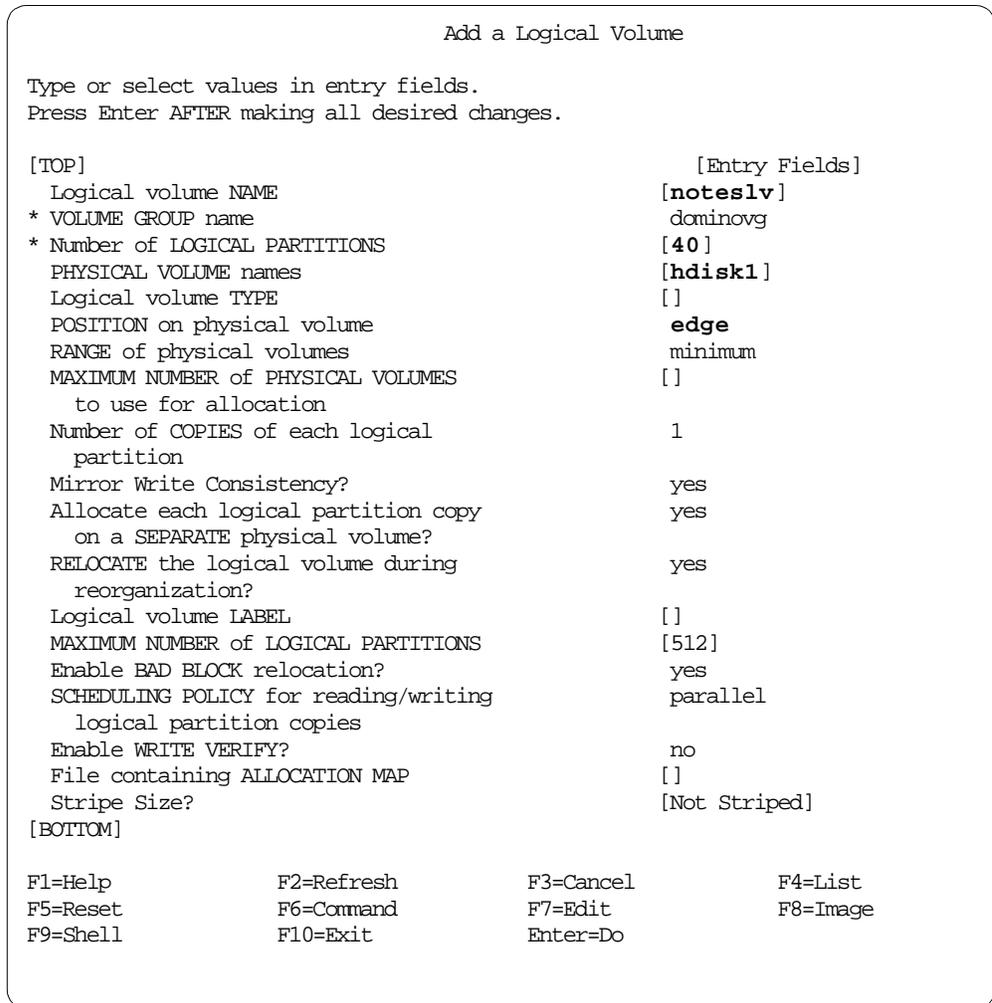


Figure 67. Add a Logical Volume on the Workstation Screen

The placement of data on the disk affects its performance. The closer the data is to the center of the disk the better. This alleviates the problem of disk arm travel. Since your Lotus Domino binaries are read-only and only accessed when starting the server or the workstation, you can keep them at the edge of the disk.

3.1.4 Create the Logical Volume for the User Database

The following steps and screens will show you how we created the logical volume for the user data.

1. Type `smitty mklv` to display the **Add a Logical Volume** screen (see Figure 68 on page 79).

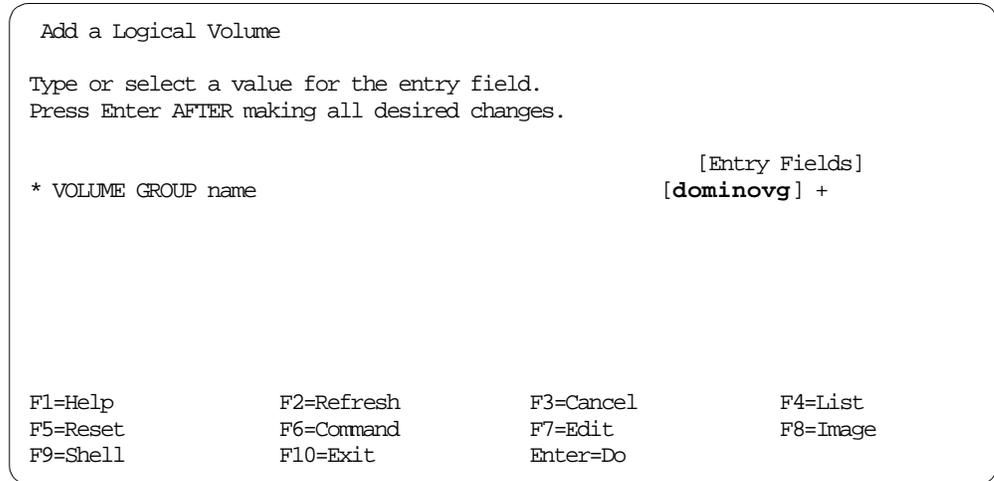


Figure 68. Add a Logical Volume on the Workstation to Enter Volume Group Name

Select the name of the volume group in which you want to place this logical volume. In our example, we select the volume group name `dominovg`.

2. Create the logical volume for the installation software. In our example, we named it `wsdatalv`, size: 80 MB.

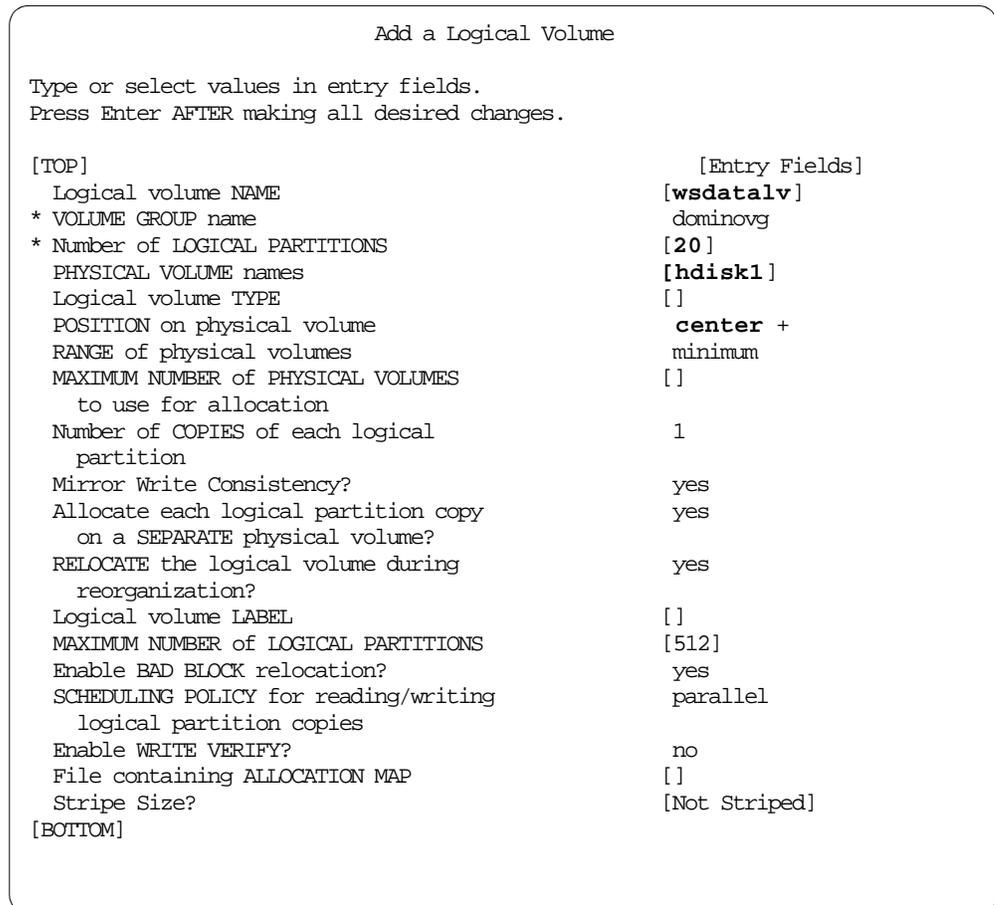


Figure 69. Add a Logical Volume on the Workstation Screen

The placement of data on the disk affects its performance. The closer the data is to the center of the disk the better. This alleviates the problem of disk arm travel. So we chose to place the user data at the center of the disk.

3.1.5 Create and Mount the File System on the Workstation

If you don't use the default directory where Lotus Notes installs the software (/opt/lotus), the install program creates symbolic links from /opt/lotus to the install directory that you specify. The final directory name of the path must be lotus.

In AIX, we need to create a file system to contain the installation binary code which is copied from the CDROM to the hard disk on your AIX system. The following steps and screens will show you how we created this file system on the logical volume.

1. Create a file system for the installation software. In our example we called it /usr/domino, size: 160 MB.

- Type `smitty crjfselv` to display the **Add a Journaled File System on a Previously Defined Logical Volume** screen (Figure 70).

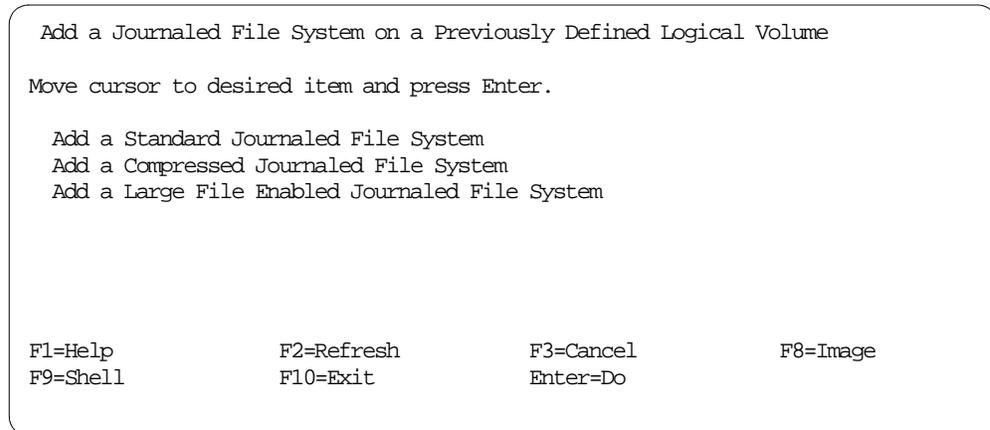


Figure 70. Add a Journaled File System on the Workstation

- When you select **Add a Standard Journaled File System** by pressing the **Enter** key, the screen, as shown in Figure 71, is displayed.

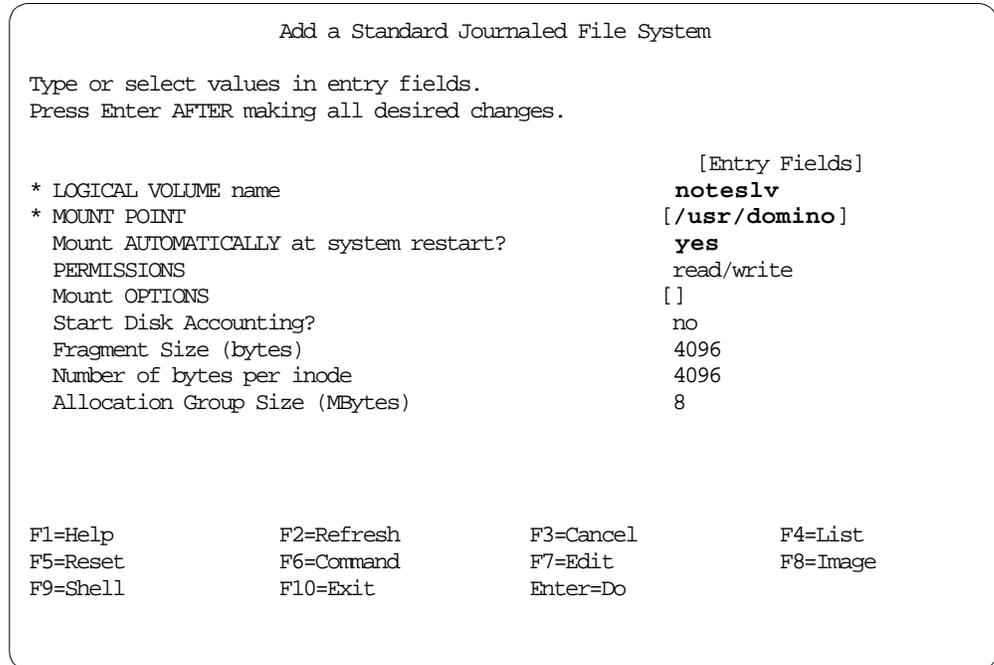


Figure 71. Add a Standard Journaled File System on the Workstation Screen

- Press **Enter** to create the filesystem.
2. Mount the filesystem just created for the installation software. In our example, it is named `/usr/domino`.
 - `mount /usr/domino`

3.1.6 The File System for the User Database on the Workstation

Note

You do not have to create a separate file system for the User Database. This is an optional step. If you choose not to create a file system for the User Database, by default, the setup process will put the User Database in the Lotus Notes userid's `$HOME/notesr4` directory.

If you do choose to create a file system for the User Database, for best performance, you should use disk-striping technology for this file system.

1. Create the file system for the User Database. In our example, we call it `/home/michael/notesr4`, size: 80 MB.
 - Type `smitty crjfslv` to display the **Add a Journaled filesystem on a Previously Defined Logical Volume** screen (Figure 72 on page 82).

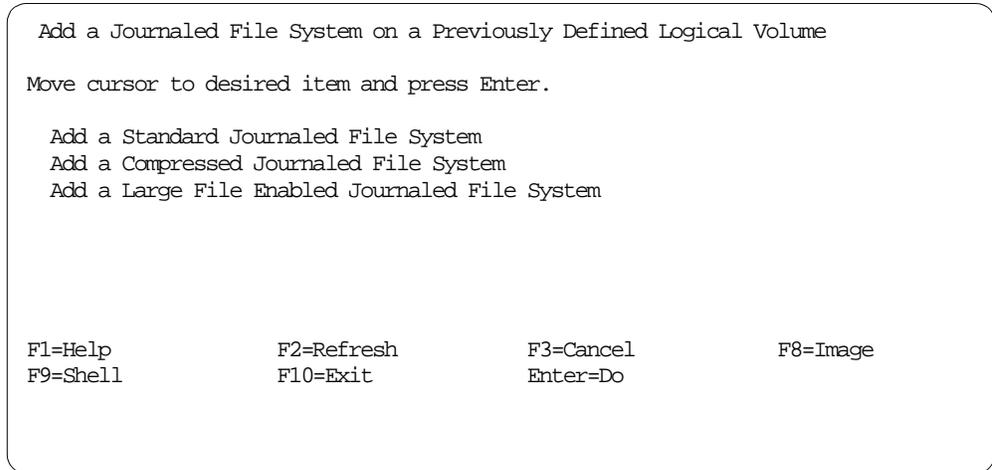


Figure 72. Add a Journaled File System on the Previously Defined Logical Volume

- When you select **Add a Standard Journaled File System** by pressing the **Enter** key, the screen, as shown in Figure 73, is displayed.

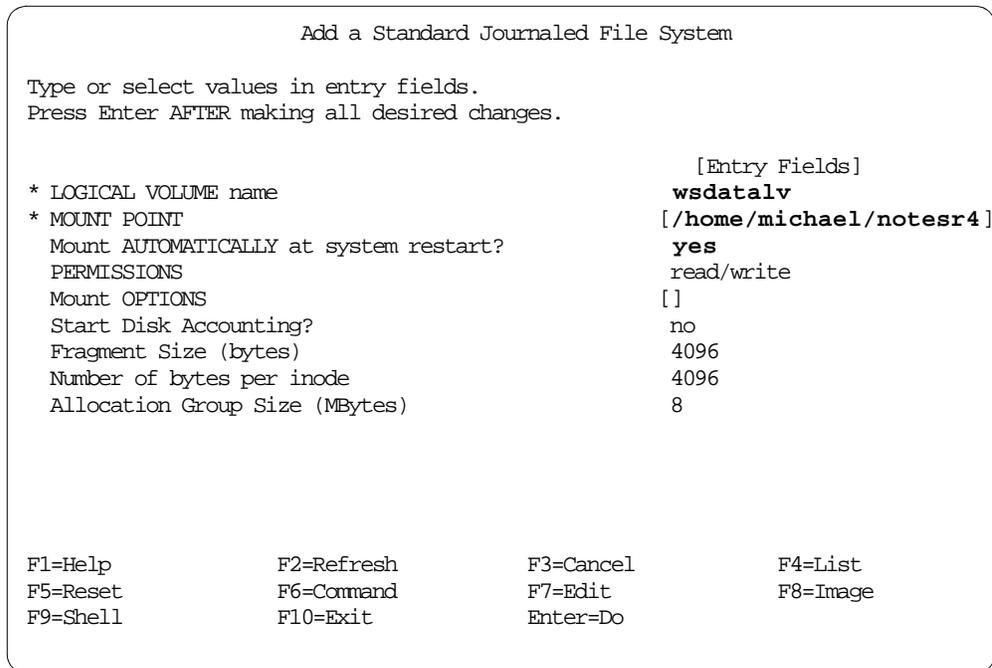


Figure 73. Add a Standard Journaled File System on the Workstation Screen

- Press **Enter** to create the filesystem.
2. Mount the filesystem just created for the Lotus Domino Server Databases, in our example, it is named `/home/michael/notesr4`:
 - `mount /home/michael/notesr4`
 3. Create an AIX group account for Lotus Notes by issuing the command:

```
mkgroup -A notes
```
 4. Create an AIX user account for ownership of the Lotus Notes software by issuing the command:

```
mkuser pgrp=notes groups='staff, notes' home=/home/notes gecos="Lotus
Notes User" notes
```

5. Define a password for user `notes` by issuing the command:

```
pwdadm notes
```

6. Change ownership of the Lotus Notes `/usr/lpp/lotus` and `/notes` file systems by issuing the command:

```
chown -R notes.notes /usr/domino
chown -R notes.notes /home/michael/notesr4
```

7. To mount the CD-ROM type:

```
mount -r -v cdrfs /dev/<device_name> <cd_mount_point>
```

An example of this is the command

```
mount -r -v cdrfs /dev/cd0 /cdrom
```

where:

<device_name> is `cd0` and <cd_mount_point> is `/cdrom`

If the <cd_mount_point> does not exist, you can create it by using the command `mkdir <cd_mount_point>`, for example `mkdir /cdrom`

For setup of the network (LAN), please refer to 2.2.6, "Setting Up a Local Area Network (LAN)" on page 32.

For installation of Lotus Notes R4.5 Workstation on AIX, please refer to 2.3, "Starting the Installation" on page 36.

As shown in Figure 18 on page 39, press the **SpaceBar** to change the installation option from `[Domino Server]` to `[Notes Workstation]`.

3.1.7 Setting Up the Lotus Notes R4.6 Workstation on AIX

After you successfully installed the Notes Workstation, you must complete the Notes setup program for every user on this system who wants to use the Notes Workstation. During the Notes setup program, Lotus Notes copies the necessary files into the data directory. By default this directory is `$HOME/notesr4`, where `$HOME` is the environment variable specifying the home directory of the user. The Notes setup program also creates the default Lotus Notes configuration file called `notes.ini` and places it in `$HOME`.

Note

To provide maximum performance and reduce network dependancies, the data directory should reside locally on your workstation.

Below are the steps for setting up the Notes Workstation on the AIX workstation:

1. You have to be on a graphical workstation.
2. If you are on an Xstation, check that you have the right `DISPLAY` variable, for example: `DISPLAY=ah1610d.itsc.austin.ibm.com:0.0; export DISPLAY` (You also must have write access to the X-Host, for example, through the command:

```
xhost +<machinename>).
```

Repeat the following steps for each new user on the system.

1. Log in as root user.
2. Check if there is enough space in the home directory for your personal databases (minimum free space > 5 MB / user), in case you choose to place the user databases in their home directories, by issuing the following command:

```
df -k $HOME
```

In our example, we have created a separate filesystem (/home/michael/notesr4) for placing the user database.

3. Expand the file system /home in case you decide to place user databases in the /home filesystem, if necessary, by issuing the following command: `chfs -a size=+<number_of_512_byte_blocks> /home`. This command increases the size of the /home file system by <number_of_512_byte_blocks>.
4. Create a personal user, if one doesn't already exist. For example, create a user `michael` by issuing the command:

```
mkuser groups='staff, notes' gecos="Lotus Notes User" michael
```

5. Define the password for user `michael` by issuing the command:

```
pwdadm michael
```

6. Log in as your predefined user, for example, `michael`.
7. Add the data directory and /opt/lotus/bin to the PATH statement in `.profile` in the home directory:

```
PATH=/usr/bin:/etc.....:$HOME/notesr4:/opt/lotus/bin:
```

Note

If you plan to the Notes Workstation on the same machine as the server or if you plan to run multiple Notes Workstations on the same machine, then please refer to 6.4, "Environment Variables" on page 168.

8. If you are using CDE, please comment out the last line in `.dtprofile`:

```
DTSOURCEPROFILE=true
```

9. Change the directory to `/opt/lotus/bin`.

The Lotus Notes setup program automatically starts the first time you type the command `notes`

Note

If you need to rerun Lotus Notes setup, you can do so by typing `./notes -u`

10. Type `./notes`.

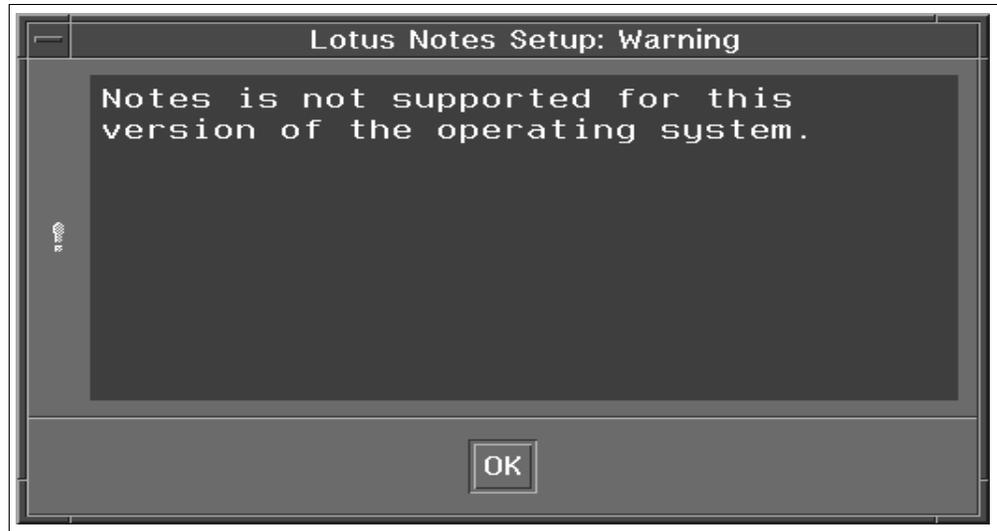


Figure 74. Warning message screen

11. Lotus Domino Server Release 4.6.1 is not certified on AIX 4.3.1 by Lotus Corporation. Beginning with Release 4.6.2, the Lotus Notes Client and Domino Server for IBM AIX 4.3 is a certified and supported platform. Although not certified at this time, AIX 4.3.1 is a supported platform. Click on the **OK** button to continue with the installation.

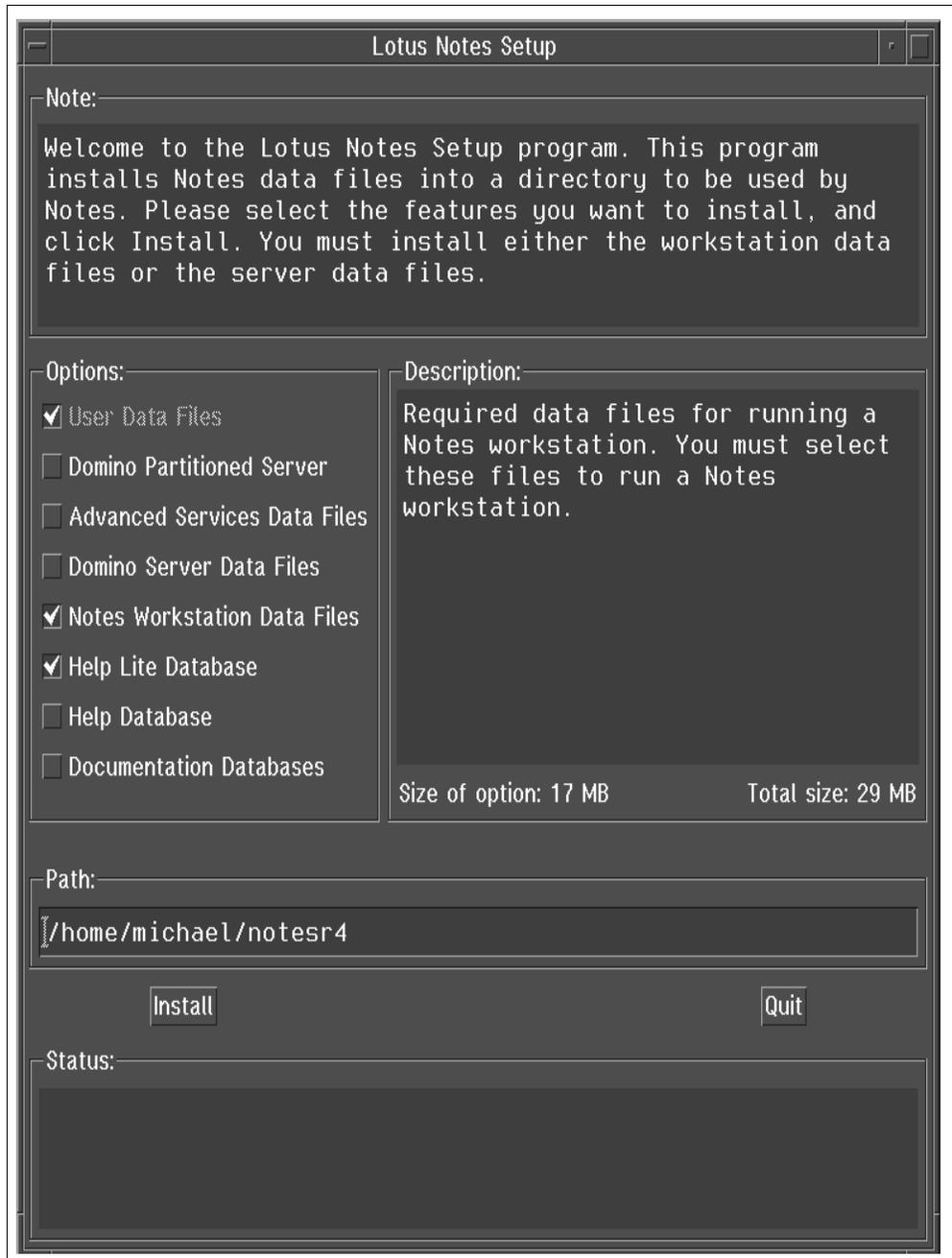


Figure 75. Lotus Notes Setup Screen

12. Select the options on the Lotus Notes Setup screen (Figure 75) that you want to install and click on the **Install** button.

Lotus Notes Help Lite should be installed if you plan to use Lotus Notes remotely.

Lotus Notes Release 4 Help is not necessary since this database is accessible from a server.

After you have finished the setup, as shown in Figure 75 on page 86, the following screen (Figure 76) will appear:

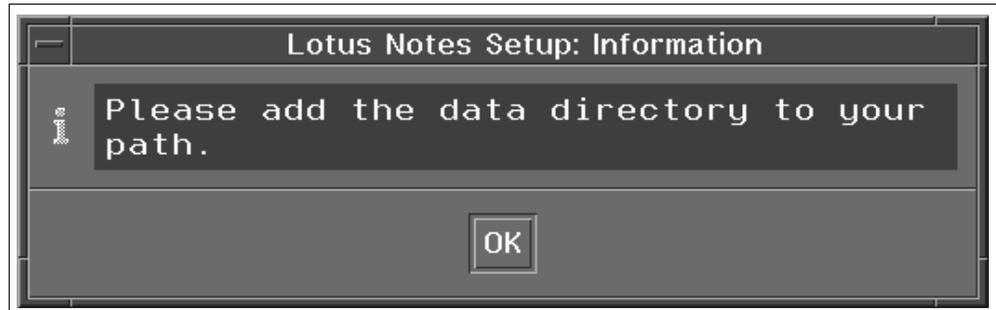


Figure 76. Information Screen

13. Click on the **OK** button since this has been done in Step 7 on page 84.

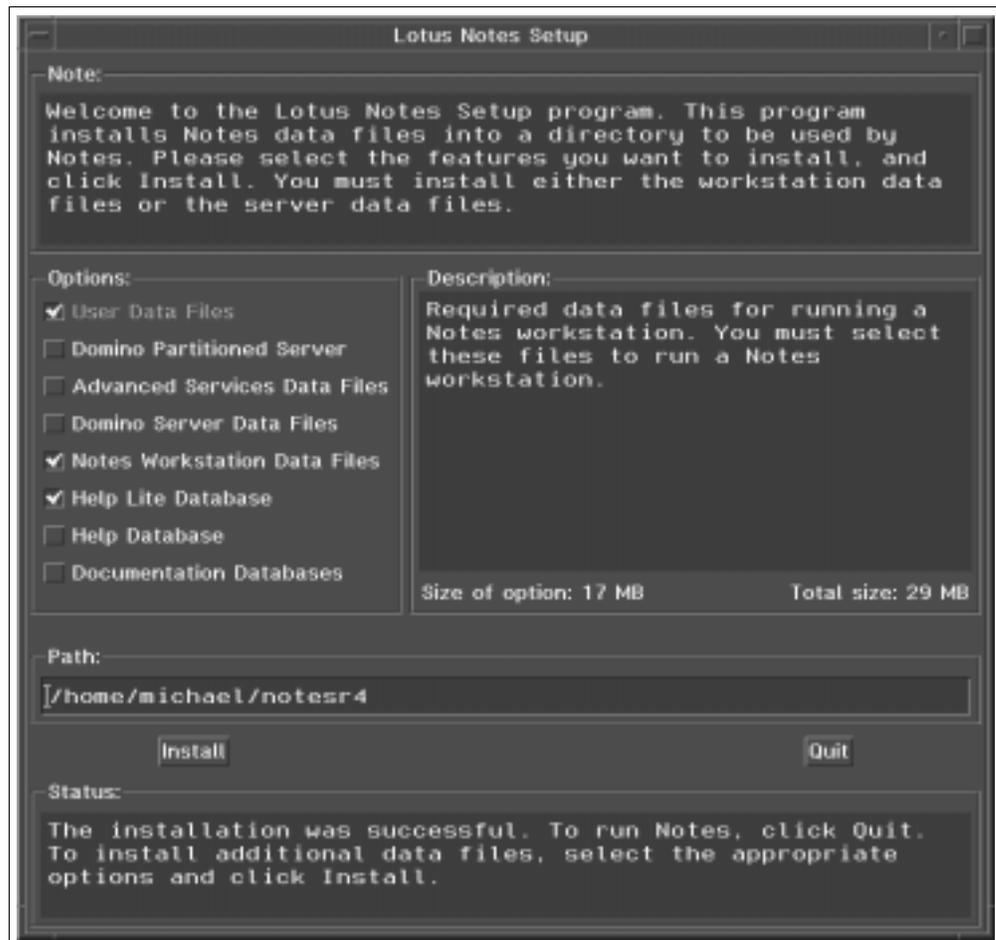


Figure 77. Lotus Notes Setup Status Screen

14. Click on **Quit** at the Lotus Notes Setup Status screen (Figure 77).

3.1.8 Workstation Setup Program

This section covers the workstation setup program that must be completed before Lotus Notes can be run properly. You must complete the workstation setup program before working with Lotus Notes. If you exit the setup before it completes, the setup program will restart the next time you start Lotus Notes.

Note

Users must be registered on the Lotus Domino Server before you continue the workstation setup. That is, a personal account must be generated on the Lotus Domino Server by the Lotus Notes administrator before you run the Notes Workstation setup program on the clients. See 4.1, "User Registration" on page 95, for more information.

The following screen will appear after clicking on the **Quit** button of the Lotus Notes Setup Status Screen (Figure 77 on page 87):

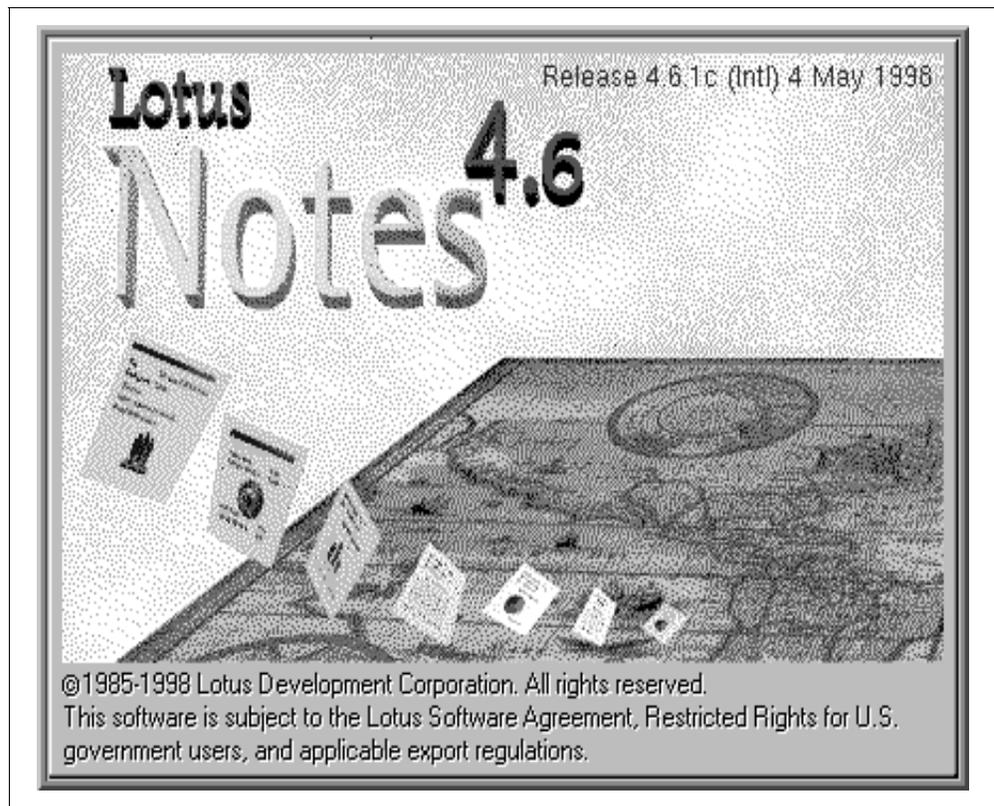


Figure 78. Starting Lotus Notes

Note

If you want to redo the workstation setup, type the command

```
notes -u
```

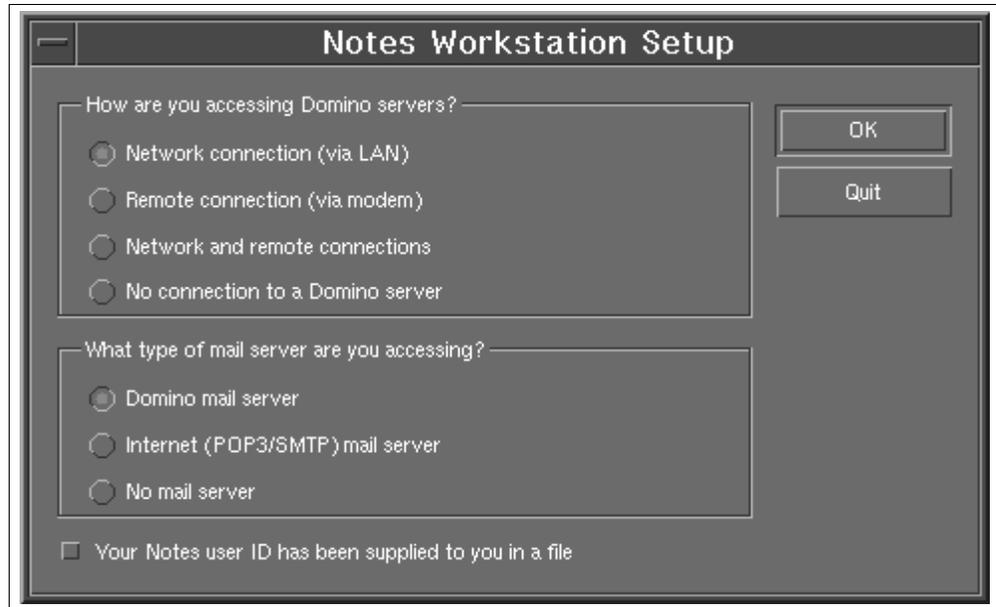


Figure 79. Notes Workstation Configuration Screen

1. Select the type of connection you have to your Lotus Domino Server in the panel shown in Figure 79.
2. If your Lotus Notes user ID was supplied to you in a file, click on the button on this screen and see 3.1.8.1, “Lotus Notes User ID Supplied to You In a File” on page 91, for additional details.
3. Click on **OK**.
4. The next screen, Network Workstation Setup (Figure 80), is a key panel for the installation of Lotus Notes Workstation.

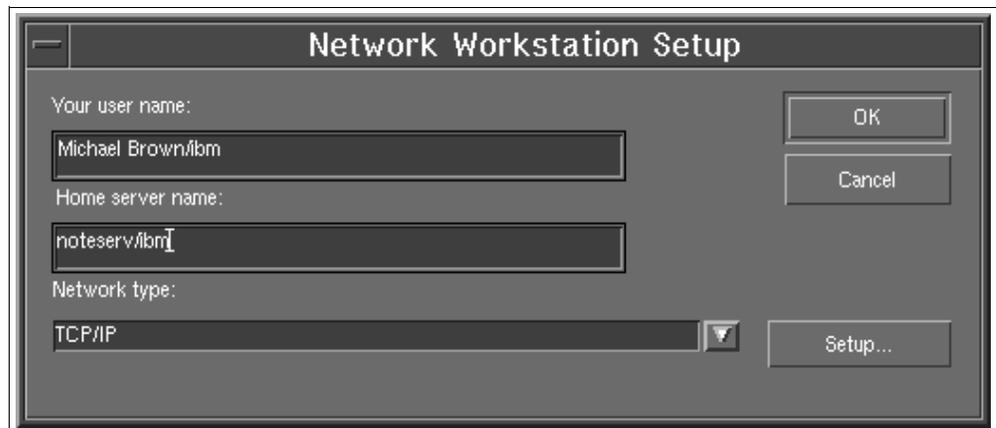


Figure 80. Network Workstation Setup Screen

5. Type your full user name exactly as your Lotus Notes administrator gave it to you.

Note

This name may not be the same as your AIX user name.

6. Type the full name of your home server exactly as your Lotus Notes administrator gave it to you.

Note

If the home server name differs from the hostname (TCP/IP configuration) of the server, you have to add an entry in the file /etc/hosts. Please refer to 2.5.2, "Setting Up the First Server in Your Organization" on page 57.

7. Select the correct network protocol your workstation uses to connect to Lotus Domino Servers.
8. Click on **OK** to display the User Password Entry Screen (Figure 81).



Figure 81. User Password Entry Screen

9. Enter the password for the workstation user, shown in Figure 81, defined by the Lotus Notes administrator in the Public Name and Address Book.
10. Click on **OK** to display the Time Zone Setup screen (Figure 82).

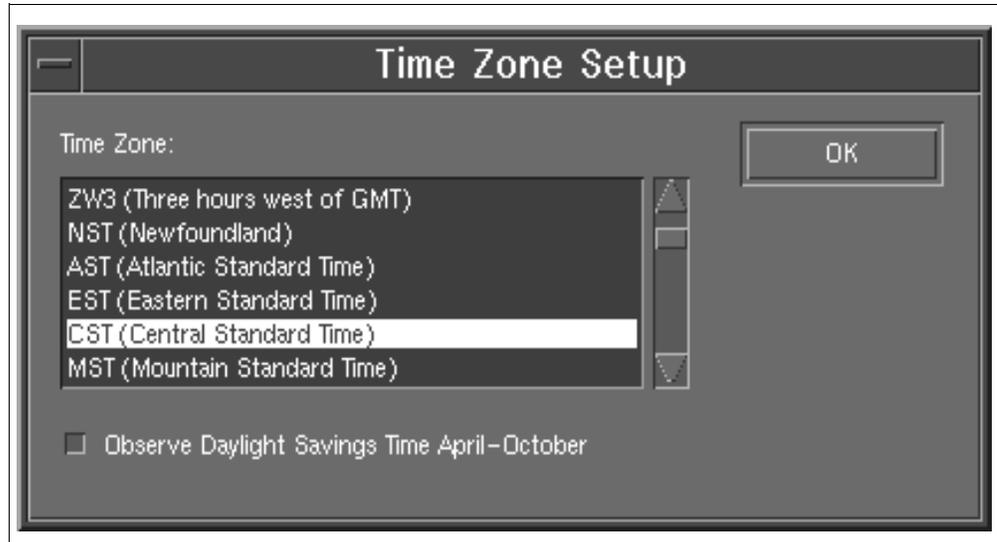


Figure 82. Time Zone Setup Screen

11. Choose the time zone from the Time Zone Setup panel (Figure 82) and check **Observe Daylight Savings Time...** if appropriate.
12. Click on the **OK** button.



Figure 83. Setup Complete

13. Click on the **OK** button on the Setup Complete screen, as shown in Figure 83, to end the setup.

The Notes Workstation for AIX is now running.

3.1.8.1 Lotus Notes User ID Supplied to You In a File

If your Lotus Notes user ID has been supplied to you in a file, when you see the Notes Workstation Setup screen, Figure 84, you should click on the appropriate button near the bottom of the screen.

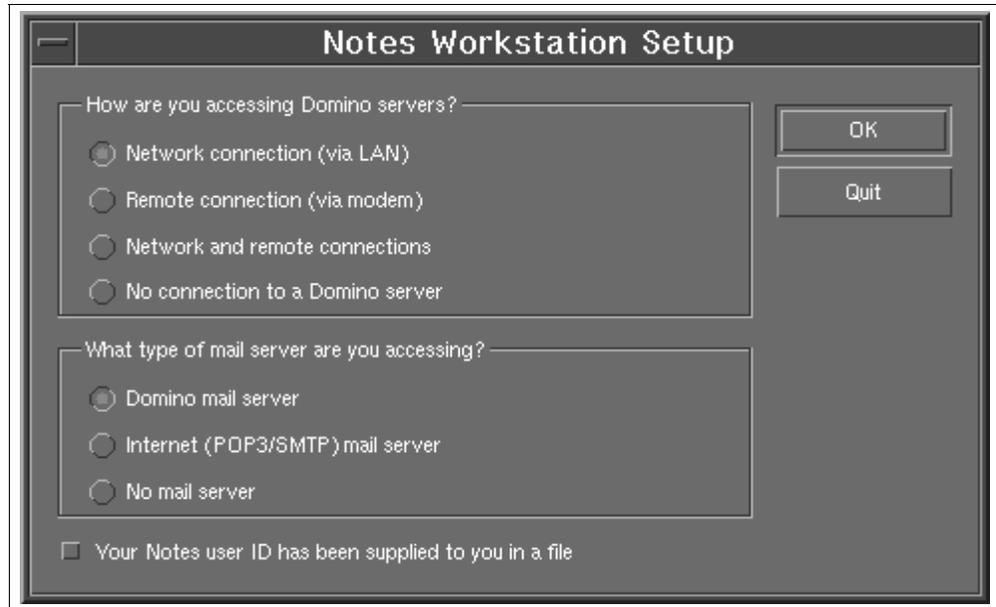


Figure 84. Notes Workstation Configuration Screen

By default, Lotus Notes will look in your \$HOME directory for any .id files and will list all those that it finds. If there is more than one, then select the one you want to use. In case the user's .id file is found in the \$HOME directory, you will get an option of copying the user's .id file from the \$HOME directory to their data directory (\$HOME/notesr4). Allow the system to copy the .id file to their data directory.

In our example we selected the user's id file, mbrown.id and selected the user's data directory /home/michael/notesr4. Click on **OK** on the User ID Entry screen, as shown in Figure 85.



Figure 85. User ID Entry Screen

The rest of the installation proceeds from the Enter Password screen, as shown on Figure 81 on page 90, and continues until the installation has been completed.

Chapter 4. User and Server Registration

This chapter covers some aspects of registering Lotus Notes users and Servers. For additional information about registration and other administrative tasks, refer to the *Lotus Notes Administrator's Guide*.

4.1 User Registration

Before you can install and set up Lotus Notes users for your Lotus Domino Servers, you must first set up an ID for each user in the Public Address Book. You perform this task by *registering* each user with the appropriate certifier, which creates an ID with the appropriate certificates. To make the setup of users more efficient, you can create user setup profiles to set the default workstation settings, set up a default workstation Execution Control List (ECL) for workstation data security, and customize the installation.

Before you can install and set up Lotus Notes on workstations, you must first create new users by registering them. You will need the following information to register new users:

- A copy of the Certifier ID file with the necessary password
- Full user name and home server name
- Lotus Notes administrator's password, if there is one

When you register a new user, Lotus Notes does the following:

- Creates a user.id file for the new user
- Creates a Lotus Notes user document in the Name and Address Book
- Optionally creates the user's mailbox

The registration server must be available on the network, and you must have access to the server and at least Author access in the Public Address Book. In 4.4, "Giving Access to Address Book Database" on page 116, you learn how to give this access to a user. In 4.5, "Giving Access to the Certifier ID File" on page 118, you will find some suggestions about the Certifier ID file.

4.1.1 Certification Log

After you install your first Lotus Domino Server, you should create a Certification Log (certlog.nsf) to record all your certification and registration tasks. When you add servers and users to Lotus Domino, the Certification Log maintains a record of how you registered the servers and users, including information about the certifier ID you used. In addition, you need the log if you plan to use the Administration Process to rename, recertify, or upgrade servers and users.

The Certification Log stores a document containing the following information for each registered server and user:

- Name, license type, and ID number of the server or user
- Date of the certification and expiration
- Name, license type, and ID number of the certifier ID used to create or recertify the ID

To view this information, from the administration panel, click the **System Databases** icon and choose **Open Certification Log** or choose **File -> Database**

-> **Open**, and choose **Certification Log** (this will only work if it has already been created). The log contains views by certifier name, user name, and expiration date.

The Certification Log also includes the Updates Status view, which contains messages describing the results of the recertification requests that the Administrations Process is processing.

4.1.2 Creating the Certification Log

To create the Certification Log:

1. Log on to system as user *notes*.
2. Choose **File -> Database -> New**.
3. Select the name of the server you are using to register users in the Server box.
4. Enter **Certification Log** in the Title box.
5. Enter **certlog.nsf** in the File Name box.
You must name this file **certlog.nsf**.
6. Click **Show Advanced Templates**, select **Certification Log** as the template, and then click **OK**.
7. Choose **File -> Database -> Access Control**, and assign **Editor** access to all administrators who register users and servers and recertify IDs.

4.1.3 Registering New Lotus Notes Users

To register a new Lotus Notes user, do the following:

1. Log on to the AIX system as the Lotus Notes administrator, or with your own Lotus Notes user ID if you have the necessary access rights and roles, and run the Lotus Notes client by executing the command: *notes*

Note

You can log in as any user that has at least Author access and the role *UserCreator* for the Lotus Notes Name and Address Book.

2. Choose **File -> Tools -> Server Administration...** from a Lotus Notes client screen to display the Server Administration screen (Figure 86).

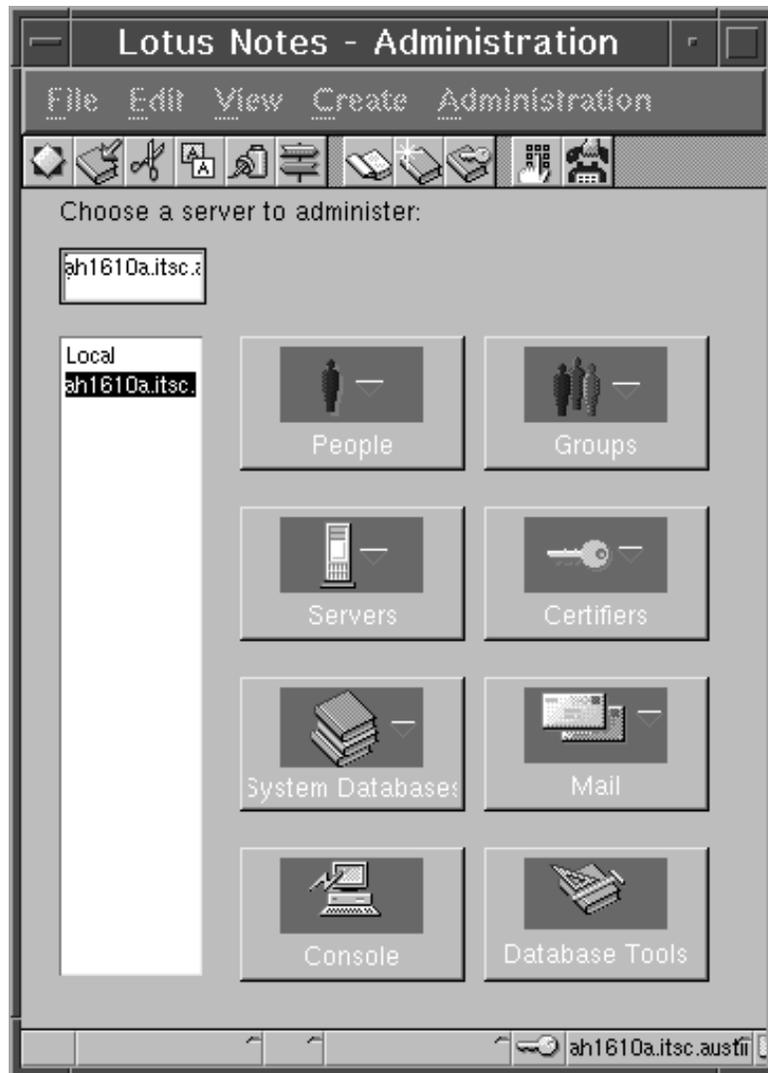


Figure 86. Server Administration

3. Select a home server for the new user, for example, ah1610a/IBM Corp.
4. Click on the **People** button and select **Register Person** from the pop-up menu.
5. On the next prompt, click on the **Yes** button if you have purchased a user license.
6. If you are not using the Lotus Domino Administrator workspace, you may be asked to choose a Certifier ID file. You can choose the cert.id file.

Note

The Lotus Notes client remembers the last used ID file and prompts you for its password. If you need to select a different Certifier ID file, click on **Cancel** at the password prompt.

7. When the Enter Password screen appears, enter the case-sensitive required password, then click on **OK**.



Figure 87. Register Person

8. After you type in the correct password, the Register Person screen (Figure 87) will appear.
 - a. Select **Registration Server....** Specify the name of the server where the new person record will be added to the Public Address Book.
(Optional) If the local server is not the registration server, click **Registration Server** and select the server that registers all users and click **OK**.
 - b. Click on **Certifier ID...**, select the Certifier ID file, and type in the administrator's password.
(Optional) To select a different certifier ID, click **Certifier ID** and press **Enter**. Enter the Certifier ID password and click **OK**.
 - c. The North American security type is the default selection for the North American version only. Select International only if you will be using this ID on a computer with the International Release of Lotus Notes. In the International Release of Lotus Notes, there is no choice other than an International security type.
 - d. Change the **Certificate expiration date** as needed.

Note

To change the expiration date, enter the date in mm/dd/yy format in the certification expiration date field.

- e. Click on **Continue....**



Figure 88. Register Person - Basics

9. The **Register Person** Basics screen (Figure 88) will appear.

- a. Type the user's first name, last name and, if applicable, the middle initial in the appropriate boxes. If you want a period after the middle initial, be sure to add one. Lotus Notes does not add the period automatically. The IBM Global Notes Architecture specifies the standard that no period will be used after the middle initial.
- b. Enter a case-sensitive password.
- c. Enter a minimum password length for this ID if desired.
- d. If you want Internet users to have authenticated access to the Lotus Domino Server, select **Set Internet Password** to set an Internet password in the Person document. This field is automatically selected if you select the Other Internet, POP, or IMAP mail types. This password is the one you entered in the Password box in Step 9.c. The Internet password in the Person document is set as your Lotus Notes password. The Internet message storage field is set to Internet. If you select Other Internet, POP, or IMAP, you can supply an Internet supply an Internet address for the user (for example, michael@braegen.com).
- e. Choose the type of license you purchased.

Lotus Notes has three types of licenses. See the *Lotus Notes Deployment Guide* for more information on license type.

- f. Select a user profile if you have defined one.

Lotus Notes Release 4.6 provides a method for customizing the registration of multiple users in an organization at one time with a group user profile. This user profile contains default information on database, the mail domain, passthru servers, and remote servers for a group of users. See section 4.1.4, "Creating a User Profile" on page 101 and *the Lotus Notes Installation Guide for Servers* published by Lotus, for additional information.



Figure 89. Register Person - Mail

10. Click on the **Mail** icon to go to the Register Person Mail screen (Figure 89).
 - a. In the Mail type box, select the mail program you want for this user.
 - b. If you select Lotus Notes, enter the name of the user's mail file and select whether you want to create the mail file now or during the Setup program. The default name of the mail file is the first character of the first name, followed by the last name.
 - c. If you select cc:mail or Other VIM Mail, enter the user's complete forwarding address.
 - d. If you select Other Internet, POP, or IMAP (depending on the mail server) in the Home server box, select or enter the name of the server that stores the user's mail file.

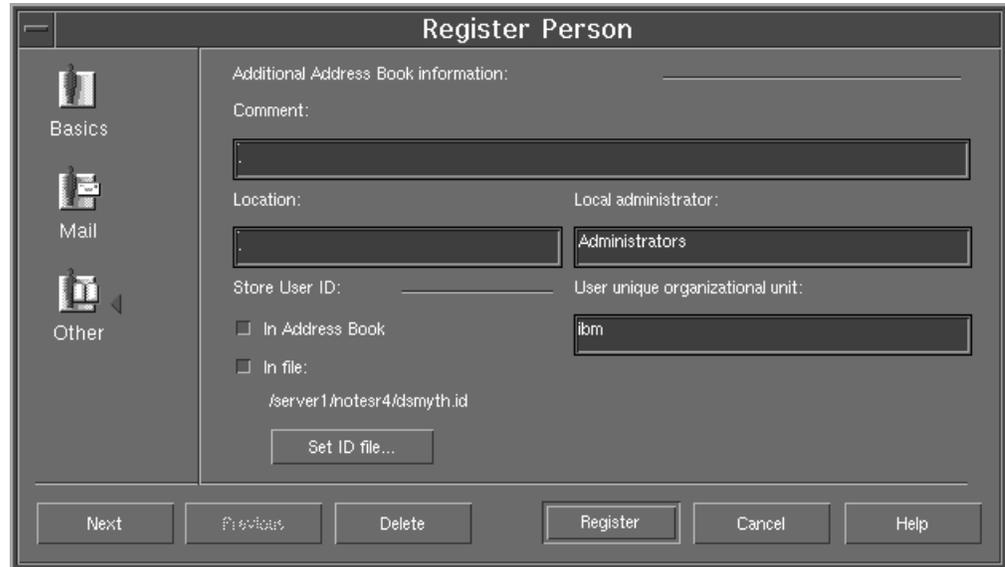


Figure 90. Register Person - Other

11. (Optional) Click on the **Other** icon to type in additional information about the user for the Public Address Book (Figure 90).
 - a. In the Comment box, enter any information you want stored in the user's Person document in the Public Name and Address Book.
 - b. Enter the user's location, for example, an office location.
 - c. Enter the local Lotus Domino administrator's name, if desired.
 - d. Select **In Address Book** or **In a file** or both to indicate how you want to store the user's ID file. If you store the ID in a file, click **Set ID file**, specify the file name and path, and double click. If you do not select an ID storage type, a Lotus Notes ID is not created unless the mail type is Notes Mail.
 - e. Enter the unique organization for the user. This is useful only if you have two people with the same name in the same organizational unit to uniquely identify the person.
12. Click **Next** and repeat the steps to register more than one user.
13. Click **Previous** to view the previous user; click **Delete** to delete the user.
14. Click **Register** to register the user(s).
15. You will be asked if you want to register another user. Select **No** to terminate the registration process.

4.1.4 Creating a User Profile

You can create a **Setup Profile** to configure workstation default options for users. Create a Setup Profile in the Public Address Book and specify an Internet browser, how Web pages should be retrieved, a default passthru server, databases to add to the workspace, default remote servers, Java Applet security options, proxy configuration settings, and secondary NDS (Notes Domain Server) and TCP/IP servers. Use profiles to set up batches of users who have the same default settings. For example, you create user IDs and set up workstation defaults for your sales force, who can access the same remote server and need

the same databases on their desktop. Create a profile called Sales with these options and use it to create these users. You can create multiple profiles.

1. Open the **Public Address Book**.
2. Open the **Setup Profile** view.
3. Click on **Add Setup Profile**.
4. Enter the name for the profile that describes the group. You can use any of these characters for the name: A - Z, 0 - 9, &, -, _, ', /, (ampersand, dash, period, space, underscore, apostrophe, forward slash). Do not use \ (backslash) or any other characters, because this can cause unexpected results.
5. Select an Internet Browser and select where you want users to retrieve and store Web pages.
6. To add one or more databases to users workspaces automatically, copy database links to the setup profile. To perform this step, select a database and choose **Edit -> Copy as a link -> Database Link**. Then, in the Database links field in the setup profile, choose **Edit -> Paste**.
7. Enter the name and the phone number of a default passthru server to automatically set up a passthru server for users.
8. Enter the names and phone numbers of the remote dialup servers to automatically create connection records for the servers in the user's Personal Address Books.
9. (Optional) Enter the names and addresses of secondary TCP/IP and DNS Lotus Domino name servers.
10. (Optional) Select default Java Applet security options and default proxy configuration options.
11. Choose **File -> Close** and click **Yes** to save your changes.

4.1.5 Installing Lotus Notes Clients

You will need the following information to install Lotus Notes clients:

- The full user name followed by a slash and the organization name, for example, Dianne Smyth/IBM Corp.
- The user ID, as a file on a disk or as a file in the Name and Address Book.
- The user ID's temporary password.
- The full home server name followed by a slash and the organization name, for example, ah1610a/IBM Corp.

4.1.6 Registering Multiple Users From a File

Registering users from a text file lets you decide on options and then go through the setup process with the Administration Control panel only once. You can generate lists of users from existing lists to save time. For example, you copy a human resources list of employees in one group and use this list to create a text file to create user IDs for employees.

All users in a registration file must be registered with the same certifier. You must create a separate text file for each organizational unit (OU) certifier you will use.

To perform this task, you must be an Administrator with the UserCreator role or have Editor access in the Public Address Book on the registration server.

```
Last Name; [First Name]; [Middle Initial]; [Organizational Unit];  
[Password]; [ID File Directory]; [ID File Name];  
[Home Server Name]; [Mail File Directory];  
[Mail File Name]; [Location];  
[Comment]; [Forwarding Address];  
[Profile name]; [Local Administrator]
```

4.1.7 Examples of Registering a Group of Users

Example 1: Text file specifying last names and passwords

```
Stenmark;;;password1  
Kapur;;;password2  
Kunde;;;password3  
Smyth;;;password4
```

Example 2: Text file specifying complete names, home servers, and user setup profiles

```
Stenmark;Andreas;J;;password1;;;MARKETING/IBM;;;;Marketing Profile  
Kapur;Sanjay;;;password2;;;SALES/IBM;;;;Sales Profile  
Kunde;Hans;J;;password3;;;MARKETING/IBM;;;;Marketing Profile  
Smyth;Alison;;;password4;;;SALES/IBM;;;;Sales Profile
```

Example 3: Text file specifying more information for each user

```
Stenmark;Andreas;J;;password1;C:\USERID;AJSTENMARK.ID;MARKETING/IBM;MAIL;ASTEN  
MARK;Marketing;#45738;;Marketing Profile;Michael White  
Kapur;Sanjay;;;password2;C:\USERID;SKAPUR.ID;SALES/IBM;MAIL;JKAPUR;Sales;#6893  
2;;Sales Profile;Chris Benn  
Kunde;Hans;J;;password3;C:\USERID;HJKUNDE.ID;MARKETING/IBM;MAIL;HKUNDE;Marketi  
ng;#89647;;Marketing Profile;Michael White  
Smyth;Alison;;;password4;C:\USERID;ASMYTH.ID;SALES/IBM;MAIL;ASMYTH;Sales;#1937  
5;;Sales Profile;Chris Benn
```

4.1.8 Registering Multiple Users from a Text File

The parameters for each line in a text file (in the order you must enter them) are:

1. Last Name

(Required) Use to specify a last name.

2. First Name

(Optional) Use to specify a first name. Lotus Notes uses the person's name for the ID file name. For example, the ID file name for a user called Craig Keller will be ckeller.id. You may need to include the user's first name to avoid duplicate ID file names. If you attempt to register two users with the same name, you will get an error message when registering the second one. You must use the ID File Name field to avoid this error.

3. Middle Initial

(Optional) Use to specify a middle initial. Include a period if desired. Avoid duplicate ID file names.

4. Organizational Unit

(Optional) For hierarchical naming, use to add another level to a name to distinguish between two users with the same name, certified by the same certifier.

5. Password

(Required) The password is required if you use a minimum password length when registering the users (the default length is eight characters) or if you store the IDs in the Public Address Book (one character or more is required).

6. ID File Directory

(Optional) Use to store an ID in a specific directory in addition to or instead of as an attachment in the Public Address Book. You must create the directory before doing the registration. For this parameter to take effect, during registration you must select the "**In directory**" option for storing the user ID; the text file parameter overrides the default ID directory shown in the registration dialog box.

7. ID File Name

(Optional) Use to specify a name on an ID. This field applies only if you are storing an ID in an ID file directory. If you do not specify a user ID file name, the name on the ID is based on the person's name.

8. Home Server Name

(Optional) Use to specify a home server for a specific user that overrides the one you select during registration. If the server is hierarchical, specify its hierarchical name, for example, ah1610a/IBM Corp.

9. Mail File Directory

(Optional) Use to specify a mail file directory for a specific user that overrides the one you select during registration.

10. Mail File Name

(Optional) Use to specify a name for a mail file. If you do not use this parameter, the name is based on the person's name if the person uses Lotus Notes Mail.

11. Location

(Optional) Use to add descriptive information about the user that appears in the Person document. If someone addresses mail to this user and there is another user with the same name, Lotus Notes displays the location to help the sender distinguish the two users.

12. Comment

(Optional) Use to add an identifying comment to a Person document in the Public Address Book.

13. Forwarding Address

If all of these users use other Internet mail, you must specify a forwarding/Internet address to ensure that mail reaches these users. Type the full route to each user, for example, mwhite@braegen.com. Rather than specifying the forwarding address in the text file, you can edit the Forwarding address field in each Person document after registering the users.

14. Profile Name

(Optional) Use to specify a User Setup Profile for a user. Enter the name of the User Setup Profile. This parameter overrides for a specific user a User Setup Profile you specified during registration.

15. Local Administrator

(Optional) Use to specify a local administrator to allow a person with Author access to the Public Address Book, but without the UseModifier role to modify the users' Person documents. A local administrator specified in the text file overrides one you specified in the registration dialog box.

After you have created a file with all the necessary information for multiple users, you should now do the following steps:

1. Log in as the Lotus Notes administrator and run the Lotus Notes client with the command: `notes`

Note

You can log in as any user that has at least Author access in the Lotus Notes Name and Address Book.

2. Choose **File -> Tools -> Server Administration...** from the Lotus Notes Workspace screen to get the Server Administration screen (Figure 86 on page 97).
3. Select a home server for the new user, for example, ah1610a/IBM Corp.
4. Click on the **People** button and select **Register From File...** from the pop-up menu.
5. You will be asked if you have purchased a license for the users. If you have purchased all the licenses, then click on the **Yes** button.
6. If you are not using the Lotus Administrator workspace, you may be asked to choose a Certifier ID file. You can choose the cert.id file.

Note

The Lotus Notes client remembers the last used ID file and prompts you for its password. If you need to select a different Certifier ID file, click on **Cancel** at the password prompt.

7. When the Enter Password screen appears, enter the case-sensitive required password, then click on **OK**.
8. After you type in the correct password, the Register Person screen (Figure 87 on page 98) will appear.
 1. If the registration server is not the local server, click **Registration Server**, select the server that registers all new users, and click **OK**.
 2. To select a different certifier, click **Certifier ID**, select the Certifier ID file, and press **Enter**. Enter the certifier password and click **OK**.
 3. The North American security type is the default selection for the North American version of Lotus Notes. Select International only if you will be using this ID on a computer with the International Version of Lotus Notes. In the International release of Lotus Notes, the only choice for security type is International.
 4. Change the **Certificate Expiration Date** as needed. Enter in the date as a **mm/dd/yy** format.
 5. Click on **Continue**.

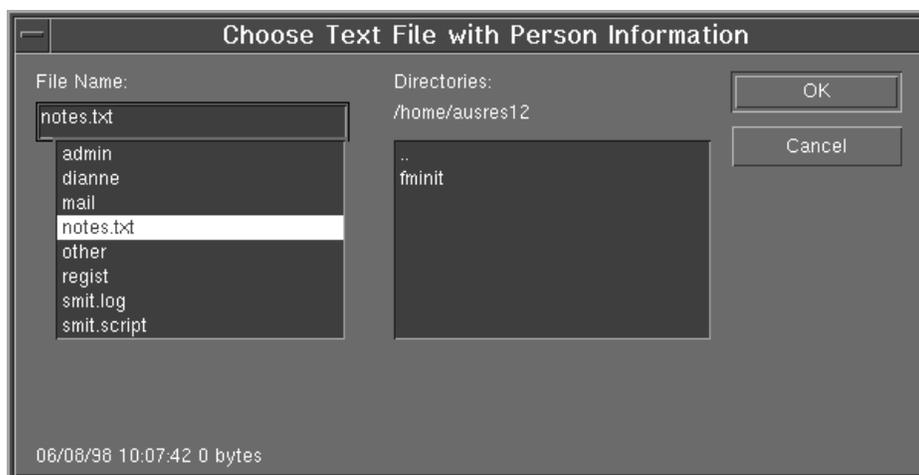


Figure 91. Choose Text File with Person Information

9. The Choose Text File with Person Information screen (Figure 91) will appear. Select the directory and the users' information files you have created and then click on the **OK** button.

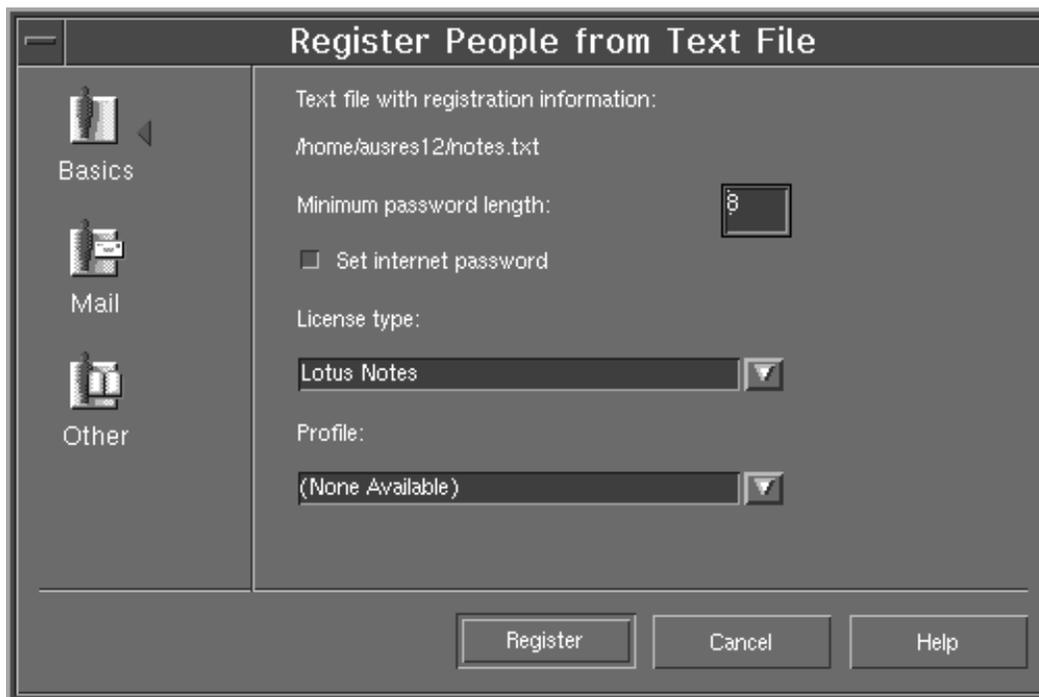


Figure 92. Register People from Text File - Basics

10. The Register People from Text File Basics screen (Figure 92) will appear.
 - a. Enter a minimum password length for the IDs if desired.
 - b. Choose the type of license type you purchased.
 - c. Select a user profile if you have defined one.

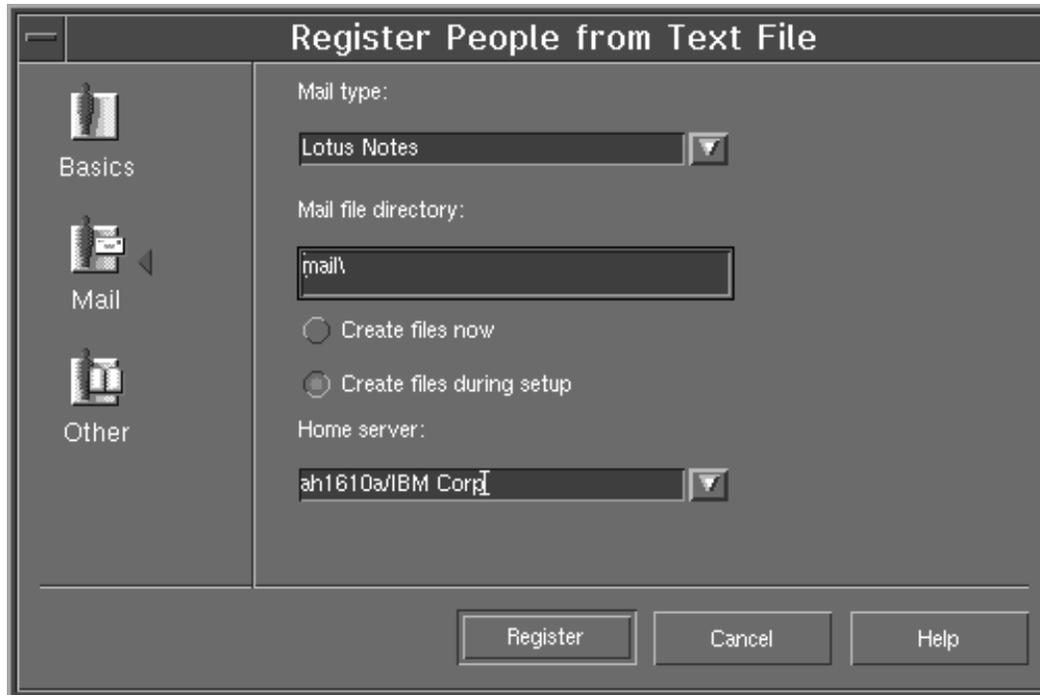


Figure 93. Register People from Text File - Mail

11. Click on the **Mail** icon to go to Register People from Text File Mail screen (Figure 93).

- a. In the Mail type box, select the mail program compatible with the information you entered in the input file.

If you select Lotus Notes, enter the name of the user's mail file and select whether you want to create the mail file now or during the Setup program. The default name of the mail file is the first character of the name, followed by the last name.

If you select POP or IMAP (depending on your mail server), select **Set Internet password** to set an Internet password in the Person document. This password is the one you entered in the Password box in Step 10a. The Internet password in the Person document is set as your Lotus Notes password. The Internet message storage field is set to Internet.

Select or type the name of the server that stores the user mail databases in the Home Server box.

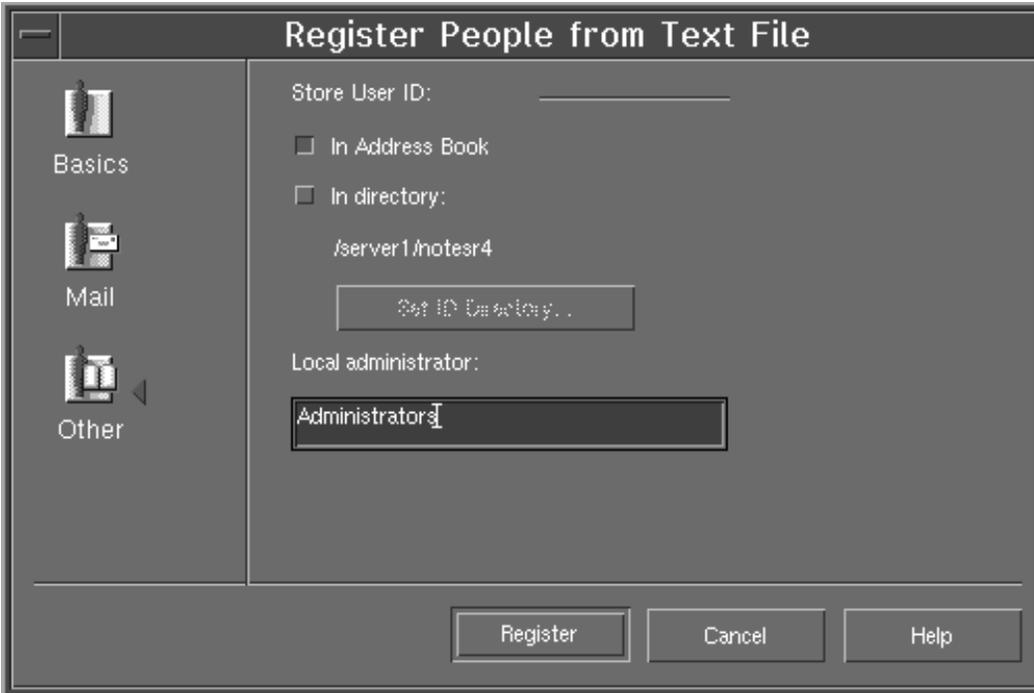


Figure 94. Register People from Text File - Other

12. Click on the **Other** icon to type in additional information about the users (Figure 94).
 - a. Select **In Address Book** or **In directory** to indicate how you want to store the Lotus Notes user ID files. If you want to store the IDs in a directory, click **Set ID Directory** to specify the directory name.
 - b. Enter the local Lotus Notes administrator's name, if desired.
13. Click on **Register** to register the users.
14. You can see status messages in the bottom of the workspace screen.
15. If there are errors, a pop-up screen alerts you. You can see the errors on the Lotus Domino Server log.
16. Finally, you will see a screen with the number of created users.

4.1.8.1 Registering Users From a UNIX Password File

If you want to register all your UNIX users, you can create a shell script to convert the user information from the `/etc/passwd` file to a Lotus Notes input file. Here is a simple example:

```
#!/bin/ksh
# @(#) converts /etc/passwd to a Lotus Notes registration file
# Usage: convpasswd <passwd_file> <notes_file>
# It only converts users with userid >= 200

if [[ $# != 2 ]]
then
  echo "Usage: $0 <passwd_file> <notes_file>"
  exit 1
fi

awk -F: '($3 >= 200) && ($5 != "") {
  total = split ($5, NAME, " ");
  INITIAL = total>2 ? sprintf("%s",substr(NAME[2],1,1)) : "";
  printf ("%s;%s;%s;;password;;%s.id;;;%s.nsf;;%s;;\n",
          NAME[total], NAME[1], INITIAL, $1, $1, $5)
}' $1 >| $2
```

Figure 95. Shell Script to Convert a UNIX Password File

This script converts the password file, as shown in Figure 96, into the Lotus Notes input file shown in Figure 97. It only converts the lines with non-administrative users (user IDs greater than 199) and with user names that are not null (gecos field not null). It also forces the ID File Name and the Mail File Name to be the same as the login name to avoid duplicate ID File Names.

```
root::0:0:The powerful system administrator:/:/bin/ksh
sys::3:3:/:usr/sys:
uucp::5:5:/:usr/lib/uucp:
morg::200:201:Morgan Smyth:/home/morg:/bin/ksh
erin::202:202:Erin L Smyth:/home/erin:/bin/ksh
mich::203:209:Michael Donald White:/home/mich:/bin/ksh
chri::204:215:Chris Benn:/home/chri:/bin/ksh
...
```

Figure 96. UNIX Password File

```
Smyth;Morgan;;;password;;morg.id;;;morg.nsf;;Morgan Smyth;;
Smyth;Erin;L;;;password;;erin.id;;;erin.nsf;;Erin L Smyth;;
White;Michael;D;;;password;;mich.id;;;mich.nsf;;Michael Donald White;;
Benn;Chris;;;;password;;chri.id;;;chri.nsf;;Chris Benn;;
...
```

Figure 97. Lotus Notes Input File to Register Users

4.2 Registering Web Users

As an administrator, you need to set up two types of Web, NNTP, and LDAP users: anonymous users and users who want to authenticate with a server.

4.2.1 Anonymous Users

If you want to access the server anonymously, you do not have to create Person documents for them. However, you need to ensure that anonymous users can access the server and databases on the server.

4.2.2 Allowing Anonymous Users

You can set up anonymous access on a server so users and servers can access the server even if the server can't authenticate them. The method you use to set up anonymous access depends on whether you are setting up access for Lotus Notes users and Lotus Domino servers or Internet and intranet users.

1. Create an entry called Anonymous in the database access control list (ACL) of the databases on the server and assign the appropriate access level, typically Reader access, unless it is an interactive database then you would assign Author access. If you don't add Anonymous as an entry in the ACL, users and servers accessing the server anonymously are given the Default access.
2. Do one of the following:
 - From the Administration panel, click **Servers** and choose **Servers View**.
 - From the Web Administration tool, click **Server** and then **Server**.
3. Open the Server document for the server in the Public Address Book and do one of the following:
 - If you setting up anonymous access for Lotus Notes users and Lotus Domino servers, in the Security section, select **Yes** in the Allow anonymous connections field. If there are any entries in the Access Server field in the Restrictions section of the Server document, add Anonymous to this field.
 - If you are setting up anonymous access for Internet and intranet users, in the Internet Port and Security Configuration section, select **Yes** in the Anonymous field in the column for the protocol.

Note

POP3 and IMAP do not support Anonymous access.

4. Set up the database access control list to allow access by anonymous users.
5. Save the document.
6. Shut down and restart the server for the changes to take effect.

If the administrator does not allow anonymous access, all anonymous users receive an "authorization failure" message when they access the server. If you set up basic password authentication on the server, the users are prompted for a user password before this message occurs. The Anonymous setting in the Server document overrides individual database access controls for anonymous users.

If both Name & Password and Anonymous are selected for an Internet protocol, and you set up the database access control list to allow anonymous access, users connect using anonymous access. The server does not ask users for a name and password even if the user is set up for basic password authentication.

If Client certificate and Anonymous are selected for SSL, Lotus Domino first checks for a client certificate and if that fails, allows the client to access the

database using anonymous access, if you set up the database access control list to allow anonymous access.

4.2.3 Authenticated Users

If you want users to enter a name and password when accessing the server or use client authentication with Secure Socket Layer (SSL), you must create a Person document for the user. You do not have to register Web, NNTP, or LDAP users. They do not require a Lotus Notes ID or mail file unless you are setting up a Web user for Web Mail. You can just create the Person document directly in the Public Address Book and enter information about the users' name, password, and SSL certificate.

1. Do one of the following:
 - From the Web Administration tool, click **Users** and click **People**.
 - From the Administration Control Panel, select **People** and choose **People View**.
2. Click **Add Person**.
3. Enter the user's first name, middle initial (optional), and last name in the First Name, Middle Initial, and Last Name fields.
4. Enter the users full name in the User name field. This is the user name the user enters when trying to access a database on the server.
5. Enter the user's password in the Internet password field. This will automatically be encrypted when you save the document.
6. (Optional) Enter additional information about the user in the Work and Home sections.
7. Save the document.
8. Do one of the following:
 - From the Web Administration tool, click **Server -> Server**.
 - From the Administration Control panel, click **Servers** and choose **Servers View**.
9. Select one of the following:
 - In the Internet Protocol and Security Configuration section, under TCP/IP, Name & Password, select **Yes** in the column for the protocol for which you want to require a name and password for basic password authentication.
 - In the Internet Protocol and Security Configuration section, under SSL Name & Password, select **Yes** in the column for the protocol for which you want to require a name and password for SSL clients.
10. Save the document.
11. Set up the database access control list (ACL) for the databases on the server.

Two settings on the database ACLs control the Internet and Intranet access: The ACL entry and the Maximum Internet name & password access on the Advanced panel of the ACL.

The name on the database access control list used to authenticate the user is used to determine form, document, and section access for each of these database components. The server uses the same method as Lotus Notes and Lotus Domino users to secure access to these database components.

You must set up SSL, anonymous access to servers, and basic password authentication before database ACLs take effect.

Set up the database ACL as follows:

- Add the user name from the Person document to the ACL and assign access.
- Add the entry **Anonymous**, and set it and Default access to **No Access**.
- If you don't set these entries to No Access, they take precedence over the individual user name.
- If the users are connecting over TCP/IP set the Maximum Internet name & password access to the maximum level allowed, even if the name listed individually has more access. If the individual entry has less access than the Maximum Internet name & password access, then the access for the individual entry takes precedence.

12.(Optional) If you want to further secure information in the Internet password field, select the documents in the view, choose **Actions** -> **Upgrade to More Secure Internet Password Format**, and click **Yes**.

4.3 Registering Additional Servers

Before you install additional servers, you must register them. Registration is how you add servers to Lotus Domino by creating IDs stamped with the appropriate certificates. The server registration process creates a Server document in the Public Address Book and creates a server ID.

When you register servers, you should know your company's naming scheme. The naming scheme helps you know which certifier to use when you register each new server. In addition, you must have access to each certifier that you are using and you must know each certifier ID password.

The registration server, that is, the server from which you register other servers, must be up and running on your network. To register servers from your workstation, you must have access to the registration server and have at least Author access to the Public Address Book with the appropriate role ServerCreator in the access control list of the Public Address Book.

When you register a server, Lotus Domino does the following:

- Creates a server ID for the new server and certifies it with the certifier.
- Creates a Server document for the new server in the Public Address Book and enters the administrator name in the Administrators field of the Server document.
- Encrypts and attaches the server ID to the Server document in the Public Address Book and saves the ID on a disk or to a file on the server.
- Adds the server name to the LocalDomainServers group in the Public Address Book.
- Creates an entry for the new server in the Certification Log (CERTLOG.NSF), if you created it.

To install additional Lotus Domino Servers in the same domain, you have to register them on an existing server. Then, you can install and set them up.

Registering additional servers is a task normally performed by the Lotus Notes administrator. You will need the following information to register an additional server:

- A copy of the Certifier ID file and the corresponding password
- Server name
- Lotus Notes administrator's password

4.3.1 Registering New Lotus Domino Server

1. Log in as the Lotus Notes administrator and run the Lotus Notes client with the command: `notes`

Note

You can log in as any user that has at least Author access and the ServerCreator role in the Lotus Notes Name and Address Book.

2. Choose **File -> Tools -> Server Administration...** from the Lotus Notes Workspace screen to get the Server Administration screen (Figure 86 on page 97).
3. In the Administration screen, as shown in Figure 86 on page 97, click on the **Servers** button and choose **Register Server...** from the pull-down menu.
4. If you have purchased a server license, click **Yes**.
5. If you are not using the Lotus Administrator Workspace, you may be asked to choose a **Certifier ID** file. You can choose the cert.id file.

To change which certifier is used for registering the server, click **Certifier ID**, select the Certifier ID, and press **Enter**.

Note

The Lotus Notes client remembers the last used ID file and prompts you for its password. If you need to select a different Certifier ID file, click on **Cancel** at the password prompt.

6. Type the administrator's password and click **OK**.



Figure 98. Register Servers

7. On the Register Servers screen (Figure 98):
 - a. If you are not at the server in which you want to register, click **Registration Server**, choose the server, and click **OK**
 - b. If you want to create a new entry in the Certification Log, click on **Certifier ID...**, select the Certifier ID file, and click on **OK**.
 - c. Choose a Security type: North American or International.
 - d. (Optional) To change the expiration date, enter the date in **mm-dd-yy** format.
 - e. Click on **Continue....**

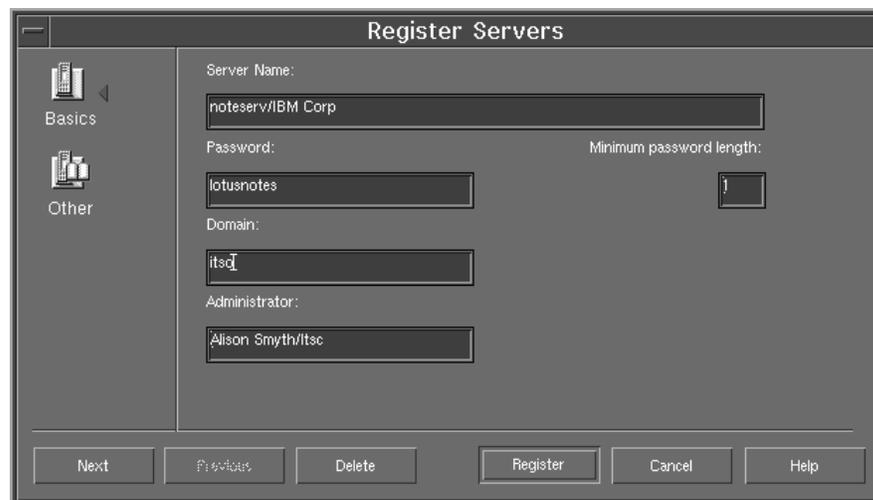


Figure 99. Register Servers - Basics

8. On the Register Servers Basics screen (Figure 99):

- a. Enter a unique server name of up to 79 characters. If you are running the UNIX version of the Lotus Domino Server, its name must be a valid TCP/IP name or alias.
- b. If you want to register the server in a different domain from the one containing the registration server, enter the new domain name. The registration server's Lotus Notes domain is the default value for the Domain field.
- c. Enter the administrator's name. If you also want to use the new server as a workstation for the administrator, then the administrator must have a user.id file on the registration server or in the Name and Address Book Database.
- d. Consider setting the Minimum password length to 0. With a setting of 0, you will later be able to clear the password on the server ID, which will allow an automatic startup of the Lotus Domino Server after a reboot of the server machine.



Figure 100. Register Servers - Other

9. Click **Other** to get the Register Servers Other screen (Figure 100):
 - a. In the **Server Title** box you can enter any information about the server.
 - b. In the **Network** box you can enter the server's network name that is different than the default.
 - c. Change the local Lotus Notes administrator's name as needed.
 - d. Select **In Address Book** or **In file** to indicate how you want to store the Server ID file. If you want to store the ID in a file, click **Set ID file...** to specify the file name.
10. Click **Next** and repeat the steps to register more than one server.
11. Click **Previous** to view the previous server, or you can click **Delete** to delete the server.
12. Click **Register** to register the server(s).

13. You will be asked if you want to register another server. Select **No** to terminate the registration process.

4.3.2 Installing Lotus Domino Servers

You need the following information to install Lotus Domino Servers in the same domain:

- The full server name followed by a slash and the organization name, for example, ah1610a/IBM Corp.
- The Server ID, as a file on a disk or as a file in the Name and Address Book.
- The Server ID's temporary password.
- The full primary server name followed by a slash and the organization name, for example, noteserv/IBM Corp.

4.4 Giving Access to Address Book Database

Any user can create new users or register new servers if they have at least Author access to the Address Book Database and possess the correct roles. If you want to give this power to particular users, you have to trust them, for they will have access to modify your Address Book Database. Normally, this user will be another Lotus Notes administrator. Usually, only the administrator of the primary server needs to register users and other servers.

To give a user access to the database, you have to do the following:

1. Log in as the Lotus Notes administrator and run the Lotus Notes client by typing in the command: `notes`
2. Click with the right button on the **Address Book Database** icon. A pop-up menu will appear. Select **Access Control...**
3. Enter the administrator's password.

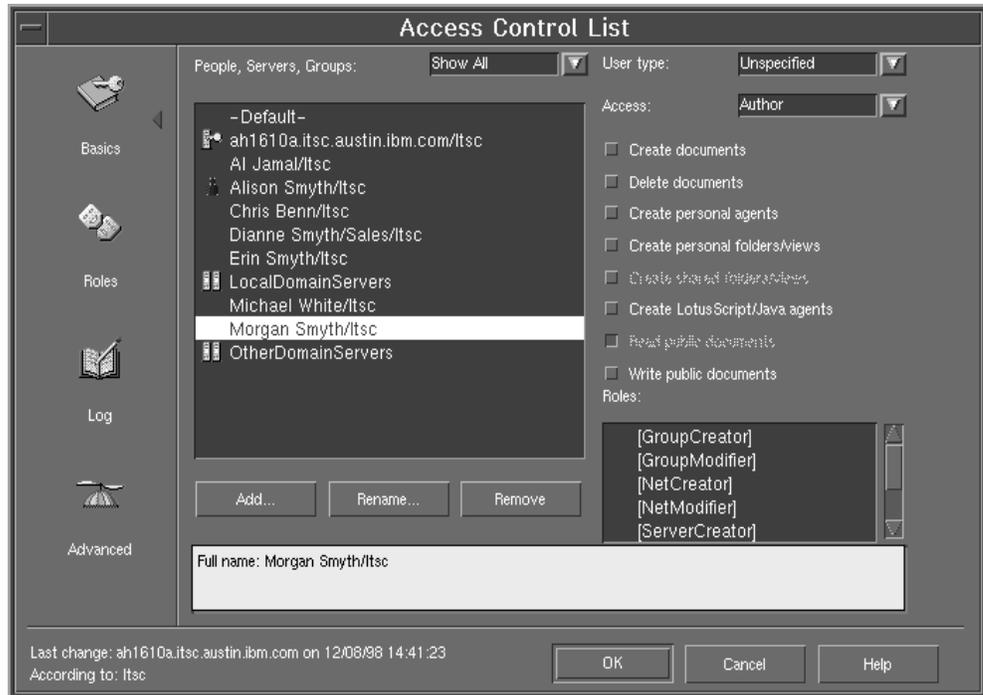


Figure 101. Access Control List

4. The Access Control List screen (Figure 101) will appear. If the user is not shown on the **People, Servers, Groups** box, click on the **Add** button and follow the steps outlined. If the user is shown on the list, go to step 5 on page 118.

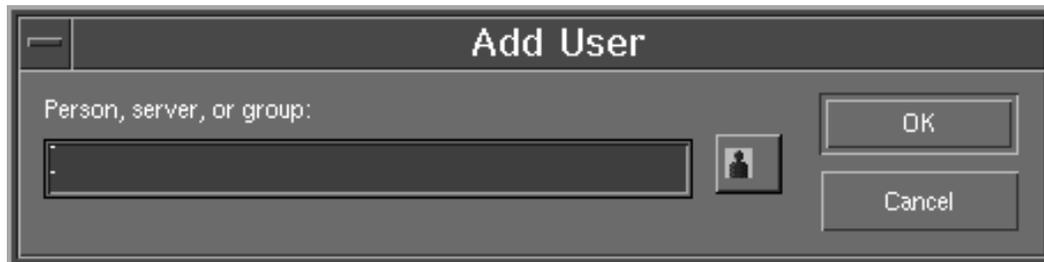


Figure 102. Add User

- a. On the Add User screen (Figure 102), click on the button beside the Person, server, or group field, this will give you a list of all people, groups and servers that are in the Public Address Book to choose from.

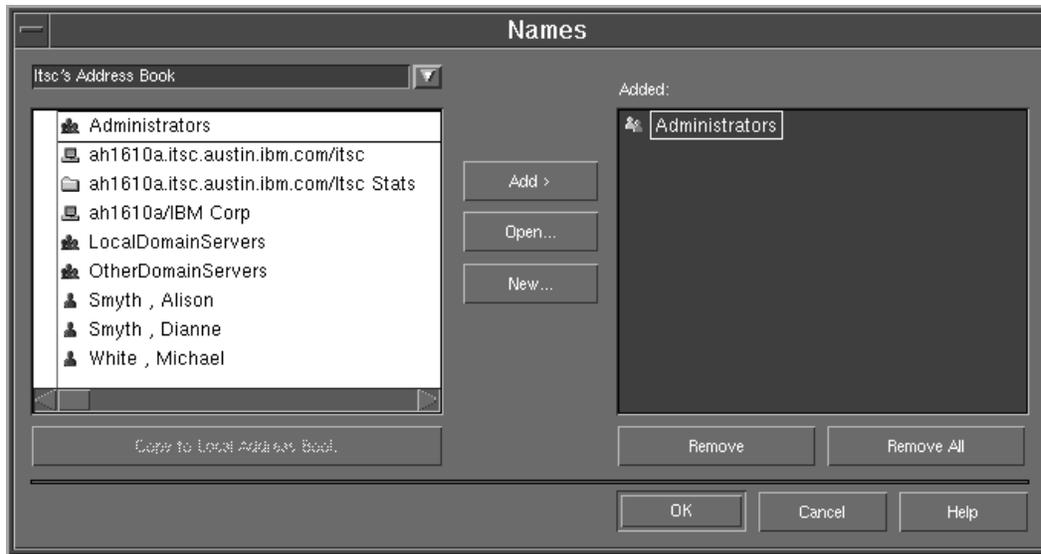


Figure 103. Names

- b. Select the person you want to have access to the Address Book Database and click on the **Add** button. The name(s) you selected will appear in the Added box, as shown in Figure 103.
 - c. Click on the **OK** button.
 - d. You will be back at the screen shown in Figure 101 on page 117.
5. Select the user on the People, Servers, Groups box.
 6. Select the type of access this user will have, for example, Editor. You can do this with the Access pull-down menu.
 7. Select the user type, for example, Person Group. You can do this with the User type pull-down menu.
 8. Select the specific access allowances and roles.
 9. Click on the **OK** button.

4.5 Giving Access to the Certifier ID File

The easiest way to give users access to the Certifier ID file is to copy to their directories the cert.id file that is in the data directory of the Lotus Notes primary server. After copying the file, make sure the users have read and write permissions and/or ownership of the copied file.

The users now have access, but it is a security risk. This file must always be protected, and normally, only the administrator of the primary server should be able to access it. If more than one user needs to access this file, make sure that it remains in a secure place.

If all the users you want to have access to the cert.id file use the same UNIX host, you can set up a UNIX group with all of them, and set it up as a group cert.id file. Then, give group read and write permissions to the cert.id file. The users also

need permission to access and search the directory where the cert.id file is located.

In Lotus Notes Release 4.6, it is also possible to restrict access to an ID file further by requiring more than one password to use the ID file. With this additional security requirement, two or more people may be necessary before a cert.id is usable.

This is covered in more detail in 8.5.4.1, “Securing the Certifier ID” on page 200.

Chapter 5. Connecting Lotus Domino Servers

In this scenario, as shown in Figure 1 on page 22, we attempt to connect our six AIX Lotus Domino Servers in such a way that mail routing and replication are enabled efficiently and transparently.

The first step in setting up connections between servers and domains is to design the network topology that will be used.

5.1 Choosing a Topology for Replication and Mail Routing

The topology that was chosen was a *hub and spoke* topology. With this method, the hub always initiates the request for replication. Connection documents for replication were created at the hub, and not at the spokes, to ease administration and maintenance.

Hub and spoke topology is the most efficient setup for Lotus Domino servers. The hub server replicates with each spoke server in turn according to the schedule you define. You can:

- Install multiple protocols on hub servers to enable communication in organizations using more than one protocol. This places hub servers in multiple Lotus Domino named networks, another source of efficiency. Hub servers can connect multiple Lotus Domino named networks.
- Bridge parts of a network, such as a LAN and a WAN, with a hub server.
- Centralize administration of the Public Address Book by designing the hub with Manager access and the spokes with Reader access. Making changes in one replica (on the hub) synchronizes the spokes.
- Designate hubs by role, for example, replication hubs and mail hubs.
- Place server programs like Message Transfer Agents on hubs to make them easily accessible.
- Use a hub to connect remote sites to your LAN or WAN.

Often, a single hub server and its spoke servers make up one Lotus Domino named network.

For our scenario, we created one hub in each domain with all servers (spokes) in that domain connected to the hub. Each *domain hub* was then a spoke of the main hub, thus fully connecting all the servers in the network.

The topology that we used as a base is shown in Figure 1 on page 22.

Notice that noteserv/ibm acts both as a domain hub for the ibm domain and also as the main hub, connecting all domains together. It has a dual role.

5.2 Mail Routing

This section discusses what needs to be set up for mail to be routed between servers in different domains and how to do the setup.

5.2.1 Introduction to Mail Routing

For mail routing to occur between two Lotus Domino servers, you usually must create *Connection documents* that specify how and when the mail routing occurs. Connection documents are stored in the Public Address Book, and you should ensure that all Public Address Books have been replicated correctly.

In a connection document, both the *Mail* and *Replication* tasks are enabled by default. However, you can edit this setting and create separate Connection documents for each task. If the Mail task is enabled in the Connection document, Lotus Domino routes any pending mail during replication, in addition to routing mail at scheduled times.

How you connect servers for mail routing depends on whether the servers are in the same *Lotus Domino named network* and/or *Lotus Domino domain*:

- To set up *mail routing between two servers in the same Lotus Domino named network*, you do not need to create a Connection document. Lotus Domino automatically routes mail between servers on the same Lotus Domino named network. A Lotus Domino named network is a group of Lotus Domino servers, that share a common LAN protocol and have the same Lotus Notes Network name in their Server documents in the Public Address Book in the Network Configuration section.
- To set up *mail routing between two servers that are in the same Lotus Domino domain but are on two different Lotus Domino named networks*, you create two Connection documents, one in each direction, to ensure two-way server-to-server communication.
- To set up *mail routing between two servers in adjacent domains*, you need a Connection document in the Public Address Book of each Lotus Domino domain.
- To set up *mail routing if the servers are in two different Lotus Domino domains that are connected by a third Lotus Domino domain*, you create a Connection document to the adjacent Lotus Domino domain and a non-adjacent domain document in the Public Address Book. The adjacent Lotus Domino domain then has a document to your non-adjacent Lotus Domino domain and does the delivery to the destination Lotus Domino domain for you. Otherwise, every user needs to know the full delivery path if addressing mail to a non-adjacent Lotus Domino domain.
- To set up *mail routing between a Lotus Domino Server and a non-Domino server in a foreign domain*, such as on the Internet, you create a Connection document and a foreign Domain document in the Public Address Book of your Lotus Domino domain.

5.2.2 Setting Up Mail Routing Connection Documents

Initially, there will be no Connection documents for routing mail to other domains. Any attempt to route mail across to another domain would result in error messages on the server.

In this section, we will describe how to set up mail routing between two different domains. To start, you must create Connection documents between two servers for which you want mail routing to take place.

Having logged on as the administrator for the main hub:

1. Select the server's **Public Name and Address Book** icon by clicking on it once with the left mouse button or from the Administration Control Panel, click **System databases** and choose **Open Address Book** or double click on the **Public Address Book** icon to open the database.
2. Once the Public Address Book is open, choose the **Connection** view from the navigator pane on the left side and click the **Add Connection** button at the top of the screen.



Figure 104. New Server Connection for Mail Routing

We decided to create one Connection document for mail routing and one for replication.

3. In the **Basics** section of the Connection document, select the type of connection and complete the remaining fields in the Basics section. These fields will vary on the type of connection you choose. In our case, for **Connection Type**, you chose **Local Area Network** from the drop down menu. Our **Source Server** was `noteserv/ibm` with the **Source Domain** `ibm` and our **Destination Server** was `itsosmp/itso` with the **Destination Domain** `itso`.

The Basics section of the screen (as the name suggests) is trivial. Just make sure that the Source server name is fully qualified with the Source domain name.

4. Complete the Scheduled Connection section:

- In the Schedule field, make sure **ENABLED** is selected.

Should you wish to disable the Connection document, select **DISABLED** from the pull-down of the Schedule field in the Scheduled Connection section of the screen.

- In the **Call at Times** field, enter a range of times (for example 12:00 AM - 2:00 AM) and or specify times (for example 12:00 AM, 3:00 AM) when you want the source server to connect to the destination server. Separate multiple specific times with a comma. The default is 8:00 AM to 22:00 PM.
- (Optional) If you enter a range of times to connect, then in the **Repeat Interval of** field, optionally enter how soon after a successful connection the source server attempts to connect again. The default is 360 minutes.
- In the **Days of week** field, enter the days of the week that you want the source server to connect to the destination server. The default is every day of the week.

5. In the Routing and Replication section:

- In the **Tasks** field, make sure **Mail Routing** is selected.
- In the **Route at once if** field, enter a value to determine the number of pending messages that force mail routing to occur. The default is 5.
- In the **Routing cost** field, leave the default value of 1.

Lotus Domino uses routing costs to select the most efficient, least expensive way to route mail messages from one server to another. The Mail Router computes and stores information about these costs in its internal routing tables. If there is more than one possible route for mail to travel between the source server and the destination server, the Mail Router uses information in the tables to calculate a least-cost route to the destination.

Save the Connection document (press the **Esc** key on the keyboard and click on **Yes** in the Confirmation window to save the changes). On returning to the Workspace, make sure the **Public Name and Address Book** icon is selected, and select **View -> Server -> Connections** to see the Connection document in the Name and Address Book. Figure 105 shows the Connection document for noteserv/ibm to itsosmp/itso in the Public Name and Address Book.

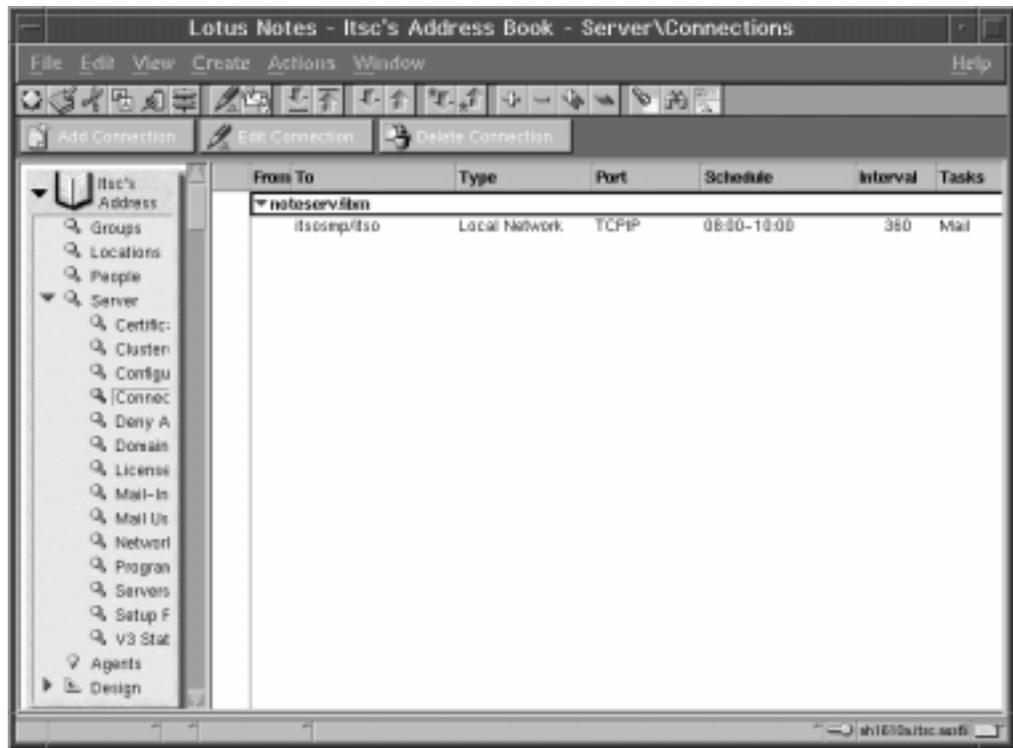


Figure 105. Lotus Notes - Connection Document in Name & Address Book

The second server (the domain hub) in domain itso will also need a Connection document to the first server (the main hub) in domain ibm. Without it, users on that domain would not be able to send mail or reply to users on other domains through the main hub. The Connection document for the second server is shown in Figure 106.



Figure 106. Mail Routing Connection Document for Second Server

Now that the Connection documents are in place, we need to authorize the two servers to communicate with each other. This is done by using cross certificates.

5.2.3 How Cross Certification Works

Cross Certification at the Organization Level (Scenario 1)

The Braegen organization certifier (/braegen) cross certifies the IBM organization certifier (/ibm). The cross certificate issued by Braegen is stored in Braegen's Public Address Book. The IBM organization certifier (/ibm) cross certifies the Braegen organization certifier (/braegen) and the cross certificate issued by IBM is stored in IBM's Public Address Book. This allows all users and servers from Braegen to authenticate with IBM and vice versa.

Cross Certification at the Organizational Unit Level (Scenario 2)

The Braegen Group maintains a customer support server SUPPORT exclusively for use by external customers, one of which is Visual Concepts. The Braegen organizational unit certifier (/support/braegen/ca) cross certifies the Visual Concepts organizational unit certifier (/audio/visual/us), and the cross certificate issued by /support/braegen/ca is stored in Braegen's Public Address Book. The Visual Concepts organizational unit certifier (/audio/visual/us) cross certifies the Braegen organizational unit certifier (/support/braegen/ca), and the cross certificate issued by /audio/visual/ca is stored in Visual Concept's Public Address Book.

This cross certification enables Michael White/audio/visual/US and Erin Smyth/audio/visual/us to authenticate with the server SUPPORT/support/braegen/ca. However, it does not allow all users to authenticate with the Braegen server PRODUCTION/DEV/braegen/ca.

5.2.4 Cross Certification and Authentication

Having set up the Connection document, the next step is to cross-certify the Certifier ID on the servers in the two Lotus Domino domains. For this, we will be following example 1: Cross Certification at the Organization Level. Without this cross certification in place, the Lotus Domino Servers will not route any mail.

The steps for cross-certifying certificates are as follows:

1. Server A creates a Safe Copy of its Certifier ID and makes this file available to Server B.
2. Server B cross-certifies the Certifier ID for Server A.
3. Server B creates a Safe Copy of its Certifier ID and makes this file available to Server A.
4. Server A cross-certifies the Certifier ID for Server B.

The next two sections, 5.2.4.1, "Creating a Safe Copy of the Certifier ID" on page 127 and 5.2.4.2, "Cross Certifying the Certifier ID" on page 129 describe this process by using two servers, noteserv/ibm and itsosmp/itso, as examples.

5.2.4.1 Creating a Safe Copy of the Certifier ID

This section outlines how to create a Safe Copy of the Certifier ID file, with the assumption that there is no intermediary gateway in place for distributing the ID file by mail:

1. Select **File -> Tools -> Server Administration...** to display the Lotus Notes - Administration dialog box, as shown in Figure 86 on page 97.
2. Select the server that you want to administer and click **Administration -> ID File...** to display the Choose ID File to Examine dialog box, as shown in Figure 107.

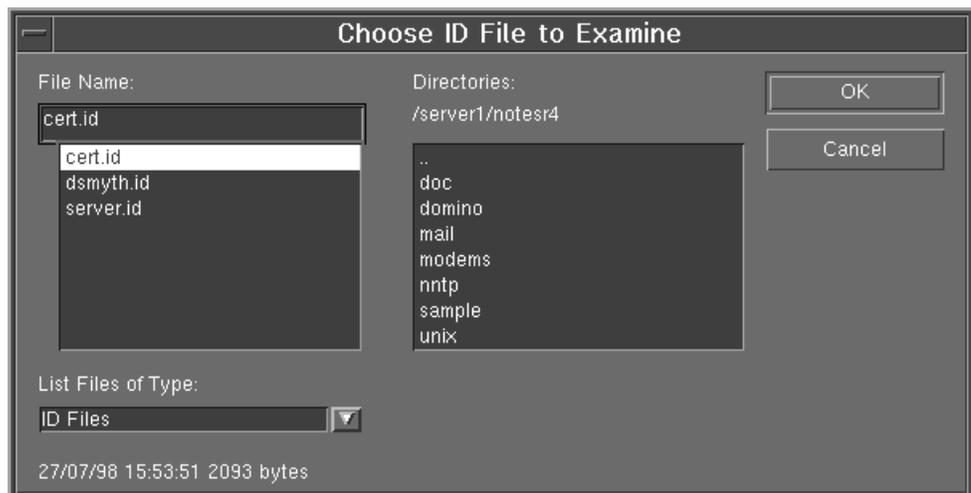


Figure 107. Choose ID File to Examine

3. Select the Certifier ID file for this server (usually cert.id) and click on **OK**.
4. Enter the password for the server on the Enter Password dialog box and click on **OK** (Figure 108).



Figure 108. Enter Password

5. On the User ID <domain_name> dialog box (Figure 109), select the **More Options** icon and click on the **Create Safe Copy...** button.

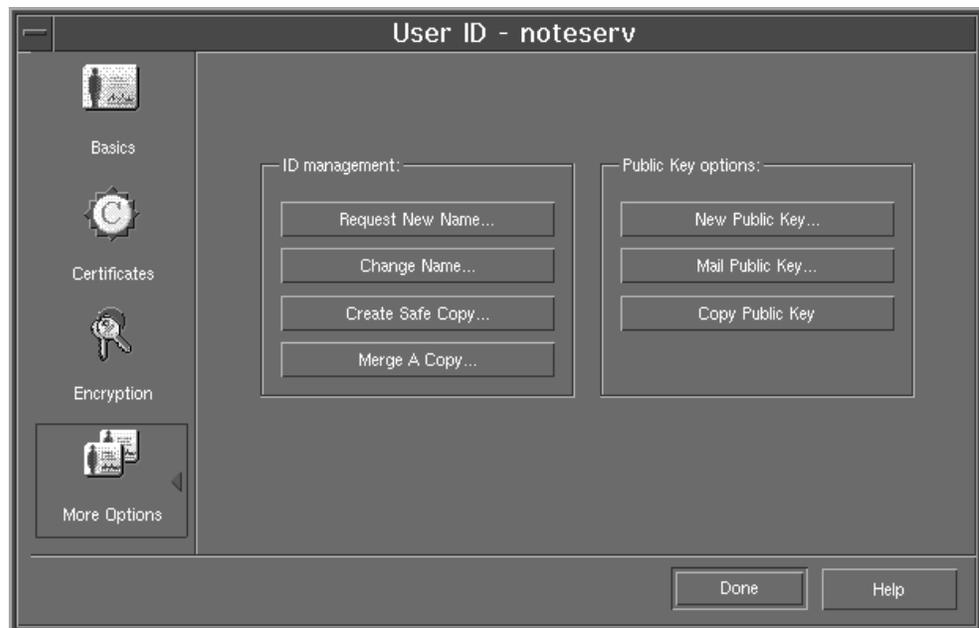


Figure 109. User ID Management Screen

6. On the **Enter Safe Copy ID File Name** screen that is presented (Figure 110), either accept the default or specify the name of the Safe Copy file in the **File Name** field. You can either save the file on diskette or on a drive that is shared with the server that you wish to connect to for mail routing.

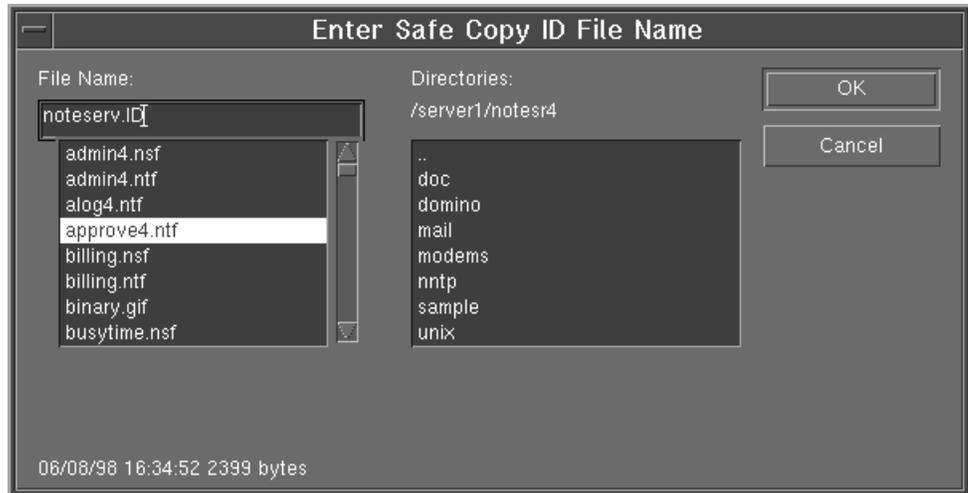


Figure 110. Name of the Safe Copy ID File

7. Click on **OK**.
8. Tell the Safe Copy's file name and location to the administrator of the server that you wish to cross-certify with.

5.2.4.2 Cross Certifying the Certifier ID

This section outlines how to cross-certify a Safe Copy of an ID file.

1. From the Notes Workspace, select **File -> Tools -> Server Administration...**, click on the **Certifiers** icon, and select **Cross Certify ID File...** to display the Choose Certifier ID screen (Figure 111).



Figure 111. Choose Certifier ID Screen

2. Choose the server's own Certifier ID file and click on **OK**.
3. Enter the password for the ID file (if required) and click on **OK**.

- On the Choose ID to be Cross-Certified dialog box (Figure 112), select the other server's Safe Copy ID file (in this scenario, it's noteserv.id) and click on **OK**.

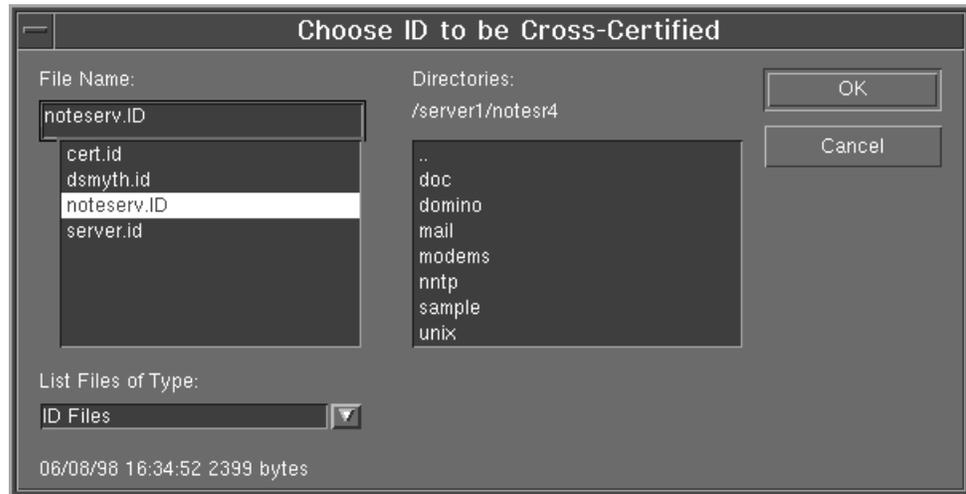


Figure 112. Choose ID to Cross-Certify Screen

- (Optional) Change the expiration date of the certificate. The default is 10 years.
- (Optional) Click **Certifier**, select a different certifier to issue the cross certificate, and click **OK**.
- On the Cross Certify ID dialog box (Figure 113), click on **Cross Certify**.

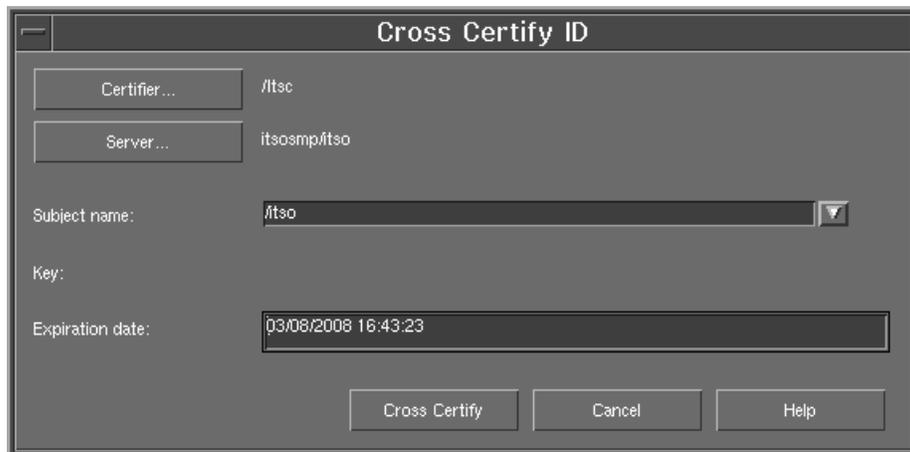


Figure 113. Cross Certify

- Enter the password for the ID file (if required) and click **OK**.
- Click on **No** to exit the screen prompting for more ID files to be cross certified.

5.3 Replication

This section discusses what needs to be set up for replication of databases to occur between servers and how to do the set up and customization for replication.

5.3.1 Introduction to Replication

Replication is the process of synchronizing documents from the same databases on different servers or workstations. The synchronization only works if the databases are replicas -- that is, they have the same replica ID, which is a unique number assigned to the database when it is created. You can keep multiple replicas of a single database on multiple servers. By using distributed replicas, users can access the same information on different networks, in different time zones, or in different countries, without having to access one centrally located database.

5.3.2 Creating the Connection Document for Replication

We will use a different Connection document for replication. To do this, follow these steps:

1. Double Click on the **Public Name and Address Book** to open it.
2. Choose **Connections view** from the Navigation Panel on the left.
3. Click on the **Add Connection** button at the top of the view.

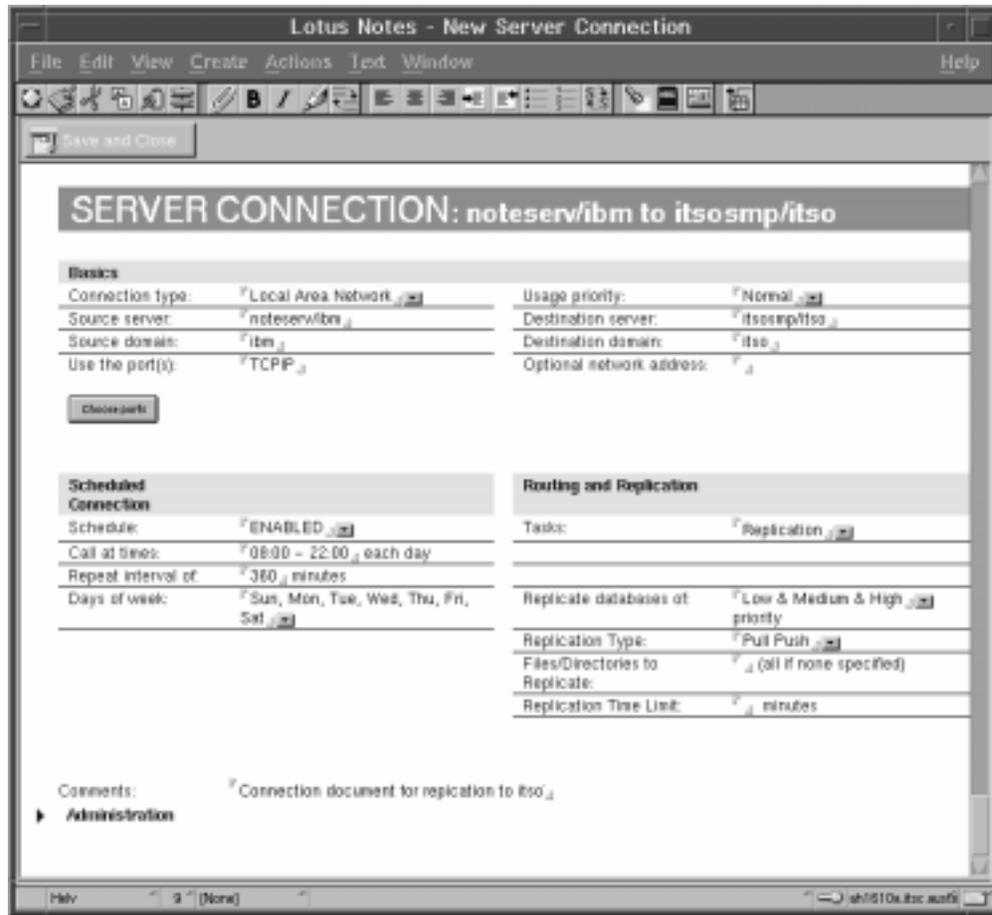


Figure 114. Lotus Notes - New LAN Connection (for Replication)

4. Complete the Basics section of the document first, making sure that you specify the Source server field as the fully qualified name of the server that will act as the hub. In our scenario, this will be the AIX server noteserv/ibm.
5. In the Connection type field, select the type of network connection to be used (LAN, dial-up modem, Remote LAN service, or passthru server).
6. In the **Routing and Replication** section, select **Replication** only from the pull-down on the Tasks field, while keeping the **Replication Type** as **Pull Push**. (We want the hub to pull changes from the spokes and push changes to the spokes.)
7. (Optional) In the **Replicate databases of Priority** field, specify High, Medium & High, or Low & Medium & High. The default is Low & Medium & High.
8. (Optional) In the **Files/Directories to Replicate** field, you can specify to only replicate certain databases or directories of databases.
9. (Optional) Enter a time limit for the replication in the **Replication Time Limit** field.
10. The **Scheduled Connection** section of the document is where you specify when and how often replication should take place.

11. When you have filled-in all the values, press **Esc** on your keyboard and answer **Yes** to save the document and return to your Workspace.

5.3.3 Required Authorizations in Server Document

The next step is for the spoke server to authorize the hub server to create replica databases. This is done by using the Create replica databases field in the spoke Server document.

To ease administration, it is recommended that a Lotus Notes Group be set up which lists all the resources allowed to create replicas on the server:

1. Double click on the **Public Name and Address Book** to open it. Choose the **Group view** from the Navigation panel on the left side and click on the **Add Group** button at the top of the view. When you have opened Group document, the screen, shown in Figure 115, will appear.

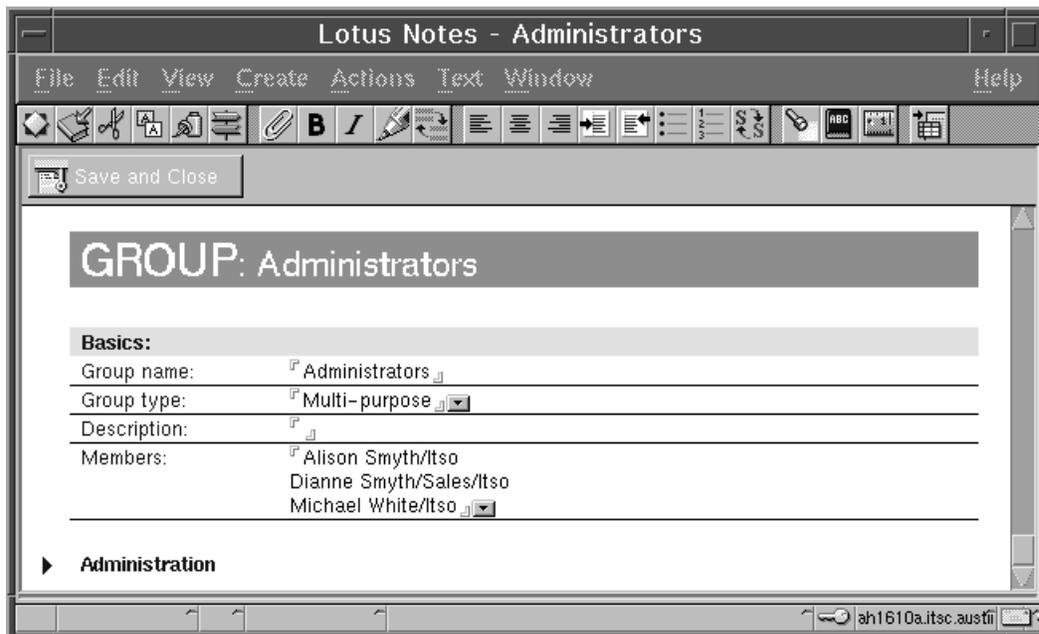


Figure 115. Lotus Notes - New Group

Once the Group has been set up, we can update the Server document to authorize that Group to create replicas:

1. Select the **Public Name and Address Book** by clicking on it once. Select **View -> Server Other... -> Server\Servers** and click on **OK** to display a view of the servers.
2. Select the spoke server that will be replicated to, and click on the **Edit Server** button.
3. Click on **> Restrictions**. Your screen should now look like the one shown in Figure 116.

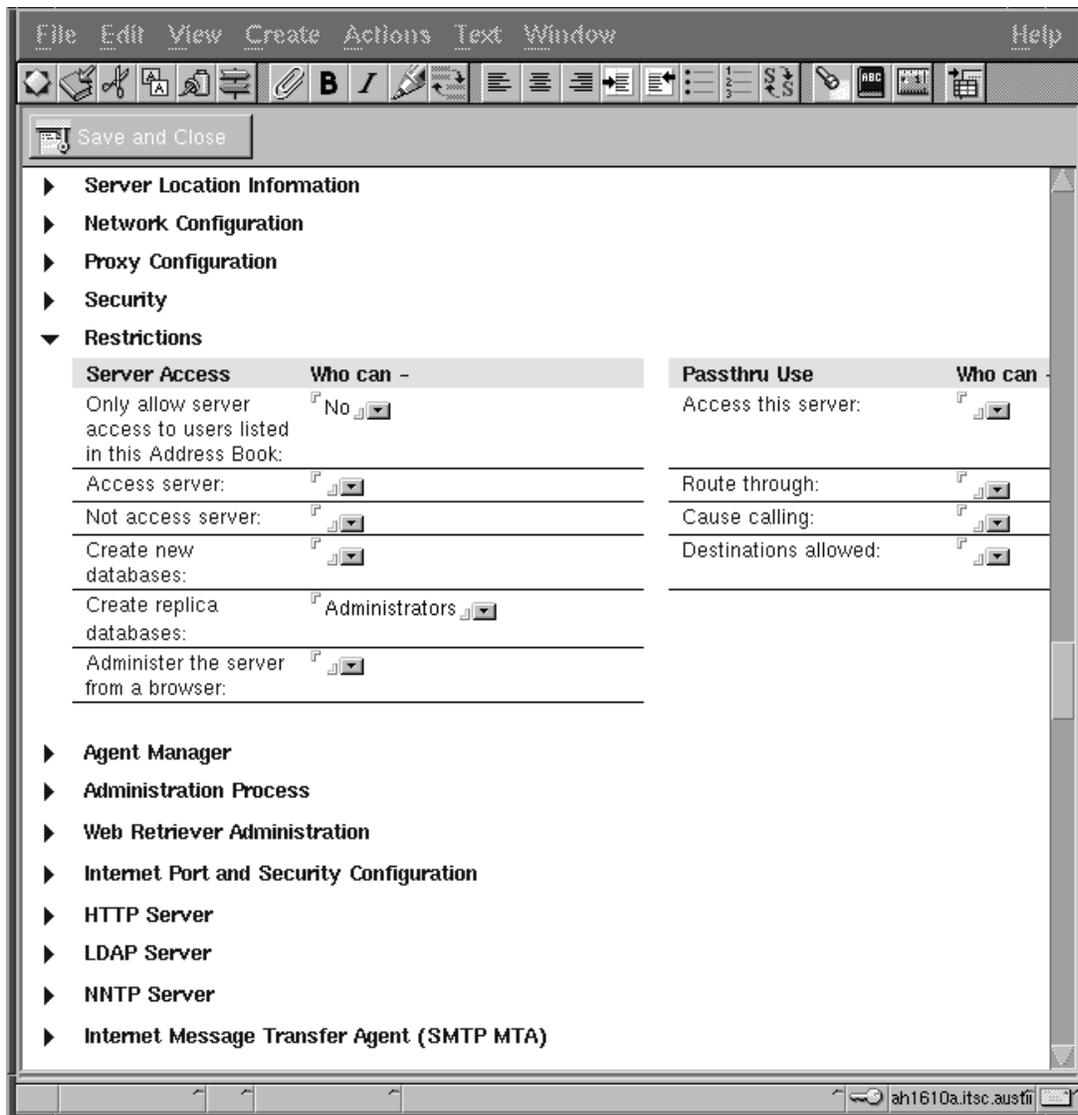


Figure 116. Updating Server Document for Replication Authorization

4. Tab down to the Create replica databases field, and type in the Lotus Notes Group name that you created for this use, or use the drop-down menu and select the Group from the Public Address Book.
5. Save the document and return to your workspace.

5.3.4 Creating the Replica on the Spoke Server

Replication only works when two servers have a database in common. For this reason, before scheduled replication can work, the hub server must create a replica of the database on the spoke.

If you wish to define replication settings for the database, such as specifying the documents or database features the replica can receive, then you must define those settings first. Refer to 5.4, "Selective Replication" on page 136 for details on what the settings are and how to define them.

Once the replication settings are in place, it is then possible to create the replica:

1. Select the icon of the database that you want to replicate (by clicking on the icon once) and select **File -> Replication -> New Replica...** to display the New Replica <database_title> screen, as shown in Figure 117.

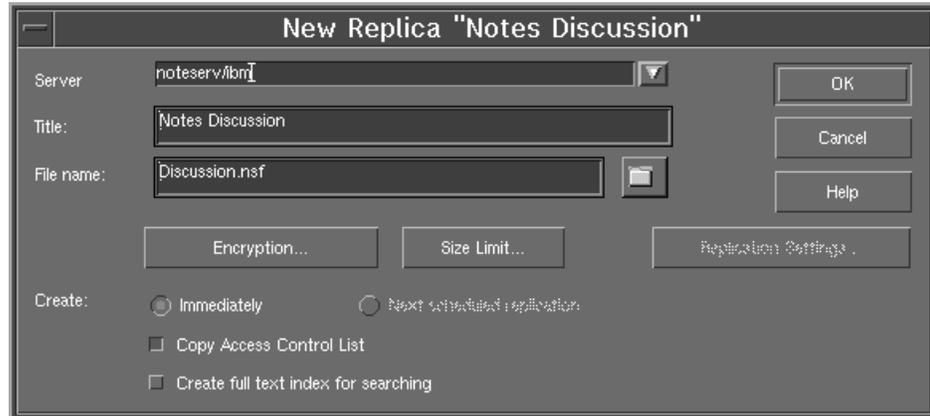


Figure 117. Creating a New Replica of a Database

2. Type in the name of the spoke server (the server you want to replicate to) in the **Server** field, or select it, if available, from the pull-down menu.
3. Enter the title of the replica in the **Title** field and give the replica a name in the **File name** field. The name you specify in this field does not have to be the same as the name of the file on the source server. Lotus Notes recognizes replicas using the Replica ID. Refer to 5.4.2, "Database Replica IDs" on page 141 for more information.
4. If you want to define the replication settings, click on **Replication Settings**.
5. If you want to encrypt the local copy of the database, click on the **Encryption...** key and specify how you want the database to be encrypted.
6. If you want the database to grow beyond the 1 GB default limit, click on the **Size Limit...** key and select a new value.
7. Select **Immediately** to create the replica on the destination server while also replicating the documents that the database holds. Or, if you want to create the replica now and wait for the normal replication process to replicate the documents, then select the **Next scheduled replication** radio button.
8. Select **Copy Access Control List** to copy the list from the source server to the destination server.
9. Click on **OK**.
10. Enter your password, if prompted, and click on **OK**.

The database will then be replicated to the spoke server where it can be added to the workspace by using **File -> Database -> Open...**, selecting the replica database, and then clicking on the **Add Icon** on the Open Database screen to add the icon to the workspace. Then click on **Done**.

If you get a message back saying that you are not authorized to update the server, restart the spoke server and then try creating the new replica again.

If you have **Stack Replica Icons** selected from the **View** pull-down menu on the Notes Workspace and you open the replicated version that is on the hub server's Workspace, Lotus Notes will stack that icon onto the local server icon. (This will only work if you click on the replicated version.)

Clicking on the downward arrow that's present on the icon itself will enable you to select which version of the database you want to work with.

The prerequisites for replication are now in place:

1. Connection document on one of the servers
2. Authorization for creating replicas
3. Creating the new replica

The databases(s) can now be replicated according to the schedule in the Connection document. To replicate outside of this schedule or to force unscheduled replication, you can select **File -> Replication -> Replicate....**

5.4 Selective Replication

Selective replication formulas establish a set of criteria for a replicated document. For example, a replication formula can instruct the server to replicate only documents from a certain person, about a certain topic, or in a particular view or folder.

Database managers with authority to create replicas on other servers can centrally administer those replicas. (See 5.3.3, "Required Authorizations in Server Document" on page 133.)

It is important to remember that database managers of replicas on other servers can at any time bypass any replication settings that were defined centrally.

There are three steps that need to be completed for centralized replica administration. They are:

1. Select a destination/source server combination.
2. Specify the documents a replica can receive.
3. Select the database features that replicas can receive.

Each one of these three points is discussed here:

1. Select a destination/source server combination:
 - a. Right-click on the **Database** icon, and select **Replication Settings**.
 - b. On the Replication Setting screen, click on the **Advanced** icon. A dialog box similar to the one in Figure 118 will be displayed.
 - c. In the **When computer** field, enter the name of the server where the replica will be. If you can't find the server that you want from the pull-down for this field, click on the **Computer** icon on the far right-hand side of the field. From the Servers screen that appears, either type or select the name of the server you want. Click on **OK** to return to the Replication Settings dialog box.

- d. In the **Receives from** field, either select the source server from the pull-down, or click on the **computer** icon on the far right-hand side to either select or type the name of the server that you want.

Make sure that you have the **source** and **destination** servers specified in the correct order. The **When computer** server is the one which will receive the new replica and, perhaps, a subset of the information. The **Receives from** server is the one which stores the entire contents of the database, and it is also the server from which all other replicas of this database are administered.

Figure 118 shows the advanced settings for a new replica of a database that will be created on the destination server, **noteserv/ibm** and administered centrally from the source server, **itsosmp/itso**.

See step 2 on page 138 for information on how to Replicate a subset of documents and how to Select by formula.

See step 3 on page 139 for information on the Replicate incoming section of the dialog box.

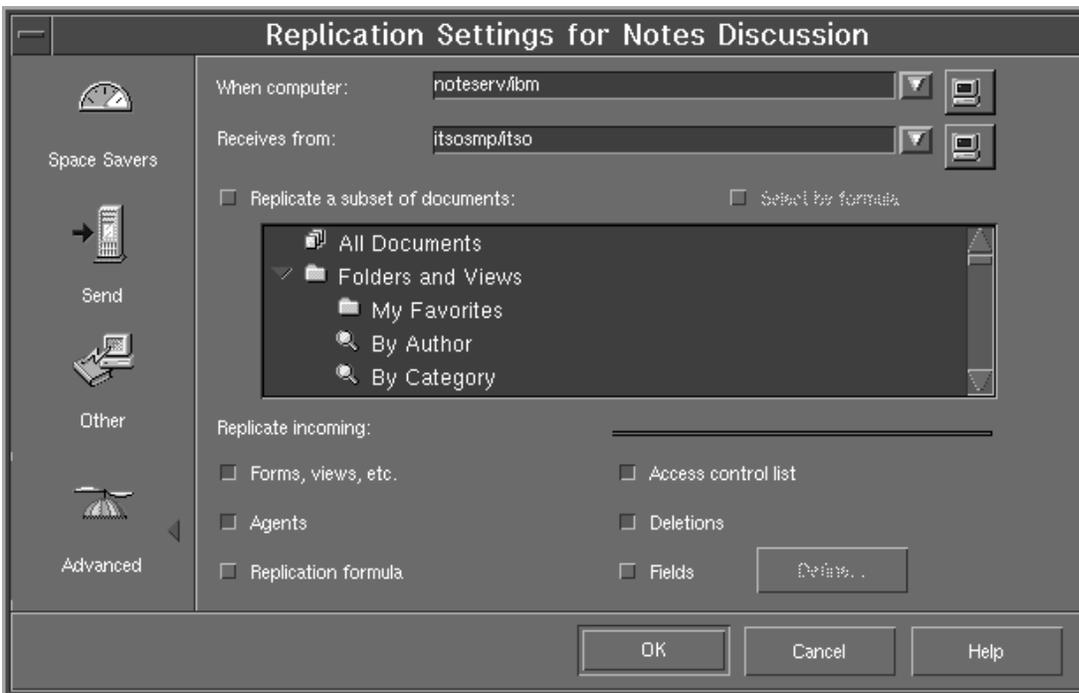


Figure 118. Advanced Settings for Replication

- e. Select **Fields** to select the specific fields that the replica will receive. Click on the **Define** button to select whether you want to replicate All Fields or Custom. If **Custom** is selected, you can choose a subset of fields to replicate. See Figure 119 for an example of the list of fields you can choose to selectively replicate.

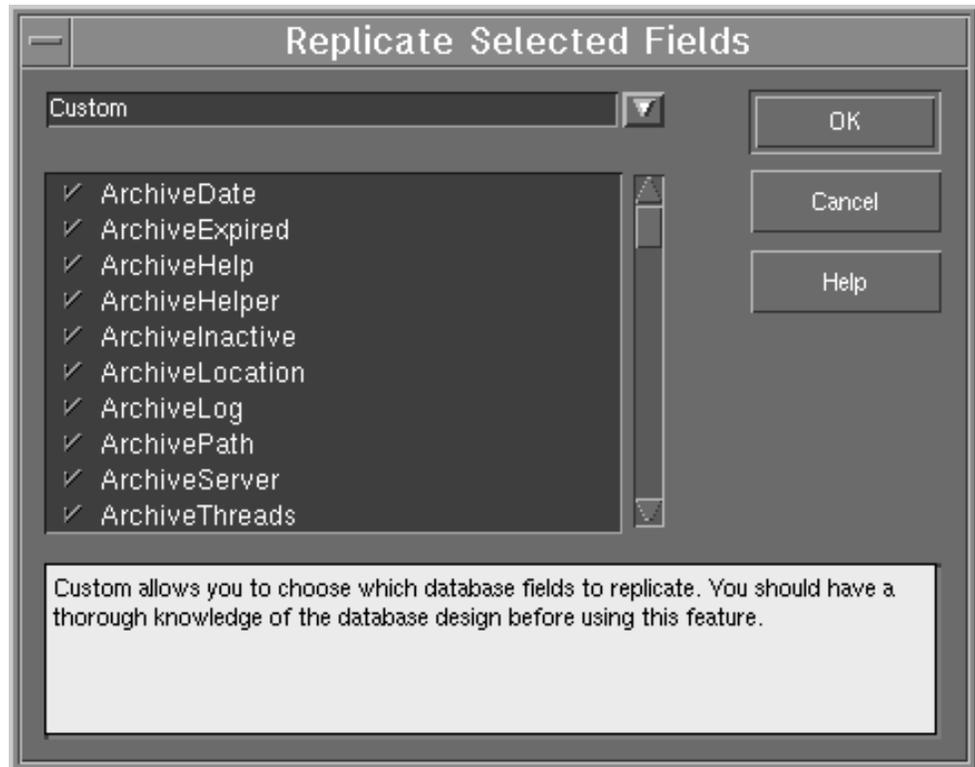


Figure 119. Replicate Selected Fields

Note

If defining fields to replicate for the Public Name & Address book, you can select a third option - Minimal Address Book - which will send the smallest possible set of fields required to send Lotus Notes mail. This option is particularly useful for mobile Lotus Notes users.

Specify the documents that a replica can receive.

There are three main reasons why you may want to define only a subset of documents to be replicated:

- To save disk space on destination servers
 - To save on time (and, therefore, cost) associated with replicating a database
 - To meet the requirement for making certain views and folders available at the destination server
2. To define a subset of documents, follow the steps below:
 - a. Right-click on the **Database** icon, and select **Replication Settings....**
 - b. On the Replication Settings screen, click on the **Advanced** icon and check **Replicate a subset of documents.**
 - c. If you want the destination server to receive only certain folders and/or views, then select the ones that apply from the list that is displayed. The

specification for the subset of documents is only applicable to the destination/source server combination selected in the Replication Settings dialog box.

- d. A replication formula is similar in concept to a view formula. You may use replication formulas to determine which documents a replica receives. Check **Select by formula**, having first checked **Replicate a subset of documents**.

You can then enter the formula that defines the subset of documents in the formula window (see Figure 120).

Note: The specification for the subset of documents is only applicable to the destination/source server combination selected in the Replication Settings dialog box.

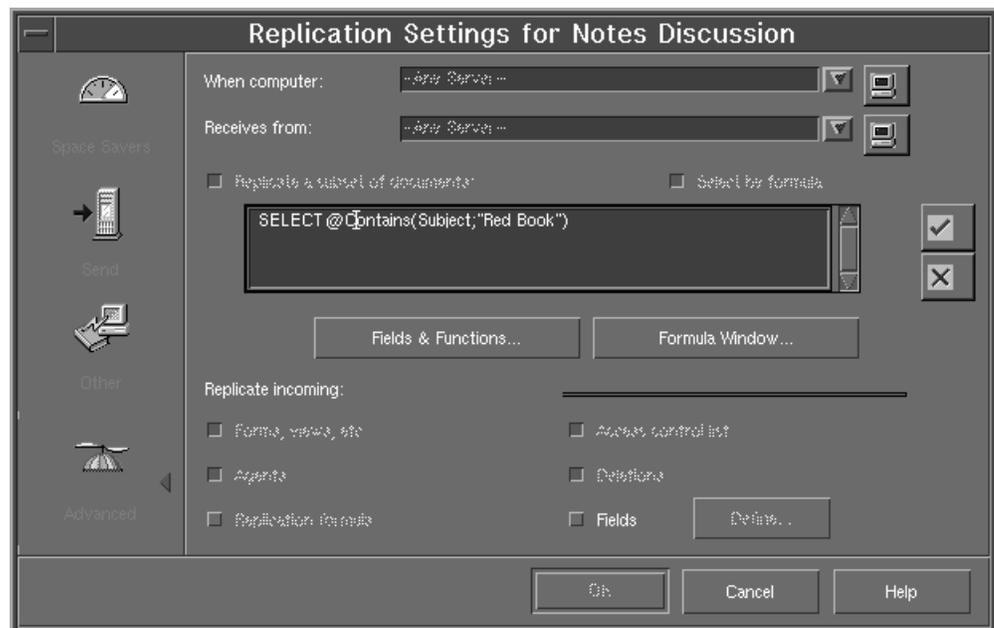


Figure 120. Selecting a Subset of Documents by Formula

The formula shown in the formula window of Figure 120 will only allow documents with the string "Red Book" in the Subject field of the database to be replicated.

You cannot use @DbLookup, @UserName, @Environment, or @Now in a replication formula.

Using @IsResponseDoc in a replication formula causes all response documents in a database to replicate, not just those that meet the selection criteria. To avoid this, use @AllChildren or @AllDescendants instead.

3. Select the database features that replicas can receive.

It is possible to tailor the following replication features:

- a. Deselect **Forms, views, etc.** to prevent database design changes being sent to the replica.
- b. Deselect **Agents** to prevent a database replica receiving agents.

- c. Select **Replication formula** to allow a replica to receive the selected replication settings.

Note: Steps a, b and c above are only relevant when the source server has Manager or Designer access to the replica as specified in the ACL of the replica database.

- d. Deselect **Access control list (ACL)** to prevent a replica from receiving changes made to the ACL. This is only relevant if the source server has Manager access to the replica.

- e. Select **Deletions** to allow a replica to act on deleted documents.

Documents will not be deleted from the replica database if:

- 1) **Do not send deletions made in this replica to other replicas** is checked in the Send panel of the Replication Settings dialog box (Figure 121) for the source server, or

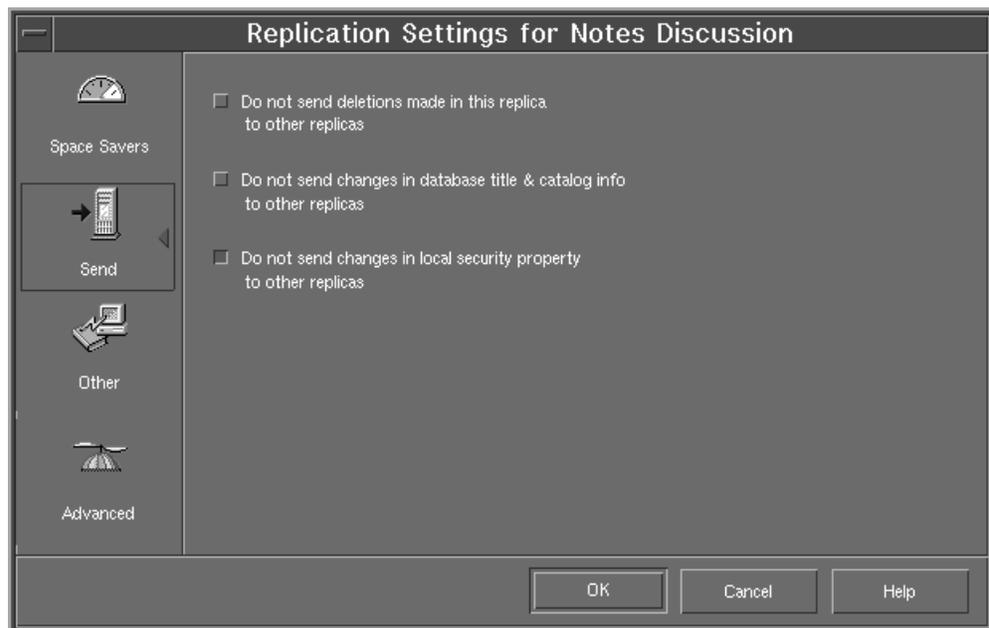


Figure 121. Replications Settings - Dialog Box

- 2) **Deletions** is not checked in the Advanced panel of the Replication Settings dialog box.

As a default, a replica will inherit all the database features with the exception of the replication formula.

Note

The features that you specify are only applicable to the destination/source server combination selected in the Replication Settings dialog box.

Note

Everything is now in place for the central administration of the replica.

5.4.1 Features That Will Not Replicate

The following values must be tailored at the destination server and cannot be defined centrally:

- Remove documents not modified in the last <number> of days.
- Receive summary and 40 KB of Rich Text only.
- Do not send deletions made in this replica to other replicas.
- Do not send changes in database title and catalog information to other replicas.
- Do not send changes in local security property to other replicas.
- Temporarily disable replication.
- Only replicate documents saved or modified after <date>.
- CD-ROM publishing date.

5.4.2 Database Replica IDs

All replicas of a database have the same Replica ID. This ID distinguishes a copy from a replica. When Lotus Notes replicates, it checks for common databases using this Replica ID.

To check a Replica ID, click once on the icon for the database on the Workspace, select **File -> Database -> Properties...**, and then click on the **Information** tab (second tab) to display the Replica ID for the database (Figure 122).

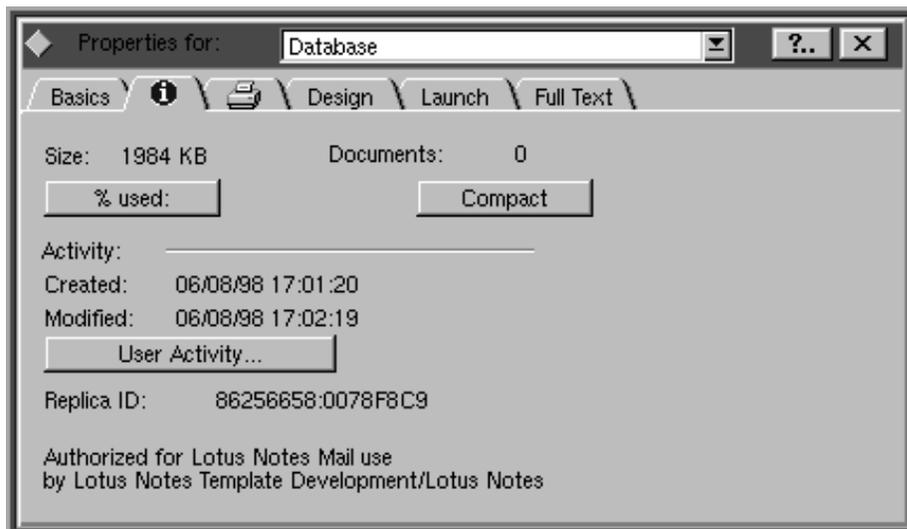


Figure 122. Replica ID

5.4.3 Access Control Lists and Replication

The determining factor on exactly what changes a replica receives is the Access Control Level given to the source server on the server where the replica database exists.

For example, the replica can only receive changes made to the design and formulas of the database if the source server has at least Designer access to the database.

Table 10 illustrates what is replicated according to the Access Level of the source server to the database replica.

Table 10. Changes That Will Replicate

Access Level	Access Control List (ACL)	Design & Formula	Edited Documents	New Documents
Manager	Yes	Yes	Yes	Yes
Designer	No	Yes	Yes	Yes
Editor	No	No	Yes	Yes
Reader	No	No	No	No
Depositor	No	No	No	No
No Access	No	No	No	No

Chapter 6. Configuring Lotus Domino Servers on AIX

This chapter covers some Lotus Notes features related to the AIX system, for example, Lotus Domino Server startup and shut down and code distribution under Network File System (NFS).

Several examples are presented throughout this chapter.

The following Lotus Domino Server configuration will be used for the examples:

- The Lotus Domino software is installed in the file system `/usr/domino`.
- The server is running as the AIX user `notes` and AIX group `notes`.
- The `notes` user home directory is in another file system mounted on `/server1`. All the server data files will be in the directory `$HOME/notesr4`.

Note

The `/usr/domino` and the `/server1` directories are mount points for two different file systems. The first one will be used for the Lotus software in general, and the second one is the home directory for the `notes` user.

All the code and examples in this chapter were made assuming this configuration, and you will need to customize them to work properly in your environment. To do so, you will be required to know about administering AIX systems and Korn Shell scripts.

6.1 Lotus Domino Server Startup

This section covers the following topics:

- How to start up the Lotus Domino Server manually from an AIX command line.
- How to startup the Lotus Domino Server using a startup script.
- How to start up the Lotus Domino Server on an AIX machine automatically at bootup.

6.1.1 Lotus Domino Server Startup from AIX Command Line

These are the steps to start up the Lotus Domino Server on an AIX machine and get a server console:

1. Log in as the `notes` user.
2. Type the command: `server`

Note

If your `notes.ini` file is in your path, you don't need to type the Lotus Notes data directory. In our configuration, this directory is `/server1/notesr4`.

3. You may need to type the Lotus Domino Server password.

This procedure will give you the server console on a screen or window. If you kill this screen, the server crashes; it won't respond to any requests. To recover from this situation, you have to kill all the servers and all their child processes and remove the corrupted shared memories and semaphores they created. Section 15.3, "Cleaning Lotus Domino Processes" on page 418 contains an explanation

about killing these processes and removing corrupted shared memories and semaphores and contains a script to do it.

To run the server in the background, use the following command:

```
$ nohup /opt/lotus/bin/server <notes_data_directory> <<EOF &
> <Server_Password>
> EOF
```

Figure 123. Running the Lotus Domino Server in Background

The server output will be directed to the file nohup.out. You will have to type your Lotus Domino Server password. If your server doesn't need a password, press **Enter**. If you wish to see the server output, you need to look into the nohup.out file. You can send commands to this server through the server remote console (see 6.2.2, "Shutting Down Lotus Domino Server on Remote Console" on page 150).

The recommended way to start up a server is the startup script shown next.

6.1.2 Starting the Lotus Domino Server using a Startup Script

In case you wish to start the Lotus Domino Server in the background using a shell script, we give below the following two shell scripts to be executed for fully accomplishing the task.

6.1.2.1 Defining the Environment

This script defines essential parameters for use by the other scripts.

```
#!/bin/ksh
# Domino Application Server Environment Variable Script
# Licensed Materials - Property of IBM
# (C) COPYRIGHT International Business Machines Corp 1994,1998
# All Rights Reserved.
# US Government Users Restricted Rights - Use, duplication or disclosure
# restricted by GSA ADP Schedule Contract with IBM Corp.
#####
# Description - env_domino
#
# This script makes variable definitions that are common to
# the start_domino, stop_domino scripts
#####

# This script is provided "As Is".

# Script Environment variables.

NOTES_USER=notes# AIX userid for this server
NOTES_PATH=/server1/notesr4# Path for server data directory
NOTES_SERVER=noteserv# Name of Domino Server
OUTPUT_LOG=/tmp/$NOTES_SERVER.log# Output file for server console
INPUT_FILE=$NOTES_PATH/$NOTES_USER.input# Input file for server console
PATH=$NOTES_PATH:/opt/lotus/bin:$HOME/bin:$PATH# Ensure PATH is set for scripts
```

6.1.2.2 Starting the Server

This script starts the server in the background, redirecting the console to \$OUTPUT_LOG, and reading commands from \$INPUTFILE.

```
#!/bin/ksh -x
# Domino Server Start Script
# Licenced Materials - Property of IBM
# (C) COPYRIGHT International Business Machines Corp 1994,1998
# All Rights Reserved.
# US Government Users Restricted Rights - Use, duplication or disclosure
# restricted by GSA ADP Schedule Contract with IBM Corp.
```

```

#####
# Description - start_domino
#
# This is a server startup script to start the Domino Server in background
# that gets command input from a file and pipes the output to another which
# can be monitored by administrators.
#
# The INPUT file allows any command to be issued to the Domino Server so
# this file should be treated accordingly ...hidden with the appropriate
# permissions to prevent unauthorized access to the server
#####

# This script is provided "As Is".

# Set Script Environment variables.

. env_domino

# Script Logic

if (('id -u' == 0))
then
    print "Run the Domino Server as the $NOTES_USER user "
    exit
fi

#
# if you are using /etc/hosts for tcpip name resolution rather than a name
# server or NIS, then uncomment the following line:
#export NSORDER=bind,local,nis
#

if [ ! -x /opt/lotus/bin/server ] ; then
    echo "Cannot access server command - exiting"
    exit 1
fi

if [ ! -d $NOTES_PATH ] ; then
    echo "Cannot access notes data directory - exiting"
    exit 1
fi

NOTES_RUNNING=`ps -fu $NOTES_USER | grep /opt/lotus | grep -v grep `
if [[ -n $NOTES_RUNNING ]] ; then
    echo "Domino Server is already running - exiting"
    exit 1
fi

cd $NOTES_PATH
#
# Clean up if the Domino Server terminated abnormally earlier
#

rm -f ~notes.lck
mems=`ipcs | grep $NOTES_USER | awk '{ print $1 $2 }' | awk -F"m" '{ print $2 }' | awk '{
print $1 }'`
sems=`ipcs | grep $NOTES_USER | awk '{ print $1 $2 }' | awk -F"s" '{ print $2 }' | awk '{
print $1 }'`
for j in $mems;do if [ -n "$j" ] ; then ipcrm -m $j;fi;done
for j in $sems;do if [ -n "$j" ] ; then ipcrm -s $j;fi;done

export Notes_SHARED_DPOOLSIZE=4000000
#
# For servers using Notes passwords,
# replace the previous line with the following two lines.
#
cat .secure_hidden_passwd > $INPUT_FILE
echo "show server" >> $INPUT_FILE

cp -p $OUTPUT_LOG $OUTPUT_LOG.`date +%m%d%y_%H%M`
#cp -p $OUTPUT_LOG $OUTPUT_LOG.backup
print "Starting Domino for AIX ($NOTES_SERVER)"
/opt/lotus/bin/server < $INPUT_FILE > $OUTPUT_LOG 2>&1 &

```

6.1.3 Starting the Lotus Domino Server Automatically

To start up the Lotus Domino Server automatically after a reboot, you have to create an entry in the `/etc/inittab` file and a script to start up the server. In our example, the script is called `start_domino`, which is described in 6.1.2.2, "Starting the Server" on page 144. It will be in the directory `/server1/bin`. The output of the server will be moved into `/tmp` directory.

Use the following procedure to implement our example:

1. Log in as the `notes` user, and do the following:

- Create a directory called `bin`

```
$ mkdir -m 700 /server1/bin
```

- Move the file `start_domino` in the directory `/server1/bin`.

```
$ mv start_domino /server1/bin
```

2. Log in as `root` to do the following:

- Create an entry in the `/etc/inittab` file for the Lotus Notes startup script

```
# /usr/sbin/mkitab "notes:2:once:/bin/su - notes -c
/server1/bin/start_domino
# Domino Server Startup"
```

This is a one line command.

Note

If you want to remove this entry from `/etc/inittab`, use the command below. This is a one line command.

```
# /usr/sbin/rmitab "notes:2:once:/bin/su - notes -c
/server1/bin/start_domino
# Domino Server Startup"
```

In the next boot, the Lotus Domino Server will be started up automatically. If you want to start up the server without rebooting the machine, as the `notes` user type:

```
$ nohup /server1/bin/start_domino &
```

This is a simple example. You can change this sample program to customize your logs and directories.

6.1.4 Using the AIX alog Facility

The `alog` facility of AIX can be used to maintain the server log messages. The `alog` command creates and maintains fixed-sized, circular log files. It makes it easier to maintain the size of the log file.

Note

To use the `alog` facility, you need to have at least AIX 4.1.5, and the `bos.rte.serv_aid` fileset must be installed in the system. Without this, the `alog` facility won't work properly with Lotus Notes. You can use the command:

```
lsllpp -l | grep bos.rte.serv_aid
```

to check if the fileset is installed in your system.

You also can run the following test to ensure that your `alog` version will work properly with Lotus Notes:

1. Run the command:

```
alog -f /tmp/test.log
```

2. Type some words and press **Enter**. The `alog` command echoes your input.
3. Suspend the `alog` command by pressing **Ctrl-Z** (stop signal).
4. Run the command:

```
alog -f /tmp/test.log -o
```

5. If it shows what you've typed, it is working. If it shows only what you've typed when you finish the previous `alog` command (you have to put it in the foreground again and press **Ctrl-D**), it won't work with Lotus Notes. The reason for this is that it outputs the messages to the log file only when its standard input is finished.

To use the `alog` command, you must:

- Create a log file definition in the Software Service Aids Attributes Object Class (SWservAt) of the host's Object Data Manager (ODM).
- Modify the startup script to use the `alog` command.

The script `configure.alog` (Figure 124 on page 148) creates a log file definition (file name `/server1/log/server.alog`, file size 512 KB) and creates the `inittab` entry to start up the server.

It first tries to remove the old definitions, if there are any, with the `odmdelete` command. Then, it creates the log file ODM definition. The log name is `notes`, the file name is `/server1/log/server.alog`, and the file size is 512 KB.

After that, it removes any `inittab` entry that begins with `Notes` (take care to not destroy your `inittab`) and creates the `inittab` to call the script `/server1/bin/startup.alog`.

```

#!/bin/ksh
#@(#) Configures Automatic Notes Startup.
# Script startup must be in ~notes/bin/startup

if [[ ` /bin/id -u ` != 0 ]]
then
    echo "Error: you must be root..." >&2
    exit 1
fi

LHOME=~notes
LOG=$LHOME/log/server.alog
SIZE=524288

# Deletes previous old odm for the log notes...
echo "Deleting previous ODM entries..."
/bin/odmdelete -o SWServAt -q 'attribute=log_type AND deflt=notes'
/bin/odmdelete -o SWServAt -q attribute=notes_logname
/bin/odmdelete -o SWServAt -q attribute=notes_logsize
/bin/odmdelete -o SWServAt -q attribute=notes_logverb

# Define in ODM an alog for Domino Server with size 512K
echo "Defining new ODM entries..."
/bin/cat <<EOF | /bin/odmadd
SWServAt:
    attribute="alog_type"
    deflt="notes"
    value="notes"
SWServAt:
    attribute="notes_logname"
    deflt="$LOG"
    value="$LOG"
SWServAt:
    attribute="notes_logsize"
    deflt="$SIZE"
    value="$SIZE"
SWServAt:
    attribute="notes_logverb"
    deflt="1"
    value="1"
EOF

# Delete old inittab entries...
ENIRY=`/bin/awk -F: '$1 == "notes" {print}' /etc/inittab`
if [[ -n $ENIRY ]]
then
    echo Removing inittab entry: $ENIRY
    /usr/sbin/mtab "$ENIRY"
fi

# Create the new one...
echo Creating inittab entry...
/usr/sbin/mkitab "notes:2:once:/bin/su - notes -c $LHOME/bin/startup.alog \
# Domino Server Startup"

```

Figure 124. Script to Configure Automatic Start Up (configure.alog)

The new script, startup.alog, is shown in Figure 125 on page 149. The difference is that this script redirects the standard output to the `alog` command instead of to the log file. Note that the server messages will appear in the host console. If you don't want this, redirect the `alog` standard output to `/dev/null`. You need to put the password of the user `notes` in the file named `~/bin/.notes`.

```

#!/bin/ksh
#@(##) Starts up Lotus Domino Server...
#
. /etc/environment | /bin/alog -tnotes > /dev/console

NOTESPATH=/opt/lotus/bin
export PATH=$NOTESPATH:~/notesr4:$PATH
export LANG=C

echo "-----> `date` <-----" | \
  /bin/alog -tnotes > /dev/console
$NOTESPATH/server < ~/bin/.notes 2>&1 | \
  /bin/alog -tnotes > /dev/console &

```

Figure 125. Script to Start Up a Lotus Domino Server (startup.alog)

To view the log contents, use the command:

```
$ alog -tnotes -o
```

You also can use smit, run: `smit alog_show`, type: `notes` in the Alog TYPE field and press **Enter** (Figure 126). Press **Enter** again, and you'll have the log file.

```

Show an Alog File

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

                                     [Entry Fields]
Alog TYPE                             notes
Alog File NAME                         [/server1/log/server.alog]

F1=Help           F2=Refresh       F3=Cancel       F4=List
F5=Reset          F6=Command       F7=Edit         F8=Image
F9=Shell          F10=Exit         Enter=Do

```

Figure 126. Show an Alog File

To change the file name, or the log size, run: `smit alog_change`. Then type `notes` in the Alog TYPE field and press **Enter** (Figure 127 on page 150). To change the file name, type the new one in the Alog File NAME field. To change the file size, type the new one in the Alog File SIZE field. Note that if you change the file size, the prior log messages will be erased.

```

Change / Show Characteristics of an Alog File

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

                                     [Entry Fields]
Alog TYPE                             notes
Alog File NAME                         [/server1/log/server.alog] /
Alog File SIZE                         [524288] #
VERBOSITY                              [1] #

F1=Help           F2=Refresh       F3=Cancel       F4=List
F5=Reset          F6=Command       F7=Edit        F8=Image
F9=Shell          F10=Exit          Enter=Do

```

Figure 127. Change / Show Characteristics of an Alog File

6.2 Lotus Domino Server Shut Down

This section covers the following topics:

- How to shut down the Lotus Domino Server on server console.
- How to shut down the Lotus Domino Server on remote console.
- How to shut down the Lotus Domino Server using AIX commands.
- How to shutdown the Lotus Domino Server using a shell script.

6.2.1 Shutting Down Lotus Domino Server on Server Console

If you have the Lotus Domino Server console on a screen, just type the command `exit` or `quit`. It may take 10 seconds or more for the server to shut down.

6.2.2 Shutting Down Lotus Domino Server on Remote Console

Another way to shut down the server is to use the remote console from the Lotus Notes administrator workspace. Start the administrator workspace and:

1. Choose **File -> Tools -> Server Administration...** from the Lotus Notes Workspace screen to get the Server Administration screen (Figure 128 on page 151).

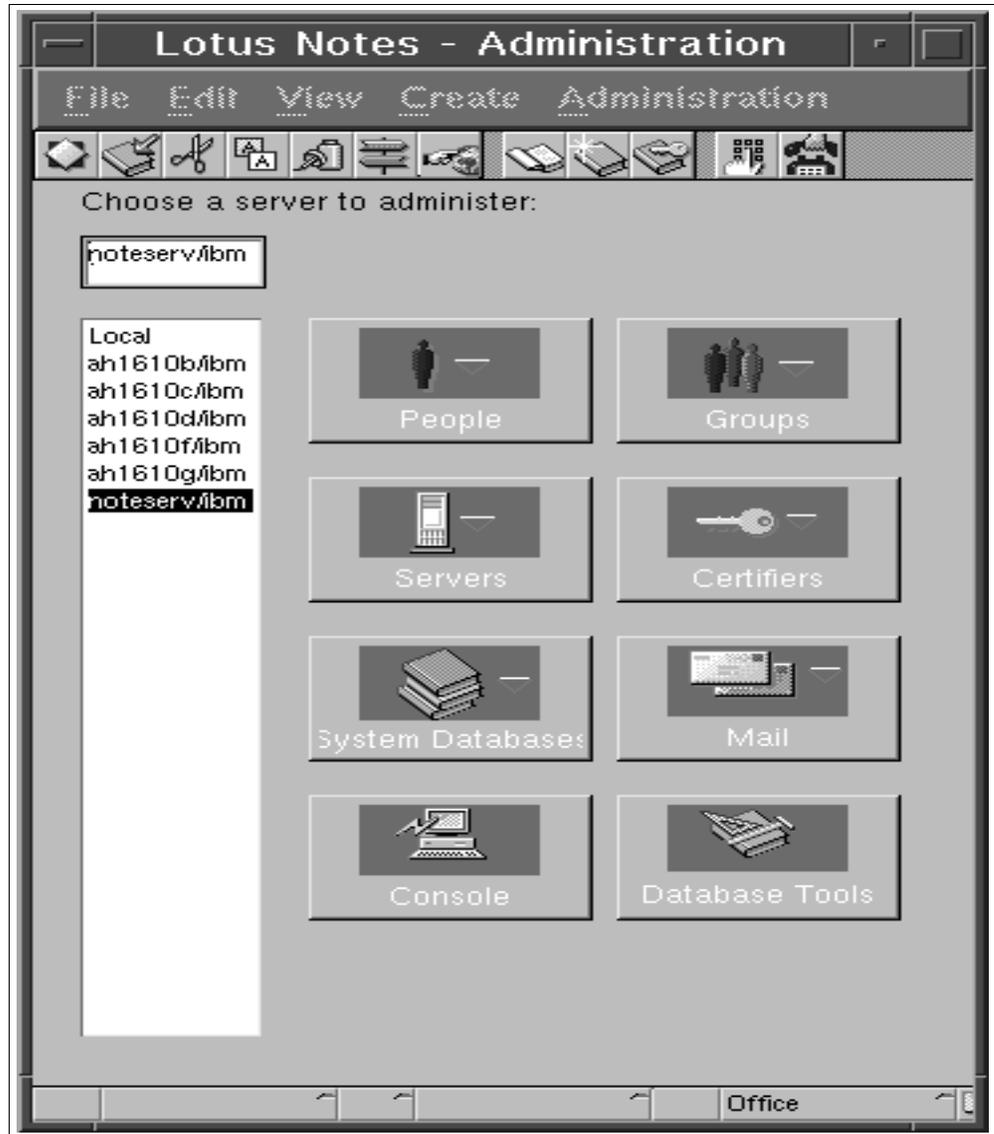


Figure 128. Lotus Notes - Administration

2. Choose the server you want to shut down and click on the **Console** button.

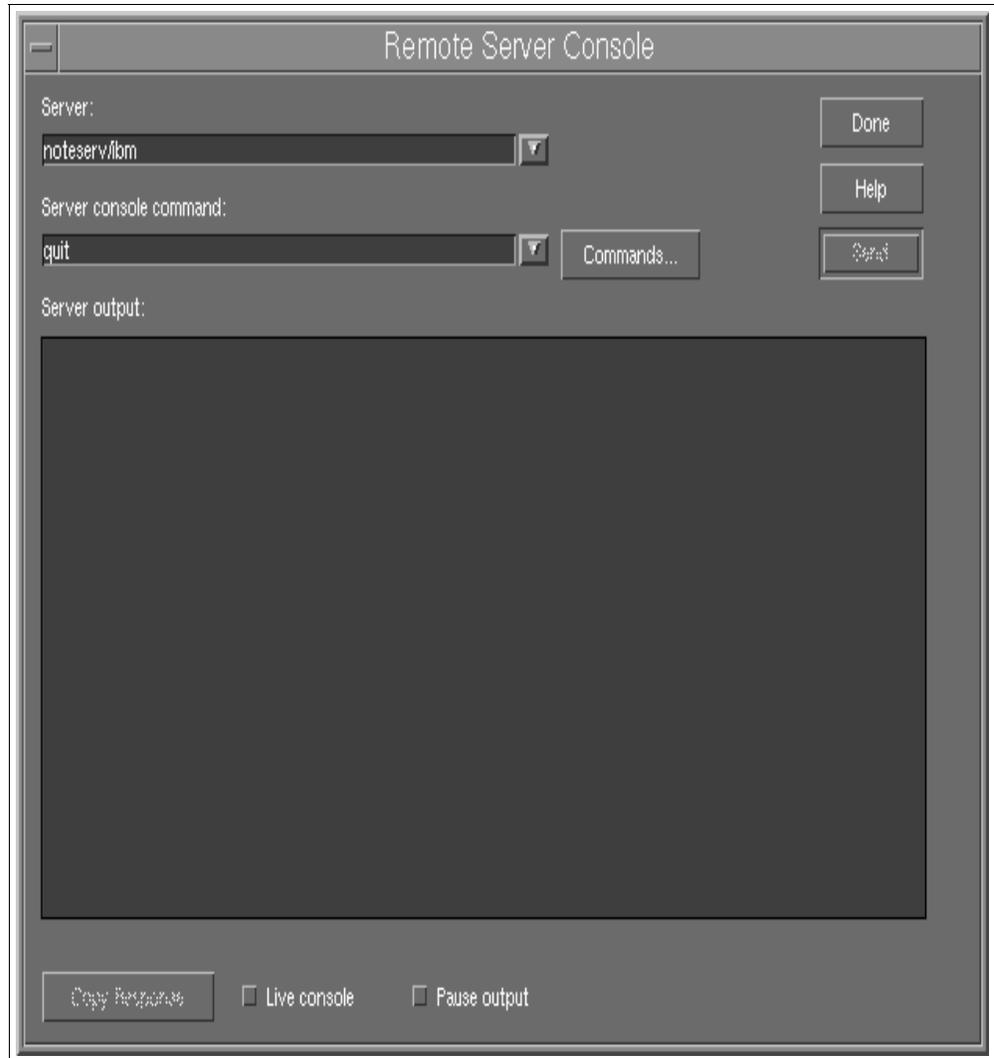


Figure 129. Remote Server Console

3. On the Remote Server Console screen (Figure 129), you can change the server you want to shut down. Enter the command `quit` or `exit` in the Server Console command box.
4. Click on the **Send** button.
5. Enter the Lotus Notes administrator password, if asked.
6. The system warns you that you won't be able to restart the server from the remote console. If you want to shut down the server, click on the **Yes** button.
7. The Server response box will show the following message when the server no longer responds:

```
COMMAND SENT: quit
Remote system no longer responding
```

Figure 130. Server Response

8. Click on the **Done** button.

Note

You can use the remote console to send other commands to a server. Refer to Appendix B in the *Lotus Notes Administrator's Guide* for additional information on server commands.

6.2.3 Shutting Down Lotus Domino Server Using AIX Command

On the operating system level, log into the server as user `notes`, then you can use the command, `server -q` to shut down the Lotus Domino Server (assuming the directory containing the installation binaries, `/opt/lotus/bin`, is already in your `PATH` statement).

Note

If the server is not responding, you have to kill (with `-9` signal) all the servers and their child processes. You also have to clean the shared memory and semaphores used by the `notes` user. The script in 15.3, "Cleaning Lotus Domino Processes" on page 418, describes how to kill `notes` processes and clean shared memory and semaphores.

6.2.4 Shutting Down Lotus Domino Server Using Shell Script

In case you wish to stop the Lotus Domino Server using a shell script, we give below the following two shell scripts to be executed for fully accomplishing the task.

6.2.4.1 Defining the Environment

This script defines essential parameters for use by the other scripts.

```
#!/bin/ksh
# Domino Application Server Environment Variable Script
# Licenced Materials - Property of IBM
# (C) COPYRIGHT International Business Machines Corp 1994,1998
# All Rights Reserved.
# US Government Users Restricted Rights - Use, duplication or disclosure
# restricted by GSA ADP Schedule Contract with IBM Corp.
#####
# Description - env_domino
#
#       This script makes variable definitions that are common to
#       the start_domino, stop_domino scripts
#####

# This script is provided "As Is".

# Script Environment variables.

NOTES_USER=notes# AIX userid for this server
NOTES_PATH=/server1/notesr4# Path for server data directory
NOTES_SERVER=noteserv# Name of Domino Server
OUTPUT_LOG=/tmp/$NOTES_SERVER.log# Output file for server console
INPUT_FILE=$NOTES_PATH/$NOTES_USER.input# Input file for server console
PATH=$NOTES_PATH:/opt/lotus/bin:$HOME/bin:$PATH# Ensure PATH is set for scripts
```

6.2.4.2 Stopping the Server

This script is used to stop a running server properly. If the server does not respond anymore, the script kills the server processes and cleans up system resources.

```

#!/bin/ksh -x
# Domino Server Stop Script
# Licenced Materials - Property of IBM
# (C) COPYRIGHT International Business Machines Corp 1994,1998
# All Rights Reserved.
# US Government Users Restricted Rights - Use, duplication or disclosure
# restricted by GSA ADP Schedule Contract with IBM Corp.
#####
# Description -
#
# This is the script to STOP the Domino Server which has been started using
# the corresponding script (start_domino).
# The script attempts to QUIT the server gracefully and waits 2 minutes.
#
# If Domino Server has not shut down by then, the plug is yanked.
# Depending on your environment, you may want to change this time-out period.
#####

# This script is provided "As Is".

# Set Script Environment variables.

. env_domino

# Script Logic

print "Stopping Domino for AIX ($NOTES_SERVER)"
print " ... waiting for shutdown to complete"
echo " quit " >> $INPUT_FILE
#
#
#
count=0
NOTES_RUNNING=`ps -fu $NOTES_USER | grep /opt/lotus | grep -v grep `
while [[ -n $NOTES_RUNNING ]] ; do
sleep 10
count=`expr $count + 1`
echo " ... waiting "$count"0 seconds"
#
# Terminate Domino Server if still running
#
if [ $count -eq 13 ] ; then
echo "Domino Server is still running after 2 minutes"
echo " ... now for the ungraceful method"
for i in `ps -fu $NOTES_USER | grep lotus | grep -v grep | awk '{ print $2 }'; do
kill -9 $i
done
mems=`ipcs | grep $NOTES_USER | awk '{ print $1 $2 }' | awk -F"m" '{ print $2 }' | awk '{
print $1 }'`
sems=`ipcs | grep $NOTES_USER | awk '{ print $1 $2 }' | awk -F"s" '{ print $2 }' | awk '{
print $1 }'`
for j in $mems;do if [ -n "$j" ] ; then ipcrm -m $j;fi;done
for j in $sems;do if [ -n "$j" ] ; then ipcrm -s $j;fi;done
echo "Domino Server ($NOTES_SERVER) TERMINATED"
exit
fi
NOTES_RUNNING=`ps -fu $NOTES_USER | grep /opt/lotus | grep -v grep `
done
#
echo "Domino for AIX ($NOTES_SERVER) shutdown completed"

```

6.3 Lotus Domino and NFS

This section covers how to use the Network File System (NFS) to share the Lotus Notes installation kit files (the Lotus Notes CD-ROM), share the Notes workstation software files, and distribute the client's Notes data directories.

Using remote directories for the Lotus Notes servers is not recommended. With NFS, you may have performance problems due to the use of the network. Beyond the performance problems, you have an availability problem. When the NFS server goes down, the Lotus Domino Server stops working until the NFS server becomes available again.

For the clients, there are the same problems, but there are some advantages:

- When sharing the Notes workstation software files, you reduce the disk space usage on the clients.
- When sharing the Lotus Notes installation kit files, you don't need to have a CD-ROM physically installed on each host. This is also useful for installing servers, because these files are used only in the installation of the Notes workstation software files.
- When distributing the client's Lotus Notes data directories, you have an easier way to back up the client's files and save some client's disk space. But most importantly, if you use a distributed environment, with the machines sharing the same users, this is the easiest way to make a Lotus Notes client available to the whole environment.

Note

To use NFS, the `bos.net.nfs.server` fileset must be installed on the host that will export its file systems, and the `bos.net.nfs.client` fileset must be installed on the machine that will mount servers' file systems. It's a good idea to install both of them.

Run the command:

```
lslpp -l bos.net.nfs.server
```

to see if the server fileset is installed, and run the command:

```
lslpp -l bos.net.nfs.client
```

to check the client fileset.

Install both filesets if they aren't installed.

To use NFS correctly, you need a way to resolve all the host names and addresses. This can be achieved by using the Domain Name Server (DNS), by using Network Information System (NIS), or by using a consistent `/etc/hosts` file in all hosts.

6.3.1 Combined Lotus Domino Server and Note Client Hosts

In Figure 131 on page 156, you can see a diagram of a UNIX host used as both a Lotus Domino Server and a Lotus Notes client. It follows the server conventions from the beginning of this chapter.

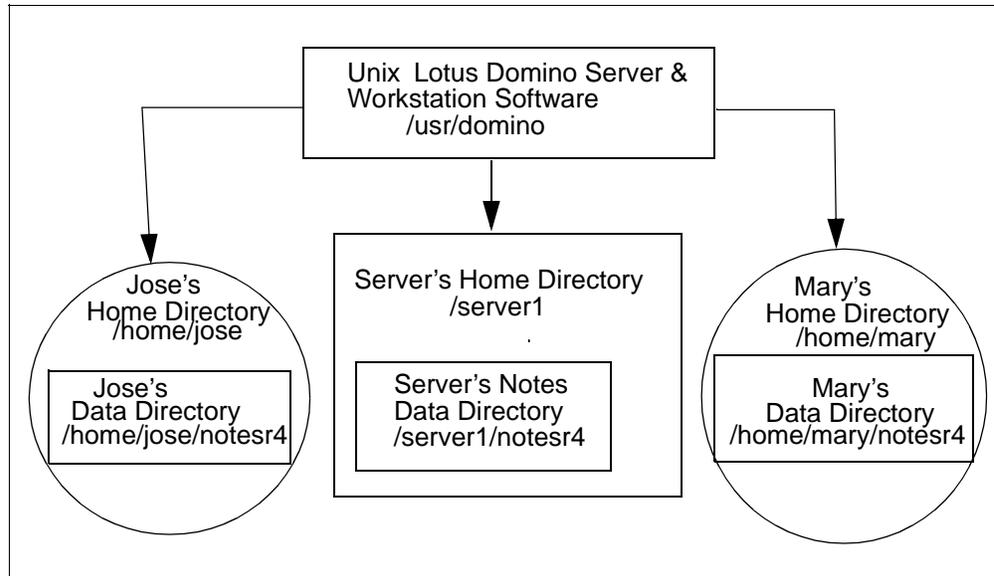


Figure 131. Lotus Domino Server Unix Host

The principal components of the figure are:

UNIX Lotus Domino Server and Workstation Software

Located in the file system /usr/domino, it is used to run the server and all the clients that can exist in this host.

Server's Home Directory

In our example, it is on the file system /server1. It contains the server's Notes data directory (/server1/notesr4), the user profile, the scripts directory, and so on.

Server's Notes Data Directory

Located in the directory /server1/notesr4, it contains the server.id, user.id, notes.ini, Lotus Notes databases, templates, mail files, and so on.

Jose's Home Directory

This is the directory for the AIX user jose. It is located in the directory /home/jose.

Jose's Notes Data Directory

Located in the directory /home/jose/notesr4, it contains all the notes files for Jose's Notes client.

Mary's Directories

The AIX user mary, like the AIX user jose, has her own home directory, Mary's home directory (/home/mary), and her own Lotus Notes data directory (/home/mary/notesr4).

In Figure 132 on page 157, you can see a diagram of a UNIX host used as a Lotus Notes client. This host has only the Notes workstation software installed locally. You don't need to install the Lotus Domino Server software in this host. The client's directories are such that they are in the UNIX server host. This host will access its Lotus Notes server using a network protocol (TCP/IP or SPX).

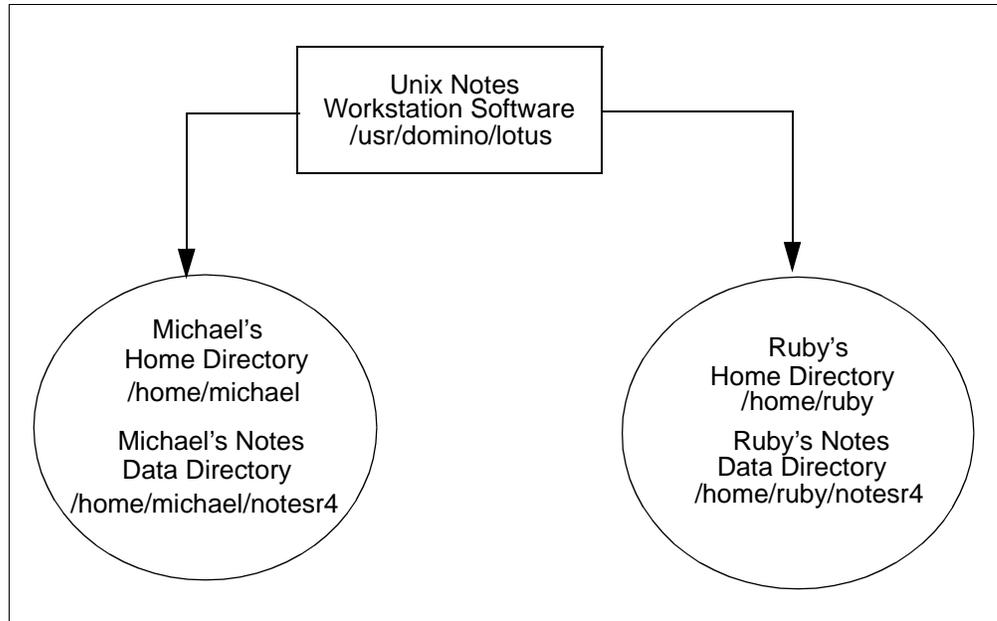


Figure 132. Lotus Notes Client UNIX Host

We can say that the installation process of the Lotus Notes software has two major steps:

1. Creating the UNIX Lotus Notes software from the distribution CD-ROM. At the end of this step, you have the `/opt/lotus/bin` file system. This step has to be done only once for each host, and after that, you won't need the CD-ROM.
2. Creating the Lotus Notes data directory. This is done when you run the `notes` command for the first time. At the end of this step, you have the users' `notesr4` directory. This is the Lotus Notes setup procedure that has to be done at least once for each server and each client. After that, you use both the `/opt/lotus/bin` and the `notesr4` directories to run the Lotus Domino Server or client workstations.

Now you have different choices on how to distribute over the network:

- The Installation Kit to install other clients or server hosts. The target hosts need to access this kit once for the first step of the installation.
- The UNIX Lotus Notes software to client hosts. These hosts will have to access the file server whenever its users run the Notes workstation. With these clients, you won't need to perform the first step of the installation.
- The users' Notes data directories. You can make the user's Notes workstation available over the network.

6.3.2 Distributing the UNIX Installation Kit

When you want to install the Lotus Domino Server and workstation software on a Lotus Domino Server host, or the Notes workstation software on a client host (the first major step of the installation), you need the UNIX Installation Kit available on a file server on the network.

The Lotus Notes installation program can run on the file server to install multiple remote hosts, or you can mount the Installation Kit directory from the file server host on the host you want to install.

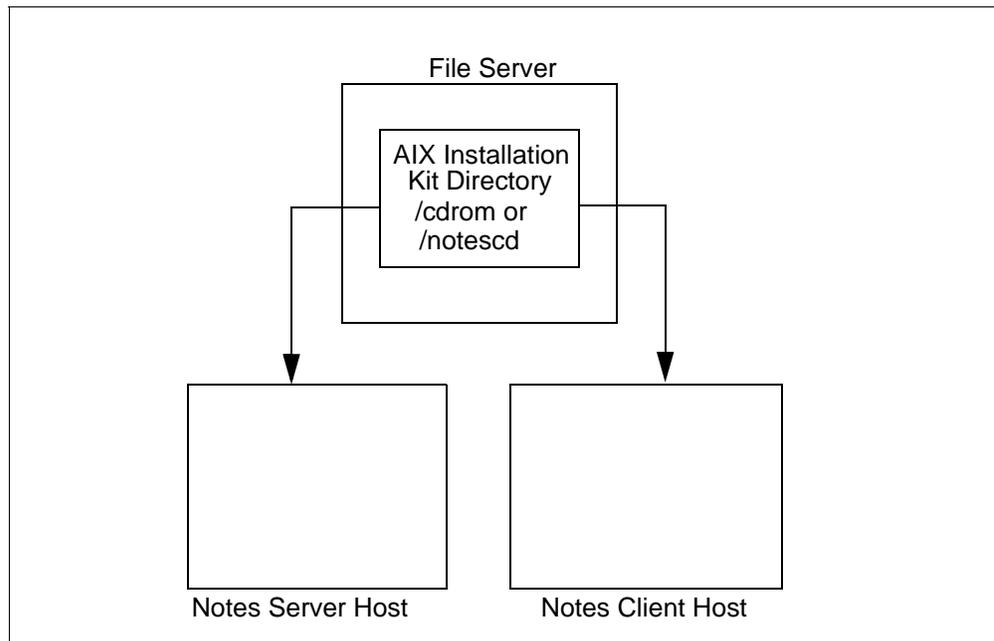


Figure 133. Distributing the Lotus Notes AIX Installation Kit

The file server may have the Installation Kit on CD-ROM or copied to a file system on its hard disk. If the Installation Kit is on a hard disk, the installation process will be faster, and you will have your CD-ROM unit available for other purposes.

In Figure 133, there is a file server with the Installation Kit exported and other hosts that mount it.

Note

In our example, the CD-ROM is mounted over the /cdrom directory. The /notescd contains a copy of the CD-ROM on the hard disk. You can choose one of them to export.

You can choose names other than /cdrom or /notescd for these directories. Just change them to your directories by using the commands in the following sections.

6.3.2.1 Copying the UNIX Installation Kit

If you decided to use a file system, you first have to copy the Lotus Notes CD-ROM to the hard disk. To copy it, log in as root, and do the following:

1. The Lotus Notes Release 4.6 CD-ROM has about 390 MB of data. Create the /notescd file system using `smitty crjfs`; then select the volume group you want, and the menu on Figure 134 will be shown. Enter the information in bold.

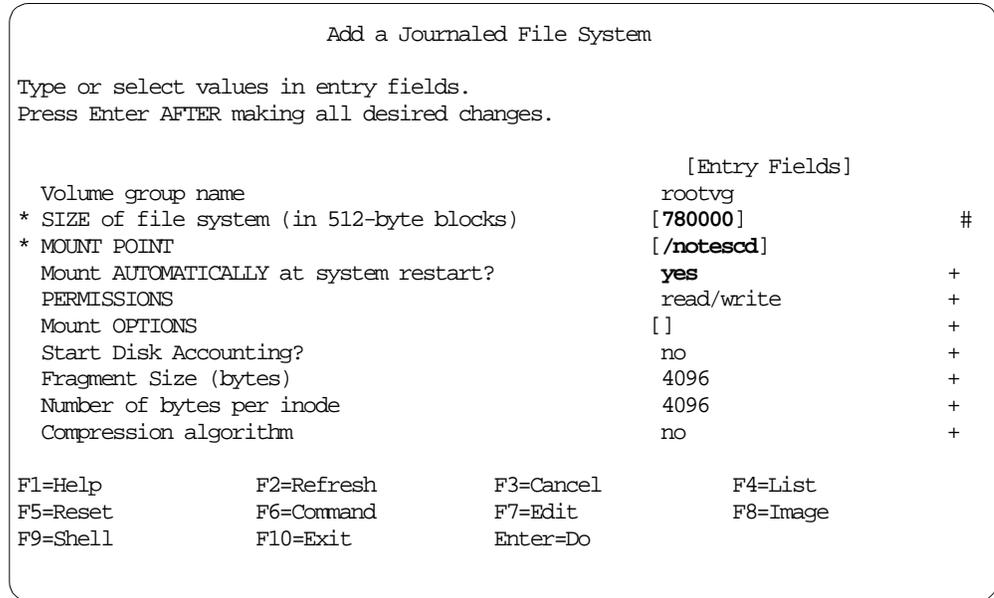


Figure 134. Add a Journaled File System

2. Mount the new file system: `mount /notescd`.
3. Remove the setgid bit from the /notescd permissions: `chmod g-s /notescd`.
4. Mount the CD-ROM: `mount -r -v cdrfs /dev/cd0 /cdrom`. The /cdrom directory must exist before you issue this command. You can be using a CD-ROM device other than /dev/cd0.
5. Run the commands below to copy the CD-ROM:

```
# cd /cdrom
# tar cvf - . | ( cd /notescd ; tar xvf - )
```

Or run the Lotus Notes for UNIX Distribution Copy utility:

```
# /cdrom/unix/copydist /notescd
```

It is recommended that you use the utility, which copies the files and checks them.

6.3.2.2 Exporting UNIX Installation Kit

To make the Installation Kit directory available to NFS mounts, be sure to have the NFS filesets installed in your machine, log in as root and:

1. If you never used NFS in this host, run the command `/usr/sbin/mknfs -B`. This starts NFS.
2. Run `smitty mknfsexp` and complete the fields as shown in Figure 135, or use the command:

```
# /usr/sbin/mknfsexp -d /notescd -t ro -B
```

Change the /notescd directory to /cdrom if you want to export the CD-ROM.

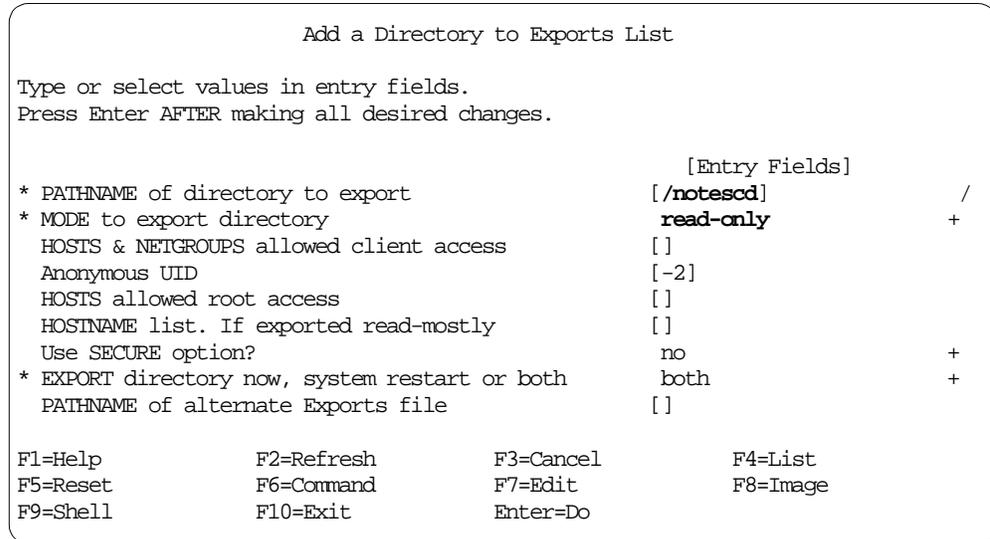


Figure 135. Add a Directory to Exports List

6.3.2.3 Mounting the UNIX Installation Kit

Now, you can mount the Installation Kit directory on the hosts you want to install. For example, suppose that the file server host is called *filserv*, and the machine you want to install is called *ah1610d*. You have to log in as root on *ah1610d* and mount the Installation Kit directory from *filserv*. Perform the command:

```
# mount filserv:/notescd /mnt
```

to temporarily mount the Installation Kit over */mnt*. Of course, you can choose another directory as the mount point, and you have to change */notescd* to */cdrom* if you have exported the CD-ROM directory.

After that, type in the command: `cd /mnt/unix` and continue with your normal installation procedure. See Chapter 2, "Installing a Lotus Domino Server" on page 23, for the server installation, and Chapter 3, "Installing a Notes Workstation" on page 75, for the client installation.

6.3.3 Distributing the Lotus Notes Software Directory

In the example on Figure 136 on page 161, Michael's and Ruby's workstations don't have the */opt/lotus/bin* file system installed. Instead of doing the first step of the Lotus Notes installation, you can mount a file system from a remote server that has the Notes Workstation installed on it. In our example, this file system will be called */noteswrk*. In the file server, you have to install the Notes Workstation software to serve as a network resource.

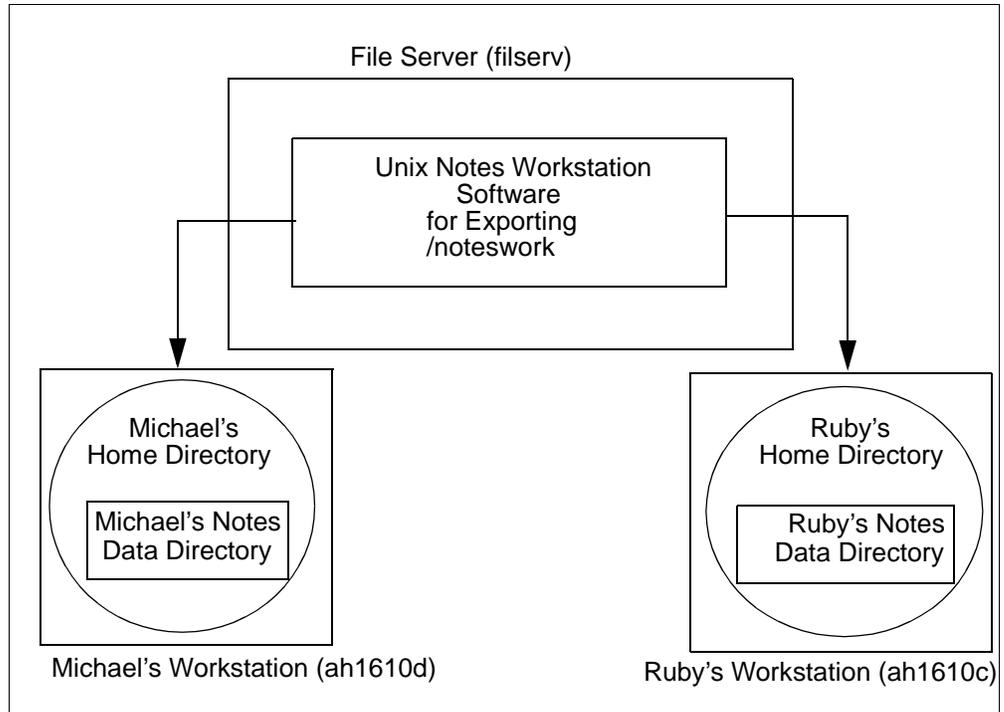


Figure 136. Distributing the Lotus Software Directory

For example, suppose that the File Server in Figure 136 is called `filserv`, Michael's workstation `ah1610d`, and Ruby's workstation `ah1610c`. Both `ah1610c` and `ah1610d` mount `filserv`'s file system, `/noteswrk`, over its local `/opt/lotus`.

To implement this example, you must:

1. Install the client workstation to serve as a network resource on `/noteswrk` on `filserv`.
2. Export `/noteswrk`.
3. Mount `/noteswrk` on `ah1610c` and `ah1610d`.
4. Create a link for the VIM applications on `mars` and `earth`.

The file server doesn't need to be the Lotus Domino Server or run any Lotus Notes applications. For performance reasons, it is recommended that you use different servers, one host to be the Lotus Domino Server, another to be the file server. But you can use a host as file server and Lotus Domino Server. In this case, the configuration would be like that shown in Figure 137 on page 162. Note that the server local clients use the `/opt/lotus/bin` file system to run the workstations.

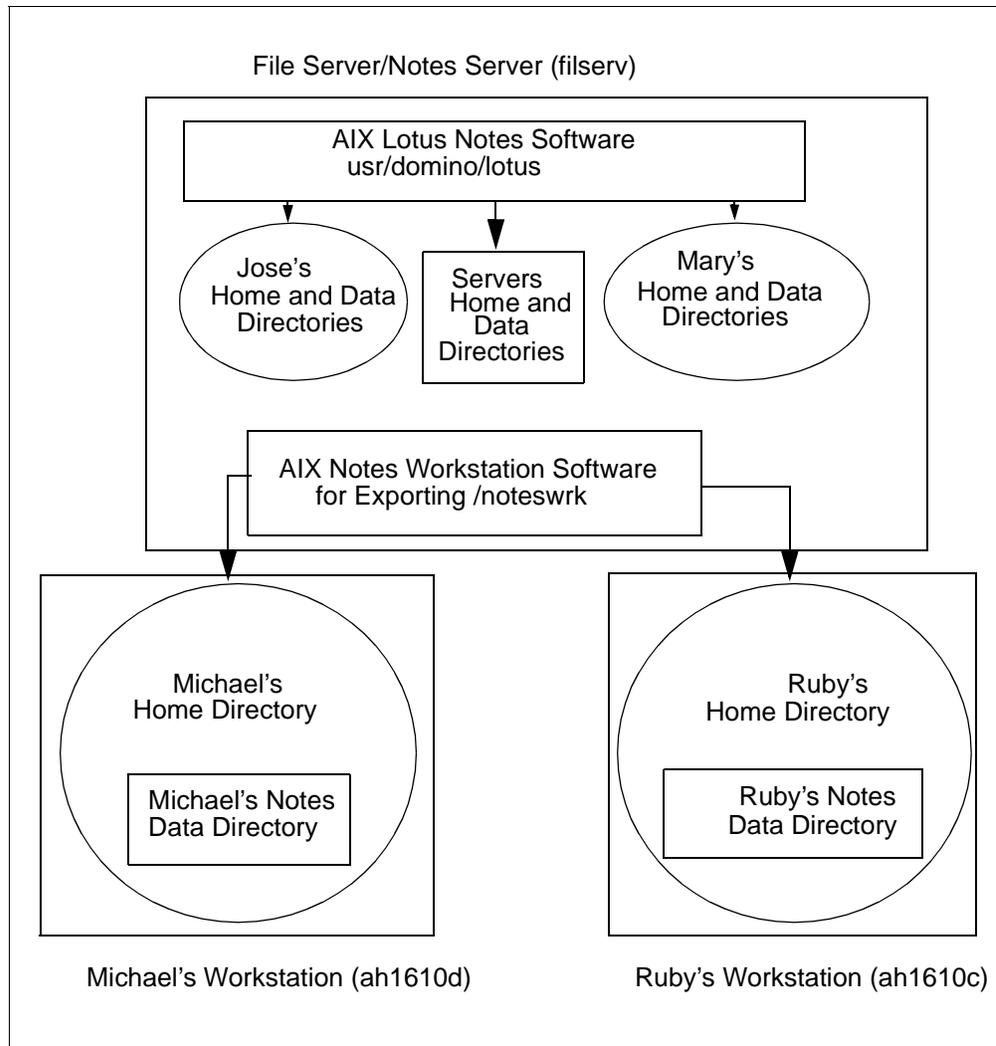


Figure 137. Distributing the Lotus Domino Software Directory from a Server

6.3.3.1 Installing the Notes Workstation Software

Before installing the Notes Workstation software, it's recommended that you create a new file system to hold this software. With Lotus Notes Release 4.6, installing Notes Workstation for AIX code without the documentation requires approximately 160 MB of disk space.

Note

1. Run all commands below as root on the file server.
2. If you want to reinstall the Notes Workstation Software on a previous file system, remove all its files and perform the installation.

To create a file system called /noteswrk:

1. Run `smit crjfs`
2. Select the Volume Group you want to create the file system and press **Enter**.

- Complete the **Add a Journaled File System** menu, as shown in Figure 138, and press **Enter**.

```

Add a Journaled File System

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

                                     [Entry Fields]
Volume group name                      rootvg
* SIZE of file system (in 512-byte blocks) [320000]
* MOUNT POINT                          [/noteswrk]
Mount AUTOMATICALLY at system restart?  yes
PERMISSIONS                             read/write
Mount OPTIONS                           []
Start Disk Accounting?                   no
Fragment Size (bytes)                    4096
Number of bytes per inode                 4096
Compression algorithm                     no

F1=Help      F2=Refresh      F3=Cancel      F4=List
F5=Reset     F6=Command     F7=Edit       F8=Image
F9=Shell     F10=Exit       Enter=Do

```

Figure 138. Add a Journaled File System

- Mount the file system: `mount /noteswrk`
- Run the command: `chmod g-s /noteswrk`

Now, you must install the Notes Workstation software on this file system. Mount the Lotus Notes UNIX Installation Kit from the network (as described in 6.3.2.3, “Mounting the UNIX Installation Kit” on page 160) or from the CD-ROM (as described in step 4 on page 159).

Now, you have to run the Lotus installation script:

- Change the directory to where you mounted the Installation Kit. If the install script is present on this directory, run it with the command `./install` or change to the directory UNIX, and run the install script.
- Press **Tab** to display the second screen.
- Press the **Spacebar** to select the installation of the Notes Workstation software. Press **Tab** again to display the next screen.
- Now you have to press the **Spacebar** to select to install the software on a network resource. Press **Tab** to display the next screen.
- The script explains that you have to select the hardware platforms you want to use. Press **Tab** to begin the selection.

Note: By default, all platforms are selected (a **Yes** is displayed). To select **No**, you have to press the **Spacebar**.

- It asks for IBM AIX; press **Tab** to confirm this selection.
- It asks for Sun Solaris/Sparc; press the **Spacebar** to deselect it and press **Tab** to display the next selection.
- Finally, it asks for Hewlett-Packard HP-UX; press the **Spacebar** to deselect it and press **Tab** to display the next screen.

9. Press **Tab** to accept that you want to install to only one computer. The next screen will be displayed.
10. Press **Tab** to accept the current destination hostname and to display the next screen.
11. Now, you have to change the destination path to your new file system. Press **Enter**, type `/noteswrk`, and press **Enter** again to install to the file system you have created. Then, the script sets a new destination path to `/noteswrk/lotus`. Press **Tab** to display the next screen.
12. If you don't want to install the optional documentation, press the **Spacebar**. Press **Tab** to display the next screen.
13. Change the installation owner user ID to the user `bin`. Press **Enter**, then type `bin`. Press **Enter** again, and press **Tab** to display the next screen.
14. Change the installation owner group ID to the group `bin`. Press **Enter**, then type `bin`. Press **Enter** again and press **Tab** to display the next screen.

Note

Steps 13 and 14 are very important. You have to change the user ID and the group ID to a user ID and a group ID that is the same on all machines where you will mount the `/noteswrk` file system. If you don't, when mounting over NFS, a normal user on the client host that has the same user ID number as the user you selected on the file server will have owner access to these files. The same applies to the group ID. For example, if on the server the user `notes` (ID 201) owns the files under `/noteswrk`, and on a client host there is a normal local user called `john` with ID 201, the user `john` will own these files on the client host and will be able to change them.

15. Press **Tab** again, and you will see a configuration summary similar to the one shown in Figure 139. Make sure that you selected the correct destination path, platforms, user ID, and group ID.

```

Begin Installation - Tue Aug 11 12:11:28 CST 1998

Configuration Summary...

Install to single host:          fileserv.itsc.austin.ibm.com
Destination path:              /noteswrk/lotus

Installation type:              Network Fileserver
Platforms specified:           IBM AIX
                               Sun Solaris/Sparc

Product options selected:       Workstation
Installation owner user Id:     bin
Installation owner group Id:    bin

```

Figure 139. Installation Script Configuration Summary

16. Pressing **Tab** again validates the configuration settings.
17. If everything is correct, press **Tab** to begin the installation. If it is not, correct the errors display and you must redo the configuration.

18. It installs the software that you selected and finishes.

6.3.3.2 Exporting the Notes Workstation File System

After you create the /noteswrk directory, you have to export it so that the clients will be able to use it. To run the following commands, you need to have root access to the file server (filserv).

To export the /noteswrk directory, run: `smitty mknfsexp`. The smit menu shown in Figure 140 is displayed. You have to specify the PATHNAME of the directory to export and HOSTS & NETGROUPS allowed client access fields. You can also run the command:

```
# /usr/sbin/mknfsexp -d /noteswrk -t rw -c 'ah1610c ah1610d' -B
```

Add a Directory to Exports List

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

	[Entry Fields]	
* PATHNAME of directory to export	[/noteswrk]	/
* MODE to export directory	read-write	+
HOSTS & NETGROUPS allowed client access	[ah1610c ah1610d]	
Anonymous UID	[-2]	
HOSTS allowed root access	[]	
HOSTNAME list. If exported read-mostly	[]	
Use SECURE option?	no	+
* EXPORT directory now, system restart or both	both	+
PATHNAME of alternate Exports file	[]	

F1=Help	F2=Refresh	F3=Cancel	F4=List
F5=Reset	F6=Command	F7=Edit	F8=Image
F9=Shell	F10=Exit	Enter=Do	

Figure 140. Add a Directory to Exports List

Note

Don't export a read/write file system without specifying the HOSTS & NETGROUPS allowed client access field. If you do that, you can have some security problems because everyone with access to your IP network will be able to access this file system.

6.3.3.3 Configuring the Lotus Notes Client Host

On the clients ah1610c and ah1610d, you can mount filserv's /noteswrk/lotus directly over /opt/lotus directory. Run, as root: `smitty mknfsmnt` to display the following menu, shown in Figure 141 on page 166, and complete the fields that are highlighted.

```

Add a File System for Mounting

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

[ TOP ]                                [ Entry Fields ]
* PATHNAME of mount point              [ /opt/lotus ]      /
* PATHNAME of remote directory         [ /noteswrk/lotus ]
* HOST where remote directory resides  [ filserv ]
Mount type NAME                        [ ]
* Use SECURE mount option?             no                +
* MOUNT now, add entry to /etc/filesystems or both? both      +
* /etc/filesystems entry will mount the directory on system RESTART. yes      +
* MODE for this NFS file system        read-write        +
* ATTEMPT mount in foreground or background background      +
NUMBER of times to attempt mount       [ ]                #
Buffer SIZE for read                   [ ]                #
Buffer SIZE for writes                 [ ]                #
NFS TIMEOUT. In tenths of a second    [ ]                #
[ MORE...19 ]

F1=Help          F2=Refresh      F3=Cancel      F4=List
F5=Reset        F6=Command      F7=Edit        F8=Image
F9=Shell        F10=Exit        Enter=Do

```

Figure 141. Add a File System for Mounting

You also must create a directory and a link in order to support the VIM applications. As root, type the following:

```

# mkdir -m 755 -p /opt/vim/lib
# ln -s /opt/lotus/notes/latest/ibmpow /opt/vim/lib/ibmpow

```

After that, you can run the Notes Workstation on the client hosts. Michael and Ruby will be able to run their Notes Workstations.

6.3.4 Distributing the Clients Data Directories

If you have the Lotus Notes clients data directory on a file system of a file server, you have an easier way to back up the clients files, and you save some clients disk space. But most importantly, if you use a distributed environment (all users can access all hosts with the same login and home directory), this is the easiest way to make a notes client available to the whole environment. Such a setup does reduce performance and availability, however.

Note

Some examples of distributed environments that can be used are the Distributed Computer Environment (DCE), Network Information Service (NIS), or Andrew File System (AFS). We will not discuss how to set up or how to work with these environments in this redbook.

The example in Figure 142 on page 167 shows a file server that contains the UNIX Notes Workstation software directory (/noteswrk) and the Clients Home and Data Directories (/home). It exports both file systems to the workstation's hosts. If all the hosts have the same AIX users, Michael will be able to log in on Ruby's

workstation and access his UNIX home directory and his Lotus Notes data directory. The same applies to Ruby.

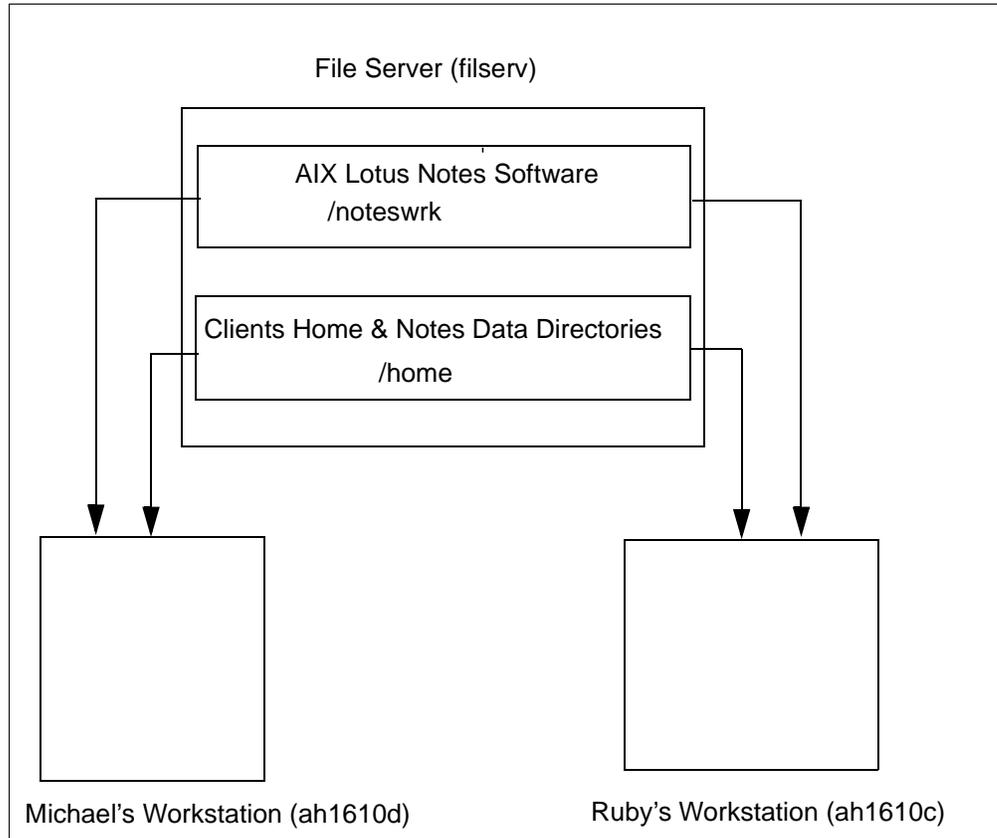


Figure 142. Distributing the Clients Data Directories

Note

In this example, Michael's home directory is /home/michael. Michael's Lotus Notes data directory is /home/michael/notes4. Both directories will be in the /home file system

The /noteswrk directory and the /home directory do not need to be in the same file server. In this case, we are using the /home file system as the home file system for the AIX users and to hold the Lotus Notes data directories. If you want, you can have two different file systems. We won't discuss this case here.

See 6.3.3, "Distributing the Lotus Notes Software Directory" on page 160, it explains how to distribute the /noteswrk directory. To distribute the /home directory, you have to follow the same steps. Remember, all of them must be done as root. Suppose, again, that the file server in Figure 142 is called filserv, Michael's workstation ah1610d and Ruby's workstation ah1610c.

After you have created a large enough /home file system on filserv, you have to export it. Run the command:

```
# /usr/sbin/mknfsexp -d /home -t rw -c 'ah1610c ah1610d' -B
```

or use `smitty mknfsexp` to get the menu shown in Figure 140 on page 165. Change the `PATHNAME` of the directory to `export` field to `/home`.

If you have a local `/home` file system on `ah1610c` or on `ah1610d`, after you mount the `/home` file system from `filserv`, you won't be able to access your local file system until you unmount the remote one. It's a good idea to move the data and the local users to somewhere else (to a file system called `/local`, for example) and remove the local `/home` file system. Please be careful when removing a file system.

To change the mount point of the local `/home` file system to `/local`, for example, run the commands below as root. Note that the `/local` file system must not exist. If you fail to unmount the `/home` directory, the next reboot of the machine will solve the problem.

Note

Please be very careful while performing these steps. You can mix up the file system and/or user configuration of your machine.

```
# chfs -m/local /home
# umount /home
# mount /local
```

You can edit the `/etc/passwd` file to change the local users' home directory definition (if you have local users). Change the `/home/<username>` fields to `/local/<username>`. If you don't want to edit the `/etc/passwd`, run the command: `chuser home=/local/<username> <username>` for each local user that you want to move, except the root and the administrative users.

If you want to remove the `/home` file system and its data enter the following:

```
# umount /home
# rdfs /home
```

If you fail to unmount the `/home` file system, try to finish all processes that can be completed using this file system. If you can't do this, ask AIX not to mount this file system after the reboot. Reboot by typing the following:

```
# chfs -Ano /home
# shutdown -Fr
```

After the reboot, run the command: `rdfs /home`.

To mount the remote `/home` file system, run: `smitty mknfsmnt` to display the menu shown in Figure 141 on page 166. Change the `PATHNAME` of the mount point and the `PATHNAME` of the remote directory to `/home`.

6.4 Environment Variables

Some of the important variables required for the environment settings are described below:

6.4.1 Notes_SHARED_DPOOLSIZE

The Notes_SHARED_DPOOLSIZE value is automatically set to: $((\text{Total System RAM in bytes}) / 2) / 7$. The objective of this setting is to use not more than 50 percent of the Total System RAM for the shared memory and to keep the total number of shared memory segments required at seven or less. You can override this value by issuing the following command from your shell:

```
export Notes_SHARED_DPOOLSIZE=(New value in bytes)
```

For example:

```
export Notes_SHARED_DPOOLSIZE=4000000
```

If the number of shared memory segments used in your system exceeds 7, then increase the Notes_SHARED_DPOOLSIZE setting. AIX allows a maximum of 10 shared memory segments.

6.4.2 NSORDER

In case you are not running either Domain Name Service (DNS) or Network Information Services (NIS) to provide name resolution for your network, and instead are using local /etc/hosts file on each machine, then you must have the environment variable NSORDER set for either the Lotus Domino Server or Notes Workstation to be able to resolve names using the local /etc/hosts file. This variable is set as follows:

```
export NSORDER=local,bind,nis
```

This variable specifies the order in which the operating system searches for addresses for name resolution, specifying that the local (/etc/hosts) is to be searched before attempting to contact NIS for name resolution. You can set this variable and place the given line within the .kshrc file in the home directory for the user ID being used to run the Lotus Domino Server/Notes Workstation so that the variable is set each time the user logs in to the network.

6.4.3 DEBUG_ENABLE_CORE

If you want the Lotus Domino Server to generate a core file in the event of a fatal error, set this environment variable by issuing the following command from the shell:

```
export DEBUG_ENABLE_CORE=1
```

The default behavior is not to generate a core file.

Chapter 7. Setting Up Printers

This chapter outlines how to install and set up printers on AIX for use on Lotus Notes.

7.1 Installation and Setup of Printers on AIX

This chapter is only a short description on how to set up and install a printer on AIX. For more detailed information, please refer to the *AIX V4.1 Installation Guide* (SC23-2550), the *AIX 4.2 Installation Guide*(SC23-1924), *AIX V4.3 Installation Guide* (SC23-4112), or the *AIX V4.3 Guide to Printers and Printing* (SC23-4130).

To each physically attached printer, different Virtual Printer Queues with different initial sequences (PS, PCL, ASCII, and so on) can be attached.

In this way, you can print to the same physical printer with different printer modes using different printer queues.

7.1.1 Add/Configure a Local Attached Printer

To add a local printer complete the following steps:

1. Log in on the local system as the root user.
2. Check if the Printer Backend `printers.rte` is already installed. (You don't need it for printing to a remote host.) Type `lslpp -l printers.*`.
3. Enter `smitty mkpq` to make a printer queue.
4. Select **Add a Printer/Plotter** and press **Enter** to get to the screen shown in Figure 143.

```
                                Add a Print Queue

Move cursor to desired item and press Enter.  Use arrow keys to scroll.

# ATTACHMENT TYPE      DESCRIPTION
local                 Printer Attached to Local Host
remote                Printer Attached to Remote Host
xstation              Printer Attached to Xstation
ascii                 Printer Attached to ASCII Terminal
hpJetDirect           Network Printer (HP JetDirect)
file                  File (in /dev directory)
other                 User Defined Backend

F1=Help              F2=Refresh              F3=Cancel
F8=Image             F10=Exit                Enter=Do
/=Find               n=Find Next
```

Figure 143. *smitty's Add a Local Print Queue*

5. Select **Printer Attached to Local Host** (Figure 143) and press **Enter**.

```

Printer Type

Move cursor to desired item and press Enter.

Bull
Canon
Dataproducts
Hewlett-Packard
IBM
OKI
Printronix
QMS
Texas Instruments
Other (Select this if your printer type is not listed above)

F1=Help          F2=Refresh      F3=Cancel
F8=Image         F10=Exit        Enter=Do
/=Find           n=Find Next

```

Figure 144. smitty's Select Printer Type

6. Select the Printer Type (Figure 144) and press **Enter**.

```

Printer Type

Move cursor to desired item and press Enter.

[TOP]
ilm2380      IBM 2380 Personal Printer II
ilm2380-2    IBM 2380 Plus printer (Model 2)
ilm2381      IBM 2381 Personal Printer II
ilm2381-2    IBM 2381 Plus printer (Model 2)
ilm2390      IBM 2390 Personal Printer II
ilm2390-2    IBM 2390 Plus printer (Model 2)
ilm2391      IBM 2391 Personal Printer II
ilm2391-2    IBM 2391 Plus printer (Model 2)
ilm3812-2    IBM 3812 Model 2 Page Printer
ilm3816      IBM 3816 Page Printer
ilm4019      IBM 4019 LaserPrinter
[MORE...43]

F1=Help          F2=Refresh      F3=Cancel
F8=Image         F10=Exit        Enter=Do
/=Find           n=Find Next

```

Figure 145. smitty's Printer Type

7. Select the printer you want to install (Figure 145) and press **Enter**.

If the dedicated printer device driver is not installed, you will see the following screen (Figure 146):

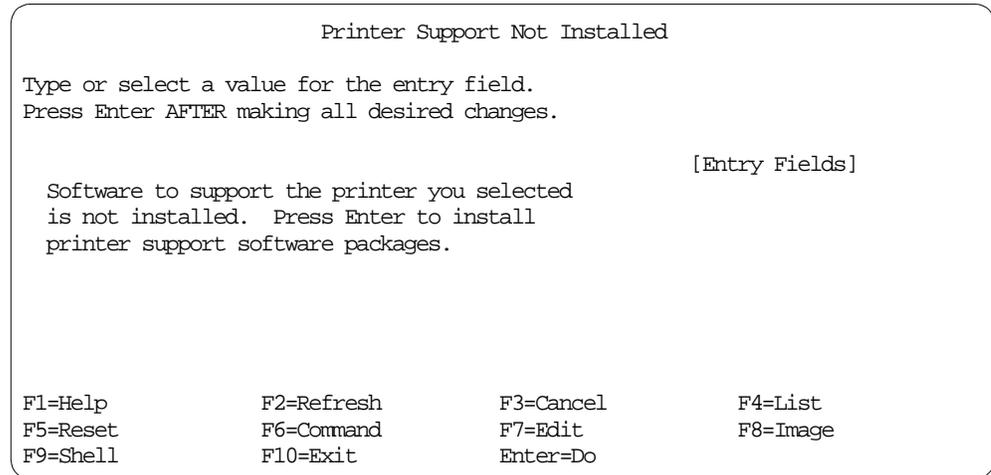


Figure 146. smitty's Printer Support Not Installed

- a. Press **Enter**.
- b. Press **F4** to get to the Installation Device Selection list.
- c. Select the correct installation device and press **Enter**.
- d. Press **F4** to get to the Software Installation Selection list.
- e. Mark the printer(s) you want to install with **F7** and press **Enter**.
- f. Accept the default settings and press **Enter**.
- g. Pass the warning *Are You sure?* by pressing **Enter**.
- h. If the installation process succeeds, press **F10** to exit smit.
- i. Repeat the first steps, while referring to 7.1.1, "Add/Configure a Local Attached Printer" on page 171.

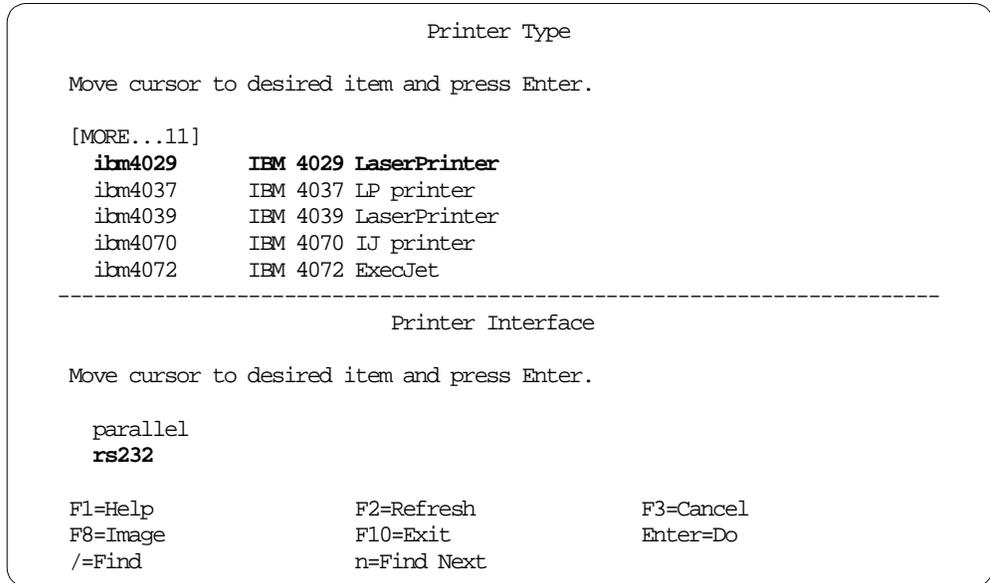


Figure 147. smitty's Printer Type and Interface

8. Select the Printer Interface the printer is attached to (Figure 147) and press **Enter**.

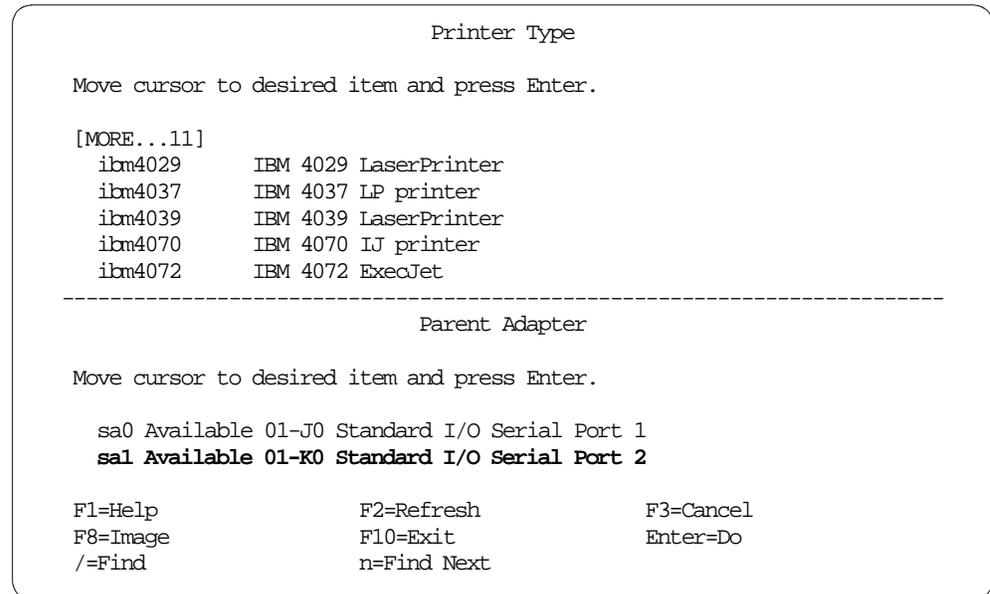


Figure 148. smitty's Parent Adapter

9. Select the serial port the printer is attached to (Figure 148) and press **Enter**.

```

                                Add a Print Queue

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

[TOP]                                [Entry Fields]
Description                          IBM 4029 LaserPrinter

Names of NEW print queues to add
ASCII                                 [l_asc]
GL Emulation                          []
PCL Emulation                         [l_pcl]
PostScript                            [tmps]

Printer connection characteristics
* PORT number                         [s2] +
  BAUD rate                           [9600] +
  PARITY                               [none] +
  BITS per character                   [8] +
  Number of STOP BITS                 [1] +
  FLOW CONTROL to be used             [dtr] +
  Printer TIME OUT period (seconds)   [600] +#
  STATE to be configured at boot time  available +
[BOTTOM]

F1=Help          F2=Refresh      F3=Cancel      F4=List
F5=Reset         F6=Command      F7=Edit        F8=Image
F9=Shell         F10=Exit       Enter=Do

```

Figure 149. smitty's Add a Print Queue

10. Fill in the names of the new printer queues you want to add for the preselected printer, also the baud rate, and so on, or accept the defaults (Figure 149).
11. Press **Enter**.
12. After successful installation, exit smit with **F10**.
13. On return to the prompt, enter: `lpstat` (Figure 150).

```

Queue  Dev  Status  Job Files  User  PP %  Blks  Cp Rnk
-----
l_asc  lp0  READY
l_pcl  lp0  READY
tmps   lp0  READY

```

Figure 150. Output of Command `lpstat`

Note

To remove printer queues, type: `smit rmpq`

7.1.2 Add/Configure a Remotely Attached Printer

If an AIX host with a locally attached printer already exists and you want to use this system as a printer server, you should take the following steps:

1. Log in on the remote server host as root user (you can also use the command: `telnet <hostname>`).

2. Get a list of all available printer queues with the command: `lpstat` (Figure 151).

```
lpstat on remote host
Queue  Dev  Status  Job Files  User  PP %  Blks  Cp Rnk
-----
ps      @prt3  READY
ps      ps      READY
cps     @prt3  READY
cps     cps     READY
ps3825 ps382  READY
ps3825 ps382  READY
ps3825 dev2    READY
asc3825 asc38   READY
asc3825 asc38   READY
asc3825 dev2    READY
os2asc  lan     READY
os2ps   os2     READY
lab1ps  @prt3  READY
lab1ps  lab1p   READY
lab1asc @prt3  READY
lab1asc lab1a   READY
psdup   hp@pr   READY
ps4019 p@tx2  READY
```

Figure 151. Output of `lpstat` on Remote Host

3. Add the client's hostname to the `/etc/hosts.lpd` file to provide the client the printer access to the server.
4. Exit the remote host (and log in to the local system as root user).
5. Enter: `smitty mkppq`.
6. Select **Printer Attached to Remote Host** (Figure 152) and press **Enter**.

```

                                Add a Print Queue

Move cursor to desired item and press Enter.  Use arrow keys to scroll.

# ATTACHMENT TYPE      DESCRIPTION
local                  Printer Attached to Local Host
remote                Printer Attached to Remote Host
xstation               Printer Attached to Xstation
ascii                  Printer Attached to ASCII Terminal
hpJetDirect            Network Printer (HP JetDirect)
file                   File (in /dev directory)
other                  User Defined Backend

F1=Help                F2=Refresh                F3=Cancel
F8=Image               F10=Exit                  Enter=Do
/=Find                 n=Find Next
```

Figure 152. `smitty`'s Add a Remote Print Queue

7. If you use the AIX printer subsystem, select **Standard processing** (Figure 153) and press **Enter**.

```

Add a Print Queue

Move cursor to desired item and press Enter. Use arrow keys to scroll.

-----

Type of Remote Printing

Move cursor to desired item and press Enter.

Standard processing
Standard with NFS access to server print queue attributes
Local filtering before sending to print server

F1=Help          F2=Refresh      F3=Cancel
F8=Image         F10=Exit        Enter=Do
/=Find           n=Find Next

```

Figure 153. smitty's Add a Print Queue

8. Fill in the new queue name you want to add, the hostname of the dedicated printer server and also the name of the queue on the remote printer server you want to add to your local printer subsystem (Figure 154).
9. Press **Enter**.

```

Add a Standard Remote Print Queue

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

                                     [Entry Fields]
* Name of QUEUE to add                [tamps]
* HOSTNAME of remote server           [itsosmp]
* Name of QUEUE on remote server      [ps]
TYPE of print spooler on remote server AIX Version 3 or 4      +
DESCRIPTION of printer on remote server [My New PS_printer]

F1=Help          F2=Refresh      F3=Cancel      F4=List
F5=Reset         F6=Command     F7=Edit        F8=Image
F9=Shell         F10=Exit       Enter=Do

```

Figure 154. smitty's Add a Print Queue

10. After a successful setup, exit smit with **F10**.
11. On return to the prompt, enter: `lpstat` (Figure 155).

Queue	Dev	Status	Job Files	User	PP %	Blks	Cp	Rnk
tomps	@itso	READY						
tomps	ps	READY						
ps	ps	READY						

Figure 155. Output of Command `lpstat` on Local Host

7.2 Setting Up AIX Printers in Lotus Notes

1. Start Lotus Notes by typing: `notes`.
2. Open any database.
3. Highlight the document.
4. Choose **File -> Print...** (or press **Ctrl+P**).

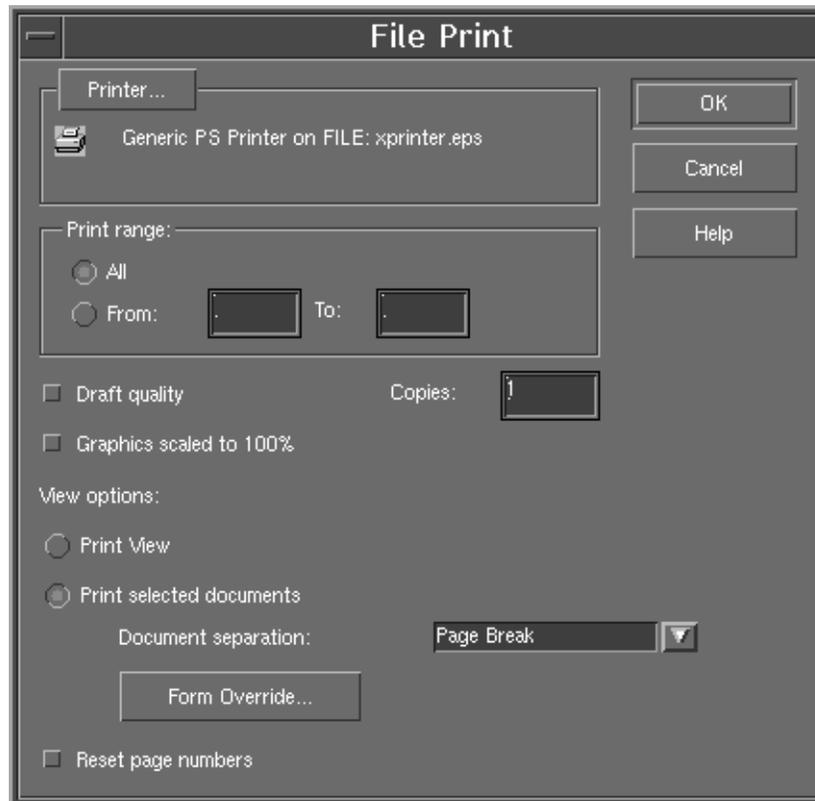


Figure 156. File -> Print

5. Click on **Printer...** (Figure 156).

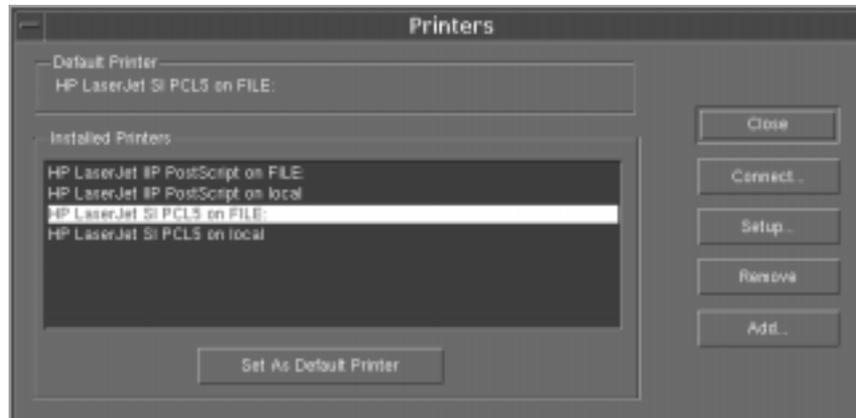


Figure 157. Printer Setup

6. Click on **Connect...** (Figure 157).

Note

If you press the **Printer** button and no printer is already installed, you will get the following error message:

```
Unable to read printer configuration file.  
Personal: /notes/.Xpdefaults or  
System: /opt/lotus/notes/<version>/common/Xp/Xpdefaults.  
Check file permissions and [devices] section
```



Figure 158. Choosing a Port

7. Choose the **Port** that the printer will use to connect.
8. Click on **OK** or **New** depending on if you would like to use an existing port or add a new one.(Figure 158). In this instance, we chose **New** to add a new port.

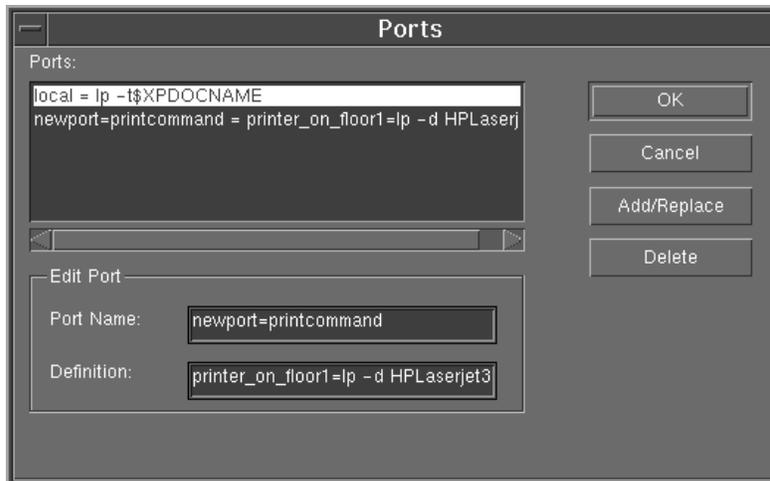


Figure 159. Add Printer

9. To replace a port rather than add a new one, select the port you want to replace.
10. To replace or add a port in the Port Name field, enter the name of the new port, for example, `newport=printercommand`.
11. In the Description field, enter in a description for the port. For example in the Port Name field we entered `newport=printercommand`, where `newport` is the alias for the port and `printercommand` is a system printer command. For example, type `printer_on_floor1=lp -d HPLaserjet3` in the description field.
12. Click on **Add/Replace** (Figure 159).

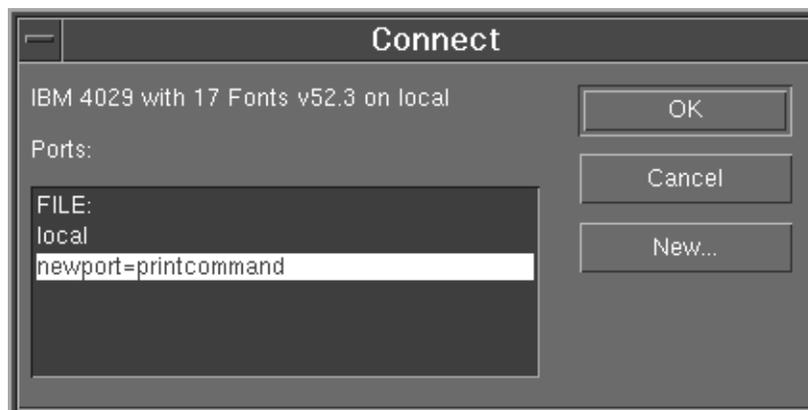


Figure 160. Define New Port

13. Click on **OK** or click on **New** to define another new port.(Figure 161).

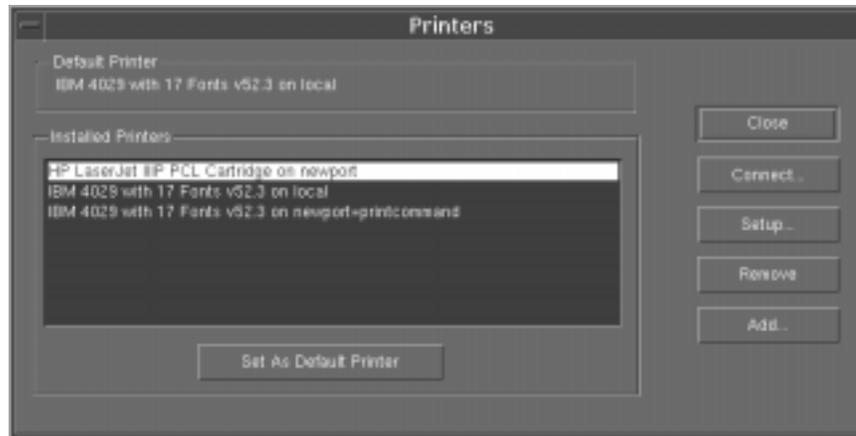


Figure 161. Select Port to be Edited

14.Repeat steps 10 on page 180 to step 13 on page 180 for all the queues you want to add.

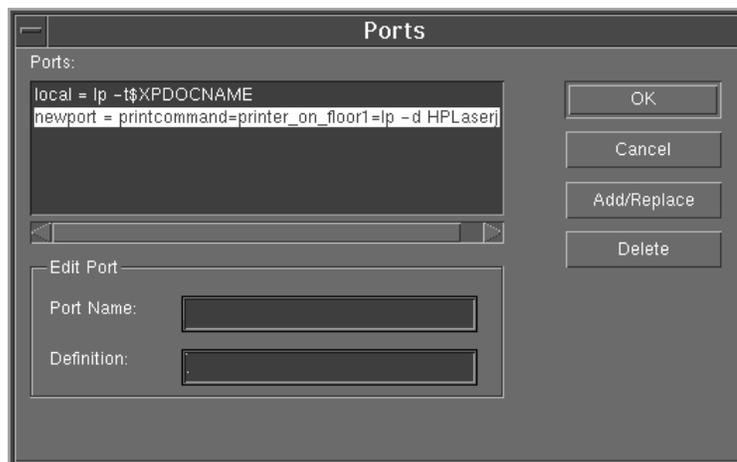


Figure 162. Remove a Printer Queue

15.To remove unnecessary printer queues, click on the **Connect...** button, shown in Figure 161 on page 181, to open the Ports screen and select the queue and click on **Delete** (Figure 162).

16.Click on **OK**

17.To add a new printer, choose the printer from the list of printers and a port.



Figure 163. Add Printer

18. Click on **OK** (Figure 163).

Note

There is no indicator that the **Add** operation was OK.

19. Repeat step 18 on page 182 for all printers you want to add.

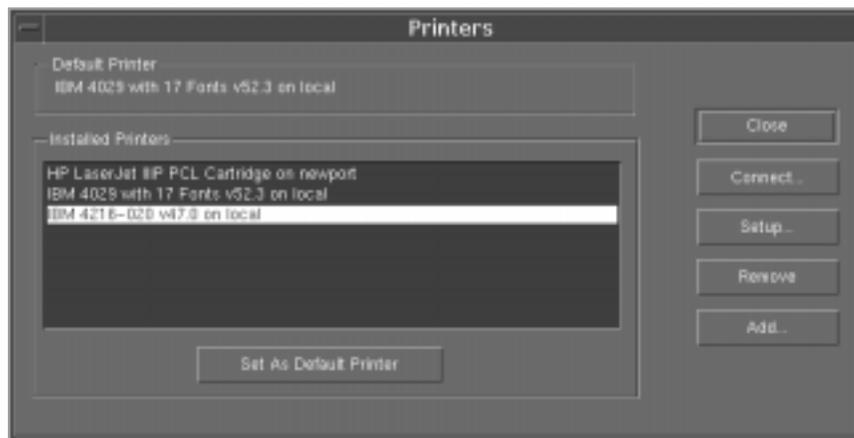


Figure 164. Remove Selected Printer

20. To remove printers, select the printer and click on **Remove** (Figure 164).

21. Click on **Close**.

22. To adjust any paper issues or printing preferences, click on **Setup...** and make the adjustments.



Figure 165. Save/Apply Printer

23. Click on **OK** (Figure 165).

7.3 Create a Site-Specific System Printer Setup File

After you have added appropriate printers and port information as described in section 7.2, “Setting Up AIX Printers in Lotus Notes” on page 178, you must do the following:

- Save an original copy of the `/opt/lotus/notes/<version>/common/Xp/Xpdefaults` file.
- Copy the `$HOME/.Xpdefaults` file, which Xprinter will have now created, to the `/opt/lotus/notes/<version>/common/Xp/Xpdefaults` file.

Note

The system printer setup file should only have Read permission.

7.4 Maintenance of an AIX Printer Subsystem

This section explains how to change and maintain the printer subsystem on AIX. You can give the printer-handling permission to any user you want; so you must not be the root user to maintain the AIX printer subsystem.

7.4.1 Give a User the Right to Maintain the AIX Printer Subsystem

To maintain the AIX printer subsystem, you must have root permission or be a member of the group `printq`.

To add the group `printq` to the user `notes`, follow these steps:

1. Log in as root.
2. Type: `smitty chuser`.
3. Enter user name, or **F4** to select user from the list and press **Enter**.

```

Change / Show Characteristics of a User

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

[TOP]                                     [Entry Fields]
* User NAME                               notes
User ID                                  [223] #
ADMINISTRATIVE USER?                     true +
Primary GROUP                             [notes] +
Group SET                                 [notes,staff,printq] +
ADMINISTRATIVE GROUPS                     [ +
Another user can SU TO USER?              true +
SU GROUPS                                  [ +
HOME directory                            [notes]
Initial PROGRAM                            [usr/bin/ksh]
User INFORMATION                           [Lotus Notes User]
EXPIRATION date (MMDDhhmmyy)              [
Is this user ACCOUNT LOCKED?              true +
User can LOGIN?                           true +
[MORE...30]

F1=Help      F2=Refresh      F3=Cancel      F4=List
F5=Reset     F6=Command     F7=Edit       F8=Image
F9=Shell     F10=Exit         Enter=Do

```

Figure 166. *smitty's Change User Characteristics of User notes*

4. Add `printq` to Group SET (Figure 166) and press **Enter**.

7.4.2 Useful Printer Commands

You can also maintain the printer subsystem by using `smitty`.

- The command `lpstat` will list the actual printer queues and all running printer jobs (Figure 167).

Queue	Dev	Status	Job Files	User	PP %	Blks	Cp	Rnk
<code>l_asc</code>	<code>lp0</code>	READY						
<code>l_pcl</code>	<code>lp0</code>	READY						
<code>tumps</code>	<code>lp0</code>	RUNNING	752 /tmp/notesfile.ps	notes	0 76	738	1	1

Figure 167. *Output of Command lpstat with Running Print Jobs*

- The command `qcan -P<QueueName> -x <JobNumber>` will cancel print jobs in the printer queues. For example:
 - To cancel job number 752 on whichever printer the job is on, enter:


```
qcan -x 752
```
 - To cancel all jobs queued on printer `tumps`, enter:


```
qcan -X -Ptumps
```
- The command `qadm -D<printer/queue>` will bring *down* the appropriate printer.

- The command `qadm -U<printer/queue>` will bring *up* the appropriate printer. You will need this command after a queue went down because of printer problems.
- The command `qadm -X` will cancel all print jobs immediately.

7.5 Understanding the Xpdefaults Printer Setting of Lotus Notes

When a user prints a document, Xprinter looks for printer setup information in the `.Xpdefaults` file in the user's home directory. If that file does not exist, Xprinter reads the system printer setup file, `/opt/lotus/notes/<version>/common/Xp/Xpdefaults`, for information.

Important Note

If the user does not have an `.Xpdefaults` file and changes any printer setup information, Xprinter creates a `$HOME/.Xpdefaults` file for the user that includes the changes.

The information in the user's `$HOME/.Xpdefaults` file controls the options that a user has in the various printing-related dialog boxes when printing from Lotus Notes. To ensure that users can successfully print, administrators should create a useful, site-specific system printer setup file.

Since Xprinter will use the system printer setup file for users who lack a `$HOME/.Xpdefaults` file, it is important that the system file contains appropriate information for the site's printers.

About the `.Xpdefaults` file:

The Xprinter distribution contains a system printer setup file:

- System: `/opt/lotus/notes/<version>/common/Xp/Xpdefaults`
- Personal: `$HOME/.Xpdefaults`

The `.Xpdefaults` file is divided into sections, and section names are enclosed in brackets.

Within a section, entries are formatted such as:

`keyword=data`

The following is an example of an `.Xpdefaults` file:

```

[windows]
device=IB4029A1,PostScript,myfirst

[other-devices]

[Xprinter,PostScript]
Filename=xprinter.eps
Scale=1.00
Copies=1
Orientation=Portrait
PageSize=Letter
DPI=300

[Xprinter,PCL5]
Filename=xprinter.pcl
Scale=1.00
Copies=1
Orientation=Portrait
PageSize=Letter
DPI=300

[Xprinter,PCL4]
Filename=xprinter.pcl4
Scale=1.00
Copies=1
Orientation=Portrait
PageSize=Letter
DPI=300

[IB4029A1,PostScript,myfirst]
Scale=1.00
Copies=1
PaperTray=Upper
PageSize=Letter
Orientation=Portrait
DPI=300

[ports]
FILE:=

l_asc=lp -d l_asc
l_pcl=lp -d l_pcl
toms=lp -d toms
myfirst=lp -d toms

```

Figure 168. Xpdefaults File

In the example shown in Figure 168, the default printer file follows the device keyword in the [windows] section.

The default printer is an IBM 4029 printer in PostScript mode.

IB4029A1 is the name of the PPD file to use when printing to that particular type of printer, as specified in the [devices] section.

The last parameter for the device keyword, myfirst, is the print command from the [ports] section to spool the output file to the printer. The [devices] section contains a list of all printers that are configured on the system.

The port aliases, such as myfirst, are configured by the user to reflect system-specific configurations.

However, the reserved alias `FILE:` indicates that output is sent to a file.

The `[IB4029A1,PostScript,myfirst]` section shows that the default printer parameters are a scale factor of 1.00, one copy, upper paper tray, letter size, portrait orientation, and 300 dots-per-inch resolution.

Chapter 8. Security and Lotus Domino

Security in Lotus Domino is a big and complex topic. The aim of this chapter is not to document how Lotus Domino internally deals with access and authorization issues but to highlight the areas where security can be applied and how to go about establishing the required security.

Lotus Domino provides functions to restrict or deny access at all levels, ranging from Lotus Domino domains and servers to individual databases and fields within a database.

8.1 User Security

There are many aspects of end-user security. The ones which will be covered in this section are:

- User IDs and Passwords
- Locking User IDs
- Local Database Encryption

8.1.1 User IDs and Passwords

Lotus Domino uses ID files to secure access to servers. Every Lotus Domino Server and Lotus Notes user must have an ID. An ID is a unique binary file that identifies a legal Lotus Domino Server and Lotus Notes user. IDs are created at the time of user or server registration. An ID file contains:

- The name of its owner.
- A license number that indicates that the owner is legal and specifies whether the owner can run the North American or International edition of Lotus Domino or Lotus Notes. You can't change a license number associated with a specific public key.
- A public key and a private key.
- At least one certificate from a Certifier ID. A certificate is an electronic stamp added to a user ID or server ID. This stamp is generated using the private key of a Certifier ID that verifies that the name of the owner of the ID is correctly associated with a specific public key.
- (Optional) One or more encryption keys, created and distributed by users that allow users to encrypt and decrypt fields in a document.

If the owner of an ID creates a password for it, the password generates a key that encrypts most of the data on the ID.

8.1.1.1 Securing the User ID File

Each user should protect their ID file from unauthorized use because it is the key to their data, and in addition, the data that has been made available to them. They can do this in the following ways:

- By restricting access to their ID file. Refer to 8.7.4, "UNIX File Permissions" on page 212 to see how to restrict access to the ID file in a UNIX environment.
- By password protecting the ID file using a secure password. The best passwords to use are those that contain a mixture of numbers and letters and are in mixed case.

Note

If users forget their passwords for their IDs, their IDs are of limited use. They will still be able to perform some local work, but they will not be able to open or read encrypted data or authenticate with any servers. To restore full functionality, users must obtain (if available) backup copies of the ID that do not have password protection. Otherwise, you must re-register the user.

8.1.1.2 Backup of the User ID File

Since the user ID file contains the private encryption keys and certificates for a user, any loss or damage to the file would be a disaster for the user concerned.

Without a user ID, the user cannot access servers. Even if users obtain new IDs, the users can never read messages and other data that they encrypted with the lost ID.

Users should always ensure that they have a backup copy of their user ID file.

In addition, the Lotus Domino administrator can set up a special Lotus Notes user, which requires multiple passwords to gain access. User ID files can then be stored in the mail file and can be retrieved in case they are corrupted or if passwords are forgotten. (For more information, see the *Escrow Agent* entry in the online *Lotus Domino Administration Help* database.)

8.1.2 Locking User IDs

By locking a user ID, any connections that the authorized user had to Lotus Domino Servers are dropped, and any request to access them again will require that the appropriate password be entered for the ID file.

IDs can be locked either manually or automatically.

8.1.2.1 Manual Locking

Users should always remember to lock their user ID when they leave their workstation unattended so that unauthorized users do not gain access to any servers that the legitimate user was connected to.

It is possible to lock the user ID by either pressing **F5** on the keyboard or by selecting **File -> Tools -> Lock ID**.

8.1.2.2 Automatic Locking

Users can define an inactivity time period when their user ID is automatically locked.

This is possible through selecting **File -> Tools -> User Preferences...** to display the User Preferences dialog box and then specifying a time in the Lock ID after [number] minutes of inactivity field.

8.1.3 Local Database Encryption

Users can encrypt local databases to prevent unwanted access by anyone who gains unauthorized access to the workstation or anyone who makes a copy of the database through the operating system layer.

To encrypt a database:

1. Left-click on the **Database** icon to select it.
2. Select **File -> Database -> Properties....**
3. On the Properties screen that is displayed, click on **Encryption...** to display the Encryption screen (Figure 169).

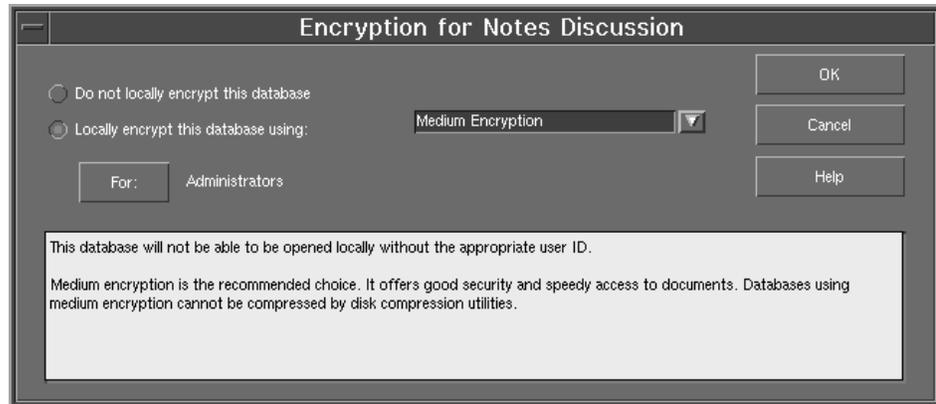


Figure 169. Encrypting a Local Database

4. Select **Locally encrypt this database using** and select an encryption level.
5. The For value defaults to your own user ID. If you want to encrypt the database for another person or group, click on the **For** button and select a person or a group from the Names screen.
6. Click on **OK**.

Unauthorized users will receive the following message when they try to access the locally encrypted database:

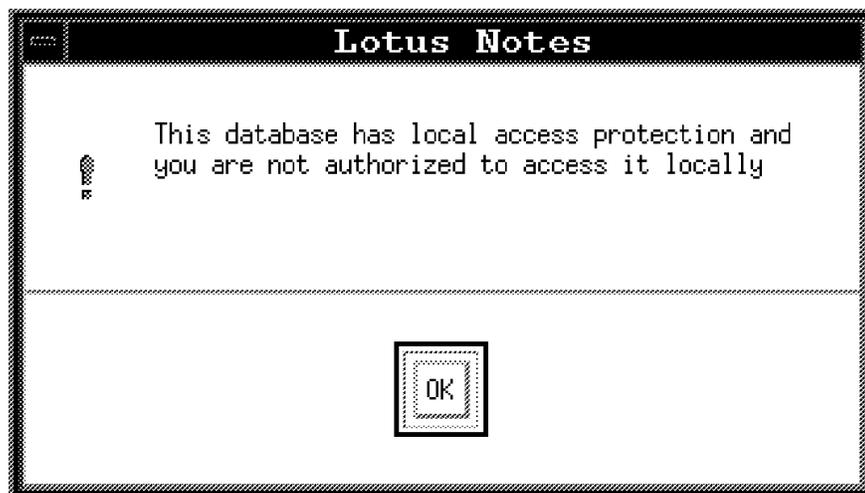


Figure 170. Not Authorized Message for Locally Encrypted Database

8.2 About Workstation Data Security

The User Preferences box allows users to secure their workstations through the Execution Control List (ECL). The ECL can limit the actions of another user's formula or scripts that run on a workstation, including limiting:

- Access to the file system
- Access to the current database
- Access to environment variables
- Access to databases of other applications
- Access to external programs
- Ability to send mail
- Ability to read databases other than the current one
- Ability to modify databases other than the current one
- Ability to export data
- Access to the workstation Security ECL

To access the ECL, you must first open the User Preferences box. To do this choose **File -> Tools -> User Preferences**.

Once this dialog box appears on the screen click on the **Security Options...** button and the following screen, shown in Figure 197, will appear.

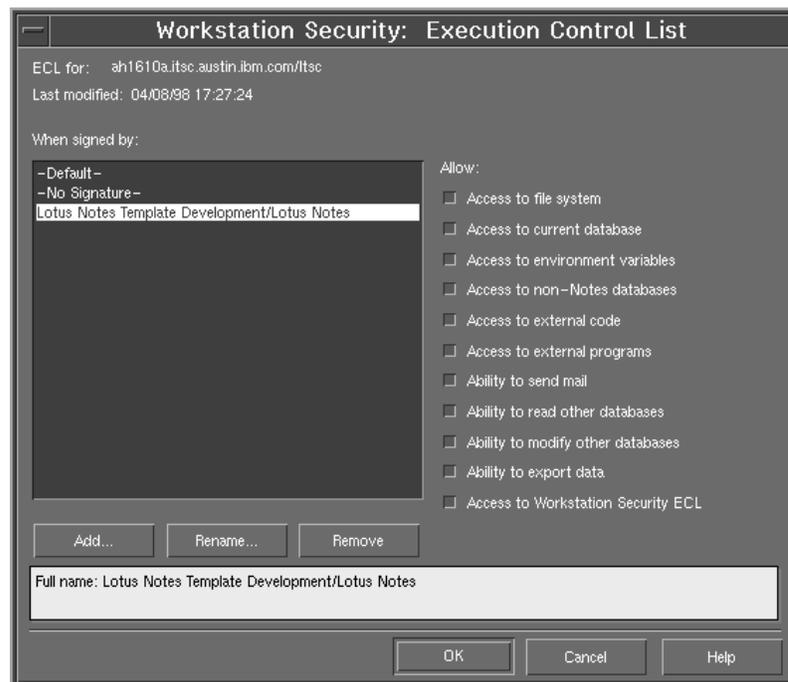


Figure 171. User Preferences ECL

Before you register users you should set up a generic ECL for user workstations by editing the Administration ECL. After you have registered the users, you can modify the ECL to make it more user specific. To do this follow the steps below:

1. Open the **Public Address Book**.
2. Choose **Actions -> Edit Administration ECL**.

3. Select **-Default-** and then select default access levels. Any signature not specified in the ECL is given the **-Default-** access. Typically, you allow only minimal default access.
4. Select **-No Signature-** and then select access levels to determine the access allowed when there is no signature or when a signature cannot be verified a signature. Typically, you allow only minimal access.
5. To add a name, click **Add**, and enter the name of a person, server, or group. Click **OK**.
6. Deselect one or more levels of workstation access for the specified name, as the default is everything is selected.
7. Repeat steps 5 and 6 to add more names.
8. To change a name, select the name, click **Rename**, enter the new name, and click **OK**.
9. To delete a name, select the name and click **Remove**.
10. To let users modify the ECL on their workstations, select **Allow user to modify**.
11. Click **OK**.

You can also make changes to the ECL after you have registered all the users by sending them a mail message with the changes made to the ECL. To do this follow the steps below:

1. Address a memo to the users whose ECLs you want to update.
2. Add a button to the memo that executes this formula:
@RefreshEcl (server, database, name)
3. Describe the purpose of the memo and instruct the users to click the button.
4. Mail the memo.
 - The first null parameter in the formula means that you're not selecting a specific server to draw the ECL changes from; instead, the changes are drawn from the users' home server. Therefore, you should make sure the Public Address Book with the new Administration ECL has replicated throughout the domain before sending the memo.
 - When a user clicks the button in the memo, the Administration ECL is merged into the user's existing workstation ECL; any entries in the Administration ECL are added to the user's ECL, but any entries the user has customized remain.

8.3 Remote User Security

Security may be required if sensitive or company confidential information is being transmitted across insecure telephone lines through a modem. Lotus Notes passwords are not a problem area because they are already encrypted before they are sent to the server for validation.

Lotus Notes can be configured so that data transmitted to and from a remote user is automatically encrypted. Encryption should be enabled at the port rather than at the user level so that the data is encrypted bidirectionally. This will slow down the transfer, but with a fast modem, the degradation is negligible.

To enable encryption for the modem port:

1. Log in as the Lotus Domino administrator and select **File -> Tools -> User Preferences...** to display the User Preferences screen.
2. Click on the **Ports** icon.
3. Select the communications port for modem communications and select the **Encrypt network data** check box.
4. Click on **OK**.

8.4 Mail Security

Lotus Notes mail can be secured by:

1. Encryption

The memo will be encrypted when sent and decrypted by Lotus Notes when the recipient opens the memo. The encryption/decryption is transparent to the user, but it needs access to the recipients public key either in the Public or the Personal Name and Address Book.

There are three ways to encrypt mail:

Encrypting Outgoing Mail

This method ensures the sender that only the recipient of a message can read it while the message is in transit or stored in intermediate mail boxes or in the recipients mail file.

Encrypting Saved Mail

This method allows users to encrypt drafts of unsent messages and messages saved after sending.

To set up encrypting outgoing and saved mail messages, in the User Preferences box, choose **File -> Tools -> User Preferences** and select the options you would like to use.

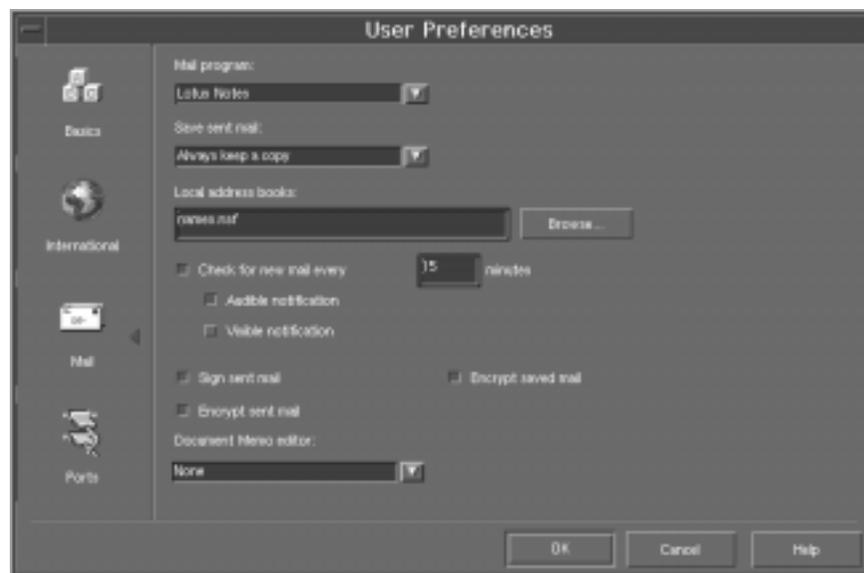


Figure 172. Encrypting Outgoing and Saved Mail

Encrypting Incoming Mail

This method ensures recipients of messages that only they can read the messages sent to them. Encrypting incoming messages prevents administrators or users with unauthorized access to mail servers from reading messages.

To encrypt incoming mail messages, in the Public Address Book, open the **Person** document of the user that wishes to encrypt incoming mail messages and in the **Misc** section, next to the **Encrypt incoming mail**, change the default from No to **Yes**, and save the document, as shown in Figure 173.

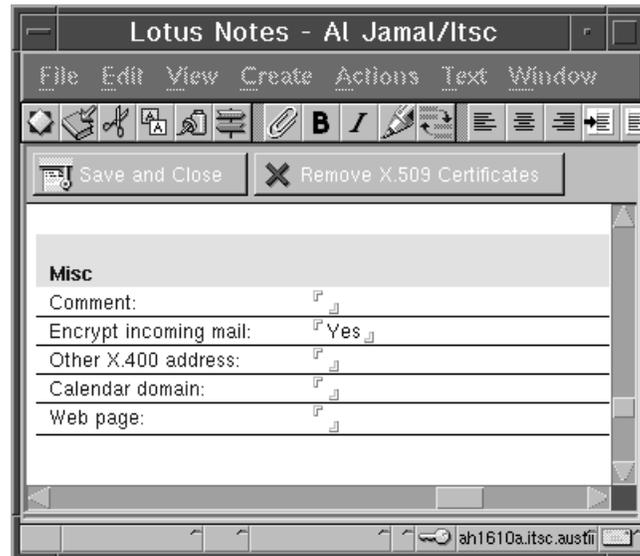


Figure 173. Encrypting Incoming Mail

Signing

Signing stamps the memo with the name of the author and the date and time of the signature. It doesn't prevent the memo from being read enroute, but if the contents are tampered with, the recipient will know about it.

When the recipient opens the signed memo, the signature will be displayed in the message box. An example is shown below:

Signed by Al Jamal/itso on 08/11/98 03:13:50 PM, according to /itso.

Here is an overview of how Lotus Notes uses electronic signatures:

1. Lotus Notes generates a 128-bit fingerprint of the data being signed and then encrypts the scrambled fingerprint with the private key of the author of the data.
2. Lotus Notes attaches the encrypted fingerprint to the data.
3. Lotus Notes attaches the signer's public key and certificates to the data.
4. When someone accesses the signed data, Lotus Notes verifies that the signer has a common certificate ancestor with and from a certifier that the reader trusts. If so, Lotus Notes attempts to decrypt the signed data using the public key that corresponds to the private key with which the data was signed.

5. If decryption is successful, Lotus Notes indicates who signed the message. If decryption is not successful, Lotus Notes indicates that it could not verify the signature. Unsuccessful decryption may indicate that the data has been tampered with and/or that the sender does not have a certificate trusted by the reader. This might happen, for example, when a user receives mail from a user in another company and that user doesn't have a cross certificate.

A signature can be verified as long as the two IDs have a certifier in common, or Lotus Notes finds a cross certificate between some level of the two IDs.

The signing and encryption of a memo are enabled from the Delivery Options screen which is displayed when **Delivery Options...** is clicked from the New Memo screen shown in Figure 174. The default can be set by selecting **File -> Tools -> User Preferences...** in the Mail section.



Figure 174. Delivery Options for Lotus Notes Memo

8.5 Server Security

The following aspects of server security will be discussed in this section:

- Restricting Physical Access to Lotus Domino Servers
- Restricting Access to Lotus Domino Server Consoles
- Server Access Control Lists
- Certification

8.5.1 Restricting Physical Access to Lotus Domino Servers

It is crucial to restrict access to the workstation which is running the Lotus Domino Server program by locking it in an air-conditioned room to which only authorized Lotus Domino administrators have access. If need be, the keyboard and mouse can be removed to stop the casual intruder from gaining access to the system. The server can then be administered from the remote console.

Besides restricting physical access to the server, it is probably best to allow only the necessary administrative people to log into the server on the operating system level. All other users should be able to access the server only through the Lotus Notes clients on other machines.

8.5.2 Restricting Access to Lotus Domino Server Consoles

You can provide additional security by providing a keyboard lock password and by using the `Notes Set Secure <password>` command on the server console.

This command restricts access to the following commands to only those people who know the password that was used when the `Set Secure` command was issued:

- Load
- Tell
- Exit
- Quit
- Set Configuration

Restricted access to these commands is removed when the `Set Secure <password>` command is issued again.

It's possible to change the password by issuing the `Set Secure <old_password> <new_password>` command.

8.5.3 Server Access Control Lists (SACL)

SACLs are specified in the Server Document in the Public Name and Address Book, and they control access to the server.

To see the SACL for a server:

1. Double-click on the icon for the **Public Name and Address Book**.
2. Select the **Server/Servers** view, if it is not already selected, to display a list of servers in the domain.
3. Click on the Server document that you want to work with, and either press **Ctrl+E** or click on the **Edit Server** button to display the Server document in edit mode (Figure 175).
4. Click on **Restrictions** to display the SACL for this server (Figure 175 on page 198).

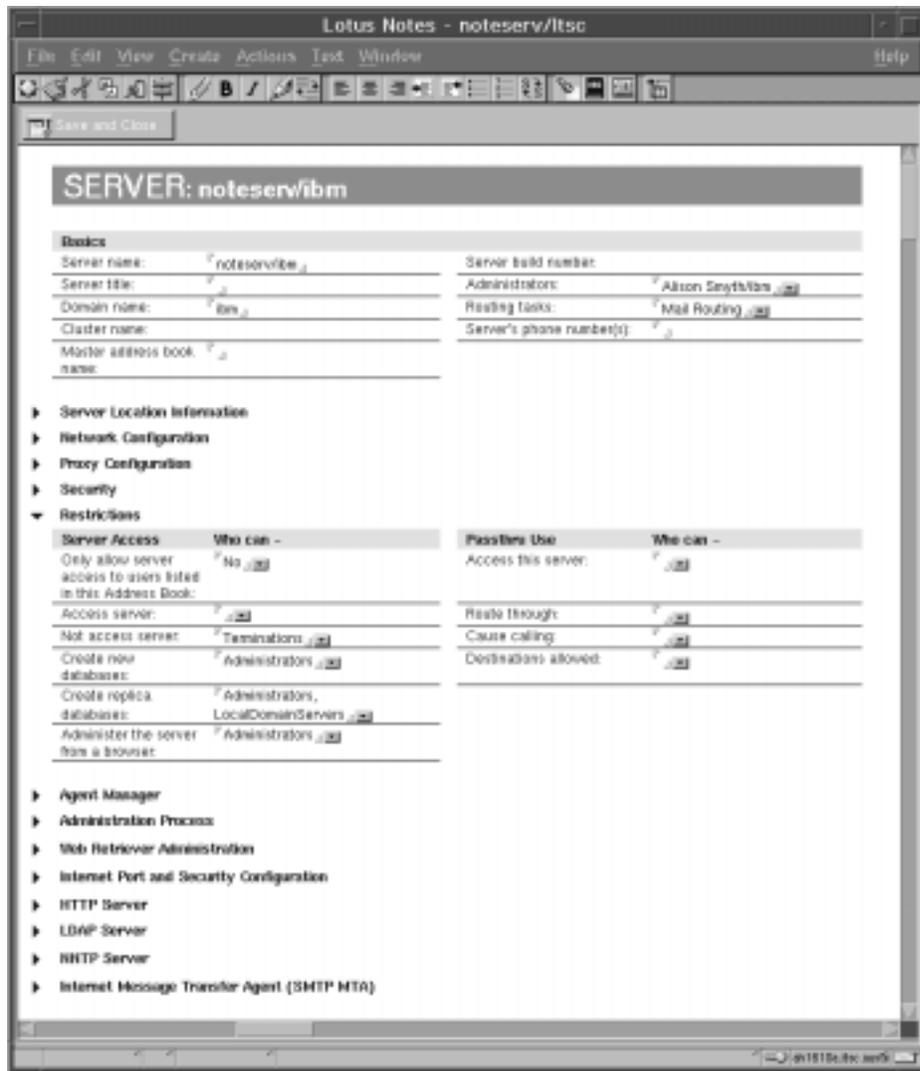


Figure 175. Server Document in Edit Mode

The meanings of the fields within this section are described here:

- Only allow server access to users listed in this Address Book.

Selecting **Yes** prevents users and servers not listed in the Public Name and Address Book from accessing the server. Note that you may have to restart the server for the change to take effect.

Users who are not listed in the Public Name and Address Book will receive the following message when trying to gain access to the server:

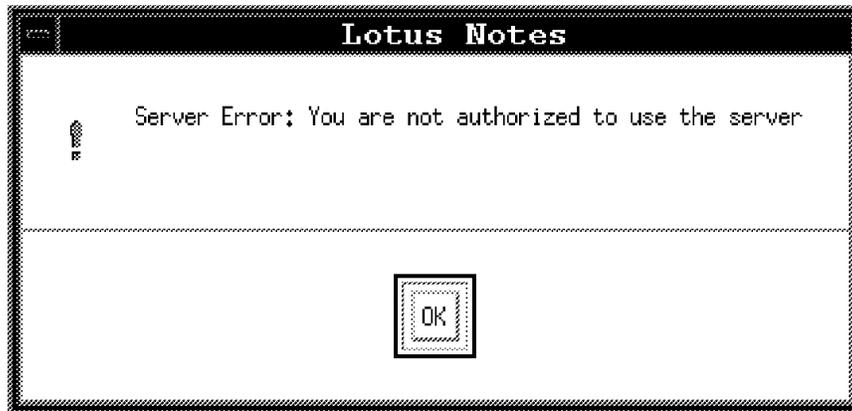


Figure 176. Restricted Access to Server - Error Message

- Access server
Allows users, servers, and groups listed in this field to access the server. If this field is blank, all certified users can access the server.
- Not access server
Denies access to users, servers, and groups listed in this field. Use this to deny access to people who have left the company and who still have their IDs. For example, create a group called *Terminations* and add people leaving the company to this group.
- Create new databases
Allows users, servers, or groups specified in this field to create databases on the server. If this field is blank, all certified users can create new databases.
- Create replica databases
Allows users, servers, or groups specified in this field to create replica databases. If this field is blank, only the person working at the server machine can create replica databases.
- Administer the server from a browser
Allows users or groups specified in this field to use the web based Administration Tool from a browser.
- Access this server
Allows users, servers, and groups listed in this field to access this server as a passthru destination. If this field is blank, all users can access this server as a passthru destination.
- Route through
Enter the names of users, servers, and groups whom you want to allow to use this server as a passthru server. If the Route through field is blank, no users and servers can use this server as a passthru server. Note that the Access server and Not access server fields have no bearing on passthru users. Any users or servers listed in the Route through field can use the server as a passthru server, regardless of whether or not they are also included in the Access server or Not access server fields.
- Cause Calling

Enter the names of users, servers, and groups allowed to call other servers while routing through this server. If this field is blank, no one can use the server to call other servers.

- Destinations allowed

Enter the remote servers that this server may route to through passthru. If this field is blank, every server can be routed to.

Note

If you change the entries in these SACs, a restart of the server is necessary to make the changes active. Therefore, it is advisable to enter group names instead of user names. If you have, for example, the group Terminations in the Not access server field and you add a user who left the company to this group, access to the server will be denied immediately without restarting the server.

8.5.4 Certification

When a server is created or a user is registered, a Certifier ID is used to certify the server or user ID. The certifier that is used must be secured.

8.5.4.1 Securing the Certifier ID

It is important to secure the Certifier ID for any organization (especially the top-level organizational certifier that is used to certify organizational units, servers, and users) by assigning multiple passwords to the ID file. You can secure any ID file this way, not just the Certifier ID.

If security of the Certifier ID is compromised, all organizational units, servers, and users will have to be recertified with a new certifier.

The first step is to decide how many people will be required to be given a password to the ID file and who those people are.

Note

IBM Corporation's Global Notes Architecture, dated November 1995, recommends four passwords with any two being present for access to the Certifier ID.

Once they have been identified, the following procedure can be used to set multiple passwords for the ID file:

1. Select **File -> Tools -> Server Administration...** to display the Lotus Domino - Administration panel.
2. Select the server that you want to administer.
3. Click on the **Certifiers** icon, and select **Edit Multiple Passwords....**
4. Choose the **Certifier ID** (or any other ID file), and click on **OK** to display the Edit ID File Password List dialog box.
5. Type the number of passwords required to access the chosen ID file in the At least [number] passwords are required to access this ID field.

6. Each administrator should then:
 - a. Type their name (this does not have to be their Lotus Notes user name) in the Authorized user field.
 - b. Type their password in the New password field.
 - c. Verify their password in the Confirm password field.
 - d. Click on **Add**.
7. Once all authorized users have been added, click on **OK** to return to the Lotus Domino - Administration screen.



Figure 177. Edit ID File Password List - Completed

8.6 Secure Socket Layer (SSL)

SSL security is based on certificates used by both client and server. Lotus Domino uses the X.509 format for SSL certificates, which is currently the most widely-recognized certificate format. This allows servers and clients with certificates created by Lotus Domino certificate applications to exchange certificates easily between Lotus Domino and other applications.

Certificates contain a public key, a name, an expiration date, and a digital signature. *Client certificates* are stored in browsers, and *server certificates* are stored in files called *key ring* files. A key ring file is a binary file that is protected by a password and stores one or more certificates on the server's hard drives. Public and Private keys are a unique pair of mathematically-related keys that are used to initiate SSL-encrypted transactions.

The link that allows a server and client to communicate is a *Certification Authority* (CA). Like a mutual friend, a CA vouches for the identity of a server and client by issuing certificates stamped with the CA's digital signature and including the CA's trusted root certificate in the key ring file. The digital signature ensures the client and the server that both the client certificate and the server certificate can be trusted. If the client and server can identify the digital signature on the certificate, then a secure SSL session can be established. Otherwise, the client and server

cannot authenticate each other, and the session cannot be established. Clients and servers identify digital signatures by comparing them against the trusted root certificate in their key ring files.

A CA can be an external, commercial certifier or an internal certifier that you establish at your organization using Lotus Notes and Lotus Domino. External and internal CAs create both server and client certificates.

You can use SSL for the following tasks:

- Web Server (HTTP server task)
- Server Web Navigator (Web server tasks)

Note

You cannot authenticate client certificates with the Server Web Navigator.

- Network News Transfer Protocol (NNTP server task)
- Post Office Protocol (POP3 server task)
- Internet Messaging Access Protocol (IMAP server task)
- Lightweight Directory Access Protocol (LDAP server task)

You must set up SSL and configure the Lotus Domino Server before Lotus Domino secures the transactions.

SSL offers the following security benefits:

- Privacy
Data is encrypted to and from clients, so privacy is ensured during transactions.
- Message Validation
An encoded message digest accompanies data to detect any message tampering.
- Server Authentication
The server certificate accompanies messages to assure the client that the server identity is authentic.
- Client Authentication
The client certificate accompanies messages to assure the server that the client identity is authentic. Client authentication is optional and may not be a requirement for you organization.

8.6.1 Enabling SSL on a Server

You can enable SSL on a server using one of two methods:

1. Enable SSL for a server only. This secures transactions, validates messages, and authenticates server identity, but does not authenticate client identity. You can control access to databases on the server by user name if you set up an Internet password for the user in the Person document and use basic password authentication.

To enable SSL for servers only:

- The servers must have certificates from an internal or external Certification Authority (CA).
- The clients must have the servers CA certificate marked as a trusted root.

2. Enable SSL for clients and servers. This method secures transactions, validates messages, and authenticates both the server and client identities. You can set database access control using individual client user names.

To enable SSL for clients and servers, in addition to the steps above:

- The clients must have certificates from an internal or external CA.
- The servers must have the client's CA certificate marked as a trusted root.
- The clients must have the server's CA certificate marked as a trusted root.
- Every client must have a Person document in the Public Address Book that contains the SSL public key certificate.

8.6.1.1 Server Certificate Administration

The Server Certificate Administration application (certsrv.nsf) lets you request server certificates from either an internal or external Certification Authority (CA) and manage your server certificates in a key ring file.

The Server Certificate Administration application lets you:

- Create the server certificate and key ring file, which holds your server certificate.
- Send a request to a CA to sign the server certificate.
- View requests that you submitted to CAs.
- Add a CA certificate as a trusted root to the server certificate.
- View information about certificates in the key ring file.
- Control client access to servers by adding or removing trusted root certificates from the key ring file.
- Create a self-certified certificate for testing purposes.

The screen shown in Figure 178 on page 204 is the navigator screen for the Server Certificate Administration application. There are four steps involved with setting up SSL for your server and to use these steps you must be running Lotus Domino Release 4.6.1.

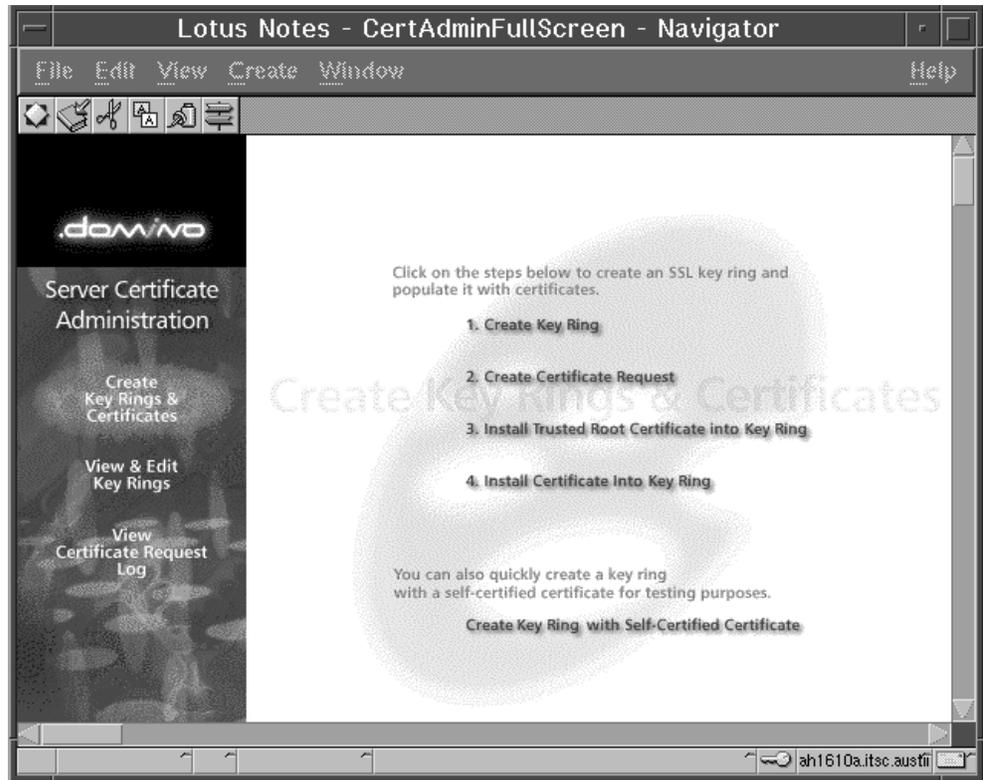


Figure 178. Server Certificate Administration Navigator Screen

The first step in enabling SSL is to create a key ring. Once the key ring is created, a public/private keypair is automatically generated and stored in the key ring. To create a key ring, click on the first step on the navigator screen **Create Key Ring**.

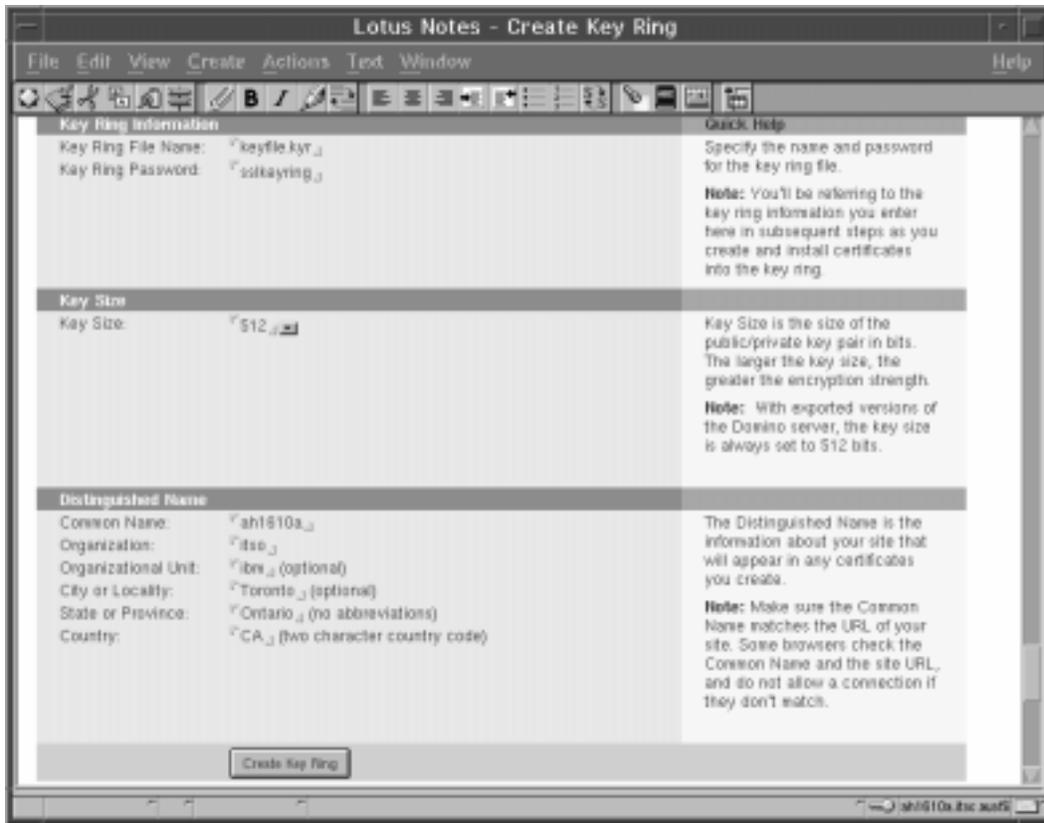


Figure 179. Create Key Ring

Once you have filled out all the information that is required, click on the **Create Key Ring** button on the bottom of the screen.

- This step creates a password-protected file on the server's hard drive that holds the server certificate and trusted roots.
- A summary screen appears next with all the parameters you specified, signifying that the key ring has been created.
- Click on the **OK** button, which will bring you back to the navigation screen where you will then choose the next step, which is **Create Server Certificate Request**. A certificate is required for the public key in the key ring you created. Use the following form, shown in Figure 180 on page 206, to create the certificate request.



Figure 180. Creating a Server Certificate Request

Before you move on from this step, you should have already chosen a Certificate Authority that will provide you with a certificate that will verify your identity.

Be sure to read the documentation provided by your CA that will specify how to send your request, whether it be through e-mail or copy and paste it into their Web site.

Once you have completed all the required fields in the form, click on the **Create Certificate Request** button at the bottom of the screen (Figure 180) and your certificate request will be created.

When the screen appears be sure to copy the bottom portion of the screen to your clipboard, as this information is what the external certificate will use to verify your identity. To copy this, highlight the section starting with **BEGIN NEW CERTIFICATE REQUEST** all the way down to **END NEW CERTIFICATE REQUEST**. Once this text is highlighted, click with the right mouse button and choose copy from the menu. After you have completed this click the **OK** button, which will prompt you for the password (Figure 181 on page 207) that you entered in the first setup screen and then bring you back to the navigation screen.

- Browse to the Certificate Authority application on the CA Web site. If you are using Microsoft Internet Explorer, make a TCP/IP connection to the server. Internet Explorer does not allow you to accept site certificates into your browser. If you are using Netscape, it is recommended that you connect to the Certificate Authority application using SSL.
- If you are using Netscape, accept the site certificate in your browser using the instructions provided by the browser software.

- Click on **Request Server Certificate**.
- Enter your name, e-mail address, phone number, and any comments to the CA.
- Paste your certificate in the dialog box and click **Submit Certificate Request**.



Figure 181. Password Prompt

After you have entered the password, choose the third step from the navigation screen.



Figure 182. Install Trusted Root Certificate

The external CA that you choose will provide you with their certificate contents that you will copy and paste into the **Certificate form clipboard** field; this is what your server will use to verify the external CAs identity. When you have pasted the contents of the clipboard into the Certificate form clipboard field, click on the **Merge Trusted Root Certificate into Key Ring** button at the bottom of the screen, and again, you will be prompted for another password, as shown in Figure 181 on page 207. Enter the password and proceed to step four from the navigation screen.

This step adds the CA's certificate as a trusted root to the server key ring file so the server trusts certificates signed by this CA.

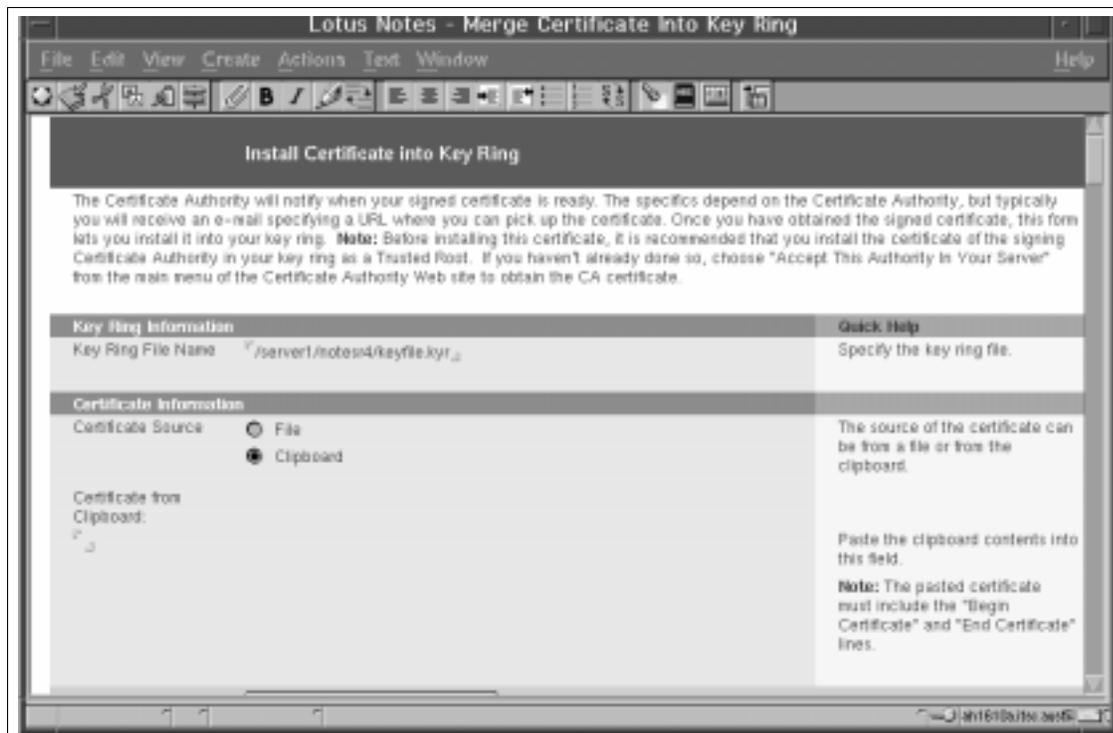


Figure 183. Merge Certification into Key Ring

This final step adds the signed certificate from the CA to the server's key ring file. The last step in configuring your server to use SSL is to edit the server document in the Public Address Book.

1. Open the Public Address Book.
2. Choose the **Servers** view.
3. Double click on the server that you want to enable SSL transactions.
4. Select the **Internet Port and Security Configuration** section.
5. In the **SSL protocol Version** field, select one of the following:

Note

This setting applies only to NNTP, IMAP, LDAP, and POP3 connections.

- V2.0 only - Allow only SSL 2.0 connections.
 - V3.0 handshake - Attempts an SSL 3.0 connection. If this fails and the requestor detects SSL 2.0, it then attempts to connect using SSL 2.0.
 - V3.0 only - Allows only SSL 3.0 connections.
 - V3.0 and V2.0 handshake - Attempts a SSL 3.0 connection, but starts with a SSL 2.0 handshake, which displays relevant error messages. Makes an SSL 3.0 connection if possible.
 - Negotiated - (default) Attempts an SSL 3.0 connection. If this fails, attempts to connect using SSL 2.0. Use this setting only if you are having connection problems due to incompatible protocol versions.
6. In the SSL key file field enter the name of the key ring file that the server uses.
 7. In the column for the protocol for which you enable SSL, select **Enabled** in the SSL port status field and, if necessary, change the SSL port number. For example, to enable SSL for the Lotus Domino Web server, select **Enabled** in the SSL port status field in the Web column.
 8. Make sure the client has the server CA certificate marked as a trusted root, and the server has the client CA certificate marked as a trusted root.
 9. Make sure the client has a certificate issued from an internal or external CA and that the client has a Person document with their public key certificate in the Public Address Book.
 10. In the Internet Port and Security Configuration section, in the column for the protocol for which you want to enable SSL, select **Yes** in the Client certificate field.

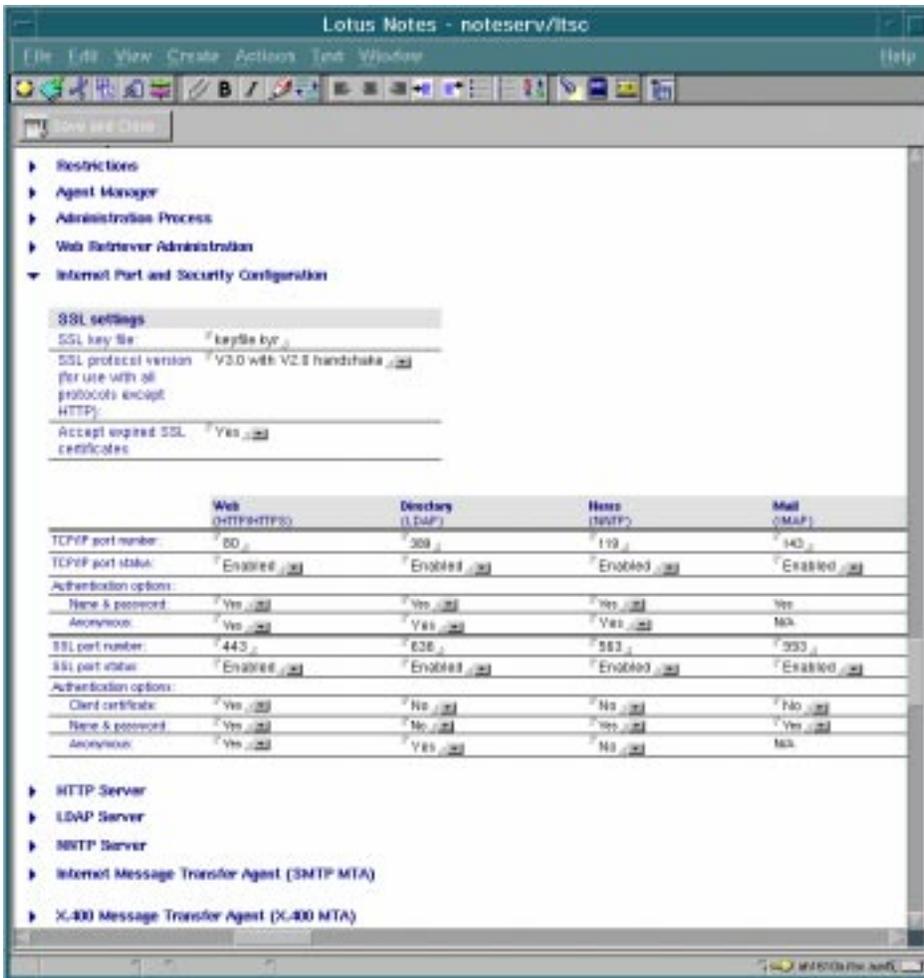


Figure 184. Server Document - Port and Security Configuration Section

11. Close and save the document.
12. You may have to restart the server for the changes to take effect.

8.7 AIX Security

There are many aspects of AIX security. Just a few of them will be highlighted in this section:

- UNIX Passwords
- UNIX File Permissions
- NFS Export Security

8.7.1 Security Concepts

User Accounts

- Each user has a unique name, ID, and password.
- File ownership is determined by user ID
- The ownership is usually the user that created the file, but ownership can be transferred by root.
- Default users:

root Super user
adm, sys, bin IDs that own system files but cannot be used for login

Groups

- Users who need to access the same files can be placed in a single group.
- Group ID gives an extra level of file ownership.
- Default groups:
 - system** Administrators
 - staff** Ordinary users

The security of the system is based on a user being assigned a unique name, user ID (UID), and password. When the user logs in, the UID is used to validate all requests for the access.

When a file is created, the UID associated with the process that created the file is assigned to the file. Only the owner or root can change the access permissions.

Users that require shared access to a set of files are placed in groups. A user can belong to multiple groups. Each group has a unique name and Group ID (GID). The GID is also assigned to a file when it is created.

8.7.2 UNIX Passwords

Don't use trivial passwords. There are public domain programs available on the Internet that can crack the passwords. Any word that can be found in dictionaries is a trivial password.

Try to protect your password file. Avoid using the Network Information System (NIS) as your login method. With NIS, you make the password file available to everyone on your network.

If the root password is known by too many people, no one can be held accountable. The root password should be limited to a single system administrator. The fewer people who know the root password the better. The same goes for user notes. Try to limit the amount of people who know this password as well.

Attempts to become root through `su` can be investigated. Successful and unsuccessful attempts might be logged by the audit system.

8.7.3 Security Logs

- **/var/adm/sulog**

The sulog file is an ASCII text file that can be viewed with the commands `more` or `pg`. In the file, the following information is recorded: date, time, system name and login name. The file also records whether or not the login attempt was successful (it indicates a successful login by a + and a failed login by a -).

- **/var/adm/wtmp** and **/etc/utmp**

The `/etc/utmp` file contains a record of users logged into the system, and the `/var/adm/wtmp` file contains connect-time accounting records. To obtain information from either file, use the `who` command with the file name. The `who` command normally examines the `/etc/utmp`, but you can specify either one of the named files as arguments to the command.

- **/etc/security/failedlogin**

The last command can also be used to display, in reverse chronological order, all previous logins and logoffs still recorded in the /var/adm/wtmp file. The /var/adm/wtmp file collects login and logout records as these events occur and holds them until the records are processed by the accounting commands.

For example:

```
last root      Displays all the recorded logins and logoffs by the user root.
last reboot    Displays the time between reboots of the system.
```

8.7.4 UNIX File Permissions

The files on the /usr/domino/lotus file system, the Lotus Software System, have to be available to all the users that need to run the Lotus software. The default permissions are secure enough.

The notes user home directory must be accessible only by the notes user. You don't want a user to copy a confidential database to their directory. Some files that are critical are the user.id, notes.ini, cert.id, and server.id. If they aren't password protected, you must ensure that only the notes user has the access to them.

To protect the notes home directory, log in as notes and run the command:

```
$ cd ; chmod -R go-rwx
```

Note

Use the command above with caution. It follows the links and may change something that you don't want changed.

To change the ownership of files and directories, log in as the current owner of the file or directory, in this case it would be user root, and run the command `chown`. For example:

```
# ls -l
-rw-r--r--  1 root      system      0 Aug 14 16:48 myfile
# chown ausres12 myfile
# ls -l
-rw-r--r--  1 ausres12 system      0 Aug 14 16:48 myfile
```

To change the group of the files or the directory, log in as the current owner of the file or directory, in this example it would be user ausres12 and run the command `chgrp`. For example:

```
$ ls -l
-rw-r--r--  1 ausres12 system      0 Aug 14 16:48 myfile
$ chgrp notes myfile
$ ls -l
-rw-r--r--  1 ausres12 notes      0 Aug 14 16:48 myfile
```

To change both owner and group at the same time, log in as the current owner of the file, in this example it would be user root, and run the command `chown` but with different arguments. For example:

```
# ls -l
-rw-r--r--  1 root      system      0 Aug 14 16:48 myfile
# chown ausres12.notes myfile
```

```
# ls -l
-rw-r--r--  1 ausres12 notes          0 Aug 14 16:48 myfile
```

Use the `umask` command to force the permissions of the new files. Put the following line in the `notes` user's `.profile` file:

```
umask 077
```

You also have to protect the UNIX users' Lotus Notes data directory. This can be done in the same manner as explained for the server's data directory in 8.7.4, "UNIX File Permissions" on page 212.

8.7.5 File System Security

All file system objects (including files, directories, special files, link files, symbolic link files, and pipes) have security mechanisms associated with them. The most commonly used is the access control list (ACL), but the following additional ways of controlling file security can be used:

Base ACLs Specifies the permissions for the owner, group, and others. These permissions are controlled through the `chmod` command.

Extended ACLs Provides finer access control than the base ACLs.

Status of Extended ACLs

The extended ACL must be enabled for a file system object; otherwise, the extended ACL is ignored.

Owner ID This is the user ID of the owner of the file system object. Only this user ID has the permissions granted for the owner of the object.

Group ID This is the ID of the group associated with the object. Only members of this group have the permissions granted for the group associated with the object.

Sticky bit If the sticky bit is set for a directory, only the owner of the directory or the owner of a file can delete or rename a file within that directory. This can be set with the `t` flag with the `chmod` command.

TCB bit If the TCB bit is set for a file system object, it identifies that object as part of the Trusted Computing Base (TCB).

umask The `umask` environment parameter specifies the default permissions for any file or directory created.

Status of the file system

A file system can be mounted with read/write or read-only permissions.

Follow these guidelines when dealing with file system objects:

- In general, do not use extended ACLs. For most systems, base ACLs are sufficient for administration. If you do need the extra security control provided by extended ACLs, use them only when necessary and in an organized manner. Maintaining relevant entries in many extended ACLs can become very time-consuming. Also, do not use extended ACLs at all if you are in a heterogeneous network because they are only recognized by AIX systems.

- Use the *sticky bit* on directories where everyone has write permissions. For example the /server1/notesr4/mail directory for Lotus Domino.
- Protect user .profile files with 740 permissions.
- Do not let users have write access to system directories.
- Do not change permissions on any files or directories installed as part of the system. Changing those permissions affects system integrity.

8.7.6 Validating the User Environment

The commands `pwdck`, `usrck`, and `grpck` can be executed by root or any user in the security group to clean up after a change to the user configuration. Because they run with root permissions, they give administrative users the ability to make necessary changes to the /etc/security/passwd file in a controlled way, without knowing the root password.

The `usrck` command verifies the validity of the user definitions in the user database files by checking the definitions for ALL the users or for the users specified by the user parameter. You must select a flag to indicate whether the system should try to fix erroneous attributes.

All the options for `pwdck`, `usrck`, and `grpck` are as follows:

- n reports errors but does not fix them.
- p fixes errors but does not report them.
- t reports errors and asks if they should be fixed.
- y fixes errors and reports them.

8.7.7 Documenting Security Policy and Setup

- Identify the different types of users and what data they will need to access.
- Organize groups around the type of work that is to be done.
- Organize ownership of data to fit with the group structure.
- Set SVTX on shared directories.
- Remember that UNIX/AIX has no concept of application ownership.

AIX security in itself only controls access to the system and it's files and directories. Once an additional application (for example, Lotus Domino) is installed, you must further the application security by using tools within Lotus Domino. This last function cannot be provided for by AIX.

8.7.8 NFS Export Security

When using NFS, never export a read-write file system, without restricting the hosts' access. You have to specify the hosts that are allowed to mount the file system. If you don't, all the hosts connected to your IP network will be able to mount your file system. This might be your LAN, your company or possibly the entire Internet, depending on your site's setup.

You have to pay attention to the groups and user numbers of your file system while exporting it. If you are exporting a file system with files owned by a regular user, ensure that, on the machines that mount this file system, the same user exists with the same user ID.

For example, an NFS server exports a file system with files owned by a user with user ID 210. A host mounts this file system and has another local user with the same ID. This local user will own these files and will be able to do anything with

them. This means, of course, that you must trust the remote host completely. A user with root access to the remote host could easily create users with UID's matching those on the exported file system, and thereby, gain read or write access to the files.

8.7.9 AIX Security Checklist

The following list is intended to serve as a basic reminder of the most important things to keep in mind when trying to secure your AIX server. It is not a detailed list, however; AIX security is a very large topic, and we can only begin to scratch the surface in this redbook. Don't believe that this list tells you everything that you need to know about AIX security, because it doesn't. Also, when designing secure AIX servers, new issues will appear, as well as new methods to deal with those new issues. Keep this in mind and you are well on your way to achieve AIX security awareness.

- Keep your servers and server consoles physically protected (locked away) and restrict access to as few people as possible.
- If you are on the Internet, set up router filters or firewalls to minimize the number of services accessible from outside your domain.
- Examine carefully services offered by inetd and the portmapper. Eliminate any that aren't explicitly needed. A Lotus Domino Server will probably need a minimum of AIX services; most can be disabled. Use an inetd wrapper if you can, if, for no other reason, than to log the sources of connections to your host. This will help you to detect and prevent network attacks.
- Protect your root account as well as you can. Restrict root access to one or very few persons.
- Disable root network logins.
- Don't run NIS unless it's absolutely necessary. Use NFS as little as possible.
- Never export NFS filesystems unrestricted to the world. Specify fully-qualified host names when exporting. Export file systems read-only when possible.
- Fortify and protect Lotus Domino Servers. Don't allow any regular AIX user accounts on these hosts. If you need an AIX server where many users will use the Lotus Notes client, set up a separate server for that task.
- Use shadow passwords and the password restriction parameters in AIX to disallow poor passwords. Enable password check methods to ensure good user passwords. Disable or delete unused/dormant system or user accounts.
- Force users to change their passwords every once in a while. Don't overdo it however. If users need to change their passwords too often, they tend to write them down instead of memorizing them. The root password is an exception to this rule. Change it often and make sure it is safe.
- Install all AIX security patches as soon as possible on all of your hosts.
- Eliminate trust relationships unless there is an absolute need for it. Create a cron job to remove .rhosts files that have not been authorized.
- Check your log files regularly. They are your key to uncovering any attempts to compromise system security.
- Use all available tools that can help you check your system. There are many good tools in the Public Domain that you can use for free.

- Keep abreast of current literature and security tools; communicate to others about security problems and incidents. Read security newsgroups and subscribe to the various security mailing lists on the Internet. You can find a subscription Web page at <http://www.rs6000.ibm.com/resource/maillist.html>.

There are many resources on the Web on AIX security. We can't list all of them here, but a very good starting point for finding information is <http://www.ers.ibm.com/security-links/index.html>.

Chapter 9. Lotus Domino and the World Wide Web

The Internet connects millions of people together in a global work and recreation domain. The development of the World Wide Web (WWW) has significantly changed the way people communicate, exchange information, and do business. Lotus Domino allows the seamless integration of the World Wide Web with the proven Lotus technology. This provides a way for users to organize, share, collaborate, and integrate information in a secure environment, both for Lotus Notes clients and Web browsers.

Before Lotus Domino was available, Lotus InterNotes Web Publisher was the only way to publish Lotus Notes databases to the World Wide Web, but it has been static publishing. However, Lotus announced in July 1997 that InterNotes Web Publisher will no longer be developed beyond the 4.0 release. As a result, this redbook is focussing on the WWW capabilities of Lotus Domino, based on Lotus Domino Release 4.6.1.

Lotus Domino provides integrated solutions that seamlessly merge Lotus Notes and the Internet. Specifically, these solutions are:

Lotus Domino Web Server

Internet users with any Web browser can access information on Lotus Domino servers. 9.1, "Lotus Domino Server" on page 217 provides the information to setup and administer a Lotus Domino site.

Lotus Domino Virtual Server - multihomed Web server on one server

If you want to maintain separate sites without installing different systems or using different partitions, you can set up virtual servers for which a single Lotus Domino Web server can host several Web sites. 9.2, "Lotus Domino Virtual Server" on page 235 describes the basic tasks.

Lotus Domino Server Web Navigator and Personal Web Navigator

With these integrated WWW browsing facilities, users can navigate the Internet even without a direct Internet connection or a separate browser. See 9.3, "Web Navigator" on page 242 and 9.4, "Server Web Navigator" on page 249 for details.

Web administration tool (Lotus Domino Server administration with a web browser)

You can setup your Lotus Domino server to be administered by a Web browser client. See 9.5, "Server Web Administration Tool" on page 259 for more detailed information.

Support for various Internet protocols

For information regarding the various internet protocols, such as POP3, IMAP and others, see Chapter 10, "Connectivity and Internet Communications" on page 265.

9.1 Lotus Domino Server

Lotus Domino is a server technology that transforms Lotus Notes into an Internet application server. Lotus Domino brings together the open networking environment of Internet standards and protocols with the powerful application development facilities of Lotus Notes, providing you with the ability to rapidly develop a broad range of business applications for both Internet and intranets.

Using Lotus Domino, you can build applications which leverage access control to databases, views, pages, forms, and even fields. This allows you to present information or commands differently to different users, though all the information resides within one database or application.

Lotus Domino extends a rich set of Lotus Notes features for Web application development, such as:

- Lotus Notes databases offer a programmable content store.
- Full-text search capabilities, with automatic indexing.
- Integrated application development.
- Messaging and workflow.
- Enterprise integration.
- Lotus Notes replication.

Lotus Domino lets you develop interactive Web applications that:

- Deliver dynamic content based on time, user identity, user access level and client type.
- Host collaborative applications such as threaded discussions.
- Extend the reach of RDBM (Relational Database Manager) systems to the Web.
- Streamline and automate business processes with workflow applications.

Lotus Domino also offers a rich framework for securing Web applications, for example:

- Lotus Domino leverages the Lotus Notes Access Control model to provide a framework for securing Web applications.
- The Lotus Notes Public Address Book, for managing Web users as individuals or in user groups.
- Sample registration application, which automates creating user accounts.
- Database Access Control List for controlling access rights to information from the database down to the field level.
- Roles-based assigning of access rights to information.
- Lotus Domino supports Basic Web Authentication.
- Secure Sockets Layer (SSL) support for server authentication and encryption of data in secured sessions.

9.1.1 How the Lotus Domino Web Server Works

This section provides a brief technical overview of how Lotus Domino works. Figure 185 shows the main components working together:

1. Lotus Domino Server, performing classical Lotus Notes Server functions
2. HTTP Server, performing the handling of HTTP requests
3. Lotus Domino Engine, performing the dynamic conversion of Lotus Notes databases and documents into HTML on request of the HTTP server

Note

The HTTP server can serve both dynamically generated pages and static contents (HTML) and CGI (Common Gateway Interface) programs as any other Web server. You do not have to have a different server for static pages.

Let's take a closer look on how the process works:

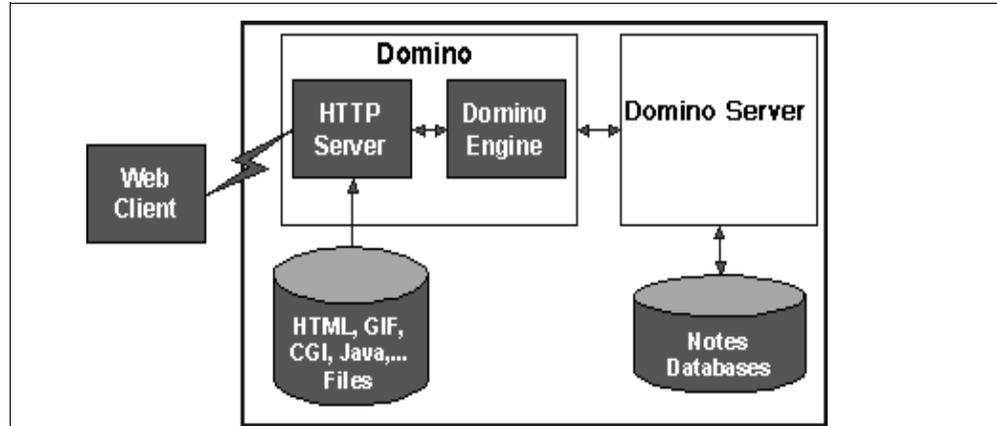


Figure 185. Lotus Domino Server Components

A Web client will direct a HTTP request to the Lotus Domino HTTP server. The Lotus Domino HTTP server examines the URL (Uniform Resource Locator) in the incoming request and determines if the request is for an item in a Lotus Notes database or if it's for a plain HTML file (located in the AIX file system).

If the request is for an HTML file, Lotus Domino acts just like any other HTTP server and serves the file to the Web client. When the request is for something in a Lotus Notes database, Lotus Domino interacts with the Lotus Notes database to serve the information to the Web client or to put information from the Web client into the Lotus Notes database.

Lotus Domino automatically translates Lotus Notes constructs, such as navigators, views, documents, and links, into HTML for display in the Web client. For example, Lotus Notes links and action buttons become URLs in the Web client. You simply develop your Web application in Lotus Notes, and Lotus Domino does the rest. Lotus Domino supports extensions that enable Web clients to explore Lotus Notes functionality. For example, to open a database, the URL might have an extension as in: <http://notes.net/1bytes.nsf?OpenDatabase>.

For Lotus Domino system requirements on RS/6000 please refer to the Lotus Domino release notes. You could also use the sizing tools available to you if you are a member of the POWERNET program (<http://powernet.rs6000.ibm.com>). In general, you should consider at least a few points:

- Bandwidth of server's (TCP/IP) network connection, depending on the number of clients and amount of data retrieved per request (for example, small text compared to large images).
- Percentage of dynamically generated pages versus static pages; of course, CPU load and memory requirements will increase if more pages have to be created dynamically in a given time.
- Provide disk space for static pages, logfiles, and paging, as required.
- Integration with other applications (for example, relational databases) on dynamically building pages; impact on CPU and memory.

9.1.2 Specify HTTP Settings for the Lotus Domino Web Server

Whether you specified to start the http Task at the setup of the server, or later during standard administration tasks, the following steps have to be performed:

1. Double click on the **Public Name and Address Book** icon.
2. Select the **View -> Server\Servers** to display the list of server documents.

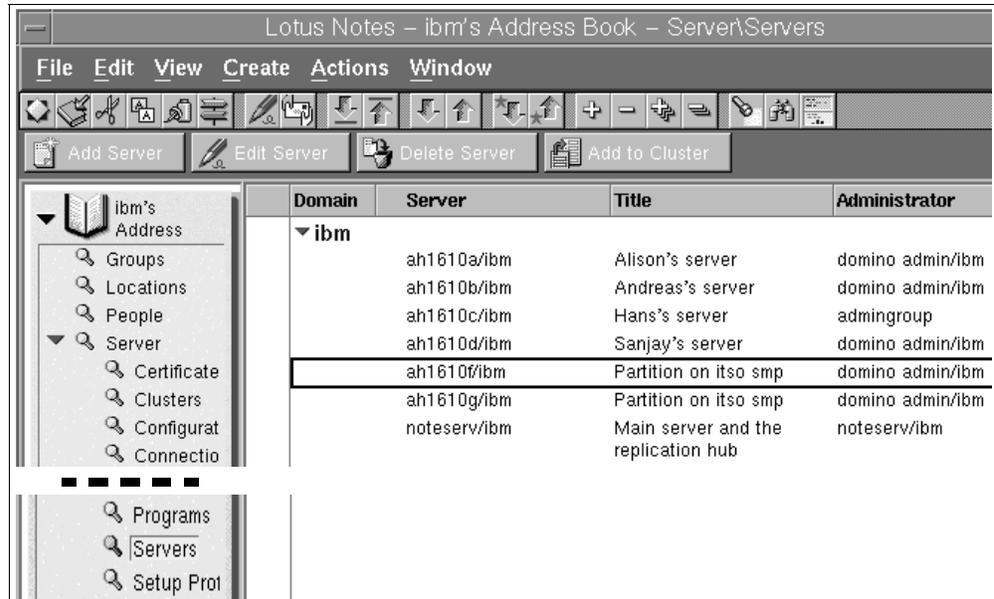


Figure 186. List of Server Documents

3. Select the server document that you want to define as the Lotus Domino Web server and click on **Edit Server**.
4. Click on **HTTP Server** section.
5. Modify each of the paragraphs in that section to accommodate your needs. There are 11 paragraphs you may wish to modify. For most entry fields, you will get context help by pointing with the mouse to the field name and keeping the left button pressed. A few of them, which we considered important, especially for Lotus Domino on AIX, are described below.

Note

It is strongly recommended to change settings in the server document within the NAB. Do not edit the files http.cnf and domino.cnf directly as you might be used to from earlier versions or other Web servers. After making changes, stop the http task and start it again.

9.1.2.1 Basics and Mapping

Figure 187 includes the most important settings on setting up a HTTP server. Normally, you can leave the hostname blank to use the TCP/IPs hostname. Our example shows the setting if there are multiple http Tasks on one system (for example, on a partitioned Lotus Domino server). To prevent getting errors as specified in 15.12, "Errors at Startup of http Task" on page 426, you would enter a fully qualified hostname, as shown, and set **Bind to host name** to **Enabled**.

The DNS lookup should normally be disabled, because performance of server degrades when looking up the DNS name for each connecting client.

The number active threads value could be increased if you have a powerful SMP (Symmetric Multi-Processing) system and heavy HTTP traffic. It is basically a tuning parameter, telling how many threads are available for answering requests.

The Mapping section defines the directories for keeping static HTML files, icons, and CGI programs, as well as the Home URL. HTML directory, Icon directory and CGI directory are relative to the server's data directory. You might want to enter fully qualified paths if you would like a different location. CGI URL path and Icon URL path refer to URLs, not to file systems.

If Home URL is specified, someone entering `http://ah1610f` in their browser would get this Home URL. Adding `/?Open` to this URL gives the inventory of all databases available on the server contacted. This is equivalent to the File -> Database -> Open in Lotus Notes.

If you would like to open a certain database by default, you could enter (readmes.nsf is used as an example) `/readmes.nsf?OpenDatabase` instead.

Hint

Specifying a URL that begins with a / (slash) will cause Lotus Domino to return the information in that URL directly to the browser. The browser will still display `http://ah1610f/` as the URL. Modify the field **Home URL** to just `?Open` and the browser will change the URL shown in its location field.

If you would like to start with a static HTML file, you must leave **Home URL** blank and enter the filename into the field **Default home page**.

Basics		Mapping	
Host name:	ah1610f.itsc.austin.ibm.com	Home URL:	/?Open
Bind to host name:	Enabled	HTML directory:	domino\html
DNS lookup:	Disabled	Icon directory:	domino\icons
Default home page:	default.htm	Icon URL path:	/icons
Allow HTTP clients to browse databases:	<input checked="" type="radio"/> Yes <input type="radio"/> No	CGI directory:	domino\cgi-bin
Maximum requests over a single connection:	5	CGI URL path:	/cgi-bin
Number active threads:	40		
NOTE: The following parameter is no longer used in Domino 4.6. You should use it only for server running versions prior to 4.6.			
Minimum active threads:	20		

Figure 187. HTTP Settings: Basics and Mapping

9.1.2.2 Cache Settings

You can specify certain settings for disk cache and memory cache as shown in Figure 188. The settings for disk cache are mostly self-explanatory and can be adjusted as required. Garbage collection runs after the specified interval or when the Maximum cache size is reached and cleans the cache with a least frequently used algorithm.

The meaning of the memory cache settings cannot be retrieved by the context help in the server document; so here is a short description. You might also want to take a look at the `helppadm.nsf` installed with the server documentation on your system.

Maximum cached commands

Lotus Domino must convert some HTTP server commands, such as `OpenDatabase` and `OpenView`, to HTML before the server can process the commands. This conversion process takes time. This field specifies how many commands you want to store in memory; so the next time a user issues the server command, it is immediately available.

Maximum cached (database) designs

When a user opens a database, Lotus Domino must complete a procedure that maps the design element names to an identification number. This mapping procedure takes time. Use this field to specify how many elements you want to store in memory.

Maximum cached users

After a user successfully authenticates with a server, Lotus Domino stores in memory the user's name, password, and the list of groups to which the user belongs. Use this field to increase the number of users for whom Lotus Domino stores this information. You should clear the cache for a user periodically using the **Cached user expiration field** to force user to authenticate again.

Disk Cache for Images and Files		Memory Caches	
Cache directory:	domino\cache	Maximum cached commands:	128
Maximum cache size:	50 (MB)	Maximum cached designs:	128
Delete cache on shutdown:	Disabled	Maximum cached users:	64
Garbage collection:	Enabled	Cached user expiration interval:	120 seconds
Garbage collection interval:	60 minutes		

Figure 188. HTTP Settings: Cache

9.1.2.3 Logging Settings

There are couple of logging options you may want to set on the server. The fields Access log and Error log are not longer used since Lotus Domino 4.6. As there is nothing special for AIX, but most definitions are related to the question of how to administer and control a Web server, there are no details provided here. You might want to log on to a Lotus Domino database instead of to flat files. If you do, you should enable `Domlog.nsf`. Keep in mind that the log database has to have that name (`domlog.nsf`).

Enable Logging To:		Log File Settings	
Log files:	Disabled	Access log format:	Common
Domlog.nsf:	Disabled	Time format:	LocalTime
Log File Names		Exclude From Logging	
Directory for log files:		URLs:	
Access log:	access-log	Methods:	
Agent log:	agent-log	MIME types:	
Referer log:	referer-log	User agents:	
Error log:	error-log	Return codes:	
CGI error log:	cgi-error-log	Hosts and domains:	

Figure 189. HTTP Settings: Logging

9.1.2.4 Timeouts, Character Set, and Conversion/Display Settings

These settings are well explained within the contextual help of the server document. They may be adjusted to suit your needs.

Timeouts		Character Set Mapping	
Input timeout:	2 minutes	Default character set group:	Western
Output timeout:	20 minutes	Western:	Latin 1 (ISO-8859-1)
CGI timeout:	5 minutes		
Idle thread timeout:	0 minutes		
Conversion/Display			
Image conversion format:	GIF		
Interlaced rendering:	Enabled		
Default lines per view page:	30		
Maximum lines per view page:	1000		
Default search results limit:	250		
Maximum search results limit:	1000		

Figure 190. HTTP Settings: Timeouts, Character Set, and Conversion/Display

Input Timeout

defines the time a client can take to send requests to the server after connecting.

Output Timeout

defines the time the server can take to send output to clients.

CGI Timeout

defines the time a CGI program may take to finish. After the specified time, the server sends a warning message to the program and terminates it after an additional five minutes.

Image conversion format:

GIF and JPEG are available.

Interlaced Rendering

describes the way an image is presented on loading.

Default lines per view page

defines the number of lines the Lotus Domino server displays for a notes view by default.

Maximum lines per view page

limits the lines per notes view displayed by the server.

Maximum search results limit

limits the results returned after a search.

Default Character set group

defines the character set used to display text to browsers; depending on the group set, you may have a additional choice for a special character set.

9.1.3 Specify Internet Port and Security Settings for the Web Server

The Lotus Domino Web Server allows you to open your Lotus Notes system to Web users, while still protecting the information with a powerful array of security features.

There are a couple of options to restrict or grant access to the HTTP services provided by the Lotus Domino server. Some of the security features you might consider for Web users are:

- Registration of Web users in the Public Address Book in addition to Lotus Notes clients.
- Decide how to handle anonymous users.
- Adding optional encryption to HTTP transactions by activating the Secure Sockets Layer (SSL) at the server.

Basically, you may enable or disable ports which are used for accessing the server, and you may choose between common authentication mechanisms. The place to do this is in the section Internet Port and Security Configuration in the server's document in the Public NAB (Name and Address Book). This chapter briefly describes the setup of these options.

For an overview of SSL, see Chapter 8, "Security and Lotus Domino" on page 189. For an example on how to test SSL, see 9.1.7, "Sample SSL Setup Session" on page 231. For a discussion on how to restrict access to Web users based on Lotus Domino security features, see 9.1.6, "Restricting Access to the Lotus Domino Web Server" on page 230.

9.1.3.1 SSL Settings

As you may see in Figure 191, you have to provide a SSL key file, and to make a decision whether to accept expired SSL certificates or not. Take a look at the information in parentheses for the SSL protocol version. The key file has to be created as described in the Lotus Domino documentation. For testing purposes, we created a SSL key file `selfcert.kyr` by using the Server Certificate Administration database `certsrv.nsf` on the server `ah1610f`. The default key file name is `keyfile.kyr`.

SSL settings	
SSL key file:	selfcert.kyr
SSL protocol version (for use with all protocols except HTTP):	Negotiated
Accept expired SSL certificates:	Yes

Figure 191. SSL Settings in Server Document

9.1.3.2 Internet Port Configuration

This section defines which ports are used for pure TCP/IP connections and SSL-enabled connections. You may decide here whether anonymous connections and password authorized connections are allowed. Disabling anonymous users forces everybody who connects to this server to present a valid user name and http password. Disabling password authorized access would prevent access for every database, which can not be read by default. For the port numbers, well-known ports are specified in the server document by default. You would not change that without a specific requirement.

Remember to restart the http task after making changes in that section. A sample SSL setup session is shown in 9.1.7, "Sample SSL Setup Session" on page 231. That example uses the parameters shown in Figure 191 and Figure 192.

Web (HTTP/HTTPS)	
TCP/IP port number:	80
TCP/IP port status:	Enabled
Authentication options:	
Name & password:	Yes
Anonymous:	Yes
SSL port number:	443
SSL port status:	Enabled
Authentication options:	
Client certificate:	No
Name & password:	Yes
Anonymous:	Yes

Figure 192. Internet Port Configuration for HTTP in Server Document

9.1.4 Starting and Stopping the Lotus Domino Web Server

There are two ways to start the Lotus Domino Web server:

- To start it manually, enter the command `load http` at the Lotus Domino server console.
- To start it automatically at server start-up, modify the `ServerTasks` variable in the `notes.ini` file adding the keyword value of `http`.

Note

If you modify the notes.ini file while the Lotus Notes Server is running, you must shut down the server and restart it for your changes to take effect. Also if you are changing settings in the HTTP Server section as described above, you have to restart your http Task.

To get statistics for the Lotus Domino server, enter the commands `show tasks` and `show domino` at the servers console, `show stat net` gives network related statistics. Below are a few examples of what you would see:

```
> sh stat net
NET.Log.ahl610f/ibm.UnwrittenEntries = 2
NET.TCPIP.BytesReceived = 7,671,136
NET.TCPIP.BytesSent = 3,784,090
NET.TCPIP.Sessions.Established.Incoming = 120
NET.TCPIP.Sessions.Established.Outgoing = 10
NET.TCPIP.Sessions.Limit = 65535
NET.TCPIP.Sessions.LimitMax = 65535
NET.TCPIP.Sessions.LimitMin = 10
NET.TCPIP.Sessions.Peak = 4
NET.TCPIP.Sessions.Recycled = 0
NET.TCPIP.Sessions.Recycling = 0
```

The following screen shows an excerpt from `sh tasks`. Note the HTTP Web server.

```
> sh tasks
Lotus Domino Server (Release 4.6.1c (Intl) for UNIX) 29/07/98 17:56:27

Server name:          ahl610f/ibm - Partition on itso smp
Server directory:     /ahl610f/notesr4
Partition number:     2
Elapsed time:         1 day 02:31:19
Transactions/minute:  Last minute: 0; Last hour: 16; Peak: 872
Peak # of sessions:   2 at 28/07/98 19:11:27
Transactions:         17301
Shared mail:          Not enabled
Pending mail: 0       Dead mail: 0

      Task                Description

Database Server        Perform console commands
Database Server        Listen for connect requests on TCPIP
Database Server        Idle task
Database Server        Idle task
Database Server        Idle task
HTTP Web Server        Ready
Billing                Idle
.
.
.
```

The command `show domino` results to all settings for the http task which are currently set. Thereby, you can verify whether the settings in the NAB are active. You also get some access statistics. The next screen shows only a small excerpt to provide an idea of the information available.

```

> sh stat domino
Domino.BuildName = Release 4.6.1c (Intl)
Domino.BuildNumber = Release 4.6.1c (Intl)
Domino.BuildPlatform = AIX
Domino.BuildVersion = Lotus-Domino Release 4.6.1c (Intl)
Domino.Cache.Command.Count = 0
...
Domino.Cache.User.MaxSize = 64
...
Domino.Config.ActiveThreads.Max = 40
...
Domino.Config.Cache.Size.Max = 50
Domino.Config.Directory.CGI = /ah1610f/notesr4/domino/cgi-bin
Domino.Config.Directory.HTML = /ah1610f/notesr4/domino/html
...
Domino.Config.WelcomePage = default.htm
Domino.Requests.Per1Day.Peak = 2
Domino.Requests.Per1Day.PeakTime = 07/29/98 15:56:00
Domino.Requests.Per1Day.Total = 2
Domino.Requests.Per1Hour.Peak = 2
Domino.Requests.Per1Hour.PeakTime = 07/29/98 15:51:00
Domino.Requests.Per1Hour.Total = 0
Domino.Requests.Per1Minute.Peak = 2
Domino.Requests.Per1Minute.PeakTime = 07/29/98 15:51:00
Domino.Requests.Per1Minute.Total = 0
Domino.Requests.Per5Minute.Peak = 2
Domino.Requests.Per5Minute.PeakTime = 07/29/98 15:51:00
Domino.Requests.Per5Minute.Total = 0
Domino.Requests.Total = 2
Domino.StartTime = 07/29/98 15:50:55
Domino.Threads.Active.Peak = 1
Domino.Threads.Peak.Time = 07/29/98 15:50:56
Domino.Threads.Peak.Total = 40
Domino.Threads.Total = 40

```

9.1.5 Accessing the Lotus Domino Web Server from a Browser

After you've completed installation, specified your configuration settings, and started Lotus Domino, you should access the Lotus Domino Web server using a Web browser to verify that the installation procedure was successful.

1. Make sure the Lotus Domino server is up and running, and the http task is active.
2. In the Web browser's location box, enter the host name you specified in the server record. For example to access our Lotus Domino Web server ah1610f you would enter `http://ah1610f.itsc.austin.ibm.com`.
3. The result should look similar to the next figure, if you did not change the Home URL. (`http://ah1610f.itsc.austin.ibm.com` results in `http://ah1610f.itsc.austin.ibm.com/?Open` and displays the selection of all databases on the server; we specified only `?Open` as the Home URL to see browsers location field change.)
4. If you attempt to access a database from a Web browser for which the default access is No Access (for example, your mail file) you will be prompted for a user ID and password to authenticate with the Lotus Domino server.

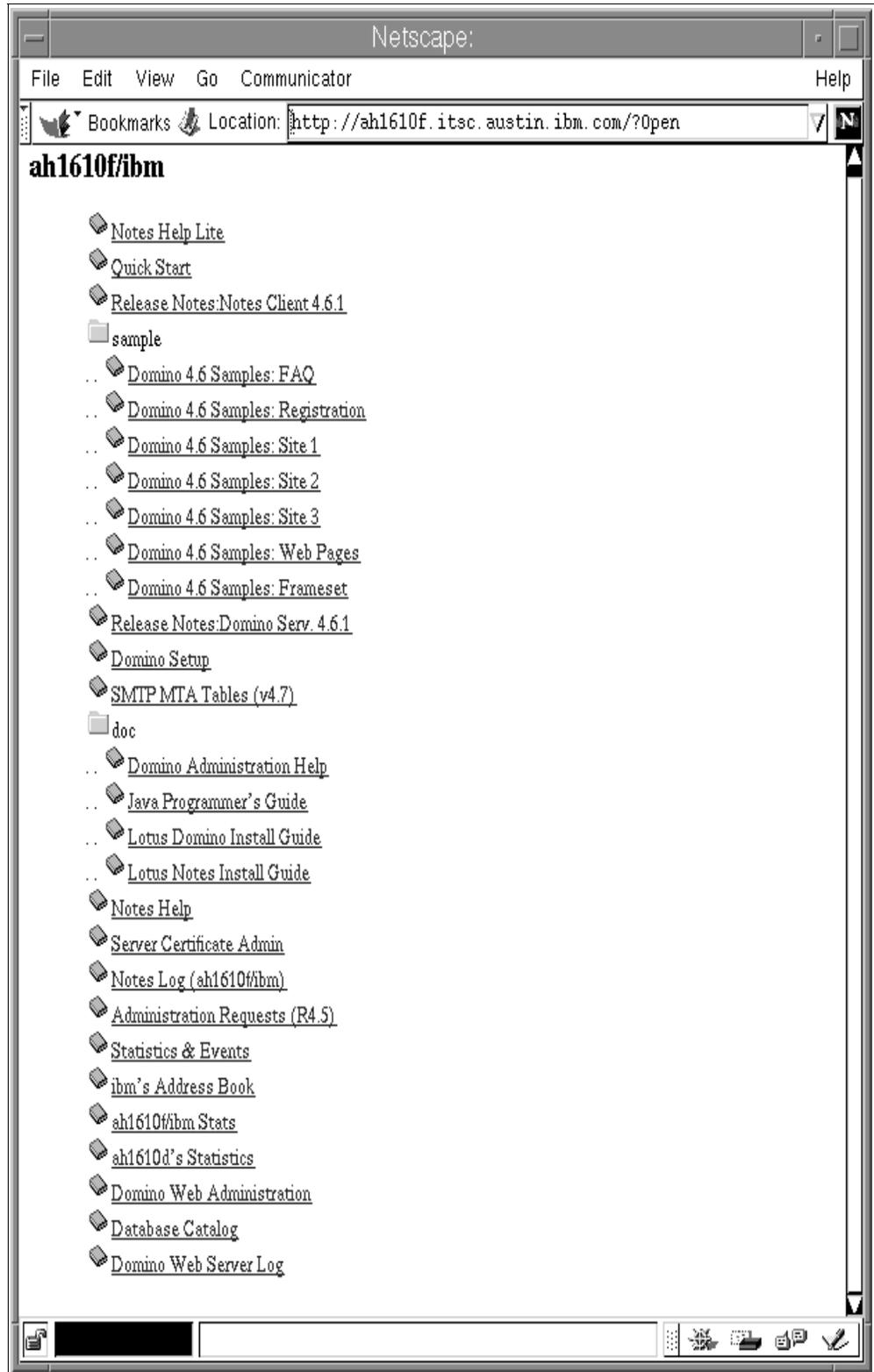


Figure 193. Sample Web Browser Connection to a Lotus Domino Server

9.1.6 Restricting Access to the Lotus Domino Web Server

You may have wondered while playing around with the Web browser, as shown in Figure 193 on page 229, that you can read every database. That happens because the Internet Port Configuration section in 9.1.3.2, “Internet Port Configuration” on page 225 stated under Authentication options: Anonymous: Yes. Based on that you have two possibilities:

1. For each database where you do not want read access for an anonymous Web user, you have to change the ACL as shown in the example below:



Figure 194. ACL with User Anonymous

2. If you want to generally prevent anonymous users from accessing your Web server, but allow authorized users to connect to the server, you must set **Anonymous to No** as shown below in the server document in the NAB. But remember: This setting needs a restart of the http task to be enforced. In general, grant anonymous users **Reader** access for an information database or **Author** access for an interactive database, unless there is a specific security concern. Any Web users who access a database are classified as anonymous when they aren't prompted for a name and password.

For SSL, you would have to disable anonymous access in the same way as for pure TCP/IP. This enables you to specify your security settings in greater detail.

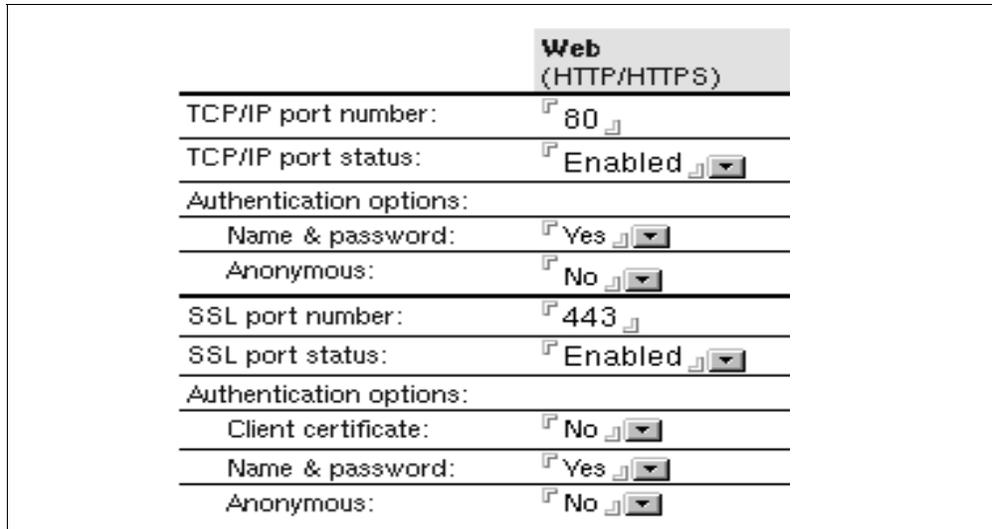


Figure 195. Disabling Anonymous Users from Accessing the Server.

In either case, after disabling anonymous access, a user connecting with a browser to your Web server would get a prompt like this, asking the user for authorization:

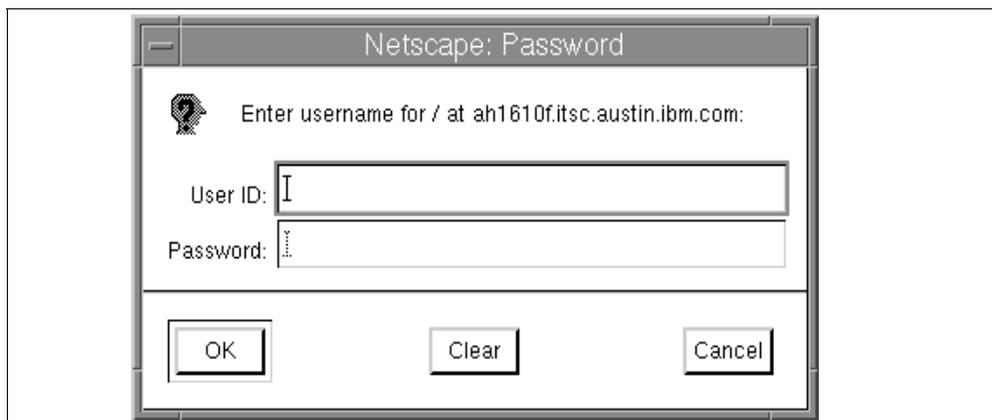


Figure 196. Disabling Anonymous Users from Accessing the Server.

To access the server in this case, you need either an Internet password for an already registered Lotus Notes user in the user's document in the Public Address Book, or you could register an Internet only user with an Internet password; these users would have a document in the NAB, too.

9.1.7 Sample SSL Setup Session

The next screen shots provide an example how the certificate for testing purposes can be created and how the secure connection from a Web browser may be enabled.

Note

Only the most important screens have been captured for this redbook. If you should try to reproduce the steps, please take this into consideration. Missing screens are mentioned in the accompanying text.

1. First of all, start the administration Notes client on the server you want to create the test key file.
2. Open the **Server Certificate Admin** database in **local** mode. The database is automatically created during server setup (Figure 197).



Figure 197. Server Certificate Database

3. After closing the About document, click on the **Create Key Ring with Self-Certified Certificate** selection (Figure 198).



Figure 198. Create Key Ring Selection

4. Enter the required information. Be sure to write down the password and enter the fully qualified hostname. Also be sure to enter the correct file name.

Create Key Ring with Self-Certified Certificate	
<p>This form lets you easily create a key ring with a self-certified certificate for testing purposes. The resulting key ring is ready for use with SSL, but is not appropriate for a production internet or intranet site due to the certificate being signed by yourself instead of a Certificate Authority.</p>	
Key Ring Information	Quick Help
Key Ring File Name <input type="text" value="selfcert.kyr"/> Key Ring Password <input type="text" value="ah1610f"/>	Specify the name and password for the key ring file. Note: You'll be referring to the key ring information you enter here if you install additional Trusted Root certificates into the key ring later.
Distinguished Name	
Common Name <input type="text" value="ah1610f.itsc.austin.ibm.com"/> Organization <input type="text" value="IBM"/> Organizational Unit <input type="text" value=""/> (optional) City or Locality <input type="text" value=""/> (optional) State or Province <input type="text" value="Texas"/> (no abbreviations) Country <input type="text" value="US"/> (two character country code)	The Distinguished Name is the information about your site that will appear in any certificates you create. Note: Make sure the Common Name matches the URL of your site. Some browsers check the Common Name and the site URL, and do not allow a connection if they don't match.
<input type="button" value="Create Key Ring with Self-Certified Certificate"/>	

Figure 199. Self-Certified Certificate

5. Click on the **Create Key Ring with Self-Certified Certificate** button (see Figure 199).
6. Follow the directions on the next screens, mainly confirmation of what has happened.
7. Close the **Server Certificate Admin** database.
8. Be sure the server document in the public NAB contains the entries of Figure 191 on page 225 and Figure 192 on page 226 and restart the `http` Task.
9. Open a Web browser on a system which is able to access the Lotus Domino Server over TCP/IP; the browser must support SSL by design.
10. Connect through `https://ah1610f.itsc.austin.ibm.com:443` to the Lotus Domino server.
11. You will get the following notification, if you work with Netscape Communicator 4.04:



Figure 200. New Site Certificate Screen

12. Accept by clicking **NEXT>** as long as required and follow your browser's instructions to accept the certificate.
13. If everything went well, you should get the Home URL of your Lotus Domino Server, but now in secure mode. The encryption symbol in the lower left corner should have changed. In our example the lock symbol is closed now (see Figure 201 on page 235).

For a production environment on the Internet, you would have to get a certificate from a Certificate Authority; see 8.6, "Secure Socket Layer (SSL)" on page 201, for more information.

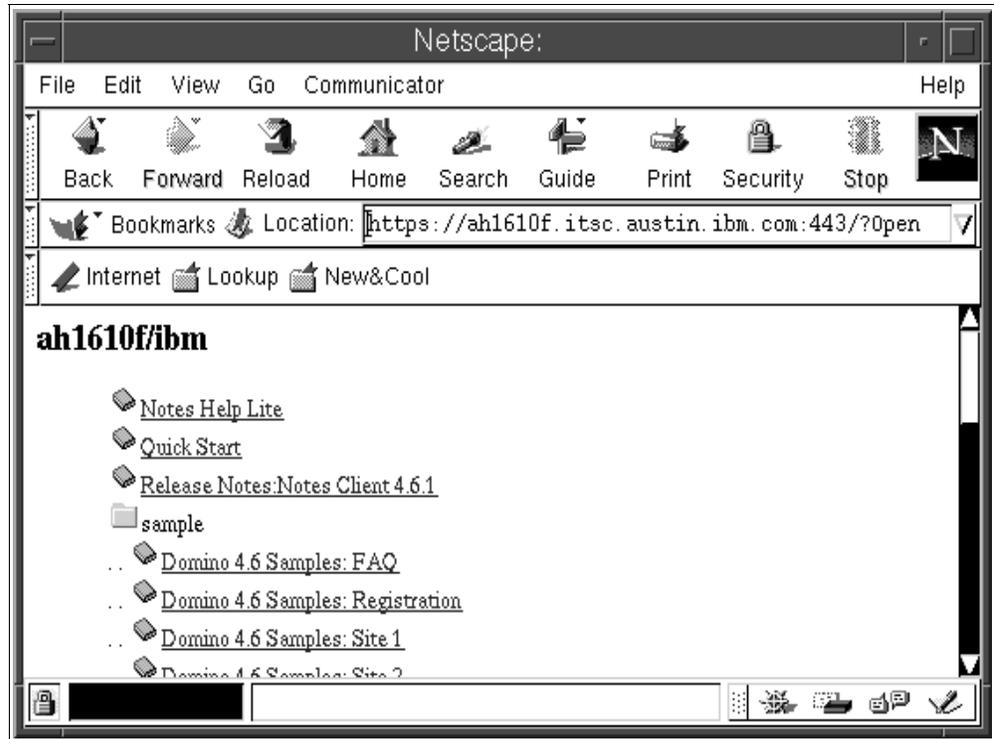


Figure 201. SSL Secured Browser

9.2 Lotus Domino Virtual Server

The previous section focused on how to do the basic setup for a single HTTP server. By doing that, you would have to set up either a separate system for each Lotus Domino server, or you could place several Lotus Domino partitions on one system, each having its own server name and IP address. For more information how to set up partitions, refer to 11.3, "Partitioned Servers" on page 337.

Note

This chapter describes how to do the basic setup for an Lotus Domino Virtual Server (sometimes it is also called multihoming, as one Web server provides services for different sites), but it will not describe the process of designing a complete Website. This would be beyond the scope of this redbook. You might want to refer to another redbook, SG24-2183, "Developing Web Applications Using Lotus Notes Designer for Lotus Domino 4.6" for information on designing a Website and web applications.

However, before you proceed to read about the details, you should keep a few points in mind:

- You can configure each site in Lotus Domino with its own IP address, Home URL, Default home page, and HTML, CGI, and icons directories, but the Lotus Domino data directory structure is the same for all virtual servers. To configure the virtual server, use the Lotus Domino Configuration database (`domcfg.nsf`).

- You cannot use Secure Sockets Layer (SSL) if you are setting up multiple sites on one server. You can require users to enter their names and passwords using basic password authentication over TCP/IP.
- Before configuring the virtual server settings in Lotus Domino, you must set up the network connections for each virtual server. Each virtual server must have its own separate, permanent numeric IP address. It is not sufficient to have multiple names mapped to the same IP address.

In our example, we used one RS/6000, assigned three TCP/IP addresses to its network interface, and configured a virtual server, as described below.

9.2.1 Network Setup

Assume the basic IP setup has already be done, using the network interface `tr0`. Now you have to add additional IP addresses to be used by your virtual server. That has to be done by `ifconfig` commands, which may be placed into the file `/etc/rc.net` to be automatically activated on system start-up. The screen shot below refers to this setup. The network interface `tr0` now has three IP addresses.

```
# hostname
itsosmp
# host itsosmp
itsosmp.itsc.austin.ibm.com is 9.3.1.27
#/usr/sbin/ifconfig tr0 inet 9.3.1.71 netmask 255.255.255.0 alias
#/usr/sbin/ifconfig tr0 inet 9.3.1.85 netmask 255.255.255.0 alias
# netstat -i
Name Mtu Network Address Ipkts Ierrs Opkts Oerrs Coll
lo0 16896 link#1 4049 0 4049 0 0
lo0 16896 127 localhost 4049 0 4049 0 0
lo0 16896 ::1 4049 0 4049 0 0
tr0 1500 link#2 10.0.5a.c9.7c.f1 468252 0 315434 0 0
tr0 1500 9.3.1 itsosmp.itsc.aust 468252 0 315434 0 0
tr0 1500 9.3.1 ah1610f.itsc.aust 468252 0 315434 0 0
tr0 1500 9.3.1 ah1610g.itsc.aust 468252 0 315434 0 0
#
```

Figure 202. Network Setup

You may now proceed with the Lotus Domino configuration.

9.2.2 Configuring `domcfg.nsf`

Assume the Lotus Domino server `ah1610f/ibm` has already been setup; as described earlier, it already acts as a HTTP server, and you would like to extend its capabilities to a be a virtual server:

1. First, change the settings in the server's document in the NAB to comply to the restrictions for a virtual server:
 - HTTP: Clear the hostname and disable binding (see Figure 203 on page 237).

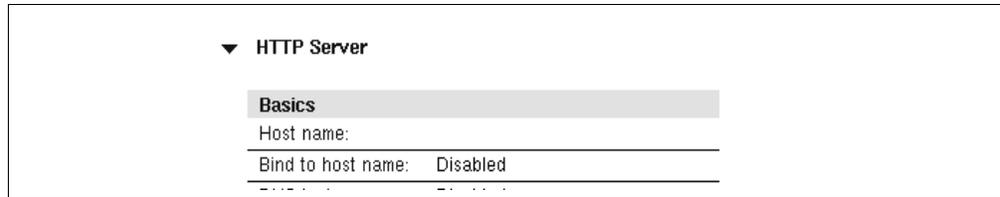


Figure 203. HTTP Server Settings for Virtual Server

- Internet Port and Security: disable SSL and allow anonymous browsers for access (it eases testing, and you normally would allow any browser to connect to your site).

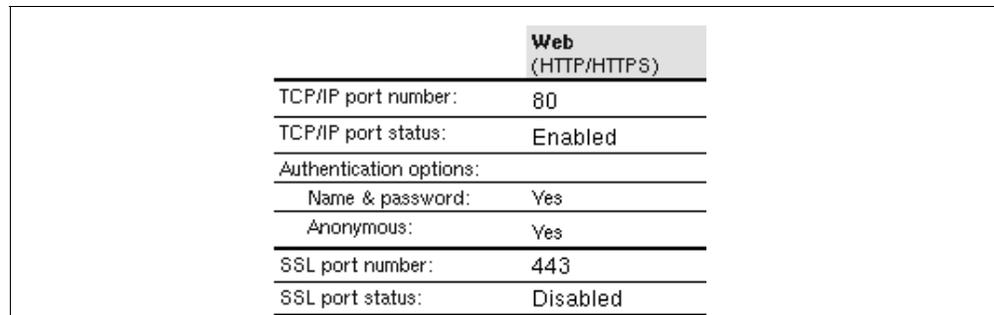


Figure 204. Internet Port and Security Settings for Virtual Server

2. Open the admin notes client on the Lotus Domino server and create the database `domcfg.nsf` locally, using the template `domcfg.ntf`. Later, you can open it from another authorized client on the server, but at creation time, it should be done locally. We named the database Virtual Server (see Figure 205).

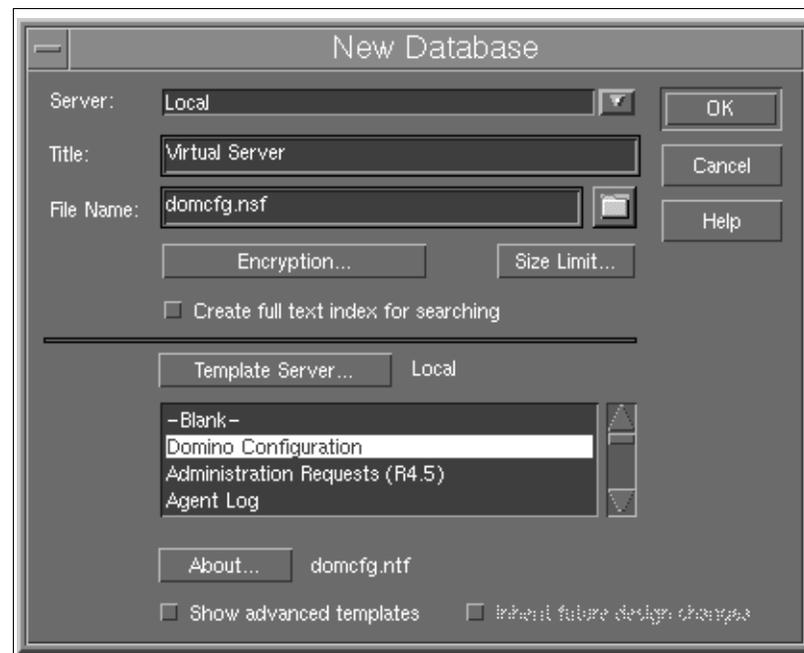


Figure 205. Creation of Database `domcfg.nsf`

3. Open the database from your Lotus Notes client



Figure 206. Virtual Server Administration Database

4. Select **Create->Virtual Server** from the action bar.

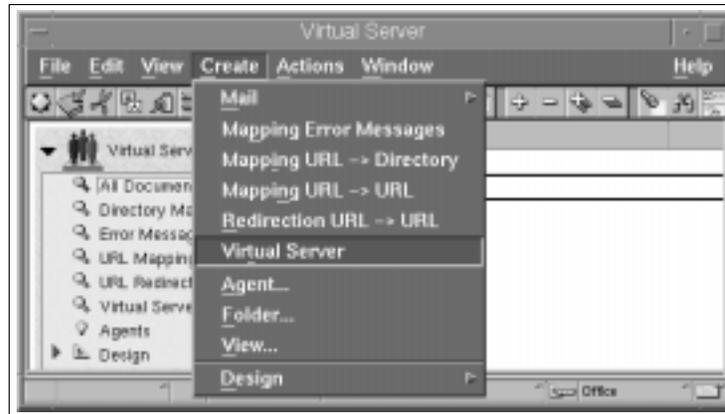


Figure 207. Creating Documents in the Virtual Server Database

5. Edit the document as required. Our example uses one of the three site database samples provided by Lotus, which are automatically installed in the subdirectory sample in the servers data directory.

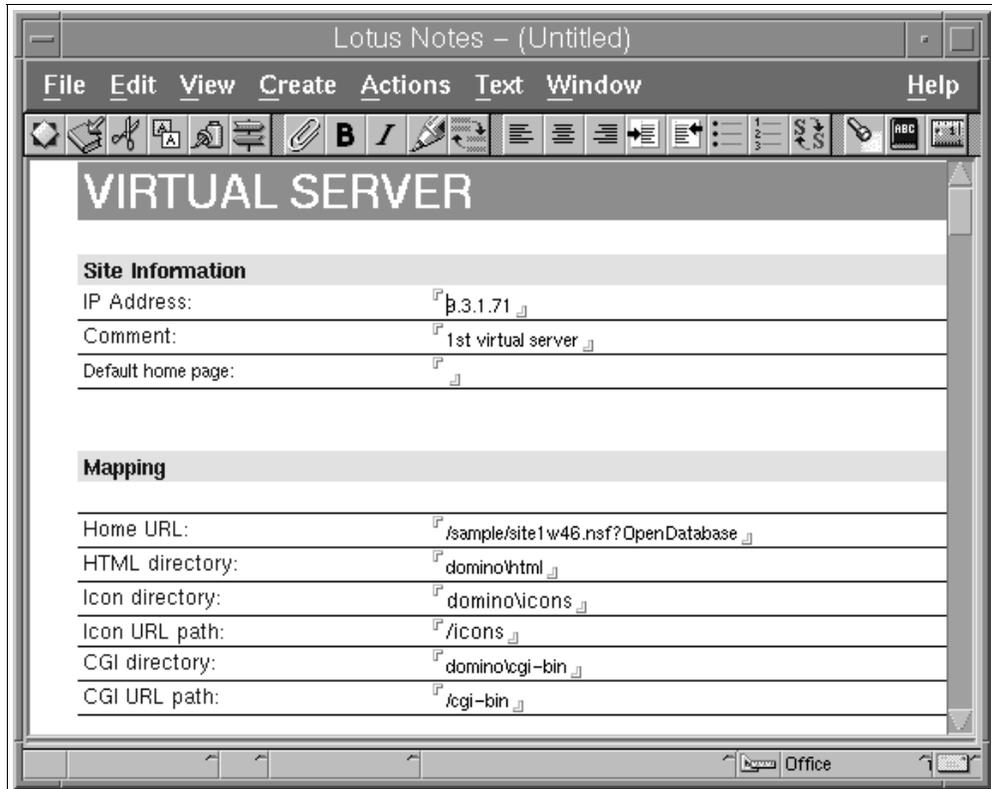


Figure 208. Virtual Server Definition

6. Proceed with all the sites you wish to set up. We set up three sites, using the databases `sample/site1v46.nsf`, `sample/site2v46.nsf`, and `sample/site3v46.nsf`; each database has been mapped to one of the three IP addresses. If you would like to, you may also provide Mapping directories and URLs for each site within the virtual server document.
7. In the same way, you can also create documents for mapping error messages, mapping a URL to a directory, mapping a URL to a URL, or redirecting a URL to another URL (see Figure 207 on page 238). Figure 209 shows an example for an URL Redirection. If someone browses to `http://9.3.1.71/ibm`, they will be redirected to `http://www.rs6000.ibm.com`.

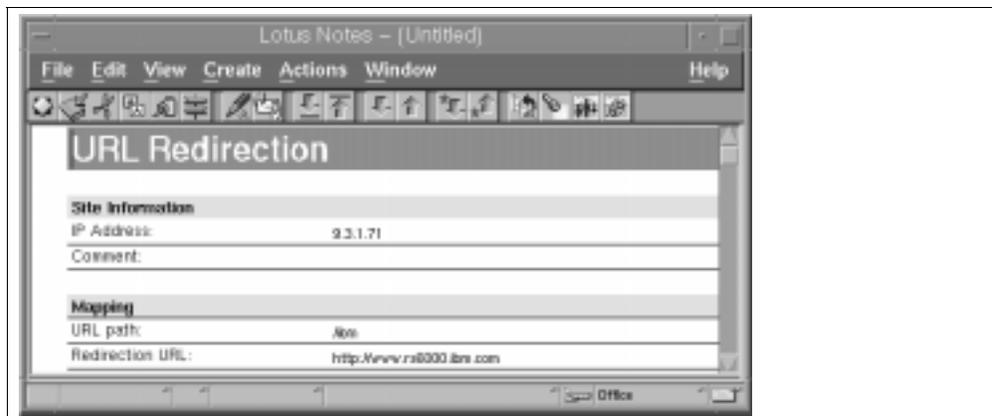


Figure 209. Redirecting a URL on a Virtual Server

8. The next two figures show the resulting Virtual Server view and URL Redirections view, defining our small virtual server.

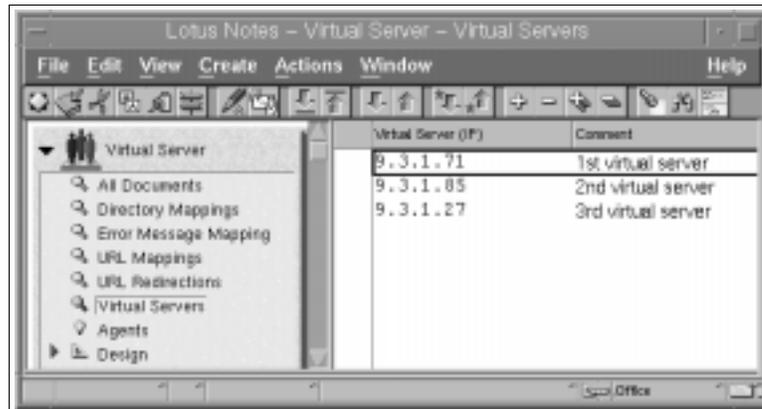


Figure 210. Resulting Virtual Server View

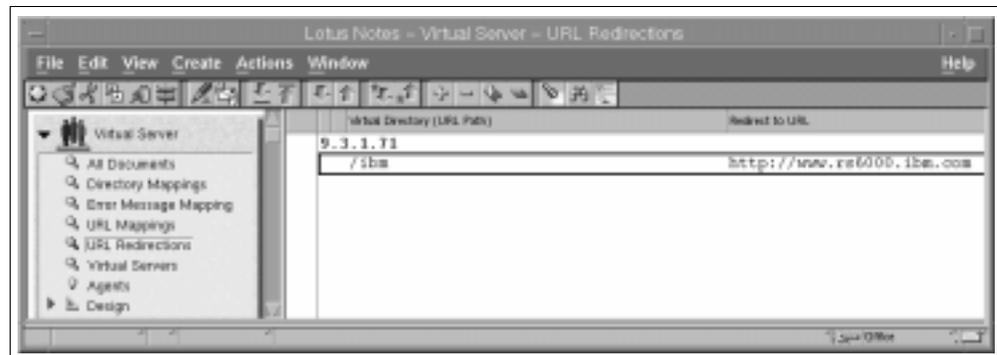


Figure 211. Resulting URL Redirections View

9. After finishing the configuration, stop your http Task and restart it.
10. Connect with a Web browser to the virtual servers you have set up (in our example, itsosmp, ah1610f, and ah1610g, as shown in Figure 202 on page 236). You should get results shown in Figure 212, Figure 213, and Figure 214:

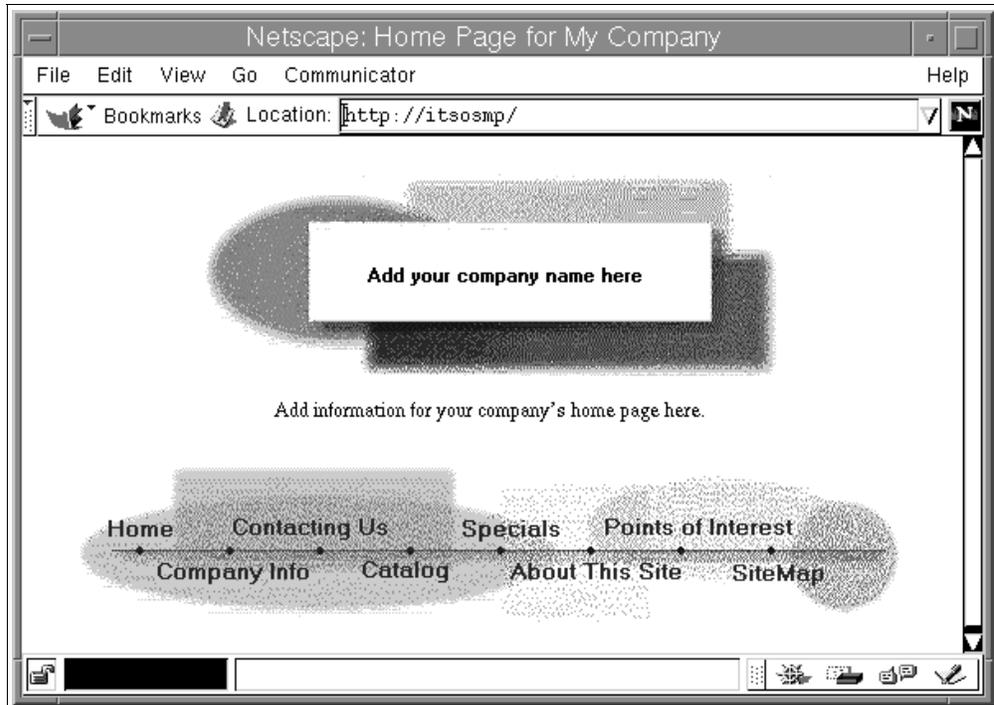


Figure 212. Result for the First Virtual Server



Figure 213. Result for the Second Virtual Server

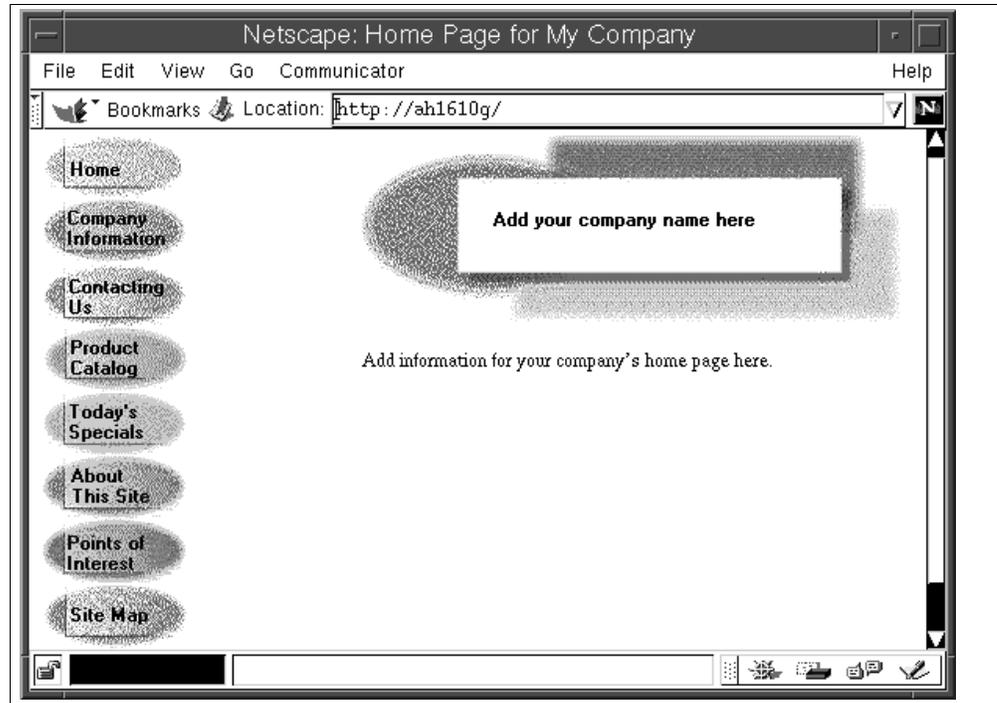


Figure 214. Result for the Third Virtual Server

9.3 Web Navigator

The Web Navigator is a feature of Lotus Notes Release 4.x, which allows you to access information on the Internet. The Web Navigator integrates the components of a Web browser with the capabilities of Lotus Notes. It allows two different ways to comfortably access and explore the exciting world of the Internet.

- Personal Web Navigator - you can access the Web in a personal way through a local Web Navigator database on your Notes Workstation that is connected to the Internet.
- Server Web Navigator - you can access the Web in a collaborative way through the central Web Navigator database that resides on the InterNotes server (a Lotus Notes Server connected to the Internet). See 9.4, "Server Web Navigator" on page 249, for more information.

9.3.1 Personal Web Navigator

The Personal Web Navigator provides you with easy access to information on the Internet right from your Notes Workstation, which is connected to the Internet. This database acts as a repository for Internet documents and files that have been retrieved by you. The Personal Web Navigator is your own personal database for surfing the Internet.

The Notes Workstation:

- Maintains either a direct (dial-modem or leased line) or proxy connection to the Internet.
- Runs the TCP/IP network protocol (this is a requirement).

- Stores the perweb45.ntf and perweb.nsf files; with Lotus Notes 4.6.1, the Personal Web Navigator database is automatically created upon client setup.

9.3.2 Setting Up the Personal Web Navigator

You can set up a Web Navigator database on your local Notes Workstation so that all Web pages are retrieved and stored in that local database. To set up the Personal Web Navigator:

1. Create a new Location document in your Personal Address Book. Select **File -> Mobile -> Locations -> Add Location**; you can also edit an existing location document and proceed with steps 4 - 7 below.
2. Select the **Location type**, for example, **Local Area Network**.
3. Give the location document a name by making an entry in the **Location name** field, for example, *Office (local navigator)*.
4. From the Retrieve/open pages field, select **from Notes workstation**. This specifies that retrievals will be performed by the Notes Workstation and Web pages will be stored in the Personal Web Navigator database; unfortunately, frames are not yet supported.

LOCATION: office (Network)	
Basics	
Location type: <input type="text" value="Local Area Network"/>	Prompt for time/date/phone: <input type="text" value="No"/>
Location name: <input type="text" value="Office (Network)"/>	Web proxy: <input type="text" value="http://proxy.austin.ibm.com:80"/> 
Internet Browser	
Internet browser: <input type="text" value="Notes Web Navigator"/>	Servers
Browse: <input type="text" value="direct from Notes workstation"/>	Home/mail server: <input type="text" value="noteserv/ibm"/>
	Passthru server: <input type="text" value=""/>
Ports	
Ports to use: <input checked="" type="checkbox"/> TCPIP	

Figure 215. Settings for Location: Office (Local Navigator)

5. If a proxy is used, either enter your proxy settings, as shown above, or click the button next to the Web proxy field to enter your specific proxy settings (see Figure 216):

- **HTTP:**

Enter the name, IP address of the proxy, and the port to access HTTP pages. Select the **Use same proxy for Internet protocols** field if you want Lotus Notes to use the same HTTP proxy for FTP, Gopher, and SSL Security.

- **FTP:**

Enter the name or IP address of the proxy and the port to access FTP pages.

- **Gopher:**

Enter the name or IP address of the proxy and the port to go through for Gopher pages through the proxy.

- **SSL Security**

Enter the name or IP address of the proxy and the port you want to go through for pages on Internet servers using SSL.

- **SOCKS**

Enter the name or IP address of the proxy and the port.

- **Notes RPC**

This field is used for all Notes-to-Notes communication over the Internet, for example, if you want to connect to a Lotus Notes Server over the Internet.

- **No proxy for these hosts or domains**

You can bypass the proxy to access certain domains on the Internet (or to access your internal intranet domain). Enter the names of the hosts and domains you want to access without going through the proxy. (You cannot use the IP address in this field; you need to use the name.)

Separate multiple entries with commas or carriage returns. You can use wildcard (*) characters, for example, *.lotus.com or www.*.com.

If you enter multiple proxies, the SOCKS setting has a higher priority than HTTP, and Lotus Notes RPC (Remote Procedure Call) has a higher priority than SOCKS.



Figure 216. Proxy Settings for Personal Web Navigator

6. Save your location document and exit.
7. Make sure your location document is active.
8. Choose **File -> Open URL** from the action bar of your Lotus Notes Workspace and enter the URL for a Web page, for example: `http://www.ibm.com/`.

Lotus Notes opens the browser window of the Personal Web Navigator database and retrieves the page from the proxy; every retrieved page is also stored in the Personal Web Navigator database itself (perweb.nsf) on your client for later off-line browsing. Unfortunately, the built in browser does not support frames nor Java Script.

Hint: To open the database to the view level from that point, click on the **View Go Up Level** Smarticon (you may need to exit Edit Mode to see this Smarticon by pressing **Ctrl-E**).



Figure 217. Smarticon: Go Up Level

9. If you clicked on the Smarticon mentioned above, or if you open the Personal Web Navigator database manually, you will see a window like the one shown in Figure 218.

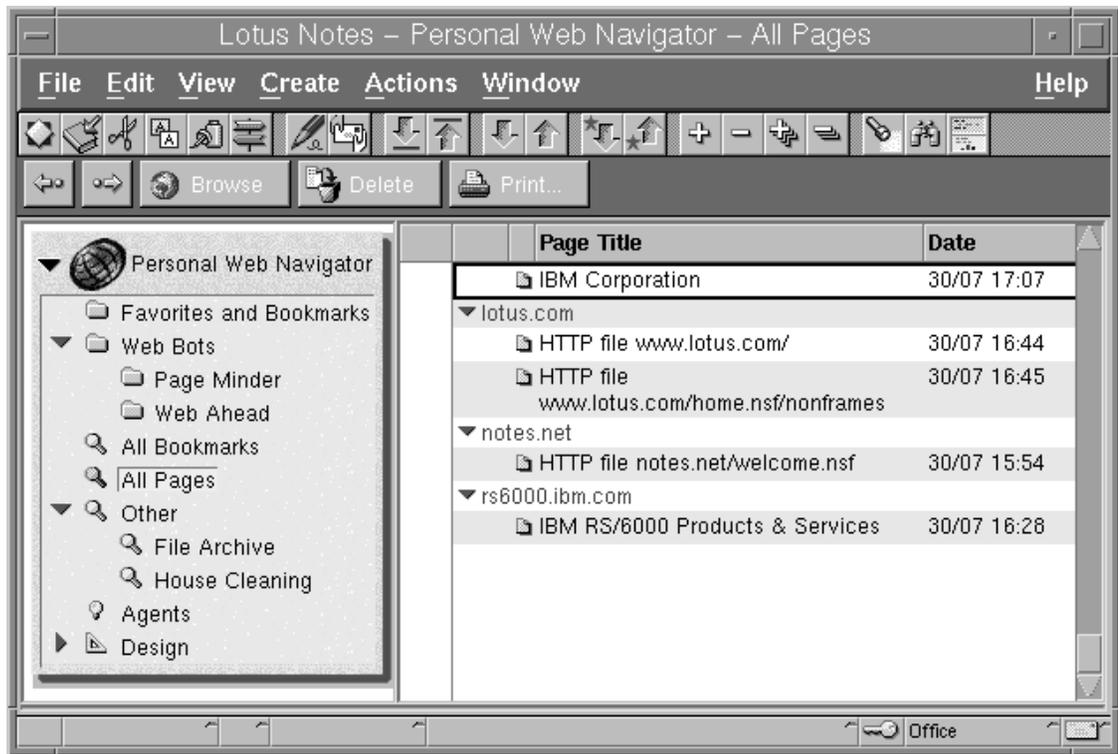


Figure 218. Personal Web Navigator Database View

Note

You could also choose to retrieve the Web pages, not from a Notes Workstation, but with another browser installed on your system (to be specified in the location document on the client). This would allow you to browse pages with frames, but the pages would not be stored in the Personal Web Navigator database, inhibiting all the features described below.

9.3.3 Web Ahead - Automatically Following Links on Web Pages

Web pages usually contain URLs that point to other Web pages. You can run a background agent called Web Ahead that retrieves all the Web pages specified by the URLs on a particular Web page and saves all the resulting Web pages in your database to read later. You can set the agent to retrieve the URLs several levels down from the page you specify.

Web Ahead only runs while your Notes workstation is running.

9.3.3.1 Enabling the Web Ahead Agent

To enable the Web Ahead agent (you only need to do this once):

1. Choose **File -> Tools -> User Preferences**. When the **Basics** section is selected, there will be an Advanced Options box shown. In the Advanced Options box, select **Enable scheduled local agents**.
2. Open the Personal Web Navigator database by double clicking on the **Personal Web Navigator** database icon.
3. Select **Actions -> Internet Options....**
4. In the Web Ahead agent preferences section, enter the number of levels of pages you want the agent to preload. You can select a value between 1 and 4, we selected 2.



Figure 219. Web Ahead Agent Preferences

5. Click on the **Enable Web Ahead** button (this button only appears if you have not yet enabled the agent in this database).
6. In the Choose Server To Run On dialog box, choose **Local** and click on **OK**.
7. Click on **OK** on the Enabled Background Agents dialog box.
8. Confirm the following messages by clicking **OK**.
9. Press **Esc** and select **Yes** to save your changes.
10. Restart your workstation.

9.3.3.2 Running the Web Ahead Agent

To run Web Ahead on a Web page:

1. Double click on the **Personal Web Navigator** database icon.

2. Select any Web page and drag it into the Web Ahead folder.

The Web Ahead agent runs immediately.

9.3.4 Managing Database Size (perweb.nsf)

To keep the size of your database under control, you can purge the database based on options you specify in the Internet Options document. To specify purge options:

1. Double click on the **Personal Web Navigator** database icon.
2. Select **Actions -> Internet Options....**
3. In the Database purge options section, specify one of these purge options:
 - **Reduce full pages to links if not read within:** Lotus Notes deletes the contents of the page after the specified number of days, but saves the URL so you can still see the page in the database views.
 - **Remove pages from database if not read in:** Lotus Notes deletes the entire page from the database if it has not been read within the number of days you specify.
 - **Disable:** Disables the purge options.

Database size options:

Remove pages from database if not read in: 15 days

Warn me when the database exceeds: 25 megabytes

Figure 220. Database Purge Options

4. Check **Warn me when the database exceeds** box and select a database size if you want Lotus Notes to warn you by displaying a message box when the database exceeds a certain size.
5. Press the **Enable Housekeeping** button.
6. Press **Esc** and select **Yes** to save your changes.

9.3.5 Using Page Minder to Keep Track of Changes to Web Pages

You can also run a background agent called Page Minder that closely watches a particular Web page and notifies you when the contents of that page change. Keep in mind that Page Minder only runs while your Notes Workstation is running.

9.3.5.1 Enabling the Page Minder Agent

To enable the Page Minder agent (you only need to do this once):

1. Choose **File -> Tools -> User Preferences** and select **Enable scheduled local agents** (if you have not done it before).
2. Open the Personal Web Navigator database icon by double clicking on the **Personal Web Navigator** database icon.
3. Select **Actions -> Internet Options....**
4. In the Page Minder agent preferences section, fill out these fields:

- **Search for updates every:** Choose how often you want the agent to check to see if the page contents have changed. You can choose Hour, 4 Hours, Day, or Week.
 - **When updates are found:** Specify how you want to be alerted that the page changed. Choose **Send me a summary** to send a message notifying you that the page has changed. Choose **Mail the actual page** to send the recently updated Web page.
 - **Send to:** Specify the name of the person to alert when the page content changes (as found in the Lotus Notes NAB).
5. Click on the **Enable Page Minder** button next to the agent. (Note that this button only appears if the agent is not already enabled.)
 6. In the Choose Server To Run On dialog box, choose **Local** and click on **OK**.

Figure 221. Page Minder Agent Preferences

7. Click on **OK** in the Enable Background Agents dialog box.
8. Press **Esc** and select **Yes** to save your changes.

9.3.5.2 Running the Page Minder Agent

To run Page Minder on a Web page:

1. Double click on the **Personal Web Navigator** database icon.
2. Select any Web page and drag it into the Page Minder folder.

The Page Minder agent runs based on the times you selected in the Internet Options document.

Note

You can run the Page Minder agent and Web Ahead agent on pages from authenticated servers where you are required to supply a user name and password before you can gain access to the page. Similarly, you can run the agent through an authenticated proxy server where you have to supply a user name and password to gain access to the Internet.

As long as you have successfully retrieved the page during your current Lotus Notes session, Notes stores your user name and password in a field on the Web page and pulls it from there when it runs the agent. For security purposes, if you run this agent on authenticated servers or through authenticated proxy servers, you should encrypt your database so that the field is not visible to others.

9.4 Server Web Navigator

The Server Web Navigator provides you with easy access to information on the Internet through a Lotus Notes Server (the InterNotes server) connected to the Internet. This database acts as a repository for Internet documents and files that have been retrieved by you or other users. You can also use this database as an easy entry point for exploring the Internet. The Server Web Navigator is a collaborative database where you and your coworkers can explore the Internet together.

The Server Web Navigator:

- Maintains either a direct or proxy connection to the Internet.
- Runs the TCP/IP network protocol.
- Runs the Web Navigator server task.
- Stores the template `pubweb45.ntf` and Navigator database `web.nsf` (you can change the file name of the Server Web Navigator database).

One advantage of using the database on the Lotus Notes Server is that only one computer, the InterNotes server, needs to be connected to the Internet to give multiple Lotus Notes users access to the Web. The Lotus Notes clients retrieve pages from the Server Web Navigator database by accessing this database, not the WWW. A Lotus Notes environment can have multiple InterNotes servers, each with its own separate database, so that users can explore the Web from several different databases.

9.4.1 Setting Up the Server Web Navigator

The following example guides you through the setup of the Server Web Navigator. Our host to provide the Server Web Navigator database is `ah1610c/ibm`. It will retrieve Web pages by using the proxy `proxy.austin.ibm.com`. All Lotus Notes users are registered on `server.noteserv/ibm`. Depending on your type of Internet connection, you may have to specify different settings. But the basic order of steps to conduct remains the same.

9.4.1.1 Creating the Server Web Navigator Database

At the Lotus Domino Server console, enter `load web`; that will automatically create the Server Web Navigator database on the first time. The output will look similar to this:

```
> load web
> 30/07/98 18:46:10      WEB(1): InterNotes(R) WEB Retriever starting for
'ah1610c/ibm'...
30/07/98 18:46:10      WEB(1): Creating InterNotes database 'web.nsf', using
template 'pubweb45.ntf'
30/07/98 18:46:22      WEB(1): Creating InterNotes Navigator administration
options for server 'CN=ah1610c/O=ibm'
```

This step has enabled server `ah1610c/ibm` to provide Server Web Navigator services.

9.4.1.2 Modifying the User Server's Entry in the Public NAB

If a user tries to access the Server Web Navigator, the Lotus Notes client will look up the server first in the user's NAB. If it does not find the information, it will

check the Public NAB of the user's mail server. Therefore, change the server document in NAB for the appropriate mail server (in our example, noteserv/ibm):

1. Open the **Public Name and Address Book** with admin rights.
2. Select **Server\Servers** to display the list of server documents.
3. Select the server document for noteserv/ibm and click on **Edit Server**.
4. Click on **Server Location Information** and enter the fully qualified name of the server where InterNotes is installed in the InterNotes server field (Figure 222).

Additional Info		Servers	
Local time zone:	<input type="text" value="Central Standard Time"/>	Mail server:	<input type="text" value="noteserv/ibm"/>
Daylight savings time:	<input type="text" value="Observed here"/>	Passthru server:	<input type="text" value=""/>
		InterNotes server:	<input type="text" value="ah1610c/ibm"/>

Figure 222. Servers

5. Press **Esc** and click on **Yes** to save your changes.

Now every user can access the Server Web Navigator without modifications in their own address book.

9.4.2 Connecting the Server Web Navigator to the WWW

In our example, we need to update the server document of our Server Web Navigator server to tell the server to use a proxy server for its page retrieval:

1. Edit the Server document in the public NAB (for ah1610c/ibm).
2. Click on **Proxy Configuration** and modify the settings as required:

Proxy Configuration	
Proxy Configuration	
HTTP proxy:	<input type="text" value="http://proxy.austin.ibm.com:80"/>
FTP proxy:	<input type="text" value="http://"/>
Gopher proxy:	<input type="text" value="http://"/>
SSL Security proxy:	<input type="text" value="http://"/>
Notes RPC proxy:	<input type="text" value="http://"/>
SOCKs proxy:	<input type="text" value=""/>
No proxy for these hosts and domains:	<input type="text" value=""/>

Figure 223. Proxy Configuration

9.4.2.1 (Re-)starting the Web Retrieval Task

This server task is required for the InterNotes Server Web Navigator so that pages on the Web can be retrieved and viewed. To start this task either enter: `load web` at the InterNotes server console or add it to the list of ServerTasks in the notes.ini file of the InterNotes server (this will start the task every time you start the Lotus Notes Server). Remember to restart it after changing configuration settings (`tell web quit, load web`). If you would like to modify the more advanced

settings of the Web Retrieval Task, you should read the next section, 9.4.3, “Specifying Web Retrieval Settings” on page 251.

9.4.3 Specifying Web Retrieval Settings

You could also specify additional settings related to the retrieval services the Server Web Navigator server should offer. To specify settings related to the Web retrieval process running on the Server Web Navigator server:

1. Double click on the **Public Name and Address Book** icon.
2. Select **Server\Servers** to display the list of server documents.
3. Select the server document of the server the Server Web Navigator runs on, and click on **Edit Server**. All users who have this server as their mail server will be able to gain access to the InterNotes server.
4. Click on the **Web Retriever Management** section to edit these settings.

Web Retriever Management		Internet Site Access Control	
Web Navigator database:	web.nsf	Allow access to these Internet sites:	*
Services:	HTTP, FTP, GOPHER	Deny access to these Internet sites:	
Concurrent retrievers:	25		
Retriever log level:	None		
Update cache:	Never		
SMTP Domain:			
		SSL	
		Accept SSL site certificates:	<input type="radio"/> Yes <input checked="" type="radio"/> No

Figure 224. Web Retriever Management

- **Web Navigator database:** Change this field if you want to rename the Server Web Navigator database file name.
- **Services:** Choose the Internet services that you will allow users to access. The Web Navigator supports HTTP, FTP, HTTPS, Gopher, and Finger. The default allows access to HTTP, FTP, and Gopher services.
- **Concurrent retrievers:** Enter the maximum number of users that can use the Web Navigator database concurrently. This number depends on the system configuration for your InterNotes server. If user access is slow because the number of users specified in this field is less than the number of users attempting to retrieve pages off the Internet, increase the number. (If users start more concurrent Web retrievals than you have specified in this field, Lotus Domino queues them and starts them as soon as it can.) The default is 25.
- **Retriever log level:** This field specifies whether messages should be logged by the Web Retriever to the server’s log.nsf database. Select **None** to send no messages, **Terse** to send minimal messages, and **Verbose** to send all messages to your log.nsf. The default is None.
- **Update cache:** Lotus Domino stores retrieved Web pages in the Server Navigator database. You can specify how often you want Lotus Domino to

verify that these pages are still up to date or if they have to be reloaded from the Internet:

- **Never:** To perform no verifications (this is the default).
- **Every time:** To check each time you open a page already in the database.
- **Once per session:** To check only one time per user session.
- **SMTP Domain:** If you have an SMTP Gateway already installed, enter the foreign domain name of the gateway in this field; for use with the Lotus SMTP MTA, leave this blank.

9.4.3.1 Internet Site Access Control

You can control access to certain Internet sites by using the Deny Access and Allow Access fields in the Internet Site Access Control section shown in Figure 224. Both lists work in conjunction with each other. A more specific setting overrides a generic setting using wildcards. If you should have identical settings in both fields, the Allow Access field takes precedence.

9.4.4 Customizing Basic Settings in the Administration Document

To edit the Administration document of the Server Web Navigator database perform the following steps:

1. Ensure you have proper access rights for the Server Web Navigator database; that means you should be manager of the database and have the role of the Webmaster. The example below shows that all members of the admingroup have the proper rights.



Figure 225. ACL for Server Web Navigator Database

2. As a member of the admingroup, open the **Server Web Navigator** database on the server, not locally.

3. Click on **Database Views** on the Home Navigator, open the **All Documents** view (the default view), and choose **Actions -> Administration** from the action bar. If you do not see this menu, you do not have the proper rights as Webmaster.
4. You will see the following form:

Figure 226. Server Web Navigator Administration Form

5. You may now change the fields as desired. The meaning of the Enable Purge agent button, the Enable Refresh agent button and the Purge Agent settings is described in 9.4.5.2, “Keeping the Server Web Navigator Database Current” on page 255 and 9.4.5.3, “Managing the Size of the Server Web Navigator Database” on page 256. The other settings are described here:

- In the Server Basics section, you can change the following settings:
 - **InterNotes server name:** This field should already contain the name of your InterNotes server. To change the name in this field, enter the hierarchical name of the InterNotes server where the Web Navigator database resides. This is a required field and is case sensitive.
 - **Maximum database size:** The maximum size in megabytes for the database. The default is 500 MB.

- **Save author Information:** Choose **Yes** to save the name of the user who retrieved the Web page from its Internet server into a field called Save_Author. Use the @Author function to create a view to display the name of the user (or server) that retrieved the Web page. The default is not to save the author information.
- **Save HTML in Note?:** Check this box to save the HTML source for Web pages in a field called HTMLSource. The default is not to save the source.
- The HTML preferences sections contains font types for various elements and is self-explanatory.

Do not forget to save any changes you made.

9.4.5 Managing the Server Web Navigator Database

There are several administrative issues that you should be aware of when running the Server Web Navigator in a production environment. They are covered within this section.

9.4.5.1 Security for LotusScript Agents

To run any of the LotusScript agents for the Server Web Navigator (Refresh, Purge, and Averaging), the correct authorities must be given in the server document in the Public NAB. However, you will only need to do this once to use any of the Server Web Navigator agents. Follow the steps below to authorize the server to run the Server Web Navigator agents:

1. Edit the server's entry in the **Public Name and Address Book**.
2. Click on **Agent Manager** and go to the **Agent Restrictions** section.
3. Enter the fully qualified name of your Webmaster (in our case, admingroup/ibm) in the fields, as shown below, since the Webmaster will run the agents as scheduled.

▼ Agent Manager	
Agent Restrictions	
	Who can -
Run personal agents:	
Run restricted LotusScript/Java agents:	admingroup
Run unrestricted LotusScript/Java agents:	admingroup

Figure 227. Agent Manager

4. You may also modify the Nighttime Parameters section (Figure 228) to adjust to your system's capacity and your maintenance window. Increase the values in the Max LotusScript/Java execution time field and in the Max % Busy before delay field; shown are the default values.

Nighttime Parameters	
Start time:	20:00
End time:	08:00
Max concurrent agents:	2
Max LotusScript/Java execution time:	15 minutes
Max % busy before delay:	70

Figure 228. Nighttime Parameters

5. Save your changes to the server document and exit.

9.4.5.2 Keeping the Server Web Navigator Database Current

The Web pages that are held in the Server Web Navigator database are snapshots of the Web page when it was first viewed. As long as a page is accessed later by a user, it may be verified according to the Update Cache setting as described in 9.4.3, “Specifying Web Retrieval Settings” on page 251. But purging pages that are out of date or no longer accessed is also a concern. This may be done by enabling the **Refresh agent**. Since the Web is a dynamic environment, a Lotus Notes agent must run so that the database is refreshed.

1. Ensure you have set the agent restrictions according to 9.4.5.1, “Security for LotusScript Agents” on page 254.
2. Open the Server Web Navigator administration form, as described in 9.4.4, “Customizing Basic Settings in the Administration Document” on page 252.
3. Click on the **Enable Refresh agent** button.
4. Choose the Lotus Domino server the Server Web Navigator runs on in the Choose Server To Run On dialog box.
5. Save your changes and exit.

To change the time when the Refresh agent runs (default is 03.00 am), follow these steps:

1. Click on the **Agents** view on the Server Web Navigator screen to display the list of agents for this database.
2. Double click on the **Refresh** agent to display the Lotus Notes - Refresh - Agent screen.
3. Select **Schedule** to display the Schedule screen, as shown in Figure 229; as you may have noticed, you can change the schedule of the agent as well as the server it runs on. This setting cannot be changed from the administration screen anymore when initially set without checking the tiny checkbox at the bottom of the window shown here:

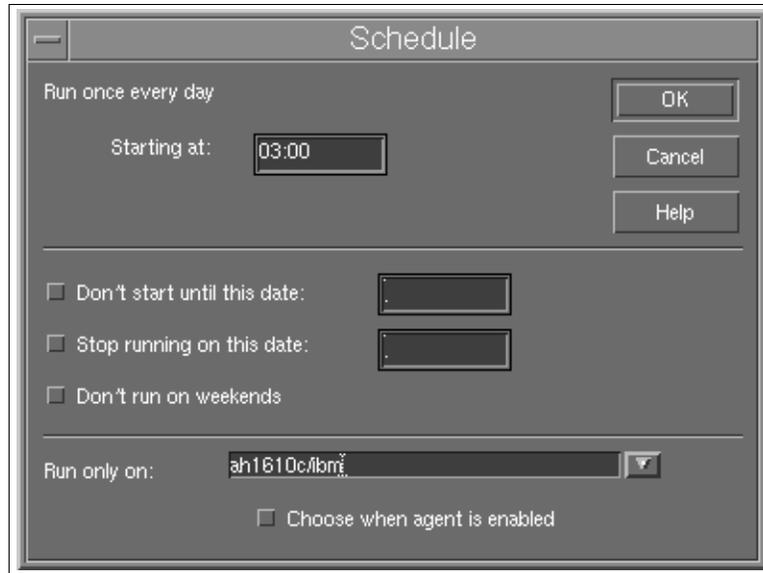


Figure 229. Refresh Agent Schedule

9.4.5.3 Managing the Size of the Server Web Navigator Database

The size of the Server Web Navigator's database may be maintained by enabling the purge agent which will delete outdated documents:

1. Ensure you have set the agent restrictions according to Chapter 9.4.5.1, "Security for LotusScript Agents" on page 226.
2. Open the Server Web Navigator administration form as described in Chapter 9.4.4, "Customizing Basic Settings in the Administration Document" on page 224.
3. You may want to modify the Purge Agent Settings (Figure 226 on page 253):
 - **Purge agent action:** When Lotus Notes runs the Purge agent, you can specify whether you want Web pages deleted from the database or reduced. Reduced means that Lotus Notes deletes the contents of the page but saves the URL; so you can still see the page in the database Views. Choose the **Delete page** or **Reduce page** keyword depending on how you want the Purge agent to run. The default is Delete page.
 - **Purge to what % of maximum size:** Enter a percent of the maximum database size (specified in the Maximum database size in the Server Basics section) that you want the purge agent to reach. The default is 60%.
 - **Purge documents older than:** Select the appropriate keyword to specify when to delete documents based on the number of days they have been in the database. The default is 30 days.
 - **Purge documents larger than:** Select the appropriate keyword to specify when to delete documents based on their size. The default is 512KB.
 - **Purge Private documents:** Select the checkbox to specify that the purge agent should delete documents that users have stored in their private folders. Leave the checkbox unchecked if you do not want private documents to be deleted by the Purge agent. The default is unchecked.

4. To enable the Purge agent click on the **Enable Purge agent** action button (Figure 226).
5. Choose your Lotus Domino server the agent is going to run on from the **Choose Server To Run On** dialog box

To change the time when the Purge agent runs (default is 01.00 am), change the parameters in the Schedule screen, as shown in Figure 229 on page 256.

Note

During our tests with Lotus Domino 4.6.1 on AIX 4.3.1, the Purge agent had some problems. Apparently, the maximum database size specification in the port settings is misinterpreted. If you should need that function, perform sufficient tests and please check with Lotus support.

9.4.5.4 Creating the Top Ten List of Web Pages

The Averaging agent is used to collect the ratings users assign to Web pages and to compute the Top Ten Web pages.

1. Ensure you have set the agent restrictions according to Chapter 9.4.5.1, “Security for LotusScript Agents” on page 226.
2. Open the **Server Web Navigator** database.
3. Click on the **Agents** view and click on **Averaging Agent**.
4. Enter the name of the server where you want this agent to run in the Choose Server To Run On dialog box.
5. If you want to change the time when the agent runs, double click on the **Averaging Agent** entry and click on the **Schedule** button.

9.4.6 Providing Access to the Server Web Navigator Database

The default access values in the Web Navigator server database are:

- Editor: allows users to fill out HTML forms, create recommendation documents, and create Web tours.
- Administrator of the InterNotes server: Webmaster role, which allows access to the Web Navigator Administration document.
- LocalDomainServers: Manager.
- OtherDomainServers: No access.

Tip

So that all replica copies of the web.nsf share the same ACL, open the **Advanced** section of the ACL and check **Enforce a consistent Access Control List across all replica copies of this database**.

9.4.7 Installing the Server Web Navigator for the Lotus Notes End User

Once the Server Web Navigator is up and running, the Lotus Notes client users may access it. The only step a user has to perform is to update its location document as follows:

LOCATION: Office (Network)			
Basics			
Location type:	Local Area Network	Prompt for time/date/phone:	No
Location name:	Office (Network)	Web proxy:	http://
Internet Browser		Servers	
Internet browser:	Notes Web Navigator	Home/mail server:	noteserv/ibm
Browse:	through InterNotes server	Passthru server:	
		InterNotes server:	

Figure 230. Client Location Document for Using Server Web Navigator

Remember, the specification of which Server Web Navigator to use has been made in the server document of the user's Home/mail server.

Afterwards, the user may open an URL by selecting **File->Open URL** from the action bar of the Lotus Notes client. The page will be retrieved, and the Server Navigator Database is automatically added to the workspace.



Figure 231. Server Web Navigator Database Icon

This database may be used by the client to retrieve URLs, to select information selectable on the (Home-) Navigator, as shown in the next figure, or to lookup pages already contained in the database by earlier retrievals.

To open Web pages from databases other than the Web Navigator database, you should change your user preferences (for example, if the user gets mail that includes a HTTP link):

1. Click on **File -> Tools -> User Preferences** to display the User Preferences dialog box.
2. In the Advanced options section (located in selection Basics), check the **Make Internet URLs (http://...) into Hotspots**.
3. Click on **OK**.

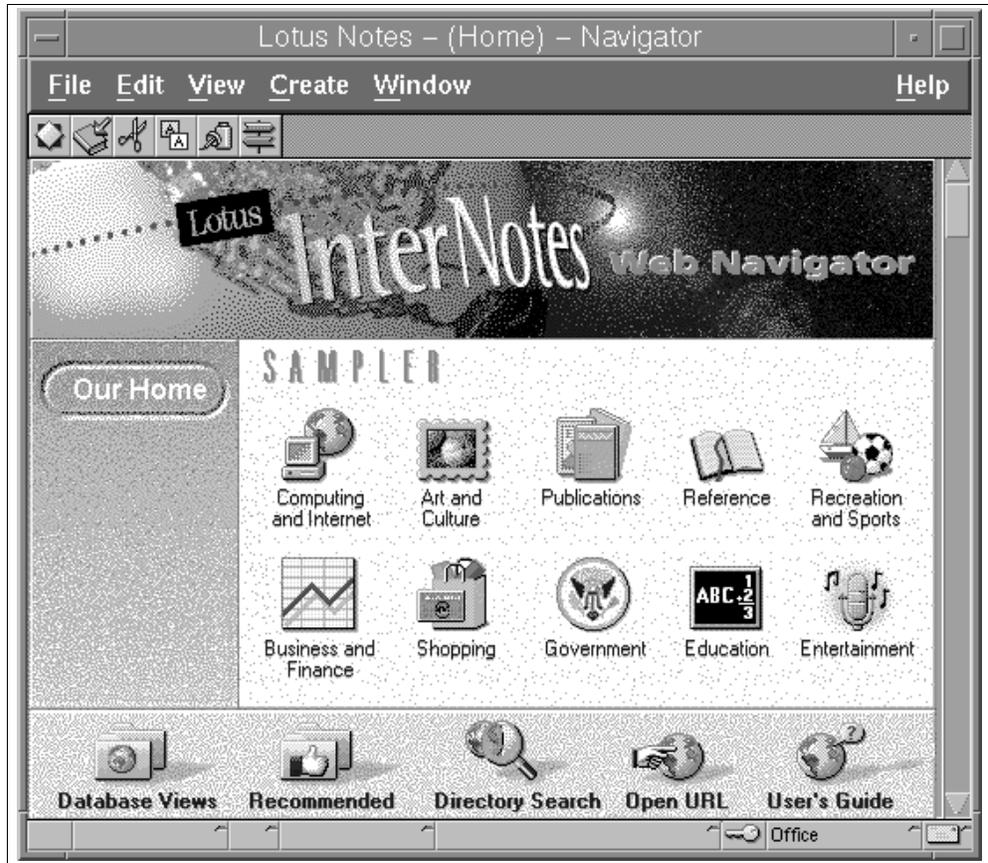


Figure 232. Server Web Navigator View

9.5 Server Web Administration Tool

During setup, Lotus Domino creates a database named webadmin.nsf, or if it should not exist for any reason, when the http Task starts. You can administer a Lotus Domino Server with a Web browser using that database. if you perform the following setup steps:

1. Add the names of the Lotus Notes users going to administer the server to the access control list (ACL) of webadmin.nsf as Managers with the ServerAdmin, ServerMonitor, and DatabaseAdmin roles.
2. Add the names of the Lotus Notes users going to administer the server to the Administer the server from a browser field in the Restrictions section of the server document in the Public NAB.
3. Add the names of the Lotus Notes users going to administer the server to the Run restricted LotusScript agents field in the Agent Manager section of the server document in the Public NAB.
4. Enter an Internet password in the Person documents of all the allowed administrators authorized in step one to three.
5. Setup the server you want to administer as a Web server, running the http server task, so you can access the Web Administration database and send commands to the server using a browser.

6. If you would like to, you can further refine access to the Web Administration tool by allowing administrators to access only a subset of the available Web Administration commands by modifying the ACL.

The Web Administration tool uses the following server databases: the log file (log.nsf), Lotus Domino Web server log file (domlog.nsf), the Public Address Book (names.nsf), cascaded Public Address Books, listed in the NAMES= setting of the notes.ini file, the Database Catalog (catalog.nsf), Administration Requests (admin4.nsf), Statistics (statrep.nsf), and Lotus Notes Administration Help (helpadm.nsf in the doc subdirectory). If one of these files does not exist on the server, the Web Administration tool does not display the command associated with the file. For example, if the Lotus Notes Administration Help file does not exist in the doc subdirectory, the Web Administration tool does not display the Help command.

Note

When entering your user ID in the Web browser authentication window, you have to enter your Common Name, or your fully qualified name, but not your shortname. For example, our administrative user has been named domino admin. He might authorize as domino admin/ibm or domino admin, but not as dadmin.

The next figures show a few examples of what you might get by playing around after connecting to the server successfully. Explaining all the functions and screens of the Web administration module would go beyond the scope of this redbook. The best way to get familiar with it is to use it.

You will get information about the server disk space, as shown in Figure 233, by clicking on **Monitoring**, and then clicking on **Disk Space** (both buttons have a slightly different color in the figure because they have been pressed).

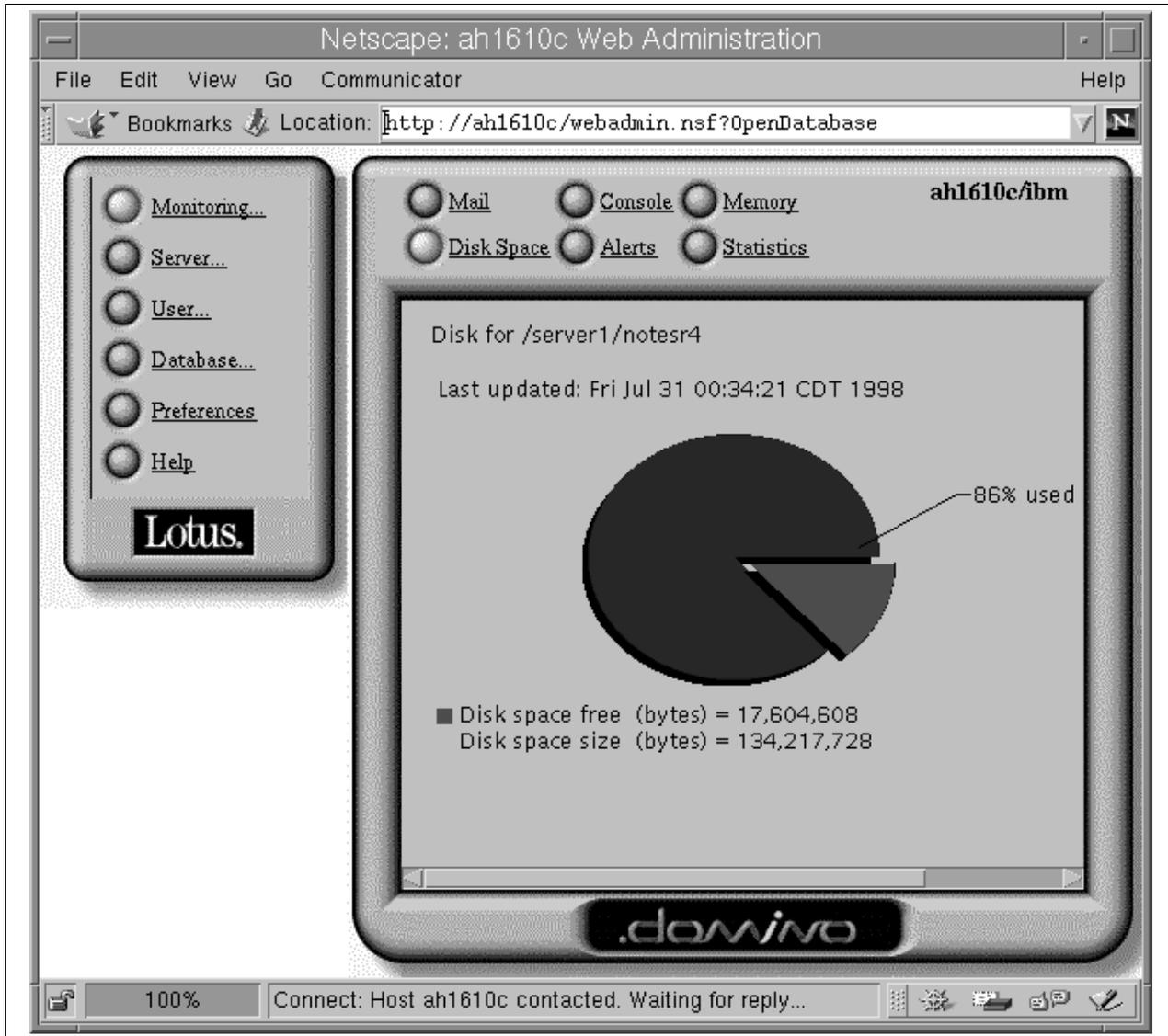


Figure 233. Lotus Domino Web Administration Example: Server Disk Space

You will get information about the server statistics, as shown in Figure 234, by clicking on **Monitoring**, and then clicking on **Statistics** (both buttons have a slightly different color in the figure because they have been pressed).

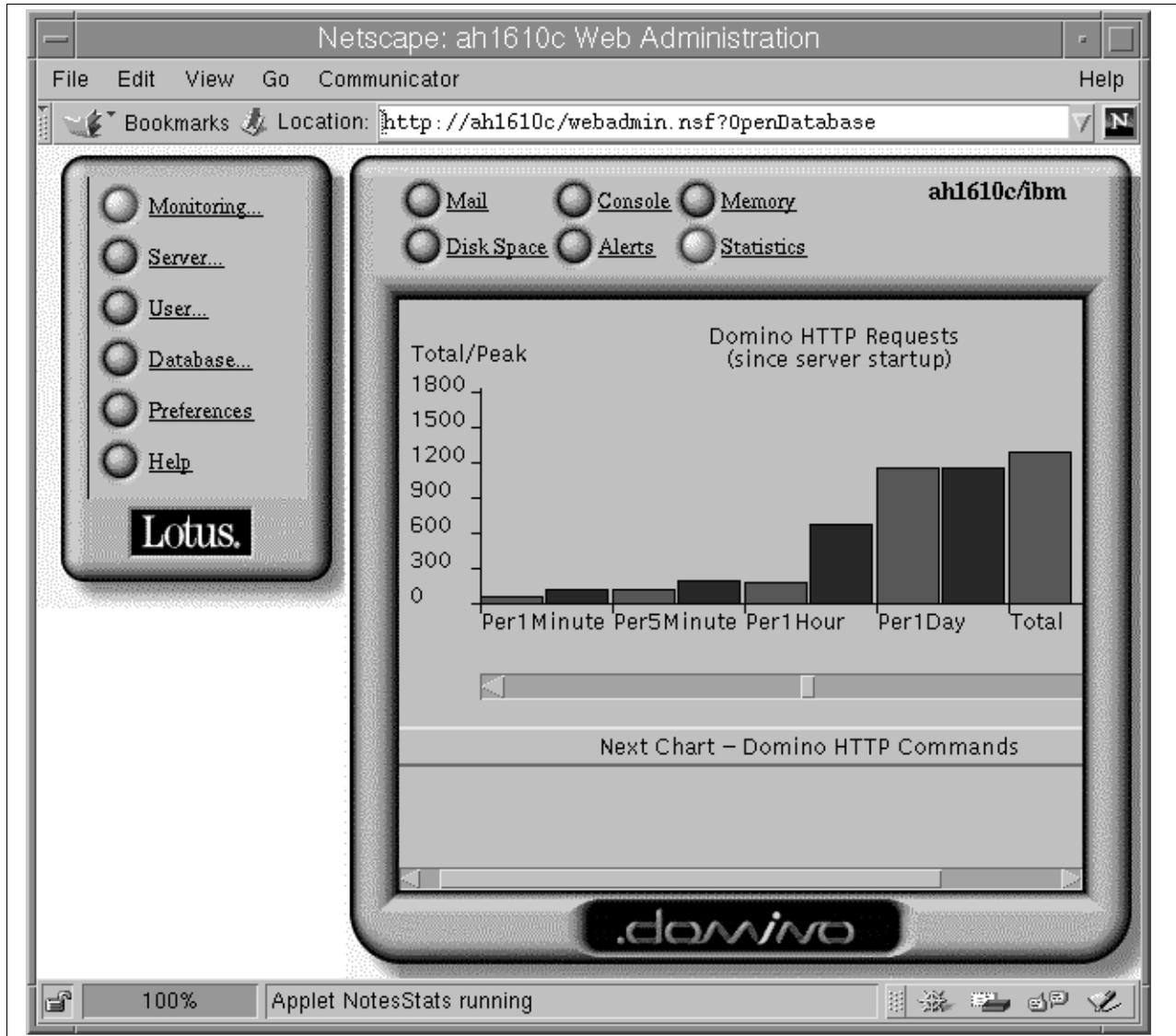


Figure 234. Lotus Domino Web Administration Example: Server Disk Space

You will get information about the server's mail router, as shown in Figure 235, by clicking on **Monitoring**, and then clicking on **Mail** (both buttons have a slightly different color in the figure because they have been pressed).

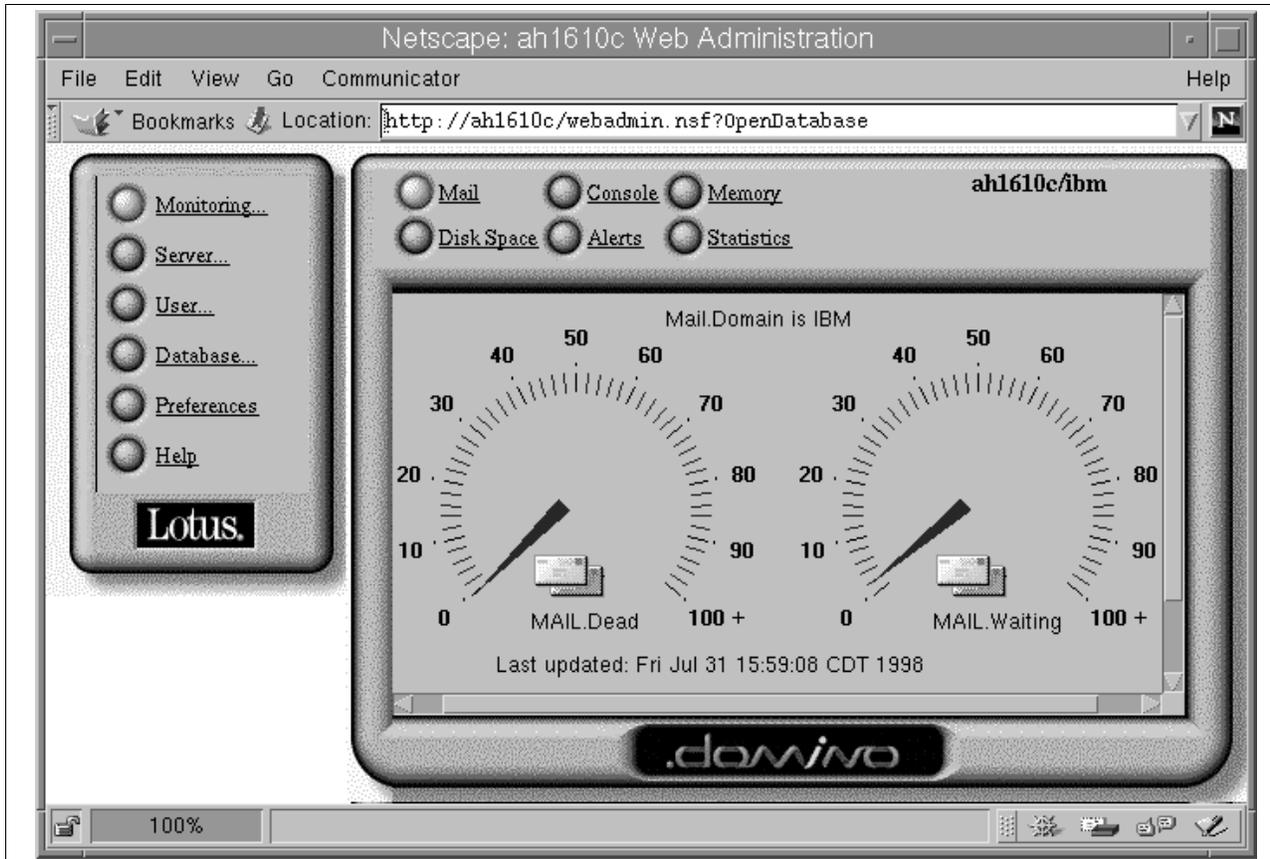


Figure 235. Lotus Domino Web Administration Example: Mail Monitor

To get sufficient pending mails for testing purposes, you must stop the router task on the monitored server (`tell router quit`), then create lots of mail with a user on that server with a Lotus Notes application you may have, so that mail.box gets filled. Afterwards, start the router again. The number of messages pending you can see on the monitor depends on how quickly the router can deliver the messages. When this screen shot was taken, there were only two messages pending.

9.6 New WWW Features in Lotus Domino Release 4.6.1

The information in this section has been extracted from the Lotus Domino Release notes for your convenience

9.6.1 Improving Web Server Performance Using the Command Cache

In Release 4.6.1, Lotus Domino caches in memory pages that contain @functions, in addition to HTTP commands, databases, and user names. Previous releases of Lotus Domino did not cache pages that contained @functions, since many of the @functions made the pages too volatile for caching. The area of memory reserved for this type of cache is called the Command Cache.

This feature is turned off by default in Lotus Domino. To turn on this feature, enter the following line in the NOTES.INI file on the Web server:

```
DominoAnalyzeFormulas=1
```

Chapter 10. Connectivity and Internet Communications

Along with the explosion of the Internet in the mid-1990s, the World Wide Web started growing and became very popular. Up to this point, the Internet was mainly used for electronic mail and news. Electronic mail (or e-mail) is almost as old as networking itself. Writing notes to each other was one of the first things people with interconnected computers wanted to do. News can be seen as a variation of e-mail. Where e-mail usually is sent from one person to another, or from one person to a few, news allows you to send a message to "everyone". In this case, everyone means anyone who wants to read the message and has access to a news client.

Aside from the World Wide Web services described in Chapter 9, "Lotus Domino and the World Wide Web" on page 217, Lotus Domino Release 4.6 also provides mail, news, and directory services. Together with the Lotus Domino Web Server, this makes Lotus Domino a provider of all essential Internet services. These services are seamlessly integrated with Lotus Domino, and merge Lotus Domino and the Internet to allow Lotus Notes users full communication capabilities with the Internet and Internet users. Specifically, these solutions are:

Lotus Domino SMTP/MIME MTA

Lotus Notes users can send and receive Internet e-mail through an SMTP gateway.

Lotus Domino POP3 server

Lotus Domino servers can accept and distribute mail for a POP3 mail client.

Lotus Domino IMAP server

Lotus Domino servers can accept and distribute mail for an IMAP mail client.

Lotus Domino NNTP Server

Lotus Domino servers can act as servers for Usenet News, allowing Internet users access to newsgroups over the NNTP protocol.

Lotus Domino LDAP server

Through the Lotus Domino LDAP server, Lotus Domino can share its Public Address Book with Internet users with access to an LDAP client.

All of these protocols, except SMTP, can use the Secure Sockets Layer (SSL) to make an encrypted connection between the client and the server. Setting up the server tasks for these protocols to use SSL is very similar for all protocols. For details on setup, refer to section 8.6, "Secure Socket Layer (SSL)" on page 201.

It is also possible to use all the above protocols, again except for SMTP, in a partitioned environment (more than one Lotus Domino Server per host). There are more details on running the Lotus Domino Server and the Internet server tasks in a partitioned environment in section 11.3.6, "Considerations for Internet Server Tasks" on page 345.

10.1 SMTP

Mail over the Internet predominantly means mail through the Simple Mail Transport Protocol (SMTP). This open standard protocol transports plain text

messages only. The Multipurpose Internet Mail Extensions (MIME) standard adds the capabilities of sending more complex parts like pictures or sound, or using foreign font sets by a suitable encapsulation.

The SMTP MTA can translate messages from SMTP/MIME to Lotus Domino and vice versa, like a gateway. In addition, the Lotus Domino SMTP/MIME MTA can operate as a traditional Message Transfer Agent (MTA) when there is a requirement to relay messages, unconverted, from one SMTP MTA to another.

In cases, where SMTP is the only protocol available between two Lotus Domino environments, the MTA could be used to encapsulate Lotus Domino mail messages over the SMTP network. This provides high-fidelity transfer of Lotus Domino mail messages through an SMTP backbone.

The SMTP MTA can be activated as part of the Lotus Domino Release 4.6 installation procedure, or activated separately at a later time. It uses documents in the Public Address Book for configuration and is managed from the Lotus Domino Server console.

It is not necessary to activate the SMTP MTA on each Lotus Domino Server in the domain. The MTA only needs to be activated on the server that actually runs the MTA, which can be one or more Lotus Domino servers depending on your configuration. If you want to be able to configure the MTA from other servers than the one it's running on, then the Public Address Book design elements included with the MTA need to be replicated to the Public Address Books on these other servers.

Starting with Lotus Domino Release 4.6, the SMTP MTA is installed as part of the general installation procedure for the Lotus Domino Server. If you want to activate the SMTP MTA on Lotus Domino Release 4.6, you will find that it is already installed, and all that is missing is its configuration. In addition to what is required by the Lotus Domino Server, the SMTP MTA requires a minimum of 16 MB of additional memory; 32 MB or more is recommended. It will also need an additional minimum of 200 MB of disk space. For high volume mail environments, 1 GB or more is recommended.

Note

Before you activate the Lotus Domino SMTP MTA, you must make sure that the `sendmail` daemon is deactivated on that system. The `sendmail` daemon is normally started at system startup time. To change this behavior, log in as user `root` on the SMTP MTA server and run the command `chrctcp -d sendmail`.

If the `sendmail` daemon is already running, you must either reboot your system after making the above changes, or shut down the `sendmail` daemon manually. You can check if it is active using the command `lssrc -s sendmail`. If the command reports the status as active, you can shut it down using `stopsrc -s sendmail`.

10.1.1 How the SMTP MTA Works

For the configuration of the SMTP MTA, an understanding of every detail of it may not be necessary, but some detail is provided here as a reference for

troubleshooting. For further details of the SMTP MTA, consult the *SMTP MTA Administration Guide*.

For an overview of the parts of the SMTP MTA, refer to the following figure:

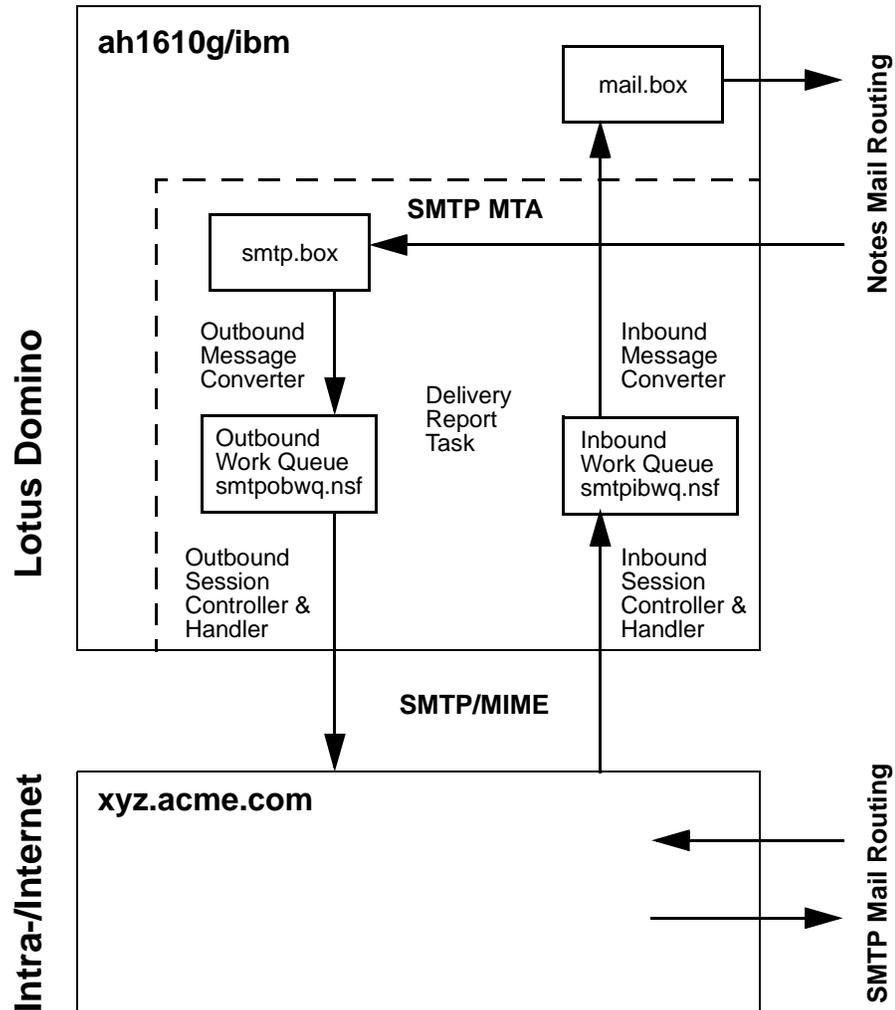


Figure 236. Overview of How the SMTP MTA Works

10.1.1.1 How Mail Travels from Lotus Domino to the Internet

1. A Lotus Notes user addresses a message to an SMTP address, for example, Joe@xyz.acme.com.
2. The Lotus Domino Mail Router identifies this as an SMTP address based on the syntax of the address and the Foreign SMTP Domain documents. It uses the Foreign SMTP Domain documents and Connection documents of Connection Type SMTP in the Public Address Book to determine the Lotus Domino Server running the appropriate SMTP/MIME MTA.
3. The Lotus Domino Mail Router then uses standard Lotus Domino routing techniques to route the message to the Lotus Domino Server running the SMTP MTA and into the database SMTP.BOX

4. The Outbound Conversion Handler task polls SMTP.BOX at regular intervals for new messages, as configured in the Poll for new messages every: field on the Server document. When it finds a message, it converts it from Lotus Notes format to RFC822 (SMTP) format and writes it to the Outbound Work Queue (SMTPPOBWQ.NSF). It also updates the message in SMTP.BOX to indicate that it is pending transmission.
5. The Outbound Session Controller reads the message from the Outbound Work Queue and notifies (or creates) an Outbound Session Handler task passing it the message ID. The Outbound Session Controller can launch up to three handlers by default; however, you can configure it to launch a maximum of eight handlers. If possible, the controller groups messages for the same host to reduce overhead.
6. The Outbound Session Handler retrieves the message from the work queue. It resolves the destination host to an IP address, opens a connection to the destination, and sends the message through the SMTP protocol driver. It then changes the state of the message in the Outbound Work Queue to Sent.
7. The Delivery Report Task removes the message from the Outbound Work Queue and SMTP.BOX. If the message experiences a temporary failure--for example, if the destination was unavailable -- the message will be requeued to be resent later. If the message experiences a permanent failure--for example, if the destination host is unknown or the user on that host is unknown -- the Delivery Report Task generates and sends a Non-delivery Report to the sender and removes the original message from the Outbound Work Queue and SMTP.BOX.

10.1.1.2 How Mail Travels from the Internet to Lotus Domino

The following explains how mail travels from the Internet to Lotus Domino:

1. The Inbound Session Controller task performs a passive listen on the well-known SMTP socket to respond to connection requests. When a connection request comes in, the Inbound Session Controller notifies (or creates) an Inbound Session Handler to process the message. The Controller can launch up to three handlers by default; however, you can configure it to launch a maximum of eight.
2. The Inbound Session Handler receives the SMTP message and writes it to the Inbound Work Queue (SMTPIBWQ.NSF) in RFC822 format.
3. The Inbound Message Conversion task reads the message out of the Inbound Work Queue. If the message is not addressed to a configured list of Internet domains in the Global Domain document(s), it passes the message on to the Outbound Work Queue to be sent to the correct destination. If the address is recognized, the address is converted to a Lotus Notes address. If the message is deliverable, it is converted to Lotus Notes format and placed in MAIL.BOX for the Lotus Domino Mail Router to deliver. If the message fails to be routed to a destination or fails conversion, the conversion task will indicate this in the message so that Delivery Report Task can take appropriate action.
4. The Delivery Report Task polls the Inbound Work Queue and deals with the message accordingly, either deleting it or placing a Non-Delivery Report in the Outbound Work Queue.

10.1.2 Configuration of the SMTP MTA

The configuration of the SMTP MTA is done through documents in the Public Address Book:

- Server document of the server running the SMTP MTA: (main configuration in the Internet Message Transfer Agent (SMTP MTA) section)
 - Specifies the SMTP Mail Routing task.
 - Provides the relationship to the Global Domain.
 - Control of logging and housekeeping.
 - Conversion options for the message body.
 - SMTP Transport configuration.
- Global Domain document:
 - Specifies the Lotus Domino domains which are members of the Global Domain.
 - Specifies the Internet domain suffixes, for which the MTA is acting.
 - Control of the conversion of the mail addresses.
- Foreign SMTP Domain document:
 - Specifies which outbound addresses are treated as Internet addresses.
 - Specifies where to send it to through the corresponding SMTP Server Connection.
- SMTP Server Connection document:
 - Specification of source and destination.
 - Route mail directly or via mail relay.

The correct setup of these documents in the Public Name and Address Book is necessary for starting up the SMTP MTA and is described in more detail in the following sections.

10.1.3 Foreign SMTP Domain

A Foreign SMTP Domain document is necessary for Lotus Domino to decide, which mail addresses should be sent to the SMTP MTA and which should be handled by Lotus Domino itself:

1. Create a Foreign SMTP Domain:

- In the PAB, view Server/Domains and click on **Add Domain**.
- Specify **Foreign SMTP domain** as Domain type.

2. Messages Addressed to: Internet Domain:

The Lotus Domino Mail Router routes outbound SMTP mail for the Internet Domain you specify here. The entry acts as a filter that passes all outbound SMTP mail matching the filter to the SMTP MTA mailbox (smtp.box) through a related Connection document, rather than a regular Lotus Notes mailbox. Wildcards like * are allowed as part of this entry, for example, an Internet domain of *.* passes all outbound mail with a period to right of the @ sign to smtp.box. A filter value of *.com enables the Lotus Domino Router to forward all outbound SMTP mail with .com as the last four characters to the right of the

last commercial @ sign in the address. Only one wildcard designation can be used in the Internet Domain field.

3. Should be routed to: Domain name:

Use this field to specify a hypothetical Domain name, in our example, *InternetSMTP*, for outbound SMTP mail. The name of this hypothetical domain is arbitrary, but it provides the relationship to the corresponding Connection document and must, therefore, exactly match the entry for Destination domain. So, through the specification of the Internet Domain in the Foreign SMTP domain record, Lotus Domino decides about which messages should be sent to SMTP. Through this Domain name, it can find the corresponding connection document, which in turn states to which MTA server and which database (normally *smtp.box*) the message should be routed.

4. Save and close this screen.

The example below shows the setup in our environment:

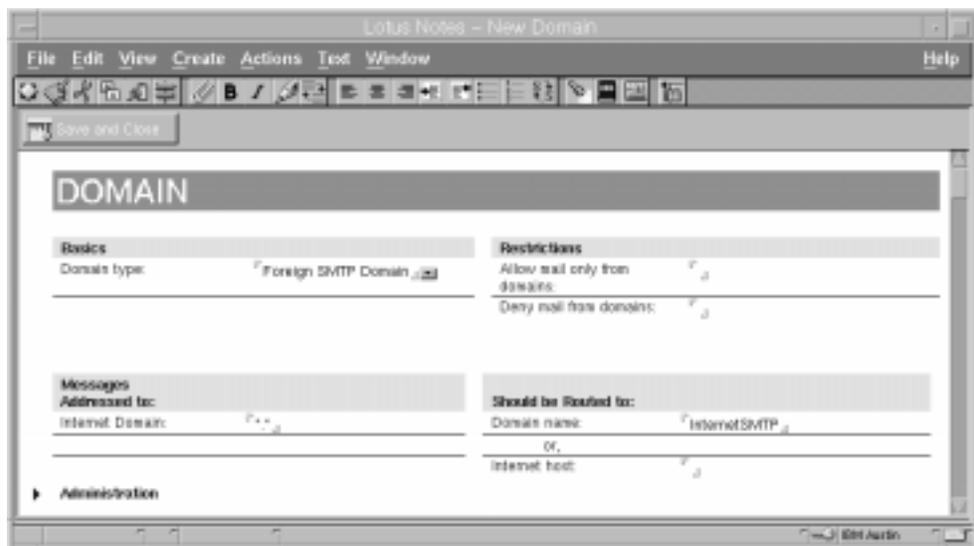


Figure 237. Foreign SMTP Domain

10.1.4 SMTP Connection Document

The SMTP Connection document specifies how the SMTP/MIME MTA routes outbound mail to the MTA server. The MTA server in turn can route the mail directly to the Internet hosts or to a specified Internet relay host.

1. Create an SMTP Connection record:
 - Go into the PAB, view Server/Connections and click on **Add Connection**.
 - Specify *SMTP* as the Connection type.
2. Source server: This field should contain the hierarchical name of the Lotus Domino Server, in our example, *ah1610g/ibm*.
3. Destination Server: Put an (arbitrary) description here such as we did *All Internet hosts*.
4. Destination Domain: Enter here the hypothetical Domain name in the Foreign SMTP Domain document as Domain name. These must exactly match since

this name provides the link between both documents. In our example, InternetSMTP is used.

5. Relay host: If you want to use a mail relay host, you must enter its Internet network address here. You can enter the address in its numeric form (9.3.1.95) or by its name (ah1610b.itsc.austin.ibm.com). If you enter the Internet domain name of a relay host (ah1610b.itsc.austin.ibm.com), the SMTP MTA performs an extra DNS lookup to determine the IP address for the domain name. While entering an IP address avoids the extra DNS lookup, it may be an advantage to enter a domain name if the relay host has multiple MX (mail exchanger) records for reliability or for throughput considerations. Specifying an optional network address causes the SMTP MTA to establish an SMTP session with the relay host. When the SMTP MTA completes outbound mail transfer to the relay host, it is the responsibility of the relay host to determine the next-hop routing for the specified destination (Internet domain).
6. Verify that Scheduled Connection is **Enabled**. See Figure 238.
7. Save and Close this screen.

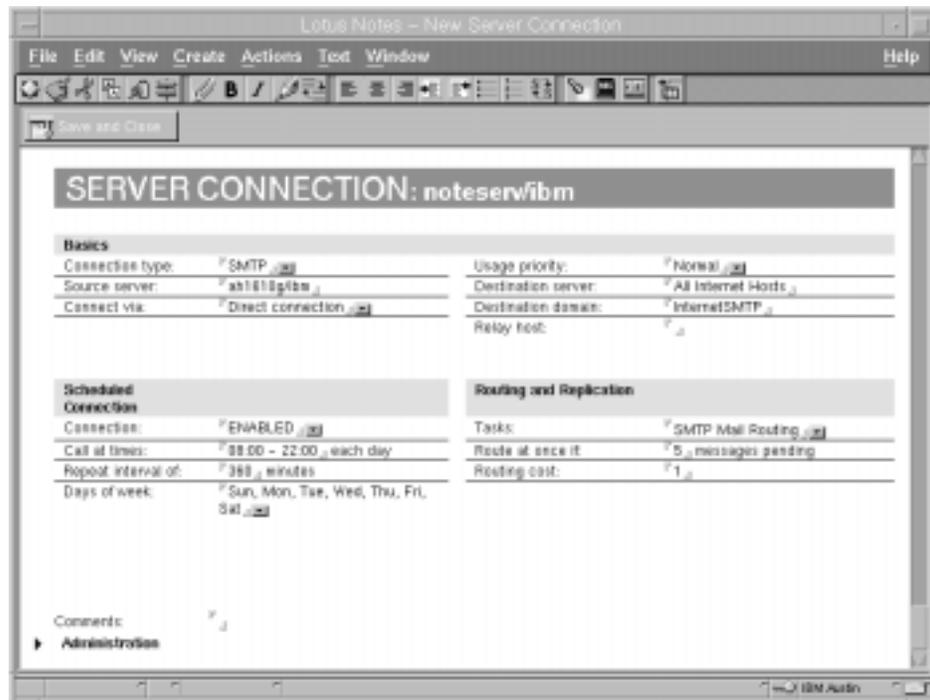


Figure 238. SMTP Connection Document

10.1.5 Server Document

In the server document of the PAB for the server on which the SMTP MTA is running, as shown in Figure 239 on page 274 and Figure 240 on page 275, make at least the following changes:

1. In the Basics section, under Routing tasks, add the task **SMTP Mail Routing**.
2. In the Internet Message Transfer Agent (SMTP MTA) section edit/check at least the fields:
 - Global Domain Name

Enter the name for the SMTP global domain -- for example, ITSOSMTP. The name of the domain is arbitrary, but is used to point to the corresponding Global Domain document and enables the MTA server to access the SMTP address conversion information stored in this document.

- Fully qualified Internet host name

Enter the fully qualified Internet host name for the Lotus Domino Server that is running the SMTP MTA. This field identifies the MTA server as the initial routing point for inbound SMTP mail. For example, ah1610g.itsc.austin.ibm.com is a fully qualified Internet host name. The string ah1610g is the Internet host name (or an alias for it) and itsc.austin.ibm.com is the Internet domain. Each SMTP MTA server must have a unique, fully qualified Internet host name. SMTP systems use the name entered in this field to identify each other during *handshaking* and when creating the mail header. For example, MTAs generate a Received header line that specifies the fully qualified Internet host names for the message source and destination.

- MTA work path

The MTA uses the working directory, for example, /server1/smtpwrk, that will be used as the location to create temporary files for attachments and encapsulations. Make sure that this working directory exists on the MTA server, otherwise, create it.

- MTA administrator

Enter the name of an individual administrator or group of MTA administrators who will receive notification from the MTA when certain events take place, for example, when SMTP mail is designated dead. If you do not specify an MTA administrator, the MTA will not deliver any notifications, although dead mail and other notifications will still appear in the Lotus Domino Log (log.nsf) on the MTA server.

Note

It is strongly recommended that you comply with an important Internet SMTP convention by creating a Postmaster mail user in the Lotus Domino Public Address Book for the Domain in which the SMTP MTA resides. By creating a Postmaster, you derive the following benefits:

- All inbound SMTP mail addressed to Postmaster requesting information or help goes to a central address.
- All administrative notifications go to the same central address.

3. Check the settings of the other settings: the default is fine in most cases, but you might be interested in reviewing the following sections:

- Log level:

The default is Normal, but in case of problems setting this to Informational or Verbose might help for diagnosis, which will produce many lines in the log for each transmission.

- Header handling:

SMTP mail has all information of routing and such in SMTP headers prefixed to the mail. The default is to Store with Delivery Information, which

is probably the most practical since one can look at it if necessary, but the headers do not show up in the main body of the Lotus Notes mail as with Prepend to body of message.

- Message content:

This important setting specifies the format for outbound mail to SMTP. The different options are:

Users without Lotus Notes (default)

Converts the message to a SMTP/MIME message.

Simple text only mail users

Converts the message to a simple-text, non-MIME message.

You can only encode attachments to a message (specified in the server field Attachment encoding method) as UUencode or as None (8-bit).

Only Lotus Notes users

Encapsulates the message. (You must specify Base64 or QuotedPrintable as the attachment encoding method.)

Users with and without Notes

Sends a message with both converted and encapsulated. (You must specify Base64 or QuotedPrintable as the attachment encoding method.)

In most cases the default (Users without Lotus Notes) is probably the right choice since it converts your Lotus Notes mail for SMTP/MIME mail users with the highest possible fidelity, and also a remote Lotus Notes user will be able to see all your attachments (after a reconversion by another SMTP MTA).

If you are sending mail between different Lotus Domino domains without a Lotus Domino connection through SMTP (for example, the Internet) using SMTP MTA's on both sides, you can specify Only Lotus Notes users. In this case, all Lotus Notes messages will be converted and encapsulated so that they are sent and received with 100% fidelity. Users with and without Notes would be the most general setting since it combines the highest fidelity for SMTP/MIME users (as with Users without Lotus Notes) with the 100 percent fidelity for Lotus Notes users (as with Only Lotus Notes users), but has the serious drawback that the mail volume is more than doubled since every piece of mail is essentially sent in two versions.

Note

This setting will be in effect for *all* messages converted by this SMTP MTA. It is however possible for the Lotus Notes mail user to specify encapsulation on a per mail basis: Open a new mail, select **Actions - Special Options...** and select the option **Sending this Notes document to other Notes mail user(s) through the Internet.**

- Message typeface & point size

Inbound SMTP mail will be converted into this typeface and point size. The default is Courier (monospaced) of point size 9.

Use the Message Typeface field to specify a typeface style for inbound SMTP mail. The MTA converts mail messages to the specified typeface. Courier (monospaced) is the default.

Note

Keep in mind that Internet mail users use fixed space fonts. If you select a proportional font here, parts of the mail (for example, a table) will probably not be aligned correctly.

For an explanation of all parameters, refer to the *SMTP MTA Administration Guide*.

An example of the respective parts in our environment of the server document of ah1610g/ibm is shown below:

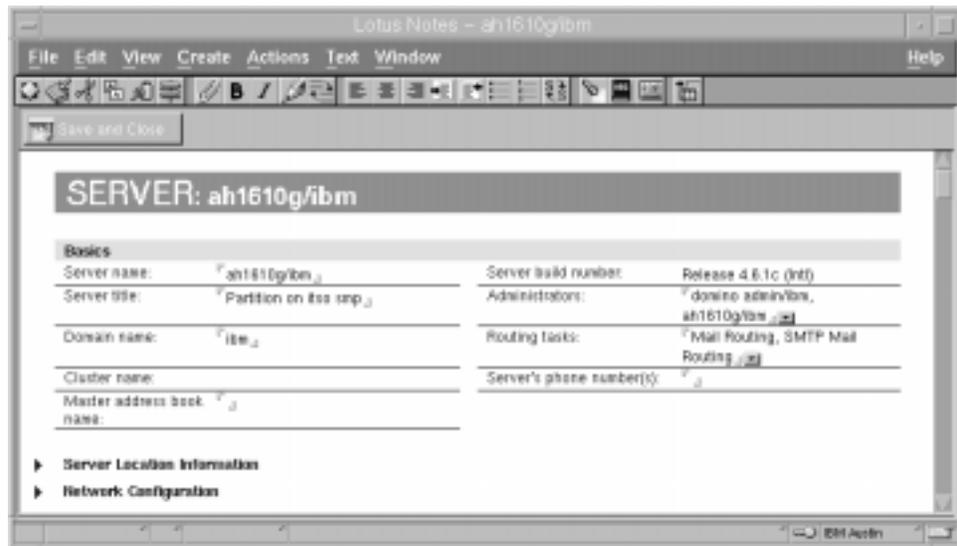


Figure 239. Internet Message Transfer Agent (SMTP MTA) (Screen 1 of 2)

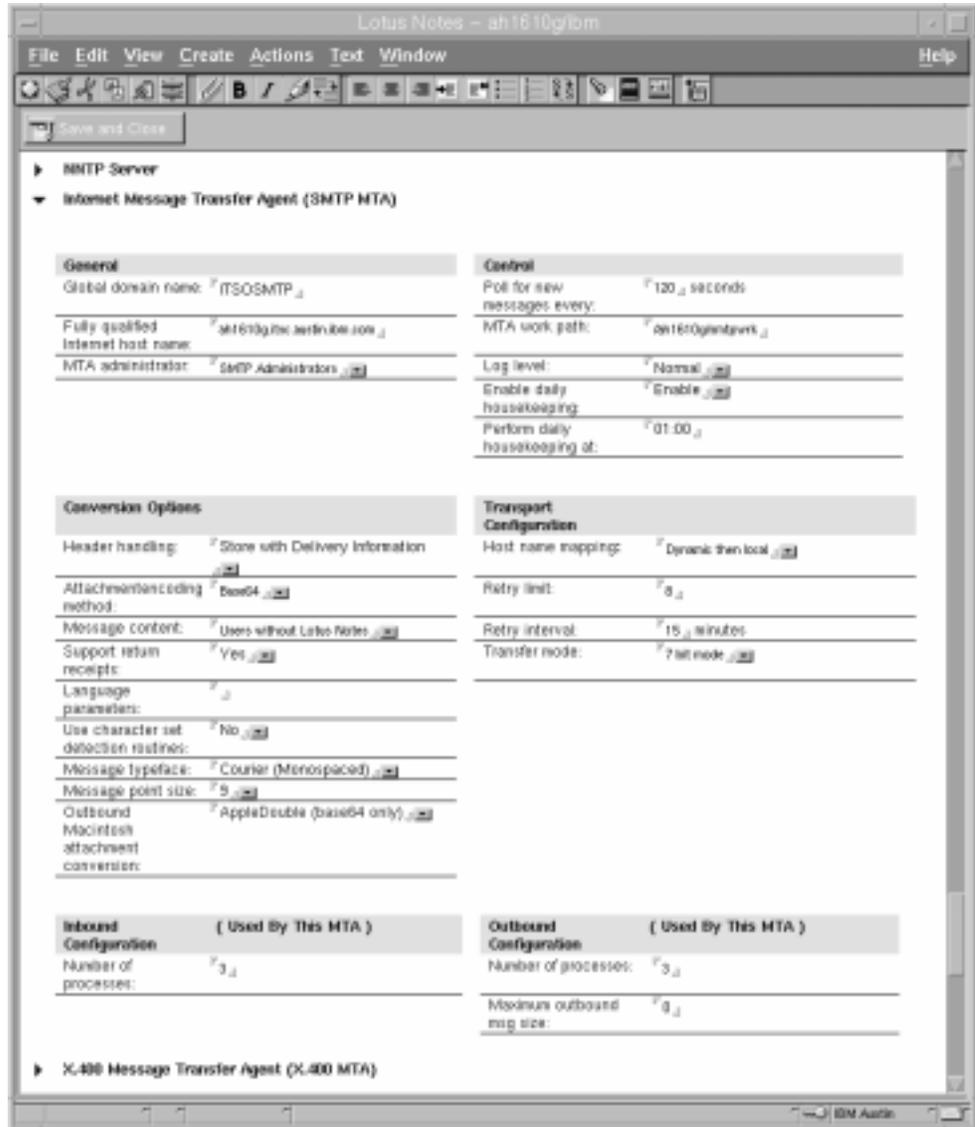


Figure 240. Internet Message Transfer Agent (SMTP MTA) (Screen 2 of 2)

10.1.6 Global Domain Document

At least one Global Domain document must be set up:

1. Create a Global Domain document:
 - Open the PAB in view Server/Domain and click on **Add Domain**.
 - Under the Basics section, select **Global Domain** as the Domain type.
2. Assign the Global Domain name that was used in the server document. This name provides the link between the MTA server and the Global Domain document, but is otherwise arbitrary. In our case, this is `ITSOSMTP`.
3. Specify **SMTP MTA** in the field Global domain role.
4. Internet domain suffix: Enter a list of Internet domain suffixes for which you want to receive/convert incoming mail. In our environment we have set this to `itsc.austin.ibm.com`, which means that the SMTP MTA would try to deliver mail to a user `joe@itsc.austin.ibm.com`. Addresses with any other Internet

domain suffix will not be converted but the SMTP MTA will try to relay it through SMTP to the respective domain. It is possible to enter more than one domain in this field, which means that Lotus Domino will accept all of the listed domain names.

Note

The first entry in the list will be used as part of the senders address for outbound mail from Lotus Domino to SMTP.

5. Save and close the Global Domain document.

To ensure that messages sent to these domains are routed to the Lotus Domino Server running the SMTP MTA, you must arrange for the Domain Naming Service (DNS) to map each of your Internet domain names to the IP address of your server, or to an MX record that names your server. The DNS typically requires one or more mail exchanger (MX) records that associate the Internet domain with one or more SMTP MTA servers. You might, for example, define an MX record that links an Internet domain to a primary SMTP MTA server, and another MX record that links the same Internet domain to a backup SMTP MTA server. When specifying an SMTP MTA server to the DNS, use the server's fully qualified Internet host name.

10.1.6.1 Specifying Multiple Internet Domains

The text that follows illustrates how to specify the MX records for a single Lotus Domino Global Domain (for example, `ITSOSMTP`) with multiple Internet domain names (for example, `notes.itsc.austin.ibm.com` and `itsc.austin.ibm.com`).

Mail can be addressed to both Internet domains:

1. MX record: `notes.itsc.austin.ibm.com IN MX ah1610g.itsc.austin.ibm.com`
2. MX record: `itsc.austin.ibm.com IN MX ah1610g.itsc.austin.ibm.com`

Additionally MX records could be provided pointing to a (second) backup SMTP MTA server on `ah1610f/ibm`, such as:

3. MX record: `notes.itsc.austin.ibm.com IN MX ah1610f.itsc.austin.ibm.com`

In this case, if `ah1610g.itsc.austin.ibm.com` wasn't operational, mail could be delivered to `ah1610f` and processed there.

Notes Domains and aliases:

Enter a list of Lotus Domino domains, which are part of this Global domain. In many cases this will be only the one Lotus Domino domain, which the MTA server is part of. If you need to specify any domain name containing non-ASCII characters, follow the special instructions in the *Lotus Domino Administration Help* database.

SMTP Address Conversion:

These variables specify for outgoing Lotus Domino mail into SMTP the way in which Lotus Notes addresses are converted (to allow an SMTP mail recipient to reply to your mail). Given the defaults also shown in Figure 241, in our environment a sender address of `Notes User/ibm` would convert into `Notes_User/ibm%ibm@notes.itsc.austin.ibm.com`. Note that the first item in the Internet domain suffix list is taken as the last part in the above address. You can change the composition of the address by deciding what part should be

specific (for example, *.*). It then matches outgoing Internet addresses in that order. For example, the outgoing address link.alfaskop.se matches *.alfaskop.se because it is more specific than *.*.

Other examples, including the configuration documents in the PAB, are described in the *SMTP MTA Administration Guide*.

10.1.6.3 Character Set Translation

The MTA tables database (mtatbls.nsf) is a preconfigured Lotus Notes database that provides file format and character set information for all MTAs during outbound and inbound message conversion processing. It is possible to extend or modify the content of the MTA tables database, if you have specific needs, for example, changing the default file extension that is assigned to inbound attachments when a file name is not specified.

But because updating the MTA tables is a sensitive operation that requires caution, be sure to read and understand all aspects of tables processing, before you undertake this task. For the necessary information, see Appendix C of the *SMTP MTA Administration Guide*.

10.1.6.4 Migration from the SMTP Gateway

SMTP MTA has more features than the older SMTP Gateway, runs only under Lotus Domino Release 4, and is the replacement for the SMTP Gateway.

The migration from an SMTP Gateway to an SMTP MTA can happen gradually, if you run both programs concurrently for a limited time (on different servers). A *gradual* approach means that you can migrate one group at a time from the old gateway-style addressing (for example, user@internet.address@SMTPGW) to the new MTA-style addressing (for example, user@internet.address).

If you have an existing SMTP Gateway set up as the Foreign Domain SMTPGW, you can proceed like this:

1. Install a new server as an SMTP MTA (or install the SMTP MTA on an existing Lotus Domino Release 4 server).
2. To enable users that are on Lotus Notes Release 3 mail servers to use the SMTP MTA, do the following:
 - a. Set up a Foreign Domain document on the Lotus Notes Release 3 server.
 - b. Enter an appropriate name for the Foreign Domain document, such as SMTPMTA.
 - c. Enter the Gateway Server Name. This is the name of the server that is running the SMTP MTA.
 - d. Enter the Gateway mail file name as SMTP.BOX.

Note that users, who have their mail files on Lotus Notes Release 3 servers, can't use MTA-style addressing. After you configure the Foreign Domain document, users will still have to add the new foreign domain name to the end of addresses (for example, jdoe@acme.com@SMTPMTA).

3. If the Foreign Domain document for your SMTP Gateway is changed similar to the document in Step 2 by filling in Gateway Server and Mail file name, you can reroute all old style addresses, such as user@internet.address@SMTPGW, to the new SMTP MTA. After doing so, the

SMTP Gateway should not receive any messages from Lotus Notes users any more.

4. After making the corresponding changes in your Domain Name System (DNS), so that no more messages are routed from the SMTP side to the SMTP Gateway machine, but only to the SMTP MTA server, the SMTP Gateway machine can be switched off.
5. After all users have been educated not to use @SMTPGW in their addresses (and it is taken out of all Name and Address Books), the Foreign Domain SMTPGW is not necessary and can be removed.

10.1.7 Monitoring the SMTP MTA

To monitor the status of the SMTP MTA and its subtasks use:

```
show tasks
```

on the server console of the MTA server. In idle state you should see the following six lines in the output of this command:

```
SMTPMTA drt           Idle
SMTPMTA isesctl       Listening on SMTP port 25
SMTPMTA imsgcnv       Idle
SMTPMTA osesctl       Idle
SMTPMTA omsgcnv       Idle
SMTPMTA                Idle
```

plus additional lines for in- and/or outbound session handlers, such as:

```
SMTPMTA oshl0         Active SMTP session with link.alfaskop.se
```

10.1.7.1 Statistics

The SMTP/MIME MTA automatically sends statistical information to Lotus Domino. To display the SMTP MTA statistics enter:

```
show stat mta.smtp.*
```

on the MTA's server console.

A series of messages that begin with the text string `MTA.Smtp` appears on the console screen and is added to the Lotus Domino Log in the Miscellaneous Events view:

```
> show stat mta.smtp.*
MTA.Smtp.Dead = 1
MTA.Smtp.TotalKBTransferred = 189
MTA.Smtp.TotalRouted = 0
MTA.Smtp.TransferFailures = 19
MTA.Smtp.Transferred = 162
MTA.Smtp.Waiting = 2
MTA.Smtp.WaitingRecipients = 0
```

For the detailed explanation of these statistics variables, see the *SMTP MTA Administration Guide*.

Note

Obviously `MTA.Smtp.Dead` is an important statistics variable. If it is not zero, you will find messages with status dead in some of the MTA's internal workqueues (SMTP.BOX, SMTPOBWQ.NSF, SMTPIBWQ.NSF). These dead messages must be handled manually. The SMTP MTA will try to inform the MTA Administrator, specified in the MTA's server document, if mail goes into the status dead.

The Delivery Report Task (`drt`) is responsible for collecting the statistics. Therefore, if the `drt` subtask is not running, statistics will not get updated. This also means that the statistics will not be updated at the point every message is processed, but will only be updated when `drt` processes the messages in the queues. The `MTA.Smtp.Waiting` statistic is first a snapshot of the inbound work queue count. Then the outbound work queue count is added to the inbound. If either queue is greater than 100, the count for that queue will only be 100.

10.1.8 Running the SMTP MTA

In this section, we will be discussing some of the useful commands for controlling the operations of the SMTP MTA.

10.1.8.1 Starting and Stopping the SMTP MTA

To start the SMTP MTA manually enter on the Lotus Domino Server console of the MTA server:

```
load smtpmta
```

Lotus recommends that you load the MTA manually the first time, and that whenever possible, you start the application from the server console rather than from the remote server console.

To start the SMTP MTA automatically at server startup add the task `SMTPMTA` to the `ServerTasks=` line in the `notes.ini` file, for example,

```
ServerTasks=SMTPMTA, REPLICCA, ROUTER, UPDATE, ...
```

To completely shut down the SMTP MTA once all tasks have finished the current process, on the Lotus Domino Server console, enter the command:

```
tell smtpmta Quit
```

It is also possible to start or stop the subtasks of the SMTP MTA individually. For the respective commands, see the *SMTP MTA Administration Guide*.

10.1.8.2 Other Useful Commands for the SMTP MTA

You can get help about the SMTP MTA commands with:

```
tell smtpmta help
```

You can display the current version of the MTA with:

```
tell smtpmta show versios
```

To see the configuration of the SMTP MTA use:

```
tell smtpmta show config
```

To reload the configuration manually you can use:

```
tell smtpmta refresh
```

This `refresh` command instructs the SMTP MTA to reload its configuration. It reloads the `notes.ini` setting that applies to the MTA and any changes in Public Address Book documents that apply to the MTA.

The command:

```
tell smtpmta compact
```

forces the SMTP MTA to compact the file `smtp.box`. The daily housekeeping (see the specification in the server document) will shut down the SMTP MTA once a day and compact the MTA databases (`smtp.box`, `smtpobwq.nsf` and `smtpibwq.nsf`).

10.2 POP and IMAP

There are two Internet protocols in wide spread use for e-mail message access. The Post Office Protocol, Version 3 (POP3) is a protocol that allows a client capable of POP3, such as Netscape Navigator, Eudora Pro, or Microsoft Internet Explorer to retrieve mail from a host server also capable of POP3. The Internet Message Access Protocol, Version 4 (IMAP4) is another protocol that allows for more advanced message manipulation. POP3 can only be used for off-line reading, where messages are downloaded from the POP3 server to the local host. IMAP4 allows for both off-line and on-line reading of messages. IMAP4 also permits manipulation of remote message folders in a way that is functionally equivalent to local message folders. Examples of IMAP4 clients are Netscape Navigator and Microsoft Outlook 98.

10.2.1 Lotus Domino and Internet Mail

Lotus Domino servers can now be host servers for Internet mail (POP3 and IMAP4) clients. These clients do not (necessarily) run Lotus Notes but have Lotus Notes mail files on the Internet mail server and they periodically connect to the server using TCP/IP to retrieve their mail.

To use a Lotus Domino Server as an Internet mail server:

- Run the server task POP3 or IMAP respectively, or both.
- Create a mail file on the server and a Person document in the Public Address Book for each client that will use the server as its Internet mail host (and is not already a Lotus Notes user).

An existing Lotus Notes user can access their mail file through an Internet mail client (and/or through the Lotus Notes client) as long as their mail database (or a replica of it) is located on the Internet mail server.

A Lotus Domino Internet mail server continuously listens for connection requests from e-mail clients on a TCP/IP port. For POP3 it is port number 110, and IMAP4 uses the port 143. When a client establishes a connection, the Internet mail server authenticates the client using standard POP3 or IMAP4 authentication (with the `HTTP password` from the Person document in the PAB). If authentication is successful, the server gives the client access to the contents of the client's Lotus Notes mail file.

Internet mail clients do not use Lotus Notes user IDs and their Person documents do not contain public keys if they are not also Lotus Notes users. Therefore they cannot receive encrypted mail. Authentication occurs through the standard POP3 or IMAP4 user and password authentication mechanism. Authentication using the APOP command in POP3 is not implemented on Lotus Domino POP3 servers, but the whole session can use SSL for security.

A Lotus Domino Internet mail server only stores and enables retrieval of mail received by POP3 and IMAP4 clients. To implement a complete Lotus Domino mail system for Internet mail clients requires the Lotus Domino SMTP/MIME MTA for transporting outbound and inbound mail for the client and the Lotus Domino Mail Router for delivering inbound mail to Internet mail files on a Lotus Domino POP3/IMAP4 server. Therefore, in addition to setting up a Lotus Domino POP3 or IMAP4 server, you must also set up the SMTP/MIME MTA on at least one server at your site and set up Lotus Domino mail routing by creating the necessary Connection and Domain documents in the Public Address Book.

Internet mail clients can send e-mail to other Internet mail clients having their Lotus Notes mail files in the same domain or Lotus Notes mail users through a conversion from SMTP to Lotus Domino via the SMTP MTA.

For example, to send a message to another POP3 client in the same Lotus Domino Domain, the client addresses the mail using the Internet addressing format, `astenmark@itsc.austin.ibm.com`. The message goes directly to the SMTP/MIME MTA which finds the recipient's name in the Lotus Domino Server's Public Address Book and converts the message. From there, the Lotus Domino Mail Router delivers the message to the recipient's mail file on the Lotus Domino Server running POP3 and on to the Lotus Domino mail server of the Lotus Notes mail user. It works the same way with IMAP4. It also does not matter if the sender and receiver use different protocols to read their mail.

If an Internet mail client sends mail to another Internet mail client that uses another mail system or any other SMTP mail address, the message goes to the SMTP/MIME MTA which begins the transfer of the message to the recipient's remote server.

The software and hardware requirements for a Lotus Domino Internet mail server are the same as for a standard Lotus Domino Server, except for the following:

- The Lotus Domino Server must be configured to use TCP/IP.
- On at least one server of the site the SMTP/MIME MTA must be installed and the Connection and Domain documents for the mail routing must be set up to handle the transport of mail from Internet mail clients.

Note

Even if the Lotus Notes mail database for an Internet mail client is able to hold mail messages with Rich Text formed bodies including pictures, and so on, by accessing this mail database through the Internet mail client, you lose all these capabilities and can see only the plain text of the message. Only attachments can be accessed through the Internet mail client.

10.2.2 Starting and Stopping the POP3/IMAP4 Servers

There are three options for starting the Internet Mail servers:

- If you selected POP and/or IMAP when you installed Lotus Domino, the respective server task(s) will be automatically activated.
- If you did not select POP and/or IMAP when you installed Lotus Domino, you may start it manually using one of the following commands on the server console:

```
load pop3
```

for POP3, or

```
load imap
```

for IMAP4.

- To start the POP and IMAP server tasks automatically at Lotus Domino Server startup, add POP3 and/or IMAP to the `ServerTasks` entry in `notes.ini`. For example:

```
ServerTasks=POP3, IMAP, REPLICA,...
```

You can verify that your Internet Mail server(s) are running by executing the command `show tasks` at the server console. The output should include a few lines similar to these:

```
POP3 Server      Listen for connect requests on TCP/IP port 110
POP3 Server      Control task
IMAP Server      Listen for connect requests on TCP Port:143
IMAP Server      Control task
```

To shut down the Internet Mail servers, you have two options:

- Shut it down manually by executing one of the following commands at the server console:

```
tell pop3 quit
```

for POP3, or

```
tell IMAP quit
```

for IMAP4.

- Deactivate the automatic startup by removing POP3 and/or IMAP from the `ServerTasks` entry in `notes.ini`, and then restart the Lotus Domino Server.

10.2.3 Preparation for an Internet Mail Client

If you want to prepare for an Internet mail client, who is not already a Lotus Notes user, and therefore, has neither a Lotus Notes mail file nor a Lotus Notes Person document, you must create these manually:

1. Create a Lotus Notes mail file:

- a. Log into the Lotus Notes Workspace as an administrative user.
- b. Choose **File - Database - New...**
- c. In the Server field, select a Lotus Domino Server which is running the POP3 or IMAP4 server.
- d. In the title field, enter the title of the client's mail file, for example, `Andreas Stenmark's Mail`

- e. In the File name field, enter a path name and file name for the mail file, for example, `mail/astermark.nsf`.
 - f. Select the template `Mail (R4.6)`.
 - g. Click on **OK**.
2. Create a Person document:
- a. Open the **Public Address Book**
 - b. Choose **Create - Person**
 - c. Complete the Name section:
 - Enter a first name, middle initial, and last name. Lotus Domino uses this to display the user's name in the People view of the Public Address Book.
 - In the User name field, enter the hierarchical name for the client.
 - In the Short name field, enter a string (without spaces), which is unique in your domain (for example, not equal to any other First, Last or Short name in the PAB). This will be used as the Internet mail client user name. You may choose the first character of the First name followed by the Last name, for example, `astermark`.
 - In the HTTP password field, enter the password the Internet mail client will use to log on to the server. Lotus Domino scrambles the password. This field is required.
 - d. Complete the Mail section:
 - In the Mail system field, select **POP or IMAP**.
 - In the Domain field, enter the Lotus Domino domain of the Internet mail server.
 - In the Mail server field, enter the name of the Internet mail server.
 - In the Mail file field, enter the path to the client's mail file on the Internet mail server relative to the Lotus Domino data directory. For example, enter `mail/astermark`.
 - e. In the Encrypt incoming mail field in the Misc section, you must select **No**, since Internet mail clients cannot receive encrypted mail.

To make preparations to allow existing Lotus Notes mail users to access their mail from POP3 or IMAP4 clients, specify a password in the HTTP password field of their existing Person documents. Also configure the Internet mail clients so that mail is not automatically removed from the server, since otherwise, they cannot be read from the Lotus Notes client after retrieving them through the Internet mail client.

Note

The Lotus Domino POP3 server does not copy messages to the POP3 client that have already been read through Lotus Notes. If you are viewing your messages online using IMAP4, you will see all messages. However, be aware that Lotus Notes and the IMAP server have separate flags for whether a message has been read or not. If you read a message in one system, it will not automatically show up as read in the other.

10.2.4 Setting Up a POP3 Client

The steps to configure POP3 client software for mail are specific to each manufacturer, but the following information is required:

- The TCP/IP Internet host name of the machine running the SMTP/MIME MTA, for example, ah1610f.itsc.austin.ibm.com.
- The TCP/IP port number, if the POP3 server is using a non-standard port.
- The TCP/IP Internet host name of the machine running the Lotus Domino POP3 server, for example, ah1610g.itsc.austin.ibm.com.

If the Lotus Domino POP3 server and the SMTP/MIME MTA run on the same machine, the host names are the same.

- The POP3 client user name. The POP3 client user name must exactly match the Short name entry in the client's Person document in the Public Address Book.

In addition, we recommend that you do the following:

- Set up the POP3 client so that mail is automatically deleted from the mail file on the POP3 server after the client copies it locally. If you do this, the client mail file takes up minimal disk space on the Lotus Domino Server. Do not select this option, however, if a user also continues to access mail from Lotus Notes.
- Set up the POP3 client so that it checks for mail at most once every five minutes. If the client checks for mail more frequently than this, it's possible for server performance to suffer.

10.2.4.1 Setting up the Netscape Navigator POP3 Client Software

The following table, Table 11, shows the fields in the Netscape Navigator Mail and News Preferences dialog box that pertain to setting up a client for a Lotus Domino POP3 server.

Table 11. Netscape Navigator Mail and News Preferences (POP)

Mail and News Preferences	Description	Example
Outgoing Mail Server (SMTP)	The TCP/IP hostname of the host running the SMTP MTA.	ah1610f.itsc.austin.ibm.com
Incoming Mail Server (POP3)	The TCP/IP hostname of the host running the Lotus Domino POP3 Server.	ah1610g.itsc.austin.ibm.com
Mail Server User Name	Short name field from the Person document in the Lotus Domino Public Address Book.	axel
Leave messages on server after retrieval	Determines whether the client's messages remain on the Lotus Domino POP3 Server after being copied to the client.	Remove from server
Check for Mail: Every x minutes or never	Determines how often the POP3 client checks for new mail.	Every 15 minutes

Figure 242 on page 286 and Figure 243 on page 286 show screen shots of an example setup of the POP3 client in Netscape Navigator 4.

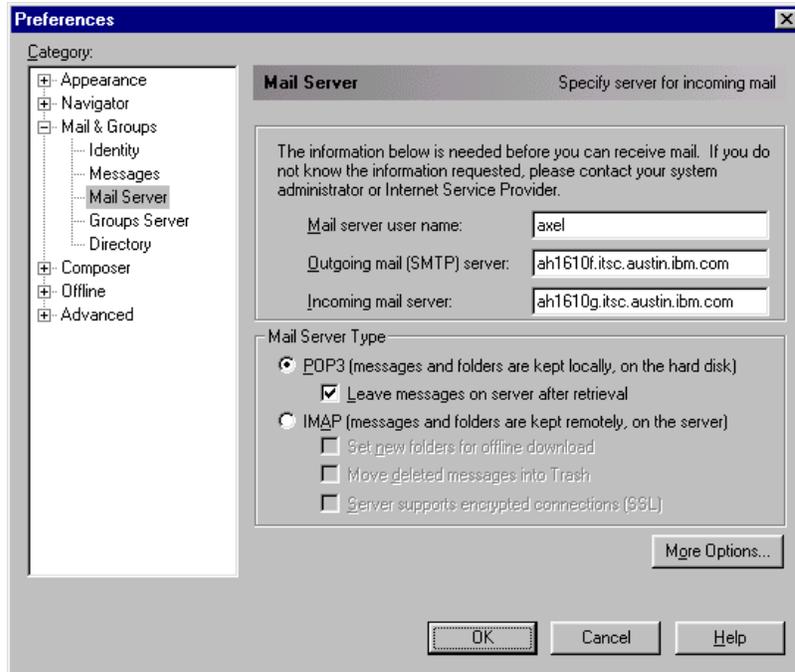


Figure 242. Netscape Navigator Setup (POP)

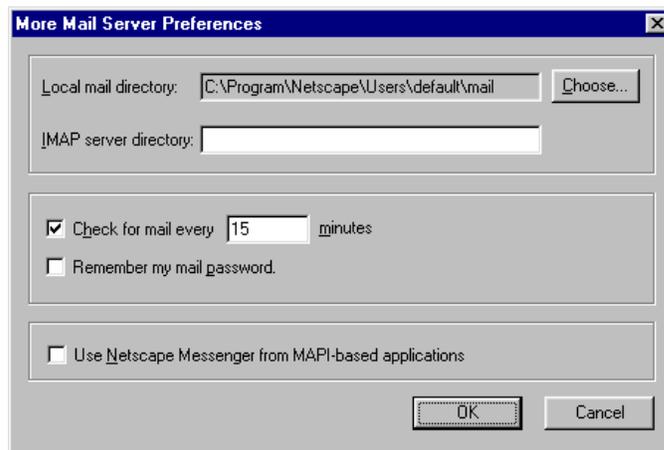


Figure 243. Netscape Navigator Setup, More Options... (POP)

For another POP3 client, Eudora Pro, see the *Lotus Domino Administration Help* documentation database.

10.2.5 Setting Up an IMAP4 Client

The steps to configure IMAP4 client software for mail are specific to each manufacturer and is very similar to configuring POP3 client software. The following information is required:

- The TCP/IP Internet hostname of the machine running the SMTP/MIME MTA, for example, ah1610f.itsc.austin.ibm.com.
- The TCP/IP port number, if the IMAP4 server is using a non-standard port.

- The TCP/IP Internet hostname of the machine running the Lotus Domino IMAP4 server, for example, ah1610g.itsc.austin.ibm.com.
If the Lotus Domino IMAP4 server and the SMTA/MIME MTA run on the same machine, the hostnames are the same.
- The IMAP4 client user name. The IMAP4 client user name must exactly match the Short name entry in the client's Person document in the Public Address Book.

In addition, we recommend that you do the following:

- Set up the IMAP4 client so that it checks for mail at most once every five minutes. If the client checks for mail more frequently than this, it's possible for server performance to suffer.

10.2.5.1 Setting up the Netscape Navigator IMAP4 Client Software

The following table, Table 12, shows the fields in the Netscape Navigator Mail and News Preferences dialog box that pertain to setting up a client for a Lotus Domino IMAP4 server.

Table 12. Netscape Navigator Mail and News Preferences (IMAP)

Mail and News Preferences	Description	Example
Outgoing Mail Server (SMTP)	The TCP/IP hostname of the host running the SMTP MTA.	ah1610f.itsc.austin.ibm.com
Incoming Mail Server (IMAP4)	The TCP/IP hostname of the host running the Lotus Domino IMAP4 Server.	ah1610g.itsc.austin.ibm.com
Mail Server User Name	Short name field from the Person document in the Lotus Domino Public Address Book.	axel
Check for Mail: Every x minutes or never	Determines how often the POP3 client checks for new mail.	Every 15 minutes
Keep copies of messages for offline reading	Determines whether messages should be copied to the local host, as well as kept on the remote host.	Not checked
Move deleted messages into Trash	Determines whether you want to use a trash folder to delete messages.	Checked

Figure 244 on page 288 and Figure 245 on page 288 show screen shots of an example setup of the IMAP4 client in Netscape Navigator 4.

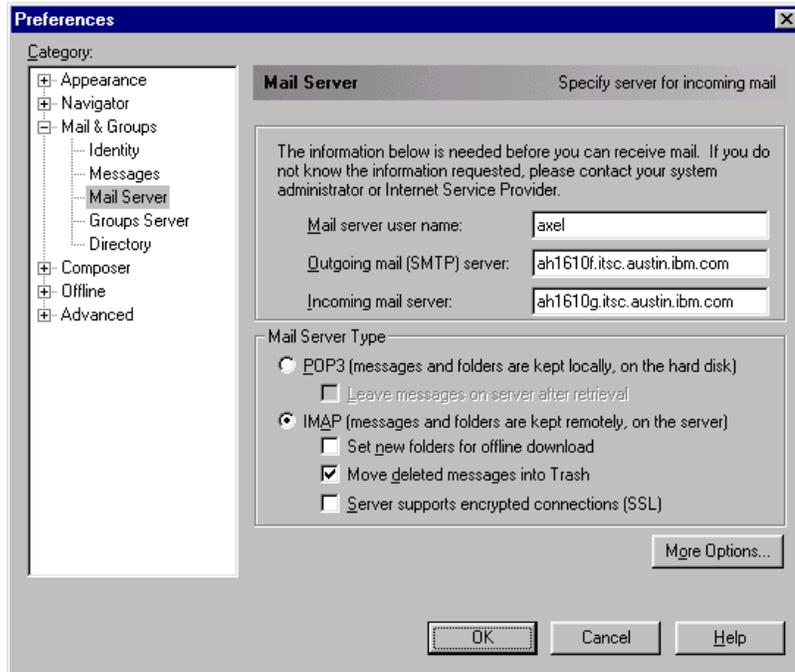


Figure 244. Netscape Navigator Setup (IMAP)

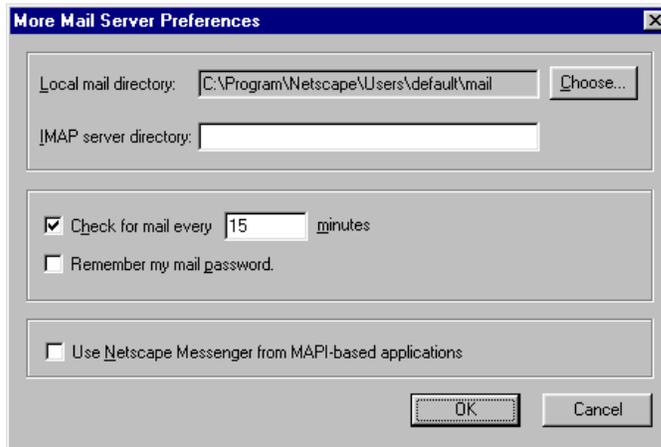


Figure 245. Netscape Navigator Setup, More Options... (IMAP)

Eudora Pro can also act as an IMAP4 client. For more information on how to set it up, see the documentation that came with your copy of Eudora Pro.

10.3 NNTP

Network News Transfer Protocol (NNTP) is an Internet protocol for reading and distributing Network News, or newsgroups. It is used both for client-server connections and for communications between servers. It is an alternative to setting up a mailing list, using direct mail to distribute messages. Such remailing is inefficient when the number of subscribers grows beyond a dozen or so people. What you really want is efficient, centralized storage of messages that people can access if and when they need them. NNTP provides means for distribution,

inquiry, retrieval, and posting of news articles using a reliable stream client-server model. NNTP is designed so that news articles need only be stored on one host, while subscribers on other hosts may read news articles over TCP/IP connections, thereby minimizing the disk and CPU resources necessary on the client hosts.

10.3.1 Lotus Domino and NNTP

When you activate the Network News Transfer Protocol on your Lotus Domino Server, the server becomes a Lotus Domino NNTP Server. A Lotus Domino NNTP Server lets users participate in private discussion groups or public USENET newsgroups using a Lotus Notes client, a standard NNTP newsreader (such as Netscape Collabra or Microsoft Internet Explorer News), or a Web browser.

A Lotus Domino NNTP Server supports the following:

- Users of Lotus Notes Release 4.6 clients, standard newsreader client and Web browser clients participating in the same discussion.
- USENET newsgroups that are distributed across the Internet.
- Private newsgroups for use within your organization.
- Distribution of news articles using NNTP newsfeeds to and from other NNTP servers.
- Server security: anonymous access, basic password authentication, and Secure Socket Layer encryption and authentication.
- Archiving of newsgroup articles.
- Personal interest profiles that notify you about articles of interest.

We will describe the most important tasks involved in setting up a Lotus Domino NNTP Server. It is beyond the scope of this book to describe every single feature of a Lotus Domino NNTP Server in detail. For more information on any particular subject concerning the NNTP server task, refer to the *Lotus Domino Administration Help* database or the printed manuals that came with your copy of Lotus Domino.

It is possible to use the Lotus Domino NNTP Server in a partitioned environment, if you have the Domino Advanced Services installed. See 11.3.6, “Considerations for Internet Server Tasks” on page 345 for details on how to run the NNTP server task on a partitioned server.

10.3.2 Installation and Configuration

When you install Lotus Domino Release 4.6, the NNTP server task is also automatically installed. There is no need to install additional software to enable Lotus Domino to be used as an NNTP server. There is also very little configuration to be done before you can start adding your own newsgroups to your Lotus Domino NNTP Server. How much work you need to do after this depends of course on how you intend to use the NNTP server. You may want a single stand-alone NNTP server, without any connections to other NNTP servers or the USENET. On the other hand, you might be looking for a large solution with many newsgroups, USENET news as well as private news, and many servers in different physical locations, each with one or more newsfeeds or replicated databases. Each installation of Lotus Domino NNTP will have its own

configuration and setup procedure, but here is a rough overview of the necessary steps included:

1. Start the NNTP server task on your Lotus Domino Server, if necessary.
2. (Optional) Connect to your Internet Service Provider (ISP) if you want to get a newsfeed from your ISP.
3. (Optional) Set up the Internet Port and Security Configuration section in the Server document for your Lotus Domino NNTP Server in the Public Address Book. If you do change the default settings in the Internet Port and Security Configuration section, you must restart your Lotus Domino NNTP Server task. To restart, type `tell nntp quit` and `load NNTP` at the server console.
4. Set up the NNTP Server section in the Server document for your Lotus Domino NNTP Server.
5. (Optional) Set up each newsfeed in a Connection document.
6. Create private or USENET newsgroups. If you want your Lotus Domino NNTP Server to host existing USENET newsgroups, which reside on a peer NNTP server, you can configure the NNTP server to create these newsgroups automatically during a newsfeed.
7. (Optional) Prepare for and set up a newsfeed to exchange articles with other NNTP servers on the Internet. You can use replication to exchange articles in newsgroups with other Lotus Domino NNTP servers within your organization.
8. Set up newreader clients to connect to your Lotus Domino NNTP Server.

In addition to this, you may want to think about security. It is possible with NNTP on Lotus Domino to control access to newsgroups. Maybe some users should have read-only access to some newsgroups. Maybe you are setting up newsgroups with sensitive information that you don't want all employees to read, and so only some users should be able to read those newsgroups. If you don't trust the network that the information will be travelling, you may want to set up SSL for your NNTP server. For more information on SSL and security, refer to 8.6, "Secure Socket Layer (SSL)" on page 201.

10.3.3 Starting and Stopping the NNTP Server Task

There are three options for starting the NNTP server:

- If you selected NNTP when you installed Lotus Domino, the NNTP server task will be automatically activated.
- If you did not select NNTP when you installed Lotus Domino, you may start it manually using the following command at the server console:

```
load nntp
```

- To start the NNTP server task automatically at Lotus Domino Server startup, add NNTP to the `ServerTasks` entry in `notes.ini`. For example:

```
ServerTasks=NNTP, REPLICICA, ROUTER, UPDATE, ...
```

You can verify that the NNTP server is running by using the command `show tasks` at the server console. The output should include a few lines similar to these:

```
NNTP Server      Scheduler
NNTP Server      Listen for connect requests on TCP Port:119
NNTP Server      Control task
```

To shut down the NNTP server, you have two options:

- Shut it down manually by executing the command `tell nntp quit` at the server console.
- Deactivate the automatic startup by removing NNTP from the `ServerTasks` entry in `notes.ini`, and then restart the Lotus Domino Server.

10.3.4 Creating a Private Newsgroup

To create a new private newsgroup you must be logged in as a user with the authority to create databases. A newsgroup is a Lotus Domino database, and each newsgroup is its own database. Follow these steps to create the newsgroup `itso.redbooks.aix.domino` on server `ah1610g/ibm`:

1. From the Lotus Notes Workspace, choose **File -> Database -> New...** to create the new newsgroup database.
2. In the server field, select **ah1610g/ibm**.
3. As the title of the database, enter `itso.redbooks.aix.domino`.
4. In the file name field, enter `nntp/itso.redbooks.aix.domino.nsf`.
5. Select server **ah1610g/ibm** as the template server, and highlight the template **NNTP Discussion (R4.6)**. Your window should now look similar to the one in Figure 246.

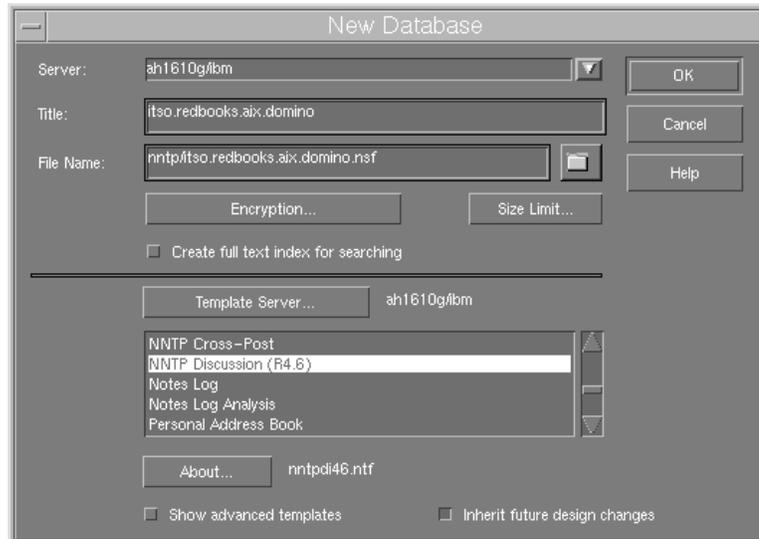


Figure 246. Create a New Newsgroup Database

6. Click **OK** to create the database. It might take a little while before you see the next window.
7. The next window you should see is the Database Profile window for the database you just created (see Figure 247 on page 292). There might also be an About... window popping up, but it is safe to close it down. Verify that the settings are the ones you entered when you created the database. The Database Profile Editor field will be filled in with the creator of the database. You might want to add people or groups to this field. When you're done, click on **Save and Close**.

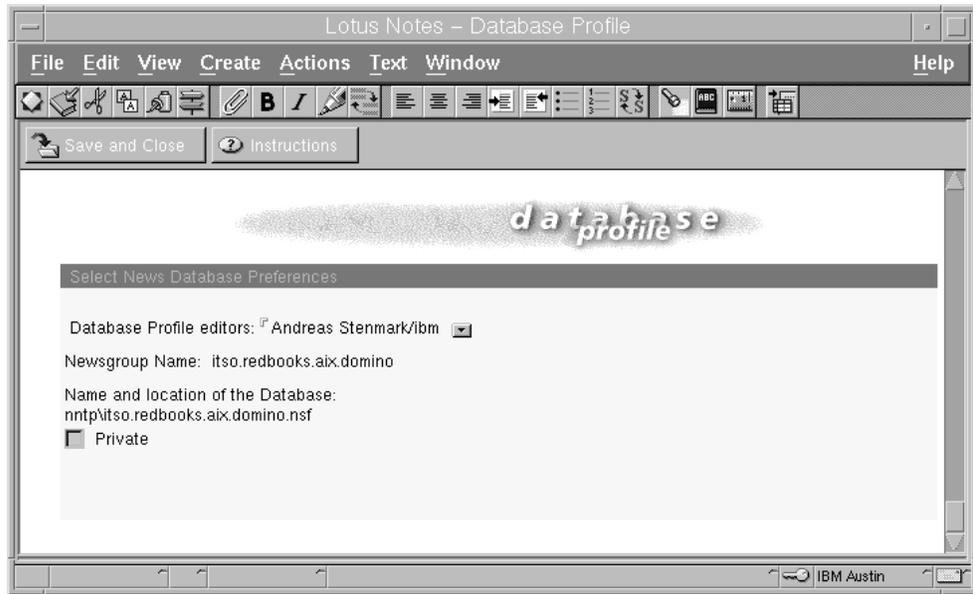


Figure 247. Edit the New Newsgroup Database Profile

Congratulations! Your newsgroup has been created, and you can start posting news articles to it. If the NNTP server task is running, NNTP clients can also connect and post news articles at this time.

Note

If you create the newsgroup from a Lotus Notes client and not on the server, the newsgroup may not be visible to NNTP clients and remote NNTP servers for up to two hours. To make the newsgroup immediately visible, type `tell nntp quit` and then `load nntp` to stop and then restart the NNTP server.

It is also possible to create a new private newsgroup from the server console. See the *Lotus Domino Administration Help* database for details.

10.3.5 Removing a Private Newsgroup

Removing a private newsgroup is no more difficult than removing any other Lotus Domino database. Follow these instructions:

1. From the Lotus Notes Workspace, select the newsgroup database you wish to delete, and choose **File -> Database -> Delete....**
2. A window will appear, similar to the one in Figure 248 on page 293. Verify that the database name and the server are correct for the database you want to delete, and click **Yes** to delete it permanently. Click **No** if you do not wish to delete this database.

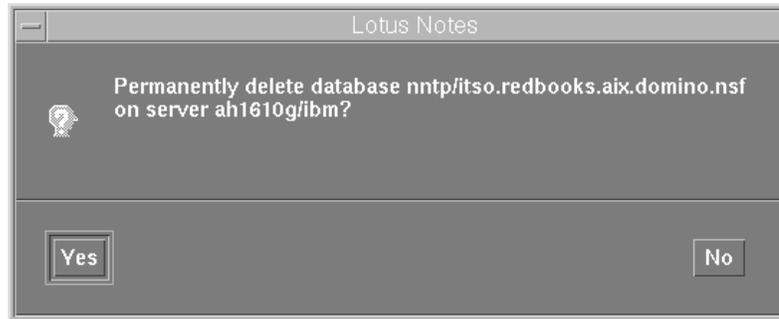


Figure 248. Confirm or Deny Removal of Database

If you clicked Yes, the database will be removed from the workspace and from disk. NNTP clients can no longer use this newsgroup.

10.3.6 Configuring a Newsfeed

With Lotus Domino, there are four types of newsfeeds: Accept, Push, Pull, and Pull-Push. A push newsfeed allows your Lotus Domino Server to connect to a remote NNTP server and send new articles to that server. A pull newsfeed connects to a remote NNTP server and requests new articles from that server. A pull-push newsfeed will copy articles in both directions. If you want another NNTP server to be able to initiate a push newsfeed to your server, you need to set up an accept newsfeed. In this section, we will describe how to set up your Lotus Domino NNTP Server to do accept and push newsfeeds. Setting up the remaining newsfeed (pull and pull-push) is similar to setting up the push newsfeed. Refer to your Lotus Domino documentation for more information.

Note

Access control lists for newsgroups are not distributed through an NNTP newsfeed. If you include private newsgroups in a newsfeed, you must trust the remote NNTP server to enforce the access control policy. To enforce access control for private newsgroups within your organization, you should use Lotus Domino replication instead of an NNTP newsfeed.

10.3.6.1 Accepting Incoming Newsfeeds

This example assumes that you have a direct connection, through a firewall or otherwise, to the remote NNTP server. If you are connecting to the remote server in any other way, please refer to the *Lotus Domino Administration Help* database for more details.

1. As an Lotus Domino administrator, open the **Public Address Book** and select the **Server Connections** view.
2. Click on the **Add Connection** button.
3. In the Connection Type field, select **News/NNTP Feed**.
4. In the Source server field, specify the Lotus Domino NNTP Server name, for example ah1610g/ibm.
5. In the Connect via field, select **Direct connection**.
6. In the Destination Server field, enter the fully qualified TCP/IP hostname or address of the remote NNTP server. For Accept newsfeeds, this field denotes

the remote host that will be connecting to your NNTP server. In our case, the remote host is noteserv.itsc.austin.ibm.com.

7. In the Newsfeed type field, select **Accept**.
8. In the Authentication field, select **None** or **Password**. The default is None.
Select Password if you require the remote server to authenticate with a name and password to initiate the feed. This setting must be in sync with the authentication options that you select in the Internet Port and Security section of the Server document for your server. For example, if your server does not accept Name & Password authentication over the port that this remote server uses for the newsfeed, then Password authentication is not needed for this feed. If you use Password authentication, the Server document settings take precedence and can prohibit the feed.
9. In the Channel encryption field, select **None** or **SSL**. The default is None.
Select SSL if you require the remote server to connect over the SSL port that you have enabled in the Internet Port and Security section of your Server document. This setting must be in line with the authentication options that you select in the Internet Port and Security section of the Server Document for your server. For example, if your server does not enable an SSL port, then SSL encryption can be required for this feed. If you use SSL encryption, the Server document settings take precedence and can prohibit the feed.
10. In the Create newsgroups field, select **Automatic** or **Manual**.
The default is Automatic. Select Automatic if you want your Lotus Domino NNTP Server to create newsgroups for all groups included in this newsfeed that do not already exist on your server.
Select Manual if you want to manually create all newsgroups on your server.
11. In the Newsgroup subdirectory field, specify the subdirectory in which to store newsgroups created during the newsfeed, for example, nntp. This field only applies if you selected Automatic in step 10. We recommend that you organize your newsgroup databases in one or more subdirectories.
12. In the Connection time limit field, specify the maximum time in minutes this newsfeed can take to complete. Enter 0 for no timeout.
13. In the Newsgroups field, specify which newsgroups you want to send or receive during this feed. Separate multiple entries with commas. The feed includes all articles in each newsgroup specified. You can use wildcards (including *) to describe a set of newsgroups, for example, its.* or *.
14. Verify that the connection is **Enabled** in the Schedule field.
15. Close and save the Connection document.

Figure 249 on page 295 shows an example of how you can fill out the document to accept newsfeeds from the NNTP server on noteserv.itsc.austin.ibm.com.

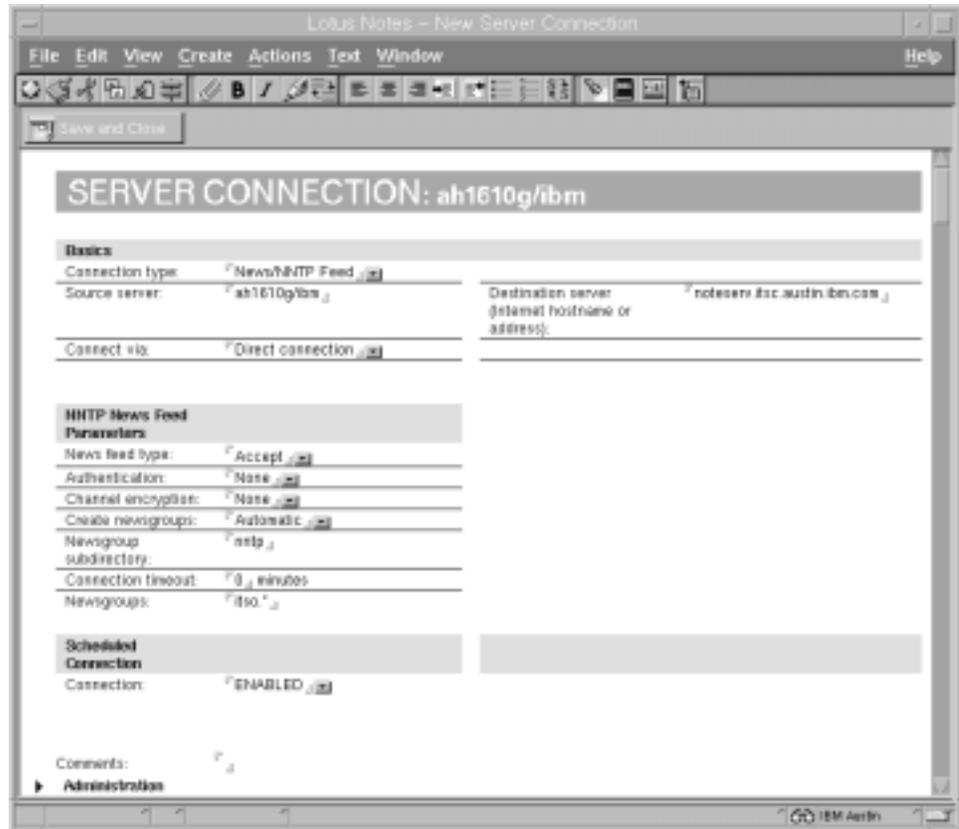


Figure 249. Create a Server Connection for Accepting a Newsfeed

10.3.6.2 Initiating a Push Newsfeed

To initiate a push newsfeed, follow these steps:

1. As an Lotus Domino administrator, open the **Public Address Book** and select the **Server Connections** view.
2. Click on the **Add Connection** button.
3. In the Connection Type field, select **News/NNTP Feed**.
4. In the Source server field, specify the Lotus Domino NNTP Server name, for example, ah1610g/ibm.
5. In the Connect via field, select **Direct connection**.
6. In the Destination Server field, enter the fully qualified TCP/IP hostname or address of the remote NNTP server. For Push newsfeeds, this field denotes the remote host that your Lotus Domino NNTP Server will be connecting to, to send new articles. Our remote host is noteserv.itsc.austin.ibm.com.
7. In the Newsfeed type field, select **Push**.
8. In the Authentication field, select **None** or **Password**. The default is None. Select Password if the remote NNTP server requires you to login with a name and password. You are then prompted for a name and password.
9. If you selected Password in step 8 on page 295 above, you must enter the user name and password that are required to connect to the remote NNTP server.

Note

If you are authenticating with a user name and a password, you should strongly consider encrypting this document with the public keys of the source server and at least one administrator. If you don't, it is possible for a user on your system with read access to the database file to connect to the remote NNTP server and potentially read or destroy sensitive data. You may also want to consider using channel encryption to protect against people listening for the user name and password en route.

10. In the Channel encryption field, select **None** or **SSL**. The default is None. Select SSL if the remote NNTP server requires SSL encryption over the specified NNTP port.
11. In the NNTP port field, select the port number on which the remote NNTP servers listens for connections. The default is 119 for non-SSL ports and 563 for SSL ports.
12. In the Connection time limit field, specify the maximum time in minutes this newsfeed can take to complete. Enter 0 for no timeout.
13. In the Newsgroups field, specify which newsgroups you want to send during this feed. Separate multiple entries with commas. The feed includes all articles in each newsgroup specified. You can use wildcards (including *) to describe a set of newsgroups, for example, itso.* or *.
14. In the Schedule field, select **Enabled**.
15. In the Connect at times field, enter a range of time, for example, 8:00 - 22:00, or specific times (for example, 8:00, 12:00, 16:00) when you want the NNTP server to connect to the remote NNTP server. Separate multiple specific times with a comma.
16. (Optional) If you enter a range of time to connect, then in the Repeat interval of field, enter how soon after a successful connection the NNTP server attempts to connect again. For example, to exchange news once an hour, enter 60 minutes.
17. In the Days of week field, enter the days of the week that you want your Lotus Domino NNTP Server to connect to the remote NNTP server. In our example, we want the server to connect Sunday through Saturday.
18. Close and save the Connection document.

Figure 250 on page 297 shows an example of how you can fill out the document to connect to the NNTP server on noteserv.itsc.austin.ibm.com every hour between 8:00 AM and 10:00 PM, every day of the week.

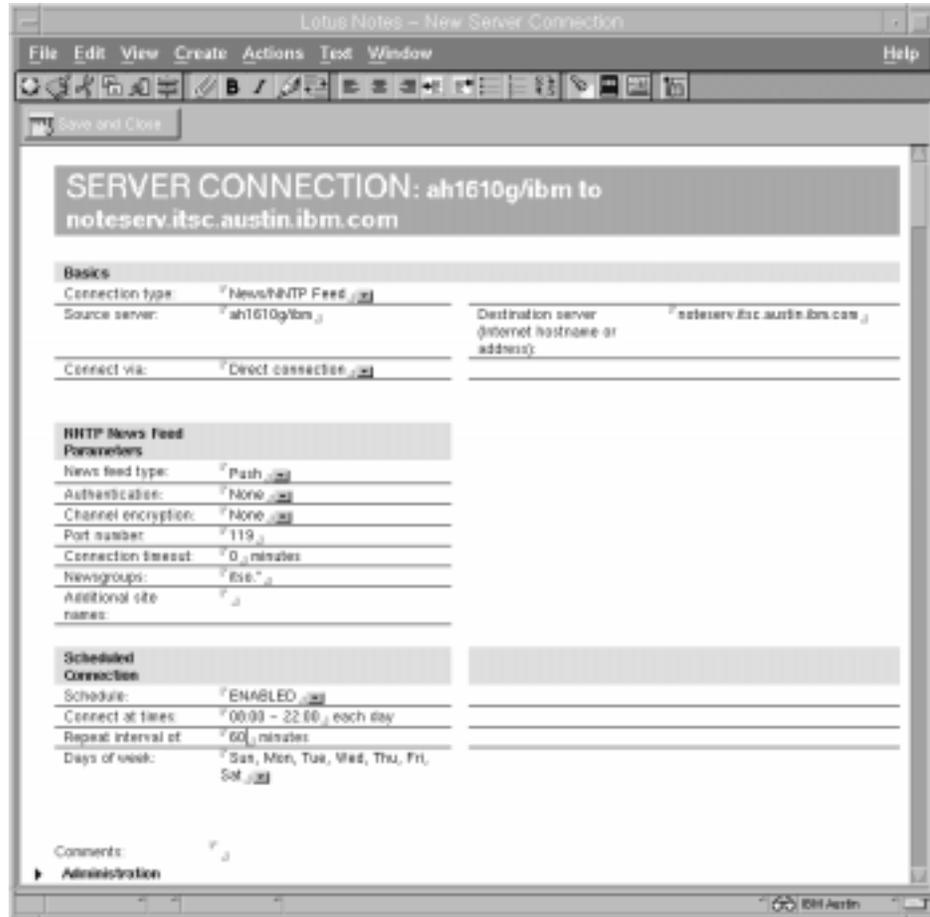


Figure 250. Create a Server Connection for a Push Newsfeed

10.3.7 Control Messages

An NNTP client or newsfeed can send control messages to the Lotus Domino NNTP Server to help coordinate administrative functions, such as creating or removing newsgroups and removing specific news articles from existing newsgroups. You can decide whether or not to act according to the instructions in the control message.

A control message is stored in a unique newsgroup with the prefix "control." For example, control.qwerty, where qwerty is the type of control message. Three of these control groups are created automatically when you start the NNTP server task. Table 13 on page 298 shows these three control messages and their corresponding newsgroups.

Note

If you delete one of the three automatically created control groups, it will be recreated the next time you start the NNTP server task.

Table 13. NNTP Control Messages and Corresponding Newsgroups

Control Message	Newsgroup	Description
newgroup	control.newgroup	Broadcasts the creation of a newsgroup
rmgroup	control.rmgroup	Broadcasts the removal of a newsgroup
cancel	control.cancel	Broadcasts the removal of a single article posted in a newsgroup

To receive, for example, new group messages through a newfeed, you need to add control.newgroup to the Newsgroup field in the NNTP News Feed Parameters section of the Server Connection document. See Figure 251 for an example. A control message sent from a newsreader client is stored in the corresponding newsgroup if it exists. For example, if a newsreader client deletes an article, the delete message is stored in the control.cancel newsgroup.

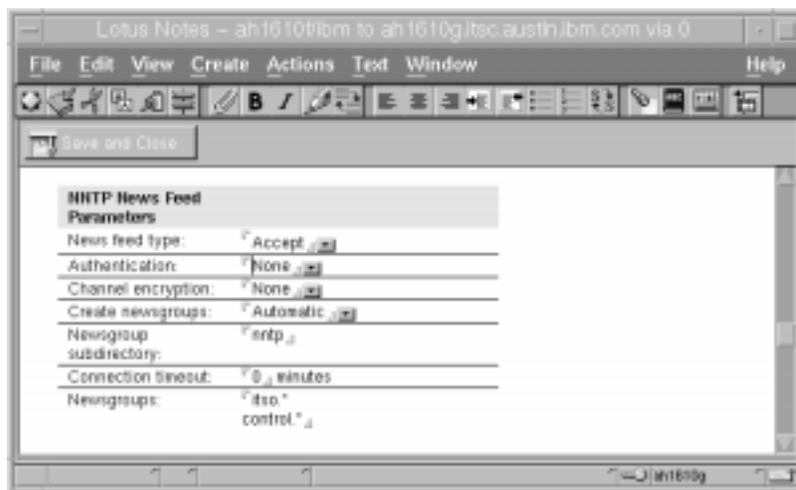


Figure 251. Adding the Control Newsgroups to the Accept Newsfeed

You should regularly review control messages received by your Lotus Domino NNTP Server. You can create an agent in a control newsgroup that sends you an e-mail notification when a control message is received. You can read more about how to set up an agent in the *Lotus Domino Administration Help: Getting Started with Domino*, "Chapter 7 Using Administration Tools".

Responding to Newsgroup Control Messages

When your Lotus Domino NNTP Server receives a newsgroup control message, and you want to subscribe to that newsgroup, include the name of the newsgroup in the Newsgroups field under NNTP News Feed Parameters section in the Server Connection document.

Responding to Rmgroup Control Messages

When you Lotus Domino NNTP Server receives an rmgroup control message, you might want to manually delete that newsgroup. If you delete newsgroups using a Lotus Notes Designer client, make sure you have Manager with Delete documents access to delete the newsgroup.

10.3.8 Lotus Domino NNTP and USENET

Subscribing to USENET newsfeeds is not significantly different from subscribing to private newsgroups on another NNTP server. You use the same procedures to create connection documents, although you might have to contact your Internet Service Provider to get its permission to poll for news at their server. However, if you are planning on subscribing to many newsgroups, you should take into consideration that it can require significant system resources. You might want to have one or more Lotus Domino NNTP servers dedicated to USENET feeds. Consider the following before configuring a USENET newsfeed:

- Disk space** The Lotus Domino NNTP Server on which you download USENET newsgroups should have adequate disk space to handle your newsfeed. Consider the number of newsgroups in your feed and how often articles in the newsgroups are archived to free up space. The daily volume of a full USENET newsfeed is approximately 5 GB of data.
- Throughput** A USENET newsfeed can transfer gigabytes of data across the network. Ensure that your Internet connection has the bandwidth to accommodate newsfeeds without disrupting other traffic on the network.
- Activity** Consider the number of users you expect to access your Lotus Domino NNTP Server and configure adequate CPU and memory resources.

10.3.9 Setting Up an NNTP Client

The exact procedure to set up an NNTP client will of course depend upon which client you are setting up. They all differ slightly in how they are configured, but in this section, we will tell you the minimum amount of information that is required. We will also provide an example of setting up Netscape Navigator as a client for the Lotus Domino NNTP server.

10.3.9.1 Required Information

The following information is required when setting up an NNTP client:

- The TCP/IP host name of the host running the Lotus Domino NNTP Server task, for example ah1610g.itsc.austin.ibm.com
- The TCP/IP port number, if the NNTP server is using a non-standard port. The standard port number is 119, and for SSL it is 563.
- Whether the NNTP server requires secure connections through SSL or not.

In addition, you may want to know the following:

- The user name and password required to access the NNTP server, if the server is using access control.
- The TCP/IP host name of the host acting as an SMTP server for outbound mail, in case you want to make personal follow-ups to news articles.

10.3.9.2 Setting Up the Netscape Navigator NNTP Client Software

If you have all the information listed in the previous section, you have all you need to set up Netscape Navigator as an NNTP client:

1. From the main browser window, select **Edit -> Preferences...** to open the preferences window.
2. Expand the **Mail & Groups** subtree and select the **Groups Server** settings dialog.
3. In the Discussion groups server field, enter the TCP/IP host name of the Lotus Domino Server that will act as your NNTP server.
4. If you changed the port number settings in the Lotus Domino Server document, you also have to change the port settings in the Port field accordingly. Otherwise, you just accept the default number of 119.
5. If your Lotus Domino NNTP Server is set up to accept SSL connections, you may check the Security checkbox. If you do, Netscape Navigator will attempt to connect to the NNTP server over a secure SSL connection. Your window might look something like the one shown in Figure 252.

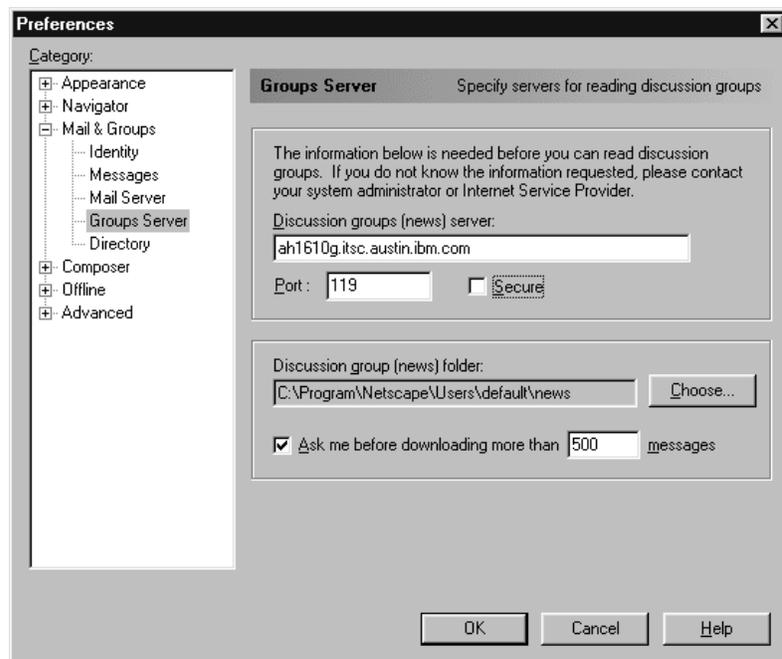


Figure 252. Netscape Navigator Groups Server Preferences

6. When you are done filling out the form, click **OK** to exit the preferences window.
7. To test your new settings, make sure that the NNTP server task is running on your Lotus Domino Server, and then select **Communicator - Collabra Discussion Groups**.
8. Select your NNTP server and click on the **Subscribe** button to open the Subscribe window. From there, subscribe to all newsgroups that you want and click **OK** to get back to the Netscape Message Center.

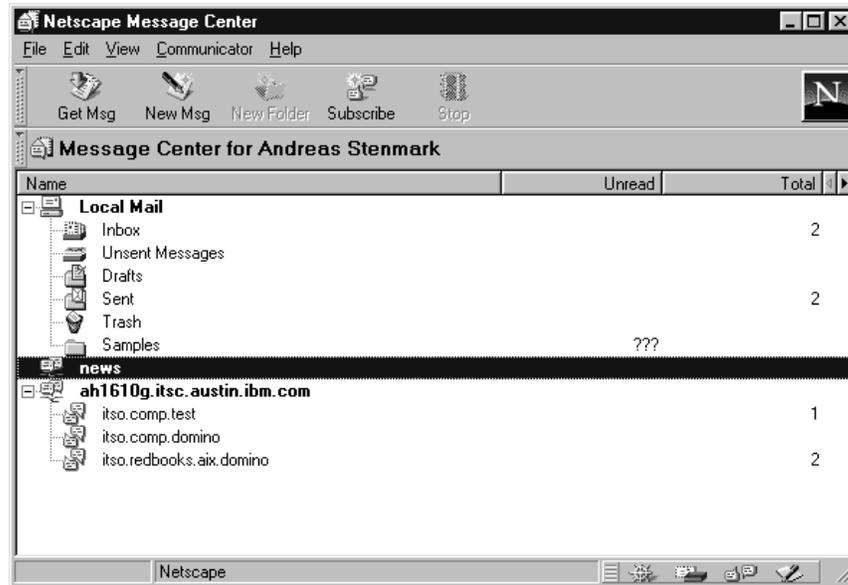


Figure 253. Connection to the Lotus Domino NNTP Server Using Netscape Navigator

Depending on which and how many private newsgroups you are subscribed to, your Netscape Collabra window should look something like Figure 253.

10.4 LDAP

People and businesses are increasingly relying on networked computer systems to support distributed applications. These distributed applications might interact with computers on the same local area network (LAN), within a corporate intranet, or anywhere on the worldwide Internet. Information describing the various users, applications, files, printers, and other resources accessible from a network is often collected into a special database, sometimes called a directory. The Lightweight Directory Access Protocol (LDAP) is an Internet standard protocol that has evolved to meet the needs of sharing information in a directory between computers that might be on different networks, using different operating systems and different applications. LDAP is quickly gaining wide acceptance as the directory access method of the Internet and is, therefore, also becoming strategic within corporate intranets. It is being supported by a growing number of software vendors and included in a growing number of software applications.

10.4.1 Lotus Domino and LDAP

Beginning with Lotus Domino Release 4.6, Lotus Domino incorporates an LDAP service that allows any LDAP clients to access the information in the Public Address Book. Lotus Domino Release 4.6 supports LDAP version 2, and attributes defined by the Lightweight Internet Person Schema (LIPS), a related standard. Full search access is provided to the Groups and People parts of the address book. Update operations are supported from the Lotus Notes client only. The LDAP server in Lotus Domino supports SSL, storage of X.509v3 certificates and referrals. A Lotus Domino LDAP server can also act as a gateway for Lotus Notes clients to other (possibly not using Lotus Domino) LDAP services, perhaps on the intranet.

In this section, we will describe the basic procedures to set up a Lotus Domino Server as an LDAP server, sharing the Groups and People parts of the Public Address Book. It is beyond the scope of this book to describe the LDAP protocol in detail, as well as describing the more advanced features of the Lotus Domino LDAP server. For more information on LDAP in general, please refer to the IBM Redbook *Understanding LDAP*, SG24-4986. If you need more details on how to configure LDAP on Lotus Domino, please refer to the *Lotus Domino Administration Help* database.

10.4.2 Installation and Configuration

The Lotus Domino LDAP server task is automatically installed when you install Lotus Domino Release 4.6. There is no need to install additional software to enable Lotus Domino to function as an LDAP server. There is also very little extra configuration needed. The following is a quick overview of the steps involved in turning Lotus Domino into an LDAP server:

1. Configure LDAP server security, including who is authorized to access the directory, and whether or not you want encrypted and signed transfers.
2. Edit or add the Server Domain Configuration document to configure client interaction with the LDAP server.
3. Specify a default Global Domain document, which the LDAP server can use to form Internet addresses.
4. (Recommended) Create a full-text index of the Public Address Book to facilitate quick LDAP client searches.
5. Load the LDAP server task.
6. Configure LDAP clients to connect to the LDAP server.
7. (Optional) Create Directory Assistance documents for LDAP servers in the Master Address Book. This step lets Lotus Notes users access the servers through a gateway or refer LDAP clients to these servers.

10.4.2.1 Configuring Anonymous Access and Client Interaction

This is how to configure the LDAP server to allow anonymous client access, as well as other parameters for the LDAP server.

1. Open the Public Address Book and choose **View -> Server -> Configurations**.
2. Do one of the following:
 - If a Domain Configuration document exists for all servers in the domain, select it and click **Edit Configuration**.
 - If a Domain Configuration document doesn't exist for all servers in the domain, choose **Create -> Server -> Domain Configuration**.
3. Locate the LDAP Configuration section.
4. Click **Choose fields that anonymous users can query via LDAP**, and select the fields in Person and Group documents that anonymous LDAP users can access. An LDAP client connecting anonymously can query and retrieve any of the selected fields, assuming the client supports them. By default, anonymous LDAP clients can access these fields:
 - Person document: FirstName, FullName, LastName, MailAddress, ShortName

- Group document: ListName, Members

Note

This is the procedure used to control access to the Public Address Book for LDAP clients. You do not use access control lists (ACLs).

5. In the Timeout field, specify the maximum time in seconds allowed for LDAP client queries. The default of 0 means that LDAP client queries can take an unlimited amount of time.
6. In the Maximum number of entries returned field, set the maximum number of field entries servers can return to LDAP clients. The default of 0 means that the LDAP server can return an unlimited number of entries.
7. In the Minimum characters for wildcard search field, specify the minimum number of characters that users must specify before the first wildcard in a search query. The default is 1.
8. Your document should look similar to the one in Figure 254 on page 304. Save the Domain Configuration document when you are done.

Note

The settings in this document will affect all LDAP servers in the Lotus Domino domain.

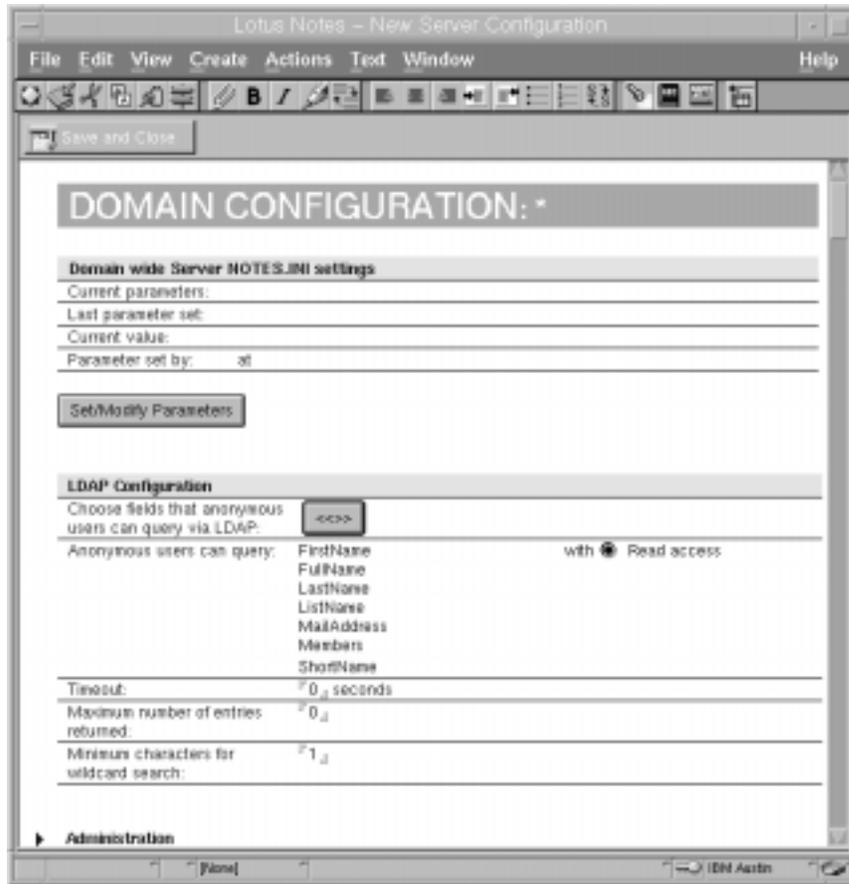


Figure 254. Server Domain Configuration, LDAP Settings

10.4.2.2 Specifying the Global Domain Document

You will need a Global Domain document for your Lotus Domino domain to allow the LDAP server to figure out the Internet mail addresses for the people in the address book. If you already configured an SMTP MTA for your domain as in section 10.1, "SMTP" on page 265, you already have a Global Domain document. If you have more than one Global Domain document, you need to specify one as the default, so that the LDAP server knows which one to use. We will not go into detail on how to configure the Global Domain document in this section. You can see one example of how to fill out the document in Figure 255. For a more detailed description, please refer to section 10.1.6, "Global Domain Document" on page 275 earlier in this chapter.

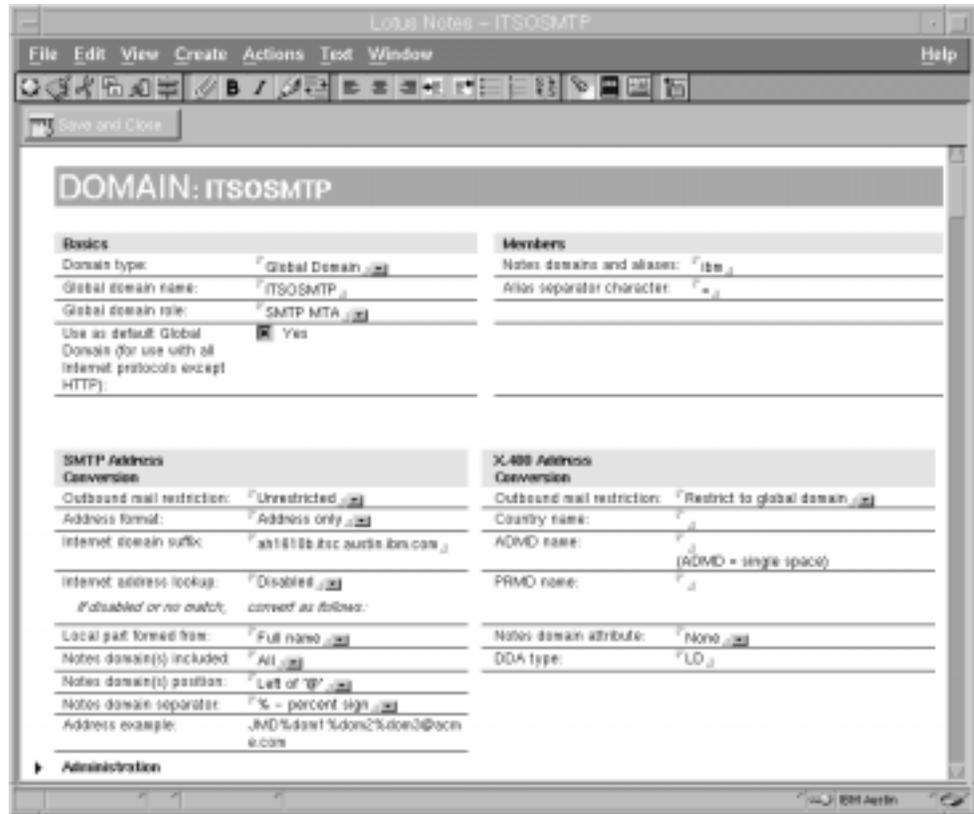


Figure 255. The Default Global Domain Document

10.4.2.3 Creating a Full-Text Index

Creating a full text index for the Public Address Book requires Designer access to that database.

1. From the server administration panel, click **Database Tools**.
2. In the Server box, select the server that stores the database, for example, ah1610g/ibm.
3. In the Databases box, select the Public Address Book from the list; in our case, it is called ibm's Address Book.
4. In the Tool box, select **Full Text Index**.
5. (Optional) Select one or more of the following: Case sensitive index, Index attachments, Index encrypted fields, Exclude words in stop word file. See below for more information on what each one of these check boxes do:

Case sensitive index

When you create a case-sensitive index, Lotus Domino will distinguish between upper and lower case characters in a word, creating a new entry in the index for every different upper and lower case combination. For example, "computer" and "Computer" will appear in the index as two separate words.

Index attachments

This option allows you to index the text in attachments and OLE objects. Only ASCII text is indexed. Compressed attachments will not be indexed.

Index encrypted fields

With this option selected, Lotus Domino will index encrypted fields. Note however that the full text index is unencrypted plain text, and anyone with access to the server can read the file. Be aware that encrypted text may become unencrypted.

Exclude words in stop file

If you use a stop file, you can exclude from the index words that you don't want Lotus Domino to index. For example, you might want to exclude the words a, an, be and to. Choosing this option wisely can reduce the size of the full text index significantly.

6. Below Index breaks, select **Word breaks only**. Your window should now look similar to the one in Figure 256.

7. Click on **Create**.

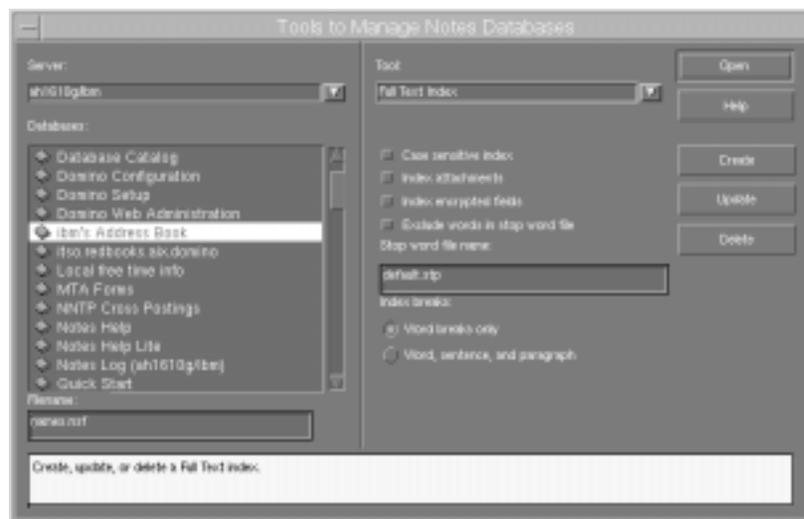


Figure 256. Creating a Full-Text Index for the Public Address Book

10.4.3 Starting and Stopping the LDAP Server Task

There are three options for starting the LDAP server:

- If you selected LDAP when you installed Lotus Domino, the LDAP server task will be automatically activated.
- If you did not select LDAP when you installed Lotus Domino, you may start it manually using the following command at the server console:

```
load ldap
```

- To start the LDAP server task automatically at Lotus Domino Server startup, add LDAP to the `ServerTasks` entry in `notes.ini`. For example:

```
ServerTasks=LDAP, REPLICa, ROUTER, UPDATE, ...
```

You can verify that the LDAP server is running by using the command `show tasks` at the server console. The output should include a few lines similar to these:

```
LDAP Server      Listen for connect requests on TCP Port:389
LDAP Server      Control task
```

To shut down the LDAP server, you have two options:

- Shut it down manually by executing the command `tell ldap quit` at the server console.
- Deactivate the automatic startup by removing LDAP from the `ServerTasks` entry in `notes.ini` and then restarting the Lotus Domino Server.

10.4.4 Granting LDAP Server Access

There are three different access levels in the Lotus Domino LDAP server. Here is a description of them:

Anonymous connections

You can specify whether to allow LDAP clients to connect anonymously. Anonymous clients don't authenticate and you can restrict their access to specific fields in the Public Address Book. This is a way to provide the general public access to the LDAP server. The procedure to do this is described in 10.4.2.1, "Configuring Anonymous Access and Client Interaction" on page 302.

Basic password authentication

The Lotus Domino LDAP server supports basic password client authentication. To enable basic password authentication for an LDAP client, you create a Person document for the client which includes a user name and Internet password. The client then provides the user name and password to access the server. Clients that use basic password authentication can access all fields in Person documents, assuming they have at least Reader access to the Public Address Book.

Secure Sockets Layer

The Lotus Domino LDAP server supports Secure Sockets Layer (SSL) connections. SSL connections provide additional security by encrypting data transferred between client and server, detecting message tampering, and providing certificate authentication. LDAP users using SSL client certificate authentication to connect to the LDAP server can access all fields in Person documents, assuming they have at least Reader access to the Public Address Book. You must create a Person document in the Public Address Book for an LDAP user to use SSL client certificate authentication. Read more about activating SSL for LDAP in 8.6, "Secure Socket Layer (SSL)" on page 201.

10.4.5 Setting Up an LDAP Client

The exact procedure to set up an LDAP client will of course depend upon which client you are setting up. They all differ slightly in how they are configured. In this section, we will give you enough information to get started setting up any client software. We will also provide an example of setting up Netscape Navigator as a client to the Lotus Domino LDAP server.

10.4.5.1 Required Information

The following information is required when setting up an LDAP client:

- The fully qualified TCP/IP hostname of the host running the Lotus Domino LDAP server task, for example, `ah1610g.itsc.austin.ibm.com`.
- The TCP/IP port number, if the LDAP server is using a non-standard port. The standard port number is 389, and for SSL, it is 636.
- The search root for your queries. For Lotus Domino address books, this is probably the top of the directory tree, for example, `o=IBM,c=US`.

In addition, you may want to know the following:

- The user name and password required to access the LDAP server, if the server is using access control.

10.4.5.2 Setting Up the Netscape Navigator LDAP Client Software

If you have all the information listed in the previous section, you have all you need to set up Netscape Navigator as an LDAP client.

1. From the main browser window, select **Edit -> Preferences...** to open the preferences window.
2. Expand the **Mail & Groups** subtree, and select the **Directory** settings dialog.
3. Click **New...** to add your Lotus Domino LDAP server to the list of directory services.
4. In the Description field, enter any phrase by which you can identify your directory server. For example, ITSO Lotus Domino LDAP Server.
5. In the LDAP Server field, enter the fully qualified host name of the Lotus Domino LDAP server, in our case, ah1610g.itsc.austin.ibm.com.
6. In the Search Root field, enter the search root that you want for your LDAP queries. Normally, you would enter a search root consisting of your organization name and country. In our case, we entered o=ibm,c=us.
7. If you are using a non-standard port number for your LDAP server, enter the correct number in the Port Number field. Otherwise accept the default. If the LDAP server requires clients to use SSL, make sure the Secure checkbox is checked.
8. Your dialog box should now look similar to the one in Figure 257. When you are done, click **OK** to add the server, and then **OK** again to close the Preferences window.

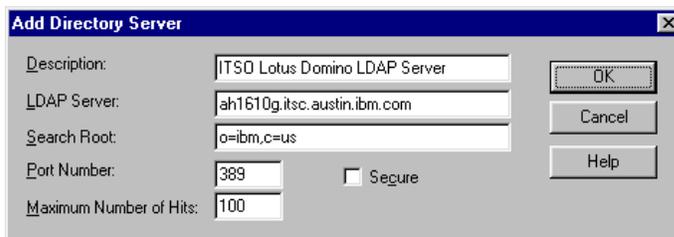


Figure 257. Add a New Directory Server to Netscape Navigator

If you want to test your LDAP client setup, use the following instructions:

1. From the main browser window, select **Edit -> Search Directory** to open the directory search window.
2. In the Search for items drop-down list, select your newly added Lotus Domino LDAP server. (ITSO Lotus Domino LDAP Server)
3. Check that your search type and conditions are **Name** and **Contains**, and then enter a name, or part of a name, of a person that exists in the Public Address Book of the Lotus Domino LDAP server.
4. Click **Search**. If your LDAP server is up and running, you should get one or more hits depending on what you searched for. See Figure 258 for an example of LDAP search.

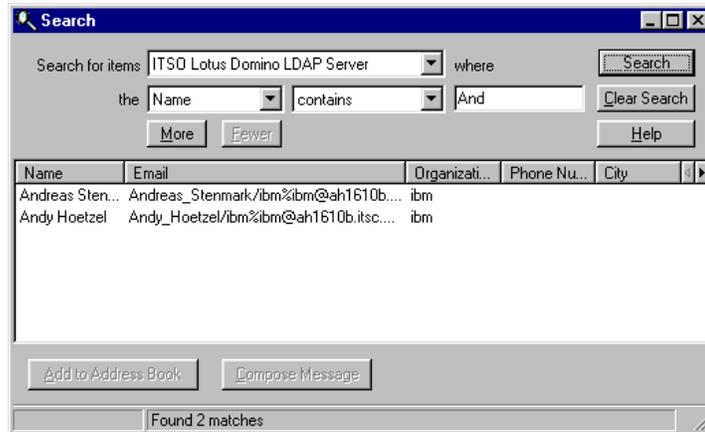


Figure 258. Searching an LDAP Server Using Netscape Navigator

10.5 Using X.PC for Client Connections

The following sections explain how to set up the AIX system so that the Lotus Domino Server can communicate with Lotus Notes clients using the X.PC protocol. These are the three steps required to allow a client to make a modem connection through the X.PC protocol:

- Configuring AIX to allow modem connections, see 10.5.1, “Setting Up the Communication Port (TTY)” on page 309.
- Configuring Lotus Domino to answer the incoming calls, see 10.5.2, “Setting Up the Modem on Lotus Domino” on page 312.
- Installing a remote client, see 10.5.3, “Configuring the Windows 95 Client To Use X.PC” on page 319, for information on how to set up the Windows 95 Lotus Notes client.

10.5.1 Setting Up the Communication Port (TTY)

The steps for the setup of a communication port (tty) are as follows:

1. Log on to the AIX host as root.
2. Make sure that there is at least one free serial port physically available (serial1, serial2).
3. Type `smitty tty` to get into the tty configuration menu (Figure 259 on page 310).

```

TTY

Move cursor to desired item and press Enter

List All Defined TTYS
Add a TTY
Move a TTY to Another Port
Change / Show Characteristics of a TTY
Remove a TTY
Configure a Defined TTY
Generate Error Report
Trace a TTY

F1=Help          F2=Refresh      F3=Cancel      F8=Image
F9=Shell         F10=Exit       Enter=Do

```

Figure 259. smitty's TTY Screen

4. Select **Add a TTY** (Figure 259) to add a new serial device to the system's configuration and press **Enter**.

```

TTY Type

Move cursor to desired item and press Enter.

tty rs232 Asynchronous Terminal
tty rs422 Asynchronous Terminal

F1=Help          F2=Refresh      F3=Cancel
F8=Image         F10=Exit       Enter=Do
/=Find          n=Find Next

```

Figure 260. smitty's Select the TTY Port Type

5. Select with the cursor **tty rs232 Asynchronous Terminal** (Figure 260) for an asynchronous connection to the modem and press **Enter**.

```

Parent Adapter

Move cursor to desired item and press Enter.

sa0 Available 00-00-S1 Standard I/O Serial Port 1
sa1 Available 00-00-S2 Standard I/O Serial Port 2

F1=Help          F2=Refresh      F3=Cancel
F8=Image         F10=Exit       Enter=Do
/=Find          n=Find Next

```

Figure 261. smitty's Select the Serial Adapter

6. Select with the cursor **sa0 Available 00-00-S1 Standard I/O Serial Port 1** (Figure 261) and press **Enter**.

Note

You should select either serial port1 or serial port2. If you have a multi-IO adapter in your system, check if the serial device has full rs232 capability.

```

                                Add a TTY

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

[ TOP]                                [Entry Fields]
TTY type                               tty
TTY interface                           rs232
Description                             Asynchronous Terminal
Parent adapter                           sa0
* PORT number                            [s1]
Enable LOGIN                             disable +
BAUD rate                                [38400] +
PARITY                                    [none] +
BITS per character                        [8] +
Number of STOP BITS                       [1] +
TIME before advancing to next port setting [0] +#
TERMINAL type                             [dumb]
FLOW CONTROL to be used                   [xon] +
OPEN DISCIPLINE to be used                [dtropen] +
[ MORE...28]

F1=Help      F2=Refresh      F3=Cancel      F4=List
F5=Reset     F6=Command     F7=Edit       F8=Image
F9=Shell     F10=Exit        Enter=Do
```

Figure 262. Settings of the TTY

7. Enter the PORT number (you can press **F4** for selection) and also the BAUD rate for the connection to the modem and press **Enter**. See Figure 262.

Note

The Enable LOGIN field must be set to **disable**, otherwise X.PC will not work correctly.

The `smitty` command will return the following COMMAND STATUS (Figure 263) if the device was created successfully:

```

COMMAND STATUS

Command: OK          stdout: yes          stderr: no

Before command completion, additional instructions may appear below.

tty0 Available

F1=Help            F2=Refresh          F3=Cancel          F6=Command
F8=Image           F9=Shell            F10=Exit           /=Find
n=Find Next

```

Figure 263. Command Status OK of Creating a TTY

Alternatively, you can type the following command, for example, using serial port #1:

```
mkdev -c tty -t tty -s rs232 -p sa0 -w s1 -a speed=38400
```

8. Check if the device exists by typing:

```
ls -la /dev/tty<X>
```

/dev/tty<X> is the tty which will be returned after entering the previous command or noted by the COMMAND STATUS screen. For our system, X = 0. Enter:

```
ls -la /dev/tty0
```

```
crw-rw-rw-  1 root    system   16,  0 Feb 05 16:53 /dev/tty0
```

Figure 264. Output of the Command `ls -la /dev/tty0`

On the AIX platform, Lotus Domino communicates through the device file /dev/cua<N>, where <N> corresponds to the Lotus Domino port number.

9. If /dev/cua<N> does not exist on your system, link /dev/cua<N> to the previous configured asynchronous port. For example, to specify port number <N> = 1 and using tty0, type:

```
ln -s /dev/tty0 /dev/cua1
```

10. Enter `ls -la /dev/cua1` (Figure 265).

```
lrwxrwxrwx  1 root    system    9 Feb 05 16:54 /dev/cua1 -> /dev/tty0
```

Figure 265. Output of the Command `ls -la /dev/cua1`

10.5.2 Setting Up the Modem on Lotus Domino

The following steps are required to correctly set up a modem for use on a Lotus Domino Server for AIX:

1. Install the modem on the server's communication port and make sure the operating system recognizes the port.
2. Turn on the modem - consult the documentation that came with the modem for more information on installing a modem.

3. Log in as the server user, for example `notes`.
4. Shut down the Lotus Domino Server if it is running.
5. Start the Lotus Notes workspace by typing the command `notes`.
6. Choose **File => Tools => User Preferences**.
7. Select **Ports** icon (see Figure 266).

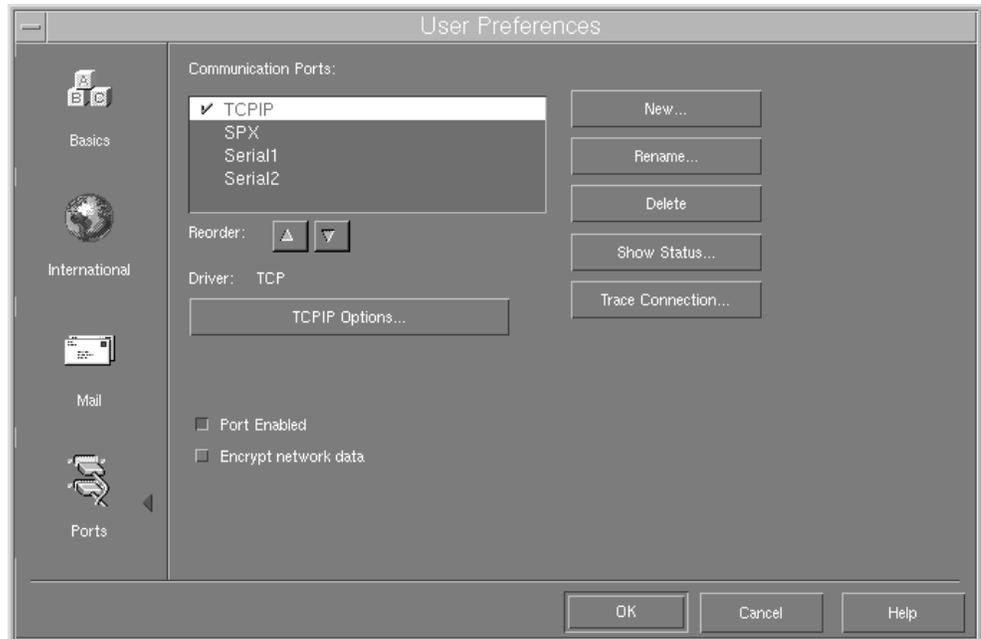


Figure 266. User Preferences

8. Select **Serial1** and click on **Port Enabled** (see Figure 267).
9. (Optional) Select **Encrypt network data** to secure data sent to or received by the server.

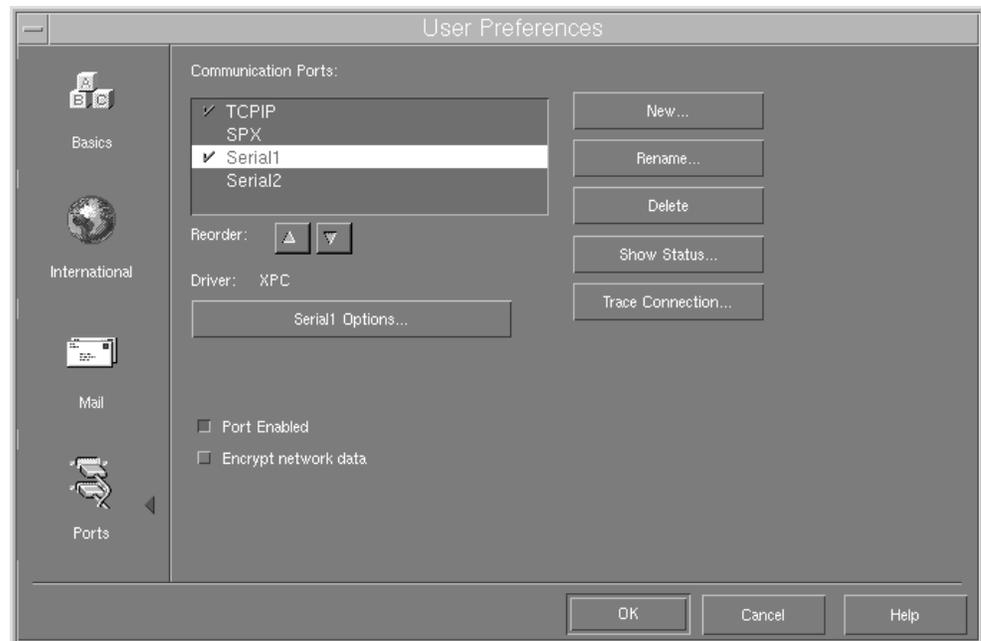


Figure 267. User Preferences, Serial1 Selected

10. Click on **Serial1 Options...**. You should see a dialog similar to the one in Figure 268 on page 314.

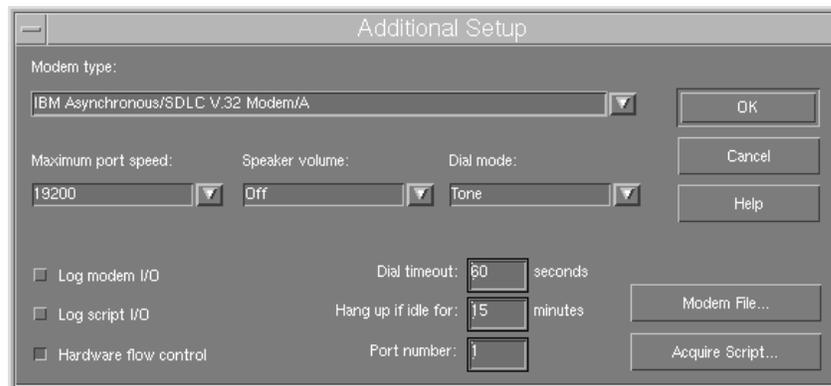


Figure 268. Additional Setup of Serial1

11. Select the Modem type. The default type is Auto Configure.

If you don't know your modem type or if your modem is not on the list, try Auto Configure. The Auto Configure modem command file (auto.mdm) checks the modem's speed and then selects the appropriate generic modem command file.

For more information, review the template.mdm file in the directory /usr/domino/lotus/notes/4613/common/data/nls/C/modems.

12. Select the maximum port speed (default is 19200). Be aware of the configuration of the TTY.

- The maximum port speed is the maximum speed at which the communication port on the computer sends data to the modem and receives data from the modem.
 - The modem carrier speed is the speed at which modems communicate with one another.
 - The modem carrier speed may be lower than the port speed.
 - When using a null modem, the maximum port speed selected on both computers must be identical.
13. Select a volume from the Speaker Volume field (default is Off). Selections are Low, Medium, or High.
14. Select a dial mode in the Dial mode field (default is Tone).
15. Log modem I/O (default is deselected).
Select Log modem I/O to record information about the modem connection in the Lotus Domino Log if you suspect a problem with the modem.
16. Log script I/O (default is deselected).
Select Log script I/O if you are using modem scripts and want to record asynchronous script file responses and replies in the Lotus Domino Log. Use this option if you suspect a problem with a modem script file.
17. Hardware flow control (default is selected for all operating systems except UNIX).
If you do not select Hardware flow control, the modem may generate cyclic redundancy check (CRC) errors and retransmissions. CRC is a form of error detection that Lotus Domino uses to ensure that data is transferred correctly. Deselect Hardware flow control if the modem doesn't support flow control.
18. Dial timeout field (default is 60 seconds).
19. Hang up if idle for (default is 15 minutes).
This field refers to the amount of time the modem waits before hanging up if there is no data passing through the connection. On a port that workstation users dial into, you might want to specify a longer idle time than the default since users may need more time to read or compose long documents. Lotus Domino uses the lower of the settings on the calling and answering computers.
20. Port number (default is the number 1 through 5, entered in the Communication Port field). On our AIX system, specify a port number N that matches the /dev/cuaN device file that you linked to the asynchronous port.
21. If you want to change the modem file, press **Modem File...**, and make any changes in the window that appears (see Figure 269). Click **Done** when finished.

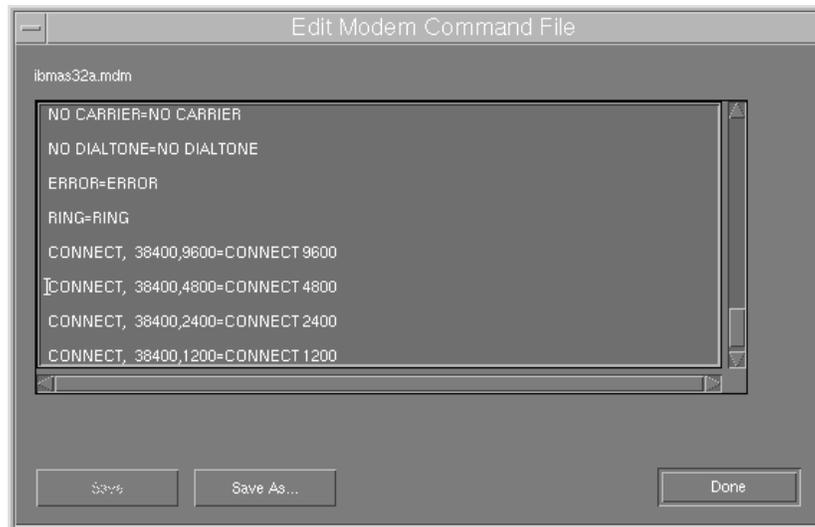


Figure 269. Edit Modem Command File

Modem command files have the file extension `mdm`. If your modem, or if the default modem command file `auto.mdm` does not work, Lotus Domino provides the Generic All-Speed Modem file, `gen_all.mdm`, which you can modify. For information on modem command files and instructions on modifying them, please read the `template.mdm` file.

Note

All default modem files reside in `/usr/domino/lotus/notes/4613/common/data/nls/C/modems`. They will be copied for every Lotus Notes user into `$HOME/notesr4/modems`.

22. To associate an acquire script with the current port, select **Acquire Script**, select a script file to use, and click on **OK**.
23. Click **OK** in the Additional Setup dialog (see Figure 268 on page 314) to save the information you have entered.
24. To check the connection status, click on **Show Status...** in the dialog shown in Figure 267 on page 314. You will get output that looks similar to the dialog in Figure 270 on page 317. If you haven't saved the port settings yet, your status output might look slightly different. When you're done with this dialog, click **Cancel**.



Figure 270. Show Status of Connection

Lotus Domino also records the information for the communication port in the Miscellaneous Events and Phone Calls views of the Lotus Domino Log, log.nsf.

Table 14 explains these entries to the Lotus Domino Log:

Table 14. Name and Description as Shown in the log.nsf Database

Name	Description
Bit per second connection (port speed)	The speed at which the server's port is communicating with the modem.
Bit per second connection (carrier speed)	The speed at which the server's modem is communicating with the other modem.
Currently active sessions	Number of users or servers currently connected to the server.
User messages sent	Number of transmit requests issued by the user for one or more packets.
User messages received	Number of transmit requests issued by the sender for one or more packets.
User bytes sent	Number of bytes sent from this port.
User bytes received	Number of bytes received on this port.
Retransmitted packets	The number of packets retransmitted because of errors. Use this statistic to check remote transmissions. A high number (more than one per minute) indicates a problem that will adversely affect performance. Use Hardware flow control, if supported, or choose a lower port speed.

Name	Description
CRC errors detected	The number of cyclic redundancy check (CRC) errors. The CRC errors mean that the CRC included in the frame is not consistent with the actual number of bits in the frame. Such errors slow transmission speed.
Port errors detected	Port errors on this port indicates operating system port driver buffer overflow or possible parity errors.

25. Click on **OK** in the User Preferences window (see Figure 267 on page 314) to save the current port setup.

26. Restart the Lotus Domino Server so that it listens to incoming phone calls on the port.

You may get other messages after starting the server if Log modem I/O and Log script I/O (Figure 268 on page 314) are active:

Note

If a Lotus Notes Workstation is also running, these messages will be written to the Lotus Domino log file.

```

Lotus Domino (c) Server, Release 4.6.1c (Intl), 4 May 1998
Copyright (c) 1985-1998, Lotus Development Corporation, All Rights Reserved

02/05/96 04:55:05 PM Server entry in Name and Address database does not contain any
information for port TCP/IP
02/05/96 04:55:10 PM Database Replicator started
02/05/96 04:55:11 PM Seriall: End of script file or END command reached
02/05/96 04:55:13 PM Mail Router started for domain ibm
02/05/96 04:55:14 PM Seriall: Send to Modem: +++ (1200 bits per second)
02/05/96 04:55:16 PM Seriall: Send to Modem: ATEOV1 (1200 bits per second)
02/05/96 04:55:16 PM Seriall: Receive from Modem: ATEOV1
02/05/96 04:55:16 PM Seriall: Receive from Modem: OK
02/05/96 04:55:16 PM Seriall: Send to Modem: ATH0 (19200 bits per second)
02/05/96 04:55:17 PM Seriall: Receive from Modem: OK
02/05/96 04:55:17 PM Seriall: Send to Modem: AT&F0 (19200 bits per second)
02/05/96 04:55:17 PM Seriall: Receive from Modem: OK
02/05/96 04:55:17 PM Seriall: Send to Modem: ATEOV1 (19200 bits per second)
02/05/96 04:55:17 PM Seriall: Receive from Modem: OK
02/05/96 04:55:17 PM Seriall: Receive from Modem: OK
02/05/96 04:55:18 PM Seriall: Send to Modem: ATN1Q0W1X4&C1&D3 (19200 bits per second)
02/05/96 04:55:18 PM Seriall: Receive from Modem: OK
02/05/96 04:55:18 PM Seriall: Send to Modem: ATMLL2 (19200 bits per second)
02/05/96 04:55:18 PM Seriall: Receive from Modem: OK
02/05/96 04:55:18 PM Index update process started
02/05/96 04:55:18 PM Seriall: Send to Modem: AT&K3&R0 (19200 bits per second)
02/05/96 04:55:19 PM Seriall: Receive from Modem: OK
02/05/96 04:55:29 PM Agent Manager started
02/05/96 04:55:34 PM Administration Process started
02/05/96 04:55:35 PM Searching Administration Requests database for new and modified
admin requests.
02/05/96 04:55:39 PM AMgr: Executive '1' started
02/05/96 04:55:40 PM Database Server started

```

and after a ring signal:

```

> 02/05/96 05:01:36 PM Seriall: Receive from Modem: RING
02/05/96 05:01:36 PM Seriall: Send to Modem: ATA (19200 bits per second)
02/05/96 05:01:46 PM Seriall: Receive from Modem: CARRIER 14400
02/05/96 05:01:47 PM Seriall: Receive from Modem: PROTOCOL: LAP-M
02/05/96 05:01:47 PM Seriall: Receive from Modem: CONNECT 19200
02/05/96 05:01:48 PM Seriall: 19200 bits per second connection established

```

After an X.PC connection is established the icon in the lower left corner of the Lotus Notes Workstation screen will look like the one in Figure 271:

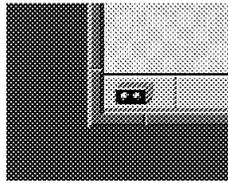


Figure 271. X.PC Connection Established

If there is also a network connection active (TCP/IP, SPX/IPX), the icon will look like the one in Figure 272:

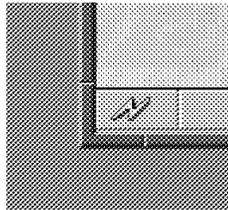


Figure 272. Network Connection (TCP/IP, SPX/IPX) Active

10.5.3 Configuring the Windows 95 Client To Use X.PC

The first time, after installation, you launch the Lotus Notes Windows 95 client, you will see the Lotus Notes Workstation Setup screen (Figure 273):

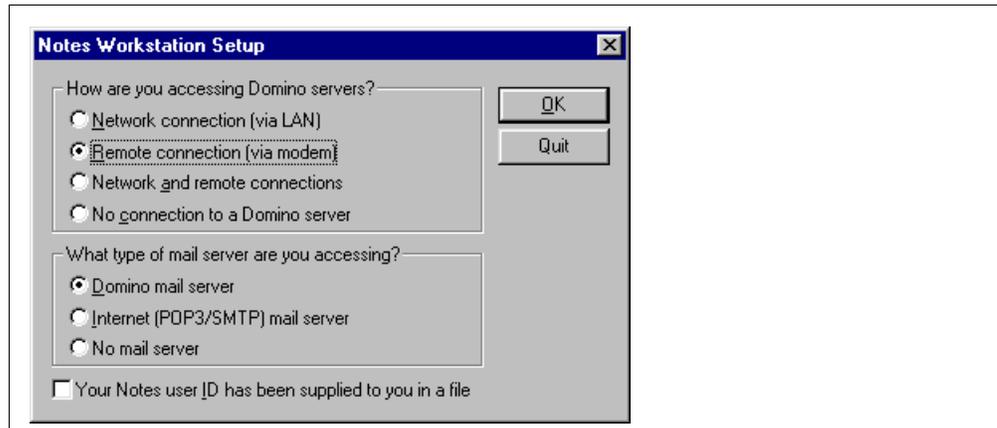


Figure 273. Workstation Setup for DOS/Windows Client

1. Select **Remote connection (via modem)** and click **OK**. Your next dialog is shown in Figure 274.

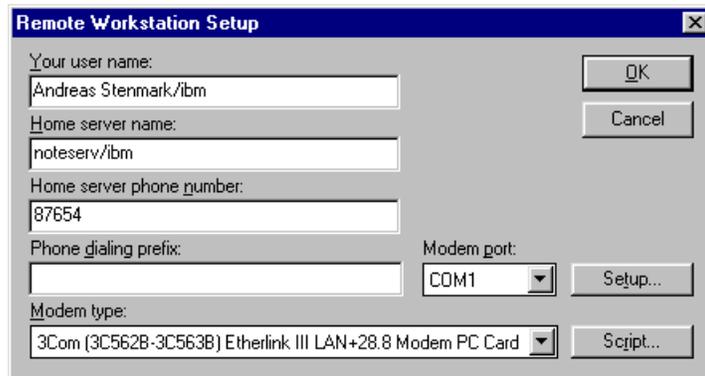


Figure 274. Remote Workstation Setup

2. Enter the complete user name in the Your user name field.
3. Enter the name for the Lotus Domino Server in the Home server name box, for example noteserv/ibm.
4. Enter the phone number of your server in the Home server phone number box.
5. If you are using dialing prefixes, enter them in the Phone dialing prefix box.
6. Select the port to which you have attached the modem.
7. Select the Modem type.
8. Click on **OK**.

The Workstation will dial up the server, connect, and ask for the password defined by the Lotus Domino administrator.

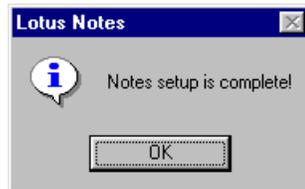


Figure 275. Remote Workstation Setup Finished

9. After the setup process has finished, click **OK** (Figure 275 on page 320). The Lotus Notes Client setup is finished, and your workspace should appear on the screen, similar to Figure 276.

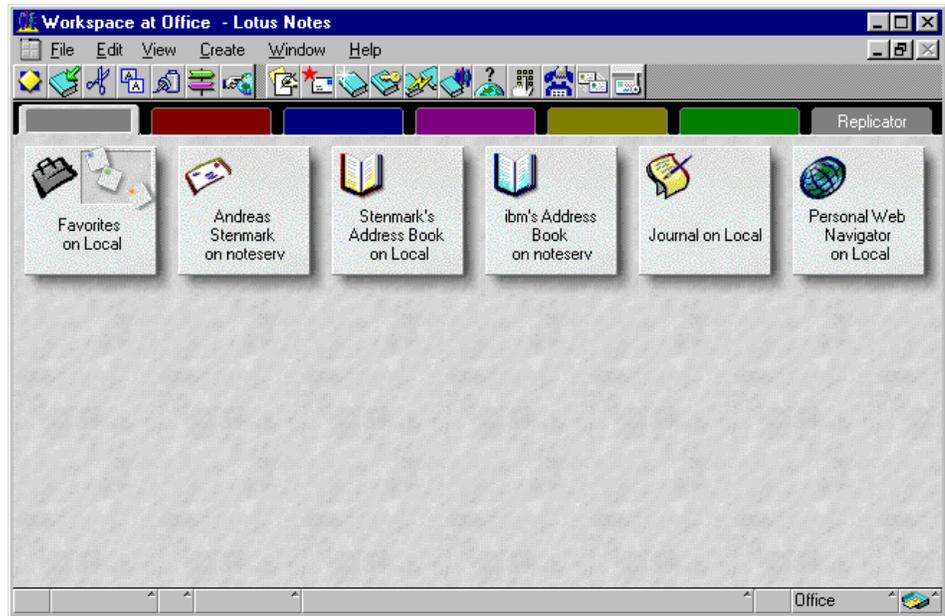


Figure 276. Screen Lotus Notes - Workspace on the Client

10.6 Using PPP for Client Connections

The asynchronous Point-to-Point Protocol (PPP) subsystem provides a standard method for transporting multiprotocol datagrams over point-to-point media, such as a serial link between two modems. If you already have TCP/IP configured for your Lotus Domino Server, you don't need to do any additional setup on the Lotus Domino side to prepare for PPP. You do, however, need to set up PPP on the AIX side. Following the instructions in this section, you should be able to set up your AIX host as a PPP server with one or more modems.

An AIX system can act as both a client and a server. In this chapter, we only discuss the server part of PPP on AIX.

1. Log on to the AIX host as root.
2. Use the `lsppp -l bos.net.ppp` command to check if the following software is installed:

```
bos.net.ppp          4.3.1.0  COMMITTED  Async Point to Point Protocol
```

Note

You must have at least AIX version 4.1.4 or greater installed.

3. Create a TTY. Please refer to 10.5.1, "Setting Up the Communication Port (TTY)" on page 309, steps 1 on page 309 through step 7 on page 311. The only parameter you have to change is the Enable LOGIN field. This option must be set to **share**. Check also if the BAUD rate is correct.
4. Create a PPP user to give a PPP client access to your system by typing the following command: `mkuser gecos="PPP client user" pppuser`

Note

You may add a separate user ID and password for each remote PPP client.

5. Define a password for user *pppuser* by issuing the command `pwdadm pppuser`

6. Confirm the password by typing:

```
login pppuser
```

and change the password requested.

7. Add the following line in the `.profile` file located in `$HOME`:

```
exec /usr/sbin/pppattachd server 2>/dev/null
```

8. Change user ID back to root by typing:

```
su - root
```

9. To configure the Asynchronous Point-to-Point Protocol, use the `smit` fastpath:
`smit` `ppp` (Figure 277).

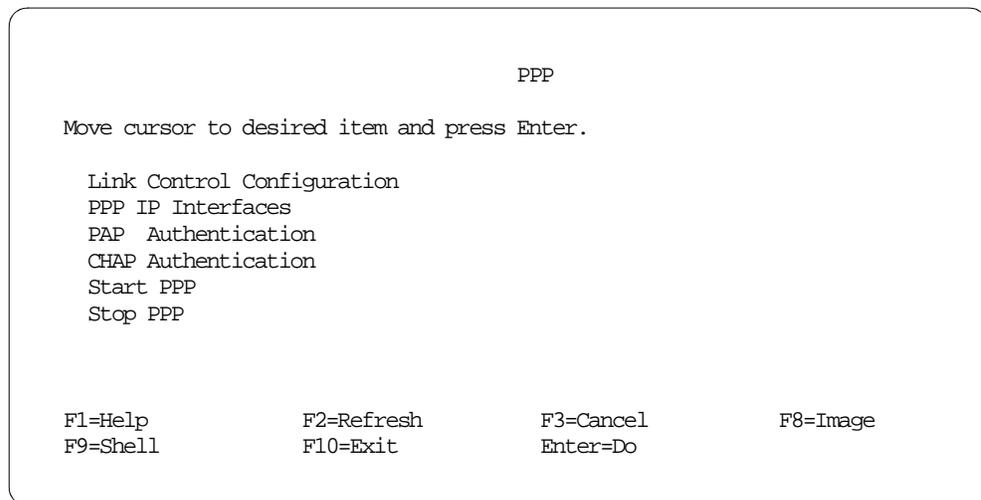


Figure 277. *smitty's PPP Screen*

10. Select with the cursor **Link Control Configuration** to configure the link control stored in the file `/etc/ppp/lcp_config` and press **Enter**.

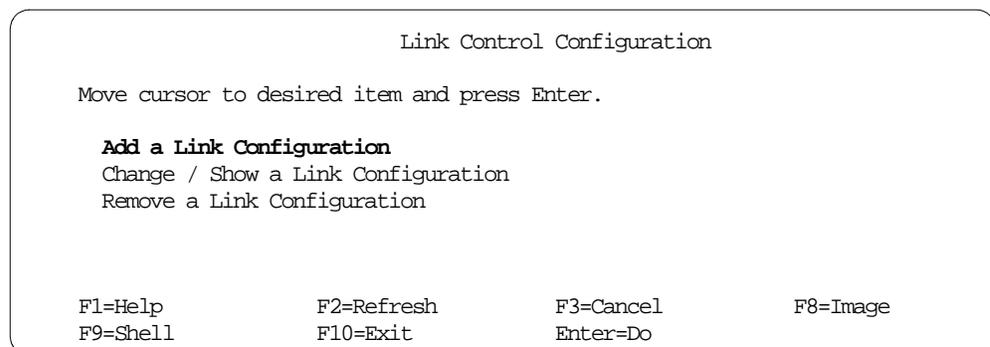


Figure 278. *smitty's PPP Link Control Configuration Screen*

- To create a new /etc/ppp/lcp_config file select with the cursor **Add a Link Configuration** (as shown in Figure 278 on page 322) and press **Enter**.

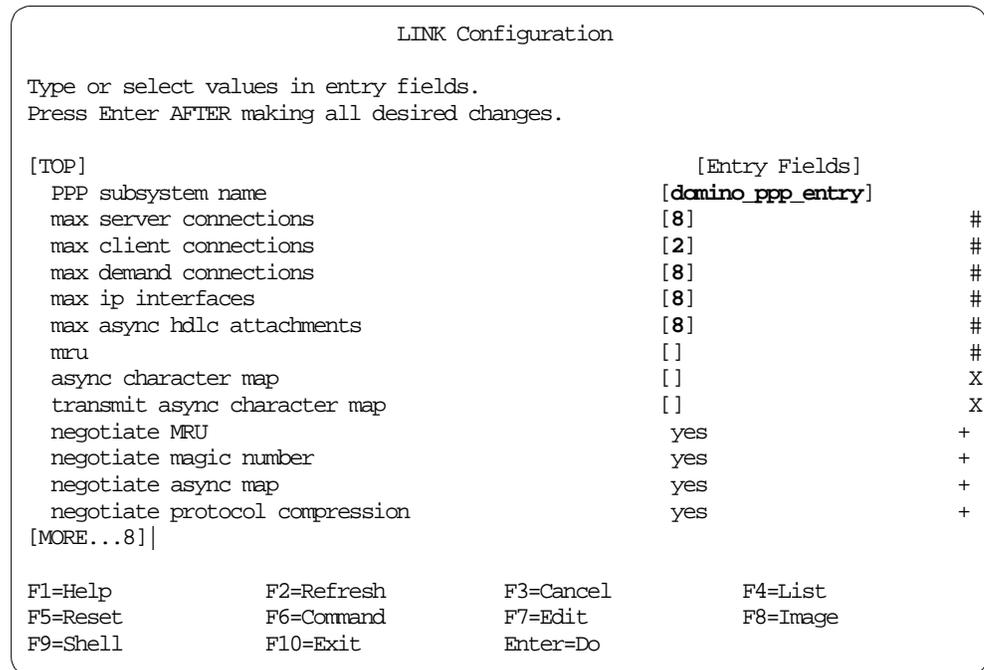


Figure 279. smitty's PPP Link Configuration Screen

- Enter a name without spaces into the PPP subsystem name field as shown in Figure 279. This name will identify the system to PPP and has no meaning to any other interface, such as IP. The first 20 bytes must be unique.
- Enter the number of clients that can access this machine in the max server connections field.
- Enter the maximum number of servers that can be accessed through client connections on this machine into the max client connections field.
- Enter the maximum number of demand connections in the max demands connections field.
- To define the maximum number of allowed TCP/IP interfaces enter a number not greater than the total maximum number of server and client connections into the field max ip interfaces.
- Enter the maximum number of concurrent asynchronous PPP sessions, both client and server, that can be active into the max async hdlc attachments field. The value cannot be greater than the total maximum number of server and client connections.
- All other fields on the LINK Configuration panel are optional. If you do not have a deeper knowledge of PPP and a complete understanding of the options, you can leave them set to the default.
- Press **Enter** to create the link configuration file.

The file /etc/ppp/lcp_config in our example will look like this:

```

server_name domino_ppp_entry
lcp_server 8
lcp_client 2
lcp_demand 8
num_if 8
num_hdlc 8

```

Figure 280. PPP Link Configuration File /etc/ppp/lcp_config

20. Press **F3** twice to return to smitty's first menu (Figure 277 on page 322).

21. To create the PPP IP Interfaces, select **PPP IP Interfaces** in (as shown in Figure 277 on page 322) with the cursor and press **Enter**.

```

                PPP IP Interfaces

Move cursor to desired item and press Enter.

Add a Server Interface
Change / Show a Server Interface
Remove a Server Interface
Add a Demand Interface
Change / Show a Demand Interface
Remove a Demand Interface

F1=Help          F2=Refresh       F3=Cancel        F8=Image
F9=Shell         F10=Exit         Enter=Do

```

Figure 281. smitty's PPP IP Interfaces Screen

22. To create a new server interface, select with the cursor **Add a Server Interface** in Figure 281 and press **Enter**. The file /etc/ppp/if_conf will be created for you.

```

                PPP IP Configuration

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

Local IP address          [Entry Fields]
Starting Remote IP address [9.3.16.243]
Number of addresses       [9.244.8.110]
Netmask                   [8]
                           [255.255.255.0]

F1=Help          F2=Refresh       F3=Cancel        F4=List
F5=Reset         F6=Command       F7=Edit          F8=Image
F9=Shell         F10=Exit         Enter=Do

```

Figure 282. smitty's PPP IP Configuration

23. Enter the IP address of your current system into the Local IP address field.

24. Enter the first remote IP address into the Starting Remote IP address field. If you enter more than one into the Number of addresses field, this address will be the first IP address, and the following remote IP addresses will always be incremented by one.

Note

Please be aware that all remote IP addresses must be unique for a given local (server) IP address.

25. As mentioned before, you can define more than one remote IP address. You may specify only one if you desire a single interface. The value of the Number of addresses field should not exceed the value specified in the `/etc/ppp/lcp_config` file for max server connections.

Note

Do not specify 0 (zero) for this field.

26. Press **Enter** to accept the settings.

The `/etc/ppp/if_conf` file in our example will look like this:

```
interface
server
local_ip 9.3.16.243
remote_ip 9.244.8.110
netmask 255.255.255.0

interface
server
local_ip 9.3.16.243
remote_ip 9.244.8.111
netmask 255.255.255.0
.
.
.
interface
server
local_ip 9.3.16.243
remote_ip 9.244.8.116
netmask 255.255.255.0

interface
server
local_ip 9.3.16.243
remote_ip 9.244.8.117
netmask 255.255.255.0
```

Figure 283. PPP IP Configuration File (`/etc/ppp/ip_conf`)

27. To start PPP, return to smitty's first menu by pressing **F3** twice (Figure 277 on page 322). With the cursor, select **Start PPP**, accept the defaults and press **Enter**. The PPP subsystem will then be up and running, and clients should be able to connect.

Chapter 11. Domino Advanced Services

This chapter describes the additional features of the Domino Advanced Services (DAS) License and outlines the configuration of those features. They have basically not changed since Lotus Domino version 4.5.

Domino Advanced Services is a collection of logically independent features that add special capabilities to the standard Lotus Domino Server.

These DAS features consist of:

- Clustering: See 11.2, "Clustering" on page 328.
- Partitioned Servers: See 11.3, "Partitioned Servers" on page 337.
- Billing: See 11.4, "Billing" on page 346.

The Domino Advanced Server (DAS) enables sites to exploit Lotus Domino and Lotus Domino service providers to make their service more reliable and scalable, better manageable and secure, and allow for more detailed and customized usage tracking for billing their services.

For issues about scalability and reliability, see also Chapter 12, "High Availability, Scalability, RS/6000 SP" on page 351.

For a detailed discussion of Domino Advanced Services, you may want to refer to another new ITSO redbook, *High Availability and Scalability with Domino Clustering on AIX*, SG24-5163.

For the basic installation of the Domino Advanced Services License see 2.3, "Starting the Installation" on page 36.

11.1 Domino Advanced Services Environment

Figure 284 on page 328 illustrates the DAS environment that we set up in our lab. Our DAS environment is three physical machines, with one partitioned into the Lotus Domino servers itsosmp, ah1610f, and ah1610g. itsosmp, ah1610f, and ah1610g share the same token-ring interface. The Lotus Domino Servers ah1610f, noteserv, and ah1610c are configured as a cluster named *democluster*. Lotus Domino Server itsosmp is in a different domain ITSO than the other Lotus Domino Servers.

Having multiple partitioned servers running on the same interface is common, for example, in the RS/6000 SP environment, when you are using the High Performance Switch (HPS) as a separate interconnect network between the servers. For showing the principles of operation, the setup in Figure 284 is quite sufficient, and it may be easier to be recreated than a setup with different network cards.

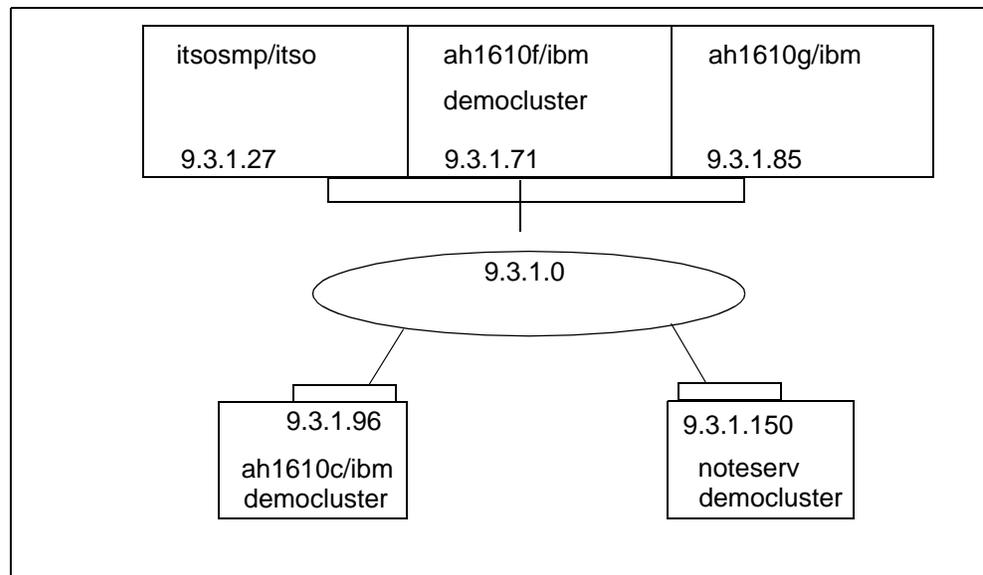


Figure 284. Domino Advanced Server Environment with Unique IP Addresses

11.2 Clustering

Up to six Domino Advanced Servers can be interconnected to provide *high availability, scalability, and load balancing* to Lotus Notes users (although not to browser clients). This is achieved by placing multiple replicas of some or all databases onto different servers within the cluster. Subsequently, transparent failover or load balancing can redirect the open request for a database on a broken or overloaded server to another server of the cluster. These clustered servers should be interconnected through a sufficiently high data transfer bandwidth network to allow for the tight synchronization between the databases in the cluster (T1 links, corresponding to 1.5 Mb/sec, or better, are recommended); in LAN environments, you find most often FDDI, ATM, FastEthernet; in RS/6000 SP environments, the SP switch is commonly used. The main advantages of clustering are:

- High availability

See Chapter 12, "High Availability, Scalability, RS/6000 SP" on page 351 for a detailed discussion and the redbook, *High Availability and Scalability with Domino Clustering on AIX*, SG24-5163.

- Scalability: Growing your cluster to accommodate more users

The clustering strategy also offers the advantage of gradual, scalable growth. It is easy to add a Lotus Domino Server to the cluster to share the growing workload. Clusters allow you to place a heavily used database on several servers within the cluster so many more users can access the database. The main difference to replication is the ability to direct users to a server with a smaller workload automatically and the propagation of changes immediately. As a cluster scales to contain more servers, clusters allow server administrators to migrate users from one system in the cluster to another. But keep in mind to plan your requirements carefully and do consider the overhead clustering causes as well as the additional administration effort.

- Load balancing within the cluster

Clustering allows you to achieve efficient use of server resources and better user response times. The administrator can balance the workload across all servers in the cluster by adjusting the availability threshold of each server. Through its load balancing and failover capabilities, the cluster software shifts users attempting to access a database on a loaded (busy) cluster member to a tightly synchronized replica on an available cluster member. It will not shift users that have already a database opened at that server.

11.2.1 Configuration of a Cluster

In our environment, the servers ah1610f/ibm, ah1610g/ibm, and noteserv/ibm are part of the cluster democluster. In this section, we will outline the process of how we created the cluster democluster and then added the servers to the cluster. For detailed descriptions about setting up a cluster, see the redbook, *High Availability and Scalability with Domino Clustering on AIX*, SG24-5163.

The steps required to implement the new cluster are:

1. Prepare for the cluster by ensuring consistent protocol usage on existing servers; only TCP/IP is supported in Version 4.6. There are no plans to support IPX/SPX later. Please check Lotus Domino Server Release Notes.
2. Determine database distribution in the cluster and acquire sufficient storage for the existing and new servers. You would replicate application databases for load balancing and/or high availability and mail databases only for high availability.
3. Install Domino Advanced Services data files on all servers of the cluster, as described in Chapter 2, "Installing a Lotus Domino Server" on page 23. All servers must have the same Lotus Domino version and be part of the same domain. Make sure that you specify an Administration Server in the Advanced section of the access control list of the Public Name and Address Book before you create a cluster.
4. Create replicas of existing databases as defined in step 2, following standard mechanisms, as described in 5.3, "Replication" on page 131, or using the database tools available from **File->Tools->Server Administration....** For use of cluster commands from a server's console, check with the most current Lotus Domino manuals.
5. Add each server to the cluster.

Open the **Public Name and Address Book** on one of the servers that will be part of the cluster, switch to the **Server\Servers View**. Then select the server that you want to add to the cluster and click on the Action button **Add to Cluster**. For the cluster to be added, accept the **Create New Cluster** selection and enter the name of the new cluster on the following request.

Add Server Edit Server Delete Server Add to Cluster				
Domain	Server	Title	Administrator	
<ul style="list-style-type: none"> ibm's Address Groups Locations People Server <ul style="list-style-type: none"> Certificate Clusters Configurat Connectio 				
▼ ibm	ah1610a/ibm	Alison's server	domino admin/ibm	
	ah1610b/ibm	Andreas's server	domino admin/ibm	
	ah1610c/ibm	Hans's server	admingroup	
	ah1610d/ibm	Sanjay's server	domino admin/ibm	
	ah1610f/ibm	Partition on itso smp	domino admin/ibm	
	ah1610g/ibm	Partition on itso smp	domino admin/ibm	
	noteserv/ibm	Main server and the replication hub	noteserv/ibm	

Figure 285. Server\Servers View

The request will now be added to the Administration Requests database and executed by the AdminP process. With Lotus Domino 4.6.1, the AdminP process is setup automatically; if you have setup your Lotus Domino domain properly, the AdminP request database, admin4.nsf, is handled and replicated properly.

On the server console of the admin server of the domain (noteserv/ibm in our case), you will see the following as soon as the AdminP requests get executed:

```

03/08/98 14:57:58 Cluster Administration Process started
03/08/98 14:59:00 Adding server to cluster democluster
03/08/98 14:59:02 Cluster Database Directory started
03/08/98 14:59:05 Cluster Replicator was unable to configure using Cluster
Database Directory clbdbdir.nsf: File does not exist
03/08/98 14:59:05 Cluster Replicator started
03/08/98 14:59:05 Cluster Replicator was unable to configure using Cluster
Database Directory clbdbdir.nsf: File does not exist
03/08/98 14:59:10 Created database Cluster Database Directory: clbdbdir.nsf
03/08/98 14:59:22 Finished initialization of Cluster Database Directory

```

The two error messages about the missing `clbdbdir.nsf` are to be expected this first time, since the `clbdbdir.nsf` is created at this first start-up, as you can see in the above log.

Adding server `af1610c/ibm` and `ah1610f/ibm` to the cluster `democluster` works similarly to the above, but of course, you have to select the already existing clustername when asked to the select a cluster to add to.

You should now find in the Server\Clusters view of the Public Name and Address Book the cluster `democluster` with the three members `noteserv/ibm`, `ah1610f/ibm`, and `ah1610g/ibm`.

Additionally, the first time the cluster processes start on a server, the `notes.ini` setting for `ServerTasks` will be changed to include the two new cluster processes: the Cluster Database Directory Manager, `CLDBDIR`, and the Cluster Replicator, `CLREPL`, so that cluster processes will start up automatically during subsequent server starts.

11.2.2 Overview of Cluster Components

11.2.2.1 Cluster Database Directory Manager CLDBDIR

The Cluster Database Directory, `cldbdir.nsf`, is a database residing on each cluster server, which contains information about all the databases and replicas within the cluster. When you add a server to the cluster, DAS creates `cldbdir.nsf` with the same Replica ID as on its cluster mates. The Cluster Database Directory is used by other components in the cluster to provide their functions.

The Cluster Database Directory has to be initialized first either manually or by a scheduled replication with another member of the cluster before the cluster components will work correctly. This database is maintained and updated continuously by the Cluster Database Directory Manager task, CLDBDIR, that runs on each member of the cluster. As databases are added or removed from the Lotus Domino Server, the Cluster Database Directory Manager dynamically adds or removes the database from `cldbdir.nsf`. Changes to `cldbdir.nsf` are then replicated by the Cluster Replicator to other cluster members.

11.2.2.2 Cluster Replicator CLREPL

The Cluster Replicator keeps the database replicas within the cluster in close synchronization. Different from the normal scheduled replication set up by connection documents, the Cluster Replication is event driven. The Cluster Replicator task, CLREPL, runs on each cluster server and continuously responds to changes to its server databases by pushing the changes to each of the other replicas within the cluster. It is this continuous transfer of changes that allows DAS to achieve closely synchronized databases.

More than one Cluster Replicator can be running at the same time. To start more than one instance of the Cluster Replicator, use the command `load clrepl` on the console of the server or add multiple `clrepl` statements to the `ServerTasks` variable in the `notes.ini` file. The following statement will start up three Cluster Replicator processes. The number of replicators you would start depends on the number of servers in the cluster and the load of the system. Lotus recommends that you start $n-1$ Cluster Replicators for a cluster of n servers. For more details, see the *Lotus Domino 4.6.1 DAS Administration Guide*, published by Lotus.

11.2.2.3 Cluster Manager

The Cluster Manager runs on each Lotus Domino Server in the cluster. It will track the state and the load of all cluster members. The Cluster Managers within the cluster exchange periodic messages, called keepalives or heartbeats, to do this monitoring. The Cluster Manager also triggers cluster events (failover, load balancing) when there is a change in the status of the cluster. Finally, the Cluster Manager will provide statistics and logging.

11.2.2.4 Cluster Administration Process CLADMIN

The Cluster Administration Process is responsible for the correct operation of all cluster components. On clustered servers, the process runs automatically at server start-up and whenever the cluster membership changes.

11.2.3 Failover

If a database has more than one replica on different servers of the cluster, DAS can provide failover during the opening of this database. When a Lotus Notes client tries to open a database on a server in the cluster and the server is not

available, the client fails over to a different replica within the cluster. As an example, assume that in our setup a user has replicas of his/her mail database on his/her mail server ah1610f/ibm and ah1610g/ibm, both members of the cluster democluster. If ah1610f/ibm is currently down and he tries to open his or her mail database, the Lotus Notes client fails over to the replica on ah1610g/ibm: DAS puts the icon for his or her mail database on ah1610g/ibm on top of the workspace icon stack and opens the database on ah1610g/ibm.

A Lotus Notes client keeps the information about different clusters in a special text file, cluster.ncf, in the Lotus Notes data directory. Our cluster.ncf is shown here:

```
Time=03/08/98 16:25:11 (86256655:0075A9DC)
democluster
CN=ah1610c/O=ibm
CN=ah1610f/O=ibm
CN=noteserv/O=ibm
```

The cluster.ncf file consists of a timestamp of this cache entry, the name of the cluster, and the canonical names of the members of this cluster. The contents are created on termination of the client, after a failover to a cluster replica.

For more details on failover, how and in which cases it will occur, consult the *Lotus DAS Administration Guide*, published by Lotus or the redbook *High Availability and Scalability with Domino Clustering on AIX*, SG24-5163.

11.2.4 Monitoring, Logging, and Statistics of the Cluster Processes

To find out whether a particular server is part of a cluster and get more information about the configuration, you can use the command `show cluster` on the server console. As an example, the following is the output of the command in our environment:

```
sh cluster
Cluster Information
Cluster name: democluster, Server name: ah1610c/ibm
Server cluster probe timeout: 1 minute(s)
Server cluster probe count: 225
Server availability threshold: 0
Server availability index: 100 (state: AVAILABLE)
Cluster members (3)...
  server: ah1610c/ibm, availability index: 100
  server: ah1610f/ibm, availability index: 100
  server: noteserv/ibm, availability index: 100
```

For a description of the `availability index` see 11.2.8, "Load Balancing" on page 334. To monitor the status of the cluster processes use the command `show tasks` on the server console. You will find the following lines among others:

```
Database Server      Cluster Manager is idle
Cluster Replicator   Idle
Cluster Directory    Idle
Cluster Replicator   Idle
```

11.2.4.1 Logging

To avoid the generation of a Replication Event log record for each (event driven) cluster replication, the Cluster Replicator maintains replication information in logging that can be forced manually at any time with the command:

```
tell clrepl log
```

on the server console. This will immediately create a Replication Event log entry.

For details, see the redbook *High Availability and Scalability with Domino Clustering on AIX*, SG24-5163.

11.2.4.2 Statistics

Each server that is a member of a cluster maintains statistics that may be useful for monitoring its cluster related status. Refer to the *Lotus Domino Administrator's Guide* for information about collecting Lotus Notes statistics and customizing reports.

View the current values of cluster server and replicator statistics by typing the following commands at the Lotus Domino Server console:

```
show statistics server  
show statistics replica
```

For a reference and explanation of the cluster related statistic variables see the Lotus *DAS Administration Guide*, published by Lotus.

11.2.5 Removing a Server From a Cluster

A Lotus Domino Server can be easily removed from a cluster from the Public Name and Address Book:

1. Open the **Public Name and Address Book** to the Server/Clusters view.
2. Select the server that should be removed from the cluster and click on the action **Remove from Cluster**.
3. After clicking **Yes**, a confirmation will come up.

The request to remove the server from the cluster will now be carried out by the Administration server of the Public Name and Address Book. After the server is removed from the cluster, the Cluster Manager will do the following:

- Stop the cluster processes CLDBDIR and CLREPL.
- Remove them from ServerTasks in notes.ini.
- Remove the local databases from the Cluster Database Directory on the cluster server which is the least busy.
- Finally, remove the local Cluster Database Directory, clbdir.nsf.

If this is the last server of the cluster, the cluster will cease to exist.

11.2.6 Managing Databases On a Cluster

For information on using the Notes Workstation to create replicas, see 5.3, "Replication" on page 131. By setting the notes.ini variable `Cluster_Admin_On=1`, you could perform database management, such as the creation of clusters, also from the server console. But as normal administration is done from the GUI, we do not provide details here about the server console commands. You might have

a look at the document "About NOTES.INI settings for clusters" in the *Lotus Domino Administration Help* database helpadm.nsf.

You can perform all administration tasks for databases in a cluster by selecting **File->Tools->Server Administration** from the Lotus Notes action bar, then select the server you would like to administer and select database tools. Of special interest are the pull-downs under Tool: Cluster Management, Create Replica, and Replication.

Of special interest are the cluster management settings, out of service, in service, and pending delete. Out of service restricts access to a database, in service is the default, and pending delete deletes a database as soon as all currently active users disconnect from that database.

11.2.7 Restricting Server Access

If you would like to test your cluster, use the notes.ini setting `Server_Restricted`. When you restrict access, the server accepts no new database open requests, but users with open databases are not affected. In this way, you do not disrupt the work of users with open databases.

To restrict server access while a server is running, enter the console command:

```
set config Server_Restricted=1
```

This restricts server access until it is restarted or `Server_Restricted` is set to 0. To permanently restrict server access, set `Server_Restricted=2`. While a server is in the RESTRICTED state, DAS's failover capability shifts open requests by a Notes R4 client to another replica (if one exists) on another available server in the cluster.

11.2.8 Load Balancing

DAS's load balancing feature allows you to balance the workload across the cluster by specifying, for each server, the acceptable level of available system resources. Each server in a cluster periodically determines its own workload, based on the average response time of requests recently processed by the server. The workload on the server is expressed as the server availability index, which is a value between 0 and 100, where 100 indicates a lightly loaded server (fast response times), and 0 is a heavily loaded server (slow response times). Despite the fact that the server availability index is a number between 0 and 100, it is not a percentage. Some people think that a server availability index of, say 85, means that the server is 85% available. This is not the case. In fact, it is far from it.

The server availability index is closely related to a common performance metric called the expansion factor. The expansion factor is simply the ratio of the response time for a function under the current load to the response time for this same function in an optimum (light load) condition. So, for example, if the system currently takes three seconds to perform a database open, but could perform the same database open in 0.3 seconds under optimum conditions, the expansion factor for this operation is 10. The expansion factor for a set of operations can be computed as a simple weighted average. To compute the server availability index, the Lotus Domino Server computes the expansion factor for a representative set of Lotus Notes RPC transactions over a recent time interval

(roughly the last minute). The server availability index is then set to 100 minus this expansion factor.

Remember that the server availability index only considers the response time as measured at the server. So a server availability index of 90 does not indicate that the response time as seen by clients is ten times the optimal value. It only indicates that the server processing this request took ten times longer than the optimal value.

So, there are three parameters that influence the load balancing between servers, being reflected by three notes.ini settings:

Server_Availability_Threshold

Defined as described above with a range between 0 and 100; 0 disables load balancing, 100 keeps the server in the BUSY state regardless of load.

Server_MaxUsers

Defines the maximum number of users that may have an active session at a time. If MaxUsers are connected, the server reaches the MAXUSERS state.

Server_Restricted

As described in 11.2.7, "Restricting Server Access" on page 334, it puts the server in the RESTRICTED state.

Important

These settings are most often used in conjunction with clustering, but they can be set on every server, either standalone, partitioned, or clustered.

11.2.9 Summary of the States of Cluster Members

The `SHOW CLUSTER` console command shows the specified value of the `Server_Availability_Threshold`, the computed value of the Server Availability Index, and the state of each server in the cluster. Possible server states are AVAILABLE, BUSY, RESTRICTED, and MAXUSERS. Unreachable is not a server state, but a symptom if a client wants to access a server which is actually down or not reachable over the network.

Failover occurs only when accessing a database for Lotus Notes R4 clients or for the mail router if the server is unavailable. A Lotus Notes R3 client would get access if the server is in the busy state, but access would be denied for RESTRICTED or MAXUSERS. For a detailed list, see "About failover" in the *Lotus Domino Administration Help* database. Server tasks, such as replication and cluster replication, are not inhibited by the server's state.

11.2.10 Related Settings in notes.ini

The following notes.ini file settings are applicable to correctly setting up your clusters:

Cluster_Admin_On

Not set by default (equivalent to `Cluster_Admin_On=0`).

`Cluster_Admin_On=1` allows access to the cluster administrative console commands. To turn off access to the cluster administrative console commands, remove this setting from notes.ini or set it to 0. The cluster

administrative console commands will then return the error: The requested function is not supported by the software on this server

Server_Cluster_On

Controls whether the Cluster Manager is enabled (1) or disabled (0) on a cluster server. This setting is updated by the `CLUSTER ADD` and `CLUSTER REMOVE` console commands. There is no reason for the administrator to change this setting.

MailClusterFailover

Enables the Mail Router request failover when set to 1 (default). If replicas of your mail file are located on multiple servers, mail from servers within the cluster and outside the cluster can be received even when your home server is down.

11.2.11 Cluster Replicator Caveats

As stated before, the Cluster Replication is event driven rather than scheduled. Because these events are stored in memory only, both the source and destination servers must be started in order for the Cluster Replicator to push changes to the destination. If the destination server is not available when the modification event occurs, the event will be kept in memory so that the Cluster Replicator can retry the replication. However, if the source server is shut down before the replication completes with all replicas, the modification event is lost. On restart of the source server and Cluster Replicator, modifications that were made in databases on the source server before the shutdown are not automatically replicated. This is one reason why it is necessary to set up a periodic scheduled replication with all members of the cluster in addition to the Cluster Replication.

Normally, private folders and their contents do not replicate between different replicas (except when replicating with the workstation of the folder owner). When replicating within a cluster, however, private folders are replicated to other replicas within the cluster. This ensures that the databases appear equivalent from the user's perspective when failing over to other replicas within the cluster. The replication of private folders and their content within a cluster is supported by both the Cluster Replicator and the regular Lotus Notes replicator.

Note

Private folders can be accessed only by the creator of the folder and by a server within the cluster. With Domino Advanced Server, only servers defined as User type: Server or Server Group in a database's ACL can access and consequently replicate private folders within the database. Thus, servers accessing the database through an ACL entry defined with any other User type, especially the User type Unspecified, cannot replicate private folders.

11.2.12 Use of Private LAN for Cluster Communication

One option to attain better performance is to direct the intra-cluster traffic (traffic within the cluster) to a private network. Each member of the cluster must be connected to two LANs. One LAN, the public LAN, is used for normal client access to the cluster. The second LAN, the private LAN, is used for all the communication within the cluster, such as heartbeat messages and Cluster Replication. Each LAN is a separate physical wire and may or may not be connected by a router. Note that all cluster members must be connected by the

private LAN (for cluster traffic) as well as the public LAN (for client failover). Each cluster member must use an identical set of ports. Ideally suited for that purpose would be an RS/6000 SP with a High Performance Switch (HPS) used as the private cluster LAN.

The following steps are required to set up a LAN for intra-cluster communication on every cluster server. The example has to be adjusted for each server:

- Make sure you have the LANs set up correctly on the TCP/IP level (each cluster member can ping the private LAN port of the other cluster members and resolve the address to a valid hostname). Make sure that the client systems on the public LAN can still ping the cluster members. As an example, assume the following IP addresses:

```
192.114.32.5 tree
198.168.168.2 privateroot
```

- Start up the Lotus Notes administrative client for the server and go into the **File=>Tools=>User Preferences...** dialog box. In this dialog box, choose the **Ports** section and add and/or enable the new private LAN port. For example, if you already have the TCP/IP port, select **New...** to add and enable the CLUSTER0 port.
- Edit the server record in the Public Address Book. In the Network Configuration section add and enable the new port. For example, records for tree look like:

```
TCPIP Network1 tree Enabled
CLUSTER0 Network2 privateroot Enabled
```

- In the notes.ini file, put in the following line for each port:

```
PORTx_TcpIpAddress=0,a.b.c.d:1352
```

(Substitute PORTx with the name of your ports. Substitute a.b.c.d with the appropriate IP address.) In our example, we would have:

```
TCPIP_TcpIpAddress=0,192.114.32.5:1352
CLUSTER0_TcpIpAddress=0,198.168.168.2:1352
```

- Add the following line to the notes.ini file:

```
Server_Cluster_Default_Port=CLUSTER0
```

- Restart the server.
- Enter the `SHOW CLUSTER` command at each server's console and look for the line:

```
Server cluster probe port: CLUSTER0
```

11.3 Partitioned Servers

This section covers the installation and set-up of the partitioned servers feature of Domino Advanced Services. This feature allows up to six Lotus Domino servers to run on a single computer. You may want to have a look at the redbook *High Availability and Scalability with Domino Clustering on AIX*, SG24-5163, but as this is a commonly used method of installing Domino on RS/6000, we also covered the topic here.

Partitioning a single computer into separate Lotus Domino servers provides:

- Full Lotus Domino security for users of different partitions

- A reduced number of computers to own and administer in order to support independent groups of users

Partitioned servers share the same Lotus Domino binaries but each has its own assigned Lotus Domino data directory containing the required set of system files, such as the Public Address Book, notes.ini, and database files associated with that particular Lotus Domino Server. This means partitioned servers have their own services and resources. The operation of one partition does not affect the other partitions. So, you can logically treat each partitioned server as a separate system.

Partitioned servers provide growth capabilities through migration. Initially you can assign a group of users to a partitioned server. If the group's resource requirements grow you can easily migrate them to their own system by using the clustering feature of the Domino Advanced Server.

Besides, partitioning is a performance issue on SMP systems.

11.3.1 Planning a Partitioned Server Deployment

The following are basic guidelines to help you with your partitioned server deployment:

- The maximum number of supported partitioned servers on one system is six.
- Each additional partitioned server should get additional 128 MB of memory; depending on your setup, you should increase that value. If you are an IBM Business Partner qualified for the POWERNet program, or you are working at IBM itself, you could use the sizing tool available under <http://www.rs6000.ibm.com/powernet> to get an estimate for your environment.
- As a rule of thumb, you could use one partition for each pair of Central Processing Units (CPUs), but not more partitions than CPUs in one system. Experience shows an advantage of having more partitions with lower registered numbers of users rather than one large server, since the Lotus Domino Server itself does not exploit SMP systems completely.
- Use of the TCP/IP Network, as IPX, is not supported with Lotus Domino 4.6 for DAS.
- Partitioned servers can share a single network interface card or can use multiple network interface cards. (see 11.3.2, "Configuring Partitioned Servers" on page 338.)
- Each partitioned server requires disk space for its own Lotus Domino data directory filesystem.
- A partitioned server may be a member of a cluster; however, it is recommended that the other Lotus Domino servers in the cluster be located on other systems.

11.3.2 Configuring Partitioned Servers

The steps for the installation, registration, and set-up of the first partitioned server are the same as for a standard non-partitioned Lotus Domino Server (refer to Chapter 2, "Installing a Lotus Domino Server" on page 23). For subsequent partitioned servers only the registration and set-up steps are required - all partitioned servers on a single computer share the same binaries (throughout this redbook, the files which have been installed under /usr/domino/lotus).

In our environment, one machine is configured as three partitioned servers: itsosmp/itso, ah1610f/ibm, and ah1610g/ibm (refer to Figure 1 on page 22).

The following points should be noted to ease the administration of your partitioned servers:

1. Create a separate filesystem for each partitioned server's data directories and mount the filesystems. Consider associating the name of the filesystem with the server name.
2. Create a separate AIX user account for ownership of the server's data directory for each partitioned server. Consider associating each AIX user account name with the server name. You can use the same group name for all partitioned servers, for example:

Table 15. Lotus Domino Partitioned Server and User Accounts

Server	Server's data directory filesystem	AIX user account	AIX group account
itsosmp/itso	/itsosmp	itsosmp	notes
ah1610f/ibm	/ah1610f	ah1610f	notes
ah1610g/ibm	/ah1610g	1h1610g	notes

3. Ensure that each Lotus Domino database filesystem is owned by the corresponding AIX user and group account defined above in step 2. For example:

```
chown ah1610f.notes /ah1610f
```

11.3.3 Configuring Partitioned Servers for TCP/IP

There are two ways to configure partitioned servers for TCP/IP network access. You can:

- Use unique IP addresses--one unique IP address for each partitioned server.
- Use unique TCP/IP port numbers--one unique port number for each partitioned server that shares an IP address (which is the most common and recommended method).

11.3.3.1 Using Unique IP Addresses

1. Assign a unique IP address to each partitioned server, as shown in Figure 284 on page 328.
2. Make sure, that name resolution is set up properly, so that your planned server name can be resolved to one corresponding IP address.
3. Make sure that all addresses map to either the different network cards of your server or just to one card (as shown in Figure 202 on page 236).
4. Use the hostname of each server as its server name during Lotus Domino Setup. For example for the partitioned server with the hostname ah1610g.itsc.austin.ibm.com uses the server name ah1610g/ibm.
5. Edit the notes.ini file of each partitioned server to include

```
TCPIP_TcpIpAddress=0,IPaddress:1352
```

where `TCPIP` is the port name as specified in the server document of the Public Address Book in the Network Configuration section, and `IPaddress` is the TCP/IP address of the specific partitioned server.

For example, for the server ah1610g/ibm:

```
TCPIP_TcpIpAddress=0,9.3.1.87:1352
```

6. Edit the server document in each partitioned server Public Address Book to include the host names defined in the previous step in the in the Network Configuration section of the server's document.

11.3.3.2 Using Unique TCP/IP Port Numbers

You can use TCP/IP port mapping to configure multiple partitioned servers to share the same network interface card and the same IP address. TCP/IP port mapping requires that you assign a unique IP port number to each partitioned server that shares the IP address and assign one of these servers to be the port mapper server.

The port mapper server's role is to dispatch (map) incoming IP requests to the appropriate server. It must be running for the partitioned servers that share its IP address to receive new connections from workstations. If the port mapper server is down, new sessions cannot connect. Existing sessions, however, remain connected. Also, each client maintains a cache of recent server connections, requiring redirection by the port mapper. This means the clients can still reach other partitioned servers if the requested server connection information is in the cache.

To provide higher availability for partitioned servers, you can set up the first partitioned server to function only as a listener/port mapper (not a customer server). This reduces the chance of failure by the first partitioned server, but causes additional overhead as you need one partition only for portmapping.

To reduce resource use for a dedicated port mapper server, you can remove all the ServerTasks from your notes.ini to minimize the number of server processes. You can also remove large databases (such as the help database from the data directory for this server). *Do not* remove the Public Address Book for this server.

For details of how to configure using TCP/IP port numbers refer to "Configuring partitioned servers using unique TCP/IP port numbers" in the *Lotus Domino Administration Help* database.

11.3.4 Starting and Stopping Partitioned Servers

Each partitioned server is started and stopped the same way as a single server would be. In the output of the `show server console` command, you will notice a partition number, which is unique for each server on a physical system. The Partition number is obtained from the file `.sgf.notespartition` in the Notes data directory of the respective partitioned server. This file is updated from the file `/opt/lotus/notes/latest/common/data/.sgf.lastpartition`; content is incremented by one each time the Lotus Domino setup process is run. It may contain any integer value from 1 to 99, as long as the number is unique across all servers on a single system.

11.3.4.1 Administrative Clients

Each partitioned server has its own administrative client which shares its system resources and Lotus Notes data directory. The administrative client must be run from the respective partitioned server Lotus Domino data directory. You can run up to six administrative clients at one time.

11.3.4.2 Handling a Partitioned Server Failure

Partitioned server shutdowns and failures do not affect other partitioned servers that run on the same computer. If one server shuts down, the others continue to run. The setting `KillProcess=1` is added during installation into the `notes.ini` file of each partitioned server, enabling automatic clean up of all the processes associated with a partitioned server. With this default setting, you can restart a failed partitioned server without restarting the computer. But you have to make sure to clean up the interprocess communication resources (shared memory and semaphores) before restarting the server.

11.3.5 Starting the Server in the Background

It is quite obvious that you would not want to have one or more partitions running on one RS/6000 in foreground. Therefore, you have to implement scripts that start the server in the background, provide console facilities, and allow for proper cleanup. The following scripts are provided "as is". You need one set of all scripts per server instance (partition).

11.3.5.1 Defining the Environment

This script simply defines essential parameters for use by the other scripts.

```
#!/bin/ksh
# Domino Application Server Environment Variable Script
# Licenced Materials - Property of IBM
# (C) COPYRIGHT International Business Machines Corp 1994,1998
# All Rights Reserved.
# US Government Users Restricted Rights - Use, duplication or disclosure
# restricted by GSA ADP Schedule Contract with IBM Corp.
#####
# Description - env_domino
#
# This script makes variable definitions that are common to
# the start_domino, stop_domino, and start_monitor scripts
#####

# This script is provided "As Is".

# Script Environment variables.

NOTES_USER=notes# AIX userid for this server
NOTES_PATH=/server1/notesr4# Path for server data directory
NOTES_SERVER=noteserv# Name of Domino Server
OUTPUT_LOG=/tmp/$NOTES_SERVER.log# Output file for server console
INPUT_FILE=$NOTES_PATH/$NOTES_USER.input# Input file for server console
PATH=$NOTES_PATH:/opt/lotus/bin:$HOME/bin:$PATH# Ensure PATH is set for scripts
```

11.3.5.2 Starting the Server

This script actually starts a particular server in the background, redirecting the console to `$OUTPUT_LOG` and reading commands from `$INPUTFILE`.

```
#!/bin/ksh -x
# Domino Server Start Script
# Licenced Materials - Property of IBM
# (C) COPYRIGHT International Business Machines Corp 1994,1998
# All Rights Reserved.
# US Government Users Restricted Rights - Use, duplication or disclosure
# restricted by GSA ADP Schedule Contract with IBM Corp.
#####
# Description - start_domino
#
# This is a server startup script to start the Domino Server in background
# that gets command input from a file and pipes the output to another which
# can be monitored by administrators by the start_monitor script.
#
# The INPUT file allows any command to be issued to the Domino Server so
# this file should be treated accordingly ...hidden with the appropriate
# permissions to prevent unauthorized access to the server
```

```

#####

# This script is provided "As Is".

# Set Script Environment variables.

. env_domino

# Script Logic

if (('id -u' == 0))
then
    print "Run the Domino Server as the $NOTES_USER user "
    exit
fi

#
# if you are using /etc/hosts for tcpip name resolution rather than a name
# server or NIS, then uncomment the following line:
#export NSORDER=bind,local,nis
#

if [ ! -x /opt/lotus/bin/server ] ; then
    echo "Cannot access server command - exiting"
    exit 1
fi

if [ ! -d $NOTES_PATH ] ; then
    echo "Cannot access notes data directory - exiting"
    exit 1
fi

NOTES_RUNNING=`ps -fu $NOTES_USER | grep /opt/lotus | grep -v grep `
if [[ -n $NOTES_RUNNING ]] ; then
    echo "Domino Server is already running - exiting"
    exit 1
fi

cd $NOTES_PATH
#
# Clean up if the Domino Server terminated abnormally earlier
#

rm -f ~notes.lck
mems=`ipcs | grep $NOTES_USER | awk '{ print $1 $2 }' | awk -F"m" '{ print $2 }' | awk '{
print $1 }'`
sems=`ipcs | grep $NOTES_USER | awk '{ print $1 $2 }' | awk -F"s" '{ print $2 }' | awk '{
print $1 }'`
for j in $mems;do if [ -n "$j" ] ; then ipcrm -m $j;fi;done
for j in $sems;do if [ -n "$j" ] ; then ipcrm -s $j;fi;done

export Notes_SHARED_DPOOLSIZE=40000000
#
# For servers using Notes passwords,
# replace the previous line with the following two lines.
#
cat .secure_hidden_passwd > $INPUT_FILE
echo "show server" >> $INPUT_FILE

cp -p $OUTPUT_LOG $OUTPUT_LOG.`date +"%m%d%y_%H%M"`
#cp -p $OUTPUT_LOG $OUTPUT_LOG.backup
print "Starting Domino for AIX ($NOTES_SERVER)"
/opt/lotus/bin/server < $INPUT_FILE > $OUTPUT_LOG 2>&1 &

```

11.3.5.3 Stopping the Server

This script is used to stop a running server properly. If the server does not respond anymore, the script kills the server processes and cleans up system resources.

```

#!/bin/ksh -x
# Domino Server Stop Script
# Licenced Materials - Property of IBM
# (C) COPYRIGHT International Business Machines Corp 1994,1998
# All Rights Reserved.
# US Government Users Restricted Rights - Use, duplication or disclosure

```

```

# restricted by GSA ADP Schedule Contract with IBM Corp.
#####
# Description -
#
# This is the script to STOP the Domino Server which has been started using
# the corresponding script (start_domino).
# The script attempts to QUIT the server gracefully and waits 2 minutes.
#
# If Domino Server has not shut down by then, the plug is yanked.
# Depending on your environment, you may want to change this time-out period.
#####

# This script is provided "As Is".

# Set Script Environment variables.

. env_domino

# Script Logic

print "Stopping Domino for AIX ($NOTES_SERVER)"
print " ... waiting for shutdown to complete"
echo " quit " >> $INPUT_FILE
#
#
count=0
NOTES_RUNNING=`ps -fu $NOTES_USER | grep /opt/lotus | grep -v grep `
while [[ -n $NOTES_RUNNING ]] ; do
sleep 10
count=`expr $count + 1`
echo " ... waiting "$count"0 seconds"
#
# Terminate Domino Server if still running
#
if [ $count -eq 13 ] ; then
echo "Domino Server is still running after 2 minutes"
echo " ... now for the ungraceful method"
for i in `ps -fu $NOTES_USER | grep lotus | grep -v grep | awk '{ print $2 }'; do
kill -9 $i
done
mems=`ipcs | grep $NOTES_USER | awk '{ print $1 $2 }' | awk -F"m" '{ print $2 }' | awk '{
print $1 }'`
sems=`ipcs | grep $NOTES_USER | awk '{ print $1 $2 }' | awk -F"s" '{ print $2 }' | awk '{
print $1 }'`
for j in $mems;do if [ -n "$j" ] ; then ipcrm -m $j;fi;done
for j in $sems;do if [ -n "$j" ] ; then ipcrm -s $j;fi;done
echo "Domino Server ($NOTES_SERVER) TERMINATED"
exit
fi
NOTES_RUNNING=`ps -fu $NOTES_USER | grep /opt/lotus | grep -v grep `
done
#
echo "Domino for AIX ($NOTES_SERVER) shutdown completed"

```

11.3.5.4 Cleanup a Server That Would Not Respond

If you just want to clean up, knowing the server cannot be stopped gracefully, use this script.

```

#!/bin/ksh
# Domino Cleanup Script
# Licenced Materials - Property of IBM
# (C) COPYRIGHT International Business Machines Corp 1994,1998
# All Rights Reserved.
# US Government Users Restricted Rights - Use, duplication or disclosure
# restricted by GSA ADP Schedule Contract with IBM Corp.
#####
# Description - kill_domino
#
# This script kills processes and cleans up shared memory and semaphores
#####

# This script is provided "As Is".

# Script Environment variables.

```

```

. env_domino

# Script Logic

print "Terminating Domino for AIX ($NOTES_SERVER)"
#
for i in `ps -fu $NOTES_USER | grep lotus | grep -v grep | awk '{ print $2 }'; do
    kill -9 $i
done
mems=`ipcs | grep $NOTES_USER | awk '{ print $1 $2 }' | awk -F"m" '{ print $2 }' | awk '{
print $1 }'`
sems=`ipcs | grep $NOTES_USER | awk '{ print $1 $2 }' | awk -F"s" '{ print $2 }' | awk '{
print $1 }'`
for j in $mems;do if [ -n "$j" ]; then ipcrm -m $j;fi;done
for j in $sems;do if [ -n "$j" ]; then ipcrm -s $j;fi;done
echo "Domino Server ($NOTES_SERVER) TERMINATED"
exit
#

```

11.3.5.5 Starting a Server's Console Monitor

As the server runs in the background, you cannot use the `tty` console as usual. This script provides you with an interface very similar to the Lotus Domino Server console by reading the output logfile and passing commands to the server's input file.

```

#!/bin/ksh
# Domino Monitor Start Script
# Licenced Materials - Property of IBM
# (C) COPYRIGHT International Business Machines Corp 1994,1998
# All Rights Reserved.
# US Government Users Restricted Rights - Use, duplication or disclosure
# restricted by GSA ADP Schedule Contract with IBM Corp.
#####
# Description -
#
# This script will start a virtual Domino Server console where it is issued.
#
# The variables below must be set to point to the input and output files.
# Note that the CASE statement at the bottom also allows you to create your
# own custom server commands
#####

# This script is provided "As Is".

# Set Script Environment variables.

. env_domino

CURRENT_TTY=`tty`

# Script Logic

if [[ $# -gt 1 ]]; then
    echo "\nSyntax:\n start_monitor\n"
    echo "This program attaches to the Lotus Domino Server input and output"
    echo "streams so you may interact with the server."
    echo "\nUse Ctrl-c to exit the monitor.\n"
    exit 1
fi

function stop_monitor
{
    echo ""
    echo "Exiting notes monitor..."
    echo ""
    kill -9 $TAILPID
    exit 0
}

PCOUNT=`fuser $OUTPUT_LOG 2>/dev/null | wc -w`
if [ $PCOUNT -lt 1 ]; then
    echo ""
    echo "The Domino Server does not appear to be started. Monitor terminating."
    echo ""

```

```

        exit 1
    fi

    trap "stop_monitor" 1 2 3

    echo ""
    echo "*****"
    echo "    To exit this monitor enter a <CTRL>-C"
    echo "*****"
    echo ""

    tail -f $OUTPUT_LOG >> $CURRENT_TTY &
    TAILPID=$!

    while [ 1 -eq 1 ]
    do
        CMD=""
        OPT=""
        read CMD OPT
        case $CMD in
            "cls") clear
                    echo "" >> $INPUT_FILE ;;
            "CLS") clear
                    echo "" >> $INPUT_FILE ;;
            "clear") if [[ "$OPT" = "log" || "$OPT" = "LOG" ]]; then
                        echo "Log cleared on `date`" > $OUTPUT_LOG
                    fi
                    echo "" >> $OUTPUT_LOG
                    fi
            "CLEAR") if [[ "$OPT" = "log" || "$OPT" = "LOG" ]]; then
                        echo "Log cleared on `date`" > $OUTPUT_LOG
                    fi
                    echo "" >> $OUTPUT_LOG
                    fi
            "exit") echo "Are you sure you want to EXIT the Domino Server ???" >> $OUTPUT_LOG
                    echo "Enter the command 'shutdown' if you really mean it" >> $OUTPUT_LOG
                    echo ">" >> $OUTPUT_LOG ;;
            "quit") echo "Are you sure you want to EXIT the Domino Server ???" >> $OUTPUT_LOG
                    echo "Enter the command 'shutdown' if you really mean it" >> $OUTPUT_LOG
                    echo ">" >> $OUTPUT_LOG ;;
            "q") echo "Are you sure you want to EXIT the Domino Server ???" >> $OUTPUT_LOG
                    echo "Enter the command 'shutdown' if you really mean it" >> $OUTPUT_LOG
                    echo ">" >> $OUTPUT_LOG ;;
            "shutdown") echo "quit" >> $INPUT_FILE ;;
            "EXIT") echo "Are you sure you want to EXIT the Domino Server ???" >> $OUTPUT_LOG
                    echo "Enter the command 'shutdown' if you really mean it" >> $OUTPUT_LOG
                    echo ">" >> $OUTPUT_LOG ;;
            "QUIT") echo "Are you sure you want to EXIT the Domino Server ???" >> $OUTPUT_LOG
                    echo "Enter the command 'shutdown' if you really mean it" >> $OUTPUT_LOG
                    echo ">" >> $OUTPUT_LOG ;;
            "Q") echo "Are you sure you want to EXIT the Domino Server ???" >> $OUTPUT_LOG
                    echo "Enter the command 'shutdown' if you really mean it" >> $OUTPUT_LOG
                    echo ">" >> $OUTPUT_LOG ;;
            "SHUTDOWN") echo "quit" >> $INPUT_FILE ;;
            *) echo $CMD $OPT >> $INPUT_FILE ;;
        esac
    done
stop_monitor

```

11.3.6 Considerations for Internet Server Tasks

On a partitioned server, you have to specify additional parameters for the tasks HTTP, IMAP4, POP3, LDAP, NNTP and for the SMTP MTA.

11.3.6.1 Considerations for HTTP

If you plan to use the http task for multiple partitions, you have to specify the Bind to host name parameter, as described in 9.1.2.1, “Basics and Mapping” on page 221.

11.3.6.2 Considerations for IMAP4, POP3, LDAP, NNTP

These tasks are new since Release 4.6. The following entries must be added to the notes.ini file for these tasks to run in a partitioned server environment for the respective protocol:

- IMAPAddress=<IP address or fully qualified hostname>
- LDAPAddress=<IP address or fully qualified hostname>
- NNTPAddress=<IP address or fully qualified hostname>
- POP3Address=<IP address or fully qualified hostname>

11.3.6.3 Considerations for the SMTP MTA

The SMTP MTA is currently not certified to run on a partitioned environment. The current solution is to run a dedicated SMTP MTA server outside of the partitioned server environment. The UNIX sendmail must be disabled to run the SMTP MTA on any UNIX server.

A SMTP MTA notes.ini variable has been added in Lotus Domino 4.61 to change the SMTP MTA TCP/IP port (defaults to 25), so that this MTA can run on a partitioned server. This variable is unsupported on Lotus Domino 4.61; so check for official support in Lotus Domino Release 4.62. You would have to specify SMTPMTA_IPPORT=<portnumber>.

11.4 Billing

The Domino Advanced Services license is required to run Lotus Domino billing.

Billing consists of two major components:

1. Lotus Domino Server enabled for billing: the server provides billing information according to seven billing classes, (see below).
2. The Lotus Domino `billing` task collects the information provided by the server and generates billing records, stored either in a database (`billing.nsf`) or in a binary file (`billing.nbf`), or both.

The `BillingClass` setting in notes.ini controls which of the seven allowed billing classes are to be tracked:

Session

Tracks when a Lotus Notes session starts or ends and when any ongoing activities, document editing, or replication occur during the session.

Database

Tracks when users or servers open and close a Lotus Notes database and the duration of use.

Document

Tracks read and write activity for specified documents only.

Replication

Tracks when a billing server initiates replication with another server or a workstation.

Mail

Tracks when a billing server mail router transfers messages to another Lotus Domino Server.

Agent

Tracks when users or servers run a scheduled agent on a server, and tracks the elapsed runtime of agents on a billing server.

HttpRequest

Tracks Web server requests.

The notes.ini setting `BillingAddInWakeup=<n>` specifies the interval after which the billing task should run, where n is the number of seconds. `BillingAddInRuntime=<n>` specifies the allowed runtime for the task in seconds to minimize the impact of billing on server performance: whereas `BillingAddInOutput={1|8|9}` defines the output file mentioned above {`billing.nsf|billing.nbf|both`}.

Let's assume we want billing to be active for Mail, Replication and Web, starting generating records every 10 minutes for 2 minutes, logging to a binary file, we would specify in notes.ini:

```
ServerTasks=...,Billing,...
BillingClass=Mail,Replication,HttpRequest
BillingAddInWakeup=600
BillingAddInRuntime=120
BillingAddInOutput=8
```

11.4.1 Managing Billing

The same rules as for any other Lotus Domino task apply for billing. You may either modify notes.ini as described above, to start multiple billing tasks, or you can set billing parameters at the server's console by issuing `Set Config <parameter=xxx>` commands. To disable server activity billing from within all components of the Lotus Notes server, that is, router, replicator, and so on, remove the `BillingClass` configuration variable from the notes.ini file.

11.4.2 Sample Billing Records

Below you find screen shots of sample billing records for each of the classes to give you an idea of the information which is collected. They have been collected on different servers and do not have any relations. Document billing sample records are not included because this type of billing has to be enabled for specific documents by changing the design to include hidden charge fields in the document's form.

If you want to use billing in a production environment, you have to create an application which actually does the evaluation of the billing database or the billing binary file.

For more detailed information, see the *Lotus Notes API 4.6* documentation, published by Lotus.

11.4.2.1 Session Billing

Session billing collects information of the data volume of a certain user session: Who has transferred how many bytes?

Session Billing	
Basics	
Billing record type:	Session
Billing class:	Session
Server name:	ah1610c/ibm
Timestamp:	03/08/98 17:05:42
Session Information	
Session ID:	269243
Bytes read:	252348
Bytes written:	226506
User name:	ah1610f/ibm
Action:	End
Network address:	TCPIP: 9.3.1.27:32901

Figure 286. Session Billing

11.4.2.2 Database Billing

Database billing delivers two types of records (DBOpen and DBClose), which allow you to track how long a database has been in use by a certain user and how long it has taken to actually perform the open and close actions.

Database Billing		Database Billing	
Basics		Basics	
Billing record type:	Database	Billing record type:	Database
Billing class:	Database	Billing class:	Database
Server name:	ah1610c/ibm	Server name:	ah1610c/ibm
Timestamp:	03/08/98 15:29:21	Timestamp:	03/08/98 15:29:32
Session Information		Session Information	
Session ID:	269243	Session ID:	269243
Replica ID:	8025664B:0462EB3D	Replica ID:	8025664B:0462EB3D
User name:	ah1610f/ibm	User name:	ah1610f/ibm
Database open time:	0	Database open time:	11
Action:	DBOpen	Action:	DBClose

Figure 287. Database Billing: Open and Close

11.4.2.3 Replication Billing

Replication billing offers information on which servers exchanged, how much data, for which replica, when.

Replication Billing	
Basics	
Billing record type:	Replication
Billing class:	Replication
Server name:	ah1610c/ibm
Timestamp:	29/07/98 09:39:47
Replication Information	
Session ID:	136984
Replica ID:	8525632D:0055EA6C
Bytes read:	1558
Bytes written:	314
Source server:	noteserv/ibm
Destination server:	ah1610c/ibm
Priority:	1

Figure 288. Replication Billing

11.4.2.4 Mail Billing

Mail billing tells you which mail has been routed where and who has created it. It also tells you the size and the recipient.

Mail Billing	
Basics	
Billing record type:	Mail
Billing class:	Mail
Server name:	ah1610c/ibm
Timestamp:	31/07/98 15:58:32
Message Information	
Form type:	Memo
Billing ID:	4BD68A584D9018318625665200 71F1C1
Originator:	first dummy/ibm
Priority:	1
Message size:	332434
Hop name:	NOTESERV/IBM
Posted date:	31/07/98 15:44:34
Recipient count:	6
Recipients:	domino admin/ibm@ibm

Figure 289. Mail Billing

11.4.2.5 Agent Billing

Agent billing allows you to keep track the time an agent consumed on your system, which database they acted on, and who started the agent.

Agent Billing	
Basics	
Billing record type:	Agent
Billing class:	Agent
Server name:	CN=ah1610c/O=ibm
Timestamp:	30/07/98 23:32:55
Session Information	
User name:	Hans-Juergen Kunde/ibm
Elapsed run time:	850 ms
Flags:	Public agent
Agent name:	Averaging Agent
Database name:	web.nsf

Figure 290. Agent Billing

11.4.2.6 HTTP Request Billing

HTTP Request Billing provides you with extensive information about which objects have been retrieved from your web server, the time elapsed to fulfill the request, and the user who retrieved it, as well as the number of bytes retrieved and the IP address of the client system.

HTTP Request Billing	
Basics	
Billing record type:	HttpRequest
Billing class:	Http
Server name:	CN=ah1610f/O=ibm
Timestamp:	04/08/98 18:12:08
Http Request Information	
Date/Time:	04/Aug/1998:18:12:08 +0600
Remote machine address:	9.3.1.96
Authenticated user:	domino admin
Status code:	200
Content length:	50
Content type:	text/html
Request:	GET /webadmin.nsf/\$buttons/border_bot_left HTTP/1.0
Browser:	Mozilla/4.04 [en] (X11; I; AIX 4.3)
Referer:	http://ah1610f/
Server Address:	9.3.1.71
Elapse Time (ms):	850

Figure 291. HTTP Request Billing

Chapter 12. High Availability, Scalability, RS/6000 SP

This chapter provides an overview regarding the various high availability and scalability issues related to Lotus Domino and the RS/6000, as well as the RS/6000 SP. For information about the RS/6000 SP, refer to 12.3, “Scalability and RS/6000 SP” on page 355. It does not provide a detailed description regarding all these issues, but it is a good starting point for getting familiar with these topics.

In general, you have to cover different areas of availability to provide high availability for a Lotus Domino Server. Each area is addressed by certain features or solution packages.:

1. System availability:

- Addressed by hardware features, such as redundant components, fault tolerant components, service processor, service director.

2. Data availability:

- Addressed by operating system or hardware (RAID, AIX LVM, Lotus Domino replication); if data is not available by these mechanisms, you have to take care about restoring from a backup.

3. Service availability:

- Addressed by Domino Advanced Services (application failover and loadbalancing) for mail and application databases:
 - Focused on application errors.
 - Client view: Client does not reach their database.
- Addressed by HACMP (restart of service in case the system is no longer available on another system):
 - Focussed on hardware or operating system errors.
 - Server view: System is not working properly.

12.1 RS/6000 and AIX Issues

This section addresses high availability issues related to the RS/6000.

12.1.1 RS/6000 and AIX Basics

Depending on the model you are using for your Lotus Domino Server, different areas of hardware availability are covered. Redundant components like fans and power supplies, hot plugable disks and the ability for remote maintenance by using a service processor (see 12.1.2, “Service Processor” on page 352) or the service director are features that make administration tasks a lot easier. For a closer look on these features, you might want to have a look at the system documentation books at <http://www.rs6000.ibm.com/resource/pubs.html>; another valuable source are the following redbooks:

- *RS/6000 SP Monitoring: Keeping it Alive*, SG24-4873
- *RS/6000 Models E30, F40, F50 and H50 Handbook*, SG24-5143

Within AIX, there are a couple of features that support the availability of the server and the application service. The most important regarding the Lotus Domino Server are:

- Dynamic kernel reconfiguration
- Logical Volume Manager LVM
- Journaled filesystems
- automatic reboot after crash

The URL http://www.rs6000.ibm.com/resource/features/1998/aix_details may be a good starting point to get familiar with AIX, if you are not so far. You can also access the complete software documentation for AIX Version 4.3 at http://www.rs6000.ibm.com/resource/aix_resource/Pubs.

12.1.2 Service Processor

The service processor allows you to access your system remotely even without an active AIX. The service processor monitors the status of the system and sends a message to a remote site if a hardware or operating system problem is detected. The service processor enables remote power control, reset, and boot features. It also enables remote maintenance and diagnostic activities, including console mirroring. Using a RS/6000 with a service processor is ideal for customers with geographically distributed computing environments that need to be serviced and monitored remotely.

The service processor enables or contributes to the following RAS functions, among others:

- Integrated system environmental monitoring/alerting included as standard.
- This includes AC/DC voltage, fan speed, and temperature sensing.
- Early Power Off Warnings (EPOW) and error log analysis and alert.
- Auto-dial out, call IBM Service Center capability. The system objective is to predict a potential component failure and automatically dispatch an IBM service representative to take preventive maintenance measures to avoid an outage. The system may also call the IBM Service Center in the event of a critical failure.
- Integrated system monitoring enhances failure error logging, analysis, and alert. It can be programmed by the system administrator to re-boot after experiencing the following conditions:
 - AC power restored (after a power loss)
 - Hardware checkstop failures
 - Machine check interrupt
 - Operating system hang or failure

For a detailed description of a service processor, you might want to look at http://www.rs6000.ibm.com/resource/hardware_docs. There you will find the manuals for the models F50, H50 and S70.

12.1.3 RS/6000 HA50 cluster server

The RS/6000 High Availability Cluster Server - HA50 is a special package-priced solution, with options for applications, services, and financing; it is not a new server model. The HA50 consists of currently marketed products:

- H50 Enterprise Servers

- 7133 Serial Disk System
- HACMP cluster software
- AIX operating system

Designated applications are featured solutions with the HA50. The applications (and the providers) are selected as focus segments. The featured application solutions include HA50 specific implementation guides and scripts, available from IBM, to simplify the planning and installation of an HA50 cluster. One of the applications currently featured is Lotus Domino Release 4.6.

The application scripts are executable “start/stop” failover scripts and are tested for compatibility with the specific application and the HA50. Implementation guides describe the scripts and provide assistance for planning and installation. The scripts and implementation guides are available from a central IBM repository and can be downloaded through the Internet by IBM Global Services (IGS), Business Partner, or customer service personnel from the IBM Web site at <http://www.rs6000.ibm.com/HA50scripts>.

12.2 Middleware Issues

On top of RS/6000 and AIX, you may apply some high availability solutions.

12.2.1 HACMP

HACMP works in conjunction with Lotus Domino and provides failover of service to another system. You can think of scenarios of two servers backing up each other, as available as a prepackaged solution HA50. Another common configuration in a Lotus Domino environment is to have three systems with an active Lotus Domino Server, and a fourth system standing by, providing for takeover in case one of the other three system fails.

For a detailed discussion, please refer to:

- *High Availability and Scalability with Domino Clustering and Partitioning on AIX*, SG24-5163

Background information about HACMP for both RS/6000 single server and SP systems is provided by:

- *RS/6000 SP HA Infrastructure*, SG24-4838
- *Implementing High Availability on RISC/6000 SP*, SG24-4742
- *High Availability on the RISC System/6000 Family*, SG24-4551

12.2.2 Lotus Notes Recovery Kit (NRK)

There has been an application specific recovery kit for the Lotus Notes server environment, available as Programming Request for Price Quotation (PRPQ) with program number: 5799-GBJ. As the currently available versions of Lotus Domino on AIX are running quite stable, this recovery kit is no longer maintained.

12.2.3 Lotus Domino Clustering

As we have seen in 11.2.3, “Failover” on page 331, Domino Advanced Services provides for high availability of your Lotus Domino service. This section provides

rough guidelines on how to use which solution. For a detailed discussion, please refer to the redbook *High Availability and Scalability with Domino Clustering and Partitioning on AIX*, SG24-5163.

The decision to use DAS or HACMP or a combination of both has to be made individually based on your specific needs.

The decision may be based on the technical restrictions or on your preference for one environment because you have the administration skills just for one environment and you do not want to invest in gaining the skills for the other environment. Some customers even do both.

For deciding based on the technical restrictions, you may want to have a look at the following table:

Table 16. Selection of Technology for Availability

Lotus Domino Server Function	Preferred Availability Solution	Rationale
Mail	Either HACMP or Domino Advanced Server	Domino Advanced Services will support mail user failover if a mail server is unavailable. However, shared mail is not yet supported and HACMP may be easier to implement for mail availability.
Mail Router	HACMP	Domino Advanced Services does not failover mail routing functions for outgoing mail. HACMP can failover/restart and recover this functionality.
Application	Domino Advanced Server	Domino Advanced Services will load balance and failover users to a backup for properly replicated databases.
Out-of-Domain Replication	HACMP	Domino Advanced Services does not failover out-of-domain replication. Therefore, if it is required to keep a dedicated replication server available, use HACMP.
Internet	HACMP or Domino Advanced Server combined with Interactive Network Dispatcher	Lotus Domino HTTP/IP addresses are not failedover by Domino Advanced Services as with HACMP. However, Interactive Network Dispatcher can balance load among HTTP servers and provide IP address "takeover." Combined with standard Lotus Domino, this solution provides high available HTTP solutions.
InterNotes	Domino Advanced Server	InterNotes Servers are part of the advanced services functions/servers that can be failedover.

From the implementation point of view, you should be aware of the main differences regarding the data handling:

- HACMP would restart the defined services on the backup system, using the same data the original system used (by acquiring the volume group). In case of Lotus Domino, that means restarting the server and running fixup on all databases that were open at the time of the takeover.
- DAS would care for cluster (real-time-) replication during normal operation to have replicas of the data available on another system. This replication is based on events kept in memory. In case of a crash on a heavily loaded

system, you might not get all the data replicated in time before the crash. If that should happen, you would have slight differences between the databases on your original system and the replica databases, until the crashed server is on-line again and can schedule standard replication to get rid of these differences.

- With HACMP, even if the end user is working in an already opened database at the time of the service outage, they will be able to save their work afterwards, transparently, as HACMP has taken over the original IP address. DAS failover occurs on opening a database.

12.3 Scalability and RS/6000 SP

The most important point about scaling in a Lotus Domino environment is, as always, the proper design of your implementation. As soon as you have identified your Lotus Domino topology in terms of server instances, you have different possibilities to scale your installation. Again, the detailed scalability issues for your environment have to be identified individually, and you have to pick the approach that is right for you.

Scaling in terms of faster hardware on the same server is possible by adding additional memory, and additional CPUs, additional network cards, depending on your scaling needs. Therefore, if you expect growth during the lifetime of your server, you should start with an SMP system or with a SMP node in a RS/6000 SP. Remember that more than two CPUs are exploited best with more than one Lotus Domino Server instance on the system (Domino Advanced Services Partitioning). Therefore, start early with evaluating partitioning for your server.

If you reach the limits of your single server, you must add an additional system. You could either use Domino Advanced Services and/or HACMP to provide for high availability, as discussed in 11.2, “Clustering” on page 328 and 12.2.3, “Lotus Domino Clustering” on page 353.

If you need more systems, you should plan in time for a RS/6000 SP, since management of multiple servers would be much easier. If you know your scaling needs just from the start, it would be wise to start with a one- or two-node SP, instead of starting with single boxes. If you want to use clustering right from the start, think of the SP High Performance Switch as the proper connection solution for the servers, without the sharing of bandwidth you would get on another LAN environment. You would follow the same procedure as described in 11.2.12, “Use of Private LAN for Cluster Communication” on page 336, just using the IP address of the switch in setting up your port definitions.

If you would like to have a scalable Webserver solution, you could use the combination of Lotus Domino Advanced Services clustering plus the IBM Interactive Network Dispatcher (IND) for directing Web clients to an appropriate server. IND provides loadbalancing between servers for TCP/IP oriented protocols, such as HTTP. The redbook, *Load-Balancing Internet Servers*, SG24-4993, provides you with an overview about this product.

12.3.1 RS/6000 SP: Planning

If you are going to install a Lotus Domino Server in a SP system, you should know some specifics of the software and the hardware of the RS/6000 SP. For a

good starting point to get familiar with software and hardware of RS/6000 SP systems, refer to the new redbook *Inside the RS/6000 SP*, SG24-5145. As the Scalable Parallel (SP) system is one of the most successful products within the RS/6000 family, known by many extraordinary events, this redbook provides a comprehensive and detailed look at the different components that make up this system. It also includes the history and evolution of the SP.

In general running Lotus Domino on the SP is the same as on a cluster of distinct servers, from the application point of view. But you have to consider the system administration advantages of the RS/600 SP as a foundation for your Lotus Domino servers. You can also use all the information provided so far in this redbook about Lotus Domino on the RS/6000 SP. Major points to consider, especially for the combination of Lotus Domino and RS/6000 SP, are:

1. Use of the High Performance Switch as separate network for DAS cluster communications.
2. Use of the High Performance Switch as a network for backup/restore purposes. If you have a large number of registered mail users, or high volumes of application data, you must carefully plan your backup/restore to fit in the timeframe available at your site. Using the switch to eliminate network restrictions might help, compared to a setup with standard servers without the switch.
3. Use of the High Performance Switch in conjunction with a network routing node to gain network bandwidth advantages on connecting many clients, instead of multiple network adapters per node.

The central source of information about how to implement Lotus Domino servers using the RS/6000 SP is currently available at the IBM web site:

<http://www.rs6000.ibm.com/resource/technology/notesSPcfg>

This location provides information about:

- Planning the hardware.
- Planning SP Lotus Domino servers.
- Planning SP AIX users.
- Planning disk space and configuration.
- Planning networks for Lotus Domino.
- Planning Lotus Domino High Availability on the RS/6000 SP.

Even if you are starting a small Lotus Domino implementation on your SP system, follow these recommendations. It will simplify the growth of your Lotus Domino environment in your SP system.

12.3.2 RS/6000 SP: Installation

After planning your installation, just install Lotus Domino on the SP as usual (see Chapter 2, "Installing a Lotus Domino Server" on page 23):

1. Make sure the hardware is installed correctly and each node meets the requirements for a Lotus Domino Server as described in 1.5, "Available Platforms" on page 14.
2. Make sure AIX and Parallel System Support Progress (PSSP) is installed on all nodes; see 1.5, "Available Platforms" on page 14 and check with the current release notes of Lotus Domino for the needed PTFs. Lotus Domino on a RS/6000 SP needs the same PTFs as a standalone server.

3. Make sure the X11 runtime libraries are installed on the nodes. Otherwise, you cannot start Lotus Notes for installation and administration. They are not installed by default on an SP since there is normally no graphic adapter installed in a node. You could check by issuing the commands `lsldpp -L bos.rte.X11` and `lsldpp -L X11.compat.lib.X11R5` on the node (X11.compat.lib.X11R5 is only required if you have trouble with a Lotus Notes client on the node).
4. Make sure your network connectivity is setup correctly (multiple IP addresses for the switch interfaces if you use partitioning, network routes). The server names you are going to use must be resolvable both by the servers and the clients. For details about multiple IP addresses and partitioning, see 9.2.1, “Network Setup” on page 236 and 11.3.3, “Configuring Partitioned Servers for TCP/IP” on page 339. Basic network setup is described in 2.2.6, “Setting Up a Local Area Network (LAN)” on page 32.
5. Make sure paging space is large enough for your environment (not below installed memory, depending on the number of users and databases significantly larger); again, there are no special requirements as compared to a standalone server.
6. Make sure a user notes with group notes exists on every node where Lotus Domino is going to be installed. It does not have to be a login user, but it is used for file ownership of the server code. Details about creating a user can be found in 2.2.5, “The File System for the Lotus Domino Server Databases” on page 30.
7. For each server instance, create a user ID (preferable username=<domino server instance name>) part of group notes.
8. Create the filesystem `/usr/domino` on each node where the Lotus Domino Server code is to be installed, owned by user notes; see 2.2.2, “Create the Logical Volume for the Lotus Domino Server Binaries” on page 26 and 2.2.4, “The File System for the Lotus Domino Server Binaries” on page 29 for details.
9. Create Volume Groups and filesystems, as planned, for each server instance owned by the appropriate user from step 4. A good naming convention is to create the filesystem with the server instance name and install the instance in the subdirectory `notesr4`. So, each filesystem for each server instance will have a different name. See 2.2.3, “Create the Logical Volume for Lotus Domino Server Databases” on page 27 and 2.2.5, “The File System for the Lotus Domino Server Databases” on page 30.
10. Modify each user’s `.profile` as usual for a notes server user. Do not forget the specific environment variables for a UNIX system, such as `NSORDER` and `Notes_SHARED_DPOOLSIZE`. For details about these variables, see Chapter 6, “Configuring Lotus Domino Servers on AIX” on page 143.
11. Install the Lotus Domino Server executable code on all nodes through the Lotus Domino installation process. If you have the installation CD on the SP’s control workstation, you can install to multiple hosts, as specified in 2.3.1, “Installing on Multiple Hosts” on page 49. You do not have to modify the file `.rhosts`, since the control workstation has access to the nodes anyway.
12. Install each server instance by performing the following steps:
 - a. Login as user <serverinstance> on the appropriate node.

- b. Export the `DISPLAY` environment variable to the graphical terminal you are working on; remember to allow access for the Xclient by issuing the `xhost` command before on your graphical terminal.
 - c. Type `notes` and proceed as usual with the Lotus Domino setup.
13. Perform further setup and administration of Lotus Domino as usual.

12.4 Further Information on High Availability and Scalability

As already pointed out several times, the redbook *High Availability and Scalability with Domino Clustering and Partitioning on AIX*, SG24-5163, provides valuable additional information on these topics. It gives a comprehensive explanation about the different ways of making a Lotus Domino Server highly available. It describes the Lotus Domino Clustering technology, which is part of the Advance Services offering of Lotus Notes servers, as well as the standard HACMP implementation for AIX and RS/6000 SP.

The redbook will help you to plan, install, and configure a highly available Lotus Domino Server using Lotus Domino Clustering and Partitioning, as well as HACMP technology, including the special version developed for the RS/6000 SP.

Within the six chapters of the book, you will find a good deal of information about what environment will better fit your needs for high availability and scalability, as well as detailed examples for implementing those different environments.

Chapter 13. Backup and Recovery

This chapter covers one of the most important tasks in Lotus Domino administration, backup and recovery. We will focus mainly on the tools that come with AIX, but we will also give a quick overview on other means of backing up your Lotus Domino system.

13.1 Introduction

Performing regular backups is critical. Back up Lotus Domino Servers often to protect from data loss. This is a very laborious task that needs your attention daily. For your assistance, there are many good tools that come with AIX.

We will present several ways to back up your Lotus Domino servers in this chapter. You are free to choose the one solution that will best suit your environment. When choosing your backup plan, remember that the goal of all backups is to minimize server downtime. When one or more servers are down, and you have hundreds, or maybe thousands, of users waiting for Lotus Domino to come back on-line, you will find that you don't have time for lengthy recovery procedures or many mistakes. Make sure to have a good recovery plan written down on paper.

Note

Don't make the mistake of storing your recovery plan in your Lotus Notes database. At the time you need it, it might be unavailable! Keeping an up-to-date hardcopy physically near the Lotus Domino Server is a good idea.

When setting up your backup environment it is also crucial to know for certain that it is functional. A backup is not a backup unless you have tested your recovery plan. It is a good idea to test out backup as well as recovery before taking the Lotus Domino Server into production. When in production, make sure to make a recovery test every six months or so.

Assuming that the server was installed as described in 2.2, "Preparing the Environment for the Installation" on page 24, you need to back up the following directories and files:

/usr/domino/lotus

This is the Lotus software file system. You need to back it up only before you install new Lotus software or an upgrade in this directory. If you are not extremely short on backup media and backup time, however, it is recommended that you include this file system in your regular backups.

/noteswrk

If you created this file system (see 6.3.3, "Distributing the Lotus Notes Software Directory" on page 160) you may back it up once. Note that you can repeat the procedure in 6.3.3.1, "Installing the Notes Workstation Software" on page 162, to restore this file system from the Lotus Notes UNIX Distribution CD-ROM.

/server1

This is the file system with the home directory for the user notes. It contains the Lotus Domino Server data directory (notesr4) with the

databases, the templates, the mail files, and others. This file system may require one or more daily backups if your organization produces a lot of data. Be aware that with the procedures described in this chapter, you must shut down your Lotus Domino Server software before you make a backup.

notes.ini, server.id, cert.id, user.id

Keep a copy of these files on a floppy disk in a secure place. You will find them in the Lotus Domino Server data directory (/server1/notesr4).

Note

Do not rely on replication as your only backup method. Corrupted, damaged, or accidentally changed databases can replicate, and all replicas may become damaged.

In this chapter, we discuss the following examples:

- How to back up only one server
- How to back up a server that contains users data
- How to back up more than one server

For our examples, we will assume that a backup server exists with two identical tape units. In order to make examples easier to understand, the capacity of these tape units are assumed to be sufficient for all of our backup needs. These tape units may be 4 or 8 mm DAT, or maybe DLT, depending on the size of the data to be backed up. In our case, the device names will be /dev/rmt0 and /dev/rmt1.

Additionally, it is also assumed that you have installed the scripts from 11.3.5, “Starting the Server in the Background” on page 341 for starting the server in the background. This is normally required when running Lotus Domino on AIX in a production environment. In scripts and examples, we will assume that these scripts are installed in the directory /server1/bin.

All the examples here can be used in small organizations with some work and customization. For a larger organization, consider using a professional backup tool like the IBM ADSTAR Distributed Storage Manager Solution (ADSM). There is a redbook on using IBM ADSM to back up Lotus Notes; *Using ADSM to Back Up Lotus Notes*, SG24-4534.

13.2 Server Backup Using AIX Native Tools

The `backup` and `restore` commands are the native AIX tools for backups that will be used in this section. These tools are capable of incremental backup, but since a Lotus Notes database is one file, the modification of one document in a huge database will change the file, and, thereby, force a backup of the entire file. Obviously, it would be more economical to be able to make an incremental backup of the database saving only the modified documents. Refer to 13.5, “Advanced Backup Solutions” on page 374 for backup solutions that can make incremental backups of Lotus Notes databases on a document level.

13.2.1 Stopping and Starting the Database Server

To ensure the integrity of a Lotus Domino Server backup using native AIX tools, the server should be stopped, and the file system where it resides preferably unmounted. It is not necessary to unmount the file system if you know that there are no users on the server and that no process will work with the server file system during the backup. If you are uncertain, unmount the file system before the backup.

The commands for stopping and starting the Lotus Domino Server depend on your installation. If you installed the start and stop scripts described in 11.3.5, "Starting the Server in the Background" on page 341, you would use the following procedures:

To stop a running server:

1. Log in as user root.
2. Execute the command `/server1/bin/app_stopdomino`.

To start a server that is not already running:

1. Log in as user root.
2. Execute the command `/server1/bin/app_startdomino`.

13.2.2 How to Back Up the Lotus Software File System

You have to back up the `/usr/lotus` file system only after you install new Lotus software or perform an upgrade. You can also use the instructions in this section to back up the `/noteswrk` file system.

If you have a local tape on the system, you can use the `backup` command.

1. Insert a blank and unprotected media in the tape unit.
2. Log in as `root`.
3. Enter the following command to set the tape block size:

```
# /usr/sbin/chdev -l rmt0 -a block_size=1024
```

Note

Change the `rmt0` to your tape unit name; you can use other block sizes than 1024. You can list your system's tape names with the following command:

```
lsdev -C -c tape
```

4. Before running a file system backup, you should check the file system integrity. Run the command:

```
# fsck /usr/lotus
```

This command will report the problems you may have. If you have any problems, you must unmount the file system and run `fsck` again to correct the problem and then remount it. For additional information, please refer to the `fsck` AIX manual page by typing in the command: `man fsck`

Alternatively, you can also find relevant documentation, including a commands reference for AIX, at http://www.rs6000.ibm.com/resource/aix_resource/Pubs/ on the World Wide Web.

5. If the `/usr/domino/lotus` is a file system, enter:

```
# backup -u -0 -f /dev/rmt0 /usr/domino/lotus
```

This command will perform a level 0 file system backup by i-node.

Note

- Change `rmt0` to the name of your tape unit.
- To ensure the data integrity of the backup when performing a backup by i-node, you must unmount the file system before doing the backup. Don't forget to remount it again after the backup.

If it is not a file system, you can use the following commands:

```
# cd /usr/domino/lotus
# find . -print | backup -i -v -f /dev/rmt0
```

This creates a backup by file name on the tape. Invoked this way, the `backup` command needs a list of files and directories to backup. The `find` command, as used above, lists the entire directory structure starting at the current directory.

6. If you need to copy the backup tape, just insert the target tape in the tape unit, `rmt1`, and enter the command:

```
# tcopy /dev/rmt0 /dev/rmt1
```

In this example, `rmt0` is the source tape unit, and `rmt1` is the target tape unit. Don't forget to set the block size for `rmt1`, the same as for `rmt0`.

See 13.2.5.1, "Restoring Files with restore" on page 366 for information on restoring backups. See also the manual pages for a detailed explanation of the commands `find`, `tcopy`, `backup`, and `restore`. To get an explanation of any AIX commands, type: `man <command>`. For example, you can get an explanation of `backup` by typing in the command:

```
man backup
```

Alternatively, you can also find relevant documentation, including a commands reference for AIX, at http://www.rs6000.ibm.com/resource/aix_resource/Pubs/ on the World Wide Web.

13.2.3 How to Back Up Only One Server

It is very important to have a backup schedule. The AIX `backup` command offers 10 different levels (0 through 9) of incremental backup. Level 0 is the full backup. On the other levels, all the files that have been changed since the last lower-level backup are backed up.

For our example, we will use the following backup schedule:

Weekly Full Backup (Level 0)

Performed every Wednesday. The full backup tape will be copied for security reasons. The second copy from this tape can be stored on a secure place in another building, for example.

Incremental Daily Backup (Level 5):

Performed on Monday, Tuesday, Thursday, Friday and Saturday.

To implement this schedule, we will use the script `backtape` (Figure 292 on page 364) and the AIX crontab facility. The `cron` and `crontab` commands give you the ability to schedule commands to be executed at given times. Please refer to the `crontab` manual page if you are not familiar with `crontab`.

```
#!/bin/ksh
#(##) backtape Lotus Notes backup procedure
#
# Usage: backtape [-copy] <level> <tape0> <tape1>
#
COPY=NO
FS=/server1

# Display error message and exits
Error () {
    echo "Usage: backtape [-copy] <level> <tape0> <tape1>"
    echo "Example: backtape 5 mnt0 mnt1" >&2
    exit 1
}

NARGS=$#
# Test for the copy option
[[ $1 = -copy ]] && { COPY=YES ; shift ; let NARGS=${NARGS}-1 ; }
# Test the number of flags, must be 3
[[ $NARGS -ne 3 ]] && Error

LEVEL=$1
TAPE0=$2
TAPE1=$3

echo "Backup level $LEVEL, tape0 $TAPE0, tape1 $TAPE1, copy=$COPY"
echo "Started on `date` on server `uname -n`"

# These tape attributes applies to the 8mm 2.3/5GB tapes
# Check for the attributes that applies to your tape
echo "\nChanging the attributes of $TAPE0..."
/usr/sbin/chdev -l $TAPE0 -a block_size=1024 -a mode=yes -a extfmt=yes

# We have to rewind the tape
echo "\nRewinding the tape $TAPE0..."
/bin/tctl -f /dev/$TAPE0 rewind

# Stop the Lotus Domino server
echo "\nStopping the Lotus Domino server..."
$FS/bin/app_stopdomino

# Make the system backup of the $FS
echo "\nMaking backup level $LEVEL of $FS on $TAPE0..."
/usr/sbin/sync
/usr/sbin/sync
/usr/sbin/backup -u -$LEVEL -f /dev/$TAPE0 $FS

# Restart the Lotus Domino server
echo "\nRestarting the Lotus Domino server..."
$FS/bin/app_startdomino
```

```

# Making the tape copy...
if [[ $COPY = YES ]]
then
  # These tape attributes apply to the 8mm 2.3/5GB tapes
  # Check for the attributes that applies to your tape
  echo "\nChanging the attributes of $TAPE1..."
  /usr/sbin/chdev -l $TAPE1 -a block_size=1024 -a mode=yes -a extfm=yes

  # We have to rewind the tapes
  echo "\nRewinding the tape $TAPE0 for copy..."
  /bin/tctl -f /dev/$TAPE0 rewind
  echo "\nRewinding the tape $TAPE1 for copy..."
  /bin/tctl -f /dev/$TAPE1 rewind

  # Make the copy
  echo "\nMaking the copy of $TAPE0 on $TAPE1..."
  /bin/tcopy /dev/$TAPE0 /dev/$TAPE1

  # Ejecting the tape
  echo "\nEjecting $TAPE1..."
  /bin/tctl -f /dev/$TAPE1 offline
fi

# Ejecting the tape
echo "\nEjecting $TAPE0..."
/bin/tctl -f /dev/$TAPE0 offline

echo "\nEnd of the backup program..."

```

Figure 292. Simple Script to Make the Lotus Notes Backup (backtape)

This script will back up the file system /server1 to the specified device (rmt0 or rmt1) using the `backup` command, then makes a copy of the backup tape, if specified (using the command `tcopy`), and finally ejects the backup tape(s) (using the command `tctl`).

Note

To use AIX with this form of the `backup` command, /server1 must be a valid file system.

To implement the backup schedule, you have to add the lines in Figure 293 to the root crontab. As root, run the command: `crontab -e` and add the lines at the end of the file.

The first line is only a comment to remember the crontab file fields. The second line implements the Monday, Tuesday, Thursday, and Friday daily incremental level 5 backup on rmt0. The third one implements the Saturday backup on rmt1. The last one is the weekly full backup that is made on rmt0 and copied to rmt1.

```

#minute hour day_of_month month weekday command
0 23 * * 1,2,4,5 /server1/scripts/backtape 5 rmt0 rmt1 2>&1 | /bin/mail -s "Backup level 5" root
0 23 * * 6 /server1/scripts/backtape 5 rmt1 rmt0 2>&1 | /bin/mail -s "Backup level 5" root
0 23 * * 3 /server1/scripts/backtape -copy 0 rmt0 rmt1 2>&1 | /bin/mail -s "Full Backup" root

```

Figure 293. Crontab for the backtape Script

The backup operator will need five tapes (one for each day of the week) for the level 5 backup. These five tapes may be labeled with the weekday name and reused weekly. So, for example, on Monday, the operator inserts the Monday tape in rmt0, and on Friday, the Friday tape is inserted in rmt0 and the Saturday tape in rmt1.

For each week, two tapes will be needed for the full backup. They have to be labeled with the backup date. On Wednesday, the operator will have to insert the backup tape in rmt0 and the copy tape in rmt1. On Thursday, the tapes must be backed up and the copy sent to another place. In Table 17, there is an example of the backup schedule and tape labels.

Table 17. Backup Schedule and Tape Labels

Weekday	Tape Labels	
	Tape rmt0	Tape rmt1
Monday	Monday level 1	
Tuesday	Tuesday level 1	
Wednesday	MM/DD/YY level 0	MM/DD/YY level 0 copy
Thursday	Thursday level 1	
Friday	Friday level 1	Saturday level 1

Another decision that needs to be made is how long you want to keep these tapes. For example, you can keep the backup tapes for the last year. For the most recent three months, you keep all the weekly backups. For the previous nine months, older tapes can be reused.

Note

You must be careful when storing tapes for a long time because they maintain the data integrity only for a defined time period (generally one to two years). You also must be careful about reusing tapes.

13.2.4 Backing Up a Server that Contains User Data

If you have a file system that contains all of the user data directories on the Lotus Domino Server (with the configuration shown in Figure 131 on page 156), just replace the lines in Figure 294 in the script backtape (Figure 292 on page 364) with the lines in Figure 295 on page 366.

```
# Make the system backup of the $FS
echo "\nMaking backup level $LEVEL of $FS on $TAPE0..."
/usr/sbin/sync
/usr/sbin/sync
/usr/sbin/backup -u -$LEVEL -f /dev/$TAPE0 $FS
```

Figure 294. Lines To Be Removed

```

# Make the system backup of the /server1
echo "\nMaking backup level $LEVEL of /server1 on ${TAPE0}.1..."
/usr/sbin/sync
/usr/sbin/sync
/usr/sbin/backup -u -$LEVEL -f /dev/${TAPE0}.1 /server1
# Make the system backup of the /home
echo "\nMaking backup level $LEVEL of /home on ${TAPE0}.1..."
/usr/sbin/sync
/usr/sbin/sync
/usr/sbin/backup -u -$LEVEL -f /dev/${TAPE0}.1 /home

```

Figure 295. Lines To Be Added

You will have the same backup schedule for the users' data file system using the same tapes.

To restore the data of the /server1 file system, run the `restore` command (see 13.2.5.1, "Restoring Files with restore" on page 366). To restore the data of the /home file system, you must use the `tctl` command to advance the tape. With the `restore` command, specify the `-f` flag to indicate a non-rewinding device. The commands below list the table of contents of the /home file system backup. They assume the backup tape is available at the unit `rmt0`.

```

# tctl -f /dev/rmt0 rewind
# tctl -f /dev/rmt0.1 fsf 1
# restore -T -f /dev/rmt0.1

```

13.2.5 Restoring Backup Data

To restore a whole file system, first ensure you have an empty and error-free file system before restoring the tape to it. Next, you will have to use the `restore` command.

To restore a database that is stored on tape or in a file, you must use the `restore` command. This command copies the database files you select from the tape to the hard disk. You can copy the backup file over the damaged file to restore the whole database or use one of the following tips to manage at the document level:

- To preserve the new documents added since the last backup, restore the backup to a different directory, move it to the databases directory using a new file name, and copy the new documents from the live database to the backup. Delete the live database and rename the backup to the original name.
- To restore a single damaged or deleted document, you must restore the backup of the whole database with a new file name and copy the document from the backup to the live database. Following this, delete the backup database from the hard disk.

13.2.5.1 Restoring Files with restore

The `restore` command extracts files from archives created with the `backup` command. To check a backup tape, you can use the `restore` command with the `-T` flag: `restore -T -f /dev/rmt0`. This command produces a list of all backed up files.

For example, you lost all the /server1 file system. To recover it on the last backup, you must take the appropriate actions (for example, remove the old files, remove

the file system and create a new one, and so on) until you have an empty, mounted, and error-free file system in /server1. After that, as root:

1. Change directory to /server1. This is very important.
2. First restore the last full backup:
 - a. Make sure that your media (the tape or the file) is available.
 - b. Run the command:

```
# restore -x -v -f <device name>
```

If you are using the tape, use /dev/rmt0.1. You may need to run the `tctl` command. Use the `tctl` command when you have made more than one backup on a single tape, see 13.5.1.2, “Back Up Using `rdump`” on page 379. If you are using a file archive, use its name.

- c. When the system prompts with the message

```
Specify the next volume number:
```

press **1** and **Enter**, and the restoration proceeds.

- d. When the system prompts with the message

```
Do you want to set the owner or the mode for the current
directory? [ yes or no ]
```

answer `yes` to set the owner and the mode for the /server1 directory.

3. If you have performed incremental backups since the last full backup, restore only the last incremental one. Insert the correct tape, or specify the new file name, and run the same command as above. Be sure to be in the /server1 directory, and run the same `restore` command.

If you want to restore only some files, restore them to a temporary directory and then move them into place using the `mv` command. For example, as root, do the following:

1. Create a temporary directory, /server1/restore.
2. Change the owner and group of this directory to notes.
3. Change the current directory to /server1/restore.
4. Make the archive media available as described above.
5. Run the command:

```
# restore -i -f <filename>
```

6. Use the `-i` flag subcommands to list the files. Select the ones you want and restore them.

In Figure 296 on page 368, you see an example. The file names.nsf (Address Book database) is restored. What you have to type is in bold.

```

# mkdir -m 750 /server1/restore
# chown notes.notes /server1/restore
# cd /server1/restore
# restore -i -f /dev/rmt0.1
Please mount volume 1 on /dev/rmt0.1.
    Press the Enter key to continue.

restore > ls
.:
.Xpdefaults      .sh_history      notesr4/
.profile         log/             scripts/

restore > cd notesr4
restore > ls
./notesr4:
.notes4000      certlog.ntf      doclibm4.ntf    mail/           readme.nsf
admin4.nsf      cluster.ncf      events4.ntf     mail.box        reserve4.ntf
admin4.ntf      dba4.ntf         help4.nsf       mail4.ntf       server.id
alog4.ntf       dblib4.ntf      help4.ntf       mailbox.ntf     statrep.ntf
approve4.ntf    desktop.dsk     journal4.ntf    modems/         unix/
cache.dsk       discuss4.ntf    log.nsf         names.nsf       user.id
catalog.nsf     doc/            log.ntf         notes.ini       web.ntf
catalog.ntf     doclib4.ntf     loga4.ntf      pernames.ntf   ~console.tmp
cert.id        doclibl4.ntf    lotusenl.dic   pubnames.ntf   ~notes.lck

restore > add names.nsf
restore > extract
You have not read any media yet.
Unless you know which volume your file or files are on, you should start
with the last volume and work towards the first volume.
Specify the next volume number: 1
Do you want to set the owner or the mode for the current
directory? [ yes or no ] yes
restore > quit
# pwd
/server1/restore
# ls
notesr4
# cd notesr4
# ls
names.nsf
# mv names.nsf /server1/notesr4
# cd ..
# rmdir notesr4
#

```

Figure 296. Restoring the names.nsf File

For more information, refer to the `restore` manual page. Alternatively, you can also find relevant documentation, including a commands reference for AIX, at http://www.rs6000.ibm.com/resource/aix_resource/Pubs/ on the World Wide Web.

13.3 Backup and Recovery of the AIX System

It is very important to do a full system backup from the AIX server machine at least weekly. You will need to have a tape unit locally attached to each server you want to back up.

You can make a system backup to a file on a backup server, but you will need to set up a Network Install Manager (NIM) environment to be able to restore the AIX

machine from this file. To learn about the NIM, see *AIX Version 4.1 Network Installation Management Guide and Reference*, SC23-2627.

To make a system backup, you need the `bos.sysmgt.sysbr` fileset installed in your system. You can use the command `lsllpp -l bos.sysmgt.sysbr` to see if this file set is installed on your system. Refer to the *AIX Version 4.1 Installation Guide*, SC23-2550, for more information about installing a fileset.

The `mksysb` command only backs up the rootvg volume group. If you have other Volume Groups, you can use the `smitty savevg` command.

13.3.1 Backing Up the AIX System

In this redbook, we show only the minimal procedure to do a system backup for the rootvg volume group. Please refer to the *AIX Version 4.1 Installation Guide*, SC23-2550, for more information about the system backup.

To backup the system:

1. Log in as root.
2. Mount all file systems (in the rootvg) you want to back up. Refer to the `mount` command for details.

Note

The `mksysb` command does not back up file systems mounted across an NFS network.

3. Enter the `smitty mksysb` command. The Back Up the System screen, as shown in Figure 297 on page 369, appears.

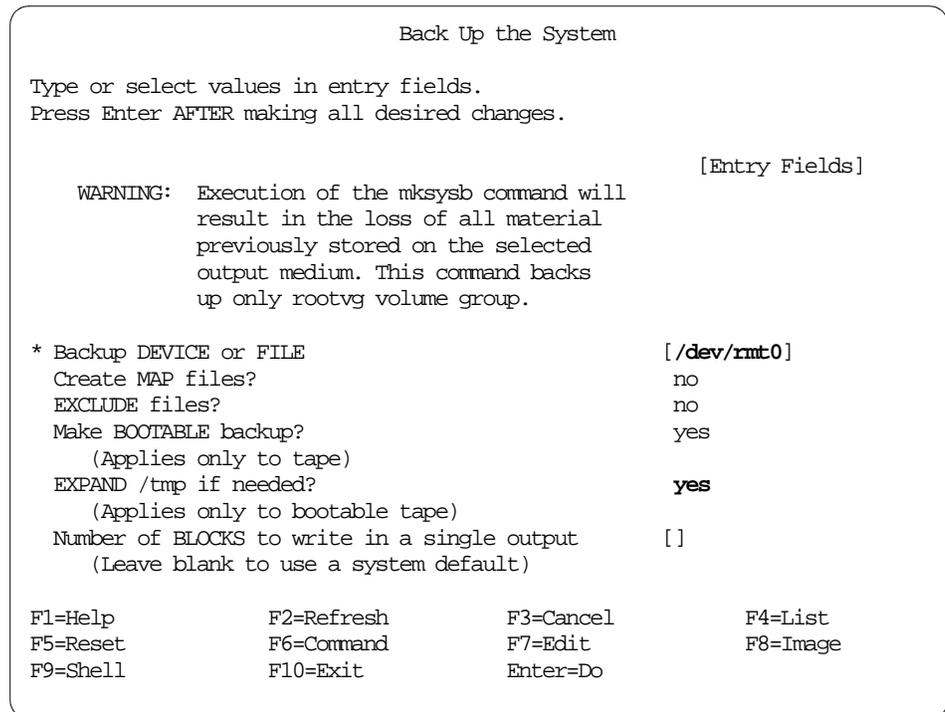


Figure 297. Back Up the System

- a. Press **F4** in the Backup DEVICE or FILE field and choose the tape for the backup.
- b. Select **yes** on the EXPAND /tmp if needed? field.
- c. Insert the tape in the unit and press **Enter**.

Note

- The `mksysb` command will create a bootable tape on an ISA (Industry Standard Architecture)-bus machine, but not every ISA-bus machine will boot from tape. To determine if your system will boot from tape, run the command: `bootinfo -e`. If a 0 is returned, it will not boot from tape, and you must boot from CD-ROM to install your `mksysb` tape.
- The `mksysb` tapes that are created on ISA-bus machines will not boot Micro Channel-based uniprocessor or Micro Channel-based symmetric multiprocessor machines, and `mksysb` tapes made from Micro Channel-based uniprocessor and Micro Channel-based symmetric multiprocessor machines will not boot on ISA-bus machines.

13.3.2 Restoring the AIX System Backup

In this redbook, we show only the minimal procedure to restore the system from the backup tape. Please refer to the *AIX Version 4.1 Installation Guide*, SC23-2550, for more information about the system backup.

To restore the system:

1. Insert the backup tape (write protected) in the tape unit.
2. Shut down and power-off the system.
3. Put the system key in the Service position, if there is a key.
4. Power on the system.
5. After several minutes, c31 is displayed in the LED. Choose the system console.

After this, turn the key to the normal position (when asked), and follow the installation menus.

13.4 Other Native AIX Backup Tools

Instead of the commands `backup` and `restore`, you may choose between several other tools for backup. Each of these tools have advantages and disadvantages over the others. One reason to choose another tool might be that your site is already using `tar` or `cpio` for other backups. It might then make sense to look into using the same tool for your Lotus Domino Server as well. In this section, we will give a quick overview of the other tools you may choose from. If you need more information, please refer to the man pages of the respective command.

13.4.1 tar

Tar (Tape Archiver) is a traditional AIX tool, that has been around since the early days. As the name suggests, it archives files and puts them on a tape. The `tar` command works with the usual AIX files; so it is not really restricted to archiving

to tape. You can put your archives on almost anything that is a file in AIX. Basically, it is a very simple tool. All it really does is to take one or more files and directories and archives them into one single file. Nothing more, nothing less. There is no compression or encryption involved as in some other tools. If you want compression for instance, you have the option of adding that after the archive is created.

It is possible to exchange the `backup` and `restore` commands that we have used so far with `tar`. This might be preferable if there is a mixed environment at your site and the other hosts on your network don't support the `backup` and `restore` commands. If you choose to do this, there are a few things to be aware of. First of all, unlike `backup`, `tar` can only back up files by file name. This is not really a problem, just different. Also, `tar` does not read files to back up from standard input. You must add the files and the directories to the command line when invoking `tar`. However, if you specify directories on the command line, `tar` will search those directories recursively; so, normally, you only need to specify one or a few. Finally, `tar` has some restrictions on file names, sizes, and attributes. For example, `tar` does *not* back up ACLs.

Note

The `tar` command does not normally perform any translations of file and directory names. Therefore, if you specify absolute path names when you back up files or directories, they will also appear at the very same location if you extract them later, potentially overwriting an old file. A good rule of thumb is to always try to use relative path names with `tar`. A relative path name is a path name that does not begin with the character `/`.

If you want to back up the directory (or file system) `/usr/domino/lotus` to tape device `/dev/rmt0` using `tar`, you could use the following sequence of commands (note that the `tar` command ends with a space and a period):

```
# cd /usr/domino/lotus
# tar -cvf /dev/rmt0 .
a .
a ./notes
a ./notes/4613
a ./notes/4613/ibmpow
a ./notes/4613/ibmpow/Notes.jar 401 blocks.
a ./notes/4613/ibmpow/icsclass.jar 447 blocks.
a ./notes/4613/ibmpow/getgroup 67 blocks.
a ./notes/4613/ibmpow/amgr 357 blocks.
a ./notes/4613/ibmpow/chronos 68 blocks.
a ./notes/4613/ibmpow/notes 28984 blocks.
...
```

To list the entire archive you would use `tar -tvf /dev/rmt0`, and to extract the entire archive to the current directory, `tar -xvf /dev/rmt0`. Be advised that when extracting files, `tar` will overwrite any existing files with the archived version, if a file with the same name exists.

The `tar` command isn't really able to create archives on remote hosts, but if your file system is on one host and the tape device on another and they can talk to

each other over a network, you can use the following little trick to copy your archive to the remote host. First of all, the root user on the local host must be trusted as root on the remote host, that is, the local machine name must be in the file `/.rhosts` on the remote host. See 13.5.1.2, “Back Up Using `rdump`” on page 379, for more information. Then, to back up the local directory `/usr/domino/lotus` to the remote tape unit `/dev/rmt0`, you would use the following commands. In this example, the remote host with the tape unit is called `noteserv`.

```
# cd /usr/domino/lotus
# tar -cvf - . | remsh noteserv "dd bs=1024 of=/dev/rmt0"
```

Note

- This trick will only work with a remote host running AIX or some other version of UNIX.
- Depending on the OS and the tape unit on the remote host, you might need to give a different block size. See the user manuals for the OS in question.

The `tar` command has many more options worth exploring that are beyond the scope of this book. For more information, refer to the `tar` manual page. Alternatively, you can also find relevant documentation, including a commands reference for AIX, at http://www.rs6000.ibm.com/resource/aix_resource/Pubs/ on the World Wide Web.

13.4.2 `cpio`

The name `cpio` comes from the intended use of the command: CoPy files In and Out of archives. Just like `tar`, `cpio` has been around since the beginning of AIX. The `cpio` command differs from `backup` and `tar` by only working with the standard input and output of the shell. You must use shell redirection to send a `cpio` archive to permanent storage. To specify the files to be archived or extracted, you must supply them on the standard input of `cpio`. It may sound difficult, but it really isn't. It also gives you great flexibility in how you want to list filenames and where to store the archive. Just like `tar`, `cpio` does not compress or encrypt the archived files, but it is very easy to add with other commands.

You may want to choose `cpio` for your backups if you are on a mixed environment network, or if your site already uses `cpio` for regular backups. The `cpio` command has similar restrictions on file name, size, and attributes to `tar`. The main difference is that `cpio` takes file names on standard input instead of the command line.

Note

The `cpio` command does not normally perform any translations of file and directory names. Therefore, if you specify absolute path names when you back up files or directories, they will also appear at the very same location if you extract them later, potentially overwriting an old file. A good rule of thumb is to always try to use relative path names with `cpio`. A relative path name is a path name that does not begin with the character `/`.

If you want to back up the directory (or file system) `/usr/domino/lotus` to tape device `/dev/rmt0` using `cpio`, you could use the following sequence of commands:

```
# cd /usr/domino/lotus
# find . -print | cpio -ovB > /dev/rmt0
.
notes
notes/4613
notes/4613/ibmpow
notes/4613/ibmpow/Notes.jar
notes/4613/ibmpow/icsclass.jar
notes/4613/ibmpow/getgroup
notes/4613/ibmpow/amgr
notes/4613/ibmpow/chronos
...
```

To list the entire archive, you would use `cpio -itvB < /dev/rmt0`, and to extract the entire archive to the current directory, `cpio -idumvB < /dev/rmt0`. Be advised that when extracting files, `cpio` will overwrite any existing files with the archived version, if a file with the same name exists.

For storing the archive on a remote tape unit, it is possible to use a trick similar to the one we used for `tar` in 13.4.1, “tar” on page 370. The same restrictions on network connectivity and trust relationship applies to `cpio`. For example, to back up the local directory `/usr/domino/lotus` to the remote tape unit `/dev/rmt0` you would use the following commands. In this example, the remote host with the tape unit is called `noteserv`.

```
# cd /usr/domino/lotus
# find . -print | cpio -ovC2 | remsh noteserv "dd bs=1024 of=/dev/rmt0"
```

Note

- This trick will only work with a remote host running AIX or some other version of UNIX.
- Depending on the OS and the tape unit on the remote host, you might need to give a different block size. See the user manuals for the OS in question.

The `cpio` command has many more options worth exploring that are beyond the scope of this book. For more information, refer to the `cpio` manual page. Alternatively, you can also find relevant documentation, including a commands reference for AIX, at http://www.rs6000.ibm.com/resource/aix_resource/Pubs/ ON the World Wide Web.

13.4.3 savevg/restvg

If you followed the installation instructions in Chapter 2, “Installing a Lotus Domino Server” on page 23, you have a good setup for using the commands `savevg` and `restvg` to back up your Lotus Domino Server. These two commands are significantly different from the ones we’ve described so far, since they back up an entire volume group, not just files or filesystems. However, this also means that you can’t perform incremental backups, nor can you backup or restore individual files or filesystems. (It is, however, possible to recover single files from a `savevg` backup using the `restore` command. See 13.2.5.1, “Restoring Files with restore” on page 366 for more information.) These tools make it really quick for you to restore your system after a disk crash. They do not, however, provide very

good help if you've accidentally removed a file and want to recover just that single file.

With `savevg` and `restvg` you have the option, just like with `tar` and `cpio`, to save the backup to tape, a regular file on disk, or any other AIX supported file. It is not, however, possible to use the remote "remsh" trick above with `savevg`. Your only option, if you can't save the backup locally, is to save the backup file to an NFS server or some other shared file system.

If you have a volume group `dominovg` that contains the logical volumes `noteslv` and `notesdatalv`, then you can use the following command to back up both your server file system and your Lotus Domino software file system. It is assumed that the directory or file system `/backup` exists and can hold `dominovg` in its entirety. Remember to shut down your Lotus Domino Server before starting the backup.

```
# savevg -f/backup/savevg-dominovg-980731 -v dominovg

Creating list of files to back up.
Backing up 2366 filesBacking up to /backup/savevg-dominovg-980731.
Cluster 51200 bytes (100 blocks).
Volume 1 on /backup/savevg-dominovg-980731
a          70 ./tmp/vgdata/vgdata.files
a        2569 ./tmp/vgdata/dominovg/filesystems
a        2707 ./tmp/vgdata/dominovg/dominovg.data
a           0 ./server1
a           0 ./server1/lost+found
a          391 ./server1/.profile
a          654 ./server1/.sh_history
a           0 ./server1/notesr4
a           0 ./server1/notesr4/unix
a          406 ./server1/notesr4/unix/123.bmp
a           28 ./server1/notesr4/unix/123.mac
...

```

To restore the backup in the previous example, you would use:

```
# restvg -f/backup/savevg-dominovg-980731 -q
```

to restore `dominovg` to the same physical volume that it came from, or

```
# restvg -f/backup/savevg-dominovg-980731 -q hdisk1
```

to restore it to the physical volume `hdisk1`. You can specify more than one physical volume if you wish.

The commands `savevg` and `restvg` have many more options worth exploring that are beyond the scope of this book. For more information, refer to the `savevg` and `restvg` manual pages. Alternatively, you can also find relevant documentation, including a commands reference for AIX, at

http://www.rs6000.ibm.com/resource/aix_resource/Pubs/ on the World Wide Web.

13.5 Advanced Backup Solutions

If you have a large installation of Lotus Domino with many hosts, and/or high demands of availability, you may want to consider using a more advanced backup solution. Some of these solutions can give you easier administration, on-line

backup of your databases, and shorter recovery time, in case of a system failure. They may also give you the opportunity to use multiple tape devices and tape libraries on several servers throughout your network.

13.5.1 Backup of More Than One Server

If you have a small number of servers, you can implement local backups for each of them, as described in 13.2.3, “How to Back Up Only One Server” on page 362.

Another idea is to make the backups in a host with enough disk space or to use the `rdump` command to back up to a remote tape. You will find a simple implementation of these two methods in the following subsections.

13.5.1.1 Backup on Disk

If you have a host with enough disk space and tape units, you can make it a backup server. First, you have to create the file system(s) for backups and, after that, export it/them through NFS or AFS. Refer to 6.3, “Lotus Domino and NFS” on page 154, for information about creating, exporting, and mounting file systems using NFS.

Next, mount the backup file system on the servers you want backed up and change the script `backtape` to make the backups to files instead of on tapes. The updated script is presented in Figure 298.

On the backup server, you need to back up the backup file system(s) to one or more tapes. This can be done using the `backup` command.

This sample environment will be used for our discussion on backup:

- The backup server will be called `noteserv`. This also is a Lotus Domino Server. The `/backup` is the backup file system.
- Two other Lotus Domino Servers, called `ah1610a` and `ah1610b`. Both use NFS to mount the `/backup` file system from `noteserv`.

The new version of the `backtape` script is in Figure 298. It is called `backfile`.

```

#!/bin/ksh
#@(##) backfile Lotus Notes backup procedure
#
# Usage: backfile <level>
#
FS=/server1
LEVEL=$1
FILE=/backup/`/bin/uname -n`/backup.$LEVEL.`/bin/date +%y%m%d.%w`

echo "Backup level $LEVEL, file $FILE"
echo "Started on `date` on server `uname -n`"

# Remove the old file for the last week.
echo "\nRemoving old backup files..."
/bin/ls -la /backup/`/bin/uname -n`/backup.$LEVEL.*.`/bin/date +%w`

/bin/rm -f /backup/`/bin/uname -n`/backup.$LEVEL.*.`/bin/date +%w`

# Stop the Lotus Domino server
echo "\nStopping the Lotus Domino server..."
$FS/bin/app_stopdomino

# Make the system backup of the $FS
echo "\nMaking backup level $LEVEL of $FS on $FILE..."
/usr/sbin/backup -u -$LEVEL -f $FILE $FS

# Restart the Lotus Domino server
echo "\nRestarting the Lotus Domino server..."
$FS/bin/app_startdomino

echo "\nEnd of the backup program."

```

Figure 298. Modified Script to Back Up on Files (backfile)

This script makes the backup on the file

`/backup/<hostname>/backup.<level>.<date>.<weekday>` where:

<code><hostname></code>	is the machine host name.
<code><level></code>	is the level of the backup. In our example, it will be 0 or 5.
<code><date></code>	is the date of the backup in the format: YYMMDD (year, month, day).
<code><weekday></code>	is the number of the weekday, beginning with 0 (Sunday) and ending with 6 (Saturday).

It also removes the old backup files for the same weekday. The backup operator must be sure that the copy to the tapes is working well. This is a critical part of this backup environment.

In order to set up the backup environment, the following steps are required:

1. Create the /backup file system on noteserv. Remember, it must be large enough to hold all the backup files. Running `smitty crjfs`, you can create the file system. The smit menu is in Figure 138 on page 163. You have to specify the size of the file system, specify the mount point name (/backup), and ask for the automatic mount after the system restart. If you want, you can use a compressed file system.
2. Mount the new file system: `mount /backup.`

3. Export this file system to the machines you want to back up and do one of the following:
 - a. Give the client machines write access to the backup file system.
 - b. Export the file system and allow the hosts to have root access to the client machines.
 - c. Give 1777 permission to the directories that the client machines must write to.

The smit fastpath for exporting a file system is `mknfsexp`, and the menu can be seen in Figure 140 on page 165.

4. Create a directory for each machine you want to back up. In our example, the directories `/backup/noteserv`, `/backup/ah1610a`, and `/backup/ah1610b` have to be created. These directories need permissions 1777 if you haven't exported the `/backup` file system with the hosts allowed root access option to the client hosts.
5. Copy the script `backfile` to the `/server1/scripts` directory of all hosts.
6. Mount the `/backup` file system on `ah1610a` and `ah1610b`. Use `smitty mknfsmnt` and complete the fields as follows:

```

                                Add a File System for Mounting

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

[TOP]                                [Entry Fields]
* PATHNAME of mount point              [ /backup] /
* PATHNAME of remote directory         [ /backup]
* HOST where remote directory resides  [ noteserv]
Mount type NAME                        [ ]
* Use SECURE mount option?             no +
* MOUNT now, add entry to /etc/filesystems or both? both +
* /etc/filesystems entry will mount the directory yes +
  on system RESTART.
* MODE for this NFS file system        read-write +
* ATTEMPT mount in foreground or background background +
NUMBER of times to attempt mount      [ ] #
Buffer SIZE for read                   [ ] #
Buffer SIZE for writes                  [ ] #
NFS TIMEOUT. In tenths of a second    [ ] #
[MORE...21]

F1=Help      F2=Refresh      F3=Cancel      F4=List
F5=Reset     F6=Command     F7=Edit       F8=Image
F9=Shell     F10=Exit        Enter=Do

```

Figure 299. Mount the Remote `/backup` File System Using `smitty`

7. Create the crontab entries in Figure 300 on all hosts:

```

#minute hour day_of_month month weekday command
0 23 * * 0,1,2,4,5,6 /server1/scripts/backfile 5 2>&l | /bin/mail -s "Backup level5" root
0 23 * * 3 /server1/scripts/backfile 0 2>&l | /bin/mail -s "Full Backup" root

```

Figure 300. Crontab for the `backtape` Script

In this case, the level 5 backup is done every day except Wednesday, when the full backup is done. This script must be present in the `/server1/scripts` directory for all the servers you want to back up. Also, the crontab lines must

be present. Note, the backup server needs to run this script because it is a Lotus Domino Server, too.

8. The backup server needs another script (See Figure 301 on page 378) to handle the backup files and copy them to the tapes. Put this script in `/server1/scripts` on `noteserv`.

```
#!/bin/ksh
#(##) dumpfiles:  Dump the backup files to
the tape.
# It must run on thursday night, after the operator confirm
# the success of the full backup from wednesday.
# Usage: dumpfiles
#

echo "dumpfiles: started on `date` on server `uname -n`"

# These tapes attributes applies to the 8mm 2.3/5GB tapes
# Check for the attributes that applies to your tape
echo "\nChanging the attributes of rmt0..."
/usr/sbin/chdev -l rmt0 -a block_size=1024 -a mode=yes -a extfm=yes

# We have to rewind the tape
echo "\nRewinding the tape rmt0..."
/bin/tctl -f /dev/rmt0 rewind

#
# Make the backup of the /backup file system
#
cd /backup
find . -print | backup -q -f/dev/rmt0

# Ejecting the tape
echo "\nEjecting rmt0..."
/bin/tctl -f /dev/rmt0 offline

echo "End of the backup..."
```

Figure 301. Script to Dump Backup Files to Tape (`dumpfiles`)

9. Create the crontab entry in Figure 302 on `noteserv`:

```
#minute hour day_of_month month weekday command
0 17 * * 4 /server1/scripts/dumpfiles 2>&1 | /bin/mail -s "Dumpfiles" root
```

Figure 302. Crontab for the `dumpfiles` Script

The script `dumpfiles` copies all the data in the `/backup` file system to a tape. It must end before the Thursday backup begins.

To recover a file, if it is an old backup that is on tape, you have to copy it back to the hard disk and then use the `restore` command, as described in 13.2.5.1, “Restoring Files with `restore`” on page 366. To copy it to your hard disk, create a temporary directory, for example, `/backup/tmp`, and make it your current directory (using `cd /backup/tmp`). Then, use the `restore` command to extract the files you want.

To list the contents of the tape you can use the following:

```
# restore -T -q -f/dev/rmt0
./noteserv
./noteserv/backup.5.960215.4
./noteserv/backup.5.960216.5
./noteserv/backup.5.960217.6
./noteserv/backup.5.960218.0
./noteserv/backup.5.960219.1
./noteserv/backup.5.960220.2
./noteserv/backup.0.960214.3
./noteserv/backup.0.960221.3
...
```

To extract the level 0 file from 2/21/96:

```
# cd /backup/tmp
# restore -x -q -f/dev/rmt0 ./noteserv/backup.0.960221.3
x ./noteserv/backup.0.960221.3
```

13.5.1.2 Back Up Using rdump

Using the `rdump` command, you can use another machine tape for performing backups. The host with the tape will be called tape server, and the others will be called clients.

To use this command, the client machines must have root `.rhosts` access to the tape server machine. In our example, the tape server will be `noteserv`, and the clients will be `ah1610a` and `ah1610b`. The `.rhosts` file for `noteserv` is shown in Figure 303:

```
ah1610a.itsc.austin.ibm.com root
ah1610b.itsc.austin.ibm.com root
```

Figure 303. The `.rhosts` File for the Tape Server `noteserv`

The group and other users can't have any access to this file.

Let's again modify the backtape script (See Figure 292 on page 364).

```

#!/bin/ksh
#@(##) backhosts Lotus Notes backup procedure
#
# Usage: backhosts [-copy] <level> <tape0> <tape1>
#
COPY=NO
FS=/server1
SERVER=noteserv
HOSTS="noteserv ahl610a ahl610b"

# Display error message and exits
Error () {
    echo "Usage: backhosts [-copy] <level> <tape0> <tape1>"
    echo "Example: backhosts 5 rmt0 rmt1" >&2
    exit 1
}

NARGS=$#
# Test for the copy option
[[ $1 = -copy ]] && { COPY=YES ; shift ; let NARGS=${NARGS}-1 ; }
# Test the number of flags, must be 3
[[ $NARGS -ne 3 ]] && Error

LEVEL=$1
TAPE0=$2
TAPE1=$3

echo "Backup level $LEVEL, tape0 $TAPE0, tape1 $TAPE1, copy=$COPY"
echo "Started on `date` on server `uname -n`"

# These tapes attributes applies to the 8mm 2.3/5GB tapes
# Check for the attributes that applies to your tape
echo "\nChanging the attributes of $TAPE0..."
/usr/sbin/chdev -l $TAPE0 -a block_size=1024 -a mode=yes -a extfm=yes

# We have to rewind the tape
echo "\nRewinding the tape $TAPE0..."
/bin/tctl -f /dev/$TAPE0 rewind

# Stop the Lotus Domino server
echo "\nStopping the Lotus Domino server"
$FS/bin/app_stopdomino

for HOST in $HOSTS
do
    if [[ $HOST != $SERVER ]]
    then
        # Make the system backup of the $HOST:$FS
        echo "\nMaking backup level $LEVEL of $HOST:$FS on $TAPE0..."
        rsh $HOST /usr/sbin/sync
        rsh $HOST /usr/sbin/sync
        # The values of density (-d 6250) and tape length (-s 33000)
        # refers to the 8mm 2.3GB
        rsh $HOST /usr/sbin/rdump -d 6250 -s 33000 -u -$LEVEL \
            -f ${SERVER}:/dev/${TAPE0}.1 $FS
    else
        /usr/sbin/sync
        /usr/sbin/sync
        # Make the system backup of the $HOST:$FS
        echo "\nMaking backup level $LEVEL of $HOST:$FS on $TAPE0..."
        /usr/sbin/backup -u -$LEVEL -f /dev/${TAPE0}.1 $FS
    fi
done

```

```

# Restart the Lotus Domino server
echo "\nRestarting the Lotus Domino server..."
$FS/bin/app_startdomino

# Making the tape copy...
if [[ $COPY = YES ]]
then
  # These tape attributes apply to the 8mm 2.3/5GB tapes
  # Check for the attributes that apply to your tape
  echo "\nChanging the attributes of $TAPE1..."
  /usr/sbin/chdev -l $TAPE1 -a block_size=1024 -a mode=yes -a extfm=yes

  # We have to rewind the tapes
  echo "\nRewinding the tape $TAPE0 for copy..."
  /bin/tctl -f /dev/$TAPE0 rewind
  echo "\nRewinding the tape $TAPE1 for copy..."
  /bin/tctl -f /dev/$TAPE1 rewind

  # Make the copy
  echo "\nMaking the copy of $TAPE0 on $TAPE1..."
  /bin/tcopy /dev/$TAPE0 /dev/$TAPE1

  # Ejecting the tape
  echo "\nEjecting $TAPE1..."
  /bin/tctl -f /dev/$TAPE1 offline
fi

# Ejecting the tape
echo "\nEjecting $TAPE0..."
/bin/tctl -f /dev/$TAPE0 offline

echo "\nEnd of the backup program."

```

Figure 304. Script to Back Up Several Hosts (backhosts)

This script performs a remote shell on the client machines to do the remote backup. On the client machines, you will need the `/.rhosts` file (Figure 305) to permit noteserv to perform the remote shell.

```
noteserv.itsc.austin.ibm.com root
```

Figure 305. `/.rhosts` File for the Clients

The crontab entry on the tape server (noteserv) is shown in Figure 306:

```

#minute hour day_of_month month weekday command
0 23 * * 1,2,4,5 /server1/scripts/backhosts 5 rmt0 rmt1 2>&l | /bin/mail -s "Backup level 5" root
0 23 * * 6 /server1/scripts/backhosts 5 rmt1 rmt0 2>&l | /bin/mail -s "Backup level 5" root
0 23 * * 3 /server1/scripts/backhosts -copy 0 rmt0 rmt1 2>&l | /bin/mail -s "Full Backup" root

```

Figure 306. Crontab for the backtape Script

Note that only one tape is required to perform all the backups. This can be done with the non-rewinding device; the tape name ends with a `.1`.

In order to restore the files, you will need to run the `tctl` command to position the tape on the right backup. In our case, to restore the noteserv files, you don't need

to run `tctl` because it is the first backup. To restore the ah1610a backup, you need to advance to the second backup:

```
# tctl -f /dev/rmt0 rewind
# tctl -f /dev/rmt0.1 fsf 1
```

The first command rewinds the tape. On the second, it is very important to put the `.1` at the end of the tape name. This command advances the tape to the second backup. To access the ah1610b backup:

```
# tctl -f /dev/rmt0 rewind
# tctl -f /dev/rmt0.1 fsf 2
```

The `restore` command is described in 13.2.5.1, “Restoring Files with `restore`” on page 366.

13.5.2 ADSM

ADSTAR Distributed Storage Manager (ADSM) is an IBM product that can give you much more than the native AIX tools. Together with the ADSMConnect Agent for AIX, the “Notes Agent”, you get access to the following features:

- Perform incremental backups of Lotus Notes databases on the document level, backing up only those documents that have changed since the previous backup.
- Recover individual documents in a database that have previously been backed up by the Notes Agent.
- Recover individual documents that have been deleted from a Lotus Notes database.
- Recover an entire Lotus Notes database.
- Perform an incremental restore function by merging changed documents into a previously restored database.
- On-line backup of a Lotus Notes database, that is, you can still use the database while backing it up.
- Backup and recovery of access control lists.
- Point in time recovery, meaning that you can restore your Lotus Domino Server to the state at a certain point in time.
- Centralized backup of all Lotus Domino Servers.

When ADSM and the Notes Agent is installed, performing a backup is very simple. The following is a transcript of a sample backup session:

```

# dsmnotes incr \*
ADSTAR Distributed Storage Manager
ADSMConnect Agent for Lotus Notes - Version 2.1.7
(C) Copyright IBM Corporation, 1990, 1997, All Rights Reserved.
Backing up database: /server1/notesr4/busytime.nsf
Documents sent: 40
Documents sent: 80
Documents sent: 96
Documents deleted: 5
Backing up database: /server1/notesr4/catalog.nsf
Documents sent: 29
Backing up database: /server1/notesr4/log.nsf
Documents sent: 15
Documents deleted: 5
Backing up database: /server1/notesr4/notes.nsf
Documents sent: 40
Documents sent: 53
Documents deleted: 5
Summary:
Database: /server1/notesr4/busytime.nsf
Documents backed up: 96, documents deleted: 5
Database: /server1/notesr4/catalog.nsf
Documents backed up: 29, documents deleted: 0
Database: /server1/notesr4/log.nsf
Documents backed up: 15, documents deleted: 5
Database: /server1/notesr4/notes.nsf
Documents backed up: 53, documents deleted: 5
Total number of documents backed up: 193
Total number of documents deleted: 15
Total number of bytes sent: 2210.5 KB
ANS09001 dsmnotes completed

```

Recovery is also very simple. For example, this is the command that you would type on the command line to recover a single database that already exists on your server: `dsmnotes restore /server1/notesr4/notes.nsf -merge=yes`

Using the graphical Lotus Notes Workspace, it is also possible to restore single documents from a database backup.

For detailed installation and usage instructions, please refer to the Redbook on using ADSM with Lotus Notes, *Using ADSM to Back Up Lotus Notes*, SG24-4534. There is also a spot on the IBM Web site for ADSM. You find it at the following address: <http://www.storage.ibm.com/storage/software/adsm/adsmhome.htm>.

13.5.3 Legato NetWorker

If you are currently using Legato NetWorker for backups on your system you might be interested in using the Legato NetWorker BusinessSuite Module for Lotus Notes to back up your Lotus Domino Server (the "Notes Module"). You will need to have the Legato NetWorker server software already installed on your system. With the Notes Module, you gain the following features in addition to what NetWorker normally offers:

- Perform incremental backups of Lotus Notes databases on the document level, backing up only those documents that have changed since the previous backup.

- Recover individual documents in a database that have previously been backed up by the Notes Module.
- Recover individual documents that have been deleted from a Lotus Notes database.
- Recover an entire Lotus Notes database.
- On-line backup of a Lotus Notes database, that is, you can still use the database while backing it up.
- Point in time recovery, meaning that you can restore your Lotus Domino Server to the state at a certain point in time.
- Centralized backup of all Lotus Domino servers.

It is beyond the scope of this book to describe installation and operation of Legato NetWorker and the Notes Module. For more information on these products, contact Legato Systems, Inc., or see their Web site at <http://www.legato.com/>.

Chapter 14. System Performance Considerations

This chapter explains how to monitor the system performance and tune the various resources to achieve maximum throughput of the system. AIX provides a powerful set of performance monitoring and tuning tools. The available tools give performance information for different components on the system and on various parameters that affect performance.

14.1 Performance Monitoring

A performance bottleneck is the slowest component in a computer environment. This can either be a system resource, such as the CPU, memory, or disk, or it could be the network. There is always a bottleneck because some resource will always be slower than the others. Although there is no cookbook for performance monitoring, there are some guidelines that should be followed. The sequence of measuring system performance is extremely important. One should always follow the specified path, which is described in the performance monitoring flowchart shown in Figure 307.

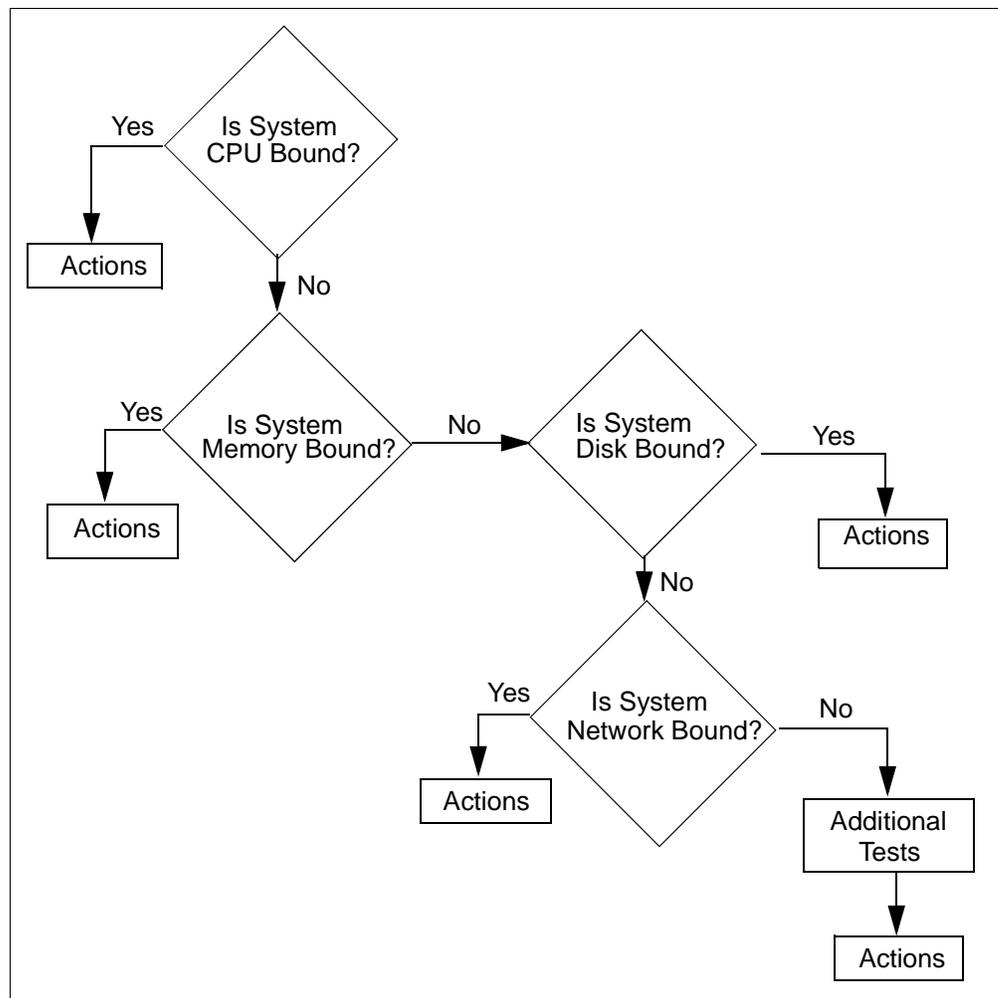


Figure 307. Performance Monitoring Flowchart

We would strongly recommend that you follow this path, else you might overlook a bottleneck. For instance, if a system is paging a lot, you might see a heavy usage of the disks. Not looking at the memory statistics before looking at the I/O statistics could mislead you to the assumption that there is an I/O bottleneck.

We explain below some of the important AIX performance monitoring tools that are usually used for monitoring the system performance.

You can refer to the redbook *RS/6000 Performance Tools in Focus*, SG24-4989 to get further details.

14.1.1 The vmstat Command

The first tool to use is `vmstat` which provides very quick and compact information about various system resources and their related performance problems. The `vmstat` command reports statistics about kernel threads in the run and wait queue, memory, paging, disks, interrupts, system calls, context switches, and CPU activity. The reported CPU activity is a percentage breakdown of user mode, system mode, idle time, and waits for disk I/O.

Note

If the `vmstat` command is used without any options or only with the interval and, optionally, the counter parameter, such as `vmstat 5`, then the first line of numbers is an average since system reboot.

This line should, therefore, be ignored.

The `vmstat` command allows to look for three probable performance problems on the system: CPU bound, memory bound, and I/O bound.

14.1.1.1 CPU Bound

In the following `vmstat` output, a CPU-bound program was started.

```
# vmstat 2 10
```

kthr		memory				page				faults				cpu			
r	b	avm	fre	re	pi	po	fr	sr	cy	in	sy	cs	us	sy	id	wa	
0	0	3269	10342	0	0	0	0	0	0	130	36	20	0	0	99	0	
0	0	3275	10336	0	0	0	0	0	0	132	40	26	0	1	99	0	
0	0	3282	10326	0	0	0	0	0	0	128	6996	27	3	8	90	0	
2	0	3282	10326	0	0	0	0	0	0	121	80064	20	15	85	0	0	
2	0	3282	10326	0	0	0	0	0	0	126	79579	21	22	78	0	0	
2	0	3282	10326	0	0	0	0	0	0	124	79662	19	20	80	0	0	
2	0	3282	10326	0	0	0	0	0	0	121	79686	20	16	84	0	0	
0	0	3275	10336	0	0	0	0	0	0	128	30305	24	8	30	62	0	
0	0	3275	10336	0	0	0	0	0	0	123	36	20	0	0	99	0	
0	0	3275	10336	0	0	0	0	0	0	122	36	20	0	0	99	0	

In this example, the CPU was idle for 99 percent of the interval until, as can be seen in the third row of `cpu` headings, a CPU-bound program was started and absorbed the CPU idle time with no I/O wait time consumed. After the program was stopped, the CPU use went back to the initial values.

To check if the CPU is the bottleneck, consider the four `cpu` columns (`us`, `sy`, `id`, `wa`) and the two `kthr` (kernel threads) columns (`r`, `b`)

14.1.1.2 Memory Bound

The following `vmstat` output is an example for a memory-bound system.

```
# vmstat 1 8
kthr      memory          page        faults        cpu
-----  -
 r  b   avm    fre re  pi  po  fr   sr  cy  in  sy  cs  us  sy  id  wa
1  1 17264   127 0   0  14 296  818   0 233 172 120 90 10  0  0
2  0 17264   121 0   0  10 384  871   0 282 486 282 78 14  0  9
3  0 17264   117 0   0  38 328 1128   1 290 257 156 83 17  0  0
2  0 17264   119 0   0  67 136  512   0 272 209  94 84 14  0  2
1  2 17264   115 0   0  69 176 1476   0 300 232  99 85 15  0  0
2  0 17264   121 0   0  18  24   88   0 186 340 132 84  7  2  7
2  0 17264   125 0   0  71 160  682   0 282 137  69 94  6  0  0
2  0 17264   124 0   0  74 160  412   0 262 112  64 85 15  0  0
```

In this example, the size of the free list (`fre`) is already low, and pages are being scanned (`sr`), freed (`fr`), and paged out (`po`). The CPU utilization is around 85 percent in user mode (`us`), and the user application continues to allocate memory. In the third row of numbers, the `fre` number drops under the minimum value for this count; therefore, the system starts to free up more pages, until the high water mark for `fre` is reached. This is the reason for the high numbers of page outs (`po`), freed pages (`fr`), and scanned pages (`sr`). In the sixth row, a process finished and its memory is freed, requiring fewer page outs.

To see if the system has performance problems with its VMM, look at the columns of `memory` and `page`.

Memory is over-committed when the ratio of `fr` to `sr` (`fr:sr`) is high. An `fr:sr` ratio of 1:4 means that for every page freed, four pages had to be examined. It is difficult to determine a memory constraint based on this ratio alone, and what constitutes a high ratio is workload/application dependent. In this case, having taken a baseline measurement of the system, when all is fine, may help a lot.

14.1.1.3 I/O Bound

To prove that the system is I/O bound, it is better to use the `iostat` command. However `vmstat` could point to that direction by looking at the `wa` column, as discussed earlier in this chapter. Other indicators for I/O bound are:

- The `disk xfer` part of `vmstat`

To display a statistic about the logical disks (a maximum of four disks is allowed), use the following command:

```
# vmstat hdisk0 hdisk1 1 4
kthr      memory          page        faults        cpu        disk xfer
-----  -
 r  b   avm    fre re  pi  po  fr   sr  cy  in  sy  cs  us  sy  id  wa  1  2  3  4
0  0 3456 27743   0  0  0  0  0  0 131 149 28  0  1 99  0  0  0
0  0 3456 27743   0  0  0  0  0  0 131  77 30  0  1 99  0  0  0
1  0 3498 27152   0  0  0  0  0  0 153 1088 35  1 10 87  2  0 11
0  1 3499 26543   0  0  0  0  0  0 199 1530 38  1 19  0 80  0 59
```

The `disk xfer` part provides the number of transfers per second to the specified physical volumes that occurred in the sample interval. One to four

physical volume names can be specified. Transfer statistics are given for each specified drive in the order specified. This count represents requests to the physical device. It does not imply an amount of data that was read or written. Several logical requests can be combined into one physical request.

- The `in` column of the `vmstat` output

Number of device interrupts per second observed in the interval.

```
# vmstat 1 4
kthr      memory          page        faults          cpu
-----  -
 r  b   avm   fre  re  pi  po  fr  sr  cy  in   sy  cs  us  sy  id  wa
0  0  3544 28065  0  0  0  0  1  0 120   90  21  0  0  99  0
0  0  3544 28065  0  0  0  0  0  0 125   64  26  0  0  99  0
0  1  3586 26866  0  0  0  0  0  0 184 2529  51  5  22  11  62
0  1  3586 26297  0  0  0  0  0  0 186 1257  28  0  16  0  84
```

This column shows the number of hardware or device interrupts (per second) observed over the measurement interval. Examples of interrupts are disk request completions and the 10 millisecond clock interrupt. Since the latter occurs 100 times per second, the `in` field is always greater than 100.

14.1.2 The `iostat` Command

The `iostat` command is the fastest way to get a first impression, whether the system has an I/O-bound performance problem or not. The tool reports CPU statistics and I/O statistics for TTY devices, disks, and CD-ROMs. It is used for monitoring system I/O device use by observing the time the physical disks are active in relation to their average transfer rates. The `iostat` command is useful to determine whether a physical volume is becoming a performance bottleneck and if there is a way to improve the situation. The generated reports can be used to change system configurations to better balance the I/O load between physical disks. For multiprocessor systems, the CPU values are global averages among all the processors. The I/O wait state is also defined system wide, and not per processor.

The following example shows a part of an `iostat` output. The first stanza shows the summary statistic since system startup. During the report, there was a copy command started.

```
# iostat 2 2

tty:      tin          tout  avg-cpu:  % user   % sys    % idle   % iowait
          0.0          13.3          0.2     0.2     99.4     0.2

Disks:    % tm_act    Kbps    tps    Kb_read  Kb_wrtn
hdisk0    0.2         2.4     0.2    1192730  706531
hdisk1    0.0         0.3     0.0     60479   190316
cd0       0.0         0.0     0.0         0         0

tty:      tin          tout  avg-cpu:  % user   % sys    % idle   % iowait
          0.0          208.0          0.0    11.5     0.0     88.5

Disks:    % tm_act    Kbps    tps    Kb_read  Kb_wrtn
hdisk0    35.5        848.0   76.0    1696         0
hdisk1    74.5        790.0   58.0         4    1576
cd0       0.0         0.0     0.0         0         0
```

Since the CPU use statistics are also available with the `iostat` report, the percentage of time the CPU is in I/O wait can be determined at the same time.

The `iostat` command adds little overhead to the system. It uses about 20 milliseconds of CPU time for each report generated.

Note

If the `iostat` command is used without interval and, optionally, count, then the output is a summary since startup. If the command is used with an interval and count parameter, such as `iostat 2 5`, then only the first stanza is an average since system reboot; the trailing stanzas are interval statistics. The first stanza should be ignored when doing real-time measurements because the history is usually not of interest in this case.

14.1.3 The sar Command

The `sar` command is a standard UNIX command used to gather statistical data about the system. Though it can be used to gather some useful data regarding system performance, the `sar` command is somewhat intrusive and can increase the system load, which will exacerbate a pre-existing performance problem.

With its numerous options, `sar` provides queuing, paging, TTY, and many other statistics. One important new feature of the `sar` command on RS/6000 is that it reports either system-wide (global among all processors) CPU statistics (which are calculated as averages for values expressed as percentages, and as sums otherwise), or it reports statistics for each individual processor. Therefore, this command is particularly important on SMP systems.

Note

The `sar` command reports only on local activities; no statistics about network activities are included. The execution is limited to the root user. All data types that `sar` supports are collected; however, only the data types specified by options are reported.

Some of the most useful options for `sar` are:

sar -P

The `-P` option reports per-processor statistics for the specified processor or processors. By specifying the `ALL` keyword, statistics for each individual processor and an average for all processors are reported. Of the flags which specify the statistics to be reported, only the `-a`, `-c`, `-m`, `-u`, and `-w` flags are meaningful with the `-P` flag.

The following example shows the per-processor statistic while a CPU-bound program was running on processor number 0:

```
# sar -P ALL 2 3

AIX itsosmp 2 4 00045067A000    02/23/97

17:30:50 cpu    %usr    %sys    %wio    %idle
17:30:52 0         8       92       0       0
```

```

      1      0      4      0      96
      2      0      1      0      99
      3      0      0      0     100
    -      2      24      0      74
17:30:54 0      12     88      0      0
      1      0      3      0     97
      2      0      1      0     99
      3      0      0      0     100
    -      3      23      0      74
17:30:56 0      11     89      0      0
      1      0      3      0     97
      2      0      0      0     100
      3      0      0      0     100
    -      3      23      0      74

Average 0      10     90      0      0
      1      0      4      0     96
2      0      1      0     99
      3      0      0      0     100
    -      3      24      0      74

```

The last line of every stanza, which starts with a dash (-) in the `cpu` column, is the average for all processors. There is only an average (-) line if the `-p ALL` option is used. It is removed if processors are specified. The last stanza, labeled with the word *Average* instead of a time stamp, keeps the averages for the processor specific rows over all stanzas. If the `ALL` keyword is used, its last row, starting also with a dash (-), represents the average over all processors for the investigated period.

sar -A

To display all possible statistics, use the `-A` option. Without the `-P` flag, this is equivalent to specifying `-a, -b, -c, -k, -m, -q, -r, -u, -v, -w, -y`. With the `-P` flag, this is equivalent to specifying `-a, -c, -m, -u, -w` (which are the useful options for SMP systems).

sar -b

Reports buffer activity for transfers, accesses, and cache (kernel block buffer cache) hit ratios per second. Access to most files in AIX V3 and AIX V4 bypasses kernel block buffering, and therefore, does not generate these statistics. However, if a program opens a block device or a raw character device for I/O, traditional access mechanisms are used, making the generated statistics meaningful.

These values are usually zero. If they are not zero, then the "Maximum number of pages in block I/O BUFFER CACHE" (`maxbuf`) should be tuned. This can be done under the following path in `smit` or with the fast path `smit chgsys`:

```

-> System Environments
-> Change/Show Characteristics of Operating System
-> Maximum number of pages in block I/O BUFFER CACHE

```

14.1.4 The tprof Command

The `tprof` command is an AIX-specific profiler and is based on the trace facility. By using this profiler, one can identify the heaviest processes on the machine, the heaviest subroutines in the programs, and the time spent in each subroutine.

The `tprof` command is a very versatile AIX profiler that provides a detailed profile of CPU usage for every AIX process ID and name. The `tprof` command is a trace-driven profiler and provides a global and a detailed view. It profiles at the application level, routine level, and even at the source-statement level. It can profile any program produced by one of the following compilers: C for AIX, C Set++ for AIX, and XL FORTRAN, but does not work with COBOL or PASCAL programs at the statement level.

The raw data for `tprof` is obtained through the trace facility. When a program is profiled, the trace facility is activated and instructed to collect data from the trace hook that records the contents of the instruction address register.

The distribution of ticks is roughly proportional to the CPU time spent in each program (10 milliseconds per tick). Once the programs that use a lot of CPU time have been identified, the programmer can take action to restructure the hot spots in the program or minimize their use.

14.1.5 The `svmon` Command

The `svmon` command is an AIX-specific tool that provides global, process-level, and segment-level reporting of memory use. The `svmon` command gives a more in-depth analysis of memory usage. It is more informative but also more intrusive than the `vmstat` command. The `svmon` command captures a snapshot of the current state of memory. The displayed information can be analyzed using four different reports:

- | | |
|-----------------------|--|
| Global (-G) | Displays statistics describing the real memory and paging space in use for the whole system. |
| Process (-P) | Displays memory usage statistics for active processes. |
| Segment (-S) | Displays memory usage for a specified number of segments or the top ten. |
| Detailed Segment (-D) | Displays detailed information on specified segments. |

The `svmon` command can be run in intervals with the `-i` option. The `-G` and `-P` options are the most useful.

The `svmon` command is not a true snapshot because it runs at the user level with interrupts enabled. If no command line argument is present, the `-G` is taken as the default. If an interval is used, statistics will be displayed until the command is killed or until the number of intervals, which can be specified right after the interval, is reached. The overhead to run `svmon` is substantial, but the information is very valuable.

14.1.6 The `filemon` Command

The `filemon` command collects and presents trace data on the various layers of file system use, including the logical file system, virtual memory segments, LVM, and physical disk layers. Data can be collected on all the layers, or on specific layers by specifying the `-o` layer option. The default is to collect data on the VM segments, LVM, and physical layers. Both summary and detailed reports are generated.

Note

The `filemon` command will only collect data for those files opened after `filemon` was started unless you specify the `-u` flag.

The `filemon` command uses the trace facility to obtain a detailed picture of I/O activity during a time interval. Since it uses the trace facility, `filemon` can be run only by root or by a member of the system group, and it cannot be executed in parallel with other trace-based commands like `tprof` and `netpmon`. Tracing is started by the `filemon` command, optionally suspended with `trcoff`, resumed with `trcon`, and terminated with `trcstop`. As soon as tracing is terminated, `filemon` writes its report to stdout.

14.1.7 The netpmon Command

The `netpmon` command is an AIX performance tool used to measure network device-driver I/O, CPU usage, Internet socket calls, and NFS I/O. To improve performance, one can use the `no` (network options), `nfsso`, `chdev`, and `ifconfig` commands.

The `netpmon` command uses the trace facility to obtain a detailed picture of network activity during a time interval. Since it uses the trace facility, the `netpmon` command can only be run by root or by a member of the system group. Also, the `netpmon` command cannot run together with any of the other trace-based performance commands like `tprof` and `filemon`. In its normal mode, `netpmon` runs in the background while one or more application programs or system commands are being executed and monitored. Tracing is started by the `netpmon` command, optionally suspended with `trcoff`, resumed with `trcon`, and terminated with `trcstop`. As soon as tracing is terminated, the `netpmon` writes its report to stdout.

14.1.8 The Performance Toolbox

The Performance Toolbox (PTX) is a comprehensive tool for monitoring and tuning system performance. PTX uses the client/server model to monitor local and remote system performance with several graphical windows that are fully user configurable. It is a Motif-based toolbox that includes 2D and 3D views of performance statistics. Analysis and tuning facilities incorporate existing performance tools into a menu-driven environment.

PTX for AIX consists of two major components: the agent and the manager. The agent consists of programs that run on the machine or machines you want to monitor, and its role is to obtain and filter performance statistics. The manager has the tools to manipulate the data providing meaningful statistics, such as:

- Monitoring of system resource statistics
- Analysis of system resource statistics
- Tuning of the systems performance parameters to balance the use of fixed resources

The client/server implementation of PTX is an excellent aid to monitor and tune the performance of various UNIX systems in a network environment from a single graphics workstation.

While you run the manager and the agent on the same machine, it is highly recommended that the manager not run on the system to be monitored. This will minimize the impact of running PTX on the system load and will give a true indication of system performance. Be aware that the manager puts a significant load on the system.

PTX major features are:

- Separately installable manager and agent components that allow a manager to monitor multiple agents and an agent to supply data to multiple managers.
- Application programming interfaces (API) that allow programmers to access local or remote data as well as to register custom data with the local agent.
- Ability to respond to simple network management protocol (SNMP) requests and to send traps to an SNMP manager (AIX agents only).
- Support for RS/6000 SP systems using the Performance Toolbox Parallel Extensions Feature of the Parallel System Support Programs (PSSP) for AIX/6000.

Performance Toolbox Parallel Extensions (PTPE) is a feature of PSSP (2.2 and higher) and is used in conjunction with PTX to simplify the performance analysis and reduce RS/6000 SP administrative overhead by organizing your SP nodes into reporting groups. Each node sends performance data to a manager node, which performs the administrative tasks for the group. It also provides the utilities to monitor, store, and retrieve performance data collected on RS/6000 SP nodes about their resources, such as the switch, virtual shared disk, and LoadLeveler.

There are a number of benefits derived from using PTX, including:

Monitoring System Performance

PTX/6000 provides an easy way of monitoring your local as well as your remote systems, including the performance of the network, which is very important in the SP environment. In network client/server environments, the performance of sets of systems working together can be as important as the performance of an individual system. Likewise, the performance of multiple applications working together can be as important as that of an individual application. Therefore, it is very important to be able to get the “big picture” by graphically viewing many correlated parameters concurrently across multiple nodes in a network. PTX/6000 allows a user to concurrently visualize the live (near real time) performance characteristics of the clients and server applications across the network.

Analysis and Control of System Performance

By providing an umbrella for tools that can be used to analyze performance data and control system resources, the manager program `xmperf` assists the system administrator in keeping track of available tools and in applying them in appropriate ways. This is done through a customizable menu interface. Tools can be added to menus, either with fixed sets of command line arguments to match specific situations or in a dialog window. The menus of `xmperf` are preconfigured to include most of the performance tools shipped as part of the tools option of the agent component.

All performance-related tools already available in AIX can be accessed through this interface. In addition, the ability to record load scenarios and play them back

in graphical windows at any desired speed provides ways of analyzing a performance problem.

Features for analyzing a recording of performance data are provided by the `azizo` program and its support programs. Recordings can be produced from the monitoring programs `xmperf` and `3dmon` during monitoring, or can be created by the `xmservd` daemon. The `xmservd` daemon allows for recording with a minimum of overhead. This makes constant recording possible so that you can analyze performance problems after they occurred.

Finally, using the agent component filter `filtd`, you can define conditions that, when met, could trigger any action you deem appropriate, including alerting yourself and/or initiating corrective action without human intervention. This facility is entirely configurable so that alarms and actions can be customized to your installation.

Capacity Planning

If you can make your system simulate a future load scenario, `xmperf` can be used to visualize the resulting performance of your system. By simulating the load scenario on systems with more resources, such as more memory or more disks, the result of increasing the resources can be demonstrated.

Network Operation

The `xmservd` data supplier daemon can provide consumers of performance statistics with a stream of data. Frequency and contents of each packet of performance data are determined by the consumer program. Any consumer program can access performance data from the local host and one or more remote hosts. Any data supplier daemon can supply data to multiple hosts.

SNMP Interface

By entering a single keyword in a configuration file, the data supplier daemon can be told to export all its statistics to a local `snmpd` SNMP agent. Users of an SNMP manager, such as IBM NetView, see the exported statistical data as an extension of the set of data already available from `snmpd`.

14.1.9 Monitoring Lotus Notes Servers Using Performance Toolbox

The PTXNOTES Agent can be used to graphically monitor AIX Lotus Notes servers from a single graphical console. The Agent runs as a background daemon from a Lotus Notes Add-In task and consumes very little system resources (< 1% CPU). It provides real-time statistics on a variety of Lotus Notes and operating system metrics. The tool could be very useful for a Lotus Notes system administrator for monitoring and optimizing a Lotus Notes network and for troubleshooting potential problems. It also has the capability to record data for later playback and analysis. Alarms and triggers can be set to warn an operator when certain preset levels are reached.

The following types of statistics can be monitored:

- Lotus Notes Web_retreiver Stats
- Lotus Notes Database Stats
- Lotus Notes Mail Stats
- Lotus Notes Server Stats
- Lotus Domino Server Stats
- Lotus Notes Memory Stats

The following is a list of supported statistics for PTXNOTES. This is in addition to the standard suite of operating system and network statistics that are also available.

Notes Web_retriever Stats

WebAccessFtp	Number of FTP retriever accesses
WebAccessGopher	Number of Gopher retriever accesses
WebAccessHttp	Number of HTTP retriever accesses
WebBytesReceived	Number of retriever bytes received
WebBytesSent	Number of retriever bytes sent
WebImageCacheHits	Number of successful hits on the image cache
WebImageCacheMiss	Number of misses on retriever image cache
WebActiveProcess	Number of active web retriever processes
WebBusyProcess	Number of busy web retriever processes
WebIdleProcess	Number of idle web retriever processes
WebTimeDuration	Elapsed time since retriever started
WebUrlFail	Number of retriever URL's that have failed
WebUrlRequested	Number of retriever URL's that have been requested
WebUrlSucceeded	Number of retriever URL's successfully accessed.

Notes Database Stats

BufCtlPoolPeak	Size of buffer control pool
BufCtlPoolUsed	Number of bytes used in buffer control pool
BufPoolPeak	Number of bytes allocated from buffer pool
BufPoolMax	Maximum size of buffer pool
BufPoolUsed	Number of used buffers from buffer pool
BufPoolPerCReads	Percentage of buffer pool reads
BufPoolReads	Number of database buffer pool reads
BufPoolWrites	Number of database buffer pool writes
NSFPoolPeak	Size of NSF pool
NSFPoolUsed	Amount of space used in NSF pool
NIFPoolPeak	Size of database NIF pool
NIFPoolUsed	Number of database NIF pools

Notes Mail Stats

DeadMail	Number of dead (undeliverable) mail messages
DeliveredMail	Number of messages received by router
TotalMailFail	Total number of routing failures
TotalRoutedMail	Total number of mail messages routed
TransfMail	Number of messages router attempted to transfer
WaitingMail	Number of mail messages waiting to be routed
NumWaitingRecp	Number of pending mail messages awaiting local delivery
AvgMailDlvTime	Average time for mail delivery in seconds
AvgMailSrvHops	Average number of server hops for mail delivery
AvgMailSizeDlv	Average size of mail messages delivered in bytes
MaxMailDlvTime	Maximum time for mail delivery in second
MaxMailSrvHops	Maximum number of server hops for mail delivery
MaxMailSizeDlv	Maximum size of mail delivered in bytes
MinMailDlvTime	Minimum time for mail delivery in seconds
MinMailSrvHops	Minimum number of server hops for mail delivery
MinMailSizeDlv	Minimum size of mail delivered in bytes
TotalKBTransf	Total mail transferred in Kilobytes
MailTransfFail	Mail messages the router was unable to transfer

Notes Server Stats

Open.MaxUsers	Attempts to open MAXUSER server
Open.PreV4Client	Attempts to open server by pre V4 clients
Open.V4Client	Attempts to open server by post V4 client
Open.Restricted	Attempts to open restricted server
Dropped_Sessions	Number of dropped sessions
TransPerMin	Average number of transactions per minute

TransPerMinPeak	Peak number of transactions n given minute
TransPerMinPeakT	Date and time for TransPerMinPeak
TransTotal	Total number of transactions the server has serviced
ServerUsers	Number of users with sessions open on the server
UsersPeak	Peak number of concurrent users with open sessions
UsersPeakTime	Date and time for UsersPeak
Domino Server Stats	
DomReqMin	Number of Domino requests in the last minute
DomReqMinPeak	Peak number of Domino requests per minute
DomReqMinPeakT	Time at one minute peak requests
DomReq5Min	Number of Domino requests in the last 5 minutes
DomReq5MinPeak	Peak number of Domino requests in 5 minutes
DomReq5MinPt	Time at one five minute peak requests
DomReqHour	Number of Domino requests in the last hour
DomReqHourPeak	Peak number of Domino requests in one hour
DomReqHourPeakT	Time at one hour peak requests
DomReqDay	Number of Domino requests in the last day
DomReqDayPeak	Peak number of Domino requests in one day
DomReqDayPeakT	Time at one day peak requests
DomReqTotal	Total Domino requests since the Domino server stats
Notes Memory Stats	
MemTotal	Total memory allocated
MemProcess	Total process-private memory allocated by ALL
MemShared	Total shared memory allocated
MemAvailability*	Availability of memory on this server
MemFree*	Free memory as reported by OS
MemSwapSize	Size of swap file

For more information on the PTXNOTES Agent, refer to the IBM intranet page at <http://ncpdt.austin.ibm.com>. Customers should contact their IBM sales representative to get the program.

14.2 Performance Tuning

After monitoring the system performance and getting a fair idea on the bottleneck resource, the next step is to tune the resource to improve the system performance.

You can refer to the redbooks *AIX Performance Monitoring and Tuning Guide*, SC23-2365 and *RS/6000 Performance Tools in Focus*, SG24-4989, for further details.

14.2.1 CPU Related Tuning Tools

This part deals with techniques for minimizing the effect on performance that runaway or CPU-intensive programs may cause.

14.2.1.1 The nice Command

With the `nice` command, the user can specify a value to be added to or subtracted from the current priority of a process. By using `nice`, the priority of the process does not get fixed; only its nice value is changed. The priority value is still recalculated periodically based on the CPU usage, the `nice` value, and the default user-process-priority value. The `nice` command can only set the `nice` value for a process at the creation time of the process.

Note

Any user can run a command at a lower priority than normal by using `nice`. Only the root user can use `nice` to run commands at higher than normal priority.

There are several ways to change the `nice` value, when creating a thread:

Favoring Processes

The following two commands execute a program with higher priority:

```
# nice --15 program
```

or better:

```
# nice -n -15 program
```

The `nice` command subtracts 15 from the default `nice` value (20) and the `program` will start with a priority of 45 because the user-priority-level is 40.

Disfavoring Threads

The following two commands execute a program with lower priority:

```
# nice -10 program
```

or better:

```
# nice -n 10 program
```

The `nice` command adds 10 to the default `nice` value (20) and the `program` will start with a priority of 70 because the user-priority-level is 40.

14.2.1.2 The `renice` Command

With the `renice` command, the user can specify a value to be added to or subtracted from the priority of one or more running processes. The modification is done to the `nice` values of the processes. The priority of these processes is still non-fixed.

Note

If you do not have root user authority, you can only change the priority of processes you own and can only increase their priority value within the range of 0 to 20, with 20 giving the lowest priority. If you have root user authority, you can alter the priority of any process and change the priority value within the range of -20 to 20.

The `renice` command modifies the `nice` value of one or more processes that are already running. The processes are identified either by process ID, process group ID, or the name of the user who owns the processes. It cannot be used on fixed-priority processes.

For AIX V4, the syntax of `renice` has been changed to complement the alternative syntax of `nice`, which uses the `-n` flag to identify the `nice`-value increment.

The following examples show the different usages of the `renice` command. The `xclock` command is started by a staff user in background:

```
# ps -lu mike
```

```

      F S UID   PID  PPID   C PRI  NI ADDR   SZ   WCHAN   TTY  TIME CMD
8200011 A 201  7746 20540   0  64  24 6898   192             pts/5  0:00 xclock
200001 A 201  20540 22352   0  60  20 5a0   360 5a9b844 pts/5  0:00 ksh
# renice -8 7746
# ps -lu mike
      F S UID   PID  PPID   C PRI  NI ADDR   SZ   WCHAN   TTY  TIME CMD
8200011 A 201  7746 20540   0  52  12 6898   192             pts/5  0:00 xclock
200001 A 201  20540 22352   0  60  20 5a0   360 5a9b844 pts/5  0:00 ksh

```

In the previous example, the `renice` command is used without the `-n` option. This alters the `nice` value from the default value of 20. The `renice -<Increment>` command always uses the default `nice` value (20) for the calculation, not the current value. If you want to use the current value for the calculation, you need to use the following commands:

```

# ps -lu mike
      F S UID   PID  PPID   C PRI  NI ADDR   SZ   WCHAN   TTY  TIME CMD
200001 A 201  7778 20540   0  64  24 6898   192             pts/5  0:00 xclock
200001 A 201  20540 22352   0  60  20 5a0   360 5a9b844 pts/5  0:00 ksh
# renice -n -8 7778
# ps -lu mike
      F S UID   PID  PPID   C PRI  NI ADDR   SZ   WCHAN   TTY  TIME CMD
200001 A 201  7778 20540   0  56  16 6898   192             pts/5  0:00 xclock
200001 A 201  20540 22352   0  60  20 5a0   360 5a9b844 pts/5  0:00 ksh

```

In the previous example, the `renice` command subtracts eight from the current `nice` value.

14.2.1.3 The `schedtune` Command

The `schedtune` command can be used to set the parameters for CPU scheduler and Virtual Memory Manager (VMM) processing. The executable and source for `schedtune` can be found in the `/usr/samples/kernel` directory. In AIX V3, these files are located in the `/usr/lpp/bos/samples` directory.

Note

The `schedtune` command is in the `samples` directory because it is VMM-implementation dependent. The `schedtune` code that accompanies each release of AIX is tailored specifically to the VMM of that release. This command is not supported under `smit`, nor has it been tested with all possible combinations of parameters. Misuse of this command can cause performance degradation or operating-system failure. If execution of `schedtune` causes a system to crash with flashing 888, then the appropriate level of `schedtune` for that release of AIX needs to be installed. Be sure that you have studied the appropriate tuning sections before using `schedtune` to change system parameters.

The `schedtune` command can only be executed by the root user. Changes made by this tool last until the next reboot of the system. If a permanent change is needed, an appropriate entry should be put in the `/etc/inittab`. For example:

```
schedtune:2:wait:/usr/samples/kernel/schedtune -m 6
```

Executing the `schedtune` command with no options shows the current settings for the parameters:

```
# schedtune
      THRASH      SUSP      FORK      SCHED
-h   -p   -m     -w   -e     -f     -d     -r     -t
SYS  PROC  MULTI  WAIT  GRACE  TICKS  SCHED_D  SCHED_R  TIMESLICE
  6   4    2      1    2     10     5      16      2
```

The first five parameters specify the thresholds for the memory load control algorithm: `-f` defines a wait time value used by the `fork()` routine, the `-d` and `-r` options are used in the scheduling policy algorithm, and `-t` defines the maximum amount of time a thread can spend on the processor. Each one of them will be discussed in detail in the next sections.

The `-D` option can be used to restore the default settings:

```
# schedtune -D
      THRASH      SUSP      FORK      SCHED
-h   -p   -m     -w   -e     -f     -d     -r     -t
SYS  PROC  MULTI  WAIT  GRACE  TICKS  SCHED_D  SCHED_R  TIMESLICE
  6   4    2      1    2     10     16     16      1
```

14.2.2 Memory Related Tuning Tools

An optimum amount of memory should be allocated on the server to service your workload. A rough rule of thumb is 400 K / user (a little higher to be on the safe side). If your system runs out of memory, performance can suffer a multiple punch, first, since it starts using the disk, which looks like "slow memory" to the system, and second, since your CPU enables all this activity rather than just servicing the active workload.

14.2.2.1 The `mkps` Command

It is recommended to configure enough paging space on the system so that the paging space used does not approach 100 percent. For systems up to 256 MB of memory, the paging space should be twice the size of real memory. For memories larger than 256 MB, the following is recommended:

$$\text{total paging space} = 512 \text{ MB} + (\text{memory size} - 256 \text{ MB}) * 1.25$$

The paging space size cannot be less than 16 MB and not greater than 20 percent of total disk space.

When fewer unallocated pages than the `npskill` value of the `vmtune` command remain on the paging device, the system will begin to kill processes to free some paging space.

Use the command `lspgs -a` to list the sizes and percentage use of the paging spaces in the system. For example, `lspgs -a` shows the following output on our system:

Page Space	Physical Volume	Volume Group	Size	%Used	Active	Auto	Type
paging00	hdisk0	rootvg	128MB	58	yes	yes	lv
hd6	hdisk1	dominovg	128MB	71	yes	yes	lv

In case the paging space approaches 100 percent and we need to add an additional paging space, you can use the `smitty mkps` command.

For example, to add an additional paging space of 128 MB in the volume group dominovg, use the following commands:

```
smitty mkps
```

```
VOLUME GROUP name                x
x
x Move cursor to desired item and press Enter.
x
x  rootvg
x  dominovg
x
x F1=Help          F2=Refresh          F3=Cancel
x F8=Image         F10=Exit            Enter=Do
x /=Find          n=Find Next
```

Select the volume group as **dominovg** and press **Enter**.

```
Add Another Paging Space

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

                                     [Entry Fields]
Volume group name                    dominovg
SIZE of paging space (in logical partitions) [32]
PHYSICAL VOLUME name
Start using this paging space NOW?    yes
Use this paging space each time the system is
RESTARTED?                            yes

F1=Help          F2=Refresh          F3=Cancel          F4=List
F5=Reset         F6=Command          F7=Edit            F8=Image
F9=Shell         F10=Exit            Enter=Do
```

Press **Enter** to create the additional paging space.

You can optionally use the following command to do the same activity:

```
mkps -s'32' -n' ' -a' ' dominovg
```

14.2.2.2 The vmtune Command

The `vmtune` command can be used to modify the VMM parameters that control the behavior of the memory-management subsystem. Some options are available to alter the defaults for other AIX components. The executable for `vmtune` is found in the `/usr/samples/kernel` directory.

Prior to AIX V4.2, a copy of the source code for `vmtune` was also shipped along with the executable. But to recompile the program, a kernel header file that is needed is not available. So you are not able to make changes to `vmtune`, although you have the source code.

Note

The `vmtune` command is in the `samples` directory because it is VMM-implementation dependent. The `vmtune` code that accompanies each release of AIX is tailored specifically to the VMM in that release. Running `vmtune` from one release on a system with a different VMM release might result in an operating system failure. It is also possible that the functions of `vmtune` may change from release to release. It takes know-how and experience to set `vmtune` parameters properly. Be sure that you have studied the appropriate tuning sections before using `vmtune` to change system parameters.

The `vmtune` command can only be executed by the root user. Changes made by this tool last until the next reboot of the system. If a permanent change is needed, an appropriate entry should be put in the `/etc/inittab`. For example:

```
schedtune:2:wait:/usr/samples/kernel/vmtune -P 50
```

Executing the `vmtune` command with no options:

```
# vmtune
vmtune: current values:
  -p      -P      -r      -R      -f      -F      -N      -W
minperm  maxperm  minpgahead  maxpgahead  minfree  maxfree  pd_npages  maxrandwrt
3072     12288      2           8           120      128     524288     0

  -M      -w      -k      -c      -b      -B      -u
maxpin   npswarn  npskill  numclust  numfsbufs  hd_pbuf_cnt  lvm_bufcnt
13108    1280     320      1         93         64          9

number of valid memory pages = 16384    maxperm=75.0% of real memory
maximum pinable=80.0% of real memory    minperm=18.8% of real memory
number of file memory pages = 3004     numperm=18.3% of real memory
```

The output shows the current settings for the parameters.

14.2.3 Network Related Tuning Tools

The optimal setting of the tunable communications parameters vary with the type of LAN as well as with the communication I/O characteristics. The following describes two commands that can be used to adjust these parameters.

14.2.3.1 The `no` Command

The `no` command can be used to configure network attributes. It sets or displays current network attributes in the currently running kernel. Therefore, the command must be run again after each startup or after the network has been configured. For more information on how the network attributes interact with each other, refer to the *AIX Version 4 System Management Guide: Communications and Networks*, SC23-2526.

Note

The `no` command performs no range checking. If used incorrectly, the `no` command can cause your system to become inoperable.

The `no` parameters and their values can be displayed by using `no -a`:

You can choose to tune either for maximum throughput or for minimum memory use. Some recommendations apply to one or the other; some apply to both. In this section, only some performance relevant parameters are described:

thewall

This is one of the most important parameters because it limits the memory that is assigned to the networking subsystem.

Note

Before AIX V4.2, the `thewall` value was usually set in the `/etc/rc.net` file, and any value specified by the Object Database Manager (ODM) was overwritten. But in AIX V4.2, the highest instance for setting the `thewall` value after system start-up is the ODM. The value set in the `/etc/rc.net` file is overwritten. So if there are any problems with the value of the `thewall` parameter after start-up, check the `/etc/rc.net` file, and also check the ODM by using `lsattr -El sys0` and look for the `maxmbuf` parameter.

After expanding the mbuf pools, verify using the `vmstat` command that paging rates have not increased. If you cannot expand the pools to necessary levels without adversely affecting the paging rates, additional physical memory may be required.

sb_max

The `sb_max` value sets the absolute upper bound on the size of TCP and Universal Datagram Protocol (UDP) socket buffers, such as `setsockopt()`, `udp_sendspace`, `udp_recvspace`, `tcp_sendspace`, and `tcp_recvspace`. The recommended size for this parameter is twice the size of the largest socket buffer. Remember to set `rfc1323` to one, if the buffer size crosses 64 KB.

14.2.3.2 The `nfso` Command

The `nfso` command can be used to configure Network File System attributes. It sets or displays network options in the currently running kernel. Therefore, the command must run after each system startup or network configuration.

Note

The `nfso` command performs no range checking. If used incorrectly, the `nfso` command can make your system inoperable.

The `nfso` parameters and their values can be displayed by using `nfso -a`:

```
# nfso -a
portcheck= 0
udpchecksum= 1
nfs_socketsize= 60000
nfs_setattr_error= 0
nfs_gather_threshold= 4096
nfs_repeat_messages= 0
nfs_duplicate_cache_size= 0
nfs_server_base_priority= 0
nfs_dynamic_retrans= 1
nfs_iopace_pages= 32
```

Most NFS attributes are runtime attributes that can be changed at any time, with the exception of `nfs_socketsize`, which needs NFS to be stopped first and restarted afterwards.

To display or change a specific parameter, use the `nfsd -o` command:

```
# nfsd -o portcheck
portcheck= 0
# nfsd -o portcheck=1
```

The parameters can be reset to their default value by using the `-d` option.

14.3 Optimal File System Performance for the Lotus Domino Server

To achieve optimal performance from the AIX file system, we must look at how AIX manages the data logically and physically. By controlling the physical allocation of data on the disk and the distribution of data between disks, you can tune the storage system to get the highest possible performance.

14.3.1 Performance Considerations for the Logical Volume Manager

- Intra-Disk Allocation Policy

The placement of the data on the disk surface itself affects the performance of the subsystem. The closer a given physical partition is to the center of a physical volume, the lower the average seek time is, but for large, sequential files, it's better to put them on the edge of the disk because the sequential performance is better there (there are more blocks per track at the edge than there are farther in).

- Inter-Disk Allocation Policy

The inter-disk allocation policy specifies the number of disks on which a logical volume's physical partitions are located. The `Range` option (minimum, maximum) determines the number of disks used for a single physical copy of the logical volume. To enhance the availability, the physical partitions should be assigned to the logical volume and then located on a single disk (`Range = minimum`). For maximum performance, the maximum number of physical volumes available should be used (`Range = maximum`). It will spread the physical partitions of the logical volume as evenly as possible over as many physical volumes as possible but with the risk that, if one disk fails, all data in this logical volume may get lost.

- Size of Logical Volume

To ensure that the file system does not become fragmented, assign enough free space to the file system in advance. If you have to re-size the file system at a later time because you run out of space, the physical volumes may not be continuous, that is, they will get fragmented.

- Mirroring

For maximum performance, mirroring should generally be disabled. If it is a must on your system, then the scheduling policy should be set to parallel and the allocation policy to strict. Write-Verify Policy and mirror write consistency should then be set to no or the LVM will need extra time to read back the data for validity and to verify that all writes to copies have succeeded.

14.3.2 Creating the Volume Group

Assume there are four hard disks available in your system and disk one, by default, represents the volume group rootvg.

Now, we want to add a second volume group with the name datavg containing the other three disks, hdisk1, hdisk2 and hdisk3:

1. Log on to the AIX machine as root.
2. Check to see if all disks you want to use are available by typing:

```
lsdev -Cc disk
```

3. Enter `smitty mkvg`.

Add a Volume Group

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

VOLUME GROUP name	[Entry Fields]
Physical partition SIZE in megabytes	[datavg]
* PHYSICAL VOLUME names	4
Activate volume group AUTOMATICALLY at system restart?	[hdisk1 hdisk2 hdisk3]
Volume Group MAJOR NUMBER	yes
	[]

F1=Help	F2=Refresh	F3=Cancel	F4=List
F5=Reset	F6=Command	F7=Edit	F8=Image
F9=Shell	F10=Exit	Enter=Do	

Figure 308. smitty's Add a Volume Group

1. Type a unique name into the field **VOLUME GROUP name** (Figure 308).
2. Type the names of all physical volumes that should be part of the new volume group into the **PHYSICAL VOLUME names** field, or press **F4** to get a selection list.
3. Press **Enter**.
4. Exit `smitty` and enter `lsvg -p datavg` and `lsvg datavg` to make sure the volume group was added correctly.

14.3.3 Creating the Logical Volume

To create a logical volume, follow these steps:

1. Enter `smitty mklv`.

The `mklv` command creates a new logical volume within the volume group.

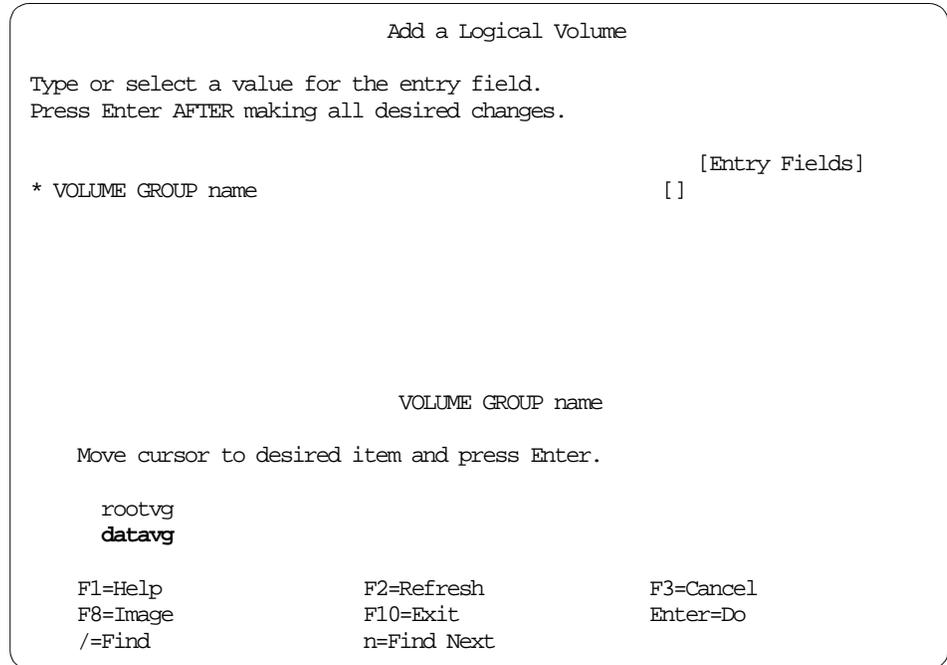


Figure 309. smitty's Add a Logical Volume

2. Press **F4** to get the list of all available volume groups.
3. Select the volume group onto which you want to add the logical volume and press **Enter** (Figure 309).

Add a Logical Volume

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

	[Entry Fields]
Logical volume NAME	[notesdatalv]
* VOLUME GROUP name	datavg
* Number of LOGICAL PARTITIONS	[20]
PHYSICAL VOLUME names	[hdisk1 hdisk2 hdisk3]
Logical volume TYPE	[jfs]
POSITION on physical volume	edge
RANGE of physical volumes	maximum
MAXIMUM NUMBER of PHYSICAL VOLUMES to use for allocation	[3]
Number of COPIES of each logical partition	1 +
Mirror Write Consistency?	no
Allocate each logical partition copy on a SEPARATE physical volume?	no
RELOCATE the logical volume during reorganization?	yes +
Logical volume LABEL	[]
MAXIMUM NUMBER of LOGICAL PARTITIONS	[128]
Enable BAD BLOCK relocation?	yes
SCHEDULING POLICY for writing logical partition copies	parallel
Enable WRITE VERIFY?	no +
File containing ALLOCATION MAP	[]
Stripe Size?	[Not Striped]

F1=Help	F2=Refresh	F3=Cancel	F4=List
F5=Reset	F6=Command	F7=Edit	F8=Image
F9=Shell	F10=Exit	Enter=Do	

Figure 310. smitty's Add a Logical Volume (Continued)

4. Enter the **Logical volume NAME** (Figure 310).
5. Enter the **Number of LOGICAL PARTITIONS**; Figure 308 on page 404 shows a predefined partition size of 4 MB.
6. Enter `jfs` for the Logical volume TYPE.
7. Enter the **POSITION on physical volume** and the **RANGE of physical volumes**, as described in 14.3.1, "Performance Considerations for the Logical Volume Manager" on page 403.
8. Set the field **Number of COPIES** of each logical partition to **1** for no mirroring.
9. The fields Mirror Write Consistency?, Allocate each logical partition and SCHEDULING POLICY are valid only if mirroring is active.
10. Set **RELOCATE the logical volume during reorganization?** to **yes** to allow the physical partitions to be moved during reorganization if it is required at a later time for performance reconsiderations.
11. For performance considerations, the parameter **Enable WRITE VERIFY?** should be set to **no**.
12. You can also use an **ALLOCATION MAP** to exactly define which physical partitions, on which disks, will contain the logical partitions.
13. Press **Enter** to create the logical volume.

14.Exit smit, and enter: `lslv lvnotes` to ensure that the logical volume was added correctly.

14.3.4 Performance Considerations for the File System

- Fragment size

Use a fragment size of 4096 bytes. For file systems with small fragment sizes, this is the primary performance hazard. Space fragmentation and the performance of accessing large files will suffer because of too many allocation operations.

- Compression

Using compression increases the number of processor cycles; it also generates additional writes and reads to the file system. Therefore, for maximum performance, disk compression should not be used.

- Log devices

A file system log is a formatted list of file system transaction records. A dedicated log device is created on `hdisk8` for `rootvg` when the system is installed. For performance improvements, you can add other log devices (or use a separate disk, if it is available) for other file systems.

14.3.5 Creating a New Log Device

In this procedure, the new file system log for the file system `/notes` will be created on the volume group `datavg` on `hdisk1`.

Note: For best performance, this file system log should reside on a less-frequently-used hard disk.

1. Enter `smitty mklv`, and select the **datavg** as the dedicated volume group (Figure 311), and see 14.3.1, “Performance Considerations for the Logical Volume Manager” on page 403.

```

                                Add a Logical Volume

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

                                [Entry Fields]
Logical volume NAME                [fsnoteslog]
* VOLUME GROUP name                datavg
* Number of LOGICAL PARTITIONS     [1]
#
PHYSICAL VOLUME names              [hdisk1]  +
Logical volume TYPE                [jfslog]
POSITION on physical volume        center
RANGE of physical volumes         minimum
MAXIMUM NUMBER of PHYSICAL VOLUMES [ ]
#
to use for allocation
Number of COPIES of each logical   1
partition
Mirror Write Consistency?          no
Allocate each logical partition    no
copy on a SEPARATE physical volume?
RELOCATE the logical volume during  yes
reorganization?
Logical volume LABEL               [ ]
MAXIMUM NUMBER of LOGICAL PARTITIONS [128]
Enable BAD BLOCK relocation?       yes
SCHEDULING POLICY for writing logical partition copies
Enable WRITE VERIFY?              no
File containing ALLOCATION MAP       [ ]
Stripe Size?                      [Not Striped]

F1=Help      F2=Refresh      F3=Cancel      F4=List
F5=Reset     F6=Command     F7=Edit       F8=Image
F9=Shell     F10=Exit       Enter=Do

```

Figure 311. smitty's Add a New File System Log File

2. Enter parameters as shown in Figure 311.
3. Press **F10** to exit smitty, and enter the following command to format the new JFS-log logical volume:

```
/usr/sbin/logform /dev/fsnoteslog
```

4. Answer **y** to the following prompt: logform: destroy /dev/fsnoteslog (y)? and press **Enter**.

14.3.6 Creating the New File System for the Lotus Notes Databases

A logical volume, lvnotes, was created in 14.3.3, "Creating the Logical Volume" on page 404. Now, we create a file system using the previously created logical volume, lvnotes, and the new file system log file, fsnoteslog.

1. Type in the command:

```
crfs -v jfs -d notesdatalv -m /server1 -A yes -a frag=4096 -a
logname=/dev /fsnoteslog
```

and press **Enter**.

2. To verify that you have set up the file system and log file correctly, use the following command: `lsvg -l datavg` (Figure 312).

```

datavg:
LV NAME          TYPE      LPs  PPs  PVs  LV STATE  MOUNT POINT
notesdata1v     jfs       20   20   1    open/syncd /server1
fsnoteslog      jfs1log   1     1    1    open/syncd N/A

```

Figure 312. `lsvg -l datavg`

3. You can also use the command: `lspv -p hdisk<N>` to check the location of the physical partitions.
4. Mount the file system with the command: `mount /server1`.

14.4 Creating a Striped File System for Maximum Database Performance

Striped logical volumes are very efficient if used for large sequential file systems that are frequently accessed and performance-sensitive.

Note

1. Since mirroring is not supported when striping is applied, the availability of the striped logical volume is low when compared with a mirrored logical volume.
2. For striping, at least two physical drives are required. The drives used should have little or no other activity.

In a striped logical volume, data is accessed using addresses that follow the sequence of stripe units. A complete stripe consists of one stripe unit on each of the dedicated physical devices. The Logical Volume Manager schedules the necessary I/O operations for all drives simultaneously. The stripe unit can be any power of 2 from 4 KB through 128 KB.

The following principles should be followed when using striped file systems:

- For best performance, you should divide the workload of a striped logical volume between as many disks as possible.
- Create a logical volume containing only these disks you want to use for disk striping.
- Use as many disk drive adapters as possible.
- Use high-performance disk drive adapters, such as Small Computer System Interface (SCSI) Fast/Wide or better, or use Serial Storage Architecture (SSA) technology.

14.4.1 Creating the Striped Logical Volume

Assume we have four hard disks in our system. The first hard disk (`hdisk0`) holds the default volume group `rootvg`. The other three disks are unused and are attached to different SCSI adapters.

1. Log on to the AIX machine as root.
2. To see if all disks you want to use are available type:

```
lsdev -Cc disk
```

3. Enter `smitty mkvg`.

```

                                Add a Volume Group

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

                                [Entry Fields]
VOLUME GROUP name                [stripevg]
Physical partition SIZE in megabytes 4
* PHYSICAL VOLUME names           [hdisk1 hdisk2 hdisk3]
Activate volume group AUTOMATICALLY yes
  at system restart?
Volume Group MAJOR NUMBER         []

F1=Help      F2=Refresh    F3=Cancel    F4=List
F5=Reset     F6=Command   F7=Edit     F8=Image
F9=Shell     F10=Exit     Enter=Do

```

Figure 313. smitty's Add a Volume Group for Disk Striping

4. Type a unique name into the **VOLUME GROUP name** field (Figure 313).
5. Type the names of all physical volumes that should be part of the new striped file system into the **PHYSICAL VOLUME names** field, or press **F4** to get a selection list.
6. Press **Enter**.
7. Exit smit and enter `lsvg -p stripevg` and `lsvgstripevg` to make sure the volume group was added correctly.

14.4.2 Creating the Logical Volume for Disk Striping

Select a stripe unit size of 64 KB and a logical volume size of 30 partitions (each has the previously defined size of 4 MB):

1. Enter `smitty mklv`.

The `mklv` command creates a new logical volume within the volume group.

```

                                VOLUME GROUP name

Move cursor to desired item and press Enter.

                                rootvg
                                stripevg

F1=Help      F2=Refresh    F3=Cancel
F8=Image     F10=Exit     Enter=Do
/=Find      n=Find Next

```

Figure 314. smitty's Add a Logical Volume for Disk Striping

2. Select the volume group on which you want to add the logical volume and press **Enter** (Figure 314).

```

                                Add a Logical Volume

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

                                [Entry Fields]
Logical volume NAME                [strnotes]
* VOLUME GROUP name                stripevg
* Number of LOGICAL PARTITIONS     [30]
#
PHYSICAL VOLUME names              [hdisk1 hdisk2 hdisk3]
Logical volume TYPE                []
POSITION on physical volume        outer middle
RANGE of physical volumes          minimum
MAXIMUM NUMBER of PHYSICAL VOLUMES []
#
to use for allocation
Number of COPIES of each logical   1
partition
Mirror Write Consistency?          no
Allocate each logical partition copy
on a SEPARATE physical volume?     no
RELOCATE the logical volume during  yes
reorganization?
Logical volume LABEL               []
MAXIMUM NUMBER of LOGICAL PARTITIONS [128]
Enable BAD BLOCK relocation?       yes
SCHEDULING POLICY for writing logical
partition copies                   parallel
Enable WRITE VERIFY?               no
File containing ALLOCATION MAP       []
Stripe Size?                       [64k]          +

F1=Help          F2=Refresh          F3=Cancel          F4=List
F5=Reset         F6=Command          F7=Edit           F8=Image
F9=Shell         F10=Exit            Enter=Do

```

Figure 315. smitty's Add a Logical Volume for Disk Striping (Continued)

3. Enter the **Logical volume NAME** (Figure 315).
4. Enter the **Number of LOGICAL PARTITIONS**; the partition size was already set in Figure 308 on page 404 at 4 MB.
5. Enter the **POSITION on physical volume** and the **RANGE of physical volumes**, as described 14.3.1, "Performance Considerations for the Logical Volume Manager" on page 403.
6. Set **RELOCATE the logical volume during reorganization?** to **yes** to allow the physical partitions to be moved during reorganization if it is required at a later time for performance reconsiderations.
7. For performance considerations, the parameter **Enable WRITE VERIFY?** should to be set to **no**.
8. Press **Enter** to create the logical volume.
9. Exit smit and enter `lslv strnotes` to make sure the logical volume was added correctly.

14.4.3 Creating a Striped File System for Lotus Notes Databases

A logical volume, `strnotes`, was created in 14.4.2, “Creating the Logical Volume for Disk Striping” on page 410. You should also create a new file system log file; refer to 14.3.5, “Creating a New Log Device” on page 407. Now, we can create a file system using the previously created logical volume, `strnotes`.

- Type the command:

```
crfs -d strnotes -m /server1 -A yes -a logname=/dev/fsnoteslog
```

and press **Enter**.

14.4.4 Performance Tuning Using Disk Striping

Be aware that there are many different factors which need to be considered when tuning a striped logical volume for best performance. Changing some parameters may impact the performance of other processes in the system, and you should know what you are doing. In this chapter, we will only talk about the possible parameters that you might change:

In benchmarking situations, the following techniques have yielded the highest levels of sequential I/O throughput:

- Stripe unit size of 64 KB.
- `max_coalesce` of 64 KB (the default). Equal to the stripe unit size.
`max_coalesce` specifies the maximum size, in bytes, of requests that the SCSI device driver will coalesce from the requests in its queue. Its range is from 64 KB to 2 GB. If you want to change the value, you must have a stanza in the ODM database `PdAt`. Use the command `odmget PdAt` to display the value. Use `odmdelete`, `odmadd`, and `bosboot` to change `max_coalesce`.
- `minpgahead` of 2 (the default). It defines the number of pages the Virtual Memory Manager (VMM) reads ahead when it first detects sequential access. Its range is from 0 to 16. Use `vmtune` to display and change the value.
- `maxpgahead` of (16 times the number of disk drives). This causes page-ahead to be done in units of the stripe unit size (64 KB) times the number of disk drives, resulting in the reading of one stripe unit from each disk drive for each read-ahead operation. The range of `maxpgahead` is 0 to 16. The default setting is 8. Use `vmtune` to display and change the value.

Note

If you are contemplating changing these values, keep in mind:

The values should be from the set: 0, 1, 2, 4, 8, 16. The use of other values may have adverse performance or functional effects.

Values should be powers of 2 because of the doubling algorithm of the VMM.

The value for maxpgahead > 16 can be used in systems where the sequential performance of striped logical volumes is of paramount importance. If you use only one adapter, please be aware that a value greater than 16 (64 KB read-ahead) may exceed the capabilities of some disk device drivers.

A minpgahead value of 0 effectively defeats the mechanism. This may have serious adverse consequences for performance.

The default maxpgahead value of 8 yields the maximum possible sequential I/O performance for currently supported disk drives.

The ramp-up of the read-ahead value from minpgahead to maxpgahead is quick enough that, for most file sizes, there would be no advantage to increasing minpgahead.

- I/O requests for (64 KB times the number of disk drives). This is equal to the maxpgahead value.
- Modify maxfree to accommodate the change in maxpgahead.

14.5 Lotus Domino Server Tuning

One can tune the parameters that alter the behavior of the Lotus Domino Server to improve its performance. We give below some of the parameters that can be tuned to improve Lotus Domino performance.

14.5.1 The NSF_BUFFER_POOL_SIZE Parameter

This parameter controls the allocation of memory to the NSF entry cache. Memory elements allocated to this cache help to keep the Lotus Notes data in memory without having to make extra access to disk.

14.5.2 The NIF_POOL_SIZE Parameter

This parameter controls allocation of memory to the NIF entry cache and improves performance for large views.

14.5.3 The MEMORY_QUOTA Parameter

If you are using the Lotus Domino Server for other applications also, you can use this parameter to prevent Lotus Notes from using all the memory on the system. If you do not specify a limit, Lotus Notes will consume all available memory and so the demands on another application (for example, a file server) may result in paging to disk to accommodate file server requests. This, in turn, would result in poor performance.

14.5.4 Multiple Name and Address Books

You can either partition the users into multiple domains with a single address book or can have multiple address books in the same domain. Many times, having multiple domains is not an option, so the alternative is to cascade NABs.

Having multiple Name and Address Books requires a careful analysis of the user community. You should place entries in the appropriate address books. With this approach, you can partition your NAB entries into multiple smaller NABs. The advantage is better performance if most of the hits are to the first NAB since it is smaller and more efficient to look up. The disadvantage is that if the system is designed improperly, the lookups take longer because each NAB is searched in the order in which it is cascaded on the server.

14.6 Lotus Notes Configuration Tips

You can enable configuration related parameters by editing the notes.ini file. The notes.ini file contains a set of variables for controlling parameters that can be used to optimize the functioning of the Lotus Domino Server.

14.6.1 Reducing ServerTasks

This line in the notes.ini file specifies which server tasks must be started at server startup time. Starting too many unwanted tasks at startup time is not desirable. Active server tasks take up system resources even if they are not servicing an active workload. So one should remove the unnecessary tasks from the ServerTasks list.

14.6.2 Reducing Mail-Polling Intervals (MinNewMailPoll)

This parameter specifies the polling interval to check for new mail messages. By reducing the frequency of queries, you can improve the system performance significantly. MinNewMailPoll is expressed in minutes, and for a large system, the optimal setting is about 30 to 45 minutes. The parameter MinNewMailPoll=45 changes the minimum polling interval for mail and overrides more frequent polling requested by users.

14.6.3 Increasing the MailMaxThreads Value

The performance of the mail router can be improved by increasing the number of worker threads that start up with the Lotus Notes Mail Router. A good rule of thumb for the number of such threads is the number of Lotus Notes Mail servers in the domain. For example, if you have four servers in your domain, all of which have mail users, specify MailMaxThreads=4 in the notes.ini file for all the Domain servers. This setting ensures routing of mail to all four servers in parallel, thereby increasing the performance of mail routing. The MailMaxThreads setting affects only the routing component and has no affect on the delivery component.

14.6.4 Dropping Idle Sessions

Setting Server_Session_timeout=15 drops idle sessions automatically after 15 minutes of the session's being idle. Recycling sessions by timeout is done in the background as opposed to creating sessions in demand. In some cases, dropping idle sessions may result in higher throughput.

14.6.5 Enabling Full-Text Indexes

Ensure that you have full-text indexes and searching capabilities enabled on databases on which the users execute searches. This will make the search operation faster and won't put a lot of load on the Lotus Domino Server.

14.6.6 Partitioning Data on Servers

This is a big topic in itself, and we will cover only one important technique here. In case you have a mix of dial-in users (who mostly replicate changes from the databases) and LAN users (online users who actively use and view databases interactively), an effective technique is to partition users to two servers based on usage. This way, you can cut the replication time for the dial-in users significantly because system resources on the dial-in server are dedicated. A further optimization is to delete indexes on the dial-in server and shut down all server tasks other than scheduled replication. Performance on the server supporting the online users also improves since that server does not have to suffer interruptions caused by dial-ins.

14.7 Conclusion

When you begin to tune your Lotus Domino IBM RS/6000 system, change only one thing at a time. Then re-evaluate the performance of your system to see if it has resulted in a performance improvement or a performance degradation. If you make many changes at one time, it is much harder to assess your resulting performance.

Chapter 15. Troubleshooting

Some potential problems and solutions are presented in this chapter. Please also take a careful look at "Things you need to know->Platforms and requirements" in *Release Notes: Domino Server 4.6.1*, supplied on the Lotus Domino Server CD.

A good source for known problems regarding Lotus Domino is the Lotus Knowledge Base. It is used by Lotus Support to collect known problems. If you work for IBM, you can access it on the intranet at <http://w3.ncs.ibm.com/lkb.nsf>. If you are a Lotus Business Partner, please check with Lotus on how to access it. In general, you might want to go to <http://www.support.lotus.com> and perform a search.

For RS/6000 related topics, it is worth visiting <http://www.rs6000.ibm.com/support>.

15.1 Performing Copy and Paste

To perform a copy from a Lotus Notes Client screen, you must select the text you want to copy with the left mouse button and perform the copy operation as you would do on a PC operating system (Windows NT, OS/2). That is, pressing **Ctrl-C**, choosing **Edit->Copy**, or using the "**Copy**"-Smarticon. To paste, press the central mouse button, as normally done in the X-Windows environment, or the appropriate menu action if you are pasting to another field of the client.

If you want to copy something from an aixterm to, for example, a Lotus Notes Client screen, select the text with the left mouse button (you don't need to press **Ctrl-C**) and paste with the central mouse button. If you are running CDE, you can also perform a PC-style copy operation (**Edit->Copy** from the dterm action bar).

15.2 Multiple Lotus Notes Clients on the Same AIX System

If you intend to run multiple clients on one UNIX workstation (think of a Network Station environment), Lotus recommends that you set the `Notes_ISOLATION` environment variable in the UNIX shell of every UNIX account that is running the Lotus Notes client. This environment variable allows multiple Lotus Notes clients to run on the same workstation in a way that isolates one Lotus Notes client termination from affecting the other Lotus Notes clients on the same workstation. If you do not set this environment variable, one Lotus Notes client termination hangs other Lotus Notes clients on that workstation.

Set the `Notes_ISOLATION` environment variable in your `.cshrc`, `.profile`, or `.kshrc` file so that you always run Lotus Notes with the environment variable set.

Note

All Lotus Notes Clients started on a single system must have the variable set for `Notes_ISOLATION` to work.

If you run the C Shell, add this line to your `~/.cshrc` file:

```
setenv Notes_ISOLATION 1
```

If you run the Bourne Shell, add this line to your `~/.profile` file:

```
Notes_ISOLATION=1; export Notes_ISOLATION
```

If you run the Korn Shell, add this line to your `~/.kshrc` file:

```
export Notes_ISOLATION=1
```

Note that these environment variables are case sensitive. You must set this variable before running the Lotus Notes clients or the server programs. This can be done by using the profile or login files, or in the server's startup script.

15.3 Cleaning Lotus Domino Processes

In general, the current version of Lotus Domino runs quite well without server hangs. If a server or a client should crash, you may have trouble restarting them. This is caused by corrupted shared memory and semaphores that the program does not clean. Even if you do not have trouble after a crash, it is a good practice to clean up before restarting any process. In order to clean up after a crash, you basically have three steps to perform:

1. Kill all processes of the server or the client, whichever failed.
2. Remove the associated Inter-Process Communication (IPC) resources, which are:
 - Shared memory segments
 - Semaphores
3. Remove the file `~notes.lck` (located in the notes data directory).

How do you do it manually?

Assume the Lotus Domino Server and/or the client have been running with the userid notes:

1. Identify the processes to kill by issuing:

```
ps -ef | grep notes
```

2. Do a `kill -9` on all suspicious processes either as user root or user notes.

Note

Be careful when you are using the `kill` command. In general, the notes processes have the path `/opt/lotus/notes/latest/ibmpow`. If you are *absolutely sure* that only the Lotus Domino processes have been run under the userid notes, you could do the following:

```
su - notes  
kill -9 -1
```

The following screen shot shows an example of a list of processes you might get on issuing the `ps` command. Obviously, you should preferably use scripts to do the cleanup (see below). The sample shows how to end the first Lotus Domino process.

```

$ ps -ef | grep notes
notes 22706 3886 0 10:26:55 pts/1 0:00 -ksh
notes 23736 22706 0 10:27:09 pts/1 0:00 sh /usr/lotus/bin/server
notes 23814 23736 0 10:27:16 pts/1 0:04 /opt/lotus/notes/latest/ibmpow/server
notes 24280 23814 0 10:27:31 pts/1 0:02 /opt/lotus/notes/latest/ibmpow/router
notes 24524 23814 1 10:27:41 pts/1 0:00 /opt/lotus/notes/latest/ibmpow/update
notes 24790 23814 1 10:27:36 pts/1 0:01 /opt/lotus/notes/latest/ibmpow/replica
notes 25026 23478 0 10:27:11 pts/3 0:00 -ksh
notes 25292 23814 0 10:27:46 pts/1 0:01 /opt/lotus/notes/latest/ibmpow/stats
notes 25558 23814 1 10:27:51 pts/1 0:02 /opt/lotus/notes/latest/ibmpow/amgr
notes 25800 25558 1 10:27:52 pts/1 0:02 /opt/lotus/notes/latest/ibmpow/amgr -e 1
notes 26058 23814 0 10:27:56 pts/1 0:00 /opt/lotus/notes/latest/ibmpow/sched
notes 26316 23814 0 10:28:01 pts/1 0:00 /opt/lotus/notes/latest/ibmpow/calconn
notes 26574 23814 1 10:28:06 pts/1 0:01 /opt/lotus/notes/latest/ibmpow/adminp
notes 26832 23814 0 10:28:11 pts/1 0:00 /opt/lotus/notes/latest/ibmpow/report
notes 27090 23814 0 10:28:16 pts/1 0:01 /opt/lotus/notes/latest/ibmpow/event
notes 27348 23814 0 10:28:21 pts/1 0:00 /opt/lotus/notes/latest/ibmpow/billing
notes 27606 23814 1 10:28:26 pts/1 0:02 /opt/lotus/notes/latest/ibmpow/http
notes 27870 25026 1 10:31:00 pts/3 0:00 -ksh
notes 28128 27870 14 10:31:10 pts/3 0:00 ps -ef
notes 28380 27870 3 10:31:10 pts/3 0:00 grep notes
$ kill -9 23736

```

Figure 316. Sample Process Screen

After killing the processes, you have to remove the corrupted shared memory and semaphores. With the command `ipcs`, you can list them. With `ipcrm`, you can remove them. You have to identify the items to remove by looking at those belonging to the appropriate user (OWNER=notes in our example) and having the KEY started with `0xf80` (with release 4.0 and 4.1, it usually started with `0xff`). See Figure 317 for a sample of output and Figure 318 on how to remove the IPC resources with their ID.

```

$ipcs
IPC status from /dev/mem as of Thu Jul 23 11:15:28 CDT 1998
T ID KEY MODE OWNER GROUP
Message Queues:
q 0 0x4107001c -Rrw-rw---- root printq
Shared Memory:
m 4096 0x580518e2 --rw-rw-rw- root system
m 1 0x00001a4c --rw----- root system
m 2 0x00000001 --rw-r--r-- root system
m 8 0xf8000200 --rw-rw---- notes staff
m 9 0xf8000201 --rw-rw---- notes staff
Semaphores:
s 4096 0x580518e2 --ra-ra-ra- root system 1
s 4097 0x440518e2 --ra-ra-ra- root system 2
s 4098 0x00001a4c --ra----- root system 2
s 3 0x620520e3 --ra-r--r-- root system 1
s 4 0x00000002 --ra-r--r-- root system 1
s 5 0x00000003 --ra-ra-ra- root system 1
s 10 0x0105206f --ra----- root system 1
s 11 0xf8000200 --ra-ra---- notes staff 16
s 12 0xf8000201 --ra-ra---- notes staff 16
s 13 0xf8000202 --ra-ra---- notes staff 16
s 14 0xf8000203 --ra-ra---- notes staff 16

```

Figure 317. Output of `ipcs` Command

```

$ ipcrm -s 14
$ ipcrm -s 13
$ ipcrm -s 12
$ ipcrm -s 11
$ ipcrm -m 8
$ ipcrm -m 9

```

Figure 318. Removing of IPC Resources

Figure 319 shows a sample script that tries to kill all Notes processes and remove the semaphores and shared memory. It is only provided to show the principles; use at your own risk. More detailed scripts, as a basis for production, use are available under <http://powernet.austin.ibm.com> (Section Software, Software downloads; at time of writing this book the documents were "HA50 and Domino" and "Domino scripts").

Be sure to adjust the environment variables at the beginning to suite your environment.

```

#!/bin/ksh
NOTES_USER=notes # AIX userid for this server
NOTES_PATH=/server1/notesr4 # Path for server data directory
PATH=$NOTES_PATH:/opt/lotus/bin:$HOME/bin:$PATH # Ensure PATH is set for scripts

count=0
NOTES_RUNNING='ps -fu $NOTES_USER | grep /opt/lotus | grep -v grep `
while [[ -n $NOTES_RUNNING ]] ; do
sleep 10
count=`expr $count + 1`
echo " ... waiting "$count"0 seconds"
#
# Terminate Domino Server if still running
#
if [ $count -eq 13 ] ; then
echo "Domino Server is still running after 2 minutes"
echo " ... now for the ungraceful method"
for i in `ps -fu $NOTES_USER | grep lotus | grep -v grep | awk '{ print $2 }'`; do
kill -9 $i
done
mens=`ipcs | grep $NOTES_USER | awk '{ print $1 $2 }' | awk -F"m" '{ print $2 }'|\
awk '{ print $1 }'`
sens=`ipcs | grep $NOTES_USER | awk '{ print $1 $2 }' | awk -F"s" '{ print $2 }' |\
awk '{ print $1 }'`
for j in $mens;do if [ -n "$j" ] ; then ipcrm -m $j;fi;done
for j in $sens;do if [ -n "$j" ] ; then ipcrm -s $j;fi;done
echo "Domino Server 4.6.1 TERMINATED"
exit
fi
NOTES_RUNNING='ps -fu $NOTES_USER | grep /opt/lotus | grep -v grep `
done
#
echo "Domino for AIX ($NOTES_SERVER) shutdown completed

```

Figure 319. Clean Lotus Notes Processes Script - killnotes

15.4 File System Full

Assume your Lotus Domino Server is installed in the filesystem /server1. You can monitor the filesystem use with the command `df`. Other file systems that must be verified are /, /var, /tmp, and /usr.

```
$ df -k /server1
Filesystem      1024-blocks      Free %Used    Iused %Iused Mounted on
/dev/notesdatalv 122880          12036  91%         750    3% /server1
```

When you receive a file system full message, or when you want to increase the file system size before this error occurs, do the following as root:

1. Verify if you have space in the volume group that contains the file system you want to increase. Checkout the volume group by issuing `lslv notesdatalv`.

```
This is screen.$ lslv notesdatalv
LOGICAL VOLUME:      notesdatalv          VOLUME GROUP:  dominovg
...
$ lsvg dominovg
VOLUME GROUP:  dominovg          VG IDENTIFIER: 00382642cf3bb9d7
VG STATE:      active           PP SIZE:       4 megabyte(s)
VG PERMISSION: read/write       TOTAL PPs:    258 (1032 megabytes)
MAX LVs:       256              FREE PPs:     158 (632 megabytes)
LVs:           4                USED PPs:     100 (400 megabytes)
OPEN LVs:      4                QUORUM:       2
TOTAL PVs:     1                VG DESCRIPTORS: 2
STALE PVs:    0                STALE PPs:    0
ACTIVE PVs:    1                AUTO ON:      yes
MAX PPs per PV: 1016          MAX PVs:      32
```

In this case, we have 632 MB available in the dominovg volume group.

2. Run the command `smitty chjfs`.
3. Select the file system you want to increase in size, in our example, `/server1`
4. Type the new size (you can only increase the size) in the SIZE of file system (in 512-byte blocks) field. For example, the `/server1` file system would be changed to 150 MB by entering 300000 in that field.
5. Instead of step 2 to 4, you could just type

```
crfs -a size=300000 /server1
```

or

```
crfs -a size=+54240
```

[54240 = (300000 - (128880*2); 128880 from df -k above]

If you need more space than is left in the volume group, you can acquire a new hard disk for the server and add it to the volume group. All this filesystem handling is standard business with AIX, but may be new to somebody used to PC-based operating systems.

15.5 Increasing Paging Space

Paging space may affect the performance of your Lotus Domino Server. If paging space runs low, you may loose processes or cause a system panic. The size of the paging space is by default the size of the physical memory plus 16 MB. If you want to increase the size of the default paging space (you can't decrease), do the following as root:

1. Run the command `smitty chps` and select **hd6**.

```

Change / Show Characteristics of a Paging Space

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

                                     [Entry Fields]
Paging space name                      hd6
Volume group name                      rootvg
Physical volume name                   hdisk0
NUMBER of additional logical partitions [4]
Use this paging space each time the system is
RESTARTED?                             yes

F1=Help      F2=Refresh      F3=Cancel      F4=List
F5=Reset     F6=Command     F7=Edit       F8=Image
F9=Shell     F10=Exit       Enter=Do

```

Figure 320. Change/Show Characteristics of a Paging Space

2. Enter the NUMBER of additional logical partitions you want (Figure 320). Be sure to enter the right number of partitions based on your volume group's Physical Partition (PP) SIZE. With the `lsvg` command, you can see the logical partition size:

```

# lsvg rootvg | grep SIZE
VG STATE:      active          PP SIZE:      4 megabyte(s)

```

In the example, the `hd6` paging space size will be increased by 16 MB.

Alternatively, you can add another paging space to the system either in a different volume group or just on a different disk for performance reasons, or on the same disk if you think of decreasing paging space again later on. A paging space can be added by doing the following steps:

1. Run the command `smitty mkps` and make appropriate selections or just enter `mkps -s'4' -n -a dominovg`
This would add an additional paging space of 4 partitions size in `dominovg` for immediate use.
2. To list the total paging space, you can use the command `lspgs -a`

```

# lspgs -a
Page Space  Physical Volume  Volume Group  Size  %Used  Active  Auto  Type
paging00   hdisk1           dominovg      16MB  1      yes    yes   lv
hd6        hdisk0           rootvg        256MB  42     yes    yes   lv

```

Figure 321. List Paging Space

To remove an active paging space, change its characteristics so that it is not configured at subsequent system restarts (`smitty chps` or `chps` command). On the next system restart, the paging space is not active, and it can be removed.

15.6 Always Start with the Lotus Notes Setup Screen

If, after you have configured the Lotus Notes client, you always get the Lotus Notes setup screen again instead of the Lotus Notes Workplace, check to see if the notes.ini file is in a directory that is in your PATH.

Normally, the notes.ini is in your \$HOME/notesr4 directory if you are using just the client. If you are using the admin client of a server, the PATH must point to the server's data directory (for example: /server1/notesr4). To check the PATH, type:
echo \$PATH.

If you are using a Korn Shell, you may need to add these lines in your profile:

```
PATH=$HOME/notesr4:$PATH
export PATH
```

If you are using CDE, uncomment the line:

```
DTSOURCEPROFILE=true
```

in your .dtpfile file for the AIX Common Desktop Environment (CDE) to pick up the respective profiles.

15.7 Accessing a Server in a Different TCP/IP Domain

If you are a client of a Lotus Domino Server in a different TCP/IP domain, your Lotus Notes client (for example, mars.itsc.austin.ibm.com) needs to be able to translate the Lotus Domino Server name (for example, Jupiter/Acme Corp) into a valid TCP/IP address (for example jupiter.acme.com).

If we have a client and a server, you need to be able to resolve the TCP/IP name of the server with the names described in Table 18.

Table 18. Client and Server Names

	TCP/IP Name	Lotus Notes Name
Client	mars.itsc.austin.ibm.com	
Server	jupiter.acme.com	jupiter/Acme

The following sections explain two different methods of achieving this either from within Lotus Notes or from within the network layer.

15.7.1 Setup within Lotus Notes

Open your **Personal Name and Address Book** on the client, select the **Server/Connections** view and add a new connection, as shown in Figure 322 on page 424.

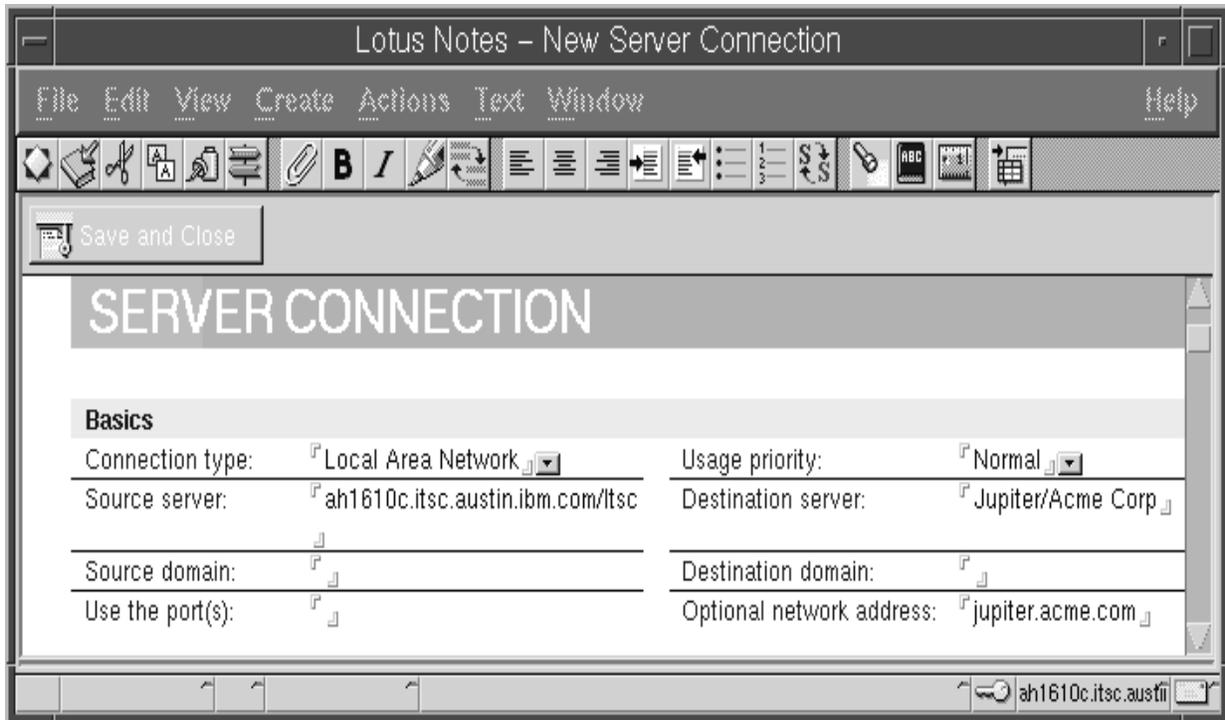


Figure 322. New Server Connection

Select the Connection type **Local Area Network** and the correct LAN port. Enter the Lotus Domino Server name to which you want to connect (Jupiter/Acme Corp) and the TCP/IP name (or its numeric IP address) into the **Destination server address** field in the Advanced section (jupiter.acme.com). Save and exit the document.

If you are specifying the server name Jupiter/Acme Corp now, for example, in the Open Database dialog, Lotus Notes uses this Connection document to find the TCP/IP address of this server and connect to it. Of course, AIX has still to be able to resolve jupiter.acme.com to an IP address. Otherwise, you could enter the IP address of jupiter.acme.com directly in the Destination server address field.

15.7.2 Setup on the Network Layer

If you are not using a connection document, you must have an alias for the server name in question (jupiter), which can be resolved by TCP/IP name resolution. If you are using the /etc/hosts file, you have to add to it a line like the one in Figure 323:

```
9.179.1.220    jupiter.sumare.ibm.com  jupiter
```

Figure 323. Host Names Line

If you are using NIS, ask your NIS administrator to add a line (like the one in Figure 323) to the host's file. He/she should add the address line to his/her host's file and propagate it to the NIS hosts map.

If you are using Domain Name Server (DNS), you can ask your DNS administrator to add to the local Name server an alias for your Lotus Domino Server name pointing to your TCP/IP complete server name. If you don't have a machine with the same name as your server name in your domain (in our example, if the machine jupiter.itsc.austin.ibm.com does not exist), you can add a search tag to the /etc/resolv.conf file of your client machine. Note that if you have a search tag, you have to remove the domain tag.

In our example, the original /etc/resolv.conf would look like this:

```
domain itsc.austin.ibm.com
nameserver 9.36.81.174
```

The new resolv.conf would look like this:

```
search itsc.austin.ibm.com sumare.ibm.com
nameserver 9.36.81.174
```

You can have up to eight domains added to the search list.

15.8 Unable to Create the Data Directory during Setup

If, when undertaking Lotus Domino setup and clicking on the **Install** button, the error message:

```
Unable to create the data directory. Please specify a new directory
```

is displayed, you need to insure the permissions on your Lotus Domino data directory filesystem are correct.

For example for the Lotus Domino data directory /server1 installed with AIX user notes (group notes) you would enter the following:

```
chown notes:notes /server1
```

15.9 "Directory is not empty" Error on Installing from CD

If you create a new filesystem, you will have a subdirectory called lost+found automatically. Lotus Domino does not accept that. So make sure that you created the filesystem /usr/domino for the Lotus Domino code, but specify /usr/domino/lotus as the target directory during initial installation.

15.10 Partitioning: File .sgf.notespartition and HACMP

The file .sgf.notespartition contains an integer number, which has to be unique across a cluster. So if you installed a mutual takeover scenario, make sure you edit this file for each server and enter a unique number (preferably starting with number 1)

15.11 TCP/IP Listener Error without TCPIP_TcpipAddress

If multiple servers are running on one system, make sure each has within notes.ini a line containing:

```
TCPIP_TcpipAddress=0,<ip address of domino server>,1352
```

Assuming an IP address of 9.3.4.5, the line would read:

```
TCPIP_TcpipAddress=0,9.3.4.5,1352
```

Otherwise, the first server coming up would listen on port 1352, and the next one would get a bind error at startup. You would get an error like this appearing in the Lotus Domino Server's console output:

```
28/07/98 14:39:09      Error on Listen function: The TCP/IP port used by the
Notes server is still in use on this system.
```

15.12 Errors at Startup of http Task

If you are running partitioned servers and more than one has the http Task active, edit the server document in the Public Address Book, section HTTP Server, and modify the fields, as shown, (replace hostname with your installation name) to contain the fully qualified hostname and binding being enabled:

▼ **HTTP Server**

Basics	
Host name:	<input type="text" value="itsosmp.itsc.austin.ibm.com"/>
Bind to host name:	<input type="text" value="Enabled"/>

Figure 324. HTTP Server Basics

Afterwards, stop the http Task from the server console (`tell http quit`) and restart it (`load http`). You may want to have a look at the file `domino.cnf` in the servers data directory afterwards; it now contains two lines like this:

```
bindspecific yes
hostname itsosmp.itsc.austin.ibm.com
```

This combination allows each servers http Task to listen on the specific port built by `hostname:port` without the need to have different port numbers per server.

Note

The error you get on startup of Lotus Domino's http Task, if another http daemon is already running, normally looks like:

```
[202cb3d8]: BIND..... Error in Privileged Port Call Failed.
```

Followed by:

```
27/07/98 16:14:21 HTTP Server Initialization error. Could not bind port 80.  
Port may be in use  
27/07/98 16:14:28 HTTP Web Server shutdown
```

15.13 Lotus Notes Clients Freezing

If your Lotus Notes client freezes after you encountered problems on selecting buttons or similar things, it may help to change your LIBPATH statement to use the X11R5 libraries instead the X11R6 libraries. We encountered that problem with AIX 4.3.1 and Lotus Notes 4.6.1c International. You should export your LIBPATH before starting notes: `LIBPATH=/usr/lpp/X11/lib/R5:/usr/lib:/lib`

See `/usr/lpp/X11/README` for details about X11R6 compatibility issues.

Appendix A. Using UNIX's vi Editor

For those new to UNIX's vi editor, below is a list of useful commands to help when using vi:

Table 19. Useful vi Commands

Command	What Does It Do?
0 (zero)	Move to the beginning of line.
\$	Move to end of line.
/search_string	Search forward for next line containing search_string.
?search_string	Search backward for next line containing search_string.
a	Append text, in insert mode, after current cursor position.
^b	Move up one screen.
B	Move to previous space-delimited word.
b	Move to previous word.
Backspace	Move left one character.
^d	Move down half a screen.
D	Delete until end of line.
dw	Delete word.
dd	Delete line.
ESC	Leave insert mode and return to command mode.
^f	Move forward on screen.
G	Move to the last line of the file.
nG	Move to the nth line of the file.
h	Move left one character.
i	Insert text before the current character.
j	Move down one line.
k	Move up one character.
l	Move right one character.
n	Repeat last search.
O	Open new line for insertion above current line.
Return	Move to start of next line.
^u	Move up half a page.
U	Undo any changes to current line.
u	Undo last changes made to file.
W	Move forward one space delimited word.
w	Move forward one word.

Command	What Does It Do?
x	Delete the current character.
:q	Quit vi and return to the shell.
:q!	Quit vi and return to the shell without saving any changes made to the file.
:w	Write the changed file to disk.

Appendix B. Special Notices

This publication is intended to help the Lotus Notes systems administrator to install, set up, and administer Lotus Notes Release 4.6 in an AIX operating system environment. The information in this publication is not intended as the specification of any programming interfaces that are provided by Lotus Notes. See the PUBLICATIONS section of the IBM or Lotus Programming Announcement for Lotus Notes Release 4 for more information about what publications are considered to be product documentation.

References in this publication to IBM products, programs, or services do not imply that IBM intends to make these available in all countries in which IBM operates. Any reference to an IBM product, program, or service is not intended to state or imply that only IBM's product, program, or service may be used. Any functionally equivalent program that does not infringe any of IBM's intellectual property rights may be used instead of the IBM product, program, or service.

Information in this book was developed in conjunction with the use of the equipment specified and is limited in application to those specific hardware and software products and levels.

IBM may have patents or pending patent applications covering subject matter in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to the IBM Director of Licensing, IBM Corporation, 500 Columbus Avenue, Thornwood, NY 10594 USA.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information that has been exchanged, should contact IBM Corporation, Dept. 600A, Mail Drop 1329, Somers, NY 10589 USA.

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The information contained in this document has not been submitted to any formal IBM test and is distributed AS IS. The information about non-IBM ("vendor") products in this manual has been supplied by the vendor and IBM assumes no responsibility for its accuracy or completeness. The use of this information or the implementation of any of these techniques is a customer responsibility and depends on the customer's ability to evaluate and integrate them into the customer's operational environment. While each item may have been reviewed by IBM for accuracy in a specific situation, there is no guarantee that the same or similar results will be obtained elsewhere. Customers attempting to adapt these techniques to their own environments do so at their own risk.

Any pointers in this publication to external Web sites are provided for convenience only and do not in any manner serve as an endorsement of these Web sites.

The following document contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples contain the names of individuals, companies, brands, and products. All of these

names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

The following terms are trademarks of the International Business Machines Corporation in the United States and/or other countries:

ADSTAR	AIX
AT	Current
ExecJet	IBM ®
InfoExplorer	LoadLeveler
Micro Channel	NetView
Operating System/2	OS/2
RISC System/6000	RS/6000
SP	Workplace
400	

The following terms are trademarks of other companies:

C-bus is a trademark of Corollary, Inc.

Java and HotJava are trademarks of Sun Microsystems, Incorporated.

Microsoft, Windows, Windows NT, and the Windows 95 logo are trademarks or registered trademarks of Microsoft Corporation.

PC Direct is a trademark of Ziff Communications Company and is used by IBM Corporation under license.

Pentium, MMX, ProShare, LANDesk, and ActionMedia are trademarks or registered trademarks of Intel Corporation in the U.S. and other countries.

UNIX is a registered trademark in the United States and other countries licensed exclusively through X/Open Company Limited.

Other company, product, and service names may be trademarks or service marks of others.

Appendix C. Related Publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this redbook.

C.1 International Technical Support Organization Publications

For information on ordering these ITSO publications see “How to Get ITSO Redbooks” on page 435.

- *Lotus Notes Release 4 in a Multiplatform Environment*, SG24-4649
- *Lotus Notes Release 4.5: A Developer's Handbook*, SG24-4876
- *Using ADSM to Back Up Lotus Notes*, SG24-4534
- *RS/6000 Performance Tools in Focus*, SG24-4989
- *Understanding LDAP*, SG24-4986
- *Load-Balancing Internet Servers*, SG24-4993
- *RS/6000 SP Monitoring: Keeping It Alive*, SG24-4873
- *Inside the RS/6000 SP*, SG24-5145
- *Developing Web Applications Using Lotus Notes Designer for Domino 4.6*, SG24-2183
- *RS/6000 SP High Availability Infrastructure*, SG24-4838
- *High Availability on the RISC System/6000 Family*, SG24-4551
- *RS/6000 Models E30, F40, F50 and H50 Handbook*, SG24-5143
- *High Availability and Scalability with Domino Clustering and Partitioning on AIX*, SG24-5163
- *Implementing High Availability on RISC/6000 SP*, SG24-4742

C.2 Redbooks on CD-ROMs

Redbooks are also available on CD-ROMs. **Order a subscription** and receive updates 2-4 times a year at significant savings.

CD-ROM Title	Subscription Number	Collection Kit Number
System/390 Redbooks Collection	SBOF-7201	SK2T-2177
Networking and Systems Management Redbooks Collection	SBOF-7370	SK2T-6022
Transaction Processing and Data Management Redbook	SBOF-7240	SK2T-8038
Lotus Redbooks Collection	SBOF-6899	SK2T-8039
Tivoli Redbooks Collection	SBOF-6898	SK2T-8044
AS/400 Redbooks Collection	SBOF-7270	SK2T-2849
RS/6000 Redbooks Collection (HTML, BkMgr)	SBOF-7230	SK2T-8040
RS/6000 Redbooks Collection (PostScript)	SBOF-7205	SK2T-8041
RS/6000 Redbooks Collection (PDF Format)	SBOF-8700	SK2T-8043
Application Development Redbooks Collection	SBOF-7290	SK2T-8037

C.3 Other Publications

These publications are also relevant as further information sources:

Lotus documentation is available online after the product has been installed. The database name is listed in parenthesis after the title of the documentation.

- *Notes 4.5 Release Notes*, (*readme.nsf*)
- *Notes Help Lite*, (*helpt4.nsf*)
- *Notes Help*, (*help4.nsf*)
- *Notes Installation Guide for Servers*, (*doc/srvinst.nsf*)
- *Workstation Install Guide*, (*doc/wrkinst.nsf*)
- *Notes Administration Help*, (*doc/migrate.nsf*)
- *Notes Migration Guide*, (*doc/migrate.nsf*)
- *NPN Administrator's Guide*, (*doc/npn_admn.nsf*)
- *Release Notes-NPN R4*, (*doc/npn_rn.nsf*)
- *Web Navigator Admin Guide*, (*doc/webadmin.nsf*)
- *Web Navigator User's Guide*, (*doc/webuser.nsf*)
- *DAS Administration Guide*, (*doc/npn_admn.nsf*)
- *SMTP MTA Administration Guide*, (*smtpag.nsf*)
- *Lotus Notes Internet Cookbook for Release 4*,
<http://NS.notes.net/cookbook/cbook.htm>
- *AIX V4.1 Installation Guide*, SC23-2550
- *AIX 4.2 Installation Guide*, SC23-1924
- *AIX V4.3 Installation Guide*, SC23-4112
- *AIX V4.3 Guide to Printers and Printing*, SC23-4130
- *IBM Internet Connection Server for AIX, Users Guide*, SC31-8194
- *AIX Performance Tuning Guide*, SC23-2365
- *AIX Version 4 System Management Guide: Communications and Networks*, SC23-2526
- *AIX Version 4.1 Network Installation Management Guide and Reference*, SC232627

How to Get ITSO Redbooks

This section explains how both customers and IBM employees can find out about ITSO redbooks, CD-ROMs, workshops, and residencies. A form for ordering books and CD-ROMs is also provided.

This information was current at the time of publication, but is continually subject to change. The latest information may be found at <http://www.redbooks.ibm.com/>.

How IBM Employees Can Get ITSO Redbooks

Employees may request ITSO deliverables (redbooks, BookManager BOOKs, and CD-ROMs) and information about redbooks, workshops, and residencies in the following ways:

- **Redbooks Web Site on the World Wide Web**

<http://w3.itso.ibm.com/>

- **PUBORDER** – to order hardcopies in the United States

- **Tools Disks**

To get LIST3820s of redbooks, type one of the following commands:

```
TOOLCAT REDPRINT
TOOLS SENDTO EHONE4 TOOLS2 REDPRINT GET SG24xxxx PACKAGE
TOOLS SENDTO CANVM2 TOOLS REDPRINT GET SG24xxxx PACKAGE (Canadian users only)
```

To get BookManager BOOKs of redbooks, type the following command:

```
TOOLCAT REDBOOKS
```

To get lists of redbooks, type the following command:

```
TOOLS SENDTO USDIST MKTTOOLS MKTTOOLS GET ITSOCAT TXT
```

To register for information on workshops, residencies, and redbooks, type the following command:

```
TOOLS SENDTO WTSCPOK TOOLS ZDISK GET ITSOREGI 1998
```

- **REDBOOKS Category on INEWS**

- **Online** – send orders to: USIB6FPL at IBMMAIL or DKIBMBSH at IBMMAIL

Redpieces

For information so current it is still in the process of being written, look at "Redpieces" on the Redbooks Web Site (<http://www.redbooks.ibm.com/redpieces.html>). Redpieces are redbooks in progress; not all redbooks become redpieces, and sometimes just a few chapters will be published this way. The intent is to get the information out much quicker than the formal publishing process allows.

How Customers Can Get ITSO Redbooks

Customers may request ITSO deliverables (redbooks, BookManager BOOKs, and CD-ROMs) and information about redbooks, workshops, and residencies in the following ways:

- **Online Orders** – send orders to:

In United States
In Canada
Outside North America

IBMMAIL
usib6fpl at ibmmail
caibmbkz at ibmmail
dkibmbsh at ibmmail

Internet
usib6fpl@ibmmail.com
lmannix@vnet.ibm.com
bookshop@dk.ibm.com

- **Telephone Orders**

United States (toll free)
Canada (toll free)

1-800-879-2755
1-800-IBM-4YOU

Outside North America
(+45) 4810-1320 - Danish
(+45) 4810-1420 - Dutch
(+45) 4810-1540 - English
(+45) 4810-1670 - Finnish
(+45) 4810-1220 - French

(long distance charges apply)
(+45) 4810-1020 - German
(+45) 4810-1620 - Italian
(+45) 4810-1270 - Norwegian
(+45) 4810-1120 - Spanish
(+45) 4810-1170 - Swedish

- **Mail Orders** – send orders to:

IBM Publications
Publications Customer Support
P.O. Box 29570
Raleigh, NC 27626-0570
USA

IBM Publications
144-4th Avenue, S.W.
Calgary, Alberta T2P 3N5
Canada

IBM Direct Services
Sortemosevej 21
DK-3450 Allerød
Denmark

- **Fax** – send orders to:

United States (toll free)
Canada
Outside North America

1-800-445-9269
1-800-267-4455
(+45) 48 14 2207 (long distance charge)

- **1-800-IBM-4FAX (United States) or (+1) 408 256 5422 (Outside USA)** – ask for:

Index # 4421 Abstracts of new redbooks
Index # 4422 IBM redbooks
Index # 4420 Redbooks for last six months

- **On the World Wide Web**

Redbooks Web Site <http://www.redbooks.ibm.com>
IBM Direct Publications Catalog <http://www.elink.ibm.com/pbl/pbl>

Redpieces

For information so current it is still in the process of being written, look at "Redpieces" on the Redbooks Web Site (<http://www.redbooks.ibm.com/redpieces.html>). Redpieces are redbooks in progress; not all redbooks become redpieces, and sometimes just a few chapters will be published this way. The intent is to get the information out much quicker than the formal publishing process allows.

List of Abbreviations

ACL	Access Control List	IMAP	Internet Message Access Protocol
ADSM	ADSTAR Distributed Storage Manager	IND	Interactive Network Dispatcher
AFS	Andrew File System	I/O	Input/Output
AIX	Advanced Interactive eXecutive	IP	Internet Protocol
APA	All Points Addressable	IPC	Inter-Process Communication
APAR	Authorized Program Analysis Report	IPX	Internetwork Packet eXchange
ASCII	American Standard Code for Information Interchange	ISA	Industry Standard Architecture
ATM	Asynchronous Transfer Mode	ISDN	Intergrated-Services Digital Network
CAPI	Common ISDN Application Programming Interface	ISP	Internet Service Provider
CDE	Common Desktop Environment	ITSO	International Technical Support Organization
CGI	Common Gateway Interface	JPEG	Joint Photographic Experts Group
CPU	Central Processing Unit	LAN	Local Area Network
CRC	Cyclic Redundancy Check	LDAP	Lightweight Directory Access Protocol
DAS	Domino Advanced Services	LIPS	Lightweight Internet Person Schema
DAT	Digital Audio Tape	LVM	Logical Volume Manager
DCE	Distributed Computing Environment	MIME	Multipurpose Internet Mail Extensions
DLT	Digital Linear Tape	MTA	Message Transfer Agent
DNS	Domain Name System	MX	Mail Exchanger
DOS	Disk Operating System	NAB	Name and Address Book
DRT	Delivery Report Task	NIC	Network Interface Card
ECL	Execution Control List	NIF	Not in File
FDDI	Fiber Distributed Data Interface	NIM	Network Install Manager
FTP	File Transfer Protocol	NIS	Network Information System
GID	Group ID	NFS	Network File System
GIF	Graphical Interchange Format	NLM	NetWare Loadable Module
HACMP	High Availability Clustered Multi-Processing	NNTP	Network News Transfer Protocol
HPS	High Performance Switch	NRK	Notes Recovery Kit
HTML	Hypertext Markup Language	ODBC	Open Database Connectivity
HTTP	Hypertext Transfer Protocol	ODM	Object Data Manager
IBM	International Business Machines Corporation	OLE	Object Linking and Embedding
I/O	Input/Output	OU	Organizational Unit
IGS	Information Gateway Service		

PAB	Public (Name and) Address Book	USENET	USErs' NETwork
POP3	Post Office Protocol Version 3	VM	Virtual Memory
PCL	Printer Control Language	VMM	Virtual Memory Manager
PP	Physical Partition	WAN	Wide Area Network
PPP	Point-to-Point Protocol	WWW	World Wide Web
PRPQ	Programming Request for Price Quotation		
PSSP	Parallel System Support Programs		
PTF	Program Temporary Fix		
PTX	Performance Toolbox		
PTPE	Performance Toolbox Parallel Extensions		
RAID	Redundant Array of Inexpensive Disks		
RAM	Random Access Memory		
RAS	Reliability, availability, serviceability		
RDBM	Relational Database Manager		
RFC	Request For Comments		
RISC	Reduced Instruction Set Computing		
RPC	Remote Procedure Call		
SACL	Server Access Control Lists		
SCSI	Small Computer system Interface		
SLIP	Serial Line Internet Protocol		
SMIT	System Management Interface Tool		
SMTP	Simple Mail Transfer Protocol		
SMP	Symmetric Multi-Processing		
SNMP	Simple Network Management Protocol		
SP	Scalable Parallel		
SPX	Sequenced Packet eXchange		
SSA	Serial Storage Architecture		
SSL	Secure Sockets Layer		
TCP/IP	Transmission Control Protocol/Internet Protocol		
TCB	Trusted Computing Base		
TTY	Teletypewriter		
UDP	User Datagram Protocol		
UID	User ID		
URL	Uniform Resource Locator		

Index

Symbols

.dtpfile 84
.profile 84
.sgf.notespartition 425
./rhosts File 379
/etc/hosts.lpd 176
/etc/inittab 146
/etc/passwd
 See Password File, UNIX
/etc/resolv.conf 425
/home 166
/notescd 158, 159, 160
/noteswrk 160, 162, 165, 166
/opt/lotus 143, 161, 165
/server1 143, 156
/server1/bin/app_stopdomino Command 361
/server1/notesr4 143, 156
@AllChildren 139
@AllDescendants 139
@DbLookup 139
@Environment 139
@IsResponseDoc 139
@Now 139
@UserName 139

Numerics

3dmon 394

A

abbreviations 439
Access
 Certifier ID file 118
acronyms 439
Additional Server on AIX 65
Administration Document 252
 Customizing 252
ADSM, Information 360
Advanced Services 40
AIX Basics 351
AIX Group
 Create 32
AIX Security 210
 /var/adm/sulog 211
 Groups 211
 User Accouts 210
AIX Security Logs 211
 /etc/security/failedlogin 212
 /etc/utmp 211
 /var/adm/sulog 211
 /var/adm/wtmp 211
AIX User
 Create 32
alog Command
 Changing the log Definition 149
 configure.alog, Script 147
 ODM Configuration 147

PTF 147
 startup.alog, script 148
 Viewing the Log 149
Available Platforms 14
 AIX 14
 OS/2 Warp 19
 Supported Protocols 19
 Windows 95 19, 20
 Windows NT 21
azizo 394

B

Backup
 /dev/rmt0 360
 ADSM, Information 360
 AIX System
 mksysb Command 369
 Procedure 369
 Requirements 368
 backup Command 362
 chdev Command 361
 Crontab 364, 377, 378, 381
 Crontab Command 364
 Data Directory 365
 Data Integrity, Tape 365
 Files to be Backed Up 359
 fsck Command 361
 Level 362
 Isdev Command 361
 Maintaining Tapes 365
 mksysb Command 369
 Multiple Servers 375
 Network (rdump) 379
 Non-Rewinding Device (tape) 381
 notes.ini, server.id, cert.id, user.id 360
 On Disk 375
 One Server 362
 rdump Command 379
 Replication 360
 restore Command 366
 Restore Data, How to 366
 Restore Examples 368
 Restoring the AIX System 370
 Schedule 362, 365
 Script Backfile 375
 Script Backtape 363
 Script Dumpfiles 378
 Software Directory 361
 Tape Block Size 361
 tar Command 362
 tcopy Command 362
 tctl Command 366, 382
 Using rdump Command 379
backup Command 362
bibliography 433
Billing 346
 Agent 347, 349

- BillingClass 347
- Database 346, 348
- Document 346
- HttpRequest 347, 350
- Mail 346, 349
- Managing 347
- Replication 346, 348
- Sample Billing 347
- Session 346, 347
- set config 347
- billing.nsf 346
- bosboot Command 412
- BUSY 335

C

- Capacity Planning 394
- CD-ROM, mount 159
- Certification Log 95, 112
 - Creating 96
- Certifier ID 113, 200
 - Creating User 95, 97, 98, 105
 - Giving Access to 118
 - Registering Server 113
 - Securing 200
- chdev Command 361
- chgrp Command 212
- chmod Command 50, 212
- chown Command 32, 212
- CLADMIN 331
- CLDBDIR 330, 331
- cldbdir.nsf 331
- Cleaning Notes Processes 418
- Client
 - Cleaning Notes Processes 418
 - Typical UNIX Configuration 156
- Clients Freezing 427
- CLREPL 330, 331
- Cluster
 - BUSY 335
 - Cluster_Admin_On 335
 - Configuration 329
 - Domino Clustering 354
 - High availability 328
 - Load Balancing 334
 - Logging 332, 333
 - MailClusterFailover 336
 - Managing Databases 333
 - MAXUSERS 335
 - Monitoring 332
 - notes.ini 335
 - Processes 332
 - Removing 333
 - RESTRICTED 335
 - RESTRICTED state 334
 - Restricting Server Access 334
 - Server_Availability_Threshold 335
 - Server_Cluster_On 336
 - Server_MaxUsers 335
 - Server_Restricted 334, 335
 - Statistic 333

- Cluster Administration Process 331
- Cluster Communication 336
- Cluster Database Directory 331
- Cluster Database Directory Manager 330
- Cluster Manager 331, 336
- Cluster Replicator 330, 331, 336
- Cluster States
 - AVAILABLE 335
 - BUSY 335
 - MAXUSERS 335
 - RESTRICTED 335
- Cluster_Admin_On 335
- Clustering 328
 - Load Balancing 329
 - Scalability 328
- Commands
 - Set Config 347
 - show cluster 335
- Compression of File Systems 407
- Configuration
 - IMAP Client 286
 - LDAP 302
 - LDAP Client 307
 - News Feed 293
 - NNTP 289
 - NNTP Client 299
 - POP Client 285
 - PPP 321
 - SMTP MTA 269
- Configure
 - TTY 309
 - X.PC 312
- Console, Remote 150
- Control Messages 297
- Copy 417
- Copydist 159
- Creating a Private Newsgroup 291
- Creating File System For Notes Binaries 29
- Creating File System for Notes Binaries 80
- Creating Replicas 134
- Creating Volume Group for Notes Binaries 25, 76
- Crontab 364, 377, 378, 381
- Cross Certification 127, 131
 - Certifier ID - Creating a Safe Copy 127
 - Certifying the Safe Copy 129

D

- DAS 40, 354
- DAS Environment 327
- Data availability 351
- Data Directory 425
 - Unable to Create 425
- Data Directory, Notes
 - Backup 365
 - Distributing 166
 - Exporting to NFS mounts 167
 - mounting from NFS 168
 - Security 212
- Data Files of Notes on AIX 55
- df Command 420

- Directory is not Empty 425
- Directory Services 301
- Disk Striping 409
- Distribution Copy Utility 159
- DNS 425
- Domain Name Server 425
- Domino Server 217
- Domino Server Commands
 - load web 249
 - show domino 226, 227
 - show stat net 226
 - show tasks 226
 - tell web quit 250
- Domino Virtual Server
 - domcfg.nsf 237
 - domcfg.ntf 237
- Domino Web Server 218
 - Domino Engine 218
 - HTTP Server 218, 220, 236
 - Server Document 220
 - Logging Settings 223
 - Restricting Access 230
 - SSL Settings 225
- Domino Web Server
 - HTTP Settings 220

E

- Encapsulation of Lotus Notes Messages 273
- Encryption
 - Database Encryption 190
 - Incoming Mail 195
 - Outgoing Mail 194
 - Saved Mail 194
 - Signing 195
- Environment
 - \$PATH 24
 - /etc/environment 24
 - Preparation 24
- Execution Control List 95

F

- Failover 331
- Features of Notes on AIX 55
- File System
 - Create 29, 408
- File System Full 420
- File System on AIX
 - Create a Logical Volume 404
 - Create a Logical Volume for Disk Striping 410
 - Create a Striped File System 412
 - Create a Striped Logical Volume 409
 - Create a Volume Group 404
 - Create Another File System Log 407
 - Creating a File System for Notes Binaries 29
 - Creating File System for Notes Binaries 80
 - Creating File System for Notes Databases 30, 81
 - mount CD-ROM 32, 83
 - Resizing Filesystem Size 84
- File system on AIX

- Checking Available Disk Space 24, 75
- File System Security 213
 - Base ACLs 213
 - Extended ACLs 213
 - Group ID 213
 - Owner ID 213
 - Status of Extended ACLs 213
 - Status of the file system 213
 - Sticky Bit 213, 214
 - TCB bit 213
- File System, Creating 80
- filemon Command 391
- filtd 394
- Final Settings on AIX 73
- First Server on AIX 57
- Foreign SMTP Domain 269
- fsck Command 361
- fsnoteslog 408

G

- Global Domain Document 275, 304

H

- HA50 cluster server 352
- HACMP 351, 353, 354, 425
- High Availability
 - Data Availability 351
 - Service Availability 351
 - Serviceprocessor 352
 - SP 351
 - System Availability 351
- HTTP 345
- http-Task 426

I

- I/O BUFFER CACHE 390
- IMAP 281
 - Overview 281
 - Preparation for an IMAP Client 283
 - Setting Up an IMAP4 Client 286
 - Setting Up Netscape Navigator 287
 - Starting 283
 - Stopping 283
- IMAP4 346
- Increasing
 - File System Size 420
 - Paging Space Size 421
- Indicator for Network Traffic 319
- Installation
 - Change Destination Path 44
 - Configuration 47
 - Configuration Summary 47
 - Destination Host 43
 - Destination Path 44
 - Group ID 46
 - Host Name 43
 - Install to One Computer 43
 - Kit, UNIX Installation

- Copy to Disk 158
- Distributing 157
- Mounting from NFS 160
- kit, UNIX Installation
 - Exporting to NFS mounts 159
- More than One Computer 43, 50
- Network Resource 42
- NFS Possibilities 157
- Notes Software as Network Resource 162
- Server 39
- Server Information 116
- User ID 46
- User Information 102
- Workstation 39
- Workstation Software as Network Resource 162
- Installing a Printer on AIX
 - Add a Local Print Queue 174
 - Add a Remote Print Queue 176
 - Local Attached Printer 171
 - mkpq 171, 176
 - Printer Type 172, 174
 - Remote Attached Printer 175
- Installing AIX Printer Support 173
- Installing Domino Servers 116
- Installing Lotus Domino Server on AIX
 - Disk-Space Requirements 23
 - Install Domino Server or Notes Workstation 39
 - Installing to Multiple AIX Hosts 49, 50
 - Network Setup 32
 - Notes Binaries 29, 80
 - Notes Databases 30, 81
 - Preparing for the Installation 24, 75
 - Software Requirements 23
 - Starting the Installation 36
- Installing Lotus Notes Workstation on AIX
 - Disk Space Requirements 84
- Inter-Disk Allocation Policy 403
- Internet Mail
 - IMAP 281
 - POP 281
 - SMTP 265
- Internet Message Access Protocol (IMAP) 281
- Internet Protocols 243
 - FTP 243
 - Gopher 243
 - HTTP 243
 - Notes RPC 244
 - SOCKS 244
 - SSL Security 244
- iostat Command 388
- ipcrm Command 419
- ipcs Command 419
- IPX and SPX Protocol Stacks 34
- IPX/SPX 19

K

- kernel Parameters for AIX
 - I/O requests 413
 - max_coalesce 412
 - maxpgahead 412

- minpgahead 412
- Stripe Unit Size 412
- Killing Processes 419

L

- LDAP 301, 346
 - Access Control 302, 307
 - Configuration 302
 - Creating a Full-Text Index 305
 - Global Domain Document 304
 - Overview 301
 - Setting Up an LDAP Client 307
 - Setting Up Netscape Navigator 308
 - Starting 306
 - Stopping 306
- Lightweight Directory Access Protocol (LDAP) 301
- Load Balancing 329, 332, 334
- Local Area Network 32
- Log Device
 - Create 407
- Log devices 407
- Logical Volume
 - Create 26, 80, 404
 - Disk Striping 410
 - Performance Considerations 403
- Lotus Domino and the World Wide Web 217
 - Domino Server Web Navigator 217
 - Domino Virtual Server 217, 235
 - Configuring domcfg.nsf 236
 - domcfg.nsf 235
 - Domino Web Server 217
 - Personal Web Navigator 217
 - Support for Internet Protocols 217
 - Web Administration Tool 217
- Lotus Domino Server 1, 5
 - Release 4.5 5
 - Release 4.6 2
- Lotus Notes 1, 9, 14
 - Available Platforms 14
 - Description 1
 - Release 4 9
 - System Requirements 14
- Lotus Notes Server
 - Release 4 9
- Lotus Notes Workstation 1
 - lsdev Command 361
 - lspp Command 33, 34
 - lsvg Command 421

M

- Mail Routing 121, 131
 - Introduction 122
 - Setting Up 122
- MailClusterFailover 336
- Maintenance of an AIX Printer Subsystem
 - Give User Permission to Change Printer 184
 - Xpdefaults 185
- MAXUSERS 335
- Memory Related Tuning Tools 399

- MEMORY_QUOTA 413
- Middleware Issues 353
- Migration from the SMTP Gateway 278
- Mirroring of AIX File System 403, 405, 406
- mkitab 146
- mkps Command 399
- mksysb Command 369
- Modem Connections Using PPP
 - Configure a Link Control 322
 - Configure a PPP Interface 324
 - Setup 321
 - Starting PPP 325
- Modem Connections Using X.PC
 - Additional Setup for a Serial Port 314
 - Edit Modem File 316
 - Log File, Description 317
 - mkdev 312
 - Modem Files 314
 - Modem Setup 312
 - Setup 309
 - Setup a Communications Port (TTY) 309
 - Setup of a Windows 95 Client 319
 - User Preferences 313
- Modem Files 314
 - Default 316
- Monitoring
 - Lotus Notes Servers 394
- Monitoring the SMTP MTA 279
- mount Command 32
- mounting the CD-ROM 159
- Multiple Hosts
 - ./rhosts 50
 - /tmp/notes_install_hostlist 49, 51
 - Hostlist File 50
 - Installing On 49
- Multiple Internet Domains (SMTP) 276
- Multiple Passwords 190

N

- Name and Address Book Database
 - Access 116
 - Security 116
 - Giving Access 116
- Name Server 425
- netpmon Command 392
- Netscape Navigator
 - IMAP Client Configuration 287
 - LDAP Client Configuration 308
 - NNTP Client Configuration 300
 - POP Client Configuration 285
 - SMTP Client Configuration 285, 287
- Network
 - .rhosts File 49
 - /etc/hosts 62
 - Hostlist File 50
 - Setup SPX/IPX 33
 - Setup TCP/IP 33
 - Supported Protocols 19
- Network Layer 424
- Network News Transfer Protocol (NNTP) 288

- Network Operation 394
- Network Protocols 72
 - Additional Network Protocol 73
- Network Setup 236
 - /etc/rc.net 236
 - ifconfig Commands 236
- Network Traffic Indicator 319
- News 288
- NFS 42
 - Advantages 155
 - Change mount Point 168
 - Data Directory, Notes 166
 - Disadvantages 154
 - Exporting
 - home/data File System 167
 - Installation Kit 159
 - read/write 165
 - Read-only 159
 - Workstation File System 165
 - Fileset Pequisites 155
 - Installation Kit, UNIX 157
 - Installing Workstation Software 162
 - Kit, UNIX Installation 157
 - mounting
 - home/data Directory 168
 - Installation Kit 160
 - Workstation Software 165
 - Notes Data Directory 166
 - Notes Software Directory 160
 - Security 214
 - Software Directory, Notes 160
 - Starting NFS 159
 - UNIX Installation Kit 157
- nfso Command 402
- nice Command 396, 397
- NIF_POOL_SIZE 413
- NIS 424
- NNTP 288, 346
 - Configuration 289
 - Configuring a News Feed 293
 - Control Messages 297
 - Creating a Private Newsgroup 291
 - Overview 288
 - Removing a Private Newsgroup 292
 - Setting Up an NNTP Client 299
 - Setting Up Netscape Navigator 300
 - Starting 290
 - Stopping 290
- no Command 401
- nohup Command 146
- Notes Clients
 - Installing 102
- Notes Recovery Kit 353
- Notes User
 - Change User Permissions 184
 - Create AIX Group for Notes 32, 82
 - Create AIX User for Notes 32, 82
 - Create AIX User on Workstation 84
 - Login 52, 84
- Notes user

- AIX group-ID 46
- Notes_ISOLATION 417
- Notes_SHARED_DPOOLSIZE 357
- NSF_BUFFER_POOL_SIZE 413

O

- odmad Command 412
- odmdelete Command 412
- odmget PdAt Command 412
- Online Documentation 42

P

- Page Minder 247
 - Enabling 247
 - Running the Page Minder Agent 248
- Paging Space, Increasing 421
- Partitioned Servers 337
 - \$INPUTFILE 341
 - \$OUTPUT_LOG 341
 - Administrative Clients 340
 - Configuring 338
 - TCP/IP 339
 - Environment 341
 - http task 345
 - IMAP 346
 - LDAP 346
 - NNTP 346
 - Planning 338
 - POP3 346
 - Portmapping 340
 - Server Failure 341
 - SMTP MTA 346
 - Starting 340, 341
 - Starting in the Background 341
 - Console Monitor 344
 - Stopping 340, 342
 - Unique IP Addresses 339
 - Unique TCPIP Port Numbers 340
- Password File, UNIX
 - Change User Home Directory 168
 - Convert to Notes Registration File 109
 - Example 109
- Paste 417
- Performance Considerations AIX File System
 - Allocation Map 406
 - Compression of File Systems 407
 - File System 407
 - Fragment Size 407
 - Inter-Disk Allocation Policy 403
 - Intra-Disk Allocation Policy 403
 - Logical Volume Manager 403
 - Mirroring of AIX File System 403
- Performance Management of the AIX File System
 - Create Another File System Log 407
 - Create the File System 408
 - Create the Logical Volume 403, 404
 - Create the Logical Volume for Disk Striping 410
 - Create the Striped File System 412
 - Create the Striped Logical Volume 409

- Create the Volume Group 404
- Disk Striping 409
- kernel Parameters 412
- Logical Volume NAME 406
- Logical Volume TYPE 406
- Mirroring 406
- Number of LOGICAL PARTITIONS 406
- Performance Tuning Using Disk Striping 412
- POSITION on Physical Volume 406
- RANGE of Physical Volumes 406
- Performance Tuning 396
- Personal Web Navigator 242
 - Managing Database Size 247
 - Setting up 243
 - Location document 243
- Point to Point Protocol (PPP) 321
- POP 281
 - Overview 281
 - Preparation for a POP Client 283
 - Setting Up a POP3 Client 285
 - Setting up Netscape Navigator 285
 - Starting 283
 - Stopping 283
- POP3 346
- Post Office Protocol (POP) 281
- Postmaster 272
- PPP 321
 - Configuration 321
- Printer Commands on AIX
 - lpstat 175, 176, 177, 184
 - qadm 184
 - qcan 184
- Printer Installation and Setup
 - See Installing a Printer on AIX
 - See Maintenance of an AIX Printer Subsystem
 - See Setting up AIX Printers in Lotus Notes
- Private Newsgroup
 - Creating 291
 - Removing 292
- PTX (Performance Toolbox) 392
 - Agent 392
 - Manager 392
- Publishing a Database 242
- Purge Agent 253
- Purge agent 256

R

- rdump Command 379
- Refresh Agent 255
- Refresh agent 253
- Registering Additional Servers 112
 - Details 113
 - Server Title 115
- Registering users from a Text File 102
 - Examples 103
- Registering Web Users 109
 - Allowing Anonymous Users 110
 - Anonymous Users 110
 - Authenticated Users 111
- Registration

- Multiple New Users from a File 103
- Multiple Users Input File
 - Example 109
 - Format 103
- New Server 113
- New User 96
- Register Person Screen 99, 101
- Register Server Screen 114, 115
- Server 112
- User 95
- Users from UNIX Password File 108
- Remote Console 150
- Remove a Printer on AIX 175
- Removing a Private Newsgroup 292
- renice Command 397
- Replica IDs 141
- Replication 131, 142
 - Access Control Lists 141
 - Creating a Replica 134
 - Creating Replication Connection Documents 131
 - Introduction 131
 - Non-replicating Features 141
 - Replica Ids 141
 - Replication Formulas 139
 - Required Authorizations in Server Document 133
 - Selective Replication 136
 - Database Features 139
 - Destination and Source 136
 - Specifying Documents 138
 - Stacking Replica Icons 136
- Requirements 23
 - Hardware 23
 - Software 23
- restore Command 366
- RESTRICTED 335
- rmitab 146

S

- Safe ID 127
- sar Command 389
- Scalability 328
- schedtune 398
- schedtune Command 401
- Secure Socket Layer 201, 230
 - Certification Authority 201, 202, 203
 - certsrv.nsf 203
 - Client certificates 201
 - Create Server Certificate Request 205
 - Enabling 202
 - Key Ring 201, 204, 233
 - Self-Certified Certificate 232
 - Server Certificate Administration 203
 - SSL Security 244
 - SSL Settings (Web Server) 225, 231
- Secure Sockets Layer 236
- Security
 - Access Control List Screen 117
 - Access to Certifier ID File 118
 - chmod Command 212
 - Data Directory, Notes 212

- End User 189, 193
- NFS 214
- Password, UNIX 211
- Software Directory, Notes 212
- umask Command 212
- Semaphores 418
- Server 196
 - alog Command 146
 - See also alog Command
 - Backup
 - See Backup
 - Cleaning Notes Processes 418
 - Installation Information 116
 - Not Responding 143, 153, 418
 - Operating System Platforms 24
 - Registration 112, 116
 - See also Registration
 - Remote Console 150
 - server.alog File 147
 - server.log File 146
 - Start Up
 - Background 144
 - Boot Time 146
 - Get a Console 143
 - Typical UNIX Configuration 156
 - Server Access Control List (SACL) 197
 - Server Connection 423
 - Server Document 271
 - Server Security 196
 - Keyboard Lock 197
 - Restricting Physical Access 196
 - Server Web Navigator 249, 252, 257
 - Connecting 250
 - End User 257
 - Managing Database Size 256
 - Providing Access 257
 - Setting Up 249
 - Web Retrieval 251
 - Web Retriever Management 251
 - Server_Availability_Threshold 335
 - Server_Cluster_On 336
 - Server_MaxUsers 335
 - Server_Restricted 334, 335
 - Service availability 351
 - Serviceprocessor 352
 - Set Secure 197
 - Setting up AIX Printers in Lotus Notes
 - Add Printer 179
 - Assign a Printer to an AIX Printer Queue 182
 - Create a Site-Specific System Printer Setup File 183
 - Remove Printer 182
 - Remove Printer Queues 181
 - Xpdefaults 179, 183
 - Setting up Lotus Notes Workstation on AIX
 - PATH Variable 84
 - Preparation 83
 - Workstation Setup Finished 87
 - Workstation Setup Program 88
 - Setup Lotus Domino Server on AIX
 - Adding an Additional Network Protocol on AIX 73

- Additional Server 65
- Final Settings 73
- First Server 57
- PATH Variable 52
- Preparation 51
- Rerun Setup 52
- Server Setup Program 56
- Setup Screen, Notes 423
 - \$PATH 423
- Shared Memory
 - Cleaning 418
 - Killing Processes 419
 - Killnotes script 420
 - Notes_ISOLATION 417
- Shell Script
 - Backfile 375
 - Backtape 363
 - configure.aalog 147
 - Dumpfiles 378
 - Startup 146
 - startup.aalog 148
- Simple Mail Transfer Protocol (SMTP) 265
- SMTP 265
 - Address Conversion 276
 - Character Set Translation 278
 - Configuration 269
 - Connection Document 270
 - Foreign SMTP Domain Document 269
 - Global Domain Document 275
 - How the SMTP MTA Works 266
 - Migration from the SMTP Gateway 278
 - Monitoring 279
 - Multiple Internet Domains 276
 - Other Configurations 277
 - Overview 265
 - Server Document 271
 - Starting the SMTP MTA 280
 - Stopping the SMTP MTA 280
 - Tunnelling Lotus Notes Messages 273
 - Useful Commands 280
- SMTP MTA 346
- SNMP Interface 394
- Software Directory, Notes
 - Backup 361
 - Configuring Client 165
 - Distributing 160
 - Exporting to NFS mounts 165
 - Installing 162
 - Link, Creating 166
 - mounting from NFS 165
 - Security 212
 - Soft Link, Creating 166
 - VIM Applications Link 166
- SP 351, 393
 - High Performance Switch 355, 356
 - Installation 356
 - Interactive Network Dispatcher 355
 - Planning 355
 - PSSP 356
 - Scalability 355

- Start Up
 - Background 144
 - Boot Time 146
 - Get a Console 143
- Striping of Disks 409
- Sun Solaris
 - setuid-root 41
- Supported Workstations 24
- svmon Command 391
- Symbols
 - /.rhosts 50
 - /etc/environment 24
 - /etc/hosts 62
 - /etc/netware/NPSConfig 34
 - /opt/lotus 29, 36, 42, 44, 84
 - /tmp/notes_install_hostlist 49, 51
 - /usr/lpp/lotus 32
 - /usr/sbin 24
 - @RefreshEcl 193
- System availability 351

T

- tar Command 362
- tcopy Command 362
- TCP/IP 19, 32, 33
 - Client Support 33
- TCP/IP host name 423
- TCPIP_TcpipAddress 426
- tctl Command 366, 382
- Terminology of a Domino Server 56
- Thunderbolt Sign 319
- tprof Command 390
- trace Command 391
- Traffic Light Sign 319
- Troubleshooting
 - .sgf.notespartition 425
 - Client Freezing 427
 - Data Directory 425
 - Unable to Create 425
 - Directory is not empty 425
 - HACMP 425
 - http-Task 426
 - TCPIP_TcpipAddress 426
- Tunnelling Lotus Notes Messages Through SMTP 273

U

- umask Command 212, 213
- UNIX File Permissions 212
 - chgrp 212
 - chmod 212
 - chown 212
- USENET 299
- User
 - ID File 95
 - Installation Information 102
 - Profile 99
 - Registration 95, 112
 - See also Registration
 - User Name Tips 103

- User Environment 214
 - grpck 214
 - pwdck 214
 - usrck 214
- User ID
 - Backup of the User ID File 190
 - Locking User IDs
 - Automatic 190
 - Manual 190
 - Passwords 189
 - Protection 189
 - Securing the User ID File 189
- User ID File
 - Create 95
- User Profile 99, 101
- User Registration 95
 - Certifier ID 98
 - Details 96
 - Internet Password 99
 - Mail 100
 - Other 101
 - Registration Server 98

V

- vmstat Command 402
- vmtune Command 399, 400
- Volume Group
 - Create 25, 76
 - Creating 404
- volume group, creating 76

W

- Web Administration Tool 259
- Web Ahead 246
 - Enabling 246
 - Running the Web Ahead Agent 246
- Web Navigator 242
 - What is it? 242
- Workstation
 - Mount File System 80, 81
 - Operating System Platforms 24
 - Preparation 83
 - Setup Finished 87
 - Setup Program 88
- Workstation Security
 - ECL 192

X

- X.PC 309
 - Configuration 312
- xhost 83
- xmperf 393
- xmservd 394
- Xpdefaults 179, 183, 185
- Xstation 83

ITSO Redbook Evaluation

Lotus Domino Release 4.6 on IBM RS/6000: Installation, Customization and Administration
SG24-4694-02

Your feedback is very important to help us maintain the quality of ITSO redbooks. **Please complete this questionnaire and return it using one of the following methods:**

- Use the online evaluation form found at <http://www.redbooks.ibm.com>
- Fax this form to: USA International Access Code + 1 914 432 8264
- Send your comments in an Internet note to redbook@us.ibm.com

Which of the following best describes you?

Customer **Business Partner** **Solution Developer** **IBM employee**
 None of the above

Please rate your overall satisfaction with this book using the scale:
(1 = very good, 2 = good, 3 = average, 4 = poor, 5 = very poor)

Overall Satisfaction _____

Please answer the following questions:

Was this redbook published in time for your needs? Yes___ No___

If no, please explain:

What other redbooks would you like to see published?

Comments/Suggestions: (THANK YOU FOR YOUR FEEDBACK!)

SG24-4694-02
Printed in the U.S.A.

