# Implementing SAP R/3 in an OS/390 Environment: AIX or Windows NT Application Servers

Jan Baisden, Harald Flo, Chris Wagner
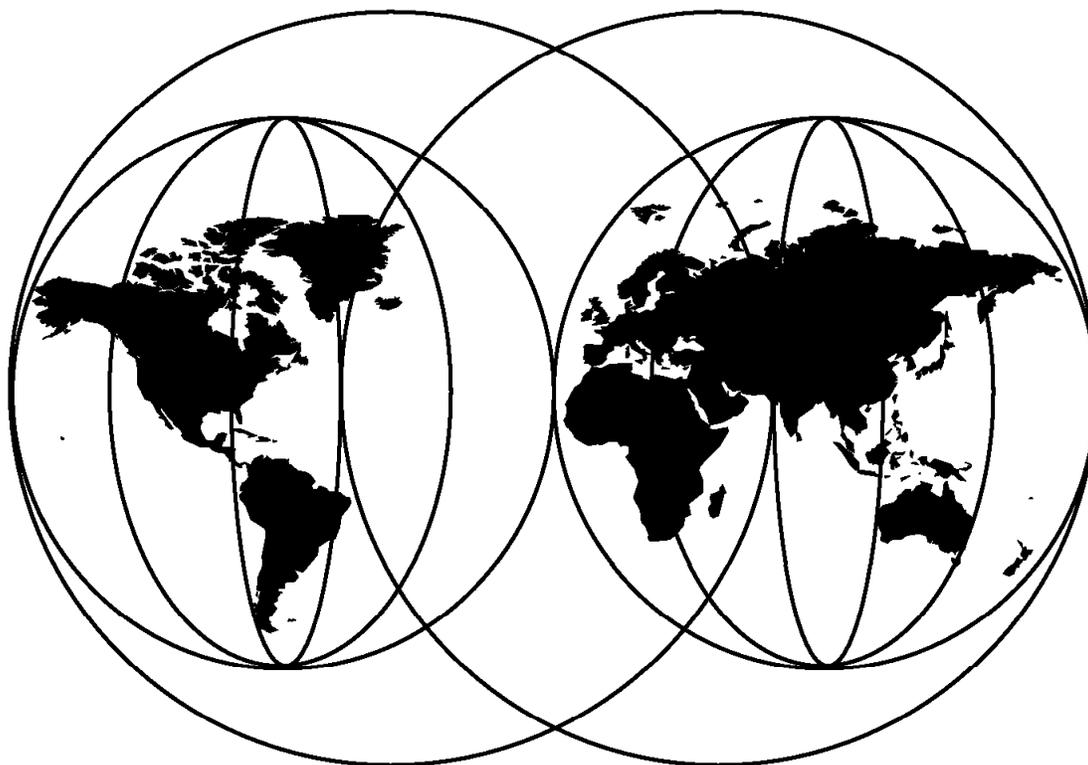
International Technical Support Organization

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**Implementing SAP R/3
in an OS/390 Environment:
AIX or Windows NT Application Servers**

December 1998

> **Take Note!**
>
> Before using this information and the product it supports, be sure to read the general information in Appendix L, "Special Notices" on page 261.

Second Edition (December 1998)

This edition applies to SAP R/3 on DB2 for OS/390, SAP R/3 Release 4.0B, OS/390 Release 2.5 (5645-001), AIX Release 4.3.1 (5765-603), and IBM DATABASE 2 Server for OS/390 Version 5.1 (DB2 for OS/390) (5655-DB2), and to all subsequent releases and modifications until otherwise indicated in new editions or Technical Newsletters.

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Preface

This redbook is directed to customers who need to install and do the initial implementation of SAP R/3 on DB2 for OS/390, with SAP R/3 Release 4.0B. The initial implementation uses the AIX platform for SAP R/3 application servers and the OS/390 platform for the SAP R/3 database server. The redbook presents practical examples to demonstrate the installation, database setup, and operational aspects of SAP R/3 on DB2 for OS/390. The redbook helps system programmers, database administrators, and SAP basis consultants to understand the implementation of SAP R/3 on DB2 for OS/390.

This second edition of the redbook addresses the new releases of OS/390, SAP R/3, and associated software. It also discusses Windows NT application servers. Additionally, the redbook incorporates experience gained since the first edition was published; it includes suggested revisions.

Knowledge of SAP R/3, AIX, ESCON hardware, OS/390, OpenEdition, and DB2 is assumed.

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 Poughkeepsie Center.

Jan Baisden is a Senior Market Support Representative at the International Technical Support Organization, Poughkeepsie Center. He concentrates in ERP Solutions and particularly in AIX support of S/390 uses in those solutions. Before joining the ITSO 5 years ago, Jan worked in the International Systems Center in Gaithersburg, Maryland, supporting projects in Latin America and Asia.

Harald Flo is an Advisory I/T Specialist for the Norwegian IBM SAP Service line. He has three years of experience in R/3 Basis administration, and has more than 10 years experience as an MVS system programmer. His areas of expertise include OS/390, OpenEdition, TCP/IP and SAP R/3.

Chris Wagner is an SAP Basis Administrator, working for IBM Global Services-North in the SAP Technology Deployment Department. He has been involved with SAP for 3 years, is certified as an SAP R/3 Technical Consultant, and has installed and maintained an R/3 with DB2 for OS/390 system. He has 13 years total experience in the IT field and joined IBM in October of 1997.

The authors of the first edition of this redbook were:

Jan Baisden
Kathryn Arrell
Michael A. Ahern
Mark Gordon
Phil Hardy
Chris Hastings
Donald E. Geissler
Daniel Lavergne
Young-Wook Lee
Sohtaroh Nimura
Budi S. Rustandi
Volker Schmidt
Carmel V. Wiles

Thanks to the following people for their invaluable contributions to the project producing the second edition of this redbook:

David Bennin
International Technical Support Organization, Poughkeepsie Center

Kathryn Arrell
International Technical Support Organization, Poughkeepsie Center

Mike Gordon
IBM/SAP Competency Center (North America)

Bob Haimowitz
International Technical Support Organization, Poughkeepsie Center

Vasilis Karras
International Technical Support Organization, Poughkeepsie Center

Ewald Koerner
IBM Poughkeepsie

Veng Ly
IBM Poughkeepsie

Petra Seubert
IBM Boeblingen

Andreas Maier
IBM Boeblingen

Hoson Rim
IBM/SAP Competency Center (North America)

Volker Schoelles
IBM Boeblingen

William White
International Technical Support Organization, Poughkeepsie Center

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Chapter 1. Introduction

This book assumes you have the current SAP documentation for SAP R/3 on DB2 for OS/390 available. See Appendix M.4, "SAP References" on page 268 for the SAP R/3 documents you should have.

This chapter gives an overview of SAP R/3 on DB2 for OS/390, and describes its components.

1.1 Overview of SAP R/3 and Its Architecture

SAP R/3′s suite of client/server data processing products is based on the concept of combining all the business activities and technical processes of a company into a single, integrated software solution. The power of SAP software lies in *real-time integration*, linking a company′s business processes and applications, and supporting immediate responses to change throughout the organization—on a departmental, divisional or global scale. Its applications cover a wide variety of areas, including financial, asset management, controlling, production planning, project system, quality assurance, and human resources.

SAP R/3 is designed around software services rather than hardware platforms—note the distinction between software services, which logically have no dependency on hardware; and servers, which are machines. There are three categories of services:

- Presentation Services:

  SAP R/3 graphical interfaces on Windows, OS/2, MAC, Motif or JAVA platforms.

- Application Services:

  SAP R/3 application logic running on one or more systems, including batch and interactive SAP programs. SAP R/3 also provides monitoring utilities.

- Database Services:

  Vendor-provided database systems. SAP R/3 uses the database systems to store data from various application servers.

An application service is designed and implemented in layers, isolating the SAP R/3 application logic from the operating system-dependent services. A middleware layer, called the "basis layer," communicates with the operating system and the network. Figure 1 on page 2 illustrates the layering of the application service.
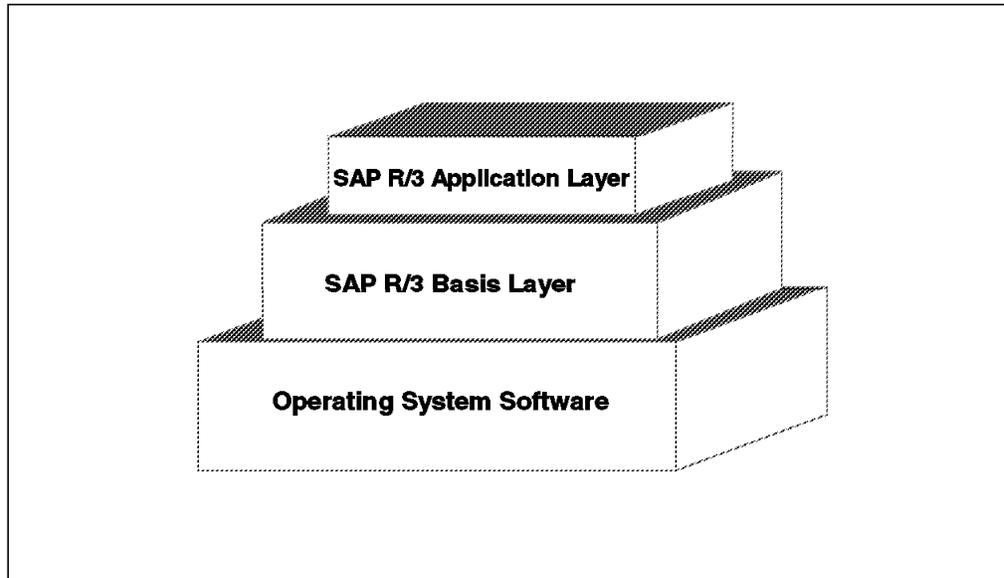
Figure 1. SAP R/3 Basis and Application Layers

The client/server architecture employed by SAP R/3 removes from administration tasks many configuration details about the network and individual machines in use by SAP R/3. In addition, SAP has been careful to implement this architecture at the level of work items and services. An application task can be scheduled on any server within the same SAP system. Further, this application task can use services on the server it is on and from other servers in the SAP system. The SAP R/3 system routes these requests to the appropriate server.

Services are provided by administrative units called *instances* that group together components of SAP R/3. When first installed, the SAP R/3 system has a central instance, which has services such as dialog, update, enqueue, batch, message, gateway, and spool. After installation, these services can be moved to other application servers in order to balance workloads.

This architecture allows a more dynamic approach to managing workloads, because customers can organize their SAP R/3 systems into *tiers*. Some installations have the application services, database service, and presentation service on the same machine. This is a single-tier system. Usually, though, the presentation service is moved to workstations, making the SAP R/3 system a two-tier system. Others wish to optimize database performance; they place the database service on a system separate from the other services. This is a three-tier system. Figure 2 on page 3 illustrates the three-tiered architecture of SAP R/3.
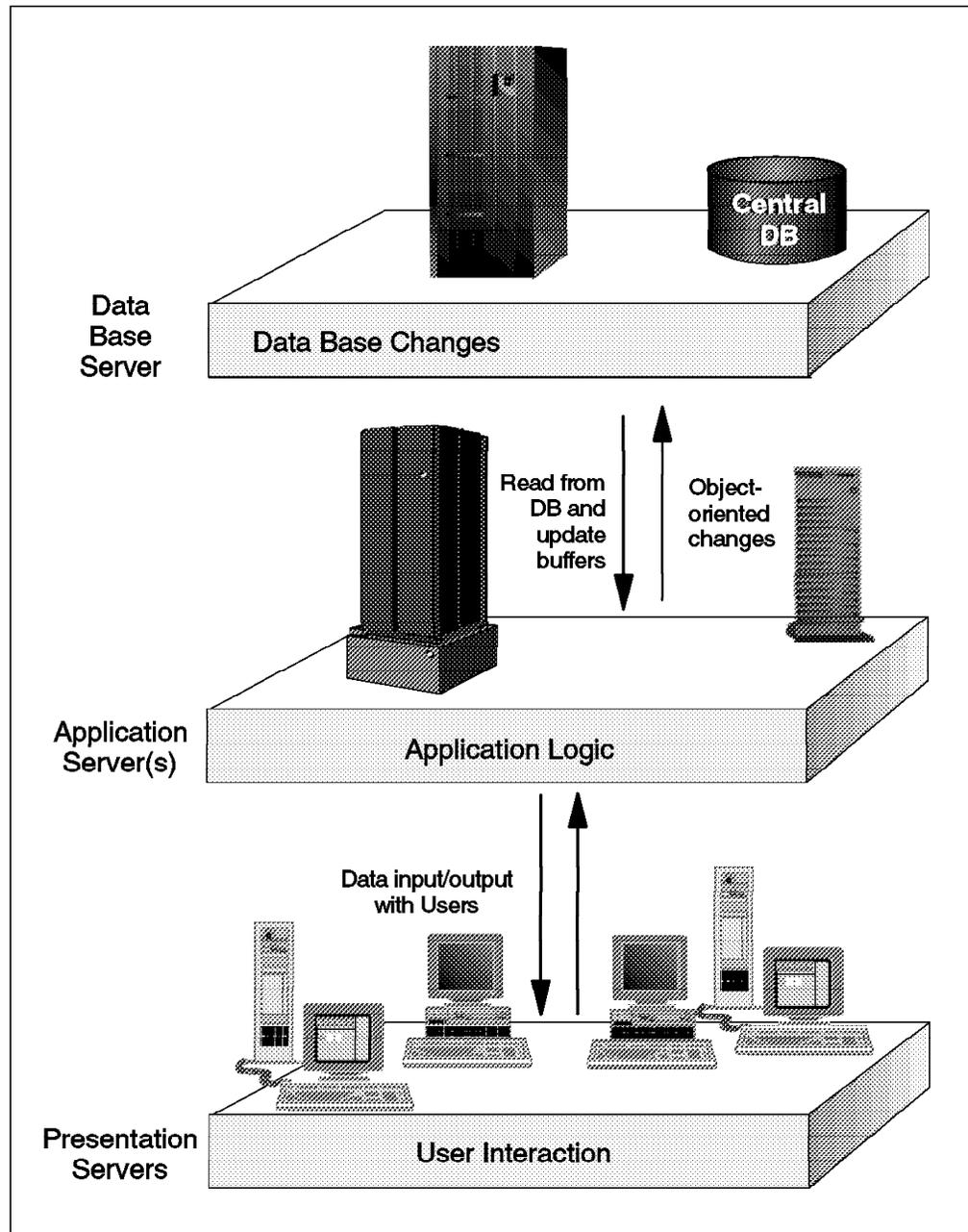
Figure 2. SAP R/3 Three-Tier Architecture of SAP R/3

SAP R/3 customers can use SAP-supplied utilities to add more machines for application and presentation services to the existing SAP R/3 system. Thus, SAP R/3 can support centralized or decentralized computing with its distributed client/server architecture.

This architecture is implemented with a group of services designed to provide simple, consistent interfaces to SAP R/3 programs and support the largest possible number of operating systems, databases and networks.

In multi-tier configurations, TCP/IP is usually used for network communication. As explained in 1.4, "SAP R/3 on DB2 for OS/390 Structure" on page 6, SAP R/3 on DB2 for OS/390 is a three-tier structure in which DB2 for OS/390 and the OS/390 operating system supply database services. The network communication

between the application services (running on AIX or Windows NT) and DB2 for OS/390 is handled by a special high speed protocol. There are three different types of this high speed protocol, as explained in 1.5.2, "Communication Protocols" on page 8. Note that communication between application servers and presentation servers is done through TCP/IP.

1.2 OS/390 Features for SAP R/3

OS/390 is an integrated enterprise server operating system environment. It incorporates into one product an open communication server, distributed data and file services, Parallel Sysplex support, object-oriented programming, and open application interfaces.

OS/390 continues to build on the classic strengths of MVS—reliability, continuous availability, serviceability, data integrity, workload management, and security. OS/390 gives you a scalable system that supports massive transaction volumes and large numbers of users with high performance, as well as advanced system and network management.

Through its support of UNIX interfaces in OS/390 UNIX Services, OS/390 becomes a database server for SAP R/3, allowing you to profit from client/server technology benefits such as distributed processing and extensive scalability. SAP R/3 application programs and user data, including data and process models, are stored on the database server. SAP R/3 uses DB2 for OS/390 as the database server, which can manage large amounts of data on behalf of many users.

The strengths that OS/390 and System/390 bring to the SAP R/3 environment include:

- Reliability, Availability, and Serviceability

  SAP R/3 customers need continuous data availability and integrity. OS/390 reliability and availability is unsurpassed and it has a history of unmatched security and integrity. SAP R/3 benefits from these underlying characteristics.

- Scalability

  The System/390 platform ranges from small uniprocessors to 10-way processors to Parallel Sysplex environments, which allow you to connect up to 32 OS/390 systems. The platform can thus support thousands of users. The architecture of the System/390 I/O subsystem and the OS/390 operating system allow data to be transferred into memory from many devices simultaneously, allowing the processing of data requests for many users at high data rates. The requests may require accessing data residing in multiple-terabyte repositories.

- System Management

  OS/390 has many system management capabilities, providing data security, strong operations tools, and the ability to manage diverse workloads. System/390 has proven procedures and tools to manage systems in a very efficient way.

- Cost of Ownership

  System/390 is acknowledged by consultants such as IDC, GartnerGroup, Xephon, ITG, and others as having one of the lowest overall costs of

ownership in a client/server environment when calculated over multiple years. CMOS technology and software pricing actions have drastically reduced the cost of System/390 enterprise computing.

1.3 DB2 for OS/390 Features

DB2 for OS/390 is engineered to deliver the high performance and high levels of availability, integrity, and security needed for your business applications. The strengths DB2 for OS/390 brings to the SAP R/3 environment include:

- Continuous Operation and High Availability

  DB2 for OS/390 can operate for long periods without interruption. With data sharing, work can be transferred between DB2 for OS/390 subsystems within a Parallel Sysplex as a result of a planned or unplanned outage. Online reorganization provides greater availability during database unload and reload processes. See the redbook *High Availability Considerations: SAP R/3 on DB2 for OS/390*, SG24-2003, for more detail on high availability planning.

- Data Sharing in a Parallel Sysplex Environment

  DB2 for OS/390 exploits the Parallel Sysplex environment through data sharing, which allows applications running on more than one DB2 for OS/390 subsystem to read from and write to the same set of data concurrently.

- High Data Integrity

  DB2 for OS/390 provides high data integrity through capabilities such as a sophisticated lock manager and integration with IBM system security products. DB2 for OS/390 also protects data from subsystem, media, and application failures with integrated recovery schemes.

- Very Large Database Support

  DB2 for OS/390 works with the System/390 I/O subsystem to allow the rapid parallel processes needed for very large database backup, reorganization, and recovery of data. The maximum table space size is now one terabyte (TB 10^{12} bytes).

- Database and System Administration Aids

  To help database administrators manage their database environments, DB2 for OS/390 offers an integrated set of tools and functions, including flexible security mechanisms, an extensive set of logging and recovery utilities, trace facilities for tuning, and functions and tools to monitor and tune subsystems. DB2 for OS/390 can use hardware compression to drive down the cost of data storage.

- Other Features

  In addition to the preceding items, the following features have been added to DB2:

  - Dynamic Statement Cache
  - ASCII Tables
  - Isolation Level Read Stability
  - Keep Exclusive Locks
  - Improvements in DDL Concurrency
  - SQL RENAME of Tables
  - SQL STRIP Function

These features are particularly beneficial (in some cases required) for an enterprise using SAP R/3.

1.4 SAP R/3 on DB2 for OS/390 Structure

The SAP R/3 on DB2 for OS/390 implementation is a three-tier structure. Presentation services run on workstations connected to application services that are running on AIX or Windows NT. The SAP R/3 database runs on an OS/390 system connected to AIX or Windows NT application servers over a network connection. The different options regarding network connectivity are explained in 1.5.1, "Physical Connection" on page 8.
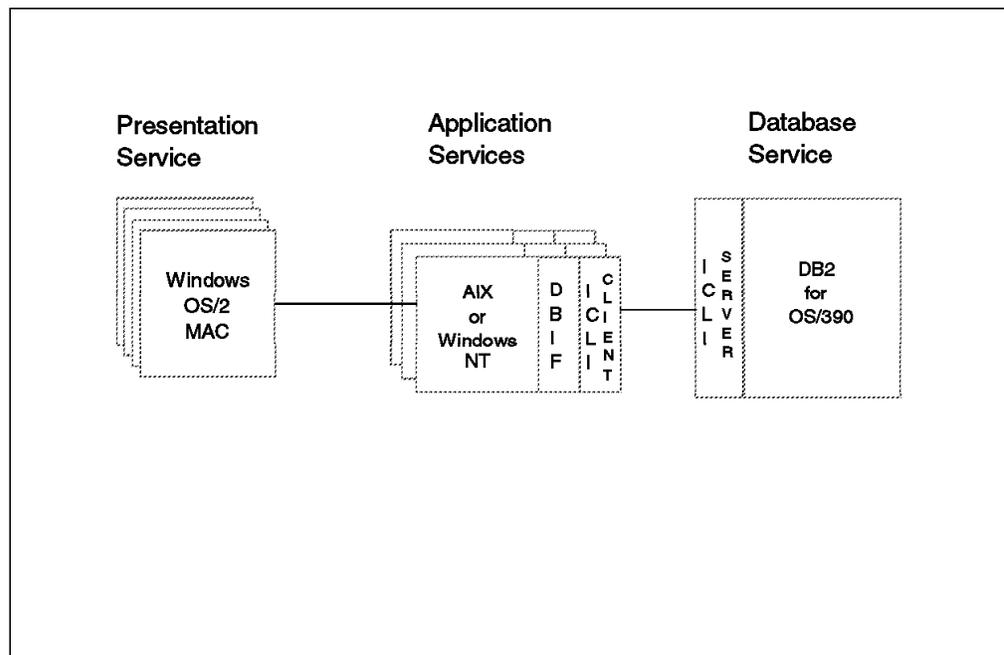
Figure 3. Structure of SAP R/3 on DB2 for OS/390

The SAP R/3 system is comprised of all of the hardware and software components used in the SAP R/3 on DB2 for OS/390 solution, including the database, application, and presentation server(s) and the services that they provide.

Figure 3 shows important components for SAP R/3 on DB2 for OS/390:

DBIF   The Database Interface (DBIF) of SAP R/3 has been modified to support DB2 for OS/390. The DBIF resides on the application server and is responsible for interacting with the database.

ICLI   For communication with the database service, the DBIF uses a component called the Integrated Call Level Interface (ICLI). The ICLI consists of a client and server component, which allows AIX and Windows NT application servers to access an OS/390 database server remotely across a network. The DBIF uses only a subset of database functions and the ICLI delivers exactly that subset.

The server component of the ICLI is a program based on OS/390 UNIX Services; it executes on S/390 usually as a started task. The client component is downloaded as an AIX shared library member or a Windows NT dynamic link library member; there is also a

"keep-alive" executable that continuously checks that the ICLI client is functioning. The ICLI components are provided as a part of OS/390 UNIX Services; users should consult SAP notes to determine the ICLI level (and IBM service identifiers) they require. Figure 4 shows how an ICLI connection between an application server and an OS/390 database server is established.
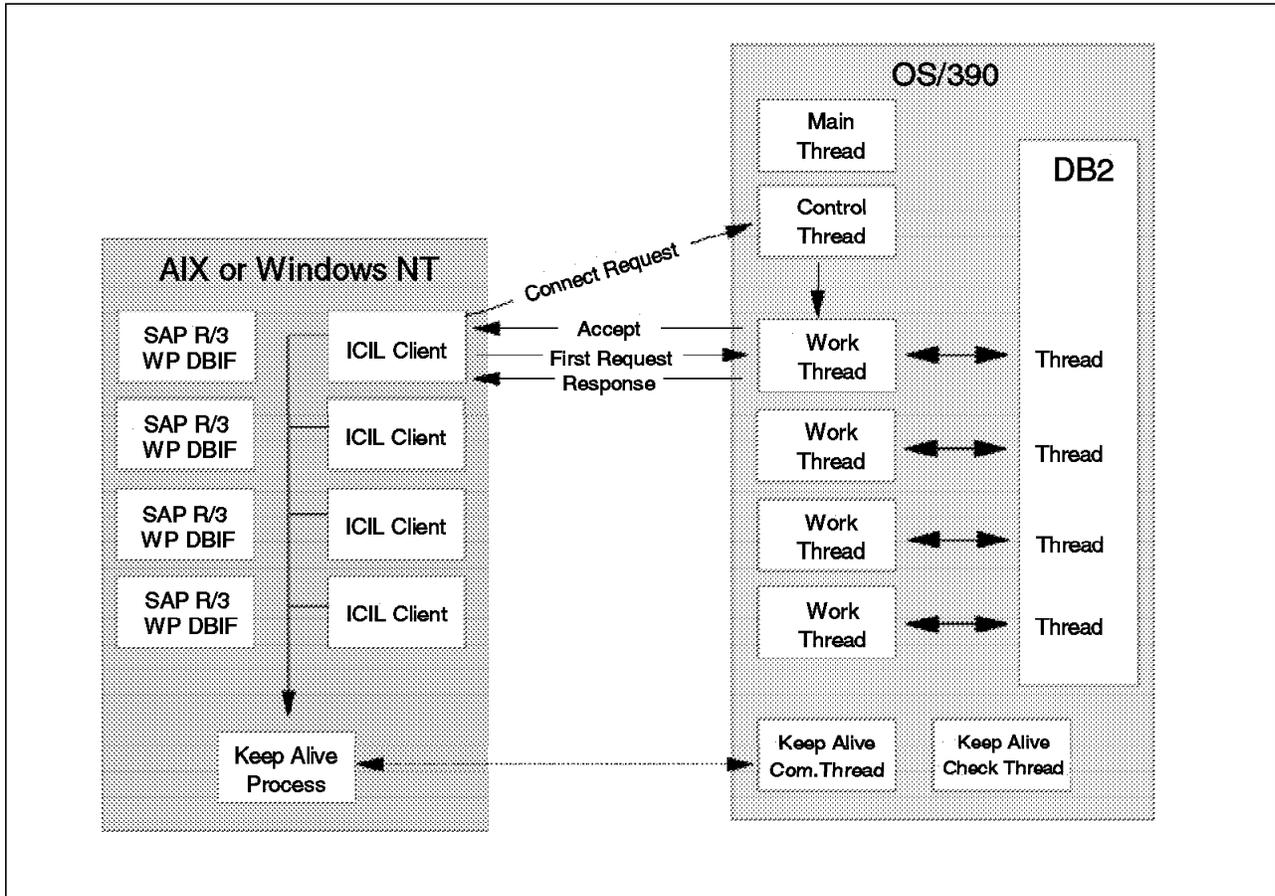
Figure 4. ICLI Architechture

1.5 Network Connectivity

The three-tier structure that the implementation of SAP R/3 on DB2 for OS/390 uses requires a high-speed, high-bandwidth communication connection between the database server and the application server.

On the current release of OS/390, the options for network connectivity can be divided into two separate areas:

- Physical Connection
- Network Protocol

1.5.1 Physical Connection

For the physical connections between the application server and the database server, three types of connection hardware are supported:

- ESCON channel
- FDDI LAN
- Fast Ethernet LAN

> **Note**
>
> All information about FDDI LANs in this chapter also applies to Fast Ethernet LANs.

The ESCON channel option is only available for a connection between OS/390 and AIX. It is not possible to use an ESCON channel between OS/390 and Windows NT. Figure 5 shows examples of possible physical connections.
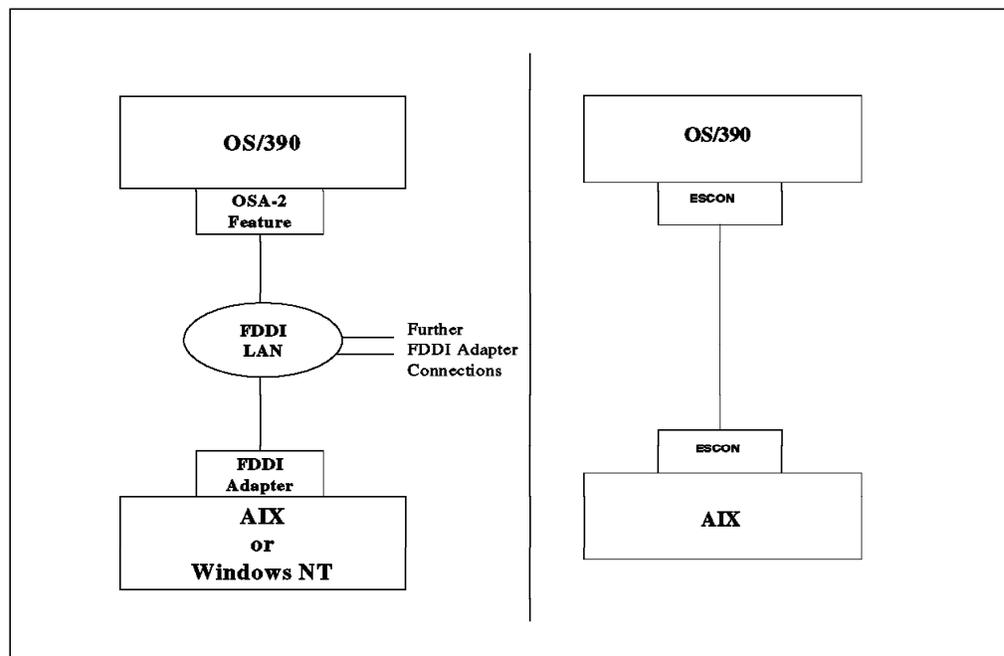
Figure 5. Examples of Physical Connections

1.5.2 Communication Protocols

Two communication protocols are available for communication between the SAP R/3 work processes on the application server and the database server:

- High Speed UDP

> **Notes**
>
> - In OS/390 Version 2 Release 5 the name of this communication protocol has changed from HPDT UDP to High Speed UDP. We will use the new name throughout the book.

- Enhanced ESCON

Both High Speed UDP and Enhanced ESCON are UDP-based, high-performance, low-overhead protocols. They offer efficient communication between the application server and the database server. The newer protocol, High Speed UDP, provides more flexibility than Enhanced ESCON. It allows the connection of Windows NT and AIX application servers to the database server over either ESCON or OSA-2 LAN connections. A properly configured system can provide high availabity and throughput.

The Enhanced ESCON protocol was implemented as a tactical solution only. We recommend that customers implementing DB2 for OS/390 database servers use High Speed UDP. For a complete discussion, refer to *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*, SC33-7962.

1.5.2.1 High Speed UDP

As previously mentioned, IBM has implemented a high-speed protocol named High Speed UDP that can use both OSA-2 and ESCON connections. This support allows Windows NT application servers, in addition to AIX servers, to be connected to the same OS/390 system through an OSA-2 feature and an FDDI LAN.

The High Speed UDP protocol provides efficient communications for applications such as SAP R/3 through its short OS/390 instruction path. The protocol uses UDP as its method for transferring data packets. Over ESCON, this support uses the HPDT MPC channel protocol, which requires special device drivers for AIX. Over an FDDI LAN, this support uses the HPDT MPC mode to communicate with the OSA-2 feature, which sends IP packets over the FDDI LAN. Thus, there are no special requirements for application servers connected to an FDDI LAN.

Note that while High Speed UDP is UDP-based, you will still have to configure the normal full-function TCP/IP stack for it to work. TCP/IP is necessary during the installation process for ftp, and during normal operation by the SAP R/3 system and OS/390 for performance monitoring and CCMS remote job submission. The logical file system support in OS/390 allows several different backend stacks to coexist. The OS/390 system transparently directs standard inbound and outbound data to the correct backend stack.

Note: You will also have to define a VTAM Transport Resource List Entry (TRLE) to be able to use High Speed UDP support.

1.5.2.2 Enhanced ESCON

Enhanced ESCON support provides high-performance communications between an OS/390 system and an AIX system that is attached through the ESCON channel interface. Typically, this connection will be between an OS/390 and an IBM RS/6000 Scalable POWERparallel System (SP2) processor. In such cases, only a subset of the SP2 nodes running SAP R/3 applications need to be connected to the System/390 through the ESCON channel. The SAP R/3 applications on remaining SP2 nodes access OS/390 by using the ESCON-connected nodes as gateways (which are accessed through the SP2 High Performance Switch).

The Enhanced ESCON support provides an OS/390 internal communications protocol that is roughly compatible with the standard AF_INET UDP protocol for ESCON-connected RS/6000s.

Enhanced ESCON support consists of the following parts:

- An OS/390 physical file system (PFS) that provides enhanced ESCON communications through a new I/O device driver for the ESCON channel interface. This new PFS is called the AF_UEINT PFS.

- A complementary network interface driver for AIX that supports both the existing CLAW and the new Enhanced ESCON communication interfaces.

Chapter 2. Installation on AIX

This chapter describes the activities we performed when we installed SAP R/3 on DB2 for OS/390 from an AIX application server in the ITSO environment. The SAP R/3 release and kernel were at the 4.0B level. These activities can be grouped into five phases:

1. During *Pre-Installation Checking*, we identified which functions and PTFs needed to be installed prior to the SAP R/3 on DB2 for OS/390 installation.

2. During *Defining the Configuration*, we created a planning template to ensure that parameters defined during the prerequisite installation and the installation were consistent between the database server and the central instance.

3. During *Installing Prerequisites*, we installed the missing functions based on the findings in the *Pre-Installation Checking* phase.

4. During *Installing SAP R/3 on DB2 for OS/390*, we installed the SAP R/3 central instance, and built and loaded the database.

5. During *Completing the Installation*, we performed standard SAP R/3 post-installation.

The amount of work required will vary for each installation. We recommend that you allow ample time to carefully complete the first two phases to ensure that remaining phases will go smoothly.

Table 1 shows the tasks performed in each phase.

Table 1 (Page 1 of 2). Tasks to Be Performed for SAP R/3 on DB2 for OS/390 Installation	
Task	**Refer to:**

Pre-Installation Checking
• Obtain the latest OSS notes. OSS notes can change daily.
 	
  Request the following notes:
 	
  − OSS Note #98186-DB2/390: 4.0B R/3 Installation on UNIX or WinNT
 	
  − OSS Note #81737-DB2/390: APAR List for SAP R/3 on DB2 for OS/390
	2.1, "Pre-Installation Checking" on page 13

• Check hardware requirements: − Database Server	2.1.1, "Database Server Hardware We Used" on page 14
− Central Instance	2.1.2, "Central Instance Hardware We Used" on page 14
• Check software requirements: − Database Server	2.1.3, "Database Server Software We Used" on page 14
− Central Instance	2.1.4, "Central Instance Software We Used" on page 14
Defining the Configuration	2.2, "Defining the Configuration" on page 15

Task	Refer to:
Installing Prerequisites	2.3, "Installing Prerequisites" on page 17
• On the database server:	
− Install required PTFs.	Refer to OSS Note #81737-DB2/390: APAR List
− Initialize DASD.	2.3.1, "DASD Initialization on Database Server" on page 19
− Configure OSA-2.	2.3.2, "Configuring OSA-2 on Database Server" on page 19
− Install DB2 for OS/390.	2.3.3, "Installing DB2 for OS/390" on page 20
− Configure SMS.	2.3.4, "Configuring SMS" on page 33
− Customize OpenEdition.	2.3.5, "Customizing OpenEdition" on page 33
− Customize TCP/IP.	2.3.6, "Customizing TCP/IP on Database Server" on page 34
− Customize High Speed UDP.	2.3.7, "Customizing High Speed UDP on Database Server" on page 35
− Customize ICLI Server.	2.3.8, "Customizing the ICLI Server" on page 38
− Customize RACF or equivalent.	2.3.9, "Customizing RACF or Equivalent" on page 39
• On the central instance:	
− Customize TCP/IP.	2.3.10, "Customizing TCP/IP on Central Instance" on page 40
− Customize High Speed UDP.	2.3.11, "Customizing High Speed UDP on the Central Instance" on page 41
− Set up ICLI Client.	2.3.12, "Setting Up the ICLI Client" on page 43
• Check database server and central instance communication.	
− Test TCP/IP connection.	2.3.13, "Testing Connectivity - Central Instance and Database Server" on page 44
Installing SAP R/3 on DB2 for OS/390	2.4, "Installing SAP R/3 on DB2 for OS/390" on page 44
• SAP R/3 central instance installation.	2.4.3, "Installing the SAP R/3 Central Instance with AIX" on page 47
• Test ICLI connection.	2.4.4, "Testing Connectivity between ICLI Client and ICLI Server" on page 49
• Build and load the database.	2.5, "Build and Load the Database" on page 50
Completing the Installation	2.6, "Completing the Installation" on page 57
• Standard SAP R/3 Steps.	2.6.1, "Standard SAP R/3 Steps" on page 57

2.1 Pre-Installation Checking

> **References**
>
> - *Check List—Installation Requirements: DB2 for OS/390*, Material Number: 51002656
>
> - *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*, SC33-7962
>
> - *R/3 Installation on UNIX: DB2 for OS/390*, Material Number: 51002659
>
> - *R/3 Installation on UNIX: OS Dependencies*, Material Number: 51002955
>
> - *OSS Note #98186-DB2/390: 4.0B R/3 Installation on UNIX or WinNT*
>
> - *OSS Note #81737-DB2/390: APAR List*

As a three-tier client/server application, SAP R/3 on DB2 for OS/390 requires some hardware and software to be set up on the database server, on the central instance, and on the presentation server. It is also required to set up communication between them.

The *Check List—Installation Requirements: DB2 for OS/390* contains the hardware and software requirements needed for the SAP R/3 on DB2 for OS/390.

As described in the *Check List—Installation Requirements: DB2 for OS/390* the database server for SAP R/3 on DB2 for OS/390 runs on any S/390 (or compatible) processor capable of supporting OS/390 Version 2.5.

Connectivity from the database server can be achieved in various ways:

- ESCON channel feature(s) on the S/390 database server and ESCON channel adapter(s) on the gateway AIX application server(s).

- FDDI OSA-2 feature(s) on the S/390 database server and FDDI LAN adapter(s) on the gateway AIX or NT application server(s).

- Fast Ethernet OSA-2 features on the S/390 database server and FAST Ethernet adapter(s) on the gateway AIX or NT application server(s).

- An ESCON, FDDI, or Fast Ethernet connection from the database server to a router (such as the IBM 2216 Multiprotocol Router) and a LAN connection from that router to the gateway application servers.

One of the means of connection in the preceding list must be used. Refer to *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*, and Appendix F, "Advanced ICLI Configurations" on page 205 of this redbook for further information.

The central instance runs on any processor that supports AIX Version 4.2.1 or higher, or Windows NT Version 4.0, Build 1381. The Service Pack 3 products for Windows NT are recommended.

The presentation service runs on Windows 3.1, Windows 95, Windows NT, Motif(UNIX), OS/2, and MacIntosh. Note that a Java version of the GUI is now also available.

The *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B* describes the preparatory steps and actual settings to be used during and after installation. The installation guide, *R/3 Installation on UNIX: DB2 for OS/390*, directs you to

use the values from the *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B* over the ones it has listed in the case that any should differ. The *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B* will have the more recent information.

The *R/3 Installation on UNIX: OS Dependencies* contains detailed information on the OS dependent settings to be used.

Review the *OSS Note #98186-DB2/390: 4.0B R/3 Installation on UNIX or WinNT* to get the latest list of the installation requirements.

Review the *OSS Note #81737-DB2/390: APAR List* to get the latest information about the software fixes needed.

2.1.1 Database Server Hardware We Used

For the database server, we used an IBM 9672-R75 with an OSA-2 adapter and 512MB of memory. Besides the OS/390 system disks and DB2 system disks, we allocated seven 3390 model 3 disks for the SAP database, and one 3390 model 3 disk for the DB2 BSDS. These were verified as adequate by reviewing the *Check List—Installation Requirements: DB2 for OS/390*.

2.1.2 Central Instance Hardware We Used

We used an RS/6000 F50 processor for the central instance, with 1280MB of memory. We dedicated 2GB of hard disk space for the SAP R/3 system, and nearly 4GB for swap space. These were verified as adequate by reviewing the *Check List—Installation Requirements: DB2 for OS/390*.

2.1.3 Database Server Software We Used

We had OS/390 Version 2.5 installed, and the OpenEdition services and TCP/IP were customized. The OSA-2 feature was installed and configured. We did not have DB2 for OS/390 installed, which is required for the SAP R/3 on DB2 for OS/390 installation.

2.1.4 Central Instance Software We Used

On the central instance, we had AIX Version 4.3.1.0 installed with English and German language support. IBM Performance Agent Version 2.2.31.1, Motif/X11 Version 4.3.1.0, NFS and all other items listed in the *Check List—Installation Requirements: DB2 for OS/390* were in place.

The AIX user environment settings were set as specified in the *R/3 Installation on UNIX: OS Dependencies*.

Note

The help files for R3SETUP are needed during the installation. To read those files, an HTML browser is necessary. Therefore we installed Netscape from the AIX bonus pack on the central instance.

2.2 Defining the Configuration

The hardware configuration in our environment is shown in Figure 6.
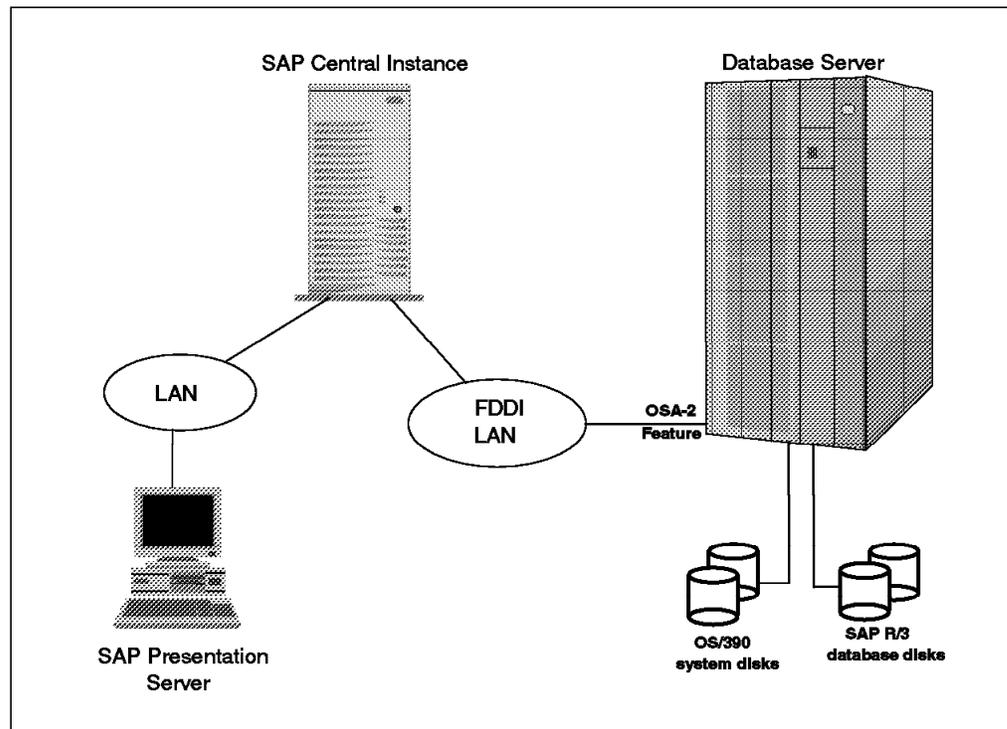
Figure 6. Physical SAP R/3 System Configuration

To ensure consistency of definitions between the database server and central instance, we compiled all the definitions and parameters that require coordination in Table 2, Table 3, and Table 4 on page 16. Note that in these tables the IP addresses used for the FDDI connectivity are defined as 10.1.1.x; these addresses were chosen in order not to conflict with attached networks or known routings.

Table 2. Database Server User ID			
Description	**USER-ID**	**TSO**	**OMVS**
SAP DB owner	SAPR3	No	No
ICLI server	ICLIRUN	No	Yes
Submit job, and OpenEdition	RED390	Yes	Yes

Table 3. TCP/IP Communication Definition		
Description	**Database Server**	**Central Instance**
IP address	10.1.1.81	10.1.1.80
IP name	REDSAP	riscsap
Device address	22C4, 22C5	N/A

Table 4. Other Definitions	
Parameter Description	**Parameter Value**
ICLI connection port	5531
ICLI keep alive port	5532
SAP system name	RED
SAP system number	00
DB2 subsystem name	DB2R
DB2 group attach name	RED
DB2 BSDS volume	TOTDB4
SAP R/3 - DB2 volumes	SAP001, SAP002, SAP003, SAP004 SAP005, SAP006, SAP007

2.3 Installing Prerequisites

The prerequisites installation can be divided into two separate tasks:

- The installation on the database server
- The installation on the central instance

However, in the prerequisites installation, some of the parameters must match between the database server and the central instance. Use Table 2 on page 15, Table 3 on page 15, and Table 4 on page 16 as references when installing the prerequisites.

Installation on the Database Server

Based on our findings during the Pre-installation Checking phase, we planned additional tasks to be done prior to the SAP R/3 on DB2 for OS/390 installation.

Following are the tasks we performed during our installation.

1. Initialize DASD

   See 2.3.1, "DASD Initialization on Database Server" on page 19.

2. Configure OSA-2

   See 2.3.2, "Configuring OSA-2 on Database Server" on page 19.

3. Install DB2 for OS/390

   See 2.3.3, "Installing DB2 for OS/390" on page 20.

4. Configure SMS

   See 2.3.4, "Configuring SMS" on page 33.

5. Customize OS/390 OpenEdition

   See 2.3.5, "Customizing OpenEdition" on page 33.

6. Customize TCP/IP

   See 2.3.6, "Customizing TCP/IP on Database Server" on page 34.

7. Customize High Speed UDP

   See 2.3.7, "Customizing High Speed UDP on Database Server" on page 35.

8. Set up ICLI Server

   See 2.3.8, "Customizing the ICLI Server" on page 38.

9. Customize RACF

   See 2.3.9, "Customizing RACF or Equivalent" on page 39.

Installation on the Central Instance

The following tasks were done on the central instance:

1. Customize TCP/IP

   See 2.3.10, "Customizing TCP/IP on Central Instance" on page 40.

2. Customize High Speed UDP

   See 2.3.11, "Customizing High Speed UDP on the Central Instance" on page 41.

3. Set up the ICLI Client

See 2.3.12, "Setting Up the ICLI Client" on page 43.

Notes:

Because the ICLI code is supplied from OS/390, this step could only be done after the connection with the database server was set up.

Database Server and Central Instance Connectivity Testing

There will be an opportunity to test basic LAN connectivity on both the database server and central instance once all prerequisites have been installed. If possible, it should be verified that you are able to reach at least one other remote IP address on the same network prior to checking connectivity between the central instance and database server. Refer to 2.3.7.3, "Testing the Database Server High Speed UDP Connection" on page 37 and 2.3.11.1, "Testing the Central Instance High Speed UDP Connection" on page 42 for the correct procedures.

After each network connection has been verified, you can test connectivity between the database server and the central instance. Refer to 2.3.13, "Testing Connectivity - Central Instance and Database Server" on page 44 for the correct procedure.

Once the connection between the central instance and database server has been verified, you start the R/3 installation process. R3SETUP will configure the ICLI client during the central instance installation phase. When this phase completes, you can check the communication between the ICLI server and ICLI client with the R3trans -x command. Refer to 2.4.4, "Testing Connectivity between ICLI Client and ICLI Server" on page 49.

2.3.1 DASD Initialization on Database Server

> **Reference**
>
> • *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*, SC33-7962

The SAP R/3 installation includes about 10,000 indices. Therefore, we recommend that you initialize the volumes which are associated with the DB2 STOGROUPs with a minimum Virtual Table of Contents (VTOC) size of 250 tracks (this recommendation is based on a 3390 DASD unit).

During the installation of SAP R/3, the DB2 logs must tolerate up to 2GB per hour. Archiving is required and there must be at least 20GB of archiving space. Most of this space can be reclaimed when SAP R/3 on DB2 for OS/390 is up and running.

2.3.2 Configuring OSA-2 on Database Server

> **Reference**
>
> • *MVS/ESA Hardware Configuration Definition: User's Guide*, SC33-6468

In our configuration, the OSA-2 Feature from the database server connects to the FDDI network as shown in Figure 7.
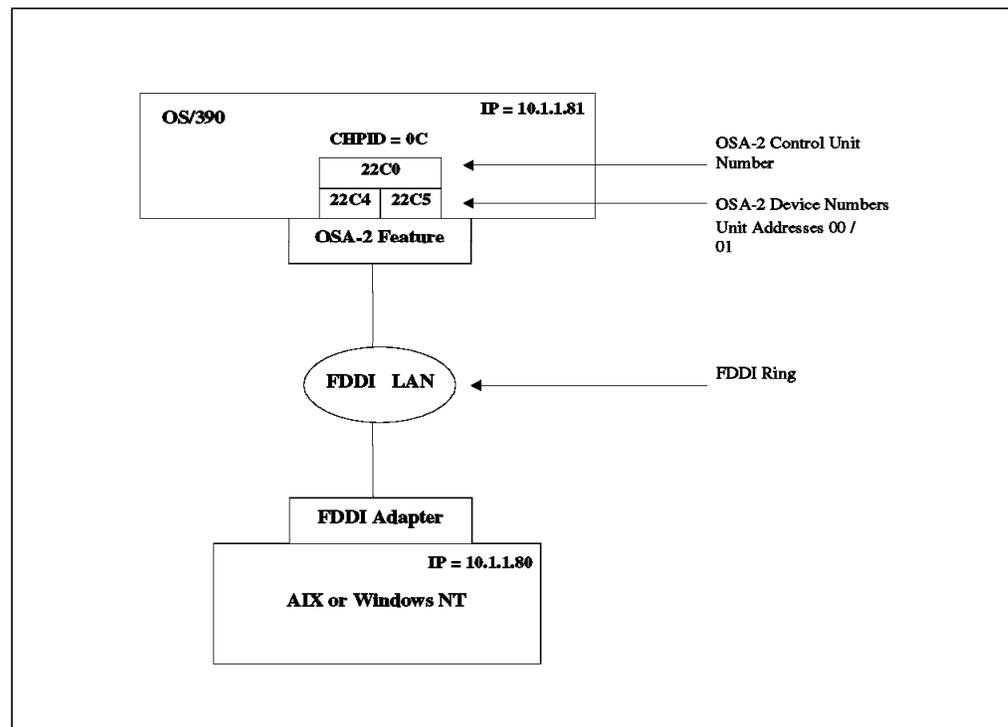
Figure 7. I/O Configuration for the FDDI Connection

This OSA-2 Feature was already installed and configured on our system. See Appendix K, "Configuring OSA-2 on Database Server" on page 255 and *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*, Chapter 4, for details on how to install and configure the OSA-2 adapter.

2.3.3 Installing DB2 for OS/390

> **References**
>
> - *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*,
>   SC33-7962
> - *DB2 for OS/390 V5 Installation Guide*, GC26-8970
> - *BC SAP Database Administration Guide: DB2 for OS/390*, Material
>   Number: 51002651

The DB2 for OS/390 product must have been installed prior to the SAP R/3 on
DB2 for OS/390 installation.

After completing the SMP/E installation of the DB2 for OS/390 product, we
continued with the setup of DB2 for OS/390 parameters by considering the
recommended values given by SAP in the *SAP R/3 on DB2 for OS/390: Planning
Guide SAP R/3 Release 4.0B*, SC33-7962.

2.3.3.1 Setting Up DB2 for OS/390 System Parameters

In Figure 8 on page 21 through Figure 32 on page 32, you can see the values
we have chosen during the execution of the DSNTINST command list run. Keep
in mind that some parameters will depend on your installation data and should
be changed as needed.

> **Note**
>
> The parameters and options shown in these screens were done to enable
> operation in a test environment. The values are not optimized for
> performance, nor are the user choices the ones that might be made in an
> environment emphasizing production. The screens are shown for three
> purposes:
>
> 1. To show administrators the choices to make, and to familiarize those
>   administrators with the screen formats on which the choices appear.
> 2. To show sample values that functioned in a test environment, as a
>   troubleshooting aid for administrators whose choices will not function.
> 3. To provide a test case to determine if new software releases will function
>   with a known set of choices.
>
> *You should choose values consistent with your objectives. Consult the
> references at the beginning of this section, rather than our examples.*

```
                    INSTALL, UPDATE, AND MIGRATE DB2 - MAIN PANEL
 ===>
 DSNT401I Warning - help is not installed
 Check parameters and reenter to change:

  1  INSTALL TYPE          ===> INSTALL   Install, Update, or Migrate
  2  DATA SHARING          ===> NO        Yes, No, or blank for Update

 Enter the following value for migration only:
  3  DATA SET NAME(MEMBER) ===>

 Enter name of your input data sets (    LOAD, SDSNMACS, SDSNSAMP, SDSNCLST):
  4  PREFIX                ===> DB2V510
  5  SUFFIX                ===>

 Enter to set or save panel values (by reading or writing the named members):
  6  INPUT MEMBER NAME     ===> DSNTIDXA  Enter to read old panel values
  7  OUTPUT MEMBER NAME    ===> DSNTIDBR  Enter to write new panel values
```

Figure 8. DSNTINST Command List - Main Panel

In our installation, we used DB2V510 as the high level qualifier for all DB2
system data sets.

The default values are taken from the DSNTIDXA member, and new values will
be written into the DSNTIDBR member.

The next screen displayed is shown in Figure 9. We changed some parameters
based on our installation data.

```
                INSTALL DB2 - DATA PARAMETERS
 ===>

 Check parameters and reenter to change:

  1  CATALOG ALIAS        ===> DB2V510U              Alias of VSAM catalog for
                                                     DB2 subsystem data sets
  2  DEFINE CATALOG       ===> NO              YES or NO
  3  VOLUME SERIAL 1      ===> LABDB2          CLIST allocation
  4  VOLUME SERIAL 2      ===> LABDB2          Non-VSAM data
  5  VOLUME SERIAL 3      ===> LABDB2          VSAM catalog, default, and
                                               work file database
  6  VOLUME SERIAL 4      ===> LABDB2          Directory, catalog data
  7  VOLUME SERIAL 5      ===> LABDB2          Directory, catalog indexes
  8  VOLUME SERIAL 6      ===> TOTDB4          Log copy 1, BSDS 2
  9  VOLUME SERIAL 7      ===> TOTDB4          Log copy 2,  SDS 1
 10  PERMANENT UNIT NAME ===> 3390             Device type for MVS catalog
                                               and partitioned data sets
 11  TEMPORARY UNIT NAME ===> 3390             Device type for
                                               temporary data sets
```

Figure 9. DSNTINST Command List - Data Parameters

It is recommended that you put your DB2 log volumes onto separate strings if
possible.

The next panel, shown in Figure 10 on page 22, will be the definition of DB2 system resource data set names. This definition also varies between installations.

```
                 INSTALL DB2 - SYSTEM RESOURCE DATA SET NAMES
 ===>
 DSNT444I Scrolling backward may change fields marked with asterisks
 Enter data below:

 Bootstrap Data Sets (BSDS):
 * 1 COPY 1 NAME        ===> DB2V510U. SDS01
 * 2 COPY 2 NAME        ===> DB2V510U.BSDS02

 Active Logs:
   3 NUMBER OF COPIES   ===> 2        2 or 1.   Number of active log copies
 * 4 COPY 1 PREFIX      ===> DB2V510U.LOGCOPY1
 * 5 COPY 2 PREFIX      ===> DB2V510U.LOGCOPY2

 Archive Logs:
   6 NUMBER OF COPIES   ===> 2        2 or 1.   Number of archive log copies
 * 7 COPY 1 PREFIX      ===> DB2V510.ARCHLOG1
 * 8 COPY 2 PREFIX      ===> DB2V510.ARCHLOG2
   9  IMESTAMP ARCHIVES ===> NO       YES or NO
```

Figure 10. DSNTINST Command List - System Resource Data Set Names

The next screens will ask for the DB2 data set names that are required and that will be used in the procedures created by the command list. (We do not show the screens for practical purposes.) You have to change the data set names based on your installation data.

The next entry, as shown in Figure 11, is made to determine whether you have CICS; as we are not using CICS, we left the default, which is 0.

```
                 INSTALL DB2 - CICS RELEASE
 ===>

 Enter data below:

  1 CICS RELEASE  ===> 0       0 = not using CICS
                                5 = CICS/ESA 3.3.0
                                6 = CICS/ESA Version 4
                                7 = CICS Transaction Server for OS/390
```

Figure 11. DSNTINST Command List - CICS Release

We left the next screen blank (as shown in Figure 12 on page 23), again because we are not using CICS.

```
                 INSTALL DB2 - CICS DATA SETS
===>
DSNT444I Scrolling backward may change fields marked with asterisks
Enter CICS library data below:

*  1 CICS COBOL LIBRARY   ===>
*  2 CICS COBOL II LIBRARY===>
*  3 CICS PL/I  LIBRARY   ===>
*  4 CICS LOAD LIBRARY    ===>
*  5 CICS MACRO LIBRARY   ===>

CICS Resource Definition Online (RDO) data ( NOT APPLICABLE ):

   6 CSD NAME             ===>
   7 LIST NAME            ===>            CICS RDO list name
   8 DB2 SAMPLES GROUP    ===>            Group for CICS-DB2 samples
   9 IS SAMPLES GROUP NEW?===>            YES or NO
  10 DB2 GROUP            ===>            Group for CICS-DB2 system modules
  11 IS DB2 GROUP NEW?    ===>            YES or NO
```

Figure 12. DSNTINST Command List - CICS Data Sets

The next panel, as shown in Figure 13, will be the DB2 size parameters that we changed based on the recommendation by SAP in *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*, SC33-7962.

The parameters selected on the following panels reflect our objective of running what might be called a development or "sandbox" environment. For a production environment or a high-performance environment, these parameters require further adjustment.

```
              INSTALL DB2 - SIZES
 ===>


 Check numbers and reenter to change:

  1  DATABASES          ===> 120       In this subsystem
  2  TABLES             ===> 100       Per database (average)
  3  COLUMNS            ===> 20        Per table (average)
  4  VIEWS              ===> 1         Per table (average)
  5  TABLE SPACES       ===> 1         Per database (average)
  6  PLANS              ===> 100       In this subsystem
  7  PLAN STATEMENTS    ===> 30        SQL statements per plan (average)
  8  PACKAGES           ===> 200       In this subsystem
  9  PACKAGE STATEMENTS ===> 30        SQL statements per package (average)
 10  PACKAGE LISTS      ===> 2         Package lists per plan (average)
 11  EXECUTED STMTS     ===> 30        SQL statements executed (average)
 12  TABLES IN STMT     ===> 2         Tables per SQL statement (average)
 13  TEMP 4K SPACE      ===> 40M       Bytes of 4K-page work space
 14  TEMP 4K DATA SETS  ===> 4         Number of data sets for 4K data
 15  TEMP 32K SPACE     ===> 40M       Bytes of 32K-page work space
 16  TEMP 32K DATA SETS ===> 2         Number of data sets for 32K data
```

Figure 13. DSNTINST Command List - Sizes

The DB2 thread management parameters will be displayed, as shown in Figure 14 on page 24. We changed the maximum number of prepared dynamic statements parameter as suggested by SAP.

```
                 INSTALL DB2 - THREAD MANAGEMENT
 ===>


 Check numbers and reenter to change:

  1  DATABASES            ===> 100        Concurrently in use
  2  MAX USERS            ===> 80         Concurrently running in DB2
  3  MAX REMOTE ACTIVE    ===> 64         Maximum number of active
                                           database access threads
  4  MAX REMOTE CONNECTED ===> 64         Maximum number of active/inactive
                                           database access threads
  5  MAX TSO CONNECT      ===> 20         Users on QMF or in DSN command
  6  MAX BATCH CONNECT    ===> 40         Users in DSN command or utilities
  7  SEQUENTIAL CACHE     ===> BYPASS     3990 storage for sequential IO.
                                          Values are  NQ or BYPASS.
  8  UTILITY CACHE OPTION ===> NO         3990 storage for DB2 utility IO
  9  DEFAULT INDEX TYPE   ===> 2          1 or 2
 10  MAX KEPT DYN STMTS   ===> 16000      Maximum number of prepared dynamic
                                          statements saved past commit points
```

Figure 14. DSNTINST Command List - Thread Management

The maximum batch connect value depends on the environment workload.
Change this parameter based on your predicted number of threads.

In a typical R/3 database, you will have more BATCH connections to the DB2
database compared to TSO connections.

Each SAP work process (dialog, batch, spool, enqueue) opens a batch connect
thread on DB2. Set MAX BATCH CONNECT to be larger than the sum of all
started SAP work processes.

The sequential cache could be changed to SEQ if you have the 3990 caches,
which would increase the performance.

The maximum number of prepared dynamic statements value is taken from the
value recommended by SAP.

The buffer pool sizes were changed as recommended by SAP, as can be seen in
Figure 15 on page 25 and Figure 16 on page 25. These are the minimum
values that we recommend.

```
                    INSTALL DB2 - BUFFER POOL SIZES - PANEL 1
===>


Enter sizes (in number of pages).   Specify yes (Y) or no (N) for CASTOUT.


          BUFFERPOOL   Hiperpool   CASTOUT             BUFFERPOOL   Hiperpool   CASTOUT
 1 BP0    ==> 2000     ==> 0        ==> Y    16 BP15   ==> 0        ==> 0        ==> Y
 2 BP1    ==> 5000     ==> 0        ==> Y    17 BP16   ==> 0        ==> 0        ==> Y
 3 BP2    ==> 20000    ==> 40000    ==> Y    18 BP17   ==> 0        ==> 0        ==> Y
 4 BP3    ==> 30000    ==> 60000    ==> Y    19 BP18   ==> 0        ==> 0        ==> Y
 5 BP4    ==> 0        ==> 0        ==> Y    20 BP19   ==> 0        ==> 0        ==> Y
 6 BP5    ==> 0        ==> 0        ==> Y    21 BP20   ==> 0        ==> 0        ==> Y
 7 BP6    ==> 0        ==> 0        ==> Y    22 BP21   ==> 0        ==> 0        ==> Y
 8 BP7    ==> 0        ==> 0        ==> Y    23 BP22   ==> 0        ==> 0        ==> Y
 9 BP8    ==> 0        ==> 0        ==> Y    24 BP23   ==> 0        ==> 0        ==> Y
10 BP9    ==> 0        ==> 0        ==> Y    25 BP24   ==> 0        ==> 0        ==> Y
11 BP10   ==> 0        ==> 0        ==> Y    26 BP25   ==> 0        ==> 0        ==> Y
12 BP11   ==> 0        ==> 0        ==> Y    27 BP26   ==> 0        ==> 0        ==> Y
13 BP12   ==> 0        ==> 0        ==> Y    28 BP27   ==> 0        ==> 0        ==> Y
14 BP13   ==> 0        ==> 0        ==> Y    29 BP28   ==> 0        ==> 0        ==> Y
15 BP14   ==> 0        ==> 0        ==> Y    30 BP29   ==> 0        ==> 0        ==> Y
```

Figure 15. DSNTINST Command List - Buffer Pool Sizes (Panel 1)

Remember, these are the default buffer pool settings for R3INST. After the system is running, you will need to monitor and change the buffer pool settings to improve DB2 performance.

```
                    INSTALL DB2 - BUFFER POOL SIZES - PANEL 2
===>


Enter sizes (in number of pages).   Specify yes (Y) or no (N) for CASTOUT.


          BUFFERPOOL   Hiperpool   CASTOUT             BUFFERPOOL   Hiperpool   CASTOUT
 1 BP30   ==> 0        ==> 0        ==> Y    16 BP45    ==> 0       ==> 0        ==> Y
 2 BP31   ==> 0        ==> 0        ==> Y    17 BP46    ==> 0       ==> 0        ==> Y
 3 BP32   ==> 0        ==> 0        ==> Y    18 BP47    ==> 0       ==> 0        ==> Y
 4 BP33   ==> 0        ==> 0        ==> Y    19 BP48    ==> 0       ==> 0        ==> Y
 5 BP34   ==> 0        ==> 0        ==> Y    20 BP49    ==> 0       ==> 0        ==> Y
 6 BP35   ==> 0        ==> 0        ==> Y    21 BP32K   ==> 2000    ==> 4000     ==> Y
 7 BP36   ==> 0        ==> 0        ==> Y    22 BP32K1  ==> 0       ==> 0        ==> Y
 8 BP37   ==> 0        ==> 0        ==> Y    23 BP32K2  ==> 0       ==> 0        ==> Y
 9 BP38   ==> 0        ==> 0        ==> Y    24 BP32K3  ==> 0       ==> 0        ==> Y
10 BP39   ==> 0        ==> 0        ==> Y    25 BP32K4  ==> 0       ==> 0        ==> Y
11 BP40   ==> 0        ==> 0        ==> Y    26 BP32K5  ==> 0       ==> 0        ==> Y
12 BP41   ==> 0        ==> 0        ==> Y    27 BP32K6  ==> 0       ==> 0        ==> Y
13 BP42   ==> 0        ==> 0        ==> Y    28 BP32K7  ==> 0       ==> 0        ==> Y
14 BP43   ==> 0        ==> 0        ==> Y    29 BP32K8  ==> 0       ==> 0        ==> Y
15 BP44   ==> 0        ==> 0        ==> Y    30 BP32K9  ==> 0       ==> 0        ==> Y
```

Figure 16. DSNTINST Command List - Buffer Pool Sizes (Panel 2)

In the next screen, we defined the DB2 tracing parameters and changed the SMF statistics and number of log records per checkpoint based on an SAP recommendation. See Figure 17 on page 26.

```
                   INSTALL DB2 - TRACING
===>

Enter data below:

 1  AUDIT TRACE       ===> NO            Audit classes to start.  NO,YES,list

 2  TRACE AUTO START ===> NO            Global classes to start.  YES, NO, list
 3  TRACE SIZE        ===> 64K           Trace table size in bytes.   4K-396K

 4  SMF ACCOUNTING    ===> 1             Accounting classes to start.  NO,YES,list
 5  SMF STATISTICS    ===> 1,3           Statistics classes to start.  NO,YES,list
 6  STATISTICS TIME   ===> 30            Time interval in minutes.   1-1440

 7  MONITOR TRACE     ===> NO            Monitor classes to start.  NO, YES, list
 8  MONITOR SIZE      ===> 8K            Default monitor buffer size.  8K-1M

 9  CHECKPOINT FREQ   ===> 100000        Number of log records per checkpoint
10  UR CHECK FREQ     ===> 2             Checkpoints required to enable UR check.
```

Figure 17. DSNTINST Command List - Tracing

Except for the DFHSM recall function, we did not change the DB2 operator
functions parameters on the next screen. See Figure 18.

```
                   INSTALL DB2 - OPERATOR FUNCTIONS
===>

Enter data below:

 1  WTO ROUTE CODES    ===> 1
                                          Routing codes for WTORs
 2  RECALL DATABASE    ===> YES           Use DFHSM automatic recall.   YES or NO
 3  RECALL DELAY       ===> 120           Seconds to wait for automatic recall

 4  RLF AUTO START     ===> NO            Resource Limit Facility.   NO or YES
 5  RLST NAME SUFFIX   ===> 01            Resource Limit Spec.  Table (RLST)
 6  RLST ACCESS ERROR  ===> NOLIMIT       Action on RLST access error.  Values are:
                                          NOLIMIT - Run without limit
                                          NORUN   - Do not run at all
                                          1-5000000 - Limit in CPU service units
 7  PARAMETER MODULE   ===> DSNZPARM      Name of DB2 subsystem parameter module
 8  AUTO BIND          ===> YES           Use automatic bind.   YES or NO
 9  EXPLAIN PROCESSING ===> YES           Explain allowed on auto bind? YES or NO
10  DPROP SUPPORT      ===> 1      ==> 1=NO  2=ONLY  3=ANY
11  SITE TYPE          ===> LOCALSITE    LOCALSITE OR RECOVERYSITE
```

Figure 18. DSNTINST Command List - Operator Functions

The next screen will be the definition of application programming defaults. We
changed the EBCDIC coded character set, the ASCII coded character set, and the
Encoding scheme based on the SAP recommendation, which can be seen in
Figure 19 on page 27 and Figure 20 on page 27.

```
                 INSTALL DB2 - APPLICATION PROGRAMMING DEFAULTS PANEL 1
 ===>

 Enter data below:

  1  LANGUAGE DEFAULT     ===> C        ASM,C,CPP,COBOL,COB2,IBMCOB,FORTRAN,PLI
  2  DECIMAL POINT IS     ===> .          .  or ,
  3  MINIMUM DIVIDE SCALE ===> NO       NO or YES for a minimum of 3 digits
                                        to right of decimal after division
  4  STRING DELIMITER     ===> DEFAULT  DEFAULT, ″ or ′ (COBOL or COB2 only)
  5  SQL STRING DELIMITER ===> DEFAULT  DEFAULT, ″ or ′
  6  DIST SQL STR DELIMTR ===> ′         ′ or ″
  7  MIXED DATA           ===> NO       NO or YES for mixed DBCS data
  8  EBCDIC CODED CHAR SET===> 500      CCSID of SBCS or mixed data.  0-65533.
  9  ASCII CODED CHAR SET ===> 819      CCSID of SBCS or mixed data.  0-65533.
 10  DEF ENCODING SCHEME  ===> ASCII    EBCDIC or ASCII
```

Figure 19. DSNTINST Command List - Application Programming Defaults (Pnl 1)

```
                 INSTALL DB2 - APPLICATION PROGRAMMING DEFAULTS PANEL 2
 ===>

 Enter data below:

  1  DATE FORMAT         ===> ISO      ISO, JIS, USA, EUR, LOCAL
  2  TIME FORMAT         ===> ISO      ISO, JIS, USA, EUR, LOCAL
  3  LOCAL DATE LENGTH   ===> 0        10-254 or 0 for no exit
  4  LOCAL TIME LENGTH   ===> 0         8-254 or 0 for no exit
  5  STD SQL LANGUAGE    ===> NO       NO or YES
  6  DECIMAL ARITHMETIC  ===> DEC15    DEC15, DEC31, 15, 31
  7  CURRENT DEGREE      ===> 1        1 or ANY
  8  CACHE DYNAMIC SQL   ===> YES      NO or YES
```

Figure 20. DSNTINST Command List - Application Programming Defaults (Pnl 2)

The parameters we used for the IRLM panels are shown in Figure 21 and
Figure 22 on page 28.

```
                 INSTALL DB2 - IRLM PANEL 1
 ===>

 Enter data below:

  1  INSTALL IRLM       ===> YES         IRLM is required for DB2.  Should the
                                         IRLM distributed with DB2 be installed?
  2  SUBSYSTEM NAME     ===> IRLM        IRLM MVS subsystem name
  3  RESOURCE TIMEOUT   ===> 600         Seconds to wait for unavailable resource
  4  AUTO START         ===> YES         Start IRLM if not up.  YES or NO
  5  PROC NAME          ===> IRLM51R     Name of start procedure for IRLM
  6  TIME TO AUTOSTART  ===> 300         Time DB2 will wait for IRLM autostart
  7  UTILITY TIMEOUT    ===> 6           Utility wait time multiplier
  8  U LOCK FOR RR/RS   ===> YES         Lock mode for update cursor with
                                         RR or RS isolation.  YES or NO
```

Figure 21. DSNTINST Command List - IRLM (Panel 1)

```
                INSTALL DB2 - IRLM PANEL 2
 ===>


 Enter data below:

  1  CROSS MEMORY           ===> YES        Local storage and cross memory usage
  2  MAXIMUM ECSA           ===> 40M        Control block storage (1M - 99M)
  3  LOCKS PER TABLE(SPACE) ===> 0          Maximum before lock escalation
  4  LOCKS PER USER         ===> 0          Maximum before resource unavailable
  5  DEADLOCK TIME          ===> 5          Detection interval in seconds




 For DB2 data sharing ONLY enter data below:

  6  DEADLOCK CYCLE         ===> 1          Number of LOCAL cycles before GLOBAL
  7  MEMBER IDENTIFIER      ===> 1          Member ID for this IRLM (1-247)
  8  IRLM XCF GROUP NAME    ===> DXRGROUP   Name of IRLM XCF group
  9  LOCK ENTRY SIZE        ===> 2          Initial allocation in bytes (2,4,8)
```

Figure 22. DSNTINST Command List - IRLM (Panel 2)

We deleted the passwords for MVS catalog, BSDS, Log, Archive log, and DB2
directory for practical reasons, but if your installation needs a more secure
environment, use the password for those items. See Figure 23.

```
                INSTALL DB2 - PROTECTION
 ===>


 Enter data below:

  1  MVS CATALOG        ===>            MVS catalog control password
  2  BSDS PASSWORD      ===>            Bootstrap data sets password
  3  LOG PASSWORD       ===>            Active log data sets password
  4  ARCHIVE LOG PW     ===>            Archive log data sets password
  5  ARCHIVE LOG RACF   ===> NO         RACF protect archive log data sets
  6  DIRECTORY/CATALOG  ===>            DB2 directory and catalog password
  7  USE PROTECTION     ===> YES        DB2 authorization enabled.   YES or NO
  8  SYSTEM ADMIN 1     ===> SYSADM     Authid of system administrator
  9  SYSTEM ADMIN 2     ===> SYSADM     Authid of system administrator
 10  SYSTEM OPERATOR 1  ===> SYSOPR     Authid of system operator
 11  SYSTEM OPERATOR 2  ===> SYSOPR     Authid of system operator
 12  UNKNOWN AUTHID     ===> IBMUSER    Authid of default (unknown) user
 13  RESOURCE AUTHID    ===> SYSIBM     Authid of Resource Limit Table creator
 14  BIND NEW PACKAGE   ===> BINDADD    Authority required: BINDADD or BIND
 15  PLAN AUTH CACHE    ===> 1024       Size in bytes per plan (0 - 4096)
 16  PACKAGE AUTH CACHE ===> 1048576    Global - size in bytes (0-2M)
```

Figure 23. DSNTINST Command List - Protection

Since we used DB2R as the DB2 subsystem name, we entered the subsystem
name as DB2R. The suffixes for the entries in parmlib are all R3. See Figure 24
on page 29.

```
                   INSTALL DB2 - MVS PARMLIB UPDATES
===>

Check data and reenter to change:

 1   SUBSYSTEM NAME      ===> DB2R        Name for connecting to DB2
 2   COMMAND PREFIX      ===> =DB2R       DB2 subsystem command prefix
 3   SUBSYSTEM MEMBER    ===> R3          xx in IEFSSNxx
 4   SUBSYSTEM SEQUENCE  ===> 88888888    Sequence number for insertion
 5   AUTH MEMBER         ===> R3          xx in IEAAPFxx APF member name
 6   AUTH SEQUENCE       ===> 88888888    Sequence number for insertion
 7   LINK LIST ENTRY     ===> R3          xx in LNKLSTxx for SDSNLINK
 8   LINK LIST SEQUENCE  ===> 88888888    Sequence number for insertion
 9   COMMAND SCOPE       ===> STARTED     SYSTEM, SYSPLEX, or STARTED
```

Figure 24. DSNTINST Command List - MVS PARMLIB Updates

We changed the output buffer parameter as specified in the SAP
recommendation. There were three logs used in our environment, but for a
production environment, it is highly recommended to use 10 logs to ensure
availability. Availability is also affected by the log size, so specify a larger
number, for example, UPDATE RATE = 200000. See Figure 25.

```
                INSTALL DB2 - ACTIVE LOG DATA SET PARAMETERS
 ===>

 Enter data below:

  1 NUMBER OF LOGS    ===> 3        Number data sets per active log copy (2-31)
  2 INPUT BUFFER      ===> 60K      Size in bytes (28K-60K)
  3 OUTPUT BUFFER     ===> 4000K    Size in bytes (40K-4000K)
  4 WRITE THRESHOLD   ===> 20       Buffers filled before write (1-256)
  5 ARCHIVE LOG FREQ  ===> 24       Hours per archive run
  6 UPDATE RATE       ===> 200000   Updates, inserts, and deletes per hour
```

Figure 25. DSNTINST Command List - Active Log Data Set Parameters

We used DASD for the archive logs. See Figure 26 on page 30 for the
parameters chosen.

```
┌─────────────────────────────────────────────────────────────────────────────┐
│                 INSTALL DB2 - ARCHIVE LOG DATA SET PARAMETERS                 │
│  ===>                                                                         │
│                                                                               │
│  Enter data below:                                                            │
│                                                                               │
│     1   ALLOCATION UNITS ===> CYL          Blk, Trk, or Cyl                   │
│     2   PRIMARY QUANTITY ===> 850           Primary space allocation          │
│     3   SECONDARY QTY.   ===> 100           Secondary space allocation        │
│     4   CATALOG DATA     ===> YES           YES or NO to catalog archive data sets │
│     5   DEVICE TYPE 1    ===> 3390          Unit name for COPY1 archive logs   │
│     6   DEVICE TYPE 2    ===> 3390          Unit name for COPY2 archive logs   │
│     7   BLOCK SIZE       ===> 28672         Rounded up to 4096 multiple        │
│     8   READ TAPE UNITS  ===> 2             Number of allocated read tape units │
│     9   DEALLOC PERIOD   ===> 0             Time interval to deallocate tape units │
│    10   RECORDING MAX    ===> 1000          Number of data sets recorded in BSDS │
│    11   WRITE TO OPER    ===> YES           Issue WTOR before mount for archive │
│    12   WTOR ROUTE CODE  ===> 1,3,4                                            │
│                                             Routing codes for archive WTORs    │
│    13   RETENTION PERIOD ===> 9999          Days to retain archive log data sets │
│    14   QUIESCE PERIOD   ===> 5             Maximum quiesce interval (1-999)    │
│    15   COMPACT DATA     ===> NO            YES or NO for data compaction       │
└─────────────────────────────────────────────────────────────────────────────┘
```

Figure 26. DSNTINST Command List - Archive Log Data Set Parameters

We used the default parameter for the screen in Figure 27.

```
┌─────────────────────────────────────────────────────────────────────────────┐
│              INSTALL DB2 - DATABASES AND SPACES TO START AUTOMATICALLY        │
│  ===>                                                                         │
│                                                                               │
│  Enter data below:                                                            │
│                                                                               │
│   1  ===> RESTART       RESTART or DEFER the objects named below.             │
│      The objects to restart or defer may be ALL in item 2, a database         │
│      name, or database name.space name.                                       │
│                                                                               │
│   2  ==> ALL          14  ==>              26  ==>                            │
│   3  ==>              15  ==>              27  ==>                            │
│   4  ==>              16  ==>              28  ==>                            │
│   5  ==>              17  ==>              29  ==>                            │
│   6  ==>              18  ==>              30  ==>                            │
│   7  ==>              19  ==>              31  ==>                            │
│   8  ==>              20  ==>              32  ==>                            │
│   9  ==>              21  ==>              33  ==>                            │
│  10  ==>              22  ==>              34  ==>                            │
│  11  ==>              23  ==>              35  ==>                            │
│  12  ==>              24  ==>              36  ==>                            │
│  13  ==>              25  ==>              37  ==>                            │
└─────────────────────────────────────────────────────────────────────────────┘
```

Figure 27. DSNTINST Command List - Databases and Spaces Automatic Restart

As we did not use the distributed data facility, we left the parameters at default
values, as shown in Figure 28 on page 31 and Figure 29 on page 31.

```
                     INSTALL DB2 - DISTRIBUTED DATA FACILITY PANEL 1
===>
DSNT512I Warning: Enter unique names for LUNAME and LOCATION NAME
Enter data below:

 1 DDF STARTUP OPTION    ===> NO          NO, AUTO, or COMMAND
 2 DB2 LOCATION NAME     ===> LOC1                The name other DB2s use to
                                                  refer to this DB2
 3 DB2 NETWORK LUNAME    ===> LU1         The name VTAM uses to refer to this DB2
 4 DB2 NETWORK PASSWORD  ===>             Password for DB2's VTAM application
 5 RLST ACCESS ERROR     ===> NOLIMIT     NOLIMIT, NORUN, or 1-5000000
 6 RESYNC INTERVAL       ===>             Minutes between resynchronization period
 7 DDF THREADS           ===> ACTIVE      (ACTIVE or INACTIVE) Status of a
                                          database access thread that commits or
                                          rolls back and holds no database locks
                                          or cursors
 8 DB2 GENERIC LUNAME    ===>             Generic VTAM LU name for this DB2
                                          subsystem or data sharing group
 9 IDLE THREAD TIMEOUT   ===> 0           0 or seconds until dormant server ACTIVE
                                          thread will be terminated (0-9999)
10 EXTENDED SECURITYS or===> NO           Allow change password and descriptive
                                          security error codes.   YES or NO.
```

Figure 28. DSNTINST Command List - Distributed Data Facility (Panel 1)

```
                     INSTALL DB2 - DISTRIBUTED DATA FACILITY PANEL 2
===>


Enter data below:

 1 DRDA PORT                ===>          TCP/IP port number for DRDA clients.
                                           1-65534.  446 is reserved for DRDA.
 2 RESYNC PORT              ===>          TCP/IP port for 2-phase commit.  1-65534
 3 TCP/IP ALREADY VERIFIED ===> YES       Accept requests containing only a userid
Password for DB2's VTAM application       (no password)? YES or NO
```

Figure 29. DSNTINST Command List - Distributed Data Facility (Panel 2)

The stored procedures address space is not needed to run SAP R/3, therefore
we entered no values into the screen in Figure 30.

```
                     INSTALL DB2 - STORED PROCEDURES PARAMETERS
===>


Scrolling backward may change fields marked with asterisks
Enter data below:

* 1 WLM PROC NAME    ===>               WLM-established stored procedure
                                        JCL PROC name
* 2 DB2 PROC NAME    ===>               DB2-established stored procedure
                                        JCL PROC name
  3 NUMBER OF TCBS   ===> 8             Number of concurrent TCBs (1-100)
  4 MAX ABEND COUNT  ===> 0             Allowable ABENDs for a procedure (0-255)
  5 TIMEOUT VALUE    ===> 180           Seconds to wait before SQL CALL fails
                                         5-1800 or NOLIMIT (no timeout occurs)
```

Figure 30. DSNTINST Command List - Stored Procedures Parameters

```
┌─────────────────────────────────────────────────────────────────────┐
│               INSTALL DB2 - DATA DEFINITION CONTROL SUPPORT           │
│  ===>                                                                 │
│                                                                       │
│  Enter data below:                                                    │
│                                                                       │
│   1 INSTALL DD CONTROL SUPT. ===> NO        YES - activate the support│
│                                             NO  - omit DD control support
│   2 CONTROL ALL APPLICATIONS ===> NO        YES or NO                 │
│   3 REQUIRE FULL NAMES       ===> YES       YES or NO                 │
│   4 UNREGISTERED DDL DEFAULT ===> ACCEPT    Action for unregistered DDL:
│                                             ACCEPT - allow it         │
│                                             REJECT - prohibit it      │
│                                             APPL   - consult ART      │
│   5 ART/ORT ESCAPE CHARACTER ===>           Used in ART/ORT Searches  │
│   6 REGISTRATION OWNER       ===> DSNRGCOL        Qualifier for ART and ORT
│   7 REGISTRATION DATABASE    ===> DSNRGFDB        Database name       │
│   8 APPL REGISTRATION TABLE  ===> DSN_REGISTER_APPL Table name        │
│   9 OBJT REGISTRATION TABLE  ===> DSN_REGISTER_OBJT Table name        │
│                                                                       │
│  Note: ART = Application Registration Table                           │
│        ORT = Object      Registration Table                          │
└─────────────────────────────────────────────────────────────────────┘
```

Figure 31. DSNTINST Command List - Data Definition Control Support

Finally, we entered the job card information to be used by the command list in creating the jobs for setting up the DB2 parameter. Change the job card information according to your installation environment.

```
┌─────────────────────────────────────────────────────────────────────┐
│                    INSTALL DB2 - JOB EDITING                          │
│  ===>                                                                 │
│                                                                       │
│  Enter data below:                                                    │
│                                                                       │
│   1  REMOTE LOCATION   ===>                     Remote location for COBOL
│                                                 organization application
│   2  COBOL TYPE        ===> COBOL               COBOL for sample applications
│                                                 (COBOL, COB2 or IBMCOB)
│                                                                       │
│  Enter job card information for install and sample jobs:              │
│                                                                       │
│   3 ===> //REDINIT  JOB  MSGLEVEL=(1,1),NOTIFY=RED390,REGION=0M,      │
│   4 ===> // CLASS=A,MSGCLASS=H                                        │
│   5 ===>                                                              │
│   6 ===>                                                              │
│   7 ===>                                                              │
│   8 ===>                                                              │
└─────────────────────────────────────────────────────────────────────┘
```

Figure 32. DSNTINST Command List - Job Editing

The command list then calculates the pool sizes. We changed some parameters based on the SAP recommendations.

The command list will then create many jobs that were stored in the SDSNSAMP data set. Submit the jobs as described in *DB2 for OS/390 V5 Installation Guide*, GC26-8970.

For SAP R/3 on DB2 for OS/390, we decided to set the DB2 group attach name to the SAP system name.

In our example we added:

```
SUBSYS SUBNAME(DB2R)
  INITRTN(DSN3INI)
  INITPARM('DSN3EPX,=DB2R,S,RED')
```

to the IEFSSNxx parmlib member, because our SAP system name was RED.

After we re-IPLed the system, we then tested the DB2 applications provided in the SDSNSAMP data set.

2.3.3.2 Granting DB2 Authority

> **References**
>
> - *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*, SC33-7962 (DB2 Setup)

The ICLI server in our installation uses one DB2 plan for each of the R/3 work processes on the application servers. It is also possible to use only one DB2 plan for all of the R/3 work processes, but for performance, tuning, and problem determination purposes it is better to run with one DB2 plan per R/3 work process. The EXECUTE privilege on these plans is granted only to ICLIRUN, the user ID which runs the ICLI server. This step is performed by R3SETUP during the central instance installation. R3SETUP creates the bind and grant JCL with defaults, provides an opportunity to modify the defaults, and then submits the jobs. For more information, see 2.4.3.1, "Binding Plans for the ICLI Server" on page 47 and 2.4.3.2, "Granting Authorities for the ICLI Server" on page 48.

2.3.4 Configuring SMS

> **References**
>
> - *DFSMS/MVS V1R4 Implementing System-Managed Storage*, SC26-3123
> - *DFSMS/MVS V1R4 DFSMSdfp Storage Administration Reference*, SC26-4920
> - *DFSMS/MVS V1R4 General Information*, GC26-4900

SMS-managed storage is required to store hierarchical file system (HFS) data sets that are used by OS/390 OpenEdition. Define at least one volume on disk to be managed by SMS. In our system, we used LABSMS as the SMS-managed storage for HFS data sets.

SMS can also be used to manage the SAP R/3 DB2 datasets, although we did not elect to do so in our environment.

2.3.5 Customizing OpenEdition

> **Reference**
>
> - *OS/390 OpenEdition Planning*, SC28-1890

An OpenEdition environment has to be set up first, according to the steps described in *OS/390 OpenEdition Planning*, SC28-1890.

Normal TCP/IP for OpenEdition must also be set up according to the steps described in *OS/390 OpenEdition Planning*.

High Speed UDP communications is defined to the system by the use of the following statements in the BPXPRMxx parmlib member:

```
SUBFILESYSTYPE NAME(OESTACK)
            TYPE(CINET)
            ENTRYPOINT(BPXUIINT)
```

Figure 33. High Speed UDP Statement in BPXPRMxx

Appendix E.3, "OS/390 SYS1.PARMLIB(BPXPRMxx)" on page 193 contains a complete list of the BPXPRMxx parameters.

2.3.6 Customizing TCP/IP on Database Server

> **Reference**
>
> • *OS/390 eNetwork Communications Server IP Configuration Version 2 Release 5*, SC31-8513

For successful ICLI server and client communication, the ICLI server must know which port to monitor for ICLI client connection requests. There are 3 methods for specifying the ICLI connection port to the ICLI server.

 1. Specify the ICLI connection port in the OpenEdition /etc/services file, in the <TCPIP>.ETC.SERVICE file, or in <ICLI user ID>.ETC.SERVICES. These files are interrogated in the order listed if the SERVICENAME or PORT is not specified as an argument to the fome40bs command.

 2. Specify the ICLI connection port via the SERVICENAME argument of the fome40bs command. This will be used to interrogate the file(s) listed in option 1. The files will be searched in the order listed for a matching service name.

 3. Specify the ICLI connection port via the PORT argument of the fome40bs command. This will override any port number derived from a service name.

It is recommended to use the first method, except when you are running multiple ICLI servers in the same OS/390 LPAR. See Chapter 9 in *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B* for details.

2.3.6.1 Service Name and Port Entries
The connection port used by ICLI and by ICLI keep-alive can be chosen freely from the available services. The values must match the specification of services file and TPPARAM on the central instance. See 2.3.12.2, "Changing TPPARAM" on page 43.

In our environment, we chose 5531 as the ICLI connection port, and 5532 as the ICLI keep-alive connection port. We used the PORT argument of the fome40bs command to tell the ICLI server which port to monitor for ICLI client connection requests. We added the entries shown in Figure 34 on page 35 to the OpenEdition /etc/services file to document that the ports are in use.

```
#
#       SAP ICLI ports
#
fome40bs      5531/udp                    # SAP ICLI server port
```

Figure 34. Service Name and Port Number Entry

2.3.7 Customizing High Speed UDP on Database Server

> **Reference**
>
> - *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*,
>   SC33-7962
> - *High Speed Access Services User Guide*, GC31-8676

The steps to customize High Speed UDP are as follows:

1. Check that the OSA-2 feature has been configured.

   See 2.3.2, "Configuring OSA-2 on Database Server" on page 19.

2. Check that the "SUBFILESYSTYPE NAME(OESTACK)" is defined in the
   SYS1.PARMLIB member BPXPRMxx.

3. Create a VTAM TRL resource and activate it.

   See 2.3.7.1, "Create the VTAM Definition."

4. Configure the High Speed UDP connection.

   See 2.3.7.2, "Configure the High Speed UDP Connection" on page 36.

5. Test the connection.

Table 5. Parameters Needed to Configure High Speed UDP	
Parameter Description	**Parameter Value**
The OSA name specified during OSA-2 configuration	REDSAP
The device addresses specified during OSA-2 configuration	22C4,22C5
The FDDI IP address to be configured for the OS/390 server	10.1.1.81
The TCP/IP Netmask to be used	255.255.255.0

2.3.7.1 Create the VTAM Definition
Create a VTAM definition as shown in Figure 35 on page 36. We used the
membername TRLFDDI for this member in the ESA.SYS1.VTAMLST dataset.

```
    ***********************************************************************
    *                                                                     *
    * VTAM TRL DEFINITIONS FOR OSA-2 FDDI CONNECTIONS                     *
    *                                                                     *
    ***********************************************************************
    TRLFDDI  VBUILD TYPE=TRL
    REDSAP   TRLE  MAXBFRU=9,                                             X
                   READ=(22C4),                                          X
                   WRITE=(22C5),                                         X
                   LNCTL=MPC
```

Figure 35. VTAM Definition for High Speed UDP

Activate the VTAM definition as shown in Figure 36.

```
    V NET,ACT,ID=TRLFDDI
```

Figure 36. Activate VTAM Definition for High Speed UDP

To automatically activate this VTAM definition after a restart of the system, make sure that the membername TRLFDDI has been added to member ATCCONxx in SYS1.VTAMLST:

```
membername,                    OTHER VTAM MEMBERS TO BE ACTIVATED   X
TRLFDDI,                       TRL DEFINITIONS FOR HPDT UDP         X
membername,                    OTHER VTAM MEMBERS TO BE ACTIVATED   X
membername                     OTHER VTAM MEMBERS TO BE ACTIVATED
```

2.3.7.2 Configure the High Speed UDP Connection
The configuration of the High Speed UDP connection must be executed from the OMVS environment.

- Logon to TSO on OS/390.

- Start up the OMVS environment.

- Change directory to /usr/sbin.

- Configure High Speed UDP with the following command:

```
SC42 /usr/sbin>
SC42 /usr/sbin>oeifconfig REDSAP 10.1.1.81 osaport 0 mtu 4050 netmask
255.255.255.0 checksum
SC42 /usr/sbin>
  ===>
```

Figure 37. Configure High Speed UDP Using oeifconfig

- Check the High Speed UDP configuration with the command *oeifconfig*, as shown in Figure 38 on page 37.

```
SC42 /usr/sbin>
SC42 /usr/sbin>oeifconfig REDSAP
REDSAP: flags= 440 < UP RUNNING CHECKSUM >
         inet 10.1.1.81 netmask 0xffffff00 osaport 0
SC42 /usr/sbin>
 ===>
```

Figure 38. Check the High Speed UDP Configuration Using oeifconfig

Note that it may take a few seconds for the connection to show a status of UP after you activate it. Check again after 15-30 seconds to verify status.

2.3.7.3 Testing the Database Server High Speed UDP Connection

You can test the connection to the LAN from inside OpenEdition using the *oeping* command as shown in Figure 39. Note that the target address is not the central instance. Ideally, there will be another remote IP address on the FDDI LAN that is known to be working. This IP address can be used to verify that the connection to the LAN has been established. Once that has been confirmed, you can check the connectivity between the central instance and database server.

```
SC42 /usr/sbin>
SC42 /usr/sbin>oeping -c 1 10.1.1.100
OEPING 10.1.1.100 (10.1.1.100): 56 data bytes
64 bytes from 10.1.1.100: icmp_seq=0 ttl=53 time=6.002 ms

--- 10.1.1.100 oeping statistics ---
1 packets transmitted, 1 packets received, 0% packet loss
round-trip min/avg/max = 6.002/6.001/6.002 ms
SC42 /usr/sbin>
```

Figure 39. Check the High Speed UDP Connection

Note

The *oeping* command will only support pinging of remote IP addresses. Do not attempt to *oeping* the newly configured local High Speed UDP IP address.

To automatically define and activate the High Speed UDP connection after a restart, the configuration command in should be placed in a file that is executed after a VTAM start. To see how we did this see Figure 40 on page 38. which is the job control language for a job that is started just following VTAM start.

```
//OEIFCNF EXEC PGM=BPXBATCH,TIME=NOLIMIT,REGION=200M,
//         PARM='PGM /usr/sbin/oeifconfig REDSAP 10.1.1.81 osaport 0 mtu-
//              4050 netmask 255.255.255.0 checksum'
//STDERR  DD PATH='/tmp/oeifconfig.err',
//         PATHOPTS=(OWRONLY,OCREAT,OTRUNC),
//         PATHMODE=(SIRWXU)
//STDOUT  DD PATH='/tmp/oeifconfig.out',
//         PATHOPTS=(OWRONLY,OCREAT,OTRUNC),
//         PATHMODE=(SIRWXU)
//SYSUDUMP DD SYSOUT=*
//SYSMDUMP DD SYSOUT=*
```

Figure 40. VTAM Start Job for TRLE. This figure contains a column dependency; the - in the line containing PARM (line 2) must be in column 72.

2.3.8 Customizing the ICLI Server

> **Reference**
>
> • *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*, SC33-7962

The steps to customize the ICLI server are as follows:

• Define the environment file; see 2.3.8.1, "Define the Environment File."

• Define the start up JCL; see 2.3.8.2, "Define the Start Up JCL" on page 39.

The bind and grant activities required for the ICLI server are performed by R3SETUP during the central instance installation. For more information, see 2.4.3.1, "Binding Plans for the ICLI Server" on page 47 and 2.4.3.2, "Granting Authorities for the ICLI Server" on page 48.

2.3.8.1 Define the Environment File

Following are the environment variables used by the ICLI server started task. This was defined in the file /u/iclirun/instl/iclienv.

```
ICLI_TRUSTED_CONNECTIONS=1
ICLI_TRACE_LEVEL=0
UDPP_TRACE=0
NLSPATH=/usr/lib/nls/msg/%L/%N
STEPLIB=DB2V510.SDSNLOAD
```

Figure 41. ICLI Environment File

During the testing of ICLI, you can set the ICLI_TRACE_LEVEL to 1, 2, or 3. However, it is recommended that when you load the database, and then begin running the system, you set the ICLI_TRACE_LEVEL to 0 to reduce the storage space requirement of the OS/390 OpenEdition HFS and provide better performance.

2.3.8.2 Define the Start Up JCL

We used the started task technique to start ICLI. The ICLI started task JCL was put in member ICLIRED in SYS1.PROCLIB.

Following is a copy of the ICLI server started task JCL that we used.

```
//***********************************************************************
//*                                                                     *
//*                                                                     *
//*    ICLI server startup for SAP R/3 on DB2 for OS/390               *
//*                                                                     *
//*                                                                     *
//***********************************************************************
//ICLI    EXEC PGM=BPXBATCH,TIME=NOLIMIT,REGION=200M,
//        PARM='PGM /usr/sbin/fome40bs -PLAN FOMEP40B -LOGDIR /u/icliru-
//            n/instl -PORT 5531 -HPDT'
//STDENV  DD PATH='/u/iclirun/instl/iclienv'
//STEPLIB DD DISP=SHR,DSN=DB2V510.SDSNLOAD
//STDERR  DD PATH='/u/iclirun/instl/icliserv.err',
//        PATHOPTS=(OWRONLY,OCREAT,OTRUNC),
//        PATHMODE=(SIRWXU)
//STDOUT  DD PATH='/u/iclirun/instl/icliserv.out',
//        PATHOPTS=(OWRONLY,OCREAT,OTRUNC),
//        PATHMODE=(SIRWXU)
//SYSUDUMP DD SYSOUT=*
//SYSMDUMP DD SYSOUT=*
```

Figure 42. ICLI Procedure

You can use a copy of the file /u/iclirun/instl/iclitask.jcl and adapt it to your need. Do not forget to specify -HPDT if you use the High Speed UDP protocol.

Notes:

- It is possible to use //STDENV DD * and specify variables within this JCL stream. Some installations have found this to be convenient.

2.3.9 Customizing RACF or Equivalent

```
┌─ References ──────────────────────────────────────────────────────────┐
│                                                                        │
│  • OS/390 Security Server (RACF) Administrator's Guide, SC28-1915      │
│  • OS/390 Security Server (RACF) Support for OpenEdition DCE, SOMobjects│
│    for MVS, and SystemView for MVS, GC28-1924                          │
│                                                                        │
└────────────────────────────────────────────────────────────────────────┘
```

The following definitions were performed when we configured the security using RACF:

- User definition
- OpenEdition facility
- Started task protection

2.3.9.1 User Definition

The following user IDs must be defined to RACF:

- RED390
- ICLIRUN
- SAPR3

We created an OpenEdition user as ICLIRUN.

The RACF commands that we used to define the group and user ID were as follows:

```
ADDGROUP OMVSGRP OMVS(GID(1))
ADDUSER ICLIRUN DFLTGRP(OMVSGRP) OMVS(UID(0) HOME('/') PROGRAM('/bin/sh'))
```

Note: ICLIRUN is defined as an OpenEdition super user. The superuser has UID(0), and can bypass all file security, as well as run any administrative commands.

2.3.9.2 OpenEdition Facility

OpenEdition uses a new RACF class, FACILITY, and the FACILITY class profile BPX.DAEMON. If they are not defined on your system, they can be defined with the following statements:

```
RDEFINE FACILITY BPX.DAEMON UACC(NONE)
SETROPTS CLASSACT(FACILITY)
SETROPTS RACLIST(FACILITY)
```

We created an OpenEdition user ICLIRUN and granted it the class profile for daemon administration, BPX.DAEMON, as can be seen in the following RACF statements:

```
PERMIT BPX.DAEMON CLASS(FACILITY) ID(ICLIRUN) ACCESS(READ)
SETROPTS RACLIST(FACILITY) REFRESH
```

2.3.9.3 ICLI Started Task

We used the RACF STARTED class to associate the ICLIRUN user ID with the ICLI started task. When the ICLI procedure is started at the console, it runs as the ICLIRUN user.

```
RDEFINE STARTED ICLI.* STDATA(USER(ICLIRUN),GROUP(OMVSGRP))
SETROPTS RACLIST(STARTED) REFRESH
```

2.3.10 Customizing TCP/IP on Central Instance

References

- *R/3 Installation on UNIX: DB2 for OS/390*, Material Number: 51002659
- *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*, SC33-7962
- *BC SAP Database Administration Guide: DB2 for OS/390*, Material Number: 51002651

On the central instance, we modified only the /etc/hosts file. The R3SETUP tool adds the appropriate ICLI client and keep alive port entries to the /etc/services and /usr/sap/trans/bin/TPPARAM files.

2.3.10.1 Hosts File
We added the following entries to the /etc/hosts file:

```
10.1.1.81      redsap          # OS/390 address by UDP     from AIX
10.1.1.80      riscfddi        # AIX     address by UDP     from OS/390
```

2.3.10.2 Services File
R3SETUP adds the following entries to the /etc/services file:

```
# SAP specific services
sapdp00                   3200/tcp          # SAP R/3 dispatcher port
   |                         |
   v                         v
sapdp99                   3299/tcp
sapgw00                   3300/tcp          # SAP R/3 gateway port
   |                         |
   v                         V
sapgw99                   3399/tcp
sapmsRED                  3600/tcp          # SAP R/3 message server port
# ICLI specific services
sapdb2RED                 5531/udp          # ICLI port
iclikaRED                 5532/udp          # ICLI Keep Alive Port
```

2.3.10.3 TPPARAM File
R3SETUP adds the following entry to the TPPARAM file in the /usr/sap/trans/bin directory during the central instance installation.

```
RED/dblogicalname=5531
```

The port number must match the sapdb2RED entry in the services file.

2.3.11 Customizing High Speed UDP on the Central Instance

> **References**
>
> - *Check List—Installation Requirements: DB2 for OS/390*, Material Number: 51002656
> - *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*, SC33-7962
> - *BC SAP Database Administration Guide: DB2 for OS/390*, Material Number: 51002651

To customize High Speed UDP on the central instance, there are two required activities.

1. Install FDDI adapter.
2. Add an FDDI routing entry to the TCP/IP routing table on AIX.

We will assume that the FDDI adapter has been installed.

After that, a network route must be added so that the central instance can communicate with the database server. SMIT can be used to add a route to the FDDI LAN using the local FDDI adapter address as the gateway. Invoke the AIX utility SMIT and take the following path.

```
->Communications Applications and Services
->TCP/IP
->Further Configuration
->Static Routes
->Add a Static Route
```

```
                              Add Static Route

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


                                                       [Entry Fields]
   Destination TYPE                                     net
 * DESTINATION Address                                  [10.1.1.0]
   (dotted decimal or symbolic name)
 * Default GATEWAY Address                              [10.1.1.80]
   (dotted decimal or symbolic name)
 * METRIC (number of hops to destination gateway)       [1]
   Network MASK (hexadecimal or dotted decimal)         []




  F1=Help             F2=Refresh          F3=Cancel           F4=List
  Esc+5=Reset         F6=Command          F7=Edit             F8=Image
  F9=Shell            F10=Exit            Enter=Do
```

No further work should be necessary to set up the FDDI LAN connection.

2.3.11.1 Testing the Central Instance High Speed UDP Connection

The High Speed UDP connection on the central instance can be checked using
the *ping* command as shown in Figure 43. Note that the target IP address is not
that of the database server. Ideally, there will be another remote IP address on
the FDDI LAN that is known to be working. This IP address can be used to verify
that the connection to the LAN has been established. Once that has been
confirmed, you can check the connectivity between the Central Instance and
Database Server. If another IP address is not available, simply attempt to verify
connectivity by using the ping command directly between the central instance
and the database server.

```
 riscsap:/usr/sap/RED/install >ping -c 1 10.1.1.100
 PING 10.1.1.100: (10.1.1.100): 56 data bytes
 64 bytes from 10.1.1.100: icmp_seq=0 ttl=255 time=1 ms

 ----10.1.1.100 PING Statistics----
 1 packets transmitted, 1 packets received, 0% packet loss
 round-trip min/avg/max = 1/1/1 ms
```

Figure 43. Checking the Central Instance High Speed UDP Connection

The ping command can be used to check the connectivity, but it can be very
difficult to diagnose connectivity problems by simply attempting to ping back and
forth between the two new connections. :

2.3.12 Setting Up the ICLI Client

References

- *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*, SC33-7962
- *BC SAP Database Administration Guide: DB2 for OS/390*, Material Number: 51002651

The ICLI client code is provided in the OS/390 PTF containing the ICLI server. The executables FOME40BA(client) and FOME40BK(keep alive) can be found in the <HLQ>.SFOMDATA, where HLQ is the High Level Qualifier for your OpenEdition application services datasets. R3SETUP will download these to the /sapmnt/<SAPSID>/exe directory and rename FOME40BA to ibmiclic.o and FOME40BK to ibmiclika.

2.3.12.1 ICLI Client Code

The ICLI client code is downloaded by R3SETUP from the OS/390 system during the installation of the central instance.

If the ICLI server on the OS/390 system is changed, you will have to manually transfer the members FOME<REL>A and FOME<REL>K from the OS/390 SYS1.SFOMDATA dataset to the central instance. Rename FOME<REL>A to ibmiclic.o and FOME<REL>K ibmiclika, and place them in the /sapmnt/<SAPSID>/exe/ directory. Ensure that these files belong to <sapsid>adm and have permissions set to 755(-rwxr-xr-x).

Note

- <sapsid> is the SAP system name in lowercase.

- <SAPSID> is the SAP system name in uppercase.

2.3.12.2 Changing TPPARAM

ICLI uses a special connection port for the database traffic between the central instance and database server. This connection port must be specified in the TPPARAM file, and must match the port number specified in the /etc/services file on the central instance. See 2.3.10, "Customizing TCP/IP on Central Instance" on page 40.

Note

If the TPPARAM file does not already exist and is not created by R3SETUP, you will have to create it yourself. In this case, verify that the entries are correct in the TPPARAM.TPL file in the /usr/sap/trans/bin directory, and then copy it to TPPARAM in the same directory.

The port number must also match the port specified for the ICLI server to use. In our case, this was specified via the *PORT* argument to the fome40bs command in the ICLI server started task. The number can be freely chosen from the numbers not yet used. For more information, see 2.3.6.1, "Service Name and Port Entries" on page 34.

2.3.13 Testing Connectivity - Central Instance and Database Server

The connectivity between the database server and the central instance can be tested by using the `ping` command from the central instance and `oeping` from the database server.

To test the High Speed UDP protocol, we performed these commands:

- From the central instance:

    `ping 10.1.1.81`

- From within OpenEdition on the database server:

    `oeping -c 1 10.1.1.80`

If the `ping` and `oeping` commands are successful, then the connectivity between the data base server and the central instance has been established.

2.4 Installing SAP R/3 on DB2 for OS/390

┌─── Reference ───┐

- *R/3 Installation on UNIX: DB2 for OS/390*, Material Number: 51002659

- *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*,
  SC33-7962

└──┘

This section describes the steps we performed during the installation of SAP R/3.

2.4.1 General Notes on Installation from AIX

Beginning with SAP R/3 40A, SAP R/3 does not use the R3INST utility for installation. R3INST is an installation tool used on earlier releases. The new installation tool is called R3SETUP. It has a real graphical interface, the INSTGUI, which provides a more comfortable look and feel. It also provides integrated help documentation and the ability to view the activity log during and after installation. When R3SETUP is started, you are given the option of using the GUI or running from the command line.

The tool uses various script files to create command files designed for specific installations. These shell scripts can be found in the /<kernel-CD>/UNIX directory.

Table 6 summarizes the SAP-supplied shell scripts and the command files created by the shell scripts. The shell scripts are in the directory /<kernel CD>/UNIX. The command files are created in the installation work directory.

Table 6. Shell Scripts to Create Command Files		
Shell Script	**Command files**	**Descriptions**
CENTRAL.SH	CENTRAL.R3S	For installing central instance with database
DATABASE.SH	DATABASE.R3S	For installing database
DBDROP.SH	DBDROP.R3S	Dropping database
DIALOG.SH	DIALOG.R3S	For installing dialog instance without central instance

The scripts copied from the installation CD can be found in Appendix A, "Installation Shell Scripts" on page 121. The original (unmodified) command files generated can be found in Appendix B, "Installation Command Files" on page 145.

To generate the command files, the following commands must be executed from the installation work directory:

/<kernel-cd>/UNIX/CENTRAL.SH

/<kernel-cd>/UNIX/DATABASE.SH

/<kernel-cd>/UNIX/DBDROP.SH

/<kernel-cd>/UNIX/DIALOG.SH

2.4.2 Hints and Tips - Installing Using AIX

1. There is a large amount of print documentation for the installation and related topics contained in the \docu directory on the DB EXPORT1 CD. All of it can be viewed and printed with Acrobat Reader, which can be obtained from the \docu\viewer directory of the same CD. We obtained our copies of *Check List—Installation Requirements: DB2 for OS/390* and *R/3 Installation on UNIX: DB2 for OS/390* in this way.

2. Make sure that the worksheet has been prepared before executing the installation shell script and R3SETUP.

3. If you make a mistake in typing an answer during the build process of the command file, re-execute the build process from the beginning. One way to do this is to rename the current command file, CENTRAL.R3S for example. Then rename the initial command file CENTRRAL.R3S.1 to CENTRAL.R3S.

4. The command file will be updated by the R3SETUP program during the install process.

5. To use the INSTGUI tool, you will need either Windows 95 or NT, or Motif installed on an AIX system.

6. To view the R3SETUP documentation and help files, you will need a browser that supports frames, such as Netscape.

7. The first time you start the R3SETUP program it will ask if you want to use the graphical installation tool. If you answer Yes, it will start INSTGUI for you.

   When you later need to restart the installation process, the INSTGUI program must be started before the R3SETUP program. The R3SETUP program must then be started with the following options:

   ```
   R3SETUP -f <command file> -g <x-term_address>:61312
   ```

8. Every time R3SETUP is restarted, it will copy the log from the last run to a different file. The current log file will always have the name <command file>.log, while the old log is named <command file>.log.<number>. The file with the highest number will be the newest old log file.

9. We recommend restarting INSTGUI when you are restarting R3SETUP. The reason is that the number of errors and error messages shown by INSTGUI are accumulated from the previous failed R3SETUP runs. It can be difficult to

determine which errors occurred in the current execution of R3SETUP if you do not restart INSTGUI also.

10. The R3SETUP tool will by default attempt to copy the DB EXPORT 1 CD to a local hard disk. If you do not want to do this, edit the DATABASE.R3S command file after it has been created by R3SETUP. Find the section CDSERVER_IND_DB2 and delete the line beginning with 1_COPY. The DATABASE.log and the <process name>.log.

11. We recommend that you make sure you allocate ample space for the SYSVIEWS table during the installation of DB2. We ran out of extents multiple times during our installation.

12. The percentage indication on the INSTGUI does *not* show the percentage of the actual work completed in hours. Instead, it shows the percentage of steps completed.

    For example, in the database installation during the database load, the percentage indication will stay in 53% completed because you have finished 18 steps of 33 steps; then the percentage indication will jump to 57% after finishing the load of the database. However, you have completed significantly more than 57% of the work of installing the database.

13. Each phase of the database load has a unique name. This name is assigned to the load process and log associated with a particular phase. If an error occurs with one of the processes, you must check *two* logs. One log file is DATABASE.log and the other file is <process name>.log. :1.log file

14. You will most likely have to install the new version of the SAP GUI or SAPLOGON to be able to logon. Our 3.1G version did not allow us to logon the system. The software can be found on the Presentation CD in the gui directory. Go to the appropriate subdirectory for your platform (OS2, UNIX or Windows), and execute the installation program.

> **Reference**
>
> • *R/3 Installation on UNIX: DB2 for OS/390*, Material Number: 51002659

The SAP R/3 on DB2 for OS/390 installation can only be started if the network connection has been established between the database server and the central instance. Refer to section 2.3.13, "Testing Connectivity - Central Instance and Database Server" on page 44.

The steps needed for SAP R/3 installation are as follows:

- Install the SAP R/3 central instance; see section 2.4.3, "Installing the SAP R/3 Central Instance with AIX" on page 47.

- Test the ICLI client/server connection; see section 2.4.4, "Testing Connectivity between ICLI Client and ICLI Server" on page 49.

- Build and load the database; see section 2.5, "Build and Load the Database" on page 50.

2.4.3 Installing the SAP R/3 Central Instance with AIX

The central instance is installed as a standard SAP R/3 installation using the command R3SETUP -f CENTRAL.R3S -g <INSTGUI_host>:<port>.

Follow the procedure described in *R/3 Installation on UNIX: DB2 for OS/390*.

2.4.3.1 Binding Plans for the ICLI Server

┌─ **References** ──┐
│   │
│ • *R/3 Installation on UNIX: DB2 for OS/390*, Material Number: 51002659 │
│ • *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*, │
│   SC33-7962   │
│ • *BC SAP Database Administration Guide: DB2 for OS/390*, Material │
│   Number: 51002651   │
│   │
└──┘

During the central instance installation, R3SETUP generates the bind JCL and SQL for the plans used by the ICLI server. Since the SQL requires modification, R3SETUP will prompt you to stop the installation process and perform the required changes. Pages 4-9 of *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B* discuss the necessary changes in detail. Briefly, the required SQL changes are as follows:

- Create a total number of plans that is equal to the number of work processes on the application server, plus 10.

- Rename the plans to be the last 5 characters of the application server hostname plus a 3-digit sequential number starting with 000.

- Do not delete the plan named FOMEP40B, as this is the default plan to be used by the system when the work process plans are not appropriate or available.

We stopped the installation when prompted, modified FOMEBIND.jcl in the installation directory, and restarted R3SETUP. Figure 44 is an example of the JCL and SQL that R3SETUP uses to bind the plans for the ICLI server.

```
//FOMEBIND JOB USER=&USERID,NOTIFY=&USERID,CLASS=A,MSGCLASS=H,
//         MSGLEVEL=(1,1)
//BIND000   EXEC PGM=IKJEFT01
//STEPLIB  DD  DISP=SHR,DSN=DB2V510.SDSNLOAD
//SYSPRINT DD  SYSOUT=*
//SYSTSPRT DD  SYSOUT=*
//SYSTSIN  DD  *
  DSN SYSTEM(DB2R)
    BIND PLAN(<plan name>) MEMBER(FOME40B1,FOME40B2) -
         LIBRARY('SYS1.SAMPLIB') -
         ACTION(REPLACE) ISOLATION(CS) DYNAMICRULES(RUN) -
         ACQUIRE(USE) RELEASE(COMMIT) -
         CURRENTDATA(NO) KEEPDYNAMIC(YES) -
         OWNER(SAPR3)
  END
/*
```

Figure 44. Bind JCL for ICLI Server(FOMEBIND.jcl)

2.4.3.2 Granting Authorities for the ICLI Server

> **References**
>
> - *R/3 Installation on UNIX: DB2 for OS/390*, Material Number: 51002659
> - *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*, SC33-7962
> - *BC SAP Database Administration Guide: DB2 for OS/390*, Material Number: 51002651

All SAP R/3 DB2 objects are owned by one DB2 user, SAPR3. The user ID running the ICLI server (ICLIRUN) must change its CURRENT SQLID to SAPR3 to access the database. During the installation of the central instance, R3SETUP generates the grant JCL and SQL required for the ICLI server. Since the SQL requires modification, R3SETUP will prompt you to stop the installation process and perform the required changes. When prompted, we stopped the R3SETUP process and modified FOMEGRNT.jcl in the installation directory, adding EXECUTE statements for all of the plan names we created with the bind job. Refer to 2.3.8.1, "Define the Environment File" on page 38 for more detail.

Notes:

1. Do not create logon IDs of SAPR3 or ICLIRUN. There is a risk that such logon users could get the authorities intended solely for the ICLI server. This would risk the integrity of the R/3 data.

2. Assigning a secondary authorization ID of SAPR3 to ICLIRUN is an alternative and this is what is recommended in *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*, SC33-7962.

3. Since ICLIRUN is not a defined as a logon user, we needed another user ID with SYSADM authority for database administration. We used the standard DB2 administrator, SYSADM.

R3SETUP used the JCL shown in Figure 45 on page 49 to grant the DB2 authorities required by the ICLI server.

```
//FOMEGRNT JOB USER=&USERID,NOTIFY=&USERID,CLASS=A,MSGCLASS=H,
//          MSGLEVEL=(1,1)
//DBGRANT  EXEC PGM=IKJEFT01
//STEPLIB DD DISP=SHR,DSN=DB2V510.SDSNLOAD
//SYSPRINT DD  SYSOUT=*
//SYSTSPRT DD  SYSOUT=*
//SYSIN    DD  *
    GRANT EXECUTE ON PLAN <plan name> TO ICLIRUN;
    GRANT EXECUTE ON PLAN FOMEP40B TO ICLIRUN;
    GRANT TRACE,MONITOR1,MONITOR2 TO ICLIRUN;
    GRANT CREATESG TO SAPR3;
    GRANT CREATEDBA TO SAPR3;
    GRANT USE OF ALL BUFFERPOOLS TO SAPR3;
    GRANT SELECT ON TABLE SYSIBM.SYSCOPY TO SAPR3;
    GRANT SELECT ON TABLE SYSIBM.SYSCOLUMNS TO SAPR3;
    GRANT SELECT ON TABLE SYSIBM.SYSFIELDS TO SAPR3;
    GRANT SELECT ON TABLE SYSIBM.SYSINDEXES TO SAPR3;
    GRANT SELECT ON TABLE SYSIBM.SYSINDEXPART TO SAPR3;
    GRANT SELECT ON TABLE SYSIBM.SYSKEYS TO SAPR3;
    GRANT SELECT ON TABLE SYSIBM.SYSSYNONYMS TO SAPR3;
    GRANT SELECT ON TABLE SYSIBM.SYSTABLEPART TO SAPR3;
    GRANT SELECT ON TABLE SYSIBM.SYSTABLES TO SAPR3;
    GRANT UPDATE ON TABLE SYSIBM.SYSTABLES TO SAPR3;
    GRANT INDEX ON TABLE SYSIBM.SYSTABLES TO SAPR3;
    GRANT SELECT ON TABLE SYSIBM.SYSTABLESPACE TO SAPR3;
    GRANT INDEX ON TABLE SYSIBM.SYSTABLESPACE TO SAPR3;
    GRANT SELECT ON TABLE SYSIBM.SYSDATABASE TO SAPR3;
    GRANT SELECT ON TABLE SYSIBM.SYSSTOGROUP TO SAPR3;
    GRANT SELECT ON TABLE SYSIBM.SYSVOLUMES TO SAPR3;
    GRANT SELECT ON TABLE SYSIBM.SYSCOLDIST TO SAPR3;
    GRANT SELECT ON TABLE SYSIBM.SYSVIEWS TO SAPR3;
    GRANT SELECT ON TABLE SYSIBM.SYSVIEWDEP TO SAPR3;
/*
//SYSTSIN  DD  *
 DSN SYSTEM(DB2R)
   RUN  PROGRAM(DSNTIAD) PLAN(DSNTIA51) -
        LIB('DB2V510U.RUNLIB.LOAD')
 END
/*
```

Figure 45. ICLI Server Grant JCL and SQL

2.4.4 Testing Connectivity between ICLI Client and ICLI Server

When the installation of the central instance is finished, and the ICLI server has been started on the database server, you can test the connection between the central instance and the database server. This is done using the R3trans -x command.

The command and the output from the command after a successful connection are shown in Figure 46.

```
redadm 1> /sapmnt/RED/exe/R3trans -x
This is /sapmnt/RED/exe/R3trans version 6.03 (release 40B - 30.04.98 - 15:00:54)
.
/sapmnt/RED/exe/R3trans finished (0000).
```

Figure 46. R3trans Command

A return code of 0 is expected. If you do not get the return code of 0, then do not proceed to install the database until the problem is fixed and R3trans gives a return code of 0.

2.5 Build and Load the Database

This section describes the steps necessary to build and load the DB2 for OS/390 database:

1. Database Build

   See section 2.5.1, "Starting the Database Installation."

2. Database Load

   See section 2.5.3, "Loading the Database" on page 54.

3. Update DB2 statistics

   See section 2.5.4, "Update Catalog Statistics" on page 57.

2.5.1 Starting the Database Installation

```
┌─ Reference ────────────────────────────────────────────────────────┐
│                                                                      │
│  •  R/3 Installation on UNIX: DB2 for OS/390, Material Number: 51002659 │
│                                                                      │
└──────────────────────────────────────────────────────────────────────┘
```

```
┌─ Important ─────────────────────────────────────────────────────────┐
│                                                                       │
│  Check that the ICLI connection with the OS/390 host is up and running.  See │
│  section 2.4.4, "Testing Connectivity between ICLI Client and ICLI Server" on │
│  page 49.                                                             │
│                                                                       │
└───────────────────────────────────────────────────────────────────────┘
```

The following command starts the build and load database phase:
/<kernel-cd>/UNIX/DATABASE.SH.

After the script has copied the installation tool to the working directory, it offers to start R3SETUP. If you do not want to modify the command file, choose yes. The script will then start R3SETUP. R3SETUP will offer to start the graphical tool INSTGUI; choose yes if you want the graphical installation tool.

If you do not choose to start R3SETUP after it has been copied to the working directory, you can start the R3SETUP tool with the following command when needed: R3SETUP -f DATABASE.R3S.

If you encounter a problem during the loading of the database that requires that you start from the beginning again, use the /<kernel-cd>/UNIX/DBDROPE.SH command to create the necessary command file for dropping the database. The command file can be started with the command: R3SETUP -f DBDROP.R3S.

2.5.1.1 Troubleshooting
The progress of the installation is written to the log file DATABASE.log.
Figure 47 on page 51 shows an extract of the information contained in this log.

```
INFO 1998-06-22 14:27:36 DATABASEINSTANCE_IND_DB2 InternalWarmKeyCheck:0
    The installation phase is starting now. Please look in the log
    file for further information about current actions.

INFO 1998-06-22 14:27:36
    Requesting Installation Details

INFO 1998-06-22 14:27:36
    Reading and Checking DB2 for OS/390 Specific Keys

INFO 1998-06-22 14:27:36
    Creating the R/3 Administration Group sapsys

INFO 1998-06-22 14:27:36
    Creating the R/3 Administration User

INFO 1998-06-22 14:27:36
    Checking DB2 for OS/390 Parameters

INFO 1998-06-22 14:27:36
    Preparing JCL Submission Service

INFO 1998-06-22 14:27:36
    Exit to Adapt jobcard.tpl

INFO 1998-06-22 14:27:36
    Multiplying the Jobcard
 .
 .
 .
```

Figure 47. Example of Information in the DATABASE.log File

2.5.2 Database Build

This step creates the database layout, and uses the layout to create the different DB2 storage groups (stogroups) and tablespaces via SQL statements.

2.5.2.1 Creating Jobcard

> **Important**
>
> Make sure that the JOB CARD is correctly set. It is important that the JOBCLASS and MSGCLASS are defined on the OS/390 side.
>
> Make sure that the MSGCLASS has the HOLD option, otherwise the ICLI cannot get the return code status.

R3SETUP executes the PGM IEFBR14. This job is only used to test ICLI's ability to retrieve the return code from jobs on OS/390, and return it to the central instance. An extract of the output messages in the DATABASE.log file for this IEFBR14 test is shown in Figure 48 on page 52.

```
INFO 1998-06-18 12:10:52
    CREATETESTJCLSS_IND_DB2

INFO 1998-06-18 12:10:52
    Testing JCL Submission Service

INFO 1998-06-18 12:10:55 TESTJCLSSEXE_IND_DB2 RunAsynJobs:0

    Job ./iefbr14.jcl with jobid 1238 finished, retrieve output.

INFO 1998-06-18 12:10:56 TESTJCLSSEXE_IND_DB2 RunAsynJobs:0

    Execution of job ./iefbr14.jcl with jobid 1238 successful,
    condition code = 0.

INFO 1998-06-18 12:10:57 TESTJCLSSEXE_IND_DB2 RunAsynJobs:0

    All 1 started processes ended successfully.
```

Figure 48. DATABASE.log - JCL Submission Test

2.5.2.2 Design of Database

The file VOLUMES.PFL was copied by R3SETUP from
/<kernel-cd>/OS390/DBTOOLS to the file volumes.pfl in the installation work
directory. The file volumes.pfl must be adjusted so that it matches your local
hardware definition. The adjustment must be done before the database build is
started. The file volumes.pfl we used is shown in Figure 49. :i1,disk space
requirements

```
# volume profile
#
#       volid    size in kByte
volume  SAP001   2100000
volume  SAP002   2100000
volume  SAP003   2100000
volume  SAP004   2100000
volume  SAP005   2100000
volume  SAP006   2100000
volume  SAP007   2100000
```

Figure 49. volume.pfl Profile

The size in kByte field is the free space available on each volume. The total
must be greater than the size required for the installation. Total size of data
base from the SAP R3 4.0B installation CD is near 12.5GB.

Recommendation

Make sure that you have more than enough DASD space available for the
database load.

We found that it was a good idea to enter a smaller amount of free space
than the real free space available on each volume. We had empty disks, but
kept some capacity hidden from R3SETUP.

Note: Some installations have experienced difficulties because of the large
numbers of datasets contained on the SAP R/3 volumes and the space allocated
for the table of contents (VTOC) on the volumes. Allocate a large VTOC on each

volume. Refer to chapter 2.3.1, "DASD Initialization on Database Server" on page 19.

In Figure 50 you can see an extract of the information regarding the checking for space on OS/390.

```
INFO 1998-06-22 14:27:36
    Creating SQL File for Build Phase

INFO 1998-06-22 14:27:37 DBLAYOUT_IND_DB2 InternalInstallationDo:0

    Available space: 13230000 kB,
     Required space: 11476820 kB.

INFO 1998-06-22 14:27:37 DBLAYOUT_IND_DB2 InternalInstallationDo:0

    Average temperature per volume is 782.142857.
    Variation of average temperature per volume is 7.220799.

INFO 1998-06-22 14:27:37 DBLAYOUT_IND_DB2 InternalInstallationDo:0

    Average space utilisation per volume is 1639545.714286.
    Variation of average space utilisation per volume is 68120.869541.
```

Figure 50. DATABASE.log for Checking Space on OS/390 Volumes

2.5.2.3 Database Layout

Before the actual loading of data, R3SETUP creates an SQL file that builds the database. This file is called dblayout.sql. When R3SETUP executes the dblayout file, it goes through three different types of create statements:

1. Creating the DB2 storage groups

2. Creating the databases

3. Creating the table spaces

Figure 51 shows an extract from the DATABASE.log.

```
INFO 1998-06-22 14:29:26
    Executing Build Phase

INFO 1998-06-22 14:29:30 DBLAYOUTEXE_IND_DB2 InternalInstallationDo:0

    Statement(s)  CREATE STOGROUP DBTAB VOLUMES (
    SAP001,SAP002,SAP003,SAP004,SAP005,SAP006,SAP007 ) VCAT DB2V510U
    successfully executed.
 .
 .
INFO 1998-06-22 14:29:51 DBLAYOUTEXE_IND_DB2 InternalInstallationDo:0

    Statement(s)  CREATE DATABASE BTAB03 BUFFERPOOL BP3 STOGROUP
    IBTAB03  successfully executed.
 .
 .
INFO 1998-06-22 14:30:08 DBLAYOUTEXE_IND_DB2 InternalInstallationDo:0

    Statement(s)  CREATE TABLESPACE SBTAB03 IN BTAB03 USING STOGROUP
    DBTAB03 PRIQTY 000143229 SECQTY 000131068 ERASE NO LOCKSIZEO
    TABLESPACE LOCKMAX 0 BUFFERPOOL BP2 CLOSE YES COMPRESS NO SEGSIZE
    0000032 FREEPAGE 16 PCTFREE 20  successfully executed.y executed.
```

Figure 51. Example from DATABASE.log - Creating Database Objects

2.5.3 Loading the Database

After building the database using the dblayout.sql command file, R3SETUP starts loading the database. Database loading is divided into 14 different processes. R3SETUP starts each of these processes, and keeps track with the progress of each process. Each process has a specific command file that is executed.

2.5.3.1 Logging during Database Load

The main log in the load phase is the log file DATABASE.log. In this file R3SETUP logs activity of the started processes. Every load process started by R3SETUP also has a log file. In those log files you will find information specific to the tables loaded with that process.

Figure 52 shows the different command files and the logs involved. Figure 53 on page 55 shows an example of the information in one of the process log files. Figure 54 on page 55 shows an extract of the information in the DATABASE.log file during the load phase.
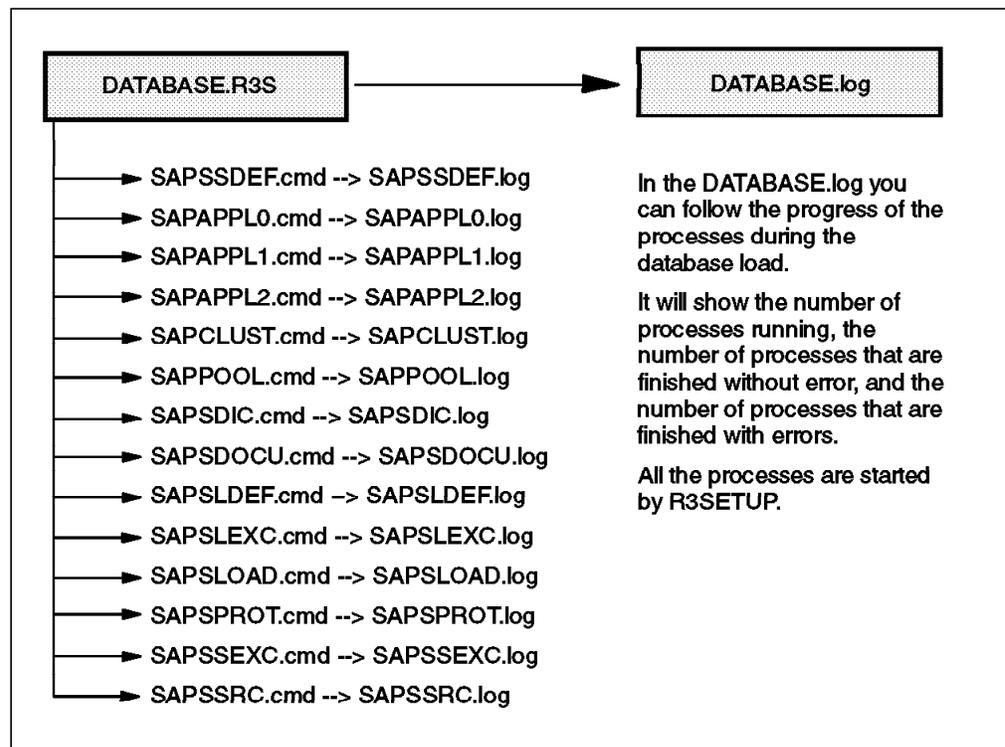
Figure 52. R3SETUP Command Files and Logs

```
#START OF LOG: 19980622180351

# R3load version @(#)R3load.c       20.71.26.1    SAP      98/05/15
# Process ID: 12350
# R3load -i  SAPSSRC.cmd -p SAPSSRC.log

### start of syntax check ###

### end of syntax check ###

#START: 19980622180403
(IMP) TABLE: "APTREE"
#Trying to create primary key "APTREE˜0"
(IMP) PRKEY: "APTREE˜0"
#Trying to create index "APTREE˜001"
(IMP) INDEX: "APTREE˜001"
TAB: APTREE
FIL: /sap_inst/dbexport2/DATA/SAPSSRC.001 #19980622180422
EOT: APTREE
(IMP) DATA: 1531 rows in table "APTREE" #19980622180425

 .
 .
```

Figure 53. Example from SAPSSRC.log - Database Load Phase

```
INFO 1998-06-22 14:47:35
    Loading Data with R3load

INFO 1998-06-22 14:47:35 DBR3LOADEXEC_IND_DB2 OptionSet:0
    No database dependent options for DB2.

INFO 1998-06-22 14:47:35 DBR3LOADEXEC_IND_DB2 R3loadOptionSet:0
    No additional R3load Option set.

INFO 1998-06-22 14:47:35 DBR3LOADEXEC_IND_DB2 R3loadPreFork:0
    R3load -i  SAPSSDEF.cmd -p SAPSSDEF.log

INFO 1998-06-22 14:47:35 DBR3LOADEXEC_IND_DB2 SyGroupIDGet:200
    Determining group id for group sapsys ...

INFO 1998-06-22 14:47:35 DBR3LOADEXEC_IND_DB2 SyGroupIDGet:300
    Group id for group sapsys is 500.

INFO 1998-06-22 14:47:35 DBR3LOADEXEC_IND_DB2 SyUserIDGet:200
    Determining user id for user redadm ...

INFO 1998-06-22 14:47:35 DBR3LOADEXEC_IND_DB2 SyUserIDGet:300
    User id for user redadm is 500.

INFO 1998-06-22 14:47:35 DBR3LOADEXEC_IND_DB2 R3loadFork:0
    INFO: Total number of processes: 1
    INFO: 0 process(es) finished successfully:
    INFO: 0 process(es) finished with errors:
    INFO: 1 process(es) still running: 0
 .
 .
 .

INFO 1998-06-22 18:03:51 DBR3LOADEXEC_IND_DB2 R3loadFork:0
    INFO: Total number of processes: 14
    INFO: 4 process(es) finished successfully: 0 4 10 11
    INFO: 0 process(es) finished with errors:
    INFO: 10 process(es) still running: 1 2 3 5 6 7 8 9 12 13
 .
 .
 .
```

Figure 54. Extract from DATABASE.log - Database Load Phase

2.5.3.2 Restarting the Load Phase

If one of the processes dies during the load, you have to restart the R3SETUP process. When you do this, R3SETUP will start each process again. Every process will check in the log file for the work it has done to date. If the process previously finished successfully, it will say so and terminate. If the process was stopped by an error, the process deletes the table it was loading when the failure occurred. Then the process creates the table and starts loading it.

R3SETUP can be started as many times as needed to successfully complete all the load processes. When all of the load processes are complete, R3SETUP begins the next stage.

Figure 55 shows an extract of the log from a restarted process.

```
#START OF LOG: 19980623064113

# R3load version @(#)R3load.c        20.71.26.1     SAP      98/05/15
# Process ID: 16284
# R3load -i  SAPSSEXC.cmd -p SAPSSEXC.log -r

### start of syntax check ###

### end of syntax check ###

### trying to restart import ###
(RIM) INFO: table "D010TAB" truncated

### restart finished ###
#START: 19980623064204
TAB: D010TAB
FIL: /sap_inst/dbexport2/DATA/SAPSSEXC.001 #19980623064210
EOT: D010TAB
(IMP) DATA: 1063889 rows in table "D010TAB" #19980623075352

(IMP) TABLE: "D020S"
#Trying to create primary key "D020S~0"
(CS) INFO: modified secqty for D020S
(IMP) PRKEY: "D020S~0"
TAB: D020S
FIL: /sap_inst/dbexport2/DATA/SAPSSEXC.001 #19980623075354
EOT: D020S
(IMP) DATA: 55422 rows in table "D020S" #19980623075441

(IMP) TABLE: "D020T"
#Trying to create primary key "D020T~0"
(CS) INFO: modified secqty for D020T
(IMP) PRKEY: "D020T~0"
TAB: D020T
FIL: /sap_inst/dbexport2/DATA/SAPSSEXC.001 #19980623075443
EOT: D020T
(IMP) DATA: 89934 rows in table "D020T" #19980623075559
 .
 .
 .
R3load> Import terminated successfully
```

Figure 55. SAPSSEXC.log Restart Extract

2.5.4 Update Catalog Statistics

After the load phase, R3SETUP submits the RUNSTAT JCL to update catalog statistics. In our case, the job lasted one hour and a half.

> **Note**
>
> If you change the parameters on your job card, R3SETUP may not be able to find the status of the jobs, and may terminate this phase with a false failure. Check the condition code of the JOB in the OS/390 JOBLOG. If it is acceptable, change the status of your installation to DB-Stats-OK and restart R3SETUP.
>
> This could happen if your job card does not route output to a held queue or if the job name starts with letters other than those you told R3SETUP to use for this job submission; in this case, R3SETUP may not be able to find the job output. R3SETUP uses this output to determine the success of the RUNSTATS. If R3SETUP does not find the output or cannot submit the job, it will terminate this phase by a failure.

After a successful import, R3SETUP alters the table spaces, installs a temporary license, and tests an RFC connection.

The installation is then complete.

2.6 Completing the Installation

> **References**
>
> - *R/3 Installation on UNIX: DB2 for OS/390*, Material Number: 51002659
> - *OSS Note #98186-DB2/390: 4.0B R/3 Installation on UNIX or WinNT*

The following section lists the post-installation steps to finalize the installation; these are standard SAP R/3 steps.

2.6.1 Standard SAP R/3 Steps

See *R/3 Installation on UNIX: DB2 for OS/390* for the appropriate post-installation procedures. Among these procedures are the following:

- SAP login
- SAP license installation
- Configure the Correction and Transport System (with transaction SE06)
- Installing presentation servers
- Backup of databases
- Installing SAProuter code
- Verifying installation (with transaction SM28)
- Verifying owner of saposcol (root)
- Starting saposcol
- Establishing OSS Connection

- Importing fixes and hot packages

- Customizing profiles

- Altering the permission setting of /usr/sap/trans (to 771)

There was another problem fixed after we completed the installation:

- Application of OSS note #107952. The table INSTVERS was not correctly updated by R3SETUP during the installation. This caused the error message 'Your system has not been installed correctly'. Manual update of the table INSTVERS as described in the OSS note corrected the problem.

Chapter 3. Installation Using Windows NT

This chapter describes the activities we performed when we installed SAP R/3 on DB2 for OS/390 from a Windows NT application server in the ITSO environment. The activities involved with preparing OS/390 and DB2 for the installation are discussed in Chapter 2. Those procedures are the same for the Windows NT installation and will not be duplicated here. Refer to the appropriate sections in Chapter 2 for guidance.

As with the installation of SAP R/3 on AIX, the activities can be grouped into 5 phases:

1. During *Pre-Installation Checking*, we identified any additional software or fixes requiring installation prior to the SAP R/3 on DB2 for OS/390 installation.

2. During *Defining the Configuration*, we created a planning template to ensure that parameters defined during the prerequisite installation and the installation were consistent between the database server and the central instance.

3. During *Installing Prerequisites*, we installed the missing functions based on the findings in the *Pre-Installation Checking* phase.

4. During *Installing SAP R/3 on DB2 for OS/390*, we installed the SAP R/3 central instance, and built and loaded the database.

5. During *Completing the Installation*, we performed standard SAP R/3 post-installation.

The amount of work required will vary for each installation. We recommend that you allow ample time to carefully complete the first two phases to ensure that remaining phases will go smoothly.

Table 7 shows the tasks performed in each phase.

Table 7 (Page 1 of 2). Tasks to Be Performed for SAP R/3 on DB2 for OS/390 Installation	
Task	**Refer to:**

Pre-Installation Checking
• Obtain the planning and installation guides, and current versions of OSS notes. OSS notes can change daily.
 	
All necessary references materials are listed in a window box at the beginning of section 3.1, "Pre-Installation Checking" on page 61.
• Check hardware requirements:
 	
  – Central Instance
• Check software requirements:
 	
  – Central Instance
	3.1, "Pre-Installation Checking" on page 61
	
	3.1.1, "Central Instance Hardware We Used" on page 62
	
	3.1.2, "Central Instance Software We Used" on page 62

Defining the Configuration	3.2, "Defining the Configuration" on page 63

Table 7 (Page 2 of 2). Tasks to Be Performed for SAP R/3 on DB2 for OS/390 Installation	
Task	**Refer to:**
Installing Prerequisites	2.3, "Installing Prerequisites" on page 17
• On the database server:	
– Install required PTFs.	Refer to OSS Note #81737-DB2/390: APAR List
– Initialize DASD.	2.3.1, "DASD Initialization on Database Server" on page 19
– Configure OSA-2.	2.3.2, "Configuring OSA-2 on Database Server" on page 19
– Install DB2 for OS/390.	2.3.3, "Installing DB2 for OS/390" on page 20
– Configure SMS.	2.3.4, "Configuring SMS" on page 33
– Customize OpenEdition.	2.3.5, "Customizing OpenEdition" on page 33
– Customize TCP/IP.	2.3.6, "Customizing TCP/IP on Database Server" on page 34
– Customize High Speed UDP.	2.3.7, "Customizing High Speed UDP on Database Server" on page 35
– Customize ICLI Server.	2.3.8, "Customizing the ICLI Server" on page 38
– Customize RACF or equivalent.	2.3.9, "Customizing RACF or Equivalent" on page 39
• On the central instance:	
– Customize TCP/IP.	3.3.1, "Customizing TCP/IP on Central Instance" on page 66
– Customize High Speed UDP.	3.3.2, "Customizing High Speed UDP on the Central Instance" on page 67
– Set up ICLI Client.	3.3.3, "Setting Up the ICLI Client" on page 68
• Check database server and central instance communication.	
– Test TCP/IP connection.	3.3.4, "Testing Connectivity - Central Instance and Database Server" on page 69
Installing SAP R/3 on DB2 for OS/390 on Windows NT	3.4, "Installing SAP R/3 on DB2 for OS/390 Using Windows NT" on page 69
• SAP R/3 central instance installation.	3.4.3, "Installing the SAP R/3 Central Instance Using Windows NT" on page 72
• Test ICLI connection.	3.4.4, "Testing Connectivity between ICLI Client and ICLI Server" on page 74
• Build and load the database.	3.5, "Build and Load the Database" on page 75
Completing the Installation	3.6, "Completing the Installation" on page 75
• Standard SAP R/3 Steps.	3.6.1, "Standard SAP R/3 Steps" on page 75

3.1 Pre-Installation Checking

```
┌─ References ──────────────────────────────────────────────────┐
│                                                               │
│  •  SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B,│
│     SC33-7962                                                  │
│                                                               │
│  •  R/3 Installation on Windows NT: DB2 for OS/390, Material Number:│
│     51002660                                                  │
│                                                               │
│  •  Check List—Installation Requirements: DB2 for OS/390, Material Number:│
│     51002656                                                  │
│                                                               │
│  •  OSS Note #98186-DB2/390: 4.0B R/3 Installation on UNIX or WinNT│
│                                                               │
│  •  OSS Note #98711-Inst: 4.0B R/3 Installation on Windows NT │
│                                                               │
│  •  OSS Note #81737-DB2/390: APAR List                        │
│                                                               │
└───────────────────────────────────────────────────────────────┘
```

As a three-tier client/server application, SAP R/3 on DB2 for OS/390 requires some hardware and software to be set up on the database server, the central instance, and on the presentation server. It is also required to set up communication between them.

The document, *Check List—Installation Requirements: DB2 for OS/390*, contains the hardware and software requirements needed for SAP R/3 on DB2 for OS/390 .

As described in *Check List—Installation Requirements: DB2 for OS/390*, the database server for SAP R/3 on DB2 for OS/390 runs on any S/390 (or compatible) processor capable of supporting OS/390 Version 2.5.

Connectivity from the database server can be achieved in various ways:

- ESCON channel feature(s) on the S/390 database server and ESCON channel adapter(s) on the gateway AIX application server(s).

- FDDI OSA-2 feature(s) on the S/390 database server and FDDI LAN adapter(s) on the gateway AIX or NT application server(s).

- Fast Ethernet OSA-2 features on the S/390 database server and FAST Ethernet adapter(s) on the gateway AIX or NT application server(s).

- An ESCON, FDDI, or Fast Ethernet connection from the database server to a router (such as the IBM 2216 Multiprotocol Router) and a LAN connection from that router to the gateway application servers.

One of the means of connection in the preceding list must be used.

The central instance runs on any processor that supports AIX Version 4.2.1 or higher, or Windows NT Version 4.0, Build 1381. The Service Pack 3 products for Windows NT are recommended.

The presentation service runs on Windows 3.1, Windows 95, Windows NT, Motif(UNIX), OS/2, and MacIntosh. Note that a Java version of the GUI is now also available.

The publication, *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*, describes the preparatory steps and actual settings to be used during and after installation. The installation guide, *R/3 Installation on Windows NT: DB2 for OS/390*, directs you to use the values from the *SAP R/3 on DB2 for OS/390:*

Planning Guide SAP R/3 Release 4.0B over the ones it has listed in the case that any should differ. The *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B* will have the more recent information.

Review *OSS Note #98186-DB2/390: 4.0B R/3 Installation on UNIX or WinNT* and *OSS Note #98711-Inst: 4.0B R/3 Installation on Windows NT* to get the latest list of the installation requirements.

Review the *OSS Note #81737-DB2/390: APAR List* to get the latest information about the software fixes needed.

3.1.1 Central Instance Hardware We Used

We used an IBM PC 350 processor for the central instance, with 128MB of memory. We dedicated approximately 500MB of hard disk space for the SAP R/3 system, and approximately 1GB for swap space. These were verified as adequate by reviewing the *Check List—Installation Requirements: DB2 for OS/390*.

3.1.2 Central Instance Software We Used

On the central instance we had Windows NT Server Version 4.0 Build 1381 installed. We applied the recommended Service Pack 3.

> **Note**
>
> The help files for R3SETUP are needed during the installation. To read those files, an HTML browser is necessary. Therefore we installed Netscape onto the Windows NT Server.

3.2 Defining the Configuration

The hardware configuration for this environment was the same as the one shown in Figure 6 on page 15, except for the central instance, which was a Windows NT machine and not AIX.

To ensure consistency of definitions between the database server and central instance, we compiled all the definitions and parameters that require coordination in Table 8, Table 9, and Table 10. Note that in these tables, the IP addresses used for the FDDI connectivity are defined as 10.1.1.x; these addresses were chosen in order not to conflict with attached networks or known routings.

Table 8. Database Server User ID

Description	USER ID	TSO	OMVS
SAP DB owner	SAPR3	No	No
ICLI server	ICLIRUN	No	Yes
Submit job, and OpenEdition	SAPRES3	Yes	Yes

Table 9. TCP/IP Communication Definition

Description	Database Server	Central Instance
IP address	10.1.1.81	10.1.1.185
IP name	REDSAP	pcntsap1
Device address	22C4, 22C5	N/A

Table 10. Other Definitions

Parameter Description	Parameter Value
ICLI connection port	5531
ICLI keep alive port	5532
SAP system name	RED
SAP system number	00
DB2 subsystem name	DB2R
DB2 group attach name	RED
DB2 BSDS volume	TOTDB4
SAP R/3 - DB2 volumes	SAP001, SAP002, SAP003, SAP004 SAP005, SAP006, SAP007

3.3 Installing Prerequisites

The prerequisites installation can be divided into two separate tasks:

- The installation on the database server
- The installation on the central instance

The installation on the database server is covered in Chapter 2 and so those steps will not be duplicated here. Please refer to the Chapter 2 sections we have cited for guidance.

In the prerequisites installation, some parameters must match between the database server and the central instance. Use Table 8 on page 63, Table 9 on page 63, and Table 10 on page 63 as references when installing the prerequisites.

Installation on the Database Server

Based on our findings during the Pre-installation Checking phase, we planned additional tasks to be done prior to the SAP R/3 on DB2 for OS/390 installation.

Following are the tasks we performed during our installation.

1. Initialize DASD

   See 2.3.1, "DASD Initialization on Database Server" on page 19.

2. Configure OSA-2

   See 2.3.2, "Configuring OSA-2 on Database Server" on page 19.

3. Install DB2 for OS/390

   See 2.3.3, "Installing DB2 for OS/390" on page 20.

4. Configure SMS

   See 2.3.4, "Configuring SMS" on page 33.

5. Customize OS/390 OpenEdition

   See 2.3.5, "Customizing OpenEdition" on page 33.

6. Customize TCP/IP

   See 2.3.6, "Customizing TCP/IP on Database Server" on page 34.

7. Customize High Speed UDP

   See 2.3.7, "Customizing High Speed UDP on Database Server" on page 35.

8. Set up ICLI Server

   See 2.3.8, "Customizing the ICLI Server" on page 38.

9. Customize RACF

   See 2.3.9, "Customizing RACF or Equivalent" on page 39.

Installation on the Central Instance

The following tasks were done on the central instance:

1. Customize TCP/IP

   See 3.3.1, "Customizing TCP/IP on Central Instance" on page 66.

2. Customize High Speed UDP

See 3.3.2, "Customizing High Speed UDP on the Central Instance" on page 67.

3. Set up the ICLI Client

See 3.3.3, "Setting Up the ICLI Client" on page 68.

Note: Because the ICLI code is supplied from OS/390, this step could only be done *after* the connection with the database server was set up.

Database Server and Central Instance Connectivity Testing

There will be an opportunity to test basic LAN connectivity on both the database server and central instance once all prerequisites have been installed. If possible, it should be verified that you are able to reach at least one other remote IP address on the same network prior to checking connectivity between the central instance and database server. Refer to 2.3.7.3, "Testing the Database Server High Speed UDP Connection" on page 37 and 3.3.2.1, "Testing the Central Instance High Speed UDP Connection" on page 67 for the correct procedures.

After each network connection has been verified, you can test connectivity between the database server and the central instance. Refer to 3.3.4, "Testing Connectivity - Central Instance and Database Server" on page 69 for the correct procedure.

Once the connection between the central instance and the database server has been verified, you start the R/3 installation process. R3SETUP will configure the ICLI client during the Central Instance installation phase. When this phase completes, you can check the communication between the ICLI server and ICLI client with the R3trans -x command. Refer to 3.4.4, "Testing Connectivity between ICLI Client and ICLI Server" on page 74.

3.3.1 Customizing TCP/IP on Central Instance

```
┌─ References ──────────────────────────────────────────────────┐
│                                                               │
│  •  SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B, │
│     SC33-7962                                                  │
│  •  R/3 Installation on Windows NT: DB2 for OS/390, Material Number: │
│     51002660                                                  │
│                                                               │
└───────────────────────────────────────────────────────────────┘
```

To customize TCP/IP on the NT Central instance, there are three required activities.

 1. Install Token Ring adapter.
 2. Configure the Token Ring address via the installation disks and the Windows NT control panel.
 3. Add entries to the hosts and services files for SAP.

We will assume that the Token Ring adapter has been installed using the driver disks from the manufacturer.

After that, the Token Ring interface must be configured/verified so that the central instance can communicate with SAP frontends and the database server TCP/IP stack. Invoke the control panel via the following path.

```
->Start
->Settings
->Control Panel
```

Double click on the Network icon, and select the **protocols** tab. Select **TCP/IP Protocol** and click on the **properties** button. There should be a pull-down list of installed adapters. Enter/verify the correct IP address and subnet mask for the Token Ring adapter. This will be the address used by the Token Ring interface with SAP frontends and the database server. The system must be rebooted for the changes to take effect. On the central instance, we modified only the hosts file in the C:\WINNT\system32\drivers\etc\ directory. The R3SETUP tool adds the appropriate ICLI client and keep-alive port entries to the services file in the same directory, and creates the Tpparam.nt file in the C:\USR\SAP\RED\sys\exe\run\ directory.

3.3.1.1 Hosts File
We added the following entries to the /etc/hosts file:

```
# Added to make this the central transport host for this system
9.12.0.235    pcntsap1   SAPTRANSHOST
# Added to make this for the High Speed UDP connection to the OS/390
10.1.1.81     redsap
```

3.3.1.2 Services File
R3SETUP adds the following entries to the services file:

```
# SAP specific services
sapdp00                 3200/tcp           # SAP R/3 dispatcher ports
  |                       |
  v                       v
sapdp99                 3299/tcp
sapgw00                 3300/tcp           # SAP R/3 gateway ports
  |                       |
  v                       V
sapgw99                 3399/tcp
```

```
sapmsRED                3600/tcp          # SAP R/3 message server port
# ICLI specific services
sapdb2RED               5531/udp          # ICLI port
iclikaRED               5532/udp          # ICLI Keep Alive Port
```

3.3.1.3 TPPARAM File

R3SETUP creates the Tpparam.nt file in the C:\USR\SAP\RED\sys\exe\run\
directory during the central instance installation. R3SETUP did not add any
entries to the file.

3.3.2 Customizing High Speed UDP on the Central Instance

> **References**
>
> • *Check List—Installation Requirements: DB2 for OS/390*, Material Number:
>   51002656
> • *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*,
>   SC33-7962
> • *BC SAP Database Administration Guide: DB2 for OS/390*, Material
>   Number: 51002651

To customize High Speed UDP on the central instance, there are two required
activities.

1. Install FDDI adapter.
2. Configure the FDDI address via the installation disks and the Windows NT
   control panel.

We will assume that the FDDI adapter has been installed using the driver disks
from the manufacturer.

After that, the FDDI interface must be configured/verified so that the central
instance can communicate with the database server. Invoke the control panel
via the following path.

```
->Start
->Settings
->Control Panel
```

Double click on the Network icon, and select the **protocols** tab. Select **TCP/IP
Protocol** and click on the **properties** button. There should be a pull-down list of
installed adapters. Enter/verify the correct IP address and subnet mask for the
FDDI LAN adapter. This will be the address used by the HPDT UDP interface
with the database server. The system must be rebooted for the changes to take
effect.

3.3.2.1 Testing the Central Instance High Speed UDP Connection

The High Speed UDP connection on the central instance can be checked using
the ping command from a DOS command prompt as shown in Figure 56 on
page 68. Note that the target IP address is not that of the Database Server.
Ideally, there will be another remote IP address on the FDDI LAN that is known
to be working. This IP address can be used to verify that the connection to the
LAN has been established. Once that has been confirmed, you can check the
connectivity between the central instance and database server. If another IP
address is not available, you may attempt to verify connectivity by using the ping
command directly between the central instance and database server, but it can

be very difficult to diagnose connectivity problems by simply attempting to ping
back and forth between the two new connections.

```
C:USERS>ping -c 1 10.1.1.100

Pinging 10.1.1.100 with 32 bytes of data:

Reply from 10.1.1.100: bytes=32 time<10ms TTL=255
Reply from 10.1.1.100: bytes=32 time<10ms TTL=255
Reply from 10.1.1.100: bytes=32 time<10ms TTL=255
Reply from 10.1.1.100: bytes=32 time<10ms TTL=255
```

Figure 56. Checking the Central Instance High Speed UDP Connection

3.3.3 Setting Up the ICLI Client

> **References**
>
> - *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*,
>   SC33-7962
> - *BC SAP Database Administration Guide: DB2 for OS/390*, Material
>   Number: 51002651

The ICLI client code is provided in the OS/390 PTF containing the ICLI server.
The executables FOME40BN(client) and FOME40BL(keep alive) can be found in
the <HLQ>.SFOMDATA, where HLQ is the High Level Qualifier for your
OpenEdition application services datasets. R3SETUP will download these to the
C:\USR\RED\<SAPSID>\exe\run\ directory and rename FOME40BN to
ibmiclic.dll and FOME40BL to ibmiclika.exe.

3.3.3.1 ICLI Client Code
The ICLI client code is downloaded by R3SETUP from the OS/390 system during
the installation of the central instance.

If the ICLI server on the OS/390 system is changed, you will have to manually
transfer the members FOME<REL>A and FOME<REL>K from the OS/390
SYS1.SFOMDATA dataset to the central instance. Rename FOME<REL>A to
ibmiclic.o and FOME<REL>K ibmiclika, and place them in the
\usr\sap\<SAPSID>\exe\run\dbg directory.

> **Note**
>
> - <sapsid> is the SAP system name in lowercase.
>
> - <SAPSID> is the SAP system name in uppercase.

3.3.3.2 Changing TPPARAM
ICLI uses a special connection port for the database traffic between the central
instance and database server. This connection port is specified in the services
file in the the C:\winnt\system\drivers\etc\ directory, and must match the port
specified on the database server either by the *PORT* argument to the fome40bs,
or in one of the services files. See 3.3.1, "Customizing TCP/IP on Central
Instance" on page 66.

In our case, this was specified via the *PORT* argument to the `fome40bs` command in the ICLI server started task. The number can be freely chosen from the numbers not yet used. For more information, see section 2.3.6.1, "Service Name and Port Entries" on page 34.

3.3.4 Testing Connectivity - Central Instance and Database Server

The connectivity between the database server and the central instance can be tested by using the `ping` command from the central instance and the `oeping` command from the database server.

To test the High Speed UDP protocol, we performed these commands:

- From the central instance:

    `ping 10.1.1.81`

- From within OpenEdition on the database server:

    `oeping -c 1 10.1.1.185`

If the `ping` and `oeping` commands are successful, then the connectivity between the database server and the central instance has been established.

3.4 Installing SAP R/3 on DB2 for OS/390 Using Windows NT

> **Reference**
>
> - *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*, SC33-7962
>
> - *R/3 Installation on Windows NT: DB2 for OS/390*, Material Number: 51002660

This section describes the actual steps we performed during the installation of SAP R/3 on a Windows NT central instance.

3.4.1 General Notes on Installation Using Windows NT

Beginning with SAP R/3 40A, SAP R/3 does not use the R3INST utility for installation. R3INST is an installation tool used on earlier releases. The new installation tool is called R3SETUP. It has a real graphical interface which provides a comfortable look and feel. It also provides integrated help documentation and the ability to view the activity log during and after installation.

The R3SETUP tool is installed into installation directory on the central instance using the R3SETUP.BAT DOS batch file. This will install the R3SETUP.EXE program and create command files for specific installations based on various template files. The R3SETUP.BAT file and the templates can be found in the C:\<kernel-CD>\NT\COMMON\ directory.

Table 11 on page 70 summarizes the SAP-supplied command files created by the R3SETUP.BAT batch file. The command files are created in the installation work directory.

Table 11. R3SETUP Command Files	
Command file	**Description**
CENTRAL.R3S	For installing central instance with database
DATABASE.R3S	For installing database
DBDROP.R3S	Dropping Database
DIALOG.R3S	For installing dialog instance without central instance

The original {unmodified} command files generated, can be found in Appendix B, "Installation Command Files" on page 145.

3.4.2 Hints and Tips - Installing Using Windows NT

1. There is a large amount of print documentation for the installation and related topics contained in the \docu directory on the DB EXPORT1 CD. All of it can be viewed and printed with Acrobat Reader, which can be obtained from the \docu\viewer directory of the same CD. We obtained our copies of *Check List—Installation Requirements: DB2 for OS/390* and *R/3 Installation on Windows NT: DB2 for OS/390* in this way.

2. Make sure that the worksheet has been prepared before executing the installation shell script and R3SETUP.

3. Make sure that you choose a hostname of 8 characters or less.

4. If you make a mistake in typing an answer during the build process of the command file, re-execute the build process from the beginning. One way to do this is to rename the current command file, CENTRAL.R3S for example. Then rename the initial command file CENTRRAL.R3S.1 to CENTRAL.R3S.

5. The command file will be updated by the R3SETUP program during the install process.

6. To view the R3SETUP documentation and help files, you will need a browser that supports frames, such as Netscape.

7. To use the transport system, the installation guide instructs you to designate a central transport host known to the Domain Name Server (DNS) for all Windows NT systems. This involves creating the entry 'ALIAS SAPTRANSHOST' on the DNS for the central transport host. Since ours was a standalone installation, we simply created the the following entry in our 'hosts':

   9.12.0.235 pcntsap1   SAPTRANSHOST

   We also had to create the \USR\SAP and \USR\SAP\TRANS directories, and set up \USR\SAP as share SAPMNT. This can be done using NT Explorer. Right click on the \USR\SAP directory and go to Sharing, then pick the **Sharing** tab. Select the **Shared as** radio button and enter SAPMNT.

8. There is some confusion as to which user to log on with for each phase of the installation. It was our experience that after we had installed the R3SETUP tool onto the local hard disk, we *did not* have to logoff and logon as <SID>ADM to perform the central instance installation. However, we did indeed have to be logged on as <SID>ADM to run the database installation.

9. Although not mentioned in the documentation, the Local Group named Power Users was necessary for creation of the SAP Service Account, and had to be created manually.

10. The R3SETUP tool created the SAP Service Account, but not correctly. Modify the user via the User Manager for Domains. Highlight the user and select **User->Properties**. Make sure that the only checkboxes selected are **User Cannot Change Password** and **Password Never Expires**. We also reset the password, which may not be necessary.

11. Every time R3SETUP is restarted, it will copy the log from the last run to a different file. The current log file will always have the name <command file>.log, while the old log is named <command file>.log.<number>. The file with the highest number will be the newest old log file.

12. The R3SETUP tool will, by default, attempt to copy the DB EXPORT 1 CD to a local hard disk. If you do not want to do this, edit the DATABASE.R3S command file after it has been created by R3SETUP. Find the section CDSERVER_IND_DB2 and delete the line beginning with 1_COPY.

13. We recommend that you make sure you allocate ample space for the SYSVIEWS table during the installation of DB2. We ran out of extents multiple times during our installation.

14. The percentage indication on the INSTGUI does *not* show the percentage of the actual work completed in hours, instead it shows the percentage of steps completed.

    For example, in the database installation during the database load, the percentage indication will stay in 53% completed because you have finished 18 steps of 33 steps; then the percentage indication will jump to 57% after finishing the load of the database. However, you have completed significantly more than 57% of the work of installing the database.

15. Each phase of the database load has a unique name. This name is assigned to the load process and log associated with a particular phase. If an error occurs with one of the processes, you must check *two* log files: The DATABASE.log and the <process name>.log.

16. You will most likely have to install the new version of the SAP GUI or SAPLOGON to be able to logon. Our 3.1G version did not allow us to logon the system. The software can be found on the Presentation CD in the gui directory. Go to the appropriate subdirectory for your platform (OS2, UNIX or Windows), and execute the installation program.

Reference
- *R/3 Installation on Windows NT: DB2 for OS/390*, Material Number: 51002660

The SAP R/3 on DB2 for OS/390 installation can only be started if the network connection has been established between the database server and the central instance. Refer to section 2.3.13, "Testing Connectivity - Central Instance and Database Server" on page 44.

The steps needed for SAP R/3 installation are as follows:

- Install the SAP R/3 central instance; see section 3.4.3, "Installing the SAP R/3 Central Instance Using Windows NT" on page 72.

- Test the ICLI client/server connection; see section 3.4.4, "Testing Connectivity between ICLI Client and ICLI Server" on page 74.

- Build and load the database; see section 3.5, "Build and Load the Database" on page 75.

3.4.3 Installing the SAP R/3 Central Instance Using Windows NT

The central instance is installation is started from the NT Start menu. Choose **Programs** -> **SAP R3 setup** - **Central Instance**. R3SETUP will open the R3SETUP GUI window along with a second, less important, Command Prompt window showing which step of the command file is being executed.

Follow the procedure described in *R/3 Installation on Windows NT: DB2 for OS/390*.

3.4.3.1 Binding Plans for the ICLI Server

References

- *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*, SC33-7962
- *R/3 Installation on Windows NT: DB2 for OS/390*, Material Number: 51002660
- *BC SAP Database Administration Guide: DB2 for OS/390*, Material Number: 51002651

During the central instance installation, R3SETUP generates the bind JCL and SQL for the plans used by the ICLI server. Since the SQL requires modification, R3SETUP will prompt you to stop the installation process and perform the required changes. Pages 4-9 of *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B* discusses the necessary changes in detail. Briefly, the required SQL changes are as follows:

- Create a total number of plans that is equal to the number of work processes on the application server, plus 10.

- Rename the plans to be the last 5 characters of the application server hostname, plus a 3-digit sequential number starting with 000.

- Do not delete the plan named FOMEP40B, as this is the default plan to be used by the system when the work process plans are not appropriate or available.

We stopped the installation when prompted, modified FOMEBIND.jcl in the installation directory, and restarted R3SETUP. Figure 57 on page 73 is an example of the JCL and SQL that R3SETUP uses to bind the plans for the ICLI server.

```
//FOMEBIND JOB USER=&USERID,NOTIFY=&USERID,CLASS=A,MSGCLASS=H,
//         MSGLEVEL=(1,1)
//BIND000   EXEC PGM=IKJEFT01
//STEPLIB  DD  DISP=SHR,DSN=DB2V510.SDSNLOAD
//SYSPRINT DD  SYSOUT=*
//SYSTSPRT DD  SYSOUT=*
//SYSTSIN  DD  *
  DSN SYSTEM(DB2R)
    BIND PLAN(<plan name>) MEMBER(FOME4OB1,FOME4OB2) -
         LIBRARY('SYS1.SAMPLIB') -
         ACTION(REPLACE) ISOLATION(CS) DYNAMICRULES(RUN) -
         ACQUIRE(USE) RELEASE(COMMIT) -
         CURRENTDATA(NO) KEEPDYNAMIC(YES) -
         OWNER(SAPR3)
  END
/*
```

Figure 57. Bind JCL for ICLI Server(FOMEBIND.jcl)

3.4.3.2 Granting Authorities for the ICLI Server

References

- *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*,
  SC33-7962
- *R/3 Installation on Windows NT: DB2 for OS/390*, Material Number:
  51002660
- *BC SAP Database Administration Guide: DB2 for OS/390*, Material
  Number: 51002651

All SAP R/3 DB2 objects are owned by one DB2 user, SAPR3. The user ID
running the ICLI server (ICLIRUN) must change its CURRENT SQLID to SAPR3 to
access the database. During the installation of the central instance, R3SETUP
generates the grant JCL and SQL required for the ICLI server. Since the SQL
requires modification, R3SETUP will prompt you to stop the installation process
and perform the required changes. When prompted, we stopped the R3SETUP
process and modified FOMEGRNT.jcl in the installation directory, adding
EXECUTE statements for all of the plan names we created with the bind job.
Refer to 3.4.3.1, "Binding Plans for the ICLI Server" on page 72 for more detail.

Notes:

 1. Do not create logon IDs of SAPR3 or ICLIRUN. There is a risk that such
    logon users could get the authorities intended solely for the ICLI server.
    This would risk the integrity of the R/3 data.

 2. Assigning a secondary authorization ID of SAPR3 to ICLIRUN is an
    alternative and this is what is recommended in *SAP R/3 on DB2 for OS/390:
    Planning Guide SAP R/3 Release 4.0B*, SC33-7962

 3. Since ICLIRUN is not a logon user, we needed another user ID with SYSADM
    authority for database administration. We used the standard DB2
    administrator, SYSADM.

R3SETUP used the JCL shown in Figure 58 on page 74 to grant the DB2
authorities required by the ICLI server.

```
//FOMEGRNT JOB USER=&USERID,NOTIFY=&USERID,CLASS=A,MSGCLASS=H,
//        MSGLEVEL=(1,1)
//DBGRANT  EXEC PGM=IKJEFT01
//STEPLIB DD DISP=SHR,DSN=DB2V510.SDSNLOAD
//SYSPRINT DD  SYSOUT=*
//SYSTSPRT DD  SYSOUT=*
//SYSIN    DD  *
   GRANT EXECUTE ON PLAN <plan name> TO ICLIRUN;
   GRANT EXECUTE ON PLAN FOMEP40B TO ICLIRUN;
   GRANT TRACE,MONITOR1,MONITOR2 TO ICLIRUN;
   GRANT CREATESG TO SAPR3;
   GRANT CREATEDBA TO SAPR3;
   GRANT USE OF ALL BUFFERPOOLS TO SAPR3;
   GRANT SELECT ON TABLE SYSIBM.SYSCOPY TO SAPR3;
   GRANT SELECT ON TABLE SYSIBM.SYSCOLUMNS TO SAPR3;
   GRANT SELECT ON TABLE SYSIBM.SYSFIELDS TO SAPR3;
   GRANT SELECT ON TABLE SYSIBM.SYSINDEXES TO SAPR3;
   GRANT SELECT ON TABLE SYSIBM.SYSINDEXPART TO SAPR3;
   GRANT SELECT ON TABLE SYSIBM.SYSKEYS TO SAPR3;
   GRANT SELECT ON TABLE SYSIBM.SYSSYNONYMS TO SAPR3;
   GRANT SELECT ON TABLE SYSIBM.SYSTABLEPART TO SAPR3;
   GRANT SELECT ON TABLE SYSIBM.SYSTABLES TO SAPR3;
   GRANT UPDATE ON TABLE SYSIBM.SYSTABLES TO SAPR3;
   GRANT INDEX ON TABLE SYSIBM.SYSTABLES TO SAPR3;
   GRANT SELECT ON TABLE SYSIBM.SYSTABLESPACE TO SAPR3;
   GRANT INDEX ON TABLE SYSIBM.SYSTABLESPACE TO SAPR3;
   GRANT SELECT ON TABLE SYSIBM.SYSDATABASE TO SAPR3;
   GRANT SELECT ON TABLE SYSIBM.SYSSTOGROUP TO SAPR3;
   GRANT SELECT ON TABLE SYSIBM.SYSVOLUMES TO SAPR3;
   GRANT SELECT ON TABLE SYSIBM.SYSCOLDIST TO SAPR3;
   GRANT SELECT ON TABLE SYSIBM.SYSVIEWS TO SAPR3;
   GRANT SELECT ON TABLE SYSIBM.SYSVIEWDEP TO SAPR3;
/*
//SYSTSIN  DD  *
 DSN SYSTEM(DB2R)
   RUN  PROGRAM(DSNTIAD) PLAN(DSNTIA51) -
        LIB('DB2V510U.RUNLIB.LOAD')
 END
/*
```

Figure 58. ICLI Server Grant JCL and SQL

3.4.4 Testing Connectivity between ICLI Client and ICLI Server

When the installation of the central instance is finished, and the ICLI server has been started on the database server, you can test the connection between the central instance and the database server. This is done using the R3trans -x command when logged on as the <sid>adm user from a DOS Command Prompt window.

The command and the output from the command after a successful connection are shown in Figure 59.

```
C:\USERS>R3trans -x
This is /sapmnt\RED/exe/R3trans version 6.03 (release 40B - 30.04.98 - 15:00:54).

/sapmnt/RED/exe/R3trans finished (0000).
```

Figure 59. R3trans Command

A return code of 0 is expected. If you do not get the return code of 0, then do not proceed to install the database until the problem is fixed and R3trans gives a return code of 0.

3.5 Build and Load the Database

The database build and load from Windows NT is very similar to the previously documented build and load from AIX, and so will not be covered here. Refer to section 2.5, "Build and Load the Database" on page 50.

3.6 Completing the Installation

> **References**
>
> - *R/3 Installation on Windows NT: DB2 for OS/390*, Material Number: 51002660
>
> - *OSS Note #98186-DB2/390: 4.0B R/3 Installation on UNIX or WinNT*

The following section lists the post-installation steps to finalize the installation; these are standard SAP R/3 steps.

3.6.1 Standard SAP R/3 Steps

See *R/3 Installation on UNIX: DB2 for OS/390* for the appropriate post-installation procedures. Among these procedures are the following:

- SAP login

- SAP license installation

- Configure the Correction and Transport System (with transaction SE06)

- Installing presentation servers

- Backup of databases

- Installing SAProuter code

- Verifying installation (with transaction SM28)

- Verifying owner of saposcol (root)

- Starting saposcol

- Establishing OSS Connection

- Importing fixes and hot packages

- Customizing profiles

- Altering the permissions of /usr/sap/trans (to 771)

There was another problem fixed after we completed the installation:

- Application of OSS note #107952. The table INSTVERS was not correctly updated by R3SETUP during the installation. This caused the error message 'Your system has not been installed correctly'. Manual update of the table INSTVERS as described in the OSS note corrected the problem.

Chapter 4. Managing the Environment

This chapter is unchanged since the first edition of the redbook. The chapter was reviewed; our belief is that the material is still important in an SAP R/3 installation, even though the evolution of software from both SAP and IBM (such as the keep-alive processing associated with ICLI) has addressed some of the reasons we did special monitoring during the first edition.

Users of SAP R/3 should consider the use of techniques such as those found in 4.3.4, "Monitoring the ICLI Address Space" on page 90, 4.3.5, "Monitoring the ICLI Internal Status" on page 91, and 4.4, "Getting OS/390 Status Information on AIX" on page 94. Certainly the ICLI server-client code and connectivity is more stable than at the time the first edition of this book was written, but it is still important to automate the availability checking of that functionality.

This chapter explores considerations of system management of SAP R/3 in an OS/390 environment. We also discuss some of the management tools that we used.

4.1 Overview

An SAP R/3 OS/390 system is a heterogeneous and distributed client/server environment, which includes OS/390 with AIX (or Windows NT), Windows and OS/2 platforms. This complexity means that it is challenging to manage in an integrated and consistent manner given the current available tools.

We focused on several products for specific management areas and we connected some of them to share the status information among different platforms.

For the following areas the focal point of the management aspects is the SAP R/3 central instance. We focused on the TME AMS module for SAP R/3 and on the TME software distribution products for:

- Software deployment: Getting the right levels of code to various platforms, especially to the presentation servers, then to the application servers.

- Event monitoring and control: Monitoring applications, hardware servers, operating systems and their subsystems, networks, and so on for significant events or problems (for example, performance thresholds), correlating these events, applying rules and filters to describe further actions, and then carrying out the proper actions to correct the condition. The coordination and control can be accomplished either through manual means or automation.

- Task management and job scheduling: Preparation and setup of when and what jobs should be run, what operation parameters and policies should be changed, and when administration tasks should be routinely executed.

- User administration and security administration: A single place to define users and their authorization levels that span all systems and their components.

For the OS/390 aspects we used RMF, DB2PM and Netview/390 to monitor and manage the database and network portions of the SAP R/3 system.

- Database administration: Copying, loading, reorganizing, archiving, setting up structure of tables, directories, converting from one database type to another, capacity planning, and so on.

- Network administration: Managing the availability of the presentation clients

Our experience with some of these tools is described in this chapter.

TME10 is IBM's solution for centrally managing the systems and networks in complex distributed environments effectively and easily. There is development work in progress (at the time of the writing of this book) to provide integration of information for the SAP R/3 solution on OS/390.

4.1.1 Availability Monitoring and Reporting - Practical Experiences

There are many system management and monitoring tools available in the market. The tools we installed and implemented are:

- Resource Measurement Facility (RMF) on OS/390

- NetView on OS/390

- DB2 Performance Monitor (DB2PM) on OS/390

- Tivoli AMS Module for R/3

We developed some NetView REXX code and an AIX shell script to get the status information of OS/390 at the AIX side. Our experiences are documented in this chapter.

4.2 Using Resource Measurement Facility (RMF) on OS/390

This section contains an example of RMF implementation to monitor the ICLI address space and to find the primary reason for any performance degradation.

4.2.1 RMF Overview

RMF is an IBM program product for monitoring the performance of each address space running on OS/390, and so it can be the foundation of the performance management. With RMF you can:

- Determine that the overall system is running smoothly

- Detect the primary reasons for contention for resources

- Identify the workload delayed and the reason for the delay

RMF provides three types of monitors:

Monitor I   Provides long term data collection and printed reports about system workload and resource utilization. The Monitor I session measures various areas of system activity continuously over a long period of time, and provides the report in the batch mode. It is a useful tool for viewing the overall system performance and workload either on a daily basis or over longer time periods.

Monitor II   Provides online measurements on demand for use in solving immediate problems. It provides a requested report from a single data sample, and so is generally used for a "snapshot" of a session.

Monitor III Provides short term data collection and online reports for continuous monitoring of system status and solving performance problems; it is used to find the reason for delays in a specific job or in the complete system.

Refer to *Resource Measurement Facility User's Guide*, SC28-1949, and *Resource Measurement Facility Report Analysis*, SC28-1950, for further information.

4.2.2 Using RMF for ICLI

ICLI must be active. If it is not, it must be reactivated. Also, it runs in a critical address space whose performance is monitored. The resources that ICLI requires to run well include processor cycles, adequate real storage, and availability of special devices defined for Enhanced ESCON communication on OS/390.

ICLI will run very well even if there is contention or shortage in using these resources, but if the service from even one of these system resources is less than required, the execution of ICLI will be slow or delayed.

Monitor III can be useful in checking this situation more quickly, because it provides information about the execution speed of ICLI, and the reason for the delay, if any. If you find any specific reasons for the delay or any performance issues or resource contention from Monitor III, you may also use the reports of other Monitor sessions to investigate the detail status and fix the problems.

4.2.3 Monitoring ICLI by Monitor III

There can be several starting points for monitoring ICLI with RMF, but the Job Delay report of Monitor III may be a good starting point to focus on the execution status of ICLI. This section explains how to go to that report.

Figure 60 on page 80 is the screen for RMF Performance Management, which comes from invoking the command RMF at the TSO session.

```
┌─────────────────────────────────────────────────────────────────────────┐
│                    RMF - Performance Management              OS/390 1.3.0 RMF │
│                                                                           │
│   Enter selection number or command on selection line.                    │
│                                                                           │
│                                                                           │
│     1 Postprocessor   Postprocessor reports for Monitor I, II, and III   (PP) │
│     2 Monitor II      Snapshot reporting with Monitor II                 (M2) │
│     3 Monitor III     Interactive performance analysis with Monitor III  (M3) │
│                                                                           │
│     U USER            User-written applications (add your own ...)       (US) │
│                                                                           │
│                                                                           │
│                          T TUTORIAL     X EXIT                            │
│                                                                           │
│                                                                           │
│                                                                           │
│                                                                           │
│           5645-001 (C) Copyright IBM Corp. 1994, 1997. All Rights Reserved │
│                        Licensed Materials - Property of IBM               │
│                                                                           │
│   Selection ===> 3                                                        │
│    F1=HELP      F2=SPLIT      F3=END      F4=RETURN    F5=RFIND    F6=RCHANGE │
│    F7=UP        F8=DOWN       F9=SWAP     F10=LEFT     F11=RIGHT   F12=RETRIEVE │
└─────────────────────────────────────────────────────────────────────────┘
```

Figure 60. RMF Performance Management Menu

Select Monitor III by entering 3 at the Selection field. Figure 61 will be shown.

```
┌─────────────────────────────────────────────────────────────────────────┐
│                    RMF Monitor III Primary Menu             OS/390 1.3.0 RMF │
│                                                                           │
│   Enter selection number or command on selection line.                    │
│                                                                           │
│                                                                           │
│     S SYSPLEX         Sysplex reports, Data Index                        (SP) │
│                                                                           │
│     1 OVERVIEW        Workflow/Exceptions, System information, and delays (OV) │
│     2 JOBS            All information about job delays                    (JS) │
│     3 RESOURCE        Processor, Device, Enqueue, and Storage            (RS) │
│     4 SUBS            Subsystem information for HSM, JES, and XCF        (SUB) │
│                                                                           │
│     U USER            User-written reports (add your own ...)            (US) │
│                                                                           │
│                                                                           │
│                       O OPTIONS    T TUTORIAL     X EXIT                   │
│                                                                           │
│           5645-001 (C) Copyright IBM Corp. 1986, 1997. All Rights Reserved │
│                        Licensed Materials - Property of IBM               │
│                                                                           │
│                                                                           │
│   Selection ===> 2                                                        │
│    F1=HELP      F2=SPLIT      F3=END      F4=RETURN    F5=RFIND    F6=TOGGLE │
│    F7=UP        F8=DOWN       F9=SWAP     F10=BREF     F11=FREF    F12=RETRIEVE │
└─────────────────────────────────────────────────────────────────────────┘
```

Figure 61. RMF Monitor III Primary Menu

Select JOBS by entering 2 at the Selection field.

```
┌────────────────────────────────────────────────────────────────────────────┐
│                        RMF Job Report Selection Menu                         │
│                                                                              │
│  Enter selection number or command and jobname for desired job report.       │
│                                                                              │
│     Jobname ===> ICLIRED_                                                    │
│                                                                              │
│      1 DEVJ            Delay caused by devices                      (DVJ)     │
│      2 ENQJ            Delay caused by ENQdelays      (OV)          (EJ)      │
│      3 HSMJ            Delay caused by HSM            (JS)          (HJ)      │
│      4 JESJ            Delay caused by JES            (RS)          (JJ)      │
│      5 JOB             Delay caused by primary reason          (DELAYJ)       │
│      6 MNTJ            Delay caused by volume mount                 (MTJ)     │
│      7 MSGJ            Delay caused by operator reply               (MSJ)     │
│      8 PROCJ           Delay caused by processor                    (PJ)      │
│      9 QSCJ            Delay caused by QUIESCE via RESET command     (QJ)     │
│     10 STORJ           Delay caused by storage                      (SJ)      │
│     11 XCFJ            Delay caused by XCF                          (XJ)       │
│                                                                              │
│                                                                              │
│  These reports can also be selected by placing the cursor on the             │
│  corresponding delay reason column of the DELAY or JOB reports and           │
│  Selection ===> 5                                                            │
└────────────────────────────────────────────────────────────────────────────┘
```

Figure 62. Job Report Selection Menu

To monitor the execution speed and delay of ICLI, enter ICLI at Jobname, and
enter 5 at the Selection field, as shown in Figure 62; Figure 63 will then be
shown.

```
┌────────────────────────────────────────────────────────────────────────────┐
│                         RMF 1.3.0   Job Delays                 Line 1 of 1   │
│                                                                              │
│   Samples: 100      System: 3090  Date: 03/09/97  Time: 13.25.00  Range: 100    Sec │
│                                                                              │
│   Job: ICLIRED       Primary delay: Job is in an unknown state.              │
│                                                                              │
│                                                                              │
│                                                                              │
│                                                                              │
│                                                                              │
│                                                                              │
│                                                                              │
│   ------------------------- Job Performance Summary ------------------------- │
│              WFL -Using%- DLY IDL UKN ------- % Delayed for ------- Primary   │
│   C ASID DMN PG  %  PROC DEV  %   %   %  PROC  DEV STOR SUBS OPER  ENQ Reason │
│   S 0060  5  1      0    0   0   0 100   0    0    0    0    0    0           │
│                                                                              │
│   Command ===>                                              Scroll ===> CSR   │
└────────────────────────────────────────────────────────────────────────────┘
```

Figure 63. Job Delay Report for ICLI

Figure 63 shows the execution status for ICLI and the delay reason, if there is
any delay. If any resource in the %Delayed for field is higher than other
resources, ICLI may be delayed due to that resource shortage. This report
quickly shows why ICLI execution is delayed. If you determine which resources
are causing delay, type that resource name (such as PROC, STOR, or DEV) at
the command field. This brings up more detailed reports.

4.2.4 Delayed for Processor

If %Delayed for PROC is higher than for other resources, ICLI is being delayed because there is less processor power available than required. Enter PROC at the Command field to see the processor usage by other jobs.

```
┌─────────────────────────────────────────────────────────────────────────────┐
│                          RMF 1.3.0  Processor Delays                Line 1 of 8 │
│                                                                               │
│   Samples: 100      System: 3090  Date: 03/09/97  Time: 13.25.00  Range: 100   Sec │
│                                                                               │
│                          DLY USG  TCB+ VEC   ----------- Holding Job(s) ----------- │
│   Jobname   C DMN  PG   %   %   SRB% Ratio  %  Name      %  Name      %  Name │
│                                                                               │
│   *MASTER*  S   0   0    0   1   0.2    0                                      │
│   JES2      S   5   1    0   1   0.0    0                                      │
│   LLA       S   5   1    0   0   0.1    0                                      │
│   CATALOG   S   0   0    0   0   0.1    0                                      │
│   ICLIRED   S   5   1    0   0   0.1    0                                      │
│   YWLEE     T ***   2    0   0   0.1    0                                      │
│   RMF       S   5   1    0   0   0.2    0                                      │
│   RMFGAT    S   5   1    0   0   0.5    0                                      │
│                                                                               │
│                                                                               │
│   Command ===>                                             Scroll ===> SCR     │
└─────────────────────────────────────────────────────────────────────────────┘
```

Figure 64. Processor Delay Report

To find overall processor usage, see the CPU Activity Report of Monitor I. This report provides information about overall CPU utilization and workload.

There are several possible actions to obtain more processor cycles for ICLI, such as the following:

- Determine which jobs are consuming the most processor cycles.

- Check whether their execution status is normal or not.

- Review dispatching priorities to allocate more processor cycles to ICLI.

- Reduce the Multi-Programming Level (MPL) specified for ICLI in order to avoid resource contention within the same domain.

- Review processor allocation among LPARs if ICLI is running in LPAR mode.

- Install a processor with more power.

4.2.5 Delayed for Storage

Normally ICLI is started with a region size that is large enough to allow a maximum number of threads to be supported. If several threads are initialized, storage contention may occur.

If %Delayed for STOR is higher than for other resources, use the STOR command to obtain the Storage Delays report.

```
┌─────────────────────────────────────────────────────────────────────────┐
│                      RMF 1.3.0   Storage Delays                Line 1 of 64│
│                                                                            │
│  Samples: 100      System: 3090  Date: 03/09/97  Time: 13.25.00  Range: 100    Sec│
│                                                                            │
│                        DLY   ------- % Delayed for ------   -- Working Set --│
│  Jobname   C  DMN  PG   %    COMM  LOCL  SWAP  OUTR  OTHR   Central  Expanded│
│                                                                          0 │
│  *MASTER*  S   0   0    0     0     0     0     0     0      503        1   │
│  PCAUTH    S   5   1    0     0     0     0     0     0       54        1   │
│  RASP      S   5   1    0     0     0     0     0     0      121        1   │
│  TRACE     S   5   1    0     0     0     0     0     0      544        1   │
│  DUMPSRV   S   0   0    0     0     0     0     0     0      235        1   │
│  XCFAS     S   5   1    0     0     0     0     0     0      828        1   │
│  GRS       S   0   0    0     0     0     0     0     0      347        1   │
│  SMXC      S   5   1    0     0     0     0     0     0       53        1   │
│  SYSBMAS   S   5   1    0     0     0     0     0     0     4431        1   │
│  CONSOLE   S   5   1    0     0     0     0     0     0      335        1   │
│  WLM       S   5   1    0     0     0     0     0     0      339        1   │
│  ANTMAIN   S   5   1    0     0     0     0     0     0       42       91   │
│  ANTAS000  S   5   1    0     0     0     0     0     0      206      198   │
│  OMVS      S   5   1    0     0     0     0     0     0     2492        1   │
│  Command ===>                                             Scroll ===> CSR  │
└─────────────────────────────────────────────────────────────────────────┘
```

Figure 65. Storage Delay Report

Figure 65 shows jobs that are delayed due to storage contention, which results
from any bottleneck or resource shortage in paging, swapping, VIO, and
out-ready.

To find the overall storage usage, you can use the following reports of Monitor I:

• Paging Activity Report

  This report provides information about the demands on the system paging
  facilities and the usage of central storage, expanded storage, external
  paging space, and swapping data during the interval. You need to see the
  paging rate and high UIC value in this report to check whether or not the
  storage contention may occur in overall system level.

• Page/Swap Data Set Activity Report

  This report provides status and statistics for all active page/swap data sets.
  If the paging rate is high in the paging activity report, check the percentage
  of data set usage and page transfer time. If the percentage of usage is high,
  performance tuning for auxiliary storage is required. If page transfer time is
  long, then you need to refer to the detailed data for paging device on the
  DASD Activity Report of Monitor I to investigate the reason for the delay.

Determining what actions to take depends on which component is causing the
most delay. Several possible actions are to:

• Increase the target working set size for ICLI.

• Define more page/swap data set space.

• Reduce the response time of DASD allocated to page/swap space.

• Review storage allocation among LPARs if ICLI is running in LPAR mode.

• Install more storage.

4.2.6 Delayed for Device

If %Delayed for DEV is higher than for other resources, enter DEV at the command field to determine which devices are causing the delay.

Figure 66 shows jobs that are delayed due to device contention. If ICLI is being delayed for device, you can determine quickly which devices are causing the most delay.

```
                         RMF 1.3.0   Device Delays


 Samples: 100       System: 3090  Date: 03/09/97  Time: 14.16.40  Range: 100    Sec


                          DLY USG CON ------------ Main Delay Volume(s) ------------
 Jobname  C DMN  PG   %   %   %    %  VOLSER   %  VOLSER   %  VOLSER   %  VOLSER

 JES2     S  5   1    1   0   0    1  BAACAT






 Command ===>
```

Figure 66. Device Delay Report

Move the cursor to the device name causing the most delay and press Enter, and you will see a screen similar to the one in Figure 67.

```
                     RMF 1.3.0   Device Resource Delays         Line 1 of 4

 Samples: 100       System: 3090  Date: 03/09/97  Time: 14.16.40  Range: 100    Sec


 Volume   Act  Resp  ACT CON DSC  PND %,  DEV/CU                          USG DLY
  /Num S  Rate Time   %   %   %   Reasons Type    Jobname  C DMN  PG   %   %

 BAACAT S  0.4 .024    1   0   1  PND  0  33903   JES2     S  5   1   1   0
  0E6A                                    3990-3
 BAATP1 S  0.0 .011    0   0   0  PND  0  33903   YWLEE    T ***  2   1   0
  0E6C                                    3990-3






 Command ===>
```

Figure 67. Device Resource Delay Report

Figure 67 shows which jobs the delay is affecting and how badly it is affecting them. Normally the device used by and critical to ICLI is that defined as RS6K to OS/390.

If there are any performance issues or delay reasons, you should use the reports of other Monitor sessions to investigate the detail status and fix any problems. The following reports of Monitor I and II can be useful in doing so:

- Monitor I

- Channel Path Activity Report

  This report provides information about all channel path usage during the interval. From this report, you can see the average channel utilization to which the control unit is connected.

- I/O Queuing Activity Report

  This report provides information on the I/O configuration and activity rate, queue lengths, and busy percentage when one or more I/O components, grouped by a Logical Control Unit (LCU), were busy.

- Communication Equipment Report

  This report provides information about all communication devices. To get this report at Monitor I, you must specify:

  `DEVICE(COMM)`

  at the ERBRMFxx member of SYS1.PAMRLIB. This report shows the detailed data for each communication device, and you need to investigate the devices used by ICLI.

  Figure 68 shows a large number for the average resonse time and connect time for device 09C2. This is due to the fact that a device supported for Enhanced ESCON, such as 09C2, is executing a long-running channel program for transferring large amounts of data from OS/390 to AIX.

  The values for device 09C3, which is used by data flow from AIX to OS/390, is a small number because they are only data requests and there is no advantage in chaining them into a long-running channel program.

```
                    C O M M U N I C A T I O N   E Q U I P M E N T   A C T I V I T Y

        OS/390                    SYSTEM ID 3090          DATE 02/26/1997          INTERVAL 30.00.018
        REL. 01.03.00             RPT VERSION 1.3.0       TIME 16.31.02            CYCLE 1.000 SECONDS

TOTAL SAMPLES =  1,800   IODF = 73   CR-DATE: 02/17/97   CR-TIME: 22.00.50    ACT: ACTIVATE
                                  DEVICE  AVG  AVG   AVG AVG AVG   AVG AVG AVG   %     %    %    AVG    %     %   %
        DEV  DEVICE   VOLUME LCU  ACTIVITY RESP IOSQ DPB CUB DB   PEND DISC CONN DEV   DEV  DEV  NUMBER ANY   MT  NOT
        NUM  TYPE     SERIAL      RATE    TIME TIME  DLY DLY DLY  TIME TIME TIME CONN  UTIL RESV ALLLOC ALLOC PEND RDY

        09C0                 0040  0.024  41K   0   0.0 0.0 0.0   0.4  41K  2.7  0.00  0.00 0.0         100.0      0
        09C1                 0040  0.124   0    0   0.0 0.0 0.0   0.2   0   0.3  0.00  0.00 0.0         100.0      0
        09C2                 0040  0.002 599K   0   0.0 0.0 0.0   0.0 598K 1051  0.00  0.00 0.0         100.0      0
        09C3                 0040  9.334   0    0   0.0 0.0 0.0   0.1   0   0.1  0.00  0.00 0.0         100.0      0
                         LCU 0040  9.350  107   0   0.0 0.0 0.0   0.1  107  0.3  0.00  0.00 0.0         100.0      0
```

Figure 68. Communication Equipment Activity Report

If ICLI is not active or there is no activity during the interval, the message HARDWARE DATA UNAVAILABLE may appear in the data line for the devices for ICLI.

During our experiments, the messages HARDWARE DATA UNAVAILABLE and HARDWARE DATA INCOMPLETE appeared at the data line for the devices used by ICLI. They appeared with the two counters: total requests that had time overflow and total requests that had connect time overflow. These messages appeared in the report generated in the first interval after we started ICLI.

This may have resulted from an overflow condition; it occurs when any I/O request exceeds the maximum time limit. It means that an I/O request for device 09C2 consists of a long-running channel program.

Overflow conditions in connect time and disconnect time are detected by the hardware, counted by MVS, and reported by RMF. Figure 69 on page 86 shows the Monitor I report we received.

```
                    C O M M U N I C A T I O N   E Q U I P M E N T   A C T I V I T Y

        OS/390                      SYSTEM ID 3090            DATE 02/26/1997           INTERVAL 30.00.018
        REL. 01.03.00              RPT VERSION 1.3.0          TIME 16.31.02            CYCLE 1.000 SECONDS

TOTAL SAMPLES =  1,800   IODF = 73   CR-DATE: 02/17/97   CR-TIME: 22.00.50    ACT: ACTIVATE
                                     DEVICE  AVG AVG  AVG AVG AVG  AVG AVG AVG   %    %    %    AVG   %     %  %
        DEV  DEVICE   VOLUME LCU    ACTIVITY RESP IOSQ DPB CUB DB  PEND DISC CONN DEV  DEV  DEV  NUMBER ANY   MT NOT
        NUM  TYPE     SERIAL         RATE    TIME TIME DLY DLY DLY TIME TIME TIME CONN UTIL RESV ALLLOC ALLOC PEND RDY

        09C0              0040    HARDWARE DATA UNAVAILABLE
        09C1              0040      0.0    0    0  0.0 0.0 0.0  0.0   0 0.3  0.00  0.00 0.0       100.0         0
        09C2              0040    HARDWARE DATA UNAVAILABLE
                          0040    HARDWARE DATA INCOMPLETE.  0 REQUEST HAD TIMER OVERFLOW, 5 HAD CONNECT TIME OVERFLOW.
        09C3              0040     3.600    0    0  0.0 0.0 0.0  0.1 0.0 0.2  0.08  0.09 0.0       100.0         0
                      LCU 0040      0.0    0    0  0.0 0.0 0.0  0.1 0.0 0.2  0.04  0.05 0.0       100.0         0
```

Figure 69. Communication Equipment Activity Report for Overflow Condition

We also received the HARDWARE DATA UNAVAILABLE message for device 09C0 (which was used for the TCP/IP connection between OS/390 and AIX) when the connection between OpenEdition MVS (OMVS) and TCPIP was not completely established.

In addition, the average response time for the device for the TCP/IP connection between OS/390 and AIX was a large value.

• Monitor II

– Channel Path Activity Report

This report gives information about channel path activity for all channel paths in the system. In our case, the channel path connected to the control unit is a subject for investigation.

– I/O Queuing Activity Report

This report provides information, grouped by Logical Control Unit (LCU), on the I/O configuration. It includes contention rate, queue lengths, and percentages of time when one or more I/O components were busy. Normally the report shows the DASD-related LCU only, so you need to enter the command:

IOQUEUE NUMBER(0040)

at the Command field of the primary screen of Monitor II, where the LCU number of the control unit is defined as RS6K for Enhanced ESCON communication on OS/390. Then Figure 70 on page 87 results. Note however, that an LCU without any activity during an interval is omitted from the report.

```
                        RMF - IOQUEUE I/O Queuing Activity              Line 1 of 1

                     MIG= 226K CPU=  3/  2 UIC=254 PFR=   0    System= 3090 Total

 13:52:13        I= 74%              CONT  DEL Q   %ALL   CHPID   %DP    %CU
 CHAN PATHS CONTROL UNITS      LCU   RATE  LNGTH  CH BUSY TAKEN   BUSY   BUSY

 41         09C0               0040  0.0   0.00   0.05    0.97   0.00   0.00




 Command ===>
```

Figure 70. I/O Queuing Activity Report for LCU 0040

    – Device Activity Report

      This report gives information on I/O device usage, which is requested by device number, class, or volume serial. To investigate the devices only, enter the commands:

      DEVV NUMBER(09C2)

      and

      DEVV NUMBER(09C3)

      at the Command field of the primary screen of Monitor II, where the device number is defined for Enhanced ESCON communication on OS/390. Then Figure 71 and Figure 72 on page 88 are shown.

```
                        RMF - DEVV Device Activity                  Line 1 of 5

                     MIG= 227K CPU=  3/  2 UIC=254 PFR=   0    System= 3090 Total

 SG              DEV       ACTV RESP IOSQ ---DELAY--- PEND DISC CONN %D %D
   TIME  VOLSER NUM  LCU   RATE TIME TIME DPB CUB  DB TIME TIME TIME UT RV I%

 11:08:00        09C2 0040 0.002 **** 0    0   0   0  0.1 **** 1165 39  0 99
 11:08:45        09C2 0040 0.045 2402 0    0   0   0  0.1 2350 50.6 11  0 99
 11:09:32        09C2 0040 0.066 6197 0    0   0   0  0.1 6170 26.8 41  0 99
 11:10:55        09C2 0040 0.007 **** 0    0   0   0  0.1 ****  258 99  0 99
 11:11:53        09C2 0040 0.006 **** 0    0   0   0  0.1 ****  258 88  0 99






 Command ===>
```

Figure 71. Device Activity Report for Device 09C2

```
                        RMF - DEVV Device Activity                    Line 1 of 5

                MIG= 227K CPU=  3/  2 UIC=254 PFR=   0    System= 3090 Total

 SG              DEV       ACTV RESP IOSQ ---DELAY--- PEND DISC CONN %D %D
   TIME  VOLSER NUM  LCU   RATE TIME TIME DPB CUB DB  TIME TIME TIME UT RV I%

 11:08:00        09C3 0040 0.002    0    0   0   0   0  0.1    0    0 39  0 99
 11:08:45        09C3 0040 0.045    0    0   0   0   0  0.1    0    0 11  0 99
 11:09:32        09C3 0040 0.066    0    0   0   0   0  0.1    0    0 41  0 99
 11:10:55        09C3 0040 0.007    0    0   0   0   0  0.1    0    0 99  0 99
 11:11:53        09C3 0040 0.006    0    0   0   0   0  0.1    0    0 88  0 99




 Command ===>
```

Figure 72. Device Activity Report for Device 09C3

As shown in Figure 71 on page 87, the average response time is very
long for device 09C2; this device is used as the data flow path from
OS/390 to AIX, and the response time is long due to the data volume to
be transferred. It is directly related to large values for average response
time and connection time, as shown in Figure 68 on page 85. Another
factor is that if additional data arrives to be transferred before an earlier
transfer is complete, the new transfer is accomplished by lengthening the
channel program for communication, not starting another one.

In contrast, the average response time of device 09C3 is short as shown
in Figure 72. This is due to requests containing less data than
responses, and there is no advantage to increasing the length of the
channel program.

Frequently, the data value of average response time and disconnect time
may appear as "****" as shown in Figure 71 on page 87. This means
that overflow conditions in both times are detected because a long
channel program is running to transfer a large volume of data from
OS/390 to AIX through the device for Enhanced ESCON.

What actions you take depend on which component is causing the most delay. If
a device defined as RS6K causes delay, some possible actions are:

• Dedicate one channel path to the control unit for ICLI.
• Make an additional ICLI connection with application server.

4.3 Using NetView

This section contains an example of NetView implementation to monitor the SAP
R/3 database server and take appropriate actions.

4.3.1 Overview

TME10 is IBM′s solution for centrally managing the systems and networks in complex distributed environments effectively and easily. The NetView family of products is the foundation for the network management portion, and we used NetView on OS/390 in our installation.

The configuration of the NetView implementation can vary widely, depending on the systems, networks, and customer environments. The configuration will also depend upon what is being managed.

Viewing an SAP R/3 installation from OS/390, the most important resources to be managed are the ICLI and DB2 address spaces. To monitor the DB2 address space, the DB2 Performance Monitor (DB2PM) product is more suitable. The major function of NetView we used was to monitor the status of the ICLI address space, and give informational messages to the system operator. Refer to 4.5, "Using DB2 Performance Monitor on OS/390" on page 107 for using DB2PM.

4.3.2 Installing NetView on OS/390

NetView Version 3 Release 1 Modification 0 was installed on OS/390, and customized for this implementation. With this version of NetView, there are three types of NetView packages:

- Enterprise System Option

- Procedural System Option

- Remote Unattended System Option

The customer requirements determine which option is selected. The Procedural System Option was selected here because the main usages of NetView are for monitoring and automating the ICLI address space. Refer to *NetView for MVS: Managing Your Future*, G325-3530, for further information.

4.3.3 Monitoring and Automating with NetView

Automation in NetView means the execution of some predefined actions in response to a specific message or event. All related system messages must be monitored by NetView to find out whether or not the specific messages are issued. Messages to be monitored are defined with predefined actions by adding one table entry to the automation table and by writing the command list in either NetView command list (CLIST) or Restructured Extended Executor (REXX). In this chapter REXX is used in the examples.

To use the the automation table, you need to add one table entry to the end of the table, as in Figure 73.

```
IF MSGID() = 'IEE0115I'. THEN
  EXEC(CMD('MVS S DEALLOC'));
IF MSGID() = 'IEE0116I'. THEN
  EXEC(CMD('TESTCMD'));
```

Figure 73. Adding Table Entries to the Automation Table

The first table entry of Figure 73 means "if message IEE0115I is issued, MVS command S DEALLOC is executed"; the second table entry means "if message IEE0116I is issued, MVS command list TESTCMD is executed."

Using the automation table is a typical example of *passive* automation, which means that NetView will do nothing unless specific messages are issued.

To perform a check and then do some actions for the ICLI address space, a different style of automation is required. In this case, command lists written in REXX are used for sample implementations. Refer to *NetView Automation Planning*, SC31-8051, *NetView Customization: Writing Command Lists*, SC31-8055, and *NetView Command Reference*, SC31-8047, for further information.

4.3.4 Monitoring the ICLI Address Space

The ICLI address space must be active to establish the connection between the application server and DB2 on OS/390, and it must be checked periodically to see whether or not it is active. If it is not active, it must be reactivated for the connection to be reestablished. To check if the address space is active, the MVS command D A,ICLI is issued.

Figure 74 shows the the message resulting from the MVS command D A,ICLI if ICLI is already active. Note that the name of the ICLI address space must be modified by your environment.

```
IEE115I 14.38.03 1997.068 ACTIVITY 491
 JOBS     M/S    TS USERS    SYSAS    INITS    ACTIVE/MAX VTAM    OAS
00000    00019    00001      00024    00020     00001/00025        00005
 ICLI     ICLI      *OMVSEX  NSW  SO  A=003C    PER=NO    SMC=000
                                      PGN=001   DMN=005   AFF=NONE
                                      CT=197.584S  ET=43.41.24
                                      WUID=STC02855 USERID=ICLIRUN
                                      ADDR SPACE ASTE=13CFDF00
```

Figure 74. MVS D A,ICLI Command Output When ICLI Is Active

If ICLI is not active, the message resulting from the same command is different, as shown in Figure 75.

```
IEE115I 14.40.43 1997.068 ACTIVITY 493
 JOBS     M/S    TS USERS    SYSAS    INITS    ACTIVE/MAX VTAM    OAS
00000    00019    00001      00024    00020     00001/00025        00005
ICLI NOT FOUND
```

Figure 75. MVS D A,ICLI Command Output When ICLI Is Not Active

The ICLI address space can be started only when this message indicates ICLI is not already started. With the message in Figure 75, you know whether or not ICLI is active by checking the contents of the last message line. Figure 76 on page 91 is an example of REXX code called ICLICHK used to obtain the message and start ICLI if the message indicates ICLI is not already started.

```
    /*  REXX  */
    'TRAP AND SUPPRESS ONLY MESSAGE IEE*'  █1
    'MVS D A,ICLI'      █2
    'WAIT 2 SECONDS'
    'MSGREAD'          █3
    IF MSGID() = 'IEE115I' THEN
      DO
        'GETMSIZE NUMLINES'
        'GETMLINE LASTLINE' NUMLINES   █4
        IF LASTLINE = 'ICLI NOT FOUND' THEN 'MVS S ICLI'  █5
      END
    ELSE
    EXIT
```

Figure 76. Sample ICLICHK REXX Code

The steps of the ICLICHK REXX code execution match the reference number keys in Figure 76:

1. The TRAP is set for a message starting with IEE.

2. The MVS command is issued to check to the ICLI status.

3. The message is read.

4. The contents of the last line are read.

5. The text, ICLI NOT FOUND, is checked.

4.3.5 Monitoring the ICLI Internal Status

Another thing to be monitored is the internal status of ICLI itself, including information about the total number of active threads and the total access time by all threads. This information may help to quickly determine the overall usage of the ICLI connection channel.

To do that, the MVS command D OMVS,ASID=ALL must be issued to get the information about the Process ID (PID) for ICLI address space. Figure 77 shows the message resulting from that command.

```
 BPX0040I 14.42.42 DISPLAY OMVS 495
 OMVS     000E ACTIVE
 USER     JOBNAME ASID        PID      PPID STATE   START    CT_SECS
 STC      BPXOINIT 0019          1         0 MKI   18.54.13      .042
   LATCHWAITPID=         0 CMD=BPXPINPR
   SERVER=Init Process                    AF=     0 MF=65535 TYPE=FILE
 TCPSAP   TCPIP   0033  16777218         1 1R    18.55.13     4.426
   LATCHWAITPID=         0 CMD=MVPPCTSK
 STC      MVSNFS  003B  16777219         1 MF    18.55.54      .278
   LATCHWAITPID=         0 CMD=GFSAMAIN
   SERVER=MVSNFS                          AF=     0 MF=65535 TYPE=FILE
 ICLIRUN  ICLI    003C  134217732        1 HR    18.56.40   197.937
   LATCHWAITPID=         0 CMD=/usr/sbin/iclisudp
 RMFGAT   RMFGAT  003F  16777223         1 1R    13.20.00    29.121
   LATCHWAITPID=         0 CMD=ERB3GMFC
```

Figure 77. MVS D OMVS,ASID=ALL Command Output

By searching this message, the PID for the ICLI address space can be determined. In this case, it is 134217732.

With this PID, another MVS command, D OMVS,PID=134217732, is issued to get the ICLI internal information. Figure 78 on page 92 is the message resulting from this command.

```
BPXO040I 14.47.23 DISPLAY OMVS 497
OMVS     000E ACTIVE
USER     JOBNAME ASID      PID      PPID STATE   START     CT_SECS
ICLIRUN  ICLI    003C 134217732        1 HR     18.56.40    198.727
  LATCHWAITPID=        0 CMD=/usr/sbin/iclisudp
 THREAD_ID        TCB@    PRI_JOB USERNAME  ACC_TIME SC  STATE
07B69EA000000001 008DEA70 OMVS               .104 IPT   YU
07B6A74800000003 008DE6A8 OMVS              2.354 IPT JY V
07B6AFF000000004 008DE2A0 OMVS               .241 WRT JY V
07B6B89800000005 008DE108 OMVS              2.034 WRT JY V
07B6C14000000006 008D7E88 OMVS             12.511 WRT JY V
07B6C9E800000007 008D7BF8 OMVS               .073 WRT JY V
07B6D29000000008 008D7918 OMVS               .223 WRT JY V
07B6DB3800000009 008D7780 OMVS             27.496 WRT JY V
07B6E3E00000000A 008D7310 OMVS               .075 WRT JY V
07B6EC880000000B 008C9E88 OMVS            121.176 WRT JY V
07B6F5300000000C 008C96C8 OMVS               .070 WRT JY V
07B6FDD80000000D 008C9530 OMVS               .058 WRT JY V
07B706800000000E 008C92A0 OMVS             31.224 WRT JY V
07B70F280000000F 008BFA88 OMVS               .156 WRT JY V
07B717D000000010 008BFE88 OMVS               .067 WRT JY V
```

Figure 78. MVS D OMVS,PID=134217732 Command Output

With this message, the total number of active threads and the total access time by all threads can be determined and calculated. Figure 79 is an example of REXX code used to get this information, calculate the total access time, and send it to the system operator.

```
    /*  REXX  */
    'TRAP AND SUPPRESS ONLY MESSAGE BPX*'       1
    'MVS D OMVS,ASID=ALL'                   2
    'WAIT 2 SECONDS'
    'MSGREAD'                        3
    'GETMSIZE NUMLINES'
    DO I = 7 TO NUMLINES              4
      PARSE VAR LINE MSG M1 M2 M3 M4 M5 M6      5
      IF M1 = 'ICLI' THEN PID = M3
    END
    'TRAP AND SUPPRESS ONLY MESSAGE BPX*'
    'MVS D OMVS,PID='PID                 6
    'WAIT 2 SECONDS'
    'MSGREAD'
    'GETMSIZE NUMLINES'              7
    'MSG SYSOP 'NUMBER OF ACTIVE THREADS IS' NUMLINES-6  8
    'GETMLINE LINE' VALUE(7)             9
    PARSE VAR LINE MSG M1 M2 M3 M4 M5 M6
    I = 7
    ACCTIME = 0
    DO I = 7 TO NUMLINES                10
      'GETMLINE LINE' VALUE(I)
      PARSE VAR LINE MSG M1 M2 M3 M4 M5 M6
      ACCTIME = ACCTIME + M3
    END
    'MSG SYSOP 'TOTAL ACCESS TIME IS'' ACCTIME 'SEC'  11
    EXIT
```

Figure 79. Sample ICLIMON REXX Code

The steps of the ICLIMON REXX code execution match the reference keys in Figure 79:

1. The TRAP is set for a message starting with BPX.

2. The MVS command is issued to get the PID of ICLI.

3. The message is read.

4. The line with PID information is captured.

5. M*n* (where *n* is an integer) symbols are used in a parsing template.

6. The MVS command is issued with the PID number.

7. The total number of message lines is checked.

8. The number of active threads is sent to the system operator.

9. M*n* (where *n* is an integer) symbols are used in a parsing template.

10. Each access time is added through a DO loop.

11. The total access time is sent to the system operator.

The REXX code is normally invoked by specifying the name of REXX code at the command field of the NetView console. Figure 80 and Figure 81 are the results of running the ICLIMON REXX code on a NetView and MVS console, respectively.

```
NCCF                       N E T V I E W   CNM01 NETOP1    02/17/97 10:11:00
* CNM01    ICLIMON

- CNM01    DSI001I MESSAGE SENT TO SYSOP
- CNM01    DSI001I MESSAGE SENT TO SYSOP




???
ICLIMON
```

Figure 80. Results of ICLIMON REXX Code Execution at the NetView Console

```
DSI039I MSG FROM NETOP1    : NUMBER OF ACTIVE THREADS IS 15
DSI039I MSG FROM NETOP1    : TOTAL ACCESS TIME IS 198.388 SEC


```

Figure 81. Results of ICLIMON REXX Code Execution at the MVS Console

4.3.6 Scheduling ICLIMON REXX Code

ICLIMON REXX code may be activated periodically to check the ICLI internal status and to inform the system operator of that status. To do that, the EVERY command is useful for scheduling the ICLIMON REXX code to be executed at set intervals. The intervals can be specified in seconds, minutes, hours, or days, depending on management requirements. Figure 82 on page 94 is an example of using the EVERY command to schedule the ICLIMON REXX code every five minutes.

```
NCCF                         N E T V I E W    CNM01 NETOP1     02/17/97 10:11:00

- CNM01 P DSI034I COMMAND SCHEDULED BY AT/EVERY/AFTER COMMAND - 'ICLIMON'
- CNM01 P DSI020I TIMER REQUEST SCHEDULED FOR EXECUTION 'ID=SYS00003'
- CNM01 P DSI020I TIME EXPIRATIONS - ID= 'SYS00003'
- CNM01 P ICLIMON
- CNM01   DSI001I MESSAGE SENT TO SYSOP
- CNM01   DSI001I MESSAGE SENT TO SYSOP




???
EVERY 00:05:00,ICLIMON
```

Figure 82. Example of the EVERY Command

4.4 Getting OS/390 Status Information on AIX

This section discusses the methods used to get information about OS/390 from the AIX processor.

4.4.1 Overview

At the time of writing, there is no method formally provided by the vendor to get the information about OS/390 and AIX together in any managing server. We had to implement a method to do that. Our options were as follows:

- Using NetView and NetView/6000

  This option requires setting up a new SNA connection between AIX and OS/390. On AIX, SNA service has to be installed with NetView/6000.

- Using the Network File System Server (NFSS) on OS/390

  This option requires the customization of NFSS on OS/390 for any kind of status information file to be mounted by AIX. To do this, the information about current system status must be maintained to be accessed by AIX through FTP.

- Using the R3TRANS Command of SAP R/3 on AIX

  This option requires a basic level of information about the availability of DB2 for OS/390 through the R3TRANS command of SAP. We can assume that everything is normal with an 8 or less return code.

We chose to use NFSS on OS/390 with the R3TRANS command of SAP because it is quick and easy to implement as an interim solution. Figure 83 on page 95 shows the picture we implemented.
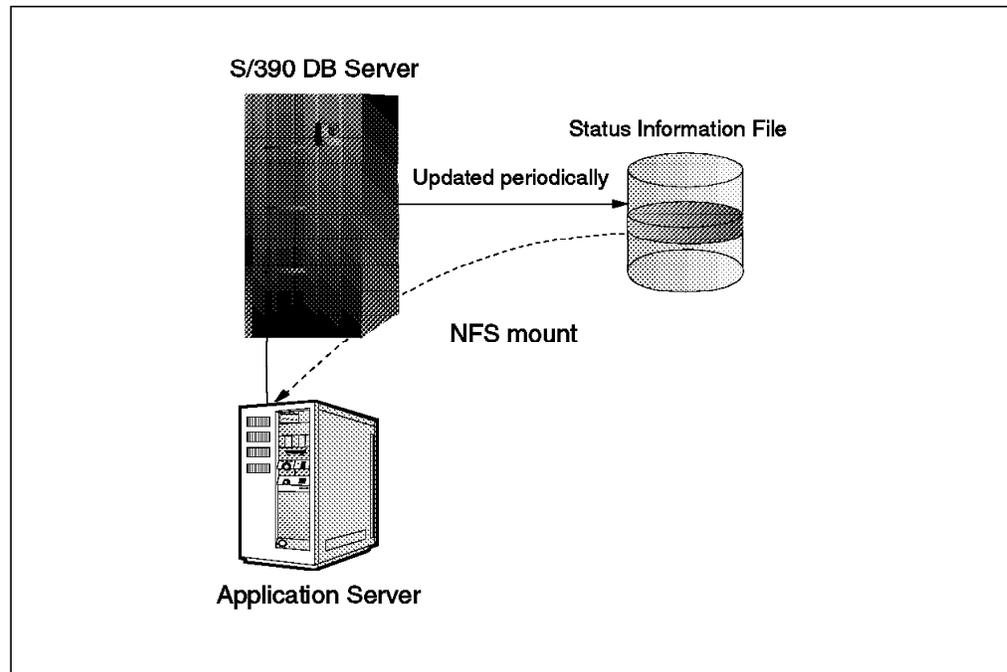
Figure 83. Getting Status Information about OS/390 on AIX

With this method, we can get three kinds of status information about OS/390 on AIX:

- Return code of the R3TRANS Command of SAP
- ICLI status code of OS/390
- DB2 status code of OS/390

With a combination of these three items, the status of the OS/390 side can be determined as follows:

Table 12. Determination of OS/390 Status

Return Code of R3TRANS	Status Code of ICLI	Status Code of DB2	OS/390 Status
< or = 8	-	-	Normal
> 8	1111	1111	Unknown
> 8	1111	0000	DB2 down
> 8	0000	1111	ICLI down
> 8	0000	0000	OS/390 down

The OS/390 status in Table 12 may not be correct and may not indicate enough to take specific actions because it was determined with limited information. But it is useful to check OS/390 status quickly from the AIX side.

This method can be further developed by implementing the following with NetView:

- Write NetView REXX code to maintain the status information file of OS/390.
- Customize NFSS on OS/390.
- Write a shell script on AIX to access the OS/390 information.

4.4.2 Writing NetView REXX Code

This section discusses the status information file, NetView REXX code, and the use of REXX code.

4.4.2.1 Format of Status File Record

The file that contains the current ICLI and DB2 status information must be maintained at the OS/390 side, which will be accessed through NFS from the AIX side. The status information is collected and written to DASD by a NetView REXX program, which we developed and called SAP390. With the status information, the date and time are also written for checking the currency of the status information.

The status record consists of 80 bytes, but we used only the first 35 bytes. A record is appended to the previous record like other log files. Figure 84 shows one record format we used. Here, xxxx will be set to 1111 or 0000 for active or inactive, respectively.

```
MM/DD/YY hh:mm::ss ICLIxxxx DB2 xxxx
```

Figure 84. Format of Status File Record

To keep only the current records and utilize DASD space efficiently, some kind of file management methods are required. We used a method to keep no more than 100 records. With this method, the status file is cleaned up if more than 100 records are written.

4.4.2.2 Sample SAP390 REXX Code - Maximum 100 Records

Figure 85 on page 97 is a sample SAP390 REXX code we used.

```
        /*   REXX   */
        'TRAP AND SUPPRESS ONLY MESSAGE IEE*'     ▌1▐
        'MVS D A,ICLI'                             ▌2▐
        'WAIT 2 SECONDS'
        'MSGREAD'
        'GETMSIZE NUMLINES'
        'GETMLINE LASTLINE' NUMLINES
        IF LASTLINE = 'ICLI NOT FOUND' THEN ICLISTAT = 'ICLI0000'   ▌3▐
        ELSE ICLISTAT = 'ICLI1111'
        END
        'MVS D A,DB2RMSTR'                                       ▌4▐
        /* DB2RMSTR was the name of our DB2 address space  */
        /* Customize this to your own name */
        'WAIT 2 SECONDS'
        'MSGREAD'
        'GETMSIZE NUMLINES'
        'GETMLINE LASTLINE' NUMLINES
        IF LASTLINE = 'DB2RMSTR NOT FOUND' THEN DB2STAT = 'DB2 0000'  ▌5▐
        ELSE DB2RMSTR = 'DB2 1111'
        END
        DATE = DATE('U')                              ▌6▐
        TIME = TIME()
        'FREE F(OUTDD)'
        'ALLOC DA('SAP390.STATUS.DATA') F(OUTDD) SHR'   ▌7▐
        ADDRESS MVS 'EXECIO 100 DISKR OUTDD (FINIS'     ▌8▐
        IF RC = 0 THEN
          DO
             ADDRESS MVS 'EXECIO 0 DISKW OUTDD (OPEN FINIS'  ▌9▐
             'MSG SYSOP 'SAP390 STATUS FILE CLEANUP COMPLETED AT ''TIME DATE
          END
        'FREE F(OUTDD)'
        /*This may cause an error code as it is only there to delete */
        /*a file that was previously allocated. You can ignore the error*/
        'ALLOC DA('SAP390.STATUS.DATA') F(OUTDD) MOD'      ▌10▐
        PUSH DATE TIME ICLISTAT DB2STAT                    ▌11▐
        ADDRESS MVS 'EXECIO 1 DISKW OUTDD (FINIS'          ▌12▐
        'FREE F(OUTDD)'
        'MSG SYSOP 'SAP390 STATUS FILE UPDATED AT ''TIME DATE ▌13▐
        EXIT
```

Figure 85. Sample SAP390 REXX Code - File Contains Records of One Day

The steps of the SAP390 REXX code execution match the reference keys in
Figure 85:

1. The TRAP is set for a message starting with BPX.
2. The MVS command is issued to get the status of ICLI.
3. The ICLI status is set.
4. The MVS command is issued to get the status of DB2.
5. The DB2 status is set.
6. The time and date are set.
7. The status file is allocated before starting I/O.
8. File management is executed.
9. The status file is emptied when it has more than 100 records.
10. The status file is allocated again.
11. The buffer contents are prepared.
12. The status record is written to the status file.
13. The message is sent to the system operator.

If you want to clean up the status file daily, the file management method shown
in Figure 86 on page 98 can be used.

```
/*   REXX   */
'TRAP AND SUPPRESS ONLY MESSAGE IEE*'
'MVS D A,ICLI'
'WAIT 2 SECONDS'
'MSGREAD'
'GETMSIZE NUMLINES'
'GETMLINE LASTLINE' NUMLINES
IF LASTLINE = 'ICLI NOT FOUND' THEN ICLISTAT = 'ICLI0000'
ELSE ICLISTAT = 'ICLI1111'
END
'MVS D A,DB2RMSTR'
/*DB2RMSTR is our name for the DB2 address space*/
'WAIT 2 SECONDS'
'MSGREAD'
'GETMSIZE NUMLINES'
'GETMLINE LASTLINE' NUMLINES
IF LASTLINE = 'DB2RMSTR NOT FOUND' THEN DB2STAT = 'DB2 0000'
ELSE DB2RMSTR = 'DB2 1111'
END
DATE = DATE('U')
TIME = TIME()
'FREE F(OUTDD)'
'ALLOC DA('SAP390.STATUS.DATA') F(OUTDD) SHR'
ADDRESS MVS 'EXECIO 1 DISKR OUTDD (FINIS'
PULL RECORD
IF SUBSTR(RECORD,1,8) <> DATE THEN
  DO
    ADDRESS MVS 'EXECIO 0 DISKW OUTDD (OPEN FINIS'
    'MSG SYSOP 'SAP390 STATUS FILE CLEANUP COMPLETED AT ''TIME DATE
  END
'FREE F(OUTDD)'
'ALLOC DA('SAP390.STATUS.DATA') F(OUTDD) MOD'
PUSH DATE TIME ICLISTAT DB2STAT
ADDRESS MVS 'EXECIO 1 DISKW OUTDD (FINIS'
'FREE F(OUTDD)'
'MSG SYSOP 'SAP390 STATUS FILE UPDATED AT ''TIME DATE
EXIT
/* we used <> for not equal */
```

Figure 86. Sample SAP390 REXX Code

4.4.2.3 Allocate Status File on OS/390

Before starting the SAP390 REXX code, the status information file is allocated. Figure 87 shows how the status file is allocated in TSO/E. You could allocate this file in REXX.

```
                           Allocate New Data Set


                                                   More:     +
   Data Set Name . . . : SAP390.STATUS.DATA

   Volume serial . . . . BAATP1          (Blank for authorized default volume)
   Generic unit. . . . .                 (Generic group name or unit address)
   Space units . . . . . CYLINDER        (BLKS, TRKS, CYLS, KB, MB or BYTES)
   Primary quantity. . . 1               (In above units)
   Secondary quantity. . 1               (In above units)
   Directory blocks. . . 0               (Zero for sequential data set)
   Record format . . . . FB
   Record length . . . . 80
   Block size  . . . . . 8800
   Expiration date . . .                 (YY/MM/DD, YYYY/MM/DD
                                          YY.DDD, YYYY.DDD in Julian form
    Enter "/" to select option           DDDD for retention period in days
      Allocate Multiple Volumes          or blank)
   Command ===>
    F1=Help        F2=Split      F3=Exit        F7=Backward    F8=Forward
    F9=Swap        F12=Cancel
```

Figure 87. Allocation of Status File

By introducing file management methods as described in Figure 85 on page 97 or Figure 86 on page 98, the DASD space for the status file cannot exceed what is specified in Figure 87.

4.4.2.4 Execution Interval of SAP390

The execution interval of SAP390 is very important for using the status information effectively. If the interval is too long, for example more than one hour, the status information may not be useful because the currency is lost. Using a short interval means that AIX can get more current information, but more processor power and DASD space are required.

So the interval must be determined by considering system management requirements, business requirements, and system resource environments.

4.4.2.5 Scheduling SAP390 REXX Code

To write one status record to the status file periodically, the SAP390 REXX command must be scheduled at periodic intervals. We set this interval to 10 minutes by using the EVERY command as shown in Figure 88 on page 100.

```
  ┌─────────────────────────────────────────────────────────────────────────┐
  │                                                                           │
  │ NCCF                    N E T V I E W   CNM01 NETOP1     02/17/97 10:11:00 │
  │                                                                           │
  │ - CNM01 P DSI034I COMMAND SCHEDULED BY AT/EVERY/AFTER COMMAND - ′SAP390′  │
  │ - CNM01 P DSI020I TIMER REQUEST SCHEDULED FOR EXECUTION ′ID=SYS00003′     │
  │ - CNM01 P DSI020I TIME EXPIRATIONS - ID= ′SYS00003′                       │
  │ - CNM01 P SAP390                                                          │
  │ - CNM01   DSI372I FREE COMMAND FAILED, ′OUTDD′ IS NOT ALLOCATED           │
  │ - CNM01   CNM272I OUTDD IS NOW ALLOCATED                                  │
  │ - CNM01   CNM272I OUTDD IS NOW DEALLOCATED                                │
  │ - CNM01   CNM272I OUTDD IS NOW ALLOCATED                                  │
  │ - CNM01   CNM272I OUTDD IS NOW DEALLOCATED                                │
  │ - CNM01   DSI001I MESSAGE SENT TO SYSOP                                   │
  │ - CNM01 P DSI020I TIME EXPIRATIONS - ID= ′SYS00003′                       │
  │ - CNM01 P SAP390                                                          │
  │ - CNM01   DSI372I FREE COMMAND FAILED, ′OUTDD′ IS NOT ALLOCATED           │
  │ - CNM01   CNM272I OUTDD IS NOW ALLOCATED                                  │
  │ - CNM01   CNM272I OUTDD IS NOW DEALLOCATED                                │
  │ - CNM01   CNM272I OUTDD IS NOW ALLOCATED                                  │
  │ - CNM01   CNM272I OUTDD IS NOW DEALLOCATED                                │
  │ - CNM01   DSI001I MESSAGE SENT TO SYSOP                                   │
  │                                                                           │
  │ ???                                                                       │
  │ EVERY 00:10:00,SAP390                                                     │
  │                                                                           │
  └─────────────────────────────────────────────────────────────────────────┘
```

Figure 88. Running SAP390 REXX Code with the EVERY Command

Figure 89 shows the message at the MVS system console when the SAP390
REXX code is running. It shows that the status record is being updated
successfully every 10 minutes.

```
  ┌─────────────────────────────────────────────────────────────────────────┐
  │                                                                           │
  │ DSI039I MSG FROM NETOP1 : SAP390 STATUS FILE UPDATE AT 10:12:23 02/28/97  │
  │ DSI039I MSG FROM NETOP1 : SAP390 STATUS FILE UPDATE AT 10:22:23 02/28/97  │
  │                                                                           │
  │                                                                           │
  │                                                                           │
  │                                                                           │
  │ ???                                                                       │
  │ EVERY 00:10:00,SAP390                                                     │
  │                                                                           │
  └─────────────────────────────────────────────────────────────────────────┘
```

Figure 89. Message from SAP390 REXX Code

Figure 90 shows status records written every 10 minutes. ICLI0000 status at
10:52:23 means that ICLI was down because we stopped for 15 minutes, then
started again for testing purposes.

```
  ┌─────────────────────────────────────────────────────────────────────────┐
  │ 02/28/97 10:12:23 ICLI1111 DB2 1111                                       │
  │ 02/28/97 10:22:23 ICLI1111 DB2 1111                                       │
  │ 02/28/97 10:32:23 ICLI1111 DB2 1111                                       │
  │ 02/28/97 10:42:23 ICLI1111 DB2 1111                                       │
  │ 02/28/97 10:52:23 ICLI0000 DB2 1111                                       │
  │ 02/28/97 11:02:23 ICLI1111 DB2 1111                                       │
  │ 02/28/97 11:12:23 ICLI1111 DB2 1111                                       │
  │ 02/28/97 11:22:23 ICLI1111 DB2 1111                                       │
  │ 02/28/97 11:32:23 ICLI1111 DB2 1111                                       │
  └─────────────────────────────────────────────────────────────────────────┘
```

Figure 90. Sample File Status Record

4.4.3 Customization of NFS Server

The customization of NFS to export directories from OS/390 was straightforward, using NFS manuals. The sequence of customization was:

1. Allocating and modifying the attribute data set
2. Allocating and modifying the exports data set
3. Allocating the mount handle data sets
4. Updating MVS system data sets for the server
5. Allocating the DFSMS/MVS NFS server log data sets
6. Modifying tcpip.ETC.RPC
7. Installing the client enabling commands

Refer to *Network File System User's Guide*, SC26-7028 and *Network File System Customization and Operation*, SC26-7029 for further information.

In customizing NFS Server on OS/390, we experienced a "hang" situation of the NFS *mount* command at the AIX client. The condition resulted because OpenEdition MVS reserved port 2049 due to the BPXPRMxx member of SYS1.PARMLIB, but this port was also defined as NFSS port at the TCP/IP profile by default. This problem was solved simply by changing one of two definitions. Refer to APAR OW22624 for further information.

4.4.3.1 Operating the NFS Server

Before starting the NFSS, the OpenEdition MVS (OMVS) address space and the TCPIP address space must be active with messages `BPXI0041 OMVS INITIALIZATION COMPLETE` and `MVSOED0001I OpenEdition-TCP/IP connection established`, being issued, respectively.

Figure 91 on page 102 shows the start command and other commands used to show the NFSS status.

```
S MVSNFS
IRR812I PROFILE ** (G) IN THE STARTED CLASS WAS USED 375
        TO START MVSNFS WITH JOBNAME MVSNFS.
$HASP100 MVSNFS   ON STCINRDR
IEF695I START MVSNFS   WITH JOBNAME MVSNFS   IS ASSIGNED TO USER STC
 , GROUP TSO
$HASP373 MVSNFS   STARTED
IEF403I MVSNFS - STARTED - TIME=12.39.23
GFSA348I DFSMS/MVS VERSION 1 NETWORK FILE SYSTEM SERVER (HDZ11SM)
STARTED.
F MVSNFS,STATUS
GFSA900I MOUNT PROCESSING ACTIVE.
GFSA904I HFS MOUNT PROCESSING ACTIVE.
GFSA751I SMF PROCESSING SUSPENDED FOR USER LOGOUT.
GFSA753I SMF PROCESSING SUSPENDED FOR FILE TIMEOUT.
GFSA903I TASK   1971F8 TCB   8D3BF8 PROGRAM = GFSASUBT = NFSTSK15.
GFSA903I TASK   1973A8 TCB   8D3E88 PROGRAM = GFSASUBT = NFSTSK14.
GFSA903I TASK   197558 TCB   8D51B8 PROGRAM = GFSASUBT = NFSTSK13.
GFSA903I TASK   197708 TCB   8D5448 PROGRAM = GFSASUBT = NFSTSK12.
GFSA903I TASK   1978B8 TCB   8D56D8 PROGRAM = GFSASUBT = NFSTSK11.
GFSA903I TASK   197A68 TCB   8D5968 PROGRAM = GFSASUBT = NFSTSK10.
GFSA903I TASK   197C18 TCB   8D5BF8 PROGRAM = GFSASUBT = NFSTSK09.
GFSA903I TASK   197D90 TCB   8D5E88 PROGRAM = GFSASUBT = NFSTSK08.
GFSA903I TASK   197ED8 TCB   8D61B8 PROGRAM = GFSASUBT = NFSTSK07.
GFSA903I TASK   13A148 TCB   8D6448 PROGRAM = GFSASUBT = NFSTSK06.
GFSA903I TASK   13A2F8 TCB   8D66D8 PROGRAM = GFSASUBT = NFSTSK05.
GFSA903I TASK   13A4A8 TCB   8D6968 PROGRAM = GFSASUBT = NFSTSK04.
F MVSNFS,LIST=MOUNTS
GFSA348I NO ACTIVE MOUNT POINTS.
GFSA782I NO ACTIVE HFS MOUNT POINTS.
```

Figure 91. Starting the NFS Server on OS/390

4.4.4 Writing Shell Script on AIX

As described in 4.4.1, "Overview" on page 94, two steps are taken to check the OS/390 status on AIX:

- Execute the R3TRANS command.

- Check the status record of the status information file of OS/390 by mounting it through NFS on AIX.

Figure 92 on page 103 shows the sample shell script we used for executing the R3TRANS command on AIX.

```
#!/bin/ksh
######################################################################
#       Name : /db.test                                             #
#       Goal : checks if a connection to the database is possible    #
#              used by tivoli to monitor connection to the host.     #
######################################################################
export SAPSYSTEMNAME=RED
export SAPDBHOST=DBSREDU
export SAPDBHOST=DBSREDU
export RSDB_ICLILIBRARY=/usr/sap/RED/SYS/exe/run/ibmicliudp.o
export RSDB_DBSLLIBRARY=/usr/sap/RED/SYS/exe/run/sldb2lib.o

/usr/sap/RED/SYS/exe/run/R3trans -d
/usr/sap/RED/SYS/exe/run/R3trans -d   1>>/dev/null 2>&1
rec=$?
if (( $rec )); then
        date  >> /tmp/db.test.log
        print "problem with DB-Connection or MVS or Database" >> /tmp/db.test.log
#       print "db.test 99" , if we use 1.X (numeric script)
        print 99 # if we use numeric script
        exit 0   # remind, that a script return code unequals
                 # means to Tivoli that there is a problem with
                 # the script.
else
        #print "db.test 0" , if we use 1.X (numeric script
        print 0 # if we use numeric script
        exit 0
fi
```

Figure 92. Shell Script db.test.orig.sh

Figure 93 on page 104 shows the sample shell script we used to get the status record of the status information file of OS/390 to be mounted through NFS, and to check the status of OS/390.

```
#!/bin/ksh
#####################################################################
#   Name : evalu                                                    #
#   Goal : called if the R3trans -d command returns a value unequals 0 #
#          checks the state of icli and db2                         #
#####################################################################
check_status_file () {

typeset STATUS_FILE=$1
typeset DATE
typeset TIME_of_write
typeset ICLI_STATUS
typeset DB2_STATUS

DATE=$(tail -n 1 $STATUS_FILE | awk '{ print $1 '})
TIME_of_write=$(tail -n 1 $STATUS_FILE| awk '{ print $2 '})
ICLI_STATUS=$(tail -n 1 $STATUS_FILE| awk '{ print $3 '} | cut -c5-5)
ICLI_STATUS_complett=$(tail -n 1 $STATUS_FILE| awk '{ print $3 '} )
DB2_STATUS=$(tail -n 1 $STATUS_FILE| awk '{ print $5 '}| cut -c3-3)
DB2_STATUS_complett=$(tail -n 1 $STATUS_FILE| awk '{ print $5 '})

print " DATE of this evaluation: $(date)"
print " DATE: $DATE  Time of last entry: $TIME_of_write "
if (($ICLI_STATUS)); then
   print " ICLI is ok : $ICLI_STATUS_complett"
else
   print " Problem with ICLI: $ICLI_STATUS_complett"
fi
if (($DB2_STATUS)); then
   print "  DB2 is ok : DB2_$DB2_STATUS_complett"
else
   print " Problem with DB2: DB2_$DB2_STATUS_complett"
fi
}
#####################################################################
#                       M A I N   P R O G R A M                     #
#####################################################################
ERROR_FTP_LOG=/tmp/error_ftp_evalu.log.$$
#sourcefile=/usr/local/Tivoli/mvs/status.data
sourcefile=/u/rustandi/nfs/status.data

ping -c3 dbsred 1>/dev/null 2>&1
RC_PING=$?
if (( $RC_PING )); then
        print " No IP-Connection to DBSRED possible "
else
        # ftp dbsred  1>/dev/null  2>$ERROR_FTP_LOG
        check_status_file $sourcefile
fi
cat $ERROR_FTP_LOG 1>/dev/null 2>&1
rm $ERROR_FTP_LOG 1>/dev/null 2>&1
```

Figure 93. Shell Script evalu

4.4.5 Running the Shell Script on AIX

This section shows what was done on OS/390 and on AIX to allow monitoring of OS/390 status from AIX.

4.4.5.1 *mvslogin* **and** *mount* **on AIX**

Before executing the shell script, use the *mvslogin* command to log into the OS/390 system, and the *mount* command to mount the data sets to AIX.

The *mvslogin* command is used to log in to MVS from a client machine for checking security, and it is required only when accessing data on systems where the DFSMS/MVS NFS server site *security* attribute is set to *saf* or *safexp*, which is defined at the NFSATTR member of SYS1.NFSDATA.

Figure 94 shows an example of the use of the *mvslogin* command to log in to *mvshost1* with user ID *carmel*.

```
$ mvslogin mvshost1 carmel
```

Figure 94. mvslogin Command on AIX

The AIX *mount* command is used to create a temporary link (until unmounted) between specific MVS data sets and the AIX directory. This AIX directory is normally empty, which is called a mount point. Client users also must know the MVS High Level Qualifier (HLQ) of the file they want to access.

This HLQ must be specified at the EXPORTS member of SYS1.NFSDATA when accessing data on systems where the DFSMS/MVS NFS server site *security* attribute is set to *saf* or *safexp*.

Figure 95 shows an example of a HLQ definition to be exported with read/write attributes.

```
# Statement Syntax
#
#    directory   -ro
#    directory   -rw=clients
#    directory   -access=clients
#
# where:
#
# directory = Prefix or file name
# -ro       = Export the directory as read only. If not specified,
#             the directory is exported read/write to every one.
# -rw       = Directory exported read/write to specified clients,
#             and read only to everyone else.  Separate clients
#             names by colons.
# -access   = Give access only to clients listed. Separate client
#             names by colons.  This can be further qualified with
#             the "ro" keyword or with an "rw" list.
SAP390               -ro
CARMEL               -ro
RUSTAND              -ro
```

Figure 95. EXPORTS List

The *mount* command is issued specifying an MVS HLQ and the mount point. If successfully mounted, the MVS data set beginning with the specified HLQ appears as files under the mount point.

Figure 96 on page 106 shows an example of the use of the *mount* command to access any MVS data sets beginning with *SAP390* on *mvshost1* under the mount point */u/carmel/nfs*.

```
$ mount mvshost1%colon.SAP390 /u/carmel/nfs
```

Figure 96. mount Command on AIX

Figure 97 shows the *mvslogin* and *mount* commands and the status information
in our environment.

```
root@sp21n09> ./mvslogin dbsred ywlee
Password required
GFSA973A Enter MVS Password:
GFSA955I ywlee logged in ok.
root@sp21n09> mount dbsred:SAP390 /u/rustandi/nfs
root@sp21n09> mount
  node        mounted          mounted over    vfs     date          options
-------- ---------------  --------------- ------ ------------ ----------
        /dev/hd4         /               jfs    Mar 03 10:00 rw,log=/dev/hd8
        /dev/hd2         /usr            jfs    Mar 03 10:00 rw,log=/dev/hd8
        /dev/hd9var      /var            jfs    Mar 03 10:00 rw,log=/dev/hd8
        /dev/hd3         /tmp            jfs    Mar 03 10:00 rw,log=/dev/hd8
        /dev/hd1         /home           jfs    Mar 03 10:03 rw,log=/dev/hd8
        /dev/lvred01     /sapmnt/RED     jfs    Mar 03 10:03 rw,log=/dev/loglv
01
        /dev/lvred02     /usr/sap/trans  jfs    Mar 03 10:03 rw,log=/dev/loglv
01
        /dev/lvred03     /usr/sap/RED    jfs    Mar 03 10:03 rw,log=/dev/loglv
01
        /dev/lv01        /usr/sap/put    jfs    Mar 03 10:03 rw,log=/dev/hd8
00
        /dev/lvTIV1      /usr/local/Tivoli jfs   Mar 03 10:03 rw,log=/dev/hd8
root@sp21n09> cd /u/rustandi/nfs
root@sp21n09> ls
status.data
```

Figure 97. mvslogin and mount Command on AIX

Figure 98 shows the status of NFSS on OS/390 after issuing the *mount* command
on AIX. The number of active mounts is not zero because some data sets are
being mounted.

```
F MVSNFS,LIST=MOUNTS
GFSA910I SAP390 ACTIVE = 2
GFSA782I NO ACTIVE HFS MOUNT POINTS.
F MVSNFS,LIST=DSNAMES
GFSA921I NO ACTIVE DATA SETS.
GFSA783I NO ACTIVE HFS DATA SETS.
```

Figure 98. NFSS Status after Issuing the mount Command on AIX

4.4.5.2 Execution of the R3TRANS Command on AIX
The status of the DB server can be determined first by the result of the R3TRANS
command. If the return code of this execution is 8 or less, everything is
assumed to be normal, and no further checking is required. The shell script
db.test.orig.sh executes the R3TRANS command. Figure 99 on page 107 shows
the execution of shell script *db.test.orig.sh* and its results.

```
root@sp21n09> cd home/residents/volker/MVS
root@sp21n09> ls
.netrc          db.test.orig.sh evalu.sh          trans.log
root@sp21n09> ./db.test.orig.sh
This is /usr/sap/RED/SYS/exe/run/R3trans version 5.30.2 (release 30F - 27
- 10:06:00).
/usr/sap/RED/SYS/exe/run/R3trans finished (0000).
0
```

Figure 99. Execution of Shell Script db.test.orig.sh

If the return code of *db.test.orig.sh* is greater than 8, you must execute *evalu.sh*
to get more status information about OS/390. This shell script accesses the
status file, SAP390.STATUS.DATA, which was mounted through NFS. It then gets
the last record entry and checks the ICLI and DB2 status. Figure 100 shows the
execution and its results.

```
root@sp21n09> ls
.netrc          db.test.orig.sh evalu.sh          trans.log
root@sp21n09> ./evalu.sh
 DATE of this evaluation: Mon Mar  3 11:54:10 EST 1997
 DATE: 02/28/97  Time of last entry: 14:21:47
 ICLI is ok : ICLI1111
  DB2 is ok : DB2_1111
root@sp21n09>
```

Figure 100. Execution of Shell Script evalu.sh

4.5 Using DB2 Performance Monitor on OS/390

This section discusses how and where to get useful information for monitoring
the DB status and managing the DB performance using DB2PM.

4.5.1 Overview

DB2PM can help you in managing the database performance by monitoring
performance critical areas, as well as in identifying bottlenecks.

You can use DB2PM for the following tasks:

- Determine DB2 subsystem performance and efficiency

- Monitor DB2 system parameters

- Identify and solve potential problems

- Control and tune your DB2 system

- Control and tune DB2 application

- Recognize trends and anticipate potential bottlenecks

DB2PM can help you in managing the performance of the SAP R/3 database
server by monitoring:

- Thread activity

- DB2 statistics

- DB2 system parameters

4.5.2 Monitoring Thread Activity

The architecture of ICLI implies that each SAP R/3 work process is handled by one ICLI client. Each ICLI client communicates with its respective ICLI server thread. In addition, each ICLI server thread is handled by a DB2 thread. See Figure 101.
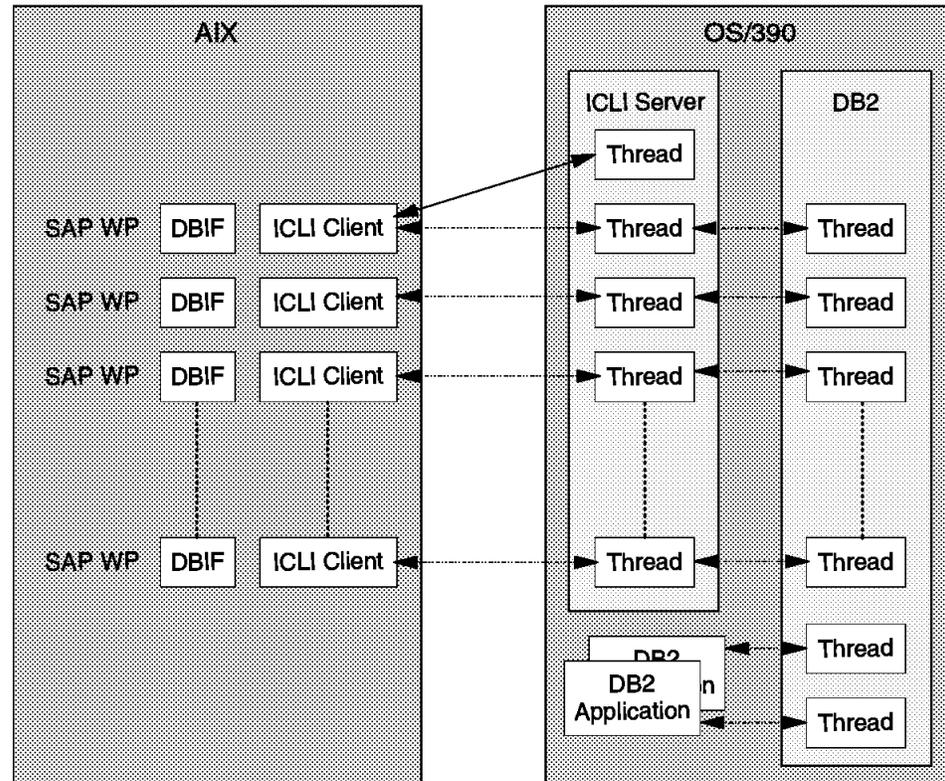
Figure 101. SAP R/3 on DB2 for OS/390 Architecture

The ICLI server should be active when you start SAP. It should remain active during the life of the SAP application. Because of that, we cannot monitor each SAP transaction. But we *can* monitor:

- DB2 thread activity

- Detail activities for each DB2 thread, such as:

  - Locking activities

  - SQL activities

  - Buffer Manager activities

4.5.2.1 Monitoring DB2 Thread Usage

Monitoring DB2 thread usage is important, because DB2 threads are the resources for executing SAP transactions. If the resources are not available, SAP transactions cannot be executed.

In Figure 102, we can see how DB2PM shows the DB2 threads. In this example, we only monitor DB2 threads that were used by SAP by issuing the QUALIFY command and selecting the FOMEPLAN plan.

```
 97/02/24 17:11              Thread Summary   SORT QUALIFY    ROW 1 to 14 OF 14

 DB2R            DB2R V5R1

 To display a thread, place any character next to it, then press Enter.

                         Program    Connection          ------- Elapsed -------
   Primauth   Planname   name       ID         Status    Class 1        Class 2
 _ ICLIRUN    FOMEPLAN   N/P        DB2CALL     APPL     12:05:23.37         N/P
 _ ICLIRUN    FOMEPLAN   N/P        DB2CALL     APPL     12:05:23.32         N/P
 _ ICLIRUN    FOMEPLAN   N/P        DB2CALL     APPL     12:05:23.19         N/P
 _ ICLIRUN    FOMEPLAN   N/P        DB2CALL     APPL     12:05:23.05         N/P
 _ ICLIRUN    FOMEPLAN   N/P        DB2CALL     APPL     12:05:23.08         N/P
 _ ICLIRUN    FOMEPLAN   N/P        DB2CALL     APPL     12:05:22.88         N/P
 _ ICLIRUN    FOMEPLAN   N/P        DB2CALL     APPL     12:05:22.86         N/P
 _ ICLIRUN    FOMEPLAN   N/P        DB2CALL     APPL     12:05:22.48         N/P
 _ ICLIRUN    FOMEPLAN   N/P        DB2CALL     APPL     12:05:22.36         N/P
 _ ICLIRUN    FOMEPLAN   N/P        DB2CALL     APPL     12:05:22.27         N/P
 _ ICLIRUN    FOMEPLAN   N/P        DB2CALL     APPL     12:05:22.22         N/P
 _ ICLIRUN    FOMEPLAN   N/P        DB2CALL     APPL     12:05:22.19         N/P
 _ ICLIRUN    FOMEPLAN   N/P        DB2CALL     APPL     12:05:22.08         N/P
 _ ICLIRUN    FOMEPLAN   N/P        DB2CALL     APPL     12:05:21.95         N/P

 Command ===>
  F1=Help      F2=Split     F3=Exit      F5=Auto      F6=History     F7=Up
  F8=Down      F9=Swap     F10=Qualify  F11=Sort     F12=Cancel
```

Figure 102. DB2PM Thread Summary Panel

4.5.2.2 Detail Activities Monitoring

We can monitor the activities of each DB2 thread by placing any character next to the DB2 thread that we want to analyze further and pressing Enter. Figure 103 on page 110, Figure 104 on page 110, and Figure 105 on page 111 show the activities of one of the DB2 threads used by the ICLI.

```
┌─
│ 97/02/24 17:12                    Thread Detail                    DB2R DB2R V5R1
│
│ For details, place any character next to heading, then press Enter.
│                                                                   More:     +
│ _ Thread Identification
│   Primauth . . . . . : ICLIRUN         Correlation name  . . . : ICLI
│   Planname . . . . . : FOMEPLAN        Connection type . . . . : DB2CALL
│   Connection ID  . . : DB2CALL         Type  . . . . . . . . . : ALLIED
│   Requesting Location: DB2R            Status  . . . . . . . . : APPL
│ _ Current DBRM       . . . . . . . . . . . : N/P
│ _ Times                                      Elapsed            CPU
│   Class 1 . . . . . . . . . . . . . . . . : 12:05:43.8322      0.000092
│   Class 2 . . . . . . . . . . . . . . . . :            N/P         N/A
│   Class 3 . . . . . . . . . . . . . . . . :            N/P         N/A
│   Class 7 . . . . . . . . . . . . . . . . :            N/P         N/P
│   Class 8 . . . . . . . . . . . . . . . . :            N/P         N/A
│ _ Locking Activity
│   Timeouts . . . . . . . . . . . . . . . . :             0
│   Deadlocks  . . . . . . . . . . . . . . . :             0
│   Suspensions  . . . . . . . . . . . . . . :             1
│   Lock escalations . . . . . . . . . . . . :             0
│ Command ===>
│  F1=Help     F2=Split    F3=Exit     F5=Auto     F6=History    F7=Up
│  F8=Down     F9=Swap    F12=Cancel
└─
```

Figure 103. DB2PM Thread Detail Panel (1 of 3)

Pressing PF8 gets you to Figure 104.

```
┌─
│ 97/02/24 17:12                    Thread Detail                    DB2R DB2R V5R1
│
│ For details, place any character next to heading, then press Enter.
│                                                                   More:     +
│   Lock escalations . . . . . . . . . . . . :             0
│   Maximum page locks held  . . . . . . . . :             8
│ _ Locked Resources
│ _ RID List Processing
│   Unsuccessful - any reason  . . . . . . . :             0
│ _ SQL Activity, Commits and Rollbacks
│   DML . . . :   4471 Commits . . . . . . . :           740
│   DCL . . . :      1 Rollbacks . . . . . . :             0
│   DDL . . . :      0 Updates/Commits . . . . :           0.2
│ _ Buffer Manager Activity
│   Getpage requests . . . . . . . . . . . . :         24085
│   Buffer updates . . . . . . . . . . . . . :           135
│   Prefetch reads . . . . . . . . . . . . . :           134
│   Synchronous I/O  . . . . . . . . . . . . :           400
│ _ SQL Statement and DBRM . . . . . . . . . :      FOMEMOD2
│   Distributed Data
│   Requester elapsed time . . . . . . . . . :           N/P
│ Command ===>
│  F1=Help     F2=Split    F3=Exit     F5=Auto     F6=History    F7=Up
│  F8=Down     F9=Swap    F12=Cancel
└─
```

Figure 104. DB2PM Thread Detail Panel (2 of 3)

Pressing PF8 gets you to Figure 105 on page 111.

```
┌─                                                                            ─┐
│ 97/02/24 17:12                 Thread Detail                 DB2R DB2R V5R1  │
│                                                                              │
│ For details, place any character next to heading, then press Enter.         │
│                                                              More:    -      │
│   DML . . . :   4471 Commits . . . . . . . . :          740                  │
│   DCL . . . :    155 Rollbacks . . . . . . . :            0                  │
│   DDL . . . :      0 Updates/Commits . . . . :          0.2                  │
│ _ Buffer Manager Activity                                                    │
│   Getpage requests . . . . . . . . . . . . . :        34529                  │
│   Buffer updates . . . . . . . . . . . . . . :          155                  │
│   Prefetch reads . . . . . . . . . . . . . . :           64                  │
│   Synchronous I/O  . . . . . . . . . . . . . :          400                  │
│ _ SQL Statement and DBRM . . . . . . . . . . :     FOMEMOD2                  │
│   Distributed Data                                                           │
│   Requester elapsed time . . . . . . . . . . :          N/P                  │
│ _ IFI (Class 5) and Data Capture                                             │
│ _ Query Parallelism Data                                                     │
│   Data Sharing Locking Activity                                              │
│   Suspensions  . . . . . . . . . . . . . . . :          N/P                  │
│   Group Buffer Pools Activity                                                │
│ _ Stored Procedures                                                          │
│ Command ===>                                                                 │
│  F1=Help     F2=Split    F3=Exit     F5=Auto     F6=History    F7=Up         │
│  F8=Down     F9=Swap     F12=Cancel                                          │
└─                                                                            ─┘
```

Figure 105. DB2PM Thread Detail Panel (3 of 3)

Details for each activity can be shown by placing any character next to the respective heading, and pressing Enter.

Some examples of detail thread activity monitoring are:

- Locking Activity; see section "Locking Activity."

- SQL Activity; see section "SQL Activity Monitoring" on page 112.

- Buffer Management; see section "Buffer Management" on page 114.

Locking Activity
Detail locking activity can be seen by entering any character in the Locking Activity heading and pressing Enter. The screen shown in Figure 106 on page 112 will then be displayed.

```
                    Locking (IRLM) Activity

                                                  More:      +
Lock and latch suspensions . . . . . . . . . . . . :     N/P
Elapsed time . . . . . . . . . . . . . . . . . :         N/P

Timeouts . . . . . . . . . . . . . . . . . . . . :        0
Deadlocks  . . . . . . . . . . . . . . . . . . . :        0
Lock requests  . . . . . . . . . . . . . . . . . :     10401
Unlock requests  . . . . . . . . . . . . . . . . :      1966
Change requests  . . . . . . . . . . . . . . . . :      1413
Query requests . . . . . . . . . . . . . . . . . :        0
Other IRLM requests  . . . . . . . . . . . . . . :        0
Suspensions - lock . . . . . . . . . . . . . . . :        0
Suspensions - latch  . . . . . . . . . . . . . . :        1
Suspensions - other  . . . . . . . . . . . . . . :        0
Lock escalations - shared  . . . . . . . . . . . :        0
Lock escalations - exclusive . . . . . . . . . . :        0
Maximum page or row locks held . . . . . . . . . :        6
Command ===>
 F1=Help     F2=Split    F3=Exit     F5=Auto     F6=History
 F7=Up       F8=Down     F9=Swap     F12=Cancel
```

Figure 106. DB2PM Thread Detail - Locking Activity Window (1 of 2)

Pressing PF8 will get the next screen, shown in Figure 107.

```
                    Locking (IRLM) Activity

                                                  More:      -
Deadlocks  . . . . . . . . . . . . . . . . . . . :        0
Lock requests  . . . . . . . . . . . . . . . . . :     10401
Unlock requests  . . . . . . . . . . . . . . . . :      1966
Change requests  . . . . . . . . . . . . . . . . :      1433
Query requests . . . . . . . . . . . . . . . . . :        0
Other IRLM requests  . . . . . . . . . . . . . . :        0
Suspensions - lock . . . . . . . . . . . . . . . :        0
Suspensions - latch  . . . . . . . . . . . . . . :        1
Suspensions - other  . . . . . . . . . . . . . . :        0
Lock escalations - shared  . . . . . . . . . . . :        0
Lock escalations - exclusive . . . . . . . . . . :        0
Maximum page or row locks held . . . . . . . . . :        8
Claim requests . . . . . . . . . . . . . . . . . :      4718
Unsuccessful claim requests  . . . . . . . . . . :        0
Drain requests . . . . . . . . . . . . . . . . . :        0
Unsuccessful drain requests  . . . . . . . . . . :        0
Command ===>
 F1=Help     F2=Split    F3=Exit     F5=Auto     F6=History
 F7=Up       F8=Down     F9=Swap     F12=Cancel
```

Figure 107. DB2PM Thread Detail - Locking Activity Window (2 of 2)

SQL Activity Monitoring

If you are interested in the SQL activity, enter a character in the SQL activity
heading and press Enter. The SQL activity window is shown in Figure 108 on
page 113.

```
                   SQL Activity
                                     More:       +
Incremental Binds . . . . . . . . . . :         0
Commits . . . . . . . . . . . . . . . :       740
Rollbacks . . . . . . . . . . . . . . :         0
Updates/Commit  . . . . . . . . . . . :         0.2

Total DML . . . . . . . . . . . . . . :      4471
  Select  . . . . . . . . . . . . . . :         0
  Insert  . . . . . . . . . . . . . . :         0
  Update  . . . . . . . . . . . . . . :         6
  Delete  . . . . . . . . . . . . . . :         0
  Prepare . . . . . . . . . . . . . . :      1419
  Describe  . . . . . . . . . . . . . :         0
  Describe Table  . . . . . . . . . . :         0
  Open  . . . . . . . . . . . . . . . :      1427
  Close . . . . . . . . . . . . . . . :        14
Command ===> _____
 F1=Help      F2=Split     F3=Exit      F5=Auto
 F6=History   F7=Up        F8=Down      F9=Swap
F12=Cancel
```

Figure 108. DB2PM Thread Detail - SQL Activity Window (1 of 4)

Pressing PF8 will get the next screen, shown in Figure 109.

```
                   SQL Activity
                                     More:     - +
  Close . . . . . . . . . . . . . . . :        14
  Fetch . . . . . . . . . . . . . . . :      1605

Total DCL . . . . . . . . . . . . . . :         1
  Lock Table  . . . . . . . . . . . . :         0
  Grant . . . . . . . . . . . . . . . :         0
  Revoke  . . . . . . . . . . . . . . :         0
  Set SQLID . . . . . . . . . . . . . :         1
  Set Host Variable . . . . . . . . . :         0
  Set Current Degree  . . . . . . . . :         0
  Connect type 1  . . . . . . . . . . :         0
  Connect type 2  . . . . . . . . . . :         0
  Set Connection  . . . . . . . . . . :         0
  Release . . . . . . . . . . . . . . :         0
  Set current rules . . . . . . . . . :         0
Command ===> _____
 F1=Help      F2=Split     F3=Exit      F5=Auto
 F6=History   F7=Up        F8=Down      F9=Swap
F12=Cancel
```

Figure 109. DB2PM Thread Detail - SQL Activity Window (2 of 4)

Pressing PF8 will get the next screen, shown in Figure 110 on page 114.

```
                   SQL Activity
                                     More:    - +
   Set current rules . . . . . . . . . :        0
   SQL call  . . . . . . . . . . . . . :        0
   SQL associate locators  . . . . . . :        0
   SQL allocation cursor . . . . . . . :        0

Total DDL . . . . . . . . . . . . . . :        0
   Comment On  . . . . . . . . . . . . :        0
   Label On  . . . . . . . . . . . . . :        0

                    Create        Drop       Alter
   Table . . . . :       1           1           0
   Index . . . . :       0         N/A         N/A
   Tablespace  . :       0           0           0
   Database  . . :       0           0           0
Command ===>
 F1=Help      F2=Split     F3=Exit      F5=Auto
 F6=History   F7=Up        F8=Down      F9=Swap
F12=Cancel
```

Figure 110. DB2PM Thread Detail - SQL Activity Window (3 of 4)

Pressing PF8 will get the next screen, shown in Figure 111.

```
                   SQL Activity
                                     More:    -
Total DDL . . . . . . . . . . . . . . :        0
   Comment On  . . . . . . . . . . . . :        0
   Label On  . . . . . . . . . . . . . :        0

                    Create        Drop       Alter
   Table . . . . :       1           1           0
   Index . . . . :       0         N/A         N/A
   Tablespace  . :       0           0           0
   Database  . . :       0           0           0
   Stogroup  . . :       0           0           0
   Synonym . . . :       0           0         N/A
   View  . . . . :       0           0         N/A
   Alias . . . . :       0           0         N/A
   Package . . . :     N/A           0         N/A
Command ===>
 F1=Help      F2=Split     F3=Exit      F5=Auto
 F6=History   F7=Up        F8=Down      F9=Swap
F12=Cancel
```

Figure 111. DB2PM Thread Detail - SQL Activity Window (4 of 4)

Buffer Management
Detail Buffer Management data can be seen by entering a character in the SQL
Buffer Manager Activity heading and pressing Enter. The Buffer Manager
Activity window is shown in Figure 112 on page 115.

```
┌─────────────────────────────────────────────────────────────────────────┐
│                    Buffer Manager Activity      ROW 1 TO 2 OF 2           │
│                                                                           │
│   For additional details, type any character next to Buffer Pool ID,      │
│   then press Enter.                                                        │
│                                                                           │
│     Buffer Pool      Getpage         Synchronous        Buffer Updates     │
│     ID               Requests        Read I/O                             │
│   _ BP0               19722             123                    0           │
│   _ BP2                 478              98                   84           │
│   _ BP3                2848             140                   58           │
│   _ BP32K              1101              39                    8           │
│   _ TOTAL             24149             400                  150           │
│   -- End of Bufferpool List --                                            │
│                                                                           │
│                                                                           │
│                                                                           │
│                                                                           │
│   Command ===> _____    │
│    F1=Help       F2=Split      F3=Exit       F5=Auto       F6=History      │
│    F7=Up         F8=Down       F9=Swap       F12=Cancel                    │
└─────────────────────────────────────────────────────────────────────────┘
```

Figure 112. DB2PM Thread Detail - Buffer Manager Activity Window

To get detail data for each buffer pool, put any character next to the Buffer Pool
ID and press Enter. The screen shown in Figure 113 will be displayed.

```
┌─────────────────────────────────────────────────────────────────────────┐
│                         Buffer Pool Detail                                │
│                                                                           │
│   Bufferpool ID . . . . . . . . . . . . . . . :      BP0                  │
│   Getpage requests . . . . . . . . . . . . . . :    19722                 │
│   Buffer updates . . . . . . . . . . . . . . . :        0                 │
│   Sequential prefetch requests . . . . . . . . :        0                 │
│   List prefetch requests . . . . . . . . . . . :      119                 │
│   Dynamic prefetch requests  . . . . . . . . . :        1                 │
│   Synchronous reads  . . . . . . . . . . . . . :      123                 │
│   Synchronous writes . . . . . . . . . . . . . :        0                 │
│   Successful hiperpool reads . . . . . . . . . :        0                 │
│   Unsuccessful hiperpool reads . . . . . . . . :        0                 │
│   Successful hiperpool writes  . . . . . . . . :        0                 │
│   Unsuccessful hiperpool writes  . . . . . . . :        0                 │
│   Asynchronous pages read  . . . . . . . . . . :        1                 │
│   Pages moved from hiperpool . . . . . . . . . :        0                 │
│                                                                           │
│   Command ===> _____    │
│    F1=Help       F2=Split      F3=Exit       F5=Auto                       │
│    F6=History    F9=Swap       F12=Cancel                                  │
└─────────────────────────────────────────────────────────────────────────┘
```

Figure 113. DB2PM Thread Detail - Detail Buffer Manager Activity Window

4.5.3 DB2 Statistics

Monitoring the DB2 statistics is very useful in identifying a potential bottleneck
problem. Figure 114 on page 116 is an example of the screen you can get from
the DB2PM.

```
┌──────────────────────────────────────────────────────────────────────────────┐
│                                                                                │
│  97/02/24 17:18              DB2 Statistics Detail           DB2R DB2R V5R1     │
│                                                                                │
│                                                                                │
│  For details, type any character next to heading, then press Enter.            │
│                                                                                │
│                                                                  More:      +   │
│  _ EDM Pool                                                                     │
│       EDM Pool full . . . . . . . . . . . . . . . . . . . . . . . . . . . :  0  │
│       EDM Pool pages in use (%) . . . . . . . . . . . . . . . . . . . . . :  3.1 │
│       CT requests/CT not in EDM pool  . . . . . . . . . . . . . . . . . :  39.3 │
│       PT requests/PT not in EDM pool  . . . . . . . . . . . . . . . . . :  6.8  │
│       DBD requests/DBD not in EDM pool  . . . . . . . . . . . . . . . . : 437.1 │
│  _ Buffer Manager                                                              │
│       Synchronous Reads . . . . . . . . . . . . . . . . . . . . . . . . : 2627  │
│       Deferred write threshold reached  . . . . . . . . . . . . . . . . :  0    │
│       DM critical threshold reached . . . . . . . . . . . . . . . . . . :  0    │
│  _ Locking Activity                                                            │
│       Suspensions - all . . . . . . . . . . . . . . . . . . . . . . . . : 363   │
│       Deadlocks . . . . . . . . . . . . . . . . . . . . . . . . . . . . :  0    │
│       Timeouts  . . . . . . . . . . . . . . . . . . . . . . . . . . . . :  0    │
│       Lock escalations - all  . . . . . . . . . . . . . . . . . . . . . :  0    │
│  Command ===>                                                                  │
│   F1=Help      F2=Split    F3=Exit     F5=Auto     F6=History   F7=Up           │
│   F8=Down      F9=Swap     F10=Delta   F11=Interval F12=Cancel                  │
│                                                                                │
└──────────────────────────────────────────────────────────────────────────────┘
```

Figure 114. DB2PM - DB2 Statistics Detail (1 of 3)

Pressing PF8 will get the next screen, shown in Figure 115.

```
┌──────────────────────────────────────────────────────────────────────────────┐
│                                                                                │
│  97/02/27 17:18              DB2 Statistics Detail           DB2R DB2R V5R1     │
│                                                                                │
│                                                                                │
│  For details, type any character next to heading, then press Enter.            │
│                                                                                │
│                                                                  More:    - +   │
│       Lock escalations - all  . . . . . . . . . . . . . . . . . . . . . :  0    │
│  _ Open/Close Management                                                       │
│       Open data sets - High Water Mark  . . . . . . . . . . . . . . . . : 154   │
│  _ Bind Processing                                                             │
│  _ Plan/Package Allocation, Authorization Management                           │
│  _ Log Manager                                                                 │
│       Reads satisfied - Output Buffer . . . . . . . . . . . . . . . . . :  0    │
│       Reads satisfied - Active Log  . . . . . . . . . . . . . . . . . . : 206   │
│       Reads satisfied - Archive Log . . . . . . . . . . . . . . . . . . :  0    │
│       Write-no-wait . . . . . . . . . . . . . . . . . . . . . . . . . . : 19276 │
│       Unavailable output log buffers  . . . . . . . . . . . . . . . . . :  0    │
│  _ Subsystem Service                                                           │
│       Queued at create thread . . . . . . . . . . . . . . . . . . . . . :  0    │
│       System event checkpoints  . . . . . . . . . . . . . . . . . . . . :  1    │
│  _ SQL Activity                                                                │
│  Command ===>                                                                  │
│   F1=Help      F2=Split    F3=Exit     F5=Auto     F6=History   F7=Up           │
│   F8=Down      F9=Swap     F10=Delta   F11=Interval F12=Cancel                  │
│                                                                                │
└──────────────────────────────────────────────────────────────────────────────┘
```

Figure 115. DB2PM - DB2 Statistics Detail (2 of 3)

Pressing PF8 will get the next screen, shown in Figure 116 on page 117.

```
97/02/24 17:18              DB2 Statistics Detail          DB2R DB2R V5R1


For details, type any character next to heading, then press Enter.

                                                               More:    -
    Reads satisfied - Archive Log . . . . . . . . . . . . . . . . . . :      0
    Write-no-wait . . . . . . . . . . . . . . . . . . . . . . . . . :  19276
    Unavailable output log buffers  . . . . . . . . . . . . . . . . :      0
_ Subsystem Service
    Queued at create thread . . . . . . . . . . . . . . . . . . . . :      0
    System event checkpoints  . . . . . . . . . . . . . . . . . . . :      1
_ SQL Activity
_ Query Parallelism Data
_ RID List Processing
  Distributed Data
_ CPU Times and Other Data
  Data Sharing Locking Activity
  Group Buffer Pool Activity
  Global Group Buffer Pool Statistics
_ Stored Procedures
Command ===> _____
 F1=Help      F2=Split     F3=Exit     F5=Auto      F6=History   F7=Up
 F8=Down      F9=Swap      F10=Delta   F11=Interval F12=Cancel
```

Figure 116. DB2PM - DB2 Statistics Detail (3 of 3)

4.5.3.1 Detail of Log Manager

To get detail data of the Log Manager, put any character next to the Log Manager heading and press Enter. The screen in Figure 117 will be displayed.

```
                           Log Manager



                                                       More:     +

 Reads satisfied
   From output buffer  . . . . . . . . . . . . . . . . . . . :      0
   From active log . . . . . . . . . . . . . . . . . . . . . :    206
   From archive log  . . . . . . . . . . . . . . . . . . . . :      0

 Reads delayed
   Tape volume contention  . . . . . . . . . . . . . . . . . :      0
   Unavailable resource  . . . . . . . . . . . . . . . . . . :      0

 Look ahead mounts attempted . . . . . . . . . . . . . . . . :      0
 Look ahead mounts successful  . . . . . . . . . . . . . . . :      0

 Command ===> _____
  F1=Help      F2=Split     F3=Exit     F5=Auto      F6=History
  F7=Up        F8=Down      F9=Swap      F10=Delta    F11=Interval
 F12=Cancel
```

Figure 117. DB2PM - Log Detail

4.5.4 DB2 System Parameters

DB2PM can show you all the system parameters you have specified during DB2 customization. An example of the DB2 system parameter screen can be seen in Figure 118 and Figure 119 on page 119. Please refer to *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*, SC33-7962 for the recommended parameters for SAP.

```
                        DB2 System Parameters Detail

   For details, type any character next to heading, then press Enter.


   DB2R                  DB2R  V5R1
                                                           More:     +
   _  Virtual and Hiperpool Buffer Sizes
   _  Storage Sizes and Connections
   _  Operator and DDF Functions
   _  Tracing, Data Installation and Pseudo-Close
      Start SMF Accounting  . . . . . . . . . . . . . :             1
      Start SMF Statistics  . . . . . . . . . . . . . :           1,3
      Start Monitor trace . . . . . . . . . . . . . . :            NO
      Checkpoint frequency  . . . . . . . . . . . . . :        50,000
   _  Locking (IRLM)
      Maximum locks per table space . . . . . . . . . :        20,000
      Maximum locks per user  . . . . . . . . . . . . :             0
      Resource timeout (seconds)  . . . . . . . . . . :            60
      Subsystem name  . . . . . . . . . . . . . . . . :          IRLM
   _  Active Log
   Command ===>
    F1=Help     F2=Split    F3=Exit     F6=History   F7=Up       F8=Down
    F9=Swap    F12=Cancel
```

Figure 118. DB2PM - DB2 System Parameters

Pressing PF8 will get the next screen, shown in Figure 119 on page 119.

```
┌─────────────────────────────────────────────────────────────────────────┐
│                      DB2 System Parameters Detail                         │
│                                                                           │
│   For details, type any character next to heading, then press Enter.      │
│                                                                           │
│                                                                           │
│   DB2R                  DB2R  V5R1                                         │
│                                                           More:   - +      │
│   _  Active Log                                                            │
│        Write threshold . . . . . . . . . . . . . . . . :           20      │
│        Input buffer size (KB)  . . . . . . . . . . . . :           28      │
│        Output buffer size (KB) . . . . . . . . . . . . :          400      │
│   _  Archive Log                                                           │
│        Number of copies  . . . . . . . . . . . . . . . :         DUAL      │
│        Quiesce period (seconds)  . . . . . . . . . . . :            5      │
│   _  Protection and Data Definition                                       │
│   _  Stored Procedures                                                     │
│        Group Buffer Pools                                                  │
│        Data Sharing Parameters                                            │
│        Data Sharing enabled  . . . . . . . . . . . . . :           NO      │
│   _  Application Programming Defaults                                      │
│   _  Other Parameters                                                      │
│   Command ===> _____       │
│    F1=Help      F2=Split     F3=Exit      F6=History    F7=Up     F8=Down  │
│    F9=Swap      F12=Cancel                                                 │
└─────────────────────────────────────────────────────────────────────────┘
```

Figure 119. DB2PM - DB2 System Parameters

4.5.4.1 Detail Archive Log

To get details of the Archive Log parameters that you specified during the DB2 customization, put any character next to the Archive Log heading and press Enter. See Figure 120.

```
┌─────────────────────────────────────────────────────────────────────────┐
│                              Archive Log                                  │
│                                                                           │
│                                                                           │
│                                                           More:     +      │
│                                                                           │
│   Archive Log Parameters                                                  │
│   Number of copies . . . . . . . . . . . . . . . . . . . . :       DUAL    │
│   Copy 1 prefix  . . . . . . :                     DSN510.ARCHLOG1         │
│   Copy 2 prefix  . . . . . . :                     DSN510.ARCHLOG2         │
│   Catalog archive data sets  . . . . . . . . . . . . . :        YES        │
│   Copy 1 - archive Log device type . . . . . . . . . . . :      3390       │
│   Copy 2 - archive Log device type . . . . . . . . . . . :      3390       │
│   Method used  . . . . . . . . . . . . . . . . . . . . . :   CYLINDER      │
│   Primary space  . . . . . . . . . . . . . . . . . . . . :       850       │
│   Secondary space  . . . . . . . . . . . . . . . . . . . :       100       │
│   Archive Log block size (bytes) . . . . . . . . . . . . :    28,672       │
│   Maximum read tape units  . . . . . . . . . . . . . . . :         2       │
│   Tape unit deallocation period  . . . . . . . . . . . . :         0       │
│   Tape unit deallocation units . . . . . . . . . . . . . :   SECONDS       │
│   Command ===> _____          │
│    F1=Help      F2=Split     F3=Exit      F6=History    F7=Up              │
│    F8=Down      F9=Swap      F12=Cancel                                    │
└─────────────────────────────────────────────────────────────────────────┘
```

Figure 120. DB2PM - DB2 System Parameters

4.6 Summary

We monitored and managed the system status of the application server and database server by using the tools we could install or develop. However more is needed for an integrated system management level. As described at 4.1, "Overview" on page 77, therefore, tools based on TME are being developed for managing the SAP R/3 with OS/390 environment more effectively.

Appendix A. Installation Shell Scripts

This appendix shows the installation shell scripts used by R3SETUP to generate
the command files for the specific installation phases.

A.1 CENTRAL.SH - Installing the Central Instance

This section shows the shell script used to generate the command file for
installing the central instance.

```
#!/bin/sh
MYNAME=basename $0
SERVICE=echo "$MYNAME" | sed 's/.SH//g'
COMMANDTPL=echo "$MYNAME" | sed 's/SH/TPL/g'

echo
echo "Welcome to $SERVICE instance installation."
echo
echo "Please do first the preparations found in the manual"
echo "'R/3 Installation on UNIX'"
echo
echo "The current directory is used as the installation directory"
echo "and some files will be copied into this directory."
echo "This can take some time."

ACTDIR=pwd
CDDIR=dirname $0

if [ $CDDIR = "." -o $ACTDIR = $CDDIR ]; then
  echo "Please change to a local install directory and call"
  echo "<CD-Mount-Path>/UNIX/$MYNAME"
  exit 1
fi


#
# get PRE_KERNEL_CDMOUNTPATH        NOTE: LABEL.ASC is assumed
#
cd $CDDIR
while :
do
  if [ -f ./LABEL.ASC ]; then
    PRE_KERNELCD_CDMOUNTPATH=pwd
    break
  else
    TMPPWD=pwd
    cd .. >/dev/null 2>&1
    NEWPWD=pwd
    if [ "$TMPPWD" = "$NEWPWD" ]; then
      echo
      echo "Sorry, a file LABEL.ASC can not be found."
      echo "Please change to a local install directory and call"
      echo "<CD-Mount-Path>/UNIX/$MYNAME"
      exit 1
    fi
  fi
done
cd $ACTDIR

# get OSDIR
case uname in
  AIX* | BOS*)
```

```
        OSDIR=AIX;;
      HP*)
        OSDIR=HPUX;;
      SIN* | Rel*)
        OSDIR=RELIANT;;
      OSF*)
        OSDIR=DEC;;
      Sun*)
        OSDIR=SOLARIS;;
      dgux*)
        OSDIR=DGUX;;
      DYNIX*)
        OSDIR=PTX;;
      NCR*)
        OSDIR=NCR;;

      *)
        echo "Wrong operating system"
        exit 1;;
    esac

    if [ ! -x ./R3SETUP ]; then
      if [ -f $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR/R3SETUP ]; then
        cp $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR/R3SETUP .
        if [ $? -ne 0 ]; then
          echo
          echo "Sorry, the program R3SETUP could not be copied into directory."
          echo
          exit 1
        fi
      else
        echo
        echo "Sorry, the program R3SETUP is not available "
        echo "in $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR"
        echo
        exit 1
      fi
    fi

    # original command file
    if [ ! -f "$COMMANDTPL" ]; then
      if [ -f $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR/$COMMANDTPL ]; then
        cp $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR/$COMMANDTPL .
        if [ $? -ne 0 ]; then
          echo
          echo "Sorry, the file $COMMANDTPL could not be copied."
          echo
          exit 1
        fi
      elif [ -f $PRE_KERNELCD_CDMOUNTPATH/UNIX/COMMON/$COMMANDTPL ]; then
        cp $PRE_KERNELCD_CDMOUNTPATH/UNIX/COMMON/$COMMANDTPL .
        if [ $? -ne 0 ]; then
          echo
          echo "Sorry, the file $COMMANDTPL could not be copied."
          echo
          exit 1
        fi
      else
        echo
        echo "Sorry, the program $COMMANDTPL is not available "
        echo "in $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR"
        echo "nor in $PRE_KERNELCD_CDMOUNTPATH/UNIX/COMMON"
        echo
        exit 1
      fi
    fi
```

```
CDEXEPATH=$PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR
CDDOCPATH=$PRE_KERNELCD_CDMOUNTPATH/DOCU
DOCUARCHIVE=R3S_DOC.CAR
if [ ! -x ./INSTGUI ]; then
  if [ -x $CDEXEPATH/INSTGUI ]; then
    cp $CDEXEPATH/INSTGUI .
    if [ $? -ne 0 ]; then
      echo
      echo "Sorry, the program INSTGUI could not be copied into directory."
      echo
      exit 1
    fi
    if [ -x $CDEXEPATH/CAR ]; then
      if [ -f $CDDOCPATH/$DOCUARCHIVE ]; then
        $CDEXEPATH/CAR -xf $CDDOCPATH/$DOCUARCHIVE
        if [ $? -ne 0 ]; then
          echo
          echo "WARNING: $DOCUARCHIVE (installation online documentation)"
          echo "could not be installed successfully."
          echo
        fi
      else
        echo
        echo "INFO: $DOCUARCHIVE (installation online documentation)"
        echo "is not available in $CDDOCPATH."
        echo "Therefore the online documentation will not be installed."
        echo
      fi
    else
      echo
      echo "INFO: the program CAR (archiver) is not available in $CDEXEPATH."
      echo "Therefore the online documentation will not be installed."
      echo
    fi
  fi
fi

echo

#
# ReadVariable prompt variablename [defaultvalue]
ReadVariable()
{
   while [ 1 -eq 1 ]
   do
      echo
      if [ $# -eq 3 ]; then
         a="$1\n[default is '$3']: "
      else
         a="$1: "
      fi
      echo $a

      read ReadVariable_Input
      if [ -z "$ReadVariable_Input" ]; then
         eval $2="'"$3"'"
      else
         eval $2="'"$ReadVariable_Input"'"
      fi

      eval ReadVariable_Loop='$'"$2"
      if [ -z "$ReadVariable_Loop" ]; then
         if [ $# -eq 3 ]; then
            echo "You must specify a value."
         else
```

```
                break
           fi
       else
          break
       fi
    done
}


# Sapconf SID
# error codes
#
#  0   ok
#  1   invalid SAPSID
#  2   non of /usr/sap/trans/.sapconf and /etc/sapconf is readable
#  3   can not find SYSTEM line for SAPSID
#  4   can not find CENTRAL INSTANCE line
Sapconf()
{
  TRUL='tr "ABCDEFGHIJKLMNOPQRSTUVWXYZ" "abcdefghijklmnopqrstuvwxyz"'
  SAPCONF_ERR=0
  SAPSID="$1"
  SIDADM="echo $SAPSID | $TRULadm"

  # Initialization of all values to empty strings
  SAPSYSNUM=""
  EXEDIR=""
  PROFILEDIR=""
  GLOBALDIR=""
  MSPORT=""
  GIDSAPSYS=""
  UIDSAPSID=""
  DBHOST=""
  CIHOST=""

  if [ $SAPCONF_ERR -eq 0 ]; then
    if [ "$SAPSID" = "" ]; then
      SAPCONF_ERR=1
    fi
  fi

  if [ $SAPCONF_ERR -eq 0 ]; then
    if [ -r /usr/sap/trans/.sapconf ]; then
      SAPCONF="/usr/sap/trans/.sapconf"
    elif [ -r /etc/sapconf ]; then
      SAPCONF="/etc/sapconf"
    else
      SAPCONF_ERR=2
    fi
  fi

  if [ $SAPCONF_ERR -eq 0 ]; then
    # search for SYSTEM line starting with SAPSID and containing sidadm
    SYSLINE="awk '/¬'$SAPSID'.*'$SIDADM'/'  $SAPCONF 2>/dev/null"
    if [ "$SYSLINE" = "" ];then
      SAPCONF_ERR=3
    fi
  fi

  if [ $SAPCONF_ERR -eq 0 ]; then
    # search for CENTRAL INSTANCE line: $2==SAPSID  AND  /DVEBMGS/
    CILINE="awk '$2 ˜ /'$SAPSID'/ && $3 ˜ /DVEBMGS/' $SAPCONF 2>/dev/null"
    if [ "$CILINE" = "" ];then
      SAPCONF_ERR=4
    fi
  fi
```

```
  if [ $SAPCONF_ERR -eq 0 ]; then
    SAPSYSNUM="echo $CILINE | awk '$7 ~ /[0-9][0-9]/ {print
$7}' 2>/dev/null"
    EXEDIR="echo $CILINE    | awk '$13~ /exe/        {print $13}'
2>/dev/null"
    PROFILEDIR="echo $CILINE| awk '$15~ /profile/    {print $15}'
2>/dev/null"
    GLOBALDIR="echo $CILINE | awk '$14~ /global/     {print $14}'
2>/dev/null"
    MSPORT="echo $SYSLINE    | awk '$6 ~ /[0-9][0-9]*/{print
$6}' 2>/dev/null"
    GIDSAPSYS="echo $CILINE | awk '$8 ~ /[0-9][0-9]*/{print
$8}' 2>/dev/null"
    UIDSAPSID="echo $CILINE | awk '$9 ~ /[0-9][0-9]*/{print
$9}' 2>/dev/null"
    DBHOST="echo $SYSLINE    | awk '{print $3}'                 2>/dev/null"
    CIHOST="echo $CILINE     | awk '{print $4}'                 2>/dev/null"
  fi
}


#
# replace the entered information in the command file template
# and write the real R3SETUP command file
#

COMMANDFLE=echo "$COMMANDTPL" | sed 's/TPL/R3S/g'

echo
echo "Generating installation command file $COMMANDFLE..."
echo "This can take some time."

ADAPTCOMMANDFILE=ADAPT.CMD
ADAPTLOG=ADAPT.log
if [ ! "$COMMANDTPL" ]
then
   echo "Installation template $COMMANDTPL not set."
   echo "exiting ..."
   exit 1
fi


echo "[EXE]"                 > $ADAPTCOMMANDFILE
echo "1=ADAPT_TEMPLATE"     >> $ADAPTCOMMANDFILE
echo "[ADAPT_TEMPLATE]"     >> $ADAPTCOMMANDFILE
echo "CLASS=CAdaptFiles"    >> $ADAPTCOMMANDFILE
echo "EXTENDEDTABLE=MACROS"      >> $ADAPTCOMMANDFILE
echo "LIST=TEMPLATE"        >> $ADAPTCOMMANDFILE
echo "[TEMPLATE]"           >> $ADAPTCOMMANDFILE
echo "1_SOURCE=$COMMANDTPL"      >> $ADAPTCOMMANDFILE
echo "1_TARGET=$COMMANDFLE"      >> $ADAPTCOMMANDFILE
echo "[MACROS]"             >> $ADAPTCOMMANDFILE

set | grep PRE_  | sed "s/=''/=/g" >> $ADAPTCOMMANDFILE

if [ ! -x ./R3SETUP ]; then
   echo
   echo "Sorry, the program R3SETUP is not in the current directory."
   echo "Please copy the program from CD in this directory and restart"
   echo "this script."
   exit 1
fi

./R3SETUP -f $ADAPTCOMMANDFILE -l ${ADAPTCOMMANDFILE}.LOG > /dev/null 2>&1
if [ $? -ne 0 ]; then
```

```
        echo "Sorry, generation of command file failed."
        echo "See log file $ADAPTLOG for more information."
        echo "Try to solve the specified error and restart this script."
        exit 1
fi

echo "Generation successfull."
echo
echo "You can start the installation with:"
echo "./R3SETUP -f $COMMANDFLE"
echo "The log file will be ${SERVICE}.log."
echo "In some (non standard) cases you need to customize the command file."

START_INST=""
while [ "$START_INST" != "no" -a "$START_INST" != "yes" ]
do
    ReadVariable \
    "Should the installation be started? (yes or no)" \
    START_INST no
done

if [ "$START_INST" = "no" ]; then
    echo
    exit 0
fi

if [ -x ./INSTGUI ]; then
    START_INSTGUI=""
    while [ "$START_INSTGUI" != "no" -a "$START_INSTGUI" != "yes" ]
    do
        ReadVariable \
        "Should the graphical installation frontend be started? (yes or no)" \
        START_INSTGUI no
    done
    if [ "$START_INSTGUI" = "yes" ]; then
        if [ ! "$DISPLAY" ]
        then
            ReadVariable \
            "Please specify on which display the frontend should be seen" \
            DISPLAY "hostname:0.0"
            export DISPLAY
        fi
        echo "Starting ./INSTGUI ..."
        ./INSTGUI &
        sleep 15
    fi
fi

echo "Starting installation ..."

./R3SETUP -f $COMMANDFLE
if [ $? -ne 0 ]; then
    echo
    echo "Sorry, the installation exited with error."
    echo "Please look in the log file ${SERVICE}.log."
    echo "You can restart the installation with ./R3SETUP -f $COMMANDFLE."
    echo
    exit 1
else
    echo
    echo "Installation successfully finished."
    echo
fi

exit 0
#
```

A.2 DATABASE.SH - Installing the Database

This section shows the shell script used to generate the command file for installing the database.

```
#!/bin/sh
MYNAME=basename $0
SERVICE=echo "$MYNAME" | sed 's/.SH//g'
COMMANDTPL=echo "$MYNAME" | sed 's/SH/TPL/g'

echo
echo "   Welcome to DB2/390 database instance installation."

echo
echo "   Please do first the preparations found in the manual 'SAP R/3"
echo "   on Db2 for OS/390: Planning Guide."

echo
echo "   All information needed for the installation is requested before"
echo "   the real setup is started. This script fills out the most important keys"
echo "   in the installation command file (express setup). After entering the"
echo "   requested values you have the possiblity to customize the installation"
echo "   command file."

echo
echo "   The current directory is used as the installation directory."
echo "   The following files are searched in this directory:"
echo "   $COMMANDTPL   : installation profile"
echo "   R3SETUP       : installation program"

ACTDIR=pwd
CDDIR=dirname $0

if [ $CDDIR = "." -o $ACTDIR = $CDDIR ]; then
  echo "Please change to a local install directory and call"
  echo "<CD-Mount-Path>/UNIX/$MYNAME"
  exit 1
fi

#
# get PRE_KERNEL_CDMOUNTPATH       NOTE: LABEL.ASC is assumed
#
cd $CDDIR
while :
do
  if [ -f ./LABEL.ASC ]; then
    PRE_KERNELCD_CDMOUNTPATH=pwd
    break
  else
    TMPPWD=pwd
    cd .. >/dev/null 2>&1
    NEWPWD=pwd
    if [ "$TMPPWD" = "$NEWPWD" ]; then
      echo
      echo "Sorry, a file LABEL.ASC can not be found."
      echo "Please change to a local install directory and call"
      echo "<CD-Mount-Path>/UNIX/$MYNAME"
      exit 1
    fi
```

```
        fi
done
cd $ACTDIR

# get OSDIR
case uname in
  AIX* | BOS*)
    OSDIR=AIX;;
  HP*)
    OSDIR=HPUX;;
  SIN* | Rel*)
    OSDIR=RELIANT;;
  OSF*)
    OSDIR=DEC;;
  Sun*)
    OSDIR=SOLARIS;;
  dgux*)
    OSDIR=DGUX;;
  DYNIX*)
    OSDIR=PTX;;
  NCR*)
    OSDIR=NCR;;

  *)
    echo "Wrong operating system"
    exit 1;;
esac

if [ ! -x ./R3SETUP ]; then
  if [ -f $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR/R3SETUP ]; then
    cp $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR/R3SETUP .
    if [ $? -ne 0 ]; then
      echo
      echo "Sorry, the program R3SETUP could not be copied into directory."
      echo
      exit 1
    fi
  else
    echo
    echo "Sorry, the program R3SETUP is not available "
    echo "in $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR"
    echo
    exit 1
  fi
fi

# original command file
if [ ! -f "$COMMANDTPL" ]; then
  if [ -f $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR/$COMMANDTPL ]; then
    cp $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR/$COMMANDTPL .
    if [ $? -ne 0 ]; then
      echo
      echo "Sorry, the file $COMMANDTPL could not be copied."
      echo
      exit 1
    fi
  elif [ -f $PRE_KERNELCD_CDMOUNTPATH/UNIX/COMMON/$COMMANDTPL ]; then
    cp $PRE_KERNELCD_CDMOUNTPATH/UNIX/COMMON/$COMMANDTPL .
    if [ $? -ne 0 ]; then
      echo
      echo "Sorry, the file $COMMANDTPL could not be copied."
      echo
      exit 1
    fi
  else
    echo
```

```
            echo "Sorry, the program $COMMANDTPL is not available "
            echo "in $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR"
            echo "nor in $PRE_KERNELCD_CDMOUNTPATH/UNIX/COMMON"
            echo
            exit 1
    fi
fi

echo
echo "   Please answer the following questions. You can savely abort this script"
echo "   at any time with –C and restart later."

#
# ReadVariable prompt variablename [defaultvalue]
ReadVariable()
{
    while [ 1 -eq 1 ]
    do
        echo
        if [ $# -eq 3 ]; then
            a="$1\n[default is '$3']: "
        else
            a="$1: "
        fi
        echo $a

        read ReadVariable_Input
        if [ -z "$ReadVariable_Input" ]; then
            eval $2="'"$3"'"
        else
            eval $2="'"$ReadVariable_Input"'"
        fi

        eval ReadVariable_Loop='$'"$2"
        if [ -z "$ReadVariable_Loop" ]; then
            if [ $# -eq 3 ]; then
                echo "You must specify a value."
            else
                break
            fi
        else
            break
        fi
    done
}


# Sapconf SID
# error codes
#
#  0   ok
#  1   invalid SAPSID
#  2   non of /usr/sap/trans/.sapconf and /etc/sapconf is readable
#  3   can not find SYSTEM line for SAPSID
#  4   can not find CENTRAL INSTANCE line
Sapconf()
{
    TRUL='tr "ABCDEFGHIJKLMNOPQRSTUVWXYZ" "abcdefghijklmnopqrstuvwxyz"'
    SAPCONF_ERR=0
    SAPSID="$1"
    SIDADM="echo $SAPSID | $TRULadm"

    # Initialization of all values to empty strings
    SAPSYSNUM=""
    EXEDIR=""
    PROFILEDIR=""
```

```
      GLOBALDIR=""
      MSPORT=""
      GIDSAPSYS=""
      UIDSAPSID=""
      DBHOST=""
      CIHOST=""

   if [ $SAPCONF_ERR -eq 0 ]; then
     if [ "$SAPSID" = "" ]; then
       SAPCONF_ERR=1
     fi
   fi

   if [ $SAPCONF_ERR -eq 0 ]; then
     if [ -r /usr/sap/trans/.sapconf ]; then
       SAPCONF="/usr/sap/trans/.sapconf"
     elif [ -r /etc/sapconf ]; then
       SAPCONF="/etc/sapconf"
     else
       SAPCONF_ERR=2
     fi
   fi

   if [ $SAPCONF_ERR -eq 0 ]; then
     # search for SYSTEM line starting with SAPSID and containing sidadm
     SYSLINE="awk '/¬'$SAPSID'.*'$SIDADM'/' $SAPCONF 2>/dev/null"
     if [ "$SYSLINE" = "" ];then
       SAPCONF_ERR=3
     fi
   fi

   if [ $SAPCONF_ERR -eq 0 ]; then
     # search for CENTRAL INSTANCE line: $2==SAPSID  AND  /DVEBMGS/
     CILINE="awk '$2 ¯ /'$SAPSID'/ && $3 ¯ /DVEBMGS/' $SAPCONF 2>/dev/null"
     if [ "$CILINE" = "" ];then
       SAPCONF_ERR=4
     fi
   fi

   if [ $SAPCONF_ERR -eq 0 ]; then
     SAPSYSNUM="echo $CILINE | awk '$7 ¯ /[0-9][0-9]/ {print
$7}'
2>/dev/null"
     EXEDIR="echo $CILINE    | awk '$13¯ /exe/        {print $13}'
2>/dev/null"
     PROFILEDIR="echo $CILINE| awk '$15¯ /profile/    {print $15}'
2>/dev/null"
     GLOBALDIR="echo $CILINE | awk '$14¯ /global/     {print $14}'
2>/dev/null"
     MSPORT="echo $SYSLINE   | awk '$6 ¯ /[0-9][0-9]*/{print
$6}'
2>/dev/null"
     GIDSAPSYS="echo $CILINE | awk '$8 ¯ /[0-9][0-9]*/{print
$8}'
2>/dev/null"
     UIDSAPSID="echo $CILINE | awk '$9 ¯ /[0-9][0-9]*/{print
$9}'
2>/dev/null"
     DBHOST="echo $SYSLINE   | awk '{print $3}'                      2>/dev/null"
     CIHOST="echo $CILINE    | awk '{print $4}'                      2>/dev/null"
   fi
}


#
# replace the entered information in the command file template
```

```
# and write the real R3SETUP command file
#

COMMANDFLE=echo "$COMMANDTPL" | sed 's/TPL/R3S/g'

echo
echo "Generating installation command file $COMMANDFLE..."
echo "This can take some time."

ADAPTCOMMANDFILE=ADAPT.CMD
ADAPTLOG=ADAPT.log
if [ ! "$COMMANDTPL" ]
then
    echo "Installation template $COMMANDTPL not set."
    echo "exiting ..."
    exit 1
fi


echo "[EXE]"                  >  $ADAPTCOMMANDFILE
echo "1=ADAPT_TEMPLATE"       >> $ADAPTCOMMANDFILE
echo "[ADAPT_TEMPLATE]"       >> $ADAPTCOMMANDFILE
echo "CLASS=CAdaptFiles"      >> $ADAPTCOMMANDFILE
echo "EXTENDEDTABLE=MACROS"        >> $ADAPTCOMMANDFILE
echo "LIST=TEMPLATE"          >> $ADAPTCOMMANDFILE
echo "[TEMPLATE]"             >> $ADAPTCOMMANDFILE
echo "1_SOURCE=$COMMANDTPL"        >> $ADAPTCOMMANDFILE
echo "1_TARGET=$COMMANDFLE"        >> $ADAPTCOMMANDFILE
echo "[MACROS]"               >> $ADAPTCOMMANDFILE

set | grep PRE_  | sed "s/='/=/g" >> $ADAPTCOMMANDFILE

if [ ! -x ./R3SETUP ]; then
    echo
    echo "Sorry, the program R3SETUP is not in the current directory."
    echo "Please copy the program from CD in this directory and restart"
    echo "this script."
    exit 1
fi

./R3SETUP -f $ADAPTCOMMANDFILE -l ${ADAPTCOMMANDFILE}.LOG > /dev/null 2>&1
if [ $? -ne 0 ]; then
    echo "Sorry, generation of command file failed."
    echo "See log file $ADAPTLOG for more information."
    echo "Try to solve the specified error and restart this script."
    exit 1
fi

echo "Generation successfull."
echo
echo "You can start the installation with:"
echo "./R3SETUP -f $COMMANDFLE"
echo "The log file will be ${SERVICE}.log."
echo "In some (non standard) cases you need to customize the command file."

START_INST=""
while [ "$START_INST" != "no" -a "$START_INST" != "yes" ]
do
    ReadVariable \
    "Should the installation be started? (yes or no)" \
    START_INST no
done

if [ "$START_INST" = "no" ]; then
    echo
```

```
                    exit 0
            fi

            if [ -x ./INSTGUI ]; then
                START_INSTGUI=""
                while [ "$START_INSTGUI" != "no" -a "$START_INSTGUI" != "yes" ]
                do
                    ReadVariable \
                    "Should the graphical installation frontend be started? (yes or no)" \
                    START_INSTGUI no
                done
                if [ "$START_INSTGUI" = "yes" ]; then
                    if [ ! "$DISPLAY" ]
                    then
                        ReadVariable \
                        "Please specify on which display the frontend should be seen" \
                        DISPLAY "hostname:0.0"
                        export DISPLAY
                    fi
                    echo "Starting ./INSTGUI ..."
                    ./INSTGUI &
                    sleep 15
                fi
            fi

            echo "Starting installation ..."

            ./R3SETUP -f $COMMANDFLE
            if [ $? -ne 0 ]; then
                echo
                echo "Sorry, the installation exited with error."
                echo "Please look in the log file ${SERVICE}.log."
                echo "You can restart the installation with ./R3SETUP -f $COMMANDFLE."
                echo
                exit 1
            else
                echo
                echo "Installation successfully finished."
                echo
            fi

            exit 0
            #
```

A.3 DBDROP.SH - Dropping the Database

This section shows the shell script used to generate the command file for
dropping the database.

```
#!/bin/sh
MYNAME=basename $0
SERVICE=echo "$MYNAME" | sed 's/.SH//g'
COMMANDTPL=echo "$MYNAME" | sed 's/SH/TPL/g'

echo
echo "    Welcome to DB2/390 database instance installation."

echo
echo "    Please do first the preparations found in the manual 'SAP R/3"
echo "    on Db2 for OS/390: Planning Guide."
```

```
echo
echo "   All information needed for the installation is requested before"
echo "   the real setup is started. This script fills out the most important keys"
echo "   in the installation command file (express setup). After entering the"
echo "   requested values you have the possiblity to customize the installation"
echo "   command file."

echo
echo "   The current directory is used as the installation directory."
echo "   The following files are searched in this directory:"
echo "   $COMMANDTPL   : installation profile"
echo "   R3SETUP       : installation program"

ACTDIR=pwd
CDDIR=dirname $0

if [ $CDDIR = "." -o $ACTDIR = $CDDIR ]; then
  echo "Please change to a local install directory and call"
  echo "<CD-Mount-Path>/UNIX/$MYNAME"
  exit 1
fi

#
# get PRE_KERNEL_CDMOUNTPATH       NOTE: LABEL.ASC is assumed
#
cd $CDDIR
while :
do
  if [ -f ./LABEL.ASC ]; then
    PRE_KERNELCD_CDMOUNTPATH=pwd
    break
  else
    TMPPWD=pwd
    cd .. >/dev/null 2>&1
    NEWPWD=pwd
    if [ "$TMPPWD" = "$NEWPWD" ]; then
      echo
      echo "Sorry, a file LABEL.ASC can not be found."
      echo "Please change to a local install directory and call"
      echo "<CD-Mount-Path>/UNIX/$MYNAME"
      exit 1
    fi
  fi
done
cd $ACTDIR

# get OSDIR
case uname in
  AIX* | BOS*)
    OSDIR=AIX;;
  HP*)
    OSDIR=HPUX;;
  SIN* | Rel*)
    OSDIR=RELIANT;;
  OSF*)
    OSDIR=DEC;;
  Sun*)
    OSDIR=SOLARIS;;
  dgux*)
    OSDIR=DGUX;;
  DYNIX*)
    OSDIR=PTX;;
  NCR*)
    OSDIR=NCR;;

  *)
```

```
                    echo "Wrong operating system"
                    exit 1;;
            esac

            if [ ! -x ./R3SETUP ]; then
              if [ -f $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR/R3SETUP ]; then
                cp $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR/R3SETUP .
                if [ $? -ne 0 ]; then
                  echo
                  echo "Sorry, the program R3SETUP could not be copied into directory."
                  echo
                  exit 1
                fi
              else
                echo
                echo "Sorry, the program R3SETUP is not available "
                echo "in $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR"
                echo
                exit 1
              fi
            fi

            # original command file
            if [ ! -f "$COMMANDTPL" ]; then
              if [ -f $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR/$COMMANDTPL ]; then
                cp $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR/$COMMANDTPL .
                if [ $? -ne 0 ]; then
                  echo
                  echo "Sorry, the file $COMMANDTPL could not be copied."
                  echo
                  exit 1
                fi
              elif [ -f $PRE_KERNELCD_CDMOUNTPATH/UNIX/COMMON/$COMMANDTPL ]; then
                cp $PRE_KERNELCD_CDMOUNTPATH/UNIX/COMMON/$COMMANDTPL .
                if [ $? -ne 0 ]; then
                  echo
                  echo "Sorry, the file $COMMANDTPL could not be copied."
                  echo
                  exit 1
                fi
              else
                echo
                echo "Sorry, the program $COMMANDTPL is not available "
                echo "in $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR"
                echo "nor in $PRE_KERNELCD_CDMOUNTPATH/UNIX/COMMON"
                echo
                exit 1
              fi
            fi

            echo
            echo "    Please answer the following questions. You can savely abort this script"
            echo "    at any time with -C and restart later."

            #
            # ReadVariable prompt variablename [defaultvalue]
            ReadVariable()
            {
               while [ 1 -eq 1 ]
               do
                  echo
                  if [ $# -eq 3 ]; then
                     a="$1\n[default is '$3']: "
                  else
                     a="$1: "
                  fi
```

```
        echo $a

        read ReadVariable_Input
        if [ -z "$ReadVariable_Input" ]; then
           eval $2="'"$3"'"
        else
           eval $2="'"$ReadVariable_Input"'"
        fi

        eval ReadVariable_Loop='$'"$2"
        if [ -z "$ReadVariable_Loop" ]; then
           if [ $# -eq 3 ]; then
              echo "You must specify a value."
           else
              break
           fi
        else
           break
        fi
   done
}


# Sapconf SID
# error codes
#
#  0   ok
#  1   invalid SAPSID
#  2   non of /usr/sap/trans/.sapconf and /etc/sapconf is readable
#  3   can not find SYSTEM line for SAPSID
#  4   can not find CENTRAL INSTANCE line
Sapconf()
{
  TRUL='tr "ABCDEFGHIJKLMNOPQRSTUVWXYZ" "abcdefghijklmnopqrstuvwxyz"'
  SAPCONF_ERR=0
  SAPSID="$1"
  SIDADM="echo $SAPSID | $TRULadm"

  # Initialization of all values to empty strings
  SAPSYSNUM=""
  EXEDIR=""
  PROFILEDIR=""
  GLOBALDIR=""
  MSPORT=""
  GIDSAPSYS=""
  UIDSAPSID=""
  DBHOST=""
  CIHOST=""

  if [ $SAPCONF_ERR -eq 0 ]; then
    if [ "$SAPSID" = "" ]; then
      SAPCONF_ERR=1
    fi
  fi

  if [ $SAPCONF_ERR -eq 0 ]; then
    if [ -r /usr/sap/trans/.sapconf ]; then
      SAPCONF="/usr/sap/trans/.sapconf"
    elif [ -r /etc/sapconf ]; then
      SAPCONF="/etc/sapconf"
    else
      SAPCONF_ERR=2
    fi
  fi

  if [ $SAPCONF_ERR -eq 0 ]; then
```

```
            # search for SYSTEM line starting with SAPSID and containing sidadm
            SYSLINE="awk '/¬'$SAPSID'.*'$SIDADM'/' $SAPCONF 2>/dev/null"
            if [ "$SYSLINE" = "" ];then
              SAPCONF_ERR=3
            fi
        fi

        if [ $SAPCONF_ERR -eq 0 ]; then
            # search for CENTRAL INSTANCE line: $2==SAPSID  AND  /DVEBMGS/
            CILINE="awk '$2 ˜ /'$SAPSID'/ && $3 ˜ /DVEBMGS/' $SAPCONF 2>/dev/null"
            if [ "$CILINE" = "" ];then
              SAPCONF_ERR=4
            fi
        fi

        if [ $SAPCONF_ERR -eq 0 ]; then
            SAPSYSNUM="echo $CILINE | awk '$7 ˜ /[0-9][0-9]/ {print
$7}'
2>/dev/null"
            EXEDIR="echo $CILINE    | awk '$13˜ /exe/         {print $13}'
2>/dev/null"
            PROFILEDIR="echo $CILINE| awk '$15˜ /profile/    {print $15}'
2>/dev/null"
            GLOBALDIR="echo $CILINE | awk '$14˜ /global/     {print $14}'
2>/dev/null"
            MSPORT="echo $SYSLINE    | awk '$6 ˜ /[0-9][0-9]*/{print
$6}'
2>/dev/null"
            GIDSAPSYS="echo $CILINE | awk '$8 ˜ /[0-9][0-9]*/{print
$8}'
2>/dev/null"
            UIDSAPSID="echo $CILINE | awk '$9 ˜ /[0-9][0-9]*/{print
$9}'
2>/dev/null"
            DBHOST="echo $SYSLINE   | awk '{print $3}'                    2>/dev/null"
            CIHOST="echo $CILINE    | awk '{print $4}'                    2>/dev/null"
        fi
}


#
# replace the entered information in the command file template
# and write the real R3SETUP command file
#

COMMANDFLE=echo "$COMMANDTPL" | sed 's/TPL/R3S/g'

echo
echo "Generating installation command file $COMMANDFLE..."
echo "This can take some time."

ADAPTCOMMANDFILE=ADAPT.CMD
ADAPTLOG=ADAPT.log
if [ ! "$COMMANDTPL" ]
then
    echo "Installation template $COMMANDTPL not set."
    echo "exiting ..."
    exit 1
fi


echo "[EXE]"                  > $ADAPTCOMMANDFILE
echo "1=ADAPT_TEMPLATE"      >> $ADAPTCOMMANDFILE
echo "[ADAPT_TEMPLATE]"      >> $ADAPTCOMMANDFILE
echo "CLASS=CAdaptFiles"     >> $ADAPTCOMMANDFILE
echo "EXTENDEDTABLE=MACROS"       >> $ADAPTCOMMANDFILE
```

```
echo "LIST=TEMPLATE"          >> $ADAPTCOMMANDFILE
echo "[TEMPLATE]"             >> $ADAPTCOMMANDFILE
echo "1_SOURCE=$COMMANDTPL"      >> $ADAPTCOMMANDFILE
echo "1_TARGET=$COMMANDFLE"      >> $ADAPTCOMMANDFILE
echo "[MACROS]"              >> $ADAPTCOMMANDFILE

set | grep PRE_  | sed "s/=''/=/g" >> $ADAPTCOMMANDFILE

if [ ! -x ./R3SETUP ]; then
   echo
   echo "Sorry, the program R3SETUP is not in the current directory."
   echo "Please copy the program from CD in this directory and restart"
   echo "this script."
   exit 1
fi

./R3SETUP -f $ADAPTCOMMANDFILE -l ${ADAPTCOMMANDFILE}.LOG > /dev/null 2>&1
if [ $? -ne 0 ]; then
   echo "Sorry, generation of command file failed."
   echo "See log file $ADAPTLOG for more information."
   echo "Try to solve the specified error and restart this script."
   exit 1
fi

echo "Generation successfull."
echo
echo "You can start the installation with ./R3SETUP -f $COMMANDFLE."
echo "The log file will be ${SERVICE}.log."
echo "In some (non standard) cases you need to customize the command file."

START_INST=""
while [ "$START_INST" != "no" -a "$START_INST" != "yes" ]
do
   ReadVariable \
   "Should the installation be started? (yes or no)" \
   START_INST no
done

if [ "$START_INST" = "no" ]; then
   echo
   exit 0
fi

if [ -x ./INSTGUI ]; then
   START_INSTGUI=""
   while [ "$START_INSTGUI" != "no" -a "$START_INSTGUI" != "yes" ]
   do
      ReadVariable \
      "Should the graphical installation frontend be started? (yes or no)" \
      START_INSTGUI no
   done
   if [ "$START_INSTGUI" = "yes" ]; then
      if [ ! "$DISPLAY" ]
      then
         ReadVariable \
         "Please specify on which display the frontend should be seen" \
         DISPLAY "hostname:0.0"
         export DISPLAY
      fi
      echo "Starting ./INSTGUI ..."
      ./INSTGUI &
      sleep 15
   fi
fi

echo "Starting installation ..."
```

```
      ./R3SETUP -f $COMMANDFLE
if [ $? -ne 0 ]; then
   echo
   echo "Sorry, the installation exited with error."
   echo "Please look in the log file ${SERVICE}.log."
   echo "You can restart the installation with ./R3SETUP -f $COMMANDFLE."
   echo
   exit 1
else
   echo
   echo "Installation successfully finished."
   echo
fi

exit 0
#
```

A.4 DIALOG.SH - Installing Dialog Instance without Central Instance

This section shows the shell script used to generate the command file for installing dialog instance without central instance.

```
#!/bin/sh
MYNAME=basename $0
SERVICE=echo "$MYNAME" | sed 's/.SH//g'
COMMANDTPL=echo "$MYNAME" | sed 's/SH/TPL/g'

echo
echo "Welcome to $SERVICE instance installation."
echo
echo "Please do first the preparations found in the manual"
echo "'R/3 Installation on UNIX', section 'Installing an R/3 Instance'"
echo
echo "The current directory is used as the installation directory"
echo "and some files will be copied into this directory."
echo "This can take some time."

ACTDIR=pwd
CDDIR=dirname $0

if [ $CDDIR = "." -o $ACTDIR = $CDDIR ]; then
  echo "Please change to a local install directory and call"
  echo "<CD-Mount-Path>/UNIX/$MYNAME"
  exit 1
fi

#
# get PRE_KERNEL_CDMOUNTPATH        NOTE: LABEL.ASC is assumed
#
cd $CDDIR
while :
do
  if [ -f ./LABEL.ASC ]; then
    PRE_KERNELCD_CDMOUNTPATH=pwd
    break
  else
    TMPPWD=pwd
    cd .. >/dev/null 2>&1
    NEWPWD=pwd
    if [ "$TMPPWD" = "$NEWPWD" ]; then
      echo
```

```
            echo "Sorry, a file LABEL.ASC can not be found."
            echo "Please change to a local install directory and call"
            echo "<CD-Mount-Path>/UNIX/$MYNAME"
            exit 1
      fi
  fi
done
cd $ACTDIR

# get OSDIR
case uname in
  AIX* | BOS*)
    OSDIR=AIX;;
  HP*)
    OSDIR=HPUX;;
  SIN* | Rel*)
    OSDIR=RELIANT;;
  OSF*)
    OSDIR=DEC;;
  Sun*)
    OSDIR=SOLARIS;;
  dgux*)
    OSDIR=DGUX;;
  DYNIX*)
    OSDIR=PTX;;
  NCR*)
    OSDIR=NCR;;

  *)
    echo "Wrong operating system"
    exit 1;;
esac

if [ ! -x ./R3SETUP ]; then
  if [ -f $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR/R3SETUP ]; then
    cp $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR/R3SETUP .
    if [ $? -ne 0 ]; then
      echo
      echo "Sorry, the program R3SETUP could not be copied into directory."
      echo
      exit 1
    fi
  else
    echo
    echo "Sorry, the program R3SETUP is not available "
    echo "in $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR"
    echo
    exit 1
  fi
fi


# original command file
if [ ! -f "$COMMANDTPL" ]; then
  if [ -f $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR/$COMMANDTPL ]; then
    cp $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR/$COMMANDTPL .
    if [ $? -ne 0 ]; then
      echo
      echo "Sorry, the file $COMMANDTPL could not be copied."
      echo
      exit 1
    fi
  elif [ -f $PRE_KERNELCD_CDMOUNTPATH/UNIX/COMMON/$COMMANDTPL ]; then
    cp $PRE_KERNELCD_CDMOUNTPATH/UNIX/COMMON/$COMMANDTPL .
    if [ $? -ne 0 ]; then
      echo
```

```
                echo "Sorry, the file $COMMANDTPL could not be copied."
                echo
                exit 1
             fi
          else
             echo
             echo "Sorry, the program $COMMANDTPL is not available "
             echo "in $PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR"
             echo "nor in $PRE_KERNELCD_CDMOUNTPATH/UNIX/COMMON"
             echo
             exit 1
          fi
       fi

       CDEXEPATH=$PRE_KERNELCD_CDMOUNTPATH/UNIX/$OSDIR
       CDDOCPATH=$PRE_KERNELCD_CDMOUNTPATH/DOCU
       DOCUARCHIVE=R3S_DOC.CAR
       if [ ! -x ./INSTGUI ]; then
         if [ -x $CDEXEPATH/INSTGUI ]; then
           cp $CDEXEPATH/INSTGUI .
           if [ $? -ne 0 ]; then
             echo
             echo "Sorry, the program INSTGUI could not be copied into directory."
             echo
             exit 1
           fi
           if [ -x $CDEXEPATH/CAR ]; then
             if [ -f $CDDOCPATH/$DOCUARCHIVE ]; then
               $CDEXEPATH/CAR -xf $CDDOCPATH/$DOCUARCHIVE
               if [ $? -ne 0 ]; then
                 echo
                 echo "WARNING: $DOCUARCHIVE (installation online documentation)"
                 echo "could not be installed successfully."
                 echo
               fi
             else
               echo
               echo "INFO: $DOCUARCHIVE (installation online documentation)"
               echo "is not available in $CDDOCPATH."
               echo "Therefore the online documentation will not be installed."
               echo
             fi
           else
             echo
             echo "INFO: the program CAR (archiver) is not available in $CDEXEPATH."
             echo "Therefore the online documentation will not be installed."
             echo
           fi
         fi
       fi

       echo

       #
       # ReadVariable prompt variablename [defaultvalue]
       ReadVariable()
       {
          while [ 1 -eq 1 ]
          do
             echo
             if [ $# -eq 3 ]; then
                a="$1\n[default is '$3']: "
             else
                a="$1: "
             fi
             echo $a
```

```
        read ReadVariable_Input
        if [ -z "$ReadVariable_Input" ]; then
           eval $2="'"$3"'"
        else
           eval $2="'"$ReadVariable_Input"'"
        fi

        eval ReadVariable_Loop='$'"$2"
        if [ -z "$ReadVariable_Loop" ]; then
           if [ $# -eq 3 ]; then
              echo "You must specify a value."
           else
              break
           fi
        else
           break
        fi
   done
}


# Sapconf SID
# error codes
#
#  0   ok
#  1   invalid SAPSID
#  2   non of /usr/sap/trans/.sapconf and /etc/sapconf is readable
#  3   can not find SYSTEM line for SAPSID
#  4   can not find CENTRAL INSTANCE line
Sapconf()
{
  TRUL='tr "ABCDEFGHIJKLMNOPQRSTUVWXYZ" "abcdefghijklmnopqrstuvwxyz"'
  SAPCONF_ERR=0
  SAPSID="$1"
  SIDADM="echo $SAPSID | $TRULadm"

  # Initialization of all values to empty strings
  SAPSYSNUM=""
  EXEDIR=""
  PROFILEDIR=""
  GLOBALDIR=""
  MSPORT=""
  GIDSAPSYS=""
  UIDSAPSID=""
  DBHOST=""
  CIHOST=""

  if [ $SAPCONF_ERR -eq 0 ]; then
    if [ "$SAPSID" = "" ]; then
      SAPCONF_ERR=1
    fi
  fi

  if [ $SAPCONF_ERR -eq 0 ]; then
    if [ -r /usr/sap/trans/.sapconf ]; then
      SAPCONF="/usr/sap/trans/.sapconf"
    elif [ -r /etc/sapconf ]; then
      SAPCONF="/etc/sapconf"
    else
      SAPCONF_ERR=2
    fi
  fi

  if [ $SAPCONF_ERR -eq 0 ]; then
    # search for SYSTEM line starting with SAPSID and containing sidadm
```

```
                SYSLINE="awk '/¬'$SAPSID'.*'$SIDADM'/'  $SAPCONF 2>/dev/null"
                if [ "$SYSLINE" = "" ];then
                  SAPCONF_ERR=3
                fi
              fi

            if [ $SAPCONF_ERR -eq 0 ]; then
              # search for CENTRAL INSTANCE line: $2==SAPSID  AND  /DVEBMGS/
              CILINE="awk '$2 ~ /'$SAPSID'/ && $3 ~ /DVEBMGS/' $SAPCONF 2>/dev/null"
              if [ "$CILINE" = "" ];then
                SAPCONF_ERR=4
              fi
            fi

            if [ $SAPCONF_ERR -eq 0 ]; then
              SAPSYSNUM="echo $CILINE | awk '$7 ~ /[0-9][0-9]/ {print
$7}'
2>/dev/null"
              EXEDIR="echo $CILINE    | awk '$13~ /exe/         {print $13}'
2>/dev/null"
              PROFILEDIR="echo $CILINE| awk '$15~ /profile/    {print $15}'
2>/dev/null"
              GLOBALDIR="echo $CILINE | awk '$14~ /global/     {print $14}'
2>/dev/null"
              MSPORT="echo $SYSLINE   | awk '$6 ~ /[0-9][0-9]*/{print
$6}'
2>/dev/null"
              GIDSAPSYS="echo $CILINE | awk '$8 ~ /[0-9][0-9]*/{print
$8}'
2>/dev/null"
              UIDSAPSID="echo $CILINE | awk '$9 ~ /[0-9][0-9]*/{print
$9}'
2>/dev/null"
              DBHOST="echo $SYSLINE   | awk '{print $3}'                 2>/dev/null"
              CIHOST="echo $CILINE    | awk '{print $4}'                 2>/dev/null"
            fi
}


#
# replace the entered information in the command file template
# and write the real R3SETUP command file
#

COMMANDFLE=echo "$COMMANDTPL" | sed 's/TPL/R3S/g'

echo
echo "Generating installation command file $COMMANDFLE..."
echo "This can take some time."

ADAPTCOMMANDFILE=ADAPT.CMD
ADAPTLOG=ADAPT.log
if [ ! "$COMMANDTPL" ]
then
   echo "Installation template $COMMANDTPL not set."
   echo "exiting ..."
   exit 1
fi


echo "[EXE]"                    > $ADAPTCOMMANDFILE
echo "1=ADAPT_TEMPLATE"        >> $ADAPTCOMMANDFILE
echo "[ADAPT_TEMPLATE]"        >> $ADAPTCOMMANDFILE
echo "CLASS=CAdaptFiles"       >> $ADAPTCOMMANDFILE
echo "EXTENDEDTABLE=MACROS"        >> $ADAPTCOMMANDFILE
echo "LIST=TEMPLATE"           >> $ADAPTCOMMANDFILE
```

```
echo "[TEMPLATE]"              >> $ADAPTCOMMANDFILE
echo "1_SOURCE=$COMMANDTPL"         >> $ADAPTCOMMANDFILE
echo "1_TARGET=$COMMANDFLE"         >> $ADAPTCOMMANDFILE
echo "[MACROS]"              >> $ADAPTCOMMANDFILE

set | grep PRE_  | sed "s/=''/=/g" >> $ADAPTCOMMANDFILE

if [ ! -x ./R3SETUP ]; then
   echo
   echo "Sorry, the program R3SETUP is not in the current directory."
   echo "Please copy the program from CD in this directory and restart"
   echo "this script."
   exit 1
fi

./R3SETUP -f $ADAPTCOMMANDFILE -l ${ADAPTCOMMANDFILE}.LOG > /dev/null 2>&1
if [ $? -ne 0 ]; then
   echo "Sorry, generation of command file failed."
   echo "See log file $ADAPTLOG for more information."
   echo "Try to solve the specified error and restart this script."
   exit 1
fi

echo "Generation successfull."
echo
echo "You can start the installation with:"
echo "./R3SETUP -f $COMMANDFLE"
echo "The log file will be ${SERVICE}.log."
echo "In some (non standard) cases you need to customize the command file."

START_INST=""
while [ "$START_INST" != "no" -a "$START_INST" != "yes" ]
do
   ReadVariable \
   "Should the installation be started? (yes or no)" \
   START_INST no
done

if [ "$START_INST" = "no" ]; then
   echo
   exit 0
fi

if [ -x ./INSTGUI ]; then
   START_INSTGUI=""
   while [ "$START_INSTGUI" != "no" -a "$START_INSTGUI" != "yes" ]
   do
      ReadVariable \
      "Should the graphical installation frontend be started? (yes or no)" \
      START_INSTGUI no
   done
   if [ "$START_INSTGUI" = "yes" ]; then
      if [ ! "$DISPLAY" ]
      then
         ReadVariable \
         "Please specify on which display the frontend should be seen" \
         DISPLAY "hostname:0.0"
         export DISPLAY
      fi
      echo "Starting ./INSTGUI ..."
      ./INSTGUI &
      sleep 15
   fi
fi

echo "Starting installation ..."
```

```
            ./R3SETUP -f $COMMANDFLE
        if [ $? -ne 0 ]; then
            echo
            echo "Sorry, the installation exited with error."
            echo "Please look in the log file ${SERVICE}.log."
            echo "You can restart the installation with ./R3SETUP -f $COMMANDFLE."
            echo
            exit 1
        else
            echo
            echo "Installation successfully finished."
            echo
        fi

        exit 0
        #
```

Appendix B. Installation Command Files

This appendix shows the installation command files used by R3SETUP. They are generated by running the installation shell scripts.

Note: Continuations marked with "?" are not found in the actual files; they are used here only to improve the readability.

B.1 CENTRAL.R3S - Installing the Central Instance

```
[EXE]
10=CENTRALINSTANCE_IND_DB2
20=DBCOMMONPARAMETERS_IND_DB2
30=CENTRDIRCHECK_IND_IND
40=CENTRSPACECHECK_IND_IND
50=R3DISPATCHERPORT_IND_IND
60=R3DISPATCHERSECURITYPORT_IND_IND
70=R3GATEWAYPORT_IND_IND
80=R3GATEWAYSECURITYPORT_IND_IND
90=R3MESSAGEPORT_IND_IND
100=ICLICONNECTIONPORT_IND_DB2
110=ICLIKEEPALIVEPORT_IND_DB2
120=OSGROUPSAPSYS_IND_IND
130=OSUSERSIDADM_IND_IND
140=R3DIRECTORIES_IND_DB2
150=R3LINKS_IND_IND
160=R3DIRPERMISSIONS_IND_IND
170=R3KERNELCD_IND_IND
180=EXTRACTSAPEXE_IND_IND
190=EXTRACTSAPEXEDB_IND_IND
200=EXTRACTSAPSECU_IND_IND
210=PREPAREJCLSS_IND_DB2
220=EXITJCLJOBCARD_IND_DB2
230=CREATEMULTIPLEJOBCARDS_IND_DB2
240=CREATETESTJCLSS_IND_DB2
250=DOWNLOADICLICLIENT_IND_DB2
260=R3TEMPLATES_IND_DB2
270=SIDADMENV_IND_IND
280=R3INSTANCEPROFILE_IND_DB2
290=R3FILEPERMISSIONS_IND_IND
300=SIGNONKEY_IND_DB2
310=TESTJCLSSEXE_IND_DB2
320=CREATEBINDGRANTJOBS_IND_DB2
330=EXITBINDGRNT_IND_DB2
340=BINDJCLSSEXE_IND_DB2
350=GRANTJCLSSEXE_IND_DB2
360=SAPOS390COLTEMPLATES_IND_DB2
370=SAPOS390COL_IND_DB2

[CENTRALINSTANCE_IND_DB2]
CLASS=CCommonParameters
INSTALLATIONTYPE=CI
SAPSYSTEMNAME=C11
SAPSYSNR=00
CONFIRMATION=SAPSYSTEMNAME SAPSYSNR SAPMOUNTEXE SAPMOUNTGLOBAL        ?
            SAPMOUNTPROFILE CIHOSTNAME DBHOSTNAME

[DBCOMMONPARAMETERS_IND_DB2]
CLASS=CDb2DbIniDefKey
DB_TYPE=DB2
DBATTACHNAME=DSNX
```

```
DB_HOME=@DBATTACHNAME@
DB_TYPE=DB2
DSNTIADLIB=@VCAT@.V510.RUNLIB.LOAD
HIGHLEVELQUALIFIER=SYS1
LOADLIB=@VCAT@.V510.SDSNLOAD
HOSTTCP=ihsapa1a
VCAT=DSN00X
RELEASE=40B
SAPREORG=/tmp/copycd
CONFIRMATION=DBATTACHNAME VCAT HIGHLEVELQUALIFIER HOSTTCP LOADLIB DSNTIADLIB

[DB_ENV]
RSDB_DB2JCLLIBRARY=/usr/sap/@SAPSYSTEMNAME@/SYS/exe/run/db2jcllib.o
R3_DB2_SSID=@DBATTACHNAME@
RSDB_DBSLLIBRARY=/usr/sap/@SAPSYSTEMNAME@/SYS/exe/run/sldb2lib.o
RSDB_ICLILIBRARY=/usr/sap/@SAPSYSTEMNAME@/SYS/exe/run/ibmiclic.o
SAPDBHOST=@DBHOSTNAME@
SAPSYSTEMNAME=@SAPSYSTEMNAME@
HOME=@OSUSERSIDADM_IND_IND=HOME@


[CENTRDIRCHECK_IND_IND]
CLASS=CDirExistCheck
LIST=Z_CENTRSPACECHECK_IND_IND
LIST2=Z_DBHOMECENTRSPACECHECK_IND_IND
LIST3=Z_DBHOMECENTRSPACECHECK_@CPUFAMILY@_IND

[CENTRSPACECHECK_IND_IND]
CLASS=CFsSpaceCheck
LIST=Z_CENTRSPACECHECK_IND_IND
LIST2=Z_DBHOMECENTRSPACECHECK_IND_IND
LIST3=Z_DBHOMECENTRSPACECHECK_@CPUFAMILY@_IND

[Z_CENTRSPACECHECK_IND_IND]
101_FREE_SPACE_WANTED=100
101_DIR_CHECK_PATH=@TRANSDIR@
101_SPACE_CHECK_PATH=@TRANSDIR@
102_FREE_SPACE_WANTED=SAPMOUNTVALUE
102_DIR_CHECK_PATH=@SAPMOUNT@
103_FREE_SPACE_WANTED=240
103_SPACE_CHECK_PATH=@SAPMOUNTEXE@
104_FREE_SPACE_WANTED=50
104_SPACE_CHECK_PATH=@SAPMOUNTGLOBAL@
105_FREE_SPACE_WANTED=10
105_SPACE_CHECK_PATH=@SAPMOUNTPROFILE@
106_FREE_SPACE_WANTED=350
106_SPACE_CHECK_PATH=@SAPDIR@/@SAPSYSTEMNAME@
106_DIR_CHECK_PATH=@SAPDIR@/@SAPSYSTEMNAME@

[DBHOMECENTRSPACECHECK_IND_DB2]
[DBHOMECENTRSPACECHECK_IBM6000_IND]
301_FREE_SPACE_WANTED=10
301_DIR_CHECK_PATH=@STARTDIRECTORY@
301_SPACE_CHECK_PATH=@STARTDIRECTORY@

[R3DISPATCHERPORT_IND_IND]
CLASS=CServicePort
PORT=32@SAPSYSNR@
PROTOCOL=tcp
SERVICENAME=sapdp@SAPSYSNR@


[R3DISPATCHERSECURITYPORT_IND_IND]
CLASS=CServicePort
PORT=47@SAPSYSNR@
```

```
PROTOCOL=tcp
SERVICENAME=sapdp@SAPSYSNR@s


[R3GATEWAYPORT_IND_IND]
CLASS=CServicePort
PORT=33@SAPSYSNR@
PROTOCOL=tcp
SERVICENAME=sapgw@SAPSYSNR@


[R3GATEWAYSECURITYPORT_IND_IND]
CLASS=CServicePort
PORT=48@SAPSYSNR@
PROTOCOL=tcp
SERVICENAME=sapgw@SAPSYSNR@s


[R3MESSAGEPORT_IND_IND]
CLASS=CServicePort
PORT=36@SAPSYSNR@
PROTOCOL=tcp
SERVICENAME=sapms@SAPSYSTEMNAME@
CONFIRMATION=PORT

[ICLICONNECTIONPORT_IND_DB2]
CLASS=CServicePort
PROTOCOL=udp
PORT=5@SAPSYSNR@O
SERVICENAME=sapdb2@SAPSYSTEMNAME@
CONFIRMATION=PORT

[ICLIKEEPALIVEPORT_IND_DB2]
CLASS=CServicePort
PROTOCOL=udp
PORT=5@SAPSYSNR@1
SERVICENAME=iclika@SAPSYSTEMNAME@
CONFIRMATION=PORT

[OSGROUPSAPSYS_IND_IND]
CLASS=COsGroup
GROUPNAME=sapsys
CONFIRMATION=GROUPID

[OSUSERSIDADM_IND_IND]
CLASS=COsUser
GROUPNAMES=sapsys
USERNAME=@LOWER_SAPSYSTEMNAME@adm
TEXT=Standard SAP R/3 User
CONFIRMATION=USERID

[R3DIRECTORIES_IND_DB2]
CLASS=CDirectories
LIST=Z_R3DIRECTORIES_IND_DB2

[Z_R3DIRECTORIES_IND_DB2]
101_PATH=@SAPDIR@
101_PERMISSION=0775
101_USERGROUP=sapsys
101_USERNAME=@LOWER_SAPSYSTEMNAME@adm
102_PATH=@SAPDIR@/tmp
102_PERMISSION=0775
102_USERGROUP=sapsys
102_USERNAME=@LOWER_SAPSYSTEMNAME@adm
103_PATH=@SAPDIR@/trans
103_PERMISSION=0775
```

```
103_USERGROUP=sapsys
103_USERNAME=@LOWER_SAPSYSTEMNAME@adm
104_PATH=@SAPDIR@/trans/tmp
104_PERMISSION=0775
104_USERGROUP=sapsys
104_USERNAME=@LOWER_SAPSYSTEMNAME@adm
105_PATH=@SAPDIR@/trans/EPS
105_PERMISSION=0775
105_USERGROUP=sapsys
105_USERNAME=@LOWER_SAPSYSTEMNAME@adm
106_PATH=@SAPDIR@/trans/EPS/in
106_PERMISSION=0775
106_USERGROUP=sapsys
106_USERNAME=@LOWER_SAPSYSTEMNAME@adm
107_PATH=@SAPDIR@/trans/EPS/out
107_PERMISSION=0775
107_USERGROUP=sapsys
107_USERNAME=@LOWER_SAPSYSTEMNAME@adm
108_PATH=@SAPDIR@/trans/EPS/log
108_PERMISSION=0775
108_USERGROUP=sapsys
108_USERNAME=@LOWER_SAPSYSTEMNAME@adm
109_PATH=@SAPDIR@/trans/bin
109_PERMISSION=0775
109_USERGROUP=sapsys
109_USERNAME=@LOWER_SAPSYSTEMNAME@adm
110_PATH=@SAPDIR@/trans/buffer
110_PERMISSION=0775
110_USERGROUP=sapsys
110_USERNAME=@LOWER_SAPSYSTEMNAME@adm
111_PATH=@SAPDIR@/trans/cofiles
111_PERMISSION=0775
111_USERGROUP=sapsys
111_USERNAME=@LOWER_SAPSYSTEMNAME@adm
112_PATH=@SAPDIR@/trans/data
112_PERMISSION=0775
112_USERGROUP=sapsys
112_USERNAME=@LOWER_SAPSYSTEMNAME@adm
113_PATH=@SAPDIR@/trans/etc
113_PERMISSION=0775
113_USERGROUP=sapsys
113_USERNAME=@LOWER_SAPSYSTEMNAME@adm
114_PATH=@SAPDIR@/trans/log
114_PERMISSION=0775
114_USERGROUP=sapsys
114_USERNAME=@LOWER_SAPSYSTEMNAME@adm
115_PATH=@SAPDIR@/trans/sapnames
115_PERMISSION=0775
115_USERGROUP=sapsys
115_USERNAME=@LOWER_SAPSYSTEMNAME@adm
120_PATH=@SAPDIR@/@SAPSYSTEMNAME@
120_PERMISSION=0751
120_USERGROUP=sapsys
120_USERNAME=@LOWER_SAPSYSTEMNAME@adm
121_PATH=@SAPDIR@/@SAPSYSTEMNAME@/SYS
121_PERMISSION=0755
121_USERGROUP=sapsys
121_USERNAME=@LOWER_SAPSYSTEMNAME@adm
122_PATH=@SAPDIR@/@SAPSYSTEMNAME@/SYS/exe
122_PERMISSION=0755
122_USERGROUP=sapsys
122_USERNAME=@LOWER_SAPSYSTEMNAME@adm
123_PATH=@SAPDIR@/@SAPSYSTEMNAME@/SYS/exe/opt
123_PERMISSION=0755
123_USERGROUP=sapsys
123_USERNAME=@LOWER_SAPSYSTEMNAME@adm
```

```
124_PATH=@SAPDIR@/@SAPSYSTEMNAME@/SYS/gen
124_PERMISSION=0755
124_USERGROUP=sapsys
124_USERNAME=@LOWER_SAPSYSTEMNAME@adm
125_PATH=@SAPDIR@/@SAPSYSTEMNAME@/SYS/gen/opt
125_PERMISSION=0755
125_USERGROUP=sapsys
125_USERNAME=@LOWER_SAPSYSTEMNAME@adm
126_PATH=@SAPDIR@/@SAPSYSTEMNAME@/SYS/gen/dbg
126_PERMISSION=0755
126_USERGROUP=sapsys
126_USERNAME=@LOWER_SAPSYSTEMNAME@adm
127_PATH=@SAPDIR@/@SAPSYSTEMNAME@/SYS/src
127_PERMISSION=0755
127_USERGROUP=sapsys
127_USERNAME=@LOWER_SAPSYSTEMNAME@adm
128_PATH=@SAPDIR@/@SAPSYSTEMNAME@/@INSTANCENAME@
128_PERMISSION=0755
128_USERGROUP=sapsys
128_USERNAME=@LOWER_SAPSYSTEMNAME@adm
129_PATH=@SAPDIR@/@SAPSYSTEMNAME@/@INSTANCENAME@/data
129_PERMISSION=0755
129_USERGROUP=sapsys
129_USERNAME=@LOWER_SAPSYSTEMNAME@adm
130_PATH=@SAPDIR@/@SAPSYSTEMNAME@/@INSTANCENAME@/log
130_PERMISSION=0755
130_USERGROUP=sapsys
130_USERNAME=@LOWER_SAPSYSTEMNAME@adm
131_PATH=@SAPDIR@/@SAPSYSTEMNAME@/@INSTANCENAME@/work
131_PERMISSION=0755
131_USERGROUP=sapsys
131_USERNAME=@LOWER_SAPSYSTEMNAME@adm
140_PATH=@SAPMOUNTEXE@
140_PERMISSION=0755
140_USERGROUP=sapsys
140_USERNAME=@LOWER_SAPSYSTEMNAME@adm
141_PATH=@SAPMOUNTGLOBAL@
141_PERMISSION=0700
141_USERGROUP=sapsys
141_USERNAME=@LOWER_SAPSYSTEMNAME@adm
142_PATH=@SAPMOUNTPROFILE@
142_PERMISSION=0755
142_USERGROUP=sapsys
142_USERNAME=@LOWER_SAPSYSTEMNAME@adm
143_PATH=@SAPMOUNTGLOBAL@/JESjoblog
143_PERMISSION=0755
143_USERGROUP=sapsys
143_USERNAME=@LOWER_SAPSYSTEMNAME@adm


[R3LINKS_IND_IND]
CLASS=CLinks
LIST=Z_R3LINKS_IND_IND

[Z_R3LINKS_IND_IND]
101_LINKCONTENT=@SAPMOUNTEXE@
101_LINKNAME=@SAPDIR@/@SAPSYSTEMNAME@/SYS/exe/dbg
102_LINKCONTENT=dbg
102_LINKNAME=@SAPDIR@/@SAPSYSTEMNAME@/SYS/exe/run
103_LINKCONTENT=@SAPMOUNTGLOBAL@
103_LINKNAME=@SAPDIR@/@SAPSYSTEMNAME@/SYS/global
104_LINKCONTENT=@SAPMOUNTPROFILE@
104_LINKNAME=@SAPDIR@/@SAPSYSTEMNAME@/SYS/profile
```

```
[R3DIRPERMISSIONS_IND_IND]
CLASS=CPermissions
LIST=Z_R3DIRPERMISSIONS_IND_IND

[Z_R3DIRPERMISSIONS_IND_IND]
101_CHANGE_ON_NFS=NO
101_PATH=@SAPMOUNTEXE@
101_PERMISSION=0755
101_TRAVERSE=
101_USERGROUP=sapsys
101_USERNAME=@LOWER_SAPSYSTEMNAME@adm
104_CHANGE_ON_NFS=NO
104_PATH=@SAPMOUNTPROFILE@
104_PERMISSION=0755
104_TRAVERSE=
104_USERGROUP=sapsys
104_USERNAME=@LOWER_SAPSYSTEMNAME@adm
120_CHANGE_ON_NFS=NO
120_PATH=@HOME@
120_PERMISSION=0700
120_TRAVERSE=
120_USERGROUP=sapsys
120_USERNAME=@LOWER_SAPSYSTEMNAME@adm
121_CHANGE_ON_NFS=NO
121_PATH=@HOME@
121_PERMISSION=0777
121_TRAVERSE=FILES
121_USERGROUP=sapsys
121_USERNAME=@LOWER_SAPSYSTEMNAME@adm
130_CHANGE_ON_NFS=NO
130_PATH=@STARTDIRECTORY@
130_PERMISSION=0777
130_TRAVERSE=
130_USERGROUP=sapsys
130_USERNAME=@LOWER_SAPSYSTEMNAME@adm
140_CHANGE_ON_NFS=YES
140_PATH=@SAPDIR@/trans
140_PERMISSION=0775
140_TRAVERSE=
140_USERGROUP=sapsys
140_USERNAME=@LOWER_SAPSYSTEMNAME@adm
141_CHANGE_ON_NFS=YES
141_PATH=@SAPDIR@/trans/bin
141_PERMISSION=0775
141_TRAVERSE=
141_USERGROUP=sapsys
141_USERNAME=@LOWER_SAPSYSTEMNAME@adm

[R3KERNELCD_IND_IND]
CDLABEL=KERNEL
CDMOUNTPATH=/sap_inst/kernel
CLASS=CCheckCD


[EXTRACTSAPEXE_IND_IND]
ARCHIVE=@CDMOUNTPATH@/@OS@/@PLATFORM@/SAPEXE.CAR
CLASS=CCARExtractArchive
TARGETDIR=@SAPMOUNTEXE@
STEP_USER=@LOWER_SAPSYSTEMNAME@adm
STEP_GROUP=sapsys


[EXTRACTSAPEXEDB_IND_IND]
ARCHIVE=@CDMOUNTPATH@/@OS@/@PLATFORM@/SAPEXEDB.CAR
CLASS=CCARExtractArchive
TARGETDIR=@SAPMOUNTEXE@
```

```
                    STEP_USER=@LOWER_SAPSYSTEMNAME@adm
                    STEP_GROUP=sapsys


                    [EXTRACTSAPSECU_IND_IND]
                    ARCHIVE=@CDMOUNTPATH@/@OS@/@PLATFORM@/SAPSECU.CAR
                    CLASS=CCARExtractArchive
                    TARGETDIR=@SAPMOUNTEXE@
                    STEP_USER=@LOWER_SAPSYSTEMNAME@adm
                    STEP_GROUP=sapsys


                    [PREPAREJCLSS_IND_DB2]
                    CLASS=CDb2SetupJclSs
                    MSGCLASS=Q
                    STEP_ENV=DB_ENV
                    JCLSSUSERNAME=SYSADM
                    CONFIRMATION=MSGCLASS JCLSSUSERNAME


                    [EXITJCLJOBCARD_IND_DB2]
                    CLASS=CExitStep

                    [CREATEMULTIPLEJOBCARDS_IND_DB2]
                    CLASS=CDb2MultipleJobcards
                    STEP_ENV=DB_ENV

                    [CREATETESTJCLSS_IND_DB2]
                    CLASS=CDb2TestJclSs
                    STEP_ENV=DB_ENV

                    [DOWNLOADICLICLIENT_IND_DB2]
                    CLASS=CDb2DownLoadIcliClient
                    STEP_ENV=DB_ENV
                    TARGETDIR=@SAPMOUNTEXE@

                    [R3TEMPLATES_IND_DB2]
                    CLASS=CAdaptFiles
                    EXTENDEDTABLE=R3TEMPLATEMACROS_IND_DB2
                    LIST=Z_R3TEMPLATES_IND_DB2
                    STEP_USER=@LOWER_SAPSYSTEMNAME@adm
                    STEP_GROUP=sapsys

                    [R3TEMPLATEMACROS_IND_DB2]
                    APPL_HOST=@CIHOSTNAME@
                    DEF_EXE=@SAPDIR@/@SAPSYSTEMNAME@/SYS/exe/run
                    INSTALL_PROFILE=@SAPDIR@/@SAPSYSTEMNAME@/SYS/profile
                    SAPCIHOST=@CIHOSTNAME@
                    SAPCISYSNR=@SAPCISYSNR@
                    SAPDBHOST=@DBHOSTNAME@
                    SAPSYSTEM=@SAPSYSNR@
                    SID=@SAPSYSTEMNAME@
                    START_FILES=START_@INSTANCENAME@_@HOSTNAME@
                    DBATTACHNAME=@DBATTACHNAME@

                    [Z_R3TEMPLATES_IND_DB2]
                    101_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/TEMU.PFL
                    101_TARGET=@SAPMOUNTPROFILE@/TEMU.PFL
                    102_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/START@INSTALLATIONTYPE@
                    102_TARGET=@SAPMOUNTPROFILE@/START_@INSTANCENAME@_@HOSTNAME@
                    103_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/DFLT@INSTALLATIONTYPE@
                    103_TARGET=@SAPMOUNTPROFILE@/DEFAULT.PFL
                    104_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/SAPENV.CSH
                    104_TARGET=@HOME@/.sapenv_@HOSTNAME@.csh
                    105_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/SAPENV.SH
                    105_TARGET=@HOME@/.sapenv_@HOSTNAME@.sh
```

```
108_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/STARTSAP
108_TARGET=@HOME@/startsap_@HOSTNAME@_@SAPSYSNR@
109_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/STOPSAP
109_TARGET=@HOME@/stopsap_@HOSTNAME@_@SAPSYSNR@
110_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/DBENV.CSH
110_TARGET=@HOME@/.dbenv_@HOSTNAME@.csh
111_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/DBENV.SH
111_TARGET=@HOME@/.dbenv_@HOSTNAME@.sh
120_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/SAPWIN.TPL
120_TARGET=@SAPMOUNTEXE@/sapwin
121_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/TPPARAM.SAP
121_TARGET=@SAPDIR@/trans/bin/TPPARAM.TPL




[SIDADMENV_IND_IND]
CLASS=CInsertTemplate
LIST=Z_SIDADMENV_IND_IND
STEP_USER=@LOWER_SAPSYSTEMNAME@adm
STEP_GROUP=sapsys

[Z_SIDADMENV_IND_IND]
100_SOURCE=@HOME@/.cshrc
100_TEMPLATE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/SAPSRC.CSH
110_SOURCE=@HOME@/.cshrc
110_TEMPLATE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/DBSRC.CSH
200_SOURCE=@HOME@/.profile
200_TEMPLATE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/SAPSRC.SH
210_SOURCE=@HOME@/.profile
210_TEMPLATE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/DBSRC.SH


[R3INSTANCEPROFILE_IND_DB2]
CLASS=CDb2InstanceProfile
DB_ON_SAME_HOST=NO
PROFILEFILENAME=@SAPMOUNTPROFILE@@DELIM@@SAPSYSTEMNAME@_@INSTANCENAME@_ØHOST
NAMEØ
SAPPFPAR_EXEDIR=@SAPMOUNTEXE@
STEP_USER=@LOWER_SAPSYSTEMNAME@adm
STEP_GROUP=sapsys
FAILOVER=YES
FAILOVERPORT=5@CENTRALINSTANCE_IND_DB2=SAPSYSNR@3
FAILOVERHOST=ihsapa3c
CONFIRMATION=FAILOVER R2_CONNECTION

[R3FILEPERMISSIONS_IND_IND]
CLASS=CPermissions
LIST=Z_R3FILEPERMISSIONS_IND_IND
BREAK_ON_NFS_PERMISSION_ERROR=NO

[Z_R3FILEPERMISSIONS_IND_IND]
101_CHANGE_ON_NFS=NO
101_PATH=@SAPMOUNTEXE@
101_PERMISSION=0755
101_TRAVERSE=SUBDIRECTORIES
101_USERGROUP=sapsys
101_USERNAME=@LOWER_SAPSYSTEMNAME@adm
102_CHANGE_ON_NFS=NO
102_PATH=@SAPMOUNTEXE@
102_PERMISSION=0755
102_TRAVERSE=FILES
102_USERGROUP=sapsys
102_USERNAME=@LOWER_SAPSYSTEMNAME@adm
103_CHANGE_ON_NFS=NO
103_PATH=@SAPMOUNTGLOBAL@
```

```
103_PERMISSION=0700
103_TRAVERSE=
103_USERGROUP=sapsys
103_USERNAME=@LOWER_SAPSYSTEMNAME@adm
104_CHANGE_ON_NFS=NO
104_PATH=@SAPMOUNTPROFILE@
104_PERMISSION=0755
104_TRAVERSE=SUBDIRECTORIES
104_USERGROUP=sapsys
104_USERNAME=@LOWER_SAPSYSTEMNAME@adm
105_CHANGE_ON_NFS=NO
105_PATH=@SAPMOUNTPROFILE@
105_PERMISSION=0755
105_TRAVERSE=FILES
105_USERGROUP=sapsys
105_USERNAME=@LOWER_SAPSYSTEMNAME@adm
106_CHANGE_ON_NFS=NO
106_PATH=@SAPMOUNTEXE@/saposcol
106_PERMISSION=04755
106_TRAVERSE=
106_USERGROUP=sapsys
106_USERNAME=root
112_CHANGE_ON_NFS=NO
112_PATH=@SAPDIR@/@SAPSYSTEMNAME@
112_PERMISSION=0751
112_TRAVERSE=SUBDIRECTORIES
112_USERGROUP=sapsys
112_USERNAME=@LOWER_SAPSYSTEMNAME@adm
113_CHANGE_ON_NFS=NO
113_PATH=@SAPDIR@/@SAPSYSTEMNAME@
113_PERMISSION=0751
113_TRAVERSE=FILES
113_USERGROUP=sapsys
113_USERNAME=@LOWER_SAPSYSTEMNAME@adm
114_CHANGE_ON_NFS=NO
114_PATH=@SAPDIR@/@SAPSYSTEMNAME@/SYS
114_PERMISSION=0755
114_TRAVERSE=SUBDIRECTORIES
114_USERGROUP=sapsys
114_USERNAME=@LOWER_SAPSYSTEMNAME@adm
115_CHANGE_ON_NFS=NO
115_PATH=@SAPDIR@/@SAPSYSTEMNAME@/SYS
115_PERMISSION=0755
115_TRAVERSE=FILES
115_USERGROUP=sapsys
115_USERNAME=@LOWER_SAPSYSTEMNAME@adm
116_CHANGE_ON_NFS=NO
116_PATH=@SAPDIR@/@SAPSYSTEMNAME@/@INSTANCENAME@
116_PERMISSION=0755
116_TRAVERSE=SUBDIRECTORIES
116_USERGROUP=sapsys
116_USERNAME=@LOWER_SAPSYSTEMNAME@adm
117_CHANGE_ON_NFS=NO
117_PATH=@SAPDIR@/@SAPSYSTEMNAME@/@INSTANCENAME@
117_PERMISSION=0755
117_TRAVERSE=FILES
117_USERGROUP=sapsys
117_USERNAME=@LOWER_SAPSYSTEMNAME@adm
118_CHANGE_ON_NFS=NO
118_PATH=@SAPDIR@/@SAPSYSTEMNAME@/@INSTANCENAME@/work
118_PERMISSION=0775
118_TRAVERSE=
118_USERGROUP=sapsys
118_USERNAME=@LOWER_SAPSYSTEMNAME@adm
120_CHANGE_ON_NFS=NO
120_PATH=@HOME@
```

```
120_PERMISSION=0700
120_TRAVERSE=
120_USERGROUP=sapsys
120_USERNAME=@LOWER_SAPSYSTEMNAME@adm
121_CHANGE_ON_NFS=NO
121_PATH=@HOME@
121_PERMISSION=0700
121_TRAVERSE=FILES
121_USERGROUP=sapsys
121_USERNAME=@LOWER_SAPSYSTEMNAME@adm
122_CHANGE_ON_NFS=NO
122_PATH=@TRANSDIR@/bin/TPPARAM.TPL
122_PERMISSION=0664
122_TRAVERSE=
122_USERGROUP=sapsys
122_USERNAME=@LOWER_SAPSYSTEMNAME@adm
130_CHANGE_ON_NFS=YES
130_PATH=@SAPMOUNTEXE@/sapwin
130_PERMISSION=0755
130_TRAVERSE=
130_USERGROUP=sapsys
130_USERNAME=@LOWER_SAPSYSTEMNAME@adm

[SIGNONKEY_IND_DB2]
CLASS=CDb2SignOnKey
TARGETDIR=@SAPMOUNTEXE@
USERGROUP=sapsys
USERNAME=@LOWER_SAPSYSTEMNAME@adm
CONFIRMATION=SIGNON
SIGNONAPPLICATION=icliserv
SIGNONUSERID=icliserv


[TESTJCLSSEXE_IND_DB2]
CLASS=CDb2JclSsExe
JOBNAME=iefbr14
EXEC=@CREATETESTJCLSS_IND_DB2=EXEC@
STEP_ENV=DB_ENV

[CREATEBINDGRANTJOBS_IND_DB2]
CLASS=CDb2BindPlans
ICLIRUN=ICLIRUN
PROFILEFILENAME=@SAPMOUNTPROFILE@@@DELIM@@SAPSYSTEMNAME@_@INSTANCENAME@_ØHOST
NAMEØ
STEP_ENV=DB_ENV
CONFIRMATION=ICLIRUN

[EXITBINDGRNT_IND_DB2]
CLASS=CExitStep

[BINDJCLSSEXE_IND_DB2]
CLASS=CDb2JclSsExe
JOBNAME=FOMEBIND
MAXCONDCODE=0
EXEC=@CREATEBINDGRANTJOBS_IND_DB2=EXEC@
STEP_ENV=DB_ENV


[GRANTJCLSSEXE_IND_DB2]
CLASS=CDb2JclSsExe
JOBNAME=FOMEGRNT
MAXCONDCODE=4
STEP_ENV=DB_ENV
EXEC=@CREATEBINDGRANTJOBS_IND_DB2=EXEC@
```

```
[SAPOS390COLTEMPLATES_IND_DB2]
CLASS=CAdaptFiles
EXTENDEDTABLE=SAPOS390COLTEMPLATEMACROS
LIST=Z_SAPOS390COLTEMPLATES_IND_DB2

[Z_SAPOS390COLTEMPLATES_IND_DB2]
101_SOURCE=@CDMOUNTPATH@@DELIM@OS390@DELIM@DBTOOLS@DELIM@ALLOCDAT.TPL
101_TARGET=.@DELIM@ALLOCDAT.TPL
102_SOURCE=@CDMOUNTPATH@@DELIM@OS390@DELIM@DBTOOLS@DELIM@SAPRFC.INI
102_TARGET=.@DELIM@SAPRFC.INI
103_SOURCE=@CDMOUNTPATH@@DELIM@OS390@DELIM@DBTOOLS@DELIM@SAPOSCOL.SH
103_TARGET=.@DELIM@SAPOSCOL.SH
104_SOURCE=@CDMOUNTPATH@@DELIM@OS390@DELIM@DBTOOLS@DELIM@UNPAX.SH
104_TARGET=.@DELIM@UNPAX.SH

[SAPOS390COLTEMPLATEMACROS]
DEST=@SAPOS390COL_IND_DB2=DEST@
GWHOST=@SAPOS390COL_IND_DB2=GWHOST@
GWSERV=@SAPOS390COL_IND_DB2=GWSERV@
HFSINSTDIR=@SAPOS390COL_IND_DB2=HFSINSTDIR@
PAXFILE=@SAPOS390COL_IND_DB2=PAXFILE@
RFCOSCOL=rfcoscol
SAPOSCOL=saposcol
TMPDATASET=@SAPOS390COL_IND_DB2=TMPDATASET@
TPHOST=@SAPOS390COL_IND_DB2=TPHOST@
TPNAME=@SAPOS390COL_IND_DB2=TPNAME@

[SAPOS390COL_IND_DB2]
CLASS=CDb2InstallSaposcol390
PAXFILE=IBMOS390.PAX
PAXFILEDIR=@CDMOUNTPATH@@DELIM@OS390@DELIM@DBTOOLS
STEP_ENV=DB_ENV
CONFIRMATION=INSTALL
DEST=SAP
GWHOST=@CENTRALINSTANCE_IND_DB2=CIHOSTNAME@
GWSERV=sapgw@CENTRALINSTANCE_IND_DB2=SAPSYSNR@
HFSINSTDIR=/tmp/install
HFSSAPOSCOLSCRIPT=SAPOSCOL.SH
HFSSAPRFCINI=saprfc.ini
TMPDATASET=@PREPAREJCLSS_IND_DB2=JCLSSUSERNAME@.TEMP
TPHOST=ihsapa
TPNAME=/usr/sbin
```

B.2 DATABASE.R3S - Installing the Database

```
[EXE]
10=DATABASEINSTANCE_IND_DB2
20=DBCOMMONDBPARAMETERS_IND_DB2
30=OSGROUPSAPSYS_IND_IND
40=OSUSERSIDADM_IND_IND
50=DBCHECKSETTINGS_IND_DB2
60=PREPAREJCLSS_IND_DB2
70=EXITJCLJOBCARD_IND_DB2
80=CREATEMULTIPLEJOBCARDS_IND_DB2
90=CREATETESTJCLSS_IND_DB2
100=TESTJCLSSEXE_IND_DB2
110=DBCHECKCLEAN_IND_DB2
120=DBDIRECTORIES_IND_DB2
130=DBSPACECHECK_IND_DB2
140=CDSERVER_IND_DB2
150=DBLAYOUT_IND_DB2
160=EXITBUILD_IND_DB2
170=DBLAYOUTEXE_IND_DB2
```

```
                180=DBCHECKBUILD_IND_DB2
                190=DBDROPLOADLOGS_IND_DB2
                200=DBR3LOADCMD_IND_IND
                210=DBR3LOADEXECDUMMY_IND_IND
                220=DBR3LOADEXEC_IND_DB2
                230=DBR3LOADVIEWDUMMY_IND_IND
                240=DBR3LOADVIEW_IND_DB2
                250=DBCHECKLOAD_IND_DB2
                260=REPORTLOADS_IND_DB2
                270=DBR3LICENSECREATE_IND_IND
                280=DBALTER_IND_DB2
                290=CREATEINDEXONCATALOG_IND_DB2
                300=RUNSTATSCREATEJOB_IND_DB2
                310=REORGCREATEJOB_IND_DB2
                320=EXITREORG_IND_DB2
                330=EXITRUNSTATS_IND_DB2
                340=RUNSTATSJCLSSEXE_IND_DB2
                350=UPDATESYSTABLES_IND_DB2
                360=DIPGNTAB_IND_IND
                370=EXITMNLS_IND_IND
                380=DBR3START_IND_DB2
                390=RFCRADDBDIF_IND_IND

                [DATABASEINSTANCE_IND_DB2]
                CLASS=CCommonParameters
                INSTALLATIONTYPE=DB
                SAPSYSTEMNAME=C11
                SAPSYSNR=00
                CONFIRMATION=SAPSYSTEMNAME SAPSYSNR SAPMOUNTEXE SAPMOUNTGLOBAL          ?
                         SAPMOUNTPROFILE CIHOSTNAME DBHOSTNAME

                [DBCOMMONDBPARAMETERS_IND_DB2]
                CLASS=CDb2DbIniDefKey
                DB_TYPE=DB2
                DBATTACHNAME=DSNX
                DB_HOME=@DBATTACHNAME@
                DB_TYPE=DB2
                DSNTIADLIB=@VCAT@.V510.RUNLIB.LOAD
                DSNTIADPLAN=DSNTIAV51
                HIGHLEVELQUALIFIER=SYS1
                LOADLIB=@VCAT@.V510.SDSNLOAD
                HOSTTCP=ihsapa1a
                VCAT=DSN00X
                SAPREORG=/tmp/copycd
                RELEASE=40B
                CONFIRMATION=DBATTACHNAME VCAT HIGHLEVELQUALIFIER HOSTTCP LOADLIB SAPREORG

                [DB_ENV]
                RSDB_DB2JCLLIBRARY=/usr/sap/@SAPSYSTEMNAME@/SYS/exe/run/db2jcllib.o
                R3_DB2_SSID=@DBATTACHNAME@
                RSDB_DBSLLIBRARY=/usr/sap/@SAPSYSTEMNAME@/SYS/exe/run/sldb2lib.o
                RSDB_ICLILIBRARY=/usr/sap/@SAPSYSTEMNAME@/SYS/exe/run/ibmiclic.o
                SAPDBHOST=@DBHOSTNAME@
                SAPSYSTEMNAME=@SAPSYSTEMNAME@
                HOME=@OSUSERSIDADM_IND_IND=HOME@


                [OSGROUPSAPSYS_IND_IND]
                CLASS=COsGroup
                GROUPNAME=sapsys
                CONFIRMATION=GROUPID

                [OSUSERSIDADM_IND_IND]
                CLASS=COsUser
                GROUPNAMES=sapsys
```

```
USERNAME=@LOWER_SAPSYSTEMNAME@adm
TEXT=Standard SAP R/3 User
CONFIRMATION=USERID

[DBCHECKSETTINGS_IND_DB2]
CLASS=CDb2CheckDb
STEP_ENV=DB_ENV

[PREPAREJCLSS_IND_DB2]
CLASS=CDb2SetupJclSs
MSGCLASS=Q
STEP_ENV=DB_ENV
JCLSSUSERNAME=SYSADM
CONFIRMATION=MSGCLASS JCLSSUSERNAME


[EXITJCLJOBCARD_IND_DB2]
CLASS=CExitStep

[CREATEMULTIPLEJOBCARDS_IND_DB2]
CLASS=CDb2MultipleJobcards
STEP_ENV=DB_ENV

[CREATETESTJCLSS_IND_DB2]
CLASS=CDb2TestJclSs
STEP_ENV=DB_ENV

[TESTJCLSSEXE_IND_DB2]
CLASS=CDb2JclSsExe
JOBNAME=iefbr14
EXEC=@CREATETESTJCLSS_IND_DB2=EXEC@
STEP_ENV=DB_ENV

[DBCHECKCLEAN_IND_DB2]
CLASS=CDb2CheckCleanDb
STEP_ENV=DB_ENV

[DBDIRECTORIES_IND_DB2]
CLASS=CDirectories
BREAK_ON_NFS=NO
LIST=Z_DBDIRECTORIES_IND_DB2

[Z_DBDIRECTORIES_IND_DB2]
101_PATH=@SAPREORG@
101_PERMISSIONS=0755
101_USERGROUP=sapsys
101_USERNAME=@LOWER_SAPSYSTEMNAME@adm
102_PATH=@SAPREORG@/CD1_DIR
102_PERMISSION=0775
102_USERGROUP=sapsys
102_USERNAME=@LOWER_SAPSYSTEMNAME@adm


[DBSPACECHECK_IND_DB2]
CLASS=CFsSpaceCheck
LIST=Z_DBSPACECHECK_IND_DB2

[Z_DBSPACECHECK_IND_DB2]
101_FREE_SPACE_WANTED  = 40
101_SPACE_CHECK_PATH   = @STARTDIRECTORY@
101_DIR_CHECK_PATH     = @STARTDIRECTORY@
102_FREE_SPACE_WANTED  = 700
102_SPACE_CHECK_PATH   = @SAPREORG@
102_DIR_CHECK_PATH     = @SAPREORG@
```

```
[CDSERVER_IND_DB2]
1_COPY=@SAPREORG@/CD1_DIR
1_LABEL=SAP:40B:EXPORT(1/2):DB-Export CD1 of 2:
1_LOCATION=/sapcd
1_NAME=EXPORT1
2_LABEL=SAP:40B:EXPORT(2/2):DB-Export CD2 of 2:
2_LOCATION=/sapcd
2_NAME=EXPORT2
3_LABEL=SAP:40B:LOAD:Report Load Installation:
3_LOCATION=/sapcd
3_NAME=REPORTLOAD
CDNUM=3
CLASS=CCDSupport
LABEL=LABEL.ASC


[DBLAYOUT_IND_DB2]
CLASS=CDb2CreateDbLayout
CONFIRMATION=SMS

[EXITBUILD_IND_DB2]
CLASS=CExitStep

[DBLAYOUTEXE_IND_DB2]
CLASS=CDb2ExeDbLayout
STEP_ENV=DB_ENV

[DBCHECKBUILD_IND_DB2]
CLASS=CDb2CheckBuild
STEP_ENV=DB_ENV

[DBDROPLOADLOGS_IND_DB2]
WORKDIR=.
CLASS=CDb2DropLoadLogs

[DBR3LOADCMD_IND_IND]
CLASS=CR3loadCmdFiles
R3LOAD_MODE = IMPORT
STEP_ENV=DB_ENV


[DBR3LOADEXECDUMMY_IND_IND]
CLASS=CR3loadDummy

[DBR3LOADEXEC_IND_DB2]
CLASS=CR3loadExec
R3LOAD_MODE=IMPORT
RUN_AS_GROUP=@OSUSERSIDADM_IND_IND=GROUPNAMES@
RUN_AS_USER=@OSUSERSIDADM_IND_IND=USERNAME@
PROCESSES=10
STEP_ENV=DB_ENV

[DBR3LOADVIEWDUMMY_IND_IND]
CLASS=CR3loadDummy

[DBR3LOADVIEW_IND_DB2]
CLASS=CR3loadPackage
R3LOAD_MODE=IMPORT
TABART=SAPVIEW
RUN_AS_GROUP=@OSUSERSIDADM_IND_IND=GROUPNAMES@
RUN_AS_USER=@OSUSERSIDADM_IND_IND=USERNAME@
STEP_ENV=DB_ENV
```

```
[DBCHECKLOAD_IND_DB2]
CLASS=CDb2CheckLoad
STEP_ENV=DB_ENV

[REPORTLOADS_IND_DB2]
CLASS=CReportLoads
CONFIRMATION=REPORT_NAMES
CD_PATH=$STEP_CD_PATH$
CONFIRMATION=REPORT_NAMES
REPORT_NAMES=@PLATFORM@
STEP_CD=REPORTLOAD
R3LOAD_MODE=IMPORT
R3LOAD_RESUME=YES
RUN_AS_GROUP=@OSUSERSIDADM_IND_IND=GROUPNAMES@
RUN_AS_USER=@OSUSERSIDADM_IND_IND=USERNAME@
STEP_ENV=DB_ENV


[DBR3LICENSECREATE_IND_IND]
CLASS=CR3License
STEP_ENV=DB_ENV

[DBALTER_IND_DB2]
CLASS=CDb2Alter
STEP_ENV=DB_ENV

[CREATEINDEXONCATALOG_IND_DB2]
CLASS=CDb2CreateIndexOnCatalog
STEP_ENV=DB_ENV

[RUNSTATSCREATEJOB_IND_DB2]
CLASS=CDb2CreateRunstats
RUNSTATSNOPARALLEL=5
STEP_ENV=DB_ENV

[REORGCREATEJOB_IND_DB2]
CLASS=CDb2CreateReorg
REORGNOPARALLEL=5
STEP_ENV=DB_ENV

[EXITREORG_IND_DB2]
CLASS=CExitStep
EXIT=NO

[EXITRUNSTATS_IND_DB2]
CLASS=CExitStep
EXIT=NO

[RUNSTATSJCLSSEXE_IND_DB2]
CLASS=CDb2JclSsExe
JOBNAME=Runstats
MAXCONDCODE=4
NOPARALLEL=@RUNSTATSCREATEJOB_IND_DB2=RUNSTATSNOPARALLEL@
EXEC=@RUNSTATSCREATEJOB_IND_DB2=EXEC@
STEP_ENV=DB_ENV


[UPDATESYSTABLES_IND_DB2]
CLASS=CDb2UpdateSysTbls
STEP_ENV=DB_ENV

[DIPGNTAB_IND_IND]
CLASS=CExecute
EXECUTABLE=dipgntab
OPTIONS=-rwr4O -srctt DDNTT -srctf DDNTF -dsttt DDNTT -dsttf DDNTF -ttonly TT
PATH=@SAPMOUNTEXE@
```

```
                   RC_OK_CODE=0
                   RUN_AS_GROUP=sapsys
                   RUN_AS_USER=@LOWER_SAPSYSTEMNAME@adm
                   STEP_ENV=DB_ENV

                   [EXITMNLS_IND_IND]
                   CLASS=CExitStep
                   EXIT=YES


                   [DBR3START_IND_DB2]
                   CLASS=CExecute
                   EXECUTABLE=sh
                   OPTIONS=@OSUSERSIDADM_IND_IND=HOME@/startsap_@CIHOSTNAME@_@SAPSYSNR@
                   PATH=/bin
                   RC_OK_CODE=0
                   RUN_AS_GROUP=sapsys
                   RUN_AS_USER=@LOWER_SAPSYSTEMNAME@adm
                   STEP_ENV=DB_ENV

                   [RFCRADDBDIF_IND_IND]
                   CLASS=CRfcJob
                   RFCREPNAME=RADDBDIF
                   RFCSTEP=3
```

B.3 DBDROP.R3S - Dropping the Database

```
                   [EXE]
                   10=DATABASEINSTANCE_IND_DB2
                   20=DBCOMMONPARAMETERS_IND_DB2
                   30=DBDROPLOADLOGS_IND_DB2
                   40=DBDROP_IND_DB2

                   [DATABASEINSTANCE_IND_DB2]
                   CLASS=CCommonParameters
                   INSTALLATIONTYPE=DB
                   SAPSYSTEMNAME=C11
                   SAPSYSNR=00
                   CONFIRMATION=SAPSYSTEMNAME SAPSYSNR SAPMOUNT CIHOSTNAME DBHOSTNAME

                   [DBCOMMONPARAMETERS_IND_DB2]
                   CLASS=CDb2DbIniDefKey
                   DB_TYPE=DB2
                   DBATTACHNAME=DSNX
                   DB_HOME=@DBATTACHNAME@
                   DB_TYPE=DB2
                   DSNTIADLIB=@VCAT@.V510.RUNLIB.LOAD
                   HIGHLEVELQUALIFIER=SYS1
                   LOADLIB=@VCAT@.V510.SDSNLOAD
                   HOSTTCP=ihsapa1a
                   VCAT=DSN00X
                   RELEASE=40B
                   SAPREORG=/tmp/copycd
                   CONFIRMATION=DBATTACHNAME

                   [DB_ENV]
                   RSDB_DB2JCLLIBRARY=/usr/sap/@SAPSYSTEMNAME@/SYS/exe/run/db2jcllib.o
                   R3_DB2_SSID=@DBATTACHNAME@
                   RSDB_DBSLLIBRARY=/usr/sap/@SAPSYSTEMNAME@/SYS/exe/run/sldb2lib.o
                   RSDB_ICLILIBRARY=/usr/sap/@SAPSYSTEMNAME@/SYS/exe/run/ibmiclic.o
                   SAPDBHOST=@DBHOSTNAME@
                   SAPSYSTEMNAME=@SAPSYSTEMNAME@
```

```
[DBDROP_IND_DB2]
CLASS=CDb2Drop
DB_TYPE=DB2
STEP_ENV=DB_ENV

[DBDROPLOADLOGS_IND_DB2]
CLASS=CDb2DropLoadLogs
WORKDIR=.
```

B.4 DIALOG.R3S - Installing Dialog Instance without Central Instance

```
[EXE]
10=DIALOGINSTANCE_IND_DB2
20=DBCOMMONPARAMETERS_IND_DB2
30=CENTRDIRCHECK_IND_IND
40=R3DISPATCHERPORT_IND_IND
50=R3DISPATCHERSECURITYPORT_IND_IND
60=R3GATEWAYPORT_IND_IND
70=R3GATEWAYSECURITYPORT_IND_IND
80=R3MESSAGEPORT_IND_IND
90=ICLICONNECTIONPORT_IND_DB2
100=ICLIKEEPALIVEPORT_IND_DB2
110=OSGROUPSAPSYS_IND_IND
120=OSUSERSIDADM_IND_IND
130=R3DIRECTORIES_IND_DB2
140=R3LINKS_IND_IND
150=CENTRSPACECHECK_IND_IND
160=R3KERNELCD_IND_IND
170=EXTRACTSAPEXE_IND_IND
180=EXTRACTSAPEXEDB_IND_IND
190=EXTRACTSAPSECU_IND_IND
200=PREPAREJCLSS_IND_DB2
210=EXITJCLJOBCARD_IND_DB2
220=CREATEMULTIPLEJOBCARDS_IND_DB2
230=CREATETESTJCLSS_IND_DB2
240=DOWNLOADICLICLIENT_IND_DB2
250=R3TEMPLATES_IND_DB2
260=SIDADMENV_IND_IND
270=R3INSTANCEPROFILE_IND_DB2
280=R3FILEPERMISSIONS_IND_IND
290=SIGNONKEY_IND_DB2
300=TESTJCLSSEXE_IND_DB2
310=CREATEBINDGRANTJOBS_IND_DB2
320=EXITBINDGRNT_IND_DB2
330=BINDJCLSSEXE_IND_DB2
340=GRANTJCLSSEXE_IND_DB2

[DIALOGINSTANCE_IND_DB2]
CLASS=CCommonParameters
INSTALLATIONTYPE=DI
SAPSYSTEMNAME=C11
SAPSYSNR=00
CONFIRMATION=SAPSYSTEMNAME SAPSYSNR SAPMOUNTEXE SAPMOUNTGLOBAL          ?
           SAPMOUNTPROFILE CIHOSTNAME DBHOSTNAME

[DBCOMMONPARAMETERS_IND_DB2]
CLASS=CDb2DbIniDefKey
DB_TYPE=DB2
DBATTACHNAME=DSNX
DB_HOME=@DBATTACHNAME@
DB_TYPE=DB2
DSNTIADLIB=@VCAT@.V510.RUNLIB.LOAD
HIGHLEVELQUALIFIER=SYS1
```

```
LOADLIB=@VCAT@.V510.SDSNLOAD
HOSTTCP=ihsapa1a
VCAT=DSN00X
RELEASE=40B
SAPREORG=/tmp/copycd
CONFIRMATION=DBATTACHNAME VCAT HIGHLEVELQUALIFIER HOSTTCP LOADLIB DSNTIADLIB

[DB_ENV]
RSDB_DB2JCLLIBRARY=/usr/sap/@SAPSYSTEMNAME@/SYS/exe/run/db2jcllib.o
R3_DB2_SSID=@DBATTACHNAME@
RSDB_DBSLLIBRARY=/usr/sap/@SAPSYSTEMNAME@/SYS/exe/run/sldb2lib.o
RSDB_ICLILIBRARY=/usr/sap/@SAPSYSTEMNAME@/SYS/exe/run/ibmiclic.o
SAPDBHOST=@DBHOSTNAME@
SAPSYSTEMNAME=@SAPSYSTEMNAME@
HOME=@OSUSERSIDADM_IND_IND=HOME@


[CENTRDIRCHECK_IND_IND]
CLASS=CDirExistCheck
LIST=Z_CENTRSPACECHECK_IND_IND
LIST2=Z_DBHOMECENTRSPACECHECK_IND_IND
LIST3=Z_DBHOMECENTRSPACECHECK_@CPUFAMILY@_IND

[R3DISPATCHERPORT_IND_IND]
CLASS=CServicePort
PORT=32@SAPSYSNR@
PROTOCOL=tcp
SERVICENAME=sapdp@SAPSYSNR@


[R3DISPATCHERSECURITYPORT_IND_IND]
CLASS=CServicePort
PORT=47@SAPSYSNR@
PROTOCOL=tcp
SERVICENAME=sapdp@SAPSYSNR@s


[R3GATEWAYPORT_IND_IND]
CLASS=CServicePort
PORT=33@SAPSYSNR@
PROTOCOL=tcp
SERVICENAME=sapgw@SAPSYSNR@


[R3GATEWAYSECURITYPORT_IND_IND]
CLASS=CServicePort
PORT=48@SAPSYSNR@
PROTOCOL=tcp
SERVICENAME=sapgw@SAPSYSNR@s


[R3MESSAGEPORT_IND_IND]
CLASS=CServicePort
PORT=36@SAPSYSNR@
PROTOCOL=tcp
SERVICENAME=sapms@SAPSYSTEMNAME@
CONFIRMATION=PORT

[ICLICONNECTIONPORT_IND_DB2]
CLASS=CServicePort
PROTOCOL=udp
PORT=5@SAPSYSNR@0
SERVICENAME=sapdb2@SAPSYSTEMNAME@
CONFIRMATION=PORT
```

```
[ICLIKEEPALIVEPORT_IND_DB2]
CLASS=CServicePort
PROTOCOL=udp
PORT=5@SAPSYSNR@1
SERVICENAME=iclika@SAPSYSTEMNAME@
CONFIRMATION=PORT

[OSGROUPSAPSYS_IND_IND]
CLASS=COsGroup
GROUPNAME=sapsys
CONFIRMATION=GROUPID

[OSUSERSIDADM_IND_IND]
CLASS=COsUser
GROUPNAMES=sapsys
USERNAME=@LOWER_SAPSYSTEMNAME@adm
TEXT=Standard SAP R/3 User
CONFIRMATION=USERID

[R3DIRECTORIES_IND_DB2]
CLASS=CDirectories
LIST=Z_R3DIRECTORIES_IND_DB2

[Z_R3DIRECTORIES_IND_DB2]
101_PATH=@SAPDIR@
101_PERMISSION=0775
101_USERGROUP=sapsys
101_USERNAME=@LOWER_SAPSYSTEMNAME@adm
102_PATH=@SAPDIR@/tmp
102_PERMISSION=0775
102_USERGROUP=sapsys
102_USERNAME=@LOWER_SAPSYSTEMNAME@adm
103_PATH=@SAPDIR@/trans
103_PERMISSION=0775
103_USERGROUP=sapsys
103_USERNAME=@LOWER_SAPSYSTEMNAME@adm
104_PATH=@SAPDIR@/trans/tmp
104_PERMISSION=0775
104_USERGROUP=sapsys
104_USERNAME=@LOWER_SAPSYSTEMNAME@adm
105_PATH=@SAPDIR@/trans/EPS
105_PERMISSION=0775
105_USERGROUP=sapsys
105_USERNAME=@LOWER_SAPSYSTEMNAME@adm
106_PATH=@SAPDIR@/trans/EPS/in
106_PERMISSION=0775
106_USERGROUP=sapsys
106_USERNAME=@LOWER_SAPSYSTEMNAME@adm
107_PATH=@SAPDIR@/trans/EPS/out
107_PERMISSION=0775
107_USERGROUP=sapsys
107_USERNAME=@LOWER_SAPSYSTEMNAME@adm
108_PATH=@SAPDIR@/trans/EPS/log
108_PERMISSION=0775
108_USERGROUP=sapsys
108_USERNAME=@LOWER_SAPSYSTEMNAME@adm
109_PATH=@SAPDIR@/trans/bin
109_PERMISSION=0775
109_USERGROUP=sapsys
109_USERNAME=@LOWER_SAPSYSTEMNAME@adm
110_PATH=@SAPDIR@/trans/buffer
110_PERMISSION=0775
110_USERGROUP=sapsys
110_USERNAME=@LOWER_SAPSYSTEMNAME@adm
111_PATH=@SAPDIR@/trans/cofiles
111_PERMISSION=0775
```

```
111_USERGROUP=sapsys
111_USERNAME=@LOWER_SAPSYSTEMNAME@adm
112_PATH=@SAPDIR@/trans/data
112_PERMISSION=0775
112_USERGROUP=sapsys
112_USERNAME=@LOWER_SAPSYSTEMNAME@adm
113_PATH=@SAPDIR@/trans/etc
113_PERMISSION=0775
113_USERGROUP=sapsys
113_USERNAME=@LOWER_SAPSYSTEMNAME@adm
114_PATH=@SAPDIR@/trans/log
114_PERMISSION=0775
114_USERGROUP=sapsys
114_USERNAME=@LOWER_SAPSYSTEMNAME@adm
115_PATH=@SAPDIR@/trans/sapnames
115_PERMISSION=0775
115_USERGROUP=sapsys
115_USERNAME=@LOWER_SAPSYSTEMNAME@adm
120_PATH=@SAPDIR@/@SAPSYSTEMNAME@
120_PERMISSION=0751
120_USERGROUP=sapsys
120_USERNAME=@LOWER_SAPSYSTEMNAME@adm
121_PATH=@SAPDIR@/@SAPSYSTEMNAME@/SYS
121_PERMISSION=0755
121_USERGROUP=sapsys
121_USERNAME=@LOWER_SAPSYSTEMNAME@adm
122_PATH=@SAPDIR@/@SAPSYSTEMNAME@/SYS/exe
122_PERMISSION=0755
122_USERGROUP=sapsys
122_USERNAME=@LOWER_SAPSYSTEMNAME@adm
123_PATH=@SAPDIR@/@SAPSYSTEMNAME@/SYS/exe/opt
123_PERMISSION=0755
123_USERGROUP=sapsys
123_USERNAME=@LOWER_SAPSYSTEMNAME@adm
124_PATH=@SAPDIR@/@SAPSYSTEMNAME@/SYS/gen
124_PERMISSION=0755
124_USERGROUP=sapsys
124_USERNAME=@LOWER_SAPSYSTEMNAME@adm
125_PATH=@SAPDIR@/@SAPSYSTEMNAME@/SYS/gen/opt
125_PERMISSION=0755
125_USERGROUP=sapsys
125_USERNAME=@LOWER_SAPSYSTEMNAME@adm
126_PATH=@SAPDIR@/@SAPSYSTEMNAME@/SYS/gen/dbg
126_PERMISSION=0755
126_USERGROUP=sapsys
126_USERNAME=@LOWER_SAPSYSTEMNAME@adm
127_PATH=@SAPDIR@/@SAPSYSTEMNAME@/SYS/src
127_PERMISSION=0755
127_USERGROUP=sapsys
127_USERNAME=@LOWER_SAPSYSTEMNAME@adm
128_PATH=@SAPDIR@/@SAPSYSTEMNAME@/@INSTANCENAME@
128_PERMISSION=0755
128_USERGROUP=sapsys
128_USERNAME=@LOWER_SAPSYSTEMNAME@adm
129_PATH=@SAPDIR@/@SAPSYSTEMNAME@/@INSTANCENAME@/data
129_PERMISSION=0755
129_USERGROUP=sapsys
129_USERNAME=@LOWER_SAPSYSTEMNAME@adm
130_PATH=@SAPDIR@/@SAPSYSTEMNAME@/@INSTANCENAME@/log
130_PERMISSION=0755
130_USERGROUP=sapsys
130_USERNAME=@LOWER_SAPSYSTEMNAME@adm
131_PATH=@SAPDIR@/@SAPSYSTEMNAME@/@INSTANCENAME@/work
131_PERMISSION=0755
131_USERGROUP=sapsys
131_USERNAME=@LOWER_SAPSYSTEMNAME@adm
```

```
140_PATH=@SAPMOUNTEXE@
140_PERMISSION=0755
140_USERGROUP=sapsys
140_USERNAME=@LOWER_SAPSYSTEMNAME@adm
141_PATH=@SAPMOUNTGLOBAL@
141_PERMISSION=0700
141_USERGROUP=sapsys
141_USERNAME=@LOWER_SAPSYSTEMNAME@adm
142_PATH=@SAPMOUNTPROFILE@
142_PERMISSION=0755
142_USERGROUP=sapsys
142_USERNAME=@LOWER_SAPSYSTEMNAME@adm
143_PATH=@SAPMOUNTGLOBAL@/JESjoblog
143_PERMISSION=0755
143_USERGROUP=sapsys
143_USERNAME=@LOWER_SAPSYSTEMNAME@adm


[R3LINKS_IND_IND]
CLASS=CLinks
LIST=Z_R3LINKS_IND_IND

[Z_R3LINKS_IND_IND]
101_LINKCONTENT=@SAPMOUNTEXE@
101_LINKNAME=@SAPDIR@/@SAPSYSTEMNAME@/SYS/exe/dbg
102_LINKCONTENT=dbg
102_LINKNAME=@SAPDIR@/@SAPSYSTEMNAME@/SYS/exe/run
103_LINKCONTENT=@SAPMOUNTGLOBAL@
103_LINKNAME=@SAPDIR@/@SAPSYSTEMNAME@/SYS/global
104_LINKCONTENT=@SAPMOUNTPROFILE@
104_LINKNAME=@SAPDIR@/@SAPSYSTEMNAME@/SYS/profile


[CENTRSPACECHECK_IND_IND]
CLASS=CFsSpaceCheck
LIST=Z_CENTRSPACECHECK_IND_IND
LIST2=Z_DBHOMECENTRSPACECHECK_IND_IND
LIST3=Z_DBHOMECENTRSPACECHECK_@CPUFAMILY@_IND

[Z_CENTRSPACECHECK_IND_IND]
101_FREE_SPACE_WANTED=100
101_DIR_CHECK_PATH=@TRANSDIR@
101_SPACE_CHECK_PATH=@TRANSDIR@
102_FREE_SPACE_WANTED=SAPMOUNTVALUE
102_DIR_CHECK_PATH=@SAPMOUNT@
103_FREE_SPACE_WANTED=240
103_SPACE_CHECK_PATH=@SAPMOUNTEXE@
104_FREE_SPACE_WANTED=50
104_SPACE_CHECK_PATH=@SAPMOUNTGLOBAL@
105_FREE_SPACE_WANTED=10
105_SPACE_CHECK_PATH=@SAPMOUNTPROFILE@
106_FREE_SPACE_WANTED=350
106_SPACE_CHECK_PATH=@SAPDIR@/@SAPSYSTEMNAME@
106_DIR_CHECK_PATH=@SAPDIR@/@SAPSYSTEMNAME@

[DBHOMECENTRSPACECHECK_IND_DB2]
[DBHOMECENTRSPACECHECK_IBM6000_IND]
301_FREE_SPACE_WANTED=10
301_DIR_CHECK_PATH=@STARTDIRECTORY@
301_SPACE_CHECK_PATH=@STARTDIRECTORY@

[R3KERNELCD_IND_IND]
CDLABEL=KERNEL
CDMOUNTPATH=/sap_inst/kernel
CLASS=CCheckCD
```

```
[EXTRACTSAPEXE_IND_IND]
ARCHIVE=@CDMOUNTPATH@/@OS@/@PLATFORM@/SAPEXE.CAR
CLASS=CCARExtractArchive
TARGETDIR=@SAPMOUNTEXE@
STEP_USER=@LOWER_SAPSYSTEMNAME@adm
STEP_GROUP=sapsys


[EXTRACTSAPEXEDB_IND_IND]
ARCHIVE=@CDMOUNTPATH@/@OS@/@PLATFORM@/SAPEXEDB.CAR
CLASS=CCARExtractArchive
TARGETDIR=@SAPMOUNTEXE@
STEP_USER=@LOWER_SAPSYSTEMNAME@adm
STEP_GROUP=sapsys


[EXTRACTSAPSECU_IND_IND]
ARCHIVE=@CDMOUNTPATH@/@OS@/@PLATFORM@/SAPSECU.CAR
CLASS=CCARExtractArchive
TARGETDIR=@SAPMOUNTEXE@
STEP_USER=@LOWER_SAPSYSTEMNAME@adm
STEP_GROUP=sapsys


[PREPAREJCLSS_IND_DB2]
CLASS=CDb2SetupJclSs
MSGCLASS=Q
STEP_ENV=DB_ENV
JCLSSUSERNAME=SYSADM
CONFIRMATION=MSGCLASS JCLSSUSERNAME


[EXITJCLJOBCARD_IND_DB2]
CLASS=CExitStep

[CREATEMULTIPLEJOBCARDS_IND_DB2]
CLASS=CDb2MultipleJobcards
STEP_ENV=DB_ENV

[CREATETESTJCLSS_IND_DB2]
CLASS=CDb2TestJclSs
STEP_ENV=DB_ENV

[DOWNLOADICLICLIENT_IND_DB2]
CLASS=CDb2DownLoadIcliClient
STEP_ENV=DB_ENV
TARGETDIR=@SAPMOUNTEXE@

[R3TEMPLATES_IND_DB2]
CLASS=CAdaptFiles
EXTENDEDTABLE=R3TEMPLATEMACROS_IND_DB2
LIST=Z_R3TEMPLATES_IND_DB2
STEP_USER=@LOWER_SAPSYSTEMNAME@adm
STEP_GROUP=sapsys

[R3TEMPLATEMACROS_IND_DB2]
APPL_HOST=@CIHOSTNAME@
DEF_EXE=@SAPDIR@/@SAPSYSTEMNAME@/SYS/exe/run
INSTALL_PROFILE=@SAPDIR@/@SAPSYSTEMNAME@/SYS/profile
SAPCIHOST=@CIHOSTNAME@
SAPCISYSNR=@SAPCISYSNR@
SAPDBHOST=@DBHOSTNAME@
SAPSYSTEM=@SAPSYSNR@
SID=@SAPSYSTEMNAME@
```

```
START_FILES=START_@INSTANCENAME@_@HOSTNAME@
DBATTACHNAME=@DBATTACHNAME@

[Z_R3TEMPLATES_IND_DB2]
101_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/TEMU.PFL
101_TARGET=@SAPMOUNTPROFILE@/TEMU.PFL
102_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/START@INSTALLATIONTYPE@
102_TARGET=@SAPMOUNTPROFILE@/START_@INSTANCENAME@_@HOSTNAME@
103_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/DFLT@INSTALLATIONTYPE@
103_TARGET=@SAPMOUNTPROFILE@/DEFAULT.PFL
104_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/SAPENV.CSH
104_TARGET=@HOME@/.sapenv_@HOSTNAME@.csh
105_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/SAPENV.SH
105_TARGET=@HOME@/.sapenv_@HOSTNAME@.sh
108_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/STARTSAP
108_TARGET=@HOME@/startsap_@HOSTNAME@_@SAPSYSNR@
109_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/STOPSAP
109_TARGET=@HOME@/stopsap_@HOSTNAME@_@SAPSYSNR@
110_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/DBENV.CSH
110_TARGET=@HOME@/.dbenv_@HOSTNAME@.csh
111_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/DBENV.SH
111_TARGET=@HOME@/.dbenv_@HOSTNAME@.sh
120_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/SAPWIN.TPL
120_TARGET=@SAPMOUNTEXE@/sapwin
121_SOURCE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/TPPARAM.SAP
121_TARGET=@SAPDIR@/trans/bin/TPPARAM.TPL




[SIDADMENV_IND_IND]
CLASS=CInsertTemplate
LIST=Z_SIDADMENV_IND_IND
STEP_USER=@LOWER_SAPSYSTEMNAME@adm
STEP_GROUP=sapsys

[Z_SIDADMENV_IND_IND]
100_SOURCE=@HOME@/.cshrc
100_TEMPLATE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/SAPSRC.CSH
110_SOURCE=@HOME@/.cshrc
110_TEMPLATE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/DBSRC.CSH
200_SOURCE=@HOME@/.profile
200_TEMPLATE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/SAPSRC.SH
210_SOURCE=@HOME@/.profile
210_TEMPLATE=@CDMOUNTPATH@/@OS@/COMMON/INSTALL/DBSRC.SH




[R3INSTANCEPROFILE_IND_DB2]
CLASS=CDb2InstanceProfile
DB_ON_SAME_HOST=NO
PROFILEFILENAME=@SAPMOUNTPROFILE@@DELIM@@SAPSYSTEMNAME@_@INSTANCENAME@_ØHOST
NAMEØ
SAPPFPAR_EXEDIR=@SAPMOUNTEXE@
STEP_USER=@LOWER_SAPSYSTEMNAME@adm
STEP_GROUP=sapsys
FAILOVER=YES
FAILOVERPORT=5@CENTRALINSTANCE_IND_DB2=SAPSYSNR@3
FAILOVERHOST=ihsapa3c
CONFIRMATION=FAILOVER R2_CONNECTION

[R3FILEPERMISSIONS_IND_IND]
CLASS=CPermissions
LIST=Z_R3FILEPERMISSIONS_IND_IND
BREAK_ON_NFS_PERMISSION_ERROR=NO
```

```
[Z_R3FILEPERMISSIONS_IND_IND]
101_CHANGE_ON_NFS=NO
101_PATH=@SAPMOUNTEXE@
101_PERMISSION=0755
101_TRAVERSE=SUBDIRECTORIES
101_USERGROUP=sapsys
101_USERNAME=@LOWER_SAPSYSTEMNAME@adm
102_CHANGE_ON_NFS=NO
102_PATH=@SAPMOUNTEXE@
102_PERMISSION=0755
102_TRAVERSE=FILES
102_USERGROUP=sapsys
102_USERNAME=@LOWER_SAPSYSTEMNAME@adm
103_CHANGE_ON_NFS=NO
103_PATH=@SAPMOUNTGLOBAL@
103_PERMISSION=0700
103_TRAVERSE=
103_USERGROUP=sapsys
103_USERNAME=@LOWER_SAPSYSTEMNAME@adm
104_CHANGE_ON_NFS=NO
104_PATH=@SAPMOUNTPROFILE@
104_PERMISSION=0755
104_TRAVERSE=SUBDIRECTORIES
104_USERGROUP=sapsys
104_USERNAME=@LOWER_SAPSYSTEMNAME@adm
105_CHANGE_ON_NFS=NO
105_PATH=@SAPMOUNTPROFILE@
105_PERMISSION=0755
105_TRAVERSE=FILES
105_USERGROUP=sapsys
105_USERNAME=@LOWER_SAPSYSTEMNAME@adm
106_CHANGE_ON_NFS=NO
106_PATH=@SAPMOUNTEXE@/saposcol
106_PERMISSION=04755
106_TRAVERSE=
106_USERGROUP=sapsys
106_USERNAME=root
112_CHANGE_ON_NFS=NO
112_PATH=@SAPDIR@/@SAPSYSTEMNAME@
112_PERMISSION=0751
112_TRAVERSE=SUBDIRECTORIES
112_USERGROUP=sapsys
112_USERNAME=@LOWER_SAPSYSTEMNAME@adm
113_CHANGE_ON_NFS=NO
113_PATH=@SAPDIR@/@SAPSYSTEMNAME@
113_PERMISSION=0751
113_TRAVERSE=FILES
113_USERGROUP=sapsys
113_USERNAME=@LOWER_SAPSYSTEMNAME@adm
114_CHANGE_ON_NFS=NO
114_PATH=@SAPDIR@/@SAPSYSTEMNAME@/SYS
114_PERMISSION=0755
114_TRAVERSE=SUBDIRECTORIES
114_USERGROUP=sapsys
114_USERNAME=@LOWER_SAPSYSTEMNAME@adm
115_CHANGE_ON_NFS=NO
115_PATH=@SAPDIR@/@SAPSYSTEMNAME@/SYS
115_PERMISSION=0755
115_TRAVERSE=FILES
115_USERGROUP=sapsys
115_USERNAME=@LOWER_SAPSYSTEMNAME@adm
116_CHANGE_ON_NFS=NO
116_PATH=@SAPDIR@/@SAPSYSTEMNAME@/@INSTANCENAME@
116_PERMISSION=0755
116_TRAVERSE=SUBDIRECTORIES
116_USERGROUP=sapsys
```

```
116_USERNAME=@LOWER_SAPSYSTEMNAME@adm
117_CHANGE_ON_NFS=NO
117_PATH=@SAPDIR@/@SAPSYSTEMNAME@/@INSTANCENAME@
117_PERMISSION=0755
117_TRAVERSE=FILES
117_USERGROUP=sapsys
117_USERNAME=@LOWER_SAPSYSTEMNAME@adm
118_CHANGE_ON_NFS=NO
118_PATH=@SAPDIR@/@SAPSYSTEMNAME@/@INSTANCENAME@/work
118_PERMISSION=0775
118_TRAVERSE=
118_USERGROUP=sapsys
118_USERNAME=@LOWER_SAPSYSTEMNAME@adm
120_CHANGE_ON_NFS=NO
120_PATH=@HOME@
120_PERMISSION=0700
120_TRAVERSE=
120_USERGROUP=sapsys
120_USERNAME=@LOWER_SAPSYSTEMNAME@adm
121_CHANGE_ON_NFS=NO
121_PATH=@HOME@
121_PERMISSION=0700
121_TRAVERSE=FILES
121_USERGROUP=sapsys
121_USERNAME=@LOWER_SAPSYSTEMNAME@adm
122_CHANGE_ON_NFS=NO
122_PATH=@TRANSDIR@/bin/TPPARAM.TPL
122_PERMISSION=0664
122_TRAVERSE=
122_USERGROUP=sapsys
122_USERNAME=@LOWER_SAPSYSTEMNAME@adm
130_CHANGE_ON_NFS=YES
130_PATH=@SAPMOUNTEXE@/sapwin
130_PERMISSION=0755
130_TRAVERSE=
130_USERGROUP=sapsys
130_USERNAME=@LOWER_SAPSYSTEMNAME@adm

[SIGNONKEY_IND_DB2]
CLASS=CDb2SignOnKey
TARGETDIR=@SAPMOUNTEXE@
USERGROUP=sapsys
USERNAME=@LOWER_SAPSYSTEMNAME@adm
CONFIRMATION=SIGNON
SIGNONAPPLICATION=icliserv
SIGNONUSERID=icliserv


[TESTJCLSSEXE_IND_DB2]
CLASS=CDb2JclSsExe
JOBNAME=iefbr14
EXEC=@CREATETESTJCLSS_IND_DB2=EXEC@
STEP_ENV=DB_ENV

[CREATEBINDGRANTJOBS_IND_DB2]
CLASS=CDb2BindPlans
ICLIRUN=ICLIRUN
PROFILEFILENAME=@SAPMOUNTPROFILE@@DELIM@@SAPSYSTEMNAME@_@INSTANCENAME@_ØHOST
NAMEØ
STEP_ENV=DB_ENV
CONFIRMATION=ICLIRUN

[EXITBINDGRNT_IND_DB2]
CLASS=CExitStep
```

```
[BINDJCLSSEXE_IND_DB2]
CLASS=CDb2JclSsExe
JOBNAME=FOMEBIND
MAXCONDCODE=0
EXEC=@CREATEBINDGRANTJOBS_IND_DB2=EXEC@
STEP_ENV=DB_ENV


[GRANTJCLSSEXE_IND_DB2]
CLASS=CDb2JclSsExe
JOBNAME=FOMEGRNT
MAXCONDCODE=4
STEP_ENV=DB_ENV
EXEC=@CREATEBINDGRANTJOBS_IND_DB2=EXEC@
```

Appendix C. Installation Dialog Questions and Responses

This appendix shows the questions asked by R3SETUP during installation and the values that we supplied in response.

C.1 AIX Central Instance Installation Dialog

This section shows the questions asked by and the responses supplied to R3SETUP during the AIX central instance installation.

```
STEP: CENTRALINSTANCE_IND_DB2 and KEY: SAPSYSTEMNAME
Please enter/confirm the SAP system name (three character string):
RED

STEP: CENTRALINSTANCE_IND_DB2 and KEY: SAPSYSNR
Please enter/confirm the SAP system number (two digits):
00

STEP: CENTRALINSTANCE_IND_DB2 and KEY: SAPMOUNTEXE
Please enter/confirm the SAPMOUNT/exe directory:
/sapmnt/RED/exe

STEP: CENTRALINSTANCE_IND_DB2 and KEY: SAPMOUNTGLOBAL
Please enter/confirm the SAPMOUNT/global directory:
/sapmnt/RED/global

STEP: CENTRALINSTANCE_IND_DB2 and KEY: SAPMOUNTPROFILE
Please enter/confirm the SAPMOUNT/profile directory:
/sapmnt/RED/profile

STEP: CENTRALINSTANCE_IND_DB2 and KEY: CIHOSTNAME
Please enter/confirm the hostname of the R/3 central instance host:
riscsap
```

> **Note**
>
> Always use short hostname for CIHOSTNAME.

```
STEP: CENTRALINSTANCE_IND_DB2 and KEY: DBHOSTNAME
The Enhanced ESCON/HPDT hostname of the database server of your R/3
system must be specified.
redsap

STEP: DBCOMMONPARAMETERS_IND_DB2 and KEY: DBATTACHNAME
This KEY specifies the database attach name that is used by the ICLI
server to attach to the DB2 subsystem. For more information about
DBATTACHNAME, see the IBM documentation SAP R/3 on DB2 for OS/390: Planning
Guide.
DB2R
```

> **Note**
>
> Use uppercase for DBATTACHNAME so that JCL will be created
> correctly.

```
STEP: DBCOMMONPARAMETERS_IND_DB2 and KEY: VCAT
This KEY specifies the volume catalog identification.
DB2V510U
```

> ┌─ **Note** ──┐
> │ Use uppercase for VCAT so that JCL will be created correctly.   │
> └───┘

STEP: DBCOMMONPARAMETERS_IND_DB2 and KEY: HIGHLEVELQUALIFIER
This KEY specifies the high level qualifier of the data sets
<HLQ>.SFOMDATA and <HLQ>.SAMPLIB where the ICLI software is provided
on OS/390.
SYS1

> ┌─ **Note** ──┐
> │ Use uppercase for HIGHLEVELQUALIFIER so that JCL will be created   │
> │ correctly.   │
> └───┘

STEP: DBCOMMONPARAMETERS_IND_DB2 and KEY: HOSTTCP
This KEY specifies the TCP host name of the database server host that is
used for FTP service.
wtsc42oe

> ┌─ **Note** ──┐
> │ Either the TSO or MVS stack hostname can be used for HOSTTCP.   │
> └───┘

STEP: DBCOMMONPARAMETERS_IND_DB2 and KEY: LOADLIB
This KEY specifies the data set name of the load library for the DB2
subsystem.
DB2V510.SDSNLOAD

> ┌─ **Note** ──┐
> │ Use uppercase for LOADLIB so that JCL will be created correctly.   │
> └───┘

STEP: DBCOMMONPARAMETERS_IND_DB2 and KEY: DSNTIADLIB
This KEY specifies the data set containing the source for the DB2 utility
DSNTIAD.
DB2V510U.RUNLIB.LOAD

> ┌─ **Note** ──┐
> │ Use uppercase for DSNTIADLIB so that JCL will be created correctly.   │
> └───┘

STEP: R3MESSAGEPORT_IND_IND and KEY: PORT
Please enter/confirm the port number for the message server:
3600

STEP: ICLICONNECTIONPORT_IND_DB2 and KEY: PORT
A service entry for the connection between ICLI client and server must be
created. Please specify a port number.
Be sure that this number is not occupied by another service and that the
Icli Server is started using this port.
5531

STEP: ICLIKEEPALIVEPORT_IND_DB2 and KEY: PORT
A service entry for the ICLI Keep Alive process must be created. Please
specify a port number.
Be sure that this number is not occupied by another service.
5532

STEP: OSGROUPSAPSYS_IND_IND and KEY: GROUPID
Please enter/confirm the group id (GID) for the group 'sapsys':
500

STEP: OSUSERSIDADM_IND_IND and KEY: USERID
Please enter/confirm the user id (UID) for the user '<sid>adm':
500

STEP: PREPAREJCLSS_IND_DB2 and KEY: MSGCLASS
This KEY specifies the JES HOLD output class, that is, a class which
refers to the hold queue. (In JES3, the output class must refer to a hold
queue reserved for external writers. This is the class that says
HOLD=EXTWTR in the JES3 installation stream.)
X

STEP: PREPAREJCLSS_IND_DB2 and KEY: JCLSSUSERNAME
This KEY specifies the user that initiates all JCL jobs. This user needs
to be SYSADM or must have the rights specified in the IBM documentation
SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B.
sapres3

This KEY specifies the password of the FTP user. It can be set with the
R3SETUP GUI but also in STEPs of this class. If the GUI sets the
password. In general, you should not specify the password in the command
file because this is insecure.
Enter password:
******
Verify password:
******

STEP: R3INSTANCEPROFILE_IND_DB2 and KEY: FAILOVER
This KEY indicates whether SYSPLEX Failover Support will be installed
(YES) or not (NO).
NO

STEP: R3INSTANCEPROFILE_IND_DB2 and KEY: R2_CONNECTION
Please enter YES if you want to use the SAP Gateway as CUA Interface for
R/2 connections. Otherwise confirm NO:
NO

STEP: SIGNONKEY_IND_DB2 and KEY: SIGNON
This KEY indicates whether PassTicket Signon will be enabled (YES) or not
(NO).
YES

STEP: SIGNONKEY_IND_DB2 and KEY: SIGNONAPPLICATION
This KEY specifies the application name, with a maximum length of 8
iclired

The SIGNONKEY KEY specifies a password. It is the RACF secured signon key
and must have 16 hexadecimal characters.
Enter password:
****
Verify password:
****

STEP: SIGNONKEY_IND_DB2 and KEY: SIGNONUSERID
The KEY specifies the user ID for the PassTicket Signon function, with a
maximum length of 8 characters.
iclirun

STEP: CREATEBINDGRANTJOBS_IND_DB2 and KEY: ICLIRUN
This KEY specifies the ICLIRUN user who runs the ICLI server on OS/390.
ICLIRUN

```
┌─── Note ──────────────────────────────────────────────────────┐
│                                                                │
│  Use uppercase for ICLIRUN so that JCL will be created         │
│  correctly.                                                    │
│                                                                │
└────────────────────────────────────────────────────────────────┘
```

STEP: SAPOS390COL_IND_DB2 and KEY: INSTALL
This KEY specifies whether saposcol and rfcoscol for OS/390 will be
installed.
YES

STEP: SAPOS390COL_IND_DB2 and KEY: DEST
This KEY specifies the program_ID, that is, the name of the parameter set
specifying the RFC connection used by rfcoscol. It is used to specify the
TCP/IP connection in R/3. Later on, rfcoscol is started with
rfcoscol -D<Program_ID>.
SAP

STEP: SAPOS390COL_IND_DB2 and KEY: GWHOST
This KEY specifies the host where the R/3 gateway is running.
riscsap

STEP: SAPOS390COL_IND_DB2 and KEY: GWSERV
This KEY specifies the port or port name for the gateway service on the
database server used by rfcoscol. The port name on the host must be
identical with the port name that is used by the R/3 gateway.
sapgw00

STEP: SAPOS390COL_IND_DB2 and KEY: HFSINSTDIR
This KEY specifies the installation directory on OpenEdition, recommended
size: at least 15 MB.
The user must create this directory. It is a temporay directory for the
installation and it can be dropped after the installation.
The JCL submission service user needs read and write authorization for
this directory.
/tmp/install

> ─── **Note** ───
>
> You may have to create this manually in OpenEdition, otherwise
> R3SETUP may fail at this point.
> If possible, open another window and check/create the directory.

STEP: SAPOS390COL_IND_DB2 and KEY: TMPDATASET
This KEY specifies the name of a temporary data set that R3SETUP creates
on OS/390. This data set is only for the installation and it can be
dropped after the installation.
SAPRES3.TEMP

STEP: SAPOS390COL_IND_DB2 and KEY: TPHOST
This KEY specifies the tcp host name of the OS/390 host where rfcoscol is
running. Make sure that this is the tcp host name by which the client
knows the host.
wtsc42oe

STEP: SAPOS390COL_IND_DB2 and KEY: TPNAME
This KEY specifies the directory where rfcoscol and saposcol will be
installed, recommended size: at least 15 MB.
The JCL submission service user needs read and write authorization for
this directory.
/usr/sbin

STEP: EXITJCLJOBCARD_IND_DB2 and KEY: EXIT
YES: exit R3SETUP
NO: continue R3SETUP
NO

STEP: EXITBINDGRNT_IND_DB2 and KEY: EXIT
YES: exit R3SETUP
NO: continue R3SETUP
YES

> ─── **Note** ───
>
> This is a good time to exit and edit the FOMEBIND.jcl and
> FOMEGRNT.jcl jobs to ensure success.

C.2 Windows NT R3SETUP Tool Installation Dialog (R3SETUP.BAT)

This section shows the questions asked by and the responses supplied to
R3SETUP during the running of R3SETUP.BAT. The program copies the files
required to run R3SETUP from the installation CD to the Windows NT Server.

To begin the process, we mounted the kernel CD and then executed the
R3SETUP.BAT found in the directory /NT/COMMON.

```
STEP: CDINSTCOPYFROMCD_NT_DB2 and KEY: SAPSYSTEMNAME
Please enter/confirm the SAP system name (three character string):
RED

STEP: CDINSTCOPYFROMCD_NT_DB2 and KEY: SAPNTDOMAIN
Please specify the name of the Windows NT Domain in which the R/3
users and groups should be created.
For a local installation you have to specify \\<COMPUTERNAME> as the
domain name:
KEVIN_KANG

STEP: CDINSTCOPYFROMCD_NT_DB2 and KEY: INSTALLPATH
Enter the path to the installation directory that the r3setup files
are to be copied to:
C:\Users\redadm\Install

OSUSERSIDADMPASSWD_NT_DB2
No documentation available for STEP OSUSERSIDADMPASSWD_NT_DB2
Enter password:
*****
Verify password:
*****

STEP: CDINSTLOGOFF_NT_INT and KEY: EXIT
To complete the installation, you have to logoff and logon again(as
same user).
Do you want to logoff now?(Enter YES or NO)
YES
```

C.3 Windows NT Central Instance Installation Dialog

This section shows the questions asked by and the responses supplied to
R3SETUP during the Windows NT central instance installation.

To begin the process, we simply went to the Start menu, then Programs,
selected **SAPR3**, and chose **SAP R3 setup - Central Instance**.

STEP: CENTRALINSTANCE_NT_DB2 and KEY: SAPSYSTEMNAME
Please enter/confirm the SAP system name (three character string):
RED

STEP: CENTRALINSTANCE_NT_DB2 and KEY: SAPSYSNR
Please enter/confirm SAP system number(two digits):
00

STEP: CENTRALINSTANCE_NT_DB2 and KEY: SAPLOC
Please specify the root for the SAP directory tree(type C: for
C:\usr\sap):
C:

STEP: CENTRALINSTANCE_NT_DB2 and KEY: SAPNTDOMAIN
Please specify the name of the Windows NT Domain in which the R/3
users and groups should be created.
For a local installation you have to specify \\<COMPUTERNAME> as the
domain name:
KEVIN_KANG

STEP: CENTRALINSTANCE_NT_DB2 and KEY: SAPTRANSHOST
Please specify the names of the central transport host for your R/3
systems:
pcntsap1

STEP: CENTRALINSTANCE_NT_DB2 and KEY: DBHOSTNAME
The Enhanced ESCON/HPDT hostname of the database server of your R/3
system must be specified.
redsap

STEP: DBCOMMONPARAMETERS_IND_DB2 and KEY: DBATTACHNAME
This KEY specifies the database attach name that is used by the ICLI
server to attach to the DB2 subsystem. For more information about
DBATTACHNAME, see the IBM documentation SAP R/3 on DB2 for OS/390: Planning
Guide SAP R/3 Release 4.0B.
DB2R

```
┌─ Note ──────────────────────────────────────────────────────────────────┐
│                                                                          │
│  Use uppercase for DBATTACHNAME so that JCL will be created correctly.    │
│                                                                          │
└──────────────────────────────────────────────────────────────────────────┘
```

STEP: DBCOMMONPARAMETERS_IND_DB2 and KEY: VCAT
This KEY specifies the volume catalog identification.
DB2V510U

```
┌─ Note ──────────────────────────────────────────────────────────────────┐
│                                                                          │
│  Use uppercase for VCAT so that JCL will be created correctly.            │
│                                                                          │
└──────────────────────────────────────────────────────────────────────────┘
```

STEP: DBCOMMONPARAMETERS_IND_DB2 and KEY: HIGHLEVELQUALIFIER
This KEY specifies the high level qualifier of the data sets
<HLQ>.SFOMDATA and <HLQ>.SAMPLIB where the ICLI software is provided
on OS/390.
SYS1

```
┌─ Note ──────────────────────────────────────────────────────────────────┐
│                                                                          │
│  Use uppercase for HIGHLEVELQUALIFIER so that JCL will be created         │
│  correctly.                                                              │
│                                                                          │
└──────────────────────────────────────────────────────────────────────────┘
```

STEP: DBCOMMONPARAMETERS_IND_DB2 and KEY: HOSTTCP
This KEY specifies the TCP host name of the database server host that is
used for FTP service.
wtsc42oe

> **── Note ───**
>
> Either the TSO or MVS stack hostname can be used for HOSTTCP.

STEP: DBCOMMONPARAMETERS_IND_DB2 and KEY: LOADLIB
This KEY specifies the data set name of the load library for the DB2
subsystem.
DB2V510.SDSNLOAD

> **── Note ───**
>
> Use uppercase for LOADLIB so that JCL will be created correctly.

STEP: DBCOMMONPARAMETERS_IND_DB2 and KEY: DSNTIADLIB
This KEY specifies the data set containing the source for the DB2 utility
DSNTIAD.
DB2V510U.RUNLIB.LOAD

> **── Note ───**
>
> Use uppercase for DSNTIADLIB so that JCL will be created correctly.

STEP: R3MESSAGEPORT_IND_IND and KEY: PORT
Please enter/confirm the port number for the message server:
3600

STEP: ICLICONNECTIONPORT_IND_DB2 and KEY: PORT
A service entry for the connection between ICLI client and server must be
created. Please specify a port number.
Be sure that this number is not occupied by another service and that the
Icli Server is started using this port.
5531

STEP: ICLIKEEPALIVEPORT_IND_DB2 and KEY: PORT
A service entry for the ICLI Keep Alive process must be created. Please
specify a port number.
Be sure that this number is not occupied by another service.
5532

OSUSERSIDADMPASSWD_NT_DB2
No documentation available for STEP OSUSERSIDADMPASSWD_NT_DB2
Enter password:
*****
Verify password:
*****

The SAP service account user SAPService<SAPSID> is a virtual
user. The SAP System will be started with this account. No
one should log on the system with this account.
In this step the password for the SAP service account is set.
Enter password:
******
Verify password:
******

This step checks whether the R/3 Kernel CD is mounted at the
specified CD mount path by searching for the term KERNEL in
the file label.asc or label.ebc.
STEP: R3KERNELCD_NT_IND and KEY: CDMOUNTPATH
Please enter/confirm the path to your R/3 Kernel CD (f.i. Z: if this
is your CD_ROM drive):
F:\kernel

Please enter YES if you want to use the SAP Gateway as CUA Interface for
R/2 connections. Otherwise confirm NO:
NO

STEP: R3INSTANCEPROFILE_NT_DB2 and KEY: RAM_R3INSTANCE
Specify the amount of memory (in MB) that you want to use for your
R/3 instance (0 means autodetect):
0

STEP: PREPAREJCLSS_IND_DB2 and KEY: MSGCLASS
This KEY specifies the JES HOLD output class, that is, a class which
refers to the hold queue. (In JES3, the output class must refer to a hold
queue reserved for external writers. This is the class that says
HOLD=EXTWTR in the JES3 installation stream.)
X

STEP: PREPAREJCLSS_IND_DB2 and KEY: JCLSSUSERNAME
This KEY specifies the user that initiates all JCL jobs. This user needs
to be SYSADM or must have the rights specified in the IBM documentation
SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B.
sapres3

This KEY specifies the password of the FTP user. It can be set with the
R3SETUP GUI but also in STEPs of this class. If the GUI sets the
password. In general, you should not specify the password in the command
file because this is insecure.
Enter password:
******
Verify password:
******

STEP: SIGNONKEY_IND_DB2 and KEY: SIGNON
This KEY indicates whether PassTicket Signon will be enabled (YES) or not
(NO).
YES

STEP: SIGNONKEY_IND_DB2 and KEY: SIGNONAPPLICATION
This KEY specifies the application name, with a maximum length of 8
iclired

The SIGNONKEY KEY specifies a password. It is the RACF secured signon key
and must have 16 hexadecimal characters.
Enter password:
****
Verify password:
****

STEP: SIGNONKEY_IND_DB2 and KEY: SIGNONUSERID
The KEY specifies the user ID for the PassTicket Signon function, with a
maximum length of 8 characters.
iclirun

STEP: CREATEBINDGRANTJOBS_IND_DB2 and KEY: ICLIRUN
This KEY specifies the ICLIRUN user who runs the ICLI server on OS/390.
ICLIRUN

> **Note**
>
> Use uppercase for ICLIRUN so that JCL will be created
> correctly.

STEP: SAPOS390COL_IND_DB2 and KEY: INSTALL
This KEY specifies whether saposcol and rfcoscol for OS/390 will be
installed.
NO

```
STEP: EXITJCLJOBCARD_IND_DB2 and KEY: EXIT
YES: exit R3SETUP
NO: continue R3SETUP
NO

STEP: EXITBINDGRNT_IND_DB2 and KEY: EXIT
YES: exit R3SETUP
NO: continue R3SETUP
NO

STEP: CDINSTLOGOFF_NT_IND and KEY: EXIT
To complete the installation, you have to logoff and logon again(As
same user).
Do you want to logoff now? (Enter YES or NO)
YES
```

C.4 Windows NT Database Build and Load Dialog

This section shows the questions asked by and the responses supplied to
R3SETUP during the Windows NT database build and load.

To begin the process, we simply went to the Start menu, then Programs,
selected **SAPR3**, and chose **SAP R3 setup - Database Instance**.

```
STEP: DATABASEINSTANCE_NT_DB2 and KEY: SAPSYSTEMNAME
Please enter/confirm the SAP system name (three character string):
RED

STEP: DATABASEINSTANCE_NT_DB2 and KEY: SAPSYSNR
Please enter/confirm the SAP system number (two digits):
00

STEP: DATABASEINSTANCE_NT_DB2 and KEY: SAPLOC
Please specify the root for the SAP directory tree(type C: for
C:\usr\sap):
C:

STEP: DATABASEINSTANCE_NT_DB2 and KEY: SAPNTDOMAIN
Please specify the name of the Windows NT Domain in which the R/3
users and groups should be created.
For a local installation you have to specify \\<COMPUTERNAME> as the
domain name:
KEVIN_KANG

STEP: DATABASEINSTANCE_NT_DB2 and KEY: SAPTRANSHOST
Please specify the names of the central transport host for your R/3
systems:
pcntsap1

STEP: DATABASEINSTANCE_NT_DB2 and KEY: CIHOSTNAME
Pleast enter/confirm the hostname of the R/3 central instance.
pcntsap1
```

Note

  Always use short hostname for CIHOSTNAME.

STEP: DATABASEINSTANCE_NT_DB2 and KEY: DBHOSTNAME
The Enhanced ESCON/HPDT hostname of the database server of your R/3
system must be specified.
redsap

STEP: DBCOMMONPARAMETERS_NT_DB2 and KEY: DBATTACHNAME
This KEY specifies the database attach name that is used by the ICLI
server to attach to the DB2 subsystem. For more information about
DBATTACHNAME, see the IBM documentation SAP R/3 on DB2 for OS/390: Planning
Guide SAP R/3 Release 4.0B.
DB2R

> **Note**
>
> Use uppercase for DBATTACHNAME so that JCL will be created
> correctly.

STEP: DBCOMMONPARAMETERS_NT_DB2 and KEY: VCAT
This KEY specifies the volume catalog identification.
DB2V510U

> **Note**
>
> Use uppercase for VCAT so that JCL will be created
> correctly.

STEP: DBCOMMONPARAMETERS_NT_DB2 and KEY: HIGHLEVELQUALIFIER
This KEY specifies the high level qualifier of the data sets
<HLQ>.SFOMDATA and <HLQ>.SAMPLIB where the ICLI software is provided
on OS/390.
SYS1

> **Note**
>
> Use uppercase for HIGHLEVELQUALIFIER so that JCL will be created
> correctly.

STEP: DBCOMMONPARAMETERS_NT_DB2 and KEY: HOSTTCP
This KEY specifies the TCP host name of the database server host that is
used for FTP service.
wtsc42

> **Note**
>
> Either the TSO or MVS stack hostname can be used for HOSTTCP.

STEP: DBCOMMONPARAMETERS_NT_DB2 and KEY: LOADLIB
This KEY specifies the data set name of the load library for the DB2
subsystem.
DB2V510.SDSNLOAD

> **Note**
>
> Use uppercase for LOADLIB so that JCL will be created
> correctly.

STEP: DBCOMMONPARAMETERS_NT_DB2 and KEY: SAPREORG
AIX only: This key specifies the directory where the first export
CD has to be copied to. The directory <SAPREORG>/CD1_DIR
must have at least 700MB free space.
dummy

```
┌─ Note ─────────────────────────────────────────────────────────┐
│                                                                 │
│  The R/3 Installation on Windows NT: DB2 for OS/390 describes the │
│  method for bypassing the copying of DB EXPORT 1 to local       │
│  hard disk on page 6-4.  We followed the procedure and          │
│  still received the prompt for SAPREORG.  So, we simply         │
│  entered 'dummy' here.                                          │
│                                                                 │
└─────────────────────────────────────────────────────────────────┘
```

STEP: PREPAREJCLSS_IND_DB2 and KEY: MSGCLASS
This KEY specifies the JES HOLD output class, that is, a class which
refers to the hold queue. (In JES3, the output class must refer to a hold
queue reserved for external writers. This is the class that says
HOLD=EXTWTR in the JES3 installation stream.)
X

STEP: PREPAREJCLSS_IND_DB2 and KEY: JCLSSUSERNAME
This KEY specifies the user that initiates all JCL jobs. This user needs
to be SYSADM or must have the rights specified in the IBM documentation
SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B.
SAPRES3

This KEY specifies the password of the FTP user. It can be set with the
R3SETUP GUI but also in STEPs of this class. If the GUI sets the
password. In general, you should not specify the password in the command
file because this is insecure.
Enter password:
******
Verify password:
******

STEP: CDSERVER_NT_DB2 and KEY: 1_LOCATION
Please insert the EXPORT CD 1. When the CD is accessible,
enter the CD path.
F:\dbexport1

STEP: CDSERVER_NT_DB2 and KEY: 2_LOCATION
Please insert the EXPORT CD 2. When the CD is accessible,
enter the CD path.
F:\dbexport2

STEP: CDSERVER_NT_DB2 and KEY: 3_LOCATION
Please insert the REPORT LOAD CD. When the CD is accessible,
enter the CD path.
F:\load

STEP: DBLAYOUT_IND_DB2 and KEY: SMS
This key specifies whether SMS is used. The default is YES. If
YES is set, SMS is used, that is the volumes.pfl file is not used.
NO

STEP: REPORTLOADS_IND_DB2 and KEY: REPORT_NAMES
Please enter/confirm the platforms for the report loads to be imported.
Use semicolons(;) to separate entries.
Enter NONE to skip the import of the report loads.
Valid platforms are: AIX DEC HPUX NT RELIANT SOLARIS
NONE

STEP: REPORTLOADS_IND_DB2 and KEY: GROUPNAMES
ooo
NONE

STEP: REPORTLOADS_IND_DB2 and KEY: USERNAME
ooo
NONE

```
STEP: EXITJCLJOBCARD and KEY: EXIT
YES: exit R3SETUP
NO: continue R3SETUP
NO

STEP: EXITBUILD_IND_DB2 and KEY: EXIT
YES: exit R3SETUP
NO: continue R3SETUP
```

> **Note**
>
> The database build phase is started at this point.
> It will last for approximately 20 minutes.

> **Note**
>
> The database load phase is started following the build.
> It will last for approximately 10 hours.
> Approximately 31300 datasets will be created.

```
STEP: REPORTLOADS_IND_DB2 and KEY: GROUPNAMES
ooo
NONE

STEP: REPORTLOADS_IND_DB2 and KEY: USERNAME
ooo
NONE

STEP: REPORTLOADS_IND_DB2 and KEY: GROUPNAMES
ooo
NONE

STEP: REPORTLOADS_IND_DB2 and KEY: USERNAME
ooo
NONE
```

> **Note**
>
> We continued to get prompted for GROUPNAMES and USERNAME,
> although we entered NONE for the REPORT_NAMES key.

> **Note**
>
> R3SETUP will skip the Report Loads phase and continue with:
>
> 1. Creating the SAP license and license table
>
> 2. Altering of tablespaces to LOCKSIZE ROW
>
> 3. Creating indexes on catalog tables
>
> 4. Creating REORG and RUNSTATS JCL
>
> 5. Submitting 5 RUNSTATS jobs in paralell

Appendix D. AIX Listings and SAP R/3 Profiles

This appendix shows listings of critical files on the RS/6000 or RS/6000 SP2 node
that served as the SAP R/3 Central Instance, Application Server, and Message
Server during our testing.

D.1 AIX /etc/hosts File

```
# Internet Address    Hostname              # Comments
127.0.0.1             loopback localhost    # loopback (lo0) name/add
10.1.1.80             riscfddi              # UDP for Central Instance
9.12.0.120            riscsap.itso.ibm.com  # TCP/IP for Central Instance
10.1.1.81             redsap                # UDP for DB server
```

D.2 AIX /etc/services File

Several entries are made to the AIX /etc/services file during the standard SAP
R/3 install. These are the ports used by workstations to talk to SAP R/3. Two
extra entries was required to define the ports used for connection to the ICLI
server. Following are the entries in the /etc/services file:

```
sapdp00               3200/tcp
sapgw00               3300/tcp
sapmsRED              3600/tcp
sapdp00s              4700/tcp
sapgw00s              4800/tcp
sapdb2RED             5531/udp
iclikaRED             5532/udp
```

D.3 SAP R/3 Central Instance DEFAULT.PFL Profile

```
#.********************************************************************
#.*
#.*      Default profile DEFAULT
#.*
#.*      Version                  = 000004
#.*      Generated by user = SAP*
#.*      Generated on = 17.07.1998 , 17:08:12
#.*
#.********************************************************************
SAPSYSTEMNAME = RED
SAPDBHOST = redsap
rdisp/mshost = riscsap
rdisp/sna_gateway = riscsap
rdisp/sna_gw_service = sapgw00
rdisp/vbname = riscsap_RED_00
rdisp/enqname = riscsap_RED_00
rdisp/btcname = riscsap_RED_00
rslg/send_daemon/listen_port = 3700
rslg/collect_daemon/listen_port = 3900
rslg/collect_daemon/talk_port = 4000
rdisp/bufrefmode = sendoff,exeauto
```

D.4 SAP R/3 Central Instance START_DVEBMGS00_RISCSAP Profile

```
#.**********************************************************************
#.*
#.*        Start profile START_DVEBMGS00_RISCSAP
#.*
#.*        Version                   = 000003
#.*        Generated by user = SAP*
#.*        Generated on = 17.07.1998 , 17:08:12
#.*
#.**********************************************************************
#-----------------------------------------------------------------------
SAPSYSTEMNAME = RED
INSTANCE_NAME = DVEBMGS00


#-----------------------------------------------------------------------
# SCSA-Verwaltung starten
#-----------------------------------------------------------------------

Execute_00 = local $(DIR_EXECUTABLE)/sapmscsa -n pf=$(DIR_PROFILE)/RED_DV
_riscsap


#-----------------------------------------------------------------------
# start message server
#-----------------------------------------------------------------------

_MS = ms.sapRED_DVEBMGS00
Execute_01 = local ln -s -f $(DIR_EXECUTABLE)/msg_server $(_MS)
Start_Program_01 = local $(_MS) pf=$(DIR_PROFILE)/RED_DVEBMGS00_riscsap


#-----------------------------------------------------------------------
# start application server
#-----------------------------------------------------------------------

_DW = dw.sapRED_DVEBMGS00
Execute_02 = local ln -s -f $(DIR_EXECUTABLE)/disp+work $(_DW)
Start_Program_02 = local $(_DW) pf=$(DIR_PROFILE)/RED_DVEBMGS00_riscsap


#-----------------------------------------------------------------------
# start syslog collector daemon
#-----------------------------------------------------------------------

_CO = co.sapRED_DVEBMGS00
Execute_03 = local ln -s -f $(DIR_EXECUTABLE)/rslgcoll $(_CO)
Start_Program_03 = local $(_CO) -F pf=$(DIR_PROFILE)/RED_DVEBMGS00_riscsa


#-----------------------------------------------------------------------
# start syslog send daemon
#-----------------------------------------------------------------------

_SE = se.sapRED_DVEBMGS00
Execute_04 = local ln -s -f $(DIR_EXECUTABLE)/rslgsend $(_SE)
Start_Program_04 = local $(_SE) -F pf=$(DIR_PROFILE)/RED_DVEBMGS00_riscsa


#-----------------------------------------------------------------------
```

D.5 SAP R/3 Central Instance RED_DVEBMGS00_RISCSAP Profile

```
#.***********************************************************************
#.*
#.*        Instance profile RED_DVEBMGS00_RISCSAP
#.*
#.*        Version               = 000009
#.*        Generated by user = SAP*
#.*        Generated on = 17.07.1998 , 17:08:57
#.*
#.***********************************************************************
# Undocumented paramater for SAP->PSF for AIX(sap2afp)->PSF/MVS->JES2 AFP
#parameter created                          by: SAP*        17.07.1998 1
rspo/host_spool/custom_print = /usr/local/afp/sap2afp -d &S -f &F
# Undocumented parameter for SAP->PSF for AIX(sap2afp)->PSF/MVS->JES AFP
#parameter created                          by: SAP*        17.07.1998 1
rspo/host_spool/custom_query = /usr/local/afp/sap2afp -d &S -q
# Instance Profile
#
SAPSYSTEMNAME = RED
INSTANCE_NAME = DVEBMGS00
SAPSYSTEM = 00
rdisp/wp_no_dia = 3
rdisp/wp_no_vb = 1
rdisp/wp_no_vb2 = 0
rdisp/wp_no_enq = 1
rdisp/wp_no_btc = 1
rdisp/wp_no_spo = 1
ztta/roll_area = 6500000
ztta/roll_first = 1000000
em/initial_size_MB = 64
abap/heaplimit = 20000000
abap/heap_area_total = 300000000
rdisp/ROLL_MAXFS = 16384
rdisp/ROLL_SHM = 0
rdisp/PG_MAXFS = 16384
rdisp/PG_SHM = 0
em/stat_log_size_MB = 20
em/stat_log_timeout = 600
rsdb/icli_library = /usr/sap/RED/SYS/exe/run/ibmiclic.o
rsdb/dbsl_library = /usr/sap/RED/SYS/exe/run/sldb2lib.o
rsdb/db2jcl_library = /usr/sap/RED/SYS/exe/run/db2jcllib.o
rsdb/max_blocking_factor = 10
rsdb/max_blocking_factor = 10
rsdb/max_in_blocking_factor = 60
rsdb/min_blocking_factor = 3
rsdb/min_in_blocking_factor = 6
rsdb/prefer_fix_blocking = 1
rsdb/prefer_union_all = 1
rsdb/prefer_in_itab_opt = 1
abap/no_dsql95 = "DB2"
dbs/db2/ssid = DB2R
dbs/db2/hosttcp = wtsc42.itso.ibm.com
rsdb/reco_ping_cmd =
rsdb/reco_sleep_time = 1
rsdb/reco_symmetric = "ON"
rsdb/reco_sync_all_server = "OFF"
rsdb/reco_trials = 1
rsdb/reco_tcp_service =
```

```
#-------------------------------------------------------------------------
#Values proposed by SAP for shared memory pool sizes
#-------------------------------------------------------------------------
#parameter created                              by: SAP*       17.07.1998 1
ipc/shm_psize_01 = -10
#parameter created                              by: SAP*       17.07.1998 1
ipc/shm_psize_02 = -40
#parameter created                              by: SAP*       17.07.1998 1
ipc/shm_psize_03 = -10
#parameter created                              by: SAP*       17.07.1998 1
ipc/shm_psize_04 = -10
#parameter created                              by: SAP*       17.07.1998 1
ipc/shm_psize_06 = -40
#parameter created                              by: SAP*       17.07.1998 1
ipc/shm_psize_07 = -10
#parameter created                              by: SAP*       17.07.1998 1
ipc/shm_psize_10 = 52000000
#parameter created                              by: SAP*       17.07.1998 1
ipc/shm_psize_31 = -10
#parameter created                              by: SAP*       17.07.1998 1
ipc/shm_psize_33 = -10
#parameter created                              by: SAP*       17.07.1998 1
ipc/shm_psize_34 = -10
#parameter created                              by: SAP*       17.07.1998 1
ipc/shm_psize_40 = 92000000
#parameter created                              by: SAP*       17.07.1998 1
ipc/shm_psize_51 = -10
#parameter created                              by: SAP*       17.07.1998 1
ipc/shm_psize_52 = -10
#parameter created                              by: SAP*       17.07.1998 1
ipc/shm_psize_54 = -10
#parameter created                              by: SAP*       17.07.1998 1
ipc/shm_psize_55 = -10
```

D.6 Volume Groups for RS/6000

```
********************************************************************
rootvg:

LV NAME            TYPE      LPs   PPs   PVs  LV STATE      MOUNT POINT
hd6                paging    141   141   1    open/syncd    N/A
paging00           paging    133   133   1    open/syncd    N/A
hd5                boot      1     1     1    closed/syncd  N/A
hd8                jfslog    1     1     1    open/syncd    N/A
hd4                jfs       3     3     1    open/syncd    /
hd2                jfs       79    79    1    open/syncd    /usr
hd9var             jfs       11    11    1    open/syncd    /var
hd3                jfs       6     6     1    open/syncd    /tmp
hd1                jfs       1     1     1    open/syncd    /home
lv00               jfs       6     6     1    open/syncd    N/A
lvTIV1             jfs       31    31    1    open/syncd    /usr/local/Tivoli
lvTIV2             jfs       8     8     1    open/syncd    /var/spool/Tivoli


********************************************************************
sapREDvg:
LV NAME            TYPE      LPs   PPs   PVs  LV STATE      MOUNT POINT
```

```
lvred01            jfs       125   125  1     open/syncd   /sapmnt/RED
lvred02            jfs       25    25   1     open/syncd   /usr/sap/trans
lvred03            jfs       87    87   1     open/syncd   /usr/sap/RED
loglv01            jfslog    1     1    1     open/syncd   N/A
**************************************************************
```

Appendix E. OS/390 Cataloged Procedures and Profiles Listings

This appendix lists the settings made in the OS/390 profiles and cataloged procedures.

E.1 OS/390 TCPIP.ETC.SERVICES File Changes

These are the additions made to the TCPIP.ETC.SERVICES file to set up the port numbers. Note that ICLI does not use TCP/IP. This entry is placed here for use by the ICLI server to resolve the port number. This allows easy modification of the port number without altering the started task. For example, this allows a network administrator to manage all the port numbers and their use in the system from one place including the ICLI and without invalidating other production routines.

```
#         SAP ICLI ports
sapdb2RED              5531/udp     # HPDT UDP ICLI port
iclikaRED              5532/udp     # HPDT UDP ICLI keep alive port
```

E.2 OS/390 TCPIP.PROFILE.TCPIP Profile File Changes

These are the additions made to the TCPIP.PROFILE.TCPIP profile to set up a TCP/IP connection to the RS/6000 using the ESCON adapter. Note that this defines the TCP connection for the R3INST job submission. CLAW allows TCP to share the ESCON with AF_UEINT sockets. No SQL or SQL results are transmitted via TCP/IP.

```
; -------------------------------------------------------------------
;
; Flush the ARP tables every 20 minutes.
;

ARPAGE 20


;
; You can specify DATASETPREFIX in the PROFILE.TCPIP and
; TCPIP.DATA data sets. If this statement is used in a profile or
; configuration data set that is allocated to a client or a server, then
; that client or server dynamically allocates additional required data
; sets using the value specified for DATASETPREFIX as the data set name
; prefix.  The DATASETPREFIX parameter can be up to 26 characters long,
; and the parameter must NOT end with a period.
;
; For more information please see "Understanding TCP/IP Data Set
; Names" in the Customization and Administration Guide.
;
DATASETPREFIX TCPIPOE
;
;
; -------------------------------------------------------------------
;
;   Telnet parms
; TELNETPARMS
;     PORT 623
;     WLMCLUSTERNAME TN3270E ENDWLMCLUSTERNAME
```

```
; ENDTELNETPARMS
;
;
; ------------------------------------------------------------------------
;
; Reserve low ports for servers
;
TCPCONFIG         RESTRICTLOWPORTS
UDPCONFIG         RESTRICTLOWPORTS
;
; ------------------------------------------------------------------------
; AUTOLOG the following servers
;
;
;
; ------------------------------------------------------------------------
; Reserve ports for the following servers.
;
; NOTES:
;
;     A port that is not reserved in this list can be used by any user.
;     If you have TCP/IP hosts in your network that reserve ports
;     in the range 1-1023 for privileged applications, you should
;     reserve them here to prevent users from using them.
;
;     The port values below are from RFC 1060, "Assigned Numbers."
;
PORT
     20 TCP OMVS              ; OE FTP Server
            DELAYACKS         ; Delay transmission acknowledgements
     21 TCP OMVS              ; OE FTPD control port
     23 TCP OMVS              ; OE Telnet Server
     80 TCP OMVS              ; OE Web Server
    111 UDP OMVS              ; OE Portmapper Server
    111 TCP OMVS              ; OE Portmapper Server
    443 TCP OMVS              ; OE Web Server SSL Port
    512 TCP OMVS              ; OE Remote Execution Server
    513 TCP OMVS              ; OE Rlogin Server
    514 TCP OMVS              ; OE Remote Shell Server
    514 UDP OMVS              ; OE SyslogD Server
    515 TCP OMVS              ;
   2000 TCP IOASRV             ; OSA/SF Server
;   623 TCP INTCLIEN          ; Telnet Server

;  1414 TCP CSQ1CHIN          ; MQ Channel Initiator

 PORTRANGE 10000 2000 TCP OMVS ; TCP 10000 - 11999
 PORTRANGE 10000 2000 UDP OMVS ; UDP 10000 - 11999
;
; ------------------------------------------------
;
; ------------------------------------------------
;
; Hardware definitions:
;
;
 DEVICE OSA2202    LCS          2202
 LINK   OSAL2202  IBMTR    1    OSA2202
;
```

```
     DEVICE OSA22C0    LCS           22C0
     LINK    OSAL22C0 FDDI    0    OSA22C0
;
; -----------------------------------------------------------------------
;
; HOME internet (IP) addresses of each link in the host.
;
; NOTE:
;
;    The IP addresses for the links of an Offload box are specified in
;    the LINK statements themselves, and should not be in the HOME list.
;
HOME
    9.12.2.11     OSAL2202
    10.1.1.200    OSAL22C0
;
; -----------------------------------------------------------------------
; The new PRIMARYINTERFACE statement is used to specify which interface
; is the primary interface.  This is required for specifying an Offload
; box as being the primary interface, since the Offload box's links
; cannot appear in the HOME statement.
;
; A link of any type, not just an Offload box, can be specified in the
; PRIMARYINTERFACE statement.  If PRIMARYINTERFACE is not specified,
; then the first link in the HOME statement is the primary interface,
; as usual.
;
; PRIMARYINTERFACE OFFLAN1
; -----------------------------------------------------------------------
;
; IP routing information for the host.  All static IP routes should
; be added here.
;
GATEWAY
;
; Direct Routes - Routes that are directly connected to my interfaces.
;
; Network First Hop Link Name Packet Size  Subnet Mask     Subnet Value
  9            =      OSAL2202    4096       0.255.255.0    0.12.2.0
  10           =      OSAL22C0    4050       0.255.255.0    0.1.1.0
;
; Indirect Routes - Routes that are reachable through routers on my
;                   network.
;
; Network  First Hop  Link Name Packet Size  Subnet Mask  Subnet Value
; 193.12.2 130.50.10.1   TR1       2000         0
; 10.5.6.4 193.5.2.10    ETH1      1500         HOST
;
;
; Default Route - All packets to an unknown destination are routed
;                 through this route.
;
; Network  First Hop  Link Name Packet Size  Subnet Mask  Subnet Value
  DEFAULTNET 9.12.2.75 OSAL2202  4096             0
;
; -----------------------------------------------------------------------
;
; RouteD Routing Information
; If you are using RouteD, uncomment all the lines below for
```

```
; 'BSDROUTINGPARMS', and in the GATEWAY statement, comment out
; the static routes to be dynamically added by RouteD.
;
; ;  Link     Maxmtu   Metric   Subnet Mask      Dest Addr
;BSDROUTINGPARMS false
;    OSAT2200  4096        0      255.255.255.0    0
;ENDBSDROUTINGPARMS
;
; --------------------------------------------------------------------------
; Use TRANSLATE to specify the hardware address of a specific IP
; address.  See the Customization and Administration Guide for more
; information.
;
; TRANSLATE
; --------------------------------------------------------------------------
; Turn off all tracing.  If tracing is to be used, change the following
; line.  To trace the configuration component, for example, change
; the line to ITRACE ON CONFIG 1

ITRACE OFF
;
; --------------------------------------------------------------------------
; The ASSORTEDPARMS NOFWD will prevent the forwarding of IP packets
; between different networks.  If NOFWD is not specified, IP packets
; will be forwarded between networks when this host is a gateway.
;
; Even though RESTRICTLOWPORTS was specified on TCPCONFIG and UDPCONFIG,
; ASSORTEDPARMS default would have been to reset RESTRICTLOWPORTS to off
; So it is respecified here.
; If the TCPCONFIG and UDPCONFIG followed ASSORTEDPARMS, RESTRICTLOWPORT
; would not have to be done twice.

ASSORTEDPARMS
; NOFWD
  RESTRICTLOWPORTS
ENDASSORTEDPARMS
; NOFWD            issues the informational message EZZ0334I
; RESTRICTLOWPORTS issues the informational message EZZ0338I
; --------------------------------------------------------------------------
; Control the IP layer
;
IPCONFIG NODATAGRAMFWD
;
; --------------------------------------------------------------------------
; Define the VTAM parameters required for the Telnet server.
;
; BEGINVTAM
;     ; Define logon mode tables to be the defaults shipped with the
;     ; latest level of VTAM
;   TELNETDEVICE 3278-3-E NSX32703 ; 32 line screen
;   TELNETDEVICE 3279-3-E NSX32703 ; 32 line screen
;   TELNETDEVICE 3278-4-E NSX32704 ; 48 line screen
;   TELNETDEVICE 3279-4-E NSX32704 ; 48 line screen
;   TELNETDEVICE 3278-5-E NSX32705 ; 132 column screen
;   TELNETDEVICE 3279-5-E NSX32705 ; 132 column screen
;     ; Define the LUs to be used for general users.
;   DEFAULTLUS
;       TCP67001 TCP67002 TCP67003 TCP67004 TCP67005
;       TCP67006 TCP67007 TCP67008 TCP67009 TCP67010
```

```
;          TCP67011 TCP67012 TCP67013 TCP67014 TCP67015
;          TCP67016 TCP67017 TCP67018 TCP67019 TCP67020
;          TCP67021 TCP67022 TCP67023 TCP67024 TCP67025
;          TCP67026 TCP67027 TCP67028 TCP67029 TCP67030
;    ENDDEFAULTLUS
; ; LUSESSIONPEND    ; On termination of a Telnet server connection,
; ;                    the user will revert to the DEFAULTAPPL
;    DEFAULTAPPL TSO  ;  Set the default application for all Telnet sessions.
;    LINEMODEAPPL TSO ; Send all line-mode terminals directly to TSO.
;    ALLOWAPPL TSO* DISCONNECTABLE ; Allow all users access to TSO applications
; ;        TSO is multiple applications all beginning with TSO, so use
; ;        the * to get them all.  If a session is closed, disconnect
; ;        the user rather than log off the user.
; ; RESTRICTAPPL IMS ; Only 3 users can use IMS.
; ;    USER USER1     ; Allow user1 access.
; ;      LU TCPIMS01  ; Assign USER1 LU TCPIMS01.
; ;    USER USER2     ; Allow user2 access from the default LU pool.
; ;    USER USER3     ; Allow user3 access from 3 Telnet sessions,
; ;                   ; each with a different reserved LU.
; ;      LU TCPIMS31 LU TCPIMS32 LU TCPIMS33
;    ALLOWAPPL *      ; Allow all applications that have not been
; ;                   ; previously specified to be accessed.
; ;    Map Telnet sessions from this node to display USSAPC screen.
; ;    USSTAB USSAPC 130.50.10.1
; ;
; ;    Map Telnet sessions from this link to display USSCBA screen.
; ;    USSTAB USSCBA SNA1
; ENDVTAM

; Start all the defined devices.
;
START OSA2202
START OSA22C0
```

E.3 OS/390 SYS1.PARMLIB(BPXPRMxx)

This is the OS/390 parameter file used for the OS/390 OpenEdition. The
parameters for your installation may vary.

```
/********************************************************************/
/*                                                                  */
/*    Specify the maximum number of processes that OpenEdition MVS   */
/*    will allow to be active concurrently.                          */
/*                                                                  */
/*    Notes:                                                         */
/*                                                                  */
/*    1. Minimum allowable value for OpenEdition MVS is 5.           */
/*    2. Maximum allowable value for OpenEdition MVS is 32767.       */
/*    3. If this parameter is not provided, the system default       */
/*       value for this parameter is 200.                            */
/*                                                                  */
/********************************************************************/
  MAXPROCSYS(300)                    /* System will allow at most 200
                                        processes to be active
                                        concurrently                 */


/********************************************************************/
```

```
/*                                                                 */
/*    Specify the maximum number of processes that a single user   */
/*    (that is, with the same UID) is allowed to have concurrently */
/*    active regardless of origin.                                 */
/*                                                                 */
/*    Notes:                                                       */
/*                                                                 */
/*    1. This parameter is the same as the Child_Max variable      */
/*       defined in POSIX 1003.1.                                  */
/*    2. Minimum allowable value for OpenEdition MVS is 3.         */
/*    3. Maximum allowable value for OpenEdition MVS is 32767.     */
/*    4. If this parameter is not provided, the system default     */
/*       value for this parameter is 25.                           */
/*                                                                 */
/*******************************************************************/
   MAXPROCUSER(10125)                  /* Allow each user (same UID) to
                                          have at most 200 concurrent
                                          processes active           */


/*******************************************************************/
/*                                                                 */
/*    Specify the maximum number of unique UID's that can be using */
/*    OpenEdition MVS services at a given time.                    */
/*                                                                 */
/*******************************************************************/
   MAXUIDS(50)                         /* Allow at most 50 OpenEdition MVS
                                          users to be active concurrently  */


/*******************************************************************/
/*                                                                 */
/*    Specify the maximum number of files that a single user       */
/*    is allowed to have concurrently active or allocated.         */
/*                                                                 */
/*******************************************************************/
   MAXFILEPROC(65535)                  /* Allow at most 65535 open files
                                          per user (the max)         */


/*******************************************************************/
/*                                                                 */
/*    Specify the maximum number of pseudo-terminal sessions       */
/*    that can be active concurrently.                             */
/*                                                                 */
/*******************************************************************/
   MAXPTYS(256)                        /* Allow up to 256 pseudo-terminal
                                          sessions                   */


/*******************************************************************/
/*                                                                 */
/*    Specify the maximum number of remote-terminal sessions       */
/*    that can be active concurrently.                             */
/*                                                                 */
/*******************************************************************/
   MAXRTYS(256)                        /* Allow up to 256 remote-terminal
                                          sessions                   */


/*******************************************************************/
/*                                                                 */
/*    Specify the parmlib member containing the initial tracing    */
/*    options to be used.                                          */
```

```
    /*                                                                    */
    /********************************************************************/
      CTRACE(CTIBPX00)                    /* Parmlib member 'CTIBPX00' will
                                             contain the initial tracing
                                             options to be used            */


    /********************************************************************/
    /*                                                                    */
    /*    Specify the HFS file that contains the list of data sets that   */
    /*    are sanctioned for use as step libraries during the running of  */
    /*    set-user-ID and set-group-ID executable files.                  */
    /*                                                                    */
    /********************************************************************/
    /*STEPLIBLIST('/system/steplib') *//* HFS file /system/steplib will
                                             contain the list of sanctioned
                                             step libraries for set-user-ID
                                             and set-group-ID executables. */


    /********************************************************************/
    /*                                                                    */
    /*    Specify the HFS file that contains the list of MVS userids      */
    /*    that will use the specified alias name for OE functions.        */
    /*                                                                    */
    /********************************************************************/
    /*USERIDALIASTABLE('/tablename') *//* HFS file /tablename will
                                             contain the list of MVS userids
                                             and their corresponding XPG4
                                             compliant alias names.        */


    /********************************************************************/
    /*                                                                    */
    /*    The FILESYSTYPE statement defines a file system to start.       */
    /*                                                                    */
    /********************************************************************/
      FILESYSTYPE TYPE(HFS)               /* Type of file system to start  */
                  ENTRYPOINT(GFUAINIT) /* Entry Point of load module       */
                  PARM(' ')               /* Null PARM for physical file
                                             system                        */
              /* ASNAME(adrspc01) */  /* Name of address space for
                                             physical file system          */


    /********************************************************************/
    /*                                                                    */
    /*    The ROOT statement defines and mounts the root file system.     */
    /*                                                                    */
    /********************************************************************/
    /* files */
    ROOT    FILESYSTEM('OMVS.OS390R5.&SYSNAME..&SYSR1..ROOT')
            TYPE(HFS)                   /* TYPE OF FILE SYSTEM           */
            MODE(RDWR)                  /* (OPTIONAL) CAN BE READ OR RDWR.
                                             DEFAULT = RDWR              */

    MOUNT FILESYSTEM('OMVS.&SYSNAME..ETC')
          MOUNTPOINT('/etc')
          TYPE(HFS)  MODE(RDWR)

    MOUNT FILESYSTEM('OMVS.&SYSNAME..USERS')
          MOUNTPOINT('/u')
          TYPE(HFS)  MODE(RDWR)
```

```
MOUNT FILESYSTEM('OMVS.OS390R5.&SYSNAME..&SYSR1..LDAP')
      MOUNTPOINT('/usr/lpp/ldap')
      TYPE(HFS)  MODE(RDWR)

MOUNT FILESYSTEM('OMVS.OS390R5.&SYSNAME..&SYSR1..EPH')
      MOUNTPOINT('/usr/lpp/booksrv')
      TYPE(HFS)  MODE(RDWR)

MOUNT FILESYSTEM('OMVS.OS390R5.&SYSNAME..&SYSR1..TCPIP')
      MOUNTPOINT('/usr/lpp/tcpip')
      TYPE(HFS)  MODE(RDWR)

MOUNT FILESYSTEM('OMVS.OS390R5.&SYSNAME..&SYSR1..DCEBASE')
      MOUNTPOINT('/usr/lpp/dce')
      TYPE(HFS)  MODE(RDWR)

MOUNT FILESYSTEM('OMVS.OS390R5.&SYSNAME..&SYSR1..ECN.V2R4')
      MOUNTPOINT('/usr/lpp/encina')
      TYPE(HFS)  MODE(RDWR)

MOUNT FILESYSTEM('OMVS.OS390R5.&SYSNAME..&SYSR1..DCEASHFS.USR')
      MOUNTPOINT('/usr/lpp/dceas')
      TYPE(HFS)  MODE(RDWR)

MOUNT FILESYSTEM('OMVS.OS390R5.&SYSNAME..&SYSR1..DFSHFS.GLOBAL')
      MOUNTPOINT('/usr/lpp/dfs/global')
      TYPE(HFS)  MODE(RDWR)

MOUNT FILESYSTEM('OMVS.OS390R5.&SYSNAME..&SYSR1..DFSHFS.LOCAL')
      MOUNTPOINT('/usr/lpp/dfs/local')
      TYPE(HFS)  MODE(RDWR)

MOUNT FILESYSTEM('OMVS.OS390R5.&SYSNAME..&SYSR1..FIREWALL.FWHFS1')
      MOUNTPOINT('/usr/lpp/fw/')
      TYPE(HFS)  MODE(RDWR)

MOUNT FILESYSTEM('OMVS.OS390R5.&SYSNAME..&SYSR1..FIREWALL.FWHFS2')
      MOUNTPOINT('/usr/lpp/fw/fwdata')
      TYPE(HFS)  MODE(RDWR)

MOUNT FILESYSTEM('OMVS.OS390R5.&SYSNAME..&SYSR1..IMW.SIMWHFS')
      MOUNTPOINT('/usr/lpp/internet')
      TYPE(HFS)  MODE(RDWR)

MOUNT FILESYSTEM('OMVS.OS390R5.&SYSNAME..&SYSR1..IMW.SIMWHFSL')
      MOUNTPOINT('/usr/lpp/internet/server_root/logs')
      TYPE(HFS)  MODE(RDWR)

MOUNT FILESYSTEM('OMVS.OS390R5.&SYSNAME..&SYSR1..CMNHFS')
      MOUNTPOINT('/usr/lpp/NetCommerce')
      TYPE(HFS)  MODE(RDWR)

FILESYSTYPE TYPE(TFS) ENTRYPOINT(BPXTFS)
MOUNT FILESYSTEM('/TMP')
      TYPE(TFS) MODE(RDWR)
      MOUNTPOINT('/tmp')
      PARM('-s 500')
```

```
/********************************************************************/
/*                                                                  */
/*   The NETWORK statement defines which domain the specified       */
/*   file system supports and some socket and port limits in that   */
/*   domain by specifying:                                          */
/*     o The address family type.                                   */
/*     o Its associated domain number.                              */
/*     o The maximum number of sockets the address family will      */
/*        support.                                                  */
/*     o The ports to be reserved for use with port zero,           */
/*        INADDR_ANY binds.                                         */
/*   There must be a previous FILESYSTYPE statement that has a TYPE */
/*   operand that matches the TYPE operand on the NETWORK           */
/*   statement.                                                     */
/*                                                                  */
/*   Currently, only two domains are supported:                     */
/*    AF_UNIX, domain number 1, and entry point (BPXTUINT)          */
/*    AF_INET, domain number 2, and entry point (BPXTIINT) or       */
/*             entry point BPXTCINT, if Converged Sockets is used.  */
/*             (Converged Sockets is intended to be used only if    */
/*             multiple AF_INET physical file systems (such as 2    */
/*             TCP/IP's) are to be active at one time.  There is a  */
/*             performance degradation if using Converged Sockets   */
/*             with a single AF_INET physical file system.)         */
/*                                                                  */
/*   Port reservation information for port zero, INADDR_ANY binds   */
/*   is only required for the AF_INET domain in a Common INET       */
/*   configuration. It is specified with the INADDRANYPORT and      */
/*   INADDRANYCOUNT parameters. If these parameters are omitted,    */
/*   then no ports are reserved.                                    */
/*                                                                  */
/*   INADDRANYPORT specifys the starting port number to be          */
/*   reserved for use by OpenEdition applications that issue        */
/*   port zero, INADDR_ANY binds. INADDRANYCOUNT specifies how      */
/*   many ports to reserve.                                         */
/*                                                                  */
/*   If you are running a Common INET configuration and you         */
/*   specify the INADDRANYPORT and INADDRANYCOUNT parameters then   */
/*   you must specify the same values to each transport provider    */
/*   that is specified with the SUBFILESYSTYPE statement. Refer     */
/*   to the documentation for that transport provider to determine  */
/*   how the port reservation information is specified.             */
/*                                                                  */
/********************************************************************/
  FILESYSTYPE TYPE(UDS) ENTRYPOINT(BPXTUINT)
  NETWORK DOMAINNAME(AF_UNIX)
          DOMAINNUMBER(1)
          MAXSOCKETS(10000)
          TYPE(UDS)

  FILESYSTYPE TYPE(CINET)
          ENTRYPOINT(BPXTCINT)
  NETWORK DOMAINNAME(AF_INET)
          DOMAINNUMBER(2)
          MAXSOCKETS(10000)
          TYPE(CINET)
          INADDRANYPORT(10000)
          INADDRANYCOUNT(2000)
```

```
                SUBFILESYSTYPE NAME(TCPIPOE)
                        TYPE(CINET)
                        ENTRYPOINT(EZBPFINI)
                        DEFAULT

                SUBFILESYSTYPE NAME(TCPIPMVS)
                        TYPE(CINET)
                        ENTRYPOINT(EZBPFINI)

                SUBFILESYSTYPE NAME(TCPKMT)
                        TYPE(CINET)
                        ENTRYPOINT(EZBPFINI)

                SUBFILESYSTYPE NAME(OESTACK)
                        TYPE(CINET)
                        ENTRYPOINT(BPXUIINT)

                FILESYSTYPE TYPE(NFS) ENTRYPOINT(GFSCINIT)
                            ASNAME(MVSNFSC5)

        /*******************************************************************/
        /*                                                               */
        /*    The SUBFILESYSTYPE statement specifies a socket file system */
        /*    that the Open MVS Converged Sockets physical file system is */
        /*    to start.  This is used if more than one AF_INET physical   */
        /*    file system  (TCP/IP) is active at the same time.           */
        /*                                                               */
        /*    The SUBFILESYSTYPE statement is associated with the         */
        /*    FILESYSTYPE statement that describes the Open MVS Converged  */
        /*    Sockets physical file system by matching the value specified */
        /*    in the TYPE operand.                                        */
        /*                                                               */
        /*******************************************************************/
          MAXTHREADTASKS(1000)                /* System will allow at most 10000
                                                 threads tasks to be active
                                                 concurrently in a single process
                                                                              */


        /*******************************************************************/
        /*                                                               */
        /*    MAXTHREADS is the maximum number of threads that            */
        /*    OpenEdition MVS will allow to be active concurrently in a    */
        /*    single process.                                            */
        /*                                                               */
        /*******************************************************************/
          MAXTHREADS(1000)                    /* System will allow at most 10000
                                                 threads to be active
                                                 concurrently in a single process
                                                                              */


        /*******************************************************************/
        /*                                                               */
        /*    PRIORITYPG   allows the user to specify 1 to 40 performance  */
        /*                 group numbers.                                 */
        /*    PRIORITYGOAL allows the user to specify 1 to 40 service      */
        /*                 classes.                                       */
        /*                                                               */
        /*    These values result in an array that is accessed via an index */
        /*    value.                                                     */
```

```
/*                                                                    */
/*    Keyword          Value Range    Number of Values                */
/*    -------          -----------    ----------------                */
/*    prioritypg        1 - 999            40                         */
/*                                                                    */
/*    prioritygoal    1-8 characters       40                         */
/*                                                                    */
/********************************************************************/
/*                                                                    */
/*    XPG4 Interprocess Communications: the following keywords and    */
/*    associated values allow the user to define the IPC values.      */
/*                                                                    */
/*    Keyword        Value Range  Default  Description                */
/*    -------        -----------  -------  -----------------------    */
/*    IPCMSGNIDS     1 -  20000     500    Maximum number of unique   */
/*                                         message queues, systemwide*/
/*    IPCMSGQBYTES  0 - 1048576   262144   Maximum number of butes    */
/*                                         in a single message.       */
/*    IPCMSGQMNUM   0 -   20000    10000   Maximum number of messages*/
/*                                         per queue, systemwide.     */
/*    IPCSHMNIDS    1 -   20000     500    Maximum number of unique   */
/*                                         shared memory segments,    */
/*                                         systemwide.                */
/*    IPCSHMSPAGES  0 - 2621440   262144   Maximum number of pages    */
/*                                         for shared memory segments*/
/*                                         systemwide.                */
/*    IPCSHMMPAGES  0 -   25600     256    Maximum number of pages    */
/*                                         for a shared memory        */
/*                                         segment.                   */
/*    IPCSHMNSEGS   0 -    1000      10    Maximum number of shared   */
/*                                         memory segments attached   */
/*                                         per address space.         */
/*    IPCSEMNIDS    1 -   20000     500    Maximum number of unique   */
/*                                         semaphore sets, systemwide*/
/*    IPCSEMNSEMS   0 -   32767      25    Maximum number of          */
/*                                         semaphores per semaphor    */
/*                                         set.                       */
/*    IPCSEMNOPS    0 -   32767      25    Maximum number of          */
/*                                         operations per semop call.*/
/*                                                                    */
/*    Notes:  None                                                    */
/*                                                                    */
/********************************************************************/
  IPCMSGNIDS    (20000)
  IPCMSGQBYTES  (262144)
  IPCMSGQMNUM   (10000)
  IPCSHMNIDS    (20000)
  IPCSHMSPAGES  (2621440)
  IPCSHMMPAGES  (25600)
  IPCSHMNSEGS   (1000)
  IPCSEMNIDS    (20000)
  IPCSEMNSEMS   (25)
  IPCSEMNOPS    (32767)


/********************************************************************/
/*                                                                    */
/*    MaxMMapArea is the maximum amount of data space storage (in     */
/*    pages) that can be allocated for memory mappings of             */
/*    HFS files. Storage is not allocated until memory mapping is     */
```

```
/*   active.                                                             */
/*                                                                       */
/***********************************************************************/
   MAXMMAPAREA(4096)                      /* System will allow at most 4096
                                             pages to be used for memory
                                             mapping.
                                                                        */


/***********************************************************************/
/*                                                                     */
/*   The MAXFILESIZE statement specifies the RLIMIT_FSIZE soft and     */
/*   hard limit resource values that processes receive when they       */
/*   are dubbed a process.  Also when they are initiated by a          */
/*   daemon process using an exec after setuid().                      */
/*                                                                     */
/*   RLIMIT_FSIZE indicates the maximum file size (in 4 KB             */
/*   increments) that a process can create.                            */
/*                                                                     */
/*   Refer to the definition of setrlimit() in Assembler Callable      */
/*   Services for OpenEdition MVS for more information about           */
/*   RLIMIT_FSIZE.                                                      */
/*                                                                     */
/*      Value Range    Default                                         */
/*      -------------- ---------                                        */
/*      0 - 2147483647 NOLIMIT                                    ØPOC*/
/*                                                                     */
/***********************************************************************/
/* MAXFILESIZE(1000)  */     /* 4 megabytes indicated                  */


/***********************************************************************/
/*                                                                     */
/*   The MAXCORESIZE statement specifies the RLIMIT_CORE soft and      */
/*   hard limit resource values that processes receive when they       */
/*   are dubbed a process, and when they are initiated by a daemon     */
/*   process using an exec after setuid().                             */
/*                                                                     */
/*   RLIMIT_CORE indicates the maximum core dump file size (in         */
/*   bytes) that a process can create.                                 */
/*                                                                     */
/*   Refer to the definition of setrlimit() in Assembler Callable      */
/*   Services for OpenEdition MVS for more information about           */
/*   RLIMIT_CORE.                                                       */
/*                                                                     */
/*      Value Range    Default                                         */
/*      -------------- -------                                          */
/*      0 - 2147483647 4194304 (4 MB)                                  */
/*                                                                     */
/***********************************************************************/
   MAXCORESIZE(4194304)


/***********************************************************************/
/*                                                                     */
/*   The MAXASSIZE statement specifies the RLIMIT_AS hard limit        */
/*   resource value that processes receive when they are dubbed a      */
/*   process.  The soft limit is obtained from MVS.  If the soft       */
/*   limit value from MVS is greater than the MAXASSIZE value, the     */
/*   hard limit is set to the soft limit.                              */
/*                                                                     */
/*   This value is also used when processes are initiated by a         */
```

```
/*   a daemon process using an exec after setuid().  In this case,  */
/*   both the RLIMIT_AS hard and soft limit values are set to the    */
/*   MAXASSIZE specified value.                                      */
/*                                                                   */
/*   RLIMIT_AS indicates the address space region size.              */
/*                                                                   */
/*   Refer to the definition of setrlimit() in Assembler Callable    */
/*   Services for OpenEdition MVS for more information about          */
/*   RLIMIT_AS.                                                       */
/*                                                                   */
/*     Value Range           Default                                 */
/*     --------------------- --------                                */
/*     10485760 - 2147483647  41943040  (40 MB)                      */
/*                                                                   */
/*********************************************************************/
   MAXASSIZE(2147483647)


/*********************************************************************/
/*                                                                   */
/*   The MAXCPUTIME statement specifies the RLIMIT_CPU hard limit    */
/*   resource value processes receive when they are dubbed a         */
/*   process.  The soft limit is obtained from MVS.  If the soft     */
/*   limit value from MVS is greater than the MAXCPUTIME value, the  */
/*   hard limit is set to the soft limit.                            */
/*                                                                   */
/*   This value is also used when processes are initiated by a       */
/*   a daemon process using an exec after setuid().  In this case,   */
/*   both the RLIMIT_AS hard and soft limit values are set to the    */
/*   MAXASSIZE specified value.                                      */
/*                                                                   */
/*   RLIMIT_CPU indicates the CPU time, in seconds, that a process   */
/*   can use.                                                         */
/*                                                                   */
/*   Refer to the definition of setrlimit() in Assembler Callable    */
/*   Services for OpenEdition MVS for more information about          */
/*   RLIMIT_CPU.                                                      */
/*                                                                   */
/*     Value Range     Default                                       */
/*     -------------- -------                                        */
/*     7 - 2147483647  1000                                          */
/*                                                                   */
/*********************************************************************/
   MAXCPUTIME(2147483647)


/*********************************************************************/
/*                                                                   */
/*   MAXSHAREPAGES is the maximum number of system shared storage    */
/*   pages that can concurrently be active using the fork(), ptrace,*/
/*   shmat, and mmap services.  The fork service uses shared storage*/
/*   only when the parmlib statement FORKCOPY(COW) is specified.     */
/*   The other services use shared storage as part of their normal   */
/*   operation.  Since the fork() and ptrace services use shared     */
/*   storage for performance improvements, these services continue   */
/*   to function when the shared storage limit is reached by no      */
/*   longer using shared storage to perform their function.  The     */
/*   shmat and mmap services, however, no longer function when the   */
/*   shared storage limit has been reached, because these functions */
/*   require shared storage to operate successfully.                 */
/*                                                                   */
```

```
          /*   By controlling the number of shared storage pages in use, an    */
          /*   installation can control the amount of System Queue Area (SQA)   */
          /*   storage consumed to support these pages.                         */
          /*   Approximately 48 bytes of SQA storage are consumed to support    */
          /*   each page of shared storage.                                     */
          /*                                                                    */
          /**********************************************************************/
            MAXSHAREPAGES(32768000)              /* System will allow at most MAX
                                                    pages of shared storage to be
                                                    concurrently in use          */


          /**********************************************************************/
          /*                                                                    */
          /*   FORKCOPY specifies how user storage is to be copied from         */
          /*   the parent process to the child process during a fork()          */
          /*   system call.                                                     */
          /*                                                                    */
          /*   If FORKCOPY(COW) is specified, all fork() calls are processed     */
          /*   with the copy-on-write mode if the suppression-on-protection      */
          /*   hardware feature is available.  Before the storage is modified,*/
          /*   both the parent process and child process refer to the same      */
          /*   view of the data.  The parent storage is copied to the child     */
          /*   as soon as the storage is modified by either the parent or       */
          /*   the child.  Use of copy-on-write causes the system to used the   */
          /*   system queue area (SQA) to manage page sharing.                  */
          /*                                                                    */
          /*   If FORKCOPY(COPY) is specified, fork() immediately copies         */
          /*   the parent storage to the child, regardless of whether the       */
          /*   suppression-on-protection feature is available.                  */
          /*                                                                    */
          /**********************************************************************/
            FORKCOPY(COPY)                       /* System will use copy-on-write
                                                    for fork system calls if the
                                                    suppression-on-protection
                                                    hardware feature is available
                                                                                 */


          /**********************************************************************/
          /*                                                                    */
          /*   SUPERUSER is a 1 to 8-character name that must conform to the     */
          /*   restrictions for an MVS user ID.  This user ID is assigned        */
          /*   to shell users when they enter the su command.  This user ID      */
          /*   should be defined to the security product and have a UID of 0     */
          /*   assigned to it.                                                   */
          /*   The default is SUPERUSER(BPXROOT).                                */
          /*                                                                    */
          /**********************************************************************/
            SUPERUSER(BPXROOT)


          /**********************************************************************/
          /*                                                                    */
          /*   TTYGROUP is a 1 to 8-character name that must conform to the      */
          /*   restrictions for an MVS group name.  Slave pseudoterminals        */
          /*   (ptys) and OCS rtys are given this group name when they are       */
          /*   first opened.  The name is used by certain setgid programs,       */
          /*   such as talk and write, when attempting to write to another       */
          /*   user's pty or rty.  This group name should be defined to the      */
          /*   security product and have a unique GID.  No users should be       */
          /*   connected to this group.                                         */
```

```
/*                                                                   */
/*   The default is TTYGROUP(TTY).                                   */
/*                                                                   */
/********************************************************************/
  TTYGROUP(TTY)


/********************************************************************/
/*                                                                   */
/*   A 1-8 character name of started procedure JCL initializing     */
/*   the OpenEdition Kernel.                                         */
/*   default: OMVS                                                   */
/*                                                                   */
/********************************************************************/
  STARTUP_PROC(OMVS)


/********************************************************************/
/*                                                                   */
/*   STARTUP_EXEC is the name of the REXX exec that performs        */
/*   application environment initialization for OpenEdition MVS.    */
/*   There is no Default.                                           */
/*                                                                   */
/*   'Dsname(Memname)' must be a quoted string. Memname is a REXX   */
/*      exec member in the PDS Dsname.                              */
/*      Dsname is a 1-44 character valid dataset name.             */
/*      Memname is a 1-8 character valid member name.              */
/*   SysoutClass is 1 character and alphanumeric. It is the sysout  */
/*      class that the REXX exec will be running under. SysoutClass */
/*      is optional.                                                */
/*                                                                   */
/********************************************************************/
/* STARTUP_EXEC('Dsname(Memname)',SysoutClass) */
```

E.4 OS/390 SYS1.PARMLIB(IEFSSNxx)

An entry is required in this member to create a group attach name for the
four-character DB2 database name that is equal to the three-character SAP R/3
System ID name. See the topic "Installation Step 1: Define DB2 to MVS:
DSNTIJMV" in *DB2 for OS/390 V5 Installation Guide* for more information. The
group attach name that follows is indicated by an arrow, and it is in the form:

```
SUBSYS SUBNAME(ssnameB2)
  INITRTN(DSN3INI)
  INITPARM('DSN3EPX,prefix<.,scope<,group-attach>>
```

We used the following values for the variables in that statement:

ssname	DB2R
prefix	=DB2R
scope	S
group-attach	RED

Following are the entries in our IEFSSNxx parmlib member:

```
SUBSYS SUBNAME(SMS)        /* SMS */
   INITRTN(IGDSSIIN)
```

```
                    INITPARM(' ID=00,PROMPT=NO')
          SUBSYS SUBNAME(JES2)        /* PRIMARY SUBSYSTEM NAME */
            PRIMARY(YES)  START(NO)
          SUBSYS SUBNAME(RACF)        /* RACF SUBSYS */
            INITRTN(IRRSSI00)
            INITPARM(' ā,M')
          SUBSYS SUBNAME(TNF)         /* TCP/IP */
          /* INITRTN(MVPTSSI) */
          SUBSYS SUBNAME(VMCF)        /* TCP/IP */
          /* INITRTN(MVPXSSI) */
          SUBSYS SUBNAME(DB2R)        /* DB2 V5 WITH LATEST PTFS 6/98 */
            INITRTN(DSN3INI)
            INITPARM(' DSN3EPX,=DB2R,S,RED')
          SUBSYS SUBNAME(IRL5)        /* IRLM DB2 5.1 */
```

E.5 OS/390 SYS1.PROCLIB(ICLIRED)

This is the procedure we used to start ICLI as a started task.

Refer to *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*,
SC33-7962 for the current options for doing the ICLI server startup.

```
//*********************************************************************
//*                                                                   *
//*                                                                   *
//*   ICLI startup for SAP R/3 on DB2 for OS/390                      *
//*                                                                   *
//*                                                                   *
//*********************************************************************
//*
//ICLI    EXEC PGM=BPXBATCH,TIME=NOLIMIT,REGION=200M,
//        PARM=' PGM /usr/sbin/fome40bs -PLAN FOMEP40B -LOGDIR /u/icliru-
//             n/instl -PORT 5531 -HPDT'
//STDENV  DD PATH='/u/iclirun/instl/iclienv'
//STEPLIB DD DISP=SHR,DSN=DB2V510.SDSNLOAD
//STDERR  DD PATH='/u/iclirun/instl/icliserv.err',
//        PATHOPTS=(OWRONLY,OCREAT,OTRUNC),
//        PATHMODE=(SIRWXU)
//STDOUT  DD PATH='/u/iclirun/instl/icliserv.out',
//        PATHOPTS=(OWRONLY,OCREAT,OTRUNC),
//        PATHMODE=(SIRWXU)
//SYSUDUMP DD SYSOUT=*
//SYSMDUMP DD SYSOUT=*
```

Appendix F. Advanced ICLI Configurations

This appendix discusses more advanced configurations with more than one application server and/or more than one ICLI connection. The appendix has been revised with corrections and additional material since the first edition of the redbook.

Immediately after completing the installation of SAP R/3, there is only one application server, the central instance, and only one ICLI connection to OS/390. If you want to install additional application servers, you have configuration options determined by the following:

- Whether the application server has an ESCON connection

- Whether you want to make another ICLI connection to OS/390

- If using HPDT, whether you have a LAN connection to OS/390

- If using HPDT, whether you have a LAN connection with a router to OS/390

The sections that follow show how to build these configurations.

F.1 Adding Application Servers - No Direct OS/390 Connection

Figure 121 shows the configuration needed to allow two additional application servers that have no direct connection to the OS/390 database server. In this case, the traffic to the database server from the new application servers must be routed through an application server that has the ICLI connection to OS/390. Use smit on application servers 7.0.0.3 and 7.0.0.4 to define a static host route to 6.6.8.1 through 7.0.0.2.
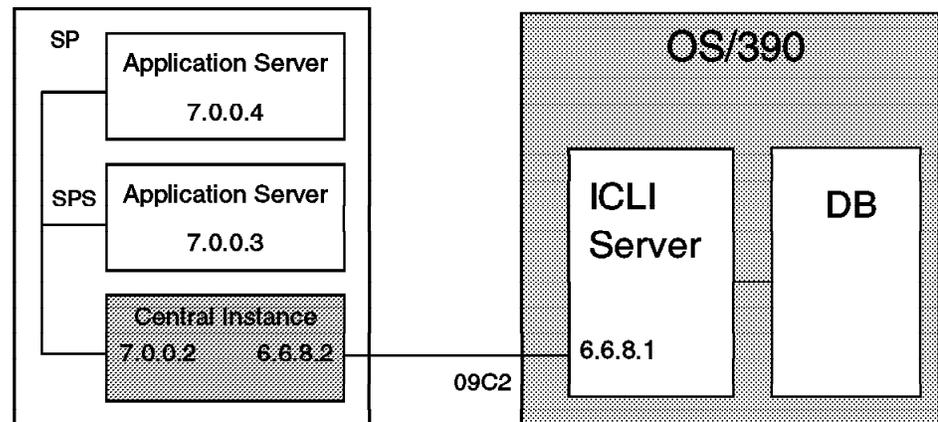
Figure 121. Adding Application Servers - No Direct Link to Database Server

To make this configuration using the enhanced ESCON protocol, you must add lines for the IP address of new application servers to the ICLI configuration file /usr/local/etc/configstk.conf as shown in Figure 122 on page 206.

If you use the High-Speed UDP protocol, this file is not necessary; see the oeifconfig command parameters (identification of valid connecting nodes is not necessary).

```
HOME 6.6.8.1 BUFFERS(50)
GATEWAY 09C2
nochecksum
6.6.8.2
7.0.0.3
7.0.0.4
```

Figure 122. ICLI Configuration File with One ICLI Connection

This specifies that OS/390 will send traffic for three IP addresses out over one
ESCON adapter. Also, the application servers must set up host routes indicating
7.0.0.2 as the gateway to 6.6.8.1.

Note that if the enhanced ESCON protocol is used, the three application servers
in Figure 121 on page 205 must be three nodes *within one SP2 frame* because
they must be connected through the switch on an SP, either the High
Performance Switch (HiPS) or the SP Switch (SPS). That is because application
servers cannot use a LAN connection that has an MTU size less than 32Kbytes —
Enhanced ESCON does not support MTU sizes smaller than 32Kbytes.

Also note the two IP addresses that apply to the central instance; one is the
address of the SPS adapter and the other is the address of the ESCON adapter.

F.2 Adding Application Servers with ESCON Adapters

As the number of application servers and the number of database accesses
increase, you should consider using additional ESCON adapters to enhance the
database performance and provide higher database availability.

Figure 123 on page 207 shows the configuration needed to install four
application servers in addition to the central instance; one of the additional
application servers has an ESCON adapter.
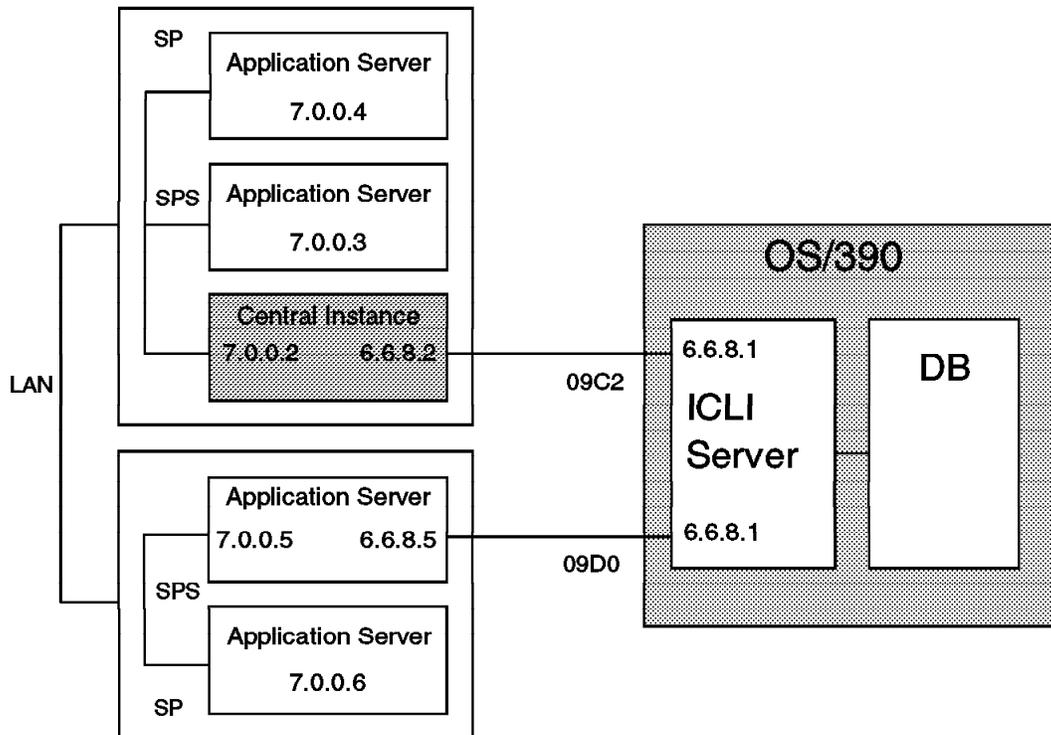
Figure 123. Adding Application Servers with ESCON Adapters

The traffic to the database server from the two new application servers, whose IP addresses are 7.0.0.5 and 7.0.0.6 in Figure 123, will be routed over the new ESCON adapter. Therefore, the data traffic to the database server can be distributed to two ESCON adapters. Because both the application servers are connected to one ICLI server, the same ICLI connection port is used.

To make this configuration, you must add lines to the enhanced ESCON configuration file for a new gateway. The file is /usr/local/etc/configstk.conf.

If you use the High-Speed UDP protocol, this file is not necessary; see the oeifconfig command parameters (identification of valid connecting nodes is not necessary). An example is shown in Figure 124.

```
HOME 6.6.8.1 BUFFERS(50)
GATEWAY 09C2
nochecksum
6.6.8.2
7.0.0.3
7.0.0.4
GATEWAY 09D0
nochecksum
6.6.8.5
7.0.0.6
```

Figure 124. Enhanced ESCON Configuration File with Two ESCON Adapters

This also requires a new HCD definition on OS/390 and an ESCON definition on the new application server with the ESCON adapter. Note that this configuration requires new IP addresses for application servers newly installed on AIX (7.0.0.5,

6.6.8.5, and 7.0.0.6 in Figure 124), but the same IP address is used on OS/390 (6.6.8.1 in Figure 124).

Application servers 7.0.0.5 and 7.0.0.6 need a connection to the central instance 7.0.0.2 because they must use the message and enqueue services. This connection could be over an SP Switch—whenever the two servers are part of the same SP2 frame as the central instance. Alternatively, if both servers 7.0.0.5 and 7.0.0.6 are in an SP2 frame separate from the central instance 7.0.0.2, they can communicate with that central instance using TCP/IP (for example, over a LAN).

Control data passing between application servers through TCP/IP does not encounter the MTU size problem. When either server 7.0.0.5 or 7.0.0.6 needs to send packets to the database, connection 09D0 is used with the Enhanced ESCON protocol.

F.3 Adding an ICLI Server

If you need to increase the number of work processes beyond what your OS/390 and ICLI setup allows, another ICLI server instance can be added.

Figure 125 on page 209 shows a configuration with two ICLI server instances to access one DB2 subsystem on the OS/390.
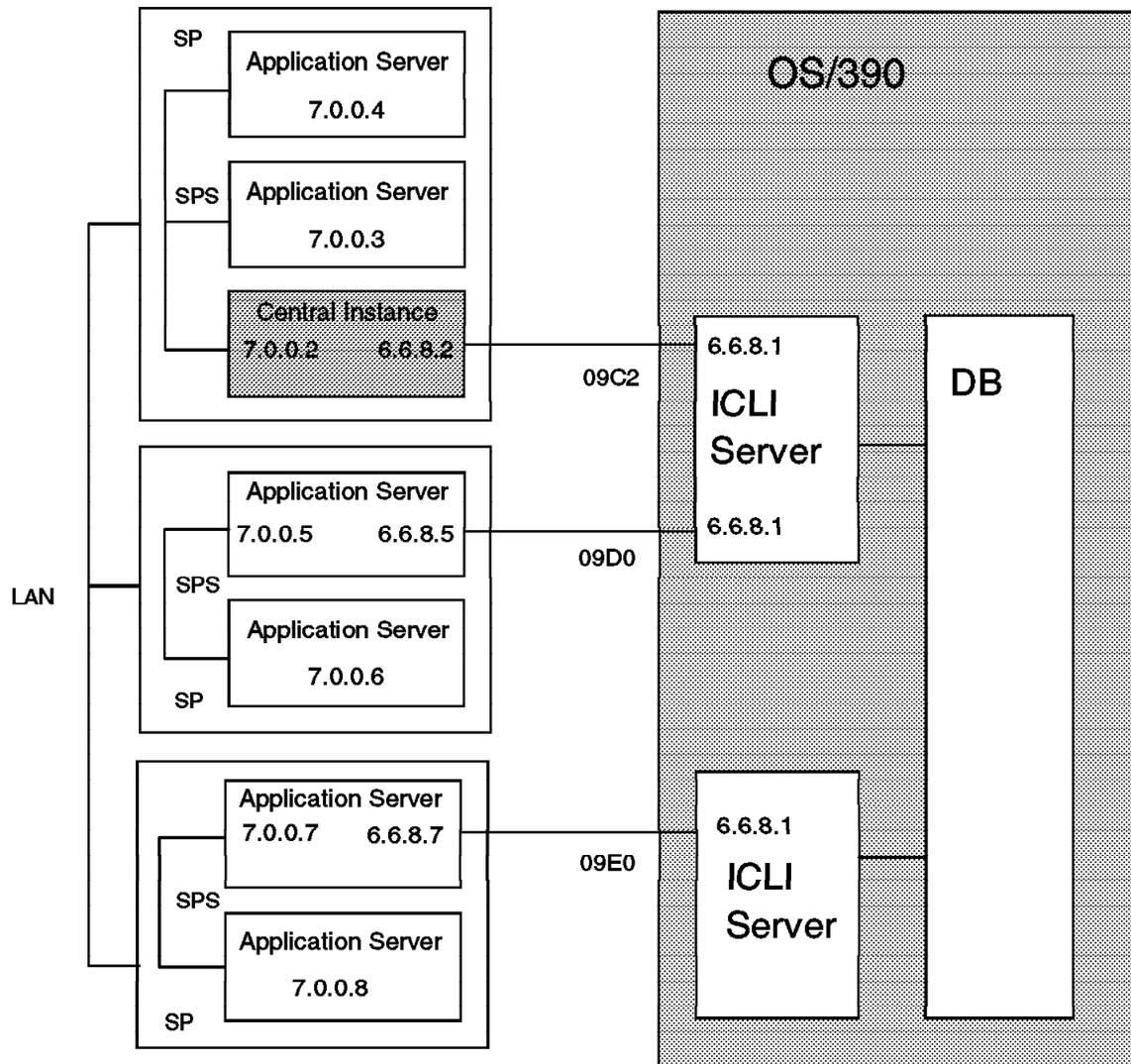
Figure 125. Two ICLI Server Instances to Access One DB2 Subsystem

To make this configuration, you must do the following:

1. Create a new HCD definition on OS/390 and an ESCON definition on the new application server with ESCON adapter.

2. Create a new stanza for the new ICLI server.

   The new stanza to define the new ICLI server must be added to the current configstk configuration file as shown in Figure 126 on page 210. This is because the configstk command sets a system-wide configuration. If you use the High-Speed UDP protocol, this file is not necessary; see the oeifconfig command parameters (identification of valid connecting nodes is not necessary).

   Note: This configuration will function but it is not practical for high availability (the second server will not be used as a backup for the first if the ESCON cable at 09C2 is severed). For availability purposes, separate stacks and S/390 IP addresses should be configured.

```
HOME 6.6.8.1 BUFFERS(50)
GATEWAY 09C2
nochecksum
6.6.8.2
7.0.0.3
7.0.0.4
GATEWAY 09D0
nochecksum
6.6.8.5
7.0.0.6
GATEWAY 09E0
nochecksum
6.6.8.7
7.0.0.8
```

Figure 126. ICLI Configuration File with Second ICLI Server

3. Add a new ICLI connection port definition for the new ICLI server.

   Add another port number with the different service name in the
   tcpip.ETC.SERVICES file as shown in Figure 127. The same port number
   must also be specified in two files on the application servers connecting to
   new ICLI server, which are /etc/services and /usr/sap/trans/bin/TPPARM.

```
iclisudp    5531/udp        # SAP Enhanced ESCON ICLI server
iclisud2    5581/udp        # SAP Enhanced ESCON ICLI server 2
```

Figure 127. Port Number File Entries - Second ICLI Server

4. Add a new ICLI start procedure.

   The start procedure created for the new ICLI server follows. (See the ICLI
   chapter in *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*
   for an explanation of SERVICENAME.)

```
//ICLI2  PROC
//STEP1  EXEC PGM=BPXBATCH,REGION=200M,
//       PARM='PGM /usr/sbin/configstk /usr/local/etc/configstk.conf'
//STDERR     DD PATH='/tmp/configstk.log',
//              PATHOPTS=(OWRONLY,OCREAT,OAPPEND),
//              PATHMODE=(SIRUSR,SIWUSR,SIRGRP,SIWGRP)
//STEP2  EXEC PGM=BPXBATCH,REGION=200M,TIME=NOLIMIT,
//       PARM='PGM /usr/sbin/iclisudp -SERVICENAME iclisud2'
//STDENV     DD PATH='/usr/local/etc/icli.env',PATHOPTS=(ORDONLY)
//STDERR     DD PATH='/tmp/icli.err',
//              PATHOPTS=(OWRONLY,OCREAT,OTRUNC),
//              PATHMODE=(SIRWXU)
//STDOUT     DD PATH='/tmp/icli.out',
//              PATHOPTS=(OWRONLY,OCREAT,OTRUNC),
//              PATHMODE=(SIRWXU)
```

   The second ICLI server is started with an ICLI connection port and service
   name different from that of the first ICLI server, but with the same plan name
   FOMEPLAN.

5. Define the new ICLI start procedure to RACF.

   A new ICLI started procedure must be associated with ICLIRUN user ID
   through the RACF STARTED class, as shown in Figure 128 on page 211.

```
RDEFINE STARTED ICLI2.* STDATA(ICLIRUN),GROUP(OMVSGRP))
SETROPT RACLIST(STARTED) REFRESH
```

Figure 128. Define ICLI2 to RACF

F.4 Installing Another SAP R/3 System

If another SAP R/3 system is installed for development or server consolidation purposes, you can use the system configuration as shown in Figure 129. Note, however, that the versions of ICLI for these systems *must* be the same.
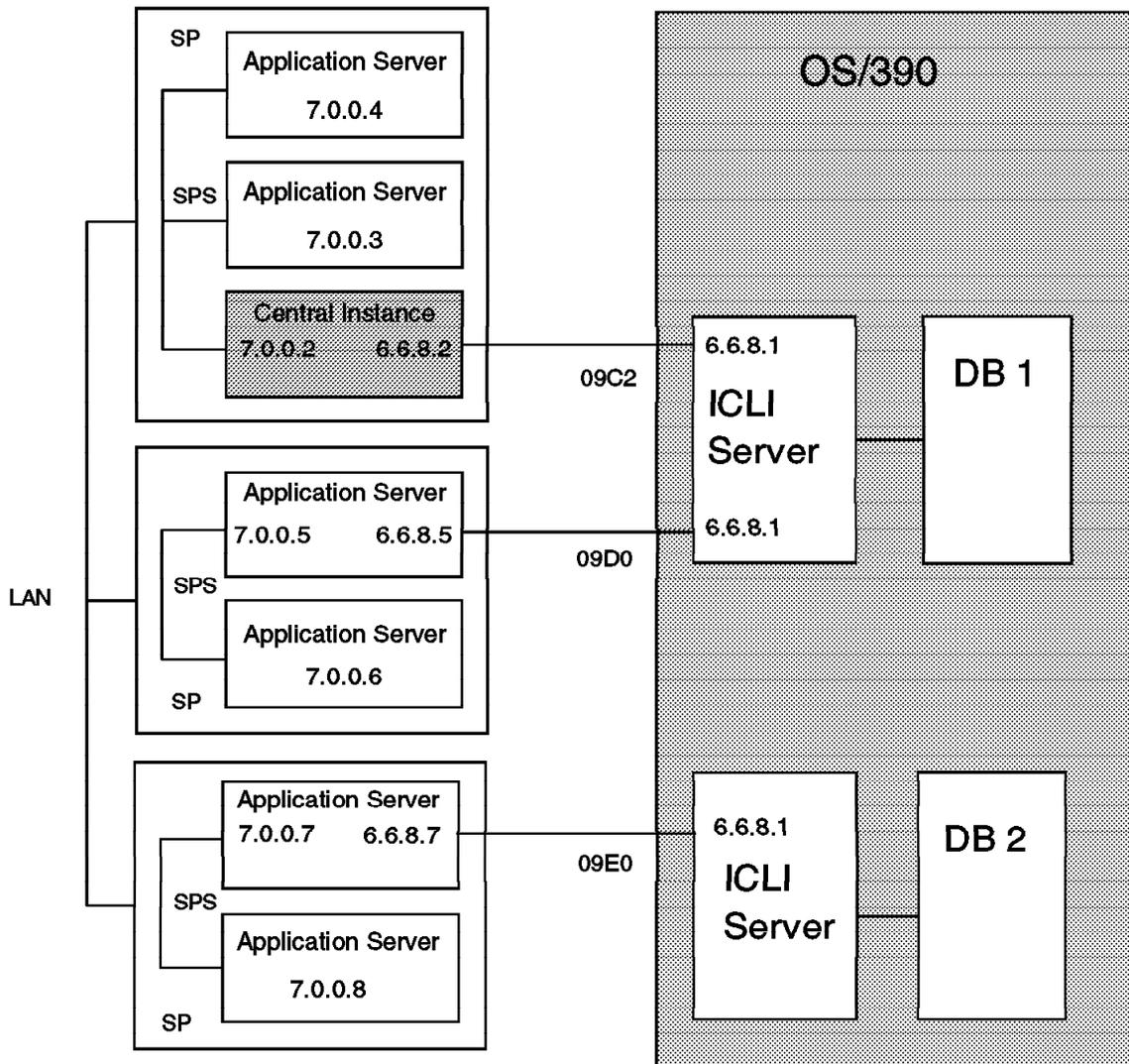

Figure 129. Two SAP R/3 Systems

To create this configuration, you must do most of the same tasks as when you installed the first SAP R/3 system:

1. Define a new HCD definition on OS/390.

2. Customize TCP/IP.

3. Customize the ICLI server.

4. Customize RACF.

5. Create an ESCON definition on the application server with ESCON adapter.

6. Set up the ICLI client.

7. Install the SAP R/3 central instance on AIX.

8. Initialize the database.

9. Load the database.

Note that the plan should be linked with a new plan name to be bound for the second database.

F.5 An Ultimate RS/6000 SP2 Configuration with a Single DB

Figure 130 on page 213 shows a configuration containing a single DB2 subsystem with six ICLI servers; this configuration would imply a heavily used SAP R/3 system with a requirement to use standby ICLI servers if (due to software maintenance, software failures, or hardware problems) some ICLI tasks were not usable. The ICLI tasks would have the following uses:

1. ICLI Server 1 is the normal server that handles ICLI clients from Application Servers 7.0.0.3 and 7.0.0.4.

2. ICLI Server 2 is the standby server that handles ICLI clients from Application Servers 7.0.0.5 through 7.0.0.9 if ICLI servers 4 and/or 5 are not available. The path to this server task is through the external LAN to 7.0.0.4, and then through the 09C2 channel address.

3. ICLI Server 3 is the normal server that handles the ICLI client from 7.0.0.2, the central instance.

4. ICLI Server 4 is the normal server that handles ICLI clients from Application Servers 7.0.0.5 and 7.0.0.6.

5. ICLI Server 5 is the normal server that handles the ICLI clients from 7.0.0.7, 7.0.0.8, and 7.0.0.9.

6. ICLI Server 6 is the standby server that handles ICLI clients from Application Servers 7.0.0.2 through 7.0.0.4 if ICLI servers 1 and/or 2 are not available. The path to this server task is through the external LAN to 7.0.0.9, and then through the 09F0 channel address.
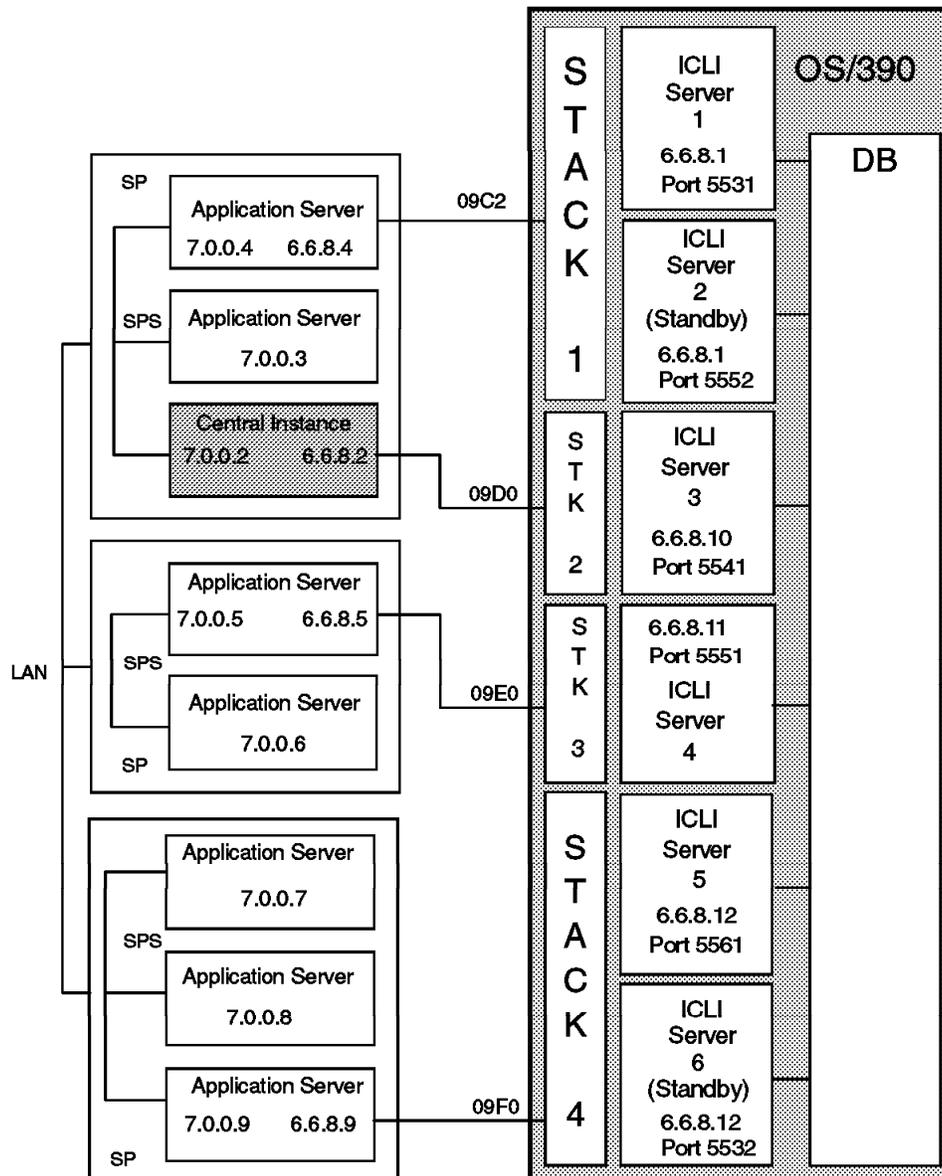
Figure 130. An Ultimate SAP R/3 SP2 Configuration (Single DB)

The steps in building this configuration are much the same as those in F.2, "Adding Application Servers with ESCON Adapters" on page 206. However the files are more complex:

1. Create a new HCD definition on OS/390 that includes the four channel address definitions. Perform the ESCON definitions on the application servers which have the adapters (7.0.0.4, 7.0.0.2, 7.0.0.5, and 7.0.0.9 in Figure 130).

2. Create or update the configstk files for each of the four stacks defined in OS/390. A composite of these files is shown in Figure 131 on page 214.

   If you use the High-Speed UDP protocol, these files are not necessary; see the oeifconfig command parameters (identification of valid connecting nodes is not necessary).

```
****************************** Configuration File for Stack 1 ***********
HOME 6.6.8.1 BUFFERS(50)
GATEWAY 09C2
nochecksum
6.6.8.4
7.0.0.3
7.0.0.5
7.0.0.6
7.0.0.7
7.0.0.8
7.0.0.9
****************************** Configuration File for Stack 2 ***********
HOME 6.6.8.10 BUFFERS(50)
GATEWAY 09D0
nochecksum
6.6.8.2
****************************** Configuration File for Stack 3 ***********
HOME 6.6.8.11 BUFFERS(50)
GATEWAY 09E0
nochecksum
6.6.8.5
7.0.0.6
****************************** Configuration File for Stack 4 ***********
HOME 6.6.8.12 BUFFERS(50)
GATEWAY 09F0
nochecksum
6.6.8.9
7.0.0.7
7.0.0.8
7.0.0.2
7.0.0.3
7.0.0.4
```

Figure 131. ICLI Configuration Files for the Stacks in a Complex RS/6000 SP2 Configuration

3. Add the ICLI connection port definitions for the ICLI servers. Add the port numbers with the different service names in the tcpip.ETC.SERVICES file as shown in Figure 132.

```
iclisud1    5531/udp      # SAP Enhanced ESCON ICLI Primary Port 1
iclisud2    5532/udp      # SAP Enhanced ESCON ICLI Standby Port 1
iclisud3    5541/udp      # SAP Enhanced ESCON ICLI Primary Port 2
iclisud4    5551/udp      # SAP Enhanced ESCON ICLI Primary Port 3
iclisud5    5552/udp      # SAP Enhanced ESCON ICLI Standby Port 2
iclisud6    5561/udp      # SAP Enhanced ESCON ICLI Primary Port 4
```

Figure 132. Services File Additions - Complex RS/6000 SP2 Configuration.   Keep-alive ports (not described in this appendix) are also defined in this file.

Port numbers must also be specified in the services file in the application servers; these files are in one of the following directories depending on the application server operating system:

/etc/services for AIX

C:WINNTsystem32driversetcSERVICES for Windows NT

Referring to Figure 130 on page 213, make the entries as follows:

- 7.0.0.2 (6.6.8.2)
  - 5541 (primary)

  – 5532 (standby)
- 7.0.0.3 and 7.0.0.4 (6.6.8.4)
  – 5531 (primary)
  – 5532 (standby)
- 7.0.0.5 (6.6.8.5) and 7.0.0.4
  – 5551 (primary)
  – 5552 (standby)
- 7.0.0.7, 7.0.0.8, and 7.0.0.9 (6.6.8.9)
  – 5561 (primary)
  – 5552 (standby)

4. Define Static Routes

   Use smit on the RS/6000 SP2 nodes to define static routes as follows:

   - 7.0.0.2
     – Route to 6.6.8.10 through 6.6.8.2 (defined when the ESCON adapter for 6.6.8.2 is defined)
     – Route to 6.6.8.12 through 7.0.0.9
   - 7.0.0.3
     – Route to 6.6.8.1 through 7.0.0.4
     – Route to 6.6.8.12 through 7.0.0.9
   - 7.0.0.4
     – Route to 6.6.8.1 through 6.6.8.4 (defined when the ESCON adapter for 6.6.8.4 is defined)
     – Route to 6.6.8.12 through 7.0.0.9
   - 7.0.0.5
     – Route to 6.6.8.11 through 6.6.8.5 (defined when the ESCON adapter for 6.6.8.5 is defined)
     – Route to 6.6.8.1 through 7.0.0.4
   - 7.0.0.6
     – Route to 6.6.8.11 through 7.0.0.5
     – Route to 6.6.8.1 through 7.0.0.4
   - 7.0.0.7 and 7.0.0.8
     – Route to 6.6.8.12 through 7.0.0.9
     – Route to 6.6.8.1 through 7.0.0.4
   - 7.0.0.9
     – Route to 6.6.8.12 through 6.6.8.9 (defined when the ESCON adapter for 6.6.8.9 is defined)
     – Route to 6.6.8.1 through 7.0.0.4

5. Add new ICLI start procedures.

   Given here is the start procedure for ICLI Server 1 in Figure 130 on page 213; the others are similar. Note the use of the -PORT <port_number> parameter on the //STEP1 EXEC statement. (See the chapter titled "ICLI Client and Server," section "Changing the ICLI Connection Port" in *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*).

```
//ICLI1  PROC
//STEP1  EXEC PGM=BPXBATCH,REGION=200M,TIME=NOLIMIT,
//        PARM='PGM /usr/sbin/iclisudp -PORT 5531'
//STDENV    DD PATH='/usr/local/etc/icli.env',PATHOPTS=(ORDONLY)
//STDERR    DD PATH='/tmp/icli.err1',
//             PATHOPTS=(OWRONLY,OCREAT,OTRUNC),
//             PATHMODE=(SIRWXU)
//STDOUT    DD PATH='/tmp/icli.out1',
//             PATHOPTS=(OWRONLY,OCREAT,OTRUNC),
//             PATHMODE=(SIRWXU)
```

F.6 Adding Application Servers: FDDI or Fast Ethernet LAN

This possibility is illustrated in Figure 133. It is the same as that described in F.1, "Adding Application Servers - No Direct OS/390 Connection" on page 205 except for the following changes:

- An OSA connection to the LAN is configured instead of performing an HCD definition.

- The routing to the ICLI Server 7.0.0.1 from nodes 7.0.0.2, 7.0.0.3, and 7.0.0.4 is through the 7.0.0 network definition performed when TCP/IP is defined for the LAN adapters on the application servers, no gateway nodes are necessary.

- The High-Speed UDP Protocol *must* be used, since the Enhanced ESCON protocol is only for ESCON hardware.

- The ICLI configuration file would not be used, since the configuration is not supported using the Enhanced ESCON protocol.

- The configuration applies to application servers that are RS/6000 SP2 nodes, RS/6000 free-standing processors, or processors running Windows NT. Previous configurations in this appendix have been for RS/6000 SP2 nodes, though specialized hardware might make those configurations apply to the other host types.
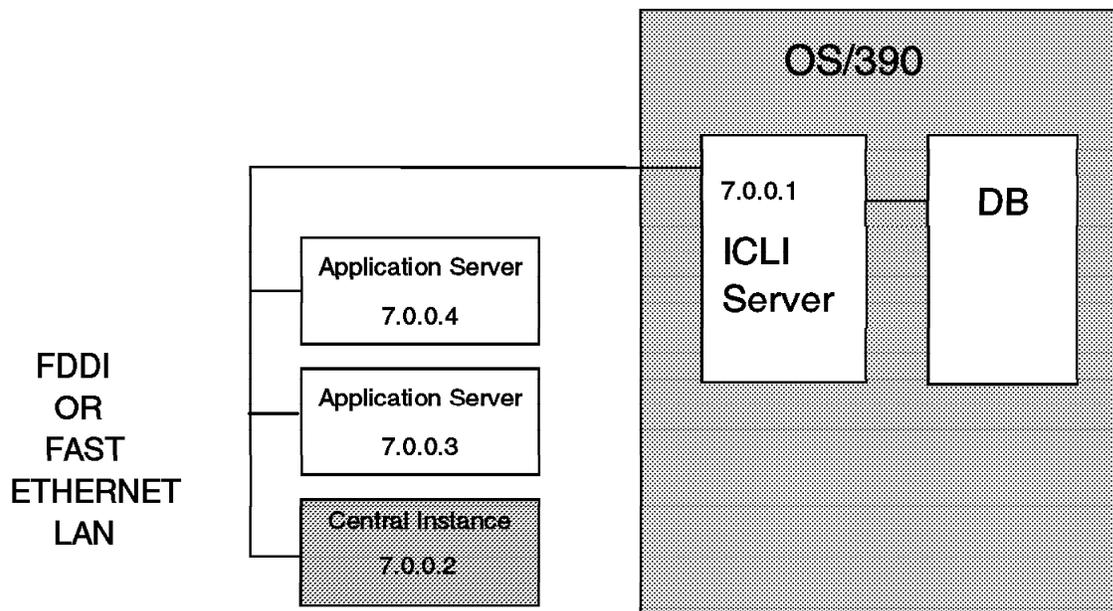
Figure 133. LAN Connection between Application Servers and a Database Server

F.7 Adding ICLI Servers: FDDI or Fast Ethernet LAN

This possibility is illustrated in Figure 134 on page 217. It is the same as that described in F.3, "Adding an ICLI Server" on page 208 except for the changes noted in F.6, "Adding Application Servers: FDDI or Fast Ethernet LAN."
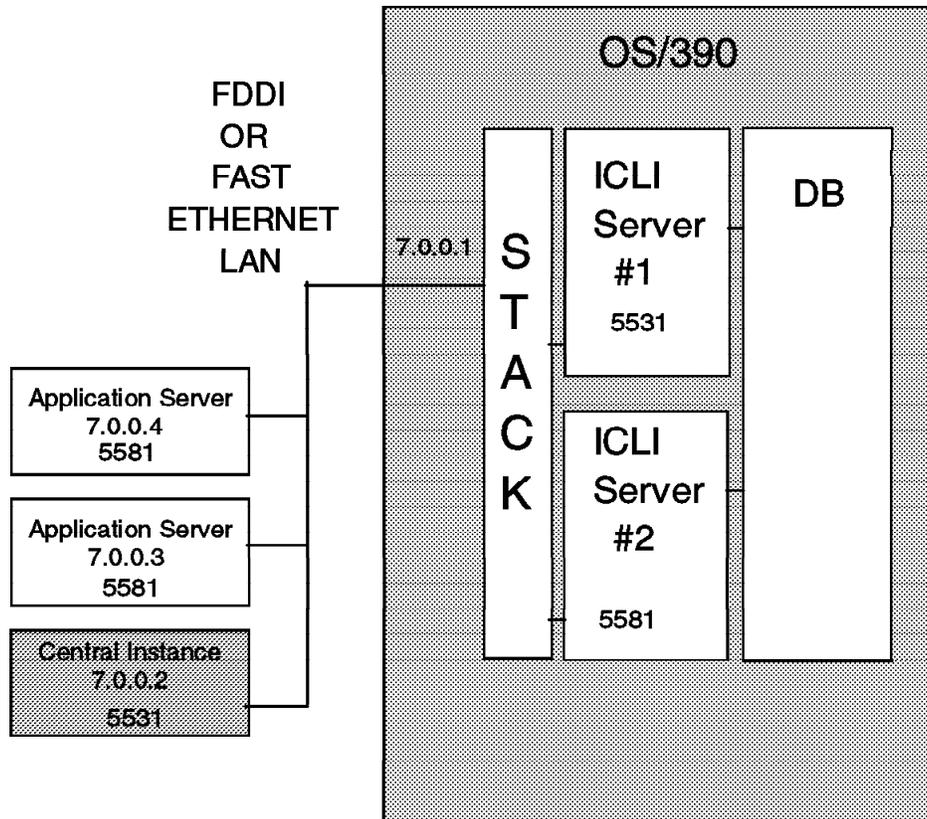
Figure 134. FDDI or Fast Ethernet LAN Connection with Two ICLI Servers

F.8 Adding Application Servers: LAN Connections through a Router

This possibility is illustrated in Figure 135 on page 218. A router, such as the IBM 2216, with a channel connection to the database server allows any LAN to be used for connecting from the application servers to the database server.

Specific configurations should be confirmed with SAP AG prior to making any hardware commitment; only certain environments are certified as supported, (while any LAN might provide a connection, the speed of the LAN might not be adequate for an SAP R/3 installation).

The specifications are much the same as in F.1, "Adding Application Servers - No Direct OS/390 Connection" on page 205 with the following exceptions:

- The router configuration must be performed according to the manufacturer's specifications for the LAN adapter to network 7.0.0 and the channel adapter 09C2 (example addresses in Figure 135 on page 218).

- The HCD definition on OS/390 for the channel address to be used to access the router (09C2) must be performed.

- The routing to the ICLI Server 6.6.8.1 from nodes 7.0.0.2, .3, and .4 is through the 7.0.0.5 Router.

- Static routes must be added on the application servers specifying 7.0.0.5 as the gateway to host 6.6.8.1.

- The High-Speed UDP Protocol *must* be used, since the Enhanced ESCON protocol is only for ESCON hardware.

- The ICLI configuration file would not be used, since the configuration is not supported using the Enhanced ESCON protocol.

- The configuration applies to application servers that are RS/6000 SP2 nodes, RS/6000 free-standing processors, or processors running Windows NT.
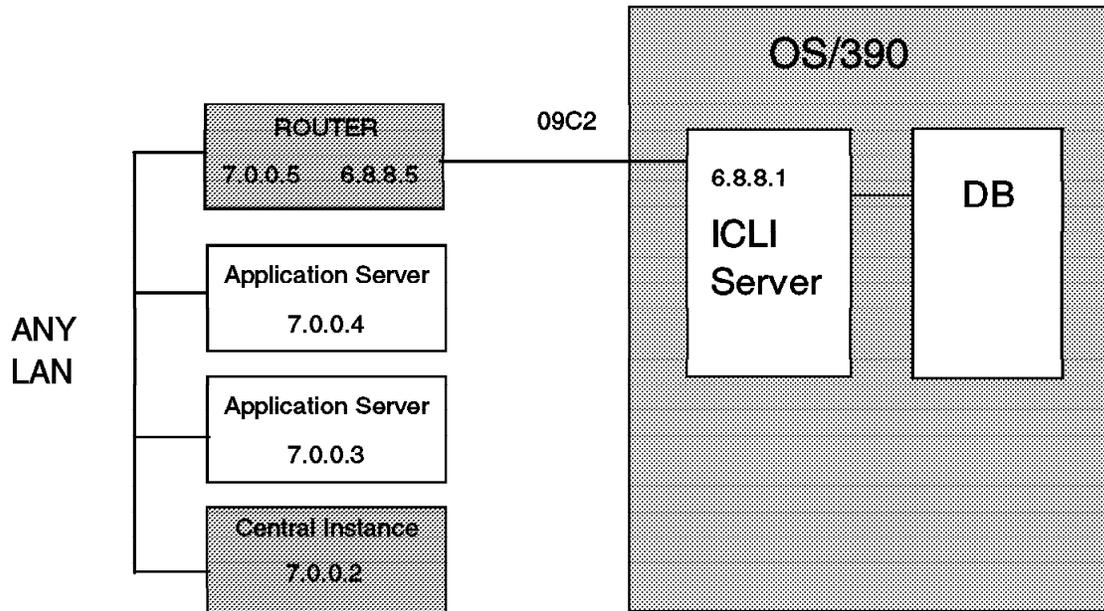

Figure 135. LAN Connection with a Router

Appendix G. DB2 Utilities

This appendix describes some of the DB2 utilities that were run after the
installation of the SAP R/3 DB2 for OS/390 system, and lists samples of the JCL
and control cards used for the utility execution. For specific information, *BC SAP
Database Administration Guide: DB2 for OS/390* documents processes delivered
with the SAP R/3 system for several utility functions, among them backup and
recovery. At the time of this writing, however, equivalent facilities do not yet
exist on the SAP R/3 DB2 for OS/390 platform, and any utilities needed were set
up and executed manually. Information about these utilities is included here for
reference. The redbook *Database Administration Experiences: SAP R/3 on DB2
for OS/390*, SG24-2078, contains more information on the use of utilities:

Although local naming conventions, procedures, standards, and operational
practices vary considerably in different installations, sample JCL is provided for
those who may not be familiar with these utilities. For specific information, refer
to *DB2 for OS/390 V5 Utility Guide and Reference*, SC26-8967.

Note: Some SAP R/3 table spaces are defined using a page size of 32K as well
as the more common page size of 4K. The use of the 32K page size is important
when specifying JCL and control statements for utilities that are sensitive to
page size, for example, DSN1COPY.

G.1 Gather Database Statistics: DB2 for OS/390 RUNSTATS

During the R/3 installation with R3INST, the DB2 for OS/390 RUNSTATS utility
gathers statistics from the SAP R/3 tables, indices, and table spaces defined in
the system, and updates selected columns in the DB2 catalog. These catalog
statistics are used during access path selection to determine the most efficient
method to retrieve data.

RUNSTATS elapsed time for our system was about one and one-half hours.

Note: At this time, you should be able to run parallel RUNSTATS jobs. The
sample JCL for two of the table spaces is as follows:

```
//DRAGONJ JOB (HBC,MVSJOB),'DRAGON',CLASS=A,MSGCLASS=Q,
//         NOTIFY=DRAGON
//*
//*      RUNSTATS PROTOTYPE
//*
//UTIL EXEC DSNUPROC,LIB=DSN510.SDSNLOAD,SYSTEM=DB2R,
//      UID='DB2R.SAPR3',UTPROC=''
//*
//SYSPRINT DD SYSOUT=*
//DSNUPROC.SYSIN  DD *
    RUNSTATS TABLESPACE LOAD00.BLOAD00 INDEX (ALL) REPORT NO

    RUNSTATS TABLESPACE LOAD00.SLOAD00 INDEX (ALL) REPORT NO
//
```

G.2 Database Image Copy: DB2 for OS/390 COPY

Upon completion of the installation, the SAP R/3 system must be backed up. It should be a regular procedure to back up catalog and directories. In our environment, this backup was accomplished by the following steps:

1. The DB2 for OS/390 system catalog was queried to determine which of the table spaces was the largest. In our case, the catalog query was written to select databases, table spaces, and SUM(NPAGES) for database tables owned by SAPR3, and sorted in descending order by SUM(PAGES).

2. This information was then used to set up a series of jobs to execute the DB2 for OS/390 COPY utility, and split the workload between the multiple jobs.

The elapsed time for all image copies to complete was approximately forty-five minutes. Twelve separate jobs were set up to accomplish the image copies of the 108 table spaces. The largest table space copied was reported to contain 77,760 active pages.

The sample JCL for ten of the table spaces is as follows:

```
//ITSO001   JOB (1,,GNECH,00000401,QPM,,SYSTEM),
//    NOTIFY=&SYSUID,CLASS=1,MSGCLASS=H,MSGLEVEL=(1,1)
//UTIL EXEC DSNUPROC,SYSTEM=DB2R,UID=COPY01,UTPROC=''
//COPYDD01 DD DSN=SYSADM.ES30E00.SES30E00.D00,
//    SPACE=(CYL,(250,20),RLSE),
//    DISP=(NEW,CATLG,CATLG),UNIT=3390,VOL=SER=DB2057
//COPYDD02 DD DSN=SYSADM.DDIC01.SDDIC01.D00,
//    SPACE=(CYL,(90,10),RLSE),
//    DISP=(NEW,CATLG,CATLG),UNIT=3390,VOL=SER=DB2057
//COPYDD03 DD DSN=SYSADM.ATAB.ATAB.D00,
//    SPACE=(CYL,(60,20),RLSE),
//    DISP=(NEW,CATLG,CATLG),UNIT=3390,VOL=SER=DB2057
//COPYDD04 DD DSN=SYSADM.DOKHL.DOKHL.D00,
//    SPACE=(CYL,(50,5),RLSE),
//    DISP=(NEW,CATLG,CATLG),UNIT=3390,VOL=SER=DB2057
//COPYDD05 DD DSN=SYSADM.SOURC00.BSOURC00.D00,
//    SPACE=(CYL,(200,50),RLSE),
//    DISP=(NEW,CATLG,CATLG),UNIT=3390,VOL=SER=DB2057
//COPYDD06 DD DSN=SYSADM.BTAB02.SBTAB02.D00,
//    SPACE=(CYL,(45,5),RLSE),
//    DISP=(NEW,CATLG,CATLG),UNIT=3390,VOL=SER=DB2057
//COPYDD07 DD DSN=SYSADM.BTAB16.SBTAB16.D00,
//    SPACE=(CYL,(25,5),RLSE),
//    DISP=(NEW,CATLG,CATLG),UNIT=3390,VOL=SER=DB2057
//COPYDD08 DD DSN=SYSADM.CLU00.SCLU00.D00,
//    SPACE=(CYL,(25,5),RLSE),
//    DISP=(NEW,CATLG,CATLG),UNIT=3390,VOL=SER=DB2057
//COPYDD09 DD DSN=SYSADM.POOL04.SPOOL04.D00,
//    SPACE=(CYL,(25,5),RLSE),
//    DISP=(NEW,CATLG,CATLG),UNIT=3390,VOL=SER=DB2057
//COPYDD10 DD DSN=SYSADM.POOL18.SPOOL18.D00,
//    SPACE=(CYL,(20,5),RLSE),
//    DISP=(NEW,CATLG,CATLG),UNIT=3390,VOL=SER=DB2057
//DSNUPROC.SYSIN   DD  *
  COPY TABLESPACE ES30E00.SES30E00 COPYDDN(COPYDD01)
  COPY TABLESPACE DDIC01.SDDIC01   COPYDDN(COPYDD02)
  COPY TABLESPACE ATAB.ATAB        COPYDDN(COPYDD03)
  COPY TABLESPACE DOKHL.DOKHL      COPYDDN(COPYDD04)
  COPY TABLESPACE SOURC00.BSOURC00 COPYDDN(COPYDD05)
  COPY TABLESPACE BTAB02.SBTAB02   COPYDDN(COPYDD06)
  COPY TABLESPACE BTAB16.SBTAB16   COPYDDN(COPYDD07)
  COPY TABLESPACE CLU00.SCLU00     COPYDDN(COPYDD08)
  COPY TABLESPACE POOL04.SPOOL04   COPYDDN(COPYDD09)
  COPY TABLESPACE POOL18.SPOOL18   COPYDDN(COPYDD10)
```

G.3 Update Space Statistics: DB2 for OS/390 STOSPACE

The STOSPACE utility was run to update the DB2 for OS/390 catalog tables to indicate how much space was allocated for storage groups and related table spaces and indices.

The elapsed time for this job was approximately 30 minutes.

G.4 Move DB2 Table Spaces

During testing, we had several table spaces that could not expand because the volume on which they resided was full. We created a job to move these table spaces. We also created two jobs to recover from errors which occurred during the table space move. This section contains copies of these jobs.

After the testing was completed, the following suggestion was found in the *BC SAP Database Administration Guide: DB2 for OS/390* to solve the volume full problem: if the volume is full, but the VSAM dataset has not yet reached 119 extents, it is possible to locate the statements that define the DB2 storage group and add a volume to the storage group. However, if all 119 extents are used, the ALTER TABLESPACE SQL statement is used to change the primary and secondary sizes and then the REORG utility is run.

For alternatives about moving data, see *DB2 for OS/390 V5 Administration Guide, Volumes I and II*.

G.4.1 Complete Job JCL

The following sample JCL was used to:

1. Stop the DB2 table space.
2. Define the new VSAM data sets.
3. Use DSN1COPY to copy the current table space to the new table space.
4. Rename the VSAM data sets (CURRENT $\rightarrow$ OLD and NEW $\rightarrow$ CURRENT).
5. Start the DB2 table space.
6. Use LISTCAT to list the current and old VSAM data sets.

```
//ITS001A       JOB (1,,GNECH,00000401,QPM,,SYSTEM),
//    NOTIFY=&SYSUID,CLASS=1,MSGCLASS=H,MSGLEVEL=(1,1)
//*-----------------------------------------------------------
//*  NOTE:  CHANGE @@@ TO THE DATABASE NAME
//*         IE. 'C @@@ DOKHL ALL'
//*         CHANGE %%% TO THE TABLESPACE NAME
//*          IE. 'C %%% DOKHLRRR ALL'
//*-----------------------------------------------------------
//*-----------------------------------------------------------
//*  STOP TABLESPACE YOU ARE GOING TO WORK WITH
//*-----------------------------------------------------------
//STOPTS  EXEC PGM=IKJEFT01
//STEPLIB  DD DSN=DSN510.SDSNLOAD,DISP=SHR
//SYSTSPRT DD SYSOUT=*
//SYSTSIN  DD *
  DSN SYSTEM(DB2R)
  -STOP DB(@@@) SPACE(%%%)
  END
//*-----------------------------------------------------------
//*  DEFINE NEW TABLESPACE
//*-----------------------------------------------------------
//DEFINE   EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
  DEFINE CLUSTER                                         -
     (NAME(DB2.DSNDBC.@@@.%%%.I0001.A001.NEW)            -
     MODEL(DB2.DSNDBC.@@@.%%%.I0001.A001)                -
     LINEAR                                              -
     VOLUMES(DB2052))                                    -
    DATA                                                 -
     (NAME(DB2.DSNDBD.@@@.%%%.I0001.A001.NEW))
//*-----------------------------------------------------------
//*  DO DSN1COPY OF TABLESPACE
//*-----------------------------------------------------------
//DSN1COPY EXEC PGM=DSN1COPY,PARM=''
//*----- CHANGE PARM='' TO PARM='32K' FOR 32K PAGE SIZE ------
//STEPLIB  DD DSN=DSN510.SDSNLOAD,DISP=SHR
//SYSPRINT DD SYSOUT=*
//SYSUT1   DD DISP=SHR,AMP=('BUFND=24'),
//      DSN=DB2.DSNDBC.@@@.%%%.I0001.A001
//SYSUT2   DD DISP=OLD,AMP=('BUFND=24'),
//      DSN=DB2.DSNDBC.@@@.%%%.I0001.A001.NEW
```

```
//*------------------------------------------------------------
//*  RENAME VSAM TABLESPACE
//*------------------------------------------------------------
//ALTER    EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
  ALTER    DB2.DSNDBC.@@@.%%%.I0001.A001                -
     NEWNAME(DB2.DSNDBC.@@@.%%%.I0001.A001.OLD)
  ALTER    DB2.DSNDBD.@@@.%%%.I0001.A001                -
     NEWNAME(DB2.DSNDBD.@@@.%%%.I0001.A001.OLD)
  ALTER    DB2.DSNDBC.@@@.%%%.I0001.A001.NEW            -
     NEWNAME(DB2.DSNDBC.@@@.%%%.I0001.A001)
  ALTER    DB2.DSNDBD.@@@.%%%.I0001.A001.NEW            -
     NEWNAME(DB2.DSNDBD.@@@.%%%.I0001.A001)
//*------------------------------------------------------------
//*  START TABLESPACE YOU ARE GOING TO WORK WITH
//*------------------------------------------------------------
//STARTTS  EXEC PGM=IKJEFT01
//STEPLIB  DD DSN=DSN510.SDSNLOAD,DISP=SHR
//SYSTSPRT DD SYSOUT=*
//SYSTSIN  DD *
  DSN SYSTEM(DB2R)
  -START DB(@@@) SPACE(%%%)
  END
//*------------------------------------------------------------
//*  LISTCAT TABLESPACES YOU WORKED WITH
//*------------------------------------------------------------
//LISTCAT  EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
  LISTC ENTRIES(DB2.DSNDBC.@@@.%%%.I0001.A001) ALL
  LISTC ENTRIES(DB2.DSNDBC.@@@.%%%.I0001.A001.OLD) ALL
//
```

Note: If you are moving a 32K page table space, change the PARM parameter to 32K on the DSN1COPY job step EXEC DD statement. If you do not do this, the DSN1COPY step will fail and the data will not get moved to the new table space.

G.4.2 Error Recovery Jobs

During our attempt to move the table spaces we had some problems. As a result, we created two recovery jobs:

- The first set of JCL was used after the DSN1COPY step failed. This set of JCL was used to rename a table space that had been renamed by the previous JCL stream. This was done to revert back to using the original table space due to time constraints.

  This was possible because we only renamed the original table space. It was not deleted until we were sure that the new table space was usable by SAP R/3, so it was still available.

  Note: A very likely reason for the DSN1COPY step to fail is that in trying to move a 32K page table space, the change to the PARM parameter is overlooked.

  Following is the sample JCL used to:

  1. Stop the DB2 table space.
  2. Rename the VSAM data sets (CURRENT→NEW & OLD→CURRENT).
  3. Start the DB2 table space.

4. Use LISTCAT to list the old and new VSAM data sets.

```
//ITSO01B         JOB (1,,GNECH,00000401,QPM,,SYSTEM),
//    NOTIFY=&SYSUID,CLASS=1,MSGCLASS=H,MSGLEVEL=(1,1)
//*------------------------------------------------------------
//*  NOTE:  CHANGE @@@ TO THE DATABASE NAME
//*          IE. 'C @@@ DOKHL ALL'
//*         CHANGE %%% TO THE TABLESPACE NAME
//*          IE. 'C %%% DOKHLRRR ALL'
//*------------------------------------------------------------
//*------------------------------------------------------------
//*  STOP TABLESPACE YOU ARE GOING TO WORK WITH
//*------------------------------------------------------------
//STOPTS  EXEC PGM=IKJEFT01
//STEPLIB  DD DSN=DSN510.SDSNLOAD,DISP=SHR
//SYSTSPRT DD SYSOUT=*
//SYSTSIN  DD *
  DSN SYSTEM(DB2R)
  -STOP DB(@@@) SPACE(%%%)
  END
//*------------------------------------------------------------
//*  RENAME VSAM TABLESPACE
//*------------------------------------------------------------
//ALTER    EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
  ALTER    DB2.DSNDBC.@@@.%%%.I0001.A001                -
    NEWNAME(DB2.DSNDBC.@@@.%%%.I0001.A001.NEW)
  ALTER    DB2.DSNDBD.@@@.%%%.I0001.A001                -
    NEWNAME(DB2.DSNDBD.@@@.%%%.I0001.A001.NEW)
  ALTER    DB2.DSNDBC.@@@.%%%.I0001.A001.OLD            -
    NEWNAME(DB2.DSNDBC.@@@.%%%.I0001.A001)
  ALTER    DB2.DSNDBD.@@@.%%%.I0001.A001.OLD            -
    NEWNAME(DB2.DSNDBD.@@@.%%%.I0001.A001)
//*------------------------------------------------------------
//*  START TABLESPACE YOU ARE GOING TO WORK WITH
//*------------------------------------------------------------
//STARTTS  EXEC PGM=IKJEFT01
//STEPLIB  DD DSN=DSN510.SDSNLOAD,DISP=SHR
//SYSTSPRT DD SYSOUT=*
//SYSTSIN  DD *
  DSN SYSTEM(DB2R)
  -START DB(@@@) SPACE(%%%)
  END
//*------------------------------------------------------------
//*  LISTCAT TABLESPACES YOU WORKED WITH
//*------------------------------------------------------------
//LISTCAT  EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
  LISTC ENTRIES(DB2.DSNDBC.@@@.%%%.I0001.A001) ALL
  LISTC ENTRIES(DB2.DSNDBC.@@@.%%%.I0001.A001.OLD) ALL
//
```

- The second set of JCL was used to complete a move operation which had failed earlier and the first error recovery JCL had been executed. This JCL is the same as the original JCL, except that the VSAM define step has been removed.

The following sample JCL was used to:

1. Stop the DB2 table space.
2. Use DSN1COPY to copy the current table space to the new table space.
3. Rename the VSAM data sets (CURRENT→OLD & NEW→CURRENT).
4. Start the DB2 table space.
5. Use LISTCAT to list the current and old VSAM data sets.

```
//ITSO01A        JOB (1,,GNECH,00000401,QPM,,SYSTEM),
//    NOTIFY=&SYSUID,CLASS=1,MSGCLASS=H,MSGLEVEL=(1,1)
//*------------------------------------------------------------
//*  NOTE:  CHANGE @@@ TO THE DATABASE NAME
//*         IE. 'C @@@ DOKHL ALL'
//*         CHANGE %%% TO THE TABLESPACE NAME
//*         IE. 'C %%% DOKHLRRR ALL'
//*------------------------------------------------------------
//*------------------------------------------------------------
//*  STOP TABLESPACE YOU ARE GOING TO WORK WITH
//*------------------------------------------------------------
//STOPTS  EXEC PGM=IKJEFT01
//STEPLIB  DD DSN=DSN510.SDSNLOAD,DISP=SHR
//SYSTSPRT DD SYSOUT=*
//SYSTSIN  DD *
  DSN SYSTEM(DB2R)
  -STOP DB(@@@) SPACE(%%%)
  END
//*------------------------------------------------------------
//*  DO DSN1COPY OF TABLESPACE
//*------------------------------------------------------------
//DSN1COPY EXEC PGM=DSN1COPY,PARM='32K'
//STEPLIB  DD DSN=DSN510.SDSNLOAD,DISP=SHR
//SYSPRINT DD SYSOUT=*
//SYSUT1   DD DISP=OLD, AMP=('BUFND=180'),
//      DSN=DB2.DSNDBD.@@@.%%%.I0001.A001
//SYSUT2   DD DISP=OLD, AMP=('BUFND=180'),
//      DSN=DB2.DSNDBD.@@@.%%%.I0001.A001.NEW
//SYSXLAT  DD *
/*
//*------------------------------------------------------------
//* RENAME VSAM TABLE SPACE
//*------------------------------------------------------------
//ALTER   EXEC  PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
 ALTER   DB2.DSNDBC.@@@.%%%.I0001.A001
   NEWNAME (DB2.DSNDBC.@@@.%%%.I0001.A001.OLD)
 ALTER   DB2.DSNDBD.@@@.%%%.I0001.A001
   NEWNAME (DB2.DSNDBD.@@@.%%%.I0001.A001.OLD)
 ALTER   DB2.DSNDBC.@@@.%%%.I0001.A001.NEW
   NEWNAME (DB2.DSNDBC.@@@.%%%.I0001.A001)
 ALTER   DB2.DSNDBD.@@@.%%%.I0001.A001.NEW
   NEWNAME (DB2.DSNDBD.@@@.%%%.I0001.A001)
//*------------------------------------------------------------
//*  START TABLESPACE YOU ARE GOING TO WORK WITH
//*------------------------------------------------------------
//STARTTS  EXEC PGM=IKJEFT01
//STEPLIB  DD DSN=DSN510.SDSNLOAD,DISP=SHR
//SYSTSPRT DD SYSOUT=*
//SYSTSIN  DD *
```

```
  DSN SYSTEM(DB2R)
  -START DB(@@@) SPACE(%%%)
  END
//*------------------------------------------------------------
//*  LISTCAT TABLESPACES YOU WORKED WITH
//*------------------------------------------------------------
//LISTCAT  EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
  LISTC ENTRIES(DB2.DSNDBC.@@@.%%%.I0001.A001) ALL
  LISTC ENTRIES(DB2.DSNDBC.@@@.%%%.I0001.A001.OLD) ALL
//
```

Appendix H. Example LOG Listings

This appendix shows the logs for various procedures that were performed.

H.1 DB2 Version 5 SYSLOG Listings Examples on Database Server

This section shows DB2 Version 5 SYSLOG listings.

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H.1.1 Start DB2 SYSLOG

```
-DB2R STA DB2
S DB2RMSTR
$HASP100 DB2RMSTR ON STCINRDR
IEF695I START DB2RMSTR WITH JOBNAME DB2RMSTR IS ASSIGNED TO USER SYSUS
 , GROUP TASKS
$HASP373 DB2RMSTR STARTED
IEF403I DB2RMSTR - STARTED - TIME=18.39.34
DSNY020I DSNYASCP -DB2R MEASURED USAGE DATA IS NOT BEING RECORDED FOR
DB2R
DSNZ002I -DB2R DSNZINIT SUBSYSTEM DB2R SYSTEM PARAMETERS LOAD MODULE
NAME IS DSNZPARM
S IRLMPROC
IRR813I NO PROFILE WAS FOUND IN THE STARTED CLASS FOR 464
        IRLMPROC WITH JOBNAME IRLMPROC. RACF WILL USE ICHRINO3.
$HASP100 IRLMPROC ON STCINRDR
IEF695I START IRLMPROC WITH JOBNAME IRLMPROC IS ASSIGNED TO USER
++++++++
$HASP373 IRLMPROC STARTED
IEF403I IRLMPROC - STARTED - TIME=18.39.38
DXR117I RLM9 INITIALIZATION COMPLETE
DSNY001I -DB2R SUBSYSTEM STARTING
DSNJ127I -DB2R SYSTEM TIMESTAMP FOR BSDS= 97.050 18:36:35.99
DSNJ001I -DB2R DSNJW007 CURRENT COPY 1 ACTIVE LOG 472
DATA SET IS DSNAME=DSN510.LOGCOPY1.DS03,
STARTRBA=000785DC0000,ENDRBA=00079D0FFFFF
DSNJ099I -DB2R LOG RECORDING TO COMMENCE WITH 473
STARTRBA=000788DF4000
S DB2RDBM1
IRR813I NO PROFILE WAS FOUND IN THE STARTED CLASS FOR 475
        DB2RDBM1 WITH JOBNAME DB2RDBM1. RACF WILL USE ICHRINO3.
$HASP100 DB2RDBM1 ON STCINRDR
IEF695I START DB2RDBM1 WITH JOBNAME DB2RDBM1 IS ASSIGNED TO USER
++++++++
$HASP373 DB2RDBM1 STARTED
IEF403I DB2RDBM1 - STARTED - TIME=18.39.50
DSNR001I -DB2R RESTART INITIATED
DSNR003I -DB2R RESTART...PRIOR CHECKPOINT RBA=000788DEEE52
DSNR004I -DB2R RESTART...UR STATUS COUNTS 482
IN COMMIT=0, INDOUBT=0, INFLIGHT=0, IN ABORT=0
DSNR005I -DB2R RESTART...COUNTS AFTER FORWARD 483
RECOVERY
IN COMMIT=0, INDOUBT=0
DSNR006I -DB2R RESTART...COUNTS AFTER BACKWARD 484
RECOVERY
INFLIGHT=0, IN ABORT=0
DSNR002I -DB2R RESTART COMPLETED
DB2R022I -DB2R DSNYASCP 'STA DB2' NORMAL COMPLETION
```

Figure 136. SYSLOG of DB2 V5 Start

H.1.2 Stop DB2 SYSLOG

```
-DB2R STO DB2
DSNY002I -DB2R SUBSYSTEM STOPPING
IEF404I DB2RDBM1 - ENDED - TIME=18.36.35
IEF352I ADDRESS SPACE UNAVAILABLE
$HASP395 DB2RDBM1 ENDED
IEA989I SLIP TRAP ID=X33E MATCHED.  JOBNAME=*UNAVAIL, ASID=00
DB2R022I -DB2R DSNYASCP 'STO DB2' NORMAL COMPLETION
IEF404I DB2RMSTR - ENDED - TIME=18.36.36
$HASP395 DB2RMSTR ENDED
IEA989I SLIP TRAP ID=X33E MATCHED.  JOBNAME=*UNAVAIL, ASID=00
DSN3104I -DB2R DSN3ECOX - TERMINATION COMPLETE
DSN3100I -DB2R DSN3ECOX - SUBSYSTEM DB2R READY FOR START COMM
DXR110I RLM9 STOP COMMAND ACCEPTED
DXR121I RLM9 END-OF-TASK CLEANUP SUCCESSFUL
IEF404I IRLMPROC - ENDED - TIME=18.36.37
IEF352I ADDRESS SPACE UNAVAILABLE
$HASP395 IRLMPROC ENDED
```

Figure 137. SYSLOG of DB2 V5 Stop

H.2 SAP Central Instance Log Listings Examples (on Central Instance)

This section exhibits log file listings seen on the AIX processors.

H.2.1 Start SAP

```
Trace of System startup of R/3 System RED on Wed Feb 19 11:42:59 EST 1997

Starting SAP-Collector Daemon
-----------------------------
 saposcol already running

Starting SAP R/3 Instance
-----------------------------

SAP-R/3-Startup Program V1.7 (92/10/21)
---------------------------------------

Starting at 1997/02/19 11:43:00
Startup Profile: "/usr/sap/RED/SYS/profile/START_DVEBMGS00_sp21n09"

Execute Pre-Startup Commands
----------------------------
(12142) Local: /usr/sap/RED/SYS/exe/run/sapmscsa -n pf=/usr/sap/RED/SYS/profile/
RED_DVEBMGS00_sp21n09
/usr/sap/RED/SYS/exe/run/sapmscsa: SCSA is attached and useable.
/usr/sap/RED/SYS/exe/run/sapmscsa: finished.
(12142) Local: ln -s -f /usr/sap/RED/SYS/exe/run/msg_server ms.sapRED_DVEBMGS00

/usr/sap/RED/SYS/exe/run/sapmscsa: finished.
(12142) Local: ln -s -f /usr/sap/RED/SYS/exe/run/msg_server ms.sapRED_DVEMGS00
(12142) Local: ln -s -f /usr/sap/RED/SYS/exe/run/disp+work dw.sapRED_DVEBGS00
(12142) Local: ln -s -f /usr/sap/RED/SYS/exe/run/rslgcoll co.sapRED_DVEBMS00
(12142) Local: ln -s -f /usr/sap/RED/SYS/exe/run/rslgsend se.sapRED_DVEBMS00

Starting Programs
-----------------
(18142) Starting: local ms.sapRED_DVEBMGS00 pf=/usr/sap/RED/SYS/profile/JS_DVEB
MGS00_sp21n09
(13536) Starting: local dw.sapRED_DVEBMGS00 pf=/usr/sap/RED/SYS/profile/JS_DVEB
MGS00_sp21n09
(25826) Starting: local co.sapRED_DVEBMGS00 -F pf=/usr/sap/RED/SYS/profil/RED_D
VEBMGS00_sp21n09
(24036) Starting: local se.sapRED_DVEBMGS00 -F pf=/usr/sap/RED/SYS/profil/RED_D
VEBMGS00_sp21n09
(12142) Waiting for Child Processes to terminate.
 Instance on host sp21n09 started
```

Figure 138. startsap_sp21n09_00.log

H.2.2 Stop SAP

```
Trace of System shutdown of R/3 System RED on Wed Feb 19 14:19:11 EST 1997



Stopping the SAP R/3 RED Processes
----------------------------------
 Instance on host sp21n09 stopped
 Waiting for cleanup of resources.....
```

Figure 139. stopsap_sp21n09_00.log

H.3 Tivoli Products Object Database Restore Listing

```
root@sp21n07> wbkupdb -r -d /var/spool/Tivoli/backups/fw_co_se
Restoring the database files for sp21n07...
.......................................................
....................
Restoring the database files for sp21n08...
."
Restoring the database files for sp21n09...
."
Restoration Complete.
root@sp21n07> check_os
 --> ps -ef | grep os
    root 16696      1   0 16:02:58      - 0:00 /usr/lpp/diagnostics/bin/diagd
    root 20892  4446   0 17:31:53      - 0:06 oserv -p 94 -I -k /var/spool/Tivoli/sp21n07.db
    root 23306 20892   0 13:50:13      - 0:00 oserv-h restart
 --> ps -ef | grep server
    root 16036 20892   0 17:31:54      - 0:06 tec_server
    root 20396 16036   0 17:31:56      - 0:31 ./dataserver -dmaster.dat -eerrorlog_TEC
    root 24870 16036   0 17:32:37      - 0:00 ./backupserver -eerrorlog_TEC_BACKUP
 --> odadmin odlist
Region      Disp Flags  Port         IPaddr    Hostname(s)
2109603707    1   ct-    94      192.168.4.7   sp21n07.msc.itso.ibm.com,sp21n07
              2   ct-    94      192.168.4.8   sp21n08.msc.itso.ibm.com
              3   ct-    94      192.168.4.9   sp21n09.msc.itso.ibm.com
 -->  wstatesvr
The Tivoli/Enterprise Console Server is running.
DONE
root@sp21n07> odadmin shutdown all
root@sp21n07> check_os
 --> ps -ef | grep os
    root 16696      1   0 16:02:58      - 0:00 /usr/lpp/diagnostics/bin/diagd
 --> ps -ef | grep server
    root 20396      1   0 17:31:56      - 0:31 ./dataserver -dmaster.dat -eerrorlog_TEC
    root 24870      1   0 17:32:37      - 0:00 ./backupserver -eerrorlog_TEC_BACKUP
 --> odadmin odlist
o_self: destination dispatcher unavailable
 wstatesvr is NOT running
DONE
root@sp21n07> kill 20396 24870
root@sp21n07> check_os
 --> ps -ef | grep os
    root 16696      1   0 16:02:58      - 0:00 /usr/lpp/diagnostics/bin/diagd
 --> ps -ef | grep server
 --> odadmin odlist
o_self: destination dispatcher unavailable
 wstatesvr is NOT running
DONE
root@sp21n07> odadmin start all
root@sp21n07> check_os
 --> ps -ef | grep os
    root 16696      1   0 16:02:58      - 0:00 /usr/lpp/diagnostics/bin/diagd
    root 24932  4446   3 13:51:29      - 0:00 oserv -p 94 -I -k /var/spool/Tivoli/sp21n07.db
 --> ps -ef | grep server
 --> odadmin odlist
Region      Disp Flags  Port         IPaddr    Hostname(s)
2109603707    1   ct-    94      192.168.4.7   sp21n07.msc.itso.ibm.com,sp21n07
              2   ct-    94      192.168.4.8   sp21n08.msc.itso.ibm.com
              3   ct-    94      192.168.4.9   sp21n09.msc.itso.ibm.com
 -->  wstatesvr
The resource type EventServer was not found.
DONE
root@sp21n07> exit
```

Figure 140. Listing of a Tivoli Object Database Restore (after a Problem with T/EC)

H.4 TME 10 Enterprise Console Sybase Database Reset Listing

```
root@sp21n07> wtdbspace
Summary:
Resource (Approximate)        Total       Used       Free      %Used      %Free
--------------------------------------------------------------------------------
Data Space:                 30.00 MB   23.73 MB    6.27 MB    79.11      20.89
Log Space:                  30.00 MB   28.44 MB    1.56 MB    94.79       5.21
Event Space:                    7475       5914       1561    79.12      20.88
·1' +  Done              tivoli
root@sp21n07> wtdbresetlog
Reset of Transaction Log Succeeded
root@sp21n07> wtdbspace
Summary:
Resource (Approximate)        Total       Used       Free      %Used      %Free
--------------------------------------------------------------------------------
Data Space:                 30.00 MB   23.75 MB    6.25 MB    79.17      20.83
Log Space:                  30.00 MB    0.08 MB   29.92 MB     0.25      99.75
Event Space:                    7474       5917       1557    79.17      20.83
root@sp21n07> wtdbclear -?
wtdbclear: Not a recognized flag: ?
Usage: wtdbclear [-S <server>] [-e] [-l] [-c <class>] [-r <severity>]
[-s <status>] [-t <seconds>] [-f]

root@sp21n07> wtdbclear -elt 4000
Clearing the T/EC logs Succeeded
Clearing the event repository Succeeded
root@sp21n07> wtdbspace
Summary:
Resource (Approximate)        Total       Used       Free      %Used      %Free
--------------------------------------------------------------------------------
Data Space:                 30.00 MB   12.14 MB   17.86 MB    40.46      59.54
Log Space:                  30.00 MB   22.01 MB    7.99 MB    73.35      26.65
Event Space:                   15379       6223       9156    40.46      59.54
root@sp21n07>
```

Figure 141. Listing of a T/EC Sybase Database Reset

Appendix I. SAP to OS/390 Printing Using PSF for AIX and PSF/MVS

```
┌─ References ──────────────────────────────────────────────────┐
│                                                               │
│  •  SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B, │
│     SC33-7962                                                  │
│                                                               │
│  •  AFP Printing for SAP Using R/3 and R/2, SG24-4629         │
│                                                               │
│  •  PSF for AIX: Print Administration Version 2.1, S544-3817  │
│                                                               │
│  •  PSF/MVS: System Programming Guide, S544-3672              │
│                                                               │
│  •  AFP Upload Configuration Guide using TCP/IP, S544-5423    │
│                                                               │
│  •  AFP Upload Configuration Guide using SNA, S544-5422       │
│                                                               │
└───────────────────────────────────────────────────────────────┘
```

This appendix describes the steps we took to enable printing from SAP R/3 to OS/390-attached printers with AFP support.

This solution allows you to use AFP printers attached to the OS/390 to print documents from the SAP R/3 system, utilizing IBM's PSF family of products. Note that AFP printing support is not unique to R/3 on DB2 for OS/390 and is available for any AIX system.

In order for SAP R/3 to use this support, PSF/MVS and PSF for AIX must be installed with the SAP R/3 Transform Feature (SAP2AFP). SAP2AFP is a relatively new method to connect AFP printers with SAP R/3. It will translate both the SAP OTF and ABAP report formats. A direct translation into AFP's native data stream (AFPDS) is performed for SAP's OTF data. ABAP Report format is translated into EBCDIC line data, which must then be converted using PSF for AIX's ACIF program LINE2AFP.

We have included a graphical depiction of the configuration in Figure 142 on page 238, followed by a step-by-step description of the process flow.
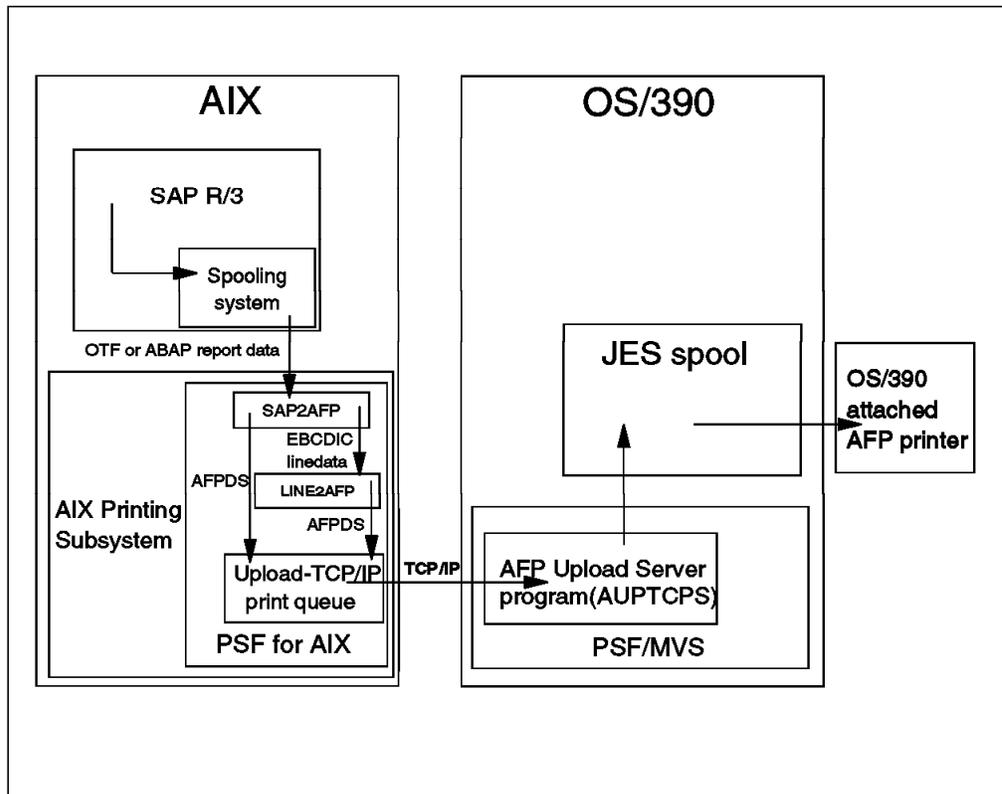
Figure 142. Graphical Representation of Configuration and Process Flow

The general processing flow is as follows.

1. A spool request is generated within SAP R/3. When the spool request is released for printing, an output request is created.

2. The output request is passed to the SAP spooling system.

3. For this solution, a special output device must be created within SAP R/3 using a special device type (IBMAFP or IBMAFP3) and Access Method of type Z. The SAP spooling system will execute a "custom print" user exit named in the SAP instance profile whenever handling output requests for printers of type Z. This will invoke the SAP2AFP conversion program.

4. SAP2AFP converts the SAP R/3 output into either an AFP data stream (if it was originally OTF data), or EBCDIC linedata (if it was ABAP report data).

5. SAP2AFP then calls the appropriate AIX shell script, either MVSAFP (for OTF data) or MVSLD (for ABAP data). MVSLD will execute an additional conversion via the LINE2AFP program. MVSAFP or MVSLD will then enqueue the file to a PSF for AIX print queue running AFP Upload.

6. The AFP Upload client on AIX accepts the print file and sends it to the AFP Upload server running on the OS/390.

7. The server places the print data sets onto the JES spool. Many print file attributes including class, forms, and destination are transmitted to the OS/390.

A general overview of the configuration can also be seen in chapter 14 of *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*. There the AIX and OS/390 software prerequisites are listed for both TCP/IP and SNA environments.

The tasks that we performed to get things working can be broken up into four phases.

1. Check and install all software prerequisites.

2. Create a remote AIX print queue definition pointing to an IBM 3130 printer and test it with simple ASCII output.

3. Create an SAP printer definition referencing the remote AIX queue and test printing ASCII and POSTSCPT output from SAP.

4. Create a PSF for AIX print queue using the feature called AFP Upload-TCP/IP referencing an OS/390 attached IBM 3130 and test printing OTF output from SAP.

I.1 Check and Install All Prerequisites

TCP/IP was the selected protocol in the ITSO environment. We have listed the software prerequisites below.

Software Prerequisites for PSF for AIX Feature

AFP Upload-TCP/IP

- PSF for AIX(5765-505), Version 2.1 or later with APAR IX59972(AFP Upload) with the OTF Transform(SAP2AFP) feature.

- PSF for OS/390(5795-040), Version 2.2 or later with APAR OW21017 with the AFP Upload for AIX feature.

- PL/I Version 2.3.0 or later(run-time library) the AFP Upload for AIX feature.

In the ITSO environment, PSF for OS/390 Version 2.2 with APAR OW21017 had already been installed, and an IBM 3130 AFP printer configured. The Pl/I Version 2.3.0 (run time library) was also already installed. On the AIX side, we had to install the PSF for AIX Base software as well as the OTF Transform feature.

Additionally, the PTF U458586 for PSF for AIX(APAR IX59972) had to be downloaded from //http:/service.software.ibm.com/aix.ww/aixfixes and applied. Note that this PTF contains the AFP Upload software, and will add/change some smit screens.

I.2 Configure a Remote AIX Print Queue

The purpose of this section is simply to verify the functionality of the AIX printing subsystem.

The tasks required to configure a remote AIX print queue are well documented and will not be covered in detail here. Briefly, we used the AIX tool, smit, to configure a remote AIX print queue with Standard processing. The target printer was an IBM 3130, so we selected **BSD** as the Type of print spooler on remote server. The print queue can be tested by issuing the qprt command as shown:

riscsap:/ >qprt -pRED1 /etc/motd

This will send the system message of the day to the print queue RED1 to verify functionality.

I.3 Configure an SAP R/3 Printer Definition

The tasks required to setup an SAP printer definition are also well documented. Use the SAP transaction spad to get to the main spool output configuration screen. Create a new output device with a 4-character name (ours was RED1). Select a Print Type of **L** and specify the host printer as the local queue name of the remote queue created in step 1. Test this new printer definition by sending some ASCII and POSTCRIPT output to it from SAP.

I.4 Configure SAP to OS/390 Attached Printing with AFP Support

There are 12 subtasks involved in the final phase of the setup, as listed below:

1. Add a PSF for AIX print queue with the AFP Upload-TCP/IP feature.

2. Configure an AFP printer using PSF for OS/390.

3. Configure the AFP Upload host server program.

4. Verify that device types IBMAFP and IBMAFP3 are available in R/3.

5. Activate the Access Method type Z in SAP R/3.

6. Update the SAP R/3 spooler host profile with the custom print exit.

7. Create an AFP printer definition in SAP R/3.

8. Connect the SAP R/3 printer definition to the AFP Upload-TCP/IP queue.

9. Start the PSF for OS/390 AFP printer.

10. Start the AFP Upload host server program.

11. Test the configuration.

12. Specify a default SYSOUT class destination.

Sections I.4.1, "Add a PSF for AIX Print Queue with AFP Upload-TCP/IP Feature" through I.4.12, "Customize the MVSAFP and MVSLD scripts" on page 243 provide details on the configuration tasks we performed. Note that these tasks do not necessarily need to be performed in the order shown.

I.4.1 Add a PSF for AIX Print Queue with AFP Upload-TCP/IP Feature

TCP/IP was the selected protocol in the ITSO environment. We used the AIX SMIT utility and took the following menu path:

```
PSF for AIX - Printing and Configuration->
Administer PSF for AIX->
Manage a PSF for AIX Printer (such as add and remove printers)->
Add a Printer or PSF Queue->
Upload-TCP/IP - Add an Upload-TCP/IP printer
```

Enter the MVS printer name and the IP address of the OS/390 host. We used the default port number 6001. The MVS server program will be listening on that port. The print queue should be up after successful creation using smit.

Note: We had to manually add the user lpq to the printq group so that it could change ownership of the /etc/qconfig.bin file.

I.4.2 Configure an AFP Printer Using PSF for OS/390

You will have to create a startup procedure for the PSF for OS/390 AFP printer if
one does not already exist. The installation of PSF for OS/390 put sample PSF
printer startup procedures into the SYS1.PROCLIB dataset. For more detail refer
to *PSF/MVS: System Programming Guide*. Once created, execute the started
task on the selected OS/390 host.

I.4.3 Configure the AFP Upload Host Server Program

We created a started task consisting of sample JCL statements found on page 19
of *AFP Upload for TCP/IP Users Guide*. It should execute the host server
program AUPTCPS. Once created, we executed the started task on the selected
OS/390 host. For convenience the JCL is duplicated below:

```
//UPLOAD   PROC
//STEP     EXEC PGM=AUPTCPS
//STEPLIB  DD  DSN=AUP.SAUPLOAD,DISP=SHR
//         DD  DSN=PLI.V2R3M0.PLILINK,DISP=SHR
//         DD  DSN=PLI.V2R3M0.SIBMLINK,DISP=SHR
//SYSPRINT DD  SYSOUT=*
```

I.4.4 Verify Device Types IBMAFP and IBMAFP3 Are Available in R/3

First check if device types IBMAFP and IBMAFP3 are already installed. They
should be in versions 3.0 and later. Use the R/3 transaction spad and follow the
menu path:

```
Full Administration ->Device Types
```

You should see the device types IBMAFP and IBMAFP3 in the list.

I.4.5 Activate the Access Method Type Z in SAP R/3

We had to activate the Access Method type Z in our 4.0B system. To check if it
has already been activated, use the SAP R/3 transaction spad and then take the
following path.

```
Output Devices->
Display->
```

To display the properties of an existing printer definition, position the cursor on
the Access Method field and bring up the listbox of available choices for type Z.
To activate it, run ABAP program RSPO0049. Use the R/3 transaction se38. On
the first screen you see, enter the program name RSPO0049 and click on the
execute button. This will activate the Access Method type Z, which will be used
later when the AFP printer definition is created in SAP R/3.

I.4.6 Update the SAP R/3 Spooler Host Profile with ′Custom Print′ Exit

Information on the special SAP instance profile for custom printing can be found
in *AFP Printing for SAP Using R/3 and R/2*. These parameters must be added to
the SAP instance profile for the host where the selected spooler process and
conversion will take place. Note that this does not have to be the central
instance. The entries we made via SAP transaction RZ10 are as follows:

```
rspo/host_spool/custom_print        /usr/lpp/psf/bin/sap2afp -d &S -f &F
rspo/host_spool/custom_query        /usr/lpp/psf/bin/sap2afp -d &S -q
```

SAP R/3 printers of Access Method Z will use this exit. If the target printer is
found in the printers.tab file described in section I.4.7, "Create an AFP Printer
Definition in SAP R/3" on page 242, then the appropriate conversion will be

performed. This converted file will be used as input to the appropriate script called to enqueue the file for printing. These scripts are named MVSLD, MVSAFP, and MVSQUE, and can be found in the AIX directory /usr/lpp/psf/sap2afp.

I.4.7 Create an AFP Printer Definition in SAP R/3

You must define an SAP R/3 output device with certain attributes. Use the SAP transaction spad and then take the following menu path:

```
Full Administration ->Change ->Output Devices ->Create
```

Ensure the device type is either IBMAFP or IBMAFP3, and the access method is of type Z. The field Host Printer is irrelevant, so you may enter dummy, and the device class may remain blank.

I.4.8 Connect the SAP R/3 Printer Definition to the AFP Upload-TCP/IP Queue

To connect the SAP R/3 printer definition with the PSF for AIX print queue, create an entry in the AIX file /usr/lpp/psf/sap2afp/printer.tab like the one shown.

```
Dest=RED3 System=MVS Queue=pok313e Node=9.12.14.208
```

Ensure the following:

- Dest= (4-character name given to new printer definition in SAP R/3)
- System= (MVS)
- Queue= (name of the AFP printer on OS/390)
- Node= (IP address of the host where the AFP Upload server program runs)

I.4.9 Start the PSF for OS/390 AFP Printer

The JCL procedure created to run the PSF for OS/390 AFP printer was named POK3130E. Logon to the selected OS/390 and issue the console command to start the AFP printer. The command we used is shown below.

```
S POK3130E
```

I.4.10 Start the AFP Upload Host Server Program

The JCL procedure we created to run the AFP Upload host program was named AFPUPTCP. We simply issued the console command to execute the started task AFPUPTCP as shown.

```
S AFPUPTCP
```

This must be issued on the same system on which the PSF for OS/390 AFP printer is running.

I.4.11 Test the Configuration

Logon to the SAP R/3 system with an authorized user ID and create an output request. Ensure that you select the correct 4-character AFP printer definition. Also ensure that you have the option **Print Immediately** checked so that a spool request is generated. You can check the status via the SAP transaction SP01. If there is no error status, check on OS/390 for the output. There should be a JES2 sysout dataset with the name and SYSOUT class of the AFP Upload started task. See section I.4.12, "Customize the MVSAFP and MVSLD scripts" on page 243 for information about how to control the destination and class.

I.4.12 Customize the MVSAFP and MVSLD scripts

The MVSLD script can be modified to perform the necessary conversion of EBCDIC linedata to AFPDS using LINE2AFP. You may also modify the scripts MVSAFP and MVSLD to specify things like a default sysout class, destination, and forms via the passthru parameter. We have also been informed, since our implementation, that there is a later version of SAP2AFP that will pass the SAP user ID associated with the output up to the JES spool for easier identification. More information can be found in :*AFP Upload Configuration Guide using TCP/IP*.

Note that you will have to modify the scripts that SAP2AFP calls after conversion which actually enqueue the output. These scripts are MVSLD, MVSAFP, and MVSQUE, and are found in the /usr/lpp/psf/sap2afp directory.

In the following example, we have included our modified version of the MVSLD file.

```
#!/bin/ksh
#*-----------------------------------------------------------------*#
#*                                                                 *#
#*   MVSLD     :  Enqueue SAP2AFP Linedata-file for MVS system     *#
#*                                                                 *#
#*             Arg : Queue, Node, Filename, NormFont, BoldFont,    *#
#*                   PageDef, Copies, ·FormDef'                     *#
#*                                                                 *#
#*             Req :  -                                            *#
#*                                                                 *#
#*-----------------------------------------------------------------*#
#
#if [[ -z $8 ]]; then
#   enq -c -P$1 -odatatype=line -occ=yes -occtype=a -otrc=yes -ochars=$4,
#$5 -opagedef=$6 -ocopies=$7 -opassthru=class=i,destination=pok3130e $3
#else
#   enq -c -P$1 -odatatype=line -occ=yes -occtype=a -otrc=yes -ochars=$4,
#$5 -opagedef=$6 -ocopies=$7 -opassthru=class=i,destination=pok3130e
#-oformdef=$8 $3
#fi
#
/usr/lpp/psf/bin/line2afp cc=yes cctype=a trc=yes chars=$4,$5 pagedef=$6
=$8 inputdd=$3 outputdd=$3.afp 1>/tmp/line2afp.out 2>/tmp/line2afp.err
enq -P$1 -oformdef=$8 -opassthru=class=a,destination=pkedps1.local,forms=docl
$3.afp
src=${ERRNO}
#
rm -f $3
rm -f $3.afp
#
return ${src}
```

Appendix J. Problem Determination

This appendix describes some of the techniques used to determine which of the components might be the cause of a problem. The section is not meant to be a comprehensive description of the general topic of problem determination; it only describes the procedures we actually used.

J.1 OS/390 Problem Determination Procedures

Use standard procedures.

J.2 DB2 Problem Determination Procedures

Use standard procedures.

J.3 AIX Problem Determination Procedures

Use standard procedures.

J.4 SAP R/3 Problem Determination Procedures

In order to identify problems in SAP R/3, use the standard SM21 transaction. Also, use the ST22 transaction to see the ABAP dumps.

Logs of the SAP R/3 process are in the /usr/sap/RED/DVEBMGS00/work directory. The file name for the log is dev_*. These files must be analyzed when problems occur. They are especially useful when SAP R/3 does not properly start.

Other logs to analyze are sapstart.log and stder*.

In the same directory, look at the file udpc.err for other error information.

J.5 ICLI Determination Procedures

In our environment, the ICLI server log is under the root directory, and the name is ICLI.$<PID>$.err, where $<PID>$ is the process identifier of the ICLI server.

Trace logs can be created by using ICLI_TRACE_LEVEL as described in *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*, SC33-7962.

A detail trace log can be seen in file ICLItrace.$<PID>$.err.

J.6 Starting SAP R/3 Example

This section shows the different logs and information you can get from the systems when you start SAP R/3.

After the DB2 subsystem is running, do the following:

1. Start the ICLI server on OS/390.

2. Issue `startsap` on the RS/6000.

J.6.1 ICLI Server Log and Trace Files

The procedures here can be used to verify that the ICLI server is executing. The trace and log files can be used to identify problems or to cross-check ICLI information with data from OS/390, such as system dump data.

After starting the ICLI server, check the following:

- The OMVS process ID of ICLI server
- The ICLI server log

J.6.1.1 OMVS Thread after Starting ICLI Server

The display command shows only one active thread. On OS/390, issue the following to find the OMVS PID:

`D OMVS,ASID=ALL`

Then issue the following to view the active thread:

`D OMVS,PID=201326594`

Figure 143 shows the active thread.

```
 D OMVS,PID=201326594
 BPXO040I 16.26.35 DISPLAY OMVS 311
 OMVS     000E ACTIVE
 USER    JOBNAME  ASID       PID      PPID STATE   START    CT_SECS
 ICLIRUN  ICLI    006F  201326594        1 1R    16.25.54       .881
   LATCHWAITPID=         0 CMD=/usr/sbin/iclisudp
  THREAD_ID       TCB@    PRI_JOB  USERNAME   ACC_TIME SC  STATE
  OBA39B1000000001 008DEA70 OMVS                   .682 GNM  Y
```

Figure 143. Active OpenEdition Thread after Starting ICLI Server

J.6.1.2 ICLI Trace after Starting ICLI Server

On OS/390, issue:

`oedit ICLI.201326594.err`

The ICLI log ICLI.201326594.err looks like the output shown in Figure 144. It shows that the ICLI server is waiting for a connection.

```
 (0001) ICLI1011  ICLI Server (UDP+ version 21.08) started with port 5531
       ICLI trace level: (2).
 Waiting for connection request by ICLI clients.
       Time: 848093159.265054 = (Fri) 1997 Feb 14 21:25:59.265054
```

Figure 144. ICLI Server Log after Starting ICLI Server

Here the ICLI_TRACE_LEVEL was set to 2.

J.6.1.3 DB2 Thread after Starting ICLI Server

Immediately after starting the ICLI server, there are no active DB2 threads. From SPUFI, issue the following to confirm this:

```
-display thread(*)
```

J.6.1.4 Problems

If you have no active OMVS thread, check:

1. The ICLI Server trace to find the error.
2. The status of your ESCON device on the host. Check whether the UDP is in an A-BUSY state.
3. The ESCON definitions on the AIX processor.

J.6.2 Starting SAP R/3

J.6.2.1 Number of SAP R/3 Processes

When you start SAP R/3, depending on your SAP R/3 profile, you start several processes. To see your start profile, under omvs issue:

```
pg /sapmnt/RED/profile/RED_DVEBMGS00_sp21n09
```

Figure 145 shows the profile we used, the number of processes of each type is indicated.

```
 rdisp/wp_no_dia=5  dialogue process
 rdisp/wp_no_vb=2   update process
 rdisp/wp_no_vb2=1  generic process
 rdisp/wp_no_enq=1  enqueue process
 rdisp/wp_no_btc=4  batch process
 rdisp/wp_no_spo=1  spool process
```

Figure 145. SAP R/3 Processes

J.6.2.2 OMVS Threads after Starting SAP R/3

In our case, 14 SAP R/3 processes are started. Therefore, under OpenEdition, you must have 1+14 active processes. Figure 146 on page 248 shows these active processes.

```
D OMVS,PID=201326594
BPX0040I 16.30.59 DISPLAY OMVS 326
OMVS     000E ACTIVE
USER     JOBNAME ASID       PID      PPID STATE   START     CT_SECS
ICLIRUN  ICLI    006F 201326594         1 HR    16.25.54    23.233
  LATCHWAITPID=       0 CMD=/usr/sbin/iclisudp
 THREAD_ID        TCB@    PRI_JOB USERNAME    ACC_TIME SC STATE
 0BA39B1000000001 008DEA70 OMVS                   .774 IPT  YU
 0BA3BDB000000002 008DE588 OMVS                  9.116 WRT JY V
 0BA3CF0000000003 008DE2F8 OMVS                  8.444 WRT JY V
 0BA3D7A800000004 008D7E88 OMVS                   .311 WRT JY V
 0BA3E05000000005 008D7CF0 OMVS                   .290 WRT JY V
 0BA3E8F800000006 008D79C0 OMVS                   .699 WRT JY V
 0BA3F1A000000007 008D7690 OMVS                   .698 WRT JY V
 0BA3FA4800000008 008D7360 OMVS                   .404 WRT JY V
 0BA402F000000009 008D7030 OMVS                   .412 WRT JY V
 0BA40B980000000A 008BECF0 OMVS                   .227 WRT JY V
 0BA414400000000B 008BE9C0 OMVS                   .280 WRT JY V
 0BA41CE80000000C 008BE2D0 OMVS                   .280 WRT JY V
 0BA425900000000D 008BAE88 OMVS                   .247 WRT JY V
 0BA42E380000000E 008BABF8 OMVS                   .328 WRT JY V
 0BA436E00000000F 008BA8C8 OMVS                   .206 WRT JY V
```

Figure 146. Active OpenEdition Threads after Starting SAP R/3

J.6.2.3 DB2 Threads after Starting SAP R/3

You can check the number of active DB2 threads after starting SAP R/3. You must have the same number as SAP R/3 processes (14). On MVS, under the SPUFI DB2 PRIMARY OPTION MENU, issue the DB2 command:

-dis thread(*)

Figure 147 shows the DB2 active threads after starting SAP R/3.

```
DSNV401I -DB2R DISPLAY THREAD REPORT FOLLOWS -
DSNV402I -DB2R ACTIVE THREADS -
NAME     ST A   REQ ID         AUTHID   PLAN      ASID TOKEN
DB2CALL  T    14792 ICLIRED     ICLIRUN  FOMEPLAN 006F  232
DB2CALL  T     2830 ICLIRED     ICLIRUN  FOMEPLAN 006F  233
DB2CALL  T      118 ICLIRED     ICLIRUN  FOMEPLAN 006F  234
DB2CALL  T      108 ICLIRED     ICLIRUN  FOMEPLAN 006F  235
DB2CALL  T     1151 ICLIRED     ICLIRUN  FOMEPLAN 006F  236
DB2CALL  T      234 ICLIRED     ICLIRUN  FOMEPLAN 006F  237
DB2CALL  T      147 ICLIRED     ICLIRUN  FOMEPLAN 006F  238
DB2CALL  T      132 ICLIRED     ICLIRUN  FOMEPLAN 006F  239
DB2CALL  T       78 ICLIRED     ICLIRUN  FOMEPLAN 006F  240
DB2CALL  T      102 ICLIRED     ICLIRUN  FOMEPLAN 006F  241
DB2CALL  T      102 ICLIRED     ICLIRUN  FOMEPLAN 006F  242
DB2CALL  T       87 ICLIRED     ICLIRUN  FOMEPLAN 006F  243
DB2CALL  T      169 ICLIRED     ICLIRUN  FOMEPLAN 006F  244
DB2CALL  T       66 ICLIRED     ICLIRUN  FOMEPLAN 006F  245
TSO      T *      3 RED390      RED390            0018  246
DISPLAY ACTIVE REPORT COMPLETE
DSN9022I -DB2R DSNVDT '-DIS THREAD' NORMAL COMPLETION
```

Figure 147. Active DB2 Threads after Starting SAP R/3

J.6.2.4 ICLI Server Traces after Starting SAP R/3

In the ICLI Server log you must find:

1. Fourteen connection requests from the UDP address defined in the ESCON definitions
2. Fourteen new threads
3. Fourteen connections to the DB2 using FOMEPLAN with:
   - The type of SAP R/3 process, DIALOG, UPDATE, SPOOL, BATCH, and so on.
   - The PID of the AIX process

Figure 148 shows the ICLI server traces after starting SAP R/3.

```
(0001) ICLI1023 (I)  Connection request accepted from in_addr 6.6.8.2
        received socket is 6.
        Time: 848093398.261276 = (Fri) 1996 Feb 14 21:29:58.261276

(0001) ICLI1026 (I)  New thread will be using port No. 1025
        Time: 848093398.380282 = (Fri) 1996 Feb 14 21:29:58.380282

(0002) ICLI1300 (I)  ICLI client 6.6.8.2 (version 21.01)
        workprocess ID = 21196 workprocess class  = 1 (DIALOG).
        connected to DB2 subsystem <RED > Plan <FOMEPLAN>.
        Time: 848093398.800359 = (Fri) 1996 Feb 14 21:29:58.800359

(0008) ICLI1300 (I)  ICLI client 6.6.8.2 (version 21.01)
        workprocess ID = 15840 workprocess class  = 3 (UPDATE).
        connected to DB2 subsystem <RED > Plan <FOMEPLAN>.
        Time: 848093401.080160 = (Fri) 1996 Feb 14 21:30:01.080160

(000B) ICLI1300 (I)  ICLI client 6.6.8.2 (version 21.01)
        workprocess ID = 13812 workprocess class  = 2 (BATCH).
        connected to DB2 subsystem <RED > Plan <FOMEPLAN>.
        Time: 848093402.181581 = (Fri) 1996 Feb 14 21:30:02.181581

(000C) ICLI1300 (I)  ICLI client 6.6.8.2 (version 21.01)
        workprocess ID = 17650 workprocess class  = 4 (ENQUEUE).
        connected to DB2 subsystem <RED > Plan <FOMEPLAN>.
        Time: 848093402.392691 = (Fri) 1996 Feb 14 21:30:02.392691

(000F) ICLI1300 (I)  ICLI client 6.6.8.2 (version 21.01)
        workprocess ID = 8444 workprocess class  = 0 (GENERIC).
        connected to DB2 subsystem <RED > Plan <FOMEPLAN>.
        Time: 848093403.572539 = (Fri) 1996 Feb 14 21:30:03.572539
```

Figure 148. ICLI Server Log after Starting SAP R/3

J.6.2.5 Link OMVS Threads and AIX Processes

On the RS/6000, the ps -eaf command gives you the active SAP R/3 process. The PID must be the same between ICLI.<PID>.err and the output of the command. On UNIX, issue:

ps -eaf | grep sap | pg

Figure 149 on page 250 shows the UNIX processes.

```
redadm 13574      1    0   Feb 14       - 44:24 /usr/sap/RED/SYS/exe/
 run/saposcol
redadm 20144 23688   0 15:13:55       - 0:09 dw.sapRED_DVEBMGS00
 pf=/usr/sap/RED/SYS/profile/RED_DVEBMGS00_sp21n09
redadm 21166 23688   0 15:13:55       - 0:00 dw.sapRED_DVEBMGS00
 pf=/usr/sap/RED/SYS/profile/RED_DVEBMGS00_sp21n09
redadm 21420 23688   0 15:13:55       - 0:00 dw.sapRED_DVEBMGS00
 pf=/usr/sap/RED/SYS/profile/RED_DVEBMGS00_sp21n09
redadm 21930 23688   0 15:13:55       - 0:00 dw.sapRED_DVEBMGS00
 pf=/usr/sap/RED/SYS/profile/RED_DVEBMGS00_sp21n09
redadm 23688 32604   0 15:13:53       - 0:01 dw.sapRED_DVEBMGS00
 pf=/usr/sap/RED/SYS/profile/RED_DVEBMGS00_sp21n09
redadm 24232 23688   0 15:13:55       - 0:56 dw.sapRED_DVEBMGS00
 pf=/usr/sap/RED/SYS/profile/RED_DVEBMGS00_sp21n09
redadm 24742 23688   0 15:13:55       - 0:00 dw.sapRED_DVEBMGS00
 pf=/usr/sap/RED/SYS/profile/RED_DVEBMGS00_sp21n09
redadm 25250 23688   0 15:13:55       - 0:00 dw.sapRED_DVEBMGS00
 pf=/usr/sap/RED/SYS/profile/RED_DVEBMGS00_sp21n09
redadm 27296 23688   0 15:13:55       - 0:00 dw.sapRED_DVEBMGS00
 pf=/usr/sap/RED/SYS/profile/RED_DVEBMGS00_sp21n09
redadm 28574 23688   0 15:13:54       - 0:07 dw.sapRED_DVEBMGS00
 pf=/usr/sap/RED/SYS/profile/RED_DVEBMGS00_sp21n09
redadm 29618 23688   0 15:13:55       - 0:00 dw.sapRED_DVEBMGS00
 pf=/usr/sap/RED/SYS/profile/RED_DVEBMGS00_sp21n09
redadm 31908 23688   0 15:13:55       - 0:00 dw.sapRED_DVEBMGS00
 pf=/usr/sap/RED/SYS/profile/RED_DVEBMGS00_sp21n09
redadm 32604      1    0 15:13:52       - 0:00 /usr/sap/RED/SYS/exe/
 run/sapstart pf=/usr/sap/RED/SYS/profile/START_DVEBMGS00_sp21n09
redadm 32916 23688   0 15:13:54       - 0:01 dw.sapRED_DVEBMGS00
 pf=/usr/sap/RED/SYS/profile/RED_DVEBMGS00_sp21n09
redadm 33170 23688   0 15:13:54       - 0:57 dw.sapRED_DVEBMGS00
 pf=/usr/sap/RED/SYS/profile/RED_DVEBMGS00_sp21n09
redadm 33694      1    0 18:52:54       - 0:00 /sapmnt/RED/exe/sapgui
 sp21n09 pf=/sapmnt/RED/profile/TEMU.PFL
redadm 34192 23688   0 15:13:54       - 0:30 dw.sapRED_DVEBMGS00
 pf=/usr/sap/RED/SYS/profile/RED_DVEBMGS00_sp21n09
redadm 36230 32604   0 15:13:53       - 0:00 ms.sapRED_DVEBMGS00
 pf=/usr/sap/RED/SYS/profile/RED_DVEBMGS00_sp21n09
redadm 36750 23688   0 15:13:54       - 0:00 gwrd -dp pf=/usr/sap/RED/
 SYS/profile/RED_DVEBMGS00_sp21n09
redadm 37004 32604   0 15:13:53       - 0:00 se.sapRED_DVEBMGS00 -F
 pf=/usr/sap/RED/SYS/profile/RED_DVEBMGS00_sp21n09
redadm 37514 32604   0 15:13:53       - 0:00 co.sapRED_DVEBMGS00 -F
 pf=/usr/sap/RED/SYS/profile/RED_DVEBMGS00_sp21n09
```

Figure 149. SAP R/3 UNIX Processes

Under SAP R/3, you can find details on the SAP R/3 process by using the
following command:

• System: SAP
• Transaction: sm50

Figure 150 on page 251 shows the SAP process.

Figure 150. SAP Process under SAP R/3

J.6.2.6 SAP R/3 Trace Logs Per Process

The UNIX SAP R/3 process logs are in /usr/sap/RED/DVEBMGS00/work. The names are dev_wXX, where XX is the process number (in this case, from 0 to 15). On UNIX, issue:

pg /usr/sap/RED/DVEBMGS00/work/dev_w0

Figure 151 on page 252 shows an example of an SAP R/3 process log.

```
-------------------------------------------------
trc file: "dev_w0", trc level: 1, release: "30F"
-------------------------------------------------
B  Interface access functions from dynamic library /usr/sap/RED/SYS/exe/run/sldb
2lib.o loaded.
B  18.02.1997 15:13:54 Interface access functions from dynamic library /usr/sap/
RED/SYS/exe/run/ibmicliudp.o loaded.
B  18.02.1997 15:13:54 ********* Profile Parameter **********
B  18.02.1997 15:13:54 DbSl    Version     : 2109
B  18.02.1997 15:13:54 ICLI    Version     : 2101
B  18.02.1997 15:13:54 Network-Protocol    : UDP+
B  18.02.1997 15:13:54 NO_SQL_TRACE        : 0
B  18.02.1997 15:13:54 DB_ID               : RED
B  18.02.1997 15:13:54 USE_CS              : 0
B  18.02.1997 15:13:54 USE_NO_HOLD         : 0
B  18.02.1997 15:13:54 USE_OPT_1_ROW       : 0
B  18.02.1997 15:13:54 DB_UID              : SAPR3
B  18.02.1997 15:13:54 DBHOST              : DBSREDU
B  18.02.1997 15:13:54 SAPSYSTEM           : 00
B  18.02.1997 15:13:54 PORT                : see /etc/services entry sapdb2RED
B  18.02.1997 15:13:54 NO_RO_COMMIT_OPT    : 1
B  18.02.1997 15:13:54 CCSID               : 819
B  18.02.1997 15:13:54 ISO_FOR_UPDATE_OF   : RS
B  18.02.1997 15:13:54 KEEP_X_LOCK         : 0
B  18.02.1997 15:13:54 **************************************
*
*  ACTIVE TRACE LEVEL           1
*  ACTIVE TRACE COMPONENTS       all, M
*
M  ***LOG Q01=> tskh_init, WPStart (Workproc 0 1 34192) ·thxxhead 0840'
M  calling db_connect ...
X
X  Tue Feb 18 15:14:03 1997
X  <ES> client 0 initializing ....
X  ES initialized.
B
B  Tue Feb 18 15:14:04 1997
B  calling dsql_db_init for library
S
S  Tue Feb 18 15:14:05 1997
S  Form-Textpool enabled (TSP06T has 4 fields)
M
M  Tue Feb 18 15:29:24 1997
M  ***LOG R68=> ThIRollBack, roll back () ·thxxhead 8954'
```

Figure 151. Example of an SAP R/3 Process Log on UNIX

J.6.2.7 ICLI Server Trace Logs Per Process

On OS/390, under OpenEdition (OMVS), issue:

ls ICLI*.*

```
ICLI.201326594.err      ICLItrace.201326594.006  ICLItrace.201326594.012
ICLItrace.201326594.001  ICLItrace.201326594.007  ICLItrace.201326594.013
ICLItrace.201326594.002  ICLItrace.201326594.008  ICLItrace.201326594.014
ICLItrace.201326594.003  ICLItrace.201326594.009  ICLItrace.201326594.015
ICLItrace.201326594.004  ICLItrace.201326594.010  ICLItrace.201326594.016
ICLItrace.201326594.005  ICLItrace.201326594.011  ICLItrace.201326594.017
```

Figure 152. ICLI Server Logs List

On OS/390, from the ISPF command shell, issue:

oedit ICLItrace.201326594.002

Figure 153 shows the ICLI trace logs per process.

```
DBSL Server (version 21.08) SQL trace. Compile Timestamp: Oct 19 1996 12
UDP+ version active.
Trace started at Fri Feb 14 21:29:58 1996
 processor clock = 1786726280
Thread id is: OBA3BDB0 00000002
Workprocess-ID = 21196, Workprocess_class  = 1, name = DIALOG
--stmt id
 │   --function
 │   │                   --sqlcode
 │   │                    --processor clock (microseconds)
 │   │                   │   │   --data
 │   │                   │   │   │
 │   │                   │   │   │
V    V                   V   V   V
     CONNECT             0 1786923355
000 PREPARE              0 1786957733 SELECT VERSION FROM SVERS   FOR FET
000 OPEN_CURSOR          0 1786973109    NO HOLD
00 FETCH                 0 1786977283      1/1
01 PREPARE               0 1786986756 SELECT COUNT(*) FROM DDNTT WHERE NO
01 OPEN_CURSOR           0 1786999822    NO HOLD
01 FETCH                 0 1787299522      1/1
02 PREPARE               0 1788330767 SELECT TABNAME, TABFORM, REFNAME FRO
02 OPEN_CURSOR           0 1788337514    NO HOLD
02 FETCH                 0 1789050822   1481/1481
02 FETCH                 0 1789740199   1481/1481
02 FETCH                 0 1790456854   1481/1481
02 FETCH                 0 1791173906   1481/1481
02 FETCH                 0 1791783653   1481/1481
02 FETCH                 0 1792413515   1481/1481
02 FETCH                 0 1793023348   1481/1481
42 OPEN_CURSOR        -514 3018273850    NO HOLD(F26/819)′ï¶¶¥ïïïçï¥K—
42 PREPARE               0 3018285303 SELECT TSPDB6, S_ID, WR_TS, NOTEBOOK
42 OPEN_CURSOR           0 3018294572    NO HOLD(F26/819)′ï¶¶¥ïïïçï¥K—
42 FETCH                 0 3018298505      1/125
37 OPEN_CURSOR        -514 3059143612    NO HOLD(F1/819)′2′,(F16/819)′1996
37 PREPARE               0 3059152078 SELECT ″PJIDENT″ , ″PJNUMMER″ , ″PJ
```

Figure 153. ICLI Server Trace Logs Per Process

The format of the ICLI server traces is described in the SAP document *SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B*, SC33-7962.

J.6.2.8 Problems during Operations

If you have problems during SAP R/3 running, check the following items:

1. In OS/390, check the ICLI server trace first (ICLI.<PID>.err).
2. In AIX, check SAP process logs (/usr/sap/RED/DVEBMGS00/work/dev_w*).
3. In AIX and OS/390, check environment variables and communications parameters.
4. Increase ICLI_TRACE_LEVEL and check the ICLI trace per process.

Appendix K. Configuring OSA-2 on Database Server

Reference

- *MVS/ESA Hardware Configuration Definition: User's Guide*, SC33-6468

In our configuration, the OSA-2 adapter from the database server connects to the FDDI network as shown in Figure 7 on page 19.

We used HCD to define the configuration of OSA-2. The addresses that are used by the SAP connection are 22C4 - 22C5, using channel path 0C.

The sequence for configuring the OSA-2 is:

1. Channel path definition
2. Control unit definition
3. Device definition

K.1 OSA-2 Channel Path Definition

figref refid=F30101. illustrates the values we used for the configuration of the OSA-2 channel interface using HCD.

```
 Goto  Filter  Backup  Query  Help
                            Add Channel Path


   Specify or revise the following values.

   Processor ID . . . : ITSO942A
   Configuration mode : LPAR

   Channel path ID  . . . . . . . 0C  +
   Number of CHPIDs . . . . . . . 1
   Channel path type  . . . . . . OSA  +

   Operation mode . . . . . . . . SHR  +
   Description  . . . . . . . . . _____

   Specify the following values only if connected to a switch:

   Dynamic switch ID  . . . . . . __  + (00 - FF)
   Entry switch ID  . . . . . . . __  +
   Entry port . . . . . . . . . . __  +


    F1=Help     F2=Split    F3=Exit     F4=Prompt   F5=Reset    F9=Swap
   F12=Cancel
```

Figure 154. OSA-2 Channel Path Definition

The channel path ID in our configuration is 41. The channel path type should be defined as OSA. The operation mode is SHR, which means it can be shared between multiple logical partitions. If your processor does not operate in LPAR mode, specify the operation mode as DED.

K.2 OSA-2 Control Unit Definition

After defining the channel path ID, we need to define the control unit.

Two steps are needed to define a control unit:

1. Define the control unit characteristics.

2. Define how the control unit is attached to processors.

After invoking the Add Control Unit function, we entered the necessary data, as can be seen in Figure 155.

```
 Goto  Filter  Backup  Query  Help
                                Add Control Unit

       Specify or revise the following values.

       Control unit number  . . . . 22C0  +

       Control unit type  . . . . . OSA_____  +

       Serial number  . . . . . . . _____

       Description  . . . . . . . . OSA-2_____

       Connected to switches  . . . __  __  __  __  __  __  __  __  +
       Ports . . . . . . . . . . . __  __  __  __  __  __  __  __  +

       If connected to a switch, select whether to have CHPIDs/link
       addresses, and unit address range proposed.

       Auto-assign  . . . . . . . . 2   1.  Yes
                                        2.  No


        F1=Help    F2=Split   F3=Exit    F4=Prompt  F5=Reset   F9=Swap
       F12=Cancel
```

Figure 155. OSA-2 Control Unit Definition

We used control unit number 09C0. The control unit type should be specified as OSA.

After pressing Enter on the Add Control Unit panel, a list panel appeared showing all the defined processors as shown in Figure 156 on page 257.

```
 ┌──────────────────────────────────────────────────────────────────────┐
 │                                                                        │
 │ Goto  Filter  Backup  Query  Help                                      │
 │                    Select Processor / Control Unit                     │
 │                                              Row 1 of 4 More:           │
 │                                                                        │
 │ Select processors to change CU/processor parameters, then press Enter. │
 │                                                                        │
 │ Control unit number . . : 22C0     Control unit type . . . : OSA       │
 │                                                                        │
 │ / Proc. ID Att. Log. Addr. ------Channel Path ID . Link Address + ---- │
 │                 (CUADD) +  1---- 2---- 3---- 4---- 5---- 6---- 7---- 8  │
 │ _ CF01          _          ____ ____ ____ ____ ____ ____ ____ _        │
 │ _ CF02          _          ____ ____ ____ ____ ____ ____ ____ _        │
 │ / ITS0942A      1          0C__ ____ ____ ____ ____ ____ ____ _        │
 │ _ ITS0942B      _          ____ ____ ____ ____ ____ ____ ____ _        │
 │ ***************************** Bottom of data ************************** │
 │                                                                        │
 │                                                                        │
 │                                                                        │
 │                                                                        │
 │                                                                        │
 │                                                                        │
 │ Command ===> _____ Scroll ===> PAGE          │
 │                                                                        │
 │  F1=Help      F2=Split      F3=Exit      F4=Prompt      F5=Reset        │
 │  F6=Previous  F7=Backward   F8=Forward   F9=Swap        F12=Cancel      │
 └──────────────────────────────────────────────────────────────────────┘
```

Figure 156. OSA-2 Control Unit Processor Selection

After selecting the processor, the screen in Figure 157 will be displayed and you
can enter the necessary data, such as Unit Address and Unit Range.

```
 ┌──────────────────────────────────────────────────────────────────────┐
 │                                                                        │
 │   Goto  Filter  Backup  Query  Help                                    │
 │                      Select Processor / Control Unit                   │
 │                                                                        │
 │   Select processors to change CU/processor parameters, then press Enter.│
 │                                                                        │
 │   Control unit number . . : 22C0     Control unit type . . . : OSA     │
 │                                                                        │
 │   / Proc. ID Att. ------------Unit Address . Unit Range + -------------- │
 │                 1----- 2----- 3----- 4----- 5----- 6----- 7----- 8----- │
 │   _ ITS0942A      00.16_ _____ _____ _____ _____ _____ _____ _____      │
 │   ***************************** Bottom of data ************************ │
 │                                                                        │
 │                                                                        │
 │                                                                        │
 │                                                                        │
 │                                                                        │
 │   Command ===> _____ Scroll ===> PAGE        │
 │                                                                        │
 │    F1=Help      F2=Split      F3=Exit      F4=Prompt      F5=Reset      │
 │    F6=Previous  F7=Backward   F8=Forward   F9=Swap        F12=Cancel    │
 │    F19=Left     F20=Right     F22=Command                              │
 └──────────────────────────────────────────────────────────────────────┘
```

Figure 157. OSA-2 Control Unit Address Definition

The output in Figure 158 on page 258 prompts you for confirmation.

```
┌─────────────────────────────────────────────────────────────────────────┐
│                            Add Control Unit                              │
│                                                                          │
│                                                                          │
│   Specify or revise the following values.                               │
│                                                                          │
│   Control unit number  . : 22C0          Type . . . . . . : OSA          │
│   Processor ID . . . . . : ITSO942A                                     │
│                                                                          │
│   Channel path IDs . . . . 0C   __  __  __  __  __  __  __  +            │
│   Link address . . . . . . __   __  __  __  __  __  __  __  +            │
│                                                                          │
│   Unit address . . . . . . 00   __  __  __  __  __  __  __  +            │
│   Number of units  . . . . _2   ___ ___ ___ ___ ___ ___ ___             │
│                                                                          │
│   Logical address  . . . . 1  + (same as CUADD)                         │
│                                                                          │
│   Protocol . . . . . . . . __   + (D,S or S4)                           │
│   I/O concurrency level  . _  + (1, 2 or 3)                             │
│                                                                          │
│    F1=Help     F2=Split    F4=Prompt   F5=Reset    F9=Swap    F12=Cancel │
│                                                                          │
└─────────────────────────────────────────────────────────────────────────┘
```

Figure 158. OSA-2 Control Unit Address Confirmation

K.3 Device Definition

After defining the control unit, you define the devices, as shown in Figure 159.

```
┌─────────────────────────────────────────────────────────────────────────┐
│  Goto  Filter  Backup  Query  Help                                       │
│                              Add Device                                  │
│                                                                          │
│                                                                          │
│   Specify or revise the following values.                               │
│                                                                          │
│   Device number  . . . . . . . . 22C0  (0000 - FFFF)                    │
│   Number of devices  . . . . . . 2___                                   │
│   Device type  . . . . . . . . . OSA_____   +                       │
│                                                                          │
│   Serial number . . . . . . . . _____                                │
│   Description . . . . . . . . . _____                │
│                                                                          │
│   Connected to CUs . . 22C0  ____  ____  ____  ____  ____  ____  ____  + │
│                                                                          │
│                                                                          │
│    F1=Help     F2=Split    F3=Exit     F4=Prompt   F5=Reset    F9=Swap   │
│   F12=Cancel                                                             │
└─────────────────────────────────────────────────────────────────────────┘
```

Figure 159. Device Definition

Here we defined 2 devices. These will be used for the TCP/IP communication.
One device is used for the data flow from OS/390 to AIX; the other device is used
for the data flow from AIX to OS/390.

Figure 160 on page 259 shows the address space layout for an OS/390 system in
the SAP Complex.
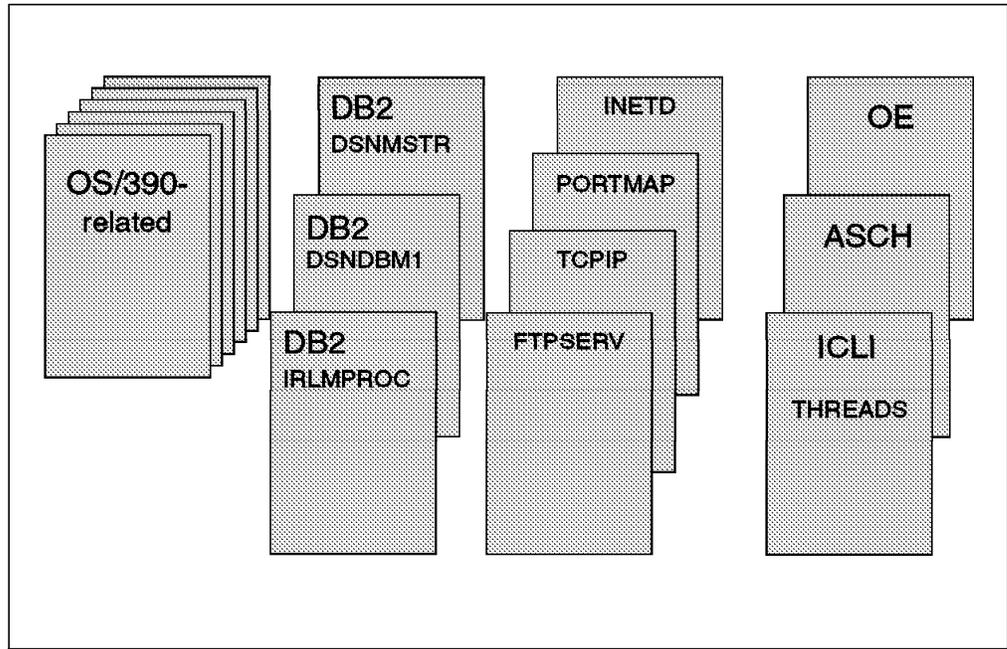
Figure 160. OS/390 Address Space Overview

Appendix L. Special Notices

This redbook is directed at customers who need to install and do the initial implementation of SAP R/3 on the System/390 platform. The redbook presents practical examples to demonstrate the installation, database setup, and operational aspects of SAP R/3 on System/390. The redbook helps system programmers, database administrators, and SAP basis consultants understand the implementation of SAP R/3 on System/390. The information in this publication is not intended as the specification of any programming interfaces that are provided by any of the products mentioned in this document. See the PUBLICATIONS section of the appropriate IBM Programming Announcement for the products mentioned in this document for more information about what publications are considered to be product documentation.

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DB2	DB2/6000
DFSMS/MVS	DFSMSdfp c.DProp
DRDA	eNetwork
Enterprise Systems Architecture/390	Enterprise Systems Connection Architecture
ES/9000	ESCON
GDDM	IBM
IMS	Integrated Systems Solutions
ISSC	Language Environment
MQ	MVS
MVS/ESA	MVS/SP
NetView	OpenEdition
OS/2	OS/390
Parallel Sysplex	Portmaster
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PSF	QMF
RACF	Resource Measurement Facility
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Appendix M. Related Publications

The publications in this section are particularly suitable for a more detailed discussion of the topics covered in this redbook. Note that the abbreviations for publications are used as cross-references in M.6, "Important Tasks" on page 269.

M.1 International Technical Support Organization Publications

For information on ordering these ITSO publications, see "How to Get ITSO Redbooks" on page 271.

Table 13. Redbook References		
Redbook	**Order Number**	**Abbreviation Used in Table 19**
AFP Printing for SAP Using R/3 and R/2	SG24-4629	afpRB
Implementing SAP R/3 in an OS/390 Environment: (this manual)	SG24-4945	r3RB
Porting Applications to the OpenEdition Platform	GG24-4473	oeRB
High Availability Considerations: SAP R/3 on DB2 for OS/390	SG24-2003	
Database Administration Experiences: SAP R/3 on DB2 for OS/390	SG24-2078	

M.2 Other IBM References

Table 14 lists useful IBM documents related to OS/390, DB2, AIX, AFP, and related subjects. Note that in this residency a pre-release copy of DB2 was used. At the time of publication, DB2 manuals for that release were not generally available. While we were assured the document numbers were correct, it is always possible that numbers could change. Consult DB2 references before ordering.

Table 14 (Page 1 of 3). List of IBM References		
IBM Documents	**Order Number**	**Abbreviation Used in Table 19**
SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B .	SC33-7962	r3PLN
DB2 for OS/390 V5 Administration Guide, Volumes I and II	SC26-8957	db2ADM
DB2 for OS/390 V5 Application Programming and SQL Guide	SC26-8958	
DB2 for OS/390 V5 Call Level Interface Guide and Reference	SC26-8959	
DB2 for OS/390 V5 Command Reference	SC26-8960	
DB2 for OS/390 V5 Data Sharing: Planning and Administration	SC26-8961	

Table 14 (Page 2 of 3). List of IBM References		
IBM Documents	**Order Number**	**Abbreviation Used in Table 19**
DB2 for OS/390 Version 5 Data Sharing Quick Reference	SX26-3841	
DB2 for OS/390 Version 5 Diagnosis Guide and Reference	LY27-9659 (available to IBM-licensed customers only)	
DB2 for OS/390 Version 5 Diagnostic Quick Reference Card	LY27-9660 (available to IBM-licensed customers only)	
DB2 for OS/390 V5 Installation Guide	GC26-8970	db2INS
DB2 for OS/390 V5 Licensed Program Specifications	GC26-8969	
DB2 for OS/390 V5 Messages and Codes	GC26-8979	
DB2 for OS/390 V5 Reference for Remote DRDA Requesters and Servers	SC26-8964	
DB2 for OS/390 V5 Reference Summary	SX26-3842	
DB2 for OS/390 V5 Release Guide	SC26-8965	
DB2 for OS/390 V5 SQL Reference	SC26-8966	
DB2 for OS/390 V5 Utility Guide and Reference	SC26-8967	db2UGR
DB2 for OS/390 V5 What's New?	GC26-8971	
DFSMS/MVS V1R4 Implementing System-Managed Storage	SC26-3123	
DFSMS/MVS V1R4 DFSMSdfp Storage Administration Reference	SC26-4920	
DFSMS/MVS V1R4 General Information	GC26-4900	
ESCON Adapter: User's Guide and Service Information	SC31-8197	
IBM PSF for AIX: AFP Upload Configuration Guide Using SNA	S544-5422	afpSNA
IBM PSF for AIX: AFP Upload Configuration Guide Using TCP/IP	S544-5423	afpTCP
IBM SAA AD/Cycle C/370 Library Reference	SC09-1761	
OS/390 C/C++ Run-Time Library Reference	SC28-1663	
MVS/ESA Hardware Configuration Definition: User's Guide	SC33-6468	
OS/390 MVS System Commands	GC28-1781	
OS/390 Language Environment for OS/390 & VM Programming Guide	SC28-1939	
OS/390 Language Environment for OS/390 & VM Programming Reference	SC28-1940	
OS/390 JCL Reference	GC28-1757	
OS/390 OpenEdition Command Reference	SC28-1892	
OS/390 OpenEdition Planning	SC28-1890	oePLN
OS/390 OpenEdition User's Guide	SC28-1891	

Table 14 (Page 3 of 3). List of IBM References		
IBM Documents	**Order Number**	**Abbreviation Used in Table 19**
OS/390 Security Server (RACF) Administrator's Guide	SC28-1915	
OS/390 Security Server (RACF) RACROUTE Macro Reference	GC28-1922	
OS/390 Security Server (RACF) Support for OpenEdition DCE, SOMobjects for MVS, and SystemView for MVS	GC28-1924	
ESCON Director Planning	GA23-0364	
ESCON Manager Planning	GC23-0423	
Fiber Optic Link Planning	GA23-0367	
OS/390 eNetwork Communications Server IP Configuration Version 2 Release 5	SC31-8513	

Table 15 lists IBM online collection kits that include documents related to OS/390 and DB2. Note that information for DB2 for OS/390 Version 5 will not be available until that product is generally available.

Table 15. IBM Online Documents on CD-ROM	
IBM Online Collection	**Collection Kit Number**
OS/390 Omnibus Collection Kit	SK2T-6700
Transaction Processing and Data Collection	SK2T-0730
System/390 Redbooks Collection	SK2T-2177
Networking and Systems Management Redbooks Collection	SK2T-6022
Transaction Processing and Data Management Redbook	SK2T-8038
Lotus Redbooks Collection	SK2T-8039
Tivoli Redbooks Collection	SK2T-8044
AS/400 Redbooks Collection	SK2T-2849
RS/6000 Redbooks Collection (HTML, BkMgr)	SK2T-8040
RS/6000 Redbooks Collection (PostScript)	SK2T-8041
RS/6000 Redbooks Collection (PDF Format)	SK2T-8043
Application Development Redbooks Collection	SK2T-8037

M.3 Tivoli Publications

Table 16 lists IBM documents related to managing an SAP R/3 installation with Tivoli products.

Table 16. Tivoli Publications	
Tivoli Manual	**Order Number**
Tivoli/AMS Module for R/3 User's Guide	GC31-8411
TME 10 Framework Planning and Installation Guide	SC31-8432

M.4 SAP References

The SAP references listed in Table 17 can be obtained via:

- FAX: +49(6227)34-4779

- Telephone: +49(6227)34-4784

Table 17. List of SAP References		
SAP Document	**Material Number**	**Abbreviation used in Table 19**
BC SAP Database Administration Guide: DB2 for OS/390	51002651	r3DBA
R/3 Installation on UNIX: DB2 for OS/390	51002659	r3INU
R/3 Installation on Windows NT: DB2 for OS/390	51002660	r3INN
OSS Note #98186-DB2/390: 4.0B R/3 Installation on UNIX or WinNT		r3OSS
SAP R/3 on DB2 for OS/390: Planning Guide SAP R/3 Release 4.0B, (see Table 14 on page 265 for the IBM order number of this guide)	51002662	r3PLN
R/3 Installation on UNIX—OS Dependencies	51002955	
Check List—Installation Requirements: DB2 for OS/390	51002656	r3XIN

M.5 World Wide Web Sources

Table 18 lists information sources on the World Wide Web.

Table 18. IBM and DB2 Information on the Web	
Item	**URL**
IBM	http://www.ibm.com
Tivoli	http://www.tivoli.com
IBM Software	http://www.software.ibm.com
DB2 Data Management: white papers, products	http://www.software.ibm.com/data
DB2 Family	http://www.software.ibm.com/data/db2/index.html
DB2 Solutions Directory: Applications and Tools	http://www.mfi.com/softwareguide/DB2-Solutions
DB2 Family Performance	http://www.software.ibm.com/data/db2/performance

M.6 Important Tasks

Table 19 lists important tasks and cross-references the SAP and IBM publications mentioned in Table 13 on page 265, Table 14 on page 265, and Table 17 on page 268 to those tasks. For abbreviations, see Table 13, Table 14, and Table 17.

Table 19 (Page 1 of 2). Task-to-Document Cross-Reference	
Tasks	**Document and Section.**
Database layout (structure, changes)	r3DBA, "Database Layout"
Installation:	
• PTFs required	r3OSS
• Hardware/software requirements	r3XIN, r3OSS
• R/3 (kernel, R/3 data)	r3INU, r3INN, r3OSS
• DB2	db2INS
	r3PLN, "DB2 Setup"
Enhanced ESCON support:	r3PLN, "Enhanced ESCON support"
ICLI client/server	
• Binding the ICLI server	r3PLN, "ICLI Client and Server"
• Changing ICLI connection port	r3PLN, "ICLI Client and Server"
• Environment variables	r3PLN, "ICLI and DBIF Environment Variables"
• Installation: ICLI client	r3INU, "Installing the Central Instance"
	r3INU, "Installing Additional Dialog Instances"
	r3INN, "Installing an SAP Instance"
• Starting/stopping ICLI server	r3PLN, "ICLI Client and Server"
• User IDs	r3PLN, "Security and User IDs"
Monitoring	db2ADM, "Performance Monitoring and Tuning"
	r3DBA, "Database Management"
Operation (backup, recovery, reorganization)	r3DBA, "Basic Operations"
	r3DBA, "Database Management"
	r3DBA, "Utilities"
	db2ADM, "Operation and Recovery"
Permissions (user IDs), authorizations, RACF definitions	r3PLN, "Security and User IDs"
	r3PLN, "DB2 Setup"
Printing	r3PLN, "Printing SAP R/3 Documents"
	afpRB, afpSNA, afpTCP
Security	See Permissions, etc.
Space management	r3DBA, "Database Management"

Table 19 (Page 2 of 2). Task-to-Document Cross-Reference	
Tasks	**Document and Section.**
Starting/stopping:	
• Complete system	r3DBA, "Basic Operations"
• DB2	db2ADM
• ICLI server	r3PLN, "ICLI Client and Server"
• R/3	r3INU, r3INN, "Completing and Checking the Installation"
Tuning	db2ADM, "Performance Monitoring and Tuning"
	r3DBA, "Database Management"
	oePLN, "Tuning OpenEdition Performance"
	oeRB
Upgrade of R/3	r3UP (not available for this release)
User IDs	See Permissions, etc.
Utilities	r3DBA, "Utilities"
	r3DBA, "Database Management"
	db2UGR

How to Get ITSO Redbooks

This section explains how both customers and IBM employees can find out about ITSO redbooks, redpieces, and CD-ROMs. A form for ordering books and CD-ROMs by fax or e-mail is also provided.

- **Redbooks Web Site** http://www.redbooks.ibm.com/

  Search for, view, download or order hardcopy/CD-ROMs redbooks from the redbooks web site. Also read redpieces and download additional materials (code samples or diskette/CD-ROM images) from this redbooks site.

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(+45) 4810-1670 - Finnish		

This information was current at the time of publication, but is continually subject to change. The latest information for customers may be found at http://www.redbooks.ibm.com/ and for IBM employees at http://w3.itso.ibm.com/.

IBM Intranet for Employees

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Glossary

Explanation of Cross-Reference: The following cross-references are used in this glossary:

Contrast with. This refers to a term that has an opposed or substantively different meaning.

See. This refers the reader to multiple-word terms in which this term appears.

See also. This refers the reader to terms that have a related, but not synonymous meaning.

A

ABAP/4 Query. Facility that allows users without knowledge of the ABAP/4 programming language or table or field names to define and execute their own reports. There are three types of report formats available:

- Basic lists
- Statistics
- Ranked lists

acceptance test. Delivery system test performed on various platforms before delivery.

access network. The part of the network connecting the application hosts to the front-end clients.

activation administrator. An activation administrator activates authorization profiles and authorizations, and makes them effective in the system. An activation administrator can only change profiles and authorizations specified in his or her own authorization profile. An activation administrator can also delete active versions of profiles and authorizations.

active. Editing status of an R/3 online document. It tells the system that the document has been edited and can now be translated.

When a document is activated, the current contents of the document are permanently linked to the current version number. When an active document is maintained, the editing status is changed to "raw version" or "final version," and the version number is incremented.

active version. In the authorization system, authorizations and authorization profiles that have been activated. Activated profiles and authorizations are available in the system.

ADK archive. The new archiving process that is offered by SAP starting with release 2.2F or 3.0A; it offers a redo option.

Advanced Program-to-Program Communication. Protocol developed by IBM as part of its Systems Network Architecture (SNA). The protocol is designed to enable application programs running on different computers to communicate with each other and exchange data.

alternative session. The SAP System is capable of simulating several working sessions simultaneously on one display terminal. The entire scope of functionality of the SAP System is available in each alternative session. You can therefore process various transactions simultaneously on one computer.

application host. A physical machine on which an application runs.

An application host may support one or more application services (dialog, update, enqueue, batch, message, gateway, or spool). The term "application server" is often used to describe the host machine, but the preferred term is "application host," since this is clearly distinct from the related term, "application service."

application server. A term used for both application host and application service.

application service. A logical component of the SAP R/3 system that provides a clearly defined service to clients requesting it.

The application services are the dialog, update, enqueue, batch, message, gateway, and spool services.

Archive Development Kit. The Archive Development Kit (ADK) contains the following components:

- Definition of commercially related data as a logical archiving entity (see also **archiving object**)
- Methods for passing the data to be archived to the archive file in the form of function modules
- Example programs
- Documentation
- Archive management for executing programs
- Network graphic to illustrate the dependencies between archiveable data.

The ADK controls the data transfer between the archiving programs and the archive files at run-time.

archive handle. Identification number assigned to an archive file when it is opened during a program run. When assigning the ID, the system specifies for each archive handle whether read or write access to the archive file is required. This identification is necessary because a program can process archive

files for several business objects (see also **archiving object**).

authorization.   Authority to perform a particular action in the R/3 System. An authorization is identified by the name of an authorization object and the name of the authorization created for the object. An authorization specifies one or more permissible values for each authorization field listed in an authorization object. There are simple authorizations and composite authorizations. A simple authorization specifies sets of values for authorization fields. A composite authorization lists simple authorizations. You can use a composite authorization to associate several alternative authorizations with an authorization object in an authorization profile. Authorizations are entered in a user's master record.

authorization administrator.   User responsible for maintaining authorizations and authorization profiles. For security reasons, this user should not be authorized to activate authorizations and profiles or to maintain user master records. With such authorizations, the user could single-handedly define, activate, and assign system access authorizations.

authorization check.   Check performed to ascertain whether a user is authorized to execute a particular function. Processes, functions, and data accesses in the R/3 System can only be performed when user authorizations have been checked in the respective system and application programs.

authorization field.   In authorization objects, authorization fields represent values for individual system elements that are supposed to undergo authorization checking to verify a user's authorization.

authorization object.   Element of the authorization concept. Authorization objects allow you to define complex authorizations. An authorization object groups together up to ten authorization fields in an AND relationship in order to check whether a user is allowed to perform a certain action. To pass an authorization test for an object, the user must satisfy the authorization check for each field in the object.

authorization profile.   Element of the authorization system. An authorization profile gives users access to the system. A profile contains authorizations which are identified by the authorization object and the authorization name. If a profile is specified in a user master record, the user has all the authorizations defined in this profile.

Changes in profiles or authorizations in the profile take effect immediately for all users who have this profile. Individual changes in user master records are not required.

There are single and composite authorizations. A single profile contains authorizations. A composite profile lists single profiles. Composite profiles can be used as reference users, that is, may contain profiles that constitute a standard set of authorizations.

To assign standard authorizations to users, the name of the composite profile must be entered in his or her user master record. Changes in a reference profile take effect immediately for all users who have the profile.

authorization trace.   Transaction to record all required authorization objects within a processing step.

B

background processing.   Processing that does not take place on the screen. Data can be processed in the background while other functions are being performed in parallel on the screen.

basic conversation.   Conversation in a prescribed format. Basic conversation is the recommended conversation type for low-level programs.

basic key figure.   A value that can be displayed in a report and that is stored in a numerical value field of a database table. It can also be used in formulas or rules for computing other values in a report.

batch input.   Interface that facilitates the transfer of large amounts of data to an SAP system. You can use batch input to transfer both legacy data and external data to the SAP system.

batch input command.   Command used to control the processing of batch input sessions. There is a batch input command for each of the following functions:

- Terminate processing a session
- Delete a transaction from a session
- Skip a transaction in a session
- Change the processing mode during processing

batch input message.   Data from an external system in a form that the SAP system can process. Created by a batch input program, a batch input message consists of data and a specific SAP record format.

batch input session.   A sequence of transactions supplied with application data by a batch input program. The system stores these transactions in a batch input session until you decide to process the session. You can later process the session in the online system. The system updates the database when the session is processed. With this technique, you can transfer large amounts of data to the SAP system in a short time.

BDC option.   Batch Data Communication option. BDC options define the processing mode for a batch input session. Examples of modes used for processing sessions are:

- Display all records

- Display for error dialogs only
- Process session in the background
- Process session on the screen

binary mode. Mode (or format) in which a file can be processed.

bridge. Computer that links two LANs with each other.

C

CCMS. See **Computing Center Management System**.

central instance. An SAP R/3 administrative unit in which, at minimum, message and enqueue services reside.

A central instance can have dialog, update, enqueue, batch, message, gateway, spool, and database services all on one host. This setup is often used in small installations, but you must ensure that the host is sufficiently powerful to support all services.

For SAP R/3 on DB2 for OS/390, SAP R/3 creates a central instance without a database; that is, the database (DB2 for OS/390) runs on another machine.

central system. See **central instance**.

CLAW. See **Common Link Access to Workstation (CLAW)**.

client. In commercial, organizational, and technical terms, a self-contained unit in an R/3 System with separate master records and its own set of tables.

command file. List of development environment objects in correction and transport requests. Command files are created in one of three different ways:

- Automatically when an object is edited
- By entering the objects with the editor
- Through the environment analyzer

Common Communications Support. IBM standard for standardized communication support. CCS provides protocols for network communication and data interchange for application programs integrated in an SAA environment.

Common Link Access to Workstation (CLAW). An architecture that defines the channel commands used between the host and the channel attachment adapter.

communication call. CPI-C calls under ABAP/4. The ABAP/4 CPI-C interface is implemented through CPI-C calls.

communication profile. Definitions for controlling how sessions in an SNA network are set up, kept open, and closed. In VTAM, a complete record of

communication profiles is defined in a "logmode table."

communications interface. An interface through which data is exchanged between programs in accordance with set protocols.

communications manager. The communications manager is responsible for communications between computers and programs. It is part of the OS/2 operating system (extended edition), and it supervises the data flow between OS/2 workstations and other systems and/or programs. It provides different terminal emulations and allows the use of different communication protocols.

communications server. Program for the management of computer and program links. It provides different types of communication and monitors the data flow between computers or programs. The communications server is suited for a client server configuration. It is a product of the companies DCA and Microsoft.

communications workstation. The communications server manages communications between computers and programs. It provides several communication types and supervises the data flow between computers and/or programs. It is a product of the companies DCA and Microsoft.

component. Data for a part of an application.

Computing Center Management System. Tool for monitoring, controlling, and configuring the R/3 System. The Computing Center Management System (CCMS) supports round-the-clock system administration functions from the R/3 System. You can analyze and distribute the system load, and monitor the resource consumption of the different system components.

controller. Control unit for communication between the logical units within an SNA network.

conversation. Data exchange between transaction programs. Prerequisite for such a data exchange is an existing session.

conversation ID. Parameter from the CPI-C interface; it identifies the conversation.

CPI. Common Programming Interface. An IBM standard that defines a standardized interface for program development. CPI provides languages, commands, and calls for developing applications within an SAA environment.

CPI-C. Common Programming Interface-Communication. The part of CPI that provides definitions for inter-program communication. These definitions can be divided into four areas:

- Session setup

- Session control
- Communication
- End of session

current status. The current status of a system with regard to its contents and structure.

D

daemon. A task, process, or thread that intermittently awakens to perform some chores and then goes back to sleep (software).

data acquisition. Initial transfer of data to the SAP system. This process can be performed automatically or manually.

data backup. Term used for all measures and automatic facilities that are used to safeguard data or data media against loss or damage.

data dictionary. A central catalog that contains the descriptions of an organization's data and provides information about the relationships between the data and its use in programs and screens. The data descriptions in a data dictionary are also called metadata, that is, data that describes other data.

Database Interface. In SAP R/3, a program that resides on the application server and is responsible for interacting with the database.

database reconnect. The automatic reconnect of an SAP work process to a database instance when the existing connection has been closed unexpectedly.

database host. A machine on which the SAP R/3 database is stored and which contains the support necessary to access that database from an instance.

database server. A term that is used for both database host and database service.

database service. A service that stores and retrieves business data in an SAP R/3 system.

DATEX-L. Public communications service mainly for duplex operation. Duplex operation means that data is transferred on one line in both directions. With DATEX-L, the exchange partners are selected directly. DATEX-L is especially suited for short connections such as the use of information system or posting transactions in banking.

DATEX-P. Public communications service for packets (a packet consists of 128 bytes). With DATEX-P, duplex operation is not possible. The post office determines through which lines the packets are transferred. DATEX-P is especially suited for the transfer of great amounts of data.

DBIF. See **Database Interface**.

DDIC. See **data dictionary**.

dialog interface. Interface for operating the SAP system from a terminal using a keyboard.

dispatcher. A job under the SAP R/3 system that manages workload. Each instance has a single dispatcher that manages the workload for that instance. Presentation services interact with the dispatcher. End user requests and units of work are assigned by the dispatcher to the work processes of the instance for completion.

E

EarlyWatch. A service provided by SAP to help customers keep their systems in a well-tuned state.

enqueue service. A special work process that is responsible for handling the special locking requirements of SAP R/3. The enqueue service handles logical locks (for example, locks that may need to be held across an entire SAP R/3 system, instead of only within the database). There is only one enqueue service for an entire SAP R/3 system and it runs under the central instance, by default.

Enhanced ESCON support. Support that provides high-performance communications between an OS/390 system and an AIX system that is attached through the ESCON channel interface.

Enterprise Systems Connection Architecture (ESCON). An architecture for an I/O interface that provides an optical-fiber communication link between channels and control units.

ESCON. See **Enterprise Systems Connection Architecture (ESCON)**.

F

fibre. The transmission medium for the serial-I/O interface. A link is a point-to-point pair of conductors (optical fibres) that physically interconnects a control unit and a channel, a channel and a dynamic switch, a control unit and a dynamic switch, or, in some cases, a dynamic switch and another dynamic switch. The two conductors of a link provide a simultaneous two-way communication path. One conductor is for transmitting information and the other is for receiving information. A link is attached to a channel or control unit by means of the link interface of that channel or control unit and to a dynamic switch by means of a dynamic-switch port.

format specification. Layout specification for an output list. In an ABAP/4 report, you specify the format of an output list with the WRITE statement.

formatting option. Presentation alternative for data in an output list. In ABAP/4 reports, you can use the

formatting options offered by the WRITE statement to output data. Examples of formatting options include alignment of text, rounding of figures, and special formats for date fields. The available options depend on the data type.

functional area. ABAP/4 Query allows users to define reports without programming knowledge. When creating a query, the user must choose a functional area. The functional area determines which tables and fields a query can reference.

functional group. Functional groups are used in ABAP/4 Query. A functional group is a set of several fields that forms a meaningful unit. It presents the user with a preselected set of fields and thus avoids the need to look at all fields in a logical database.

G

gateway. Intelligent interface that connects dissimilar networks by converting one protocol to another. For example, a gateway converts the protocol for a token ring network to the protocol for SNA. The special computers responsible for converting the different protocols, transfer speeds, codes, and so on are also usually considered gateways.

GOPHER. A menu-based search scheme, used to find information on the Internet. Originally developed at the University of Minnesota, it lets you reach a destination on the Internet by selecting items from a series of text menus.

graphical user interface. Display format that enables you to choose commands, start programs, display files, and perform other functions by selecting menu options, pressing function keys or pushbuttons, or pointing to icons with the mouse. In the R/3 System, the user interface consists of the following main elements:

- GUI title
- GUI status

GUI. See **graphical user interface**.

H

Help function. A function that delivers information on SAP System use. To request an explanation for an object, position the cursor on the object and press F1. Object-specific explanations (for example, for fields, menu options, messages, and so on) can be requested in the entire SAP system.

hot-site backup. The use of an identical copy of the production database on a standby database host.

I

ICLI. See **Integrated Call Level Interface**.

import test. Transport procedure. As you transport development environment objects, a check of the target system is made already in the export phase to find out whether all objects of the transport request can be transported to the target system. Import is blocked if the database of the target system contains a protected object that would be affected by the transport.

inactive flag. Flag that prevents a test procedure or test module from being executed.

individual execution. Execution of one test procedure on its own.

individual test. Test which makes the alpha test easier.

instance. An administrative unit that groups together components of an R/3 system that provide one or more services. These services are started and stopped at the same time. All components belonging to an instance are specified as parameters in a common instance profile. A central R/3 system consists of a single instance that includes all the necessary SAP services.

Integrated Call Level Interface. A component used by the SAP R/3 DBIF interface. It consists of a client and server component and allows AIX application servers to access an OS/390 data base server remotely across a network. The DBIF uses only a subset of data base functions and the ICLI delivers exactly that subset.

J

job. Continuous chain of programs, controlled one after the other in time by particular control commands.

L

landscape. A set of SAP R/3 systems, including production, test, quality and assurance, and "sandbox" systems.

link. The transmission medium for the serial-I/O interface. A link is a point-to-point pair of conductors (optical fibres) that physically interconnects a control unit and a channel, a channel and a dynamic switch, a control unit and a dynamic switch, or, in some cases, a dynamic switch and another dynamic switch. The two conductors of a link provide a simultaneous two-way communication path. One conductor is for transmitting information and the other is for receiving information. A link is attached to a channel or control

unit by means of the link interface of that channel or control unit and to a dynamic switch by means of a dynamic-switch port.

list header.   First line on the screen in an output list. The list header is often the same as the program title, but you can also define it separately from the program.

M

main memory size.   Size of the main memory (in kilobytes).

mapping.   The way that logical services (the various SAP R/3 system services—dialog, update, enqueue, batch, message, gateway, spool, database, and network services) are assigned to physical host machines.

message.   Message in the R/3 system. There are several different types of messages. Examples are:

- Online messages from various application areas (information messages, warning messages, error messages)

- System messages

- Messages from background jobs

message service.   A special job within the central system (instance) that is responsible for facilitating communications between instances within the same SAP R/3 system and for identifying services in the SAP R/3 system to jobs outside the SAP system. There is only one message service for an entire SAP R/3 system and it runs under the central instance, by default.

P

presentation service.   Part of the SAP R/3 system that interacts with the end user. It provides the graphical user interface on the PC and is sometimes referred to as SAPGUI. The presentation services of SAP R/3 interacts with an instance of SAP R/3 to carry out end-user requests.

printer writer.   A job that writes spooled files to an output device independently of the program that produced the output.

productive session.   A batch input session that is recorded and processed at a later time. Changes to the database are only made when the session is processed. A productive session can only be processed once.

profile.   Summary of system parameters with defined values. The parameters define, for example, the size of buffer areas, the maximum number of system users, and so on. The system parameters can be

grouped together in a profile. When activating the system, a certain profile can be called up.

Q

query.   ABAP/4 Query allows users to define reports without programming knowledge. When creating a query, you enter only individual texts such as the title and select fields and options that determine the report structure.

R

reconnect.   There is a database reconnect in the event that a work process receives an error return code of a particular class.

RFC.   Remote Function Call. RFCs allow you to call and process predefined procedures (functions) in a remote SAP system. RFCs manage communication control, parameter transfer, and error handling.

router.   An intelligent network component that holds information about the configuration of a network and controls data flows accordingly.

S

SAP R/3 system.   An SAP R/3 database and a collection of SAP R/3 instances (application servers) that provide services to the users. The collection of instances consist of one central instance and, optionally, one or more secondary instances. Each system has a system identifier called SAPSID.

SAPGUI.   See **presentation service**.

secondary instance.   An instance that does not have a message service or enqueue service. A secondary instance is connected to the central system (instance) and uses the message service and enqueue service under that central instance to perform its work. It does not depend on the central instance to be fully operational. A secondary instance does not have complete knowledge of all the resources of an SAP R/3 system nor the status of those resources. It depends upon the central instance for that knowledge.

session log.   Record of a batch input session run. A session log is created for each session run. The log is contained in an external file on the operating system level. A session log contains messages generated by the batch input system and by the transactions processed in a session. It also contains overall statistics.

session overview.   List of batch input sessions. The session overview contains the session name, date and time of creation, the session status and the name of the person who created the session, among others. You can select a session from the session overview

and run it, provided the session does not have the status "locked" or "processed."

SNA. Systems Network Architecture. A widely used communications framework developed by IBM to define network functions and establish standards for enabling its different models of computers to exchange and process data. SNA is essentially a design philosophy that separates network communications into five layers.

spool request. A record that is created when information is sent to a printer or an output device. A spool request contains details about the request and a copy of the information.

syntax group. A syntax group contains the names of all operating systems that use the same syntax for assigning file names.

system architecture. Setup and basic structure of an EDP (electronic data processing) system. This term can also be used to cover software, its setup and development. Examples are:

- The way data and programs are stored
- The method of system control
- The type of interfaces possible
- The structure of the operating system, and how it works

system log. Recorded log of errors and events in the R/3 System. The system log contains information about program and transaction terminations, database errors, and so on.

system services. The logical set of functions needed to support the SAP R/3 system. These comprise dialog, update, enqueue, batch, message, gateway, spool, and database.

T

TCP/IP. Transmission Control Protocol/Internet Protocol. A software protocol developed for communications between computers.

text element. Text that appears on the selection screen or the output screen of an ABAP/4 report. Text elements are used to store texts that are displayed on the selection screens or output screens of ABAP/4 reports, but are not hard-coded in programs. The different types of text elements include:

- Report or program titles
- List headings
- Column headings
- Selection texts
- Text symbols

text mode. Mode (or format) in which a file can be processed.

text symbol. Text constant specified and maintained outside a program. Text symbols are used instead of text literals in programs because the programs are then independent of any particular language and remain easy to maintain. Each text symbol must have a three-character ID.

trailer. Value field (6-9) associated with the context attribute field of a test procedure, for determining the order of execution.

training session. Batch input session, in which a processing model was recorded for training purposes. Training sessions can be called as often as required, and they can be edited. Database changes take place when training sessions are recorded and processed.

transport layer. The network layer that maintains end-to-end connections between communicating computers.

transport log. Record of the transfer of development environment objects from a source system to a target system. A transport log contains the following elements:

- Summary of activity
- Logging of the export of objects from a source system
- Logging of the import test carried out in the target system
- Logging of the import of objects into a target system

U

unit of measurement. Quantity of measurement for a physical quantity (see the following dimensions below). Units of measurement are displayed on the screen and are used for internal conversions. There are standardized names (ISO codes) for all units of measurement. Examples are:

- Dimension: Length Units of measurement: Meter, centimeter, inch, and so on
- Dimension: Time Units of measurement: Second, minute, hour, and so on

In the R/3 System, quantity units with no dimensions (for example, crate, cardboard box, and so on) are handled in the same way as units of measurement and are maintained at the same place (although conversion factors cannot be specified).

use. Selection among application test, platform test, and individual test, which can be assigned to a test procedure.

user administrator. A user administrator is authorized to create and edit users by entering authorizations and values for other user parameters. User master records can be assigned to user groups. A user administrator can be authorized to create or modify only user master records that belong to a

particular user group or set of groups, or users that have not been assigned to any user group. For security reasons, the administrator should not be authorized to maintain or activate authorization profiles and authorizations. With these authorizations, the user could single-handedly define, activate, and assign system access authorizations.

user buffer. Buffer from which the data of a user master record is loaded when a user logs on.

user group. A group of users as defined in the component ABAP/4 Query. In the teams or departments within a company, the problem areas to be covered by ABAP/4 Query should be similar, or even identical, and concern the same functional areas. In ABAP/4 Query, users are therefore assigned to one (or more) user groups.

W

work process. A job in the SAP R/3 system that actually does the work. Each work process is assigned a primary role by the dispatcher, which controls, to a certain degree, what type of work is to be performed by that work process. The number of work processes and the types that can exist for an

instance is controlled by the instance profile and within the SAP R/3 system by the Central Computer Management System.

Numerics

3088. 3088 Multisystem Channel Communication Unit (MCCU), a channel-to-channel adapter (CTCA). An input/output device that is normally used by a program in one system to communicate with a program in another system. The adapter provides the data path and synchronization for a data transfer between two channels. When the adapter is used to connect two channels that are associated with different systems, a loosely coupled multiprocessing system is established. The adapter, as viewed by either of the channels it connects, has the appearance of an unshared input/output device.

List of Abbreviations

ABEND	abnormal end		**CLIST**	command list
AFP	advanced function printer		**COBOL**	common business oriented language
AFP	Advanced Function Printing			
AIX	advanced interactive executive (IBM's flavor of UNIX)		**CORE**	UNIX dump data set
			CPP	C language preprocessor
			CPU	central processing unit
AMS	Application Management Services		**CSD**	common system data area (MVS control block)
APAR	authorized program analysis report		**CUA**	control unit address
			CYL	cylinder
APF	advanced printer function		**DASD**	direct access storage device
APF	authorized program facility (MVS)		**DB**	database
			DBCS	double byte character set
APPC	advanced program-to-program communication		**DBIF**	database interface
			DBMS	database management system
APPL	application			
ASCII	American National Standard Code for Information Interchange		**DBRM**	database request module
			DBS	database server
ASID	address space identifier (MVS)		**DCE**	Distributed Computing Environment (OSF)
BATCH	background computer run		**DD**	data dictionary
BDC	batch data communication		**DDF**	data dictionary facilities
BIND	create an access plan for a pre-compiled application (SQL)		**DDIC**	data dictionary
			DDL	data definition language
			DEF	destination element field
BS	basis system		**DIST**	distribute/distribution
BSDS	bootstrap dataset (DB2)		**DLF**	data lookaside facility (MVS)
CA	channel adapter		**DPROP**	data propagator (IBM program product; case should be DProp)
CACHE	high speed buffer			
CCS	Common Communications Support			
CCSID	coded character set identifier		**DRDA**	distributed relational database architecture
CD	compact disc		**DSN**	data set name
CD ROM	compact disc read only memory		**DYN**	dynamic
			EBCDIC	extended binary coded decimal interchange code
CHAR	character			
CICS	customer information control system (IBM)		**ECSA**	extended common service area
CICS/ESA	customer information control system/enterprise systems architecture (IBM)		**ESCD**	ESCON director (ES/9000)
			ESCON	Enterprise Systems Connection (architecture, IBM System/390)
CLAW	common link access to workstation protocol			
			EXEC	execution program

FDDI	fibre distributed data interface (100 Mbit/s fibre optic LAN)	**ISSC**	IBM Division 07 (ISSC), Integrated Systems Solutions Corporation
FORTRAN	formula translation (programming language)	**ITSO**	International Technical Support Organization
FREQ	frequency	**JCL**	job control language (MVS and VSE)
FTAB	field tab		
GB	gigabyte (10**9 bytes or 1,000,000,000 bytes)	**JCS**	job control system
		JCS	Joint Customer Study
GID	group identifier	**JES**	job entry subsystem (MVS)
GOPHER	A menu-based search scheme, used to find information on the Internet. Originally developed at the University of Minnesota, it lets you reach a destination on the Internet by selecting items from a series of text menus.	**K**	symbol for kilo (ISO 1000 - prefix; uppercase K for 1024 in DP)
		LAN	local area network
		LLA	library lookaside (MVS/ESA)
		LPD	line printer daemon (AIX)
		LV	logical volume
GUI	graphical user interface	**MAC**	Apple Macintosh
HCD	hardware configuration definition (MVS/SP)	**MACLIB**	macro library
		MAX	maximum
HFS	Hierarchical File System (DFSMS/MVS, POSIX 1003.1(a) compliant file system)	**MB**	megabyte, 1,000,000 bytes (1,048,576 bytes memory)
		MIH	missing interruption handler
I	integer value	**MIN**	minimum
I/O	input/output	**MSGS**	messages
IBM	International Business Machines Corporation	**MTU**	maximum transmission unit (Internet protocols)
ICLI	Integrated Call-Level Interface	**MVS**	multiple virtual storage (IBM System 370 & 390)
ID	identification/identifier	**MVS/ESA**	multiple virtual storage/enterprise systems architecture (IBM)
IMS	information management system		
INTERNET	a worldwide network of TCP/IP-based networks	**NCP**	network control program
		NIS	network information system (Sun Microsystems Inc.)
IO	input/output		
IOCP	I/O configuration program	**NO**	number
IP	internet protocol (ISO)	**NUM**	numeric
IP	internetwork protocol (OSI)	**OE**	OpenEdition
IPL	initial program load	**OPER**	operate/operation/operator
IRLM	integrated resource lock manager	**ORT**	operational readiness test
		OS	operating system
ISO	International Organization for Standardization	**PARM**	parameter
		PC	Personal Computer (IBM)
ISPF	interactive system productivity facility (MVS and VM)	**PD**	problem determination
		PFL	profile
		PFS	programming functional specifications

PID	Program Information Department	**SYSADM**	system administrator
PL/I	programming language 1	**T/EC**	Tivoli Enterprise Console
PROC	command procedure	**TAR**	tape archive
PROCLIB	procedure library (IBM System/360)	**TCP**	transmission control protocol (USA, DoD)
PSF	Print Services Facility (IBM program product)	**TCP/IP**	Transmission Control Protocol/Internet Protocol (USA, DoD, ARPANET; TCP=layer 4, IP=layer 3, UNIX-ish/Ethernet-based system-interconnect protocol)
PSF/MVS	Print Services Facility/MVS		
PTF	program temporary fix		
PW	password	**TCPIP**	transmission control protocol internet protocol
RACF	resource access control facility	**TEMP**	temporary
REC	record	**TME**	Tivoli Management Environment
RELEASE	major software update (change release)	**TMR**	Tivoli Management Region
RISC	reduced instruction set computer/cycles	**TSO**	time sharing option
		TTY	teletypewriter
RLF	recirculating loop frequency	**UID**	user identification
ROM	read only memory	**UNIX**	an operating system developed at Bell Laboratories (trademark of UNIX System Laboratories, licensed exclusively by X/Open Company, Ltd.)
SAP	Systems, Applications, Products in Data Processing (software vendor)		
SBCS	single-byte character set		
SCP	system control program	**UOW**	unit of work
SDSF	spool display and search facility	**UR**	unit of recovery
		URL	Universal Resource Locator
SEQ	sequence	**V**	vary
SMF	system management facility	**VLF**	virtual lookaside facility (MVS/ESA)
SMIT	System Management Interface Tool (see also DSMIT)	**VS**	virtual system
		VTAM	virtual telecommunications access method (IBM) (runs under MVS, VM, & DOS/VSE)
SNA	systems network architecture (IBM)		
SOM	system object model		
SPUFI	SQL Processor Using File Input (TSO Facility)	**WA**	warm start with analysis
		WTO	write to operator
SQL	structured query language	**WTOR**	write to operator with reply
STMT	statement	**XCF**	cross-system coupling facility (MVS)
STR	system task request		

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Special Characters

Numerics

A

B

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D

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W

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