

Linux for AIX Specialists: Similarities and Differences

Jim T. West
westj@us.ibm.com

Introduction:

■ Goals

- ▶ To provide a basic introduction of Linux to people with a knowledge of AIX
- ▶ To describe
 - Similarities between Linux and AIX
 - Differences between Linux and AIX

Topics Introduced

- Linux RPM Utility
- Starting and Stopping Linux daemons
- XINETD Configuration
- RSH Configuration
- AIX Smitty and Linux Linuxconf
- Linux Modules (device drivers)
- Network Configuration
- XFree86 (X-Windows)
- Logical Volume Manager (Sistine)
- Linux RAID Capability
- Linux Automount
- Linux Lilo Boot Manager
- Build a Linux Kernel
- ...and more...

Linux Distributions

■ RedHat Linux

▶ <http://www.redhat.com>

■ Suse Linux

▶ <http://www.suse.com>

■ Caldera Linux

▶ <http://www.caldera.com>

■ Turbo Linux

▶ <http://www.turbolinux.com>

■ Linux from Scratch

▶ <http://www.linuxfromscratch.com>

Installing Software Packages

■ AIX

- ▶ smitty install (installp)

■ Linux

- ▶ RPM (<http://www.rpm.org>)
 - install
 - query
 - delete
 - build
- ▶ Download RPMS
 - many sites
 - <http://www.rpmfind.net/linux/RPM/>

RPM

■ Install a Package

- ▶ `RPM -ivh cdrecord-1.9-2.i386.rpm`

■ Update a Package

- ▶ `RPM -Uvh cdrecord-1.9-2.i386.rpm`

■ Uninstall a Package

- ▶ `RPM -e cdrecord-1.9-2.i386.rpm`

RPM *(continued)*

■ Query a Package

- ▶ RPM -qlp cdrecord-1.9-2.i386.rpm
 - list the files in the package
- ▶ RPM -qip cdrecord-1.9-2.i386.rpm
 - prints a description of the package
- ▶ RPM -qa
 - same as AIX lspp -l
 - RPM -qa | grep cdrecord
 - ◆ returns the cdrecord package installed
- ▶ RPM -qf /usr/bin/cdrecord
 - returns the package owning the file

More RPM ...

■ **RPM -qif /usr/bin/cdrecord**

- ▶ give a description of the package owning the file

■ **RPM -qdf /usr/bin/cdrecord**

- ▶ gives a list of all the files documenting the file

Starting and Stopping Daemons

■ On AIX

- ▶ `startsrc -s lpd`
- ▶ `stopsrc -s lpd`

■ On Linux

- ▶ `cd /etc/rc.d/init.d`
 - `./lpd start`
 - `./lpd stop`
 - `./lpd restart`
- ▶ `ntsysv` utility
 - graphically sets daemons to start on bootup

■ Both `/etc/inittab` and `cron` are identical on AIX and Linux

/etc/rc.d/init.d Daemons

- amd, crond, httpd, ipchains, iptables, isdn, linuxconf, lpd, named, network, nfs, nfslock, pcmcia, portmap, sendmail, smb, snmpd, sshd, xinetd, ypbind (NIS), ...

Linux XINETD Control

- **On AIX INETD (On Linux XINETD) controls**
 - ▶ ftp, telnet, rsh, rlogin, imap, pop2, pop3, linuxconf, rexec, echo (ping daemon), ...
- **/etc/xinetd.conf references /etc/xinetd.d directory**
- **/etc/xinetd.d directory has a control file template for each xinetd function**
 - ▶ these control files are the core of xinetd functions
 - ▶ these files replicate the function of /etc/inetd.conf in AIX

Xinetd.d Control Files

■ Control File Template:

▶ service shell

- disable = yes/no
 - ◆ WARNING: Several of these control files default to "disable = yes", which is the exact opposite of what you would want in many cases to enable
- socket_type = stream/dgram
- wait = yes/on
- user = root
- log_on_success += USERID
- log_on_failure += USERID
- server = /usr/sbin/in.rshd

RSH Configuration in Xinetd

- Allows a user to rsh between machines without a password prompt
- Essential function for many cluster applications, such as HA, MPI, etc.
- In `/etc/xinetd.d` need "disable = no" (enable):
 - ▶ rsh (enable `/usr/sbin/in.rshd` daemon)
 - ▶ rexec (enable remote command execution)
 - ▶ rlogin (enable remote logins)
 - Note: could allow rexec and deny rlogin
- Then the normal stuff:
 - ▶ Add hosts to `/etc/hosts.allow`, `/etc/hosts.equiv`, `/etc/hosts`
 - ▶ Add `.rhosts` file to the user home directory

SMITTY and linuxconf

■ SMITTY

- ▶ gui tool for generating commands (and scripts) for system configuration

■ linuxconf

- ▶ gui tool for system administration
 - user administration
 - networking administration
 - file system administration

Creating Users and Groups

■ AIX

- ▶ mkuser or mkgroup
- ▶ smitty user or smitty group

■ Linux

- ▶ useradd or groupadd
- ▶ linuxconf

Device Drivers "modules" (the challenge of Linux)

■ AIX

- ▶ device drivers are taken for granted

■ Linux

- ▶ device drivers can be built into kernel
- ▶ loadable device drivers are called "modules"
 - lsmod
 - ◆ lists the modules loaded
 - modprobe (makefile like module utility)
 - ◆ higher level module administration
 - ◆ works with "depmod" (modules dependency)
 - ◆ insmod command loads the module into running system

More on "modules"

■ kernelcfg

- ▶ graphical tool for configuring the kernel daemon and managing modules

■ /etc/modules.conf

- ▶ modules configuration file linking devices with modules
- ▶ read during bootup
 - alias eth0 epic100
 - alias sound-slot-0 sb
- ▶ pass parameters to modules
 - options sb io=0x220 irq=5 dma=1 dma16=5

More on "modules"

- **Special Case of Plug and Play Devices**
 - ▶ isapnp utility configures and installs PNP devices
 - ▶ pnpdump creates isapnp.conf template file for editing
 - ▶ /etc/isagone controls excluding irq's, io ports, etc.
 - ▶ new motherboards do not include ISA slots
- **PCI devices configures**
 - ▶ PCI devices can share interrupts
 - ▶ lspci lists PCI devices
- **AGP (Advanced Graphics Protocol)**
 - ▶ fully supported in Linux

Network Configuration

■ AIX

- ▶ smitty tcpip

■ Linux

- ▶ netcfg

- Configure network adapters
 - ◆ assign IP address, netmask, static/dhcp
- Assign host name, domain name
- Assign name server, default gateway
- Set IP forwarding on or off
- Set network default route

Network Performance Tuning

■ TCP/IP Parameters

- ▶ /proc/sys/net/ipv4
 - equivalent to "no" parameters on AIX

■ statnet command

- ▶ can monitor network traffic

■ netstat command same as on AIX

■ route commnd similar to AIX

- ▶ slight difference in syntax

■ ifconfig command similar to AIX

■ traceroute

■ ping same as on AIX

Linux Performance Tools

- **/proc Special Process Directory**
 - ▶ meminfo, cpuinfo, interrupts, ioports, dma
 - ▶ /proc/sys/net/ipv4 tcpip parameters
- **top**
 - ▶ similar to AIX Topas or sar
 - ▶ memory usage, processes %cpu
 - ▶ %cpu, %idle, %wait
- **hdparm**
 - ▶ set disk i/o parameters, similar to vmtune
 - read ahead
- **vmstat, iostat, netstat same as AIX**
- **statnet**
 - ▶ network statistics tool

Linux XFree86

<http://www.xfree86.org>

■ **/etc/X11/XF86Config**

- ▶ X-Window Configuration File
 - sets screen resolution
 - monitor attributes (horiz freq, vert freq)

■ **XFree86 server**

- ▶ Xconfigurator (really challenging)
- ▶ XF86Setup (gui)

■ **Commercial X Servers (reasonable)**

- ▶ Metro-X from Metro Link
 - <http://www.metrolink.com>
- ▶ Accelerated-X from Xi Graphics
 - <http://www.xig.com>

X-Window Consoles

■ AIX

- ▶ Common Desktop Environment

■ Linux X Window Consoles

- ▶ Most Vulnerable Component in a Linux install
 - GNOME
 - ◆ <http://www.gnome.org>
 - KDE
 - ◆ <http://www.kde.org>

Linux Capabilities

- File Server (NFS and Samba)
- Print Server (lpd and Samba)
- Mail Server (Sendmail, pop, and imap)
- Web Server (Apache)
- FTP, Telnet, and ssh server
- PPP Dialup Server
- Name Server Version 8 (DNS)
- Router (NAT Network Address Translation)
- FireWall

Linux HOWTO Collection

`/usr/share/doc/HOWTO`

- **Collection of files documenting "HOWTO" configure or install various features**
 - ▶ PPP
 - ▶ LVM
 - ▶ MAIL
 - ▶ Sound
 - ▶ FireWall
- **Great Place to get Started!!**
 - ▶ nice cookbooks..

Creating a File System

■ AIX

- ▶ smitty lvm
 - create volume group
 - create logical volume
- ▶ smitty jfs
 - create a jfs
 - ◆ automatically places entry into /etc/filesystems
 - mount the file system

■ Linux

- ▶ Create a disk partition
 - use either fdisk or cfdisk
- ▶ mke2fs (no journaling)
- ▶ mount the file system

Logical Volume Manager

■ AIX

- ▶ a Physical Volume is an entire disk
- ▶ a disk can only contain logical volumes belonging to a single volume group
- ▶ a logical volume and a file system can be increased in size, but not decreased
- ▶ logical volume mirroring and striping are options of logical volume creation

Logical Volume Manager

■ Linux

- ▶ Obtain Linux LVM from Sistina.Com at <http://www.sistina.com/lvm>
 - developed by Heinz Mauelshagen
- ▶ a Physical Volume is a partition on a disk with partition id of "0x08e"
- ▶ a physical disk can contain physical volumes belonging to more than 1 volume group
 - not recommended for a production system
- ▶ a logical volume and a file system can be both increased and decreased in size
 - logical volume analogous to a disk partition
 - a logical volume is a logical device
 - ◆ can be mirrored (/dev/md0)
 - ◆ mke2fs (create a file system)

Logical Volume Manager (*continued*)

- ▶ logical volume file systems have "much better" I/O performance than a file system created from a simple disk partition
 - Performance is great on large sequential reads
 - ◆ LVM does 64K read ahead by default
 - can also help Random Reads depending on I/O size
- ▶ logical volume striping can be accomplished when creating the logical volume (lvcreate)
- ▶ mirroring is part of the Linux RAID capability, separate from Linux Logical Volume Manager

Logical Volume Manager (continued)

- **Linux Logical Volume Manager Supporting Linux Clusters soon to be available**
 - ▶ multiple machines sharing a common set of Linux Volume Groups (with locking)
 - ▶ Watch <http://www.sistina.com> for more details, when the information is available.

Linux LVM Commands

■ Volume Group commands

- ▶ vgcreate, vgchange, vgdisplay, vgextend, vgmerge, vgreduce, vgexport, vgimport, vgremove, vgsplit, vgcfgbackup, vgcfgrestore, vgck, vgmknodes, vgscan

■ Logical Volume Commands

- ▶ lvcreate, lvdisplay, lvchange, lvextend, lvreduce, lvremove, lvrename, lvscan

■ File System - Logical Volume Re-Sizing up or down

- ▶ e2fsadm (No data loss!)

Linux Software RAID Support

■ Supports

- ▶ RAID-0 (striping)
- ▶ RAID-1 (mirroring)
 - I use LVM logical volumes mirrored with Linux RAID-1, then mke2fs on RAID device
- ▶ Software RAID-4
 - interleaves stripes with a parity stripe
 - parity disk can be a bottleneck
- ▶ Software RAID-5
 - stores a parity stripe on each drive avoids parity stripe bottleneck
 - write performance not as good as mirroring

Linux RAID Mirroring Example

■ Create `/etc/raidtab` file defining raid devices

▶ `raiddev /dev/md0`

```
raid-level      1
nr-raid-disks  2
nr-spare-disks 0
chunk-size     4
persistent-superblock 1
device         /dev/westvg/testR1
raid-disk      0
device         /dev/westvg/testR2
raid-disk      1
```

■ `mkraid /dev/md0` (make the RAID device)

■ `startraid /dev/md0` (start the RAID device)

■ `mount /dev/md0 /RAID` (mount the RAID device on a mountpoint)

Linux RAID-1 Mirroring

- **Mirroring Allows real time backup of data**
 - ▶ Large Disks today are
 - inexpensive
 - time consuming or difficult to backup
- **Linux RAID-1 Supports multiple copies**
 - ▶ file system copies are individually complete file systems
- **Mirroring of Linux Logical Volumes provides**
 - ▶ LVM I/O performance
 - ▶ mirroring data protection

Linux RAID-1 Mirroring (continued)

■ Recovery from a Failed Disk Simple

- ▶ add "failed-disk" line to /etc/fstab
- ▶ start RAID-1 array with "raidstart"
- ▶ mount the degraded RAID-1 array
- ▶ Shutdown / Replace the failed disk / Reboot
- ▶ Partition new disk identical to old disk
- ▶ Remove old Logical Volumes in LVM
- ▶ Add new Logical Volumes
- ▶ Use "raidhotadd" to add new logical volumes to active RAID-1 Array
 - Array will re-sync
 - No need to reboot
- ▶ modify /etc/raidtab file to current LVM configuration

AIX Network File System

■ AIX

- ▶ NFS Version 3
 - Daemons
 - nfsd on server
 - biod on client
- ▶ support synchronous and asynchronous writes
- ▶ supports automount capability

Linux Network File System

■ Linux

- ▶ NFS Version 3 common on Linux
 - compatible with AIX
- ▶ Linux NFS Version 2 can be mounted on AIX
 - `nfs -o nfs_use_reserved_ports=1`
 - `mount -o vers=2 linux_box:/nfs_dir1 /mydir`
- ▶ NFS on Linux uses Virtual File System and does not require control through biod daemons
- ▶ NFS on Linux uses Block I/O and does not support synchronous writes
- ▶ NFS on Linux supports locking
 - on AIX where local locks are required
 - ◆ `mount -o llock linux:/big1 /big1`
 - allows AIX database creation on Linux NFS dir

Linux NFS Implementation

■ **/etc/exports**

- ▶ lists files to be exported with hosts and permissions
 - /home vale(rw) vstout(rw) vlight(rw)
 - /big1 *(rw)

■ **exportfs**

- ▶ lists all exported directories

■ **exportfs -a**

- ▶ reads /etc/exports and adds new directories to the export list

■ **exportfs -r**

- ▶ compares current export list with /etc/exports, removes missing directories from export list

Linux NFS Tuning

- **Number of nfsd daemons running**
 - ▶ default is 8
- **Read and Write Block Size Parameters**
 - ▶ tunable
 - rsize defaults to 4K
 - wsize defaults to 8K
 - rsize and wsize be set on mount command
- **nfspmon utility**
 - ▶ not supported, free shareware
 - ▶ <http://www.tunelinux.com>

Linux Automount Daemon AMD

- **/etc/amd.conf**
 - ▶ amd configuration file
 - ▶ mounts reference map files
- **Can automount all exported directories from an NFS server with a single line in map file**

Linux Automount Example

■ Last few lines of /etc/amd.conf

- ▶ # DEFINE AN AMD MOUNT POINT

[/net]

amd.net

map_type=

map_name=
file

■ /etc/amd.net

- ▶ /defaults fs:\${autodir}/\${rhost}/root/\${rfs};opts:=nosuid,nodev

- ▶ linux rhost:=linux;type:=host;rfs:=/

- ▶ linux2 rhost:=linux2;type:=host;rfs=/
[REDACTED]

■ /etc/rc.d/init.d/amd start (starts automount adm daemon)

■ cd /net

- linux linux2
- ▶ ls linux
 - big big1 big2 big3 big4 home opt usr
- ▶ ls linux2
 - RAID big cdrom cdrom1 home [REDACTED]

AIX Paging Space and Linux Swap Space

■ AIX

- ▶ `smitty lvm (mkps -s 32 pagingvg)`
- ▶ `lsps -a`
- ▶ no limit on total size of paging space
 - limit of 16 paging space devices
- ▶ paging devices can be either active or not active at bootup
- ▶ paging devices can be made either active or not active (requires reboot)

AIX Paging Space and Linux Swap Space (*continued*)

■ Linux

- ▶ `mkswap [-c] [-vN] [-f] [-p PSZ] device size`
 - older swap version 1 files limited to 128 MB
 - newer swap version 2 limited to 2GB
 - multiple swap devices allowed
 - ◆ a swap device in `/etc/fstab` defaults to active
 - ◆ swap device is a disk partition
 - can be a logical volume with some effort
- ▶ add swap device to `/etc/fstab`
 - `/dev/hd8 swap swap defaults 0 0`
- ▶ `swapon` or `swapoff` (`swapoff` requires reboot)
 - turns on or off swap devices in `/etc/fstab`
- ▶ `swapon -s`
 - lists active swap devices

The Linux /PROC Directory

- Similar to the AIX ODM
- /proc/cpuinfo
 - ▶ provides cpu information
- /proc/meminfo
 - ▶ provides memory information
 - size of buffer memory for io
- /proc/sys/vm
 - ▶ pagecache
 - sets max % mem available for pagecache
 - ▶ buffermem
 - sets max % mem available for buffermem

The Linux /PROC Directory (continued)

■ /proc/sys/net/ipv4

- ▶ THIS IS THE TCPIP PARAMETERS ARE !!
- ▶ similar to the no parameters on AIX

■ /proc/sys/vm

- ▶ bdflush
 - controls the operation of Linux Virtual Memory
 - similar to vmtune on AIX

■ /proc/sys/kernel/threads-max

- ▶ maximum number of running threads

AIX Domain Name Service

- BIND is Berkeley Internet Name Domain
- NAMED is the DNS daemon
- AIX Supports both BIND Version 4 and BIND Version 8
 - ▶ BIND Version 4 uses /etc/named.boot
 - ▶ BIND Version 8 uses /etc/named.conf
 - ▶ Version selection in AIX is accomplished with softlinks in /usr/sbin of named and named.xfer

AIX Domain Name Service (continued)

■ AIX Support IPV4 and IPV6

- AIX name resolution checks IPV6 and IPV4
 - ◆ this is a problem when AIX uses a Linux DNS
 - ◆ export NSORDER=BIND4,LOCAL4
 - ◆ /etc/netsvc.conf
 - rarely does anyone use IPV6 addresses
 - presence of /etc/netsvc.conf file sometimes causes problems with gethostbyname

■ A DNS Name Server returns both

- ▶ Address Record
- ▶ Mail Record (mx) contains mail destination and mail forwarder information
 - essential info for some mail servers

Linux Domain Name Service

■ Today's Linux uses BIND Version 8

■ Excellent HOWTO

- ▶ /usr/share/doc/HOWTO/DNS-HOWTO
 - Nicolai Langfeldt janl@math.uio.co

■ /etc/named.conf

- ▶ Defines "zone" DNS database files
 - 4 basic zones
 - ◆ "root zone" is the internet
 - ◆ "local zone" is the loopback address on local machine
 - ◆ "local domain zone" is forward lookup file
 - locate address given a hostname
 - ◆ "local address zone" is reverse lookup file
 - local a hostname given an address

Linux DNS Name Service

■ Linux DNS Configuration Files

▶ /etc/named.conf

- Defines "zone" DNS database files
- my /etc/named.conf references the following files in /var/named
 - ◆ named.ca
 - information on internet root name servers
 - ◆ named.hosts
 - provides addresses for hostnames on local domain
 - ◆ named.rev
 - provides hostnames for addresses on local domain (reverse lookup)
 - ◆ named.local
 - defines local loopback 127.0.0.1 information

nslookup utility

- Available on both AIX and Linux
- Excellent unix tool for querying a name server and identifying problems in a DNS configuration

Point-to-Point-Protocol PPP

- RedHat Linux provides simple tools for configuring a dialout PPP connection
- `/usr/share/doc/HOWTO/PPP-HOWTO` describes how to manually configure a PPP Client and a PPP Server
 - ▶ PPP Server Configuration not too complicated
 - configure PAP (Password Authentication Protocol)
 - configure a getty on a serial tty
 - configure a ppp user to activate pppd
 - modify `modules.conf` for ppp modules
- PPP-HOWTO is a good "cookbook"

What's New in the Linux 2.4 Kernel?

- **1. Goal to improve processor performance**
 - ▶ number of threads scalable with memory size
 - 512 MB of RAM can support 16,000 threads
- **2. Goal to change the Process Scheduler to be more efficient with more processes running**
- **3. Goal to increase System Resource Capacity**
 - ▶ Up to 4 GB memory on Intel platforms
 - ▶ Up to 16 EtherNet Adapters
 - ▶ Up to 10 IDE Controllers (20 devices)
 - ▶ 2 GB file system limit removed
- **Download the latest Linux kernel (about 25 MB) directly from <http://www.kernel.org>**

Compiling and Building a Kernel

Linux

■ **make xconfig**

- ▶ [make oldconfig (if you have an old .config file)]
- ▶ choices are:
 - Y select the option to compile in kernel
 - M compile the option as a loadable module
 - N (decline the option)

■ **make dep**

- ▶ generates dependencies for options chosen

■ **make bzImage**

- ▶ Build kernel in /usr/src/linux/arch/i386/boot/bzimage

■ **make modules**

■ **make modules_install**

- ▶ Installs modules in /lib/module/(kernel_version_number)
 - i.e. /lib/modules/2.4.5

Lilo Linux Loader

- **Allows booting from multiple kernels**
 - ▶ Easy to maintain several versions of Linux
 - ▶ Easy to experiment with new versions
- **Can boot into Windows as well as Linux**
- **Provides capability to pass options to kernels**
 - ▶ Controls boot process
 - initrd image files provides SCSI module loading during bootup
- **Controls writing master boot record**
 - ▶ similar to bosboot on AIX

Using Lilo with NT Boot.ini

- NT and Windows 2000 PE use a boot.ini file for user boot selection
-



Linux FireWall

- **2.4.0 Kernel has NetFilter Capability**
- **Packet Filtering based on ports and network**
 - ▶ Uses IPTABLE Command
 - replaces IPCHAINS and IPFWADM
 - very flexible source/destination filtering
- **RedHat 7.1**
 - ▶ uses 2.4.1 Kernel
 - kernel configured to support netfilter
 - ◆ Not Trivial
 - ▶ configured to provide netfilter firewall with IPTABLE

Other Linux Capabilities

- **Shadow Password Capability Standard**
- **Encrypted Connectivity (ssh, ...)**
- **Network Information System**
 - ▶ have a common password/group repository
- **RedHat installer supports network install**
 - ▶ NFS Server
 - ▶ FTP Server
- **High Availability Linux Cluster**
 - ▶ <http://www.linux-ha.org>
 - ▶ RedHat Piranah
 - ▶ many commercial options

Program Development on Linux

■ GNU Compilers

- ▶ C Compiler (gcc)
 - Linux is written in C
- ▶ C++ Compiler (c++)
- ▶ GNU Fortran (g77)

■ GNU Debuggers

- ▶ gdb, xgdb

■ Perl 5 on Linux

■ awk, glimp, python, tcl, bash, ...

■ Compilers and Debuggers included with most Linux distributions

Linux Share Library Maintenance

■ LDCONFIG

- ▶ executed at every boot, and many RPM installs
- ▶ Creates the links and cache for shared libraries
- ▶ Scans directories specified in /etc/ld.so.conf
- ▶ Cache is stored in /etc/ld.so.cache (binary)
- ▶ ldconfig -P will print out a list of all shared libraries with their version numbers
- ▶ Note: soft links are not processed by ldconfig

■ LDCONFIG is a very important command

- ▶ Find more info on ldconfig on the web
- ▶ this will make or break a successful build on Linux

Message Passing Interface (MPI)

- MPI is an ANSI Standard developed in 1994 with the contributions and active involvement from IBM
- SP MPI Sample Codes OK under Linux
 - ▶ SP Multi-Threaded MPI Sample Codes run OK
- In home office of 3 Linux PC's, 100 MBit EtherNet, and EtherNet Switch
 - ▶ "bounce" code measured my mpi network at
 - 259 microseconds of latency
 - 6.48 MB/second bandwidth

Microsoft Windows and Linux

■ Multi-boot Linux and Windows

- Really simple with boot.ini in NT or 2000 PE

■ VMWARE

- ▶ Simultaneously boot Linux and Windows
- ▶ Boot Windows in a Linux Window, or vice versa
- ▶ Shares Processor Cycles
 - Slows everything down almost a factor of 2
 - interesting justification for faster processors...
- ▶ Reasonably stable
- ▶ Fairly functional

Microsoft Windows and Linux (continued)

■ NetTraverse

- ▶ See <http://www.nettraverse.com> for info
- ▶ Runs Windows 95/98 in a Linux x-window
- ▶ Similar in function to vmware
 - networking support
 - popular Windows 95/98 application support
- ▶ Heard Good Reviews on it...

Microsoft Windows and Linux (continued)

■ WINE

- ▶ A software package before it's time
 - more like a near beer...
- ▶ Run Windows applications natively in Linux
- ▶ Windows API's rewritten in Linux
 - great idea with much potential
 - needs more development
- ▶ Run Windows applications without Microsoft
- ▶ Lotus Notes (WINE) package available
 - almost works well...
 - crashes occasionally...

FUN WITH LINUX

■ Large amount of CD Creation Software

- ▶ mkisofs and cdrecord
 - developed by Joerg Schilling
 - works great !
 - See <http://www.cdrecord.org> for info
 - Runs on both AIX and Linux

■ Music with Linux

- ▶ "Linux Music & Sound" by Dave Phillips
 - Midi with Timidity++
 - MP3 with xmms

FUN WITH LINUX (*continued*)

■ Sound Format Conversion Software

- ▶ CD to MP3
- ▶ MP3 to WAVE
- ▶ WAVE to CD
- ▶ MIDI TO WAVE

■ Digital Image Software

- ▶ Several digital viewers
 - xv by John Bradley is popular
 - montage is popular
 - ◆ <http://www.imagemagick.org/>

Summary

- **Linux presents**
 - ▶ Capability
 - ▶ Challenges
 - ▶ Opportunity
- **AIX 5.1 (5 L) introduces Linux GNU Tools to AIX**
 - ▶ Provides a path for Linux developers to market Linux solutions to IBM RS/6000 customers.
- **Stay tuned... more to come !**