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Cramsession™ for SAIR Linux Level I System Administration

This study guide will help you to prepare you for the SAIR 3X0-102 Exam. Exam topics include System Administration issues related to Theory of Operation, Base System, Shells and Commands, System Utilities, Applications and Troubleshooting.
Exam

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Contents:

THEORY OF OPERATION

File System Structure

Linux has one front-end file system the ext2 and many backend file systems. This means that Linux uses the ext2 as its main file system and can read/write to many other file systems like FAT, FAT32, OS/2… The ext2 file system is made up of:

- Superblock

- Index nodes or (inodes) ((These are talked about later))

- Allocated/unallocated disk blocks

General Terminology

A file system is nothing more that a storage structure.

A volume is a partition or drive that contains a file structure.

There are four file system responsibilities, 2 public and 2 private:

1. (public): Translates filenames to sector/block addresses

2. (public): Security protection on all files

3. (private): Manages the movement of data across user-defined buffers and the OS block buffers

4. (private): Translates internal map of all free allocated OS blocks

File System Terminology   ((later))

Superblock: In summary form, it identifies the volume and is made up of many fields such as:

Magic number: Identifies type and version of volume to the 'mount' program.

Mount count: Increments one every time the drive is mounted/booted.

First_data_block: Used to reach the first (root) index node (inode)

Maximum count: Max number of times before e2fsck/fsck is forced.

* When Maximum count = Mount count, a file system check is run *

Development of the ext2 File System

Designed and written by *Remy Card*.

Consistency Checking an ext2 File System

The e2fsck ensures consistency of the ext2 file system structure by checking that:

- Allocated inodes refer to their own unique data blocks.

- Each inode has at least one or more directories referencing it.

- The number of directories referencing an inode matches the inode count.

- There are no directory entries referencing free inodes.

- All remaining free inodes and data blocks are accounted for in their respective bitmap arrays.

- Other parameters, such as file type and file size, are within reasonable bounds.

What would cause the consistency check to run?

- When a drive is marked 'dirty'.

- Maximum count is reached. (default 20)

- Maximum time is reached. (defaulted to 6 months)

To view default parameters like 20 times or 6 months use the dumpe2fs utility and to modify the defaults use the tune2fs utility.

ext2 File Fragmentation

The ext2 Block groups helps to reduce the problem of fragmentation. Unlike other operating systems the Linux ext2 file system tends to have between 2-5% fragmentation.

Advanced Features

- Read-ahead operations.

- Reserved disk space for a given user or group.

- An absolute-path-name cache of previously found inode numbers.

- A security option that erases the contents of disk blocks that are returned to the free list.

- Time-stamp skipping.

The ext2 file system also has high-speed symbolic links that save path names, up to 60 characters, directly in the inode, as opposed to saving the path in a regular disk block.

The ext2 file system provides viewing of its advanced features through the 'lsattr' command. The 'c' attribute leads to automatic compression of write requests to the file, while the read requests from the file return uncompressed data. The 'u' attribute deletes the file when set, and the ext2 file manager saves its contents if the user man asks for its subsequent un-deletion.

Future Trends

Journaling is the idea that each time a file is modified or created, the old contents remain until the new contents have been committed to a file system in a special journal file.

Advantage:	Rapid recovery from system crashes
Disadvantage:	High overhead

ext2 Block Group Trade-Off

Default block size is 1024 bytes and block group is 8MB.

Inode Space versus the Number of Actual Files

Number of inodes = number of files

Too many inodes or too few inodes can mean a waste of disk space.

To find the total number of files on your system, run the command:

find / -mount | wc

Defragmentation of an ext2 File System

There is a Linux defragmentation utility maintained by Stephen C. Tweedie called 'defrag', which can be found at
ftp://linuxdoc.org/pub/Linux/system/filesystems/

File System Standard Hierarchy Standard

Edited by Daniel Quinlan since 1994. www.pathname.com/fhs/

Specifies both content and what types of files will be located in a specific directory structure.

Mounting a Volume

Mount points : 'directories' within the existing file structure '/' root, where a drive or volume is mounted:

example /mnt/cdrom

Here the cdrom is located under the / partition in a subdirectory called mnt.

Scheduling Batch (cron) Jobs

A program whose daemon is crond and looks at the crontab file every minute to see if a job is scheduled to run. The command to schedule cron is ' crontab ' and some common flags are:

-a	Edit your crontab file, or create one if one doesn't exist.
-l	List your crontab file.
-r	Remove your crontab file.
-v	Display the last time you edited your crontab file (only on a few systems)
-u user	Modify or view crontab files for user.

The format of the file is as follows:

Minute, hour, day, month, and day of the week.

NOTE: An asterix (*) can be used to denote always or wildcard.

Types of File Backup

Epoch:

<u>Best reliability,</u> <u>long and intensive</u> : complete backup of all files on system

Incremental:

One full 'Epoch' backup. Then 'incremental' backups, only the files that have a create time or modify time newer than before are backed up. This method offers <u>decreased backup time </u>in exchange for <u>increased restore time</u>. (Never go over 7 tapes before restarting the process of a full epoch backup).

Differential:

One full 'Epoch' backup, but each subsequent backup saves all modified files since the epoch. Initially, the 'differential' backup is small, but as item goes on, the 'differential' backup larger and larger until it is time to begin a new epoch backup. 'Differential backup offers a backup <u>time savings</u> similar to that of 'incremental' but with much <u>less complexity</u>.

Tape Drive Constraints

Old (since 1920) slow read/write and many possible errors.

RAID Storage

RAID combines hard disks in novel ways to maximize access time, reliability, or a combination of both.

RAID-0:

Non-redundant data striping across many disks. All drives accessed at the same time. Optimum performance, but data loss occurs if any drive is damaged.

RAID-1:

Automatically duplicates data on 2 or more drives. In other words, mirroring. Faster reads, slower writes, cost per megabyte is high.

RAID-2:

Employs ECC error checking in level one… since all modern drives have this it is not used. Ex: 4 disks would require 3 parity disks of equal size

RAID-3:

Exploits (XOR) – creates extra bits that can be used to reconstruct missing information. Stripes data at a byte level across several drives storing parity on one. Requires special drives.

RAID-4:

Stripes data at a block level across several drives storing parity on one. Fast reads, slower writes, and data can be reconstructed as long as the parity table drive isn't lost.

RAID-5:

Stripes data at a block level across several drives storing parity by parts across all. Slower reads, fast writes, and data can almost always be reconstructed. Requires five or more drives.

Basics of System Tuning

Trial and error testing. Just list system services and compare them against user loads on the system.

Picking an Optimal File System Block Size

1024-byte for volumes up to 1 –GB

2048-byte for volumes up to 10 –GB

4096-byte for volumes larger than 10 –GB

Redundant Superblock Thinning

Must have a 2.2.x kernel or newer. The ext2 file system contains backup copies of the superblock and the block group descriptors so it is possible to run the e2fsck utility with the –b flag to overwrite the bad superblock. There can be potentially 1000's of copies of this in your file system. Run the mkfs2 –s1 /dev/hdc command to create the ext2 file system without the extra copies.

Reduced Reserved Block Count

5% disk space for the root user is reserved by default.

To set this use the tune2fs utility; -r for number of blocks –m for percent

` tune2fs –r 1000 /dev/hdc1 `

Read Time Stamp Removal

- The inode modification time, or ctime (create)
- The last write time, or mtime (modify)
- The last read time, or atime   (access)
- The file deletions time, or dtime (delete)

Reconfiguration of the IDE Hard Disk Controller

The hdparm utility can be used to provide an I/O speed benchmark for IDE and SCSI drives, but the actual role of this utility is to assist in fine-tuning the IDE controller. Example:

/sbin/hdparm –c1 –A1 –m2 –d1 /dev/had

-c1 = Requests IDE driver to use the 32-bit PCI bus

-A1 = Enables block read-ahead

-m2 = specifies the number of physical sectors to transfer per interrupt signaled

-d1 = in conjunction with the –m2 flag ensures that the drive itself is programmed for mode2 multiword DMA.

Adjusting File Manager Parameters

The command echo 4096 > /proc/sys/kernel/file-max will increase the total number of simultaneous open files from the default value of 1024 to 4096. For other commands go to www.linuxdoc.org/HOWTO/Config-HOWTO.html.

Emergency Procedures

Three general things to know in regards to specific recovery procedures

1. Know how to configure your hardware and software.
2. Save the system configuration data.
3. Have a rescue disk.

A good number of catastrophic file system problems can be addressed by following five basic steps in sequence:

1. Check the MBR boot procedure. Boot the system in single-user mode and test and repair the file system, or boot a separate stand-alone kernel.

2. Use the badblocks program to identify and allocated faulty sectors.

3. Use fsck to repair crossed block numbers

4. Use copy to replace lost shared library files

5. Use tar to restore lost files.

Linux Loader Boot-Up Sequence (LILO)

Consists of four basic steps.

1. BIOS reads the first-stage LILO from the MBR

2. LILO uses the BIOS disk geometry to read a second-stage LILO called chain.b or boot.b

3. LILO uses the BIOS disk geometry to read a third-stage after chain.b to /boot/vmlinuz the kernel.

4. The kernel is loaded and Linux runs.

Single-User Rescue Boot with Read-Only Root Disk

The boot device and file offsets were hardwired into the MBR as BIOS arguments when the LILO utility was executed. The only way to boot a new device is to insert a boot CD-ROM or boot floppy (each with its own MBR) and tell the BIOS in which order to test these boot devices.

` mount –n –w –o remount /   … or … mount –n –o remount,rw /   `

To load just the kernel without running the other startup programs.

Boot: <TAB>

Linux

Linux –b (or emergency)

The –b or emergency instructs init to run a program called sulogin, which, in turn, prompts for a superuser password. If you do not know the password, then tell the kernel to run the shell directly instead of init. Use the argument:

Linux init=/bin/bash

In this example, the kernel was instructed to run the bash shell instead of the init program. In either case, you now have a superuser shell that can be used to check the file system.

Initrd (Initial RAM Disk)

When using initrd the system boots in the following manner.

1. LILO loads the kernel and sets up the initial RAM disk using the contents of /dev/initrd

2. The kernel creates a standard RAM disk /dev/ram0

3. The kernel copies the contents of /dev/initrd to this device, and then it frees the memory used by initrd.

4. The RAM disk is now mounted as a read-write device.

5. The mounted volume is the initial root file system.

6. The system will execute /linuxrc with uid 0.

7. /linuxrc terminates.

8. The standard root file system is now mounted (unless /dev/ram0 is listed as root)

9. The system is checked for an /initrd directory.

10. If /initrd exists, then initrd is now moved there; otherwise, initrd is unmounted.

11. The kernel should run /sbin/int.

12. The system should be up and running.

MBR Repair

` mount /dev/hda3 /mnt

` lilo –r /mnt/

Save the image at system installation time.

` dd if=/dev/had of=/etc/hda001.MBR bs=512 count=1

Use the dd utility to restore the MBR after mounting floppy to /mnt

` dd if=/mnt/etc/hda001.MBR of=/dev/had bs=512 count=1

Shared Library Repair

If programs suddenly complain that a shared library (such as libc.so.6) cannot be found, then the symbolic link was probably modified. To refresh the link run:

` mount /dev/hda3 /mnt

` cd /mnt/lib

` ln –sf libc-2.1.2.so libc.so.6

BASE SYSTEM

Adding and Removing Users

User account info will be held in /etc/passwd (accessible by all users on system)

` useradd or adduser will add user accounts

` usermod will modify accounts

` userdel will delete user accounts

Default Account Configuration

All files in the /etc/skell directory are generic files for everyone

` useradd –D –g 65   # group set to 65(refer to /etc/groups for the group name)

 ` useradd –D –s /bin/bash # shell to set bash

* *Note there are more switches (of course). Read the man pages!*

To see these defaults enter useradd –D or look at /etc/default/useradd

Shadow Passwords

After installing and running Shadow Suite, all passwords are moved, replacing them with one x, from the /etc/passwd file to the /etc/shadow file

To turn on shadowing type pwconv

To turn off shadowing type unpwconv

User Profiles

/etc/skell holds default files for all users created on the system.

In the user home directory there are hidden files:

~/.profile and ~/.bashrc override defaulted files in /etc/skell

Group Management

Created for users with something in common.

Group Creation

** Make sure to be logged in as a superuser

Manual creation - edit /etc/group - the format is:
groupname:grouppassword:groupid:members1,members2,…

** *group name has to be unique and 8 characters or less*

Adding a Group

' groupadd groupname

' groupadd –g gid groupname

Changing Existing Group Information

' groupmod –n newgroup oldgroup

' groupmod –g ngid groupname

Adding a User to an Existing Group

This can be done at user creation or by editing the /etc/group file

/etc/group   old file   admin:x:101:

/etc/group new file   admin:x:101:lee,mike,john

Deleting Groups

First check /etc/passwd to make sure no users use this as their default group

' groupdel groupname

Shadow Passwords

For groups the file is located in /etc/gshadow

To activate shadow passwords on the groups run grpconv

To deactivate shadow passwords on the groups run grpunconv

Group Switching

' newgrp groupname

You can only be logged in under one group at a time

Access Control Lists

Allow you to control file permissions further by granting access based on both username and group

Changing Ownership

Changing the Ownership of a File

' chown newowner filename

then type ls –l to see results

-rw-r—r— 4 rtest   users   1024 Jul 15 10:05 outline.text

you could also change ownership according to user id

' chown 510 filename

Changing the Group of a File

' chown user:group filename   or

' chown   :group filename   or

' chown group filename   * as long as groupname isn't equal to usernames

E-Mail

Each user's e-mail account will be stored in his or her home directory

Adding E-Mail Accounts

Example:

$ su

password:

cd /home/lee

useradd –m lee

passwd lee

Changing password for lee

Enter new password

Re-enter new password

Password changed

exit

$

Creating Mail Aliases

/etc/aliases

The file format is alias:user. e.g.,

Test:lee

You could now send email to Test and lee would receive mail

Techsupport:lee,mike,john

Now if you sent mail to Techsupport, lee, mike, and john would receive it

Runlevels

Halt (0)

Single user (1)

Multi-user without network varies (2)

Multi-user with network varies (3)

Reboot (6)

To see runlevels for that version of Linux go to /etc/inittab

fstab and Volume Mounting

/etc/fstab file format is:

/dev/hda2 swap   swap defaults 0 0

/dev/hda3   /   ext2   defaults 1 1

/dev/hdb   /cdrom iso9660 defaults 0 0

File Format

First field is /etc/hdb = Remote file system or block special device

Second /cdrom = mount point for the file system

Third field iso9660 = describes the type of file system

Fourth field = consists of a comma separated list of options like noauto (don't mount when the mount –a command is given), ro, user, rw, rq (read/write with quotas), xx (ignore file system)

Fifth field 0 = indicates that when the dump command is issued, and if a non present value or a 0 is given, don't dump

Sixth field = The order the file system check is to be run.

mtab

/etc/mtab : keeps list of all currently mounted file systems

Volume Mounting and Unmounting

' mount /dev/fd0 /floppy

' umount /floppy

If fstab is setup correctly you could say:

' mount /floppy

' umount /floppy

Recompiling the Kernel

WHY?

- Newer kernel support, more devices
- Fix bugs in earlier versions
- Better management of resources
- Provide more stability
- Run faster than previous versions

Precompile Guidelines

- Check for the latest or supported version's gcc, libc, etc., that are needed for the compile process

- Make sure you have the required space in /boot or other related directory to accommodate the new kernel. Based on your configuration, the new kernel could be over 30MB

- Gather information about your hardware. This will aid in properly selecting the required modules and configuring the kernel to work best with your hardware.

- Make sure you don't have any hardware problems. Though this is not very common, one might actually face a situation where the kernel might not recompile, or crashes due to bad hardware.

- Backup your existing kernel

- Make a boot /rescue disk conting your present working kernel image

- Download the latest kernel version and/or the required patches.

Unpacking and Installing the Kernel

Login as root and change to **/user/src**

If a directory "linux" exists you must remove this directory before proceeding

A Complete Install

Use the command: tar zxpf linux-latest-kernel.tar.gz

Upgrade Using Patches

' gzip –cd patchXX.gz | patch –p0

' patch –p0 < patchXX

Configuring the Kernel

' make mrproper   Removes any .o extensions and old modules/dependencies

' make config   Command based interactive mode - sucks!
      or

' make menuconfig Text-based color menus

      or

' make xconfig   GUI only works if X is running

Compiling the Kernel

' make dep

 ' make clean

' make zImage   Compile and create a compressed kernel image

   or

' make zdisk   Also makes a boot disk on a floppy disk

   or

' make zlilo   Updates existing lilo configuration with information kernel

   or

' make bzImage / bzdisk / or / bzlilo

' make modules

' make modules_install

System Shutdown Techniques

Use system commands to bring system down so it comes down gracefully

Shutdown

Reboot

' shutdown –r 300

' shutdown –r 300 System is rebooting so logoff and go home!

Halt

' shutdown –h 300

' shutdown –h 300 System is going down so get off now!

CTRL-ALT-DEL

This sequence of keys can be used to shutdown the system if it is configured correctly in the /etc/inittab file. The most common way is linked with the shutdown –r now command.

Physical Means (usually not good)

Pressing the power button , power outage, whatever.

The system didn't have time to remount the hard drive as read-only so the drive is marked dirty and fsck will run on next boot.

File Permissions

-rwxr—r— binary 100-(4) = read, 010-(2) = write, and 001-(1) = execute

' find –perm 700 finds all files with read,write,execute access to owner only

Changing File Permissions

' chmod 777 filename   : gives read/write/execute access to everyone

Boot Process

BIOS reads the MBR

LILO resides in the MBR

LILO uses the BIOS to find file called boot.b (single boot) or chain.b (dual OS)

LILO uses the BIOS to find kernel image

Kernel is loaded and BIOS goes away

System booted

Monitoring System Resources

Uptime

' uptime   displays:

10:10am up 34 days, 2:02, 7 users, load average: 0.2, 0.08 0.02

Load averages of 1.0 or more are signs of a sluggish system

Process Status Command

' ps aux   command

USER: User account name

PID: Process identification

%CPU: Approximate percentage of the CPU time a process has used relative

to the other processes

%MEM: Percent of total memory used

RSS: Resident set size, or the number of pages of memory that the process has allocated

TTY: The terminal that controls the process

STAT: R is for ready to run, S is for sleeping, SW is swapped, Z zombie

START: Time the process was started

TIME: The amount of time the process has been running

COMMAND: The command line that started the process

The top Command

The real time, updateable, interactive, version of ps, Use the spacebar to manually refresh

The vmstat Command

Snapshot of overall memory utilization

-r shows the number of processes waiting to run

-b the number of processes blocked

-w ready-to-run processes that are swapped

-swpd max amount of memory in KB used on the swap device

-free the amount of free memory for new processes

-buff amount of memory reserved for data cache

-si rate at which 4K pages are swapped into memory from swapping device

-cache current amount of paging cache employed

-bi rate at which 1K blocks are copied into memory from the hard disk

-in total interrupts per second including the system clock ticks

-cs number of context switches per second

-us percentage of time CPU executes user programs or routines

-sy executing inside the kernel

-id waiting for request for users on the network

Monitoring CPU Utilization and Controlling Processes

Monitor using: ps, top and vmstat, Control using: nice and renice

Good Housekeeping

Quotas

Hard limit is one that cannot be exceeded under any circumstances.

Soft limit sends warnings to users/groups.

Quotas can be established for both users and groups

/etc/fstab   /dev/hda3 / ext2 rw,quota 1 1

If only for users replace quota with usrquota.

If only for groups replace quota with grpquota.

Files are located on the root of the file system called quota.user or quota.group.You must create a file and edit it.

' edquota rtest

This allows you to edit quotas for user rtest

' edquota rtest stest utest

This is for multiple users

' edquota –p rtest stest utest

This allows you to edit quotas for rtest and stest and then ensure utest will have same quota as rtest.

To determine your quota limits type quota.

To enable quotas type command quotaon or quotaon –a for all file systems or quotaon /dev/hda3 for a particular file system.

Program/File Placement

Applications go in /opt directories if stable. If not place it them in /var. If you need libraries to be installed for these applications store them in /usr/local or /usr/lib

Daily Check of Logs for Intruders

' netstat –a This command will give a quick summary of network activity by protocol, specifically by IP, ICMP, TCP, and UDP.

Hard Disk Management

Making a file system:

' mkfs –t ext2 /dev/hdb 8500000   (-t means type of file system)

' Linux ext2 file system on secondary master is 8.5GB

System Startup Files

' ampd: Uses the Advanced Power Management driver in kernel to log

' arpwatch: Tracks Ethernet / ip pairings, and logs any changes

' at: Allows users to schedule processes to being at a later time

' Atd: Begins processes that have been queued for later execution

' Autofs: Works in conjunction with auto mount to automatically mount fs

' cron: Looks for files in the crontab

' dhclient: Protocol to configure interface to use DHCP

' dhcrelay: Relays DHCP requests from networks not connected directly to server

' gpm: Allows the user to cut and paste test from the Linux console using mouse

' halt: Allows the superuser to halt/reboot, or shut down the system /var/log/wtmp

' inetd: Listens for requests on internet sockets, and launches programs

' ircd: Process all commands and user messages sent by the program

' kerneld: Removes unused kernel modules, and performs operations by kernel

' killall: Stops processes requested by user

' lpd: Keeps track of existing printers and spools items in the printer queue

' pcmcia: Read by cardmgr, provides descriptions on how to initialize device

' quota: Displays the disk quota and the amount used by user

' random: Random number generator. Selects pseudo-random for programs

' reboot: Reboots the system if the system is in run level 0 or 6

' route: Changes the kernel's network routing tables

' routed: Maintains the network routing tables for the system

' rpc: Allows programs written in C to make procedure calls to network machines

' rusersd: Provides info about users currently logged into the system

' rwhod: Gets information from the system and uses it to maintain a dataset that is used by the rwho and ruptime commands

' sendmail: Sends e-mail from mail programs to their proper destinations

' syslog: Creates an entry in the system log that is delivered to the system log by syslogd

' wwwoffle: Provides offline access to web addresses

' xdm: Manages x displays on local or remote systems

' yppasswdd: Allows users on NIS system to change their passwords

' ypserv: Daemon that allows the system to be used as a NIS server

' ypdfrd: Speeds up the transfer of system maps to NIS slaves from NIS servers

' Start: Called at system boot to begin the processes

' Stop: Called at system shutdown to end the processes

' Reload: Allows the daemon to be restarted once it has begun

' Status: Reports the current status of the daemon

SHELLS AND COMMANDS

Use of the Superuser Account

The su and sudo Commands

Along with a supplied password this command gives user access to root like privileges su and sudo are the same except sudo will auto logout in minutes. This can be configured in the /etc/sudoers

Changing Passwords and Password Aging

Guidelines: 6-8 characters, at least 1 digit

Lock the passwd file with the command: passwd –l

Unlock: use passwd –u

Communication with Users

Wall

Write all: Immediately sends message to all users currently logged in.

Write

Sends message to destination person using listed terminal (tty)

' write accountname [tty] <ENTER>

' Type message here

' <CTRL> + <D>

Talk

' talk accountname

Gives you a split screen (cool). Like a Windows chat session.

MOTD

Message of the Day

/etc/motd

Users will see this global announcement every time they login. If they create a file called .hushlogin they won't receive the MOTD unless the admin edits the file /etc/default/login and edits the line ALLOWHUSH 'NO'.

Issue

/etc/issue contains info displayed prior to the terminal's login

E-Mail

Uses the sendmail facility and allows Admin's to send lengthy messages to users

Moving from DOS/Win to Linux

Mtools

Allows the running of many DOS commands by prefixing an m to the corresponding Linux command; e.g., mcopy

Mtool Command Examples

' mdel, mdir, mcd, mformat, mmove, mrd, mren

Midnight Commander

Can be custom configured. Used to browse files. It's like Windows File Explorer and can be used for FTP access and file editing.

Graphical User Interfaces

Desktop GUI interfaces to a CLI background

<u>Introduction to Shell Scripts</u>

External and Internal Commands

` ls Opens a new shell to run the command. External examples: programs in /bin /usr/bin

` cd Runs internal to the shcll

Executing Shell Scripts

` chmod 777 myscript (makes script executable)

./myscript (./ tells the shell that the script is in the current working directory)

or bash myscript

Scripts from Simple Commands

File that have nothing more than commands. File's contents are processed sequentially.

Shell Variables

To see a list of these and their values run the command env. This returns the values stored in these variables:

HISTSIZE, HOSTNAME, LOGNAME, HISTFILESIZE, MAIL, TERM, HOSTTYPE, PATH, HOME, INPUTRC, SHELL, PS1, PS2, USER, OSTYPE, SHLVE

Assignments to variables

Number = 5

String = " I hope I can pass this test"

Char = 'a'

Cmd = 'ls'

Simple Arithmetic

Res = `expr $I + $J`

` echo $Res

Looping

Lets users execute a command over and over until it is time for them to be done.

The For Loop

` for I in *

` do

` echo $I

` done

The While Loop

` echo –n "Enter the User name: "

` read name

` while [$name!= "done"

` do

` useradd –g users –d /home/$name –s /bin/bash $name

` echo –h "Enter the User Name: "

` read name

` done

Command-Line Arguments

MYSCRIPT.TXT

` echo $#
` echo #1

` echo #2
` echo #3

MYSCRIPT.TXT hi hello bye

Output is:

3
hi
hello
bye

Decision Making

` if [expr]

` then

` commands to be executed

` else

` commands to be executed

` fi

Decision Making with Case

` case $1 in

` –1) ls –l $2;;

` –2) file $2;;

` –w) wc $2;;

` –s) read old; read new; sed 's/'$old'/'$new'/g' $2'

` *) echo "Invalid Option";;

` esac   /*case spelled backwards; used to end a case statement */

System Status

System Message Logging

` boot.msg: Information read by the system at boot time
` httpd.access_log: Shows connections made by httpd
` httpd.error_log: Lists errors that httpd has encountered
` lastlog: Reports when a user was last logged in

' mail: All messages from the mail daemon are reported here
' messages: The file that syslogd reports kernel and system messages to
' warn: Messages that have been classified as warning, critical, or error logged
' wtmp: Reports, in binary format, logins and logouts on the system
' xdm.errors: Reports errors xdm has encountered while operating.

Helpful Commands

' who: Displays who is currently logged into your system. Reports user name, terminal and date

' df: Displays the amount of free space on all the currently mounted drives

' –h: Displays info in human-readable format

' –m: Prints values in megabytes

' du: Shows the amount of disk space used by the specified file or directory

' –s Summarizes the amount of disk space used

' top: Prints a list of the most CPU-intensive processes that is updated in real time

' ps: Lists the processes that are currently running on the system

' a: Shows processes belonging to other users (used with u)

' e: Displays the environment

' u: Shows the username of the owner of the process

' x: Lists processes that do not have a controlling terminal (daemons)

<u>File System Specific Commands</u>

Options for fuser

' l : lists all known signal names

' m: shows a file on a mounted file system or a block device

' s: silent mode (ignores –a, u, and v)

' u: appends the username of the process owner to each PID

' V: verbose mode

' c: current directory

' e: running executable

' f: open file

' r: root directory

' m: mapped file or shared library

' i: Confirmation before killing a process

Commands

To view man pages on these commands go to http://linux.ctyme.com/

at, batch, atq, atrm

' at: Places a command into a queue to be executed at a given time

' atq: Lists the user's queue : job number, date, hour, job class

' atrm: Removes a job from the queue based on the job number

' batch: Places a command into a queue to be executed when the average load drops below 0.8

Some switches

       -V: Prints version number

       -q: Queue sets job in another queue, a-z or A-Z

       -m: Send mail to user

       -f file: Reads job from file

       -l: Alias for atq

       -d: Alias for atrm

       -v: Displays time job will execute

       -c: Cats the job to the command line

bzip2, bunzip2, bzcat, bzip2recover

' bzip2, bunzip2: A block-sorting file compressor

' bzcat: Decompresses files to stdout

' bzip2recoveror: Recovers data from damaged bzip2 files

Some switches

       -c: Standard output

       -d: Force Decompression

-z: Compression

-t: Test integrity

-f: Force overwrite

-k: Keep input files

-s: Small compression for memory usage

-q: Suppress nonessential warnings

-v: Verbose mode

cat

Concatenates files and prints results on the standard output

Some switches

-b: Numbers the lines that are not blank

-n: Numbers all output lines

-s: Compresses multiple blank lines into one blank line

--help: Displays help file for cat

chage

Change user password expiration information

Some switches

-E: Explicitly sets the day a certain password expires

-I: Specifies number of days after a password expires that the account is locked

-l: Allows users to determine when their passwords expire

-m: Used to specify the minimum number of days that a password is valid

-M: Used to specify the maximum number of days that a password is valid

-W: Sets number of days before a password expires that a user will get a warning

chattr

Changes file attributes to the second extended file system

Some switches

-R: Recursively changes attributes into all directories

-V: Verbose output to screen

-v version: Changes version of file system

chfn

Changes user info in the CGOS field of the passwd file

Some switches

-f: Changes full name field only to the specified value

-r: Changes only the room number field to the specified value

-w: Changes the work phone number field to the specified value

-h: Changes the home phone number field to the specified value

chgrp

Changes group ownership of a file

Some switches

-c: Reports when a change has been made to a file

-f: Prevents error messages from being shown

-R: Changes the group of all files and subdirectories of a directory

-v: Prints a message for every file changed

--help: Displays the help file

chroot

Runs a command with the specified directory as the root directory

Some switches

--help: Displays the help file

--version: Prints the version information

cpio

Copy files to and from archives

cpio cannot archive files with more than 100 characters

cpio cannot archive "special" (block or character devices) files

Some switches

   -o: Creates an archive

   -i: Extracts an archive

   -l: Lists the contents of an archive

   -v: Displays information while cpio is running (verbose)

crontab

Allows users to schedule commands for the cron daemon to run

Some switches

   -l: Lists current crontabs

   -r: Removes current crontabs

   -e: Edits current crontabs

debugfs

ext2 file system debugger

Some switches

   -w: Specifies that the file system is to be opened in read-write mode

   -f: Debugs will get its commands from the specified command file

depmod

Handles dependency descriptions for loadable kernel modules

Some Switches

   -a: Loads all the modules

   -d: Runs depmod in debug mode. All commands issued are outputted

   -e: Outputs the list of unresolved symbols for each module

   -v: Outputs the list of all processed modules (verbose)

   -i: Causes depmod to ignore symbol versions.

   -m: <file> Use the symbols in <file>

   -s: Use the system log for errors

diald

Demand dialing daemon for IP links over telephone lines

Some switches

-f <file> or –file <file>: Reads file for additional commands

dot (.)

Shorthand notation for current directory

dot dot (..)

Alias to the parent directory of the current directory

dump

File system backup

Some switches

-0-9: Specifies the size of the backup 0 – epoch

-d: Allows the user to set the tape density to a specific value

-n: Notifies all people in the group user if the program requires attention

-T date: Performs a backup only of files modified since the specified date

-W: Prints information on what file system needs to be dumped.

e2fsck

Checks Linux second extended file system

Some switches

-c: Makes e2fsck look for bad blocks on the file system

-d: e2fsck Prints debugging messages

-n: Assumes an answer of 'no' to all questions asked

-p: Automatically repairs the file system without prompting

-y: Provides an answer of 'yes' to all questions e2fsck asks

-v: Prints messages for all things e2fsck does

edquota

Edits user quotas

Some switches

>   -g: Edits the quota of a specified group

>   -p: Uses the quotas of the specified prototype user

>   -u: Edits the quota of the specified user

fsck

Checks and repairs a Linux file system

Some switches

>   -A: Attempts to check all installed file systems

>   -C: Prints progress bars on the supported file systems

>   -N: Does nothing, only displays what would have been done; i.e., a "dry run"

>   -t: Lets the user specify the type of file system to check

grep, egrep, fgrep

Prints lines matching a pattern

Some switches

>   -a: Treats binary data files as test files

>   -i: Makes grep return entries regardless of case

>   -n: Prints the line number for each returned entry

>   -r: Searches all subdirectories and their files

>   -s: Does not print error messages about corrupt or nonexistent files

>   -U: Treats all files as binary

>   -w: Only returns files where the input is a whole word

>   -x: Only returns files where the input string is explicitly matched

gv

A PostScript and PDF previewer

Some switches

>   -center: Centers the document in the display

-h: Displays the help messages

-monocrome: Shows the document in black and white

-grayscale: Shows the document in grayscale

-color: Shows document in color

-scale n: Sets the scale of the document with the specified initger n

-portrait: Displays the document in portrait mode

-landscape: Displays the document in landscape mode

gzip, gunzip, zcat

Compress or expand files

Some switches (gzip)

-d: Tells gzip to uncompress files that have already been compressed

-h: Displays the help file for gzip

-l: Lists info about the specified files

-q: gzip does not display any warnings

-r: Specifies that gzip should also compress files in any subdirectories

-t: Test the file for errors

-S suffix: Adds the specified suffinsted of .gz

Some switches (gunzip)

-c: Writes the output to the standard output

-h: Displays the help file

-l: Lists compression information for specified files

-v: Displays information about every uncompressed file

hdparm

Get/set hard disk parameters

Some switches

-d: Disables/enables the 'using_dma' flag for the drive

-f: Synchronizes and flushes the buffer cache for the device on exit

-g: Displays the drive geometry (cylinders, heads, sectors)

-i: Displays the identification info that was obtained from the device at boot time

-I: Requests identification info directly from the device

-k: Gets and sets the "keep_settings_over_reset" flag for the drive

-t: Performs timing of devices reads for benchmarks and comparisons purposes

-u: Gets and sets the "interrupt-unmask" flag for the drive

id

print real and effective UIDs and GIDs

Some switches

-g: Pints only group id

-G: Prints only the supplementary groups

-n: Prints the user or group name instead of the ID number

-r: Prints the real, instead of effective, user, or group id

-u: Prints only the user ID

kill

Terminate a process

Some switches

-s signal: Lets the user specify what signal should be sent to the process. Often there is a better signal than "-9" to send to a process to end it

-l: Prints the list of signals that kill can send

-p: Only prints the pid of the process that was specified without sending a signal

killall

Kill processes by name

Some switches

-e: Processes must match the specified name exactly

-g: Kills the group to which the process belongs

-I: Ask for conformation before killing the process

-l: Lists all the signals that killall understands

-v: Tells if the signal was caught by the process

last, lastb

Show listing of last logged-in-users

Some switches

-num: Specifies the number of lines that last should print

-d: Shows the host name for remote logins

-R: Does not show the host name for logins

-i: Shows the IP number for remote logins

lastlog

Examine lastlog file

Some switches

-u uid: Allows the user to view the last login of a specific user

-t day: Lets the user view logins on a specific day

ln

Make links between files

Some switches

-b: Makes a backup of each file that would otherwise be overwritten or removed

-d: Allows the superuser to make hard links to directories

-f: Forces the removal of existing destination files

-I: Prompts whether to remove existing destination files

-n: If the destination fie is a symlink, the –n treats is as if it were a normal file

-s: Makes a symbolic link

logger

Make entries in the system log

Some switches

> -s: Logs the message to the standard log module

> -f file: Creates a log entry for the specified file

> -t tag: Adds the specified tag to every line the log file

lp

Send requests for an LP line printer

Some switches

> -c: Make copies of the files to be printed instead of linking

> -ddest: Chooses dest as the printer or class of printers

> -m: Sends mail after the files have been printed

> -nnumber: Specifies number of copies to be printed

> -ttitle: Prints title on the banner page of output

> -w: Wwrites a message on the user's terminal after the job is done

lpc

Line printer control program

lpd

Line printer spooler daemon

lpq

Examins the contents of the print que

lpr

Off line printer, allows a user to print a file

lprm

Removes jobs from the line printer spooling que

lsmod

Lists the currently loaded modules

mke2fs

Create a Linux second extended file system

Some switches

> -b block-size: Specifies the number in bytes of each block
>
> -c: Tells mke2fs to check the drive for bad blocks first
>
> -i bytes-inode: Specifies the number of bytes per inode
>
> -l file: Specifies that the list of bad blocks should come from the specified file

mkfs

Builds a Linux file system. Think of mkfs as "make file system"

Some switches

> -c: Checks drive for bad blocks
>
> -l filename: Specifies a file that has a list of the bad blocks
>
> -v: Prints output for every command used my mkfs

modprobe

High-level handling of loadable modules

Some switches

> -a: Loads all modules
>
> -c: Shows the current modules configuration
>
> -d: Causes modprobe to run in debug mode
>
> -k: Only used by the kernel daemon
>
> -l: Lists the currently available modules
>
> -r: Removes modules from the kernel
>
> -s: Uses the system logging for error reporting
>
> -v: Displays information while modprobe is running (verbose)

-t <dir> : Loads one of the modules that are stored in the targeted <dir>

mount

Mounts a file system

Some switches

-a: Mounts all file systems to a given drive in the fstab file /etc/fstab

-n: Mounts without writing in /etc/mtab

-r: Mounts a read-only file system

-t: sets vfstype of the argument following the –t, and is used to indicate the type

mt

Controls magnetic tape drive operation

Some switches (options)

' asf: Moves to the specified file number

' bsf: Spaces backward to the specified number of files

' bsr: Spaces backward to the specified number of records

' eod: Moves to the end of valid data

' erase: Erases the type

' fsf: Spaces forward to the specified number of files

' fsr: Spaces forward to the specified number of records

' offline: Rewinds and ejects the tape

' rewind: Rewinds the tape

od

Dumps files in octal and other formats

Some switches

--help: Help files

- : Reads information from standard input

-j bytes: Sskips the specified number of bytes before reading

-t type: Aallows the user to specify the type of output

TYPES

           `d signed integers

           `f floating point numbers

           `o octal numbers

           `u unsigned integers

           `x hexadecimal numbers

ps

Reports process status

Some switches

    -t[1-12]: Displays processes on the specified terminal

    -r: Displays only running processes

    -p [process id]: All processes with a specified process id

    -G[group id]: All processes with a specified group

    -U[User id]: All processes run by a user

    -l (long): Details about each process

    -u: Processes by effective user ID

    -x: Processes that do not have ttys controlling them (daemons)

quota

Displays users disk usage and limits

Some switches

    -g: Prints group quotas for the group for which the user is member of

    -v: Displays quotas on file systems where no storage is allocated

    -g: Prints quota on file system where usage is exceeded

quotaon, quotaoff

Turn on and off quotas

Some switches (quotaon)

    -a: All file systems in /etc/fstab marked read-write with quotas are turned on

-u: Manipulate user quotas

-g: Manipulate group quotas

Some switches (quotaoff)

-a: All file systems in /etc/fstab marked read-write with quotas are turned off

-u: Manipulate user quotas

-g: Manipulate group quotas

script
Makes typescript of terminal session

Some switches

-a: Appends the output to the end of an already existing file

su
Run a shell with substitute user and group Ids

Some switches

- : Makes shell a login shell

-c: Passes a single command into the shell

-m: Preserves environment variables

-s: Runs the specified shell instead of the user's shell

tar
Saves many files together in a single tape or disk archive, and can restore individual files from the archive

Some switches

-A, --concatenate: Appends files to an archive

-c, --create: Create a new archive

-d, --compare: Find differences between archive and file system

--delete: Delete from archive

-r, --append: Append files to an archive

-t, --list: List contents of an archive

-x, --extract: Extract files from an archive

-f, --file: Use archive file or device F (default /dev/rmt0)

-o, --to-stdout: Extract files to standard output

-z, --compress: Filter the archive through compress

-[0-7][lmh]: Specify drive density

top

Displays top CPU processes

Some switches

-d [time in seconds]: Specifies the delay between screen updates

-q: Causes top to refresh without any delay

-S: Specifies cumulative mode. This shows the system resource usage of the process and its dependent processes

-s: Causes top to run in secure mode

-i: Causes top to ignore all idle or zombie processes

-c: Displays the full path of each process

-n[x]: Re-updates top x number of times

umask

Set file creation mask

Some switches

-p: Prints the umask in a form that may be used as input elsewhere

-s: Prints the umask in symbolic form

zip, zipcloak, zipnote, zipsplit

Package and compress (archive) files

Some switches

-e: Lets the user specify a password to encrypt an archive

-f: Replaces entries in the archive if they have been updated

-g: Appends files to an already existing archive

-h: Shows the help for zip. Equivalent to running zip with no arguments

-i files: Only includes specified files in the archive

-k: Makes the archive conform to MSDOS standards

-m: Moves the specified files into the zip file, and deletes the original file

-q: Prevents messages from the zip program from being displayed

-t: Does not include files modified before the specified date

-tt: Does not include files modified after the specified date

-v: Enables text messages displayed on the terminal

-x: Excludes specified files from being added to the archive

-d: Delete files from existing archive

-z: Lets the user add a multiple-line comment ended by a period or CTRL-D

-#: Specifies a compression rate where # is a digit. 0=no, 9=max compression

-@: zip takes files specified by the standard input

SYSTEM UTILITIES

Archive Utilities

gzip

Files that are in gzip format have the file extension .tgz or .tar.gz (tarballs)

tar

To unzip a gziped file using tar type *tar xzf file.tar.gz*

Backup Techniques

Epoch, Incremental, Differential

Same as described earlier in this Cramsession

File Ghosting

File ghosting appears when a file exists and is backed up and then is deleted and a new file is created with the old filename and a restore is done replacing the new file with the old file.

tar

Backup utility used to select directories to backup

Command tar cvfz /dev/rfrt0 /home /bin

cpio

Copy input / output: Another backup utility

<u>Volume Integrity</u>

fsck

/etc/inittab is read at boot time to see the file system type and if it is to be checked

values 0 = do not check , 1 = always assigned to root , 2 = all other systems

Exit codes for checked file systems

Code	Significance
0	no errors
1	errors corrected
2	system should be rebooted
4	errors not connected
8	Operational error
16	usage or syntax error
128	shared library error

Some switches

-A : Checks all file systems according to the last column of /etc/fstab

-R : Skips root file system (when used with A option)

-T : Do not show title at startup (used by init scripts)

-V : Shows verbose output

-N : Shows results of check, but without modifying the volume.

-P : Checks all file systems simultaneously with root file system (A option)

-f : Forces a check even if the clean flag is set in the superblock

-t fstype: Specifies the file system type to be checked

-a :   Automatically fixes file system inconsistencies

-r :   Requests permission before repairing inconsistencies

-s :   Serializes fsck operations

fs-options : File system specific options not understood by fsck

-y, -n : Default answers to prompt for permission 'yes' 'no'

Process Management

ps

ps ax – Displays all system processes, e – Environment as well as the command run, c – Actual command line

top

same as above

kill

same as above

nice

[+|-]Allow you to schedule priorities to system programs [-19 high +20 low]

nohup

Allows programs to run in the background even after logging out because it ignores the hang up signal sent to processes when a user logs out. Good idea for telnet sessions where you could potentially loose the connection.

Accounting

/var/log/wtmp	Records system wide logins and logouts (binary format)
/var/run/utmp	Contains data about all currently logged-in users (binary format)
/var/account/pact or /var/account/acct or /VAR/LOG PACCT or /VAR/LOG/ACCT	System wide process accounting file (records commands)
/var/account/savaccountacct/apcct	Information summarized by command
/var/account/usracctacct/pact	Information summarized by user

Printer Configuration and Restarting

/etc/printcap   example

lj|HP LaserJet 4 Plus (PostScript, PCL, Graphic PCL) Printer:\

   :lp=:sh=false:rp=SXD
auto:rm=192.168.1.1:sd=/var/spool/lpd/lj:\if=/var/log/ld-err

Xerox Docuprint N40:\

  :lp=:rp=raw:rm=192.168.1.2:sd=/var/spool/lpd/lp:if=/var/log/lpd-errs:mx#0:

sd=directory	Specifies spool directory
lf=file	Specifies error log file
lp=file	Specifies device file
af=file	Specifies accounting file
Rw	Printer can both read and write information (can send information back to computer)
ff=string	String that causes printer to form feed
Fo	Outputs from feed when device is opened
mc#number	Specifies maximum number of copies of a job allowed
mx#number	Maximum file size in blocks allowed
Sc	Specifies that multiple copies should be prevented
Sf	Specifies that form feeds should be prevented
Sh	Suppresses the printing of headers

Software Package Management

RPM – Red Hat package management

Format = package-version-release.architecture.rpm

Example = gawk-2.0-1.i386.rpm

RPM works in 5 basic modes:

` rpm –I	Install
` rpm –e	Uninstall
` rpm –q	Query
` rpm –V	Verify
` rpm –U	Upgrade

All these basic modes understand options like:

-vv	Prints out the debugging information
--quiet	Prints only error messages
--version	Prints version number
--help	Prints help contents
--showrc	Shows current configuration options for rpm
--rebuilddb	Rebuilds the RPM database
--pipe	Pipes output of RPM to different command

APPLICATIONS

Backup Applications

AMANDA

Features

- Client-server based architecture

- Ability to perform network wide backup

- Maintains a database to locate tapes

- Generates reports for each backup session

- Compresses data before sending it to tape

- Use standard Unix backup programs

- Does not overwrite active tapes

- Can perform unattended backups with an automounter

- Uses tape efficiently

Kbackup

Kbackup is a shell-based program that has been developed to handle backups on tapes, hard disks, and file systems. If you are using slackware-based Linux install afio on your machine to be able to run Kbackup.

- Each archive on a tape contains a header that holds option settings, parameters compression format, date, backup type, etc.

- When using tapes or mountable block devices, all files in the archive get stored in a directory at the beginning of the archive

- To protect sensitive data, you can compress and encrypt archives using public key encryption

- You can schedule backup or restore operations to be executed at any specified time

- You have a choice between fill or incremental backups

- Kbackup supports tapes, floppy drives, and removable media

- Each backup task can have different menu based configurations files

- By using the MULTIBUF program, Kbackup automatically detects the length of your tapes

- Kbackup provides support for accessing remote devices of LAN backups

- Kbackup permits named archive configurations to allow for varied archive formats

taper

taper is an archival program designed for use with tape drives, although it will work with any file on any device to which Linux can write. taper is more user-friendly than tar because it stores information about the files being archived at the beginning of the process for easy retrieval. Finding files with taper is therefore much faster than tar. taper also stores info files about the archives being made in the user's home directory a further adaptation for easy access to information about the archive's contents.

<u>Display Tools</u>

XDM

Allows user to log into a system and start a basic shell.

Easy to configure xdm-config or the –config files

Careful: these babies run as root

Xwin32

A sophisticated X terminal program. It is a product of StarNet that allows users using Window 98 or NT to connect to remote Unix-like machines (you only see the applications)

ORL's VNC

Remote viewing tool that allows you to view the desktop of remote computers

Mail Exchange and Virtual E-Mail

Sendmail

When sendmail is run the first file it looks at is sendmail.cf located in /etc. This file points to all other files that sendmail needs

The sendmail.cf is a very complex file to deal with; here are some commands and a brief description:

#	Comment Line
space	Continue previous line
Tab	Continue previous line
C	A class macro
D	A macro
F	A class macro from a file
H	A header
K	A keymap entry (V8 only)
M	A mail delivery agent
O	Define and option
P	Delivery properties
R	A transformation rule
S	A rule-set start
T	Declare trusted users
V	Version of configuration file

Vacation files: .vacation , .vacation.msg , .vacation.db. To activate these type vacation. To deactivate them, type rm .vacation

Syntax: Subject: I am studying for my second Sair test, please leave me alone. Your mail concerning "$SUBJECT" will be read when I pass my test.

Qpopper

POP3 compatible server that runs as a host

Mahogany

Cross platform program that has support for SMTP, POP3, IMAP, and NNTP

IMAP Server

POP deletes the main message once the user reads it. IMAP saves it on the server and lets the user download it as many times as he/she wishes. IMAP – (Internet Mail Access Protocol) This means that most of the message management is controlled by the server instead of the client.

Download form ftp://cac.washington.edu/

1. Find your system type code located in the imap-4.7/MakeFile
2. Type 'make N' where 'N' is your system type number
3. Install the POP2 daemon (ipopd/ipop2d)
4. Install the POP3 daemon (ipopd/ipop3d)
5. Install IMAP daemon (imapd/imapd)
6. Update /etc/services so that the following services are registered on the right port: pop2 on port 102, pop3 on port 110, and imap on port 143
7. Update Yellow Pages/NIS/NethInfo/etc (not applicable on some systems)
8. Alter the /etc/inetd.conf file to include (pop2,pop3,and imap)
9. Send a SINGUP command to inetd to re-read the system startup files

Web Servers

Apache install

./configure –prefix=/usr/local/apache/   # working directory is in /usr/local/apache

make

make install

/usr/local/apache/apachetl start

SSL

Secure Socket Layer: A must where encryption and privacy is required

Mod_Perl

Brings together the power of Perl programming and Apache

Mod_php

Scripting that allows database interaction through a web server

Mod_frontpage

Allows frontpage server extentions to be used on Apache servers for Linux and Unix platforms

Other Window Managers

Fvwm95
AfterStep
Window Maker
Icewm
Sawmill

Benchmarks

Compare system A's performance against system B's performance

- Do not attempt a "whole system" analysis

- Keep an open mind by stating clear and concise goals

- Perform repeated tests to ensure reproducibility and accuracy, but do not over start your results by using two, three, or more decimal positions

- Demonstrate objectivity by sharing information and be sure to quote sources and note references to supporting data

FTP Servers

pro-ftp

- Has a single main configuration file
- Easy configuration of multiple FTP servers and services
- Can be run as a stand-alone server
- Can be run from inetd
- Does not require any specific directory structure or system files
- Will not execute any external programs
- Has hidden files and directories with Unix type permissions
- Runs a non-privileged user
- Supports logging and utmp/wtmp
- Supports shadow passwords

wu-ftp

- Logging of transfers and commands
- Simultaneous compression or archiving
- User type and location classification
- Limitations based on class
- Upload permissions per directory
- Restricted guest accounts
- Overall system and directory messages
- Directory aliasing
- cd path
- Final name filtering
- Virtual host support

ftpaccess

- E-mail address of administrator
- Setting the class for users
- Limitations of the number of connections

- The welcome message file

- Turning on and off compression and 'tar'ing for all users

- Ability to log certain transfers

- Restricting transfer to certain files

- Restricting commands for anonymous users

- The shutdown message file

- Turning on and off passwords for anonymous users

glFtpD

Installation: Extract the archive to the root directory. Next copy the necessary library files /lib/* and the ldconfig utility to the ftp-structure once done

```
' cd /glftpd/dev
' mknod –m666 null c 1 3
' cd /glftpd/dev
' mknod –m666 zero c 1 5
```

Be sure to check and make sure that the libs copy correctly. Now create ld.so.cache in the ftp-structure. Again, make sure that the libs copied correctly. If they did not, the installation will not work. Also check to make sure that /flftpd/etc/ld.so.cache exists. Next, copy the required binaries (sh, kill, cat, echo, grep, unzip). Ensure that permissions are properly set in /flftpd/bin and take care to set your incoming directory permissions to world-read/write enabled. Now copy the configuration fie, glfptd.conf to your /etc directory and edit it to your personal preferences. Next, add the following line in /etc/inetd.conf: glftpd stream tcp nowait root /usr/sbin/tcpd /glftpd/bin/glftpd –l –o –i

<u>Secure Shell</u>

Is included with most distributions.

Installation

` ./configure; make; make install

<u>Common Administrative Tasks through GUI Tools</u>

YAST/YAST2

Mouse, Modem, CD-ROM, Printers, User, Groups

Linuxconf

This is a GUI administration tool that will aid in user account management

Turbocfg

Originated from Japan. Also see TurboUserCfg

COAS

Caldera Open Administered System: Handleseverything from adding users to tweaking the kernel is possible

News

Usenet are Internet news services that can provide a true wealth of information.

INN

Internet News

LeafNode

A Usenet news server is designed for use with newsgroups containing a few dozen archives. This makes it optimal for use with private computes with limited system resources and slow access to the Internet

The news Forum

A news service available for Linux users to add to their Web site, The news forum was created by Joseph Nielsen around 1990, in Denmark. To install it just run the install script. To get it to work you must have MySQL (http://www.mysql.com/), PHP3 (http://www.php3.org/), and some sort of Web Server. It is also a good idea to have a mail service (http://www.qmail.org/).

TROUBLESHOOTING

I can't mount a CD-ROM drive by clicking on the icon or the floppy. How can I make this work?

Review your /etc/fstab, try other media, check permissions.

Can my Linux box read Windows 2000 NTFS file system?

Yes but it cannot write to Windows 2000 NTFS.

What should I do if my Linux box will not read all of its memory?

Use a higher kernel than 2.2.1 or pass the BIOS mem=XXX.

Why won't my computer boot after installing another video card?

Check for IRQ conflicts and correct them.

Troubleshooting Core Dumps

Software fault: program encountered an unusual error

May be due to incomplete install or error during install.

Lack of proper libraries: use latest versions

Conflict of resources: happens most commonly with sound cards

Try different base addresses for hardware.

Last concern is the disk usage for the garbage that is dumped to save disk space edit /etc/profile : ulimit –c 0 : this is not a fix you still need to find the problem that is causing the core dump and fix it!

Why does ext2-fs mounting unchecked file system warning mean?

' fsck –a ext2 needs to be run so your system can be shutdown properly.

Why does fsck run on boot?

Premature power outage, defaults to 6 months or 20 boots

What is ld.so, and where can I find it?

It is a file needed for all binaries to load and run. Available in a tar.gz format at http://www.redhat.com/apps/download

How can I log back into the system after making changes?

Login using a boot disk, gain root access and mount a drive. Fix the appropriate config files.

Why doesn't the network card work after recompiling the kernel?

Try modprobe. If unsuccessful try insmod if you know the correct module to load.

Why do some programs allow login with no passwords?

Huge security hole: Passwords reside in /etc/passwd; e.g.,

uucp:x:10:14:uucp/var

How can I limit the size of the core files?

` ulimit –c file size	bash shell
` limit	tcsh shell
` rlimit	ksh shell

How can the file system be encrypted?

CFS Cryptographic File System for Linux

TCFS Transparent Cryptographic File System

PPDD Practical Privacy Disc Driver. This is the best so far and is designed by Allen Latham

It's activiated by root at boot. See http://linux01.gwdg.de/~alatham/ppdd.html

Where would a Linux user get the latest version of JAVA?

http://java.sun.com/j2se/

Store the tar.gz in /usr/local

There is a big file named kcore in my /proc directory. What is this, and what would happen if it were deleted?

It is a mirror of the systems ram. No need to delete it! (Don't do it.)

How can I get the latest kernel?

Web sites:

www.kernel.org/pub/linux/kernel

http://metalab.unc.edu/pub/Linux/kernel

www.us.kernel.org/pub/linux/kernel

FTP sites

ftp://metalab.unc.edu/pub/Linux/

ftp://ftp.kernel.org/pub/linux/kernel/v2.2

Troubleshooting Problems Using Ulimit

Bash: ulimit: Cannot modify limit: Operation not performed

System lockdown on nonroot users. You need root privileges

Error while attempting to increase the process file limits for the number of open files with 'ulimit –n 1024'

Ulimit: Cannot rails limit; Operation not permitted

Again, you need root privileges. The number of open files can be increased from 512 to 1024. Also try modifying the values in /linux/limits.h and recompiling the kernel.

What are core files, and how can I use ulimit to help avoid the core dumps from crashes affecting performance and occupying space?

Core files contain a memory image plus debug info. To clear this large file type ` rm core, or ulimit –c 0. To see if it worked use the command ulimit –a to check and see possible causes of the core dump.

What are the typical errors encountered in the usage of ulimit()?

- When the command is not in the correct range [EINVAL]
- When a user ID other than the one with superuser privileges attempts to increase the file size [EPERM]

Will Linux support my USB xxx device?

Kernel versions 2.2.7 and newer will work.

To view available USB devices type

` more /proc/bus/usb/devices

Why are my characters in a garbage font instead of alpha?

Binary data sent to your screen is reset by typing this command at the command prompt: echo '\o3 3c' or reset or ctrl-v and ctrl-o.

To reset the whole hold screen type in echo ctrl-v esc c

Can the kernel image be bootable by LILO?

Yes, edit your lilo.conf file.

Why does memory appear to get smaller after a program is executed?

Starting Linux and running some programs will cause your buffer to grow, thereby seemingly shrinking the amount of free space. This system should stabilize itself given some time.

When you type free at the shell prompt, you are shown six lists. The number under free does not display the true amount of free space. This number is attainable by adding the 'free' number and the 'buffers' number together. Newer versions gives this total in an additional line

How do I remap the keyboard?

Login as root, run xconfigurator

Why doesn't my Num Lock come on during boot up?

' setleds +num: This will do the trick!

How can I change my terminal colors?

' xterm –fg color –bg color# &

http://metalab.unc.edu/pub/Linux/X11/colors/xcolorsel-.1.tar.gz is a good web site to find a listing of colors to try.

What is ELF?

Executable and Linkable Format.

- The ability to create shared libraries with ELF becomes simpler compared to the older a. out format
- Dynamic loading (for example, applications that have the ability to load modules at run time) also becomes much simpler.

Cramsession: SAIR Linux Level I System Administration

Why can't my modprobe find my modules?

When the system was shut down improperly, type this to fix the problem:

' shutdown –r now to fix

If you still get the error go to /etc/modules.conf and remove any modules your system is calling at startup. Do this by tabbing over twice and typing off.

What does unknown terminal type mean?

This means that you have an older kernel installed on your system, and you will eventually need to install a new one. However, there is a fix for your system until you install a new kernel: exit the /etc/termcap file. Replace the line console|con80x25 to linux|console|con80x25.

Can I install a shared library, and what is its purpose?

Yes you can use the logical link library to point to the file you need to share; this will cause a stub code to start. The stub code tells the program where to find the library that the file needs. The purpose to sharing libraries is that they reduce memory consumption and make the executable smaller.

Daemons

' cron	Responsible for running programs that have been scheduled for later
' ftpd	Ftp daemon waits to be invoked
' gpm	Allows users to copy and paste information from consoles using mouse
' inetd	Responsible for running other daemons
' lpd	Printer daemon, waits for print jobs to be sent to the spooling directory
' rlogind	Process commands for logins from remote machines
' telnetd	Telnet daemon

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65