SOLUTION

Operating Systems – Fall 2003
Laboratory Assignment Number 2
Assigned August 11, 2003
Due August 16, 2003
100 Points

Name: SOLUTION

Instructions:

Answer the following questions in the space provided. For assistance you can use the Linux Documentation Project Website http://www.tldp.org. You may discuss with each other during the lab. However, the submitted assignment must be completely your own work.

Question 1:

What is the purpose and the format of the file /etc/profile?

The /etc/profile is a file that is executed for every user who logs on interactively. It contains those commands that are used to setup the users working environment.

Following information is adapted from:
http://moka.ccr.jussieu.fr/doc_link/en_US/a_doc_lib/files/aixfiles/profile.htm

The /etc/profile file contains commands run by all users at login. The $HOME/.profile file contains commands that the system executes when you log in. The .profile also provides variable profile assignments that the system sets and exports into the environment.

After the login program adds the LOGNAME (login name) and HOME (login directory) variables to the environment, the commands in the $HOME/.profile file are executed, if the file is present. The .profile file contains the individual user profile that overrides the variables set in the profile file and customizes the user-environment profile variables set in the /etc/profile file. The .profile file is often used to set exported environment variables and terminal modes. The person who customizes the system can use the mkuser command to set default .profile files in each user home directory. Users can tailor their environment as desired by modifying their . profile file.

Note: The $HOME/.profile file is used to set environments for the Bourne and Korn shells. An equivalent environment for the C shell is the $HOME/.cshrc file.

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The following example is typical of an /etc/profile file:

```
#Set file creation mask unmask 022
#Tell me when new mail arrives
MAIL=/usr/mail/$LOGNAME
#Add my /bin directory to the shell
search sequence
PATH=/usr/bin:/usr/sbin:/etc::
#Set terminal type
TERM=lft
#Make some environment variables global
export MAIL PATH TERM
```

Question 2:

What is the purpose of the getty program? How is it configured?

getty is a program that handles the login process when you log onto a Unix box. There are 3 versions that are commonly used with Linux: agetty, getty_ps and mgetty. The getty program is responsible for monitoring each input terminal line for activity and then presents the login prompt if it detects any activity.

The getty program is configured though the files /etc/gettydefs and /etc/inittab

Question 3:

What is a Shell Environment variable? How is it indicated? How do you see its value? What is the purpose of the following variables (1) SHELL (2) PATH (3) PWD

A shell environment variable is used by the shell to hold important parameters related to a users session. A shell environment variable is indicated by the presence of the $ symbol before its name. For example $SHELL, $PATH and $PWD.

$SHELL holds the name of executable program for the users shell.

$PATH holds the list of directories which are on the PATH.

$PWD holds the value of the present/current working directory.

To check the value of a shell environment variable we can use the echo command. For example, “echo $PATH” will printout the value of the PATH shell variable to the standard output.

Question 4:

What is the purpose of the file /etc/securetty?

The file /etc/securetty list the terminals from which the root user is allowed to log in to the system. This is for the purpose of security. The location of a terminal used to be fixed in old days and it was considered more secure if we could force the root account to be used only from certain rooms where the presence of the root user is more likely rather than from any ordinary terminal in the building.

Question 5:

What is the purpose of the file /etc/nologin?

The file /etc/nologin is used to control interactive logins into the system. If the file /etc/nologin exists then if a user tries to log in the text contained in the file /etc/nologin is printed and the connection is then terminated. It may be noted that the root user can still login while the /etc/nologin file exists.

Question 6:

What purpose the /etc/ directory serve? List 20 important files in the /etc/ directory with the purpose of each file in one sentence.

The /etc/ directory contains various configuration files for the system and applications. Following table lists 20 files commonly found in the /etc/ directory along with the purpose of each file.

S. No.	***File Name***	***Purpose***
1	/etc/passwd	Contains information about user accounts on the system.
2	/etc/shadow	Contains the encrypted passwords for users in a systems where the Shadow Password suite is in use.
3	/etc/motd	Contains the “Message of the Day”. This is a message which every user who logs on interactively will see printed on his/her terminal screen after their password is verified and before they are presented with the normal shell prompt.
4	/etc/issue	Contains a warning messages which is printed on the terminal screen to those who are trying to log on interactively. First the message is printed and then they user is issued with the login prompt.
5	/etc/nologin	If the file /etc/nologin exists then if a user tries to log in the text contained in the file /etc/nologin is printed and the connection is then terminated.

S. No.	*File Name*	*Purpose*
6	/etc/intetd.conf	Contains the configuration settings for the INETD superserver.
7	/etc/securetty	Lists the terminals on which the super user (root) is allowed to login from.
8	/etc/inittab	Contains the settings for the INIT program.
9	/etc/fstab	Contains the filesystems to be mounted at the system startup. Stands for “filesystem table”.
10	/etc/mtab	Contains the list of file systems that are currently mounted. Stands for “mount table”.
11	/etc/resolv.conf	Contains the settings for the resolver.
12	/etc/hosts	Contains a list of hostnames and corresponding IP addresses.
13	/etc/printcap	Contains the printer capability information. This information defines settings for various printers that are supported by the system.
14	/etc/termcap	Contains the terminal capability information. This information defines settings for various terminals types that are supported by the system.
15	/etc/profile	The /etc/profile is a file that is executed for every user who logs on interactively. It contains those commands that are used to setup the users' working environment.
16	/etc/hosts.allow	Contains the list of hosts to which specified TCP/IP services would be allowed.
17	/etc/hosts.deny	Contains the list of hosts to which specified TCP/IP services would be denied.
18	/etc/nsswitch.conf	Contains the Name Services Switch configuration settings.
19	/etc/syslog.conf	Configuration file for the syslogd. syslogd is the System Logging Daemon.
20	/etc/groups	Contains information about user groups on the system.

Question 7:

What purpose the /proc/ directory serve? List 10 important files in the /proc/ directory or its subdirectories with the purpose of each file in one sentence.

The /proc directory is a virtual filesystem which is used to store kernel data structures and dynamic data while the system is up and running. As the /proc manual page states “/proc is a pseudo filesystem which is used as an interface to kernel data

structures rather than reading and interpreting /dev/kmem. Most of it is read only, but some files allow kernel variables to be changed."

Following table lists 10 files in the /proc directory or its subdirectories along with the purpose of each file. Most of the information is gleaned from the /proc manual page.

S. No.	*File Name*	*Purpose*
1	/proc/meminfo	Provides information about the system memory and its allocation/usage. This is used by free to report the amount of free and used memory (both physical and swap) on the system as well as the shared memory and buffers used by the kernel. It is in the same format as free, except in bytes rather than KB.
2	/proc/cpuinfo	Provides information about the CPUs currently in use by the operating system.
3	/proc/net/	Contains subdirectories which contain information about the networking subsystem of the kernel.
4	/proc/NUMBER/cmdline	This holds the complete command line for the process, unless the whole process has been swapped out, or unless the process is a zombie. In either of these later cases, there is nothing in this file: i.e. a read on this file will return 0 characters. The command line arguments appear in this file as a set of null separated strings, with a further null byte after the last string.
5	/proc/bus	Contains the subdirectories for the installed buses.
6	/proc/cmdline	Arguments passed to the Linux kernel at boot time. Often done via a boot manager such as LILO.
7	/proc/filesystems	A text listing of the filesystems which were compiled into the kernel. Incidentally, this is used by mount to cycle through different filesystems when none is specified.
8	/proc/kcore	This file represents the physical memory of the system and is stored in the ELF core file format. With this pseudo file, and an unstripped kernel (/usr/src/linux/vmlinux) binary, GDB can be used to examine the current state of any kernel data structures. The total length of the file is the size of physical memory (RAM) plus 4KB.

S. No.	*File Name*	*Purpose*
9	/proc/loadavg	The load average numbers give the number of jobs in the run queue (state R) or waiting for disk I/O (state D) averaged over 1, 5, and 15 minutes. They are the same as the load average numbers given by uptime and other programs.
10	/proc/mounts	This is a list of all the file systems currently mounted on the system. The format of this file is documented in fstab(5).

Question 8:

What is the purpose of the | symbol in the UNIX shell?

The | symbol is used by the UNIX shell as a indicator of a pipe. A pipe is a method of interprocess communication supported by the shell whereby the output of one command becomes the input to another. For example, if the "ls -l" command is used to list the files in a long directory format with one file per line and the "wc" command is used to count the number of words/lines in a file then the command "ls -l | wc" will result in the printing of the number of files in the directory because the output of "ls -l" would be the input to "wc".

Question 9:

What is the purpose of the > symbol in the UNIX shell?

The > symbol is used by the UNIX shell for output redirection. Normally the output is directed to the standard output, i.e., the monitor. However the shell can redirect the output to a file or another output device such as a printer. For example, if the following command is run the output will be put in a file files.txt rather than being printed on the screen as it normally is.

"ls -al > files.txt"

Question 10:

What is the purpose of the < symbol in the UNIX shell?

The purpose of the < symbol in a UNIX shell is for input redirection. Normally when commands/programs are executed in a shell they take their input from the standard input i.e., the keyboard. However, with input redirection the command/program takes its input from a file or another input device different from the standard input (keyboard). For example the following command obtains its input from the file input.txt rather than from the standard input.

"wc < file1.txt"