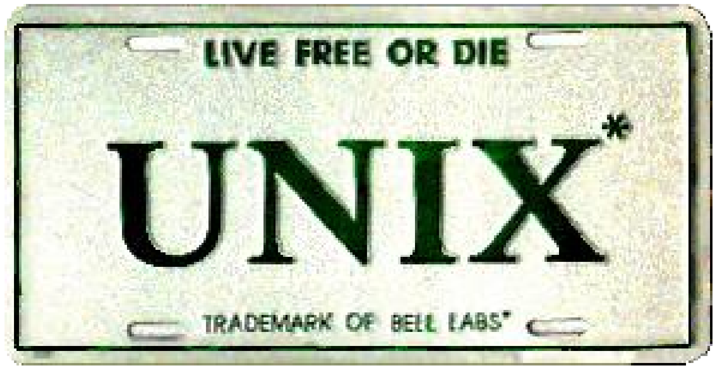


UNIX for Programmers and Users

“UNIX for Programmers and Users”
Third Edition, Prentice-Hall, GRAHAM GLASS, KING ABLES

Starting with Unix

- WARNING:
  - There are differences between the textbook and what you will see experience using Ubuntu. The examples in lectures might also be different. Use the online help to get exact syntax and functionality for another Unix system that you might be using. The differences are mechanical, and not conceptual.

Starting with Unix

- **Logging In**
  - In order to use a UNIX system, you must first log in with a suitable username.
- A username is a unique name that distinguishes you from the other users of the system.
- Your username and initial password are assigned to you by the system administrator.
- UNIX first asks you for your username by prompting you with the line “login:” and then asks for your password.

Starting with Unix

- When you enter your password, the letters that you type are not displayed on your terminal for security reasons.
- UNIX is case sensitive, so make sure that the case of letters is matched exactly to those of your password.
- Depending on how your system is set up, you should then see either a $, a % or another prompt. That is your default shell prompting you to provide some course of action.
- Here's an example login :

```
UNIX®  System V  Release 4.0
login : glass
Password :        --> What is typed here is secret and doesn't show.
Last login:  Sun  Feb  15  18:33:26  from dialin
$ _
```

Shells

- The $ or % prompt that you see when you first log in is displayed by a special kind of program called a shell.
- A Shell is a program that acts as a middleman between you and the raw UNIX operating system.
- It lets you run programs, build pipelines of processes, save output to files, and run more that one program at the same time.
- A shell executes all of the commands that you enter.
- The four most popular shells are:
  - the Bourne shell (sh)
  - the Korn shell (ksh)
  - the C shell (csh)
  - the Bash Shell (bash)

Shells

- All of these shells share a similar set of core functionality, together with some specialized properties.
- The Korn shell is a superset of the Bourne shell, and thus users typically choose either the C shell or the Korn shell to work with.
- The Bash shell, or Bourne Again Shell, is an attempt to combine the best features from Korn and C shells.
- Bash is becoming the most popular shell, because it is freely available and comes as a standard shell on Linux systems.

Running a utility

- To run a utility, simply enter its name at the prompt and press the Enter key.

- One utility that every system has is called date, which displays the current date and time:

```
 $ date                          --> run the date utility.
Thu, Aug 18, 2016  7:11:59 AM
$ _
```

Running shell

- Running shell

```
ka 9: echo $SHELL
/usr/bin/bash
```

clear

- This utility clears your screen.

man: online help

- All UNIX systems have a utility called man (short for manual page) that puts this information at your fingertips.

- The manual pages are on-line copies of the original UNIX documentation. They contain information about utilities, system calls, file formats, and shells.

Organization of the manual pages

- The typical division of topics in manual pages (sections) is as follows:

1. Commands and Application Programs.
2. System Calls
3. Library Functions
4. Special Files
5. File Formats
6. Games
7. Miscellaneous
8. System Administration Utilities

Using man

Here's an example of man in action:

```
$ man chmod                ---> select the first manual entry.
CHMOD(1V)           USER    COMMANDS
      CHMOD(1V)
NAME
       chmod - change the permissions mode of a
 file
SYNOPSIS
       chmod C -fR  V  mode filename ...
                          --> the description of chmod goes here.
SEE  ALSO
         csh(1), ls(1V), sh(1), chmod(2V), chown(8)
```

Terminating a Process: Control-c

- There are often times when you run a program and then wish to stop it before it’s finished.
- The standard way to execute this action in UNIX is to press the keyboard sequence Control-C.
- Most processes are immediately killed and your shell prompt is returned.
- Here’s an example of the use of Control-C:

```
$ man  chmod
 CHMOD(1V)    USER    COMMANDS   CHMOD(1V)
     NAME
            chmod - change the permissions mode of a file
^C
$ _
```

Pausing Output to Terminal: Control-s/Control-q

- If the output of a process starts to rapidly scroll up the screen, you may pause it by pressing Control-S.
- To resume the output, you may either press Control-s again or press Control-q.
- This sequence of control characters is sometimes called XON/XOFF protocol.
- Here's an example of its use:

```
$ man chmod
 ...
 ^s                                      ---> suspend terminal output.
 ^q                                      ---> resume terminal output.
 ...
$ _
```

End of Input: Control-d

- You must tell the utility when the input from the keyboard is finished.
- To do so, press Control-D on a line of its own after the last line of input. Control-D signifies the end of input.
- For example, the mail utility allows you to send mail from the keyboard to a named user:

```
$ mail  tim                  --> send mail to my friend tim.
Hi Tim,                      --> input is entered from the keyboard.
I hope you get this piece of mail.  How about building a
  country
one of these days?

- with best wishes from Graham
^D                    --> tell the terminal that there’s no more input.
$ _
```

Setting/Changing password

- After you first login to a UNIX system, it’s a good idea to change your initial password. The password protects all your private information.
- You might be forced to change your password by the administrator.
- Remember however, that superuser can access everything.
- Passwords should generally be at least six letters long and should not be words from a dictionary or proper nouns. Some system administrators will put restrictions on the life span of passwords, so you have to exchange them periodically.
- The best is to use a mixed expression of letters, numbers and other characters, like “GWK#145W%”.
- If you forget your password, the only thing to do is to contact your system administrator and ask for a new password.

Setting/Changing Password: passwd

- passwd allows you to change your password.
- You are prompted for your old password and then twice for the
- new one.
- The new password may be stored in an encrypted form in the
- password file "/etc/passwd" or in a "shadow" file (for more
- security), depending on your version of UNIX.

- An example of changing a password:

```
$ passwd
  Current password : penguin
  New password( ? For help ) : GWK145W                 --> invisible
  New password( again ) : GWK145W              --> invisible
  Password changed for glass
  $ _
```

- Note that you wouldn't normally be able to see the passwords, as UNIX turns off the keyboard echo when you enter them.

Logging out

- **To leave the UNIX system,** press the keyboard sequence **Control-D** at your shell prompt.
- This command tells your login shell that there is no more input for it to process, causing it to disconnect you from the UNIX system.
- Most systems then display a “login:” prompt and wait for another user to log in.
- $ ^D
- UNIX® System V Release 4.0
- login :   **--> wait for another user to log in.**
- If you connect to a remote server through ssh connection, you will not see the new login prompt; instead, you will be disconnected.

User Home Directory

- Every UNIX process has a location in the directory hierarchy, termed its current working directory.
- When you log into a UNIX system, your shell starts off in a particular directory called your home directory.
- In general, every user has a different home directory, which often begins with the prefix “/home”.
- For example, my author’s home directory is called “/home/glass”.
- The system administrator assigns these home-directory values.

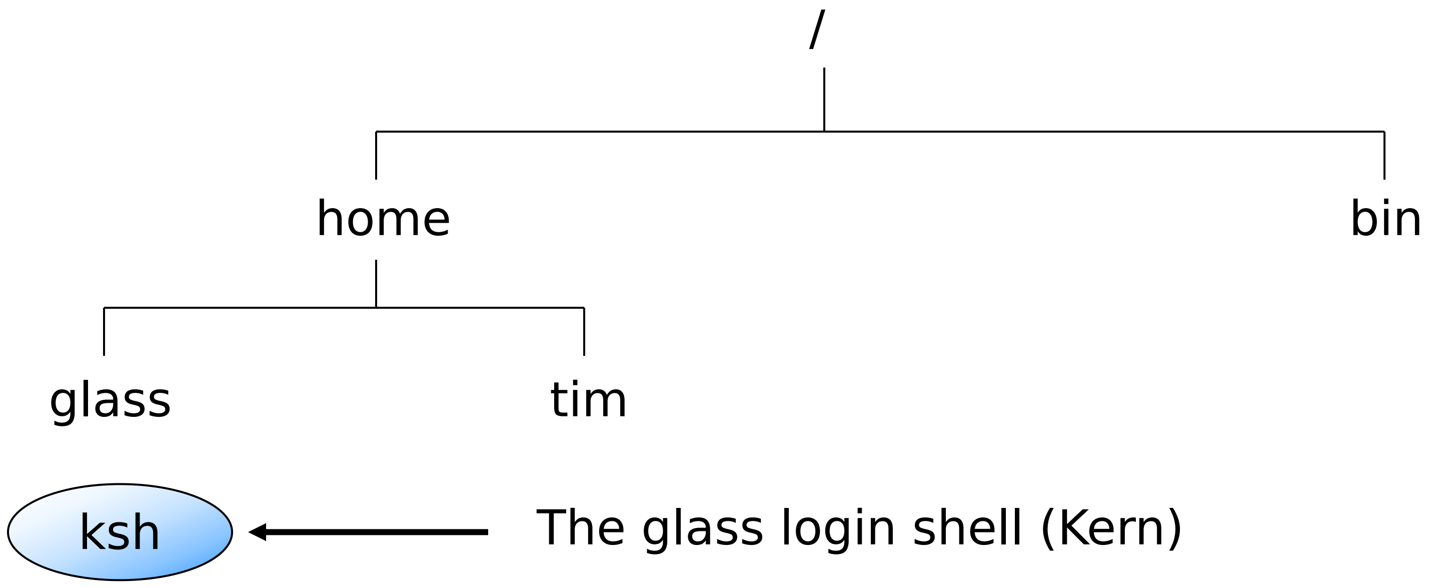
Printing Working Directory: pwd

- To display your shell’s current working directory, use the pwd utility, which works like this:

```
$pwd
/home/glass
$ _
```

Directory Hierarchy, Home Directory and Login Shell

- Here's a diagram that indicates the location of user's login Korn shell in the directory hierarchy:



Creating a file with cat

cat -n fileName

- The cat utility takes its input from standard input or from a list of files and displays them to standard output.
- The -n option adds line numbers to the output. cat is short for “concatenate” which means “to connect in a series of links.”
- By default, the standard input of a process is from the keyboard and the standard output is to the screen.

```
$ cat  > heart                --> store keyboard input into a file called
   “heart”.
I hear her breathing,
I’m  surrounded by the sound.
Floating in this secret place,
I never shall be found.
^D                    --> tell cat that the end of input has been reached.
$ _
```

Listing Contents of a Directory: ls

- The **ls** utility, which lists information about a file or a directory.

ls -adglsFR fileName or directoryName

- ls lists all of the files in the current working directory in alphabetical order, excluding files whose names start with a period.
- The -a option causes such files to be included in the listing.
- The -d option causes the details of the directories themselves to be listed, rather than their contents.
- The -g option list a file’s group.
- The -l option generates a long listing, including permission flags, the file’s owner, and the last modification time.

Listing Contents of a Directory

- The -s option causes the number of disk blocks that the file occupies to be included in the listing. (A block is typically between 512 and 4K bytes.)

- The -F option causes a character to be placed after the file's name to indicate the type of the file:
  - * means an executable file, / means a directory file,
  - @ means a symbolic link, and = means a socket.

- The -R option recursively lists the contents of a directory and its subdirectories.

Directory Listing

- Here's an example of the use of ls :

```
$ ls                                --> list all files in current directory.
heart

$ ls  -l  heart                     --> long listing of "heart."
-rw-r--r--    1    glass    106    Jan  30  19:46    heart
$ _
```

the name of the file

the time that the file was last modified

the size of the file, in bytes

the username of the owner of the file

the hard-link count

permission mode of the file

Directory Listing

Field #	Field value	Meaning
1	-rw-r--r--	the type and permission mode of the file, which indicates who can read, write, and execute the file
2	1	the hard-link count
3	glass	the username of the owner of the file
4	106	the size of the file, in bytes
5	Jan 30 19:46	the time that the file was last modified
6	heart	the name of the file

Listing Contents of a Directory

- You may obtain even more information by using additional options:

```
$ ls  -algFs                  --> extra-long  listing of current dir
total  3                      --> total number of blocks of storage.
1  drwxr-xr-x   3      glass   cs    512    Jan   30  22:52    ./
1  drwxr-xr-x 12       root    cs    1024   Jan   30  19:45    ../
1  -rw-r--r--     1    glass   cs    106    Jan   30  19:46    heart
$ _
```

- The -s option generates an extra first field, which tells you how many disk blocks the file occupies.

- On some UNIX systems, each disk block is 1024 bytes long, which implies that a 106-byte file actually takes up 1024 bytes of physical storage.