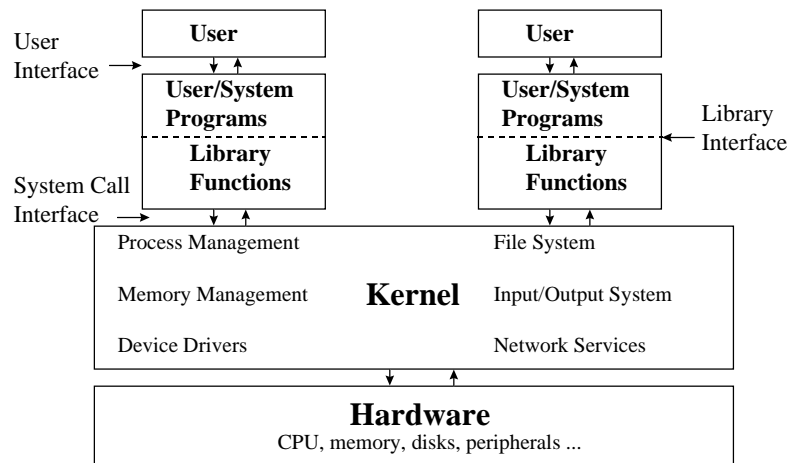


UNIX Operating System Structure



Logging In To UNIX

- The login program:
 - Takes your username and password
 - Encrypts your password
 - Compares the encrypted password against your entry in the password file
 - If they agree the login programmer starts a command line interpreter and exits

Some Shell Commands

- Examples of UNIX shell commands:
 - ls - list contents of a directory
 - cat - concatenate and display files
 - more - browse or page through a text file
 - head - display first few lines of files
 - tail - display last part of a file
 - cp - copy files
 - mv - move/rename files
 - chmod - change permissions on a file
 - mkdir - make directories
 - rmdir - remove directories (must be empty)
 - cd - change working directory
 - pwd - return working directory name
 - lp (lpr) - submit a job to the printer
 - ps - report status of processes running on a machine
 - kill - terminate a process

Using the Shell

- Shell input and output typically come from files called standard input, standard output and standard error
- UNIX pipes allow the output from one program to be used as input to another
- Wildcard characters exist to make the specification of multiple filenames easier

Environment Variables

- Define your environment when using UNIX
- Are set by the login program and by configuration files in your home directory
 - Allow you to customise your environment
- Number of commands available for manipulating environment variables
 - `man -k environment`

Shell Programming

- Shell scripts are ways of listing commands in files which you can then invoke like programs
- Can use high-level programming constructs such as loops and conditional statements
- When invoked shell scripts are usually run as separate processes

UNIX Files

- UNIX files are sequences of 0 or more bytes
- Filenames can be up to 255 characters long
 - any character
- Files are organised into directories - have a tree-like directory structure
- Can set permissions for the owner of a file/directory, the owner's group and everybody else

Symbolic Links

- Symbolic links enable us to treat directories and files from a different part of the directory tree as if they were in the current directory

Utility Programs

- Some UNIX utility programs:
 - script - make a record of a terminal session
 - banner - make posters from strings
 - spell - report spelling errors
 - grep - search a file for a pattern
 - sed - stream editor
 - awk - pattern scanning and processing language
 - tar - create tape archives and add or extract files
 - gzip, gunzip - compress or expand files

UNIX Processes

- A process is a program in execution
 - Includes not only the program code, but the environment in which the program is run
- When a UNIX system is started a process is created which creates other processes and so on

Creating Processes

```
pid = fork();

if (pid < 0) {
    /* fork failed - deal with error */
}
if(pid == 0) {
    /* This is the new child process - do child's stuff */
}
if(pid > 0) {
    /* This is the parent process - do parent's stuff */
}
```