UNIX OS

Basics

Operating System

OS is special software/program

Loaded at boot time

Controller of hardware

Communicates with hardware at very low level

Provides a convenient environment

User Interface

Arbitrates usage of hardware by user programs

Types of OSes

Single Tasking

Dos

MultiTasking

UNIX ,Windows 98

Single User

Windows XP

Multi User

UNIX

Command Line Interface, CLI

UNIX,DOS

Graphical User Interface

Windows 98

History of UNIX

Started in late 60's

Developed by Ken Thompson, AT&T

Assembly Language

PDP – 7

8KB RAM

C, an offshoot of UNIX

MULTICS, UNICS and UNIX

Enhanced at University of California, Berkely – BSD UNIX

Historical UNIXs

AT & T

System V Rel III

SVR3

Sys5

Berkely Software Distribution

BSD 4.3

Commercial UNIXs

AIX IBM, Sys 5/BSD

HPUX Hewlett-Packard Sys5

IRIX Silicon Graphics Sys5

OSF1 Digital BSD/Sys5

SunOS Sun Microsystems

BSD/Sys5

Solaris Sun Microsystems

Sys5/BSD

Ultrix Digital Equipment

Corporation BSD

Simple Commands

$ id - User id details

$ who - Users logged in

$ who am i - Current user details

$ ps - Details of processes

$ ls - List of files

$ uname - UNIX Kernal name

$ date - System date & time

$ uptime - Time since boot

$ clear - Display clearing

$ passwd - Changes the password

Simple Commands

$ echo hello world

$ echo -n hello world

$ ps -f

$ ls -l

Typical command syntax

cmd sp opt1 sp opt2 sp arg1 sp arg2

Wrong Udage:

$ ps-f

$ ls-l

$ uname-r

$ echo-n hello world

$ echo -nhello world

System documentation

Online Manual pages

man who

space Next screen

b Previous screen

q Quit

man ls

SYNOPSIS

ls [OPTION]... [FILE]... args

man cp

SYNOPSIS

cp [OPTION]... SOURCE DEST

cp [OPTION]... SOURCE... DIRECTORY

Searching commands

man –k copy

man –k copy | less

Lines with ‘(1)’ are commands

OS Components

Kernel

Core Part of the OS

Shell

Provides user interface

Commands/Utilities

Programs for using the system

OS Components-Kernel

Functions

Memory management

Process management

User management

Drivers for I/O devices

File systems

Special program loaded at booting

Manages entire hardware

System unusable without kernel

OS Components-shell

Kernel starts one shell per login

Command Line Interface

Displays a prompt

Reads commands from user

Runs the commands

Redisplays the prompt

Command interpreter program

I/O redirection

Pipes

Scripting

OS Components-Commands

Programs for using the system

who, ps, clear

cp, mkdir and chmod

Present in bin directories

echo $PATH

which who

which cp

which clear

which chmod

Applications provide more commands

acroread, firefox and

open office

User Interface...

Command Line Interface by Shell

Graphical User Interface

Included on most modern UNIXes

CDE, KDE and GNOME

UNIX Power from CLI - not from GUI

User Interface...

Network or remote Login

Login over network

Commands run on UNIX machine

Files stored on UNIX machine

Hard disk, cdrom and

Memory stick

User Interface over the network

printf

scanf

Linux - Kernel

Linus Torvalds

Eng. Prj. University of Helsinki

Initiated kernel in 1991

Contributed by programmers on world wide web

Controlled by Linus Torvalds

www.kernel.org

Shells and applications

Richard Stallman

Free Software Foundation

Source code under GPL, freely

G N U group works on UNIX

G N U is Not UNIX

Contributed by programmers on world wide web

Should be refered as GNU/Linux

www.gnu.org

Directory hierarchy

/bin/ls - ls program

/dev/hda - First ide hard disk

/home/ajith – ajith’s home dir

- placed here on login

Directories

$ mkdir d1 d2 d3

$ mkdir d1/subdir

$ mkdir d4/subdir

$ mkdir d4 d4/subdir

Directories

$ mkdir d5 d5/subdir/new d5/subdir

$ mkdir –p d6/subdir/new

Directories

$ rmdir d2 d5 d3

Directories should be empty

Directories

$ cd /tmp

$ pwd

$ cd /usr/bin

$ pwd

$ cd

$ pwd

$ cd d1/subdir

$ pwd

$ cd

$ pwd

. and ..

Every directory has . and ..

Entry . refers to the directory

containing it

Entry .. refers to the parent

. and ..

. /home/ajith

./f1 /home/ajith/f1

.. /home

../john /home/john

../../usr /usr

Pathnames

Absolute Paths

Begin with /

/home/ajith/f1, /tmp/abc

Relative paths

Begin with . Or ..

./d1/f1, ../d2/f2

Dependent on working directory

d1/f1 same as ./d1/f1

Creating files

$ touch f1 f2 f3

Creates empty files

Updates modification time if file exists

$ echo Some text here > f4

$ cat f4

Cat Command

$ echo Some more text > f5

$ cat f5 f4

$ cat f5

Creating files

$ cat > f6

Some text for line1

Some text for line1

Some text for line2

Some text for line3

ctrl-d

Copying Files

$ cp f1 f2

Copy f1 contents onto f2

$ cp -i f1 f2

Prompt before truncating

$ cp f1 d1

Copy f1 to dir d1

What if d1 doesn’t ist?

$ cp f1 f2 f3 d1

Copies to dir d1

Copying Files

cp source destination

If destination doesn’t exist it will be created as regular file

If destination is an existing regular file, it will first be truncated and source copied to it

If destination is directory a copy of source is made in the directory

Copying directories

$ cp d1 d2

What is the result ?

$ cp -r d1 d2

Recursively copy directory.

-r or –R ?

$ cp f1 d1 f2 d2

f1 and f2 copied to d2

Error for directory d1

$ cp -r f1 d1 f2 d2

Copies f1 d1 f2 to dir d2

Moving

$ mv f1 f2

f1 content moved to f2

f1 deleted

Renaming f1 to f2

$ mv -i f1 f2

Prompt if f2 exists

$ mv f1 f2 f3 d1

Moves to dir d1

$ mv f1 d1 f2 d2

Works without -r

Deleting

$ rm f1 f2 f3

Deletes f1 f2 f3

No undelete command

$ rm -i f1 f2 f3

Prompt for each file

$ rm f1 d1 f2 d2

Error on directories

$ rm -r f1 d1 f2 d2

Recursive deletion

Example File Names..

8

2+4

A=B?

p.q.w.e.

.abc

abc

a\*c

This line, a valid UNIX filename

File Names..

Can be 255 characters long

File System dependent

Chars not allowed are NULL and ‘/’

Doesn't require exensions

Dot is just another character

File names beginning with ‘.’ are hidden file names

Shell Wild cards

Create these in your home

$ touch abc axc azc a+c a-c a[c

$ touch axyzc

Shell Wild cards

$ echo a\*

$ echo \*

$ echo a?c

$ echo a???c

$ echo a[xyz]c

$ echo a[!xyz]c

$ echo a[a-z]c

$ echo a[-a-z]c

Shell Wild cards

\* Matchs zero or more chars

? Matchs any one char

[] Matchs one of the chars

[!] Matchs not included chars

Kernel file types

Regular files

Text files

Html files

C source files

Executable files

Directory files

Device files

Soft link files

Directory files

Listing

ls f1 NoFile F2

Error on non existing

files

ls Default argument is .

ls d1 List directory

Listing

ls -a All files, including

hidden ones

ls -i Display inode numbers

ls –F / directories

\* execute perm

@ symbolic links

ls -Q Quote file names

File Types

$ ls -l /dev | less

d directory,

- regular file,

b block special devices

c character special devices

l soft link

File Permissions

Group

Owner Others

rwx --x r--

111 001 100

7 1 4

cat f1

Requires read on f1

cp f1 f2

Requires read on f1

Write on f2, if f2 exists

Write on the current dir if d2 doesn’t exist

Directory Permissions

Read

listing of directory contents

$ ls d1

Write

file creation/deletion/moving

$ touch d1/newfile

$ cp f1 d1/copyf1

$ rm d1/newfile

Directory Permissions

Execute

Search

To use directory in pathname

cat /home/ajith/d1/f1 requires

Search on /,

/home,

/home/ajith

/home/ajith/d1

Read on /home/ajith/d1/f1

Listing Directories

touch f1 f2 d1/abc d1/xyz

mkdir d1/subdir

touch d1/subdir/abc d1/subdir/pqr

ls f1 d1

Lists f1

Lists contents of d1

ls -d f1 d1

List directory names and

not contents. Effective

only for directories

Listing Directories

ls -l f1 d1

Long listing for files

and directory contents

ls -ld f1 d1

Long listing for files

and directory names

Listing Directories

ls d1

Doesn’t list subdir contents

ls –R d1

Recursively list d1

ls –lR d1

Long listing Recursively

Listing Directories

List the permissions of the files in the /tmp directory

List the permissions of the directory /tmp itself

Change Permissions

chmod u+rw file1

chmod u+x,g-x file1

chmod a+rwx file2

chmod a+x dir

chmod -R a+x dir

chmod 714 file1

chmod -R 644 dir

chown ajith file1

chgrp prj1 dir2

Default Permissions

umask

umask 027

Regular files

rw- rw- rw- Attempted by commands

110 110 110

000 010 111 = 027 = umask

110 100 000 File permissions

Directories

rwx rwx rwx Attempted by commands

111 111 111

000 010 111 = 027 = umask

111 101 000 Directory permissions

Solve...

Copy the passwd file of etc directory to current directory d2

Create a directory with as your login id in the tmp directory

Copy the passwd file of etc to your directory in tmp

Solve...

Copy the passwd file of etc directory to current directory d2

$ cp /etc/passwd .

Create a directory with as your login id in the tmp directory

$ mkdir /tmp/YOURID

Copy the passwd file of etc to your directory in tmp

$ cp /etc/passwd /tmp/YOURID

What will be the result of

following when executed from

your home

$ echo a[a-z]c

$ cp a[a-z]c /tmp/YOURID