## Basics - History

### UNIX

1960s

AT&T Bell Labs

Ken Thompson

Dennis Ritchie & Brian Kerningham

MULTICS

UNICS

UNIX

### BSD

Berkeley Software Distribution

unix-like

FreeBSD

### GNU

GNU is Not Unix

glibc

GPL

BOSS -- same architecture

### Linux

Linus Torvalds

stability & security

### distributions

macOS

Darwin

Solaris

IBM AIX

HP UX

FreeBSD

NetBSD

Debain Linux kernel

MXLinux

Manjaro

Mint

Ubuntu

Debian

Raspbian

## Basics - Technical

Kernel - core of an operating system

X Window system (X11)

Wayland

### library tool chains

glibc

BusyBox

uClibc

Readline

keybindings

### CLI

SHELL

ksh

tcsh

zsh

Fish

bash

## Commands

a command

a command with options

a command with arguments

a command with options & arguments

### Basic commands

#### ls

-a (all files, including hidden)

-l (long listing, more info)

-h (memory)

-i inode number

cd

changing the directory

/name

/path

.. (parent)

. (same directory)

~ home directory

- back to the previous directory

exit exits (closes the terminal)

### Path

relative path cd jarvis

absolute path cd /home/nigam/Desktop/jarvis

home

### man

1 commands

2 system calls

3 functions

7 signals

## vi editor

vim

2 modes:-

1. command mode

some keys work as vi commands

:w save

:wq save & quit

:w! <new name> save as <new name>

:q! quit without saving

yy copy a line

10yy copy 10 lines

$yy copy all

p paste

dd delete a line (cut)

ggVG select all

1. edit (insert mode) i

editing

### Files & Directories

training.xlsx

user group others

r w x r w - r - -

1 1 1 1 1 0 1 0 0

7 6 4

rw- r-- r--

110 100 100

6 4 4

rw-rw-rw-

666

chmod 666 filename

chmod o+w filename (add w for others)

chmod u-r filename (remove read for user)

chmod +x filename (add execute permissions for all)

### types of files

- regular (ex, text, .c, .log …….)

d directory

### commands

chown changing owner(user) of a file

chgrp changing group of a file

chmod

cp copy (delete a file/directory)

rm remove (delete a file/directory)

rm -r remove the directory along with any subdirectories

rmdir remove empty directory

mv move (cut & paste)

rename

## Users & Groups

every user belongs to a group

nigam staff

root (super user)

### commands

whoami displays the current user

## intermediate

### inode

inode number : unique for every file

ls -i

### wildcards

\*

?

### word count

-w

-l

-c

### redirection operator

>

>>

<

### find

-type f

d

-name

“filename”

-perm

### pipes

|

### TAR & ZIP

TAR Tape Archive

tar.gz

.tgz

tar.bz2 (bzip compression)

### misc

whatis

whereis

type

## grep

-n

-i

-v

-w

-R

## links

1. hard links

ln

1. symbolic (short) links

ln -s

## environment variables

SHELL

LOGNAME  
PATH

TERM

## file system

ext

ext4

Btrfs

ZFS

VFAT

VFS virtual file system

procfs

view data in /proc

## process

PID

$$

getpid()

getppid()

### init

first process to run

systemd



ps

-C by name

-o customise output (columns)

pid

ppid

tty

%cpu

%mem

time

stime

etime

cmd

pri

user

stat

### file descriptors

temporary number

least available number

stdin 0

stdout 1

stderr 2

hello.docx 3

hi.docx 4

### init systemd

runlevels (system states)

0 all processes would be terminated in sequence (safe to shutdown)

1 single user mode

2 multi user mode without network

5 mutli user with GUI

6 reboot

systemd

systemctl

view the services (or start/stop/manage)

execute services in a particular order

### states of a process

run R actively using the CPU

sleep(wait) S waiting for an event to happen

stop T pauses & sent to the background

kernel I kernel based tasks

### signals

kill

| signal | can be sent from keyboard? | can be ignored ? | default action |
| --- | --- | --- | --- |
| SIGTERM | no | yes | terminate the process |
| SIGINT | ctrl+C | yes | terminate the process |
| SIGKILL | no | no | terminate the process |
| SIGSTOP | ctrl + Z | no | put in stop state |
| SIGCONT | no | yes | continue a process |

### background process

1. background of the system

daemon

1. background of the shell

## Shell Script

bash scripts

echo

read

### conditional constructs

if

for

while

until

### comparison operator

-ge

-le

-gt

-lt

-eq

-ne

### file test operators

-e file exists

-f file exists & is a file (not a directory)

-d directory exists

-r readable

-w

-x

### mathematical operations

let

(( ))

### special operators

$0 current script

$$ pid of current process

$? exit status of last command

$n arguments ($1, $2, …)

$# number of arguments

## network

MAC

Media Access Control

06:00:27:3d:c3:e9

IP

32 bit (IPv4)

(IPv6)

127.0.0.1

DNS

Domain Name System

### commands

ifconfig

host

dig

nslookup

who

whois

ping

packet internet groper

traceroute

## 

## List of commands

ls

pwd

clear

date

cal

cd

bc

chmod

chown

chgrp

whatis

man

apropos

mkdir

rmdir

mv

rm

cat

head

tail

less

nl

su

whoami

exit

alias