

- What is an operating system? Explain history of Linux
- An operating system is system software which manages computer hardware & software resources and provides common sources for computer programs.
- 5) In 1983, Richard Stallman from Free Software Foundation (FSF) started the GNU project to develop a Unix compatible operating system called GNU.
- 6) Its extension was to make the software free.
- 7) In 1991, Linus Torvalds a Finnish student started writing his own free operating system kernel.
- 8) He started with the development of disk drives and hard drive access by September 1991 a basic driver was ready which he called version 0.01.
- 9) Development was done on Urnix using C compiler on January 5<sup>th</sup> 1992 based on improved and stable kernel code under GNU license.

## (Q2) Describe Linux architecture:

- The architecture of Linux consists of following:
- When Linux is running in main memory it is divided into two types:
    - 1) User space
    - 2) Kernel space
  - The Kernel space is a hardware protected space.

- User space communicates through system calls
- The hardware communicates to kernel space using hardware interrupts

Q) Explain the features of Linux.

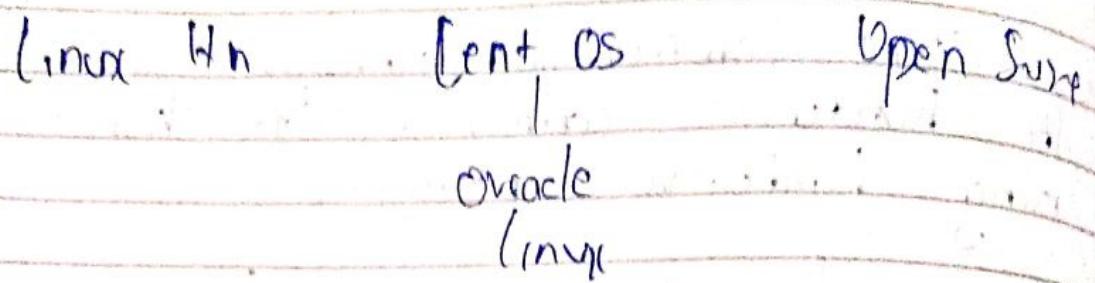
- 1) Free - Linux is known for the fact that all the distribution and most of the software is available free of charge.
- 2) Never expand forever - Build on open foundation. Most of the old traditional part is applicable to a modern distribution today.
- 3) Easy to build program: Easy to build complex program without much effort and easy to send output from one person to the other.
- 4) Customizable: It is customized to run any hardware platform.
- 5) Diversity: As its open source project can be of various type.
- 6) Reliability - Great cover in software development.
- 7) Security: More secure than any other OS.

A) List and explain various Linux distribution

- A Linux distribution contains Linux kernel, GNU tools and libraries, additional software, documentation and desktop environment.

Linux Kernel

Debian	Fedora	SUSE	Others
Ubuntu	Rhel	SLES	



### 1) Debian family system

The debian distribution is upstream from several other distributions like Ubuntu, its upstream for Linux Mint and others commonly used on server and desktop computers.

### 2) SuSE family system

It is upstream for openSUSE.  
It is used in retail sectors.

### 3) Fedora family system

Fedora family is upstream for CentOS, RHEL and Oracle Linux. RHEL used by enterprises which host their own systems.

### 4) Mandriva family system

It is also known as mandrake. Mandrake was one of the great user-friendly Linux distros now has business Linux server project.

### 5) Explain the importance of Linux mobile servers

- High level security - Linux servers offer high level of security as they have efficient firewalls and strict policies which control unauthorized access.

- 1) Great stability and durability: Linux servers don't need periodic reboots and updates if configured properly can run for years without source interruption.
- 2) Reliable - As they offer consistent service without any failure they are very reliable.

A) An Android is a mobile operating system developed by Google on basis of Linux kernel. Android is designed to manage process to keep help minimum power consumption.

- 3) Describe the boot process in Linux.
- Booting a Linux installation involves multiple stages and software components
  - 1) BIOS (Basic I/O System)
    - It searches, executes boot loader program
    - Boot loader can be in CD-Rom, floppy etc. BIOS can give control one the loader program & detected and loader in memory
  - 2) MBR (Master boot Record)
    - located in 1<sup>st</sup> sector of bootable disk. MBR is smaller than 512 bytes in size. Having the components primary boot loader info in 1<sup>st</sup> 446 bytes partition table info in next 64 bytes and 1<sup>st</sup> 512 validation check in last 2 bytes
  - 3) It contain instruction about how to load boot loader (GRUB being pre-selected 0)
  - 4) GRUB (Grand Unified Bootloader)

GRUB Shows a splash screen. waits for user input for 5 seconds. If anything is not entered default kernel is loaded. GRUB finds hard disk and checks kernel in kernel.

Once the kernel is loaded it mounts file system as per specification mentioned in grub.conf. Kernel executes the lsbin /init program which contains memory drivers compiled inside which help to access hard disk partitions.

### 2) init:

The first task done by init is it looks at at the /etc/inittab, /etc/inittab which is its initial table to decide the run level to boot on initial configuration script. To the config level is a configuration phase.

### Other level programs

Once the default run level for your system is determined init will start call of the required background process for the system running by looking in the appropriate directory for the run level.

2) What is a file? Explain type of file?  
A file is a repository for storing information. A file system is collection of files you can store.  
There are three categories

### 1) Ordinary file

Data in the stream of characters known as an ordinary file.

It is divided into two types:

- 1) Text file: A text file consists printable characters
- 2) Binary file: It consists of printable characters and unprintable characters which has entire ASCII range.

## 2) Device file:

All device are represented by file. Device files are found inside directory structure /dev. The operation of a device is handled by the attribute of its file.

- 1) Character special file: A character special file are those devices file that read or write character at a time like terminal.

- 2) Block special files: A block file are those physical devices which read or write data one-block at a time like hard disk, floppy disk, CD.

## 3)

## 3) Directory file:

It is a folder where file names and other directory are stored. It contains file names and not its attribute.

e.g. If you have 10 files in directory then there are ten entries in directory.

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1-129  
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A1/A2/A3

- (a) Q1 Write a short note on basic file permission in Linux.
- 1) Every file and directory in your Linux system has following 3 permission levels. This permission give you the authority to read file.
  - 2) Write - This permission give you the authority to modify content in file and also add, remove and rename file stored.
  - 3) Execute - In Windows an executable program usually has an extension ".exe" and you can easily run it.

- (a) Q2 State and explain different run levels in Linux.

→ Run level is state of init.  
Run level are identified by numbers.

Runlevel	Action	Actions
0	Holds the system	halted
1	Single user mode	halted
2	Multisuser mode	halted
3	Multisuser with networking	halted
4	Not used	halted
5	full multisuser and GUI	halted
6	Reboot	halted

- a) Explain various Linux installation methods
- Linux is an open source free to use kernel by programmers, hobby and non-profit companies in order to use specific system to suit their individual requirements
  - 3) Increase hundreds of Linux operating systems on distributions available designed with a specific purpose
  - 3) Most distributions have live-CD. most allow you had a minimum installation. They help you invalid long download of install (CD or DVD), you can afterwards install the package
  - 4) The software can install CDs and DVDs quickly because out of 100% we should go online & things to download
  - 3) Installation can be preferred for various way by using network method like NFS, file transfer Protocol (FTP) and HyperText Transfer Protocol (HTTP)

1) State and explain different types of desktop in Linux

→ KDE

KDE rather than being only a desktop environment is actually a collection of applications one of which is the desktop environment itself. The latest iteration is called plasma, two known variants plasma desktop and plasma notebook.

2) GATE

It is based on the confluence of currently unmaintained CINNAMON. GATE offers the traditional desktop experience with a hint of modernity.

3) GNOME

It is one of the most popular desktop environments in the world of Linux distributions. Many of the popular Linux distributions are GNOME based. Their default desktop environment and it has some popular forks such as Cinnamon, Unity etc.

2) Define command alias - How to create it? Give a suitable eg.

→ Alias means 'Name', The shell translates into another name or command. It allows you to define new commands by substituting a string for the first token taken for aside command.

Syntax:

alias Name /: value

In above bash syntax no spaces are

permitted around the equal sign - You may enclose value within quotation marks if the shell does not accept an argument from the command line in value

e.g

g glibs

alias l='ls -l'

alias L='ls -lh'

alias ls='ls -fl'

alias zap='rm -i'

3) Discuss file attributes in Linux

→ Apart from the file mode bits that control user and group read, write and execute permissions, several file systems support file extensions that enable further customization of allowed file

lstat - It's a command that allows the user to get certain attributes of a file residing in Linux file system

lstat - It displays the attributes

list of all file attributes and the deleted pages (in total)

a - append only

c - compressed

d - directory

e - extent format

f - immutable

d - data layering

s - Secure deletion

f - no tail padding

v - uncheckable

g - no atomic update

l - no copy on write

D - Synchronous directory update

- 4) Explain vi, vii, vim editor in detail.  
→ Vi / Vim is highly configurable text editor to create or edit text. It is built to enable efficient text editing. It then common mode; programs can insert text only.

It is an improved version of the vi editor. This text editor can be developed for those users who will learn advanced : short and master in editor.

- 5) How to install software from Linux command  
→ apt for Debian based distribution  
Debian packages and APT (Advanced Packaging Tool) has many advanced features are commonly used like automatic dependency resolution and signed package  
2) yum - for RPM based Linux distributions like Redhat, Red Hat Yum install \$2 packages

- 6) Name any five network management command in Linux  
→ 1) ifconfig  
It is network related command. If means interface and config means configuration. The command is used for interface in terms of assigning IP address, enable/disable demand, initialize interface etc  
2) ping command  
It is network related command like ping

means p-i-n-g. It stands for packet in - fw  
Interact and ej - Groper. It is used for  
connectivity and communication between abrery  
It is used to for interrupt control message  
Protocol for communication

### 3) netstat command

It is network related command, netstat means  
network statistics. It used to display connecting  
information and routing Table information

### 4) dig command

It is network related command. dig means  
domain - Information Gropper. It is used to display  
query. It is used to troubleshoot DNS related  
issues

### 5) nslookup command

It is Network Related command. nslookup  
means name server lookup. It is used to find out  
query in target name servers.

Q) What are environment variables? list out few  
various environment variables.

A) It is a name that contains data config and a  
more applications. That means it is a variable with  
a name and a value. Environment variables are named  
variable strings available to all applications.

It provides a simple way to share configuration  
setting between multiple applications and process

PATH - list of dir. to search for commands

HOME - user current home .dir

- 1) GNAME - User will enter name
- 2) SHELL - user preferred shell
- 3) EDITOR - user preferred text editor
- 4) Explain various file system in Linux:
  - > 1) Regular file - Normal file such as text, data or executable
  - 2) Directory file - that off list of others
  - 3) First character in string -
  - 4) Character special file - A character file are those character file that need one character at a time to like terminal first character in line = /
  - 5) Block special file - A block special file can have physical device which read or write more than block at a time like hard disk, floppy (D. etc)
  - 6) Symbolic link file - It is logical file that is another name given to file and it can be somewhere
- 5) List and explain various Linux documentation sources
  - 1) Red Hat Enterprise
  - 2) Red Hat is developed by RHEL - It's main target is toward the enterprise market. It is one of the best documentation having lots of RHEL & advanced topics.
  - 3) Arch

Arch is an independent platform - It has good documentation in form of wiki-based site. It is developed by a command line user. Was it always called

ver to add and edit config

### 3) b) Ubuntu

The official documentation - Puppet - Baidu is one of leading desktop and laptop class

### 4) i) Use VPS on libcloud

It is a provider and it is created by free BSD project. If changes the instance, within its own day to day use of the freeBSD o.

### 5) Bash hackers wiki

The bash hackers wiki is used to hold documentation of any function file GNU basic

### 10) Explain Backup in Linux file system

→ Topic for refresher by using this command Linux basics and notes can be done

### i) cpio

→ The command is used for single or multiple file backup and file backup special character file -f is applicable only on mounted file system

→ find -depth -print | CPIO -O > /dev/fd0  
→ viewing cpio files or copy

(P.D. - You will like to know)

• Restoring

→ pax -Ric L / dev / root D

### 2) tar

It is used for single or multiple file backup

It doesn't backup special character - It is applied only on mounted file system

e.g.

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This creates file of 2. Dir  
1 on 1st date for  
display content of machine by  
new data for  
extract content

### 3) dd command

This command is used for complete file copy  
It makes copy anything from regular file  
in a file system to special character file  
It is applicable on both mounted or unmounted  
file system of solving or of televint/diskette  
to restore a drive with dd restore  
or restore vfat/fat16/vmt10

## Unit - III - Linux

Q) Write a short note on the working of SSH

In SSH on secure shell is a protocol used for secure security log into remote systems

It is the most common way to access remote linux and unix like servers

for example command is: ssh remot主机

The remote-host is the IP address or domain name that we are trying to connect. This command assures that you use same username on the most system as your user name on your local system

a) Explain OSI model

here 7 layers:

Application layer

Session layer

Presentation layer

Transport layer

Data link layer

Physical layer

1) Physical layer

It describes medium over which the data travels

2) Data link layer

It describes the means by which the bits are passed to physical layer

3) Network layer

This layer handles the reading of data through a network

- 4) ~~a) Network Transport layer and Session layer~~  
It provides end to end session integrity
- b) Presentation layer and application layer  
These provides interface to the application
- 3) Write a short on regular expression
- > Regular expression are special character - It is used for second data matching patterns Grep command are used to search for a specific string in file
- 1) \? It is used for <sup>matching</sup> left or any character
  - 2) \$ It is used for matching end of string
  - 3) . It is used to replace any character.
  - 4) \* If it is used for matching up zero or more times the preceding character
  - 5) \+ It is used to represent special character
  - 6) () It is used to group regular expressions
  - 7) ? It is used for matching up exactly one character.
  - 8) \| It is used for matching one or more occurrence
  - 9) \? It is used for matching zero or more occurrences of previous character
- 4) Why it is necessary to have domain name system explain any 3 in words
- > It is a distributed system (which has three key concepts)
- 1) A hierarchical organization of hosts
  - 2) A distributed database for mapping
  - 3) Authorities of individual level

Host belong to domain which further belongs to sub elements Root is at the signified (dot) BIND maintains the DNS Hosted Software that WNS under Linux

- .int - International organization
- .edu - Educational institution
- .gov - Government
- .com - commercial organization.
- .net - Networking organization
- .in - India
- .biz - Business

5) Explain the use of tracert and ftp command in Linux

1) Prints the route that packets take to a network test attempt to trace the route or IP packet would allow to some internet host with time to live than listening having

ICMP "time exceeded f: reply from send)

FTP - (file transfer protocol)

FTP command is used to transfer file between hosts with CA or cwhost address

If hostname by default will connect you to the system, you must have a login id to be able to transfer the file ASCII and binary file can be transferred

- Q) What is an IP address? Explain the notation of IP address up to also explain IP classes.
- Every host in the network has an address called IP address used by other machines to communicate with it.
- If it is a server it form data delimited with The maximum value of each octet is 255. It uses Internet protocol for communication e.g. 211.162.0.1
- TCP/IP application can address a host by its hostname as well as IP address
- |        |             |
|--------|-------------|
| telnet | abc         |
| http   | 211.162.0.1 |
- The network administrator manages the IP addresses unique in all interconnected networks.

i) Write Shell script to print 100 to 0 with an interval of 2s using until loop.

```
#!/bin/bash
a=100
until [ ! $a -ge 1 ]
do
    echo $a
    a=$(( $a + 2 ))
done
```

8) Define shell script. Explain the syntax of shell script.

A shell script is defined as its plain text file with a #! at the beginning of Linux command. Has of control and control and input output facilities as it is created by using any text editor like unix, mac etc.

#!/bin/bash  
# (comments)

chmod +x scriptName (make script executable)  
echo " " (To print message or variable content)  
. /scriptName.sh (execute script)

#!/bin/bash - It define which shell will be used to run the shell script

# comment - by using '#' symbol you can add comments

chmod +x scriptName.sh - If script file is executable and tell to linux that file is executable

. /scriptName.sh - It define execute the script

9) Explain the syntax of if else construct

if  
    exp  
then

    statement(s) to be executed if expression is true

else  
    Statement(s) to be executed if exp is false

Example

#!/bin/bash

a=10

b=20

if \$a == \$b

then

echo "a is equal to b"

else

echo "a is equal to b"

Q) Explain various boolean operators used in shell script with example

i) logical negation ! operator

Display result as a true condition into false and vice versa

logical OR - o operator

Display, if one of the operand(s) is true then condition should be true

logical AND : & operator

Display If one of the operand(s) one true then condition should be true otherwise it should be false

e.g. !false return it is true

2) \$(a -1) 20 -0 \$b-g+100) return it is true,

3) \$(a -1) 20 -a \$b-g+100) return it is false