



ITER — SOA | SIKSHA 'O' ANUSANDHAN

Linux System & Administration Assignment

Bachelor of Technology

In

Computer Science & Information Technology

1. Enumerate the booting sequence in Linux.

Ans:-

Typical booting process consist of 6 distinct steps:

1. Reading of boot loader from master boot record
2. Loading and initialization of kernel
3. Devices detection and configuration
4. Creation of kernel Processes
5. Administrator Intervention
6. Execution of system start-up scripts

2. Define and explain the use of STDIN, STDOUT, and STDERR.

Ans:-

STDIN :- Standard input - this is the *file handle* that your process reads to get information from you.

STDOUT :- Standard output - your process writes normal information to this file handle.

STDERR :- Standard error - your process writes error information to this file handle.

3. What are the special parameters of Bash shell?

Ans:-

1	\$0 The filename of the current script.
2	\$n These variables correspond to the arguments with which a script was invoked. Here n is a positive decimal number corresponding to the position of an argument (the first argument is \$1, the second argument is \$2, and so on).
3	\$# The number of arguments supplied to a script.
4	\$* All the arguments are double quoted. If a script receives two arguments, \$* is equivalent to \$1 \$2.
5	\$@ All the arguments are individually double quoted. If a script receives two arguments, \$@ is equivalent to \$1 \$2.

6	\$?	The exit status of the last command executed.
7	\$\$	The process number of the current shell. For shell scripts, this is the process ID under which they are executing.
8	\$_	The process number of the last background command.

4. What do you mean by Master Boot Record and why it is used? What is "GRUB" and why it is used?

Ans:-

The Master Boot Record (MBR) is the information in the first sector of any hard disk or diskette that identifies how and where an operating system is located so that it can be boot (loaded) into the computer's main storage or random access memory. The Master Boot Record is also sometimes called the "partition sector" or the "master partition table" because it includes a table that locates each partition that the hard disk has been formatted into.

MBR contains the programs that tells the computer from which partition ,the secondary boots programs will be loaded and the secondary boot program is known as boot loader.

The GRUB (Grand Unified Bootloader) is a bootloader available from the GNU project. A bootloader is very important as it is impossible to start an operating system without it. It is the first program which starts when the program is switched on. The bootloader transfers the control to the operating system kernel.

The purpose of the GRUB kernel is to recognize filesystems and load boot images, and it provides both menu-driven and command-line interfaces to perform these functions.

5. Mention and explain various components of a Process Life Cycle with suitable block diagram?

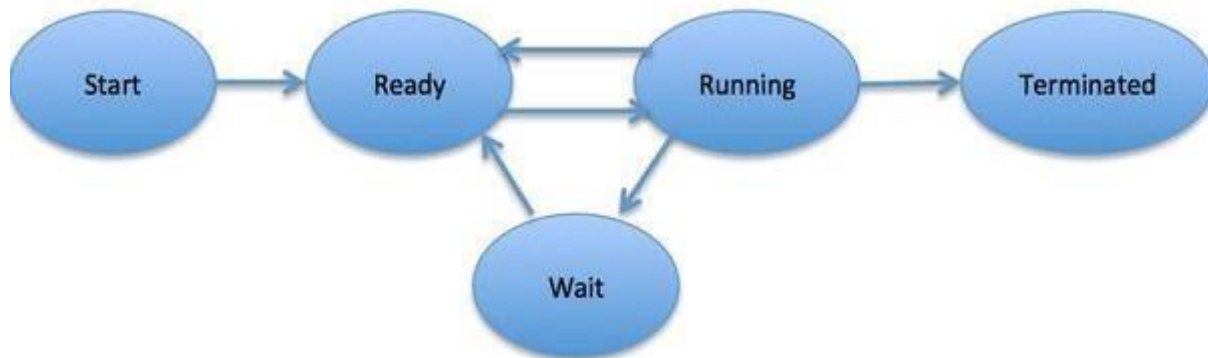
Ans:-

1. Start – This is the initial state when the process is first started or created. 2. Ready – Ready Processes are waiting to have the processor allocated to them by the operating system so that they can run.

3. Running - Once the process has been assigned to a processor by the OS scheduler, the process state is set to running and the processor executes its instructions.

4. **Waiting** - Process moves into the waiting state if it needs to wait for a resource, such as waiting for user input, or waiting for a file to become available.

5. **Terminated or Exit** - Once the process finishes its execution, or it is terminated by the operating system, it is moved to the terminated state where it waits to be removed from main memory.



6. Discuss the ATA, SATA, PATA, SCSI Storage technology development in hardware and how they are different?

Ans:-

1. **ATA (Advanced Technology Attachment)**, known in earlier revisions as IDE, was developed as a simple, low-cost interface for PCs. It was originally called Integrated Drive Electronics because it put the hardware controller in the same box as the disk platters and used a relatively high level protocol for communication between the computer and the disks. This is now the way that all hard disks work, but at the time it was something of an innovation. The traditional parallel ATA interface (PATA) connected disks to the motherboard with a 40- or 80-conductor ribbon cable. This style of disk is nearly obsolete, but the installed base is enormous.
2. **PATA** disks are often labelled as “IDE” to distinguish them from SATA drives (below), but they are true ATA drives. PATA disks are medium to fast in speed, generous in capacity, and unbelievably cheap.
3. **SATA**, is the successor to PATA. In addition to supporting much higher transfer rates (currently 3 Gb/s, with 6 Gb/s soon to arrive), SATA simplifies connectivity with tidier cabling and a longer maximum cable length. SATA has native support for hot-swapping and (optional) command

queueing, two features that finally make ATA a viable alternative to SCSI in server environments.

4. SCSI is one of the most widely supported disk interfaces. It comes in several flavours, all of which support multiple disks on a bus and various speeds and communication styles.

7. What are the various strategies for creating Back Up? Explain with the trade-off criteria.

Ans:

- Perform all dumps from one machine
 - using *rdump*, there is a performance penalty, while the ease of administration makes it worthwhile.
- Label your tapes: *exalabel*
- Pick a reasonable backup interval
 - The more often backups are done, the smaller the amount of data that can be lost in a crash
- Choose filesystems carefully
- Make daily dumps fit on one tape
- Make filesystems smaller than your dump device
- Keep tapes off-site
- Limit Activity during dumps
- Check your tapes
- Verify that the tape contains the expected files
- Prepare for the worst

8. What do you mean by Syslog? What are the various parts of Sys Log? Explain with a suitable Schematic Diagram.

Ans:

- A comprehensive logging system, used to manage information generated by the kernel and system utilities.
- Allow messages to be sorted by their sources and importance, and routed to a variety of destinations:
log files, users' terminals, or even other machines.

- Syslog has three parts

➤ Syslog and `/etc/syslog.conf`

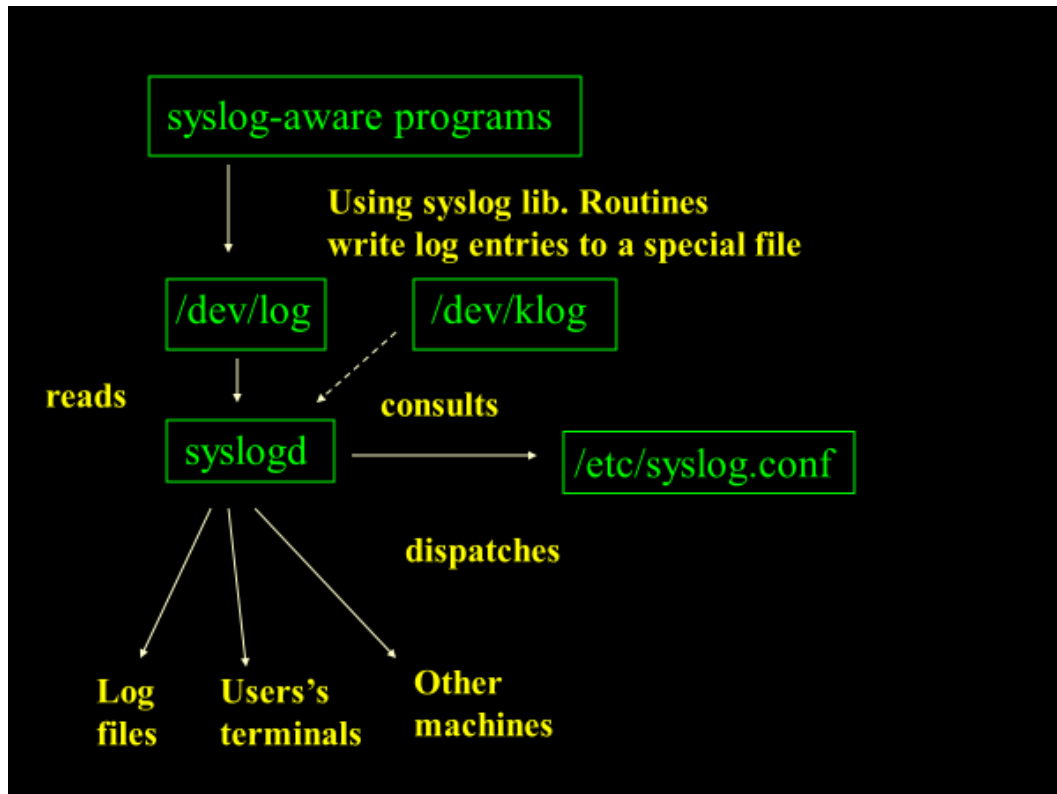
the daemon that does the actual logging its configuration file

➤ **openlog, syslog, closelog**

library routines that programs use to send data to syslog

➤ **logger**

user-level command for submitting log entries



9. What is file permission and how it is implemented in Linux?

Ans:

The file permissions on each line of the ls listing tell you what the file is and what kind of file access (that is, the ability to read, write, or execute) is granted to various users on your system.

Here are two examples of file permissions:

-rw-----

drwxr-xr-x

The first character of the file's mode field indicates the type of file. The next nine characters taken in groups of three indicate who on your computer can do what with the file. There are three kinds of permissions:

r - Permission to read

w - Permission to write

x - Permission to execute

Similarly, there are three classes of permissions:

Owner - The file's owner

Group - Users who are in the file's group

Other - Everybody else on the system (except the superuser)

10. What are the files attributes? Explain briefly.

Ans:

File attributes are a type of meta-data that describe and may modify how files and/or directories in a filesystem behave. Typical file attributes may, for example, indicate or specify whether a file is visible, modifiable, compressed, or encrypted.

File attributes:

1. No atime updates – atime record is not modified when file is read/accessed.
2. Synchronous Updates - Changes are written synchronously to the underlying filesystem storage medium; equivalent to 'sync' mount option for affected files.
3. No dump - File is skipped by the dump program.
4. Immutable - Prevents any change to file's contents or metadata: file/directory cannot be written to, deleted, renamed, or hard-linked.
5. Secure Deletion - Requests that, when deleted, all file data blocks are filled with zeroes. Append – only - Writing to file only allowed in append mode.

11. What do you mean by RAID? Discuss various types of RAID Configuration with suitable diagram.

Ans:

RAID, “redundant arrays of inexpensive disks,” is a system that distributes or replicates data across multiple disks. RAID not only helps avoid data loss but also minimizes the downtime associated with hardware failures (often to zero) and potentially increases performance.

RAID levels

RAID can do two basic things:

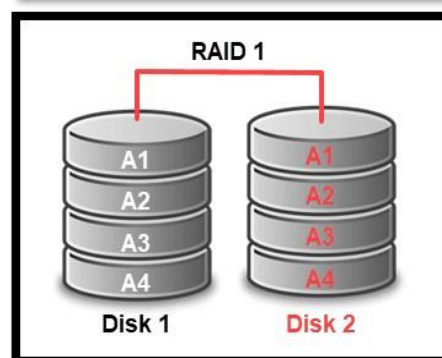
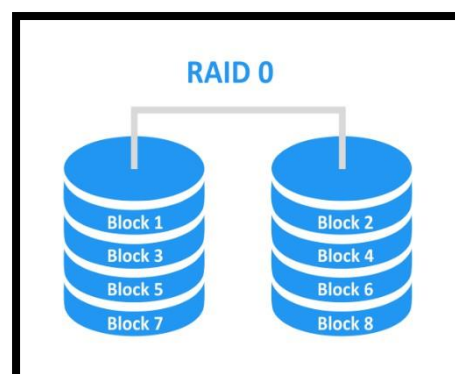
- I. First, it can improve performance by “striping” data across multiple drives, thus allowing several drives to work simultaneously to supply or absorb a single data stream.
- II. Second, it can replicate data across multiple drives, decreasing the risk associated with a single failed disk.

Replication assumes two basic forms:

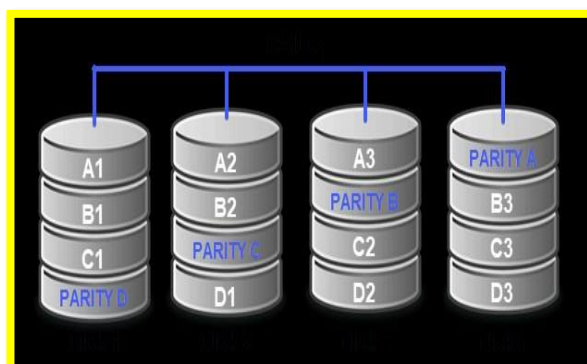
- I. Mirroring, in which data blocks are reproduced bit-for-bit on several different drives, and parity schemes, in which one or more drives contain an error-correcting checksum of the blocks on the remaining data drives. Mirroring is faster but consumes more disk space.
- II. Parity schemes are more disk-space-efficient but have lower performance.

RAID is traditionally described in terms of “levels” that specify the exact details of the parallelism and redundancy implemented by an array.

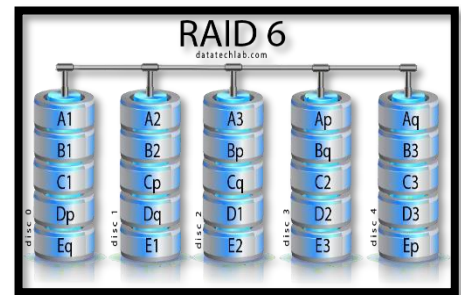
- RAID level 0 is used strictly to increase performance. It combines two or more drives of equal size, but instead of stacking them end-to-end, it stripes data alternately among the disks in the pool. Sequential reads and writes are therefore spread among several disks, decreasing write and access times.
- RAID level 1 is colloquially known as mirroring. Writes are duplicated to two or more drives simultaneously. This arrangement makes writes slightly slower than they would be on a single drive. However, it offers read speeds comparable to RAID 0 because reads can be farmed out among the several duplicate disk drives.



- RAID level 5 stripes both data and parity information, adding redundancy while simultaneously improving read performance. In addition, RAID 5 is more efficient in its use of disk space than is RAID 1. If there are N drives in an array (at least three are required), N–1 of them can store data. The space-efficiency of RAID 5 is therefore at least 67%, whereas that of mirroring cannot be higher than 50%.



- RAID level 6 is similar to RAID 5 with two parity disks. A RAID 6 array can withstand the complete failure of two drives without losing data.



12. What are some of the most important features of configuration management system? What are the security implications of distributing configuration files over the network?

Ans:

Configuration management (CM) is a systems engineering process for establishing and maintaining consistency of a product's performance, functional, and physical attributes with its requirements, design, and operational information throughout its life.

Important Features:

- Increased Efficiency
- Cost reduction
- Greater agility and faster problem resolution
- Enhanced system and process reliability
- Efficient change management
- Faster resolution of your service if a process failure occurs.

Network filesystem-based access is centralized and easier to manage from day to day, and it makes bug fixes and new packages instantaneously available on all clients. However, running over the network may be a bit slower than accessing a local disk. In addition, the network server model adds dependencies on the network and the file server, not only because it adds potential points of failure but also because it requires that clients and servers agree on such things as the shared libraries that will be available and the version of those libraries that will be installed. The bottom line is that NFS software libraries are an advanced administrative technique and should only be attempted in environments that allow for a high degree of central coordination.

13. What are the logging policies?

Ans:

- Throw away all data immediately
- Reset log files at periodic intervals
- Rotate log files, keeping data for a fixed time
- Compress and archive to tape or other permanent media

14. What are the ways to configure Network Installation Manager?

Ans:

- There are three ways to configure NIM:
 - By using the web-based system manager
 - By using the smit nim or smit eznim fast paths
 - From the command line with the nim tool

15. What do you mean by software localisation?

Ans:-

Software localization (or localization) means translation of a software interface and messages to another language plus adaptation of some formats (e.g. measures, dates and currency) plus adaptation to local cultures.