**Question Need to Prepare**

1] **What is 'inode'?**

All UNIX files have its description stored in a structure called 'inode'. The inode contains info about the file-size, its location, time of last access, time of last modification, permission and so on. Directories are also represented as files and have an associated inode.

**2] What is Symbolic link? And its type?Difference?**

If any file system getting full, then create the symbolic link to another file system .Then it redirect to new file system, file generated there rather than older one.A symbolic link(also symlink or soft link) is a special type of file that contains a reference to another file or directory in the form of an absolute or relative or relative path and that affects pathname resolution.(different inode number)

>Symbolic links are different from hard link. Hard link path on different volumes or file system, where as symbolic links may point to any file or directory irrespective of the volumes on which the links & target reside.(same inode number)

Type:

**Soft link and Hard link**

**Difference:**

**Soft Link:**

**1)**Link file and actual file is different

2)Link file will not have actual content of file.

3)File create across the file systems.

Format: #ln -s

**Hard Link:**

**1)**Actual copy of the file(Store backup of file in link file).

2)Inode number will be same for both files.

3)File create within the file system.

Format: #ln

**3] What is DNS?**

**DNS** stands for DOMAIN NAME SERVER (SYSTEM), it resolve IP address to name and name to IP address.

In network each machine is identify by an IP address ,if you want to access data from any machine(server/host)you will need to remember IP address. IP address is a numerical code & it’s hard to remember, So each machine across the n/w will have a FQDN(Fully Qualified Domain Name).And DNS use to resolve domain name to IP address.

**4] What is Sticky bit, SUID , and SGID?**

**Sticky Bit:**

If you set sticky bit on directory irrespective of the permission of the files in that directory, only the owner of the file will be able to rename or delete the file.

Ex: #chmod 1777 <directory name>

#chmod o+t <directory name>

**SUID:**

The SUID permission makes a script to run as a owner of the script rather than the user who execute it.

Ex: #chmod 4777 <script name>

**SGID:**

SGID permission makes the files to run with privileges of file group owner rather the person who running the program.

Ex: #chmod 2777 <file name>

**5] What is NAS and SAN?**

**NAS:**

**NAS** stands for Network Attached Storage, it is a kind of centralized storage.It has an array of disks and its own o.s (ONTAP).Where you can create volume group and volume and export it. And on client server we can mount individual volumes using protocols like CIFS for Windows and NFS for Linux.It is low cost product. The leading company is Netapp.

**SAN:**

**SAN** stands for Storage Area Network, where there is an array of disks which is attached to individual server through cluster of High Speed Switches.When we run the command like fdisk –l or format it will locally attached to it. One can form a small group of disk and assign through server.The interface card on server side is called as HBA(Host Based Adapter).The disk from the centralized storage are attached to individual storage using the iSCSI protocol, which is simulation of SCSI.

The leading company for SAN product is EMC.

The solution of SAN is expensive as compare to NAS.

**6] What is the RAID?**

**RAID** stands for Redundant Array of Independent Disk(Inexpensive).

**RAID** (**redundant array of independent disks**, originally **redundant array of inexpensive disks**) is a storage technology that combines multiple [disk drive](http://en.wikipedia.org/wiki/Disk_drive) components into a logical unit. Data is distributed across the drives in one of several ways called "RAID levels", depending on the level of [redundancy](http://en.wikipedia.org/wiki/Redundancy_%28engineering%29) and performance required.

There are two types of RAID which is **Hardware RAID** and **Software RAID.**

Each scheme provides a different balance between the key goals: [reliability](http://en.wikipedia.org/wiki/Reliability_engineering) and [availability](http://en.wikipedia.org/wiki/Availability), [performance](http://en.wikipedia.org/wiki/Computer_performance) and [capacity](http://en.wikipedia.org/wiki/Capacity). RAID levels greater than RAID 0 provide protection against unrecoverable (sector) read errors, as well as whole disk failure.

LEVELS of RAID:

RAID 0 = Striping RAID 1 = Mirroring

RAID 2 = Error Checking RAID 3 = Same as RAID 5

RAID 4 = Parity on Separate Disk RAID 5 = Distributed Parity

RAID 6 = Double Distributed Parity RAID 1+0 = Mirroring + Striping

RAID 0+1 = Striping +Mirroring

**7] Kernel Boot Process of Linux?**

The following are the 6 high level stages of a typical Linux boot process.

**1. BIOS**

* **BIOS** stands for Basic Input/Output System. Performs some system integrity checks
* Searches, loads, and executes the boot loader program.
* It looks for boot loader in floppy, cd-rom, or hard drive. You can press a key (typically F12 of F2, but it depends on your system) during the BIOS startup to change the boot sequence. Once the boot loader program is detected and loaded into the memory, BIOS gives the control to it.
* **So, in simple terms BIOS loads and executes the MBR boot loader**

**2. MBR**

* **MBR** stands for Master Boot Record.
* It is located in the 1st sector of the bootable disk. Typically /dev/hda, or /dev/sda
* MBR is less than 512 bytes in size. This has three components 1) primary boot loader info in 1st 446 bytes 2) partition table info in next 64 bytes 3) mbr validation check in last 2 bytes.
* It contains information about GRUB (or LILO in old systems).
* **So, in simple terms MBR loads and executes the GRUB boot loader**.

**3. GRUB**

* **GRUB** stands for Grand Unified Bootloader.
* If you have multiple kernel images installed on your system, you can choose which one to be executed.
* GRUB displays a splash screen, waits for few seconds, if you don’t enter anything, it loads the default kernel image as specified in the grub configuration file.
* GRUB has the knowledge of the filesystem (the older Linux loader LILO didn’t understand filesystem).
* Grub configuration file is /boot/grub/grub.conf (/etc/grub.conf is a link to this).
* It contains kernel and initrd image.
* **So, in simple terms GRUB just loads and executes Kernel and initrd images.**

**4. Kernel**

* Mounts the root file system as specified in the “root=” in grub.conf
* Kernel executes the /sbin/init program.Since init was the 1st program to be executed by Linux Kernel, it has the process id (PID) of 1. Do a ‘ps -ef | grep init’ and check the pid.
* initrd stands for Initial RAM Disk.
* initrd is used by kernel as temporary root file system until kernel is booted and the real root file system is mounted. It also contains necessary drivers compiled inside, which helps it to access the hard drive partitions, and other hardware.

**5. Init**

* Looks at the /etc/inittab file to decide the Linux run level.
* Following are the available run levels
  + 0 – halt
  + 1 – Single user mode
  + 2 – Multiuser, without NFS
  + 3 – Full multiuser mode
  + 4 – unused
  + 5 – X11
  + 6 – reboot
* Init identifies the default initlevel from /etc/inittab and uses that to load all appropriate program.
* Execute ‘grep initdefault /etc/inittab’ on your system to identify the default run level
* If you want to get into trouble, you can set the default run level to 0 or 6. Since you know what 0 and 6 means, probably you might not do that.
* Typically you would set the default run level to either 3 or 5.

**6. Runlevel programs**

* When the Linux system is booting up, you might see various services getting started. For example, it might say “starting sendmail …. OK”. Those are the runlevel programs, executed from the run level directory as defined by your run level.
* Depending on your default init level setting, the system will execute the programs from one of the following directories.
  + Run level 0 – /etc/rc.d/rc0.d/
  + Run level 1 – /etc/rc.d/rc1.d/
  + Run level 2 – /etc/rc.d/rc2.d/
  + Run level 3 – /etc/rc.d/rc3.d/
  + Run level 4 – /etc/rc.d/rc4.d/
  + Run level 5 – /etc/rc.d/rc5.d/
  + Run level 6 – /etc/rc.d/rc6.d/
* Please note that there are also symbolic links available for these directory under /etc directly. So, /etc/rc0.d is linked to /etc/rc.d/rc0.d.
* Under the /etc/rc.d/rc\*.d/ directories, you would see programs that start with S and K.
* Programs starts with S are used during startup. S for startup.
* Programs starts with K are used during shutdown. K for kill.
* There are numbers right next to S and K in the program names. Those are the sequence number in which the programs should be started or killed.
* For example, S12syslog is to start the syslog deamon, which has the sequence number of 12. S80sendmail is to start the sendmail daemon, which has the sequence number of 80. So, syslog program will be started before sendmail.

There you have it. That is what happens during the Linux boot process.

**8] What is the difference between Solaris and Linux?**

>**Solaris** OS started as proprietary software and recently moved to freeware while Linux started as open source freeware.

>Solaris was originally a proprietary product and operated strictly on SPARC platforms while Linux operates on x86 platforms. Solaris now supports x86 platforms in addition to SPARC.

>Both manufacturers are different.

| **Linux command** | **Solaris similar command** | **Comments** | |
| --- | --- | --- | --- |
| top | prstat | You can compile top on Solaris, but you can't rely on it's accuracy | |
| free | vmstat |  | |
| cat /proc/meminfo | prtconf | grep Memory |  | |
| cat /proc/cpuinfo | psrinfo -v | you can also use prtconf | |
| netstat -p | lsof -i | lsof is not a default command. You need the package | |
| uname -a | isainfo -b | to determine how many bits your os is | |
| java -d64 | java -d64 | Start java with a default of 64 bit. Linux seems to do this by default though. | |
| cat /etc/redhat-release | cat /etc/release |  | |
|  | sysdef | sysdef holds a lot of system info including kernel tunables | |
| lsmod | modinfo |  | |
| **Shutdown** | | |
| shutdown -h now (or) poweroff | | | shutdown -y -g0 -i5 (or) init 5 |
| reboot | | | reboot (or) shutdown -y -g0 -i6 (or) init 6 |
| halt | | | halt |
| **Kernel** | | |  |
| /sbin/lsmod | | | modinfo |
| /sbin/insmod | | | modload |
| /sbin/rmmod | | | modunload |
| scanpci | | | /usr/X11/bin/scanpci (or) prtconf -v |
| **Printing** | | |  |
| lp (or) lpr | | | lp (or /usr/ucb/lpr) |
| lpstat (or) lpq | | | lpstat (or /usr/ucb/lpq) |
| **Services** | | |  |
| /sbin/service --status-all | | | svcs -a |
| /sbin/service sendmail stop | | | svcadm disable sendmail |
| /sbin/service sendmail start | | | svcadm enable sendmail |
| /sbin/service sendmail status | | | svcs sendmail |
| /sbin/chkconfig --list | | | svcs -a |
| /sbin/chkconfig --add /etc/rc3.d/f00 | | | svccfg import f00.xml |
| /sbin/chkconfig sendmail on | | | svcadm enable sendmail |
| **Monitoring** | | |  |
| top | | | prstat |
| cat /proc/cpuinfo | | | psrinfo -v |
| cat /proc/meminfo | | | prtconf |
| **NFS** | | |  |
| exportfs | | | exportfs (or) share |
| (edit /etc/exports) | | | share /home (or) zfs sharenfs=on |
| (edit /etc/exports) unshare /home (or) zfs sharenfs=off | | |  |
| **Networking** | | |  |
| /sbin/mii-tool | | | ndd (or) /sbin/dladm show-dev |
| ifconfig | | | ifconfig -a |
| /sbin/ethtool | | | ndd |
| /sbin/dhclient | | | dhcpagent |
| iptables | | | ipfilter |
| **Storage** | | |  |
| fdisk | | | fdisk (and) format |
| parted | | | format |
| mkfs -t ext3 /dev/hda1 | | | mkfs -F ufs /dev/rdsk/c0t0d0s0 (or) newfs /dev/rdsk/c0t0d0s0 |
| cdrecord dev=2,0 f00.iso cdrw -i f00.iso | | |  |
| tar xfvj f00.tar.bz2 | | | gtar xfvj f00.tar.bz2 |
| lvm/pv\*/lv\*/vg\* | | | meta\* |
| **Dev** | | |  |
| (edit /etc/ld.so.conf) | | | crle |
| gcc | | | /opt/csw/bin/gcc |
| ld | | | /usr/ccs/bin/ld |

**9] What is Swap?**

**>Swap space** in Linux is used when the amount of physical memory (RAM) is full. If the system needs more memory resources and the RAM is full, inactive pages in memory are moved to the swap space. While swap space can help machines with a small amount of RAM, it should not be considered a replacement for more RAM. Swap space is located on hard drives, which have a slower access time than physical memory.

>Swap space can be a dedicated swap partition (recommended), a swap file, or a combination of swap partitions and swap files.

>Swap should equal 2x physical RAM for up to 2 GB of physical RAM, and then an additional 1x physical RAM for any amount above 2 GB, but never less than 32 MB.

>Swapping is necessary for two important reasons. >First, when the system requires more memory than is physically available, the kernel swaps out less used pages and gives memory to the current application (process) that needs the memory immediately. >Second, a significant number of the pages used by an application during its startup phase may only be used for initialization and then never used again. The system can swap out those pages and free the memory for other applications or even for the disk cache.

>Linux has two forms of swap space: the swap partition and the swap file..

>To see what swap space you have, use the command swapon –s

**Extra Swap partition:**

Make the partition by using swap id.

Once a partition is marked as swap, you need to prepare it using the mkswap (make swap) command as root:

**mkswap /dev/hdb1**

If you see no errors, your swap space is ready to use. To activate it immediately, type:

**swapon /dev/hdb1**

**Swap file**

To create a swap file, use the dd command to create an empty file. To create a 1GB file, type:

**dd if=/dev/zero of=/swapfile bs=1024 count=1048576**

Prepare the swap file using mkswap just as you would a partition, but this time use the name of the swap file:

**mkswap /swapfile**

**10] What is LVM?**

**LVM** is a Logical Volume Manager for the Linux operating system.LVM is a tool for logical volume management which includes allocating disks, striping, mirroring and resizing logical volumes.

With LVM, a hard drive or set of hard drives is allocated to one or more *physical volumes*. LVM physical volumes can be placed on other block devices which might span two or more disks.

The physical volumes are combined into *logical volumes*, with the exception of the /boot/ partition. The /boot/ partition cannot be on a logical volume group because the boot loader cannot read it. If the root (/) partition is on a logical volume, create a separate /boot/ partition which is not a part of a volume group.

Logical volume management is traditionally associated with large installations containing many disks but it is equally suited to small systems with a single disk or maybe two.

**11] What is Virtualization?**

**Virtualization** is a system or a method of dividing computer resources into multiple isolated environment. In computing, **virtualization** is simulating a [hardware platform](http://en.wikipedia.org/wiki/Platform_%28computing%29), [operating system](http://en.wikipedia.org/wiki/Operating_system) (OS), storage device, or network resources.

Virtual Environment (VE, also known as VPS, container, partition etc.) is an isolated program execution environment, which (from the point of view of its owner) looks and feels like a separate physical server.

**Advantages of Virtualization:**

Server consolidation allows an organization to decrease the number of physical servers, by moving their applications into virtual environments; the number of operating system environments remains the same. This leads to savings in hardware costs, rack space, electricity, and management efforts.

>Popular Linux virtualization solutions include Xen, KVM, QEMU, VirtualBox and VMware

**12] What is the range of ports or how many ports are there?**

Port numbers can vary from 0 to 65535, so total we can get 65536 ports

**13] What are the well-known ports or assigned ports or default ports?**

Well known ports are from 0 to 1023(total 2^10=1024 ports)

**14] Is there any way I can see all the port information in Linux?**

Yes, you can get that from /etc/services files.

**15] How can I see open ports in Linux?**

Use [nmap command](http://www.linuxnix.com/2009/11/nmap-with-examples.html).

**16] Well known ports:**

**20 – FTP Data** (For transferring FTP data) **21 – FTP Control** (For starting FTP connection)

**22 – SSH**(For secure remote administration which uses SSL to encrypt the transmission)

**23 – Telnet** (For insecure remote administration

**25 – SMTP**(Mail Transfer Agent for e-mail server such as SEND mail)

**53 – DNS**(Special service which uses both TCP and UDP)

**67 – Bootp** **68 – DHCP**

**69 – TFTP**(Trivial file transfer protocol uses udp protocol for connection less transmission of data)

**80 – HTTP**/WWW(apache) **88 – Kerberos** **110 – POP3**(Mail delivery Agent)

**123 – NTP**(Network time protocol used for time syncing uses UDP protocol)

**137 – NetBIOS**(nmbd) **139 – SMB-Samba**(smbd) **143 – IMAP**

**161 – SNMP**(For network monitoring) **389 – LDAP**(For centralized administration)

**443 – HTTPS**(HTTP+SSL for secure web access) **514 – Syslogd**(udp port)

**636 – ldaps(both tcp and udp)** **873 – rsync**

**989 – FTPS-data** **990 – FTPS** 993 – IMAPS **995 – POP3s**

1812 – RADIUS **1521– Oracle Database**  1194 – openVPN

**2049 – NFS**(nfsd, rpc.nfsd, rpc, portmap) **2401 – CVS server**

**3306 – MySql** 3690 – SVN **6000-6063-X11**

**Note2:**X11 use 6000 to 6063.. ports for connecting X11 from remote server.

**17] What is LUN?**

**LUN** stands for Logical Unit Number. If suppose we got a large storage array, and requirement is to not allow one server to use all storage spaces, so it need to divided into logical units as LUN(Logical Unit Number). So LUN allow us slice storage  array into usable storage chunks and present same to server. LUN basically refer to either a entire physical volume or subset of larger physical disk or volume. LUN represent logical abstraction or you can say virtual layer between physical disk and application. A LUN is scsi concept.

It is use in **SAN** & **DAS** where multiple disks are attached to single **SCSI** target i.e in **Solaris** device, definition is **c0t0d0s0.** The **d0** number will specify the **LUN** number.

**Ex:** C0t0d0s0

C0t0d1s0

**18] What is rsync?**

**rsync** is a program that behaves in much the same way that rcp does, but has many more options and uses the rsync remote-update protocol to greatly speed up file transfers when the destination file already exists.

The rsync remote-update protocol allows rsync to transfer just the differences between two sets of files across the network link, using an efficient checksum-search algorithm described in the technical report that accompanies this package.

Rsync stands for remote synchronization. It copies data from source to destinations .There are various commands like cp,scp,ftp,dd,cpio,tar, etc. for copying the data. But is specially used when we transfer large amount of data and when it takes long hours for transfer.

Some of the additional features of rsync are:

* + support for copying links, devices, owners, groups and permissions
  + exclude and exclude-from options similar to GNU tar
  + a CVS exclude mode for ignoring the same files that CVS would ignore
  + can use any transparent remote shell, including rsh or ssh
  + does not require root privileges
  + pipelining of file transfers to minimize latency costs
  + support for anonymous or authenticated rsync servers (ideal for mirroring)

**19] What account is created when you install Linux?**

Answer: **root**

Whenever you install Linux, only one user account is created. This is the superuser account also known as root.

**20] What is the name and path of the main system log?**

Answer: **/var/log/messages**

By default, the main system log is /var/log/messages.

**21] What is NFS?**

**NFS** stands for Network File System(Sharing),which is use to share the network resources

from one host to another host (source to destination)across the network.

Purpose of NFS:

* NFS can be used for sharing of files remotely.
* Data can be stored on a single machine and still remain accessible to others over the network.
* Reduction of the number of removable media drives the network since they can be shared. throughout

**22]** **What is Linux Kernel?**

The Linux Kernel is a low-level systems software whose main role is to manage hardware resources for the user. It is also used to provide an interface for user-level interaction.

2**3]** [**What is the difference between home directory and working directory?**](http://careerride.com/Linux-home-working-directory.aspx)

Answer - Home directory is the default working directory when a user logs in. On the other hand, working directory is the user’s current directory

**24]** [**What is a zombie?**](http://careerride.com/Linux-zombie.aspx)

Answer - Zombie is a process state when the child dies before the parent process. In this case the structural information of the process is still in the process table.

**25]** **What is Shell?**

A shell acts as an interface between the user and the system. As a command interpreter, the shell takes commands and sets them up for execution.

**26] How do you find which process is taking how much CPU?**

By using "top" command in UNIX.

**27] What are some common shells and what are their indicators?**

sh – Bourne shell  
csh – C SHell  
bash – Bourne Again Shell  
tcsh – enhanced C Shell  
zsh – Z SHell  
ksh – Korn SHell

**28]** **How do you find which remote hosts are connecting to your host on a particular port say 10123?**

By using **netstat command** execute netstat -a | grep "port" and it will list the entire host which is connected to this host on port 10123.

**29] There is a file Unix\_Test.txt which contains words Unix, how will you replace all Unix to UNIX?**

You can answer this Unix Command Interview question by using SED command in UNIX for example you can execute **sed s/Unix/UNIX/g fileName.**

**30] You have a tab separated file which contains Name, Address and Phone Number, list down all Phone Number without there name and Addresses?**

To answer this Unix Command Interview question you can either you AWK or CUT command here. CUT use tab as default separator so you can use

**cut -f3 filename.**

**31] You have an IP address in your network how will you find hostname and vice versa?**

This is a standard UNIX command interview question asked by everybody and I guess everybody knows its answer as well. By using **nslookup** command in UNIX, you can read more about [**Convert IP Address to hostname in Unix**](http://javarevisited.blogspot.com/2011/09/find-hostname-from-ip-address-to.html) here.

**32] Your application home directory is full? How will you find which directory is taking how much space?**

By using disk usage (DU) command in Unix for example du **–sh . | grep G**  will list down all the directory which has GIGS in Size.

**33] How do you find for how many days your Server is up?**

By using **uptime** command in UNIX