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# **L1 / L2 Linux System Admin Interview Questions – Part I**

#### **Ques 1 : – How to increase disk read performance from single command in Linux ?**

Ans : – In Linux like Operating System the Read performance of a Disk can be improved by increasing a parameter called “Read+Ahead” using ‘blockdev’ command. By default the Linux OS will read 128 KB of data in advance so that it is already in Memory cache before the program needs it. This value can be increased so as to get better Read Performance.

**Example :**

**# blockdev –setra 16384 /dev/sda**

#### **Ques 2 : – What is the use of tmfs File System ?**

Ans : – Tmpfs is a file system which keeps all files in virtual memory. Everything in tmpfs is temporary in the sense that no files will be created on your hard drive. If you unmount a tmpfs instance, everything stored therein is lost.

tmpfs puts everything into the kernel internal caches and grows and shrinks to accommodate the files it contains and is able to swap unneeded pages out to swap space. It has maximum size limits which can be adjusted on the fly via ‘mount -o remount …’

#### **Ques 3 : – What is anacron and its usage ?**

Ans : – Anacron is a service that runs after every system reboot, checking for any cron and at scheduled jobs that were to run while the system was down and hence, have not yet run. It scans the /etc/cron.hourly/0anacron file for three factors to determine whether to run these missed jobs. The three factors are the presence of the /var/spool/anacron/cron.daily file, the elapsed time of 24 hours since anacron last ran, and the presence of the AC power to the system. If all of the three factors are affirmative, anacron goes ahead and automatically executes the scripts located in the /etc/cron.daily, /etc/cron.weekly, and /etc/cron.monthly directories, based on the settings and conditions defined in anacron’s main configuration file /etc/anacrontab

#### **Ques 4 : – What is difference between Soft Link & Hard Link ?**

Ans : – A soft link (symbolic link or a symlink) makes it possible to associate one file with another. It is similar to a shortcut in MS Windows where the actual file is resident somewhere in the directory structure but you may have multiple shortcuts or pointers with different names pointing to it. Each soft link has a unique inode number.A soft link can cross file system boundaries and can be used to link directories.

A hard link associates two or more files with a single inode number. This allows the files to have identical permissions, ownership, time stamp, and file contents. Changes made to any of the files are reflected on the other linked files. All files actually contain identical data.A hard link cannot cross file system boundaries and cannot be used to link directories.

#### **Ques 5 : – What is the difference between hardware RAID and Software RAID?**

*Ans : – The hardware-based RAID is independent from the host. A Hardware RAID device connects to the SCSI controller and presents the RAID arrays as a single SCSI drive. An external RAID system moves all RAID handling “intelligence” into a controller located in the external disk subsystem. The whole subsystem is connected to the host via a normal SCSI controller and appears to the host as a single disk.*

*Software RAID is implemented under OS Kernel level. The Linux kernel contains an MD driver that allows the RAID solution to be completely hardware independent. The performance of a software-based array depends on the server CPU performance and load.*

#### **Ques 6 : – Explain the command “rpm -qf “?**

Ans : – it queries the RPM database for which package owns . When specifying a file, specify the absolute path of the file.

#### **Ques 7. What is initrd image and what is its function in the linux booting process ?**

Ans : The initial RAM disk (initrd) is an initial root file system that is mounted prior to when the real root file system is available.The initrd is bound to the kernel and loaded as part of the kernel boot procedure. The kernel then mounts this initrd as part of the two-stage boot process to load the modules to make the real file systems available and get at the real root file system. Thus initrd image plays a vital role in linux booting process.

#### **Ques 8. Explain the terms suid, sgid and sticky bit ?**

Ans : In addition to the basic file permissions in Linux, there are few special permissions that are available for executable files and directories.

SUID : If setuid bit is set, when the file is executed by a user, the process will have the same rights as the owner of the file being executed.

SGID : Same as above, but inherits group previleges of the file on execution, not user previleges. Similar way when you create a file within directory,it will inherit the group ownership of the directories.

Sticky bit : Sticky bit was used on executables in linux so that they would remain in the memory more time after the initial execution, hoping they would be needed in the near future. But mainly it is on folders, to imply that a file or folder created inside a stickybit enabled folder could only be deleted by the owner. A very good implementation of sticky bit is /tmp ,where every user has write permission but only users who own a file can delete them.

#### **Ques 9. List out few of the differences between Softlink and Hardlink ?**

Ans : a) Hardlink cannot be created for directories. Hard link can only be created for a file.

b) Symbolic links or symlinks can link to a directory.

c) Removing the original file that your hard link points to does not remove the hardlink itself; the hardlink still provides the content of the underlying file.

d) If you remove the hard link or the symlink itself, the original file will stay intact.

e) Removing the original file does not remove the attached symbolic link or symlink, but without the original file, the symlink is useless

#### **Ques 10. How do you sent a mail attachment via bash console ?**

“mutt” is an opensource tool for sending emails with attachments from the linux bash command line. We can install “mutt” from the binary rpm or via packagemanager.

For Ubuntu / Debian based destros.

# apt-get install mutt

For Redhat / Fedor based destros,

# yum install mutt

Usage :

# mutt -s "Subject of Mail" -a "path of attachment file" "email address of recipient" < "message text containing body of the message"

Eg :

mutt -s "Backup Data" -a /home/backup.tar.gz admin@mywebsite.com < /tmp/message.txt

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#### **L1 / L2 Linux System Admin Interview Questions – Part II**

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#### **Ques 1. What is the difference between umask and ulimit ?**

umask stands for ‘User file creation mask’, which determines the settings of a mask that controls which file permissions are set for files and directories when they are created. While ulimit is a linux built in command which provides control over the resources available to the shell and/or to processes started by it.

You can limit user to specific range by editing /etc/security/limits.conf at the same time system wide settings can be updated in /etc/sysctl.conf

#### **Ques 2. What are the run levels in linux and how to change them ?**

A run level is a state of init and the whole system that defines what system services are operating and they are identified by numbers.There are 7 different run levels present (run level 0-6) in Linux system for different purpose. The descriptions are given below.

0: Halt System (To shutdown the system)

1: Single user mode

2: Basic multi user mode without NFS

3: Full multi user mode (text based)

4: unused

5: Multi user mode with Graphical User Interface

6: Reboot System

To change the run level, edit the file “/etc/inittab” and change initdefault entry ( id:5:initdefault:). If we want to change the run level on the fly, it can be done using ‘init’ command.

For example, when we type ‘init 3′ in the commandline , this will move the system from current runlevel to runlevl 3. Current level can be listed by typing the command ‘who -r’

#### **Ques 3. What is the functionality of a Puppet Server ?**

Puppet is an open-source and enterprise application for configuration management toll in UNIX like operating system. Puppet is an IT automation software used to push configuration to its clients (puppet agents) using code. Puppet code can do a variety of tasks from installing new software, to check file permissions, or updating user accounts and lots of other tasks.

#### **Ques 4. What is SeLinux?**

SELinux is an acronym for Security-enhanced Linux. It is an access control implementation and security feature for the Linux kernel. It is designed to protect the server against misconfigurations and/or compromised daemons. It put limits and instructs server daemons or programs what files they can access and what actions they can take by defining a security policy.

#### **Ques 5. What is crontab and explain the fields in a crontab ?**

The cron is a deamon that executes commands at specific dates and times in linux. You can use this to schedule activities, either as one-time events or as recurring tasks. Crontab is the program used to install, deinstall or list the tables used to drive the cron daemon in a server. Each user can have their own crontab, and though these are files in /var/spool/cron/crontabs, they are not intended to be edited directly. Here are few of the command line options for crontab.

crontab -e Edit your crontab file.  
crontab -l Show your crontab file.  
crontab -r Remove your crontab file.

Traditional cron format consists of six fields separated by white spaces:

The format is explained in detail below.

\* \* \* \* \* \*

| | | | | |

| | | | | +– Year (range: 1900-3000)

| | | | +—- Day of the Week (range: 1-7, 1 standing for Monday)

| | | +—— Month of the Year (range: 1-12)

| | +——– Day of the Month (range: 1-31)

| +———- Hour (range: 0-23)

+———— Minute (range: 0-59)

#### **Ques 6. What are inodes in Linux ? How to find the inode associated with a file ?**

An inode is a data structure on a filesystem on Linux and other Unix-like operating systems that stores all the information about a file except its name and its actual data. When a file is created, it is assigned both a name and an inode number, which is an integer that is unique within the filesystem. Both the file names and their corresponding inode numbers are stored as entries in the directory that appears to the user to contain the files. The concept of inodes is particularly important to the recovery of damaged filesystems. When parts of the inode are lost, they appear in the lost+found directory within the partition in which they once existed.

The following will show the name of each object in the current directory together with its inode number:

# ls -i

The avialble number inodes in a filesystem can be found using the below command :

# df -i

The other way we can get the inode details of a file by using the stat commmand.

Usage : # stat

Example :

-sh-4.1$ stat note.txt  
File: `note.txt'  
Size: 4 Blocks: 8 IO Block: 4096 regular file  
Device: fd05h/64773d Inode: 8655235 Links: 1  
Access: (0644/-rw-r--r--) Uid: (69548/nixuser) Gid: (25000/ UNKNOWN)  
Access: 2014-06-29 15:27:56.299214865 +0000  
Modify: 2014-06-29 15:28:28.027093254 +0000  
Change: 2014-06-29 15:28:28.027093254 +0000

Apart from the above basic questions, be prepared for answers for the below questions

1. How to set linux file/directory permissions ?

2. How to set ownership for files/directories ?

3. How to create user/group and how to modify it ?

4. How to find kernel / OS version and its supported bit (32/64) version ?

5. How to set / find interface ip address ?

6. How to find linux mount points and disk usage ?

7. What command to find memory and swap usage ?

8. Have a look on ps, top, grep, find, awk and dmesg commands ?

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**L1 / L2 Linux System Admin Interview Questions – Part III**

#### **Ques 1. What is the difference between name based virtual hosting and IP based virtual hosting ? Explain the scenario where name based virtual hosting seems useful ?**

Ans – Virtual hosts are used to host multiple domains on a single apache instance. You can have one virtual host for each IP your server has, or the same IP but different ports, or the same IP, the same port but different host names. The latter are called “name based vhosts”.

IP-based virtual hosting, we can run more than one web site on the same server machine, but each web site has its own IP address while In Name-based virtual hosting, we host multiple websites on the same IP address. But for this to succeed, you have to put more than one DNS record for your IP address in the DNS database.

In the production shared webhosting environment, getting a dedicated IP address for every domains hosted in the server is not feasible in terms of cost. Most of the customers wont be able to afford the cost of having a dedicated IP address. Here is the place where the concepts of Name based virtual hosting find its place.

#### **Ques 2. What is network bonding in Linux and where the important configuration files involved? What is the advantage of Network Bonding ?**

Ans – Network Bonding is a Linux kernel feature that allows to aggregate multiple network interfaces into a single virtual link. This is a great way to achieve redundant links, fault tolerance or load balancing networks in production system. If one of the physical NIC is down or unplugged, it will automatically move traffic to the other NIC card. Similar way the bonding will increase the interface throughput to handle the traffic it it is configured in active-active mode.

There are 7 modes starting from 0 to 6 which decides how the bonding configuration behaves.

mode=0 (balance-rr) – Round-robin policy

It the default mode. It transmits packets in sequential order from the first available slave through the last.

This mode provides load balancing and fault tolerance.

mode=1 (active-backup)

Active-backup policy: In this mode, only one slave in the bond is active. The other one will become active, only when the active slave fails. The bond’s MAC address is externally visible on only one port (network adapter) to avoid confusing the switch. This mode provides fault tolerance.

mode=2 (balance-xor)

Transmit the traffic based on [(source MAC address XOR’d with destination MAC address) modulo slave count]. This selects the same slave for each destination MAC address. This mode provides load balancing and fault tolerance.

mode=3 (broadcast)

Broadcast policy: transmits everything on all slave interfaces. This mode provides fault tolerance.

mode=4 (802.3ad)

Creates aggregation groups that share the same speed and duplex settings. Utilizes all slaves in the active aggregator according to the 802.3ad specification.

mode=5 (balance-tlb) – Adaptive transmit load balancing

channel bonding that does not require any special switch support. The outgoing traffic is distributed according to the current load (computed relative to the speed) on each slave. Incoming traffic is received by the current slave. If the receiving slave fails, another slave takes over the MAC address of the failed receiving slave.

mode=6 (balance-alb) – Adaptive load balancing

It includes balance-tlb plus receive load balancing (rlb) for IPV4 traffic, and does not require any special switch support. The receive load balancing is achieved by ARP negotiation.

Important Configuration Files involved :

/etc/sysconfig/network-scripts/ifcfg-bond0  
/etc/modprobe.d/bonding.conf  
/etc/sysconfig/network-scripts/ifcfg-eth[0-4]  
/proc/net/bonding/bond0

#### **Ques 3. Explain briefly the procedure for re-installing Grub in Linux ?**

Ans – 1) Download Ubuntu Installation / Live cd

2) Boot from Ubuntu Installation / Live cd – usb, burned cd etc.

3) During boot select “Try Ubuntu” , Don’t select install !

4) Mount your Linux root partition

sudo mount /dev/sda6 /mnt

( Assuming /dev/sda6 is the Linux root partition)

5) Install / reinstall grub

$ sudo grub-install --root-directory=/mnt/ /dev/sda

( where /dev/sda is your primary disk)

Installation finished. No error reported.

6) Reboot your system, remove bootable CD and we should have the boot menu ready when the system starts.

Note : There would be slight difference when using with other distros.

#### **Ques 4. Explain the fields in /etc/passwd and /etc/shadow ?**

Ans – The /etc/shadow file stores actual password in encrypted format with some additional properties related to user password.It mainly holds athe account aging parameters. All fields are separated by a colon (:) symbol. It contains one entry per line for each user listed in /etc/passwd file Generally, shadow file entry looks as below.

steve:$1$XOdE07rn$WA6qFm4W5UIqNfaqE5Uub.:13775:0:99999:7:::

Here is the explanation of each field.

User name : Your login name

Password: Your encrypted password.

Last password change : Days since Jan 1, 1970 that password was last changed

Minimum: The minimum number of days required between password changes.

Maximum: The maximum number of days the password is valid.

Warn : The number of days before password is to expire that user is warned that his/her password must be changed

Inactive : The number of days after password expires that account is disabled

Expire : days since Jan 1, 1970 that account is disabled. It indicates an absolute date specifying when the login may no longer be used

The /etc/passwd file stores essential information, which is required during login /etc/passwd is a text file, that contains a list of user account related parameters like user ID, group ID, home directory, shell, etc.

Here is the sample entry from /etc/passwd file

steve:x:6902:6902::/home/steve:/bin/bash

Username: User’s login name.

Password: An x character indicates that encrypted password is stored in /etc/shadow file.

User ID (UID): Each user must be assigned a user ID (UID). UID 0 (zero) is reserved for root.

Group ID (GID): The primary group ID

User Info: The comment field. It allow you to add extra information about the user.

Home directory: The absolute path to the directory the user will be in when they log in.

Command/shell: The absolute path of a command or shell (/bin/bash).

#### **Ques 5. How do you boot your system into the following modes, when you are in some trouble ?**

Ans – a) Rescue mode

b) Single user mode

c) Emergency mode

Rescue mode provides the ability to boot a small Linux environment from an external bootable device like a CD-ROM, or USB drive instead of the system’s hard drive.Rescue mode is provided to help you with your system from repairing the file system or fixing certain issues which prevent your normal operations.

In order to get into the rescue mode, change the BIOS settings of the machine to boot from the external media. Once the system started booting using bootable disk, add the keyword rescue as a kernel parameter or else you can give the parameter “linux rescue” in the graphical boot interface.

In single-user mode, the system boots to runlevel 1, but it will have many more additional functionalities compared to switching to runlevel 1 from other levels.

The local file systems can be mounted in this mode, but the network is not activated.

Use the following steps to boot into single-user mode:

1) At the GRUB splash screen during the booting process, press any key to enter the GRUB interactive menu.

2) Select the proper version of kernel that you wish to boot and type “a” to append the line.

3) Go to the end of the line and type “single” as a separate word.

4) Press Enter to exit edit mode and type “b” to boot into single usermode now.

In emergency mode, you are booting into the most minimal environment possible. The root file system is mounted read-only and almost nothing is set up. The main advantage of emergency mode over single-user mode is that the init files are not loaded. If the init is corrupted , you can still mount file systems to recover data that could be lost during a re-installation. To boot into emergency mode, use the same method as described for single-user mode, with one exception, replace the keyword single with the keyword “emergency”.

#### **6. In the ps results few of the processes are having process state as “D” . What does it mean ? Briefly explain different process states ?**

Ans : To have a dynamic view of a process in Linux, always use the top command. This command provides a real-time view of the Linux system in terms of processes. The eighth column in the output of this command represents the current state of processes. A process state gives a broader indication of whether the process is currently running, stopped, sleeping etc.

A process in Linux can have any of the following four states…

Running – A process is said to be in a running state when either it is actually running/ executing or waiting in the scheduler’s queue to get executed (which means that it is ready to run). That is the reason that this state is sometimes also known as ‘runnable’ and represented by (R).

Waiting or Sleeping – A process is said to be in this state if it is waiting for an event to occur or waiting for some resource-specific operation to complete. So, depending upon these scenarios, a waiting state can be subcategorised into an interruptible (S) or uninterruptible (D) state respectively.

Stopped – A process is said to be in the stopped state when it receives a signal to stop. This usually happens when the process is being debugged. This state is represented by (T).

Zombie – A process is said to be in the zombie state when it has finished execution but is waiting for its parent to retrieve its exit status. This state is represented by (Z).

Apart from these four states, the process is said to be dead after it crosses over the zombie state; ie when the parent retrieves its exit status. ‘Dead’ is not exactly a state, since a dead process ceases to exist.

#### **Ques 7. What is drop cache in Linux and how do you clear it ?**

Ans – Cache in Linux memory is where the Kernel stores the information it may need later, as memory is incredible faster than disk.

It is great that the Linux Kernel takes care about that.Linux Operating system is very efficient in managing your computer memory, and will automatically free the RAM and drop the cache if some application needs memory.

Kernels 2.6.16 and newer provide a mechanism to have the kernel drop the page cache and/or inode and dentry caches on command, which can help free up a lot of memory. Now we can throw away that script that allocated a ton of memory just to get rid of the cache.

To free pagecache:

# echo 1 > /proc/sys/vm/drop\_caches

To free dentries and inodes:

# echo 2 > /proc/sys/vm/drop\_caches

To free pagecache, dentries and inodes:

#echo 3 > /proc/sys/vm/drop\_caches

This is a non-destructive operation in normal scenarios and will only free things that are completely unused. Dirty objects will continue to be in use until written out to disk and are not freeable. However it is always preferred to run “sync” first to flush useful things out to disk.

#### **Ques 8. Password based authentication is disabled in your infrastructure. So how do you login to the servers ?**

Ans – To improve the system security even further, most of the organizations turned to use keybased authentications instead of Password based authentication. We can enforce the key-based authentication by disabling the standard password authentication, which involves a public key private key pair. The public key is added in the server configuration file while private key is kept kept confidential on the client side.

Below listed is the procedure, to set up keybased authentication.

1) Generating Key Pairs

a) Generate an RSA key pair by typing the following at a shell prompt:

$ ssh-keygen -t rsa  
Generating public/private rsa key pair.  
Enter file in which to save the key (/home/steve/.ssh/id\_rsa):

b) Press Enter to confirm the default location (that is, ~/.ssh/id\_rsa) for the newly created key.

c) Enter a passphrase, and confirm it by entering it again when prompted to do so.

d) Copy the content of ~/.ssh/id\_rsa.pub into the ~/.ssh/authorized\_keys on the machine to which you want to connect,

appending it to its end if the file already exists.

e) Change the permissions of the ~/.ssh/authorized\_keys file using the following command:

$ chmod 600 ~/.ssh/authorized\_keys

2) Now on your client side, open the remote connection agent like putty and browse your public key and try SSH to the server, you should be able to login without a password now.

# ssh server1.myserver.com  
The authenticity of host 'server1.myserver.com (192.168.44.2)' can't be established.  
RSA key fingerprint is e3:c3:89:37:4b:94:37:d7:0c:d5:6f:9a:38:62:ce:1b.  
Are you sure you want to continue connecting (yes/no)? yes  
Warning: Permanently added 'server1.myserver.com' (RSA) to the list of known hosts.  
Last login: Tue July 13 12:40:34 2014 from server2.myserver.com

3) Public key authentication can prevent brute force SSH attacks, but only if all password-based authentication methods are disabled. Once public key authentication has been confirmed to be working, disable regular password authentication by editing /etc/ssh/sshd\_config and set the following option to “no”.

PasswordAuthentication no

#### **Ques 9. Explain the different Scenarios involved in TCP 3 way handshake ?**

Ans – The TCP three way handshake is the process for establishing a TCP connection.We can explain 3 way handshake with a simple scenario where we assume a client computer is contacting a server to send it some information.

a) The client sends a packet with the SYN bit set and a sequence number of N.

b) The server sends a packet with an ACK number of N+1, the SYN bit set and a sequence number of X.

c) The client sends a packet with an ACK number of X+1 and the connection is established.

d) The client sends the data.

The first three steps in the above process is called the three way handshake.

#### **Ques 10. As the disk space utilization was so high in the server, the Administrator has removed few files from the server but still the disk utilization is showing as high. What would be the reason ?**

Ans – In Linux even if we remove a file from the mounted file system, that will still be in use by some application and for this application it remains available. Its because file descriptor in /proc/ filesystem is held open..So if there are such open descriptors to files already removed, space occupied by them considered as used. You find this difference by checking them using the “df” and “du” commands. While df is to show the file system usage, du is to report the file space usage. du works from files while df works at filesystem level, reporting what the kernel says it has available.

You can find all unlinked but held open files with:

# lsof | grep '(deleted)'

This will list the filename which is open witht he pid in which it is running. We can kill those Pids and which will stop these process and will recover the disk space responsible for this file.

#### **Ques 11. What is rDNS and explain its benefits in the Linux Domain Name Systems ?**

Ans – A typical DNS lookup is used to determine which IP address is associated with a hostname, and this is called Forward DNS lookup. A reverse DNS lookup is used for the opposite, to determine which hostname is associated with an IP address. Sometimes reverse DNS lookups are required for diagnostic purposes. Today, reverse DNS lookups are used mainly for security purposes to trace a hacker or spammer. Many modern mailing systems use reverse mapping to provide simple authentication using dual lookup: hostname-to-address and address-to-hostname. The rDNS ( reverse DNS ) is implemented using a specialized zone record for reverse lookups called PTR record. PTR records always resolve to names, never IP addresses.

#### **Ques 12. What is sosreport, how do you generate it while working with your Redhat Support Team in production ?**

Ans : Sosreport is a command-line utility in Redhat based linux destros (RHEL / CentOS) which collects system configuration and diagnostic information of your linux box like running kernel version, loaded modules, and system and service configuration files. This command also runs external programs to collect further information, and stores this output in the resulting archive. Sosreport is required when you have open a case with redhat for technical support. Redhat support Engineers will require sosreport of your server for troubleshooting purpose. To run sosreport, sos package should be installed. Sos package is part of default installation in most of linux. If for any reason this package is no installed , then use below yum command to install it manually :

# yum install sos

Generate the report

Open the terminal type sosreport command :

# sosreport

This command will normally complete within a few minutes. Depending on local configuration and the options specified in some cases the command may take longer to finish. Once completed, sosreport will generate a compressed a file under /tmp folder. The file should be provided to Redhat support representative as an attachment to open a support case.

#### **Ques 13. What is swappiness in Linux Memory Management and how do we configure that ?**

Ans – The swappiness parameter controls the tendency of the kernel to move processes out of physical memory and onto the swap disk. Because disks are much slower than RAM, this can lead to slower response times for system and applications if processes are too aggressively moved out of memory.

swappiness can have a value of between 0 and 100

swappiness=0 tells the kernel to avoid swapping processes out of physical memory for as long as possible

swappiness=100 tells the kernel to aggressively swap processes out of physical memory and move them to swap cache

The default setting in Redhat/Ubuntu based Linux distros is swappiness=60. Reducing the default value of swappiness will probably improve overall performance for a typical Ubuntu desktop installation.

~$ cat /proc/sys/vm/swappiness  
60

If we have enough RAM, we can turn that down to 10 or 15. The swap file will then only be used when the RAM usage is around 80 or 90 percent.

To change the system swappiness value, open /etc/sysctl.conf as root. Then, change or add this line to the file:

vm.swappiness = 10

Reboot for the change to take effect

You can also change the value while your system is still running

#sysctl vm.swappiness=10

We can also clear swap by running swapoff -a and then swapon -a as root instead of rebooting to achieve the same effect.

#### **Ques 14. What is git ?**

Ans : Git is a very popular and efficient open source Version Control System. It tracks content such as files and directories. It stores the file content in BLOBs – binary large objects. The folders are represented as trees. Each tree contains other trees (subfolders) and BLOBs along with a simple text file which consists of the mode, type, name and Secure Hash Algorithm of each blob and subtree entry. During repository transfers, even if there are several files with the same content and different names, the GIT software will transfer the BLOB once and then expand it to the different files.

#### **Ques 15. What is inode ? Briefly explain the structure ?**

Ans : Inode is a data structure that keeps track of all the information about a file. When we keep our information in a file and the OS stores the information about a file in an inode. Information about files is sometimes called metadata. We can say that an inode is metadata of the data. In a file system, inodes consist roughly of 1% of the total disk space, whether it is a whole storage unit or a partition on a storage unit. The inode space is used to ?track? the files stored on the hard disk. The inode entries store metadata about each file, directory or object, but only points to these structures rather than storing the data. Each entry is 128 bytes in size. The metadata contained about each structure can include the following:

Inode number

Access Control List (ACL)

Extended attribute

Direct/indirect disk blocks

Number of blocks

File access, change and modification time

File deletion time

File generation number

File size

File type

Group

Number of links

Owner

Permissions

Status flags

Inode structure of a directory consists of a name to inode mapping of files and directories in that directory.In a directory, You can find the inode number corresponding to the files using the command “ls -i”

#ls -i  
786727 -rw------- 1 root root 4226530 May 29 13:17 sudo.log  
786437 -rw-------. 1 root root 32640 Jun 23 20:11 tallylog  
786440 -rw-rw-r--. 1 root utmp 276096 Jul 20 06:45 wtmp  
786741 -rw------- 1 root root 9653 Jul 17 09:38 yum.log

Similar way, the number of inodes allocated, used and free in a Filesystem can be listed using “df -i” command

# df -i /root  
Filesystem Inodes IUsed IFree IUse% Mounted on  
/dev/mapper/RootVol-lvmroot  
524288 80200 444088 16%

**=====================================================================**

**Where can we check the bonding (interface bonding) status in Linux?**

the bond name is bond0 check as below.  
cat /proc/net/bonding/bond0

**Q:1 Why LVM is required ?**

Ans: LVM stands for Logical Volume Manager , to resize filesystem’s size online we required LVM partition in Linux. Size of LVM partition can be extended and reduced using the lvextend & lvreduce commands respectively.

**Q:2 How To check Memory stats and CPU stats ?**

Ans: Using ‘free’ & ‘vmstat’ command we can display the physical and virtual memory statistics respectively.With the help of ‘sar’ command we see the CPU utilization & other stats.

**Q:3 What does Sar provides and at which location Sar logs are stored ?**

Ans: Sar Collect, report, or save system activity information. The default version of the sar command (CPU utilization report) might be one of the first facilities the user runs to begin system activity investigation, because it monitors major system resources. If CPU utilization is near 100 percent (user + nice + system), the workload sampled is CPU-bound.

By default log files of Sar command is located at /var/log/sa/sadd file, where the dd parameter indicates the current day.

**Q:4 How to increase the size of LVM partition ?**

Ans: Below are the Logical Steps :

– Use the lvextend command (lvextend -L +100M /dev/<Name of the LVM Partition> , in this example we are extending the size by 100MB.

– resize2fs /dev/<Name of the LVM Partition>

– check the size of partition using ‘df -h’ command

**Q:5 How to reduce or shrink the size of LVM partition ?**

Ans: Below are the logical Steps to reduce size of LVM partition :

-Umount the filesystem using umount command,

-use resize2fs command , e.g resiz2fs /dev/mapper/myvg-mylv 10G

-Now use the lvreduce command , e.g lvreduce -L 10G /dev/mapper/myvg-mylv

Above Command will shrink the size & will make the filesystem size 10GB.

**Q:6 How to create partition from the raw disk ?**

Ans: Using fdisk utility we can create partitions from the raw disk.Below are the steps to create partition from the raw dsik :

– fdisk /dev/hd\* (IDE) or /dev/sd\* (SCSI)

– Type n to create a new partition

– After creating partition , type w command to write the changes to the partition table.

**Q:7 Where the kernel modules are located ?**

Ans: The ‘/lib/modules/kernel-version/’ directory stores all kernel modules or compiled drivers in Linux operating system. Also with ‘lsmod’ command we can see all the installed kernel modules.

**Q:8 What is umask ?**

Ans: umask stands for ‘User file creation mask’, which determines the settings of a mask that controls which file permissions are set for files and directories when they are created.

**Q:9 How to set the umask permanently for a user?**

Ans: To set this value permanently for a user, it has to be put in the appropriate profile file which depends on the default shell of the user.

**Q:10 How to change the default run level in linux ?**

Ans: To change the run level we have to edit the file “/etc/inittab” and change initdefault entry ( id:5:initdefault:). Using ‘init’ command we change the run level temporary like ‘init 3’ , this command will move the system in runlevl 3.

**Q:11 How to share a directory using nfs ?**

Ans: To share a directory using nfs , first edit the configuration file ‘/etc/exportfs’ , add a entry like

‘/<directory-name> <ip or Network>(Options)’ and then restart the nfs service.

**Q:12 How to check and mount nfs share ?**

Ans: Using ‘showmount’ command we can see what directories are shared via nfs e.g ‘showmount -e <ip address of nfs server>’.Using mount command we can mount the nfs share on linux machine.

**Q:13 What are the default ports used for SMTP,DNS,FTP,DHCP,SSH and squid ?**

Ans: Service Port

SMTP 25

DNS 53

FTP 20 (data transfer) , 21 ( Connection established)

DHCP 67/UDP(dhcp server) , 68/UDP(dhcp client)

SSH 22

Squid 3128

**Q:14 What is Network Bonding ?**

Ans: Network bonding is the aggregation of multiple Lan cards into a single bonded interface to provide fault tolerance and high performance. Network bonding is also known as NIC Teaming.

**Q:15 What are the different modes of Network bonding in Linux ?**

Ans: Below are list of modes used in Network Bonding :

balance-rr or 0 – round-robin mode for fault tolerance and load balancing.

active-backup or 1 – Sets active-backup mode for fault tolerance.

balance-xor or 2 – Sets an XOR (exclusive-or) mode for fault tolerance and load balancing.

broadcast or 3 – Sets a broadcast mode for fault tolerance. All transmissions are sent on all slave interfaces.

802.3ad or 4 – Sets an IEEE 802.3ad dynamic link aggregation mode. Creates aggregation groups that share the same speed & duplex settings.

balance-tlb or 5 – Sets a Transmit Load Balancing (TLB) mode for fault tolerance & load balancing.

balance-alb or 6 – Sets an Active Load Balancing (ALB) mode for fault tolerance & load balancing.

**Q:16 How to check and verify the status the bond interface.**

Ans: Using the command ‘cat /proc/net/bonding/bond0’ , we can check which mode is enabled and what lan cards are used in this bond. In this example we have one only one bond interface but we can have multiple bond interface like bond1,bond2 and so on.

**Q:17 How to check default route and routing table ?**

Ans: Using the Commands ‘netstat -nr’ and ‘route -n’ we can see the default route and routing tables.

**Q:18 How to check which ports are listening in my Linux Server ?**

Ans: Use the Command ‘netstat –listen’ and ‘lsof -i’

**Q:19 List the services that are enabled at a particular run level in linux server ?**

Ans: With the help of command ‘chkconfig –list | grep 5:on’ we can list all the service that are enabled in run level5. For other run levels just replace 5 with the respective run level.

**Q:20 How to enable a service at a particular run level ?**

Ans: We can enable a service using the Command ‘chkconfig <Service-Name> on –level 3’

**Q:21 How to upgrade Kernel in Linux ?**

Ans: We should never upgrade Linux Kernel , always install the new New kernel using rpm command because upgrading a kenel can make your linux box in a unbootable state.

**Q:22 How To scan newly asssigned luns on linux box without rebooting ?**

Ans: There are two ways to scan newly assigned luns :

Method:1 if sg3 rpm is installed , then run the command ‘rescan-scsi-bus.sh’

Method:2 Run the Command , echo ” – – – ” > /sys/class/scsi\_host/hostX/scan

**Q:23 How to find WWN numbers of HBA cards in Linux Server ?**

Ans: We can find the WWN numbers of HBA cards using the command ‘systool -c fc\_host -v | grep port\_name’

**Q:24 How to add & change the Kernel parameters ?**

Ans: To Set the kernel parameters in linux , first edit the file ‘/etc/sysctl.conf’ after making the changes save the file and run the command ‘sysctl -p’ , this command will make the changes permanently without rebooting the machine.

**Q:25 What is Puppet Server ?**

Ans: Puppet is an open-source & enterprise software for configuration management toll in UNIX like operating system. Puppet is a IT automation software used to push configuration to its clients (puppet agents) using code. Puppet code can do a variety of tasks from installing new software, to check file permissions, or updating user accounts & lots of other tasks.

**Q:26 What are manifests in Puppet ?**

Ans: Manifests in Puppet are the files in which the client configuration is specified.

**Q:27 Which Command is used to sign requested certificates in Puppet Server ?**

Ans: ‘puppetca –sign hostname-of-agent’ in (2.X) & ‘puppet ca sign hostname-of-agent’ in (3.X)

**Q:28 At which location Puppet Master Stores Certificates ?**

Ans: /var/lib/puppet/ssl/ca/signed

**Q:29 How to find all the regular files in a directory ?**

Ans: using the command ‘find /<directory -type f’.

**Q:30 What is load average in a linux ?**

Ans: Load Average is defined as the average sum of the number of process waiting in the run queue and number of process currently executing over the period of 1,5 and 15 minutes. Using the ‘top’ and ‘uptime’ command we find the load average of a linux sever.

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# **System Admin Q & A – XX**

#### **Ques 1: – How to migrate LVM partition from One Server To Another Server ?**

Ans: – Follow the below mentioned steps to migrate LVM partition from one server to another

Umount the LVM partition

Make the voulme Group inactive using vgchange command  
# vgchange -an Voulme-Group-Name

Export the Volume Group using vgexport command  
#vgexport Voulme-Group-Name

Now Assign the same storage or volume to new server and scan the physical volume using pvscan command.

Now Import the voulme Group Activate the Voulme Group  
# vgimport Voulme-Group-Name

using below command  
# vgchange -ay Voulme-Group-Name

Now mount the LVM partition  
# mount /dev/mapper/Volume-Group-LVM-Name /Mount-Point

**Ques 2: – What are the static routes & how to add static routes in Linux ?**

Ans: – Static routes are for traffic that must not, or should not, go through the default gateway. Static routes are for traffic that must not, or should not, go through the default gateway Static routes will be added usually through “route add” & “ip route” command. The drawback of ‘route’ command is that, when Linux reboots it will forget static routes. But to make it persistent across reboots, you have to add it to /etc/sysconfig/network-scripts/route-eth0

#### **Ques 3: -What is multipathing and Why it is required ?**

Ans: – Multipathing is a feature of Red Hat Linux ,it allows you to configure multiple I/O paths from your server to your storage device (SAN, etc). These are physical paths that include HBA, cables and switches. Multipathing aggregates the I/O paths, creating a new device that consists of the aggregated paths. Multipathing is required to remove the single point of failure and provide fault tolerance.

#### **Ques 4: – How To add swap space to the Linux Servers on the Fly ?**

Ans: – There are two ways to add swap space to linux server , first create a swap partition and enable swap on the partition and add the swap space using swapon command. Second method if you don’t have enough space on the drive to create partition , so in this case , just create a swap file using dd command , enable swap space on the file.

#### **Ques 5: -How to create a initrd file in redhat linux ?**

Ans: – : Initrd is the initial ram disk , it contains the temopary root file system ,w hich helps the kernel to mount real root file system , using mkinitrd command we can create initrd file.

# mkinitrd -o /boot/initrd.$(uname -r).img $(uname -r)

#### **Ques 6: -What is load average in Linux Boxes ?**

Ans: – : Load Average is defined as the number of process waiting in the run queue, plus the numbers of process currently executing over 1 ,5 & 15 minutes period of interval. Using the ‘top’ and uptime command we can find the load average of linux servers.

#### **Ques 7: – How To enable timestamps in output of history command ?**

Ans: – When we run the “history” command it only gives you command along with the line numbers. Sometimes it’s useful to have a time stamp attached to each command to build a clearer picture. To enable the timestamps in history command we have to set “HISTTIMEFORMAT “ environment variable.

# export HISTTIMEFORMAT=”%F %T

#### **Ques 8: – How do you find how many cpu are in your system and there details?**

Ans: – Method:1 By looking into file /etc/cpuinfo for example you can use below command  
# cat /proc/cpuinfo

Method:2 We can also use the command ‘lscpu’ as shown below :

h4@prod11:~$ lscpu  
Architecture: x86\_64  
CPU op-mode(s): 32-bit, 64-bit  
Byte Order: Little Endian  
CPU(s): 4  
On-line CPU(s) list: 0-3  
Thread(s) per core: 2  
Core(s) per socket: 2  
Socket(s): 1  
NUMA node(s): 1  
Vendor ID: GenuineIntel  
CPU family: 6  
Model: 37  
Stepping: 5  
CPU MHz: 933.000  
BogoMIPS: 4787.70  
Virtualization: VT-x  
L1d cache: 32K  
L1i cache: 32K  
L2 cache: 256K  
L3 cache: 3072K  
NUMA node0 CPU(s): 0-3

#### **Ques 9: – How do you know if the remote host is alive or not ?**

Ans: – : We can use the commands ‘ping & telnet’ to find whether remote host is alive or not. If you are getting the reply of ping command then it means remote host is up and running. Now if you want to know wthether a particular service is running or not then use the telnet command as shown in the above question.

#### **Ques 10: – What is the difference between Swapping and Paging ?**

Ans: – Swapping: Whole process is moved from the swap device to the main memory for execution. Process size must be less than or equal to the available main memory. It is easier to implementation and overhead to the system. Swapping systems does not handle the memory more flexibly as compared to the paging systems.

Paging: Only the required memory pages are moved to main memory from the swap device for execution. Process size does not matter. Gives the concept of the virtual memory. It provides greater flexibility in mapping the virtual address space into the physical memory of the machine. Allows more number of processes to fit in the main memory simultaneously. Allows the greater process size than the available physical memory. Demand paging systems handle the memory more flexibly.

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# **BIND – DNS Server Interview Questions & Answers**

**Q:1 What does BIND Stands for ?**

Ans: BIND stands for Berkeley Internet Name Domain.

**Q:2 What is DNS Server and its fundamentals ?**

Ans: The Domain Name System (DNS) is a hierarchical, distributed database. It stores information for mapping Internet host names to IP addresses and vice versa, mail routing information, and other data used by Internet applications. Clients look up information in the DNS by calling a resolver library, which sends queries to one or more name servers and interprets the responses. The BIND 9 software distribution contains a name server, named, and a resolver library, liblwres.

**Q:3 What is the default port of BIND ?**

Ans: The BIND server is accessed via the network on port 53. Both TCP and UPD ports are used. Queries are made via UDP & Responses are made via UDP unless the response is too large to fit in a single packet , If the response won’t fit in a single UDP packet, then the response is returned via TCP.

**Q:4 How will you define Domain Name ?**

Ans: The data stored in the DNS is identified by domain names that are organized as a tree according to organizational or administrative boundaries. Each node of the tree, called a domain, is given a label. The domain name of the node is the concatenation of all the labels on the path from the node to the root node. This is represented in written form as a string of labels listed from right to left and separated by dots. A label need only be unique within its parent domain.

For example, a domain name for a host at the company Linuxtechi, Inc. could be mail.linuxtechi.com, where com is the top level domain to which mail.linuxtechi.com belongs, example is a subdomain of com, and ‘mail’ is the name of the host

**Q:5 What are zone files in DNS server ?**

Ans: The files which contain the data being served by the DNS system are called “Zone Files” They are made up of a series of “Resource Records”. A Zone File will always contain an SOA record as well as additional records.

**Q:6 What are the different types of DNS Server ?**

Ans: Primary Master : The authoritative server where the master copy of the zone data is maintained is called the primary master server, or simply the primary. Typically it loads the zone contents from some local file edited by humans or perhaps generated mechanically from some other local file which is edited by humans. This file is called the zone file or master file.

Slave Server : The other authoritative servers, the slave servers (also known as secondary servers) load the zone contents from another server using a replication process known as a zone transfer. Typically the data are transferred directly from the primary master, but it is also possible to transfer it from another slave. In other words, a slave server may itself act as a master to a subordinate slave server.

Caching Name Server : Caching Name server is not authoritative for any zone, all queries are forwarded to other DNS servers if they are not stored in the DNS-cache zone. Answers for all queries are cached in DNS-cache zone for a time.

Forwarding : In this type of DNS server , all queries are forwarded to a specific list of name servers

**Q:7 How the load balancing is achieved using DNS ?**

Ans: A primitive form of load balancing can be achieved in the DNS by using multiple records (such as multiple A records) for one name. For example, if you have three WWW servers with network addresses of 10.0.0.1, 10.0.0.2 and 10.0.0.3, a set of records such as the following means that clients will connect to each machine one third of the time

multiple-a-records

When a resolver queries for these records, BIND will rotate them and respond to the query with the records in a different order. In the example above, clients will randomly receive records in the order 1,2, 3; 2, 3, 1; and 3, 1, 2. Most clients will use the first record returned and discard the rest.

**Q:8 How to check syntax of named.conf is correct or not ?**

Ans: named-checkconf is the command, which checks the syntax of named.conf file.

# named-checkconf /etc/named.conf

If bind is running in chroot environment use below command

# named-checkconf -t /var/named/chroot /etc/named.conf

**Q:9 What are the different types of Resource Records in bind ?**

Ans: Below are the list of resource records in bind :

SOA – start of authority, for a given zone

NS – name server

A – name-to-address mapping

PTR – address-to-name mapping

CNAME – canonical name (for aliases)

MX – mail exchanger (host to receive mail for this name)

TXT – textual info

RP – contact person for this zone

WKS – well known services

HINFO – host information

Comments start with ; continue to end of line

**Q:10 Explain Bind chroot environment ?**

Ans: Running bind in a chroot environment means named process will be limited to their directory only (/var/named/chroot). This can help improve system security by placing BIND in a ”sandbox”, which will limit the damage done if a server is compromised.

**Q:11 What is domain delegation in Bind ?**

Ans: Domain delegation means fully delegate the responsibility for a sub-domain to another name server.

Exmaple :

squid.linuxtechi.com IN NS ns2.linuxtechi.com

ns2.linuxtechi.com IN A 192.168.1.51

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# **Linux FTP (vsftpd) Interview Questions & Answers**

In Linux Like operating system vsftpd(Very Secure FTP Daemon) is ftp server , which provides the features of downloading and uploading files to the ftp space. In this article we will discuss most common ftp server interview questions along with the Answers.

**Q:1 What does VSFTPD Stands for ?**

Ans: VSFTPD stands for Very Secure FTP Daemon.

**Q:2 What are the defaults ports used in linux ftp server ?**

Ans: Port 20 – This is the data transfer port. All the all subsequent data transfers between the client and server are done using this port.

Port 21 – On this port control connection is established. All commands we send and the ftp server’s responses to those commands will go over the control connection, but any data sent back (such as “ls” directory lists or actual file data in either direction) will go over the data connection.

**Q:3 What are most common features of vsftpd ?**

Ans:some of the Common Features are listed below :

* Virtual IP configurations
* Virtual users
* Standalone or inetd operation
* Powerful per-user configurability
* Bandwidth throttling
* Per-source-IP configurability
* Per-source-IP limits
* IPv6
* Encryption support through SSL integration

**Q:4 What is the configuration file of vsftpd ?**

Ans: ‘/etc/vsftp/vsftpd.conf’

**Q:5 How to restart the service of ftp server in linux ?**

Ans: Service vsftpd restart or /etc/init.d/vsftpd restart

**Q:6 Which Users tare not allowed to login via ftp ?**

Ans: Users mentioned in the file ‘/etc/vsftpd/ftpusers’ are not allowed to login via ftp.

**Q:7 How to disable standard ftpd xferlog log format and enable default vsftpd log ?**

Ans : Edit the file ‘ /etc/vsftpd/vsftpd.conf’ & make the below changes:

* xferlog\_std\_format=NO
* log\_ftp\_protocol=YES

The default vsftpd log file is /var/log/vsftpd.log

**Q:8 What is default directory for ftp / Anonymous user ?**

Ans : ‘/var/ftp’ is the default directory for ftp or Anonymous user

**Q:9 How to change the default directory for ftp / Anonymous user ?**

Ans: Edit the file ‘/etc/vsftpd/vsftpd.conf’ and change the below directive :

* anon\_root=/<Path-of-New-Directory>

After making above change either restart or reload vsftpd service.

**Q:10 How to disable Anonymous user in vsftpd ?**

Ans: Edit the conf file ‘/etc/vsftpd/vsftpd.conf’ and chnage below directive and restart the ftp service.

* anonymous\_enable=NO

**Q:11 What is chroot environment in ftp server ?**

Ans: chroot environment prevents the user from leaving its home directory means jail like environment where users are limited to their home directory only. It is the addon security of ftp server.

**Q:12 How to enable chroot environment in vsftpd server ?**

Ans : To enable chroot environment edit the file ‘/etc/vsftpd/vsftpd.conf’ and enable the below directives :

* chroot\_list\_enable=YES
* chroot\_list\_file=/etc/vsftpd.chroot\_list

The chroot\_list\_file variable specifies the file which contains users that are chroot.

**Q:13 How to enable only limited/allowed users are able to login via ftp ?**

Ans: This can be done by editing the file ‘/etc/vsftpd/vsftpd.conf’ and add the below directives :

* userlist\_enable=YES
* userlist\_file=/etc/vsftpd.user\_list
* userlist\_deny=NO

The file specified by userlist\_file will now contain users that are able to login.

**Q:14 How to set ftp banner in linux ?**

Ans: Open the file ‘/etc/vsftpd/vsftpd.conf’ and set the below directive :

* ftpd\_banner= “Enter New Banner Here”

**Q:15 How To limit the data transfer rate, number of clients & connections per IP for local users ?**

Ans: Edit the ftp server’s config file(/etc/vsftpd/vsftpd.conf) and set the below directives :

* local\_max\_rate=1000000 # Maximum data transfer rate in bytes per second
* max\_clients=50 # Maximum number of clients that may be connected
* max\_per\_ip=2 # Maximum connections per IP

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# 

# **Extend Swap Space using Swap file in Linux**

# **There are some scenarios where our Linux box is running out of swap space so in that case we can extend the swap space using swap partition but due to unavailability of free partitions on the disk, we are unable to extend it.**

# **So in such cases we can extend or increase swap space using a swap file**

##### **Below are the Steps to extend Swap Space using Swap File in Linux**

# **Lets first check the size of existing swap space / partition using the command like ‘free -m‘ and ‘swapon -s‘**

# free-output-with-swap

# **In my case size of swap partition is 2 GB. So we will be extending swap space by 1 GB.**

###### **Step:1 Create a swap file of size 1 GB using below dd Command**

# **[root@linuxtechi ~]# dd if=/dev/zero of=/swap\_file bs=1G count=1 1+0 records in 1+0 records out 1073741824 bytes (1.1 GB) copied, 414.898 s, 2.6 MB/s [root@linuxtechi ~]#**

# **Replace the value of ‘bs‘ and ‘count‘ according your requirement.**

###### **Step:2 Secure the swap file with permissions 644.**

# **[root@linuxtechi ~]# chmod 600 /swap\_file**

###### **Step:3 Enable the Swap Area on the file (swap\_file)**

# **Use mkswap command to enable swap area**

# **[root@linuxtechi ~]# mkswap /swap\_file Setting up swapspace version 1, size = 1048572 KiB no label, UUID=f7b3ae59-c09a-4dc2-ba4d-c02abb7db33b [root@linuxtechi ~]#**

###### **Step:4 Add the swap file entry in the fstab file**

# **Add the below entry in the fstab file so that swap file become persistent across every reboot.**

# **/swap\_file swap swap defaults 0 0**

# swap-file-fstab-entry

###### **Step:5 Enable the swap file using ‘mkswap on’ command.**

# **[root@linuxtechi ~]# swapon /swap\_file [root@linuxtechi ~]#**

###### **Step:6 Now verify the swap space**

# swap-space-after-extension

# **Note: To disable the swap file for any troubleshooting point of view, use swapoff command as shown below and to re-enable swap file then use swapon command as shown in step5.**

# **[root@linuxtechi ~]# swapoff /swap\_file [root@linuxtechi ~]#**

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# **L2 / L3 Linux System Admin Interview Questions**

**Q: –** How to increase the size of KVM IMG file ?

**Q: –** Explain page in and page out in OS memory management ?

**Q: –** How to check the perfromance of NFS server in Linux ?

**Q: –** How to check NFS server's version ?

**Q: –** What is the main difference between root\_sqush and no\_root\_squash in NFS ?

**Q: –** What is rpc and its role in nfs ?

**Q: –** What is use if sar command and location sar log files.

**Q: –** What is use of vmstat and explain its output & log files?

**Q: –** What is Network bonding and how to check status of bonding ?

**Q: –** What are the steps to configure network bonding in linux ?

**Q: –** Define the role of Luci and Ricci in redhat cluster suite ?

**Q: –** What is multipathing and why is it required ?

**Q: –** what is iostat , describe its output and log files ?

**Q: –** What is the difference of 2.4 and 2.6 kernel ?

**Q: –** What are difference between ext3 and ext4

**Q: –** What server need to check first – physical memory is not fully utilized but swap is fully utilized and physical memory is fully utilized but swap memory is free and why ?

**Q: –** What is chroot env in ftp and how enable chroot for ftp ?

**Q: –** How to scan luns on the server?

**Q: –** Difference between raid 3 & raid 5?

**Q: –** How to execute cron every 5 min from Monday to Friday?

**Q: –** How to check the machines status in vcs?

**Q: –** How to extend disk space in vcs?

**Q: –** Difference between -L & -l in lvcreate command ?

**Q: –** What activity will run in background if failover of one node occurs ?

**Q: –** What is "Split Brain" in cluster & is it visible in storage ?

**Q: –** What is dom0 in Xen ?

**Q: –** What is POST in Linux Booting Process ?

**Q: –** What is initrd or ramdisk and use of initrd while booting ?

**Q: –** What is soft & hard zoning ?

**Q: –** What is wwpn & wwnn ?

**Q: –** How Can we check the front & back ports on emc storage server through command line or gui ?

**Q: –** How can emc server be accessed through CLI ?

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**Question 1: Explain Booting procedure or steps in Linux?**

1. Once System powered on, it automatically invokes BIOS

2. BIOS will start the processor and perform a POST [power on self test] to check the connected device are ready to use and are working properly.

3. After POST , BIOS will check for the booting device. The boot sector is always the first sector of the hard disk and BIOS will load the MBR into the memory.

MBR holds the boot loader of the OS.

4. Then boot loader takes the control of the booting process.

5. GRUB is the boot loader for Linux.

6. Depending on the boot option selected the kernel is loaded first.

7. After kernel is loaded the kernel will take the control of the booting process

8. Initrd will be loaded which contains drivers to detect hardware (its called Initialization of RAM Disk)

9. Then it will initialize all the hardware including I/O processors etc.

10. Kernel will mounts the root partition as read-only

11. INIT is loaded as the first process.

12. INIT will mount the root partition and other partitions as read/write and checks for file system errors.

13. Sets the System Clock, hostname etc..

14. Based on the Runlevel, it will load the services and runs the startup scripts which are located in /etc/rcX.d/ (Network, nfs, SSH etc.)

15. Finally it runs the rc.local script & Now the login prompt will appear.

## 

## 

## 

## 

## 

## **Question 2: What is stage 1.5 boot loaded in linux?**

The great thing about GRUB is that it includes knowledge of Linux file systems. Instead of using raw sectors on the disk, as LILO does,

GRUB can load a Linux kernel from an ext2 or ext3 file system. It does this by making the two-stage boot loader into a three-stage boot loader.

A. Stage 1.5 boot loader , it contains extra coe to allow cylinders above 1024, or LBA type drives, to be read.

B. It will be stored on MBR or Boot partition .

C. Stage 1 (MBR) boots a stage 1.5 boot loader that understands the particular file system containing the Linux kernel image.

D. Basically this module will load the knowledge of Filesystem to Grub to read the kernel

so ,

Stage 1 Boot loaded is : MBR

Stage 1.5 Boo loader : e2fs\_stage1\_5

Stage 2 Boot loader is : GRUB

## **Question 3: How to reinstall GRUB?**

A.Boot up using RHEL4 disk.

B.Enter into rescue mode

#linux rescue (hit ok)

C. Then follow below commands

# chroot /mnt/sysimage

# grub

# find /boot/grub/stage1 or find /grub/stage1

root(hd0,0) //example o/p

Now install the GRUB

# setup (hd0)

# EXIT

Another Method

#linux rescue

# chroot /mnt/sysimage

# /sbin/grub-install /dev/hda

## **Question 4: Linux Booting Issues : How to solve ??**

Option 1: init not found error

Option 2: Run fsck on all FS in rescue mode

Option 3: Reinstall GRUB

Option 4: Recover grub.conf / grub configuration

**Option 1: For normal panic and "init not found" error.**

Error : "init not found" displayed

1) Launch the system to Bash shell prompt

Reboot the server and interrupt to edit the GRUB.

Edit grub and enter the below in last

init=/bin/bash

Then save and exit and boot the server. This will launch you straight into a Bash shell prompt.Then you can remount “/” file system and check /var/log/messages for any error.

Note : init=/bin/bash (Grub boot loader) or linux init=/bin/bash (if Lilo boot loader).

2) Once server booted and if it is in Bash shell prompt

#mount -o remount,rw /

3) Now you can check the log messages and try to find the reason for server pacnic or error.

#more /var/log/messages

**Option 2: If the above option not helped then follow the next**

1) Boot from the Linux First CD (boot CD).

2) Type “boot rescue” at Linux boot prompt.

3) After the bash shell prompt show up, type the below command

# chroot /mnt/sysimage

a) Run fsck and Check for any disk error

#fdisk -l /dev/sda //check how many partion you have

then run fsck on each partition

#fsck -y /dev/sda2'

**Option 3: If the above also not helped then reinstall grub and retry.**

In rescue mode.

# chroot /mnt/sysimage

# /sbin/grub-install /dev/hda

**Option 4: If a system has issues with the GRUB configuration**

(possibly caused by incorrect changes to the the GRUB configuration file, installation of another OS, changes to device ordering due to hardware or BIOS changes, etc.)

# grub> find /boot/grub/grub.conf (or) grub>find /grub/grub.conf (or) find /boot/grub/stage1

(hd0,1)

(hd1,2)

>> This tells us that we have two /boot partitions. Then we have to reinstall the GRUB config on disk (one by one) and try.

#grub> root (hd0,1) //Write the GRUB bootloader on the MBR of the first disk

grub> setup (hd0)

grub>quit

If you have doubt as to where the root partition is located then try to find a file in /etc.

#grub> find /etc/fstab

(hd0,1)

Note: You must pay attention to your devices, for me "hd0" is the root disk and (hd0,1) is /boot partition , and (hd0,1) is my ROOT (/) partition. mostly / "root" partion will be on LVM.

You might not even have "hd0" mapped out. Review your "/boot/grub/device.map" file

#cat /boot/grub/device.map

## **Question 5 : How to recover or rest Root password in LINUX?**

While booting

1. Select the kernel

2. Press the "e" key to edit the entry

3. Select second line (the line starting with the word kernel)

4. Press the "e" key to edit kernel entry so that you can append single user mode

5. Append the letter "S" (or word Single) to the end of the (kernel) line

6. Press ENTER key

7. Now press the b key to boot the Linux kernel into single user mode

8. At prompt type passwd command to reset password:

You need to mount at least / and other partitions:

# mount -t proc proc /proc

# mount -o remount,rw /

Change the root password,

# passwd

thenreboot system:

# sync

# reboot

**Question 6: What is super Block and how will u recover it ?**

The blocks used for two different purpose:

1. Most blocks stores user data aka files (user data).

2. Some blocks in every file system store the file system's metadata.

So what the hell is a metadata?

File system type

Size

Status

Information about other metadata structures

**To find super block**

#dumpe2fs /dev/sda3|grep -i superblock

or

# mke2fs -n /dev/sda3

To repair file system by alternative-superblock use command as follows:

# e2fsck -f -b 8193 /dev/sda3

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### **Question 7: What is hard link and soft link? How to create symbolic link?**

A. Hard links cannot link directories.

Cannot cross file system boundaries.

B. Soft or symbolic links are just like hard links. It allows to associate multiple filenames with a single file. However, symbolic links allows:

To create links between directories.

Can cross file system boundaries.

**How do I create symbolic link?**

You can create symbolic link with ln command:

#ln -s /path/to/file1.txt /path/to/file2.txt

(inode number will be same for hard linked file )

#ln /mades/file1 /mades/file2 - ( create hard link)

### **Question 8: What is INODE ? How to reduce inode utilization?**

An inode is a data structure on a traditional Unix-style file system such as UFS or ext3.

An inode stores basic information about a regular file, directory, or other file system object.

=> File type (executable, block special etc)

=> Permissions (read, write etc)

=> Owner

=> Group

=> File Size

=> File access, change and modification time

(remember UNIX or Linux never stores file creation time, this is favorite question asked in UNIX/Linux sys admin job interview)

**How to reduce inode usage in File system?**

For examble /opt filesystem's inode usage is high means we have to do below steps

# bdf -i /opt : check the FS usage

Create a test directory on your filesystem;

# mkdir /opt/test

Create a script that will create 10000 null files.

# cd /opt/test

# i=1

# while [ $i -lt 10000 ]

> do

> touch $i

> i=`expr $i + 1`

> done

Else you will be watching the terminal for years to get you the prompt or else CTRL + C will do :-D

once files are created do

#bdf -i /opt

### **Question 9 : What is HARD and SOFT mount in NFS ?**

**In HARD mount ...**

If the NFS file system is hard mounted, the NFS daemons will try repeatedly to contact the server. The NFS daemon retries will not time out, will affect system performance, and you cannot interrupt them

If you just mount a file system without specifying hard or soft, the default is a hard mount. Hard mounts are preferable because of the stateless nature of NFS.

If a client sends an I/O request to the server (such as an ls -la), and the server gets rebooted, in client machine the process will keep on running.

This preserves data transfers in the event of a server failure

**IN SOFT Mount :**

A soft mount allows the client to stop trying an operation after a period of time. If the NFS server goes down at the time of data transfer , it will alert and the process will do down.Thsi may cause the data corruption.

A soft link will return with an error and fail.

you should only use soft mounts in the cases where client responsiveness is more important than data integrity.

In another word ..soft mount will allow automatic unmount if the filesystem is idle for a specified time period

### **Question 10 : Explain NFS mount options ?**

Syntax to mount NFS FS:

#mount -t vfstype [-o options] NFS Servername:/exporteddirectory /mount point

or

#mount -t nfs -o options host:/remote/export /local/directory

**Mount options explained below :**

1. -0 initr

This option is used in non reliable network, or network having more network congestion. NFS request will be interrupted when server is not reachable.

2. -o hard

If hard option is specified during nfs mount, user cannot terminate the process waiting for NFS communication to resume. For ex ..if u ran ls -a command on ur NFS mounted directory but that time ur NFS server went down means .

The process wont get killed or stopped ..it will wait until the NFS server and mount poit become available.

3. -o soft

If soft option is specified during nfs mount, user will get error alert when NFS server is not reachable. This is just inverse of hard mount option. It wont wait for reply if the NFS server went down , it will alert us and the process will go down.

4. -o Nfsvers=value

If this option is specified during nfs mount NFS client uses particular NFS protocol version to communicate.

For example - TCP

# mount -t nfs -o tcp 192.168.1.4:/mnt/array1/RHEL5 /data/

# mount | grep -i tcp

192.168.1.4:/mnt/array1/RHEL5 on /data type nfs (rw,tcp,addr=192.168.1.4)

The Difference between HARD and SOFT mount option explained in another POST.

## Question 11: Explain TOP command output / Various states of CPU

# us -> User CPU time: The time the CPU has spent running users’ processes that are not niced.

# sy -> System CPU time: The time the CPU has spent running the kernel and its processes.

# ni -> Nice CPU time: The time the CPU has spent running users’ process that have been niced.

# wa -> iowait: Amount of time the CPU has been waiting for I/O to complete.

# hi -> Hardware IRQ: The amount of time the CPU has been servicing hardware interrupts.

# si -> Software Interrupts.: The amount of time the CPU has been servicing software interrupts

### **Question 12: How to check architecture of Linux OS**

We can use below commands to check the architecture of server OS,

1. #getconf LONG\_BIT

2.#uname -a

3.#grep flags /proc/cpuinfo

4.#arch

5.#file /bin or file bc

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**LVM Interview QA**

**1.What are LVM1 and LVM2?**

LVM1 and LVM2 are the versions of LVM.

LVM2 uses device mapper driver contained in 2.6 kernel version.

LVM 1 was included in the 2.4 series kernels.

**2.What is the maximum size of a single LV?**

For 2.4 based kernels, the maximum LV size is 2TB.

For 32-bit CPUs on 2.6 kernels, the maximum LV size is 16TB.

For 64-bit CPUs on 2.6 kernels, the maximum LV size is 8EB.

**3.List of important LVM related files and Directories?**

## Directories

/etc/lvm - default lvm directory location

/etc/lvm/backup - where the automatic backups go

/etc/lvm/cache - persistent filter cache

/etc/lvm/archive - where automatic archives go after a volume group change

/var/lock/lvm - lock files to prevent metadata corruption

# Files

/etc/lvm/lvm.conf - main lvm configuration file

$HOME/.lvm - lvm history

**4.What is the steps to create LVM in Linux?**

Create a physical volume by using pvcreate command

consider the disk is local.

#fdisk -l

#fdisk /dev/sda

Press "n" to create new partition. And mention the size / allocate whole disk to single partition. and assign the partition number also.

#press "t" to change the partition as LVM partition.

#enter "8e" ( 8e - is Hex decimal code for LVM )

#Enter "w" to write tghe information on Disk.

#fdisk -l ( Now you will get newly created disk numbers)

#pvcreate /dev/sda2

Add physical volume to volume group by “vgcreate” command

#vgcreate VLG0 /dev/sda2

Create logical volume from volume group by “lvcreate” command.

#lvcreate -L 1G -n LVM1 VG0

Now create file system on /dev/sda2 partition by “mke2fs” or "mkfs.ext3" command.

#mke2fs -j /dev/VG0/LVM1

or

#mkfs.ext3 /dev/vg0/LVM1

How to mount this as file system

#mkdir /test

#mount /dev/VG0/LVM1 /test

**5.How to extend a File system in Linux?**

Check the free space on vg

#vgdisplay -v VG1

Now extend the FS

# lvextend -L+1G /dev/VG1/lvol1

# resize2fs /dev/VG1/lvol1

**6.How to reduce the File system size in Linux?**

1.First we need to reduce the file system size using "resize2fs"

2.Then reduce the lvol size using "lvreduce"

#resize2fs -f /dev/VolGroup00/LogVol00 3G

#lvreduce -L 5G /dev/VG1/Lvol1

**7.How to add new LUN from storage to Linux server?**

Step 1: Get the list of HBA and exisiting disk details.

#ls /sys/class/fc\_host

#fdisk -l 2>/dev/null | egrep '^Disk' | egrep -v 'dm-' | wc -l

Step 2: Scan the HBA ports (Need to scan all HBA port)

#echo "1" > /sys/class/fc\_host/host??/issue\_lip

# echo "- - -" > /sys/class/scsi\_host/host??/scan

Do this above steps for all HBA cards

Step3 : Check the newly added Lun

# cat /proc/scsi/scsi | egrep -i 'Host:' | wc -l

# fdisk -l 2>/dev/null | egrep '^Disk' | egrep -v 'dm-' | wc -l

Once found the disk then do below steps to add to VolumeGroup

#pvcreate /dev/diskpath

#vgextend /dev/vg1 /dev/diskpath

#vgs or #vgdisplay /dev/vg1

**8.How to resize root file system on RHEL 6?**

Here is the list of steps to reduce the root file system (lv\_root) on a RHEL 6 Linux server:

Boot the system into rescue mode. Do not mount the file systems (select the option to 'Skip' in the rescue mode and start a shell)

Bring the Volume Group online

#lvm vgchange -a -y

Run fsck on the FS

#e2fsck -f /dev/vg\_myhost/lv\_root

Resize the file system with new size

#resize2fs -f /dev/vg00/lv\_root 20G

Reduce the Logical Volume of the FS with the new size

#lvreduce -L20G /dev/vg00/lv\_root

Run fsck to make sure the FS is still ok

#e2fsck -f /dev/vg00/lv\_root

Optionally mount the file system in the rescue mode

#mkdir -p /mnt/sysimage/root

#mount -t ext4 /dev/mapper/vg00-lv\_root /mnt/sysimage/root

#cd /mnt/sysimage/root

Unmount the FS

#cd

#umount /mnt/sysimage/root

Exit rescue mode and boot the system from the hard disk

#exit

Select the reboot option from the recue mode

**9.How to find server is configured with LVM RAID ?**

1.How to check linux LVM RAID ?

check the RAID status in /proc/mdstat

#cat /proc/mdstat

or

# mdadm --detail /dev/mdx

or

# lsraid -a /dev/mdx

2.Check the Volume group disks

#vgdisplay -v vg01

In disk we will get the device names like /dev/md1 , /dev/md2 . It means LVM RAID disks are configured and its added to Volume Group.

**10.How to check Linux server is configured with power path disks?**

1.Check power path is installed on server?

#rpm -qa |grep -i emc

2.Check the power path status on server?

#/etc/init.d/PowerPath status

#chkconfig --list PowerPath

# lsmod |grep -i emc

3.Check the Volume group disks

#vgdisplay -v vg01

In disk we will get the device names like /dev/emcpowera , /dev/emcpowerb . It means powerpath disks are configured and its added to Volume Group.

4.Check the power path disk status using below command

#powermt display dev=all

**11.How to check server is configured with Multipath disks??**

# ls -lrt /dev/mapper //To View the Mapper disk paths and Lvols

#dmsetup table

#dmsetup ls

#dmsetup status

2.Using Multipathd Command ( Daemon )

#echo 'show paths' |multipathd -k

#echo 'show maps' |multipathd -k

3.Check multipath Daemon is running or not

#ps -eaf |grep -i multipathd

4.check the VG disk paths

#vgs or vgdisplay -v vg01

If multipath disks are added and configured with VG then we will get disk paths like /dev/mpath0 , /dev/mpath1.

5.If you want to check the disk path status u can use below command also

#multipathd -k

#multipathd> show multipaths status

#multipathd> show topology

#multipathd> show paths

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**These are some of the consolidated real scenario based linux interview questions and answers.**

**1. An application is creating several, very large core dump files. What should the administrator do if he has no intention of debugging these files?**

**=>** If administrator have no intention of keeping these files for debugging purposes, they should be deleted because they are wasting valuable disk space, and may cause system to run out of space.

**2. What sort of kernel error can cause a Linux system to crash and write a memory core dump?**

**=>** Kernel panic error can cause a Linux system to crash. A kernel panic indicates that a kernel process has crashed. This is a very serious error that causes the entire Linux system to crash. These core dumps should be analyzed carefully to find the root cause of the problem.

**3. As a administrator you may need to terminate some process. For example lets say the sendmail process. How will you kill the process?**

**=>** First you need to determine the PID of sendmail so it can be killed.

#ps -ef |grep sendmail

Now you can use kill command to terminate the process associated with sendmail.

**4. You noticed a kernel error message during the boot process, but it scrolled before you could read this? What log file could you check to find out that message?**

**=>** The log file that contains kernel boot messages is /var/log/dmesg.

**5. You execute a command that is going to take a long time. How can you get back to your shell prompt to perform other task?**

**=>** You can use bg command to send a running process to the background.

**6. You need to kill all instances of Web Server? What command will you execute to do this?**

**=>** You can use killall httpd command to kill all httpd process. httpd process run web server.

**7. How can you list all running process?**

**=>** Use ps -ef command to list all running process.

#ps -ef

**8. As a Linux admin you want to know what processes are being run by user sumit. What command can you use ?**

**=>** You can use #ps -au command to list all the process owned by user. Following command will do the assigned task.

#ps -au sumit

**9. Which log file keeps track of all user logins and logouts?**

**=>** /var/log/wtmp log file keeps track of all user logins and logouts.

**10. What is the first process that is run when a Linux system starts, and is responsible for starting all other system processes and services?**

**=>** The init process is the first process to be run. It is the parent process of all other Linux system processes, services, and daemons that are needed to run the system.

**11. An administrator has accidentally killed a core process. What is the result of this action?**

**=>** Killing a core process can potentially crash your system because many critical services rely on these core processes

**12. As a administrator you need to monitor the /var/log/messages file in real time to resolve the issue? How would you do that?**

**=>** You can use tail command with -f option. Following command will do the assigned task

#tail -f /var/log/messages

**13. From the output of ps command how will you determine the ID number of the parent process of a particular program?**

**=>** PPID refers to the parent process identification number.

**14. While scanning the /var/log/messages file, you notices an error stating an authentication failure for root. What could this mean?**

**=>** Any failed login attempts for root are logged into the /var/log/messages file. It indicate that some one has tried to login as root.

**15. As an administrator you noticed from top command that an unidentified process is using up all CPU and memory. You suspects that is a user's process that has run away. How should you fix this ?**

**=>** The process should be immediately killed before it consumes so many resources that the server cannot run properly, and therefore crash.

**16. What command can an administrator use to track real-time information on processes and the resources that they are using?**

**=>** The top command is used to monitor processes and resources in real-time.

**17. Why should you periodically update the kernel and package versions?**

**=>** To enhance the security of system you should ensure that you are using the latest versions kernel and software packages that contain the most recent security updates.

**18. During a recent strikes at office, several archive tapes of the system were damaged and ruined. What can you do to prevent the physical damage in future?**

**=>** You should store them at offsite.

**19. Why should you avoid the Telnet to administer a Linux system remotely?**

**=>** Telnet use most insecure method for communication. It send data across the network in plain text format. Someone easily find out the password using the network tool.

**20. Your company hire a contract employee for two months. What should the Linux administrator do to enhance security on the employee's account?**

**=>** While creating new user account for this user, administrator should set the expiration date for his account, so that if the employee leaves or does not have their contract renewed, the account will be automatically disabled.

**21. A user complains you that he is unable to set '123' as his password. Why would not the system allow this password?**

**=>** There would be a minimum length rule for password, which is blocking user to use this password. Default minimum length rule for password is six characters. It means a user cannot have password less than six characters.

**22. Your company is running Web Server. One dedicate account holder customer complains that his visitors are able to scan the directory tree. Which directive would you configure to stop web server from listing the directory?**

**=>** You should remove / comment the "Options Indexes" directive from the main configuration file ' httpd.conf' of the web server. This is a security measure so that remote users can’t scan the directory tree of the server looking for security holes. Server won’t show directory listings if requested by a user.

**23. How can you enhance the security of password file?**

**=>** Linux keep user account information in a text file called /etc/passwd. This file also store one way encrypted password. This file is accessed by several tools to get user information, so file need to world readable. This is a security risk. To minimize the security risk you can use shadow password format. This method save account information in regular file /etc/passwd. However, the password is stored as a single "x" character (not actually stored in this file). A second file, called "/etc/shadow", contains encrypted password as well as other information such as account or password expiration values, etc. The /etc/shadow file is readable only by the root account and is therefore less of a security risk

**24. You have just finished the installation of sever. This server is going to be use as file server. Default installation have send mail service running, while this server will never send any e-mails. How should you deal with send mail service?**

**=>** You should disable the send mail service if server is not being used for mail purpose. Leaving them running can increase the chance of a security vulnerability being exploited, and unauthorized use of sendmail relay.

**25. Which necessary steps should you take to enhance the security of server just after the initial installation?**

**=>** Kernel and packages should be upgraded to the latest versions.

Unnecessary services and daemons should be disable.

Enable and configure firewall

Set a complex password policy.

**26. You are setting up an FTP server. Only company employees are allowed to use the FTP services. What should you configure on the FTP server to enhance security?**

**=>**You should disable the anonymous FTP account, so that only users with a username and password can access the system.

**27. What is the location of system configuration files that should be backed up on a regular basis?**

**=>**The /etc directory contains most of the Linux system configuration files.

**28. Due to power fluctuation, your system starts up from a powered off state. You receive a warning error stating that the machine was not shut down properly, and fsck will be run. What is the cause of this message?**

**=>** If your hard drive file systems are not unmounted properly, the fsck utility will automatically run the next time the system is started to fix any inconsistencies before they are mounted again. If they are not fixed, the file system can quickly become corrupt.

**29. When you try to boot a Linux system, you receive a message stating that it cannot mount the /home partition because of errors. While debugging , you found that it occur due to data error. What can you do to fix the problem?**

**=>** You can use fsck utility that enable you to recover from the errors.

**30. During a software package installation, an error occurs warning that a certain library is missing, and the installation aborts. What is the most likely cause of the problem?**

Many software packages are dependent on other programs to function properly. If these dependencies do not exist, you must install them before installing your software package or install the package using yum to avoid dependency issues.

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# Scenario based LVM Interview questions and answers

**1.Is it possible to increase the logical volume on fly?**

Answer: Yes. LVM has the feature to increase the volume without unmount it.

**2.How to reduce the logical volume? is it possible to reduce on fly?**

Answer: No. we can't reduce the logical volume on fly. Here is the steps to reduce the logical volume.

Un-mount the filesystem

Run e2fsck on the volume device

Reduce the Filesystem using resize2fs

Reduce the logical Volume using lvreduce

Mount the filesystem back for production.

**3.How do you scan the new LUN or disk?**

Answer:Use "echo 1 > /sys/class/scsi\_host/hostx/scan" to scan disk from newly connected SAN or DISKS and also replace the "x" with number of host id present under /sys/class/scsi\_host/.

**4.How to scan disks for existing volume group?**

Answer:Use "vgscan" to scan existing volume group from newly connected SAN or DISKS.

But we should use "pvscan" prior to executing this command.

**5.How to scan a logical volume from exising volume group?**

Answer: lvscan

**6.How to stop the logical volume? or deactivate the logical volume?**

Answer: "lvchange -an /dev/vg\_name/lv\_name"

**7.How to activate the logical volume which is in deactivated state?**

Answer: "lvchange -ay /dev/vg\_name/lv\_name".

**8.How to disable the volume group? or Deactivate the volume group?**

Answer:"vgchange -an volume\_group\_name".

**9.How to enable the volume group? or Activate the volume group?**

Answer:"vgchange -ay volume\_group\_name" .

**10.How do you find that what are the disks are used for logical volume mirroring?**

Answer: use "lvs -a -o +devices"

**11. What are steps to perform in order to increase the logical volume on fly?**

Answer:

Extend the logical volume

Increase the Filesystem size

Verify the status using df command or lvs command.

**12.How to list the imported volume groups?**

Answer: Use "vgs" command to display the imported volume group.

**13.How to list the available logical volumes on the system?**

Answer: Use "lvs" command to list the available logical volumes on the system.

**14.How to list the available physical volumes in LVM?**

Answer: Use "pvs" command to list the available physical volumes.

**15.How to see the detailed volume group information?**

Answer: Use "vgdisplay vg\_name"

**16.How to see the detailed logical volume information?**

Answer: Use "lvdisplay /dev/vg\_name/lv\_name"

**17.How to see the detailed physical volume information?**

Answer: Use "pvdisplay /dev/disk\_name" Ex: pvdisplay /dev/sde

**18.How to rename volume Group? can we rename the VG on fly?**

Answer:Yes. Its possible to rename the volume group on fly. But the mounted volumes will not reflect the same unless you re-mount the volume with new VG name. Need to update the /etc/fstab with new VG name to mount the volumes across the system reboot.

**19.How to take a LVM configuration backup?**

Answer:Use "vgcfgbackup vg\_name" to take the latest configuration backup of volume group. The default volume group backup location is "/etc/lvm/backup" .

**20.How to re-create the device files for LVM volumes?**

Answer:Run "vgmknodes" to recreate the LVM devices files.

**21.What is lvmdump?**

Answer: "lvmdump" is tool for LVM2 to collect the various information for diagnostic purposes.By default, it creates a tarball suitable for submission along with a problem report

**22.How are snapshots in LVM2 different from LVM1 in Redhat Linux?**

Answer:LVM1 snapshots are readonly by default where LVM2 snapshots were read/write.

**23.What are the steps involved to create the logical volume from scratch?**

Answer:

Create a physical volume using pvcreate command.

#pvcreate /dev/sdc

Create a volume group using "vgcreate" command

#vgcreate vg02 /dev/sdc

Create a logical volume using "lvcreate" command

#lvcreate -L 100M -n vol1 vg02

Create a filesystem on logical volume using mkfs command.

#mkfs -t ext4 /dev/vg02/vol1

Mount the filesystem using mount command for use.

#mount -t ext4 /dev/vg02/vol1 /vol1

**24.How to extent the volume group?**

Answer:Using "vgextend" we can increase the volume group.

**25.Assume Volume group "vg02" is already exists. How do you extend the volume group with 50GB? Provide all the steps with commands.**

Answer:

1.Get the 50GB lun from storage team.(/dev/sdd)

2.Create physcical volume ( # pvcreate /dev/sdd )

2.Extend the volume group (# vgextend vg02 /dev/sdd)

**26.If the vg02 has two physical volumes called /dev/sdc/ & /dev/sdd. How do you remove /dev/sdd from vg02.**

Answer: "vgreduce vg02 /dev/sdd/"

**27.How to decommission/remove LVM completely from the host?**

Answer:

1.Un-mount all the logical filesystems

2.Remove the logical volumes using "lvremove" command.

3.Destroy the volume group using "vgremove" command.

4.Use "pvremove" command remove the physical volumes from the system.

**28. Why LVM is required?**

Ans: LVM stands for Logical Volume Manager , to resize filesystem's size online we required LVM partition in Linux. Size of LVM partition can be extended and reduced using the lvextend & lvreduce commands respectively.

**29. How to create partition from the raw disk?**

Ans: Using fdisk utility we can create partitions from the raw disk.Below are the steps to create partition from the raw disk :

- fdisk /dev/hd\* (IDE) or /dev/sd\* (SCSI)

- Type n to create a new partition

- After creating partition , type w command to write the changes to the partition table.

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**VMWARE INTERVIEW QUESTIONS AND ANSWERS**

**1. What is a Hypervisor?**

It is a program that allows multiple operating systems to share a single hardware host. Each operating system appears to have the host's processor, memory, and other resources all to itself. However, the hypervisor is actually controlling the host processor and resources, allocating what is needed to each operating system in turn and making sure that the guest operating systems (called virtual machines) cannot disrupt each other.

**2. What are the files that make a Virtual Machine?**

.vmx - Virtual Machine Configuration File

.nvram - Virtual Machine BIOS

.vmdk - Virtual Machine Disk file

.vswp - Virtual Machine Swap File

.vmsd - Virtual MAchine Snapshot Database

.vmsn - Virtual Machine Snapshot file

.vmss - Virtual Machine Suspended State file

.vmware.log - Current Log File

.vmware-#.log - Old Log file

**3. What is the difference between the vSphere ESX and ESXi architectures?**

VMware ESX and ESXi are both bare metal hypervisor architectures that install directly on the server hardware.

Although neither hypervisor architectures relies on an OS for resource management, the vSphere ESX architecture relied on a Linux operating system, called the Console OS (COS) or service console, to perform two management functions: executing scripts and installing third-party agents for hardware monitoring, backup or systems management.

In the vSphere ESXi architecture, the service console has been removed. The smaller code base of vSphere ESXi represents a smaller “attack surface” and less code to patch, improving reliability and security.

**4. What is a .vmdk file?**

This isn't the file containing the raw data. Instead it is the disk descriptor file which describes the size and geometry of the virtual disk file. This file is in text format and contains the name of the –flat.vmdk file for which it is associated with and also the hard drive adapter type, drive sectors, heads and cylinders, etc. One of these files will exist for each virtual hard drive that is assigned to your virtual machine. You can tell which –flat.vmdk file it is associated with by opening the file and looking at the Extent Description field.

**5. What are the different types of virtualization?**

**Server Virtualization** – consolidating multiple physical servers into virtual servers that run on a single physical server.

**Application Virtualization** – an application runs on another host from where it is installed in a variety of ways. It could be done by application streaming, desktop virtualization or VDI, or a VM package (like VMware ACE creates with a player). Microsoft Softgrid is an example of Application virtualization.

**Presentation Virtualization** – This is what Citrix Met frame (and the ICA protocol) as well as Microsoft Terminal Services (and RDP) are able to create. With presentation virtualization, an application actually runs on another host and all that you see on the client is the screen from where it is run.

**Network Virtualization** – with network virtualization, the network is “carved up” and can be used for multiple purposes such as running a protocol analyzer inside an Ethernet switch. Components of a virtual network could include NICs, switches, VLANs, network storage devices, virtual network containers, and network media.

**Storage Virtualization** – with storage virtualization, the disk/data storage for your data is consolidated to and managed by a virtual storage system. The servers connected to the storage system aren’t aware of where the data really is. Storage virtualization is sometimes described as “abstracting the logical storage from the physical storage.

**6. What is VMware vMotion and what are its requirements?**

VMware VMotion enables the live migration of running virtual machines from one physical server to another with zero downtime.

VMotion lets you:

* Automatically optimize and allocate entire pools of resources for maximum hardware utilization and
* Availability.
* Perform hardware maintenance without any scheduled downtime.
* Proactively migrate virtual machines away from failing or under performing servers.

Below are the prerequisites for configuring vMotion

* Each host must be correctly licensed for vMotion
* Each host must meet shared storage requirements
* vMotion migrates the vm from one host to another which is only possible with both the host are sharing a common storage or to any storage accessible by both the source and target hosts.
* A shared storage can be on a Fibre Channel storage area network (SAN), or can be implemented using iSCSI SAN and NAS.
* If you use vMotion to migrate virtual machines with raw device mapping (RDM) files, make sure to maintain consistent LUN IDs for RDMs across all participating hosts.

Each host must meet the networking requirements

* Configure a VMkernel port on each host.
* Dedicate at least one GigE adapter for vMotion.
* Use at least one 10 GigE adapter if you migrate workloads that have many memory operations.
* Use jumbo frames for best vMotion performance.
* Ensure that jumbo frames are enabled on all network devices that are on the vMotion path including physical NICs, physical switches and virtual switches.

**7. What is the difference between clone and template in VMware?**

**Clone**

* A clone is a copy of virtual machine.
* You cannot convert back the cloned Virtual Machine.
* A Clone of a Virtual Machine can be created when the Virtual Machine is powered on
* Cloning can be done in two ways namely Full Clone and Linked Clone.
* A full clone is an independent copy of a virtual machine that shares nothing with the parent virtual machine after the cloning operation. Ongoing operation of a full clone is entirely separate from the parent virtual machine.
* A linked clone is a copy of a virtual machine that shares virtual disks with the parent virtual machine in an ongoing manner. This conserves disk space, and allows multiple virtual machines to use the same software installation.
* Cloning a virtual machine can save time if you are deploying many similar virtual machines. You can create, configure, and install software on a single virtual machine, and then clone it multiple times, rather than creating and configuring each virtual machine individually.

**Template**

* A template is a master copy or a baseline image of a virtual machine that can be used to create many clones.
* Templates cannot be powered on or edited, and are more difficult to alter than ordinary virtual machine.
* You can convert the template back to Virtual Machine to update the base template with the latest released patches and updates and to install or upgrade any software and again convert back to template to be used for future deployment of Virtual Machines with the latest patches.
* Convert virtual Machine to template cannot be performed, when Virtual machine is powered on. Only Clone to Template can be performed when the Virtual Machine is powered on.
* A template offers a more secure way of preserving a virtual machine configuration that you want to deploy many times.
* When you clone a virtual machine or deploy a virtual machine from a template, the resulting cloned virtual machine is independent of the original virtual machine or template.

**8. What is promiscuous mode in Vmware?**

* Promiscuous mode is a security policy which can be defined at the virtual switch or portgroup level
* A virtual machine, Service Console or VMkernel network interface in a portgroup which allows use of promiscuous mode can see all network traffic traversing the virtual switch.
* If this mode is set to reject, the packets are sent to intended port so that the intended virtual machine will only be able to see the communication.
* Example: In case you are using a virtual xp inside any Windows VM. If promiscuous mode is set to reject then the virtual xp won't be able to connect the network unless promiscuous mode is enabled for the Windows VM.

**9. What is the difference between Thick provision Lazy Zeroed, Thick provision Eager Zeroed and Thin provision?**

**Thick Provision Lazy Zeroed**

* Creates a virtual disk in a default thick format.
* Space required for the virtual disk is allocated when the virtual disk is created.
* Data remaining on the physical device is not erased during creation, but is zeroed out on demand at a later time on first write from the virtual machine.
* Using the default flat virtual disk format does not zero out or eliminate the possibility of recovering deleted files or restoring old data that might be present on this allocated space.
* You cannot convert a flat disk to a thin disk.

**Thick Provision Eager Zeroed**

* A type of thick virtual disk that supports clustering features such as Fault Tolerance.
* Space required for the virtual disk is allocated at creation time.
* In contrast to the flat format, the data remaining on the physical device is zeroed out when the virtual disk is created.
* It might take much longer to create disks in this format than to create other types of disks.

**Thin Provision**

* It provides on on-demand allocation of blocks of data.
* All the space allocated at the time of creation of virtual disk is not utilized on the hard disk, rather only the size with utilized data is locked and the size increases as the amount of data is increased on the disk.
* With thin provisioning, storage capacity utilization efficiency can be automatically driven up towards 100% with very little administrative overhead.

**10. What is a snapshot?**

A snapshot is a “point in time image” of a virtual guest operating system (VM). That snapshot contains an image of the VMs disk, RAM, and devices at the time the snapshot was taken. With the snapshot, you can return the VM to that point in time, whenever you choose. You can take snapshots of your VMs, no matter what guest OS you have and the snapshot functionality can be used for features like performing image level backups of the VMs without ever shutting them down.

**11. What is VDI?**

* VDI stands for Virtual Desktop Infrastructure where end user physical machine like desktop or laptop are virtualized due to which VMware described VDI as "delivering desktops from the data center”.
* Once VDI is used the end user connect to their desktop using a device called thin client.
* The end user can also connect to their desktop using VMware Horizon View installed on any desktop or mobile devices

**12. What is VMware HA?**

VMware HA i.e. High Availability which works on the host level and is configured on the Cluster.

A Cluster configured with HA will migrate and restart all the vms running under any of the host in case of any host-level failure automatically to another host under the same cluster.

VMware HA continuously monitors all ESX Server hosts in a cluster and detects failures.

VMware HA agent placed on each host maintains a heartbeat with the other hosts in the cluster using the service console network. Each server sends heartbeats to the others servers in the cluster at five-second intervals. If any servers lose heartbeat over three consecutive heartbeat intervals, VMware HA initiates the failover action of restarting all affected virtual machines on other hosts.

You can set virtual machine restart priority in case of any host failure depending upon the critical nature of the vm.

NOTE: Using HA in case of any host failure with RESTART the vms on different host so the vms state will be interrupted and it is not a live migration

**13. What is the difference between VMware HA and vMotion?**

VMware HA is used in the event when any of the hosts inside a cluster fails then all the virtual machines running under it are restarted on different host in the same cluster.

Now HA is completely dependent on vMotion to migrate the vms to different host so vMotion is just used for the migration purpose between multiple hosts. vMotion also has the capability to migrate any vm without interrupting its state to any of the host inside cluster.

**14. What is storage vMotion?**

* Storage vMotion is similar to vMotion in the sense that "something" related to the VM is moved and there is no downtime to the VM guest and end users. However, with SVMotion the VM Guest stays on the server that it resides on but the virtual disk for that VM is what moves.
* With Storage vMotion, you can migrate a virtual machine and its disk files from one datastore to another while the virtual machine is running.
* You can choose to place the virtual machine and all its disks in a single location, or select separate locations for the virtual machine configuration file and each virtual disk.
* During a migration with Storage vMotion, you can transform virtual disks from Thick-Provisioned Lazy Zeroed or Thick-Provisioned Eager Zeroed to Thin-Provisioned or the reverse.
* Perform live migration of virtual machine disk files across any Fibre Channel, iSCSI, FCoE and NFS storage

**15. What is VMware DRS and how does it works?**

* Here DRS stands for Distributed Resource Scheduler which dynamically balances resource across various host under Cluster or resource pool.
* VMware DRS allows users to define the rules and policies that decide how virtual machines share resources and how these resources are prioritized among multiple virtual machines.
* Resources are allocated to the virtual machine by either migrating it to another server with more available resources or by making more “space” for it on the same server by migrating other virtual machines to different servers.
* The live migration of virtual machines to different physical servers is executed completely transparent to end-users through VMware VMotion
* VMware DRS can be configured to operate in either automatic or manual mode. In automatic mode, VMware DRS determines the best possible distribution of virtual machines among different physical servers and automatically migrates virtual machines to the most appropriate physical servers. In manual mode, VMware DRS provides a recommendation for optimal placement of virtual machines, and leaves it to the system administrator to decide whether to make the change.

**16. What is VMware Fault Tolerance?**

* VMware Fault Tolerance provides continuous availability to applications running in a virtual machine, preventing downtime and data loss in the event of server failures.
* VMware Fault Tolerance, when enabled for a virtual machine, creates a live shadow instance of the primary, running on another physical server.
* The two instances are kept in virtual lockstep with each other using VMware vLockstep technology
* The two virtual machines play the exact same set of events, because they get the exact same set of inputs at any given time.
* The two virtual machines constantly heartbeat against each other and if either virtual machine instance loses the heartbeat, the other takes over immediately. The heartbeats are very frequent, with millisecond intervals, making the failover instantaneous with no loss of data or state.
* VMware Fault Tolerance requires a dedicated network connection, separate from the VMware VMotion network, between the two physical servers.

**17. In a cluster with more than 3 hosts, can you tell Fault Tolerance where to put the Fault Tolerance virtual machine or does it chose on its own?**

You can place the original (or Primary virtual machine). You have full control with DRS or vMotion to assign it to any node. The placement of the Secondary, when created, is automatic based on the available hosts. But when the Secondary is created and placed, you can vMotion it to the preferred host.

**18. How many virtual CPUs can I use on a Fault Tolerant virtual machine?**

vCenter Server 4.x and vCenter Server 5.x support 1 virtual CPU per protected virtual machine.

**19. What happens if vCenter Server is offline when a failover event occurs?**

When Fault Tolerance is configured for a virtual machine, vCenter Server need not be online for FT to work. Even if vCenter Server is offline, failover still occurs from the Primary to the Secondary virtual machine. Additionally, the spawning of a new Secondary virtual machine also occurs without vCenter Server.

**20. What is the difference between Type 1 and Type 2 Hypervisor?**

**Type 1 Hypervisor**

* This is also known as Bare Metal or Embedded or Native Hypervisor.
* It works directly on the hardware of the host and can monitor operating systems that run above the hypervisor.
* It is completely independent from the Operating System.
* The hypervisor is small as its main task is sharing and managing hardware resources between different operating systems.
* A major advantage is that any problems in one virtual machine or guest operating system do not affect the other guest operating systems running on the hypervisor.
* Examples: VMware ESXi Server, Microsoft Hyper-V, Citrix/Xen Server

**Type 2 Hypervisor**

* This is also known as Hosted Hypervisor.
* In this case, the hypervisor is installed on an operating system and then supports other operating systems above it.
* It is completely dependent on host Operating System for its operations
* While having a base operating system allows better specification of policies, any problems in the base operating system a ffects the entire system as well even if the hypervisor running above the base OS is secure.
* Examples: VMware Workstation, Microsoft Virtual PC, Oracle Virtual Box

**21. How does vSphere HA works?**

When we configure multiple hosts for HA cluster, a single host is automatically elected as the master host. The master host communicates with vCenter Server and monitors the state of all protected virtual machines and of the slave hosts. When you add a host to a vSphere HA cluster, an agent is uploaded to the host and configured to communicate with other agents in the cluster.

**22. What are the monitoring methods used for vSphere HA?**

The Master and Slave hosts uses two types of monitoring the status of the hosts

* Datastore Heartbeat
* Network Heartbeat

**23. What are the roles of master host in vSphere HA?**

* Monitoring the state of slave hosts. If a slave host fails or becomes unreachable, the master host identifies which virtual machines need to be restarted.
* Monitoring the power state of all protected virtual machines. If one virtual machine fails, the master host ensures that it is restarted. Using a local placement engine, the master host also determines where the restart should be done.
* Managing the lists of cluster hosts and protected virtual machines.
* Acting as vCenter Server management interface to the cluster and reporting the cluster health state.

**24. How is a Master host elected in vSphere HA environment?**

When vSphere HA is enabled for a cluster, all active hosts (those not in standby or maintenance mode, or not disconnected) participate in an election to choose the cluster's master host. The host that mounts the greatest number of datastores has an advantage in the election. Only one master host typically exists per cluster and all other hosts are slave hosts.

If the master host fails, is shut down or put in standby mode, or is removed from the cluster a new election is held.

**25. If the vCenterserver goes down with a situation that it was pre configured with vSphere HA and DRS, so after power down will HA and DRS perform their task?**

vSphere HA is not dependent on vCenterserver for its operations as when HA is configured it installs an agent into each host which does its part and is not dependent on vCenterserver. Also HA does not uses vMotion, it justs restarts the vms into another host in any case of host failure.

Further vSphere DRS is very much dependent on vCenterserver as it uses vMotion for its action for live migration of vms between multiple hosts so in case vCenterserver goes down the vMotion won't work leading to failure of DRS.

**26. What is the use of vmware tools?**

VMware Tools is a suite of utilities that enhances the performance of the virtual machine's guest operating system and improves management of the virtual machine. Without VMware Tools installed in your guest operating system, guest performance lacks important functionality. Installing VMware Tools eliminates or improves these issues:

* Low video resolution
* Inadequate color depth
* Incorrect display of network speed
* Restricted movement of the mouse
* Inability to copy and paste and drag-and-drop files
* Missing sound
* Provides the ability to take quiesced snapshots of the guest OS
* Synchronizes the time in the guest operating system with the time on the host
* Provides support for guest-bound calls created with the VMware VIX API