Device Multipathing:

[19.8.1 Configuring Multipathing](https://docs.oracle.com/cd/E52668_01/E54669/html/ol7-s20-storage.html)

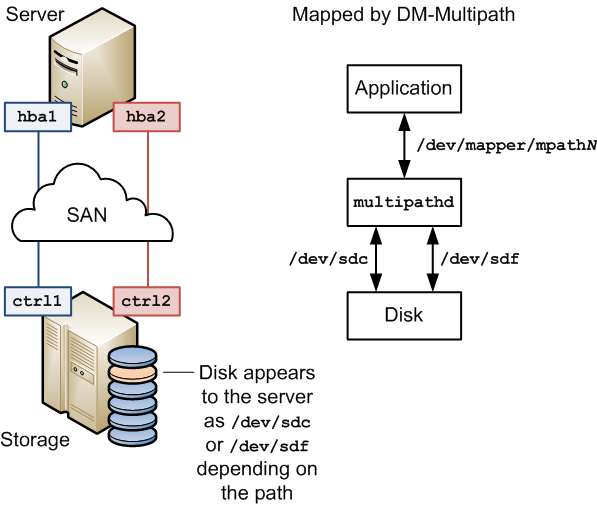
Multiple paths to storage devices can provide connection redundancy, failover capability, load balancing, and improved performance. Device-Mapper Multipath (DM-Multipath) is a multipathing tool that allows you to represent multiple I/O paths between a server and a storage device as a single path.

You would be most likely to configure multipathing with a system that can access storage on a Fibre Channel-based storage area network (SAN). You can also use multipathing on an iSCSI initiator if redundant network connections exist between the initiator and the target.

Below shows a simple DM-Multipath configuration where two I/O paths are configured between a server and a disk on a SAN-attached storage array:

* Between host bus adapter hba1 on the server and controller ctrl1 on the storage array.
* Between host bus adapter hba2 on the server and controller ctrl2 on the storage array.

****DM-Multipath Mapping of Two Paths to a Disk over a SAN****



Without DM-Multipath, the system treats each path as being separate even though it connects the server to the same storage device. DM-Multipath creates a single multipath device, /dev/mapper/mpath***N***, that include the underlying devices, /dev/sdc and /dev/sdf.

You can configure the multipathing service (multipathd) to handle I/O from and to a multipathed device in one of the following ways:

**Active/Active**

I/O is distributed across all available paths, either by round-robin assignment or dynamic load-balancing.

**Active/Passive (standby failover)**

I/O uses only one path. If the active path fails, DM-Multipath switches I/O to a standby path. This is the default configuration.

Configuring Multipathing

The procedure in this section demonstrates how to set up a simple multipath configuration.

To configure multipathing on a server with access to SAN-attached storage:

1. Install the device-mapper-multipath package:

# **yum install device-mapper-multipath**

1. You can now choose one of two configuration paths:
   * To set up a basic standby failover configuration without editing the /etc/multipath.conf configuration file, enter the following command:

# **mpathconf --enable --with\_multipathd y**

This command also starts the multipathd service and configures the service to start after system reboots.

Skip the remaining steps of this procedure.

* + To edit /etc/multipath.conf and set up a more complex configuration such as active/active, follow the remaining steps in this procedure.

1. Initialize the /etc/multipath.conf file:

# **mpathconf --enable**

1. Edit /etc/multipath.conf and define defaults, blacklist, blacklist\_exceptions, multipaths, and devices sections as required, for example:

defaults {

udev\_dir /dev

polling\_interval 10

path\_selector "round-robin 0"

path\_grouping\_policymultibus

getuid\_callout "/lib/udev/scsi\_id --whitelisted --device=/dev/%n"

prioalua

path\_checker readsector0

rr\_min\_io 100

max\_fds 8192

rr\_weight priorities

failback immediate

no\_path\_retry fail

user\_friendly\_names yes

}

blacklist {

# Blacklist by WWID

wwid "\*"

# Blacklist by device name

devnode "^(ram|raw|loop|fd|md|dm-|sr|scd|st)[0-9]\*"

# Blacklist by device type

device {

vendor "COMPAQ "

product "HSV110 (C)COMPAQ"

}

}

blacklist\_exceptions {

wwid "3600508b4000156d700012000000b0000"

wwid "360000970000292602744533032443941"

}

multipaths {

multipath {

wwid 3600508b4000156d700012000000b0000

alias blue

path\_grouping\_policymultibus

path\_checker readsector0

path\_selector "round-robin 0"

failback manual

rr\_weight priorities

no\_path\_retry 5

}

multipath {

wwid 360000970000292602744533032443941

alias green

}

}

devices {

device {

vendor "SUN"

product "(StorEdge 3510|T4"

path\_grouping\_policymultibus

getuid\_callout "/sbin/scsi\_id --whitelisted --device=/dev/%n"

path\_selector "round-robin 0"

features "0"

hardware\_handler "0"

path\_checkerdirectio

prioconst

rr\_weight uniform

rr\_min\_io 1000

}

}

The sections have the following purposes:

defaults

Defines default multipath settings, which can be overridden by settings in the devices section, and which in turn can be overridden by settings in the multipaths section.

blacklist

Defines devices that are excluded from multipath topology discovery. Blacklisted devices cannot subsumed by a multipath device.

The example shows the three ways that you can use to exclude devices: by WWID (wwid), by device name (devnode), and by device type (device).

blacklist\_exceptions

Defines devices that are included in multipath topology discovery, even if the devices are implicitly or explicitly listed in the blacklist section.

multipaths

Defines settings for a multipath device that is identified by its WWID.

The alias attribute specifies the name of the multipath device as it will appear in /dev/mapper instead of a name based on either the WWID or the multipath group number.

To obtain the WWID of a SCSI device, use the **scsi\_id** command:

# **/lib/udev/scsi\_id --whitelisted --replace-whitespace --device=*device\_name***

devices

Defines settings for individual types of storage controller. Each controller type is identified by the vendor, product, and optional revision settings, which must match the information in sysfs for the device.

You can find details of the storage arrays that DM-Multipath supports and their default configuration values in /usr/share/doc/device-mapper-multipath-***version***/multipath.conf.defaults, which you can use as the basis for entries in /etc/multipath.conf.

To add a storage device that DM-Multipath does not list as being supported, obtain the vendor, product, and revision information from the vendor, model, and rev files under /sys/block/***device\_name***/device.

The following entries in /etc/multipath.conf would be appropriate for setting up active/passive multipathing to an iSCSI LUN with the specified WWID.

defaults {

user\_friendly\_names yes

getuid\_callout "/bin/scsi\_id --whitelisted --replace-whitespace --device=/dev/%n”

}

multipaths {

multipath {

wwid 360000970000292602744533030303730

}

}

In this standby failover configuration, I/O continues through a remaining active network interface if a network interfaces fails on the iSCSI initiator.

For more information about configuring entries in /etc/multipath.conf, refer to the multipath.conf(5) manual page.

1. Start the multipathd service and configure the service to start after system reboots:
2. # **systemctl start multipathd**

# systemctl enable multipathd

Multipath devices are identified in /dev/mapper by their World Wide Identifier (WWID), which is globally unique. Alternatively, if you set the value of user\_friendly\_names to yes in the defaults section of /etc/multipath.conf or by specifying the **--user\_friendly\_names n** option to **mpathconf**, the device is named mpath***N*** where ***N*** is the multipath group number. An alias attribute in the multipaths section of /etc/multipath.conf specifies the name of the multipath device instead of a name based on either the WWID or the multipath group number.

You can use the multipath device in /dev/mapper to reference the storage in the same way as you would any other physical storage device. For example, you can configure it as an LVM physical volume, file system, swap partition, Automatic Storage Management (ASM) disk, or raw device.

To display the status of DM-Multipath, use the **mpathconf** command, for example:

# **mpathconf**

multipath is enabled

find\_multipaths is enabled

user\_friendly\_names is enabled

dm\_multipath modules is loaded

multipathd is running

To display the current multipath configuration, specify the **-ll** option to the **multipath** command, for example:

# **multipath -ll**

mpath1(360000970000292602744533030303730) dm-0 SUN,(StorEdge 3510|T4

size=20G features=‘0’ hwhandler=‘0’ wp=rw

|-+- policy=‘round-robin 0’ prio=1 status=active

| ‘- 5:0:0:2 sdb 8:16 active ready running

‘-+- policy=‘round-robin 0’ prio=1 status=active

‘- 5:0:0:3 sdc 8:32 active ready running

In this example, /dev/mapper/mpath1 subsumes two paths (/dev/sdb and /dev/sdc) to 20 GB of storage in an active/active configuration using round-robin I/O path selection. The WWID that identifies the storage is 360000970000292602744533030303730 and the name of the multipath device under sysfs is dm-0.

If you edit /etc/multipath.conf, restart the multipathd service to make it re-read the file:

# **service multipathd restart**

**Multipath Usage Guide for SANs**

1. **Overview**
2. The connection from the server through the HBA to the storage controller is referred as a path.
3. When multiple paths exists to a storage device(LUN) on a storage subsystem, it is referred as multipath connectivity.
4. Main purpose of multipath connectivity is to provide redundant access to the storage devices, i.e to have access to the storage device when one or more of the components in a path fail.
5. Another advantage of multipathing is the increased throughput by way of load balancing.

Note: Multipathing protects against the failure of path(s) and not the failure of a specific storage device.

Common example of multipath is a SAN connected storage device. Usually one or more fibre channel HBAs from the host will be connected to the fabric switch and the storage controllers will be connected to the same switch.

A simple example of multipath could be: 2 HBAs connected to a switch to which the storage controllers are connected. In this case the storage controller can be accessed from either of the HBAs and hence we have multipath connectivity.

In Linux, a SCSI device is configured for a LUN seen on each path. i.e, if a LUN has 4 paths, then one will see four SCSI devices getting configured for the same device. Doing I/O to a LUN in a such an environment is unmanageable

* applications/administrators do not know which SCSI device to use
* all applications consistently using the same device
* in case of a path failure, knowledge to retry the I/O on a different path
* always using the storage device specific preferred path
* spreading I/O between multiple valid paths

**1.1. Device Mapper**

Device mapper is a block subsystem that provides layering mechanism for block devices. One can write a device mapper to provide a specific functionality on top of a block device.

Currently the following functional layers are available:

* concatenation
* mirror
* striping
* encryption
* flaky
* delay
* multipath

Multiple device mapper modules can be stacked to get the combined functionality.

**1.2. Device Mapper Multipathing**

Object of this document is to provide details on device mapper multipathing (DM-MP). DM-MP resolves all the issues that arise in accessing a multipathed device in Linux. It also provides a consistent user interface for storage devices provided by multiple vendors. There is only one block device (*/dev/mapper/XXX*) for a LUN. This is the device created by device mapper.

Paths are grouped into priority groups, and one of the priority group will be used for I/O, and is called active. A path selector selects a path in the priority group to be used for an I/O based on some load balancing algorithm (for example round-robin).

When a I/O fails in a path, that path gets disabled and the I/O is retried in a different path in the same priority group. If all paths in a priority group fails, a different priority group which is enabled will be selected to send I/O.

DM-MP consists of 4 components:

1. **DM MP kernel module** - Kernel module that is responsible for making the multipathing decisions in normal and failure situations.
2. **multipath command** - User space tool that allows the user with initial configuration, listing and deletion of multipathed devices.
3. **multipathd daemon** - User space daemon that constantly monitors the paths. It marks a path as failed when it finds the path faulty and if all the paths in a priority group are faulty then it switches to the next enable priority group. It keeps checking the failed path, once the failed path comes alive, based on the failback policy, it can activate the path. It provides an CLI to monitor/manage individual paths. It automatically creates device mapper entries when new devices comes into existence.
4. **kpartx** - User space command that creates device mapper entries for all the partitions in a multipathed disk/LUN. When the multipath command is invoked, this command automatically gets invoked. For DOS based partitions this command need to be run manually.

**2. Terminology, Concepts and Usage**

**2.1. Output of multipath command**

|  |  |
| --- | --- |
|  |  |

**2.2. Terminology**

**Path**

Connection from the server through a HBA to a specific LUN. Without DM-MP, each path would appear as a separate device.

**Path Group**

Paths are grouped into a path groups. At any point of time only path group will be active. Path selector decides which path in the path group gets to send the next I/O. I/O will be sent only to the active path.

**Path Priority**

Each path has a specific priority. A priority callout program provides the priority for a given path. The user space commands use this priority value to choose an active path. In the group\_by\_prio path grouping policy, path priority is used to group the paths together and change their relative weight with the round robin path selector.

**Path Group Priority**

Sum of priorities of all non-faulty paths in a path group. By default, the multipathd daemon tries to keep the path group with the highest priority active.

**Path Grouping Policy**

Determines how the path group(s) are formed using the available paths. There are five different policies:

1. multibus: One path group is formed with all paths to a LUN. Suitable for devices that are in Active/Active mode.
2. failover: Each path group will have only one path.
3. group\_by\_serial: One path group per storage controller(serial). All paths that connect to the LUN through a controller are assigned to a path group. Suitable for devices that are in Active/Passive mode.
4. group\_by\_prio: Paths with same priority will be assigned to a path group.
5. group\_by\_node\_name: Paths with same target node name will be assigned to a path group.

Setting *multibus* as path grouping policy for a storage device in Active/Passive mode will reduce the I/O performance.

**Path Selector**

A kernel multipath component that determines which path will be chosen for the next I/O. Path selector can have an appropriate load balancing algorithm. Currently one one path selector exists, which is the round-robin.

**Path Checker**

Functionality in the user space that is used to check the availability of a path. This is implemented as a library function that is used by both multipath command and the multipathd daemon. Currently, there are 3 path checkers:

1. readsector0: sends a read command to sector 0 at regular time interval. Produce lot of error messages in Active/Passive mode. Hence, suitable only for Active/Active mode.
2. tur: sends a test unit ready command at regular interval.
3. rdac: specific to the lsi-rdac device. Sends a inquiry command and sets the status of the path appropriately.

**Path States**

This refers to the physical state of a path. A path can be in one of the following states:

1. ready: Path is up and can handle I/O requests.
2. faulty: Path is down and cannot handle I/O requests.
3. ghost: Path is a passive path. This state is shown in the passive path in Active/Passive mode.
4. shaky: Path is up, but temporarily not available for I/O requests.

**DM Path States**

This refers to the DM module(kernel)'s view of the path's state. It can be in one of the two states:

1. active: Last I/O sent to this path successfully completed. Analogous to ready path state.
2. failed: Last I/O to this path failed. Analogous to faulty path state.

**Path Group State**

Path Groups can be in one of the following three states:

1. active: I/O will be sent to the multipath device will be sent to this path group. Only one path group will be in this state.
2. enabled: If none of the paths in the active path group is in the ready state, I/O will be sent these path groups. There can be one or more path groups in this state.
3. disabled: In none of the paths in the active path group and enabled path group is in the ready state. I/O will be sent to these path groups. There can be one or more path groups in this state. This state is available only for certain storage devices.

**UID Callout (or) WWID Callout**

A standalone program that returns a globally unique identifier for a path.multipath/multipathd invokes this callout and uses the ID returned to coalesce multiple paths to a single multipath device.

**Priority Callout**

A standalone program that returns the priority for a path.multipath/multipathd invokes this callout and uses the priority value of the paths to determine the active path group.

**Hardware Handler**

Kernel personality module for storage devices that needs special handling. This module is responsible for enabling a path (at the device level) during initialization, failover and failback. It is also responsible for handling device specific sense error codes.

**Failover**

When all the paths in a path group are in faulty state, one of the enabled path group (path with highest priority) with any paths in ready state will be made active. If there is no paths in ready state in any of the enabled path groups, then one of the disabled path group (path with highest priority) will be made active. Making a new path group active is also referred as switching of path group. Original *active* path group's state will be changed to *enabled*.

**Failback**

A failed path can become active at any point of time. *multipathd* keeps checking the path. Once it finds a path is active, it will change the state of the path to ready. If this action makes one of the enabled path group's priority to be higher than the current active path group, *multipathd* may choose to *failback* to the highest priority path group.

**Failback Policy**

Under failback situations *multipathd* can do one of the following three things:

1. immediate: Immediately failback to the highest priority path group.
2. # of seconds: Wait for the specified number of seconds, for I/O to stabilize, then failback to the highest priority path group.
3. do nothing: Do nothing, user explicitly fails back to the highest priority path group.

This policy selection can be set by the user through /etc/multipath.conf.

**Active/Active**

Storage devices with 2 controller can be configured in this mode. Active/Active means that both the controllers can process I/Os.

**Active/Passive**

Storage devices with 2 controller can be configured in this mode. Active/Passive means that one of the controllers(active) can process I/Os, and the other one(passive) is in a standby mode. I/Os to the passive controller will fail.

**Alias**

A user friendly and/or user defined name for a DM device. By default, WWID is used for the DM device. This is the name that is listed in */dev/disk/by-name* directory. When the *user\_friendly\_names* configuration option is set, the alias of a DM device will have the form of mpath<n>. User also has the option of setting a unique alias for each multipath device.

**2.3. Configuration File (/etc/multipath.conf)**

DM-Multipath allows many of the feature to be user configurable using the configuration file /etc/multipath.conf. *multipath* command and *multipathd* uses the configuration information from this file. This file is consulted only during the configuration of multipath devices. In other words, if the user makes any changes to this file, then the *multipath* command need to be rerun to configure the multipath devices (i.e the user has to do *multipath -F* followed by *multipath*).

Support for many of the devices (as listed below) is inbuilt in the user space component of DM-Multipath. If the support for a specific storage device is not inbuilt or the user wants to override some of the values only then the user need to modify this file.

This file has 5 sections:

1. System level defaults ("**defaults**"): Where the user can specify system level default override.
2. Black listed devices ("**blacklist**"): User can specify the list of devices they do not want to be under the control of DM-Multipath. These devices will be excluded.
3. Black list exceptions ("**blacklist\_exceptions**"): Specific devices to be treated as multipath candidates even if they exist in the blacklist.
4. Storage controller specific settings ("**devices**"): User specified configuration settings will be applied to devices with specified "Vendor" and "Product" information.
5. Device specific settings ("**multipaths**"): User can fine tune configuration settings for individual LUNs.

User can specify the values for the attributes in this file using regular expression syntax.

For detailed explanation of the different attributes and allowed values for the attributes please refer to **multipath.conf.annotated** file.

* In Mainline, this file is located in the root directory of multipath-tools.
* In RedHat, this file is located in the directory /usr/share/doc/device-mapper-multipath-X.Y.Z/.
* In SuSE, this file is located in the directory /usr/share/doc/packages/multipath-tools/

**2.3.1. Attribute value overrides**

Attribute values are set at multiple levels (internally in multipath tools and through multipath.conf file). Following is the order in which the attribute values will be overwritten.

1. Global internal defaults, as specified in the man page of multipath.conf.
2. Device specific internal defaults, as defined in libmultipath/hwtable.c.
3. Items described in defaults section of /etc/multipath.conf.
4. Items defined in device section of /etc/multipath.conf.
   * Note that this will completely overwrite configuration information defined in (2) above. So, if even if you want to change/add only one attribute one have to provide the whole list for a device.
5. Items defined in multipaths section of /etc/multipath.conf.

**2.4. multipath, multipathd command usage**

Man page of multipath/multipathd provides good details on the usage of the tools.

multipathd has a interactive mode option which can be used for querying and managing the paths and also to check the configuration details that will be used.

When multipathd is running, one has to invoke multipathd with the command line **multipathd -k**. multipathd will enter into a command line mode where user can invoke different commands. Checkout the man page for different commands.

**3. Tips and Tricks**

1. Using alias: By default, the multipathed devices are named with the uid of the device, which one accesses through /dev/mapper/${uid\_name}. When one uses user\_friendly\_names, devices will be named as mpath0, mpath1 etc., which may meet ones needs. User also have an option to define a alias in multipath.conf for each of the device.

Syntax is:

|  |  |
| --- | --- |
|  | multipaths { |
|  | multipath { |
|  | wwid 3600a0b800011a2be00001dfa46cf0620 |
|  | alias mydev1 |
|  | } |
|  | } |

1. Persistent device names: The names (uid\_names or mpath names or alias names) that appear in /dev/mapper are persistent across boots, and the names dm-, dm-1 etc., can change between reboots. So, it is advisable to use the device names that appear under /dev/mapper and avoid using the dm-? names.
2. Restart of tools after changing multipath,conf file: Once multipath.conf file is changed, the multipath tools need to be rerun for those configuration values to be effective. One has to kill multipathd, run multipath -F and then restart multipathd and multipath.
3. Devices with paritions: Create device partitions before running multipath, as kpartx is configured to run to create multipathed partitions that way. Partions on device mpath0 appear as /dev/mapper/mpath0p1, /dev/mapper/mpath0p2, etc.,
4. Using binding file in clustered environment: Bindings file holds the bindings between the device mapper names and the uid of the underlying device. By default the file is /var/lib/multipath/bindings, this can be changed by the multipath command line option -b. In a clustered environment, this file can be created in one node and can be transferred to another to get the same names.  
   Note that the same effect can also be acheived by using alias and having the same multipath.conf file in all the nodes of the cluster.
5. Getting the multipath device name corresponding to a SCSI device: If one knows the name of a SCSI device and wants to get the device mapper name associated with that the could use multipath -l /dev/sda, where sda is the SCSI device. On the other hand, if one knows the device mapper name and wants to know the underlying device names they could use the same command with the device mapper name. i.e multipath -l mpath0, where mpath0 is the device mapper name.
6. When using LVM on dm-multipath devices, it is better to turn lvm scanning off on the underlying SCSI devices. This can be done by changing the filter parameter in /etc/lvm/lvm.conf to be filter = [ "a/dev/mapper/.\*/", "r/dev/sd.\*/" ].   
   If your root device is also a multipathedlvm device, then make the above change before you create a new initrd image

Performance Problems

Many performance issues are the result of configuration errors. You can avoid such errors by using a validated configuration that has been pre-tested for the supported software, hardware, storage, drivers, and networking components.

A typical problem involves out of memory errors and generally poor performance when running Oracle Database. The cause of this problem is likely to be that the system is not configured to use the HugePages feature for the System Global Area (SGA). With HugePages, you can set the page size to between 2MB and 256MB, so reducing the total number of pages that the kernel needs to manage. The memory associated with HugePages cannot be swapped out, which forces the SGA to remain resident in memory.

The following utilities allow you to collect information about system resource usage and errors, and can help you to identify performance problems caused by overloaded disks, network, memory, or CPUs:

**dmesg**

Displays the contents of the kernel ring buffer, which can contain errors about system resource usage.Provided by the util-linux-ng package.

**dstat**

Displays statistics about system resource usage.Provided by the dstat package.

**free**

Displays the amount of free and used memory in the system.Provided by the procps package.

**iostat**

Reports I/O statistics.Provided by the sysstat package.

**iotop**

Monitors disk and swap I/O on a per-process basis. Provided by the iotop package.

**ip**

Reports network interface statistics and errors. Provided by the iproute package.

**mpstat**

Reports processor-related statistics.Provided by the sysstat package.

**sar**

Reports information about system activity.Provided by the sysstat package.

**ss**

Reports network interface statistics. Provided by the iproute package.

**top**

Provides a dynamic real-time view of the tasks that are running on a system.Provided by the procps package.

**uptime**

Displays the system load averages for the past 1, 5, and 15 minutes. Provided by the procps package.

**vmstat**

Reports virtual memory statistics.Provided by the procps package.

**1. What is command to determine File System Types?**

Ans:-

[root@local]# df -T

Filesystem**Type** 1K-blocks Used Available Use% Mounted on

/dev/sda1 **ext4** 495844 36118 434126 8% /boot

/dev/sda3 **ext4** 476186680 72478892 398871248 16% /

tmpfs**tmpfs** 1013176 1156 1012020 1% /dev/shm

**2. What is EthernetBonding ?**

Ans:-

Ethernet bonding is used to combine multiple interfaces into one, creating an increase available bandwidth and redundancy. This is done by creating a special network interface file called a channel bonding interface

**3. When troubleshooting TCP Wrappers where do you find out?**

Ans:-

We can use the /var/log/secure file to view information from the log file. Its helps to determine if something is wrong with specific details.

**4. How do you allow SSH login a single ip address?**

Ans:-

Yes, it’s possible to allow only a single IP address to be able to connect the server, Open /etc/hosts.allow by any text editor (vim,vi,nano) and add the below line like this:

sshd : 192.168.1.100

**5. How do you allow SSH port number through Iptables?**

Ans:-

# iptables -I INPUT -p tcp -m tcp --dport 22 --dport -j ACCEPT

-I => Inserting Rules

- INPUT => Input chains

-m => matching only TCP connections

--dport =>Incomming connections

-j => Jumping the acceptance chain to all the locate

-p => Protocol (tcp)

**6. SSH enforcing password length and complexity?**

Ans:-

Both the pam\_cracklib and pam\_passwdqc modules are used in enforcing password length and complexity

**7. How do you validate the syntax of the Apache config file?**

Ans:-

# systemctl configtest httpd

**8.What are the two main NFS security types?**

Ans:-

host-based security

user-based security

**9. What does the testparm command do?**

Ans:-

The testparm command is used to check syntax errors in the /etc/samba/smb.conf file.

**10.Explaincrontab and how to use it ?**

Ans:-

The crontab used for schedule routine work in background process on the system.

Crontab –l : show crontab list  
Crontab –e : This option is used to edit the crontab for schedule  
For example : 00 09 \* \* \*  /usr/sbin/perl   /usr/local/jobname.pl  
Every day run cronjob at 9.00 AM.

**11. What is the different between yum remove and yum erase commands?**

Ans:-

# yum erase package\_name

Yum erase : This command removes all packages from server except the config files for those packages. We can use this config whenever want to reinstall them.

# yum remove package\_name

Yum remove : This command deletes everything from the package in system.

**12. Give sample entry for a custom repository looks like?**

Ans:-

[unique title]

name=Custom Yum Repository

baseurl=ftp://linuxfaq/opt/yum/myreposfile

enabled=1

gpgcheck=1

gpgkey=file://etc/pkg/rpm-gpg/RPM-GPG-KEY-redhat-package-release

**13. How do you create multipledirectory like dir1, dir2, and tmp under /usr/src/?**

Create the required directories:

# mkdir –p /usr/src/{dir1,dir2,tmp}

# ls -al

total 21

drwxr-xr-x 8 root root 4096 May 30 14:43 ./

drwxr-xr-x 5 root root 4096 May 30 14:43 ../

drwxr-xr-x 2 root root 4096 May 30 14:43 dir1/

drwxr-xr-x 2 root root 4096 May 30 14:43 dir2/

drwxr-xr-x 2 root root 4096 May 30 14:43 tmp/

**14. How can you create your own repositories?**

Ans:-

We have to Specify which directory created and execute thecreaterepo command.

for example

**15. What command is used to create an RPM package?**

Ans:-

rpmbuild

**16. What are the five required directories when building RPMS?**

Ans:-

The five directories are BUILD, RPMS, SOURCES, SPECS, and SRPMS.

**17. What two commands are used for installing packages?**

Ans:-

We can use yum and rpm commands for installing packages in system.

**18. How do you set up a centralized rsyslog server?**

rsyslog is very useful for centralized logging in a server, we need to configure in /etc/rsyslog.conf file and restart rsyslog

Uncomment the following line in the /etc/rsyslog.conf file:

#$ModLoad imudp.so

#$UDPServerRun 514

**19. Can you tell two commands for view the free space on the system?**

Ans:-

The du and df commands are used to view available space on the system.

**20. How do you change default run level 5 to 3 and which file need to update?**

Ans:-

The file located /etc/inittab and required to change below lines:

id:5:initdefault:

to

id:3:initdefault:

save the file. From now onwards, if the system reboots, by default it goes to run level 3 (which is character user interface)

**21. What is sos report?**

Ans:- The **sosreport** utility collects information about a system such as hardware configuration, software configuration, and operational state. You can also use **sosreport** to enable diagnostics and analytical functions. To assist in troubleshooting a problem, **sosreport** records the information in a compressed file that you can send to a support representative.

**22. How to Enable and disable directories or files listing on browser ?**

Ans:-

Its possible in apache conffile or .htaccess file. openhttpd.conf file and add the below line to Enable the directory listing on browser,

Options +Indexes

To disable the directory listing on browser

Options -Indexes

save the file and restart apache.

**23.What is the structure of virtual host in Apache?**

Ans:-

We can configure multiple virtual host in httpd.conf files

<VirtualHost 192.168.0.1:80>

ServerName www.thelinuxfaq.com

ServerAdmin admin@thelinuxfaq.com

DocumentRoot /home/thelinuxfaq/public\_html/

ErrorLog /usr/local/apache/log/error\_log

CustomLog /var/log/virtualmin/thelinuxfaq.com \_access\_log combined

</VirtualHost>

**24. Is it possible to change DocumentRoot and Port numbers ?**

Ans:-

Yes,We can change the DocumentRoot and Port number in httpd.conf file, the DcoumentRoot is located under VirtualHost.

DocumentRoot /home/thelinuxfaq/public\_html/

The apache default port number is 80 if I want to change to 8081 find “Listen” line and update it.

Example :

Listen 8081

Once updated in httpd.conf files restart apache service (httpd).

**25. How to copy iso file from the drive (cd /dvd )?**

Ans:-

It can be done using dd command,

# mkdir /var/isofile

# dd if=/dev/sda0 of=/var/isofile/isoname.iso

**26. Linux runlevels explain?**

Ans:-

0 Halt System halt (Do NOT set init default to this)

1 Single-User Mode Allow non-root logins

2 Multiuser, without NFS Does not configure network.

3 Full multiuser mode Starts the system normally.

4 Unused Not used

5 X11 Full multi-user mode(GUI)

6 Reboot Reboots the system (Do not set init default to this)

**27. How to Enable IP Forwarding in Linux?**

Open /etc/sysctl.conf file and set the value,

# vi /etc/sysctl.conf

Set net.ipv4.ip\_forward 0 to 1,

# Controls IP packet forwarding

net.ipv4.ip\_forward = 1

Save and close the file. Reload the changes by execute below command,

# sysctl –p

**28. What is use of finger command?**

Ans:-

The Finger command use to find information about system users, it Lists out Login name, Full name, Login time, Shell access details, Directory permission and Email Address.

# fingerlinuxfaq

Login: linuxfaq Name: (null)

Directory: /home/linuxfaq Shell: /usr/local/cpanel/bin/noshell

Never logged in.

No mail.

No Plan.

**29. How to change Port redirection in iptables?.**

Ans:-

Assume that the Port 80 redirect to 8080,

# iptables -t nat -A PREROUTING -p tcp -m tcp --dport 80 -j REDIRECT --to-ports 8080

# iptables -t nat -A PREROUTING -p udp -m udp --dport 80 -j REDIRECT --to-ports 8080

**30. What is difference between SAN and NAS?**

Ans:-

Storage area network (SAN) is a high-speed special-purpose network storage and connected in a fabric, so that there can be easy access to storage from many different servers. SAN support for backup and restore, disk mirroring, data migration from one storage device to another device.

Network attached storage (NAS) is a dedicated hard disk storage device and its a own network address and provides file-based data storage services to other devices on the network. The file access is redirected using a remote protocol such as CIFS or NFS to another device.

**31. Network Interface bonding in Linux?**

Ans:-

Linux kernel features that can allows combine multiple network interface(eth0, eth1) into a single virtual link like as bond0,

**32. How do I find out runlevel of Unix or Linux system?**

Ans:-

# runlevel

or

# who -r

**33. What are the command to find HBA port number and WWN ?**

**34. ipv4 is how many bits addressing system?**

Ans:-

IPv4 IP address are 32 bit numbers so total of 4 bytes here. There are Each and every binary numbers are separated by the dot.

**36. When do you use partrob command?**

Ans:-

If You don't like to reboot the Linux system after making any changes in partition table or created new partition , just use partprobe. This command probe(scans) partition table and updates the kernel.

**36. what is an Inode?**

Ans:-

Inodeis an index node. It's a data structure that stores the following information about a file, the inode contains information

about the file-size,

Timestamps for fiel creation, file access and modification time

User ID, Group ID, device ID

theinode contains pointers to the data blocks of the file.

access privileges for owner, group and others.

link counter to determine the number of hard links

**37. How do you remove RPM Package?**

Ans:-

Find rpm package name use -qa and remove that package use -e

# rpm -qa | greppackagename

# rpm -e packagename

**38. How to check all open ports on linux machine and block unsed ports?**

Ans:-

# netstat–tulpn or # netstat -anp

**39. how can you make an user to nologin without locking the account for the user?**

Ans:-

You can use the -M option will not create home directory

# useradd -M username

then lock the account to prevent logging in:

# usermod -L username

or

You can edit a line in /etc/passwd file and made changes below line to that user's shell to

# vi /etc/passwd

/bin/false (For ubuntu)

or

/bin/nologin (For Redhat,CentOS)

**40. How to scan a new disk added to Redhatlinux server. Manual method with out any script or softwares.**

Ans:-

echo "- - -" > /sys/class/fc\_host/hostX/scan

or

echo "c t l" > /sys/class/fc\_host/hostX/scan

c is the channel on the HBA,

t is the SCSI target ID ,

l is the LUN and

X is the HBA number

**41. What is difference between ping and ping6 Commands?**

Ans:-

Both ping and ping6 commands are same. Regular ping command works with IPV4 and ping6 works with ipv6 IP address.

**42. SAN connectivity to a server comes through which port?**

Ans:-

SAN storage connected through HBA/FC ports.

**43. How to check if the RHEL server is physical or virtual after login to server using command line?**

Ans:-

dmidecode command will help us to determine physical or virtual server,

*For example :Pysical*

dmidecode | grep "Product Name"

Product Name: 300E4C/300E5C/300E7C

Product Name: NP300E5X-A08IN

*For example : Virtualization*

dmidecode | grep "Product Name"

Product Name: PowerEdge R420

Product Name: 072XWF

**44. What is DHCP and what is its use?**

Ans:-

Dynamic Host Configuration Protocol, a protocol for assigning dynamic IP addressesand configuration information to clients. Minimum basic information like IP Address, Default Gateway and Subnet Mask. DHCP also supports a mix of static and dynamic IP addresses. This means that a new computer can be added to a network without the hassle of manually assigning it a unique IP address .

**45. What is RAID and what is its advantage. Name 3 basic RAID types widely used?**

RAID expands to "“Redundant Array of Inexpensive Disks” or "“Redundant Array of Independent Disks”

RAID is basically used to achieve redundancy and/or with faster I/O.

RAID 0:

Need minumum 2 disks

blocks are striped

no mirror, no parity

We do not use this level to any critical system

RAID 1:

Need minumum 2 disks

data mirrored

no striping and no parity

RAID 5:

parity protected

Need minimum 3 disks.

extra data written to identify errors

blocks are striped

**46. How to check the environment variables for a login session?**

Ans:-

We can check using env or do need to check in the respective open the .profile file on users home directory.

**47. What is multipathing I/O and how can we check if native multipathing configured in RedhatLinux server or not?**

Ans:-

Mutipathing is a fault tolerant technique, more than one physical path between the CPU in the computer systems and its main storage devices through the buses, controllers, Switches and other bridge devices connecting them Fibre Channel (FC) or iSCSI SAN environments. You can display the multipathed disks using command: multipath -ll

**48. What is the difference between snapshot and clone in vmware?**

Ans:-

A clone is a copy of a virtual machine that can be used to create many clone. Once completed the colning operation it will be a separate virtual machine.

We can take snapshot of a virtual machine backup at a specific point in time.

It's includes virtual machine settings and contents of VM Memory.

The state of all the virtual machine's disks.

**49. Unfortunately you must restart or downtime server how you will inform to all connected User's ?**

Ans:-

wall command sends a message to all connected Users and message length is limited to 20 lines.

Yum Command glossary:-

**1.Lists all enabled repositories.**

yumrepolist

**2.Lists all packages that are available in all enabled repositories and all packages that are installed on your system.**

yum list

**3.Lists all packages that are installed on your system.**

yum list installed

**4.Lists all packages that are available to be installed in all enabled repositories.**

yum list available

**5.Searches the package descriptions for the specified string.**

yum search string

**6.Find the name of the package to which the specified file or feature belongs.**

yum provides feature

example:- yum provides /etc/sysconfig/atd

**7.Displays detailed information about a package.**

yum info package

For example: yum info bind

**8.Installs the specified package, including packages on which it depends.**

yum install package

For example: yum install ocfs2-tools

**9.Checks whether updates exist for packages that are already installed on your system.**

yum check-update

**10.Updates the specified package, including packages on which it depends.**

yum update package

For example: yum upgrade nfs-utils

**11.Updates all packages, including packages on which they depend.**

yum update

**12.Removes the specified package.**

yum remove package

For example: yum erase nfs-utils

**13.Removes the specified package. This command has the same effect as the yum remove command.**

yum erase package

**14.Updates all packages, including packages on which they depend.**

yum update

**15.Remov all cached package downloads and cached headers that contain information about remote packages. Running this command can help to clear problems that can result from unfinished transactions or out-of-date headers.**

yum clean all

**16.Displays help about yum usage.**

yum help

**17.Displays help about the specified yum command.**

yum help upgrade

For example: yum help command

**18.Runs the yum interactive shell.**

yum shell