**What is Linux, and how is it different from Windows?**

* Linux is an Open-Source Operating System.
* Built by Linus Torvalds in 1991.
* It is mainly used for complicated systems.
* Used for servers.
* The core of Linux is Linux Kernel.
* Highly Secure.
* Multiple Users can work on the system without interfering into other tasks.
* Supports both Command Line and Graphical user Interfaces.

Diff between Linux and Windows;

| Linux | Windows |
| --- | --- |
| Open Source | Paid |
| Developed by an individual person | Developed by Microsoft Office |
| Highly Secure | Less secure |
| Beginners may confuse | Beginner friendly |
| Interface may change in different vesions | Interface doen’t change |
| Highly efficient | Less efficient |

**Explain the role of Linux Kernel?**

* Kernel plays a vital role in Linux.
* Responsible for managing the system efficiently.
* Responsible for bridging the gap between the software and hardware.

**What are the main Linux distributions, and how do they differ?**

**What is the purpose of a shell in Linux? Name some common shells.**

* Shell is a CLI in Linux.
* It acts as an intermediary between the user and the Kernel.
* It allows the users to run scripts and commands and manage the processes.
* **Key Functions of a Shell:**
* Command Execution: Allows the users to run the commands
* Script execution: allows users to to the scripts
* Process Management: cab stop,start and manage the process.
* File Management: allows users to create,delete,move and copy the files.
* Environment Control: manages the system environment and variables.
* **Common Shells:**
  + Bash
  + Sh
  + Ksh
  + Csh
  + Tcsh

**How do you check the Linux version you are using?**

* umask -r

**How do you list all files, including hidden files, in a directory?**

* ls -a: lists all the files and directories, including hidden files
* ls -la: detailed list, includes file permissions
* ls -lha: readable formats, long format
* ls -laR: lists all files, including hidden files, **recursively** in subdirectories

**How do you create a new directory in Linux?**

* mkdir filename: to create a directory
* mkdir file1 file2: to create multiple directories
* mkdir -p parent/child/grandchild

**What command is used to delete an empty directory? What about a directory with files?**

* rmdir directory\_name
* rmdir -r directory\_name
* rm -rf directory\_name

**How do you move or rename a file in Linux?**

* mv /path/to/directory
* mv oldfilename /path/to/destination/newfilename

**How do you copy a directory along with all its files?**

* cp -r source-directory destination\_directory
* cp -r source-directory /path/to/destination

**Explain the meaning of the following permission string: -rw-r--r--.**

* - : denotes that it is a regular file
* Owner permission(rw-): read(r), write(w), no execute(-)
* Group permission(r- -): read(r), no write(-), no execute(-)
* Other permission(r- -): read(r), no write(-), no execute(-)
* . : this means SELinux security context is applied.

**How do you change the ownership of a file?**

* Change new owner of a file: chown new owner filename.
* Change both both owner and group of a file: chown new owner: new group filename
* Change only group: chown :new group filename/ chgrp new group filename
* Change both both owner and group for a multiple files: chown new owner: new group file1 file2
* Change Ownership recursively; chown -r new owner: new group directoryname
* Verify ownership: ls -l

**How do you modify permissions of a file or directory using chmod?**

* Chmod - used to change the file permissions.
* -rwxrw-r-- :
  + - : regular file
  + rwx: owner can read, write and execute
  + rw-: others in same group can read and write
  + r - - : other than in the same group can only read
* chmod 777: everyone can read and write and execute
* chmod 755:only owner can read and write and execute and others can only read and write
* chmod 644:only owner can read and write and others can only read
* chmod 600: only owner can read and write
* chmod 400: only owner can read

**What is umask, and how does it affect default file permissions?**

* **Umask:** is used to define the default permissions of the newly created files in the octal form.
* 0022- all permission foe owner and write permission was disabled for groups and others.

**How do you grant execute permissions to a script?**

* Chmod is used to grant the file permissions to the new users.
* chmod u+x script.sh - granted the execution permission to the owner.
* chmod +x script.sh: grants execution permission to everyone.
* chmod go+x script.sh: grants execution permission to groups and others.

**Difference between chown and chmod.**

* **Chown:**
  + Changes the owner and group of the file
* **Chmod:**
  + Changes the file/directory access permissions of the file.

**What is umask, and how does it affect default file permissions?**

* **Umask** is a linux command and system setting that determines the default permissions to newly created files and directories.
* It acts as a filter that modifies the default permissions set by the system.
* For files: 666 - 022 = 644 (rw-r-----)
* For directories: 777-022 = 755 (rwxr-x---)

**How do you grant execute permissions to a script?**

* To grant execute permissions **chmod** command.
* For the Owner only:
  + chmod u+x script.sh
* For the Owner and Group only:
  + chmod ug+x script.sh
* For Everyone only:
  + chmod a+x script.sh

**What does the cat command do?**

* cat command is used to view, combine and create the files
* Display the contents of the file:
  + cat file.txt
* Display the contents of the multiple files:
  + cat file1 file2
* Concatenate file:
  + cat file1 file2 >merged file
* Create a new file:
  + cat > file1
* Append the content to a file:
  + cat >> file1

**How do you view the first 10 lines of a file? What about the last 10 lines?**

* To view First 10 lines head command will be used
* To view Last 10 lines, a tail command will be used.
* To view first 10 lines of a file:
  + head file.txt
* To view a first specific lines of a file:
  + head -n 5 file.txt
* To view last 10 lines of a file:
  + tail file.txt
* To view a last specific lines of a file:
  + tail -n 5 file.txt

**What is the difference between less and more?**

**Less and More** both are used to view the text files page by page but less provides more flexibility.

| **Less** | **More** |
| --- | --- |
| Used to scroll up and down | Only scroll down |
| More compatible for larger files | Less compatible for large files |
| Supports both forward (/) pattern and backward(?) | Uses space for next page and enter for next line |
| Doesn’t clear the screen with exit. | Clears the screen with exit |
| Can view growing files dynamically | No live file tracking |
| More powerful commands availble | Basic navigation only |

**How do you search for a word in a file using grep?**

* grep is a command used to search for a specific word in a file.
* Search for a word:
  + grep “word” file
* Case-insensitive search:
  + grep -i “word” file
* Search for an exact word:
  + grep -w “word’ file
* Search for multiple words:
  + grep -E “error|failed|warning” filename

**What command would you use to compare two files?**

* diff command is used to compare two files.
* Line by Line comparison:
  + diff file1 file2
* Byte by Byte comparison:
  + Cmp file1 file2
* Side by Side comparison:
  + sdiff file1 file2

**How do you check the currently running processes?**

| Command | Purpose |
| --- | --- |
| ps aux | Lists all processes with details |
| top | real-time process monitoring |
| htop | Interactive top alternative |
| Pgrep process\_name | Finds a process by name |
| pidof program | gets pid of a program name |
| lsof -i :port | finds process name using port name |

**What is the difference between kill and killall?**

* Kill is used to terminate a specific program using specific process id.
* Syntax:
  + kill pid
* Killall is used to terminate all processes by using matching name
* Syntax:
  + killall process name
* Force kill all process using name:
  + killall -9 process name
* Kill process for a specific user:
  + killall -u username
* Kill only process older than a certain period of time:
  + killall -o 1h process name

**How do you stop a process running in the background?**

* Using jobs and kill % numbers we can kill the process which is running in the background.
* Syntax:
  + jobs - lists the jobs that are running in the background.
  + kill %number - kill that job which is rinning in the background.

**What is the difference between jobs, fg, and bg?**

* jobs - used to display the jobs that running.
* Syntax: jobs
* fg : brings the background/ stopped job back to the foreground
* Syntax: fg %jobnumber
* bg : resume a job that stopped and keeps it running in the background.
* Syntax: bg %job number

**How do you check system resource usage (CPU, memory)?**

* free : used to check the memory usage
  + free -h: shows total, used and available memory in human readable format.

**How do you check the currently logged-in user?**

* There are several command to check the logged-in users.
* whoami - displays your currently logged-in usernames
* who - shows all the users logged into the system
* w - displays who is logged in, their activity and system load
* who am i - similar to whoami, but extracts data from who
* id - shows userid, groupid and membership groups
* users -shows all logged in users in a single line
* last - displays the list of latest logins.

**What is the difference between su and sudo?**

* **Su:**
* Su stands for substitute user/ switch user.
* It allows you to switch to the root user
* Once you are switched, u gonna stay in that same user session until you exit.
* Syntax:
  + su - switches to the root user.
  + su -username - switches to another user.
  + su -l: load’s the target user’s full environment.
* **Sudo:**
* Sudo stands for superuser do.
* Allows user to execute a single command as root user or another user.
* Requires the current user’s password.
* Grants all the permission to the user temporarily, only to run the commands.
  + sudo command - runs command as root
  + sudo -u username command - runs command as another user.
  + sudo -i - opens an interactive root shell.

**How do you change the password of a user?**

* To change the password you need to use passwd command.
* To change your own password:
  + passwd
* To change another user command:
  + sudo passwd username

**How do you list all users on a Linux system?**

* To list all the usernames:
  + cut -d: -f /etc/passwd
* To list all users:
  + compgen -u
* To list all groups:
  + compgen -g

**How do you check your IP address in Linux?**

* To check Private IP address:
  + ip a
  + ip addr show
* To check Public IP address:
  + curl ifconfig.me

**What does the ping command do?**

* The ping command inlinux is used to test the internet connectivity between your computer and another device.
* It sends ICMP echo request packets and waits for a response.
* Checks if Host is reachable:
  + ping hostname
* Ping specific no.of times:
  + ping -c number hostname
* Specify packet size:
  + ping -s number hostname
* Set timeout:
  + ping -w number hostname
* Limit time between pings:
  + ping -i number hostname

**What is traceroute, and how is it useful?**

* Traceroute is a diagnostic tool used to trace the path that packets from your computer to the destination.
* It helps to identify the network hops and where delays and failures occur.
* Syntax:
  + traceroute hostname