Linux

Linux is based on the **UNIX** operating system. **UNIX** is a powerful, multi-user, multitasking operating system originally developed in the **1970s at AT&T Bell Labs**. It laid the foundation for many modern operating systems, including Linux.

- Linux is free and open-source, accessible to everyone.
- Its source code can be inspected and modified by anyone.
- This promotes global collaboration and innovation.
- Linux offers efficient performance and strong security.
- It works well across many devices and industries.

What is a "distribution?"

Linux distribution is an operating system that is made up of a collection of software based on Linux kernel or you can say distribution contains the Linux kernel and supporting libraries and software. And you can get Linux-based operating system by downloading one of the Linux distributions and these distributions are available for different types of devices like embedded devices, personal computers, etc.
Ex: Ubuntu, Fedora, Red Hat etc.

Architecture of Linux

Linux architecture has the following components:
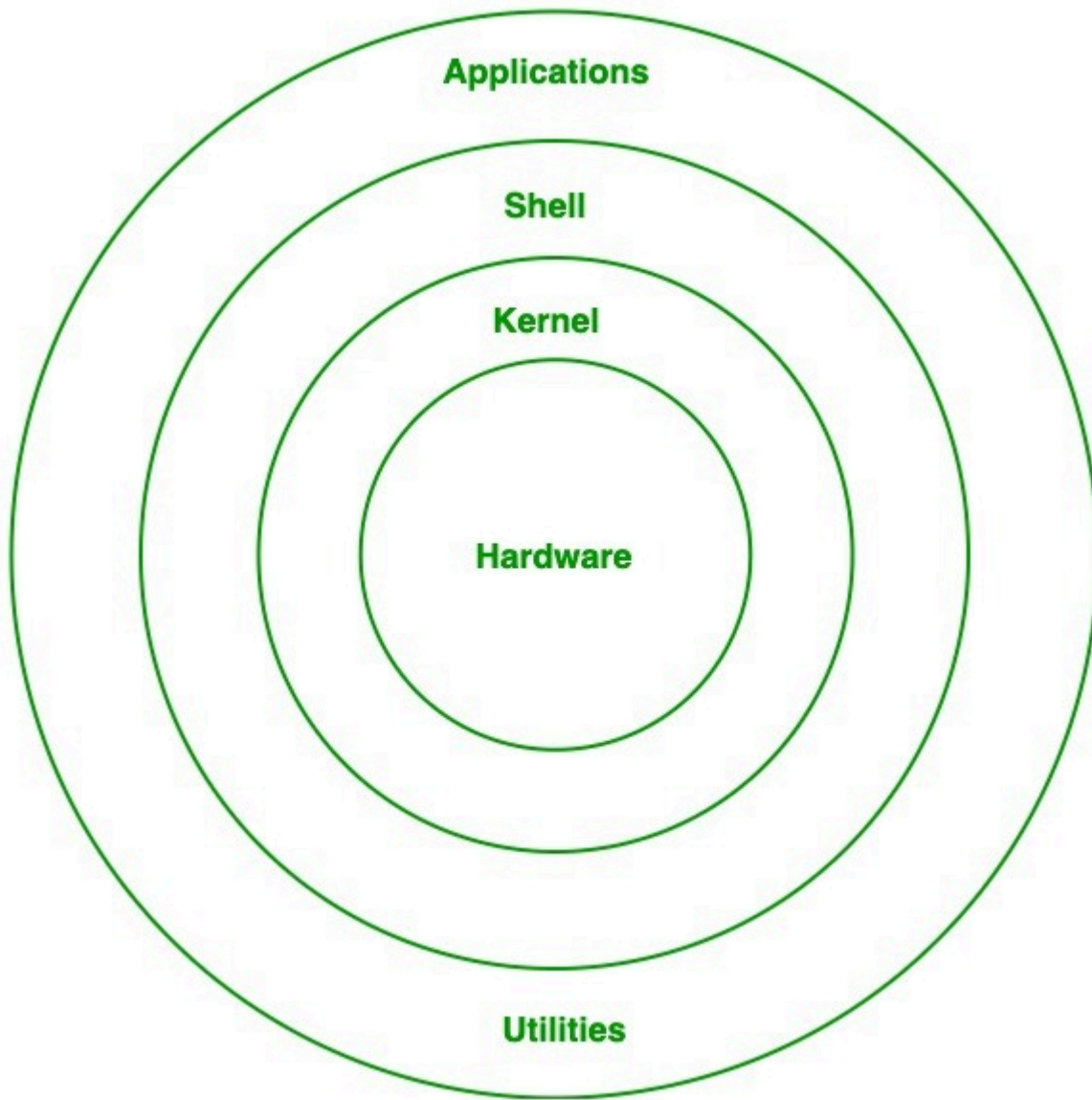
Kernel: [Kernel] is the core of the Linux based operating system. It virtualizes the common hardware resources of the computer to provide each process with its virtual resources. This makes the process seem as if it is the sole process running on the machine.

Shell: The shell is the user interface of the Linux Operating System. It allows users to interact with the system by entering commands, which the shell interprets and executes. The shell serves as a bridge between the user and the kernel, forwarding the user's requests to the kernel for processing.

System Utility: System utilities are essential tools and programs provided by the Linux Operating System to manage and configure various aspects of the system.

File System in Linux

In Linux, everything is represented as a file, including a hardware program. The files are stored in a directory, and every directory contains a file with a tree structure. That is called the [**file system hierarchy**]**.** Linux uses a single-rooted, inverted tree-like structure. The root directory is represented with / (forward slash). It is a top-level directory in Linux.

Command	**Description**	**Options**	**Example

ls	List files and directories.	- **-l**: Long format listing.
		- **-a**: Include hidden files hidden ones
		- **-h**: Human-readable file sizes.
			- **ls -l**
			  displays
			directories
			detailed in
			- **ls -a**
			  shows a
			and directo
			including
			- **ls -lh**
			  displays
			in a humar
			readable fo

cd	Change directory.		- **cd /path/to/d changes current dir the specifi
pwd	Print current working directory.		- **pwd** displays current wo directory.
mkdir	Create a new directory.		- **mkdir my_direct creates directory n "my_direct

rm	Remove files and directories.	- **-r**: Remove directories recursively.
		- **-f**: Force removal without confirmation.
			- **rm file.
			  deletes
			named "file
			- **rm -r
			my_direct
			  deletes
			directory
			"my_direct
			its content
			- **rm -f fi
			  forcefull
			the file "file
			without co

cp	Copy files and directories.	- **-r**: Copy directories recursively.	- **cp -r di destinatio copies t directory " and its cor

Command	**Description**	**Options**	**Example**
			the specifi destination - **cp file. destinatio** copies t "file.txt" to specified destination

mv	Move/rename files and directories.		- **mv file new_nam**
			  rename "file.txt" to "new_nam
			- **mv file directory**
			  moves t "file.txt" to specified d

touch	Create an empty file or update file timestamps.		- **touch f** creates file named
cat	View the contents of a file.		- **cat file** displays contents o "file.txt".

head	Display the first few lines of a file.	- **-n**: Specify the number of lines to display.	- **head fi**
			  shows t lines of the "file.txt".
			- **head - file.txt**
			  displays 5 lines of t "file.txt".

tail	Display the last few lines of a file.	- **-n**: Specify the number of lines to display.	- **tail file**
			  shows t lines of the "file.txt".
			- **tail -n ! file.txt**
			  displays 5 lines of t "file.txt".

ln	Create links between files.	- **-s**: Create symbolic (soft) links.	- **ln -s source_fil**

Command	**Description**	**Options**	**Example**
			link_name creates a symbolic li... named "lin... pointing to... "source_fil...
find	Search for files and directories.	- **-name**: Search by filename. - **-type**: Search by file type.	- *find /path/to/s... name ".tx... searche... files with th... extension... the specifi... directory.
Command	**Description**	**Options**	**Example**
chmod	Change file permissions.	- **u**: User/owner permissions. - **g**: Group permissions. - **o**: Other permissions. - **+**: Add permissions. - **-**: Remove permissions. - **=**: Set permissions explicitly.	- **chmod... file.txt** grants r... write, and... permission... owner of th...
chown	Change file ownership.		- **chown... file.txt** changes... owner of "... the specifi...
chgrp	Change group ownership.		- **chgrp ... file.txt** changes... group own... "file.txt" to... specified g...
umask	Set default file permissions.		- **umask...** sets the... file permis... read and w... the owner,... only for gr... others.
Commands	**Description**	**Options**	**Example**
tar	Create or extract archive files.	- **-c**: Create a new archive. - **-x**: Extract files from an archive. - **-f**: Specify the archive file name. - **-v**: Verbose mode.	- **tar -cz... archive.ta... files/** creates... compresse...

Command	**Description**	**Options**	**Example**
		- **-z**: Compress the archive with gzip. - **-j**: Compress the archive with bzip2.	archive na "archive.ta containing in the "files directory.
gzip	Compress files.	- **-d**: Decompress files.	- **gzip fil compres file "file.txt renames it "file.txt.gz"
zip	Create compressed zip archives.	- **-r**: Recursively include directories.	- **zip arc file1.txt fil creates archive na "archive.zi containing and "file2.t
Commands	**Description**	**Options**	**Example**
ps	Display running processes.	- **-aux**: Show all processes.	- **ps aux shows a processes detailed in
top	Monitor system processes in real-time.		- **top** displays dynamic v system pro and their r usage.
kill	Terminate a process.	- **-9**: Forcefully kill a process.	- **kill PID terminat process w specified p ID.
pkill	Terminate processes based on their name.		- **pkill process_n terminat processes specified n
pgrep	List processes based on their name.		- **pgrep process_n lists all with the sp name.
grep	used to search for specific	- **-i**: Ignore case distinctions while searching.	- **grep -i file.txt**

Command	**Description**	**Options**	**Example**
	patterns or regular expressions in text files or streams and display matching lines.	- **-v**: Invert the match, displaying non-matching lines. - **-r or -R**: Recursively search directories for matching patterns. - **-l**: Print only the names of files containing matches. - **-n**: Display line numbers alongside matching lines. - **-w**: Match whole words only, rather than partial matches. - **-c**: Count the number of matching lines instead of displaying them. - **-e**: Specify multiple patterns to search for. - **-A**: Display lines after the matching line. - **-B**: Display lines before the matching line. - **-C**: Display lines both before and after the matching line.	- **grep -v file.txt** - **grep -r "pattern" directory/** - **grep -l "keyword** - **grep -r "pattern"** In these examples extracting desirec ou filename

Command	**Description**	**Examples**	
ifconfig	Display network interface information.	- **ifconfig** shows the details of all network interfaces.	
ping	Send ICMP echo requests to a host.	- **ping google.com** sends ICMP echo requests to "google.com" to check connectivity.	
netstat	Display network connections and statistics.	- **netstat -tuln** shows all listening TCP and UDP connections.	
ss	Display network socket information.	- **ss -tuln** shows all listening TCP and UDP connections.	
ssh	Securely connect to a remote server.	- **ssh user@hostname** initiates an SSH connection to the specified hostname.	
scp	Securely copy files between hosts.	- **scp file.txt user@hostname:/path/to/destination** securely copies "file.txt" to the specified remote host.	
wget	Download files from the web.	- **wget http://example.com//file.txt** downloads "file.txt" from the specified	

Command	**Description**	**Options**	**Example**
		URL.	
curl	Transfer data to or from a server.	- **curl http://example.com/** retrieves the content of a webpage from the specified URL.	

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