



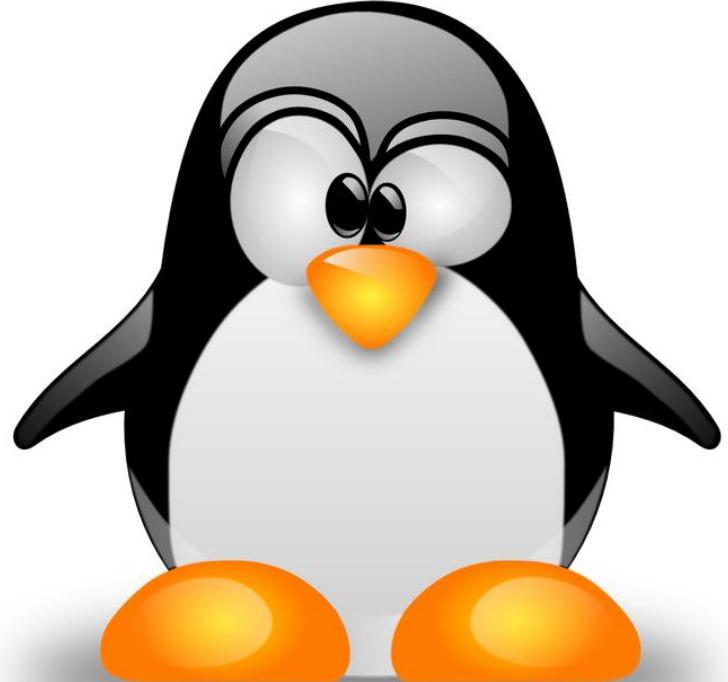
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Topics

- Operating Systems
- What is open source?
- What is Linux?
- Who invented Linux?
- Linux Distributions
- Linux vs. Windows
- Desktop Environments
- What is the Shell?
- Comparison of common DOS and Linux commands
- Other useful Linux commands
- What is Shell Scripting?



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What is an Operating System?

The diagram illustrates the layered structure of an operating system. It starts with a vertical orange bar labeled "Operating System" on its left side. To the right of this bar, the layers are stacked vertically:

- A blue bar labeled "User programs".
- A red bar labeled "User interface".
- A green bar labeled "System Calls".
- A row of eight purple rectangular boxes containing the following labels: Program Control, I/O, File System, Comms, Error Mngt, Resource, Auditing, and Security.
- A dark blue bar labeled "Hardware" at the bottom.

An operating system is a group of programs that help you operate your computer.

It manages the computer's memory, processes, and all of its software and hardware. It also allows you to communicate with the computer without knowing how to speak the computer's "language."

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What is an Operating System?

All desktop computers have operating systems.

The most common are the Windows family of operating systems developed by Microsoft, the Macintosh operating systems developed by Apple and the UNIX family of operating systems (which have been developed by a whole history of individuals, corporations and collaborators). There are hundreds of other operating systems available for special-purpose applications, including specializations for mainframes, robotics, manufacturing, real-time control systems and so on.



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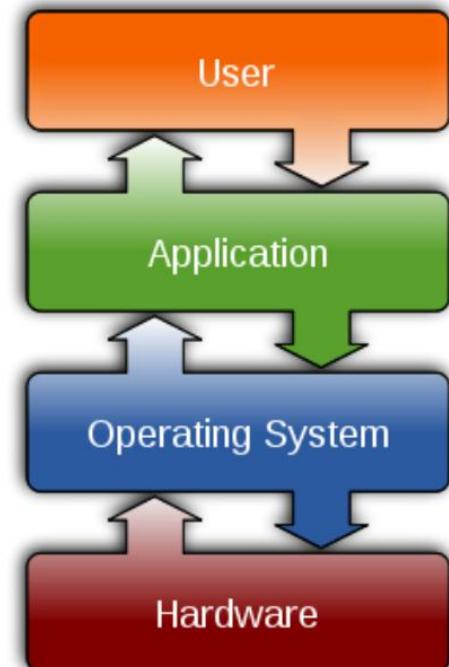
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Operating System Functions

Processor Management: It means assigning processor to different tasks which has to be performed by the computer system.

Memory Management: It means allocation of main memory and secondary storage areas to the system programmes, as well as user programmes and data.

Input and Output Management: It means coordination and assignment of the different output and input devices while one or more programmes are being executed.



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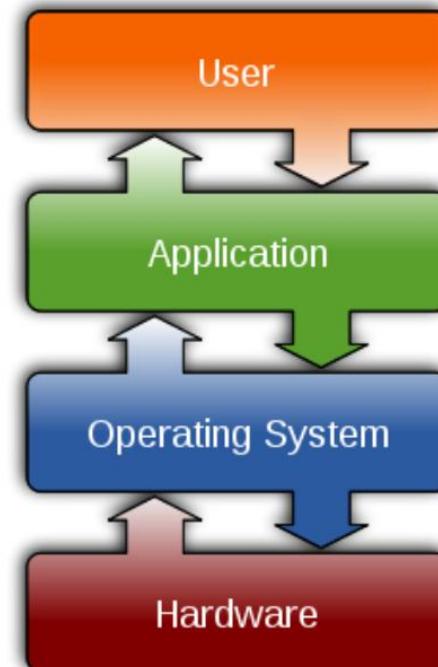
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Operating System Functions

File System Management: Operating system is also responsible for maintenance of a file system, in which the users are allowed to create, delete and move files.

Establishment and Enforcement of a Priority System: It means the operating system determines and maintains the order in which jobs are to be executed in the computer system.

Assignment of system resources, both software and hardware to the various users of the system.



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What is open source?

The term "open source" refers to something that can be modified because its design is publicly accessible.

While it originated in the context of computer software development, today the term "open source" designates a set of values—what we call *the open source way*. Open source projects, products, or initiatives are those that embrace and celebrate open exchange, collaborative participation, rapid prototyping, transparency, meritocracy, and community development.



A purple "Keep Calm" poster with a white keyhole icon and the text "KEEP CALM AND USE OPEN SOURCE".

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What is Linux and why is it so popular?

Linux is an operating system -- very much like UNIX -- that has become very popular over the last several years.

The Linux kernel, created by **Linus Torvalds**, was made available to the world for free.

Torvalds then invited others to add to the kernel provided that they keep their contributions free. Thousands of programmers began working to enhance Linux, and the operating system grew rapidly.

The first version of UNIX was originally developed several decades ago and was used primarily as a research operating system in universities.



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What is Linux

Now, you can see:

[01 - What is Linux](#)

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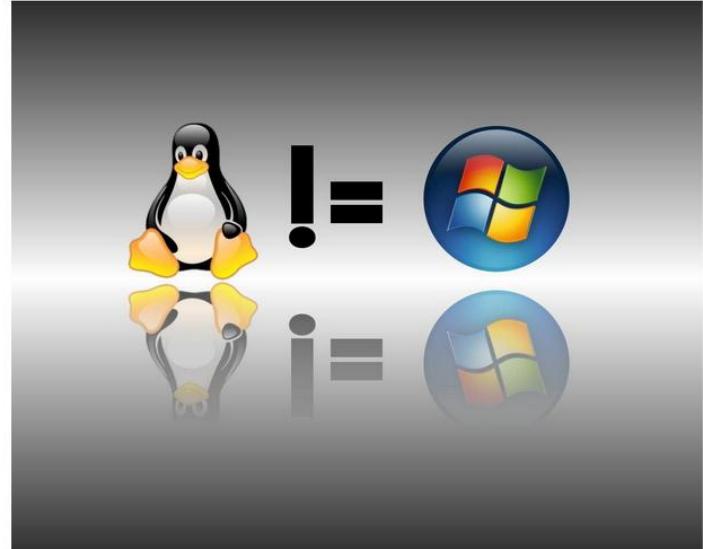
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What is Linux and why is it so popular?

High-powered desktop workstations from companies like Sun proliferated in the 1980s, and they were all based on UNIX. A number of companies entered the workstation field to compete against Sun: HP, IBM, Silicon Graphics, Apollo, etc. Unfortunately, each one had its own version of UNIX and this made the sale of software difficult.

Windows NT was Microsoft's answer to this marketplace. NT provides the same sort of features as UNIX operating systems -- security, support for multiple CPUs, large-scale memory and disk management, etc. -- but it does it in a way that is compatible with most Windows applications.



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What is the Linux Kernel?



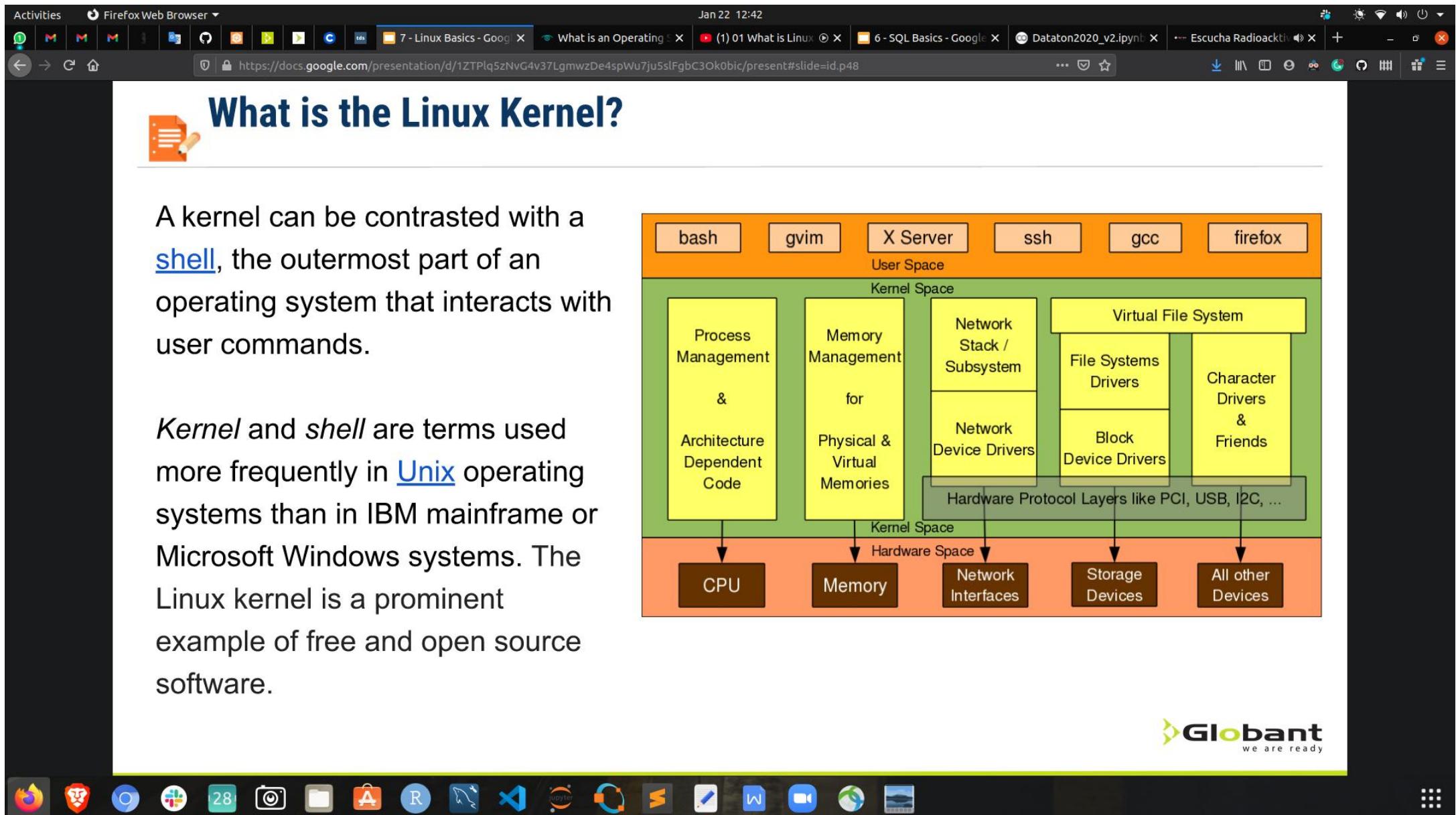
The Linux kernel is a Unix-like operating system kernel used by a variety of operating systems based on it, which are usually in the form of Linux distributions.

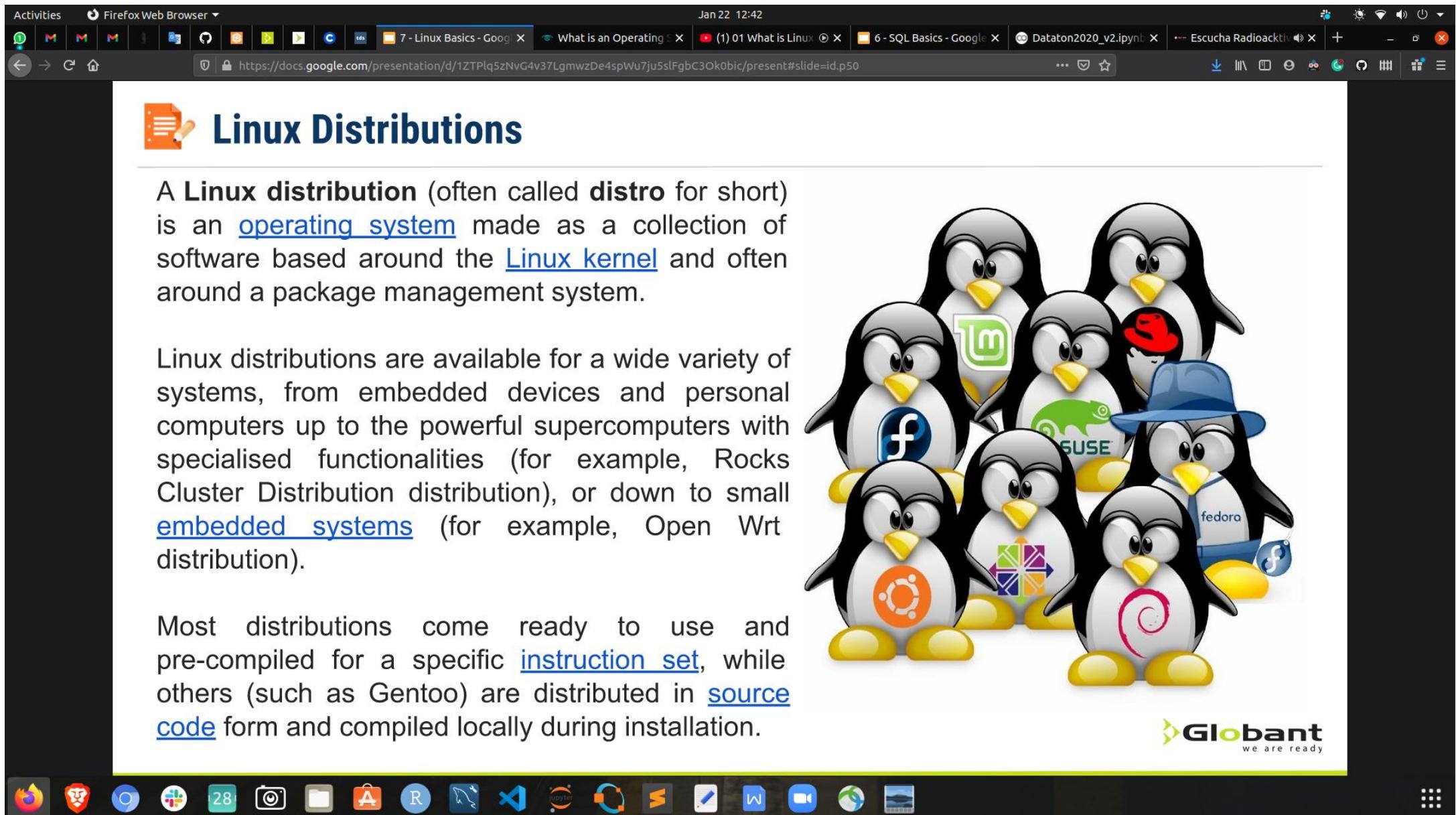
The kernel is the essential center of a computer operating system, the core that provides basic services for all other parts of the operating system. A synonym is *nucleus*.

```
graph TD; SCI[System Call Interface (SCI)] --- PM[Process Management (PM)]; SCI --- VFS[Virtual File System (VFS)]; PM --- MM[Memory Management (MM)]; MM --- NS[Network Stack]; Arch --- DD[Device Drivers (DD)];
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Linux Distributions & Installation Methods

Now, you can see:

[02 - Linux Distributions & Installation Methods](#)


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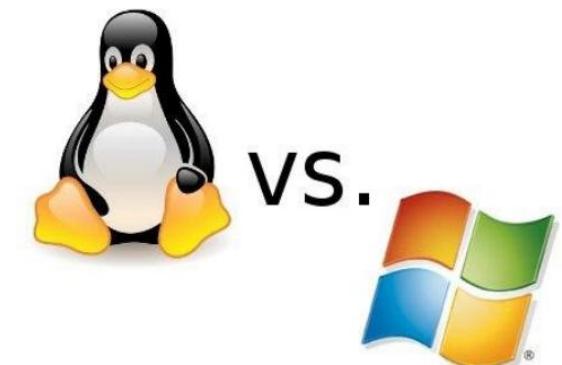
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Linux vs. Windows

	Linux	Windows
What is it?	Linux is an example of Open Source software development and Free Operating System (OS).	Windows is the family of operating system (OS) from Microsoft, which is the most famous OS in the world.
Cost	Linux can be freely distributed, downloaded freely, distributed through magazines, books, etc. There are priced versions for Linux also but they are normally cheaper than Windows.	For desktop or home use, Windows can be expensive. A single copy can cost around \$50 to \$ 450 depending on the version of Windows.
User	Everyone. From home users to developers and computer enthusiasts alike.	Everyone. From home users to developers and computer enthusiasts alike.



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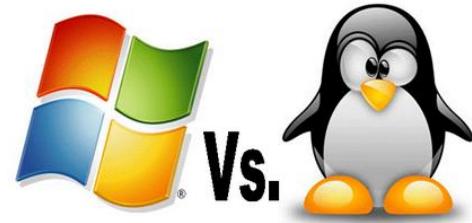
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Linux vs. Windows (cont)

Manufacturer	Linux kernel is developed by the community. Linus Torvalds oversees things.	Microsoft created the Windows operating system, but allows other computer manufacturers to distribute their own computers with Windows pre-installed.
Usage	Linux can be installed on a wide variety of computer hardware, ranging from mobile phones, tablet computers and video game consoles, to mainframes and supercomputers.	On PC's desktops, laptops, servers and some phones.
Development and Distribution	Linux is developed by Open Source development i.e. through sharing and collaboration of code and features through forums etc and it is distributed by various vendors.	Windows is developed and distributed by Microsoft.



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Firefox, LibreOffice, 28, Camera, R, Python, Jupyter, S, WPS, Video, Maps, Photos, Terminal, Dash, Grid icon.

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Linux vs. Windows (cont)

GUI	Linux typically provides two GUIs, KDE and Gnome. But there are millions of alternatives such as LXDE, Xfce, Unity, Mate, twm, ect.	The Windows GUI is an integral component of the OS and is not replaceable.
File system support	Ext2, Ext3, Ext4, Jfs, ReiserFS, Xfs, Btrfs, FAT, FAT32, NTFS	FAT, FAT32, NTFS, exFAT
Text mode interface	BASH (Bourne Again SHell) is the Linux default shell. It can support multiple command interpreters.	Windows uses a command shell and each version of Windows has a single command interpreter with dos-like commands, recently there is the addition of the optional PowerShell that uses more Unix-like commands.



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Linux vs. Windows (cont)

Price	Free but support is available for a price.	\$50-\$450
Security	Linux has had about 60-100 viruses listed till date. None of them actively spreading nowadays.	According to Dr. Nic Peeling and Dr Julian Satchell's "Analysis of the Impact of Open Source Software" there have been more than 60,000 viruses in Windows.
Threat detection and solution	In case of Linux, threat detection and solution is very fast, as Linux is mainly community driven and whenever any Linux user posts any kind of threat, several developers start working on it from different parts of the world	After detecting a major threat in Windows OS, Microsoft generally releases a patch that can fix the problem and it can take more than 2/3 months. Sometimes sooner, Microsoft releases patches and updates weekly.



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Linux Vs Windows

Now, you can see:

[03 - Linux Vs Windows](#)

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Desktop Environments

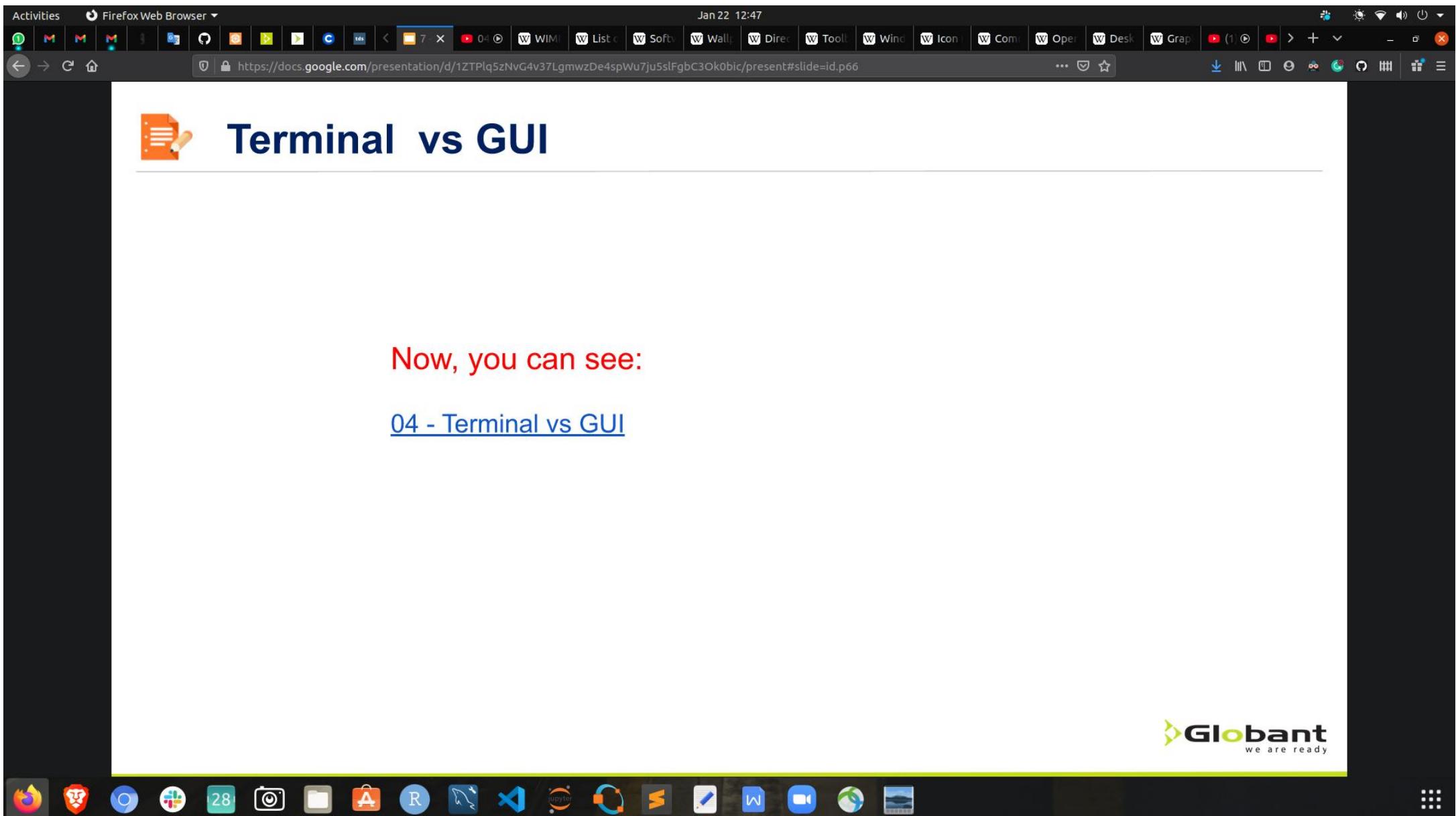
In graphical computing, a **desktop environment (DE)** commonly refers to a style of [graphical user interface \(GUI\)](#) derived from the [desktop metaphor](#) that is seen on most modern personal computers. These GUIs help the user in easily accessing, configuring, and modifying many important and frequently accessed specific [operating system \(OS\)](#) features. The GUI usually does not afford access to all the many features found in an OS.

Instead, the traditional [command-line interface \(CLI\)](#) is still used when full control over the OS is required in such cases.

A desktop environment typically consists of [icons](#), [windows](#), [toolbars](#), [folders](#), [wallpapers](#) and [desktop widgets](#) (see [Elements of graphical user interfaces](#) and [WIMP](#)).^[2]

The image displays five logos of desktop environments arranged in two rows. The top row contains the LADe logo (blue background with a stylized 'ADE' and 'L' icon) and the Kwin logo (blue rounded square with a white 'K' and gear icon). The bottom row contains the GNOME logo (grey rounded square with a black bear paw print icon) and the XFCE logo (black background with a blue 'XFCE' text and a white mouse icon). Below the XFCE logo is the Globant logo with the tagline 'we are ready'.

Firefox 28 Camera A R S W Video Globe



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Important Linux Commands

Now, you can see:

[05 - Important Linux Commands](#)

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Comparison of common DOS and Linux Commands

Command's Purpose	MS-DOS	Linux	Basic Linux Example
Copies files	copy	cp	cp <i>thisfile.txt</i> /home/ <i>thisdirectory</i>
Moves files	move	mv	mv <i>thisfile.txt</i> /home/ <i>thisdirectory</i>
Lists files	dir	ls	ls
Clears screen	cls	clear	clear
Closes shell prompt	exit	exit	exit
Displays or sets date	date	date	date
Deletes files	del	rm	rm <i>thisfile.txt</i>

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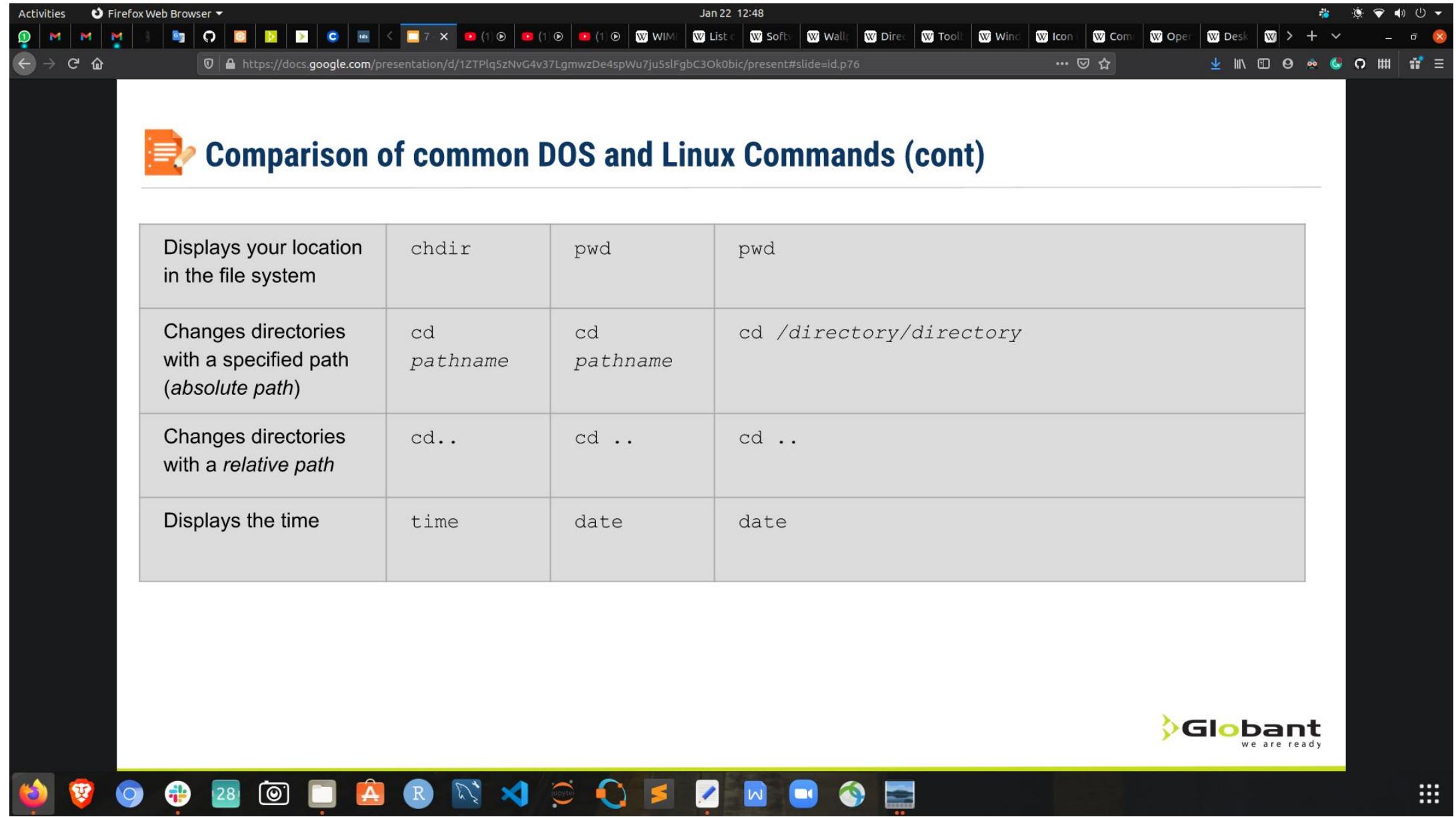
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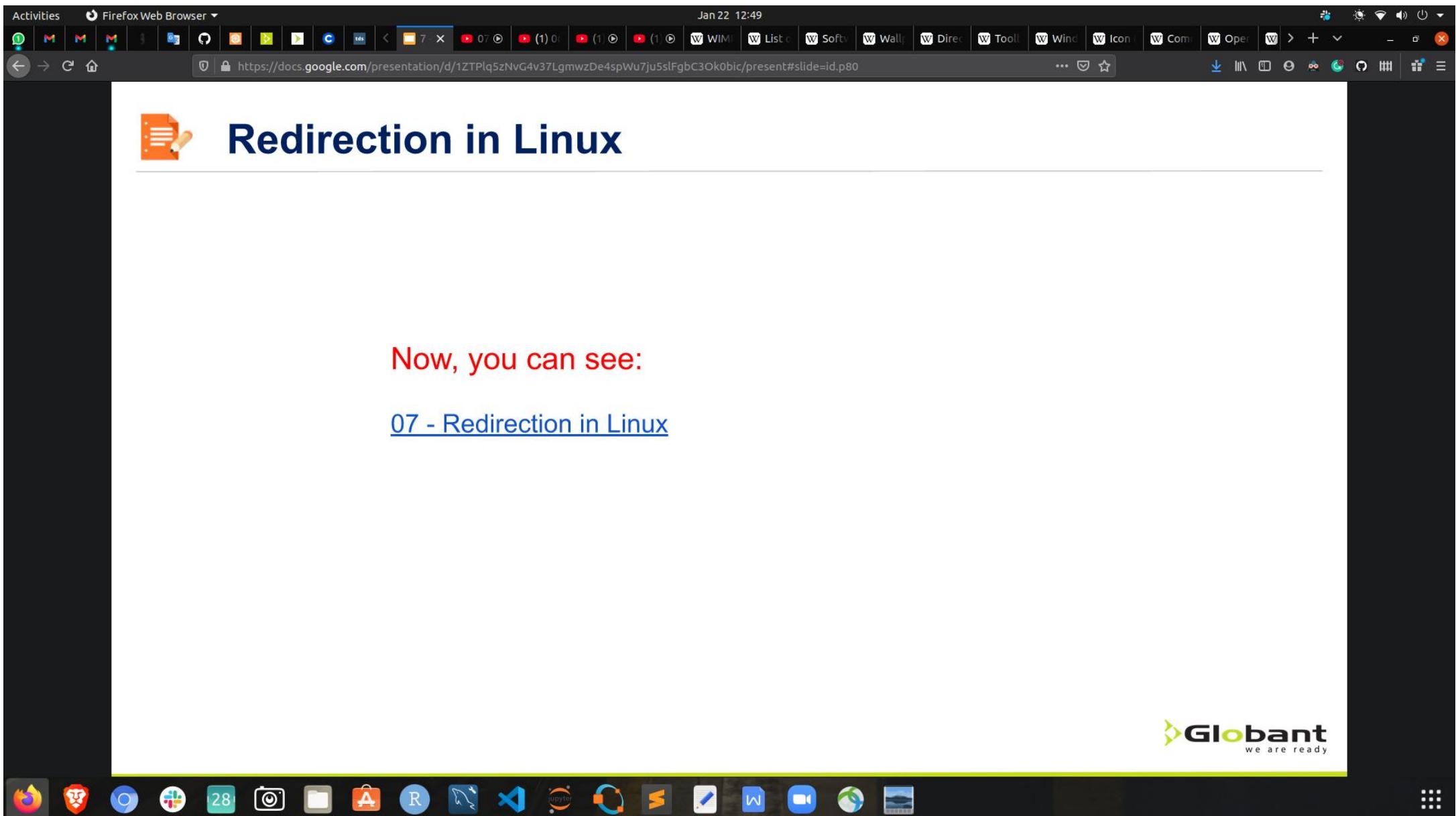
Comparison of common DOS and Linux Commands (cont)

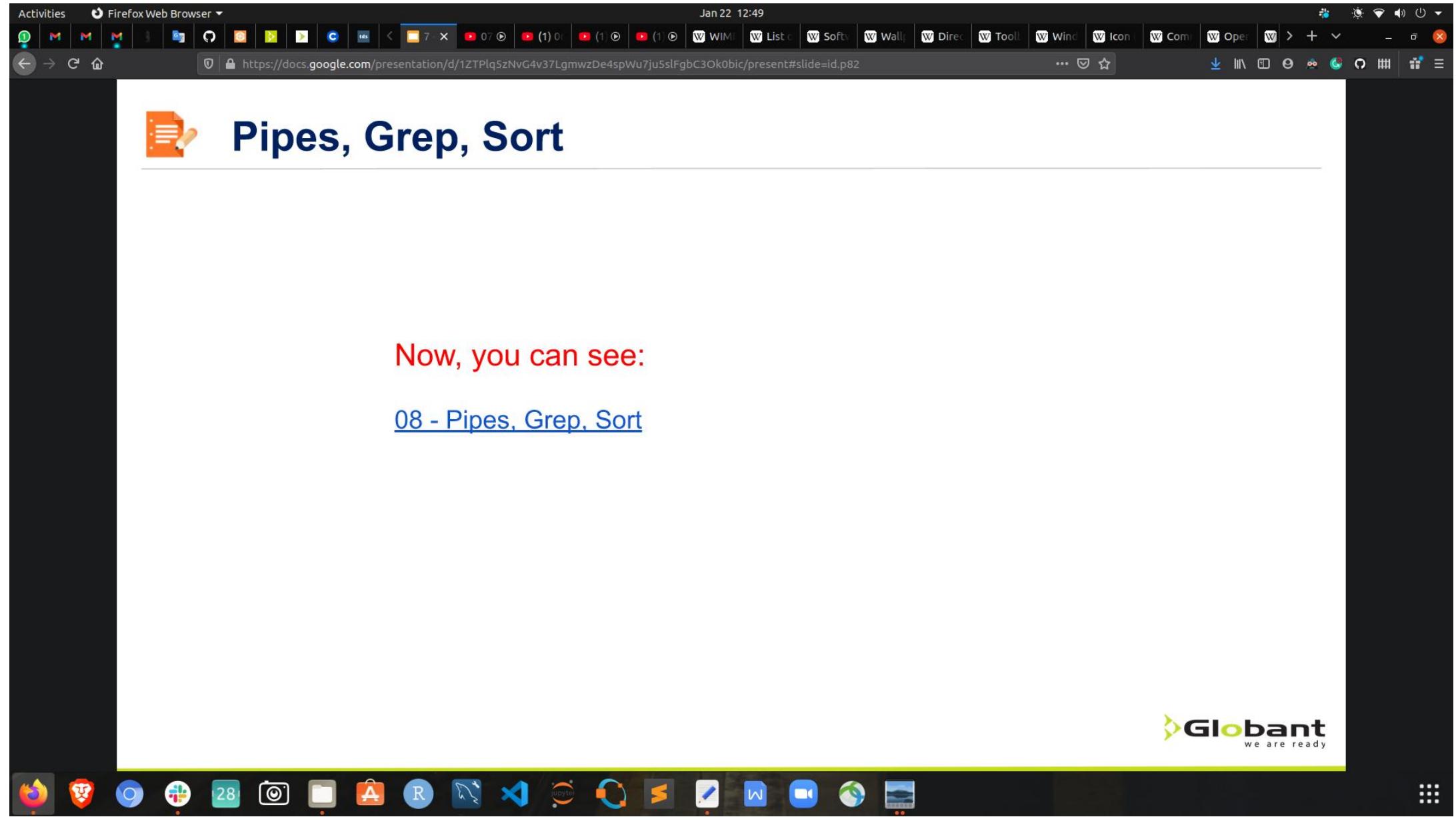
Compares the contents of files	fc	diff	diff <i>file1 file2</i>
Finds a string of text in a file	find	grep	grep <i>word or phrase thisfile.txt</i>
Formats a disk	format c: (if disk is in C:)	mke2fs	/sbin/mke2fs /dev/hd0 (/dev/hd0 is the Linux equivalent of C:)
Displays command help	<i>command /?</i>	man or info	man <i>command</i>
Creates a directory	mkdir	mkdir	mkdir <i>directory</i>
Views contents of a file	more	less([b])	less <i>thisfile.txt</i>
Renames a file	ren	mv([c])	mv <i>thisfile.txt thatfile.txt</i>

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Firefox Camera Jupyter R VSCode Jupyter Notebook Scribble WPS Office Video Player World Map









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Other useful Linux commands (cont)

ftp hostname
Opens an FTP connection to the specified host, allowing files to be transferred. The FTP program provides subcommands for accomplishing file transfers; see the online documentation.

head files - Prints the first several lines of each specified file.

kill process_ids

kill - signal process_ids

man title

ping host - Sends an echo request via TCP/IP to the specified host. A response confirms that the host is operational.

reboot - Reboots the system (requires root privileges).

shutdown minutes

sleep time - Causes the command interpreter to pause for the specified number of seconds.

sort files - Sorts the specified files. The command has many useful arguments; see the online documentation.

split file - Splits a file into several smaller files. The command has many arguments; see the online documentation

sync - Completes all pending input/output operations (requires root privileges).

telnet host - Opens a login session on the specified host.

top - Prints a display of system processes that's continually updated until the user presses the q key.

traceroute host - Uses echo requests to determine and print a network path to the host.

uptime - Prints the system uptime.

w - Prints the current system users.

wall - Prints a message to each user except those who've disabled message reception. Type Ctrl-D to end the message.



Firefox 28 R jupyter S W V M G

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What is Shell Scripting?

Normally shells are interactive. It means shell accept command from you (via keyboard) and execute them. But if you use command one by one (sequence of 'n' number of commands) then you can store this sequence of command to text file and tell the shell to execute this text file instead of entering the commands. This is known as ***shell script***.

Shell script defined as:

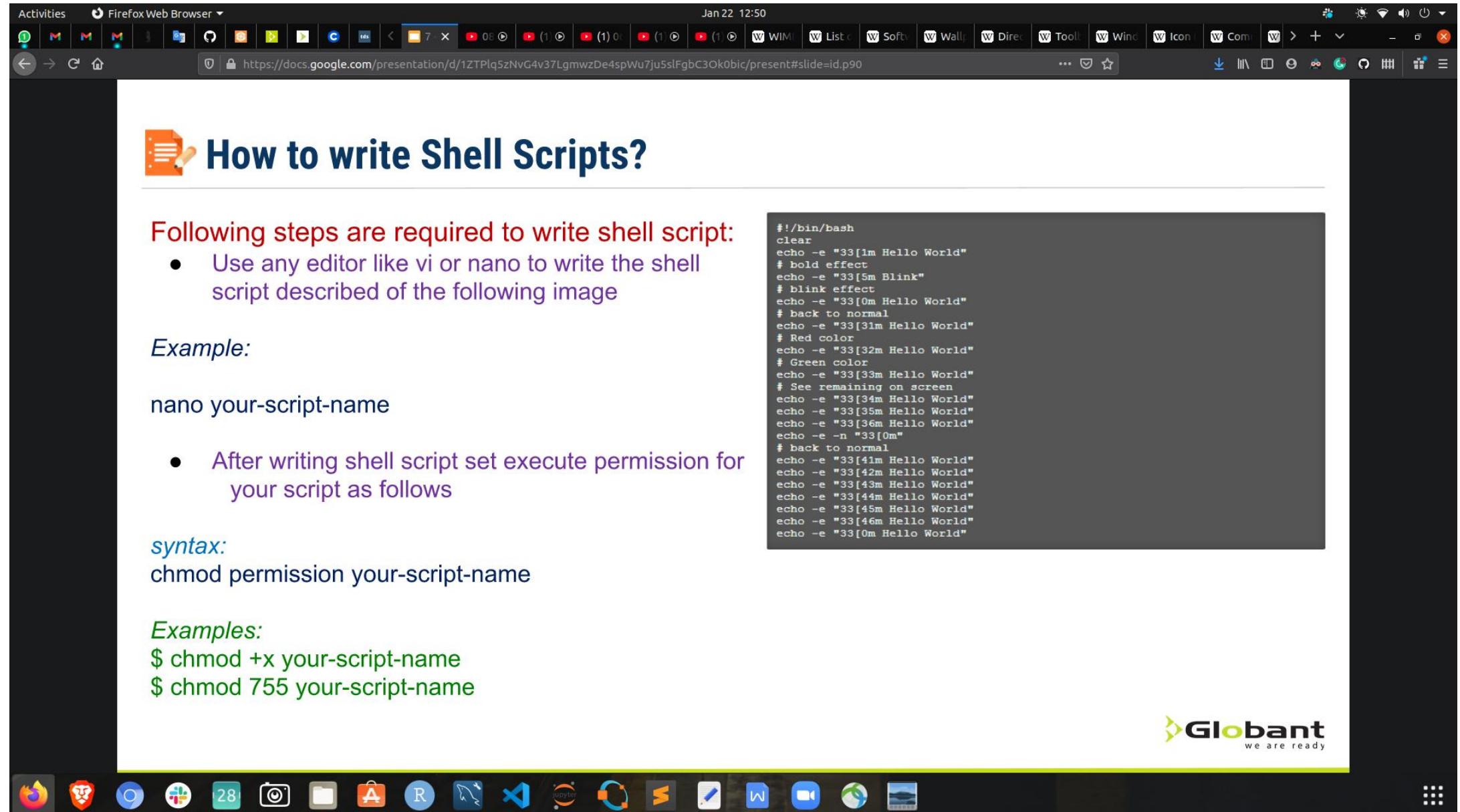
"Shell Script is series of command written in plain text file. Shell script is just like batch file is MS-DOS but have more power than the MS-DOS batch file."

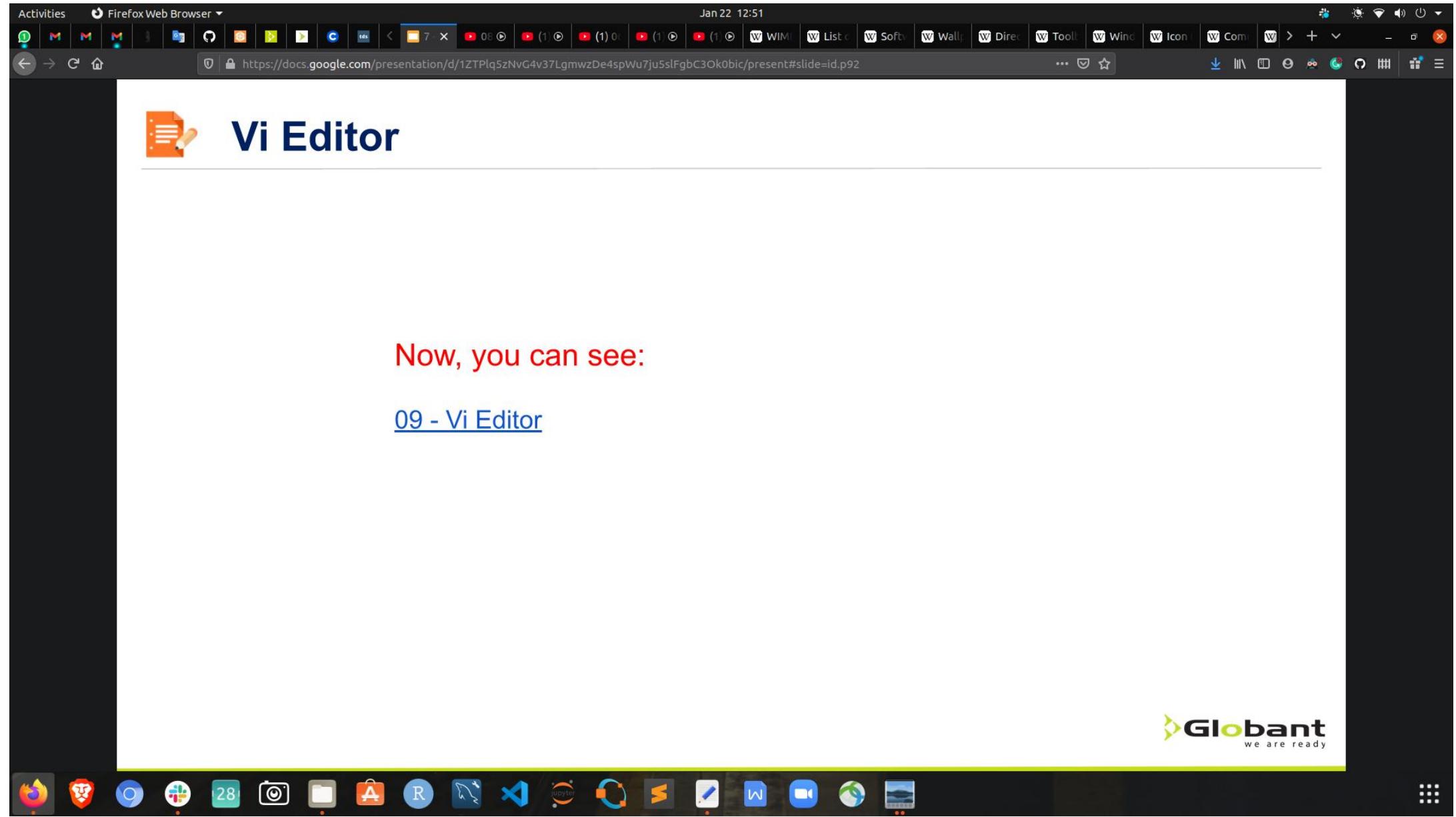
Why to Write Shell Script ?

- Shell script can take input from user, file and output them on screen.
- Useful to create our own commands.
- Save lots of time.
- To automate some task of day today life.
- System Administration part can be also automated.



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How to write Shell Scripts? (cont)

Sample Output

- Execute your script as *syntax:*

bash your-script-name
sh your-script-name
.your-script-name
Examples:
\$ bash bar
\$ sh bar
\$./bar

```
[root@tecmint ~]# chmod 755 Colorfull.sh
[root@tecmint ~]# ./Colorfull.sh

Hello World
Blink
Hello World
```

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