

# What is Linux?

Just like Windows XP, Windows 7, Windows 8, and Mac OS X, Linux is an operating system based on UNIX that was created in 1991 by Linus Torvalds. An operating system is software that manages all the hardware resources associated with your desktop or laptop. Linux can operate on Personal computers, mobile devices, embedded devices, servers, mainframes, supercomputers, etc.

Linux is an operating system's kernel. You might have heard of UNIX. Well, Linux is a UNIX clone. But it was created by Linus Torvalds from Scratch. Linux is free and open-source, that means that you can simply change anything in Linux and redistribute it in your own name! There are several Linux Distributions, commonly called “distros”.

**Ubuntu Linux**

Red Hat Enterprise Linux

Linux Mint

Debian

Fedora

Linux is Mainly used in servers. About 90% of the internet is powered by Linux servers. This is because Linux is fast, secure, and free! The main problem of using Windows servers are their cost. This is solved by using Linux servers. The OS that runs in about 80% of the smartphones in the world, Android, is also made from the Linux kernel. Most of the viruses in the world run on Windows, but not on Linux!

**Linux Shell or “Terminal”**

So, basically, a shell is a program that receives commands from the user and gives it to the OS to process, and it shows the output. Linux's shell is its main part. Its distros come in GUI (graphical user interface), but basically, Linux has a CLI (command line interface). In this tutorial, we are going to cover the basic commands that we use in the shell of Linux.



To open the terminal, press Ctrl+Alt+T in Ubuntu, or press Alt+F2, type in gnome-terminal, and press enter. In Raspberry Pi, type in lxterminal. There is also a GUI way of taking it, but this is better!

# Why Linux?

**1. Total cost of ownership**

The most obvious advantage is that Linux is free whereas Windows is not. Windows license cost is different for both desktop and server versions. In case of Linux OS either it can be desktop or server, distro comes with no cost. Not only the OS even the related applications are completely free and open source.

For personal use, a single Windows OS license fee may appear inexpensive but when considered for business, more employees mean more cost. Not only the OS license cost, organization need to be ready to pay for applications like MS Office, Exchange, SharePoint that run on Windows.

In Windows world, you cannot modify the OS as its source code is not open source. Same is the case with proprietary applications running on it. However, in case of Linux, a user can download even the source code of a Linux OS, change it and use it spending no money. Though some Linux distros charge for support, they are inexpensive when compared to Windows license price.

**2. Beginner friendly and easy to use**

Windows OS is one of the simplest desktop OS available today. Its graphical user-friendliness is exceptional. Though Windows has a relatively minimal learning curve, Linux distros like Ubuntu, Elementary OS, Linux Mint etc. are striving to improve the user experience that makes transition from Windows to Linux become smooth and easy. Linux distros allow user to choose one of the various desktop environments available: Cinnamon, MATE, KDE, Xfce, LXDE, GNOME etc. If a Windows user is looking to migrate to Linux, WINE (Wine Is Not an Emulator) can be installed to have a feel of MS Windows on a Linux system.

**3. Reliability**

Linux is more reliable when compared to Windows. Linux will rock with its top-notch design, built-in security resulting un-parallel up-time. Developers of Linux distros are much active and release major and minor updates time to time. Traditionally Unix-like systems are known for running for years without a single failure or having a situation which demands a restart. This is an important factor especially choosing a server system. Definitely Linux being a UNIX-like system, it will be a better choice.

**4. Hardware**

Linux better hardware support

Linux systems are known for consuming fewer system resources (RAM, disk space etc.) when compared to Windows. Hardware vendors already realized the popularity of Linux and started making Linux compliant hardware/drivers. When running the OS on older hardware, Windows is slower.

Linux distros like Ubuntu, Knoppix, LXLE, antiX, Puppy Linux are best suitable for aging machines. Old horses like 386 or 486 machines with decent RAM (>= 124/256) can run Linux.

**5. Software**

No doubt that Windows has a large set of commercial software available. Linux, on the other hand, makes use of open source software available for free. Linux armed with easy to use package managers which aid in installing and un-installing desired software applications. Linux is armed with decent desktop themes certainly run faster than Windows.

For developers, the Linux terminal offers superior environment when compared to Windows. The exhaustive GNU compilers and utilities will be useful for programming. Administrators can make use of package managers to manage software and of course, Linux has the unbeatable CLI interface.

Have you heard about Tiny Core Linux? It comes at only 11MB size with the graphical desktop environment. You can choose to install from the hundreds of available Linux distros based on your need. Following table presents a partial list of Linux distros filtered based on need:

**6. Security**

Microsoft Windows OS is infamous for being vulnerable to malware, trojans, and viruses. Linux is almost non-vulnerable and more secure due to its inherent design. Linux does not require the use of commercial anti-virus/anti-malware packages.

Linux respects privacy. Unlike windows, it does not generate logs and upload data from your machine. A user should be aware of Windows privacy policy.

**7. Freedom**

Linux can be installed and used it as a desktop, firewall, a file server, or a web server. Linux allows a user to control every aspect of the operating systems. As Linux is an open-source operating system, it allows a user to modify its source (even source code of applications) itself as per the user requirements. Linux allows the user to install only the desired software nothing else (no bloatware). Linux allows full freedom to install open source applications its vast repository. Windows will bore you with its default desktop theme whereas with Linux you can choose from many desktop themes available.

​You can breathe fresh air after choosing a Linux distro from an available list of Linux distros.

With USB live-mode option, you can give a try to test a Linux distro before you finalize one for you. Booting via live-mode does not install the OS on a hard disk. Just go and give a try, you will fall in love.

**8. Annoying crashes and reboots**

There are times when Windows suddenly shows an annoying message saying that the machine needs to be restarted. Apart from showing “Applying update of 5 of 361.” kind messages, Windows will confuse you with several types of updates critical, security, definition, update rollup, service pack, tool, feature pack. I did not remember how many times the Windows rebooted last time to apply an update.

When undergoing a software update or installing/uninstalling software on Linux systems, generally it does not need a machine reboot. Most of the system configuration changes can be done while the system is up.

**9. Server segment**

Linux is installed on majority of servers demonstrating that it is the best choice with the minimal resource footprint. Even rivals are using Linux on their offerings. As software applications are moving to cloud platforms, windows servers are getting phased out to make room for Linux servers. Majority of the supercomputers to run on Linux.

Though the battle between Linux and Windows continue in desktop-segment when comes to server-segment Linux evolves as a clear winner. Organizations rely on servers because they want their applications to run 24x7x365 with no or limited downtime. Linux already became favorite of most of the datacenters.

**10. Linux is everywhere**

Yes, Linux is everywhere. From smallest device to largest supercomputers, Linux is everywhere. It can be a car, router, phone, medical devices, plane, TV, satellite, watch or school tablet, Linux will be there.

The inventor Linus Torvalds himself would not have imagined about this kind of success when he was writing the Linux kernel first time. Kudos to Linus and Stallman for their contribution.

**Linux Commands**

**I. Basic Commands**

**1. pwd**

When you first open the terminal, you are in the home directory of your user. To know which directory you are in, you can use the “pwd” command. It gives us the absolute path, which means the path that starts from the root. The root is the base of the Linux file system. It is denoted by a forward slash (/). The user directory is usually something like "/home/username".

**2. ls**

Use the "Is" command to know what files are in the directory you are in. You can see all the hidden files by using the command “ls -a”.

**3. cd**

Use the "cd" command to go to a directory. For example, if you are in the home folder, and you want to go to the downloads folder, then you can type in “cd Downloads”. Remember, this command is case sensitive, and you must type in the name of the folder exactly as it is. But there is a problem with these commands. Imagine you have a folder named “Raspberry Pi”. In this case, when you type in “cd Raspberry Pi”, the shell will take the second argument of the command as a different one, so you will get an error saying that the directory does not exist. Here, you can use a backward slash. That is, you can use “cd Raspberry\ Pi” in this case. Spaces are denoted like this: If you just type “cd” and press enter, it takes you to the home directory. To go back from a folder to the folder before that, you can type “cd ..” . The two dots represent back.

**4.** **mkdir & rmdir**

Use the mkdir command when you need to create a folder or a directory. For example, if you want to make a directory called “DIY”, then you can type “mkdir DIY”. Remember, as told before, if you want to create a directory named “DIY Hacking”, then you can type “mkdir DIY\ Hacking”. Use rmdir to delete a directory. But rmdir can only be used to delete an empty directory. To delete a directory containing files, use rm.

**5. rm**

Use the rm command to delete files and directories. But rm cannot simply delete a directory. Use “rm -r” to delete a directory. In this case, it deletes both the folder and the files in it.

**6. touch**

The touch command is used to create a file. It can be anything, from an empty txt file to an empty zip file. For example, “touch new.txt”.

**7. man & --help**

To know more about a command and how to use it, use the man command. It shows the manual pages of the command. For example, “man cd” shows the manual pages of the cd command. Typing in the command name and the argument helps it show which ways the command can be used (e.g., cd –help).

**8. cp**

Use the cp command to copy files through the command line. It takes two arguments: The first is the location of the file to be copied, the second is where to copy.

**9. mv**

Use the mv command to move files through the command line. We can also use the mv command to rename a file. For example, if we want to rename the file “text” to “new”, we can use “mv text new”. It takes the two arguments, just like the cp command.

**10. locate**

The locate command is used to locate a file in a Linux system, just like the search command in Windows. This command is useful when you don't know where a file is saved or the actual name of the file. Using the -i argument with the command helps to ignore the case (it doesn't matter if it is uppercase or lowercase). So, if you want a file that has the word “hello”, it gives the list of all the files in your Linux system containing the word "hello" when you type in “locate -i hello”. If you remember two words, you can separate them using an asterisk (\*). For example, to locate a file containing the words "hello" and "this", you can use the command “locate -i \*hello\*this”.

**II. Intermediate Commands**

**1. echo**

The "echo" command helps us move some data, usually text into a file. For example, if you want to create a new text file or add to an already made text file, you just need to type in, “echo hello, my name is alok >> new.txt”. You do not need to separate the spaces by using the backward slash here, because we put in two triangular brackets when we finish what we need to write.

**2. cat**

Use the cat command to display the contents of a file. It is usually used to easily view programs.

**3. nano, vi, jed**

nano and vi are already installed text editors in the Linux command line. The nano command is a good text editor that denotes keywords with color and can recognize most languages. And vi is simpler than nano. You can create a new file or modify a file using this editor. For example, if you need to make a new file named "check.txt", you can create it by using the command “nano check.txt”. You can save your files after editing by using the sequence Ctrl+X, then Y (or N for no). In my experience, using nano for HTML editing doesn't seem as good, because of its color, so I recommend jed text editor. We will come to installing packages soon.

**4. sudo**

A widely used command in the Linux command line, sudo stands for "SuperUser Do". So, if you want any command to be done with administrative or root privileges, you can use the sudo command. For example, if you want to edit a file like viz. alsa-base.conf, which needs root permissions, you can use the command – sudo nano alsa-base.conf. You can enter the root command line using the command “sudo bash”, then type in your user password. You can also use the command “su” to do this, but you need to set a root password before that. For that, you can use the command “sudo passwd”(not misspelled, it is passwd). Then type in the new root password.

**5. df**

Use the df command to see the available disk space in each of the partitions in your system. You can just type in df in the command line and you can see each mounted partition and their used/available space in % and in KBs. If you want it shown in megabytes, you can use the command “df -m”.

**6. du**

Use du to know the disk usage of a file in your system. If you want to know the disk usage for a particular folder or file in Linux, you can type in the command df and the name of the folder or file. For example, if you want to know the disk space used by the documents folder in Linux, you can use the command “du Documents”. You can also use the command “ls -lah” to view the file sizes of all the files in a folder.

**7. tar**

Use tar to work with tarballs (or files compressed in a tarball archive) in the Linux command line. It has a long list of uses. It can be used to compress and uncompress different types of tar archives like .tar, .tar.gz, .tar.bz2,etc. It works on the basis of the arguments given to it. For example, "tar -cvf" for creating a .tar archive, -xvf to untar a tar archive, -tvf to list the contents of the archive, etc. Since it is a wide topic, here are some examples of tar commands.

**8. zip, unzip**

Use zip to compress files into a zip archive, and unzip to extract files from a zip archive.

**9. uname**

Use uname to show the information about the system your Linux distro is running. Using the command “uname -a” prints most of the information about the system. This prints the kernel release date, version, processor type, etc.

**10. apt-get**

Use apt to work with packages in the Linux command line. Use apt-get to install packages. This requires root privileges, so use the sudo command with it. For example, if you want to install the text editor jed (as I mentioned earlier), we can type in the command “sudo apt-get install jed”. Similarly, any packages can be installed like this. It is good to update your repository each time you try to install a new package. You can do that by typing “sudo apt-get update”. You can upgrade the system by typing “sudo apt-get upgrade”. We can also upgrade the distro by typing “sudo apt-get dist-upgrade”. The command “apt-cache search” is used to search for a package. If you want to search for one, you can type in “apt-cache search jed”(this doesn't require root).

**11. chmod**

Use chmod to make a file executable and to change the permissions granted to it in Linux. Imagine you have a python code named numbers.py in your computer. You'll need to run “python numbers.py” every time you need to run it. Instead of that, when you make it executable, you'll just need to run “numbers.py” in the terminal to run the file. To make a file executable, you can use the command “chmod +x numbers.py” in this case. You can use “chmod 755 numbers.py” to give it root permissions or “sudo chmod +x numbers.py” for root executable. Here is some more information about the chmod command.

**12. hostname**

Use hostname to know your name in your host or network. Basically, it displays your hostname and IP address. Just typing “hostname” gives the output. Typing in “hostname -I” gives you your IP address in your network.

**13. ping**

Use ping to check your connection to a server. Wikipedia says, "Ping is a computer network administration software utility used to test the reachability of a host on an Internet Protocol (IP) network". Simply, when you type in, for example, “ping google.com”, it checks if it can connect to the server and come back. It measures this round-trip time and gives you the details about it. The use of this command for simple users like us is to check your internet connection. If it pings the Google server (in this case), you can confirm that your internet connection is active!

**Tips and Tricks for Using Linux Command Line**

* You can use the clear command to clear the terminal if it gets filled up with too many commands.
* TAB can be used to fill up in terminal. For example, you just need to type “cd Doc” and then TAB and the terminal fills the rest up and makes it “cd Documents”.
* Ctrl+C can be used to stop any command in terminal safely. If it doesn't stop with that, then Ctrl+Z can be used to force stop it.
* You can exit from the terminal by using the exit command.
* You can power off or reboot the computer by using the command sudo halt and sudo reboot.