**Docker Basic Commands:**

|  |  |
| --- | --- |
| Command | Description |
| ***docker run hello world*** | To create a Docker container, download the ‘hello world’ image, by typing the following command in the terminal |
| ***docker images*** | For checking the number of images on your system, use the following command |
| ***docker search <image>*** | For searching an image in the Docker Hub |
| ***docker attach*** | Attach local standard input, output, and error streams to a running container |
| ***docker build*** | Build an image from a Dockerfile |
| ***docker builder*** | Manage builds |
| ***docker checkpoint*** | Manage checkpoints |
| ***docker commit*** | Create a new image from a container’s changes |
| ***docker config*** | Manage Docker configs |
| ***docker container*** | Manage containers |
| ***docker cp*** | Copy files/folders between a container and the local filesystem |
| ***docker create*** | Create a new container |
| ***docker deploy*** | Deploy a new stack or update an existing stack |
| ***docker diff*** | Inspect changes to files or directories on a container’s filesystem |
| ***docker engine*** | Manage the docker engine |
| ***docker events*** | Get real time events from the server |
| ***docker exec*** | Run a command in a running container |
| ***docker export*** | Export a container’s filesystem as a tar archive |
| ***docker history*** | Show the history of an image |
| ***docker image*** | Manage images |
| ***docker images*** | List images |
| ***docker import*** | Import the contents from a tarball to create a filesystem image |
| ***docker info*** | Display system-wide information |
| ***docker inspect*** | Return low-level information on Docker objects |
| ***docker kill*** | Kill one or more running containers |
| ***docker load*** | Load an image from a tar archive or STDIN |
| ***docker login*** | Log in to a Docker registry |
| ***docker logout*** | Log out from a Docker registry |
| ***docker logs*** | Fetch the logs of a container |
| ***docker manifest*** | Manage Docker image manifests and manifest lists |
| ***docker network*** | Manage networks |
| ***docker node*** | Manage Swarm nodes |
| ***docker pause*** | Pause all processes within one or more containers |
| ***docker plugin*** | Manage plugins |
| ***docker port*** | List port mappings or a specific mapping for the container |
| ***docker ps*** | List containers |
| ***docker pull*** | Pull an image or a repository from a registry |
| ***docker push*** | Push an image or a repository to a registry |
| ***docker rename*** | Rename a container |
| ***docker restart*** | Restart one or more containers |
| ***docker rm*** | Remove one or more containers |
| ***docker rmi*** | Remove one or more images |
| ***docker run*** | Run a command in a new container |
| ***docker save*** | Save one or more images to a tar archive (streamed to STDOUT by default) |
| ***docker search*** | Search the Docker Hub for images |
| ***docker secret*** | Manage Docker secrets |
| ***docker service*** | Manage services |
| ***docker stack*** | Manage Docker stacks |
| ***docker start*** | Start one or more stopped containers |
| ***docker stats*** | Display a live stream of container(s) resource usage statistics |
| ***docker stop*** | Stop one or more running containers |
| ***docker swarm*** | Manage Swarm |
| ***docker system*** | Manage Docker |
| ***docker tag*** | Create a tag TARGET\_IMAGE that refers to SOURCE\_IMAGE |
| ***docker top*** | Display the running processes of a container |
| ***docker trust*** | Manage trust on Docker images |
| ***docker unpause*** | Unpause all processes within one or more containers |
| ***docker update*** | Update configuration of one or more containers |
| ***docker version*** | Show the Docker version information |
| ***docker volume*** | Manage volumes |
| ***docker wait*** | Block until one or more containers stop, then print their exit codes |

**IP routing:** It is the process of sending packets from a host on one network to another host on a different remote network.

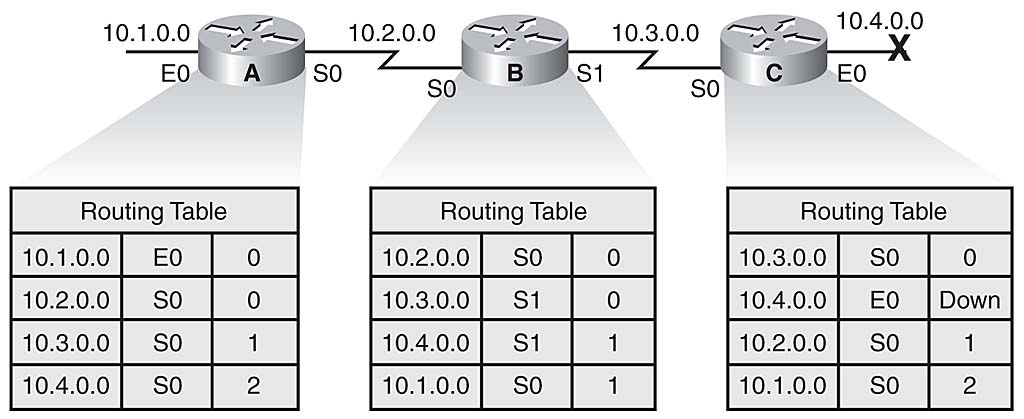
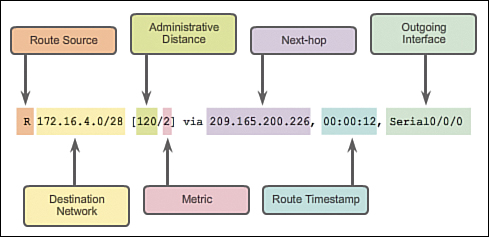
This process is done by routers. Routers examine the destination IP address of a packet, determines next hop address and forward the packet.

Each router maintains a routing table and stores it in RAM. A routing table is used by routers to determine the path to the destination network. Each routing table consists of the following entries:

* network destination and subnet mask – specifies a range of IP addresses.
* remote router – IP address of the router used to reach that network.
* outgoing interface – outgoing interface the packet should go out to reach the destination network

There are three different methods for populating a routing table:

* directly connected subnets
* using static routing
* using dynamic routing



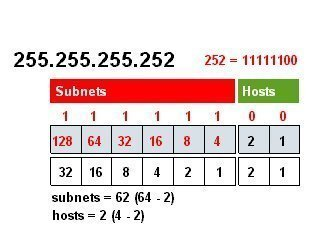
**Subnet Mask:**

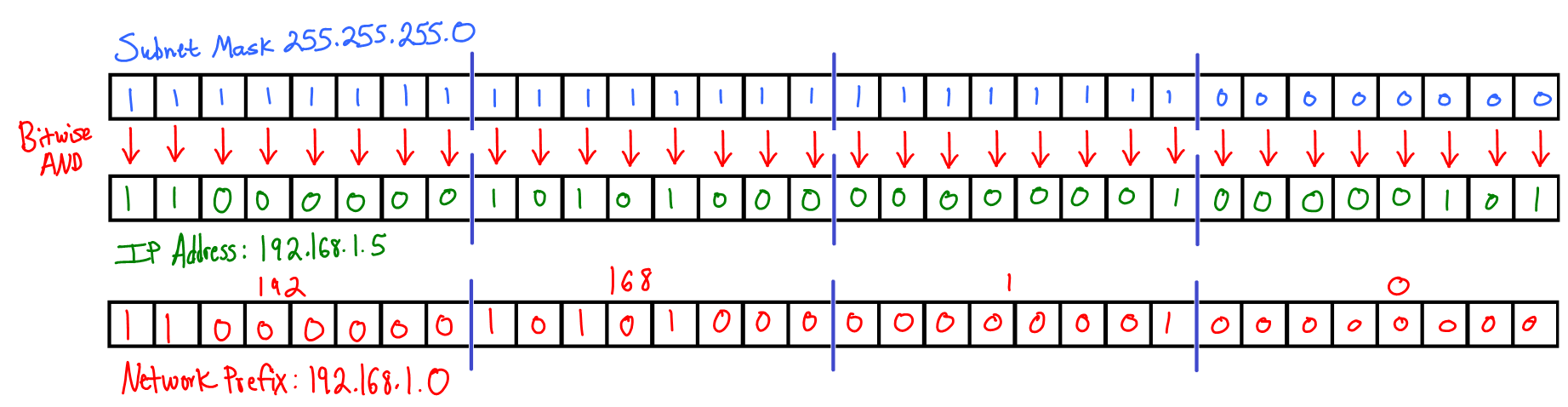
A subnet mask is a number that defines a range of IP addresses that can be used in a network. (It is not something you wear on your head to keep subnets out.) Subnet masks are used to designate subnetworks, or subnets, which are typically local networks LANs that are connected to the Internet. Systems within the same subnet can communicate directly with each other, while systems on different subnets must communicate through a router. Therefore, subnetworks can be used to partition multiple networks and limit the traffic between them.

A subnet mask hides, or "masks," the network part of a system's IP address and leaves only the host part as the machine identifier. A common subnet mask for a Class C IP address is 255.255.255.0. Each section of the subnet mask can contain a number from 0 to 256, just like an IP address. Therefore, in the example above, the first three sections are full, meaning the IP addresses of computers within the subnet mask must be identical in the first three sections. The last section of each computer's IP address can be anything from 0 to 255. For example, the IP addresses 10.0.1.201 and 10.0.1.202 would be in the same subnet, while 10.0.2.201 would not. Therefore, a subnet mask of 255.255.255.0 allows for close to 256 unique hosts within the network (since not all 256 IP addresses can be used).

**Advantages of using subnets**

* Improvements to network speed
* Reduced network congestion
* Efficiency gains for data delivery
* Improvements in network security
* Simplification of network administration
* Focused troubleshooting to just the subnet requiring support
* Barriers to data portability between subnets (e.g., departments or divisions of a company)





Find out how to give permissions to a folder through Chain modification?

***chmod permission-mask folder-path***

Basic commands: for file transfer, edit file, save, create, read and write file?

File transfer: ***ftp, nc***

Edit, save, create, read and write: ***vi***

How to install any software in Linux platform?

***apt install***

***apt-get install ${packagename}***

How to kill a process using PID?

***kill pid***

***ps aux | grep chrome***

where ps – process status, ‘a’ – list the processes of all users, ‘u’ ­­­­­– detailed info

How to create certificates (there is an open source for ssl where we can create ssl)?

***“let’s encrypt”*** gives free certificates

<https://www.javatpoint.com/linux-tutorial> for basic Linux commands

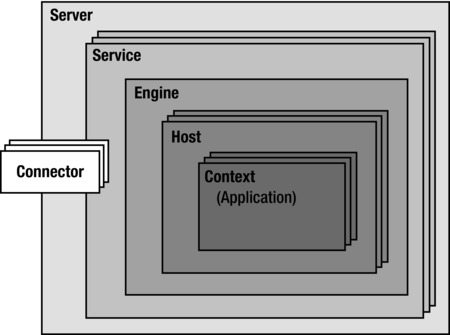
**Tomcat Server:**

Tomcat is a Servlet and JSP Server serving Java technologies. Tomcat is a servlet container and also offers a web server. A servlet, at the end, is a Java class. JSP files (which are similar to PHP, and older ASP files) are generated into Java code (HttpServlet), which is then compiled to .class files by the server and executed by the Java virtual machine. Tomcat's web server is quite good, able to handle most small and medium web site needs.

Tomcat is an application server from the Apache Software Foundation that executes Java servlets and renders Web pages that include Java Server Page coding. Described as a "reference implementation" of the Java Servlet and the Java Server Page specifications, Tomcat is the result of an open collaboration of developers and is available from the Apache Web site in both binary and source versions. Tomcat can be used as either a standalone product with its own internal Web server or together with other Web servers, including Apache, Netscape Enterprise Server, Microsoft Internet Information Server (IIS), and Microsoft Personal Web Server. Tomcat requires a Java Runtime Enterprise Environment that conforms to JRE 1.1 or later.

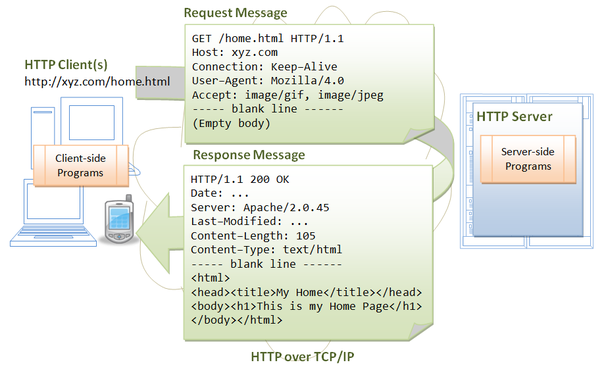
**Advantages of Tomcat:**

* It’s incredible lightweight
* It’s an open source
* It’s highly flexible
* Your server will be more stable
* It offers an extra level of security



<https://howtodoinjava.com/tomcat/tomcats-architecture-and-server-xml-configuration-tutorial/>

Apache Tomcat is a Java-capable HTTP server, HTTP is an application layer protocol runs over TCP/IP. The IP provides support for routing and addressing i.e., unique IP address on the Internet for machines. The syntax of the message is defined in the HTTP specification



Steps to configure apache tomcat:

**Step 1:** Create make sure you create a directory to keep all your project.

Example: you can create c:/mytomcatprojects file

**Step 2**: download and install tomcat

We refer to the below link to download your required version of tomcat:

[Apache Tomcat® - Welcome!](http://tomcat.apache.org/)

Unzip your file in the created directory (here c:/mytomcatprojects)

Set a variable JAVA\_HOME to Your JDK installed directory

**Step 3**: Configure Tomcat Server

Set TCP port number in the server.xml file

Enable directory listing in the web.xml file

Enable Automatic Reload context.xml

**Step 4:** start the tomcat server

Start server

Start a Client to Access the Tomcat Server

Shutdown server

**Step 5:** Develop and deploy the web application

Create a directory section for web application

Add an HTML file (here myfirsttry.html), you use the below code:

<html>

<head><title>My Home</title></head>

<body>

<h1> This is my home Page</h1>

</body>

</html>

**Step 6:** you can test it by giving filename in your browser as shown below

http://localhost:9699/filename/myfirsttry.html

Note: 9699 is the port number which is used here. Give your respective port number.

**Apache Server:**

Apache is a general-purpose http server, which supports several advanced options that Tomcat doesn't. Although Tomcat can be used as a general-purpose http server, you can also set up Apache and Tomcat to work together with Apache serving static content and forwarding the requests for dynamic content to Tomcat.

Web server [apache] process web client (web browsers) requests and forwards it to servlet container [tomcat] and container process the requests and sends response which gets forwarded by web server to the web client [browser].

**Linux Commands(A-Z)**

Linux Commands – A

|  |  |
| --- | --- |
| **Command** | **Description** |
| accept | Accept or Reject jobs to a destination, such as a printer. |
| access | Check a user’s RWX permission for a file. |
| aclocal | GNU autoconf too |
| aconnect | ALSA sequencer connection manager. |
| acpi | Show information about the Advanced Configuration and Power Interface. |
| acpi\_available | Check if ACPI functionality exists on the system. |
| acpid | Informs user-space programs about ACPI events. |
| addr2line | Used to convert addresses into file names and line numbers. |
| addresses | Formats for internet mail addresses. |
| agetty | An alternative Linux Getty |
| alias | Create an alias for Linux commands |
| alsactl | Access advanced controls for ALSA soundcard driver. |
| amidi | Perform read/write operation for ALSA RawMIDI ports. |
| amixer | Access CLI-based mixer for ALSA soundcard driver. |
| anacron | Used to run commands periodically. |
| aplay | Sound recorder and player for CLI. |
| aplaymidi | CLI utility used to play MIDI files. |
| apm | Show Advanced Power Management (APM) hardware info on older systems. |
| apmd | Used to handle events reported by APM BIOS drivers. |
| apropos | Shows the list of all man pages containing a specific keyword |
| apt | Advanced Package Tool, a package management system for Debian and derivatives. |
| apt-get | Command-line utility to install/remove/update packages based on APT system. |
| aptitude | Another utility to add/remove/upgrade packages based on the APT system. |
| ar | A utility to create/modify/extract from archives. |
| arch | Display print machine hardware name. |
| arecord | Just like aplay, it’s a sound recorder and player for ALSA soundcard driver. |
| arecordmidi | Record standard MIDI files. |
| arp | Used to make changes to the system’s ARP cache |
| as | A portable GNU assembler. |
| aspell | An interactive spell checker utility. |
| at | Used to schedule command execution at specified date & time, reading commands from an input file. |
| atd | Used to execute jobs queued by the at command. |
| atq | List a user’s pending jobs for the at command. |
| atrm | Delete jobs queued by the at command. |
| audiosend | Used to send an audio recording as an email. |
| aumix | An audio mixer utility. |
| autoconf | Generate configuration scripts from a TEMPLATE-FILE and send the output to standard output. |
| autoheader | Create a template header for configure. |
| automake | Creates GNU standards-compliant Makefiles from template files |
| autoreconf | Update generated configuration files. |
| autoscan | Generate a preliminary configure.in |
| autoupdate | Update a configure.in file to newer autoconf. |
| awk | Used to find and replace text in a file(s). |

Linux Commands – B

|  |  |
| --- | --- |
| **Command** | **Description** |
| badblocks | Search a disk partition for bad sectors. |
| banner | Used to print characters as a poster. |
| basename | Used to display filenames with directoy or suffix. |
| bash | GNU Bourne-Again Shell. |
| batch | Used to run commands entered on a standard input. |
| bc | Access the GNU bc calculator utility. |
| bg | Send processes to the background. |
| biff | Notify about incoming mail and sender’s name on a system running comsat server. |
| bind | Used to attach a name to a socket. |
| bison | A GNU parser generator, compatible with yacc. |
| break | Used to exit from a loop (eg: for, while, select). |
| builtin | Used to run shell builtin commands, make custom functions for commands extending their functionality. |
| bzcmp | Used to call the cmp program for bzip2 compressed files. |
| bzdiff | Used to call the diff program for bzip2 compressed files. |
| bzgrep | Used to call grep for bzip2 compressed files. |
| bzip2 | A block-sorting file compressor used to shrink given files. |
| bzless | Used to apply ‘less’ (show info one page at a time) to bzip2 compressed files. |
| bzmore | Used to apply ‘more’ (an inferior version of less) to bzip2 compressed files. |

Linux Commands – C

|  |  |
| --- | --- |
| **Command** | **Description** |
| cal | Show calendar. |
| cardctl | Used to control PCMCIA sockets and select configuration schemes. |
| cardmgr | Keeps an eye on the added/removes sockets for PCMCIA devices. |
| case | Execute a command conditionally by matching a pattern. |
| cat | Used to concatenate files and print them on the screen. |
| cc | GNU C and C++ compiler. |
| cd | Used to change directory. |
| cdda2wav | Used to rip a CD-ROM and make WAV file. |
| cdparanoia | Record audio from CD more reliably using data-verification algorithms. |
| cdrdao | Used to write all the content specified to a file to a CD all at once. |
| cdrecord | Used to record data or audio compact discs. |
| cfdisk | Show or change the disk partition table. |
| chage | Used to change user password information. |
| chattr | Used to change file attributes. |
| chdir | Used to change active working directory. |
| chfn | Used to change real user name and information. |
| chgrp | Used to change group ownership for file. |
| chkconfig | Manage execution of runlevel services. |
| chmod | Change access permission for a file(s). |
| chown | Change the owner or group for a file. |
| chpasswd | Update password in a batch. |
| chroot | Run a command with root privileges. |
| chrt | Alter process attributed in real-time. |
| chsh | Switch login shell. |
| chvt | Change foreground virtual terminal. |
| cksum | Perform a CRC checksum for files. |
| clear | Used to clear the terminal window. |
| cmp | Compare two files (byte by byte). |
| col | Filter reverse (and half-reverse) line feeds from the input. |
| colcrt | Filter nroff output for CRT previewing. |
| colrm | Remove columns from the lines of a file. |
| column | A utility that formats its input into columns. |
| comm | Used to compare two sorted files line by line. |
| command | Used to execute a command with arguments ignoring shell function named command. |
| compress | Used to compress one or more file(s) and replacing the originals ones. |
| continue | Resume the next iteration of a loop. |
| cp | Copy contents of one file to another. |
| cpio | Copy files from and to archives. |
| cpp | GNU C language processor. |
| cron | A daemon to execute scheduled commands. |
| crond | Same work as cron. |
| crontab | Manage crontab files (containing schedules commands) for users. |
| csplit | Split a file into sections on the basis of context lines. |
| ctags | Make a list of functions and macro names defined in a programming source file. |
| cupsd | A scheduler for CUPS. |
| curl | Used to transfer data from or to a server using supported protocols. |
| cut | Used to remove sections from each line of a file(s). |
| cvs | Concurrent Versions System. Used to track file versions, allow storage/retrieval of previous versions, and enables multiple users to work on the same file. |

Linux Commands – D

|  |  |
| --- | --- |
| **Command** | **Description** |
| date | Show system date and time. |
| dc | Desk calculator utility. |
| dd | Used to convert and copy a file, create disk clone, write disk headers, etc. |
| ddrescue | Used to recover data from a crashed partition. |
| deallocvt | Deallocates kernel memory for unused virtual consoles. |
| debugfs | File system debugger for ext2/ext3/ext4 |
| declare | Used to declare variables and assign attributes. |
| depmod | Generate modules.dep and map files. |
| devdump | Interactively displays the contents of device or file system ISO. |
| df | Show disk usage. |
| diff | Used to compare files line by line. |
| diff3 | Compare three files line by line. |
| dig | Domain Information Groper, a DNS lookup utility. |
| dir | List the contents of a directory. |
| dircolors | Set colors for ‘ls’ by altering the LS\_COLORS environment variable. |
| dirname | Display pathname after removing the last slash and characters thereafter. |
| dirs | Show the list of remembered directories. |
| disable | Restrict access to a printer. |
| dlpsh | Interactive Desktop Link Protocol (DLP) shell for PalmOS. |
| dmesg | Examine and control the kernel ring buffer. |
| dnsdomainname | Show the DNS domain name of the system. |
| dnssec-keygen | Generate encrypted Secure DNS keys for a given domain name. |
| dnssec-makekeyset | Produce domain key set from one or more DNS security keys generated by dnssec-keygen. |
| dnssec-signkey | Sign a secure DNS keyset with key signatures specified in the list of key-identifiers. |
| dnssec-signzone | Sign a secure DNS zonefile with the signatures in the specified list of key-identifiers. |
| doexec | Used to run an executable with an arbitrary argv list provided. |
| domainname | Show or set the name of current NIS (Network Information Services) domain. |
| dosfsck | Check and repair MS-DOS file systems. |
| du | Show disk usage summary for a file(s). |
| dump | Backup utility for ext2/ext3 file systems. |
| dumpe2fs | Dump ext2/ext3/ext4 file systems. |
| dumpkeys | Show information about the keyboard driver’s current translation tables. |

Linux Commands – E

|  |  |
| --- | --- |
| **Command** | **Desription** |
| e2fsck | Used to check ext2/ext3/ext4 file systems. |
| e2image | Store important ext2/ext3/ext4 filesystem metadata to a file. |
| e2label | Show or change the label on an ext2/ext3/ext4 filesystem. |
| echo | Send input string(s) to standard output i.e. display text on the screen. |
| ed | GNU Ed – a line-oriented text editor. |
| edquota | Used to edit filesystem quotas using a text editor, such as vi. |
| egrep | Search and display text matching a pattern. |
| eject | Eject removable media. |
| elvtune | Used to set latency in the elevator algorithm used to schedule I/O activities for specified block devices. |
| emacs | Emacs text editor command line utility. |
| enable | Used to enable/disable shell builtin commands. |
| env | Run a command in a modified environment. Show/set/delete environment variables. |
| envsubst | Substitute environment variable values in shell format strings. |
| esd | Start the Enlightenment Sound Daemon (EsounD or esd). Enables multiple applications to access the same audio device simultaneously. |
| esd-config | Manage EsounD configuration. |
| esdcat | Use EsounD to send audio data from a specified file. |
| esdctl | EsounD control program. |
| esddsp | Used to reroute non-esd audio data to esd and control all the audio using esd. |
| esdmon | Used to copy the sound being sent to a device. Also, send it to a secondary device. |
| esdplay | Use EsounD system to play a file. |
| esdrec | Use EsounD to record audio to a specified file. |
| esdsample | Sample audio using esd. |
| etags | Used to create a list of functions and macros from a programming source file. These etags are used by emacs. For vi, use ctags. |
| ethtool | Used to query and control network driver and hardware settings. |
| eval | Used to evaluate multiple commands or arguments are once. |
| ex | Interactive command |
| exec | An interactive line-based text editor. |
| exit | Exit from the terminal. |
| expand | Convert tabs into spaces in a given file and show the output. |
| expect | An extension to the Tcl script, it’s used to automate interaction with other applications based on their expected output. |
| export | Used to set an environment variable. |
| expr | Evaluate expressions and display them on standard output. |

Linux Commands – F

|  |  |
| --- | --- |
| **Command** | **Description** |
| factor | Display prime factors of specified integer numbers. |
| false | Do nothing, unsuccessfully. Exit with a status code indicating failure. |
| fc-cache | Make font information cache after scanning the directories. |
| fc-list | Show the list of available fonts. |
| fdformat | Do a low-level format on a floppy disk. |
| fdisk | Make changes to the disk partition table. |
| fetchmail | Fetch mail from mail servers and forward it to the local mail delivery system. |
| fg | Used to send a job to the foreground. |
| fgconsole | Display the number of the current virtual console. |
| fgrep | Display lines from a file(s) that match a specified string. A variant of grep. |
| file | Determine file type for a file. |
| find | Do a file search in a directory hierarchy. |
| finger | Display user data including the information listed in *.plan* and *.project*in each user’s home directory. |
| fingerd | Provides a network interface for the finger program. |
| flex | Generate programs that perform pattern-matching on text. |
| fmt | Used to convert text to a specified width by filling lines and removing new lines, displaying the output. |
| fold | Wrap input line to fit in a specified width. |
| for | Expand words and run commands for each one in the resultant list. |
| formail | Used to filter standard input into mailbox format. |
| format | Used to format disks. |
| free | Show free and used system memory. |
| fsck | Check and repair a Linux file system |
| ftp | File transfer protocol user interface. |
| ftpd | FTP server process. |
| function | Used to define function macros. |
| fuser | Find and kill a process accessing a file. |

Linux Commands – G

|  |  |
| --- | --- |
| **Command** | **Description** |
| g++ | Run the g++ compiler. |
| gawk | Used for pattern scanning and language processing. A GNU implementation of AWK language. |
| gcc | A C and C++ compiler by GNU. |
| gdb | A utility to debug programs and know about where it crashes. |
| getent | Shows entries from Name Service Switch Libraries for specified keys. |
| getkeycodes | Displays the kernel scancode-to-keycode mapping table. |
| getopts | A utility to parse positional parameters. |
| gpasswd | Allows an administrator to change group passwords. |
| gpg | Enables encryption and signing services as per the OpenPGP standard. |
| gpgsplit | Used to split an OpenPGP message into packets. |
| gpgv | Used to verify OpenPGP signatures. |
| gpm | It enables cut and paste functionality and a mouse server for the Linux console. |
| gprof | Shows call graph profile data. |
| grep | Searches input files for a given pattern and displays the relevant lines. |
| groff | Serves as the front-end of the groff document formatting system. |
| groffer | Displays groff files and man pages. |
| groupadd | Used to add a new user group. |
| groupdel | Used to remove a user group. |
| groupmod | Used to modify a group definition. |
| groups | Show the group(s) to which a user belongs. |
| grpck | Verifies the integrity of group files. |
| grpconv | Creates a gshadow file from a group or an already existing gshadow. |
| gs | Invokes Ghostscript, and interpreter and previewer for Adobe’s PostScript and PDF languages. |
| gunzip | A utility to compress/expand files. |
| gzexe | Used compress executable files in place and have them automatically uncompress and run at a later stage. |
| gzip | Same as gzip. |

Linux Commands – H

|  |  |
| --- | --- |
| **Command** | **Description** |
| halt | Command used to half the machine. |
| hash | Shows the path for the commands executed in the shell. |
| hdparm | Show/configure parameters for SATA/IDE devices. |
| head | Shows first 10 lines from each specified file. |
| help | Display’s help for a built-in command. |
| hexdump | Shows specified file output in hexadecimal, octal, decimal, or ASCII format. |
| history | Shows the command history. |
| host | A utility to perform DNS lookups. |
| hostid | Shows host’s numeric ID in hexadecimal format. |
| hostname | Display/set the hostname of the system. |
| htdigest | Manage the user authentication file used by the Apache web server. |
| htop | An interactive process viewer for the command line. |
| hwclock | Show or configure the system’s hardware clock. |

Linux Commands – I

|  |  |
| --- | --- |
| **Command** | **Description** |
| iconv | Convert text file from one encoding to another. |
| id | Show user and group information for a specified user. |
| if | Execute a command conditionally. |
| ifconfig | Used to configure network interfaces. |
| ifdown | Stops a network interface. |
| ifup | Starts a network interface. |
| imapd | An IMAP (Interactive Mail Access Protocol) server daemon. |
| import | Capture an X server screen and saves it as an image. |
| inetd | Extended internet services daemon, it starts the programs that provide internet services. |
| info | Used to read the documentation in Info format. |
| init | Systemd system and service manager. |
| insmod | A program that inserts a module into the Linux kernel. |
| install | Used to copy files to specified locations and set attributions during the install process. |
| iostat | Shows statistics for CPU, I/O devices, partitions, network filesystems. |
| ip | Display/manipulate routing, devices, policy, routing and tunnels. |
| ipcrm | Used to remove System V interprocess communication (IPC) objects and associated data structures. |
| ipcs | Show information on IPC facilities for which calling process has read access. |
| iptables | Administration tool for IPv4 packet filtering and NAT. |
| iptables-restore | Used to restore IP tables from data specified in the input or a file. |
| iptables-save | Used to dump IP table contents to standard output. |
| isodump | A utility that shows the content iso9660 images to verify the integrity of directory contents. |
| isoinfo | A utility to perform directory like listings of iso9660 images. |
| isosize | Show the length of an iso9660 filesystem contained in a specified file. |
| isovfy | Verifies the integrity of an iso9660 image. |
| ispell | A CLI-based spell-check utility. |

Linux Commands – J

|  |  |
| --- | --- |
| **Command** | **Description** |
| jobs | Show the list of active jobs and their status. |
| join | For each pair of input lines, join them using a command field and display on standard output. |

Linux Commands – K

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| --- | --- |
| **Command** | **Description** |
| kbd\_mode | Set a keyboard mode. Without arguments, shows the current keyboard mode. |
| kbdrate | Reset keyboard repeat rate and delay time. |
| kill | Send a kill (termination) signal to one more processes. |
| killall | Kills a process(es) running a specified command. |
| killall5 | A SystemV killall command. Kills all the processes excluding the ones which it depends on. |
| klogd | Control and prioritize the kernel messages to be displayed on the console, and log them through syslogd. |
| kudzu | Used to detect new and enhanced hardware by comparing it with existing database. Only for RHEL and derivates. |

Linux Commands – L

|  |  |
| --- | --- |
| **Command** | **Description** |
| last | Shows a list of recent logins on the system by fetching data from */var/log/wtmp* file. |
| lastb | Shows the list of bad login attempts by fetching data from */var/log/btmp*file. |
| lastlog | Displays information about the most recent login of all users or a specified user. |
| ld | The Unix linker, it combines archives and object files. It then puts them into one output file, resolving external references. |
| ldconfig | Configure dynamic linker run-time bindings. |
| ldd | Shows shared object dependencies. |
| less | Displays contents of a file one page at a time. It’s advanced than *more*command. |
| lesskey | Used to specify key bindings for less command. |
| let | Used to perform integer artithmetic on shell variables. |
| lftp | An FTP utility with extra features. |
| lftpget | Uses lftop to retrieve HTTP, FTP, and other protocol URLs supported by lftp. |
| link | Create links between two files. Similar to ln command. |
| ln | Create links between files. Links can be hard (two names for the same file) or soft (a shortcut of the first file). |
| loadkeys | Load keyboard translation tables. |
| local | Used to create function variables. |
| locale | Shows information about current or all locales. |
| locate | Used to find files by their name. |
| lockfile | Create semaphore file(s) which can be used to limit access to a file. |
| logger | Make entries in the system log. |
| login | Create a new session on the system. |
| logname | Shows the login name of the current user. |
| logout | Performs the logout operation by making changes to the utmp and wtmp files. |
| logrotate | Used for automatic rotation, compression, removal, and mailing of system log files. |
| look | Shows any lines in a file containing a given string in the beginning. |
| losetup | Set up and control loop devices. |
| lpadmin | Used to configure printer and class queues provided by CUPS (Common UNIX Printing System). |
| lpc | Line printer control program, it provides limited control over CUPS printer and class queues. |
| lpinfo | Shows the list of avaiable devices and drivers known to the CUPS server. |
| lpmove | Move on or more printing jobs to a new destination. |
| lpq | Shows current print queue status for a specified printer. |
| lpr | Used to submit files for printing. |
| lprint | Used to print a file. |
| lprintd | Used to abort a print job. |
| lprintq | List the print queue. |
| lprm | Cancel print jobs. |
| lpstat | Displays status information about current classes, jobs, and printers. |
| ls | Shows the list of files in the current directory. |
| lsattr | Shows file attributes on a Linux ext2 file system. |
| lsblk | Lists information about all available or the specified block devices. |
| lsmod | Show the status of modules in the Linux kernel. |
| lsof | List open files. |
| lspci | List all PCI devices. |
| lsusb | List USB devices. |

Linux Commands – M

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| --- | --- |
| **Command** | **Description** |
| m4 | Macro processor. |
| mail | Utility to compose, receive, send, forward, and reply to emails. |
| mailq | Shows to list all emails queued for delivery (sendmail queue). |
| mailstats | Shows current mail statistics. |
| mailto | Used to send mail with multimedia content in MIME format. |
| make | Utility to maintain groups of programs, recompile them if needed. |
| makedbm | Creates an NIS (Network Information Services) database map. |
| makemap | Creates database maps used by the keyed map lookups in sendmail. |
| man | Shows manual pages for Linux commands. |
| manpath | Determine search path for manual pages. |
| mattrib | Used to change MS-DOS file attribute flags. |
| mbadblocks | Checks MD-DOS filesystems for bad blocks. |
| mcat | Dump raw disk image. |
| mcd | Used to change MS-DOS directory. |
| mcopy | Used to copy MS-DOS files from or to Unix. |
| md5sum | Used to check MD5 checksum for a file. |
| mdel, mdeltree | Used to delete MS-DOS file. mdeltree recursively deletes MS-DOS directory and its contents. |
| mdir | Used to display an MS-DOS directory. |
| mdu | Used to display the amount of space occupied by an MS-DOS directory. |
| merge | Three-way file merge. Includes all changes from file2 and file3 to file1. |
| mesg | Allow/disallow osends to sedn write messages to your terminal. |
| metamail | For sending and showing rich text or multimedia email using MIME typing metadata. |
| metasend | An interface for sending non-text mail. |
| mformat | Used to add an MS-DOS filesystem to a low-level formatted floppy disk. |
| mimencode | Translate to/from MIME multimedia mail encoding formats. |
| minfo | Display parameters of an MS-DOS filesystem. |
| mkdir | Used to create directories. |
| mkdosfs | Used to create an MS-DOS filesystem under Linux. |
| mke2fs | Used create an ext2/ext3/ext4 filesystem. |
| mkfifo | Used to create named pipes (FIFOs) with the given names. |
| mkfs | Used to build a Linux filesystem on a hard disk partition. |
| mkfs.ext3 | Same as mke2fs, create an ext3 Linux filesystem. |
| mkisofs | Used to create an ISO9660/JOLIET/HFS hybrid filesystem. |
| mklost+found | Create a lost+found directory on a mounted ext2 filesystem. |
| mkmanifest | Makes a list of file names and their DOS 8.3 equivalent. |
| mknod | Create a FIFO, block (buffered) special file, character (unbuffered) special file with the specified name. |
| mkraid | Used to setup RAID device arrays. |
| mkswap | Set up a Linux swap area. |
| mktemp | Create a temporary file or directory. |
| mlabel | Make an MD-DOS volume label. |
| mmd | Make an MS-DOS subdirectory. |
| mmount | Mount an MS-DOS disk. |
| mmove | Move or rename an MS-DOS file or subdirectory. |
| mmv | Mass move and rename files. |
| modinfo | Show information about a Linux kernel module. |
| modprobe | Add or remove modules from the Linux kernel. |
| more | Display content of a file page-by-page. |
| most | Browse or page through a text file. |
| mount | Mount a filesystem. |
| mountd | NFS mount daemon. |
| mpartition | Partition an MS-DOS disk. |
| mpg123 | Command-line mp3 player. |
| mpg321 | Similar to mpg123. |
| mrd | Remove an MS-DOS subdirectory. |
| mren | Rename an existing MS-DOS file. |
| mshowfat | Show FTA clusters allocated to a file. |
| mt | Control magnetic tape drive operation. |
| mtools | Utilities to access MS-DOS disks. |
| mtoolstest | Tests and displays the mtools configuration files. |
| mtr | A network diagnostic tool. |
| mtype | Display contents of an MS-DOS file. |
| mv | Move/rename files or directories. |
| mzip | Change protection mode and eject disk on Zip/Jaz drive. |

Linux Commands – N

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| --- | --- |
| **Command** | **Description** |
| named | Internet domain name server. |
| namei | Follow a pathname until a terminal point is found. |
| nameif | Name network interfaces based on MAC addresses. |
| nc | Netcat utility. Arbitrary TCP and UDP connections and listens. |
| netstat | Show network information. |
| newaliases | Rebuilds mail alias database. |
| newgrp | Log-in to a new group. |
| newusers | Update/create new users in batch. |
| nfsd | Special filesystem for controlling Linux NFS server. |
| nfsstat | List NFS statistics. |
| nice | Run a program with modified scheduling priority. |
| nl | Show numbered line while displaying the contents of a file. |
| nm | List symbols from object files. |
| nohup | Run a command immune to hangups. |
| notify-send | A program to send desktop notifications. |
| nslookup | Used performs DNS queries. Read this article for more info. |
| nsupdate | Dynamic DNS update utility. |

Linux Commands – O

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| --- | --- |
| **Command** | **Description** |
| objcopy | Copy and translate object files. |
| objdump | Display information from object files. |
| od | Dump files in octal and other formats. |
| op | Operator access, allows system administrators to grant users access to certain root operations that require superuser privileges. |
| open | Open a file using its default application. |
| openvt | Start a program on a new virtual terminal (VT). |

Linux Commands – P

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| --- | --- |
| **Command** | **Description** |
| passwd | Change user password. |
| paste | Merge lines of files. Write to standard output, TAB-separated lines consisting of sqentially correspnding lines from each file. |
| patch | Apply a patchfile (containing differences listing by diff program) to an original file. |
| pathchk | Check if file names are valid or portable. |
| perl | Perl 5 language interpreter. |
| pgrep | List process IDs matching the specified criteria among all the running processes. |
| pidof | Find process ID of a running program. |
| ping | Send ICMP ECHO\_REQUEST to network hosts. |
| pinky | Lightweight finger. |
| pkill | Send kill signal to processes based on name and other attributes. |
| pmap | Report memory map of a process. |
| popd | Removes directory on the head of the directory stack and takes you to the new directory on the head. |
| portmap | Converts RPC program numbers to IP port numbers. |
| poweroff | Shuts down the machine. |
| pppd | Point-to-point protocol daemon. |
| pr | Convert (column or paginate) text files for printing. |
| praliases | Prints the current system mail aliases. |
| printcap | Printer capability database. |
| printenv | Show values of all or specified environment variables. |
| printf | Show arguments formatted according to a specified format. |
| ps | Report a snapshot of the current processes. |
| ptx | Produce a permuted index of file contents. |
| pushd | Appends a given directory name to the head of the stack and then cd to the given directory. |
| pv | Monitor progress of data through a pipe. |
| pwck | Verify integrity of password files. |
| pwconv | Creates shadow from passwd and an optionally existing shadow. |
| pwd | Show current directory. |
| python |  |

Linux Commands – Q

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| --- | --- |
| **Command** | **Description** |
| quota | Shows disk usage, and space limits for a user or group. Without arguments, only shows user quotas. |
| quotacheck | Used to scan a file system for disk usage. |
| quotactl | Make changes to disk quotas. |
| quotaoff | Enable enforcement of filesystem quotas. |
| quotaon | Disable enforcement of filesystem quotas. |
| quotastats | Shows the report of quota system statistics gathered from the kernel. |

Linux Commands – R

|  |  |
| --- | --- |
| **Command** | **Description** |
| raidstart | Start/stop RAID devices. |
| ram | RAM disk device used to access the RAM disk in raw mode. |
| ramsize | Show usage information for the RAM disk. |
| ranlib | Generate index to the contents of an archive and store it in the archive. |
| rar | Create and manage RAR file in Linux. |
| rarpd | Respond to Reverse Address Resoultion Protocol (RARP) requests. |
| rcp | Remote copy command to copy files between remote computers. |
| rdate | Set system date and time by fetching information from a remote machine. |
| rdev | Set or query RAM disk size, image root device, or video mode. |
| rdist | Remote file distribution client, maintains identical file copies over multiple hosts. |
| rdistd | Start the rdist server. |
| read | Read from a file descriptor. |
| readarray | Read lines from a file into an array variable. |
| readcd | Read/write compact disks. |
| readelf | Shows information about ELF (Executable and Linkable fomrat) files. |
| readlink | Display value of a symbolic link or canonical file name. |
| readonly | Mark functions and variables as read-only. |
| reboot | Restart the machine. |
| reject | Accept/reject print jobs sent to a specified destination. |
| remsync | Synchronize remote files over email. |
| rename | Rename one or more files. |
| renice | Change priority of active processes. |
| repquota | Report disk usage and quotas for a specified filesystem. |
| reset | Reinitialize the terminal. |
| resize2fs | Used to resize ext2/ext3/ext4 file systems. |
| restore | Restore files from a backup created using dump. |
| return | Exit a shell function. |
| rev | Show contents of a file, reversing the order of characters in every line. |
| rexec | Remote execution client for exec server. |
| rexecd | Remote execution server. |
| richtext | View “richtext” on an ACSII terminal. |
| rlogin | Used to connect a local host system with a remote host. |
| rlogind | Acts as the server for rlogin. It facilitates remote login, and authentication based on privileged port numbers from trusted hosts. |
| rm | Removes specified files and directories (not by default). |
| rmail | Handle remote mail received via uucp. |
| rmdir | Used to remove empty directories. |
| rmmod | A program to remove modules from Linux kernel. |
| rndc | Name server control utility. Send command to a BIND DNS server over a TCP connection. |
| rootflags | Show/set flags for the kernel image. |
| route | Show/change IP routing table. |
| routed | A daemon, invoked at boot time, to manage internet routing tables. |
| rpcgen | An RPC protocol compiler. Parse a file written in the RPC language. |
| rpcinfo | Shows RPC information. Makes an RPC call to an RPC server and reports the findings. |
| rpm | A package manager for linux distributions. Originally developed for RedHat Linux. |
| rsh | Remote shell. Connects to a specified host and executes commands. |
| rshd | A daemon that acts as a server for rsh and rcp commands. |
| rsync | A versitile to for copying files remotely and locally. |
| runlevel | Shows previous and current SysV runlevel. |
| rup | Remote status display. Shows current system status for all or specified hosts on the local network. |
| ruptime | Shows uptime and login details of the machines on the local network. |
| rusers | Shows the list of the users logged-in to the host or on all machines on the local network. |
| rusersd | The rsuerd daemon acts as a server that responds to the queries from rsuers command. |
| rwall | Sends messages to all users on the local network. |
| rwho | Reports who is logged-in to the hosts on the local network. |
| rwhod | Acts as a server for rwho and ruptime commands. |

Linux Commands – S

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| --- | --- |
| **Command** | **Description** |
| sane-find-scanner | Find SCSI and USB scanner and determine their device files. |
| scanadf | Retrieve multiple images from a scanner equipped with an automatic document feeder (ADF). |
| scanimage | Read images from image aquistion devices (scanner or camera) and display on standard output in PNM (Portable aNyMap) format. |
| scp | Copy files between hosts on a network securely using SSH. |
| screen | A window manager that enables multiple pseudo-terminals with the help of ANSI/VT100 terminal emulation. |
| script | Used to make a typescript of everything displayed on the screen during a terminal session. |
| sdiff | Shows two files side-by-side and highlights the differences. |
| sed | Stream editor for filtering and transforming text (from a file or a pipe input). |
| select | Synchronous I/O multiplexing. |
| sendmail | It’s a mail router or an MTA (Mail Transfer Agent). sendmail support can send a mail to one or more recepients using necessary protocols. |
| sensors | Shows the current readings of all sensor chips. |
| seq | Displays an incremental sequence of numbers from first to last. |
| set | Used to manipulate shell variables and functions. |
| setfdprm | Sets floppy disk parameters as provided by the user. |
| setkeycodes | Load kernel scancode-to-keycode mapping table entries. |
| setleds | Show/change LED light settings of the keyboard. |
| setmetamode | Define keyboard meta key handling. Without arguments, shows current meta key mode. |
| setquota | Set disk quotas for users and groups. |
| setsid | Run a program in a new session. |
| setterm | Set terminal attributes. |
| sftp | Secure File Transfer program. |
| sh | Command interpreter (shell) utility. |
| sha1sum | Compute and check 160-bit SHA1 checksum to verify file integrity. |
| shift | Shift positional parameters. |
| shopt | Shell options. |
| showkey | Examines codes sent by the keyboard displays them in printable form. |
| showmount | Shows information about NFS server mount on the host. |
| shred | Overwrite a file to hide its content (optionally delete it), making it harder to recover it. |
| shutdown | Power-off the machine. |
| size | Lists section size and the total size of a specified file. |
| skill | Send a signal to processes. |
| slabtop | Show kernel slab cache information in real-time. |
| slattach | Attack a network interface to a serial line. |
| sleep | Suspend execution for a specified amount of time (in seconds). |
| slocate | Display matches by searching filename databases. Takes ownership and file permission into consideration. |
| snice | Reset priority for processes. |
| sort | Sort lines of text files. |
| source | Run commands from a specified file. |
| split | Split a file into pieces of fixed size. |
| ss | Display socket statistics, similar to netstat. |
| ssh | An SSH client for logging in to a remote machine. It provides encrypted communication between the hosts. |
| ssh-add | Adds private key identities to the authentication agent. |
| ssh-agent | It holds private keys used for public key authentication. |
| ssh-keygen | It generates, manages, converts authentication keys for ssh. |
| ssh-keyscan | Gather ssh public keys. |
| sshd | Server for the ssh program. |
| stat | Display file or filesystem status. |
| statd | A daemon that listens for reboot notifications from other hosts, and manages the list of hosts to be notified when the local system reboots. |
| strace | Trace system calls and signals. |
| strfile | Create a random-access file for storing strings. |
| strings | Search a specified file and prints any printable strings with at least four characters and followed by an unprintable character. |
| strip | Discard symbols from object files. |
| stty | Change and print terminal line settings. |
| su | Change user ID or become superuser. |
| sudo | Execute a command as superuser. |
| sum | Checksum and count the block in a file. |
| suspend | Suspend the execution of the current shell. |
| swapoff | Disable devices for paging and swapping. |
| swapon | Enable devices for paging and swapping. |
| symlink | Create a symbolic link to a file. |
| sync | Synchronize cached writes to persistent storage. |
| sysctl | Configure kernel parameters at runtime. |
| sysklogd | Linux system logging utilities. Provides syslogd and klogd functionalities. |
| syslogd | Read and log system messages to the system console and log files. |

Linux Commands – T

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| --- | --- |
| **Command** | **Description** |
| tac | Concatenate and print files in reverse order. Opposite of cat command. |
| tail | Show the last 10 lines of each specified file(s). |
| tailf | Follow the growth of a log file. (Deprecated command) |
| talk | A two-way screen-oriented communication utility that allows two user to exchange messages simulateneously. |
| talkd | A remote user communication server for *talk*. |
| tar | GNU version of the tar archiving utility. Used to store and extract multiple files from a single archive. |
| taskset | Set/retrieve a process’s CPU affinity. |
| tcpd | Access control utility for internet services. |
| tcpdump | Dump traffic on network. Displays a description of the contents of packets on a network interface that match the boolean expression. |
| tcpslice | Extract pieces of tcpdump files or merge them. |
| tee | Read from standard input and write to standard output and files. |
| telinit | Change SysV runlevel. |
| telnet | Telnet protocol user interface. Used to interact with another host using telnet. |
| telnetd | A server for the telnet protocol. |
| test | Check file type and compare values. |
| tftp | User interface to the internet TFTP (Trivial File Transfer Protocol). |
| tftpd | TFTP server. |
| time | Run programs and summarize system resource usage. |
| timeout | Execute a command with a time limit. |
| times | Shows accumulated user and system times for the shell and it’s child processes. |
| tload | Shows a graph of the current system load average to the specified tty. |
| tmpwatch | Recursively remove files and directories which haven’t been accessed for the specified period of time. |
| top | Displays real-time view of processes running on the system. |
| touch | Change file access and modification times. |
| tput | Modify terminal-dependent capabilities, color, etc. |
| tr | Translate, squeeze, or delete characters from standard input and display on standard output. |
| tracepath | Traces path to a network host discovering MTU (Maximum Transmission Unit) along this path. |
| traceroute | Traces the route taken by the packets to reach the network host. |
| trap | Trap function responds to hardware signals. It defines and creates handlers to run when the shell receives signals. |
| troff | The troff processor of the groff text formatting system. |
| TRUE | Exit with a status code indicating success. |
| tset | Initialize terminal. |
| tsort | Perform topological sort. |
| tty | Display the filename of the terminal connected to standard input. |
| tune2fs | Adjust tunable filesystem parameters on ext2/ext3/ext4 filesystems. |
| tunelp | Set various parameters for the line printer devices. |
| type | Write a description for a command type. |

Linux Commands – U

|  |  |
| --- | --- |
| **Command** | **Description** |
| ul | Underline text. |
| ulimit | Get and set user limits for the calling process. |
| umask | Set file mode creation mask. |
| umount | Unmount specified file systems. |
| unalias | Remove alias definitions for specified alias names. |
| uname | Show system information. |
| uncompress | Uncompress the files compressed with the compress command. |
| unexpand | Convert spaces to tabs for a specified file. |
| unicode\_start | Put keyboard and console in Unicode mode. |
| unicode\_stop | Revert keyboard and console from Unicode mode. |
| uniq | Report or omit repeating lines. |
| units | Convert units from one scalar to another. |
| unrar | Extract files from a RAR archive. |
| unset | Remove variable or function names. |
| unshar | Unpack shell archive scripts. |
| until | Execute command until a given condition is true. |
| uptime | Tell how long the system has been running. |
| useradd | Create a new user or update default user information. |
| userdel | Delete a user account and related files. |
| usermod | Modify a user account. |
| users | Show the list of active users on the machine. |
| usleep | Suspend execution for microsecond intervals. |
| uudecode | Decode a binary file. |
| uuencode | Encode a binary file. |
| uuidgen | Created a new UUID (Universally Unique Identifier) table. |

Linux Commands – V

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| --- | --- |
| **Command** | **Description** |
| vdir | Same as **ls -l -b**. Verbosely list directory contents. |
| vi | A text editor utility. |
| vidmode | Set the video mode for a kernel image. Displays current mode value without arguments. Alternative: rdev -v |
| vim | Vi Improved, a text-based editor which is a successor to vi. |
| vmstat | Shows information about processes, memory, paging, block IO, traps, disks, and CPU activity. |
| volname | Returns volume name for a device formatted with an ISO-9660 filesystem. For example, CD-ROM. |

Linux Commands – W

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| --- | --- |
| **Command** | **Description** |
| w | Show who is logged-on and what they’re doing. |
| wait | Waits for a specified process ID(s) to terminate and returns the termination status. |
| wall | Display a message on the terminals all the users who are currently logged-in. |
| warnquota | Send mail to the users who’ve exceeded their disk quota soft limit. |
| watch | Runs commands repeatedly until interrupted and shows their output and errors. |
| wc | Print newline, word, and byte count for each of the specified files. |
| wget | A non-interactive file download utility. |
| whatis | Display one line manual page descriptions. |
| whereis | Locate the binary, source, and man page files for a command. |
| which | For a given command, lists the pathnames for the files which would be executed when the command runs. |
| while | Conditionally execute commands (while loop). |
| who | Shows who is logged on. |
| whoami | Displays the username tied to the current effective user ID. |
| whois | Looks for an object in a WHOIS database |
| write | Display a message on other user’s terminal. |

Linux Commands – X

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| --- | --- |
| **Command** | **Description** |
| xargs | Runs a command using initial arguments and then reads remaining arguments from standard input. |
| xdg-open | Used to open a file or URL in an application preferred by the user. |
| xinetd | Extended internet services daemon. Works similar to inetd. |
| xz | Compress/ Decompress .xz and .lzma files. |

Linux Commands – Y

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| --- | --- |
| **Command** | **Description** |
| yacc | Yet Another Compiler Compiler, a GNU Project parser generator. |
| yes | Repeatedly output a line with a specified string(s) until killed. |
| ypbind | A daemon that helps client processes to connect to an NIS server. |
| ypcat | Shows the NIS map (or database) for the specified MapName parameter. |
| ypinit | Sets up NIS maps on an NIS server. |
| ypmatch | Shows values for specified keys from an NIS map. |
| yppasswd | Change NIS login password. |
| yppasswdd | Acts as a server for the yppasswd command. Receives and executes requests. |
| yppoll | Shows the ID number or version of NIS map currently used on the NIS server. |
| yppush | Forces slave NIS servers to copy updated NIS maps. |
| ypserv | A daemon activated at system startup. It looks for information in local NIS maps. |
| ypset | Point a client (running ypbind) to a specifc server (running ypserv). |
| yptest | Calls various functions to check the configuration of NIS services. |
| ypwhich | Shows the hostname for NIS server or master server for a given map. |
| ypxfr | Transfers NIS server map from server to a local host. |

Linux Commands – Z

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| --- | --- |
| **Command** | **Description** |
| zcat | Used to compress/uncompress files. Similar to gzip |
| zcmp | Compare compressed files. |
| zdiff | Compare compressed files line by line. |
| zdump | Displays time for the timezone mentioned. |
| zforce | Adds .gz extension to all gzipped files. |
| zgrep | Performs grep on compressed files. |
| zic | Creates time conversion information files using the specified input files. |
| zip | A file compression and packaging utility. |
| zless | Displays information of a compressed file (using less command) on the terminal one screen at a time. |
| zmore | Displays output of a compressed file (using more command) on the terminal one page at a time. |
| znew | Recompress. z files to .gz. files. |

**Open SSL:**

Open SSL is an open source tool for using the Secure Socket Layer(SSL) and Transport Layer Security(TLS) protocols for web authentication. Open SSL offers cryptographic functions to support SSL/TLS protocols. In SSL security, websites use digital certificates to prove their legitimacy. Open SSL is written in C programming language and relies on different ciphers and algorithms to provide encryption. It is widely using in internet web servers, serving most of all websites.

**Example for Open SSL**:

You can also use this open SSL, yourself for your own encryption and decryption purposes like if you want to share a file with your friend on a flash-drive, you can just encrypt the file with a password and an encryption algorithm of your choice then you can share the password and the name of encryption algorithm with your friend and only he can use the file by decrypting it. This deters others from seeing what's in the file even if they get access to the flash-drive.

The openssl program is a command line tool for using the various cryptography functions of OpenSSL's crypto library from the shell. It can be used for

* Creation and management of private keys, public keys and parameters
* Public key cryptographic operations
* Creation of X.509 certificates
* Calculation of Message Digests
* Encryption and Decryption with Ciphers
* SSL/TLS Client and Server Tests
* Handling of S/MIME signed or encrypted mail
* Time Stamp requests, generation and verification

**Encrpyt:**

openssl aes-256-cbc -a -salt -in secrets.txt -out secrets.txt.enc

**Decrpyt**:

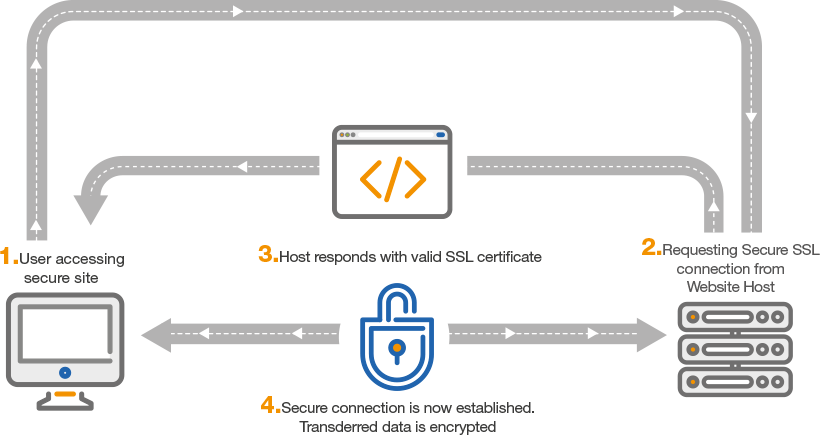
openssl aes-256-cbc -d -a -in secrets.txt.enc -out secrets.txt.new

**SSL Certificates:**

SSL Certificates are small data files that digitally bind a cryptographic key to an organization’s details. When installed on a web server, it activates the padlock and the https protocol and allows secure connections from a web server to a browser. Typically, SSL is used to secure credit card transactions, data transfer and logins, and more recently is becoming the norm when securing browsing of social media sites.

SSL Certificates bind together:

* A domain name, server name or hostname.
* An organizational identity (i.e. company name) and location.



An organization needs to install the SSL Certificate onto its web server to initiate a secure session with browsers. Once a secure connection is established, all web traffic between the web server and the web browser will be secure. When a certificate is successfully installed on your server, the application protocol (also known as HTTP) will change to HTTPs, where the ‘S’ stands for ‘secure’. Depending on the type of certificate you purchase and what browser you are surfing the internet on, a browser will show a padlock or green bar in the browser when you visit a website that has an SSL Certificate installed.

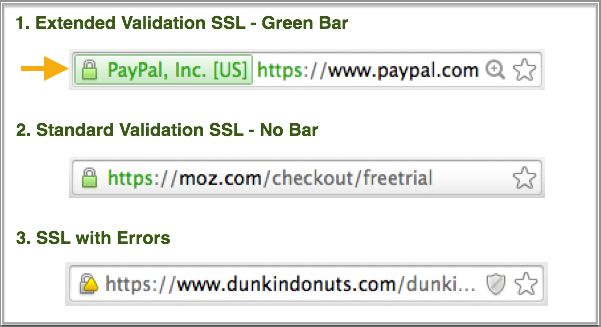
There are three types of SSL certificates available.

* Extended Validation SSL
* Organization Validated SSL
* Domain validates SSL

The encryption levels are same for three certificates but differ in the verification processes needed to obtain the certificate and the visual representation in the browser address bar.

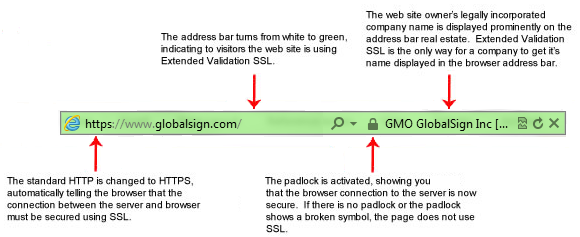
More information related to each individual certificate are described in this resource.

<https://www.globalsign.com/en/ssl-information-center/types-of-ssl-certificate/>



**How does SSL certificate work?**

SSL Certificates use something called public key cryptography. This kind of cryptography utilize the power of two keys which are long strings of randomly generated numbers. One is called a private key and one is called a public key. A public key is known to your server and available in the public domain. It can be used to encrypt any message. If Alice is sending a message to Bob, she will lock it with Bob’s public key but the only way it can be decrypted is to unlock it with Bob’s private key. Bob is the only one who has his private key, so Bob is the only one who can use this to unlock Alice’s message. If a hacker intercepts the message before Bob unlocks it, all they will get is a cryptographic code that they cannot break, even with the power of a computer.



**Why do we need a SSL certificate?**

SSL Certificates protect your sensitive information such as credit card information, usernames, passwords etc. It also:

* Keeps data secure between servers
* Increases your Google Rankings
* Builds/Enhances customer trust
* Improves conversion rates

**Where do we buy SSL certificate?**

SSL Certificates need to be issued from a trusted Certificate Authority. Browsers, operating systems, and mobile devices maintain list of trusted CA root certificates. The Root Certificate must be present on the end user's machine for the Certificate to be trusted. If it is not trusted the browser will present untrusted error messages to the end user. In the case of e-commerce, such error messages result in immediate lack of confidence in the website and organizations risk losing confidence and business from most consumers.

Companies like GlobalSign are known as trusted Certificate Authorities. This is because browser and operating system vendors such as Microsoft, Mozilla, Opera, Blackberry, Java, etc., trust that GlobalSign is a legitimate Certificate Authority and that it can be relied on to issue trustworthy SSL Certificates. The more applications, devices and browsers the Certificate Authority embeds its Root into, the better "recognition" the SSL Certificate can provide.

**Digital Certificates:**

The Digital Certificate contains information about who the certificate was issued to, as well as the certifying authority that issued it. Additionally, some certifying authorities may themselves be certified by a hierarchy of one or more certifying authorities, and this information is also part of the certificate chain. When for example a Digital Certificate is used to sign documents and software, this information is stored with the signed item in a secure and verifiable format, so that it can be displayed to a user to establish a trust relationship.

Digital signatures are composed of two different algorithms, the hashing algorithm (SHA-1 for example) and the other the signing algorithm (RSA for example). Over time these algorithms, or the parameters they use, need to be updated to improve security.

A trusted public body, such as a Certificate Authority (CA) like GlobalSign, verifies a specified selection of evidence to produce an electronic identification for future presentation, indicating that the authentication of the individual or organization has taken place.

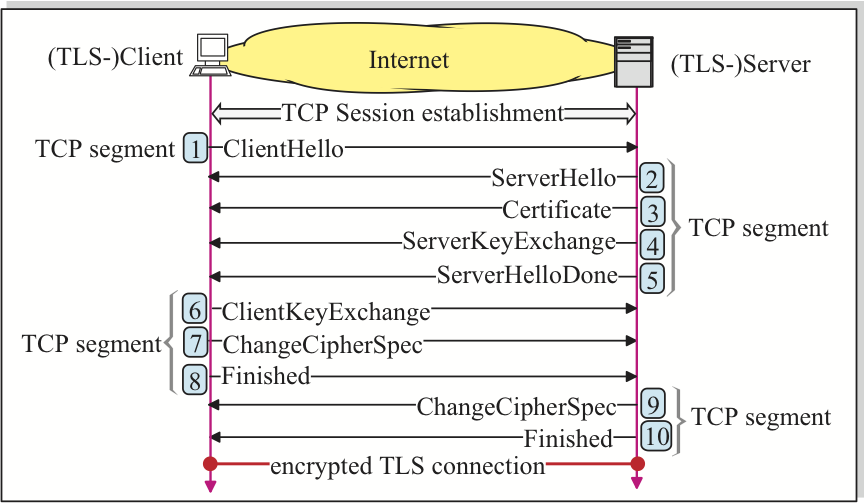
In the case of Digital Certificates involves several factors. What are the qualifications of the third-party, their practices and which cryptographic algorithms did they use to produce the digital certificate. From a CISOs perspective, using Digital Certificates such as SSL raises concerns that may impact on the organization’s operational environment. By using a certificate from a Certificate Authority, the individual/organization will need to fully trust the CA’s practices.

**TLS (Transport Layer Security):**

TLS is widely adopted security protocol designed to facilitate privacy and data security to communications over internet. Primary use case of the TLS is securing the communication between the web server applications and servers like web browsers loading a website. TLS can also be used to secure other communications such as email, messages and voice over IP(VOIP).

TLS has two distinct layers:

* TLS Record Protocol establishes a secure connection with encryption methods like data encryption standard.
* TLS Handshake Protocol allows authentication for the servers and clients together. Before data can be exchanged, it must convert cryptographic keys and algorithms.



This connection begins by contacting the server. Then, it switches to a secured method of communication after the initial handshake is successful. In the event the handshake fails, the connection will be terminated. One of the best examples of this is using the command STARTTLS that is used for an outbound email connection.

* There are number of benefits to using an SSL or TLS connection, such as:
* Secured communication between the server and the browser
* Ensured safety of your sensitive information
* Encrypted user and website info
* SEO benefits when conducting Google searches
* Protection for your website from cyber attacks
* A boost to your website's reputation online
* Security for your software, documents and applications

**What is the difference between TLS and SSL?**

TLS evolved from a previous security protocol called SSL (Secure Socket Layer Security). The difference between the two protocols are very minor but they are different standards. TLS uses stronger encryption algorithms and can work on different ports.

**What is the difference between TLS and HTTPS?**

* Protocol Version
* Message Authentication
* Session Key Generation
* Alert Protocol Message
* Supported Cipher Suites
* Client Certificate Types
* Padding of Data

**Why should we use TLS?**

TLS encryption can help protect web applications from attacks such as data breaches and DDos attacks. TLS protected HTTPS is quickly becoming a standard price for websites. For example, Google’s chrome browser is cracking down on non-HTTP sites and every day internet users are starting to become more wary of websites that don’t feature the HTTPS padlock.

**How does TLS work?**

TLS is implemented on application layer of OSI model, which means it can be used on a top of a transport layer security protocol like TCP. There are three main components to TLS: Encryption, Authentication and Integrity.

* Encryption: hides the data being transferred from third parties.
* Authentication: ensures that the parties exchanging information are who they claim to be.
* Integrity: verifies that the data has not been forged or tampered with.

A TLS connection is initiated using a sequence known as the TLS handshake. The TLS handshake starts with a syn/syn ack/ack exchange like the one used in TCP, and then establishes a cypher suite for each communication. The cypher suite is a set of algorithms that specifies details such as which shared encryption key will be used for that session.

The handshake also handles authentication, which usually consists of the server proving its identity to the client. This is done using public keys. Public keys are encryption keys that use one-way encryption, meaning that anyone can unscramble the key to ensure its authenticity, but only the original sender can generate the key.

Once data is encrypted and authenticated, it is then signed with a message authentication code (MAC). The recipient can then verify the MAC to ensure the integrity of the data. This is kind of like the tamper-proof foil found on a bottle of aspirin; the consumer knows no one has tampered with their medicine because the foil is intact when they purchase it.

**File Permissions in Linux**

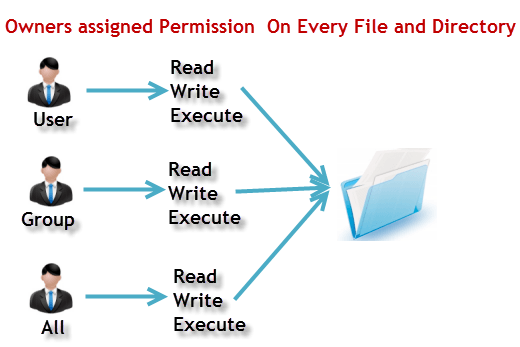
On a Linux system, each file and directory are assigned access rights for the owner of the file, the members of a group of related users, and everybody else. Rights can be assigned to read a file, to write a file, and to execute a file (i.e., run the file as a program). To see the permission settings for a file, we can use the ls command. As an example, we will look at the bash program which is in the /bin directory:

Each file and directory have three user-based permission groups:

* **owner** - The Owner permissions apply only the owner of the file or directory, they will not impact the actions of other users.
* **group** - The Group permissions apply only to the group that has been assigned to the file or directory, they will not affect the actions of other users.
* **all users** - The All Users permissions apply to all other users on the system, this is the permission group that you want to watch the most.

Each file or directory has three basic permission types:

* **read** - The Read permission refers to a user's capability to read the contents of the file.
* **write** - The Write permissions refer to a user's capability to write or modify a file or directory.
* **execute** - The Execute permission affects a user's capability to execute a file or view the contents of a directory.



|  |
| --- |
| Setting Numerical Meaning |
| -rw------- (600) Only the owner has read and write permissions. |
| -rw-r--r-- (644) Only the owner has read and write permissions; the group and others have read only. |
| -rwx------ (700) Only the owner has read, write, and execute permissions. |
| -rwxr-xr-x (755) The owner has read, write, and execute permissions; the group and others have only read and execute |
| -rwx--x—x (711) The owner has read, write, and execute permissions; the group and others have only  execute |
| -rw-rw-rw- (666) Everyone can read and write to the file. (Be careful with these permissions.) |
| -rwxrwxrwx (777) Everyone can read, write, and execute. (Again, this permissions setting can be hazardous.) |
| drwx------ (700) Only the user can read write and execute in this directory |
| drwxr-xr-x (755) Everyone can read the directory, users and groups have read and execute permissions |

* To view permissions for a file we use the long listing option for the command ls.

***ls -l [path]***

* To change permissions on a file or directory we use a command called **chmod**. It stands for change file mode bits which is a bit of a mouthful but think of the mode bits as the permission indicators.

***chmod [permissions] [path]***

* chmod - modify file access rights
* For changing the ownership of a file/directory, you can use the following command:

**chown user**

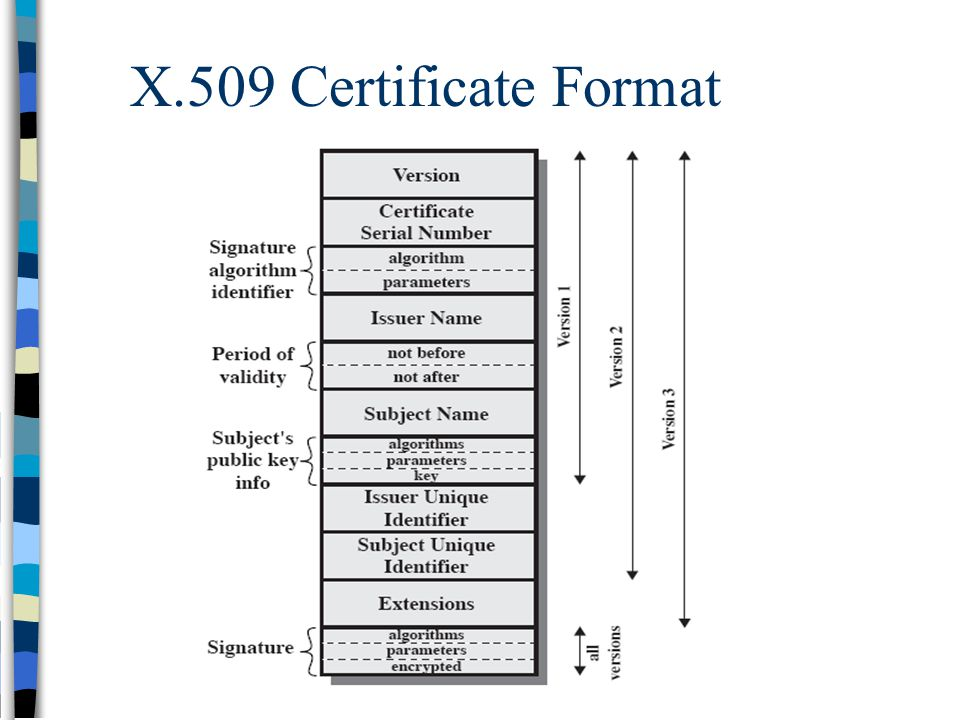
* In case you want to change the user as well as group for a file or directory use the command

**chown user:group filename**

* chown - change file ownership
* In case you want to change group-owner only, use the command

**chgrp group\_name filename**

* sudo - temporarily become the superuser



* **Subject**: Provides the name of the computer, user, network device, or service that the CA issues the certificate to. The subject name is commonly represented by using an X.500 or Lightweight Directory Access Protocol (LDAP) format.
* **Serial Number**: Provides a unique identifier for each certificate that a CA issues.
* **Issuer**: Provides a distinguished name for the CA that issued the certificate. The issuer name is commonly represented by using an X.500 or LDAP format.
* **Valid From:** Provides the date and time when the certificate becomes valid.
* **Valid To**: Provides the date and time when the certificate is no longer considered valid. The date when an application or service evaluates the certificate must fall between the Valid From and Valid To fields of the certificate for the certificate to be considered valid.
* **Public Key**: Contains the public key of the key pair that is associated with the certificate.
* **Signature Algorithm**: The algorithm used to sign the certificate.
* **Signature Value**: Bit string containing the digital signature.

**To generate a self-signed SSL certificate using the OpenSSL, complete the following steps:**

* Write down the Common Name (CN) for your SSL Certificate. The CN is the fully qualified name for the system that uses the certificate. If you are using Dynamic DNS, your CN should have a wild-card, for example: \*.api.com. Otherwise, use the hostname or IP address set in your Gateway Cluster (for example. 192.16.183.131 or dp1.acme.com).
* Run the following OpenSSL command to generate your private key and public certificate. Answer the questions and enter the Common Name when prompted.
* openssl req -newkey rsa:2048 -nodes -keyout key.pem -x509 -days 365 -out certificate.pemCopy
* Review the created certificate:

openssl x509 -text -noout -in certificate.pemCopy

* Combine your key and certificate in a PKCS#12 (P12) bundle:

openssl pkcs12 -inkey key.pem -in certificate.pem -export -out certificate.p12Copy

* Validate your P2 file.

openssl pkcs12 -in certificate.p12 -noout -infoCopy

* In the navigation section of the Cloud Management Console, click the SSL Profiles icon The SSL Profiles icon. The SSL Profiles page opens.
* In the SSL Profiles page, click + SSL Profile.
* In the Name text field, enter the name of the new SSL Profile.
* In the Present Certificate section, click Select File, then browse for and select certificate. p12
* In the Password text field, enter the password for the certificate file.
* Click Upload Certificate. The certificate is populated.
* To validate the certificate, move the Request and validate the certificate against the supplied CAs in the truststore slider to the on position.
* In the Trust Store window section, click Select File, then browse for the Trust Store certificate.
* In the Password text field, enter the password for the certificate file.
* Click Upload Certificate. The certificate is populated.
* Expand the Protocols section to display the SSL and TLS versions.
* Use the check boxes to indicate the SSL or TLS version.
* Click Save. The certificates are upload and the SSL or TLS version is saved.
* In the navigation section of the Cloud Management Console, click the Clusters icon The Clusters icon.
* In the Gateway Clusters window area, click Settings. The Gateway Clusters window is displayed.
* In the Gateway Clusters window, click Select a file, then browse for the SSL Profile you want associated with your Gateway cluster.
* Click Save.

**TrustStore vs KeyStore:**

TrustStore and KeyStore are used in context of setting up SSL connection in Java application between client and server. TrustStore and keyStore are very much similar in terms of construct and structure as both are managed by keytoolcommand.

Only difference between trustStore and keyStore is what they store and their purpose. In SSL handshake purpose of trustStore is to verify credentials and purpose of keyStore is to provide credential. keyStore in Java stores private key and certificates corresponding to their public keys and require if you are SSL Server or SSL requires client authentication. TrustStore stores certificates from third party, your Java application communicate, or certificates signed by CA (certificate authorities like Verisign, Thawte, Geotrust or GoDaddy) which can be used to identify third party.

* First and major difference between trustStore and keyStore is that trustStore is used by TrustManager and keyStore is used by KeyManager class in Java. KeyManager and TrustManager performs different job in Java, TrustManager determines whether remote connection should be trusted or not i.e. whether remote party is who it claims to and KeyManager decides which authentication credentials should be sent to the remote host for authentication during SSL handshake.
* keyStore contains private keys and required only if you are running a Server in SSL connection or you have enabled client authentication on server side. On the other hand, trustStore stores public key or certificates from CA (Certificate Authorities) which is used to trust remote party or SSL connection.
* We use -Djavax.net.ssl.keyStore to specify path for keyStore and -Djavax.net.ssl.trustStore to specify path for trustStore in Java.
* One more API level difference between keyStore and trustStore is that password of keyStore is provided using -Djavax.net.ssl.keyStorePassword and password of trustStore is provided using -Djavax.net.ssl.trustStorePassword.

