

# Assignment-1: Linux

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**Batch:** DevOps Batch – 1

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## Q1. Install and configure Tomcat version 9 on your Linux machine with the Manager and Host Manager sections enabled

**Ans:** Apache Tomcat is an open-source web server and servlet container used for hosting Java-based web applications. It's a widely used tool for deploying and running applications built with Java technologies. Tomcat is not a normal server like Apache or Nginx, because its main goal is to provide a good web environment to run Java applications only unlike other normal web servers.

### Prerequisites to install Tomcat

#### Steps:

1. Launch a Ubuntu Linux server in AWS.
2. Sudo apt-get update
3. Sudo apt-get install openjdk -11-jdk
4. Next need to go to tomcat archive website & copy tomcat version in binary  
eg: apache-tomcat-9.0.65.tar.gz
5. Need check java version: java-version
6. Cd /opt
7. We need to copy the tomcat tar file:  
wget <https://archive.apache.org/dist/tomcat/tomcat-9/v9.0.65/bin/apache-tomcat-9.0.65.tar.gz>
8. Next need to extract the tar file : sudo tar -xvf apache-tomcat-9.0.65.tar.gz
9. Then need to remove the tar file: sudo rm -rf apache-tomcat-9.0.65.tar.gz
10. Need switch as root: sudo su
11. Need to go conf directory: cd /opt/apache-tomcat-9.0.65/conf
12. Then need to configure the user
13. Sudo vi tomcat-users.xml  
--add below line at the end (2<sup>nd</sup> Last Line)  
<user username="admin" password="admin1234" roles="admin-gui, manager-gui"/>
14. Need to link startup & shutdown files  
Sudo ln -s /opt/apache-tomcat-9.0.65/bin/startup.sh /usr/bin/startTomcat  
Sudo ln -s /opt/apache-tomcat-9.0.65/bin/shutdown.sh /usr/bin/stopTomcat
15. Sudo vi /opt/apache-tomcat-9.0.65/webapps/manager/META-INF/context.xml  
Comment in the line: like <!-- Valve class name  
Allow= "127 - ->

16. Sudo vi /opt/apache-tomcat-9.0.65/webapps/host-manager/META-INF/context.xml

Comment in the line: like <!-- Valve class name

Allow= "127 - ->

17. Sudo stopTomcat

18. Sudo startTomcat



19. Then copy ip address in URL with :8080 tomcat server will open

20. Need to define in security groups that allow custom tcp 8080 my Ip

## Server Status

## Application Manager

← → ↻ ⚠ Not secure 65.0.108.115:8080/manager/html ☆ ≡ 👤 ⋮



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### Tomcat Web Application Manager

Message:



**Manager**  
[List Applications](#) [HTML Manager Help](#) [Manager Help](#) [Server Status](#)

**Applications**

Path	Version	Display Name	Running	Sessions	Commands
/	None specified	Welcome to Tomcat	true	0	<input type="button" value="Start"/> <input type="button" value="Stop"/> <input type="button" value="Reload"/> <input type="button" value="Undeploy"/> <input type="button" value="Expire sessions"/> with idle ≥ <input type="text" value="30"/> minutes
/docs	None specified	Tomcat Documentation	true	0	<input type="button" value="Start"/> <input type="button" value="Stop"/> <input type="button" value="Reload"/> <input type="button" value="Undeploy"/> <input type="button" value="Expire sessions"/> with idle ≥ <input type="text" value="30"/> minutes
/examples	None specified	Servlet and JSP Examples	true	0	<input type="button" value="Start"/> <input type="button" value="Stop"/> <input type="button" value="Reload"/> <input type="button" value="Undeploy"/> <input type="button" value="Expire sessions"/> with idle ≥ <input type="text" value="30"/> minutes
/host-manager	None specified	Tomcat Host Manager Application	true	0	<input type="button" value="Start"/> <input type="button" value="Stop"/> <input type="button" value="Reload"/> <input type="button" value="Undeploy"/> <input type="button" value="Expire sessions"/> with idle ≥ <input type="text" value="30"/> minutes
/manager	None specified	Tomcat Manager Application	true	1	<input type="button" value="Start"/> <input type="button" value="Stop"/> <input type="button" value="Reload"/> <input type="button" value="Undeploy"/> <input type="button" value="Expire sessions"/> with idle ≥ <input type="text" value="30"/> minutes

## Virtual Host Manager

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### Tomcat Virtual Host Manager

Message:

**Host Manager**  
[List Virtual Hosts](#) [HTML Host Manager Help](#) [Host Manager Help](#) [Server Status](#)

**Host name**

Host name	Host aliases	Commands
localhost		Host Manager installed - commands disabled

**Add Virtual Host**

Host

Name:

Aliases:

App base:

AutoDeploy ☒

DeployOnStartup ☒

DeployXML ☒

UnpackWARs ☒

Manager App ☒

## 2. Change the default Tomcat port to 9050.

Ans : To change the default port number from 8080 to 9050

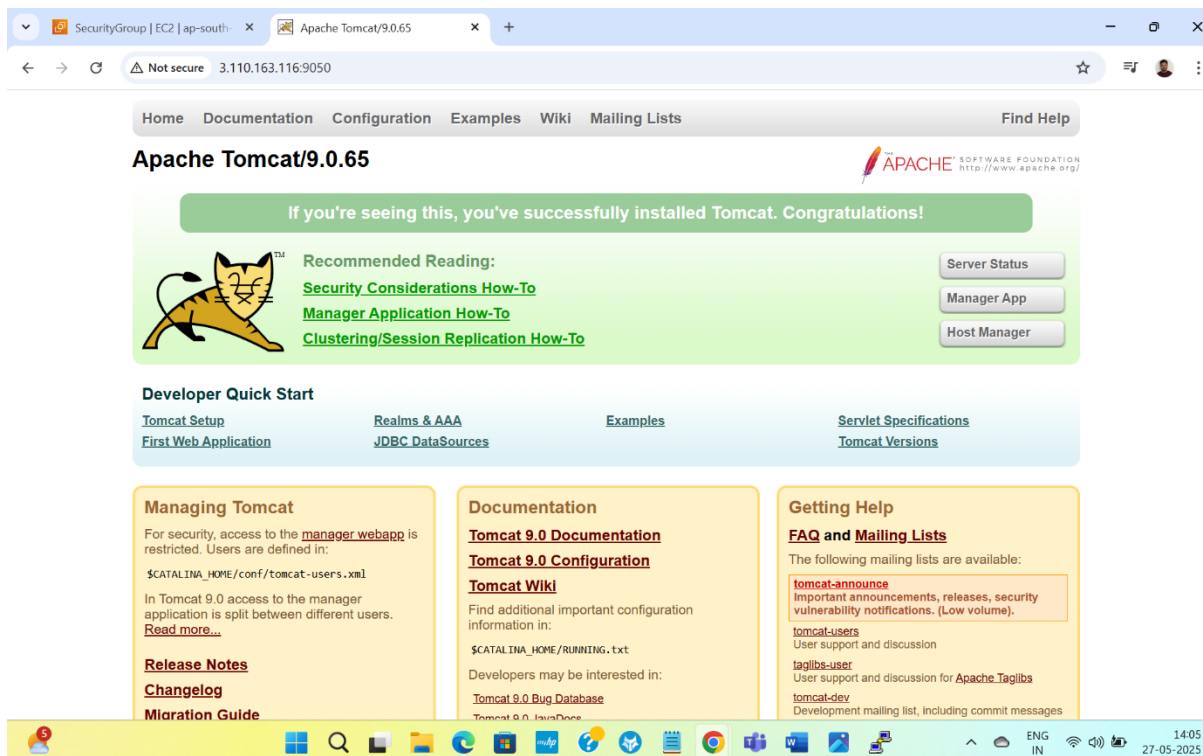
Steps:

1. Should be root user if not then sudo su
2. Then Cd /opt/apache-tomcat-9.0.65/conf
3. Vi server.xml
4. In connector line need to change the port number from 8080 to 9050
5. Then need to add inbound security rules allow 9050
6. Then need to stop tomcat by using command sudo stopTomcat
7. Then sudo startTomcat
8. If we use ip address in URL with :9050 tomcat server will open

```
root@ip-172-31-4-200: /opt/apache-tomcat-9.0.65/conf
<!--
  Documentation at: <http://localhost:8080/docs/default.html>
  <GlobalNamingResources>
    <!--
      Defines the standard JNDI resources that can also be used by
      the application.
    -->
    <Resource name="UserDatabase" auth="Container"
      type="org.apache.catalina.UserDatabase"
      description="User database that can be updated and saved"
      factory="org.apache.catalina.users.MemoryUserDatabaseFactory"
      pathname="conf/tomcat-users.xml" />
  </GlobalNamingResources>

  <!--
    A <Service> is a collection of one or more <Connector> that serve
    a single <Context>. Here, a <Service> is set that is <Standard>,
    so you may not define subcomponents such as <Executor> or <ThreadPools>.
    Documentation at: <http://tomcat.apache.org/tomcat-9.0-doc/config/service.html>
  -->
  <Service name="Catalina">
    <!--
      The <Executor> can use a shared executor, you can define one or more named thread pools:
      <!--
        <Executor name="tomcatThreadPool" maxThreads="150" minSpareThreads="25" />
      -->
    -->

    <!--
      A <Connector> represents an endpoint by which requests are received
      and responses are returned. The most common types are:
      <!--
        <Connector name="http" port="8080" protocol="HTTP/1.1"
          connectionTimeout="20000"
          redirectPort="8443" />
      -->
      <!--
        A <Connector> using the shared thread pool:
      <!--
        <Connector name="http" port="8080" protocol="HTTP/1.1"
          connectionTimeout="20000"
          redirectPort="8443" />
      -->
    -->
    <!--
      Define an SSL/TLS HTTP/1.1 connector on port 8443
      This connector uses the JSSE implementation, the details
      of configuration will depend on the provider in use.
    -->
  </Service>
-->
```



**Q3: Create a new user and configure the necessary settings for secure login via Putty or other**

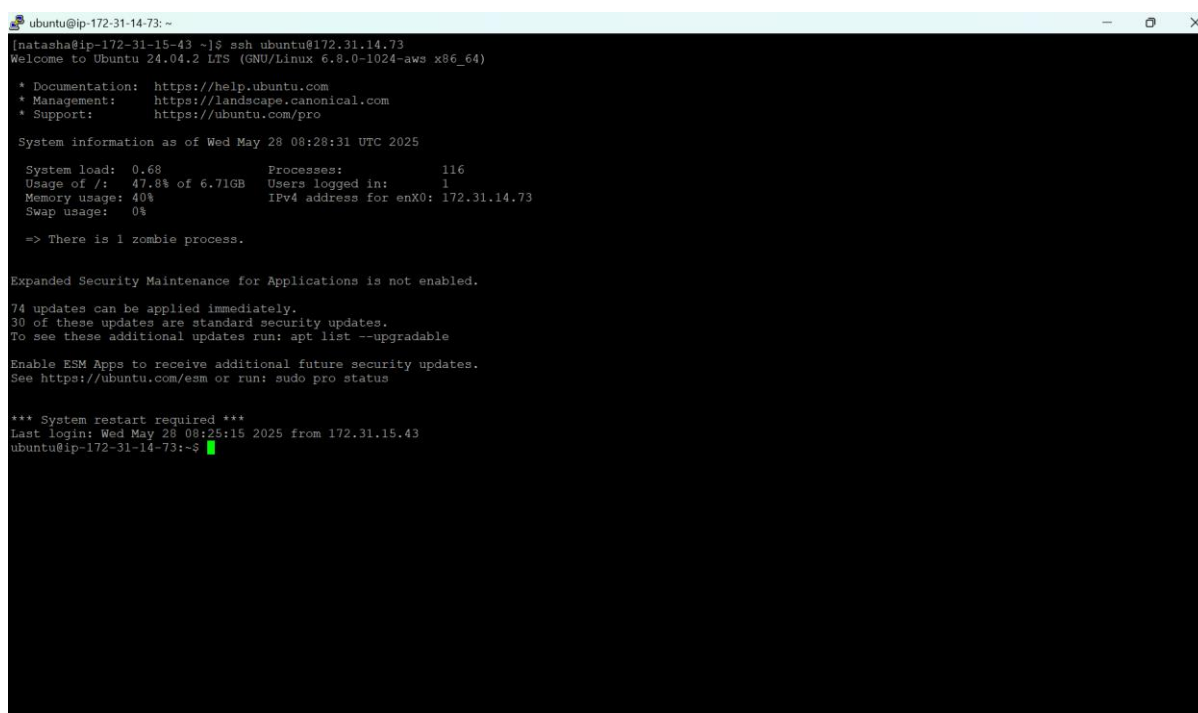
**remote access tools:**

- 1. Create a new user**
- 2. Add new users under /etc/sudoers**
- 3. Generate SSH key pair (as current user) - ssh-keygen -t rsa**
- 4. This will create: ~/.ssh/id\_rsa (private key)**  
**~/.ssh/id\_rsa.pub (public key)**
- 5. Switch to the new user**
- 6. Create .ssh directory for the new user:**  
**mkdir -p ~/.ssh**  
**chmod 700 ~/.ssh**
- 7. Create or edit the authorized\_keys file**
- 8. From root user cat ~/.ssh/id\_rsa.pub | sudo tee -a**  
**/home/natasha/.ssh/authorized\_keys**
- 9. Fix permission**  
**sudo chown -R natasha:natasha /home/natasha/.ssh**  
**sudo chmod 700 /home/natasha/.ssh**  
**sudo chmod 600 /home/natasha/.ssh/authorized\_keys**
- 10. ssh username@localhost**

```
natasha@ip-172-31-15-43:~  
[root@ip-172-31-15-43 ~]# ssh natasha@localhost  
Register this system with Red Hat Insights: rhc connect  
  
Example:  
# rhc connect --activation-key <key> --organization <org>  
  
The rhc client and Red Hat Insights will enable analytics and additional  
management capabilities on your system.  
View your connected systems at https://console.redhat.com/insights  
  
You can learn more about how to register your system  
using rhc at https://red.ht/registration  
Last login: Wed May 28 08:14:06 2025 from ::1  
[natasha@ip-172-31-15-43 ~]$
```

#### Q4. Establish passwordless connection between two Linux server

1. Server1: ssh-keygen
2. cd .ssh
3. copy the content in id\_rsa.pub
4. go to server2: cd .ssh
5. vi authorised\_keys: append the content copied from server1(do not redirect/delete just have to add/append)
6. on server1: ssh <server2-username>@private ip of server2
7. successfully established passwordless connection between two servers



```
ubuntu@ip-172-31-14-73: ~  
[natasha@ip-172-31-15-43 ~]$ ssh ubuntu@172.31.14.73  
Welcome to Ubuntu 24.04.2 LTS (GNU/Linux 6.8.0-1024-aws x86_64)  
  
 * Documentation:  https://help.ubuntu.com  
 * Management:    https://landscape.canonical.com  
 * Support:       https://ubuntu.com/pro  
  
System information as of Wed May 28 08:28:31 UTC 2025  
  
System load:  0.68      Processes:      116  
Usage of /:   47.8% of 6.71GB   Users logged in:  1  
Memory usage: 40%      IPv4 address for enX0: 172.31.14.73  
Swap usage:   0%  
  
=> There is 1 zombie process.  
  
Expanded Security Maintenance for Applications is not enabled.  
  
74 updates can be applied immediately.  
30 of these updates are standard security updates.  
To see these additional updates run: apt list --upgradable  
  
Enable ESM Apps to receive additional future security updates.  
See https://ubuntu.com/esm or run: sudo pro status  
  
*** System restart required ***  
Last login: Wed May 28 08:25:15 2025 from 172.31.15.43  
ubuntu@ip-172-31-14-73:~$
```

#### Q5. Create a new user account on your Linux machine and grant them sudo privileges.

1. Create user
2. Grant sudo permission under /etc/passwd
3. ALL=(ALL) NOPASSWD:ALL
4. Ex: run sudo useradd ram – sudo command has to work on new user account

```
culry@ip-172-31-15-43:~$ sudo useradd larry
[culry@ip-172-31-15-43 ~]$ sudo ifconfig
sudo: ifconfig: command not found
[culry@ip-172-31-15-43 ~]$ sudo ipconfig
sudo: ipconfig: command not found
[culry@ip-172-31-15-43 ~]$ sudo fdisk -l
Disk /dev/xvda: 10 GiB, 10737418240 bytes, 20971520 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: gpt
Disk identifier: D209C89E-EA5E-4FBD-B161-B461CCE297E0

Device      Start      End  Sectors  Size Type
/dev/xvda1    2048     4096     2048    1M BIOS boot
/dev/xvda2   4096  413696   409600  200M EFI System
/dev/xvda3 413696 20971486 20557791  9.8G Linux filesystem
[culry@ip-172-31-15-43 ~]$
```

**Q6. Use the 'scp' command to securely copy files and directories between Linux machines without password**

Ans: Continued from q4 question Number

1. Server1:ec2 server2: ubuntu

2. On sever1: scp filename server2-username@private-ip-server2: /home/ubuntu

```
natasha@ip-172-31-15-43:~$ touch file1
[natasha@ip-172-31-15-43 ~]$ scp file1 ubuntu@172.31.14.73:/home/ubuntu
file1                                100% 0 0.0KB/s 00:00
[natasha@ip-172-31-15-43 ~]$
```

3. On server 2: ls

```
ubuntu@ip-172-31-14-73:~$ ls
file1
ubuntu@ip-172-31-14-73:~$
```

## 7. How can you list the contents of a tar.gz file and extract a particular file

Ans: To list and extract specific files from a tar.gz archive in Linux, use the tar command with appropriate options.

Command to create tar file with gz method

Eg : tar -cvfz etc.tar.gz /etc

Which will compress /etc directory by gz method

```
[root@ip-172-31-15-43 ~]# ls
[root@ip-172-31-15-43 ~]# tar -cvfz etc.tar.gz /etc
tar: Removing leading '/' from member names
/etc/
/etc/grub.d/
/etc/grub.d/00_header
/etc/grub.d/01_users
/etc/grub.d/08_fallback_counting
/etc/grub.d/10_linux
/etc/grub.d/10_reset_boot_success
/etc/grub.d/12_menu_auto_hide
/etc/grub.d/14_menu_show_once
/etc/grub.d/20_linux_xen
/etc/grub.d/20_ppc_terminfo
/etc/grub.d/25_bli_
/etc/grub.d/30_os-prober
/etc/grub.d/30_uefi-firmware
/etc/grub.d/40_custom
/etc/grub.d/41_custom
/etc/grub.d/README
/etc/grub.d/35_fwupd
/etc/grub.d/00_tuned
/etc/depmod.d/_
/etc/depmod.d/dist.conf
/etc/rhsm/
/etc/rhsm/rhsm.conf.cloud_save
/etc/rhsm/rhsm.conf
/etc/rhsm/ca/
/etc/rhsm/ca/redhat-entitlement-authority.pem
/etc/rhsm/ca/redhat-uep.pem
/etc/rhsm/facts/
/etc/rhsm/pluginconf.d/
/etc/rhsm/syspurpose/
/etc/rhsm/syspurpose/valid_fields.json
/etc/modprobe.d/
/etc/modprobe.d/tuned.conf
/etc/credstore/
/etc/NetworkManager/
/etc/NetworkManager/NetworkManager.conf
/etc/NetworkManager/conf.d/
/etc/NetworkManager/conf.d/30-cloud-init-ip6-addr-gen-mode.conf
```

## List Contents of a tar.gz File

Eg: tar -tzvf etc.tar.gz

```
root@ip-172-31-15-43:~
/etc/, updated
/etc/hostname
/etc/resolv.conf
/etc/subuid-
/etc/subgid-
[root@ip-172-31-15-43 ~]# ls
etc.tar.gz
[root@ip-172-31-15-43 ~]#
[root@ip-172-31-15-43 ~]# ls
etc.tar.gz
[root@ip-172-31-15-43 ~]# du -sh /etc
23M    /etc
[root@ip-172-31-15-43 ~]# du -sh etc.tar.gz
5.4M    etc.tar.gz
[root@ip-172-31-15-43 ~]#
[root@ip-172-31-15-43 ~]# tar -tzvf etc.tar.gz
drwxr-xr-x root/root      0 2025-05-28 08:37 etc/
drwxr----- root/root      0 2025-04-23 14:16 etc/grub.d/
-rwxr-xr-x root/root    9380 2025-03-25 00:00 etc/grub.d/00_header
-rwxr-xr-x root/root     236 2025-03-25 00:00 etc/grub.d/01_users
-rwxr-xr-x root/root     835 2025-03-25 00:00 etc/grub.d/08_fallback_counting
-rwxr-xr-x root/root   20334 2025-03-25 00:00 etc/grub.d/10_linux
-rwxr-xr-x root/root     833 2025-03-25 00:00 etc/grub.d/10_reset_boot_success
-rwxr-xr-x root/root     892 2025-03-25 00:00 etc/grub.d/12_menu_auto_hide
-rwxr-xr-x root/root     410 2025-03-25 00:00 etc/grub.d/14_menu_show_once
-rwxr-xr-x root/root   14627 2025-03-25 00:00 etc/grub.d/20_linux_xen
-rwxr-xr-x root/root   2562 2025-03-25 00:00 etc/grub.d/20_ppc_terminfo
-rwxr-xr-x root/root     869 2025-03-25 00:00 etc/grub.d/25_bli_
-rwxr-xr-x root/root   11006 2025-03-25 00:00 etc/grub.d/30_os-prober
-rwxr-xr-x root/root    1166 2025-03-25 00:00 etc/grub.d/30_uefi-firmware
-rwxr-xr-x root/root     218 2025-03-25 00:00 etc/grub.d/40_custom
-rwxr-xr-x root/root     219 2025-03-25 00:00 etc/grub.d/41_custom
-rw-r--r-- root/root     483 2025-03-25 00:00 etc/grub.d/README
-rwxr-xr-x root/root     725 2024-12-16 00:00 etc/grub.d/35_fwupd
-rwxr-xr-x root/root    1100 2025-02-03 19:17 etc/grub.d/00_tuned
drwxr-xr-x root/root      0 2025-04-23 14:16 etc/depmod.d/_
-rw-r--r-- root/root     116 2025-01-14 00:00 etc/depmod.d/dist.conf
drwxr-xr-x root/root      0 2025-04-23 14:16 etc/rhsm/
-rw-r--r-- root/root    3151 2025-04-23 14:16 etc/rhsm/rhsm.conf.cloud_save
-rw-r--r-- root/root    3049 2025-04-23 14:16 etc/rhsm/rhsm.conf
drwxr-xr-x root/root      0 2025-04-23 14:15 etc/rhsm/ca/
-rw-r--r-- root/root   2305 2022-06-23 10:36 etc/rhsm/ca/redhat-entitlement-authority.pem
-rw-r--r-- root/root    7411 2022-06-23 10:36 etc/rhsm/ca/redhat-uep.pem
drwxr-xr-x root/root      0 2025-03-06 00:00 etc/rhsm/facts/
drwxr-xr-x root/root      0 2025-03-06 00:00 etc/rhsm/pluginconf.d/
drwxr-xr-x root/root      0 2025-04-23 14:16 etc/rhsm/syspurpose/
-rw-r--r-- root/root     347 2025-03-06 00:00 etc/rhsm/syspurpose/valid_fields.json
drwxr-xr-x root/root      0 2025-04-23 14:16 etc/modprobe.d/
-rw-r--r-- root/root     674 2025-02-03 19:17 etc/modprobe.d/tuned.conf
```



## Explanation:

- t: list contents
- z: handle gzip compression
- v: verbose (show file names)
- f: archive file to use
- 

Extract a Specific File from .tar.gz

Eg: tar -xvf etc.tar.gz

It will extract to the current directory

```
root@ip-172-31-15-43:~  
[root@ip-172-31-15-43 ~]# ls  
etc.tar.gz  
[root@ip-172-31-15-43 ~]# du -sh /etc  
22M    /etc  
[root@ip-172-31-15-43 ~]# du -sh etc.tar.gz  
5.4M    etc.tar.gz  
[root@ip-172-31-15-43 ~]#
```

## 8. How can you compress a directory or file into a tar archive on Linux

Ans: To compress a directory or file into a .tar archive on Linux, you use the tar command.

Command : tar -czvf archive\_name.tar.gz /path/to/directory\_or\_file

Eg tar -czvf new.tar.gz /directory

```
root@ip-172-31-15-43:~  
[root@ip-172-31-15-43 ~]# tar -czvf dir.tar.gz /directory/  
tar: Removing leading '/' from member names  
./directory/  
./directory/dir1/  
./directory/dir2/  
./directory/dir3/  
./directory/dir4/  
./directory/dir5/  
./directory/dir6/  
./directory/dir7/  
./directory/dir8/  
./directory/dir9/  
./directory/dir10/  
./directory/file2  
./directory/file3  
./directory/file4  
./directory/file5  
./directory/file6  
./directory/file7  
./directory/file8  
./directory/file9  
./directory/file10  
./directory/new.tar.gz  
./directory/file1  
[root@ip-172-31-15-43 ~]# du -sh /directory/  
12K    /directory/  
[root@ip-172-31-15-43 ~]# du -sh dir.tar.gz  
4.0K    dir.tar.gz  
[root@ip-172-31-15-43 ~]#
```

```
root@ip-172-31-15-43:~  
[root@ip-172-31-15-43 ~]# ls  
etc.tar.gz  
[root@ip-172-31-15-43 ~]# ls -l  
total 5516  
-rw-r--r--. 1 root root 5647529 May 28 09:45 etc.tar.gz  
[root@ip-172-31-15-43 ~]# ls -l /directory/  
total 8  
drwxr-xr-x. 2 root root  6 May 28 09:37 dir1  
drwxr-xr-x. 2 root root  6 May 28 09:37 dir10  
drwxr-xr-x. 2 root root  6 May 28 09:37 dir2  
drwxr-xr-x. 2 root root  6 May 28 09:37 dir3  
drwxr-xr-x. 2 root root  6 May 28 09:37 dir4  
drwxr-xr-x. 2 root root  6 May 28 09:37 dir5  
drwxr-xr-x. 2 root root  6 May 28 09:37 dir6  
drwxr-xr-x. 2 root root  6 May 28 09:37 dir7  
drwxr-xr-x. 2 root root  6 May 28 09:37 dir8  
drwxr-xr-x. 2 root root  6 May 28 09:37 dir9  
-rw-r--r--. 1 root root 30 May 28 09:42 file1  
-rw-r--r--. 1 root root  0 May 28 09:37 file10  
-rw-r--r--. 1 root root  0 May 28 09:37 file2  
-rw-r--r--. 1 root root  0 May 28 09:37 file3  
-rw-r--r--. 1 root root  0 May 28 09:37 file4  
-rw-r--r--. 1 root root  0 May 28 09:37 file5  
-rw-r--r--. 1 root root  0 May 28 09:37 file6  
-rw-r--r--. 1 root root  0 May 28 09:37 file7  
-rw-r--r--. 1 root root  0 May 28 09:37 file8  
-rw-r--r--. 1 root root  0 May 28 09:37 file9  
-rw-r--r--. 1 root root 373 May 28 09:38 new.tar.gz  
[root@ip-172-31-15-43 ~]#
```

Option	Meaning
c	<b>Create</b> a new archive
z	<b>Compress</b> using gzip
v	<b>Verbose</b> output (shows progress)
f	<b>Filename</b> of the archive

Other Compression options:

Format	Command Example	Compression Tool
.tar.gz	tar -czvf archive.tar.gz folder/	gzip
.tar.bz2	tar -cjvf archive.tar.bz2 folder/	bzip2
.tar.xz	tar -cJvf archive.tar.xz folder/	xz

## 9. Write a command to synchronise files and directories between 2 local folders

Ans: To synchronize files and directories between two **local folders** in Linux, use the rsync command.

Command : rsync -av /source/directory/ /destination/directory/

rsync: the tool for syncing files

- -a: archive mode (preserves permissions, timestamps, etc.)
- -v: verbose (shows progress)

This will:

- Copy all files and folders **from source directory/ to destination directory/**
- Only copy **new or changed files** (efficient sync)

```

natasha@ip-172-31-15-43:~$ mkdir sync
[natasha@ip-172-31-15-43 ~]$ cd sync/
[natasha@ip-172-31-15-43 sync]$ touch devops(1..4)
[natasha@ip-172-31-15-43 sync]$ ls
devops1 devops2 devops3 devops4
[natasha@ip-172-31-15-43 sync]$ cd
[natasha@ip-172-31-15-43 ~]$ rsync -av /home/natasha/sync ubuntu@43.204.235.130:/home/ubuntu
The authenticity of host '43.204.235.130 (43.204.235.130)' can't be established.
ED25519 key fingerprint is SHA256:aayQ38Q2UG9M0VPu6GALMtOnc2K+qWSP7TJrod/Je1.
This host key is known by the following other names/addresses:
~/.ssh/known_hosts:1: 172.31.14.73
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '43.204.235.130' (ED25519) to the list of known hosts.
sending incremental file list
sync/
sync/devops1
sync/devops2
sync/devops3
sync/devops4

sent 297 bytes  received 96 bytes  87.33 bytes/sec
total size is 0  speedup is 0.00
[natasha@ip-172-31-15-43 ~]$

```

## 10. What is load average and swap memory in Linux

Ans: **Load average** shows the average number of processes waiting to be run on the CPU(s) over time.

Commands : top, uptime, or cat /proc/loadavg.

Eg: load average: 0.45, 0.60, 0.70

This shows load over the last:

- 1 minute, 5 minutes, 15 minutes

How to Interpret It:

- If you have 1 CPU core:
  - Load 1.00 means 100% usage (fully utilized).
  - Load >1.00 means CPU is overloaded.

```
ubuntu@ip-172-31-14-73: ~  
ubuntu@ip-172-31-14-73:~$ uptime  
10:39:50 up 10 min, 1 user, load average: 0.00, 0.01, 0.01  
ubuntu@ip-172-31-14-73:~$
```

**Swap** is disk space used as virtual memory when physical RAM is full.

- It helps avoid out-of-memory crashes.
- It is much slower than RAM.

Command : free -h, top, or vmstat.

Eg: free -h

	total	used	free	shared	buff/cache	available
Mem:	8.0G	7.5G	0.2G	0.1G	0.3G	0.4G
Swap:	2.0G	1.0G	1.0G			

```
ubuntu@ip-172-31-14-73: ~  
ubuntu@ip-172-31-14-73:~$ free -h  
              total        used        free      shared  buff/cache   available  
Mem:          957Mi       316Mi       470Mi       888Ki       326Mi       640Mi  
Swap:           0B           0B           0B  
ubuntu@ip-172-31-14-73:~$
```

If swap is in use, it usually means:

- Your system ran out of RAM.
- Processes are being pushed to slower disk-based memory.

Excessive swap usage = performance drop.

## 11. What are the important system directories in linux and what are they genereally used for [Ex: var, home etc]

Ans: Important Linux System Directories

Directory	Purpose
/	<b>Root directory</b> – Top-level of the filesystem hierarchy. Everything starts here.
/bin	Essential <b>user binaries</b> (e.g., ls, cp, rm) needed for basic system use.
/sbin	Essential <b>system binaries</b> for system administration (e.g., reboot, ifconfig).
/etc	<b>Configuration files</b> for the system and services (e.g., /etc/ssh/ssh_config).
/home	<b>User home directories</b> (e.g., /home/alice, /home/bob). User data lives here.
/root	<b>Home directory of the root user.</b> Different from /home.
/var	Variable data – <b>logs, databases, mail, print spool</b> , etc.
/usr	User-related programs and data; contains subdirs like /usr/bin, /usr/lib.
/lib	Essential <b>shared libraries</b> needed by binaries in /bin and /sbin.

/tmp	Temporary files – cleared on reboot or periodically. Accessible by all users.
/opt	Optional software or <b>third-party applications</b> (e.g., /opt/google/chrome).
/dev	Represents <b>device files</b> (e.g., /dev/sda, /dev/tty). Interfaces to hardware.
/proc	Virtual directory containing <b>process and kernel information</b> (e.g., /proc/cpuinfo).
/sys	Virtual filesystem for <b>kernel and hardware status</b> (related to /proc).
/boot	Files needed for <b>booting the system</b> , including the kernel and GRUB files.
/media	Mount point for <b>removable media</b> (USB drives, CDs, etc.).
/mnt	General <b>mount point</b> for temporarily mounting filesystems.
/run	Holds <b>runtime data</b> like PID files and sockets (usually cleared on boot).

## 12. What are the package installers for Redhat, Ubuntu, Debian, CentOS, Alpine

Ans: Redhat (RHEL) : YUM / DNF,

CentOS : YUM/DNF

Ubuntu : APT

Debian : APT

Alpine : APK

```
ubuntu@ip-172-31-14-73: ~
ubuntu@ip-172-31-14-73:~$ sudo apt install locate
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  locate
0 upgraded, 1 newly installed, 0 to remove and 44 not upgraded.
Need to get 50.3 kB of archives.
After this operation, 177 kB of additional disk space will be used.
Get:1 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu/noble/universe amd64 locate amd64 4.9.0-5build1 [50.3 kB]
Fetched 50.3 kB in 1s (100 kB/s)
Selecting previously unselected package locate.
(Reading database ... 103843 files and directories currently installed.)
Preparing to unpack .../locate.4.9.0-5build1_amd64.deb ...
Unpacking locate (4.9.0-5build1) ...
Setting up locate (4.9.0-5build1) ...
Processing triggers for man-db (2.12.0-4build2) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
ubuntu@ip-172-31-14-73:~$
```

```
natasha@ip-172-31-15-43:~
[natasha@ip-172-31-15-43 ~]$ sudo yum install locate
[sudo] password for natasha:
natasha is not in the sudoers file.
[natasha@ip-172-31-15-43 ~]$ exit
exit
[root@ip-172-31-15-43 ~]# exit
exit
[ec2-user@ip-172-31-15-43 ~]$ sudo su
[root@ip-172-31-15-43 ec2-user]# cd
[root@ip-172-31-15-43 ~]# vi sudo
[root@ip-172-31-15-43 ~]# sudo su natasha
[natasha@ip-172-31-15-43 ~]# cd
[natasha@ip-172-31-15-43 ~]$ pwd
/home/natasha
[natasha@ip-172-31-15-43 ~]$
[natasha@ip-172-31-15-43 ~]$ sudo yum install locate
[sudo] password for natasha:
Updating Subscription Management repositories.
Unable to read consumer identity

This system is not registered with an entitlement server. You can use "rhc" or "subscription-manager" to register.
Last metadata expiration check: 2:36:02 ago on Wed May 28 08:11:04 2025.
Dependencies resolved.
=====
Package                Architecture      Version           Repository        Size
-----
Installing:
plocate                x86_64            1.1.22-10.el10    rhel-10-baseos-rhui-rpms 181 k
Installing dependencies:
liburing               x86_64            2.5-5.el10        rhel-10-baseos-rhui-rpms 43 k
Transaction Summary
-----
Install 2 Packages

Total download size: 224 k
Installed size: 621 k
Is this ok [y/N]: y
Downloading Packages:
(1/2): liburing-2.5-5.el10.x86_64.rpm                309 kB/s | 43 kB  00:00
(2/2): plocate-1.1.22-10.el10.x86_64.rpm             695 kB/s | 181 kB 00:00
-----
Total                                               781 kB/s | 224 kB  00:00
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
```

**Optional Assignment: Configure Gmail on your Linux machine using Postfix/Sendmail to enable sending emails from your Gmail Account through the command line**

**Ans: RHEL Machine Setup**

**Step 1: Yum install postfix to check wheather installed the application or not by using command rpm -qa | grep postfix**

**Step 2: Yum install mailx**

**Step 3: then need to enter into postfix configuration file i.e., /etc/postfix/main.cf  
Cd /etc/postfix**

**Step 4: need to take a backup if we are changing any configuration file it is better practice if anything happens after changing the configuration file we can roll back**

**Step 5: vi main.cf Add the following lines in bottom of file  
your\_hostname (enter your hostname)**

**step 6: at the bottom need to add the below commands**

**#Location of sasl\_passwd we saved**

**smtp\_sasl\_password\_maps = hash:/etc/postfix/sasl/sasl\_passwd**

**#Enables SASL authentication for postfix**

**smtp\_sasl\_auth\_enable = yes**

**smtp\_tls\_security\_level = encrypt**

**#Disallow methods that allow anonymous authentication**

**smtp\_sasl\_security\_options = noanonymous**

**step 7: mkdir sasl under postfix directory**

**touch sasl\_passwd**

**step 8: In our mail need to change the settings**

**enable two factor authentication**

**in search bar type apps there you will get app password of 16 digit there you can create name: smtp generate**

**step 9: vi sasl\_passwd**

**[smtp.gmail.com]:587 [kmchandrashekhar.iitkgp@gmail.com:password](mailto:kmchandrashekhar.iitkgp@gmail.com) (16 digit password to paste continuously)**

**Step 10: enter command postmap sasl\_passwd under sasl directory**

**Change the permission for both the files sasl files by using command**

**Chmod 600 \*( \* for both the files permission)**

**Step 11: systemctl start postfix.service**

**Systemctl status postfix.service**

**Step 12: echo "Test Mail" | mail -s "Postfix TEST" [kmchandrashekhar.iitkgp@gmail.com](mailto:kmchandrashekhar.iitkgp@gmail.com)**

**Step 13: how to attach a file**

**echo "Test Mail" | mail -s "Postfix TEST" -a filename [kmchandrashekhar.iitkgp@gmail.com](mailto:kmchandrashekhar.iitkgp@gmail.com)**

**step 14: if mail error then we can check in /var/log/maillog**

🔍 Search mail



○ Away ▾



1 of 6,570



## Test Subject ▾ Inbox x



**Cloud User** <kmchandrashekhar.iitkgp@gmail.com>

🗨 5:16 PM (0 minutes ago)



to me ▾

Test B

from: **Cloud User** <kmchandrashekhar.iitkgp@gmail.com>

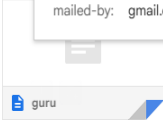
to: kmchandrashekhar.iitkgp@gmail.com

date: May 30, 2025, 5:16 PM

One

subject: Test Subject

mailed-by: gmail.com



↩ Reply

➦ Forward

