Web server app server task

1. Install nginx and run nginx on port number 81.
2. Deploy a sample index.html file on nginx.
3. Install Apache and run Apache on port number 82
4. Deploy a sample index.html file on Apache.
5. Install Apache tomcat on port number 8082
6. Deploy a sample app on webapps
7. Create a tomcat.service file for tomcat.
8. Configure HA Proxy server

1) Install nginx and run on port 81

   >> here we have installed nginx by using "yum install nginx" after logging into root user.

```
Last login: Thu Nov 27 16:06:01 on ttys000
sainiharikagundu@192 ~ % ssh -i ~/downloads/Gayu_01.pem ec2-user@13.61.8.217
The authenticity of host '13.61.8.217 (13.61.8.217)' can't be established.
ED25519 key fingerprint is SHA256:m74//e5JjTWf8FJT0LhzF8+7rq70e1kICtlJsX+EVxE.
This host key is known by the following other names/addresses:
    ~/.ssh/known_hosts:3: 13.49.68.91
    ~/.ssh/known_hosts:5: 13.60.23.201
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '13.61.8.217' (ED25519) to the list of known hosts.
   ,     #_
   ~\_  ####_        Amazon Linux 2023
  ~~  \_#####\
  ~~     \###|
  ~~       \#/ ___   https://aws.amazon.com/linux/amazon-linux-2023
   ~~       V~' '->
    ~~~         /
      ~~._.   _/
         _/ _/
       _/m/'
Last login: Fri Nov 28 07:20:23 2025 from 13.48.4.202
[ec2-user@ip-172-31-44-63 ~]$ sudo su -
Last login: Thu Nov 27 09:26:00 UTC 2025 on pts/3
[root@ip-172-31-44-63 ~]# yum install nginx
Last metadata expiration check: 21:55:54 ago on Thu Nov 27 09:27:01 2025.
Dependencies resolved.
================================================================================
 Package               Architecture   Version                   Repository   Size
================================================================================
Installing:
 nginx                 x86_64         1:1.28.0-1.amzn2023.0.2   amazonlinux  33 k
Installing dependencies:
 gperftools-libs       x86_64         2.9.1-1.amzn2023.0.3      amazonlinux  308 k
 libunwind             x86_64         1.4.0-5.amzn2023.0.3      amazonlinux  66 k
 nginx-core            x86_64         1:1.28.0-1.amzn2023.0.2   amazonlinux  686 k
 nginx-filesystem      noarch         1:1.28.0-1.amzn2023.0.2   amazonlinux  9.6 k
 nginx-mimetypes       noarch         2.1.49-3.amzn2023.0.3     amazonlinux  21 k

Transaction Summary
================================================================================
Install  6 Packages

Total download size: 1.1 M
Installed size: 3.6 M
Is this ok [y/N]: yes
Downloading Packages:
(1/6): libunwind-1.4.0-5.amzn2023.0.3.x86_64.rpm          1.8 MB/s |  66 kB   00:00
(2/6): nginx-1.28.0-1.amzn2023.0.2.x86_64.rpm             831 kB/s |  33 kB   00:00
(3/6): gperftools-libs-2.9.1-1.amzn2023.0.3.x86_64.rpm    6.3 MB/s | 308 kB   00:00
(4/6): nginx-filesystem-1.28.0-1.amzn2023.0.2.noarch.rpm  499 kB/s | 9.6 kB   00:00
(5/6): nginx-core-1.28.0-1.amzn2023.0.2.x86_64.rpm         23 MB/s | 686 kB   00:00
(6/6): nginx-mimetypes-2.1.49-3.amzn2023.0.3.noarch.rpm   856 kB/s |  21 kB   00:00
--------------------------------------------------------------------------------
Total                                                      10 MB/s | 1.1 MB   00:00
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing        :                                                        1/1
  Running scriptlet: nginx-filesystem-1:1.28.0-1.amzn2023.0.2.noarch        1/6
  Installing       : nginx-filesystem-1:1.28.0-1.amzn2023.0.2.noarch        1/6
  Installing       : nginx-mimetypes-2.1.49-3.amzn2023.0.3.noarch           2/6
  Installing       : libunwind-1.4.0-5.amzn2023.0.3.x86_64                  3/6
  Installing       : gperftools-libs-2.9.1-1.amzn2023.0.3.x86_64            4/6
```

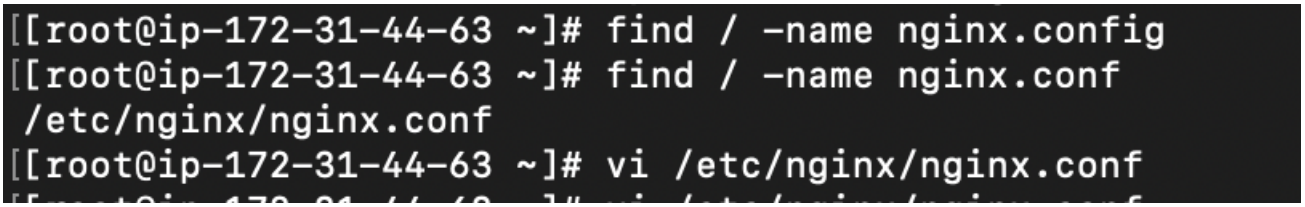
```
Installed:
  gperftools-libs-2.9.1-1.amzn2023.0.3.x86_64         libunwind-1.4.0-5.amzn2023.0.3.x86_64        nginx-1:1.28.0-1.amzn2023.0.2.x86_64        nginx-core-1:1.28.0-1.amzn2023.0.2.x86_64
  nginx-filesystem-1:1.28.0-1.amzn2023.0.2.noarch     nginx-mimetypes-2.1.49-3.amzn2023.0.3.noarch

Complete!
[root@ip-172-31-44-63 ~]#
```

>> to start, to check status & to stop the service we can verify by using below commands

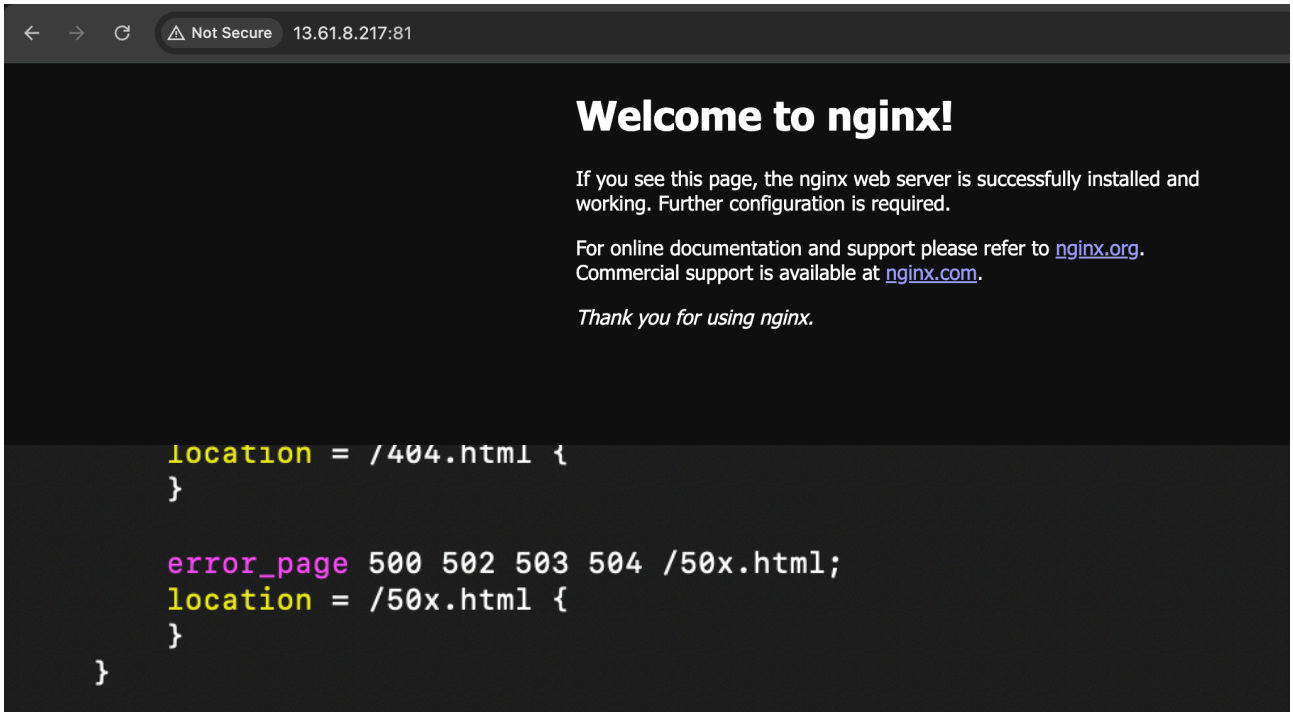
“Systemctl start nginx”
“Systemctl status nginx”
“Systemctl stop nginx”

```
[[root@ip-172-31-44-63 ~]# systemctl status nginx
○ nginx.service - The nginx HTTP and reverse proxy server
     Loaded: loaded (/usr/lib/systemd/system/nginx.service; disabled; preset: disabled)
     Active: inactive (dead)
[[root@ip-172-31-44-63 ~]# systemctl start nginx
[[root@ip-172-31-44-63 ~]# systemctl status nginx
● nginx.service - The nginx HTTP and reverse proxy server
     Loaded: loaded (/usr/lib/systemd/system/nginx.service; disabled; preset: disabled)
     Active: active (running) since Fri 2025-11-28 07:30:01 UTC; 3s ago
    Process: 2837 ExecStartPre=/usr/bin/rm -f /run/nginx.pid (code=exited, status=0/SUCCESS)
    Process: 2838 ExecStartPre=/usr/sbin/nginx -t (code=exited, status=0/SUCCESS)
    Process: 2839 ExecStart=/usr/sbin/nginx (code=exited, status=0/SUCCESS)
   Main PID: 2840 (nginx)
      Tasks: 3 (limit: 1053)
     Memory: 3.2M
        CPU: 57ms
     CGroup: /system.slice/nginx.service
             ├─2840 "nginx: master process /usr/sbin/nginx"
             ├─2841 "nginx: worker process"
             └─2842 "nginx: worker process"

Nov 28 07:30:00 ip-172-31-44-63.eu-north-1.compute.internal systemd[1]: Starting nginx.service - The nginx HTTP and reverse proxy server...
Nov 28 07:30:00 ip-172-31-44-63.eu-north-1.compute.internal nginx[2838]: nginx: the configuration file /etc/nginx/nginx.conf syntax is ok
Nov 28 07:30:00 ip-172-31-44-63.eu-north-1.compute.internal nginx[2838]: nginx: configuration file /etc/nginx/nginx.conf test is successful
Nov 28 07:30:01 ip-172-31-44-63.eu-north-1.compute.internal systemd[1]: Started nginx.service - The nginx HTTP and reverse proxy server.
[[root@ip-172-31-44-63 ~]# systemctl stop nginx
[[root@ip-172-31-44-63 ~]# systemctl status nginx
○ nginx.service - The nginx HTTP and reverse proxy server
     Loaded: loaded (/usr/lib/systemd/system/nginx.service; disabled; preset: disabled)
     Active: inactive (dead)

Nov 28 07:30:00 ip-172-31-44-63.eu-north-1.compute.internal systemd[1]: Starting nginx.service - The nginx HTTP and reverse proxy server...
Nov 28 07:30:00 ip-172-31-44-63.eu-north-1.compute.internal nginx[2838]: nginx: the configuration file /etc/nginx/nginx.conf syntax is ok
Nov 28 07:30:00 ip-172-31-44-63.eu-north-1.compute.internal nginx[2838]: nginx: configuration file /etc/nginx/nginx.conf test is successful
Nov 28 07:30:01 ip-172-31-44-63.eu-north-1.compute.internal systemd[1]: Started nginx.service - The nginx HTTP and reverse proxy server.
Nov 28 07:35:18 ip-172-31-44-63.eu-north-1.compute.internal systemd[1]: Stopping nginx.service - The nginx HTTP and reverse proxy server...
Nov 28 07:35:18 ip-172-31-44-63.eu-north-1.compute.internal systemd[1]: nginx.service: Deactivated successfully.
Nov 28 07:35:18 ip-172-31-44-63.eu-north-1.compute.internal systemd[1]: Stopped nginx.service - The nginx HTTP and reverse proxy server.
```

>> here to find the path of nginx.config file we are using “find” command >>
find / -name nginx.config
>> vi /etc/nginx/nginx.conf > opens the nginx.conf file where we can change the port number.

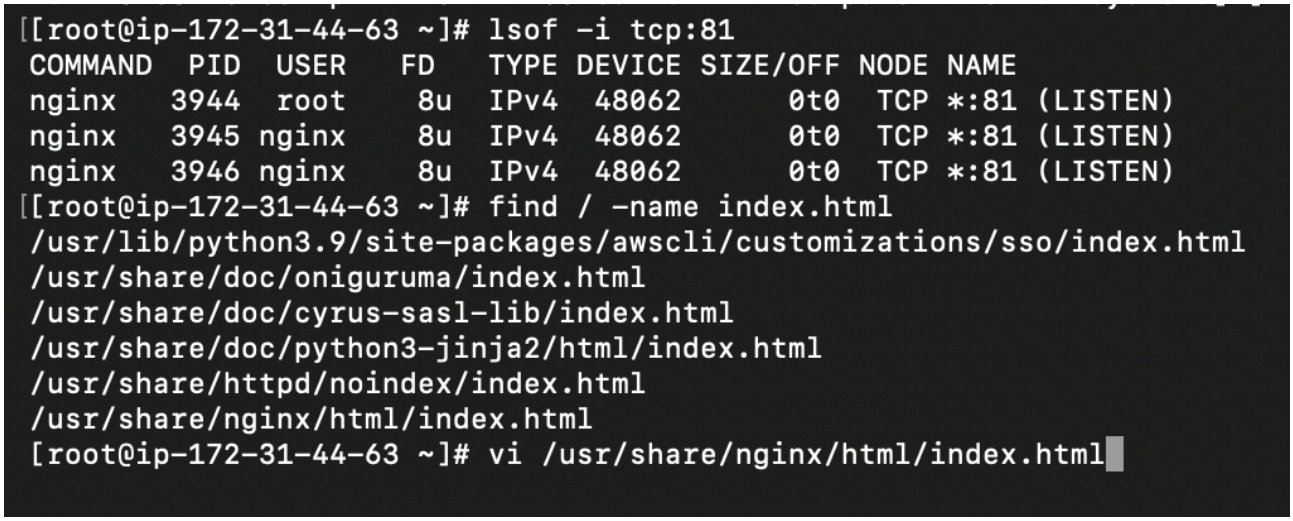


>> after changing the port number we need to restart the server
“systemctl restart nginx”



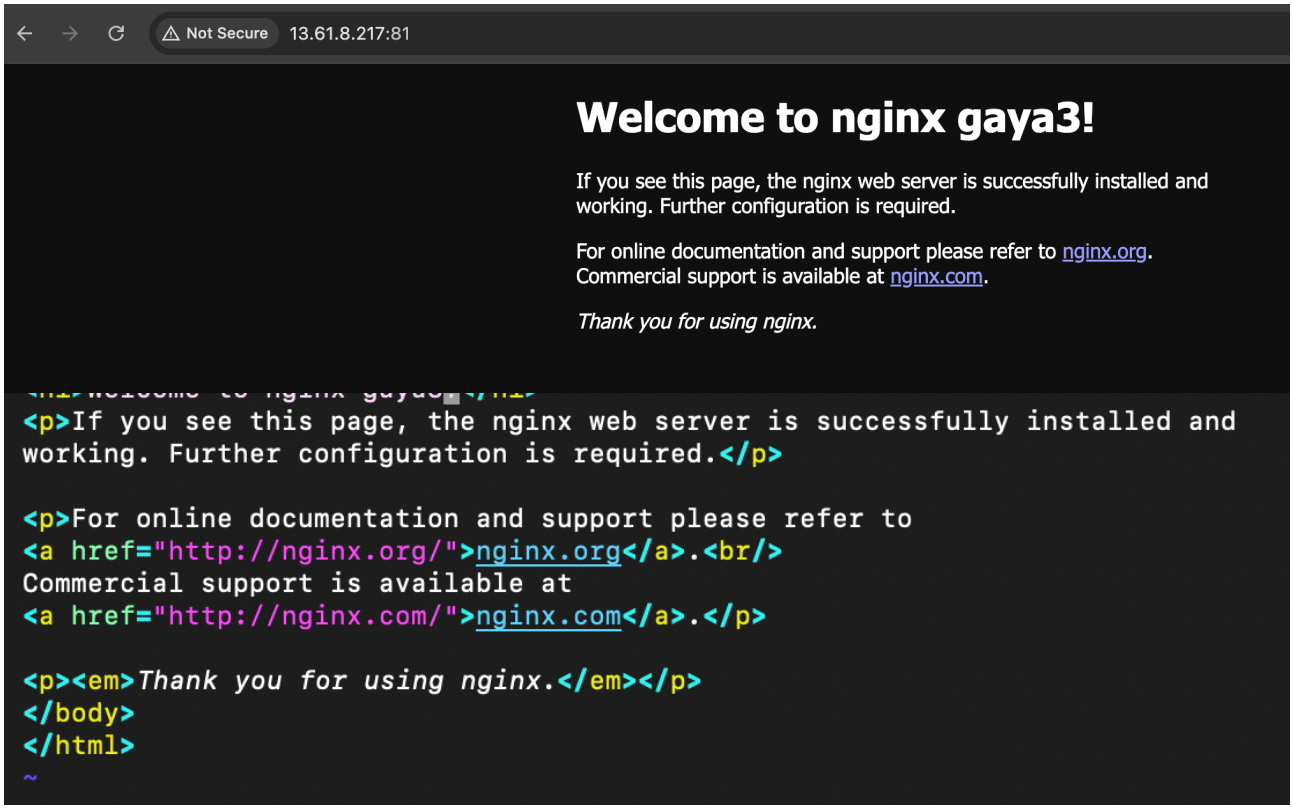
2. Deploy a sample index.html file on nginx.

>> To find the correct path of html file of nginx we can use command “find / -name index.html”



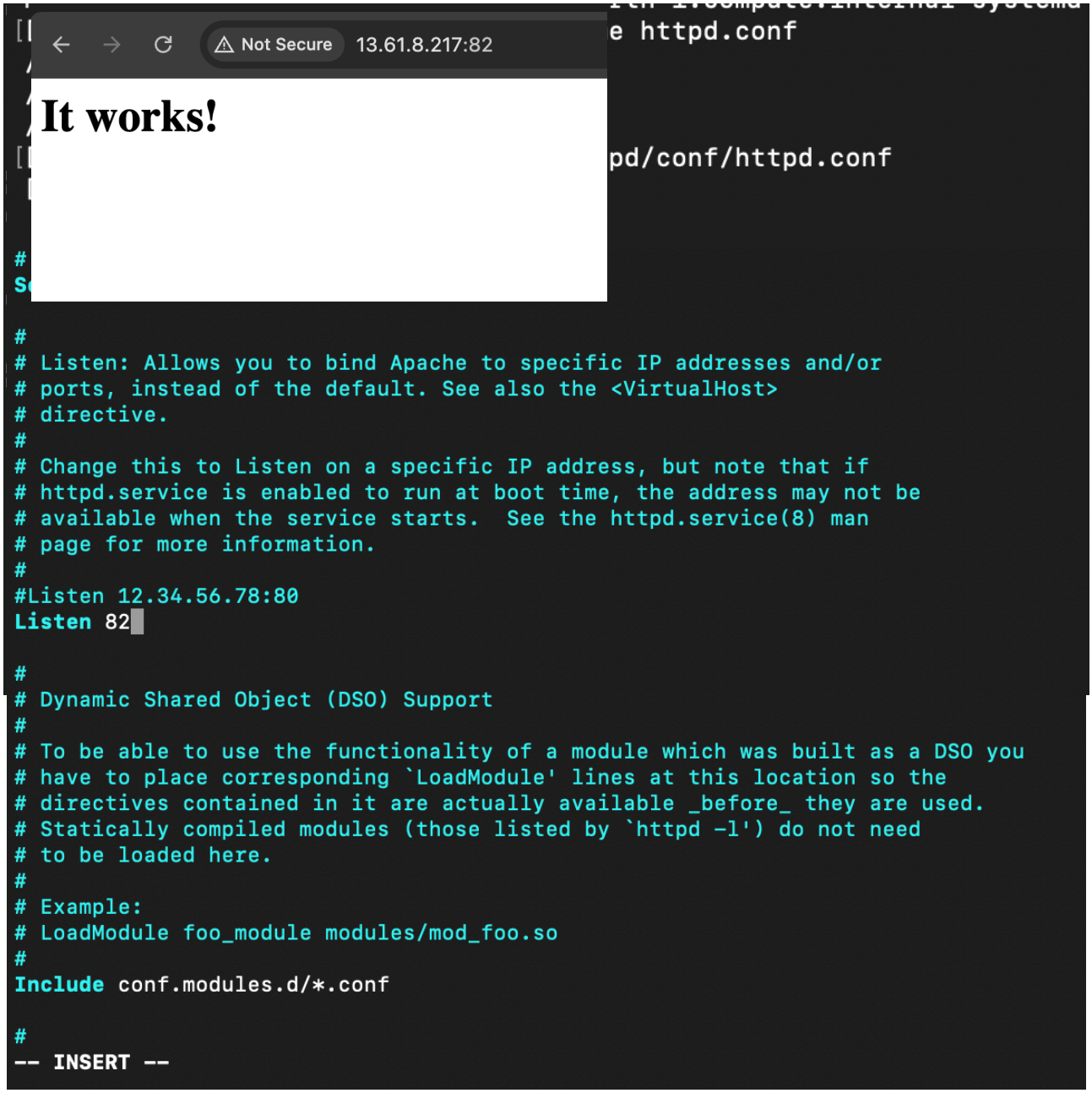
>> after saving we must need to restart the nginx

3. Install Apache and run Apache on port number 82



>> here we have installed httpd by using “yum install httpd” after logging into root user.
>> to start, to check status & to stop the service we can verify by using below commands
“Systemctl start httpd”
“Systemctl status httpd”
“Systemctl stop httpd”

>> here to find the path of httpd.config file we are using “find” command >>
find / -name httpd.config
>> vi /etc/httpd/conf/httpd.conf> opens the httpd.conf file where we can change the port number.
>> after changing the port number we need to restart the server
“systemctl restart httpd”

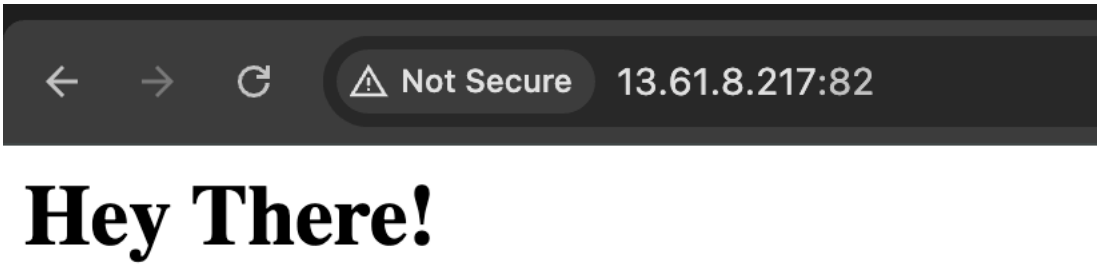


4. Deploy a sample index.html file on Apache.

>> To find the correct path of html file of nginx we can use command
"find / -name index.html"
"vi /usr/share/httpd/noindex/index.html" >> to edit the content

```
[[root@ip-172-31-44-63 ~]# find / -name index.html
/usr/lib/python3.9/site-packages/awscli/customizations/sso/index.html
/usr/share/doc/oniguruma/index.html
/usr/share/doc/cyrus-sasl-lib/index.html
/usr/share/doc/python3-jinja2/html/index.html
/usr/share/httpd/noindex/index.html
/usr/share/nginx/html/index.html
[[root@ip-172-31-44-63 ~]# vi /usr/share/httpd/noindex/index.html
[[root@ip-172-31-44-63 ~]# vi /usr/share/httpd/noindex/index.html
[[root@ip-172-31-44-63 ~]# find / -name webapps
[[root@ip-172-31-44-63 ~]# vi /usr/share/httpd/noindex/index.html
[root@ip-172-31-44-63 ~]#
```

>> now we should restart the service “systemctl restart httpd”



5. Install Apache tomcat on port number 8082

>> To install tomcat from web we will use wget command and extracted the file by using tar xvf

```
[[root@ip-172-31-44-63 ~]# cd /opt
[[root@ip-172-31-44-63 opt]# wget https://dlcdn.apache.org/tomcat/tomcat-9/v9.0.112/bin/apache-tomcat-9.0.112.tar.gz
--2025-11-28 10:25:12--  https://dlcdn.apache.org/tomcat/tomcat-9/v9.0.112/bin/apache-tomcat-9.0.112.tar.gz
Resolving dlcdn.apache.org (dlcdn.apache.org)... 151.101.2.132, 2a04:4e42::644
Connecting to dlcdn.apache.org (dlcdn.apache.org)|151.101.2.132|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 13043951 (12M) [application/x-gzip]
Saving to: ‘apache-tomcat-9.0.112.tar.gz’

apache-tomcat-9.0.112.tar.gz                    100%[=============================================================================================================>]  12.44M  --.-KB/s    in 0.04s

2025-11-28 10:25:13 (286 MB/s) - ‘apache-tomcat-9.0.112.tar.gz’ saved [13043951/13043951]

[[root@ip-172-31-44-63 opt]# ls
apache-tomcat-9.0.112.tar.gz  aws
[[root@ip-172-31-44-63 opt]# tar xvf apache-tomcat-9.0.112.tar.gz
apache-tomcat-9.0.112/
apache-tomcat-9.0.112/conf/
apache-tomcat-9.0.112/conf/catalina.policy
apache-tomcat-9.0.112/conf/catalina.properties
apache-tomcat-9.0.112/conf/context.xml
apache-tomcat-9.0.112/conf/jaspic-providers.xml
apache-tomcat-9.0.112/conf/jaspic-providers.xsd
apache-tomcat-9.0.112/conf/logging.properties
apache-tomcat-9.0.112/conf/server.xml
apache-tomcat-9.0.112/conf/tomcat-users.xml
apache-tomcat-9.0.112/conf/tomcat-users.xsd
```

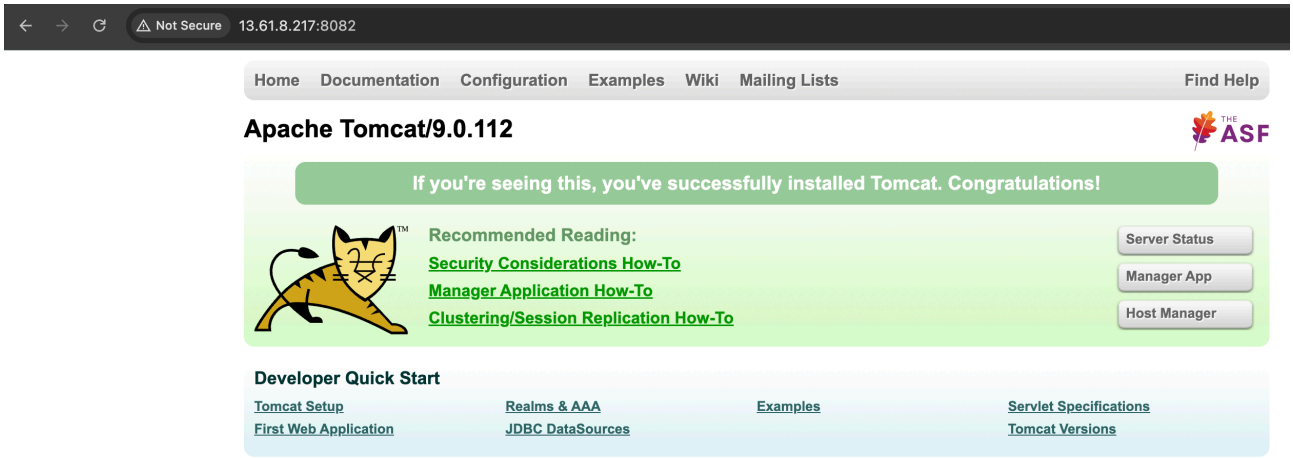
And started the bash command to startup.sh

```
[[root@ip-172-31-44-63 opt]# ls
apache-tomcat-9.0.112  apache-tomcat-9.0.112.tar.gz  aws
[[root@ip-172-31-44-63 opt]# cd apache-tomcat-9.0.112
[[root@ip-172-31-44-63 apache-tomcat-9.0.112]# ls
BUILDING.txt  CONTRIBUTING.md  LICENSE  NOTICE  README.md  RELEASE-NOTES  RUNNING.txt  bin  conf  lib  logs  temp  webapps  work
[[root@ip-172-31-44-63 apache-tomcat-9.0.112]# cd bin
[[root@ip-172-31-44-63 bin]# ls
bootstrap.jar       catalina.sh  commons-daemon-native.tar.gz  configtest.sh  digest.sh     setclasspath.bat  shutdown.sh  tomcat-juli.jar       tool-wrapper.sh
catalina-tasks.xml  ciphers.bat  commons-daemon.jar            daemon.sh      makebase.bat  setclasspath.sh   startup.bat  tomcat-native.tar.gz  version.bat
catalina.bat        ciphers.sh   configtest.bat               digest.bat     makebase.sh   shutdown.bat      startup.sh   tool-wrapper.bat      version.sh
[[root@ip-172-31-44-63 bin]# bash startup.sh
Using CATALINA_BASE:   /opt/apache-tomcat-9.0.112
Using CATALINA_HOME:   /opt/apache-tomcat-9.0.112
Using CATALINA_TMPDIR: /opt/apache-tomcat-9.0.112/temp
Using JRE_HOME:        /usr
Using CLASSPATH:       /opt/apache-tomcat-9.0.112/bin/bootstrap.jar:/opt/apache-tomcat-9.0.112/bin/tomcat-juli.jar
Using CATALINA_OPTS:
Tomcat started.
[root@ip-172-31-44-63 bin]#
```

>> here we have changed the port number from 8080 to 8082

```
            factory="org.apache.catalina.users.MemoryUserDatabaseFactory"
            pathname="conf/tomcat-users.xml" />
  </GlobalNamingResources>

  <!-- A "Service" is a collection of one or more "Connectors" that share
       a single "Container" Note:  A "Service" is not itself a "Container",
       so you may not define subcomponents such as "Valves" at this level.
       Documentation at /docs/config/service.html
   -->
  <Service name="Catalina">

    <!--The connectors can use a shared executor, you can define one or more named thread pools-->
    <!--
    <Executor name="tomcatThreadPool" namePrefix="catalina-exec-"
        maxThreads="150" minSpareThreads="4"/>
    -->


    <!-- A "Connector" represents an endpoint by which requests are received
         and responses are returned. Documentation at :
         Java HTTP Connector: /docs/config/http.html
         Java AJP  Connector: /docs/config/ajp.html
         APR (HTTP/AJP) Connector: /docs/apr.html
         Define a non-SSL/TLS HTTP/1.1 Connector on port 8080
    -->
    <Connector port="8082" protocol="HTTP/1.1"
               connectionTimeout="20000"
               redirectPort="8443"
               maxParameterCount="1000"
               />
```

Changed port number to 8082

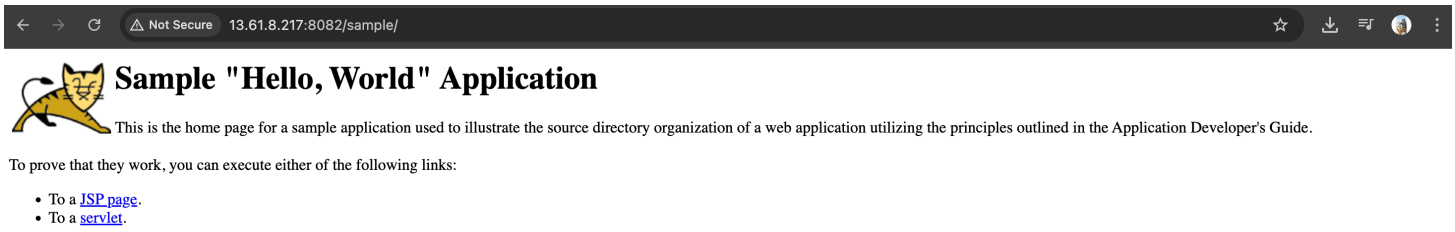


6. Deploy a sample app on webapps.

>> Here, we have downloaded a sample war file from the internet by using “wget” command.

```
[root@ip-172-31-44-63 apache-tomcat-9.0.112]# ls
BUILDING.txt  CONTRIBUTING.md  LICENSE  NOTICE  README.md  RELEASE-NOTES  RUNNING.txt  bin  conf  lib  logs  temp  webapps  work
[root@ip-172-31-44-63 apache-tomcat-9.0.112]# cd webapps
[root@ip-172-31-44-63 webapps]# ls
ROOT  docs  examples  host-manager  manager
[root@ip-172-31-44-63 webapps]# wget https://tomcat.apache.org/tomcat-7.0-doc/appdev/sample/sample.war
--2025-11-28 14:21:20--  https://tomcat.apache.org/tomcat-7.0-doc/appdev/sample/sample.war
Resolving tomcat.apache.org (tomcat.apache.org)... 151.101.2.132, 2a04:4e42::644
Connecting to tomcat.apache.org (tomcat.apache.org)|151.101.2.132|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 4606 (4.5K)
Saving to: ‘sample.war’

sample.war                                          100%[=================================================================================================================>]   4.50K  --.-KB/s    in 0s

2025-11-28 14:21:20 (34.1 MB/s) - ‘sample.war’ saved [4606/4606]

[root@ip-172-31-44-63 webapps]# ls
ROOT  docs  examples  host-manager  manager  sample.war
[root@ip-172-31-44-63 webapps]# vi sample.war
[root@ip-172-31-44-63 webapps]#
```

>> http://13.61.8.217:8082/sample/ to view



7. Create a tomcat.service file for tomcat.

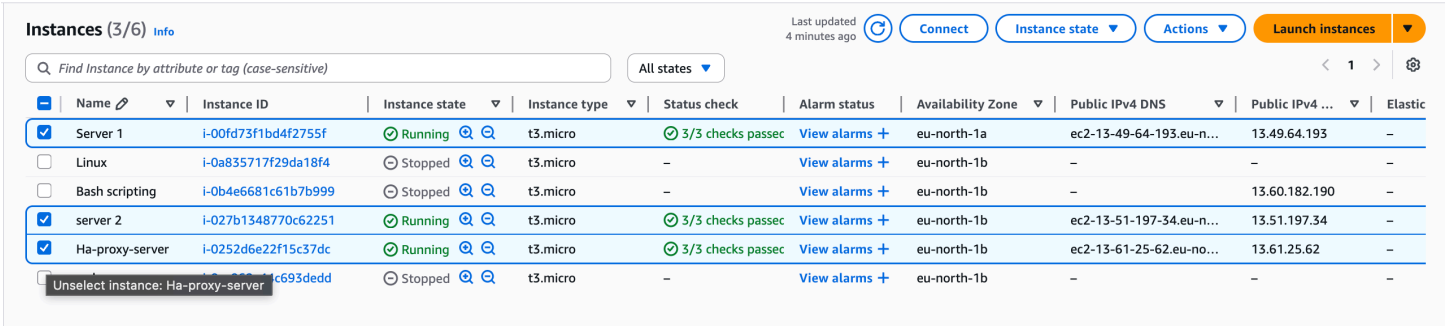
```
[root@ip-172-31-46-130 ~]# cd /etc
[root@ip-172-31-46-130 etc]# ls
DIR_COLORS                 bindresvport.blacklist  dbus-1          group             inittab          locale.conf      netconfig      printcap      rpm           sssd            tmpfiles.d
DIR_COLORS.lightbgcolor    binfmt.d                default         group-            inputrc          localtime        networks       profile       rsyncd.conf   statetab.d      trusted-key.key
GREP_COLORS                chkconfig.d             depmod.d        grub.d            issue            login.defs       nfs.conf       profile.d     rsyslog.d     subgid          udev
NetworkManager             chrony.conf             dhcp            grub2-efi.cfg     issue.net        logrotate.conf   nfsmount.conf  protocols     rwtab.d       subgid-         update-motd.d
X11                        chrony.d                dnf             grub2.cfg         kernel           logrotate.d      nsswitch.conf  rc.d          sasl2         subuid          vimrc
acpi                       chrony.keys             dracut.conf     gshadow           keyutils         lsm              openldap       rc0.d         screenrc      subuid-         virc
adjtime                    cifs-utils              dracut.conf.d   gshadow-          krb5.conf        machine-id       opt            rc1.d         security      sudo.conf       wgetrc
aliases                    cloud                   environment     gss               krb5.conf.d      magic            os-release     rc2.d         selinux       sudoers         xattr.conf
alternatives               cron.daily              ethertypes      gssproxy          ld.so.cache      man_db.conf      pam.d          rc3.d         services      sudoers.d       xdg
amazon                     cron.hourly             exports         hibinit-config.cfg ld.so.conf      mke2fs.conf      passwd         rc4.d         sestatus.conf sysconfig       yum.repos.d
amazon-linux-release       cron.monthly            exports.d       host.conf         ld.so.conf.d     modprobe.d       passwd-        rc5.d         shadow        sysctl.conf
amazon-linux-release-cpe   cron.weekly             filesystems     hostname          libaudit.conf    modules-load.d   pkcs11         rc6.d         shadow-       sysctl.d
at.deny                    crontab                 fstab           hosts             libibverbs.d     motd             pkgconfig      request-key.conf shells      system-release
audit                      crypto-policies         gcrypt          idmapd.conf       libnl            motd.d           pki            request-key.d skel           system-release-cpe
bash_completion.d          csh.cshrc               gnupg           image-id          libreport        mtab             pm             resolv.conf   ssh           systemd
bashrc                     csh.login               groff           init.d            libuser.conf     nanorc           popt.d         rpc           ssl           terminfo
[root@ip-172-31-46-130 etc]# cd sys
sysconfig/ sysctl.d/  systemd/
[root@ip-172-31-46-130 etc]# cd systemd
[root@ip-172-31-46-130 systemd]# ls
coredump.conf  homed.conf  journald.conf  logind.conf  network  networkd.conf  oomd.conf  pstore.conf  resolved.conf  sleep.conf  system  system.conf  system.conf.d  timesyncd.conf  user  user.conf
[root@ip-172-31-46-130 systemd]# cd system
[root@ip-172-31-46-130 system]# ls
basic.target.wants       dbus-org.freedesktop.home1.service      getty.target.wants          nfs-idmapd.service.requires  rpc-gssd.service.requires          sysinit.target.wants
chronyd.service.wants    dbus-org.freedesktop.network1.service   multi-user.target.wants     nfs-mountd.service.requires  rpc-statd-notify.service.requires  sysstat.service.wants
cloud-init.target.wants  dbus-org.freedesktop.resolve1.service   network-online.target.wants  nfs-server.service.requires  rpc-statd.service.requires         systemd-homed.service.wants
ctrl-alt-del.target      dbus.service                            nfs-blkmap.service.requires  remote-fs.target.wants       sockets.target.wants               timers.target.wants
[root@ip-172-31-46-130 system]#
```

```
[Unit]
Description=Apache Tomcat Web Application Container
After=network.target

[Service]
Type=forking

# Adjust these according to your installation
Environment="JAVA_HOME=/usr/lib/jvm/java-11-openjdk"
Environment="CATALINA_HOME=/opt/tomcat"
Environment="CATALINA_BASE=/opt/tomcat"
Environment="CATALINA_PID=/opt/tomcat/temp/tomcat.pid"

ExecStart=/opt/tomcat/bin/startup.sh
ExecStop=/opt/tomcat/bin/shutdown.sh

User=tomcat
Group=tomcat
UMask=0007

Restart=on-failure

[Install]
WantedBy=multi-user.target

~
~
```

```
apache-tomcat-9.0.111/bin/startup.sh
apache-tomcat-9.0.111/bin/tool-wrapper.sh
apache-tomcat-9.0.111/bin/version.sh
[Unit]
Description=Apache Tomcat Web Application Server
After=network.target
[Service]
Type=forking
User=tomcat
Group=tomcat
Environment="JAVA_HOME=/usr/lib/jvm/java-17-amazon-corretto"
Environment="CATALINA_PID=/opt/tomcat/temp/tomcat.pid"
Environment="CATALINA_HOME=/opt/tomcat"
Environment="CATALINA_BASE=/opt/tomcat"
ExecStart=/opt/tomcat/bin/startup.sh
ExecStop=/opt/tomcat/bin/shutdown.sh
RestartSec=10
Restart=always
[Install]
WantedBy=multi-user.target
Created symlink /etc/systemd/system/multi-user.target.wants/tomcat.service → /etc/systemd/system/tomcat.service.
● tomcat.service - Apache Tomcat Web Application Server
     Loaded: loaded (/etc/systemd/system/tomcat.service; enabled; preset: disabled)
     Active: active (running) since Wed 2025-12-03 11:29:04 UTC; 429ms ago
   Main PID: 15198 (java)
      Tasks: 15 (limit: 1053)
     Memory: 27.3M
        CPU: 344ms
     CGroup: /system.slice/tomcat.service
             └─15198 /usr/lib/jvm/java-17-amazon-corretto/bin/java -Djava.util.logging.config.file=/opt/tomcat/conf/logging.properties -Djava.util.logging.manager=org.apache.juli.ClassLoaderLogManager >
```

8. Configure HA Proxy server

Launched 3 servers



Installed httpd on server 1
Yum update -y
Yum install httpd

```
   ,     #_
   ~\_  ####_        Amazon Linux 2023
  ~~  \_#####\
  ~~     \###|
  ~~       \#/ ___   https://aws.amazon.com/linux/amazon-linux-2023
   ~~       V~' '->
    ~~~         /
      ~~._.   _/
         _/ _/
       _/m/'
Last login: Wed Dec  3 11:53:15 2025 from 103.203.172.230
[ec2-user@ip-172-31-29-44 ~]$
[ec2-user@ip-172-31-29-44 ~]$ sudo -i
[root@ip-172-31-29-44 ~]# yum update -y
Amazon Linux 2023 Kernel Livepatch repository
Dependencies resolved.
Nothing to do.
Complete!
[root@ip-172-31-29-44 ~]# yum install httpd
Last metadata expiration check: 0:00:29 ago on Wed Dec  3 12:06:44 2025.
Dependencies resolved.
================================================================================
 Package                    Architecture                Version
================================================================================
Installing:
 httpd                      x86_64                      2.4.65-1.amzn2023.0.2
Installing dependencies:
 apr                        x86_64                      1.7.5-1.amzn2023.0.4
 apr-util                   x86_64                      1.6.3-1.amzn2023.0.2
 apr-util-lmdb              x86_64                      1.6.3-1.amzn2023.0.2
 generic-logos-httpd        noarch                      18.0.0-12.amzn2023.0.3
 httpd-core                 x86_64                      2.4.65-1.amzn2023.0.2
 httpd-filesystem           noarch                      2.4.65-1.amzn2023.0.2
 httpd-tools                x86_64                      2.4.65-1.amzn2023.0.2
 libbrotli                  x86_64                      1.0.9-4.amzn2023.0.2
 mailcap                    noarch                      2.1.49-3.amzn2023.0.3
Installing weak dependencies:
 apr-util-openssl           x86_64                      1.6.3-1.amzn2023.0.2
 mod_http2                  x86_64                      2.0.27-1.amzn2023.0.3
 mod_lua                    x86_64                      2.4.65-1.amzn2023.0.2

Transaction Summary
================================================================================
Install  13 Packages
```

Installed httpd and made sure that service is running.
Ping load_balancer

```
[root@ip-172-31-29-44 ~]# ping load_balancer
PING load_balancer (13.61.25.62) 56(84) bytes of data.
64 bytes from load_balancer (13.61.25.62): icmp_seq=1 ttl=126 time=1.16 ms
64 bytes from load_balancer (13.61.25.62): icmp_seq=2 ttl=126 time=1.18 ms
64 bytes from load_balancer (13.61.25.62): icmp_seq=3 ttl=126 time=1.17 ms
64 bytes from load_balancer (13.61.25.62): icmp_seq=4 ttl=126 time=1.19 ms
64 bytes from load_balancer (13.61.25.62): icmp_seq=5 ttl=126 time=1.16 ms
64 bytes from load_balancer (13.61.25.62): icmp_seq=6 ttl=126 time=1.18 ms
64 bytes from load_balancer (13.61.25.62): icmp_seq=7 ttl=126 time=1.19 ms
^C
--- load_balancer ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6008ms
rtt min/avg/max/mdev = 1.159/1.175/1.190/0.011 ms
[root@ip-172-31-29-44 ~]# systemctl start httpd
[root@ip-172-31-29-44 ~]# systemctl enable httpd
Created symlink /etc/systemd/system/multi-user.target.wants/httpd.service → /usr/lib/systemd/system/httpd.service.
[root@ip-172-31-29-44 ~]# systemctl status httpd
● httpd.service - The Apache HTTP Server
     Loaded: loaded (/usr/lib/systemd/system/httpd.service; enabled; preset: disabled)
     Active: active (running) since Wed 2025-12-03 12:24:35 UTC; 20s ago
       Docs: man:httpd.service(8)
   Main PID: 26830 (httpd)
     Status: "Total requests: 0; Idle/Busy workers 100/0;Requests/sec: 0; Bytes served/sec:   0 B/sec"
      Tasks: 177 (limit: 1053)
     Memory: 13.3M
        CPU: 81ms
     CGroup: /system.slice/httpd.service
             ├─26830 /usr/sbin/httpd -DFOREGROUND
             ├─26832 /usr/sbin/httpd -DFOREGROUND
             ├─26833 /usr/sbin/httpd -DFOREGROUND
             ├─26835 /usr/sbin/httpd -DFOREGROUND
             └─26854 /usr/sbin/httpd -DFOREGROUND

Dec 03 12:24:35 ip-172-31-29-44.eu-north-1.compute.internal systemd[1]: Starting httpd.service - The Apache HTTP Server...
Dec 03 12:24:35 ip-172-31-29-44.eu-north-1.compute.internal systemd[1]: Started httpd.service - The Apache HTTP Server.
Dec 03 12:24:35 ip-172-31-29-44.eu-north-1.compute.internal httpd[26830]: Server configured, listening on: port 80
[root@ip-172-31-29-44 ~]#
```

Installed nginx on server 2 and Made sure that server is running

```
[ec2-user@ip-172-31-41-151 ~]$ sudo yum update -y
Amazon Linux 2023 Kernel Livepatch repository
Dependencies resolved.
Nothing to do.
Complete!
[ec2-user@ip-172-31-41-151 ~]$ sudo yum install nginx -y
Last metadata expiration check: 0:00:16 ago on Wed Dec  3 12:22:47 2025.
Dependencies resolved.
================================================================================
 Package                                        Architecture
================================================================================
Installing:
 nginx                                          x86_64
Installing dependencies:
 generic-logos-httpd                            noarch
 gperftools-libs                                x86_64
 libunwind                                      x86_64
 nginx-core                                     x86_64
 nginx-filesystem                               noarch
 nginx-mimetypes                                noarch

Transaction Summary
================================================================================
Install  7 Packages

Total download size: 1.1 M
Installed size: 3.7 M
Downloading Packages:
(1/7): generic-logos-httpd-18.0.0-12.amzn2023.0.3.noarch.rpm
(2/7): libunwind-1.4.0-5.amzn2023.0.3.x86_64.rpm
(3/7): gperftools-libs-2.9.1-1.amzn2023.0.3.x86_64.rpm
(4/7): nginx-1.28.0-1.amzn2023.0.2.x86_64.rpm
(5/7): nginx-filesystem-1.28.0-1.amzn2023.0.2.noarch.rpm
(6/7): nginx-core-1.28.0-1.amzn2023.0.2.x86_64.rpm
(7/7): nginx-mimetypes-2.1.49-3.amzn2023.0.3.noarch.rpm
```

>> vi /etc/hosts
>>ping load_balancer

```
[root@ip-172-31-41-151 ~]# vi /etc/hosts/
[root@ip-172-31-41-151 ~]# vi /etc/hosts
[root@ip-172-31-41-151 ~]# ping load_balancer
PING load_balancer (13.61.25.62) 56(84) bytes of data.
64 bytes from load_balancer (13.61.25.62): icmp_seq=1 ttl=126 time=0.216 ms
64 bytes from load_balancer (13.61.25.62): icmp_seq=2 ttl=126 time=0.201 ms
64 bytes from load_balancer (13.61.25.62): icmp_seq=3 ttl=126 time=0.224 ms
64 bytes from load_balancer (13.61.25.62): icmp_seq=4 ttl=126 time=0.203 ms
^C
--- load_balancer ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3102ms
rtt min/avg/max/mdev = 0.201/0.211/0.224/0.009 ms
[root@ip-172-31-41-151 ~]#
```

>> Now open haproxy server
>> yum update -y
>> yum install haproxy -y >> vi /etc/hosts >> add both server 1& 2

```
================================================================================================
Total
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing        :
  Running scriptlet: haproxy-3.0.5-1.amzn2023.0.1.x86_64
  Installing       : haproxy-3.0.5-1.amzn2023.0.1.x86_64
  Running scriptlet: haproxy-3.0.5-1.amzn2023.0.1.x86_64
  Verifying        : haproxy-3.0.5-1.amzn2023.0.1.x86_64

Installed:
  haproxy-3.0.5-1.amzn2023.0.1.x86_64

Complete!
[root@ip-172-31-42-175 ~]# vi /etc/hosts
[root@ip-172-31-42-175 ~]# ping server-1
PING server-1 (13.49.64.193) 56(84) bytes of data.
64 bytes from server-1 (13.49.64.193): icmp_seq=1 ttl=126 time=1.18 ms
64 bytes from server-1 (13.49.64.193): icmp_seq=2 ttl=126 time=1.19 ms
64 bytes from server-1 (13.49.64.193): icmp_seq=3 ttl=126 time=1.32 ms
64 bytes from server-1 (13.49.64.193): icmp_seq=4 ttl=126 time=1.17 ms
64 bytes from server-1 (13.49.64.193): icmp_seq=5 ttl=126 time=1.24 ms
64 bytes from server-1 (13.49.64.193): icmp_seq=6 ttl=126 time=1.34 ms
^C
--- server-1 ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5007ms
rtt min/avg/max/mdev = 1.170/1.239/1.343/0.067 ms
[root@ip-172-31-42-175 ~]# ping server-2
PING server-2 (13.51.197.34) 56(84) bytes of data.
64 bytes from server-2 (13.51.197.34): icmp_seq=1 ttl=126 time=0.190 ms
64 bytes from server-2 (13.51.197.34): icmp_seq=2 ttl=126 time=0.168 ms
^C
--- server-2 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1075ms
rtt min/avg/max/mdev = 0.168/0.179/0.190/0.011 ms
[root@ip-172-31-42-175 ~]#
```

```
63
64 #---------------------------------------------------------------------
65 # main frontend which proxys to the backends
66 #---------------------------------------------------------------------
67 frontend main
68     bind *:80
69     acl url_static       path_beg       -i /static /images /javascript /stylesheets
70     acl url_static       path_end       -i .jpg .gif .png .css .js
71
72     use_backend static          if url_static
73     default_backend             app
74
75 #---------------------------------------------------------------------
76 # static backend for serving up images, stylesheets and such
77 #---------------------------------------------------------------------
78 backend static
79     balance     roundrobin
80     server      static 127.0.0.1:4331 check
81
82 #---------------------------------------------------------------------
83 # round robin balancing between the various backends
84 #---------------------------------------------------------------------
85 backend app
86     balance     roundrobin
87     server  app1 127.0.0.1:5001 check
88     server  app2 127.0.0.1:5002 check
89     server  app3 127.0.0.1:5003 check
90     server  app4 127.0.0.1:5004 check
91     server  app5 13.49.64.193:5005 check
92     server  app6 13.51.197.34:5006 check
-- INSERT --
```

```
[root@ip-172-31-42-175 ~]# vi /etc/haproxy/haproxy.cfg
[root@ip-172-31-42-175 ~]# systemctl start haproxy
[root@ip-172-31-42-175 ~]# systemctl status haproxy
● haproxy.service - HAProxy Load Balancer
     Loaded: loaded (/usr/lib/systemd/system/haproxy.service; disabled; preset: disabled)
     Active: active (running) since Wed 2025-12-03 12:47:34 UTC; 11s ago
    Process: 27188 ExecStartPre=/usr/sbin/haproxy -f $CONFIG -f $CFGDIR -c -q $OPTIONS (code=exited, status=0/SUCCESS)
   Main PID: 27198 (haproxy)
     Status: "Ready."
      Tasks: 3 (limit: 1053)
     Memory: 6.8M
        CPU: 54ms
     CGroup: /system.slice/haproxy.service
             ├─27198 /usr/sbin/haproxy -Ws -f /etc/haproxy/haproxy.cfg -f /etc/haproxy/conf.d -p /run/haproxy.pid
             └─27205 /usr/sbin/haproxy -Ws -f /etc/haproxy/haproxy.cfg -f /etc/haproxy/conf.d -p /run/haproxy.pid

Dec 03 12:47:34 ip-172-31-42-175.eu-north-1.compute.internal haproxy[27198]: [NOTICE]   (27198) : Loading success.
Dec 03 12:47:34 ip-172-31-42-175.eu-north-1.compute.internal haproxy[27205]: [WARNING]  (27205) : Server static/static is DOWN, reason:
Dec 03 12:47:34 ip-172-31-42-175.eu-north-1.compute.internal haproxy[27205]: [ALERT]    (27205) : backend 'static' has no server availa
Dec 03 12:47:34 ip-172-31-42-175.eu-north-1.compute.internal haproxy[27205]: [WARNING]  (27205) : Server app/app1 is DOWN, reason: Laye
Dec 03 12:47:35 ip-172-31-42-175.eu-north-1.compute.internal haproxy[27205]: [WARNING]  (27205) : Server app/app2 is DOWN, reason: Laye
Dec 03 12:47:35 ip-172-31-42-175.eu-north-1.compute.internal haproxy[27205]: [WARNING]  (27205) : Server app/app3 is DOWN, reason: Laye
Dec 03 12:47:35 ip-172-31-42-175.eu-north-1.compute.internal haproxy[27205]: [WARNING]  (27205) : Server app/app4 is DOWN, reason: Laye
Dec 03 12:47:36 ip-172-31-42-175.eu-north-1.compute.internal haproxy[27205]: [WARNING]  (27205) : Server app/app5 is DOWN, reason: Laye
Dec 03 12:47:36 ip-172-31-42-175.eu-north-1.compute.internal haproxy[27205]: [WARNING]  (27205) : Server app/app6 is DOWN, reason: Laye
Dec 03 12:47:36 ip-172-31-42-175.eu-north-1.compute.internal haproxy[27205]: [ALERT]    (27205) : backend 'app' has no server available
...skipping...
● haproxy.service - HAProxy Load Balancer
     Loaded: loaded (/usr/lib/systemd/system/haproxy.service; disabled; preset: disabled)
     Active: active (running) since Wed 2025-12-03 12:47:34 UTC; 11s ago
    Process: 27188 ExecStartPre=/usr/sbin/haproxy -f $CONFIG -f $CFGDIR -c -q $OPTIONS (code=exited, status=0/SUCCESS)
   Main PID: 27198 (haproxy)
     Status: "Ready."
      Tasks: 3 (limit: 1053)
     Memory: 6.8M
        CPU: 54ms
     CGroup: /system.slice/haproxy.service
             ├─27198 /usr/sbin/haproxy -Ws -f /etc/haproxy/haproxy.cfg -f /etc/haproxy/conf.d -p /run/haproxy.pid
             └─27205 /usr/sbin/haproxy -Ws -f /etc/haproxy/haproxy.cfg -f /etc/haproxy/conf.d -p /run/haproxy.pid
```