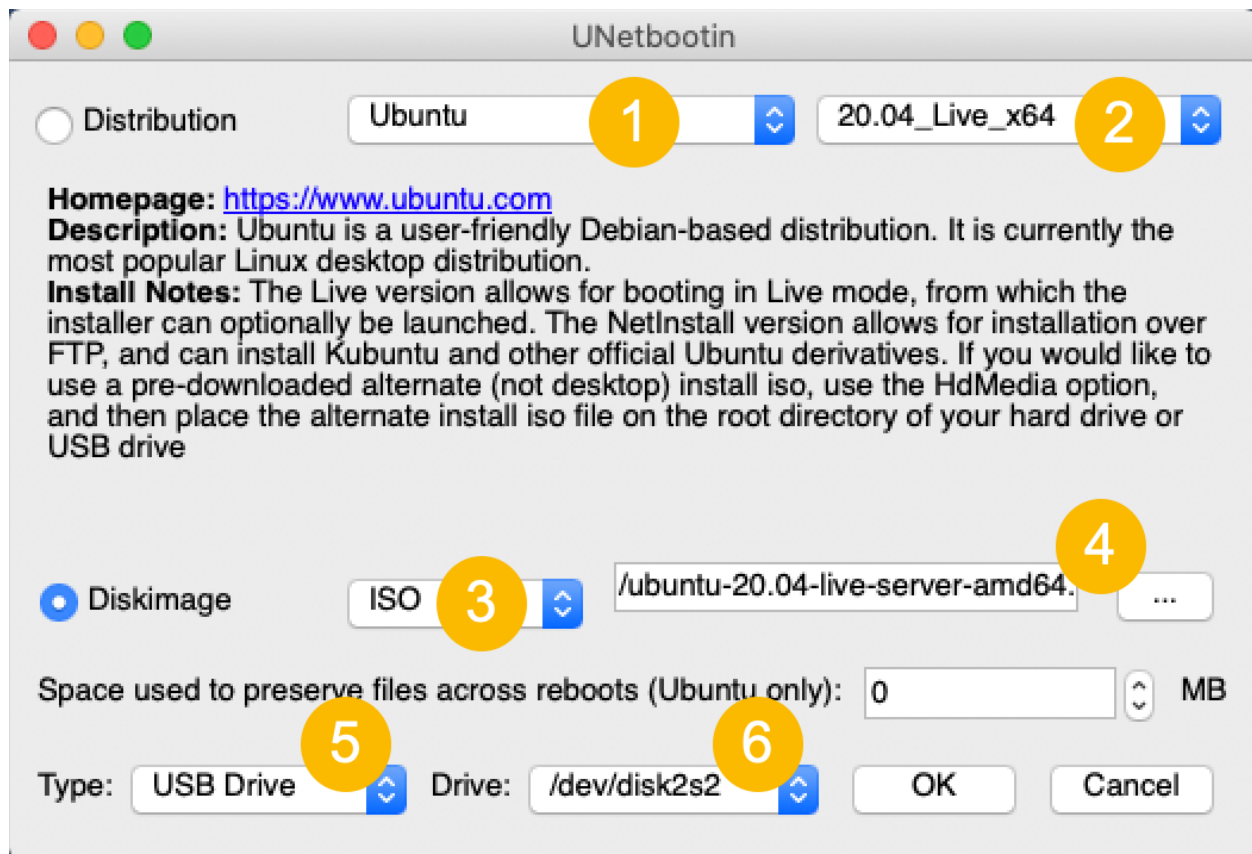
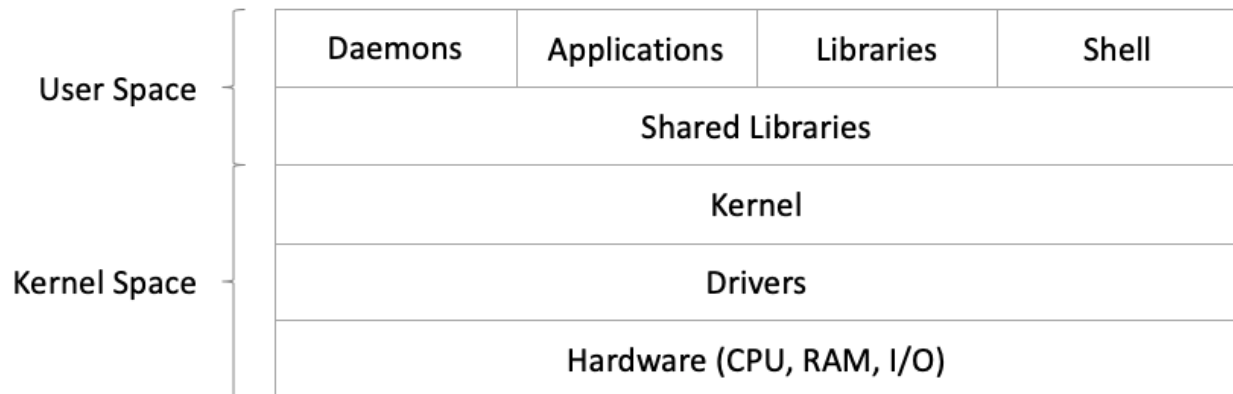
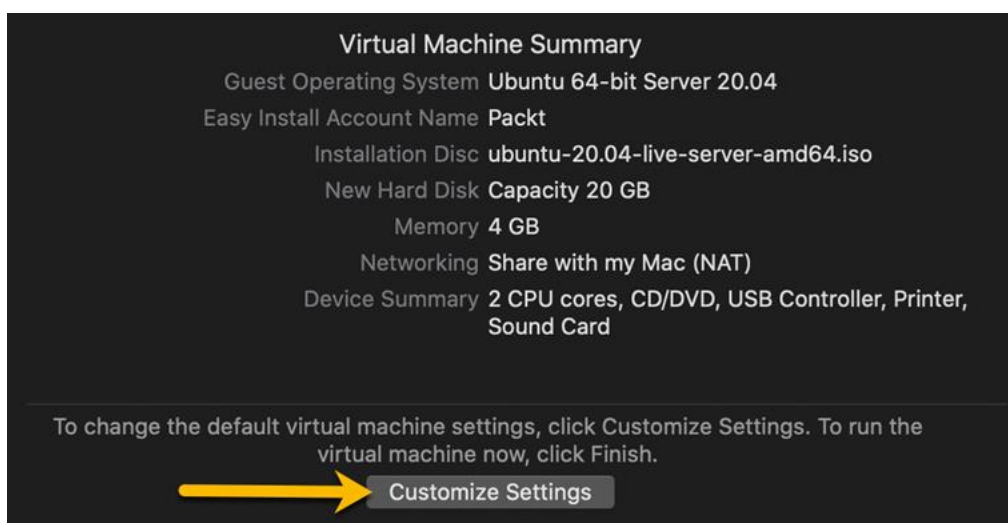
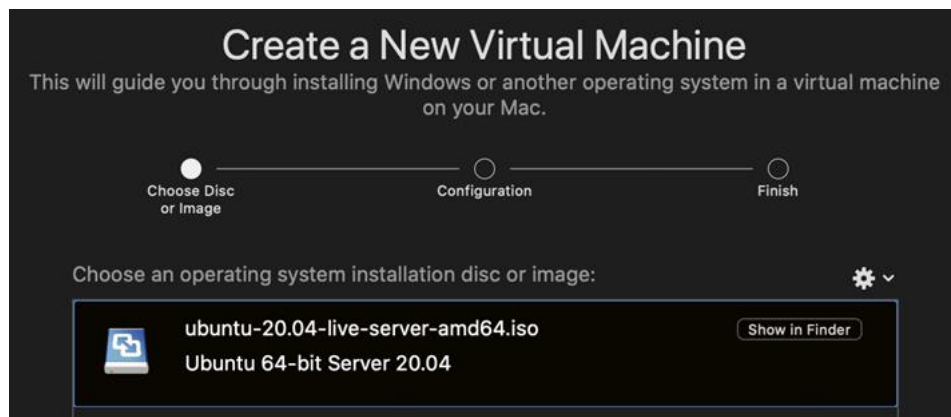
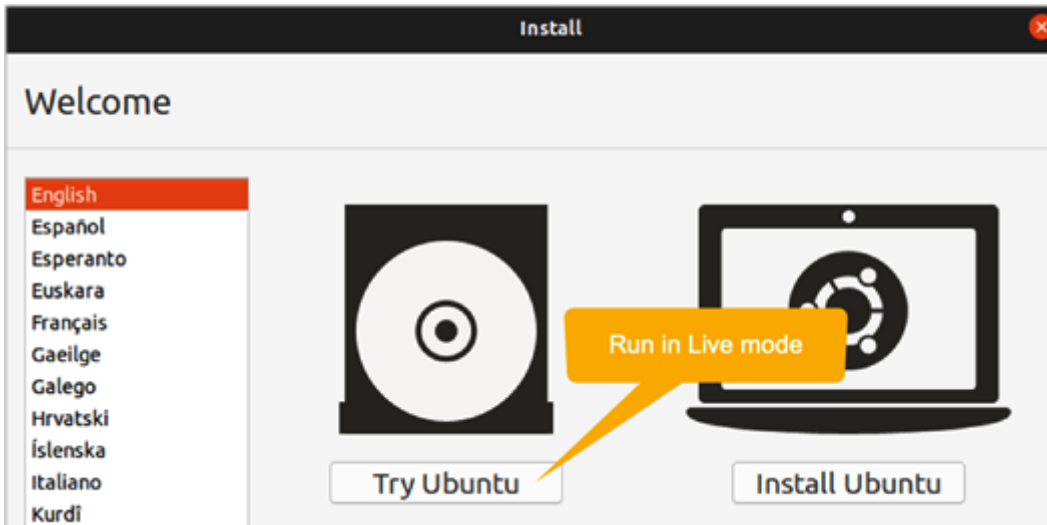
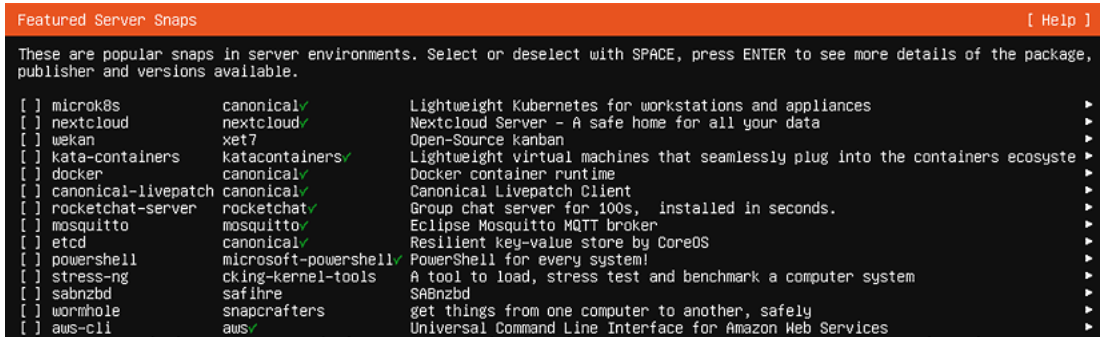
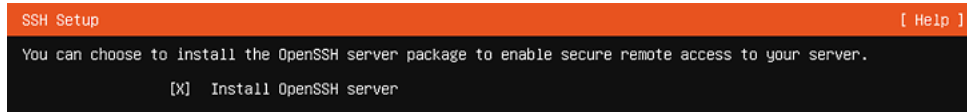
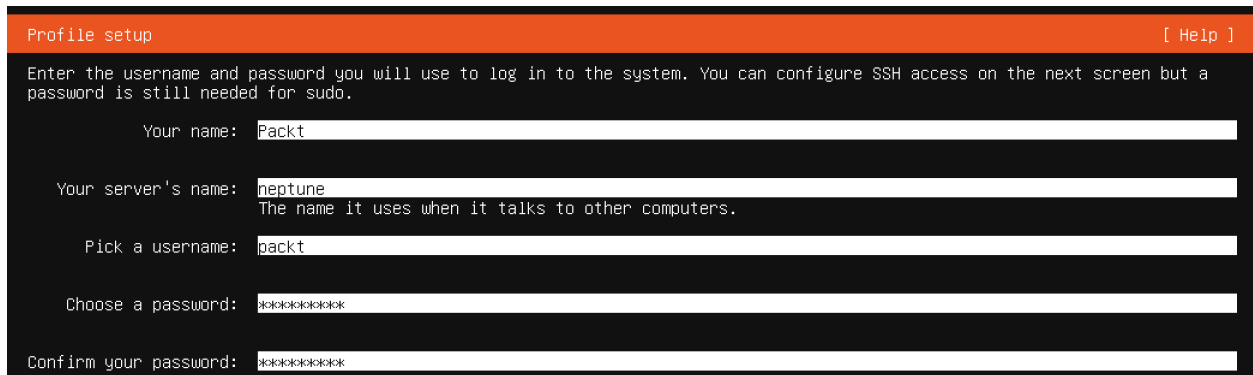
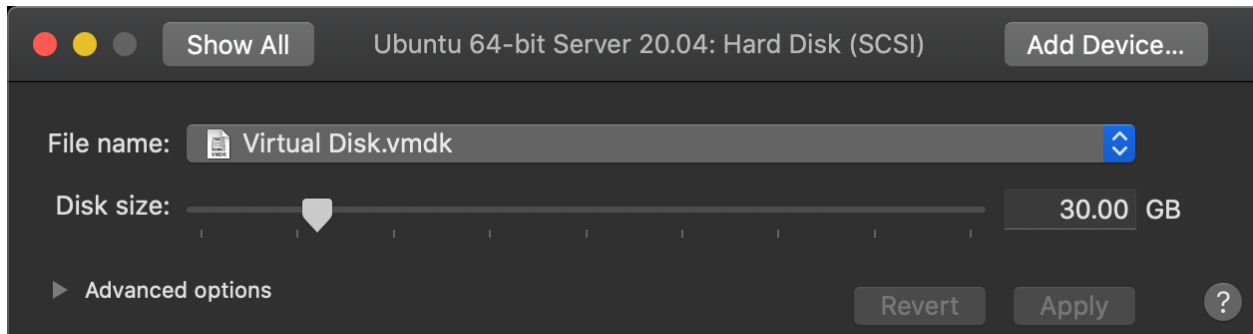
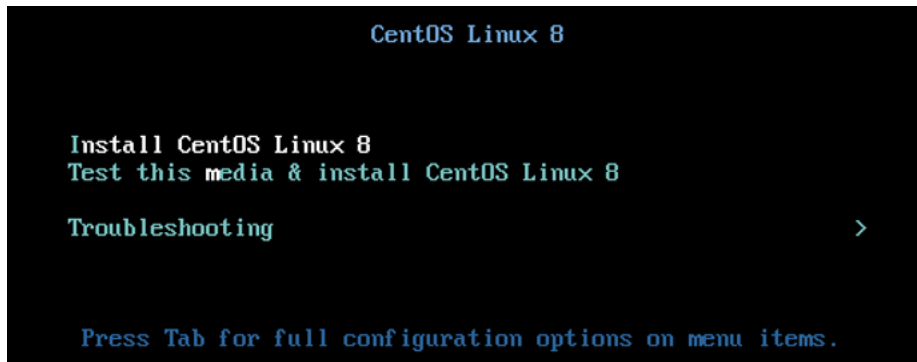
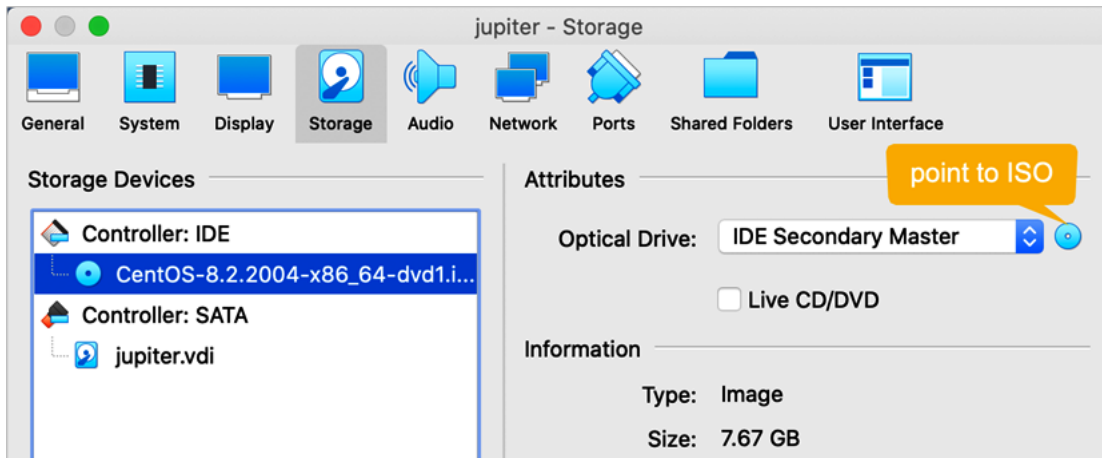











Chapter 1: Installing Linux.











LOCALIZATION	SOFTWARE	SYSTEM
 Keyboard English (US)	 Installation Source Local media	 Installation Destination Automatic partitioning selected
 Language Support English (United States)	 Software Selection Server with GUI	 KDUMP Kdump is enabled
 Time & Date Americas/New York timezone		 Network & Hostname Not connected
		 Security Policy No content found

USER SETTINGS

 **Root Password**
Root password is not set


 **User Creation**
No user will be created


Complete!

CentOS Linux is now successfully installed, but some configuration still needs to be done. Finish it and then click the Finish configuration button please.

Finish configuration

USER SETTINGS

 **Root Password**
Root password is set

 **User Creation**
Administrator packt will be created

Complete!

CentOS Linux is now successfully installed and ready for you to use!
Go ahead and reboot to start using it!

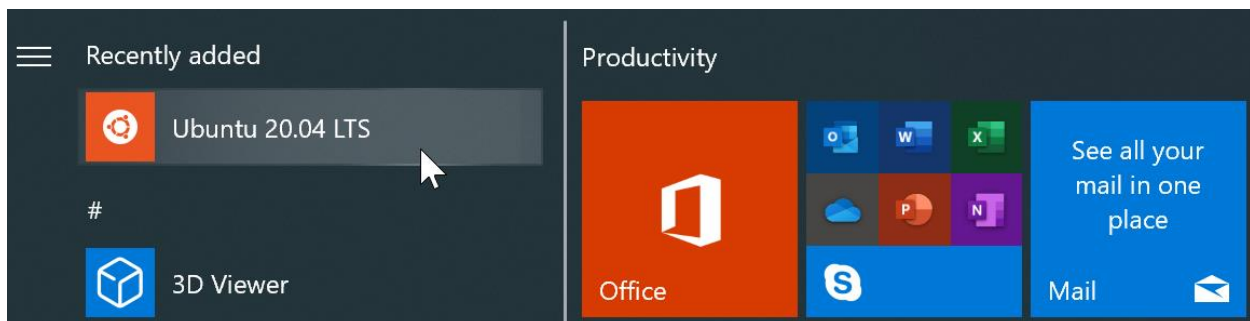
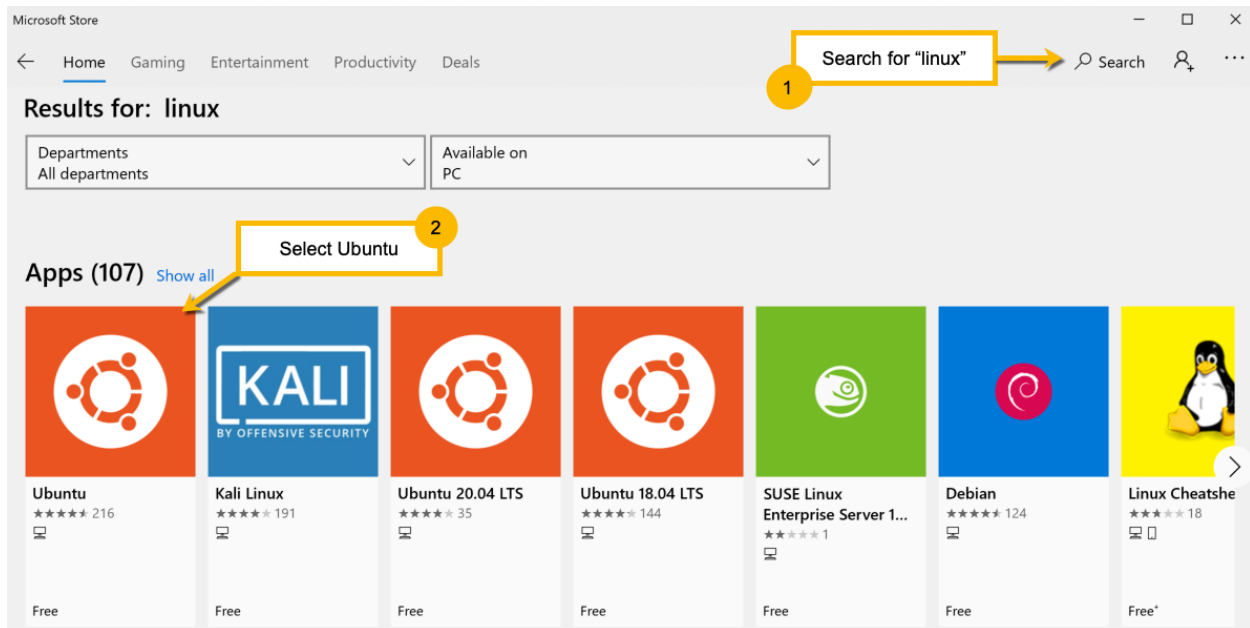
Reboot

```
Administrator: Windows PowerShell
PS C:\Windows\system32> dism.exe /online /enable-feature /featurename:Microsoft-Windows-Subsystem-Linux /all /norestart
Deployment Image Servicing and Management tool
Version: 10.0.19041.329
Image Version: 10.0.19041.388
Enabling feature(s)
[=====100.0%=====]
The operation completed successfully.
PS C:\Windows\system32>
```

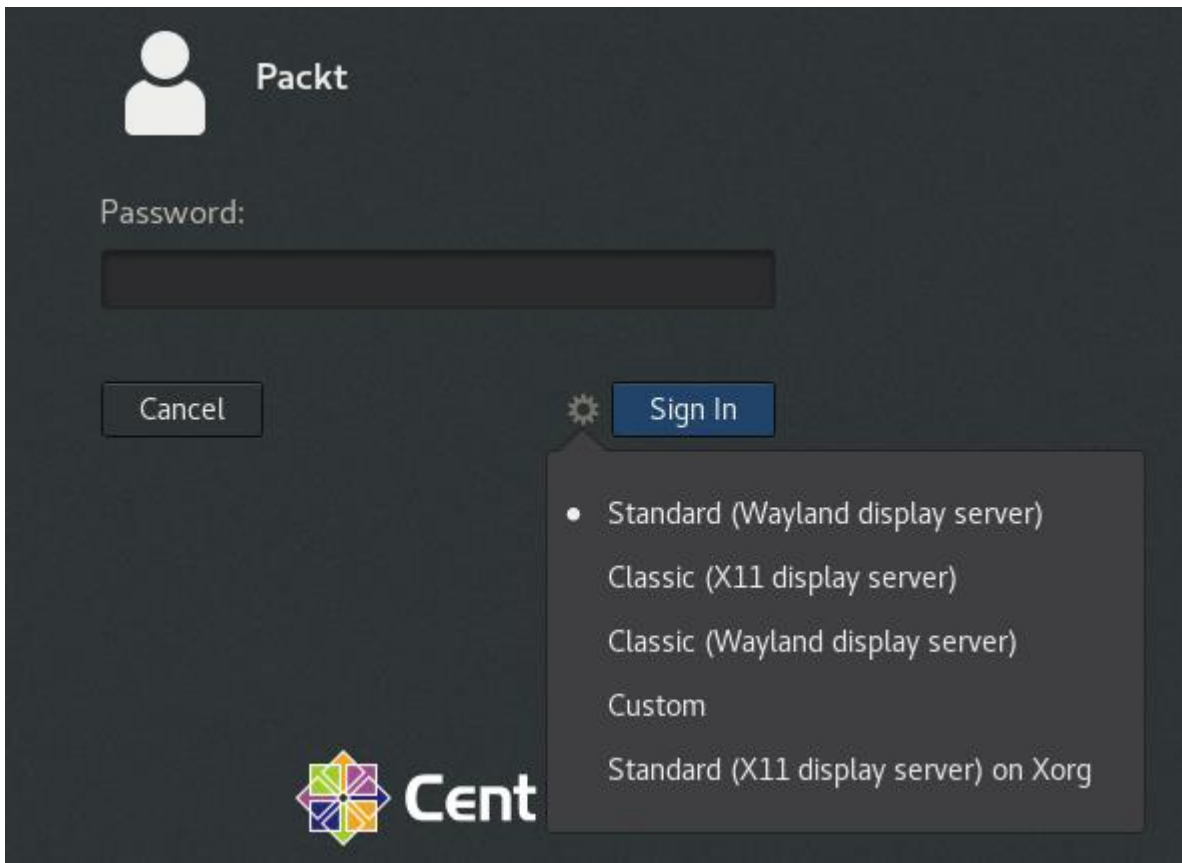
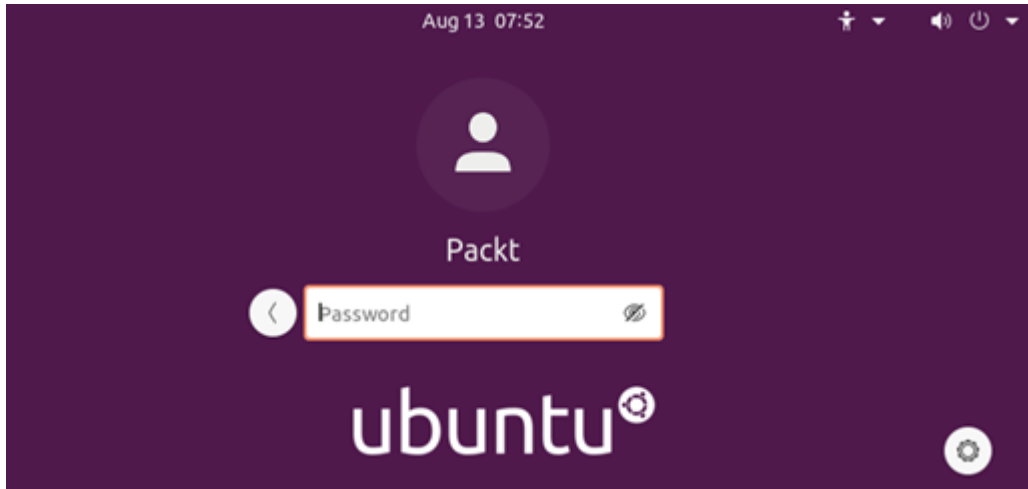
```
Administrator: Windows PowerShell
PS C:\Windows\system32> dism.exe /online /enable-feature /featurename:VirtualMachinePlatform /all /norestart
Deployment Image Servicing and Management tool
Version: 10.0.19041.329
Image Version: 10.0.19041.388
Enabling feature(s)
[=====100.0%=====]
The operation completed successfully.
PS C:\Windows\system32>
```

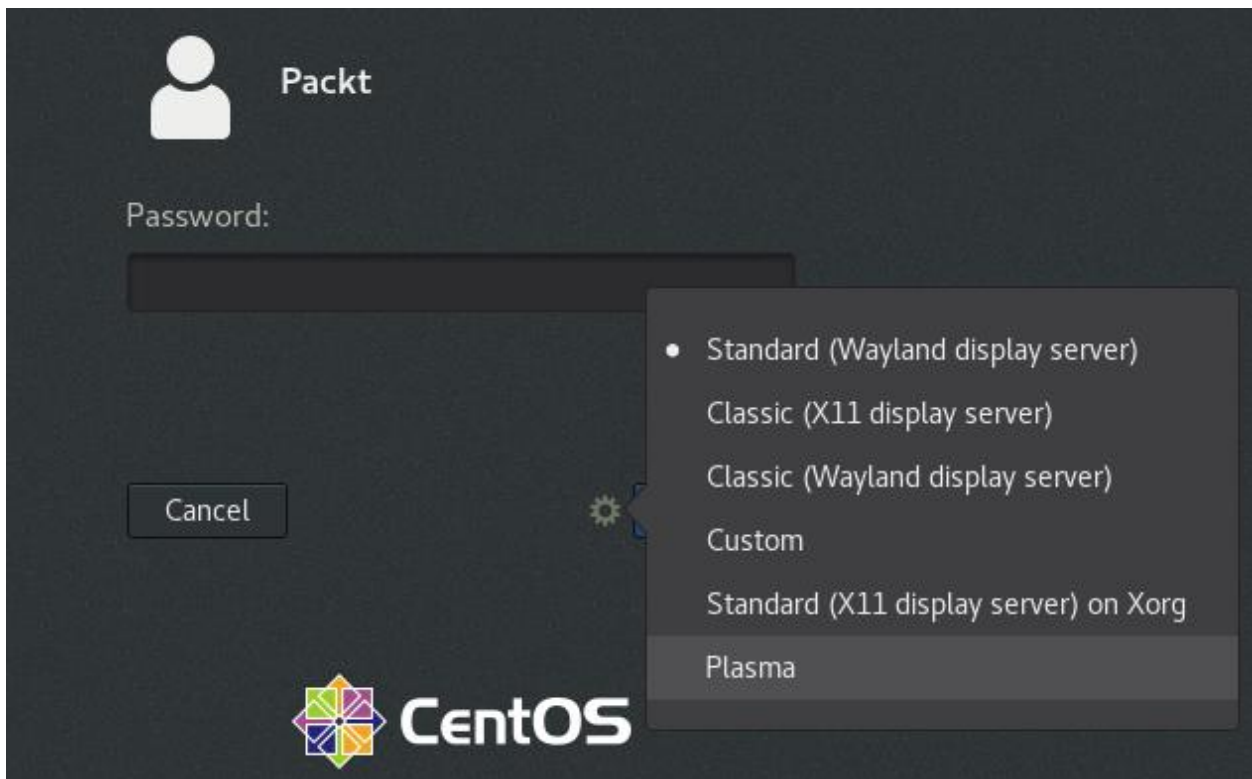
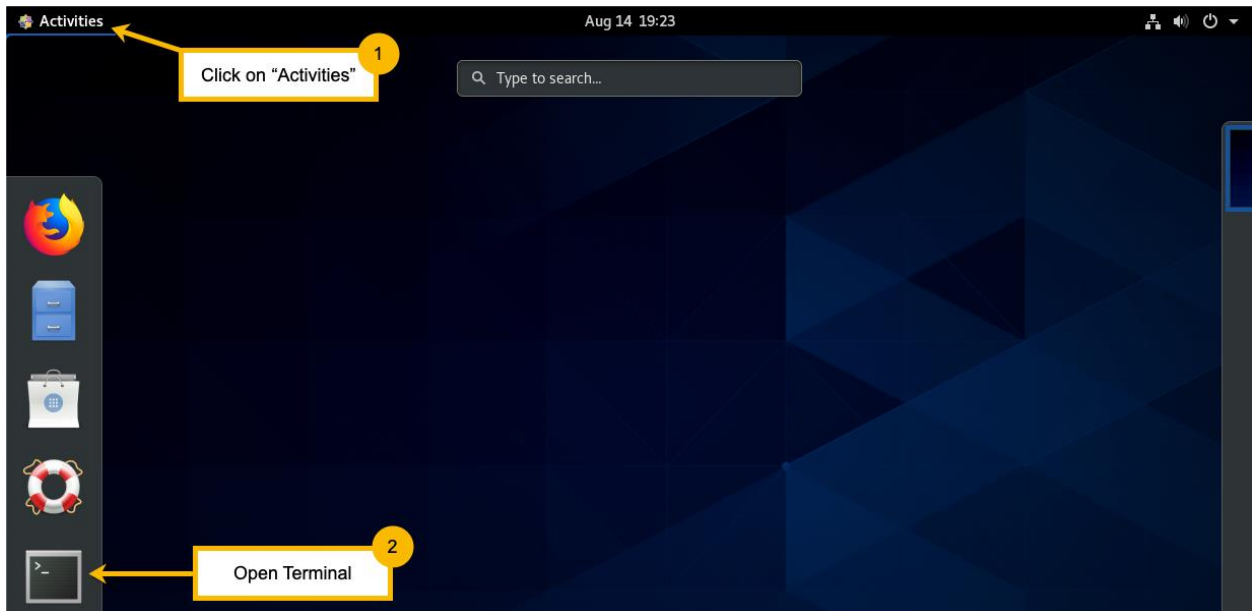
```
Administrator: Windows PowerShell
PS C:\Windows\system32> wsl --set-default-version 2
WSL 2 requires an update to its kernel component. For information please visit https://aka.ms/wsl2kernel
PS C:\Windows\system32>
```

```
Select Administrator: Windows PowerShell
PS C:\Windows\system32> wsl --set-default-version 2
For information on key differences with WSL 2 please visit https://aka.ms/wsl2
PS C:\Windows\system32>
```



```
packt@neptune:~$ systemctl status gdm
• gdm.service - GNOME Display Manager
  Loaded: loaded (/lib/systemd/system/gdm.service; static; vendor preset: enabled)
  Active: active (running) since Thu 2020-08-27 18:32:48 UTC; 53min ago
  Main PID: 1182 (gdm3)
  Tasks: 3 (limit: 4581)
  Memory: 6.7M
  CGroup: /system.slice/gdm.service
          └─1182 /usr/sbin/gdm3
```







Who are you?

Your name: ✓

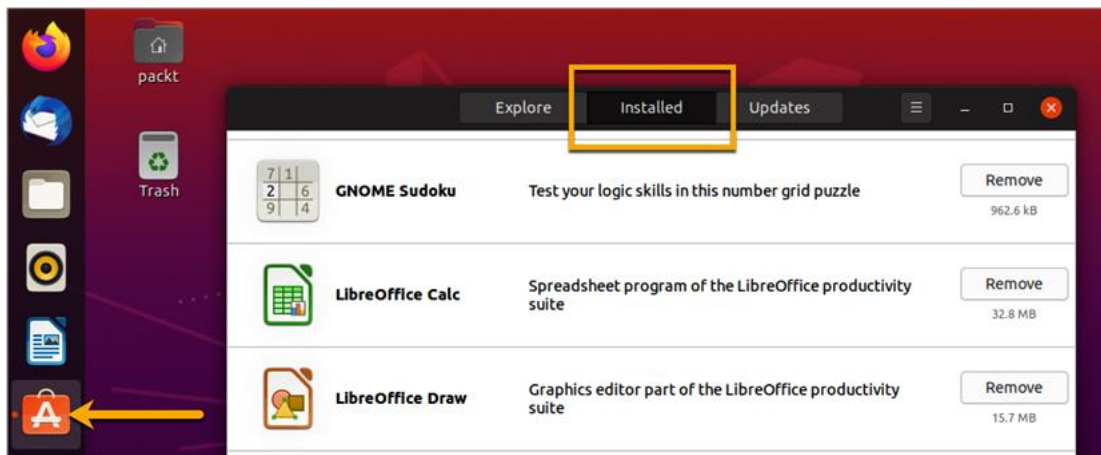
Your computer's name: ✓
The name it uses when it talks to other computers.

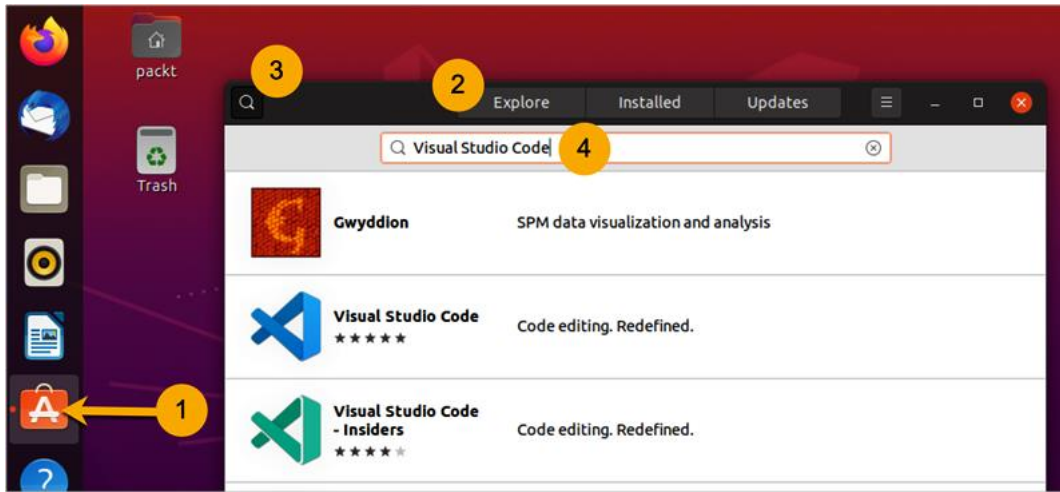
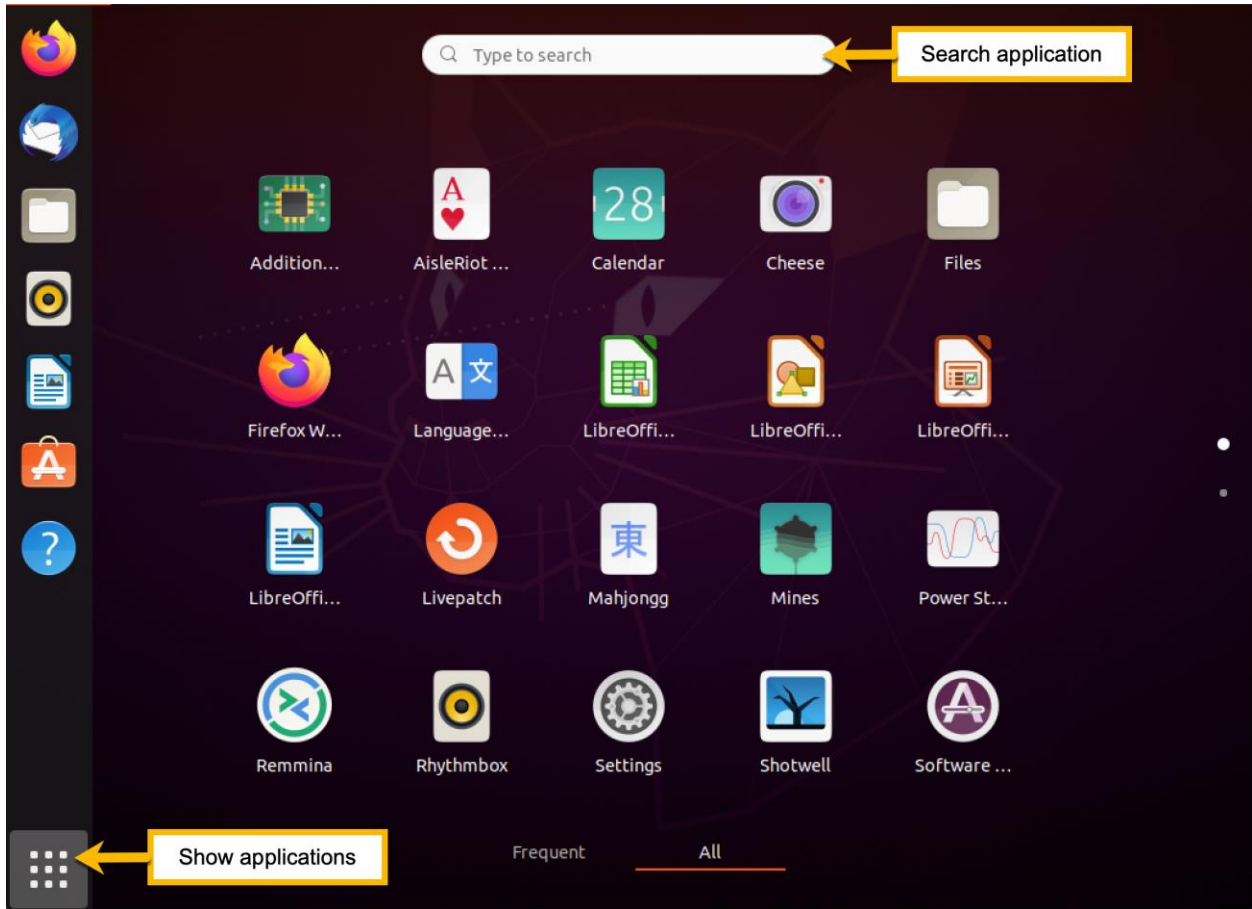
Pick a username: ✓

Choose a password: Good password

Confirm your password: ✓

Log in automatically
 Require my password to log in





```
packt@neptune:~$ curl -s http://localhost | grep Welcome
<title>Welcome to nginx!</title>
<h1>Welcome to nginx!</h1>
packt@neptune:~$
```

```
packt@neptune:~$ dpkg --get-selections | grep nginx
Desired=Unknown/Install/Remove/Purge/Hold
| Status=Not/Inst/Conf-files/Unpacked/halF-conf/Half-inst/trig-aWait/Trig-pend
|/ Err?=(none)/Reinst-required (Status,Err: uppercase=bad)
||/ Name          Version          Architecture Description
+++-----
ii nginx           1.18.0-0ubuntu1 all             small, powerful, scalable web/proxy server
packt@neptune:~$
```

```
packt@neptune:~$ apt-cache policy nginx
nginx:
  Installed: 1.18.0-0ubuntu1
  Candidate: 1.18.0-0ubuntu1
  Version table:
 *** 1.18.0-0ubuntu1 500
      500 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages
      100 /var/lib/dpkg/status
  1.17.10-0ubuntu1 500
      500 http://us.archive.ubuntu.com/ubuntu focal/main amd64 Packages
packt@neptune:~$
```

```
julian@plex:~$ dpkg --get-selections | grep plexmediaserver
Desired=Unknown/Install/Remove/Purge/Hold
| Status=Not/Inst/Conf-files/Unpacked/halF-conf/Half-inst/trig-aWait/Trig-pend
|/ Err?=(none)/Reinst-required (Status,Err: uppercase=bad)
||/ Name          Version          Architecture Description
+++-----
ii plexmediaserver 1.19.4.2935-7 amd64 Plex organizes all of your personal med
julian@plex:~$
```

Chapter 2: The Linux Filesystem.

```
packt@neptune:~$ cat /etc/passwd | grep packt
packt:x:1000:1000:Packt:/home/packt:/bin/bash
```

```
packt@neptune:~$ echo $0
-bash
```

```
packt@neptune:~$ ls -l `which ls`
-rwxr-xr-x 1 root root 142144 Sep  5  2019 /usr/bin/ls
packt@neptune:~$ ls -l $(which ls)
-rwxr-xr-x 1 root root 142144 Sep  5  2019 /usr/bin/ls
```

```
packt@neptune:~$ who; pwd;
packt :0 2020-08-28 12:00 (:0)
packt pts/0 2020-08-28 12:00 (172.16.232.1)
/home/packt
packt@neptune:~$ (who; pwd) > users
packt@neptune:~$ cat users
packt :0 2020-08-28 12:00 (:0)
packt pts/0 2020-08-28 12:00 (172.16.232.1)
/home/packt
```

```
packt@neptune:~/xpackt$ touch file{1..5}
packt@neptune:~/xpackt$ ls
file1 file2 file3 file4 file5
```

```
packt@neptune:~$ MYVAR=sysadmin
packt@neptune:~$ echo $MYVAR
sysadmin
```

```
packt@neptune:~$ echo $PATH
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin
packt@neptune:~$ PATH=$PATH:/home/packt
packt@neptune:~$ echo $PATH
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin:/home/packt
```

```
packt@neptune:~$ alias ll
alias ll='ls -aLF'
packt@neptune:~$ alias ll='ls -l'
packt@neptune:~$ alias ll
alias ll='ls -l'
```

```
packt@neptune:~$ type cd
cd is a shell builtin
```

```
packt@neptune:~$ pwd
/home/packt
packt@neptune:~$ cat passwd
cat: passwd: No such file or directory
packt@neptune:~$ cat ../../etc/pa
pam.conf  pam.d/    papersize  passwd    passwd-
packt@neptune:~$ cat ../../etc/passwd_
```

```
packt@neptune:~/xpackt$ touch new-report
packt@neptune:~/xpackt$ ls -l new-report
-rw-rw-r-- 1 packt packt 0 Aug 28 16:15 new-report
packt@neptune:~/xpackt$ touch new-report
packt@neptune:~/xpackt$ ls -l new-report
-rw-rw-r-- 1 packt packt 0 Aug 28 16:16 new-report
```

```
packt@neptune:~/xpackt$ touch -a new-report
packt@neptune:~/xpackt$ ls -l --time=atime new-report
-rw-rw-r-- 1 packt packt 0 Aug 28 16:18 new-report
```

```
packt@neptune:~$ echo text
text
packt@neptune:~$ echo "text"
text
packt@neptune:~$ echo 'text'
text
```

```
packt@neptune:~/xpackt$ echo this is a presentation file > presentation
packt@neptune:~/xpackt$ cat presentation
this is a presentation file
packt@neptune:~/xpackt$ echo this is a new line >> presentation
packt@neptune:~/xpackt$ cat presentation
this is a presentation file
this is a new line
```

```
packt@neptune:~$ mkdir backup
packt@neptune:~$ cp -a xpackt/ backup/
packt@neptune:~$ ls backup/
xpackt
```

```
packt@neptune:~/xpackt$ ls
files new-report presentation
packt@neptune:~/xpackt$ ls files/
file1 file2 file3 file4 file5
packt@neptune:~/xpackt$ cp -R files/ new-files
packt@neptune:~/xpackt$ ls
files new-files new-report presentation
packt@neptune:~/xpackt$ ls new-files/
file1 file2 file3 file4 file5
```

```
packt@neptune:~/xpackt$ ls
files new-files new-report presentation
packt@neptune:~/xpackt$ ln -s new-report new-report-link
packt@neptune:~/xpackt$ ls -l
total 8
drwxrwxr-x 2 packt packt 4096 Aug 28 16:42 files
drwxrwxr-x 2 packt packt 4096 Aug 28 16:44 new-files
-rw-rw-r-- 1 packt packt  0 Aug 28 16:16 new-report
lrwxrwxrwx 1 packt packt  10 Aug 28 17:09 new-report-link -> new-report
-rw-rw-r-- 1 packt packt  0 Aug 28 16:36 presentation
```

```
packt@neptune:~/xpackt$ ls -li
total 8
412853 drwxrwxr-x 2 packt packt 4096 Aug 28 16:42 files
412855 drwxrwxr-x 2 packt packt 4096 Aug 28 16:44 new-files
393533 -rw-rw-r-- 1 packt packt  0 Aug 28 16:16 new-report
393872 lrwxrwxrwx 1 packt packt  10 Aug 28 17:09 new-report-link -> new-report
412821 -rw-rw-r-- 1 packt packt  0 Aug 28 16:36 presentation
```

```
packt@neptune:~/xpackt$ readlink new-report-link
new-report
```

```
packt@neptune:~/xpackt$ ls
files new-files new-report new-report-link presentation
packt@neptune:~/xpackt$ ln new-report new-report-hl
packt@neptune:~/xpackt$ echo this is a new report line > new-report
packt@neptune:~/xpackt$ ls -l
total 16
drwxrwxr-x 2 packt packt 4096 Aug 28 16:42 files
drwxrwxr-x 2 packt packt 4096 Aug 28 16:44 new-files
-rw-rw-r-- 2 packt packt 26 Aug 28 17:22 new-report
-rw-rw-r-- 2 packt packt 26 Aug 28 17:22 new-report-hl
lrwxrwxrwx 1 packt packt  10 Aug 28 17:09 new-report-link -> new-report
-rw-rw-r-- 1 packt packt  0 Aug 28 16:36 presentation
packt@neptune:~/xpackt$ ls -li
total 16
412853 drwxrwxr-x 2 packt packt 4096 Aug 28 16:42 files
412855 drwxrwxr-x 2 packt packt 4096 Aug 28 16:44 new-files
393533 -rw-rw-r-- 2 packt packt 26 Aug 28 17:22 new-report
393533 -rw-rw-r-- 2 packt packt 26 Aug 28 17:22 new-report-hl
393872 lrwxrwxrwx 1 packt packt  10 Aug 28 17:09 new-report-link -> new-report
412821 -rw-rw-r-- 1 packt packt  0 Aug 28 16:36 presentation
```

```
packt@neptune:~/xpackt$ ls
files new-files new-report new-report-hl new-report-link presentation
packt@neptune:~/xpackt$ rm -i new-report-hl
rm: remove regular file 'new-report-hl'? y
packt@neptune:~/xpackt$ ls
files new-files new-report new-report-link presentation
```

```
packt@neptune:~/xpackt$ rm -f new-report-link
packt@neptune:~/xpackt$ ls
files new-files new-report presentation
```



```
packt@neptune:~/xpackt$ ls
files new-files new-report presentation
packt@neptune:~/xpackt$ rm new-files/
rm: cannot remove 'new-files/': Is a directory
packt@neptune:~/xpackt$ rm -r new-files/
packt@neptune:~/xpackt$ ls
files new-report presentation
```

```
packt@neptune:~/xpackt$ ls
files new-report presentation
packt@neptune:~/xpackt$ mkdir new-directory
packt@neptune:~/xpackt$ ls
files new-directory new-report presentation
```

```
packt@neptune:~/xpackt$ rmdir reports/
rmdir: failed to remove 'reports/': Directory not empty
```

```
packt@neptune:~/xpackt$ cat /etc/papersize
letter
```

```
packt@neptune:~$ head -2 /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
packt@neptune:~$ head -n 2 /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
```

```
packt@neptune:~/xpackt$ ls
files new-directory new-report presentation report reports
packt@neptune:~/xpackt$ ls -l new-report
-rw-rw-r-- 1 packt packt 26 Aug 28 17:22 new-report
packt@neptune:~/xpackt$ stat new-report
  File: new-report
  Size: 26          Blocks: 8          IO Block: 4096   regular file
Device: fd00h/64768d  Inode: 393533     Links: 1
Access: (0664/-rw-rw-r--)  Uid: ( 1000/   packt)   Gid: ( 1000/   packt)
Access: 2020-08-28 16:36:18.087118022 +0000
Modify: 2020-08-28 17:22:27.386285828 +0000
Change: 2020-08-28 17:37:49.899332845 +0000
 Birth: -
```

```
packt@neptune:~/xpackt$ file new-report
new-report: ASCII text
packt@neptune:~/xpackt$ file /usr/bin/who
/usr/bin/who: ELF 64-bit LSB shared object, x86-64, version 1 (SYSV), dynamically linked, interpreter /lib64/ld-linux-x86-64.so.2, BuildID[sha1]=a91ee1d8ec928415ca785c63401fba542199b89a, for GNU/Linux 3.2.0, stripped
```

```
packt@neptune:~/xpackt$ ls -l
total 20
drwxrwxr-x 2 packt packt 4096 Aug 28 16:42 files
drwxrwxr-x 2 packt packt 4096 Aug 28 17:56 new-directory
-rw-rw-r-- 1 packt packt  26 Aug 28 17:22 new-report
-rw-rw-r-- 1 packt packt   0 Aug 28 16:36 presentation
-rw-rw-r-- 1 packt packt  79 Aug 28 18:14 report
drwxrwxr-x 3 packt packt 4096 Aug 28 18:01 reports
```

r	w	x	r	w	x	r	w	x
owner / user	group			other / world				
read	write	exec	read	write	exec	read	write	exec
4	2	1	4	2	1	4	2	1

```
packt@neptune:~/xpackt$ locate new-report
/home/packt/backup/xpackt/new-report
/home/packt/xpackt/new-report
```

```
packt@neptune:~/xpackt$ locate presentation > ~/xpackt/locate-search && wc ~/xpackt/locate-search
348 348 27271 /home/packt/xpackt/locate-search
```

```
packt@neptune:~/xpackt$ cat poem
Jane, Jane
Happy Birthday, Jane!
packt@neptune:~/xpackt$ sed 's/Jane/Elane/g' poem
Elane, Elane
Happy Birthday, Elane!
```

```
packt@neptune:~/xpackt$ cat poem
Jane, Jane
Happy Birthday, Jane!
packt@neptune:~/xpackt$ sed 's/^/ /g' poem > poem-spaces
packt@neptune:~/xpackt$ cat poem-spaces
 Jane, Jane
 Happy Birthday, Jane!
```

```
packt@neptune:~/xpackt$ cat poem-spaces
 Jane, Jane
 Happy Birthday, Jane!
packt@neptune:~/xpackt$ sed -n 2p poem
Happy Birthday, Jane!
packt@neptune:~/xpackt$ sed 2d poem
Jane, Jane
```

```
packt@neptune:~$ sed -n 4,6p /etc/passwd
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
```

```
packt@neptune:~/xpackt$ sudo dpkg -l | awk '{print $2}' > package-list
packt@neptune:~/xpackt$ tail package-list
yaru-theme-gtk
yaru-theme-icon
yaru-theme-sound
yelp
yelp-xsl
zenity
zenity-common
zerofree
zip
zlib1g:amd64
```

```
packt@neptune:~/xpackt$ sudo update-alternatives --config editor
[sudo] password for packt:
There are 4 choices for the alternative editor (providing /usr/bin/editor).
```

Selection	Path	Priority	Status
* 0	/bin/nano	40	auto mode
1	/bin/ed	-100	manual mode
2	/bin/nano	40	manual mode
3	/usr/bin/vim.basic	30	manual mode
4	/usr/bin/vim.tiny	15	manual mode

```
Press <enter> to keep the current choice[*], or type selection number:
```

Chapter 3: Linux Software Management.

```
packt@neptune:~/Downloads$ ar t slack-desktop-4.8.0-amd64.deb
debian-binary
control.tar.gz
data.tar.xz
_gpgorigin
```

```
packt@neptune:~$ sudo apt search nmap | grep nmap

WARNING: apt does not have a stable CLI interface. Use with caution in scripts.

libnmap-parser-perl/focal,focal 1.37-1 all
  module to parse nmap scan results with perl
  Library for doing location lookup based on free openwlanmap.org data
  Library for doing location lookup based on free openwlanmap.org data
nmap/focal 7.80+dfsg1-2build1 amd64
nmap-common/focal,focal 7.80+dfsg1-2build1 all
  Architecture independent files for nmap
nmapsi4/focal 0.5~alpha1-3build1 amd64
  graphical interface to nmap, the network scanner
python-libnmap-doc/focal,focal 0.7.0-2 all
python3-libnmap/focal,focal 0.7.0-2 all
python3-nmap/focal,focal 0.6.1-1.1 all
  post-processor for TopHat unmapped reads
```

```
packt@neptune:~$ sudo apt-cache search nmap | grep nmap
libnmap-parser-perl - module to parse nmap scan results with perl
libwlocate-dev - Library for doing location lookup based on free openwlanmap.org
data
libwlocate0 - Library for doing location lookup based on free openwlanmap.org da
ta
nmap - The Network Mapper
nmap-common - Architecture independent files for nmap
nmapsi4 - graphical interface to nmap, the network scanner
python-libnmap-doc - Python NMAP Library (common documentation)
python3-libnmap - Python 3 NMAP library
python3-nmap - Python3 interface to the Nmap port scanner
tophat-recondition - post-processor for TopHat unmapped reads
```

```

packt@neptune:~/Documents$ sudo apt list > list
[sudo] password for packt:

WARNING: apt does not have a stable CLI interface. Use with caution in scripts.

packt@neptune:~/Documents$ sudo apt list --installed > list-installed

WARNING: apt does not have a stable CLI interface. Use with caution in scripts.

packt@neptune:~/Documents$ ls -la
total 3148
drwxr-xr-x  2 packt packt   4096 Sep  1 05:43 .
drwxr-xr-x 15 packt packt   4096 Sep  1 04:10 ..
-rw-rw-r--  1 packt packt 3098245 Sep  1 05:42 list
-rw-rw-r--  1 packt packt 113167 Sep  1 05:43 list-installed

```

```

[root@localhost Downloads]# yum history

```

ID	Command line	Date and time	Action(s)	Altered
4	remove slack.x86_64	2020-09-01 06:03	Removed	6
3	localinstall slack-4.8.0	2020-09-01 06:00	Install	6
2	update -y	2020-09-01 04:36	I, U	115 EE
1		2020-09-01 03:45	Install	1376 EE

```

xorg-x11-xkb-utils.x86_64      7.7-27.el8      @AppStream
xz.x86_64                      5.2.4-3.el8     @anaconda
xz-libs.x86_64                 5.2.4-3.el8     @anaconda
yajl.x86_64                    2.1.0-10.el8    @AppStream
yelp.x86_64                    2:3.28.1-3.el8  @AppStream
yelp-libs.x86_64               2:3.28.1-3.el8  @AppStream
yelp-tools.noarch              3.28.0-3.el8    @AppStream
yelp-xsl.noarch                3.28.0-2.el8    @AppStream
yum.noarch                     4.2.17-7.el8_2  @BaseOS
zenity.x86_64                  3.28.1-1.el8    @AppStream
zip.x86_64                     3.0-23.el8      @anaconda
zlib.x86_64                    1.2.11-13.el8   @anaconda

```

```

packt@neptune:~$ sudo snap install slack
[sudo] password for packt:
error: This revision of snap "slack" was published using classic confinement
and thus may perform arbitrary system changes outside of the security
sandbox that snaps are usually confined to, which may put your system
at risk.

If you understand and want to proceed repeat the command including
--classic.

```

```
packt@neptune:~$ sudo snap install slack --classic
slack 4.8.0 from Slack✓ installed
```

```
tracking:      latest/stable
refresh-date:  today at 06:25 PDT
channels:
  latest/stable:  4.8.0 2020-07-31 (27) 124MB classic
  latest/candidate: †
  latest/beta:    †
  latest/edge:    3.3.1 2018-08-31 (8) 148MB classic
installed:      4.8.0          (27) 124MB classic
```

```
packt@neptune:~$ snap list
Name            Version          Rev  Tracking          Publisher  Notes
core18          20200707        1880 latest/stable     canonical✓ base
gnome-3-34-1804 0+git.3009fc7   36   latest/stable/... canonical✓ -
gtk-common-themes 0.1-36-gc75f853 1506 latest/stable/... canonical✓ -
slack           4.8.0           27   latest/stable     slack✓     classic
snap-store      3.36.0-80-g208fd61 467 latest/stable/... canonical✓ -
snapd           2.45.2          8542 latest/stable     canonical✓ snapd
```

```
packt@neptune:~$ sudo snap disable slack
slack disabled
packt@neptune:~$ sudo snap enable slack
slack enabled
```

```
packt@neptune:~$ sudo snap saved
Set Snap Age Version Rev Size Notes
1 slack 7m13s 4.8.0 27 123B auto
```

```
packt@neptune:~$ sudo snap saved
Set Snap Age Version Rev Size Notes
1 slack 23.2s 4.8.0 27 124B auto
packt@neptune:~$ sudo snap forget 1
Snapshot #1 forgotten.
packt@neptune:~$ sudo snap saved
No snapshots found.
```

```
[packt@jupiter ~]$ flatpak search slack
```

Name	Description	Application ID	Version	Branch	Remotes
Slack	Chat with your team	com.slack.Slack	4.8.0	stable	flathub
Zulip	Zulip Desktop Client for Linux	org.zulip.Zulip	5.4.2	stable	flathub
Franz	Messenger for the desktop	com.meetfranz.Franz	5.5.0	stable	flathub
Rocket.Chat	Open Source Team Communication	chat.rocket.RocketChat	2.17.11	stable	flathub

```
[packt@jupiter Documents]$ ip route
default via 192.168.0.1 dev enp0s25 proto dhcp metric 100
192.168.0.0/24 dev enp0s25 proto kernel scope link src 192.168.0.113 metric 100
192.168.122.0/24 dev virbr0 proto kernel scope link src 192.168.122.1 linkdown
```

```
[packt@jupiter Documents]$ ip route get 8.8.8.8
8.8.8.8 via 192.168.0.1 dev enp0s25 src 192.168.0.113 uid 1000
cache
```

```
[packt@jupiter ~]$ cd Documents/
[packt@jupiter Documents]$ vim ip-script _
```

```
#!/bin/bash
printf "your IP is: \n"
ip route get 8.8.8.8 | awk -F"src " 'NR==1{split($2,ip," ");print ip[1]}'
printf "your interface name is: \n"
ip route get 8.8.8.8 | awk -F"dev " 'NR==1{split($2,inter," ");print inter[1]}'
```

```
[packt@jupiter Documents]$ chmod +x ip-script
[packt@jupiter Documents]$ ./ip-script
your IP is:
192.168.0.113
your interface name is:
enp0s25
```



```
This program is free software: you can redistribute it and/or modify
it under the terms of the GNU General Public License as published by
the Free Software Foundation, either version 3 of the License, or
(at your option) any later version.
```

```
This program is distributed WITHOUT ANY WARRANTY;
without even the implied warranty of MERCHANTABILITY
or FITNESS FOR A PARTICULAR PURPOSE. See the
GNU General Public License for more details.
```

```
You should have received a copy of the GNU General Public License
along with this program. If not, see <http://www.gnu.org/licenses/>.
```

```
[packt@jupiter Documents]$ ls ip-app-0.1
LICENSE ip-app
```

```
[packt@jupiter Documents]$ tar -czvf ip-app-0.1.tar.gz ip-app-0.1
ip-app-0.1/
ip-app-0.1/LICENSE
ip-app-0.1/ip-app
```

```
[packt@jupiter ~]$ sudo yum install rpmdevtools
[sudo] password for packt:
Last metadata expiration check: 2:31:42 ago on Sun 13 Sep 2020 11:22:01 AM EEST.
Package rpmdevtools-8.10-7.el8.noarch is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[packt@jupiter ~]$ rpmdev-setuptree
[packt@jupiter ~]$ ls
Desktop Documents Downloads Music Pictures Public Templates Videos rpmbuild
```

```
[packt@jupiter ~]$ ls rpmbuild/
BUILD RPMS SOURCES SPECS SRPMS
[packt@jupiter ~]$ ls -la .rpmmacros
-rw-rw-r--. 1 packt packt 228 Sep 13 13:53 .rpmmacros
```

```
[packt@jupiter SPECS]$ rpmdev-newspec ip-app
ip-app.spec created; type minimal, rpm version >= 4.14.
```

```
[packt@jupiter SPECS]$ rpmbuild -bs ip-app.spec
Wrote: /home/packt/rpmbuild/SRPMS/ip-app-0.1-1.el8.src.rpm
```

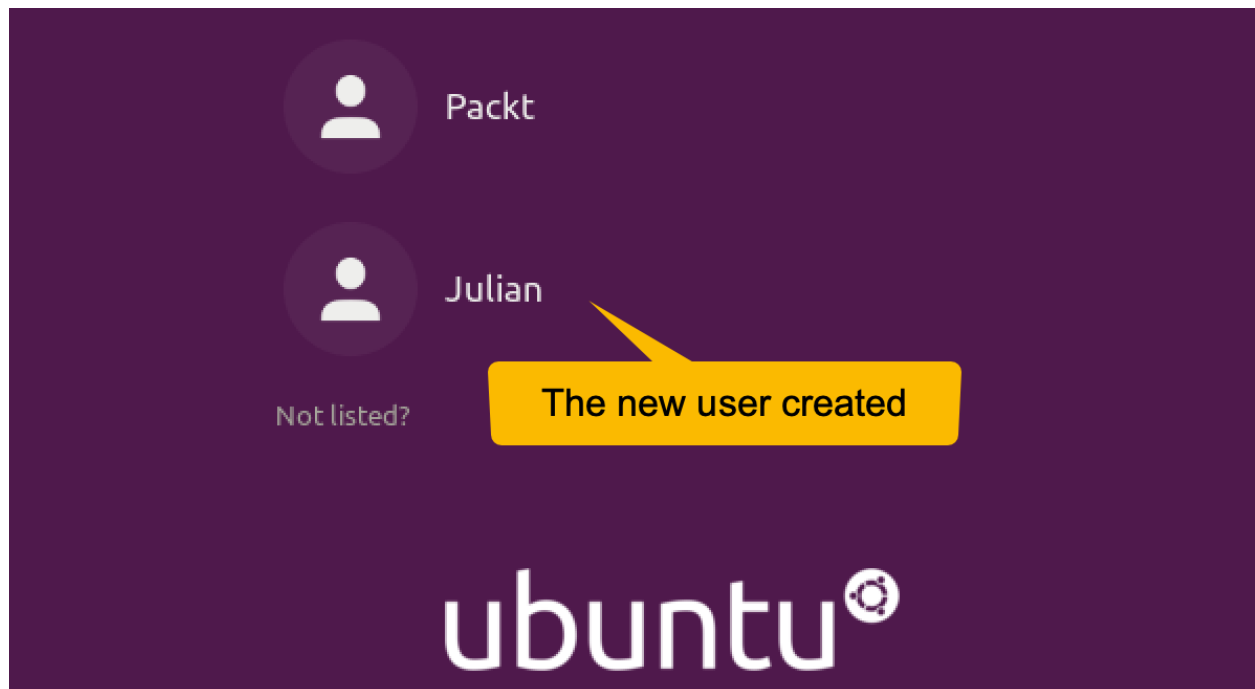
```
[packt@jupiter rpmbuild]$ ls
BUILD  BUILDROOT  RPMS  SOURCES  SPECS  SRPMS
[packt@jupiter rpmbuild]$ cd RPMS/
[packt@jupiter RPMS]$ ls
noarch
[packt@jupiter RPMS]$ cd noarch/
[packt@jupiter noarch]$ ls
ip-app-0.1-1.el8.noarch.rpm
```

Chapter 4: Managing Users and Groups.

```
packt@neptune:~$ cat /etc/passwd | grep julian
julian:x:1001:1001:~/home/julian:/bin/sh
```

```
packt@neptune:~$ id julian
uid=1001(julian) gid=1001(julian) groups=1001(julian)
```

```
packt@neptune:~$ sudo passwd julian
New password:
Retype new password:
passwd: password updated successfully
```



```
packt@neptune:~$ sudo adduser julian
Adding user `julian' ...
Adding new group `julian' (1001) ...
Adding new user `julian' (1001) with group `julian' ...
Creating home directory `/home/julian' ...
Copying files from `/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for julian
Enter the new value, or press ENTER for the default
    Full Name []: Julian
    Room Number []:
    Work Phone []:
    Home Phone []:
    Other []:
Is the information correct? [Y/n] Y
```

```
packt@neptune:~$ getent passwd julian
julian:x:1001:1001:Julian,,,:/home/julian:/bin/bash
```

```
packt@neptune:~$ id julian
uid=1001(julian) gid=1001(julian) groups=1001(julian),27(sudo),
1200(developers),1300(devops)
```

```
packt@neptune:~$ sudo getent shadow | cut -d: -f1 | less | column
root          news          systemd-network
daemon        uucp         systemd-resolve
bin           proxy        systemd-timesync
sys           www-data     messagebus
```

```
packt@neptune:~$ getent passwd julian
julian:x:1001:1001:Julian:/local/julian:/bin/bash
```

```
packt@neptune:~$ cat /etc/group | grep developers
developers:x:1002:
```

```
packt@neptune:~$ getent group devops
devops:x:1002:
```

```
packt@neptune:~$ sudo groupdel devops
groupdel: cannot remove the primary group of user 'julian'
```

```
packt@neptune:~$ id julian
uid=1001(julian) gid=1002(devops) groups=1002(devops)
```

```
packt@neptune:~$ id julian
uid=1001(julian) gid=1001(julian) groups=1001(julian)
```

```
packt@neptune:~$ id alex
uid=1002(alex) gid=1100(admin) groups=1100(admin),1200(developers),1300
(devops),1400(managers)
```

```
packt@neptune:~$ id alex
uid=1002(alex) gid=1100(admin) groups=1100(admin),1200(developers),
1300(devops),1400(managers)
```

```
packt@neptune:~$ id alex
uid=1002(alex) gid=1100(admin) groups=1100(admin),1400(managers)
```

```
packt@neptune:~$ id alex
uid=1002(alex) gid=1100(admin) groups=1100(admin)
```

```
packt@neptune:~$ id alex
uid=1002(alex) gid=1400(managers) groups=1400(managers),1200(developers),
1300(devops)
```

```
packt@neptune:~$ id alex
uid=1002(alex) gid=1002(alex) groups=1002(alex),1200(developers),
1300(devops),1400(managers)
```

```
root          irc           lxd
daemon       src           systemd-coredump
bin          gnats        packt
sys         shadow       rtkit
```

```
packt@neptune:~$ getent group developers
developers:x:1200:julian,alex
```

```
packt@neptune:~$ groups alex
alex : admin developers devops managers
```

```
packt@neptune:~$ groups
packt adm cdrom sudo dip plugdev lxd
```

```
packt@neptune:~$ id julian
uid=1001(julian) gid=1001(julian) groups=1001(julian),1200(developers),
1300(devops)
```

```
$ whoami
julian
```

```
$ groups
admin developers devops
```

```
$ id
uid=1001(julian) gid=1001(julian) groups=1001(julian),1200(developers),
1300(devops)
```

```
packt@neptune:~$ ls -l /etc/passwd
-rw-r--r-- 1 root root 3056 Sep 17 07:57 /etc/passwd
```

r	w	x	r	w	x	r	w	x
owner / user			group			other / world		
read	write	exec	read	write	exec	read	write	exec
4	2	1	4	2	1	4	2	1

```
packt@neptune:~$ stat --format '%a' /etc/passwd
644
```

```
packt@neptune:~$ chmod u+s myscript
packt@neptune:~$ ls -l myscript
-rwsrwxr-x 1 packt packt 0 Sep 21 08:09 myscript
packt@neptune:~$ stat --format '%a' myscript
4775
```

```
packt@neptune:~$ chmod g+s myscript
packt@neptune:~$ ls -l myscript
-rwxrwsr-x 1 packt packt 0 Sep 21 07:55 myscript
packt@neptune:~$ stat --format '%a' myscript
2775
```

```
packt@neptune:~$ chmod +t mydir
packt@neptune:~$ ls -ld mydir
drwxrwxr-t 2 packt packt 4096 Sep 21 08:30 mydir
packt@neptune:~$ stat --format '%a' mydir
1775
```

```
packt@neptune:~$ ls -l myfile
-rw-rw-r-- 1 packt packt 16 Sep 21 09:27 myfile
packt@neptune:~$ chmod o+w myfile
packt@neptune:~$ ls -l myfile
-rw-rw-rw- 1 packt packt 16 Sep 21 09:27 myfile
```

```
packt@neptune:~$ ls -l myfile
-rw-rw-rw- 1 packt packt 16 Sep 21 09:27 myfile
packt@neptune:~$ chmod u-rw myfile
packt@neptune:~$ ls -l myfile
---rw-rw- 1 packt packt 16 Sep 21 09:27 myfile
```

```
packt@neptune:~$ ls -l myfile
-rwxrwxrwx 1 packt packt 16 Sep 21 09:27 myfile
packt@neptune:~$ chmod u-r,ug-w,o-rwx myfile
packt@neptune:~$ ls -l myfile
---xr-x--- 1 packt packt 16 Sep 21 09:27 myfile
```

```
packt@neptune:~$ chmod 777 myfile
packt@neptune:~$ ls -l myfile
-rwxrwxrwx 1 packt packt 16 Sep 21 09:27 myfile
```



```
packt@neptune:~$ sudo chown julian:developers myfile
[sudo] password for packt:
packt@neptune:~$ ls -l myfile
-rwxrwxrwx 1 julian developers 16 Sep 21 09:27 myfile
```

```
packt@neptune:~$ ls -lR mydir/
mydir/:
total 12
-rwxrwxr-x 1 root root 16 Sep 21 10:49 file1
-rwxrwxr-x 1 root root 16 Sep 21 10:49 file2
drwxrwxr-x 2 root root 4096 Sep 21 10:50 subdir

mydir/subdir:
total 8
-rwxrwxr-x 1 root root 16 Sep 21 10:50 file3
-rwxrwxr-x 1 root root 16 Sep 21 10:50 file4
packt@neptune:~$
packt@neptune:~$ sudo chown -R julian:julian mydir/
packt@neptune:~$
packt@neptune:~$ ls -lR mydir/
mydir/:
total 12
-rwxrwxr-x 1 julian julian 16 Sep 21 10:49 file1
-rwxrwxr-x 1 julian julian 16 Sep 21 10:49 file2
drwxrwxr-x 2 julian julian 4096 Sep 21 10:50 subdir

mydir/subdir:
total 8
-rwxrwxr-x 1 julian julian 16 Sep 21 10:50 file3
-rwxrwxr-x 1 julian julian 16 Sep 21 10:50 file4
```

```
packt@neptune:~$ sudo chgrp developers myfile
[sudo] password for packt:
packt@neptune:~$ ls -l myfile
-rwxrwxrwx 1 packt developers 16 Sep 21 09:27 myfile
```

```
packt@neptune:~$ touch myfile
packt@neptune:~$ stat --format '%a' myfile
664
```

```
packt@neptune:~$ mkdir mydir
packt@neptune:~$ stat --format '%a' mydir/
775
```

value	files	directories
0000	666 (rw-rw-rw-)	777 (rwxrwxrwx)
0002	664 (rw-rw-r--)	775 (rwxrwxr x)
0022	644 (rw-r--r--)	755 (rwxr-xr-x)
0027	640 (rw-r-----)	750 (rwxr-x---
0077	600 (rw-----)	700 (rwx-----)
0277	400 (r-----)	500 (r-x-----)

Chapter 5: Working with Processes, Daemons, and Signals.

```
PS(1) User Commands PS(1)

NAME Process Categories
ps - report a snapshot of the current processes.

SYNOPSIS
ps [options]

DESCRIPTION
ps displays information about a selection of the active processes. If you want a repetitive update of the selection and the displayed information, use top(1) instead.

This version of ps accepts several kinds of options:

1 UNIX options, which may be grouped and must be preceded by a dash.
2 BSD options, which may be grouped and must not be used with a dash.
3 GNU long options, which are preceded by two dashes.

Manual page ps(1) line 1 (press h for help or q to quit)
```

```
packt@neptune:~$ while true; do echo "Wait..."; sleep 5; done
Wait...
Wait...
Wait...
Wait...
^C
```

```

packt@neptune:~$ while true; do echo "Wait..."; sleep 5; done &
[1] 109639
packt@neptune:~$ Wait...
Wait...
Wait...
echo "We still have an interactive prompt..."
We still have an interactive prompt...
packt@neptune:~$ Wait...
Wait...
kill -9 109639
packt@neptune:~$

```

```

packt@neptune:~$ pstree
systemd--ModemManager--2*[{ModemManager}]
--NetworkManager--2*[{NetworkManager}]
--VGAAuthService
--accounts-daemon--2*[{accounts-daemon}]
--acpid
--atd
--avahi-daemon--avahi-daemon
--bluetoothd
--colord--2*[{colord}]
--cron

```

```

packt@neptune:~$ ps
  PID TTY          TIME CMD
 171233 pts/0        00:00:00 bash
 171253 pts/0        00:00:00 ps

```

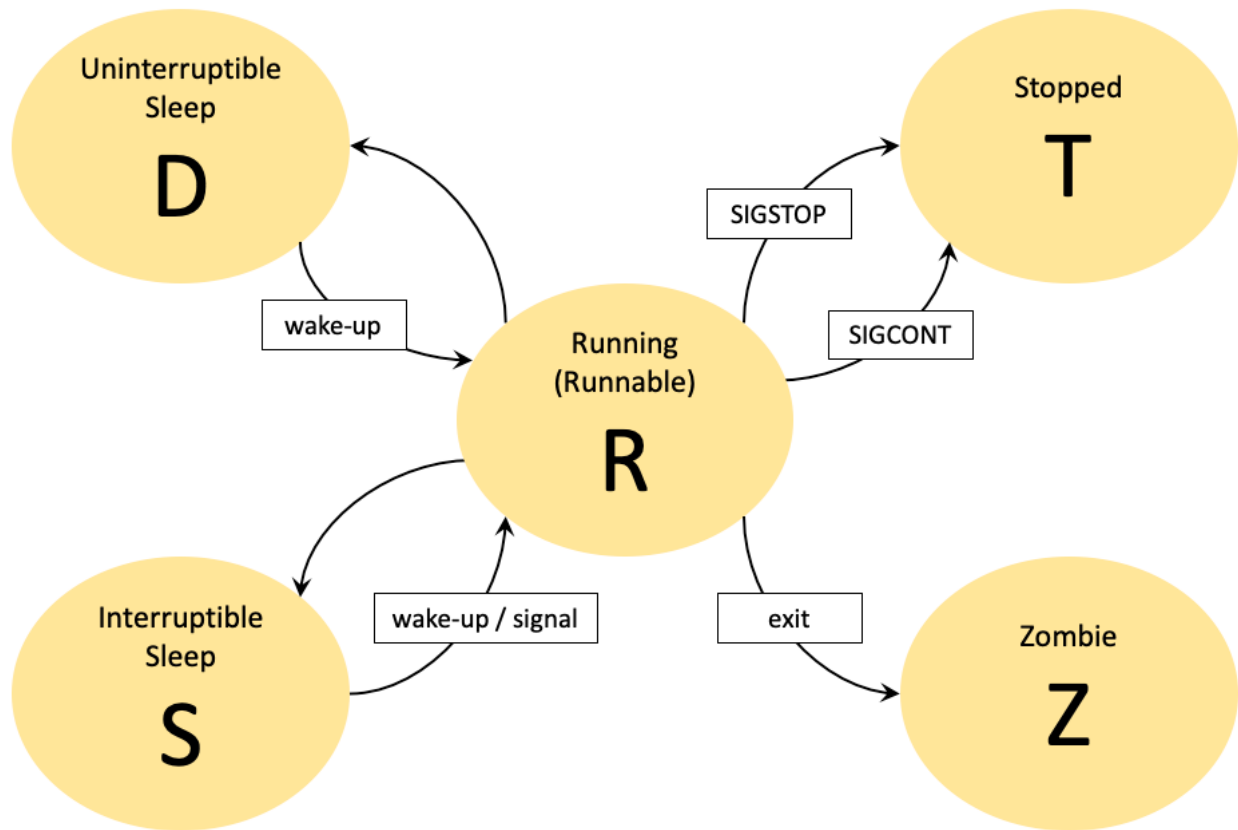
```
packt@neptune:~$ while true; do x=1; done  
^C
```

```
packt@neptune:~$ ps  
    PID TTY          TIME CMD  
  171233 pts/0    00:00:06 bash  
  172010 pts/0    00:00:00 ps
```

```
packt@neptune:~$ ps -l  
F S  UID      PID     PPID  C PRI  NI ADDR SZ WCHAN  TTY          TIME CMD  
0 S  1000    171233 171232 0  80   0 - 2103 do_wai pts/0    00:00:06 bash  
0 R  1000    174897 171233 0  80   0 - 2199 -      pts/0    00:00:00 ps
```

```
top - 07:34:16 up 4 days, 3:53, 1 user, load average: 0.08, 0.02, 0.01  
Tasks: 286 total, 1 running, 285 sleeping, 0 stopped, 0 zombie  
%Cpu(s): 0.2 us, 0.3 sy, 0.0 ni, 99.5 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st  
MiB Mem : 3908.4 total, 779.1 free, 667.0 used, 2462.3 buff/cache  
MiB Swap: 3908.0 total, 3908.0 free, 0.0 used. 2943.2 avail Mem
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
171232	packt	20	0	13952	5416	3912	S	0.3	0.1	0:02.51	sshd
181940	packt	20	0	9368	3968	3160	R	0.3	0.1	0:00.10	top
1	root	20	0	171112	13132	8300	S	0.0	0.3	0:12.66	systemd
2	root	20	0	0	0	0	S	0.0	0.0	0:00.19	kthreadd
3	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	rcu_gp
4	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	rcu_par_gp



```

packt@neptune:~$ ps -e | head
  PID TTY          TIME CMD
    1 ?            00:00:14 systemd
    2 ?            00:00:00 kthreadd
    3 ?            00:00:00 rcu_gp
    4 ?            00:00:00 rcu_par_gp
    6 ?            00:00:00 kworker/0:0H-kblockd
    9 ?            00:00:00 mm_percpu_wq
   10 ?            00:00:01 ksoftirqd/0
   11 ?            00:00:15 rcu_sched
   12 ?            00:00:02 migration/0
  
```

```

packt@neptune:~$ ps -fU $(whoami)
UID      PID      PPID     C  STIME TTY          TIME CMD
packt    171072    1        0  Oct03 ?           00:00:00 /lib/systemd/systemd --user
packt    171075   171072   0  Oct03 ?           00:00:00 (sd-pam)
packt    171081   171072   0  Oct03 ?           00:00:00 /usr/bin/pulseaudio --daemon
packt    171083   171072   0  Oct03 ?           00:00:00 /usr/libexec/tracker-miner-f
packt    171092   171072   0  Oct03 ?           00:00:00 /usr/bin/dbus-daemon --sessi
packt    171107   171072   0  Oct03 ?           00:00:00 /usr/libexec/gvfsd
packt    171123   171072   0  Oct03 ?           00:00:00 /usr/libexec/gvfsd-fuse /run
packt    171124   171072   0  Oct03 ?           00:00:00 /usr/libexec/gvfs-udisks2-vo
packt    171137   171072   0  Oct03 ?           00:00:00 /usr/libexec/gvfs-gphoto2-vo
packt    171142   171072   0  Oct03 ?           00:00:00 /usr/libexec/gvfs-goat-volume
packt    171146   171072   0  Oct03 ?           00:00:00 /usr/libexec/goa-daemon
packt    171154   171072   0  Oct03 ?           00:00:00 /usr/libexec/goa-identity-se
packt    171159   171072   0  Oct03 ?           00:00:00 /usr/libexec/gvfs-mtp-volume
packt    171164   171072   0  Oct03 ?           00:00:05 /usr/libexec/gvfs-afc-volume
packt    171232   171052   0  Oct03 ?           00:00:05 sshd: packt@pts/0
packt    171233   171232   0  Oct03 pts/0       00:00:06 -bash
packt    242150   171233   0  05:05 pts/0       00:00:00 ps -fU packt

```

```

packt@neptune:~$ cat test.sh
#!/bin/bash
while true; do x=1; done

```

```

packt@neptune:~$ ./test.sh &
[1] 243436

```

```

packt@neptune:~$ ps -ef | grep test.sh
packt    243436   171233  99 05:44 pts/0       00:04:39 /bin/bash ./test.sh
packt    243560   171233   0 05:49 pts/0       00:00:00 grep --color=auto test.sh

```

```

packt@neptune:~$ ps -ef | grep test.sh | grep -v grep
packt    243436   171233  99 05:44 pts/0       00:23:27 /bin/bash ./test.sh

```

```

packt@neptune:~$ ps -fp 243436
UID      PID      PPID     C  STIME TTY          TIME CMD
packt    243436   171233  99 05:44 pts/0       00:52:14 /bin/bash ./test.sh

```

```
packt@neptune:~$ pstree $(echo $$)
bash─┬─pstree
      └─test.sh
```

```
packt@neptune:~$ pstree -p $(echo $$)
bash(246908)─┬─pstree(262214)
              └─test.sh(243436)
```

```
packt@neptune:~$ pstree $(whoami)
sshd─┬─bash─┬─pstree
      │      └─test.sh
```

```
top - 07:04:39 up 5 days, 21:28, 1 user, load average: 1.02, 1.02, 1.00
Tasks: 289 total, 2 running, 287 sleeping, 0 stopped, 0 zombie
%Cpu(s): 50.0 us, 0.2 sy, 0.0 ni, 49.5 id, 0.0 wa, 0.0 hi, 0.3 si, 0.0 st
MiB Mem : 3908.4 total, 694.9 free, 674.0 used, 2539.5 buff/cache
MiB Swap: 3908.0 total, 3908.0 free, 0.0 used. 2936.2 avail Mem
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+
243436	packt	20	0	6892	1160	1016	R	99.3	0.0	80:02.27
821	root	20	0	238004	8132	6704	S	0.7	0.2	9:59.74
425	root	20	0	0	0	0	S	0.3	0.0	1:45.87
497	root	19	-1	300472	127076	125380	S	0.3	3.2	2:02.89
919	root	20	0	259324	18972	16136	S	0.3	0.5	0:10.34
245819	packt	20	0	9368	4036	3268	R	0.3	0.1	0:00.04
1	root	20	0	171112	13132	8300	S	0.0	0.3	0:15.05


```

Fields Management for window 1:Def, whose current sort field is %CPU
Navigate with Up/Dn, Right selects for move then <Enter> or Left commits,
'd' or <Space> toggles display, 's' sets sort. Use 'q' or <Esc> to end!

* PID      = Process Id      TTY      = Controlling T  vMj      = Major Faults
* USER     = Effective Use  TPGID    = Tty Process G  vMn      = Minor Faults
* PR       = Priority      SID       = Session Id     USED     = Res+Swap Size
* NI       = Nice Value   nTH      = Number of Thr  nsIPC    = IPC namespace
* VIRT     = Virtual Image P         = Last Used Cpu  nsMNT    = MNT namespace
* RES      = Resident Size TIME      = CPU Time       nsNET    = NET namespace
* SHR      = Shared Memory SWAP      = Swapped Size   nsPID    = PID namespace
* S        = Process Statu CODE      = Code Size (Ki nsUSER   = USER namespac
* %CPU     = CPU Usage    DATA    = Data+Stack (K nsUTS    = UTS namespace
* %MEM     = Memory Usage nMaj     = Major Page Fa  LXC      = LXC container
* TIME+    = CPU Time, hun nMin     = Minor Page Fa  RSan     = RES Anonymous
* COMMAND  = Command Name/ nDRT     = Dirty Pages C  RSfd    = RES File-base
PPID      = Parent Proces WCHAN    = Sleeping in F  RSlk    = RES Locked (K
UID       = Effective Use  Flags    = Task Flags <s RSsh    = RES Shared (K
RUID      = Real User Id   CGROUPS  = Control Group CGNAME   = Control Group
RUSER     = Real User Nam  SUPGIDS  = Supp Groups I  NU       = Last Used NUM
SUID      = Saved User Id  SUPGRPS  = Supp Groups N
SUSER     = Saved User Na  TGID     = Thread Group
GID       = Group Id      OOMAdj   = OOMEM Adjustm
GROUP     = Group Name    OOMs     = OOMEM Score c
PGRP      = Process Group ENVIRON  = Environment v

```

```

packt@neptune:~$ top -b -o +%MEM | head -n 17
top - 07:55:13 up 5 days, 22:19,  1 user,  load average: 1.00, 1.00, 1.00
Tasks: 287 total,  2 running, 285 sleeping,  0 stopped,  0 zombie
%Cpu(s): 51.6 us,  0.0 sy,  0.0 ni, 48.4 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem :  3908.4 total,  696.9 free,  670.3 used,  2541.2 buff/cache
MiB Swap:  3908.0 total,  3908.0 free,  0.0 used.  2939.9 avail Mem

  PID USER      PR  NI   VIRT   RES   SHR  S  %CPU  %MEM    TIME+  COMMAND
 1214 gdm        20   0 3867872 167128 90460 S   0.0   4.2   2:25.77 gnome-s+
  497 root      19  -1 300472 128528 126832 S   0.0   3.2   2:03.42 systemd+
 1550 gdm        20   0 464664  57380 39512 S   0.0   1.4   0:00.57 gsd-xse+
 1547 gdm        20   0 315956  55916 38764 S   0.0   1.4   0:00.38 ibus-x11
 1386 gdm        20   0 444916  52516 33664 S   0.0   1.3   0:00.64 Xwayland
171146 packt     20   0 539436  35696 29872 S   0.0   0.9   0:00.05 goa-dae+
 1206 gdm        20   0 539312  35636 29812 S   0.0   0.9   0:00.46 goa-dae+
  955 root      20   0 1007076 29792 15960 S   0.0   0.7   0:39.38 snapd
 1422 gdm        20   0 2522088 26716 21548 S   0.0   0.7   0:00.05 gjs
 1436 gdm        20   0 606016  24704 19468 S   0.0   0.6   0:00.44 gsd-med+

```

```
packt@neptune:~$ top -u $(whoami) -b -o %CPU | head -n 12
top - 08:06:20 up 5 days, 22:30, 1 user, load average: 1.15, 1.05, 1.01
Tasks: 287 total, 2 running, 285 sleeping, 0 stopped, 0 zombie
%Cpu(s): 50.0 us, 3.1 sy, 0.0 ni, 46.9 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 3908.4 total, 695.6 free, 670.8 used, 2542.0 buff/cache
MiB Swap: 3908.0 total, 3908.0 free, 0.0 used. 2939.5 avail Mem

  PID USER      PR  NI   VIRT   RES   SHR  S  %CPU  %MEM    TIME+  COMMAND
 243436 packt    20   0   6892   1160  1016  R  100.0   0.0  141:37.78 test.sh
 247657 packt    20   0   9368   3844  3276  R   6.2   0.1   0:00.01 top
 171072 packt    20   0  18780  10208  8340  S   0.0   0.3   0:00.45 systemd
 171075 packt    20   0  172364  5012    16  S   0.0   0.1   0:00.00 (sd-pam)
 171083 packt    39  19  582472  24360 16304  S   0.0   0.6   0:00.47 tracker+
```

```
top - 08:23:24 up 5 days, 22:47, 1 user, load average: 1.02, 1.22, 1.15
Tasks: 1 total, 1 running, 0 sleeping, 0 stopped, 0 zombie
%Cpu(s): 50.0 us, 0.0 sy, 0.0 ni, 49.8 id, 0.0 wa, 0.0 hi, 0.2 si, 0.0 st
MiB Mem : 3908.4 total, 694.5 free, 671.1 used, 2542.9 buff/cache
MiB Swap: 3908.0 total, 3908.0 free, 0.0 used. 2939.2 avail Mem

  PID USER      PR  NI   VIRT   RES   SHR  S  %CPU  %MEM    TIME+  COMMAND
 243436 packt    20   0   6892   1160  1016  R  100.0   0.0  158:40.02 test.sh
```

```
top - 08:25:27 up 5 days, 22:49, 1 user, load average: 1.00, 1.14, 1.12
Tasks: 1 total, 1 running, 0 sleeping, 0 stopped, 0 zombie
%Cpu(s): 49.9 us, 0.0 sy, 0.0 ni, 49.8 id, 0.0 wa, 0.0 hi, 0.3 si, 0.0 st
MiB Mem : 3908.4 total, 694.2 free, 671.1 used, 2543.1 buff/cache
MiB Swap: 3908.0 total, 3908.0 free, 0.0 used. 2939.2 avail Mem
PID to signal/kill [default pid = 243436]

  PID USER      PR  NI   VIRT   RES   SHR  S  %CPU  %MEM    TIME+  COMMAND
 243436 packt    20   0   6892   1160  1016  R  100.0   0.0  160:43.10 test.sh
```

```
packt@neptune:~$ kill -l
1) SIGHUP          2) SIGINT          3) SIGQUIT        4) SIGILL         5) SIGTRAP
6) SIGABRT        7) SIGBUS         8) SIGFPE         9) SIGKILL        10) SIGUSR1
11) SIGSEGV       12) SIGUSR2       13) SIGPIPE       14) SIGALRM       15) SIGTERM
16) SIGSTKFLT    17) SIGCHLD      18) SIGCONT       19) SIGSTOP       20) SIGTSTP
21) SIGTTIN      22) SIGTTOU      23) SIGURG        24) SIGXCPU       25) SIGXFSZ
26) SIGVTALRM    27) SIGPROF      28) SIGWINCH      29) SIGIO         30) SIGPWR
31) SIGSYS       34) SIGRTMIN     35) SIGRTMIN+1   36) SIGRTMIN+2   37) SIGRTMIN+3
38) SIGRTMIN+4  39) SIGRTMIN+5   40) SIGRTMIN+6   41) SIGRTMIN+7   42) SIGRTMIN+8
43) SIGRTMIN+9  44) SIGRTMIN+10  45) SIGRTMIN+11  46) SIGRTMIN+12  47) SIGRTMIN+13
48) SIGRTMIN+14 49) SIGRTMIN+15  50) SIGRTMAX-14  51) SIGRTMAX-13  52) SIGRTMAX-12
53) SIGRTMAX-11 54) SIGRTMAX-10  55) SIGRTMAX-9   56) SIGRTMAX-8   57) SIGRTMAX-7
58) SIGRTMAX-6  59) SIGRTMAX-5   60) SIGRTMAX-4   61) SIGRTMAX-3   62) SIGRTMAX-2
63) SIGRTMAX-1  64) SIGRTMAX
```

```
packt@neptune:~$ killall -e -TERM test.sh
[1] Terminated ./test.sh
[2]- Terminated ./test.sh
[3]+ Terminated ./test.sh
```

```
packt@neptune:~$ pgrep -f test.sh
243436
```

```
packt@neptune:~$ pgrep -f test.sh | xargs ps -fp
UID          PID     PPID  C  STIME TTY          TIME CMD
packt 243436      1  99 05:44 ?           03:22:58 /bin/bash ./test.sh
```

```
packt@neptune:~$ pkill -ef test.sh
test.sh killed (pid 243436)
[1]+ Terminated ./test.sh
```

```
root:/# service httpd status
httpd (pid 6694) is running...
```

```
root:/# service httpd stop
Stopping httpd: [ OK ]
```

```
root:/# chkconfig httpd off
Note: Forwarding request to 'systemctl disable httpd.service'.
Removed symlink /etc/systemd/system/multi-user.target.wants/httpd.service.
```

```
[packt@jupiter ~]$ systemctl enable httpd
==== AUTHENTICATING FOR org.freedesktop.systemd1.manage-unit-files =
=== I
Authentication is required to manage system service or unit files.
Authenticating as: Packt (packt)
Password:
==== AUTHENTICATION COMPLETE ====
==== AUTHENTICATING FOR org.freedesktop.systemd1.reload-daemon ====
Authentication is required to reload the systemd state.
Authenticating as: Packt (packt)
Password:
==== AUTHENTICATION COMPLETE ====
```

```
[packt@jupiter ~]$ systemctl status httpd
• httpd.service - The Apache HTTP Server
  Loaded: loaded (/usr/lib/systemd/system/httpd.service; enabled; >
  Active: active (running) since Mon 2020-10-05 17:44:15 PDT; 1h 2>
  Docs: man:httpd.service(8)
  Main PID: 10747 (httpd)
  Status: "Total requests: 1; Idle/Busy workers 100/0;Requests/sec>
  Tasks: 213 (limit: 23810)
  Memory: 28.1M
  CGroup: /system.slice/httpd.service
          └─10747 /usr/sbin/httpd -DFOREGROUND
            └─10749 /usr/sbin/httpd -DFOREGROUND
              └─10750 /usr/sbin/httpd -DFOREGROUND
                └─10753 /usr/sbin/httpd -DFOREGROUND
                  └─10829 /usr/sbin/httpd -DFOREGROUND
```

```
[packt@jupiter ~]$ systemctl is-active httpd
active
```

```
1 #!/bin/bash
2
3 # producer.sh
4
5 STORAGE_FILE="./storage"
6
7 rm -f "${STORAGE_FILE}"
8
9 while true; do
10     for (( i=1; i<=10; i++ )); do
11         uid="$(uuidgen)"
12         echo "${uid}"
13         echo "${uid}" >> "${STORAGE_FILE}"
14     done
15     sleep 5s
16 done

1 #!/bin/bash
2
3 # consumer.sh
4
5 STORAGE_FILE="./storage"
6
7 while true; do
8     while IFS= read -r line; do
9         echo "${line}"
10         done < "${STORAGE_FILE}"
11         sleep 1s
12     done
13
14 ~
15 ~
16 ~
```

```
packt@neptune:~$ ./producer.sh
b6bffe5e-2fe4-42a4-a95d-163ceea5ee68
3bac9255-78b2-4169-a322-ab2e97a67c00
ba2f5b56-f9eb-4b61-b43e-ea74f0276659
405266df-0d08-4961-8683-cd98a03c856e
e7bd1bbe-5fe3-41f0-b3b1-4d3300dfc217
76ea41d3-e1c7-46d1-8e10-4dc0c145baff
676838dc-9077-4f63-9fa1-a01710cb9423
f84b252e-f0d7-4ac9-b0c9-4679bf18caa8
edf47528-5e12-41e9-80af-faab36151c9a

packt@neptune:~$ ./consumer.sh
b6bffe5e-2fe4-42a4-a95d-163ceea5ee68
3bac9255-78b2-4169-a322-ab2e97a67c00
ba2f5b56-f9eb-4b61-b43e-ea74f0276659
405266df-0d08-4961-8683-cd98a03c856e
e7bd1bbe-5fe3-41f0-b3b1-4d3300dfc217
76ea41d3-e1c7-46d1-8e10-4dc0c145baff
676838dc-9077-4f63-9fa1-a01710cb9423
f84b252e-f0d7-4ac9-b0c9-4679bf18caa8
edf47528-5e12-41e9-80af-faab36151c9a
```

```
1 #!/bin/bash
2
3 # producer.sh
4
5 for (( i=1; i<=10; i++ )); do
6     uid="$(uuidgen)"
7     echo "${uid}"
8 done
9
10 ~
11 ~
12 ~
13 ~
14 ~

1 #!/bin/bash
2
3 # consumer.sh
4
5 echo "Consumer data:"
6 echo "-----"
7
8 if [ -t 0 ]; then
9     data="$*"
10 else
11     data=$(cat)
12 fi
13
14 echo "${data}"
```

```
packt@neptune:~$ ./producer.sh | ./consumer.sh
```

```
Consumer data:
```

```
-----  
b1da7ad8-5636-4f14-a213-a6fb2c410595  
28ae3c1f-06d0-4cc4-bffa-6da07669005f  
67f6b577-216a-4032-86f6-17008a934f88  
fcbaa50e-8424-4180-ae2b-c63aa0b8bba5  
0080c23e-8c75-4168-a3d1-ad566a02701e  
38a3a60a-7454-45fc-83ef-a5c6c045ee55  
b37c8be3-080f-40e9-993d-2dba1a51d388  
1886b132-7769-4dcb-a480-42b30101567d  
3cb86a07-63ee-473a-8698-9cb08d7eddfa  
248c4bc4-7307-4b35-9363-bb7a71e015a6
```

```
1 ~/bin/bash  
2  
3 # producer.sh  
4  
5 PIPE="pipe.fifo"  
6  
7 if [[ ! -p ${PIPE} ]]; then mkfifo ${PIPE}; fi  
8  
9 while true; do  
10     for (( i=1; i<=10; i++ )); do  
11         uid=$(uuidgen)  
12         echo "${uid}"  
13         echo "${uid}" > "${PIPE}"  
14         sleep 1s  
15     done  
16 done
```

```
1 ~/bin/bash  
2  
3 # consumer.sh  
4  
5 PIPE="pipe.fifo"  
6  
7 if [[ ! -p ${PIPE} ]]; then mkfifo ${PIPE}; fi  
8  
9 while true; do  
10     if read line < ${PIPE}; then  
11         echo "${line}"  
12     fi  
13 done  
~  
~  
~
```

```

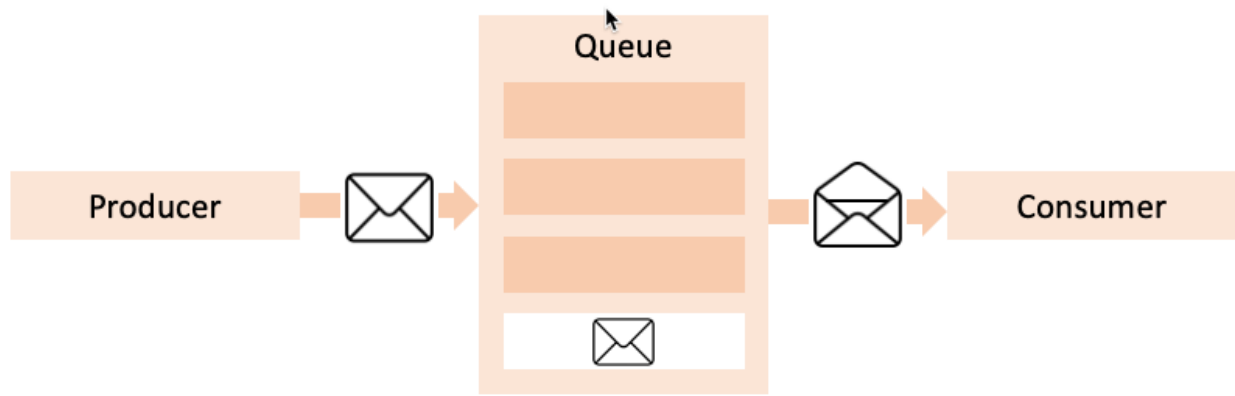
packt@neptune:~$ ./producer.sh
9f050ab7-da6a-4875-b2b6-a683090a3a97
202bd8dc-95d5-4b58-bf37-92f1bb7302c2
1b3b535d-23ff-4e77-8204-1f87d4261300
33a31f98-1ed9-4416-858b-34b39933f1bc
90225d31-33a1-4ed5-8680-64610e24c3ea
058b8e54-1d18-4ffe-8b90-248ec0734652

c2f7f61e-6f31-4e7d-8f90-d9e23fcdd56b
c4465523-be2d-443a-9e37-e2a271b8e16c
595e0c89-3b9c-4978-a475-6f6b149e10a7
306ee1e0-dab3-451e-9fe5-c37f218a713c
^C
packt@neptune:~$ ./producer.sh
4f76c9bc-ec04-4eaa-b986-3c5934af8ec8
e39999a2-58f3-405e-82cd-c5eba831f559
22ab6118-b992-4db6-9ad3-dc4d419c1a66
648a72ec-08e6-4c60-a00d-68b4f892c3ca

packt@neptune:~$ ./consumer.sh
9f050ab7-da6a-4875-b2b6-a683090a3a97
202bd8dc-95d5-4b58-bf37-92f1bb7302c2
1b3b535d-23ff-4e77-8204-1f87d4261300
33a31f98-1ed9-4416-858b-34b39933f1bc
90225d31-33a1-4ed5-8680-64610e24c3ea
^C
packt@neptune:~$ ./consumer.sh
058b8e54-1d18-4ffe-8b90-248ec0734652
c2f7f61e-6f31-4e7d-8f90-d9e23fcdd56b
c4465523-be2d-443a-9e37-e2a271b8e16c
595e0c89-3b9c-4978-a475-6f6b149e10a7
306ee1e0-dab3-451e-9fe5-c37f218a713c

4f76c9bc-ec04-4eaa-b986-3c5934af8ec8
e39999a2-58f3-405e-82cd-c5eba831f559
22ab6118-b992-4db6-9ad3-dc4d419c1a66
648a72ec-08e6-4c60-a00d-68b4f892c3ca

```



```

1 #!/bin/bash
2
3 # producer.sh
4
5 SOCKET="/var/tmp/ipc.sock"
6
7 rm -f "${SOCKET}"
8
9 while true; do
10     uuidgen;
11     sleep 1s;
12 done \
13 | tee /dev/tty \
14 | nc -lU "${SOCKET}"

1 #!/bin/bash
2
3 # consumer.sh
4
5 SOCKET="/var/tmp/ipc.sock"
6
7 nc -U "${SOCKET}"
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
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67
68
69
70
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72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

```

```

packt@neptune:~$ ./producer.sh
065a3e4e-59ea-4d8e-ba66-68c4f7dbfc6a
8f608bfb-a480-4738-8505-968b64f7e294
e767025e-ba34-40ed-b42d-3af653dc37a1
354c5333-fcb7-43f3-8c34-2538cf9e2023
HELLO!!
a250785d-3535-4e76-b7a0-865b9c4150a6
94eeff88-4701-4eb9-bcde-e7a1b9574dca
5bdb16cf-5169-412c-aa8a-b6a0076fc53f
ae1088fd-6458-4e2b-9244-69540f5e1fb2
^C

packt@neptune:~$ ./consumer.sh
065a3e4e-59ea-4d8e-ba66-68c4f7dbfc6a
8f608bfb-a480-4738-8505-968b64f7e294
e767025e-ba34-40ed-b42d-3af653dc37a1
354c5333-fcb7-43f3-8c34-2538cf9e2023
HELLO!!
a250785d-3535-4e76-b7a0-865b9c4150a6
94eeff88-4701-4eb9-bcde-e7a1b9574dca
5bdb16cf-5169-412c-aa8a-b6a0076fc53f
ae1088fd-6458-4e2b-9244-69540f5e1fb2
packt@neptune:~$ █

```

```

packt@neptune:~$ kill -l
1) SIGHUP      2) SIGINT      3) SIGQUIT     4) SIGILL      5) SIGTRAP
6) SIGABRT    7) SIGBUS     8) SIGFPE     9) SIGKILL    10) SIGUSR1
11) SIGSEGV   12) SIGUSR2   13) SIGPIPE   14) SIGALRM   15) SIGTERM
16) SIGSTKFLT 17) SIGCHLD  18) SIGCONT   19) SIGSTOP   20) SIGTSTP
21) SIGTTIN   22) SIGTTOU  23) SIGURG    24) SIGXCPU   25) SIGXFSZ
26) SIGVTALRM 27) SIGPROF  28) SIGWINCH  29) SIGIO     30) SIGPWR
31) SIGSYS    34) SIGRTMIN 35) SIGRTMIN+1 36) SIGRTMIN+2 37) SIGRTMIN+3
38) SIGRTMIN+4 39) SIGRTMIN+5 40) SIGRTMIN+6 41) SIGRTMIN+7 42) SIGRTMIN+8
43) SIGRTMIN+9 44) SIGRTMIN+10 45) SIGRTMIN+11 46) SIGRTMIN+12 47) SIGRTMIN+13
48) SIGRTMIN+14 49) SIGRTMIN+15 50) SIGRTMAX-14 51) SIGRTMAX-13 52) SIGRTMAX-12
53) SIGRTMAX-11 54) SIGRTMAX-10 55) SIGRTMAX-9 56) SIGRTMAX-8 57) SIGRTMAX-7
58) SIGRTMAX-6 59) SIGRTMAX-5 60) SIGRTMAX-4 61) SIGRTMAX-3 62) SIGRTMAX-2
63) SIGRTMAX-1 64) SIGRTMAX

```

Signal	Default Action	Description
SIGABRT	A	Process abort signal.
SIGALRM	T	Alarm clock.
SIGBUS	A	Access to an undefined portion of a memory object.
SIGCHLD	I	Child process terminated, stopped, or continued.
SIGCONT	C	Continue executing, if stopped.
SIGFPE	A	Erroneous arithmetic operation.
SIGHUP	T	Hangup.
SIGILL	A	Illegal instruction.
SIGINT	T	Terminal interrupt signal.
SIGKILL	T	Kill (cannot be caught or ignored).
SIGPIPE	T	Write on a pipe with no one to read it.
SIGQUIT	A	Terminal quit signal.
SIGSEGV	A	Invalid memory reference.
SIGSTOP	S	Stop executing (cannot be caught or ignored).
SIGTERM	T	Termination signal.
SIGTSTP	S	Terminal stop signal.
SIGTTIN	S	Background process attempting read.
SIGTTOU	S	Background process attempting write.
SIGUSR1	T	User-defined signal 1.
SIGUSR2	T	User-defined signal 2.


The default actions are as follows:

```
T      Abnormal termination of the process.
A      Abnormal termination of the process with additional actions.
I      Ignore the signal.
S      Stop the process.
C      Continue the process, if it is stopped; otherwise, ignore the signal.
```

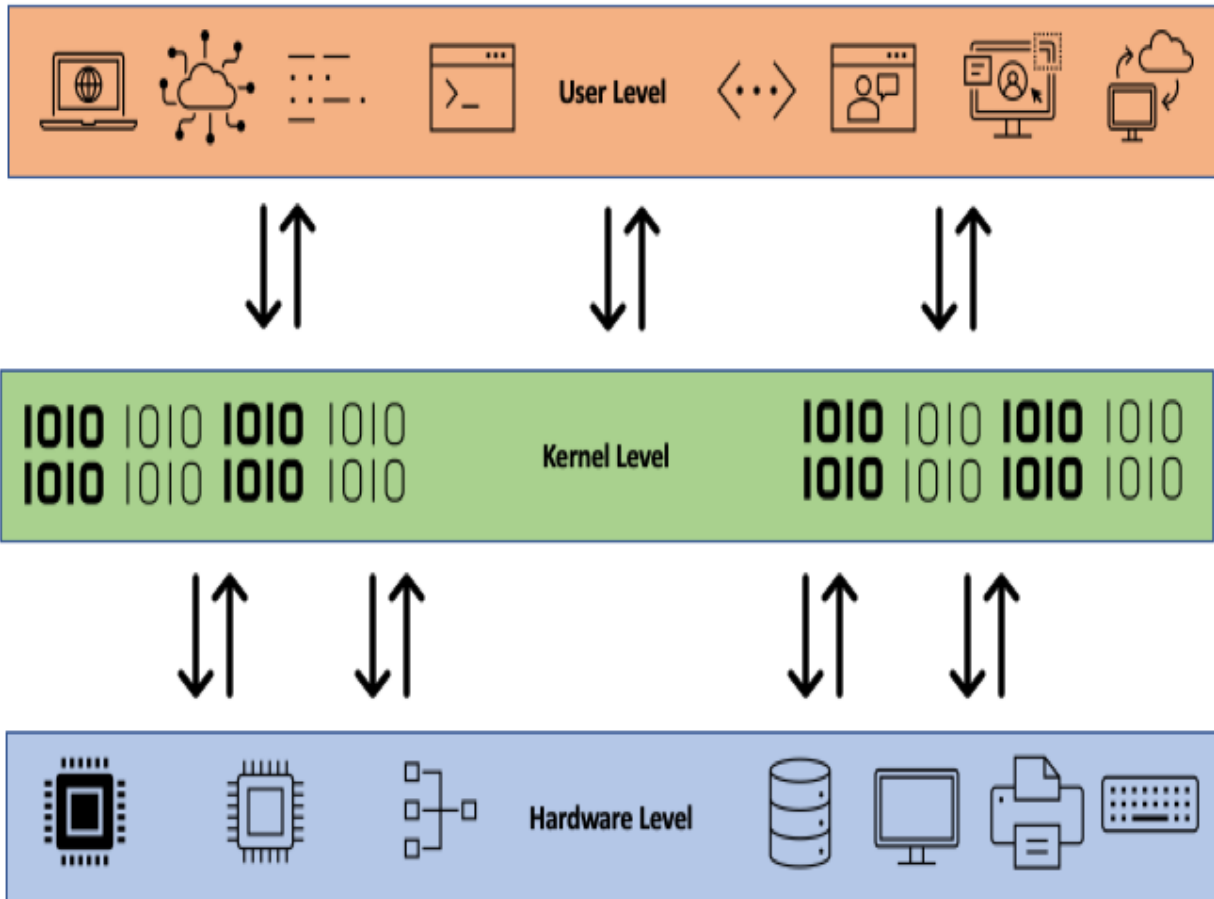
```
packt@neptune:~$ killall -e -TERM test.sh
[2]+  Terminated                  ./test.sh
[1]+  Terminated                  ./test.sh
```

```
1  #!/bin/bash
2
3  trap sig_handler SIGUSR1
4
5  function sig_handler() {
6      echo "Signal caught!"
7  }
8
9  while true; do
10     echo "Waiting..."
11     sleep 3s
12 done
```

```
packt@neptune:~$ ./test.sh &
[1] 286917
packt@neptune:~$ Waiting...
Waiting...
Waiting...
Signal caught!
Waiting...
Waiting...
Waiting...
packt@neptune:~$ killall -e -USR1 test.sh
packt@neptune:~$
```



Chapter 6: Understanding disks and partitions.



```
[packt@jupiter ~]$ cat /etc/udev/udev.conf
# see udev.conf(5) for details
#
# udevd is also started in the initrd. When this file is modified you might
# also want to rebuild the initrd, so that it will include the modified configuration.
#udev_log="info"
[packt@jupiter ~]$ ls -l /etc/udev/rules.d/
total 4
-rw-r--r--. 1 root root 628 Oct  2  2019 70-persistent-ipoib.rules
```

```
brw-rw----. 1 root disk    8,  0 Sep  8 12:59 sda
brw-rw----. 1 root disk    8,  1 Sep  8 12:59 sda1
brw-rw----. 1 root disk    8, 16 Sep  8 12:59 sdb
brw-rw----. 1 root disk    8, 17 Sep  8 12:59 sdb1
brw-rw----. 1 root disk    8, 18 Sep  8 12:59 sdb2
crw-rw----. 1 root disk   21,  0 Sep  8 12:59 sg0
crw-rw----. 1 root disk   21,  1 Sep  8 12:59 sg1
```

KERNEL

VIRTUAL FILE SYSTEM

SUPPORTED FILESYSTEMS
EXT3, EXT4, XFS, ZFS, BTRFS, NTFS, FAT, APFS, NFS, SMB ...

HARDWARE
DISK DRIVES, SSDs, TAPES

```
[packt@jupiter ~]$ blkid
/dev/mapper/cl-root: UUID="9cb51d4f-5979-4298-bab8-57144e5c42ac" TYPE="xfs"
/dev/sdb2: UUID="nH3IW7-DJlD-0vnE-D4j7-ZtuZ-rQgS-jchm4V" TYPE="LVM2_member" PART
UUID="289db18a-02"
/dev/sdb1: UUID="f748abc8-285a-46f3-9410-baf57f485ddf" TYPE="ext4" PARTUUID="289
db18a-01"
/dev/mapper/cl-swap: UUID="aebd9086-3d52-4629-b50d-2414c6d55a06" TYPE="swap"
/dev/sda1: LABEL="seagate" UUID="03d5ec9d-e291-40fd-a62c-f1b9e576d305" TYPE="ext
4" PARTUUID="c4647bc5-cfa9-4056-81c3-f64157c5d734"
/dev/mapper/cl-home: UUID="0cff53d6-4c4b-463c-8172-8ad9be341fc6" TYPE="xfs"
[packt@jupiter ~]$ lsblk
NAME                MAJ:MIN RM   SIZE RO TYPE MOUNTPOINT
sda                   8:0    0 931.5G  0 disk
├─sda1                 8:1    0 931.5G  0 part
sdb                   8:16   0 223.6G  0 disk
├─sdb1                 8:17   0    1G    0 part /boot
└─sdb2                 8:18   0 222.6G  0 part
   ├─cl-root           253:0   0    50G   0 lvm  /
   ├─cl-swap           253:1   0    7.8G   0 lvm  [SWAP]
   └─cl-home           253:2   0 164.8G   0 lvm  /home
```

```
[packt@jupiter ~]$ cat /proc/partitions
major minor #blocks name
8         0  976762584 sda
8         1  976760832 sda1
8        16  234438656 sdb
8        17   1048576 sdb1
8        18  233389056 sdb2
253        0   52428800 dm-0
253        1    8175616 dm-1
253        2   172781568 dm-2
```

```
[packt@jupiter ~]$ pwd
/home/packt
[packt@jupiter ~]$ sudo dd if=/dev/sda
sda  sda1
[packt@jupiter ~]$ sudo dd if=/dev/sda of=mbr-backup bs=512 count=1
[sudo] password for packt:
1+0 records in
1+0 records out
512 bytes copied, 0.00182814 s, 280 kB/s
[packt@jupiter ~]$ ls
Desktop      Downloads  Pictures   Templates  mbr-backup
Documents   Music      Public     Videos     rpmbuild
```

```
[packt@jupiter ~]$ ls -lh /sbin/mkfs*
-rwxr-xr-x. 1 root root 17K Apr 24 15:39 /sbin/mkfs
-rwxr-xr-x. 1 root root 42K Apr 24 15:39 /sbin/mkfs.cramfs
-rwxr-xr-x. 4 root root 135K Apr 24 05:07 /sbin/mkfs.ext2
-rwxr-xr-x. 4 root root 135K Apr 24 05:07 /sbin/mkfs.ext3
-rwxr-xr-x. 4 root root 135K Apr 24 05:07 /sbin/mkfs.ext4
-rwxr-xr-x. 1 root root 40K May 11 2019 /sbin/mkfs.fat
-rwxr-xr-x. 1 root root 87K Apr 24 15:39 /sbin/mkfs.minix
lrwxrwxrwx. 1 root root 8 May 11 2019 /sbin/mkfs.msdos -> mkfs.fat
lrwxrwxrwx. 1 root root 8 May 11 2019 /sbin/mkfs.vfat -> mkfs.fat
-rwxr-xr-x. 1 root root 475K Apr 7 2020 /sbin/mkfs.xfs
```

```
[packt@jupiter ~]$ sudo fsck -t ext4 /dev/sda
fsck from util-linux 2.32.1
e2fsck 1.45.4 (23-Sep-2019)
/dev/sda: clean, 11/61054976 files, 4114691/244190646 blocks
```

```
[packt@jupiter ~]$ cat /proc/swaps
Filename                                Type      Size      Used      Priority
/dev/dm-1                               partition 8175612  0         -2
```

```
[packt@jupiter ~]$ free
              total        used         free      shared  buff/cache   available
Mem:          7878804        625656        6410364        12552        842784        6962448
Swap:         8175612             0         8175612
```

```
[packt@jupiter ~]$ sudo pvcreate /dev/sda
WARNING: ext4 signature detected on /dev/sda at offset 1080. Wipe it? [y/n]: y
Wiping ext4 signature on /dev/sda.
Physical volume "/dev/sda" successfully created.
```

```
[packt@jupiter ~]$ sudo vgcreate newvolume /dev/sda
[sudo] password for packt:
Volume group "newvolume" successfully created
```

```
[packt@jupiter ~]$ sudo vgdisplay newvolume
--- Volume group ---
VG Name                newvolume
System ID
Format                 lvm2
Metadata Areas         1
Metadata Sequence No  1
VG Access               read/write
VG Status               resizable
MAX LV                 0
Cur LV                0
Open LV                0
Max PV                 0
Cur PV                1
Act PV                1
VG Size                931.51 GiB
PE Size                4.00 MiB
Total PE               238467
Alloc PE / Size        0 / 0
Free PE / Size         238467 / 931.51 GiB
VG UUID                voPPjN-gZf7-WKNT-Eg4x-S1s1-06kL-4KrYPe
```

```
[packt@jupiter ~]$ sudo lvcreate -n projects -L 5G newvolume
[sudo] password for packt:
Logical volume "projects" created.
```

```
[packt@jupiter ~]$ sudo ls /dev/mapper/newvolume*
[sudo] password for packt:
/dev/mapper/newvolume-projects
```

```
[packt@jupiter ~]$ sudo mkfs -t ext4 /dev/mapper/newvolume-projects
[sudo] password for packt:
mke2fs 1.45.4 (23-Sep-2019)
Discarding device blocks: done
Creating filesystem with 1310720 4k blocks and 327680 inodes
Filesystem UUID: de5be238-5a79-417f-9488-b19bf74d44ce
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376, 294912, 819200, 884736

Allocating group tables: done
Writing inode tables: done
Creating journal (16384 blocks): done
Writing superblocks and filesystem accounting information: done
```

```
[packt@jupiter ~]$ sudo mkdir /mnt/projects
[packt@jupiter ~]$ sudo mount /dev/mapper/newvolume-projects /mnt/projects/
[packt@jupiter ~]$ df -h /mnt/projects/
Filesystem                Size  Used Avail Use% Mounted on
/dev/mapper/newvolume-projects 4.9G   20M  4.6G   1% /mnt/projects
```

```
[packt@jupiter ~]$ sudo lvextend -L +5G /dev/mapper/newvolume-projects
[sudo] password for packt:
  Size of logical volume newvolume/projects changed from 5.00 GiB (1280 extents)
to 10.00 GiB (2560 extents).
  Logical volume newvolume/projects successfully resized.
```

```
[packt@jupiter ~]$ sudo resize2fs -p /dev/mapper/newvolume-projects
resize2fs 1.45.4 (23-Sep-2019)
Filesystem at /dev/mapper/newvolume-projects is mounted on /mnt/projects; on-line
resizing required
old_desc_blocks = 1, new_desc_blocks = 2
The filesystem on /dev/mapper/newvolume-projects is now 2621440 (4k) blocks long
.

[packt@jupiter ~]$ df -h /mnt/projects/
Filesystem                Size  Used Avail Use% Mounted on
/dev/mapper/newvolume-projects 9.8G   23M  9.3G   1% /mnt/projects
```



```
[packt@jupiter mapper]$ sudo lvcreate -s -L 5G -n linux-snap01 /dev/mapper/newvolume-projects
Logical volume "linux-snap01" created.
```

```
[packt@jupiter dev]$ sudo lvs
LV VG Attr LSize Pool Origin Data% Meta% Move Log Cpy%Sync Convert
home cl -wi-ao---- <164.78g
root cl -wi-ao---- 50.00g
swap cl -wi-ao---- <7.80g
linux-snap01 newvolume swi-a-s--- 5.00g projects 0.01
projects newvolume owi-aos--- 10.00g
```

```
--- Logical volume ---
LV Path /dev/newvolume/linux-snap01
LV Name linux-snap01
VG Name newvolume
LV UUID wbEIFN-t7H6-qEoW-pgeY-NS8C-UZoa-UqbZva
LV Write Access read/write
LV Creation host, time jupiter, 2020-12-18 10:51:50 +0200
LV snapshot status active destination for projects
LV Status available
# open 0
LV Size 10.00 GiB
Current LE 2560
COW-table size 5.00 GiB
COW-table LE 1280
Allocated to snapshot 0.01%
Snapshot chunk size 4.00 KiB
Segments 1
Allocation inherit
Read ahead sectors auto
- currently set to 8192
Block device 253:6
```

```
[packt@jupiter mapper]$ sudo lvs
[sudo] password for packt:
LV VG Attr LSize Pool Origin Data% Meta% Move Log Cpy%Sync Convert
home cl -wi-ao---- <164.78g
root cl -wi-ao---- 50.00g
swap cl -wi-ao---- <7.80g
linux-snap01 newvolume swi-a-s--- 5.00g projects 0.01
projects newvolume owi-aos--- 10.00g
[packt@jupiter mapper]$ sudo lvextend -L +5G /dev/mapper/newvolume-linux--snap01
Size of logical volume newvolume/linux-snap01 changed from 5.00 GiB (1280 extents) to 10.00 GiB (2560 extents).
Logical volume newvolume/linux-snap01 successfully resized.
```

```

[packt@jupiter /]$ cd /dev/mapper/
[packt@jupiter mapper]$ ls
cl-home  cl-swap  newvolume-linux--snap01  newvolume-projects
cl-root  control  newvolume-linux--snap01-cow  newvolume-projects-real
[packt@jupiter mapper]$ ls -la
total 0
drwxr-xr-x. 2 root root   200 Dec 18 10:51 .
drwxr-xr-x. 21 root root  3440 Dec 18 10:51 ..
lrwxrwxrwx. 1 root root    7 Dec 18 10:20 cl-home -> ../dm-2
lrwxrwxrwx. 1 root root    7 Dec 18 10:20 cl-root -> ../dm-0
lrwxrwxrwx. 1 root root    7 Dec 18 10:20 cl-swap -> ../dm-1
crw-----. 1 root root 10, 236 Dec 18 10:20 control
lrwxrwxrwx. 1 root root    7 Dec 18 10:51 newvolume-linux--snap01 -> ../dm-6
lrwxrwxrwx. 1 root root    7 Dec 18 10:51 newvolume-linux--snap01-cow -> ../dm-5
lrwxrwxrwx. 1 root root    7 Dec 18 10:51 newvolume-projects -> ../dm-3
lrwxrwxrwx. 1 root root    7 Dec 18 10:51 newvolume-projects-real -> ../dm-4

```

```

[packt@jupiter ~]$ sudo lvconvert --merge /dev/mapper/newvolume-linux--snap01
Merging of volume newvolume/linux-snap01 started.
newvolume/projects: Merged: 100.00%

```

```

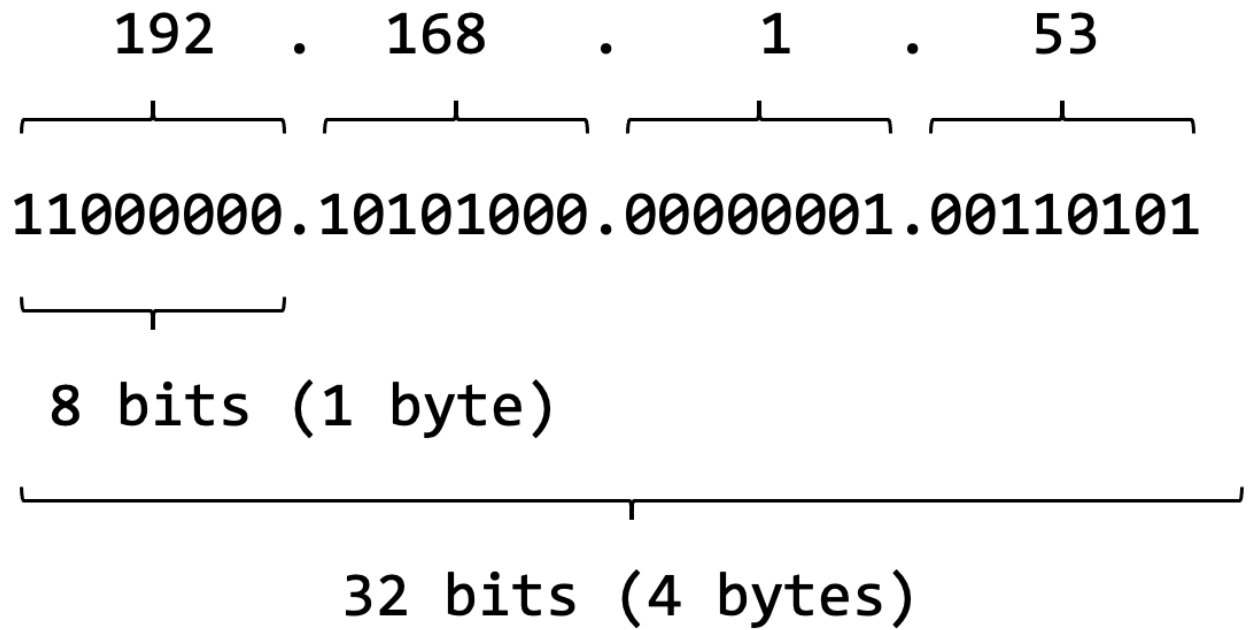
[packt@jupiter mapper]$ sudo lvs
[sudo] password for packt:
LV      VG      Attr      LSize   Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
home    cl      -wi-ao---- <164.78g
root    cl      -wi-ao---- 50.00g
swap    cl      -wi-ao---- <7.80g
projects newvolume -wi-a----- 10.00g

```

Chapter 7: Networking with Linux.

Application Layer	7	data	User interaction and high-level APIs
Presentation Layer	6		Data translation into a usable format (such as encrypt/decrypt, encode/decode, compress/deflate)
Session Layer	5		Communication sessions (connections, sockets, ports)
Transport Layer	4	segments, datagrams	Reliable data segments using transmission control protocols (such as TCP, UDP)
Network Layer	3	packets	Data packets with addressing, routing and traffic control information (that is data path)
Data Link Layer	2	frames	Formatting the data as reliable data frames
Physical Layer	1	bits	Transmission/reception of raw bit streams over a physical medium

	OSI Model	TCP/IP Model	TCP/IP Protocols
7	Application Layer	Application Layer	DNS, HTTP, FTP, SMTP, SNMP, Telnet, ...
6	Presentation Layer		
5	Session Layer		
4	Transport Layer	Transport Layer	TCP, UDP, ...
3	Network Layer	Internet Layer	IP, ARP, ICMP, IGMP, ...
2	Data Link Layer	Network Interface Layer	Ethernet, Token Ring, Frame Relay, ATM, ...
1	Physical Layer		



Class	Leading bits	Start address	End address	Default Subnet Mask
Class A	0	0.0.0.0	127.255.255.255	255.0.0.0
Class B	10	128.0.0.0	192.255.255.255	255.255.0.0
Class C	110	192.0.0.0	223.255.255.255	255.255.255.0
Class D (multicast)	1110	224.0.0.0	239.255.255.255	Not defined
Class E (reserved)	1111	240.0.0.0	255.255.255.255	Not defined

IP Address (192.168.1.53)	
Network Identifier	Host Identifier
192.168.1	53

```
packt@neptune:~$ ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group
   link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
   inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
   inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state
   link/ether 00:0c:29:db:4f:e8 brd ff:ff:ff:ff:ff:ff
   inet 172.16.146.133/24 brd 172.16.146.255 scope global dynamic ens33
       valid_lft 1175sec preferred_lft 1175sec
   inet6 fe80::20c:29ff:fedb:4fe8/64 scope link
       valid_lft forever preferred_lft forever
```

```
packt@neptune:~$ ls /etc/netplan/
00-installer-config.yaml
```

```
# This is the network config written by 'subiquity'
network:
  ethernets:
    → ens33:
      dhcp4: true
  version: 2
```

```
packt@neptune:~$ sudo netplan try
Warning: Stopping systemd-networkd.service, but it can still be activated by:
systemd-networkd.socket
Do you want to keep these settings?

Press ENTER before the timeout to accept the new configuration

Changes will revert in 117 seconds
Configuration accepted.
```

```
network:
version: 2
renderer: NetworkManager
ethernets:
  ens33: ←
    dhcp4: false
    addresses:
      - 172.16.146.100/24
    gateway4: 172.16.146.2
    nameservers:
      addresses: [8.8.8.8, 8.8.4.4]
```

```
[packt@jupiter ~]$ ls /etc/sysconfig/network-scripts/
ifcfg-ens33
```

```
[packt@jupiter ~]$ cat /etc/sysconfig/network-scripts/ifcfg-ens33
TYPE="Ethernet"
PROXY_METHOD="none"
BROWSER_ONLY="no"
BOOTPROTO="dhcp"
DEFROUTE="yes"
IPV4_FAILURE_FATAL="no"
IPV6INIT="yes"
IPV6_AUTOCONF="yes"
IPV6_DEFROUTE="yes"
IPV6_FAILURE_FATAL="no"
IPV6_ADDR_GEN_MODE="stable-privacy"
NAME="ens33"
UUID="9c38101e-1006-473c-a979-7a6f8557a1e6"
DEVICE="ens33"
ONBOOT="yes"
```

```
[packt@jupiter ~]$ cat /etc/sysconfig/network-scripts/ifcfg-ens33
TYPE="Ethernet"
PROXY_METHOD="none"
BROWSER_ONLY="no"
BOOTPROTO="none"
DEFROUTE="yes"
IPV4_FAILURE_FATAL="no"
IPV6INIT="yes"
IPV6_AUTOCONF="yes"
IPV6_DEFROUTE="yes"
IPV6_FAILURE_FATAL="no"
IPV6_ADDR_GEN_MODE="stable-privacy"
NAME="ens33"
UUID="9c38101e-1006-473c-a979-7a6f8557a1e6"
DEVICE="ens33"
ONBOOT="yes"
IPADDR=172.16.146.136
PREFIX=24
GATEWAY=172.16.146.2
DNS1=8.8.8.8
DNS2=8.8.4.4
```

```
packt@neptune:~$ hostname
neptune
```

```
packt@neptune:~$ hostnamectl
Static hostname: jupiter
Icon name: computer-vm
Chassis: vm
Machine ID: cde4b52a365f462ea4b64cde88ba6c0a
Boot ID: 3375a15598074774b525334801f8fec5
Virtualization: vmware
Operating System: Ubuntu 20.04.1 LTS
Kernel: Linux 5.4.0-53-generic
Architecture: x86-64
```

```
packt@neptune:~$ cat /etc/hostname
jupiter
packt@neptune:~$ cat /etc/hosts
127.0.0.1 localhost
127.0.1.1 jupiter
```

```
packt@neptune:~$ ip route
default via 172.16.146.2 dev ens33 proto dhcp src 172.16.146.133 metric 100
172.16.146.0/24 dev ens33 proto kernel scope link src 172.16.146.133
172.16.146.2 dev ens33 proto dhcp scope link src 172.16.146.133 metric 100
```

```
[packt@jupiter ~]$ cat /etc/resolv.conf | grep nameserver
nameserver 172.16.146.2
```

```
[packt@jupiter ~]$ nslookup neptune.local
Server:          172.16.146.2
Address:         172.16.146.2#53

;; expected ID 36298, got 0
Name:    neptune.local
Address: 172.16.146.133
```



```
packt@neptune:~$ nslookup
> wikipedia.org
Server:          127.0.0.53
Address:         127.0.0.53#53

Non-authoritative answer:
Name:   wikipedia.org
Address: 208.80.154.224
Name:   wikipedia.org
Address: 2620:0:861:ed1a::1
>
```

```
packt@neptune:~$ nslookup 8.8.8.8
8.8.8.8.in-addr.arpa    name = dns.google.

Authoritative answers can be found from:
```

```
packt@neptune:~$ dig jupiter.local.localdomain
```

```
; <<>> DiG 9.16.1-Ubuntu <<>> jupiter.local.localdomain
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 40239
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;jupiter.local.localdomain. IN A

;; ANSWER SECTION:
jupiter.local.localdomain. 5 IN A 172.16.146.136

;; Query time: 0 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Wed Nov 11 09:48:25 UTC 2020
;; MSG SIZE rcvd: 70
```

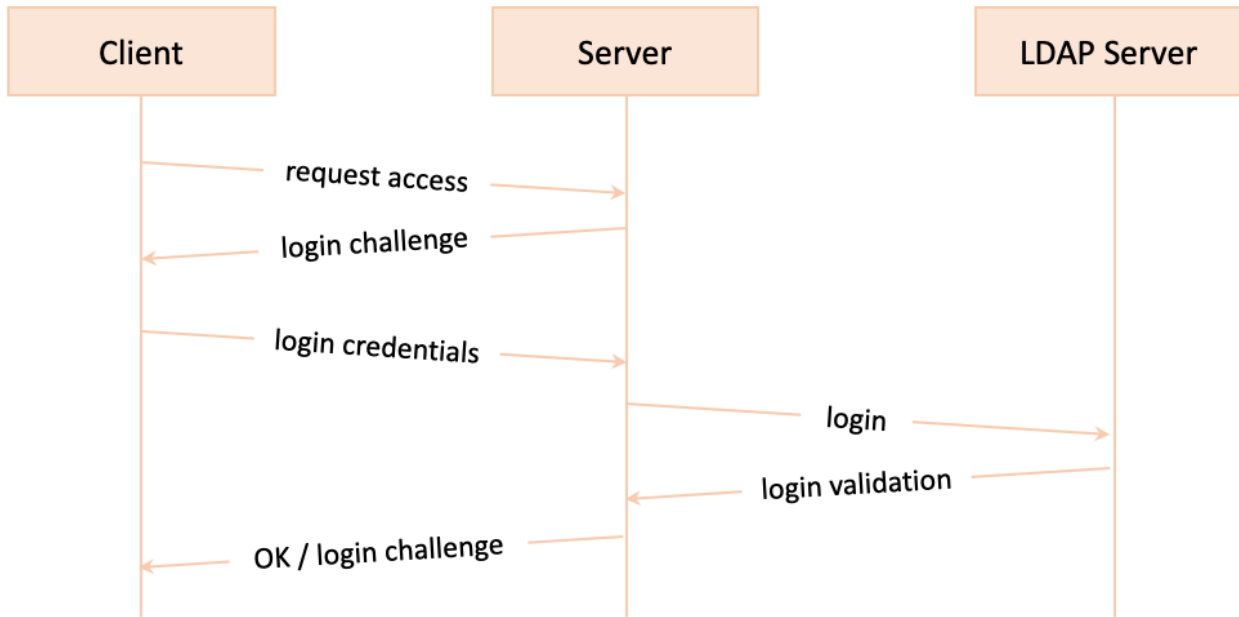
```
packt@neptune:~$ dig -x 8.8.4.4
```

```
; <<>> DiG 9.16.1-Ubuntu <<>> -x 8.8.4.4
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 25413
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;4.4.8.8.in-addr.arpa. IN PTR

;; ANSWER SECTION:
4.4.8.8.in-addr.arpa. 5 IN PTR dns.google.

;; Query time: 12 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Wed Nov 11 10:07:10 UTC 2020
;; MSG SIZE rcvd: 73
```



```

---
No client certificate CA names sent
Peer signing digest: SHA256
Peer signature type: ECDSA
Server Temp Key: X25519, 253 bits
---
SSL handshake has read 2892 bytes and written 419 bytes
Verification: OK
---
New, TLSv1.3, Cipher is TLS_AES_256_GCM_SHA384
Server public key is 256 bit
Secure Renegotiation IS NOT supported
Compression: NONE
Expansion: NONE
No ALPN negotiated
Early data was not sent
Verify return code: 0 (ok)
---
250 SMTPUTF8
  
```

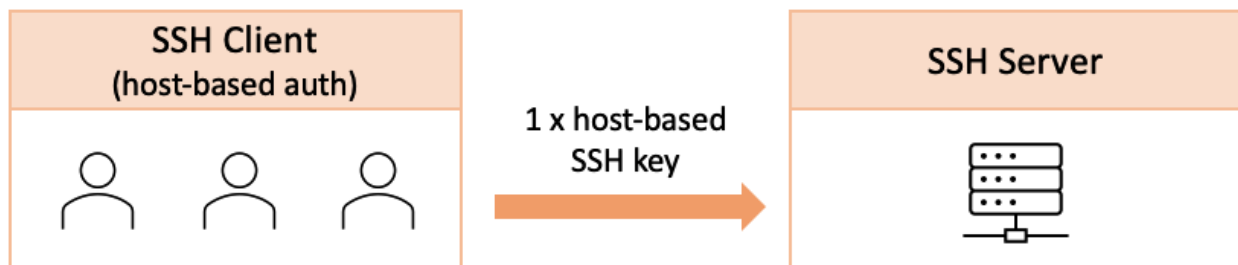
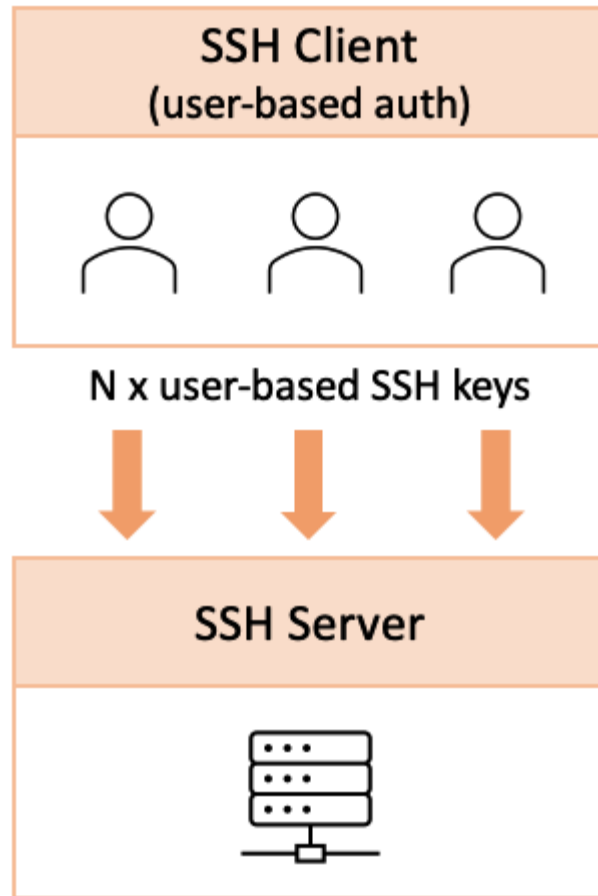
```
Start Time: 1605358583
Timeout : 7200 (sec)
Verify return code: 0 (ok)
Extended master secret: no
Max Early Data: 0
```

```
read R BLOCK
```

```
250 smtp.gmail.com at your service
```

```
[packt@jupiter ~]$ ntpstat
synchronised to NTP server (74.6.168.72) at stratum 3
time correct to within 17 ms
polling server every 1024 s
```

```
[packt@jupiter ~]$ dig -x 74.6.168.72
; <<>> DiG 9.11.13-RedHat-9.11.13-3.e18 <<>> -x 74.6.168.72
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 59198
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1
;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; MBZ: 0x0005, udp: 4096
;; QUESTION SECTION:
;72.168.6.74.in-addr.arpa.      IN      PTR
;; ANSWER SECTION:
72.168.6.74.in-addr.arpa. 5      IN      PTR      t1.time.gq1.yahoo.com.
;; Query time: 10 msec
;; SERVER: 172.16.146.2#53(172.16.146.2)
;; WHEN: Sat Nov 14 03:46:00 PST 2020
;; MSG SIZE rcvd: 88
```



```
packt@neptune:~$ telnet jupiter.local 80
Trying 172.16.146.136...
Connected to jupiter.local.localdomain.
Escape character is '^]'.
```

```
packt@neptune:~$ telnet jupiter.local 80
Trying 172.16.146.136...
Connected to jupiter.local.localdomain.
Escape character is '^]'.

GET / HTTP/1.1
Host: localhost

HTTP/1.1 403 Forbidden
Date: Sun, 15 Nov 2020 15:44:42 GMT
Server: Apache/2.4.37 (centos)
Content-Location: index.html.zh-CN
Vary: negotiate,accept-language
TCN: choice
Last-Modified: Fri, 14 Jun 2019 03:37:43 GMT
ETag: "fa6-58b405e7d6fc0;5b0f5dc6d9c8c"
Accept-Ranges: bytes
Content-Length: 4006
Content-Type: text/html; charset=UTF-8
Content-Language: zh-cn
```

```
[packt@jupiter ~]$ vncpasswd
Password:
Verify:
Would you like to enter a view-only password (y/n)? n
A view-only password is not used
```

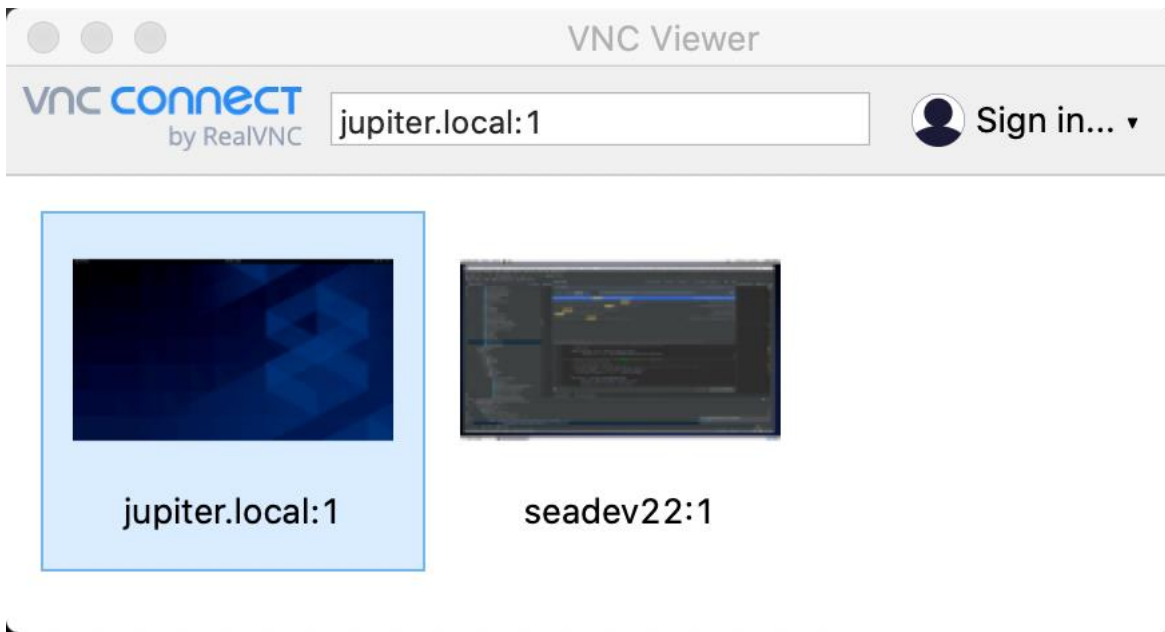
```
[packt@jupiter ~]$ vncserver -geometry 1920x1080
```

```
New 'jupiter:1 (packt)' desktop is jupiter:1
```

```
Creating default config /home/packt/.vnc/config
```

```
Starting applications specified in /home/packt/.vnc/xstartup
```

```
Log file is /home/packt/.vnc/jupiter:1.log
```



```
root@vpn:~# ip addr
```

```
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
```

```
link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
```

```
inet 127.0.0.1/8 scope host lo
```

```
valid_lft forever preferred_lft forever
```

```
inet6 ::1/128 scope host
```

```
valid_lft forever preferred_lft forever
```

```
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
```

```
link/ether b6:5d:80:be:25:fa brd ff:ff:ff:ff:ff:ff
```

```
inet 138.68.19.158/20 brd 138.68.31.255 scope global eth0
```

```
valid_lft forever preferred_lft forever
```

```
inet 10.46.0.5/16 brd 10.46.255.255 scope global eth0
```

```
valid_lft forever preferred_lft forever
```

```
inet6 fe80::b45d:80ff:febe:25fa/64 scope link
```

```
valid_lft forever preferred_lft forever
```

```
Welcome to this OpenVPN road warrior installer!
```

```
Which IPv4 address should be used?
```

```
1) 138.68.19.158
```

```
2) 10.46.0.5
```

```
3) 10.138.0.2
```

```
IPv4 address [1]: 1
```

```
Which protocol should OpenVPN use?
```

```
1) UDP (recommended)
```

```
2) TCP
```

```
Protocol [1]: 1
```

```
What port should OpenVPN listen to?
```

```
Port [1194]: 1194
```

```
Select a DNS server for the clients:
```

```
1) Current system resolvers
```

```
2) Google
```

```
3) 1.1.1.1
```

```
4) OpenDNS
```

```
5) Quad9
```

```
6) AdGuard
```

```
DNS server [1]: 1
```

```
Enter a name for the first client:
```

```
Name [client]: client
```

```
OpenVPN installation is ready to begin.
```

```
Press any key to continue...|
```

```
root@vpn:~# sudo systemctl status openvpn-server@server.service
● openvpn-server@server.service - OpenVPN service for server
   Loaded: loaded (/lib/systemd/system/openvpn-server@.service; enabled; vendor preset: enabled)
   Active: active (running) since Fri 2021-01-08 04:32:18 UTC; 8min ago
     Docs: man:openvpn(8)
           https://community.openvpn.net/openvpn/wiki/Openvpn24ManPage
           https://community.openvpn.net/openvpn/wiki/HOWTO
 Main PID: 29739 (openvpn)
   Status: "Initialization Sequence Completed"
    Tasks: 1 (limit: 1137)
  Memory: 1.2M
   CGroup: /system.slice/system-openvpn\x2dservice.slice/openvpn-server@server.service
           └─29739 /usr/sbin/openvpn --status /run/openvpn-server/status-server.log --status-versi
```



```
root@vpn:~# cat ~/client.ovpn
client
dev tun
proto udp
remote 138.68.19.158 1194
resolv-retry infinite
nobind
persist-key
persist-tun
remote-cert-tls server
auth SHA512
cipher AES-256-CBC
ignore-unknown-option block-outside-dns
block-outside-dns
verb 3
<ca>
-----BEGIN CERTIFICATE-----
```

```
OpenVPN is already installed.
```

```
Select an option:
```

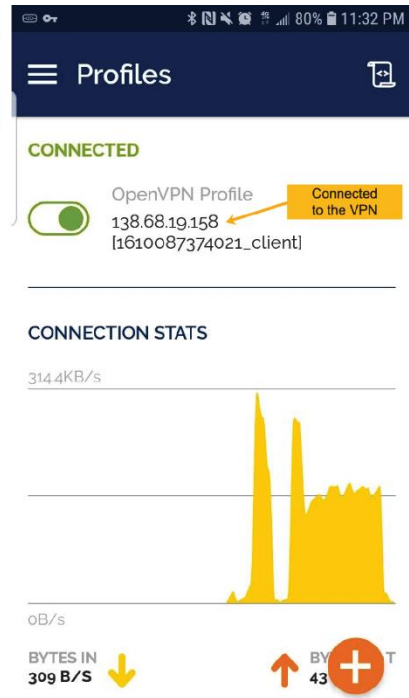
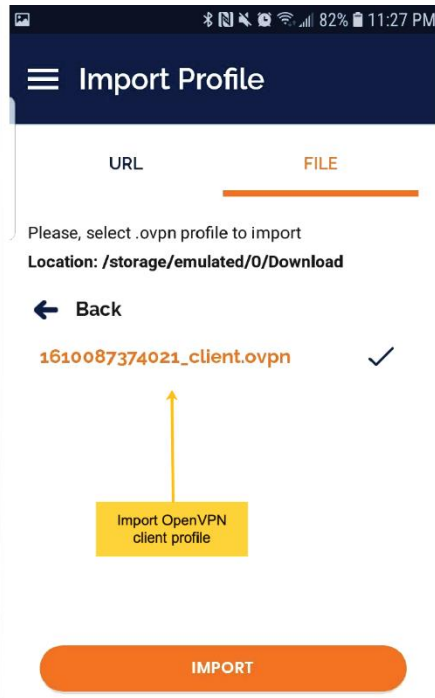
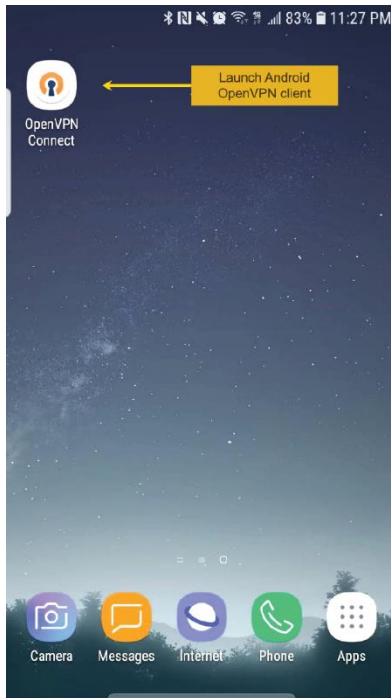
- 1) Add a new client
- 2) Revoke an existing client
- 3) Remove OpenVPN
- 4) Exit

```
Option: █
```

```
Fri Jan 8 20:50:20 2021 TUN/TAP device tun0 opened
Fri Jan 8 20:50:20 2021 TUN/TAP TX queue length set to 100
Fri Jan 8 20:50:20 2021 /sbin/ip link set dev tun0 up mtu 1500
Fri Jan 8 20:50:20 2021 /sbin/ip addr add dev tun0 10.8.0.2/24 broadcast 10.8.0.255
Fri Jan 8 20:50:20 2021 /sbin/ip route add 138.68.19.158/32 via 172.16.191.1
Fri Jan 8 20:50:20 2021 /sbin/ip route add 0.0.0.0/1 via 10.8.0.1
Fri Jan 8 20:50:20 2021 /sbin/ip route add 128.0.0.0/1 via 10.8.0.1
Fri Jan 8 20:50:20 2021 WARNING: this configuration may cache passwords in memory -- use the auth-no
cache option to prevent this
Fri Jan 8 20:50:20 2021 Initialization Sequence Completed
```

```
packt@neptune:~$ sudo systemctl status openvpn-client@client
● openvpn-client@client.service - OpenVPN tunnel for client
  Loaded: loaded (/lib/systemd/system/openvpn-client@.service; disabled; vendor preset: enabled)
  Active: active (running) since Fri 2021-01-08 21:34:40 UTC; 10s ago
  Docs: man:openvpn(8)
        https://community.openvpn.net/openvpn/wiki/Openvpn24ManPage
        https://community.openvpn.net/openvpn/wiki/HOWTO
  Main PID: 5978 (openvpn)
  Status: "Initialization Sequence Completed"
  Tasks: 1 (limit: 4581)
  Memory: 1.6M
  CGroup: /system.slice/system-openvpn\x2dclient.slice/openvpn-client@client.service
          └─5978 /usr/sbin/openvpn --suppress-timestamps --nobind --config client.conf
```

```
packt@neptune:~$ dig TXT +short o-o.myaddr.l.google.com @ns1.google.com
"138.68.19.158"
```



Chapter 8: Configuring Linux Servers.

UID	PID	PPID	C	STIME	TTY	TIME	CMD
root	1	0	0	sep13	?	00:01:41	/sbin/init splash
root	2	0	0	sep13	?	00:00:03	[kthreadd]
root	3	2	0	sep13	?	00:00:00	[rcu_gp]
root	4	2	0	sep13	?	00:00:00	[rcu_par_gp]

```
packt@neptune:~$ systemd-analyze
Startup finished in 44.504s (kernel) + 7.581s (userspace) = 52.086s
graphical.target reached after 7.556s in userspace
```

```
packt@neptune:~$ systemd-analyze blame
6.113s NetworkManager-wait-online.service
3.308s fwupd.service
2.951s bolt.service
2.822s apt-daily-upgrade.service
2.275s plymouth-quit-wait.service
996ms fstrim.service
688ms dev-nvme0n1p2.device
680ms snapd.service
415ms plymouth-read-write.service
368ms systemd-logind.service
275ms man-db.service
271ms snap-core18-1885.mount
267ms snap-gtk\x2dcommon\x2dthemes-1506.mount
180ms dev-loop1.device
170ms networkd-dispatcher.service
168ms snap-gnome\x2d3\x2d34\x2d1804-36.mount
138ms udisks2.service
111ms snap-snap\x2dstore-481.mount
104ms logrotate.service
87ms upower.service
87ms systemd-resolved.service
82ms avahi-daemon.service
82ms NetworkManager.service
```

```
alexandru@asus:~$ sudo apt install bind9 bind9utils bind9-doc
[sudo] password for alexandru:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libfprint-2-tod1 linux-headers-5.4.0-26 linux-headers-5.4.0-26-generic
  linux-image-5.4.0-26-generic linux-modules-5.4.0-26-generic
  linux-modules-extra-5.4.0-26-generic
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  bind9-utils python3-ply
Suggested packages:
  bind-doc resolvconf python-ply-doc
The following NEW packages will be installed:
  bind9 bind9-doc bind9-utils bind9utils python3-ply
0 upgraded, 5 newly installed, 0 to remove and 0 not upgraded.
Need to get 708 kB of archives.
After this operation, 3.828 kB of additional disk space will be used.
Do you want to continue? [Y/n] _
```

```
alexandru@asus:~$ nslookup google.com 127.0.0.1
Server:          127.0.0.1
Address:         127.0.0.1#53

Non-authoritative answer:
Name:   google.com
Address: 172.217.16.110
Name:   google.com
Address: 2a00:1450:400d:808::200e
```

```
alexandru@asus:~$ sudo ufw allow Bind9
[sudo] password for alexandru:
Rules updated
Rules updated (v6)
```

```
options {
  directory "/var/cache/bind";

  // If there is a firewall between you and nameservers you want
  // to talk to, you may need to fix the firewall to allow multiple
  // ports to talk.  See http://www.kb.cert.org/vuls/id/800113

  // If your ISP provided one or more IP addresses for stable
  // nameservers, you probably want to use them as forwarders.
  // Uncomment the following block, and insert the addresses replacing
  // the all-0's placeholder.

  // forwarders {
  // 0.0.0.0;
  // };

  //=====
  // If BIND logs error messages about the root key being expired,
  // you will need to update your keys.  See https://www.isc.org/bind-keys
  //=====
  dnssec-validation auto;

  listen-on-v6 { any; };
};
```

```
^G Get Help  ^O Write Out  ^W Where Is   ^K Cut Text   ^J Justify    ^C Cur Pos
^X Exit      ^R Read File  ^\ Replace   ^U Paste Text ^T To Spell  ^_ Go To Line
GNU nano 4.8 /etc/bind/named.conf.options
```

```

forwarders {
8.8.8.8; 8.8.4.4;
};

//=====
// If BIND logs error messages about the root key being expired,
// you will need to update your keys. See https://www.isc.org/bind-keys
//=====
dnssec-validation auto;

// listen-on-v6 { any; };

allow-query {
localhost; 192.168.0.0/24;
};

listen-on {
192.168.0.0/24;
};

```

```

alexandru@asus:~$ sudo named-checkconf
alexandru@asus:~$ sudo systemctl restart bind9
alexandru@asus:~$ sudo systemctl status bind9
● named.service - BIND Domain Name Server
   Loaded: loaded (/lib/systemd/system/named.service; enabled; vendor preset: enable
   Active: active (running) since Wed 2020-11-04 14:36:50 EET; 6s ago
     Docs: man:named(8)
  Main PID: 7886 (named)
    Tasks: 14 (limit: 9375)
   Memory: 27.0M
    CGroup: /system.slice/named.service
           └─7886 /usr/sbin/named -f -u bind

nov 04 14:36:50 asus named[7886]: network unreachable resolving './NS/IN': 2001:503:b>
nov 04 14:36:50 asus named[7886]: network unreachable resolving './NS/IN': 2001:500:1>
nov 04 14:36:50 asus named[7886]: network unreachable resolving './NS/IN': 2001:7fe::>
nov 04 14:36:50 asus named[7886]: network unreachable resolving './NS/IN': 2001:dc3::>
nov 04 14:36:50 asus named[7886]: network unreachable resolving './NS/IN': 2001:500:2>
nov 04 14:36:50 asus named[7886]: network unreachable resolving './NS/IN': 2001:500:2>
nov 04 14:36:50 asus named[7886]: network unreachable resolving './NS/IN': 2001:500:2>
nov 04 14:36:50 asus named[7886]: network unreachable resolving './NS/IN': 2001:500:9>
nov 04 14:36:50 asus named[7886]: managed-keys-zone: Key 20326 for zone . is now trus>
nov 04 14:36:50 asus named[7886]: resolver priming query complete

```

```
~ >>> nslookup google.com 192.168.0.205
Server:          192.168.0.205
Address:         192.168.0.205#53

Non-authoritative answer:
Name:   google.com
Address: 216.58.214.238
```

```
alexandru@asus:/etc/bind$ cat named.conf.local
//
// Do any local configuration here
//
// Consider adding the 1918 zones here, if they are not used in your
// organization
//include "/etc/bind/zones.rfc1918";

zone "openlark.com" {
    type master;
    file "/etc/bind/db.openlark.com";
    allow-transfer { 192.168.0.205; };
    also-notify { 192.168.0.205; };
};
```

```
alexandru@asus:/etc/bind$ ls
bind.keys  db.255    named.conf      named.conf.options
db.0       db.empty  named.conf.default-zones  rndc.key
db.127     db.local  named.conf.local  zones.rfc1918
alexandru@asus:/etc/bind$ sudo cp db.local db.openlark.com
```

```

alexandru@asus:/etc/bind$ cat db.openlark.com
;
; BIND data file for local loopback interface
;
$TTL      604800
@         IN      SOA      ns.openlark.com. admin.openlark.com. (
                        2          ; Serial
                        604800     ; Refresh
                        86400      ; Retry
                        2419200    ; Expire
                        604800 )   ; Negative Cache TTL
;
@         IN      NS       ns.openlark.com.
@         IN      A        192.168.0.205
ns        IN      A        192.168.0.205

```

```

~ >>> nslookup openlark.com 192.168.0.205 x 1
Server:      192.168.0.205
Address:     192.168.0.205#53

Name:   openlark.com
Address: 192.168.0.205

```

```

alexandru@asus:/etc/dhcp$ ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: enp2s0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc fq_codel state DOWN group default qlen 1000
    link/ether 2c:56:dc:2c:aa:fc brd ff:ff:ff:ff:ff:ff
3: wlp3s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP group default qlen 1000
    link/ether 80:a5:89:71:08:d7 brd ff:ff:ff:ff:ff:ff
    inet 192.168.0.205/24 brd 192.168.0.255 scope global dynamic noprefixroute wlp3s0
        valid_lft 5943sec preferred_lft 5943sec
    inet6 fe80::8b4e:e6da:99bc:c259/64 scope link noprefixroute
        valid_lft forever preferred_lft forever

```



```
packt@neptune:~$ systemctl status systemd-timesyncd
● systemd-timesyncd.service - Network Time Synchronization
   Loaded: loaded (/lib/systemd/system/systemd-timesyncd.service; enabled; ve>
   Active: active (running) since Mon 2020-11-09 12:36:46 EET; 8min ago
     Docs: man:systemd-timesyncd.service(8)
  Main PID: 334847 (systemd-timesyn)
   Status: "Initial synchronization to time server 91.189.89.199:123 (ntp.ubu>
     Tasks: 2 (limit: 9142)
    Memory: 1.6M
    CGroup: /system.slice/systemd-timesyncd.service
            └─334847 /lib/systemd/systemd-timesyncd

nov 09 12:36:46 neptune systemd[1]: Starting Network Time Synchronization...
nov 09 12:36:46 neptune systemd[1]: Started Network Time Synchronization.
nov 09 12:36:46 neptune systemd-timesyncd[334847]: Initial synchronization to t>
lines 1-14/14 (END)
```

```
packt@neptune:~$ timedatectl status
          Local time: Lu 2020-11-09 13:10:41 EET
          Universal time: Lu 2020-11-09 11:10:41 UTC
             RTC time: Lu 2020-11-09 11:10:41
          Time zone: Europe/Bucharest (EET, +0200)
System clock synchronized: yes
              NTP service: active
          RTC in local TZ: no
```

```
packt@neptune:~$ sudo apt install chrony
[sudo] password for packt:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages will be REMOVED:
  systemd-timesyncd
The following NEW packages will be installed:
  chrony
0 upgraded, 1 newly installed, 1 to remove and 0 not upgraded.
Need to get 220 kB of archives.
After this operation, 292 kB of additional disk space will be used.
Do you want to continue? [Y/n] _
```

```
# About using servers from the NTP Pool Project in general see (LP: #104525).
# Approved by Ubuntu Technical Board on 2011-02-08.
# See http://www.pool.ntp.org/join.html for more information.
pool ntp.ubuntu.com iburst maxsources 4
pool 0.ubuntu.pool.ntp.org iburst maxsources 1
pool 1.ubuntu.pool.ntp.org iburst maxsources 1
pool 2.ubuntu.pool.ntp.org iburst maxsources 2

# This directive specify the location of the file containing ID/key pairs for
# NTP authentication.
keyfile /etc/chrony/chrony.keys

# This directive specify the file into which chronyd will store the rate
# information.
driftfile /var/lib/chrony/chrony.drift

# Uncomment the following line to turn logging on.
#log tracking measurements statistics

# Log files location.
logdir /var/log/chrony

# Stop bad estimates upsetting machine clock.
maxupdateskew 100.0

# This directive enables kernel synchronisation (every 11 minutes) of the
# real-time clock. Note that it can't be used along with the 'rtcfile' directive.
rtcsync

# Step the system clock instead of slewing it if the adjustment is larger than
# one second, but only in the first three clock updates.
makestep 1 3
```

```

packt@neptune:/etc/chrony$ chronyc sources
210 Number of sources = 8
MS Name/IP address          Stratum Poll Reach LastRx Last sample
=====
^+ golem.canonical.com      2   7   377   71  -382us[ -334us] +/-  55ms
^+ alphyn.canonical.com     2   8   377   72  +344us[ +392us] +/- 110ms
^+ chilipepper.canonical.com 2   8   373   73  +315us[ +363us] +/-  47ms
^+ pugot.canonical.com      2   8   377    8  -433us[ -433us] +/-  44ms
^+                            3   8   377   75 +1967us[+2015us] +/-  99ms
^+ ftp.upcnet.ro           2   8   377   75 -4319us[-4271us] +/-  57ms
^* main-fe0.b.astral.ro     2   8   377   15  -388us[ -340us] +/-  51ms
^+ ntp0.chroot.ro          2   8   377   73 +2795us[+2843us] +/-  41ms
packt@neptune:/etc/chrony$ chronyc sourcestats
210 Number of sources = 8
Name/IP Address            NP  NR  Span  Frequency  Freq Skew  Offset  Std Dev
=====
golem.canonical.com       21  14  23m   +0.567     1.549    +575us  684us
alphyn.canonical.com      25  14  31m   +0.127     0.635    +635us  456us
chilipepper.canonical.com 24  15  31m   +0.085     0.970   +1194us  680us
pugot.canonical.com       25  14  32m   +0.077     0.538   -1364us  396us
                           25  11  31m   +0.289     0.364   +2308us  258us
ftp.upcnet.ro             25  14  31m   +0.305     0.175   -4285us  134us
main-fe0.b.astral.ro     24  13  32m   -0.014     0.157    -362us  106us
ntp0.chroot.ro            17   9  25m   -0.144     0.119   +2791us   46us

```

```

pool    pool.ntp.org          iburst  maxsources  4
pool    0.europe.pool.ntp.org iburst  maxsources  1
pool    1.europe.pool.ntp.org iburst  maxsources  1
pool    2.europe.pool.ntp.org iburst  maxsources  2

#network access
allow 192.168.0.0/24
allow 192.168.0.244

```

```

packt@neptune:/etc/chrony$ chronyc sources
210 Number of sources = 9
MS Name/IP address          Stratum Poll Reach LastRx Last sample
=====
^* neptune                   2 6 377 626 +9563ns[+4038ns] +/- 24ms
^- alpha.rueckgr.at         2 6 377 48  +3321us[+3321us] +/- 47ms
^- srv02.spectre-net.de    2 6 377 52  +2091us[+2091us] +/- 41ms
^- static.9.86.99.88.client> 2 6 377 50  +2197us[+2197us] +/- 47ms
^- ntp2.wtnet.de           2 6 377 50  +1167us[+1167us] +/- 53ms
^- 183-150-172-163.instance> 5 6 377 49  +3623us[+3623us] +/- 93ms
^- 85.199.214.102          1 6 377 52   +61us[ +61us] +/- 22ms
^- vsrv02141.customer.xenwa> 3 6 377 51  +962us[ +962us] +/- 47ms
^- ntp.cnh.at              2 6 377 51  +325us[ +325us] +/- 57ms
packt@neptune:/etc/chrony$ chronyc sourcestats
210 Number of sources = 9
Name/IP Address            NP  NR  Span  Frequency  Freq Skew  Offset  Std Dev
=====
neptune                    4   3   72   -12.662    219.996   -8014us  488us
alpha.rueckgr.at          14   9  655    -0.610     3.738    +431us  657us
srv02.spectre-net.de     14   7  654    +0.557     2.783    +1521us  447us
static.9.86.99.88.client> 14   6  655    +1.237     4.238    +2017us  893us
ntp2.wtnet.de            14   8  653    +0.214     8.685    +1583us 1813us
183-150-172-163.instance> 14  10  658    +0.286     2.010    +2724us  430us
85.199.214.102          14   6  655    -1.340     4.190    -618us  816us
vsrv02141.customer.xenwa> 14   7  654    +0.200     5.549    +730us 1051us
ntp.cnh.at               13   8  654    -1.072     5.278    +533us  947us

```

```

pool ntp.ubuntu.com        iburst maxsources 4
pool 0.ubuntu.pool.ntp.org iburst maxsources 1
pool 1.ubuntu.pool.ntp.org iburst maxsources 1
pool 2.ubuntu.pool.ntp.org iburst maxsources 2
-
server 192.168.0.244 prefer iburst

```

```
alexandru@asus:~$ chronyc sources
210 Number of sources = 9
MS Name/IP address          Stratum Poll Reach LastRx Last sample
=====
^* 192.168.0.244             3   6   17   5  -183us[ -627us] +/-  33ms
^- pugot.canonical.com      2   6   17   4  -430us[ -430us] +/-  50ms
^- golem.canonical.com      2   6   35   3 +1135us[+1135us] +/-  45ms
^- chilipepper.canonical.com 2   6   17   4  +679us[ +679us] +/-  50ms
^- alphyn.canonical.com     2   6   17   4  +977us[ +977us] +/- 135ms
^- main-fe0.b.astral.ro     2   6   17   4  +324us[ +324us] +/-  55ms
^- cache.alsys.ro          2   6   17   3  +803us[ +803us] +/-  48ms
^- ntp0.chroot.ro          2   6   17   4 +3557us[+3557us] +/-  52ms
^- 92.86.106.228           3   6   17   5 +2614us[+2170us] +/- 129ms
```

```
packt@neptune:~$ sudo apt install nfs-kernel-server
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  keyutils libnfsidmap2 libtirpc-common libtirpc3 nfs-common rpcbind
Suggested packages:
  open-iscsi watchdog
The following NEW packages will be installed:
  keyutils libnfsidmap2 libtirpc-common libtirpc3 nfs-common
  nfs-kernel-server rpcbind
0 upgraded, 7 newly installed, 0 to remove and 0 not upgraded.
Need to get 503 kB of archives.
After this operation, 1.936 kB of additional disk space will be used.
Do you want to continue? [Y/n]
```

```
packt@neptune:~$ sudo systemctl start nfs-kernel-server.service
packt@neptune:~$ sudo systemctl status nfs-kernel-server.service
● nfs-server.service - NFS server and services
   Loaded: loaded (/lib/systemd/system/nfs-server.service; enabled; vendor
   Active: active (exited) since Sat 2020-11-14 10:04:46 EET; 3min 29s ago
 Main PID: 404014 (code=exited, status=0/SUCCESS)
    Tasks: 0 (limit: 9142)
   Memory: 0B
    CGroup: /system.slice/nfs-server.service
```

```
packt@neptune:/home$ sudo mkdir -p export/shares
packt@neptune:/home$ ls
export  packt
packt@neptune:/home$ _
```

```
packt@neptune:/home/export/shares$ sudo chmod 777 /home/export/shares/
packt@neptune:/home/export/shares$ ls -la
total 8
drwxrwxrwx 2 root root 4096 nov 14 23:14 █
drwxr-xr-x 3 root root 4096 nov 14 12:29 ..
-rwxrwxrwx 1 root root  0 nov 14 23:14 test-file
```

```
packt@neptune:/etc/default$ ls
acpi-support      chrony            intel-microcode  nss
acpid             console-setup    irqbalance       openvpn
alsa             crda             kerneloops       rpcbind
amd64-microcode  cron             keyboard         rsync
anacron          dbus            locale          saned
appport          grub            networkd-dispatcher  ssh
avahi-daemon     grub.d          nfs-common       ufw
bsdmainutils     im-config       nfs-kernel-server useradd
```

```
packt@neptune:/etc/default$ cat /etc/exports
# /etc/exports: the access control list for filesystems which may be exported
#               to NFS clients.  See exports(5).
#
# Example for NFSv2 and NFSv3:
# /srv/homes      hostname1(rw,sync,no_subtree_check) hostname2(ro,sync,no_s
ubtree_check)
#
# Example for NFSv4:
# /srv/nfs4       gss/krb5i(rw,sync,fsid=0,crossmnt,no_subtree_check)
# /srv/nfs4/homes gss/krb5i(rw,sync,no_subtree_check)
#
```

```
packt@neptune:/home/export$ sudo ufw app list
```

```
Available applications:
```

```
CUPS
```

```
OpenSSH
```

```
packt@neptune:/home/export$ sudo ufw allow nfs
```

```
Rule added
```

```
Rule added (v6)
```

```
packt@neptune:/home/export$ sudo ufw status
```

```
Status: active
```

To	Action	From
--	-----	----
22/tcp	ALLOW	Anywhere
OpenSSH	ALLOW	Anywhere
2049	ALLOW	Anywhere
22/tcp (v6)	ALLOW	Anywhere (v6)
OpenSSH (v6)	ALLOW	Anywhere (v6)
2049 (v6)	ALLOW	Anywhere (v6)


```
aalexandru@asus:/home$ sudo mount 192.168.0.244:/home/export/shares /home/shares
```

```
aalexandru@asus:/home$ df -h
```

Filesystem	Size	Used	Avail	Use%	Mounted on
udev	3,9G	0	3,9G	0%	/dev
tmpfs	787M	1,8M	786M	1%	/run
/dev/sda2	110G	11G	93G	11%	/
tmpfs	3,9G	0	3,9G	0%	/dev/shm
tmpfs	5,0M	4,0K	5,0M	1%	/run/lock
tmpfs	3,9G	0	3,9G	0%	/sys/fs/cgroup
/dev/loop0	97M	97M	0	100%	/snap/core/9665
/dev/loop2	56M	56M	0	100%	/snap/core18/1885
/dev/loop1	98M	98M	0	100%	/snap/core/10185
/dev/loop4	256M	256M	0	100%	/snap/gnome-3-34-1804/36
/dev/loop5	56M	56M	0	100%	/snap/core18/1932
/dev/loop6	218M	218M	0	100%	/snap/gnome-3-34-1804/60
/dev/loop8	63M	63M	0	100%	/snap/gtk-common-themes/1506
/dev/loop9	50M	50M	0	100%	/snap/snap-store/467
/dev/loop10	51M	51M	0	100%	/snap/snap-store/481
/dev/loop11	31M	31M	0	100%	/snap/snapd/9721
/dev/loop13	150M	150M	0	100%	/snap/zoom-client/108
/dev/loop14	30M	30M	0	100%	/snap/snapd/8542
/dev/sda1	511M	12M	500M	3%	/boot/efi
tmpfs	787M	32K	787M	1%	/run/user/125
/dev/loop15	147M	147M	0	100%	/snap/slack/31
/dev/loop12	144M	144M	0	100%	/snap/slack/32
/dev/loop3	232M	232M	0	100%	/snap/zoom-client/113
tmpfs	787M	8,0K	787M	1%	/run/user/1000
192.168.0.244:/home/export/shares	468G	9,0G	436G	3%	/home/shares

```
packt@neptune: /home/export/shares (-zsh) ㄒ#1
packt@neptune:/home/export/shares$ ls -la
total 8
drwxrwxrwx 2 root  root  4096 nov 15 13:54
drwxr-xr-x 3 root  root  4096 nov 14 12:29 ..
-rw-rw-r-- 1 packt packt    0 nov 15 13:54 file
-rwxrwxrwx 1 root  root    0 nov 14 23:14 test-file
packt@neptune:/home/export/shares$ _
```

Server

```
alexandru@asus: /home/shares (-zsh) ㄒ#2
alexandru@asus:/home/shares$ ls -la
total 8
drwxrwxrwx 2 root  root  4096 nov 15 13:54
drwxr-xr-x 4 root  root  4096 nov 14 22:36 ..
-rw-rw-r-- 1 alexandru alexandru    0 nov 15 13:54 file
-rwxrwxrwx 1 root  root    0 nov 14 23:14 test-file
alexandru@asus:/home/shares$ _
```

Client

```
packt@neptune:~$ sudo apt install samba
[sudo] password for packt:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  attr ibverbs-providers libcephfs2 libibverbs1 librados2 librdmacm1
  python3-crypto python3-dnspython python3-gpg python3-ldb python3-markdown
  python3-packaging python3-pygments python3-pyparsing python3-samba
  python3-tdb samba-common samba-common-bin samba-dsdb-modules
  samba-vfs-modules tdb-tools
Suggested packages:
  python-markdown-doc python-pygments-doc ttf-bitstream-vera
  python-pyparsing-doc bind9 bind9utils ctdb ldb-tools smbldap-tools winbind
  heimdal-clients
The following NEW packages will be installed:
  attr ibverbs-providers libcephfs2 libibverbs1 librados2 librdmacm1
  python3-crypto python3-dnspython python3-gpg python3-ldb python3-markdown
  python3-packaging python3-pygments python3-pyparsing python3-samba
  python3-tdb samba samba-common samba-common-bin samba-dsdb-modules
  samba-vfs-modules tdb-tools
0 upgraded, 22 newly installed, 0 to remove and 0 not upgraded.
Need to get 10,0 MB of archives.
After this operation, 66,5 MB of additional disk space will be used.
Do you want to continue? [Y/n]
```

```
[shares]
comment = Shares on Neptune
path = /sambashares/
read only = no
browsable = yes
```

```
packt@neptune:~$ testparm
Load smb config files from /etc/samba/smb.conf
Loaded services file OK.
Server role: ROLE_STANDALONE

Press enter to see a dump of your service definitions
```

```
packt@neptune:~$ sudo chown :sambashare /sambashares/
packt@neptune:~$ sudo mkdir /sambashares/jane
```

```
packt@neptune:~$ sudo adduser --home /sambashares/jane --no-create-home --shell /usr/sbin/nologin --ingroup sambashare jane
Adding user `jane' ...
Adding new user `jane' (1001) with group `sambashare' ...
Not creating home directory `/sambashares/jane'.
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for jane
```

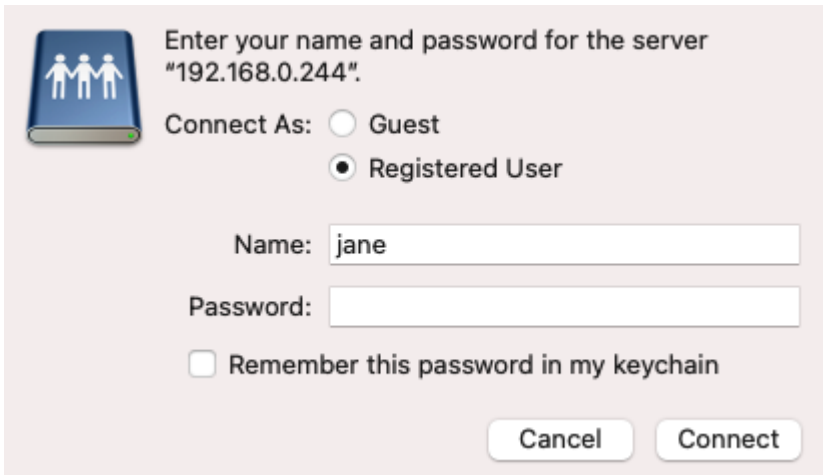
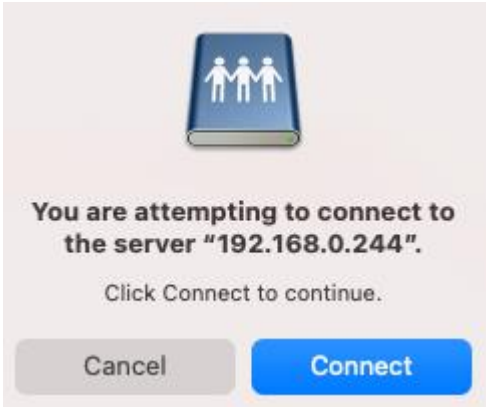
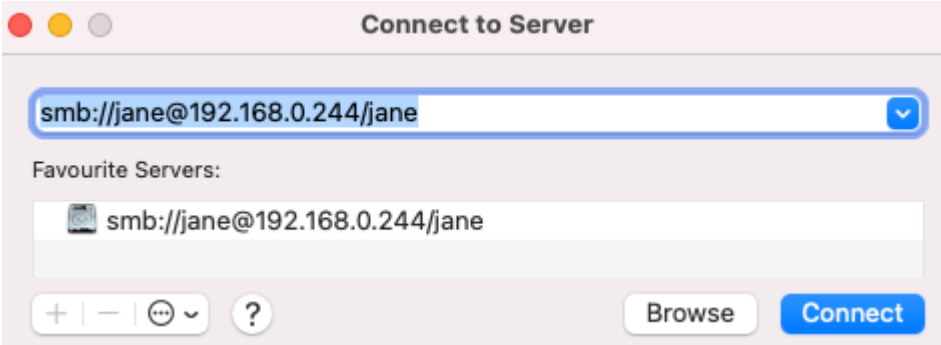
```
packt@neptune:~$ sudo chown jane:sambashare /sambashares/jane/
packt@neptune:~$ sudo chmod 2770 /sambashares/jane/
```

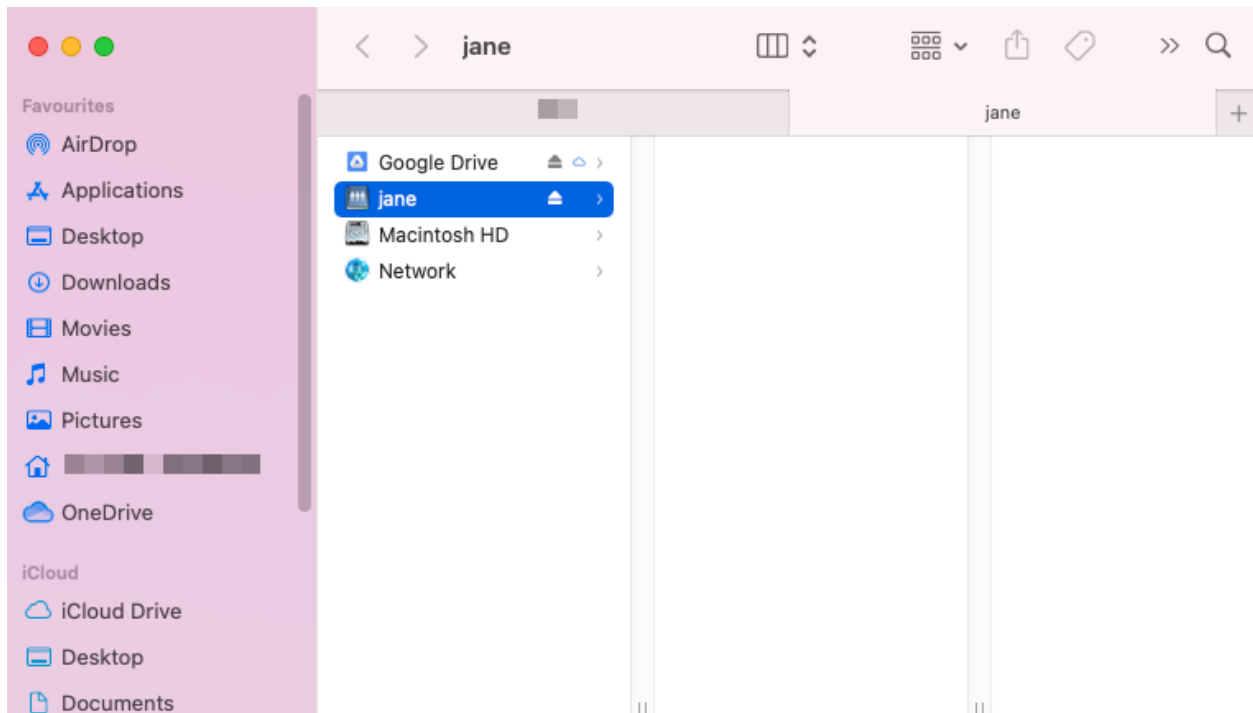
```
packt@neptune:~$ sudo smbpasswd -a jane
New SMB password:
Retype new SMB password:
Added user jane.
packt@neptune:~$ sudo smbpasswd -e jane
Enabled user jane.
```

```
packt@neptune:~$ sudo mkdir /sambashares/everyone
[sudo] password for packt:
packt@neptune:~$ sudo adduser --home /sambashares/everyone --no-create-home --shell /usr/sbin/nologin --ingroup sambashare adminsamba
Adding user `adminsamba' ...
Adding new user `adminsamba' (1005) with group `sambashare' ...
Not creating home directory `/sambashares/everyone'.
packt@neptune:~$ sudo chown adminsamba:sambashare /sambashares/everyone/
packt@neptune:~$ sudo chmod 2770 /sambashares/everyone/
packt@neptune:~$ sudo smbpasswd -a adminsamba
New SMB password:
Retype new SMB password:
Added user adminsamba.
packt@neptune:~$ sudo smbpasswd -e adminsamba
Enabled user adminsamba.
```

```
alexandru@asus:~$ smbclient //192.168.0.244/jane -U jane
Enter WORKGROUP\jane's password:
Try "help" to get a list of possible commands.
smb: \> _
```

```
[packt@jupiter ~]$ smbclient //192.168.0.244/tom -U tom
Unable to initialize messaging context
Enter SAMBA\tom's password:
Try "help" to get a list of possible commands.
smb: \> _
```





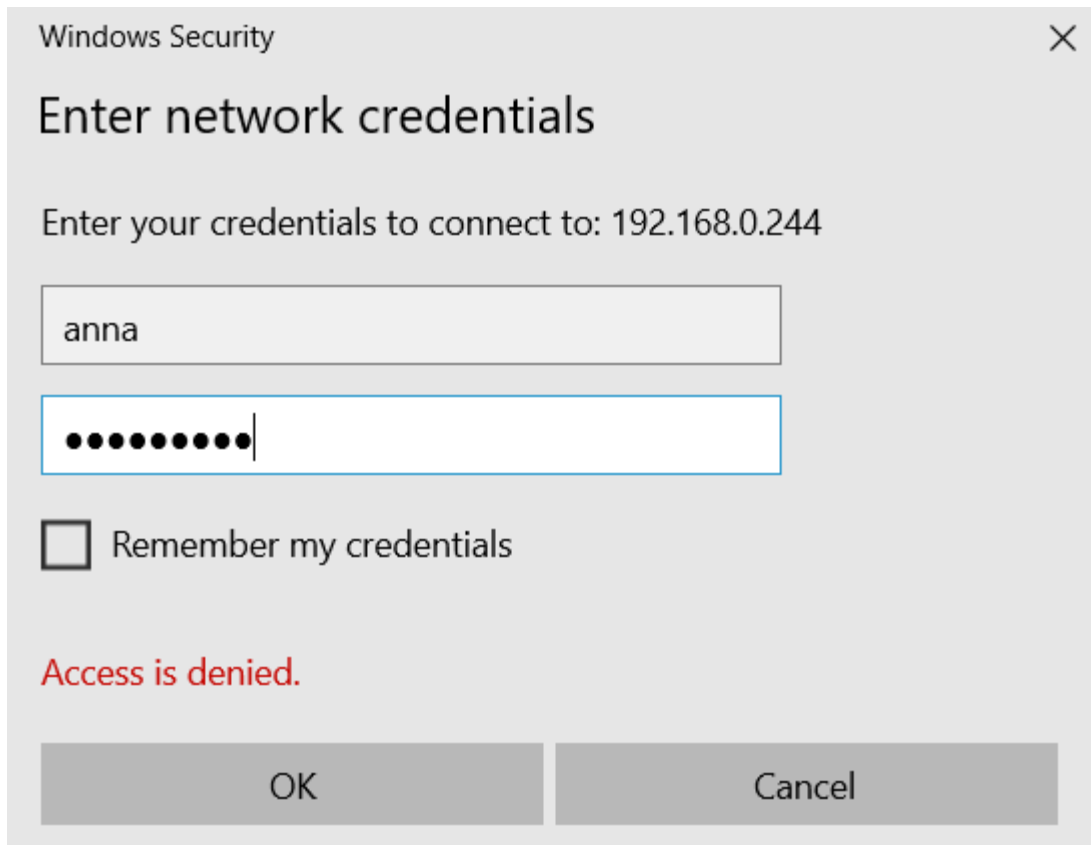
Expand

- Manage
- Pin to Start
- Map network drive...
- Open in new window
- Pin to Quick access
- Disconnect network drive...

Add a network location

- Delete
- Rename

Properties



```
packt@neptune:/etc/samba$ sudo systemctl enable nmbd
Synchronizing state of nmbd.service with SysV service script with /lib/systemd/s
ystemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable nmbd
packt@neptune:/etc/samba$ sudo systemctl start nmbd
packt@neptune:/etc/samba$ sudo systemctl status nmbd
● nmbd.service - Samba NMB Daemon
   Loaded: loaded (/lib/systemd/system/nmbd.service; enabled; vendor preset:
   Active: active (running) since Tue 2020-11-17 08:51:26 EET; 1 day 14h ago
     Docs: man:nmbd(8)
           man:samba(7)
           man:smb.conf(5)
   Main PID: 1325 (nmbd)
    Status: "nmbd: ready to serve connections..."
     Tasks: 1 (limit: 9142)
    Memory: 15.7M
    CGroup: /system.slice/nmbd.service
            └─1325 /usr/sbin/nmbd --foreground --no-process-group

nov 17 08:51:26 neptune systemd[1]: Starting Samba NMB Daemon...
nov 17 08:51:26 neptune systemd[1]: Started Samba NMB Daemon.
```

```
packt@neptune:~$ sudo ufw allow 20/tcp
Rule added
Rule added (v6)
packt@neptune:~$ sudo ufw allow 21/tcp
Rule added
Rule added (v6)
packt@neptune:~$ sudo ufw allow 990/tcp
Rule added
Rule added (v6)
packt@neptune:~$ sudo ufw status
Status: active

To Action From
--
22/tcp ALLOW Anywhere
OpenSSH ALLOW Anywhere
2049 ALLOW Anywhere
Samba ALLOW Anywhere
20/tcp ALLOW Anywhere
21/tcp ALLOW Anywhere
990/tcp ALLOW Anywhere
22/tcp (v6) ALLOW Anywhere (v6)
OpenSSH (v6) ALLOW Anywhere (v6)
2049 (v6) ALLOW Anywhere (v6)
Samba (v6) ALLOW Anywhere (v6)
20/tcp (v6) ALLOW Anywhere (v6)
21/tcp (v6) ALLOW Anywhere (v6)
990/tcp (v6) ALLOW Anywhere (v6)
```

```
packt@neptune:~$ sudo systemctl start vsftpd
packt@neptune:~$ sudo systemctl status vsftpd
● vsftpd.service - vsftpd FTP server
   Loaded: loaded (/lib/systemd/system/vsftpd.service; enabled; vendor pre>
   Active: active (running) since Thu 2020-11-19 11:50:40 EET; 33min ago
 Main PID: 20690 (vsftpd)
   Tasks: 1 (limit: 9142)
  Memory: 664.0K
   CGroup: /system.slice/vsftpd.service
           └─20690 /usr/sbin/vsftpd /etc/vsftpd.conf

nov 19 11:50:40 neptune systemd[1]: Starting vsftpd FTP server...
nov 19 11:50:40 neptune systemd[1]: Started vsftpd FTP server.
packt@neptune:~$ sudo systemctl enable vsftpd
Synchronizing state of vsftpd.service with SysV service script with /lib/syst
emd/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable vsftpd
```



```
packt@neptune:~$ sudo adduser dan
[sudo] password for packt:
Adding user `dan' ...
Adding new group `dan' (1002) ...
Adding new user `dan' (1006) with group `dan' ...
Creating home directory `/home/dan' ...
Copying files from `/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for dan
Enter the new value, or press ENTER for the default
  Full Name :
  Room Number :
  Work Phone :
  Home Phone :
  Other :
Is the information correct? [Y/n]
```

```
packt@neptune:~$ pwd
/home/packt
packt@neptune:~$ cd ..
packt@neptune:/home$ ls
dan  export  packt
packt@neptune:/home$ cd dan/
packt@neptune:/home/dan$ ls
packt@neptune:/home/dan$ sudo mkdir ftpshares
packt@neptune:/home/dan$ ls
ftpshares
packt@neptune:/home/dan$ sudo chown nobody:nogroup /home/dan/ftpshares/
packt@neptune:/home/dan$ sudo chmod a-w /home/dan/ftpshares/
packt@neptune:/home/dan$ sudo ls -la /home/dan/ftpshares/
total 8
dr-xr-xr-x 2 nobody nogroup 4096 nov 19 13:58 .
drwxr-xr-x 3 dan     dan     4096 nov 19 13:58 ..
```

```
packt@neptune:/home/dan$ sudo mkdir /home/dan/ftpshares/uploads
[sudo] password for packt:
packt@neptune:/home/dan$ sudo chown dan:dan /home/dan/ftpshares/uploads
packt@neptune:/home/dan$ sudo ls -la /home/dan/ftpshares/
total 12
dr-xr-xr-x 3 nobody nogroup 4096 nov 19 18:57 .
drwxr-xr-x 3 dan     dan     4096 nov 19 13:58 ..
drwxr-xr-x 2 dan     dan     4096 nov 19 18:57 uploads
packt@neptune:/home/dan$ echo "some text here..." | sudo tee /home/dan/ftpshares/uploads/test-file.txt
some text here...
```

```
listen=NO
listen_ipv6=YES
anonymous_enable=NO
local_enable=YES
write_enable=YES
local_umask=022
dirmessage_enable=YES
use_localtime=YES
xferlog_enable=YES
connect_from_port_20=YES
chroot_local_user=YES
secure_chroot_dir=/var/run/vsftpd/empty
pam_service_name=vsftpd
rsa_cert_file=/etc/ssl/certs/ssl-cert-snakeoil.pem
rsa_private_key_file=/etc/ssl/private/ssl-cert-snakeoil.key
ssl_enable=NO
user_sub_token=$USER
local_root=/home/$USER/ftpshares
pasv_min_port=40000
pasv_max_port=50000
```

```
alexandru@asus:~$ ftp -p 192.168.0.244
Connected to 192.168.0.244.
220 (vsFTPd 3.0.3)
Name (192.168.0.244:alexandru):
331 Please specify the password.
Password:
530 Login incorrect.
Login failed.
ftp> _
```

```
alexandru@asus:~$ ftp -p 192.168.0.244
Connected to 192.168.0.244.
220 (vsFTPd 3.0.3)
Name (192.168.0.244:alexandru): packt
331 Please specify the password.
Password:
500 OOPS: cannot change directory:/home/packt/ftpshares
Login failed.
421 Service not available, remote server has closed connection
ftp> _
```

```
alexandru@asus:~$ ftp -p 192.168.0.244
Connected to 192.168.0.244.
220 (vsFTPd 3.0.3)
Name (192.168.0.244:alexandru): dan
331 Please specify the password.
Password:
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> cd uploads
250 Directory successfully changed.
ftp> ls
227 Entering Passive Mode (192,168,0,244,162,242).
150 Here comes the directory listing.
-rw-r--r--  1 0      0              18 Nov 19 18:58 test-file.txt
226 Directory send OK.
ftp> get test-file.txt
local: test-file.txt remote: test-file.txt
227 Entering Passive Mode (192,168,0,244,167,64).
150 Opening BINARY mode data connection for test-file.txt (18 bytes).
226 Transfer complete.
18 bytes received in 0.00 secs (106.5341 kB/s)
ftp> exit
221 Goodbye.
```

```
alexandru@asus:~$ ls -l
total 40
drwxr-xr-x 2 alexandru alexandru 4096 iul 22 14:23 Desktop
drwxr-xr-x 2 alexandru alexandru 4096 iul 22 14:23 Documents
drwxr-xr-x 2 alexandru alexandru 4096 iul 22 23:27 Downloads
drwxr-xr-x 2 alexandru alexandru 4096 iul 22 14:23 Music
drwxr-xr-x 2 alexandru alexandru 4096 iul 27 18:11 Pictures
drwxr-xr-x 2 alexandru alexandru 4096 iul 22 14:23 Public
drwxr-xr-x 2 alexandru alexandru 4096 iul 22 14:23 Templates
drwxr-xr-x 2 alexandru alexandru 4096 iul 22 14:23 Videos
drwxr-xr-x 5 alexandru alexandru 4096 iul 26 16:59 snap
-rw-rw-r-- 1 alexandru alexandru  18 nov 19 21:30 test-file.txt
```

```
packt@neptune:/etc/ssl$ sudo openssl req -x509 -nodes -days 365 -newkey rsa:2048 -keyout /etc/ssl/private/private-ftp-cert.pem -out /etc/ssl/private/private-ftp-cert.pem
Generating a RSA private key
.....+++++
.....
+++++
writing new private key to '/etc/ssl/private/private-ftp-cert.pem'
-----
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [AU]:US
State or Province Name (full name) [Some-State]:WA
Locality Name (eg, city) []:Seattle
Organization Name (eg, company) [Internet Widgits Pty Ltd]:Home Computer
Organizational Unit Name (eg, section) []:Sysadmin
Common Name (e.g. server FQDN or YOUR name) []:192.168.0.244
Email Address []:
```

```
rsa_cert_file=/etc/ssl/private/private-ftp-cert.pem
rsa_private_key_file=/etc/ssl/private/private-ftp-cert.pem
ssl_enable=YES

allow_anon_ssl=NO
force_local_data_ssl=YES
force_local_logins_ssl=YES

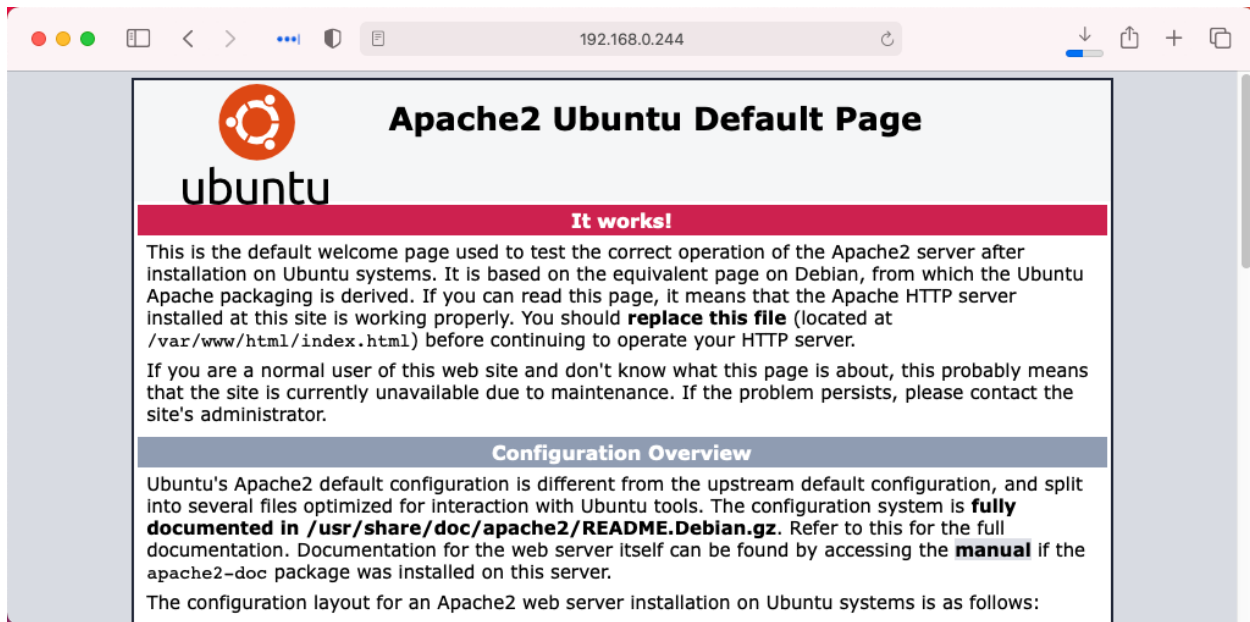
ssl_tlsv1=YES
ssl_sslv2=NO
ssl_sslv3=NO

require_ssl_reuse=NO
ssl_ciphers=HIGH
```

```
packt@neptune:~$ sudo ufw app list
[sudo] password for packt:
Available applications:
  Apache
  Apache Full
  Apache Secure
  CUPS
  OpenSSH
  Samba
```

```
packt@neptune:~$ sudo ufw status
Status: active
```

To	Action	From
--	-----	----
22/tcp	ALLOW	Anywhere
OpenSSH	ALLOW	Anywhere
2049	ALLOW	Anywhere
Samba	ALLOW	Anywhere
20/tcp	ALLOW	Anywhere
21/tcp	ALLOW	Anywhere
990/tcp	ALLOW	Anywhere
40000:50000/tcp	ALLOW	Anywhere
Apache	ALLOW	Anywhere
22/tcp (v6)	ALLOW	Anywhere (v6)
OpenSSH (v6)	ALLOW	Anywhere (v6)
2049 (v6)	ALLOW	Anywhere (v6)
Samba (v6)	ALLOW	Anywhere (v6)
20/tcp (v6)	ALLOW	Anywhere (v6)
21/tcp (v6)	ALLOW	Anywhere (v6)
990/tcp (v6)	ALLOW	Anywhere (v6)
40000:50000/tcp (v6)	ALLOW	Anywhere (v6)
Apache (v6)	ALLOW	Anywhere (v6)



```
packt@neptune:~$ sudo apt install mariadb-server
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  galera-3 libaio1 libcgi-fast-perl libcgi-pm-perl libconfig-inifiles-perl
  libdbd-mysql-perl libdbi-perl libfcgi-perl libhtml-template-perl
  libreadline5 libterm-readkey-perl mariadb-client-10.3
  mariadb-client-core-10.3 mariadb-common mariadb-server-10.3
  mariadb-server-core-10.3 socat
Suggested packages:
  libclone-perl libmldbm-perl libnet-daemon-perl libsql-statement-perl
  libipc-sharedcache-perl mailx mariadb-test tinyca
The following NEW packages will be installed:
  galera-3 libaio1 libcgi-fast-perl libcgi-pm-perl libconfig-inifiles-perl
  libdbd-mysql-perl libdbi-perl libfcgi-perl libhtml-template-perl
  libreadline5 libterm-readkey-perl mariadb-client-10.3
  mariadb-client-core-10.3 mariadb-common mariadb-server
  mariadb-server-10.3 mariadb-server-core-10.3 socat
0 upgraded, 18 newly installed, 0 to remove and 0 not upgraded.
Need to get 19,6 MB of archives.
After this operation, 165 MB of additional disk space will be used.
Do you want to continue? [Y/n] _
```

```
packt@neptune:~$ sudo mariadb
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 42
Server version: 10.3.25-MariaDB-0ubuntu0.20.04.1 Ubuntu 20.04

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement
.

MariaDB [(none)]> GRANT ALL ON *.* TO 'admin'@'localhost' IDENTIFIED BY 'password' WITH GRANT OPTION;
Query OK, 0 rows affected (0.001 sec)

MariaDB [(none)]> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.001 sec)

MariaDB [(none)]> _
```

```
packt@neptune:~$ sudo systemctl restart mariadb.service
packt@neptune:~$ sudo systemctl status mariadb.service
● mariadb.service - MariaDB 10.3.25 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor pr>
   Active: active (running) since Sun 2020-11-22 12:24:44 EET; 5s ago
     Docs: man:mysql(8)
           https://mariadb.com/kb/en/library/systemd/
   Process: 44640 ExecStartPre=/usr/bin/install -m 755 -o mysql -g root -d >
   Process: 44642 ExecStartPre=/bin/sh -c systemctl unset-environment _WSRE>
   Process: 44654 ExecStartPre=/bin/sh -c [ ! -e /usr/bin/galera_recovery ]>
   Process: 44738 ExecStartPost=/bin/sh -c systemctl unset-environment _WSR>
   Process: 44740 ExecStartPost=/etc/mysql/debian-start (code=exited, statu>
  Main PID: 44701 (mysqld)
    Status: "Taking your SQL requests now..."
     Tasks: 31 (limit: 9142)
    Memory: 66.6M
    CGroup: /system.slice/mariadb.service
            └─44701 /usr/sbin/mysqld
```

```
packt@neptune:~$ mysql -u admin -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 38
Server version: 10.3.25-MariaDB-0ubuntu0.20.04.1 Ubuntu 20.04

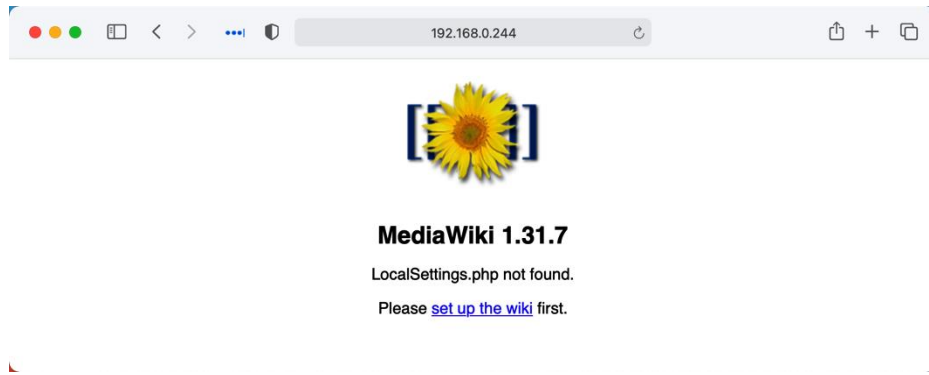
Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement
.

MariaDB [(none)]> _
```

```
packt@neptune:~$ sudo apt install php libapache2-mod-php php-mysql
[sudo] password for packt:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libapache2-mod-php7.4 php-common php7.4 php7.4-cli php7.4-common
  php7.4-json php7.4-mysql php7.4-opcache php7.4-readline
Suggested packages:
  php-pear
The following NEW packages will be installed:
  libapache2-mod-php libapache2-mod-php7.4 php php-common php-mysql php7.4
  php7.4-cli php7.4-common php7.4-json php7.4-mysql php7.4-opcache
  php7.4-readline
0 upgraded, 12 newly installed, 0 to remove and 0 not upgraded.
Need to get 4.144 kB of archives.
After this operation, 18,5 MB of additional disk space will be used.
Do you want to continue? [Y/n] _
```

```
packt@neptune:~$ cd /etc/apache2/
conf-available/  mods-available/  sites-available/
conf-enabled/   mods-enabled/    sites-enabled/
```

```
packt@neptune:~$ sudo mysql -u admin -p
[sudo] password for packt:
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 39
Server version: 10.3.25-MariaDB-0ubuntu0.20.04.1 Ubuntu 20.04

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement
.

MariaDB [(none)]> CREATE USER 'wiki-user'@'localhost' IDENTIFIED BY 'password
';
Query OK, 0 rows affected (0.001 sec)

MariaDB [(none)]> CREATE DATABASE wiki;
Query OK, 1 row affected (0.001 sec)

MariaDB [(none)]> use wiki;
Database changed
MariaDB [wiki]> GRANT ALL ON wiki.* TO 'wiki-user'@'localhost';
Query OK, 0 rows affected (0.001 sec)
```

Install

- Setting up database... done
- Creating tables... done
- Creating database user... done
- Populating default interwiki table... done
- Initializing statistics... done
- Generating secret keys... done
- Prevent running unneeded updates... done
- Creating administrator user account... done
- Creating main page with default content... done
- MediaWiki has been successfully installed. You can now

visit <<http://192.168.0.244/mediawiki>> to view your wiki. If you have questions, check out our frequently asked questions list: <<https://www.mediawiki.org/wiki/Manual:FAQ>> or use one of the support forums linked on that page.

Continue →

- Language
- Existing wiki
- Welcome to MediaWiki!
- Connect to database
- Upgrade existing installation
- Database settings
- Name
- Options
- **Install**
- Complete!
- Restart installation

MediaWiki 1.31.7 installation

Complete!



Congratulations! You have installed MediaWiki.

The installer has generated a `LocalSettings.php` file. It contains all your configuration.

You will need to download it and put it at `/etc/mediawiki/LocalSettings.php`. The download should have started automatically.

If the download was not offered, or if you cancelled it, you can restart the download by clicking the link below:



[Download LocalSettings.php](#)

Note: If you do not do this now, this generated configuration file will not be available to you later if you exit the installation without downloading it.

When that has been done, you can [enter your wiki](#).



Did you know that your wiki supports **extensions**?

You can browse [extensions by category](#).

- Language
- Existing wiki
- Welcome to MediaWiki!
- Connect to database
- Upgrade existing installation
- Database settings
- Name
- Options
- Install
- **Complete!**
- Restart installation

```
~/Downloads >>> scp LocalSettings.php packt@192.168.0.244:/home/packt/ x 1
packt@192.168.0.244's password:
LocalSettings.php          100% 4532      2.4MB/s   00:00
```

```
packt@neptune:/etc/mediawiki$ sudo cp /home/packt/LocalSettings.php .
[sudo] password for packt:
```

```
packt@neptune:~$ sudo mysql -u admin -p
[sudo] password for packt:
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 75
Server version: 10.3.25-MariaDB-0ubuntu0.20.04.1 Ubuntu 20.04

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> CREATE USER 'drupal'@'localhost' IDENTIFIED BY 'password';
Query OK, 0 rows affected (0.001 sec)

MariaDB [(none)]> CREATE DATABASE drupal;
Query OK, 1 row affected (0.001 sec)

MariaDB [(none)]> GRANT ALL ON drupal.* TO 'drupal'@'localhost';
Query OK, 0 rows affected (0.001 sec)

MariaDB [(none)]> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.001 sec)

MariaDB [(none)]> use drupal;
Database changed
MariaDB [drupal]>
```

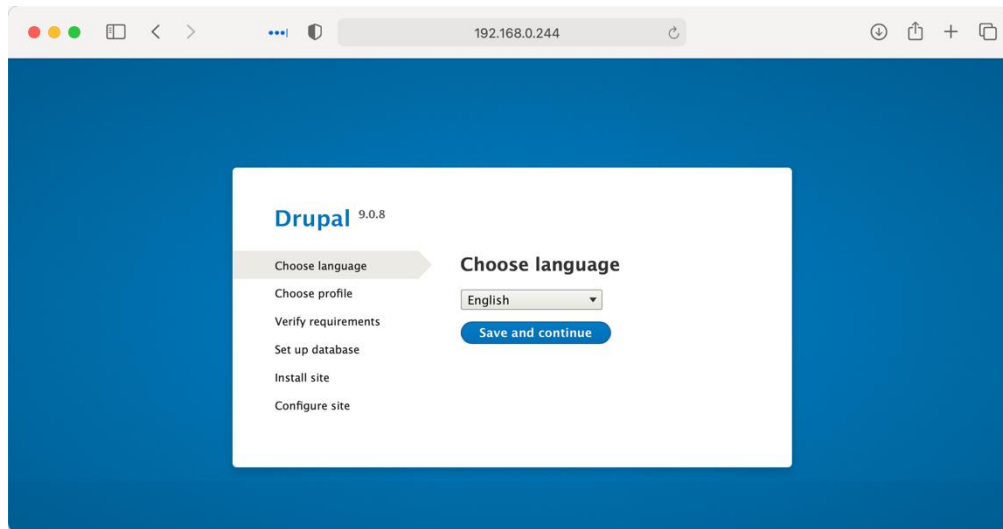
```
packt@neptune:/var/www$ sudo mkdir drupal
[sudo] password for packt:
packt@neptune:/var/www$ ls
drupal  html  wiki
packt@neptune:/var/www$ cd drupal/
packt@neptune:/var/www/drupal$ ls
```

```
packt@neptune:/var/www/drupal$ sudo chown -R www-data:www-data /var/www/drupal/
packt@neptune:/var/www/drupal$ sudo chmod -R 755 /var/www/drupal/
```

```
<VirtualHost *:80>

    ServerAdmin webmaster@localhost
    DocumentRoot /var/www/drupal
    ServerName private-cms.local
    ServerAlias www.private-cms.local
    ErrorLog ${APACHE_LOG_DIR}/error.log
    CustomLog ${APACHE_LOG_DIR}/access.log combined
    <Directory /var/www/drupal>
        Options FollowSymLinks
        AllowOverride All
        Require all granted
    </Directory>
</VirtualHost>
```

```
packt@neptune:~$ sudo a2ensite drupal.conf
[sudo] password for packt:
Enabling site drupal.
To activate the new configuration, you need to run:
  systemctl reload apache2
packt@neptune:~$ sudo a2enmod rewrite
Enabling module rewrite.
To activate the new configuration, you need to run:
  systemctl restart apache2
packt@neptune:~$ sudo systemctl reload apache2
```



```
packt@neptune:~$ sudo apt install cups -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
cups is already the newest version (2.3.1-9ubuntu1.1).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
```

```
packt@neptune:~$ sudo systemctl enable cups
Synchronizing state of cups.service with SysV service script with /lib/systemd/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable cups
```

```
packt@neptune:~$ sudo ufw allow in from 192.168.0.0/24 to any port 631
[sudo] password for packt:
Rule added
packt@neptune:~$ sudo ufw status
Status: active

To Action From
631 ALLOW 192.168.0.0/24
```

```
packt@neptune:~$ sudo apt install hplip
Reading package lists... Done
Building dependency tree
Reading state information... Done
hplip is already the newest version (3.20.3+dfsg0-2).
hplip set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
packt@neptune:~$ sudo apt install printer-driver-gutenprint
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libgutenprint-common libgutenprint9
Suggested packages:
  gutenprint-locales gutenprint-doc
The following NEW packages will be installed:
  libgutenprint-common libgutenprint9 printer-driver-gutenprint
0 upgraded, 3 newly installed, 0 to remove and 0 not upgraded.
Need to get 1.500 kB of archives.
After this operation, 9.988 kB of additional disk space will be used.
Do you want to continue? [Y/n]
```

CUPS.org Home Administration Classes Help Jobs Printers

Administration

Printers

[Add Printer](#) [Find New Printers](#) [Manage Printers](#)

Classes

[Add Class](#) [Manage Classes](#)

Jobs

[Manage Jobs](#)

Server

[Edit Configuration File](#)

Server Settings:

Advanced ▶

- Share printers connected to this system
 - Allow printing from the Internet
- Allow remote administration
- Use Kerberos authentication ([FAQ](#))
- Allow users to cancel any job (not just their own)
- Save debugging information for troubleshooting

[Change Settings](#)

Printers

Search in Printers:

Showing 2 of 2 printers.

Queue Name	Description	Location	Make and Model	Status
HP_LaserJet_Pro_MFP_M125nw_3A891B_			HP LaserJet Pro MFP M125nw, driverless, cups-filters 1.27.4	Idle
HP_Officejet_Pro_6230_4F8D38_			HP Officejet Pro 6230, driverless, cups-filters 1.27.4	Idle

HP_LaserJet_Pro_MFP_M125nw_3A891B_

HP_LaserJet_Pro_MFP_M125nw_3A891B_ (Idle, Accepting Jobs, Not Shared, Server Default)

Maintenance	Administration	
Description	Modify Printer	
Location	Delete Printer	
Driver	Set Default Options	P M125nw, driverless, cups-filters 1.27.4 (grayscale)
Connection	Set As Server Default	LaserJet_Pro_MFP_M125nw_3A891B_/_
Defaults	Set Allowed Users	none media=na_letter_8.5x11in sides=one-sided

Jobs

Search in HP_LaserJet_Pro_MFP_M125nw_3A891B_:

Jobs listed in print order; held jobs appear first.

```
packt@neptune:~$ lpinfo -m | grep "HP LaserJet Pro MFP M125nw"
driverless:ipp://HP%20LaserJet%20Pro%20MFP%20M125nw%5B3A891B%5D._ipp._tcp.local/ Hewlett-Packard HP LaserJet Pro MFP M125nw, driverless, cups-filters 1.27.4
```

```
packt@neptune:/etc/cups/ppd$ ls
HP_LaserJet_Pro_MFP_M125nw_3A891B_.ppd  HP_Officejet_Pro_6230_4F8D38_.ppd
```

```
packt@neptune:~$ lpoptions
device-uri=ipp://HP%20LaserJet%20Pro%20MFP%20M125nw%5B3A891B%5D._ipp._tcp.local/ printer-info='HP LaserJet Pro MFP M125nw[3A891B]' printer-location printer-make-and-model='Hewlett-Packard HP LaserJet Pro MFP M125nw' printer-type=83886084
```

```
packt@neptune:~$ sudo apt install avahi-daemon
Reading package lists... Done
Building dependency tree
Reading state information... Done
avahi-daemon is already the newest version (0.7-4ubuntu7).
avahi-daemon set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
packt@neptune:~$ sudo systemctl start avahi-daemon
packt@neptune:~$ sudo systemctl status avahi-daemon
● avahi-daemon.service - Avahi mDNS/DNS-SD Stack
   Loaded: loaded (/lib/systemd/system/avahi-daemon.service; enabled; vendor >
   Active: active (running) since Mon 2020-11-23 14:25:53 EET; 7h ago
TriggeredBy: ● avahi-daemon.socket
   Main PID: 665 (avahi-daemon)
   Status: "avahi-daemon 0.7 starting up."
     Tasks: 2 (limit: 9142)
   Memory: 3.3M
   CGroup: /system.slice/avahi-daemon.service
           └─665 avahi-daemon: running [neptune.local]
             └─715 avahi-daemon: chroot helper
```


Chapter 9: Securing Linux.

```
1  #include <unistd.h>
2  #include <stdio.h>
3
4  FILE *f;
5  char LOG_FILE[] = "/var/log/messages";
6
7  int main(void)
8  {
9      while (1) {
10         f = fopen(LOG_FILE, "w");
11         sleep(10);
12         fclose(f);
13     }
14 }
```

```
1  [Unit]
2  Description="Checking the logs"
3
4  [Service]
5  Type=simple
6  ExecStart=/usr/local/bin/packtd
7
8  [Install]
9  WantedBy=multi-user.target
```

```
[packt@jupiter ~]$ sudo systemctl status packtd
● packtd.service - "Checking the logs"
   Loaded: loaded (/usr/lib/systemd/system/packtd.service; disabled; vendor preset: enabled)
   Active: active (running) since Mon 2020-12-14 19:48:34 PST; 6s ago
 Main PID: 15498 (packtd)
    Tasks: 1 (limit: 23537)
   Memory: 132.0K
   CGroup: /system.slice/packtd.service
           └─15498 /usr/local/bin/packtd
```

```
[packt@jupiter ~]$ ps -efZ | grep packtd | grep -v grep
system_u:system_r:unconfined_service_t:s0 root 8523 1 0 16:12 ? 00:00:00
bash /usr/local/bin/packtd
```

```
[packt@jupiter ~]$ sudo tail -F /var/log/messages
Dec 14 16:30:58 jupiter packtd: Hello from Packt!
Dec 14 16:31:08 jupiter packtd: Hello from Packt!
Dec 14 16:31:18 jupiter packtd: Hello from Packt!
```

```
[packt@jupiter ~]$ sepolity generate --init /usr/local/bin/packtd
Created the following files:
/home/packt/packtd.te # Type Enforcement file
/home/packt/packtd.if # Interface file
/home/packt/packtd.fc # File Contexts file
/home/packt/packtd_selinux.spec # Spec file
/home/packt/packtd.sh # Setup Script
```

```
[packt@jupiter ~]$ sudo ./packtd.sh
Building and Loading Policy
+ make -f /usr/share/selinux/devel/Makefile packtd.pp
Compiling targeted packtd module
Creating targeted packtd.pp policy package
rm tmp/packtd.mod.fc tmp/packtd.mod
+ /usr/sbin/semodule -i packtd.pp
+ sepolity manpage -p . -d packtd_t
./packtd_selinux.8
+ /sbin/restorecon -F -R -v /usr/local/bin/packtd
++ pwd
```

```
[packt@jupiter ~]$ ps -efZ | grep packtd | grep -v grep
system_u:system_r:packtd_t:s0 root 15498 1 0 19:48 ? 00:00:00
/usr/local/bin/packtd
```

```
time->Mon Dec 14 19:54:54 2020
type=PROCTITLE msg=audit(1608004494.362:1138): proctitle="/usr/local/bin/packtd"
type=SYSCALL msg=audit(1608004494.362:1138): arch=c000003e syscall=257 success=yes
exit=3 a0=ffffff9c a1=601040 a2=241 a3=1b6 items=0 ppid=1 pid=15498 auid=4294967295
uid=0 gid=0 euid=0 suid=0 fsuid=0 egid=0 sgid=0 fsgid=0 tty=(none) ses=4294967295
comm="packtd" exe="/usr/local/bin/packtd" subj=system_u:system_r:packtd_t:s0 key=(n
ull)
type=AVC msg=audit(1608004494.362:1138): avc: denied { open } for pid=15498 comm
="packtd" path="/var/log/messages" dev="sda3" ino=1513719 scontext=system_u:system_
r:packtd_t:s0 tcontext=system_u:object_r:var_log_t:s0 tclass=file permissive=1
type=AVC msg=audit(1608004494.362:1138): avc: denied { write } for pid=15498 com
m="packtd" name="messages" dev="sda3" ino=1513719 scontext=system_u:system_r:packtd
_t:s0 tcontext=system_u:object_r:var_log_t:s0 tclass=file permissive=1
```

```
[packt@jupiter ~]$ sudo ausearch -m AVC -ts recent | audit2allow -R

require {
    type packtd_t;
}

#===== packtd_t =====
logging_write_generic_logs(packtd_t)
```

```
[packt@jupiter ~]$ sudo ausearch -m AVC -ts recent | audit2allow -R
<no matches>
Nothing to do
```

```
[packt@jupiter ~]$ sestatus
SELinux status:                enabled
SELinuxfs mount:              /sys/fs/selinux
SELinux root directory:      /etc/selinux
Loaded policy name:           targeted
Current mode:                 enforcing
Mode from config file:       enforcing
Policy MLS status:           enabled
Policy deny_unknown status:  allowed
Memory protection checking:   actual (secure)
Max kernel policy version:    32
```

```
[packt@jupiter ~]$ getenforce
Enforcing
```

```
[packt@jupiter ~]$ cat /etc/selinux/config
# This file controls the state of SELinux on the system.
# SELINUX= can take one of these three values:
#   enforcing - SELinux security policy is enforced.
#   permissive - SELinux prints warnings instead of enforcing.
#   disabled - No SELinux policy is loaded.
SELINUX=disabled
# SELINUXTYPE= can take one of these three values:
#   targeted - Targeted processes are protected,
#   minimum - Modification of targeted policy. Only selected processes are protected.
#   mls - Multi Level Security protection.
SELINUXTYPE=targeted
```

```
[packt@jupiter ~]$ touch afile
[packt@jupiter ~]$ ls -Z afile
unconfined_u:object_r:user_home_t:s0 afile
```

```
[packt@jupiter ~]$ sudo semanage login -l
[sudo] password for packt:

Login Name          SELinux User          MLS/MCS Range          Service
__default__         unconfined_u          s0-s0:c0.c1023        *
root                unconfined_u          s0-s0:c0.c1023        *
```

```
[packt@jupiter ~]$ id -Z
unconfined_u:unconfined_r:unconfined_t:s0-s0:c0.c1023
```

```
[packt@jupiter ~]$ ps -eZ | grep ssh
system_u:system_r:ssh_t:s0-s0:c0.c1023 1088 ? 00:00:00 sshd
unconfined_u:unconfined_r:unconfined_t:s0-s0:c0.c1023 2598 ? 00:00:00 sshd
```

```
[packt@jupiter ~]$ ls -Z /usr/bin/passwd
system_u:object_r:passwd_exec_t:s0 /usr/bin/passwd
[packt@jupiter ~]$
[packt@jupiter ~]$ ls -Z /etc/shadow
system_u:object_r:shadow_t:s0 /etc/shadow
```

```
[packt@jupiter ~]$ sudo sesearch -s passwd_t -t shadow_t -p write --allow | grep pa
sswd_t
allow passwd_t shadow_t:file { append create getattr ioctl link lock map open read
relabelfrom relabelto rename setattr unlink write };
```

```
[packt@jupiter ~]$ sudo semanage port -l | grep ssh
ssh_port_t          tcp          22
```

```
[packt@jupiter ~]$ sudo semanage port -a -t ssh_port_t -p tcp 2222
[packt@jupiter ~]$ sudo semanage port -l | grep ssh
ssh_port_t          tcp          2222, 22
```

```
[packt@jupiter ~]$ sudo semanage boolean -l | grep httpd | grep ftp
httpd_can_connect_ftp      (off , off) Allow httpd to act as a FTP client connecting to the ftp port and ephemeral ports
httpd_enable_ftp_server    (off , off) Allow httpd to act as a FTP server by listening on the ftp port.
```

```
[packt@jupiter ~]$ sudo semanage boolean -l -C
SELinux boolean          State Default Description
httpd_enable_ftp_server  (on , on) Allow httpd to act as a FTP server by listening on the ftp port.
```

```
/etc/ssh/ssh_host.*_key      regular file
system_u:object_r:sshd_key_t:s0
/etc/ssh/ssh_host.*_key\.pub  regular file
system_u:object_r:sshd_key_t:s0
```

```
[packt@jupiter ~]$ sudo semanage fcontext -l -C
SELinux fcontext          type           Context
/etc/ssh/keys(/.*)?      all files     system_u:object_r:sshd_key_t:s0
```

```
[packt@jupiter ~]$ cat packtd.te
policy_module(packtd, 1.0.0)

#####
#
# Declarations
#

type packtd_t;
type packtd_exec_t;
init_daemon_domain(packtd_t, packtd_exec_t)

permissive packtd_t;

require {
    type packtd_t;
}
```

```
[packt@jupiter ~]$ sudo semanage permissive -l  
Builtin Permissive Types  
packtd_t
```

```
[packt@jupiter ~]$ sudo semanage permissive -l  
Builtin Permissive Types  
packtd_t  
Customized Permissive Types  
httpd_t
```

```
packt@neptune:~$ sudo aa-status  
apparmor module is loaded.  
43 profiles are loaded.  
41 profiles are in enforce mode.
```

```

1  #!/usr/bin/env bash
2
3  # Assuming ./log directory exists!
4  if [[ ! -d "./log" ]]; then echo "No log dir!"; exit 1; fi
5
6  LOG_FILE="./log/appackt"
7
8  echo "Creating ${LOG_FILE}..."
9  touch ${LOG_FILE}
10
11 echo "Writing to ${LOG_FILE}..."
12 date +"%b %d %T ${HOSTNAME}: Hello from Packt!" >> ${LOG_FILE}
13
14 echo "Reading from ${LOG_FILE}..."
15 cat ${LOG_FILE}
16
17 echo "Deleting ${LOG_FILE}..."
18 rm ${LOG_FILE}

```

```

packt@neptune:~$ ./appackt
Creating ./log/appackt...
Writing to ./log/appackt...
Reading from ./log/appackt...
Dec 17 05:00:52 neptune: Hello from Packt!
Deleting ./log/appackt...

```

```

[(S)can system log for AppArmor events] / (F)inish

```

```

Profile: /home/packt/appackt
Execute: /usr/bin/bash
Severity: unknown

```

```

(I)nherit / (C)hild / (N)amed / (U)nconfined / (X)ix On / (D)eny / Abo(r)t / (F)inish
sh

```



```
Profile: /home/packt/appackt
Path: /dev/tty
New Mode: rw
Severity: 9

[1 - #include <abstractions/consoles>]
 2 - /dev/tty rw,
(A)llow / [(D)eny] / (I)gnore / (G)lob / Glob with (E)xtension / (N)ew / Audi(t) / A
bo(r)t / (F)inish
```

```
Adding #include <abstractions/consoles> to profile.

= Changed Local Profiles =

The following local profiles were changed. Would you like to save them?

[1 - /home/packt/appackt]
(S)ave Changes / Save Selec(t)ed Profile / [(V)iew Changes] / View Changes b/w (C)le
an profiles / Abo(r)t
```

```
packt@neptune:~$ ./appackt
Creating ./log/appackt...
./appackt: line 9: /usr/bin/touch: Permission denied
Writing to ./log/appackt...
./appackt: line 12: ./log/appackt: Permission denied
Reading from ./log/appackt...
./appackt: line 15: /usr/bin/cat: Permission denied
Deleting ./log/appackt...
./appackt: line 18: /usr/bin/rm: Permission denied
```

```
7 profiles are in complain mode.
/home/packt/appackt//null-/usr/bin/bash
/home/packt/appackt//null-/usr/bin/bash//null-/usr/bin/cat
/home/packt/appackt//null-/usr/bin/bash//null-/usr/bin/date
/home/packt/appackt//null-/usr/bin/bash//null-/usr/bin/rm
/home/packt/appackt//null-/usr/bin/bash//null-/usr/bin/touch
```

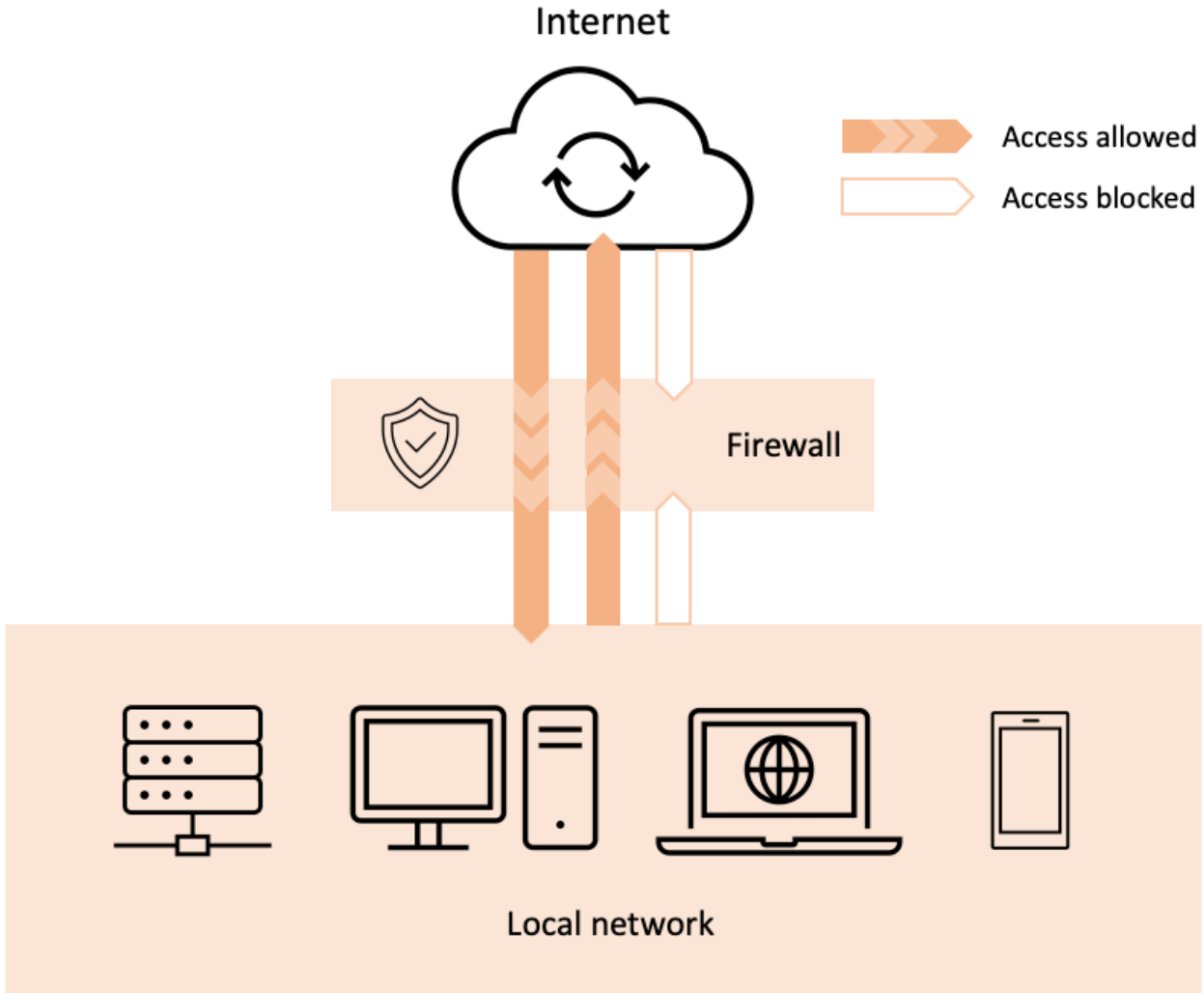
```
3 profiles are in complain mode.  
/home/packt/appackt  
libreoffice-oopslash  
libreoffice-soffice
```

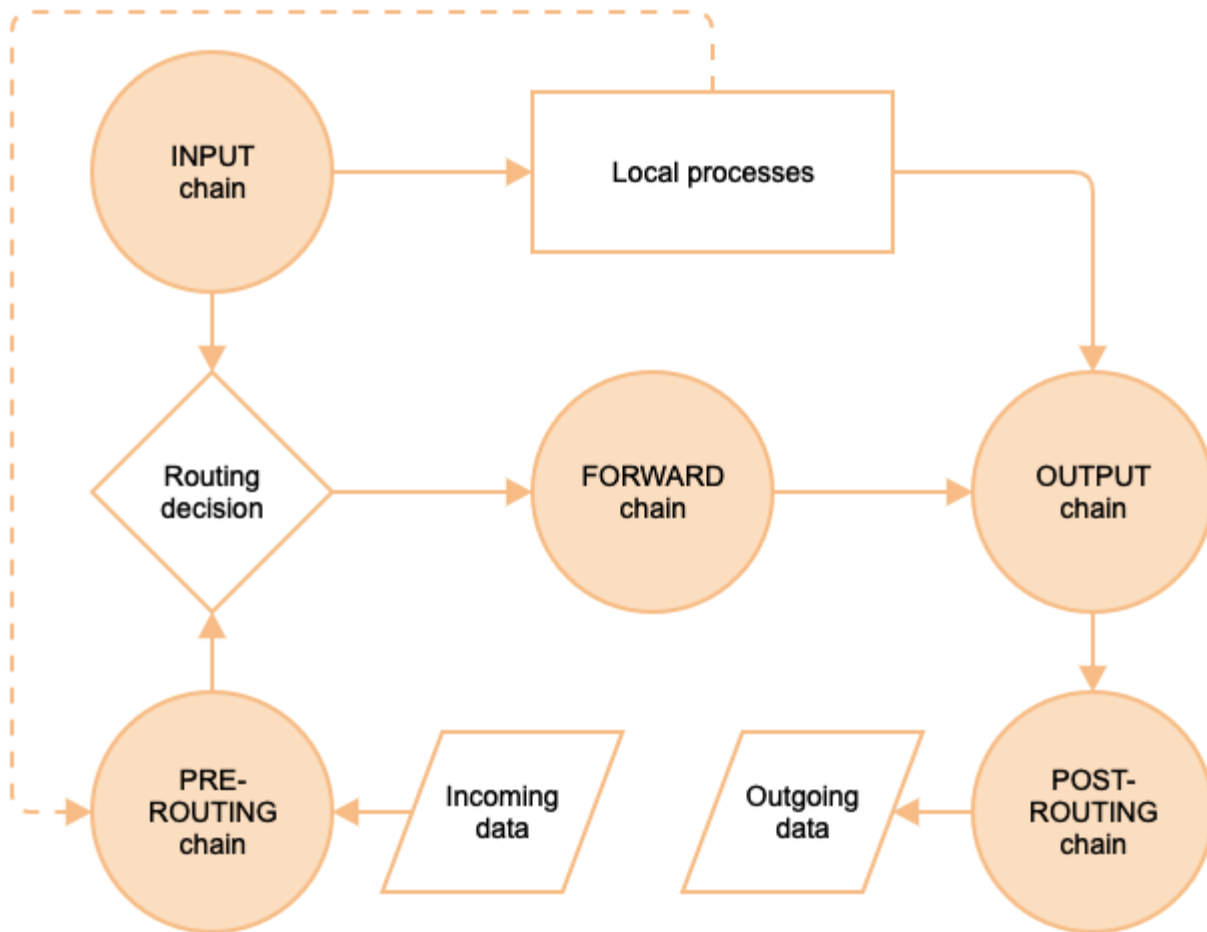
```
packt@neptune:~$ mkdir logs  
packt@neptune:~$ ./appackt  
Creating ./logs/appackt...  
touch: cannot touch './logs/appackt': Permission denied  
Writing to ./logs/appackt...  
./appackt: line 12: ./logs/appackt: Permission denied  
Reading from ./logs/appackt...  
cat: ./logs/appackt: No such file or directory  
Deleting ./logs/appackt...  
rm: cannot remove './logs/appackt': No such file or directory
```

```
packt@neptune:~$ sudo aa-enforce /home/packt/appackt  
Setting /home/packt/appackt to enforce mode.
```

```
packt@neptune:~$ sudo aa-status  
apparmor module is loaded.  
29 profiles are loaded.  
27 profiles are in enforce mode.  
/home/packt/appackt
```

```
packt@neptune:~$ ls -l /etc/apparmor.d/disable/home.packt.appackt  
lrwxrwxrwx 1 root root 34 Dec 17 08:19 /etc/apparmor.d/disable/home.packt.appackt ->  
/etc/apparmor.d/home.packt.appackt
```





Tables ↓ \ Chains →	PREROUTING	INPUT	FORWARD	OUTPUT	POSTROUTING
filter		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
nat	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
mangle	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
raw	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
security		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

```
[packt@jupiter ~]$ sudo iptables -L
Chain INPUT (policy ACCEPT)
target     prot opt source                destination

Chain FORWARD (policy ACCEPT)
target     prot opt source                destination

Chain OUTPUT (policy ACCEPT)
target     prot opt source                destination
```

```
[packt@jupiter ~]$ sudo iptables -v -F INPUT
Flushing chain `INPUT'
```

```
[packt@jupiter ~]$ sudo service iptables save
[sudo] password for packt:
iptables: Saving firewall rules to /etc/sysconfig/iptables:[ OK ]
```

```
[packt@jupiter ~]$ sudo systemctl status nftables
● nftables.service - Netfilter Tables
   Loaded: loaded (/usr/lib/systemd/system/nftables.service; enabled; vendor pre>
   Active: active (exited) since Sun 2020-12-13 18:28:20 PST; 2s ago
     Docs: man:nft(8)
   Process: 22867 ExecStart=/sbin/nft -f /etc/sysconfig/nftables.conf (code=exite>
  Main PID: 22867 (code=exited, status=0/SUCCESS)

Dec 13 18:28:20 jupiter systemd[1]: Starting Netfilter Tables...
Dec 13 18:28:20 jupiter systemd[1]: Started Netfilter Tables.
```

```
[packt@jupiter ~]$ sudo cat /etc/sysconfig/nftables.conf
[sudo] password for packt:
# Uncomment the include statement here to load the default config sample
# in /etc/nftables for nftables service.

#include "/etc/nftables/main.nft"

# To customize, either edit the samples in /etc/nftables, append further
# commands to the end of this file or overwrite it after first service
# start by calling: 'nft list ruleset >/etc/sysconfig/nftables.conf'.
```

```
[packt@jupiter ~]$ sudo nft list ruleset
table inet packt_table {
    chain packt_chain {
        type filter hook input priority filter; policy accept;
        tcp dport { 22, 80, 443 } accept
        ip protocol icmp accept
        meta nfproto ipv4 reject
    }
}
```

```
GNU nano 2.9.8 /etc/sysconfig/nftables.conf
# Uncomment the include statement here to load the default config sample
# in /etc/nftables for nftables service.

#include "/etc/nftables/main.nft"

# To customize, either edit the samples in /etc/nftables, append further
# commands to the end of this file or overwrite it after first service
# start by calling: 'nft list ruleset >/etc/sysconfig/nftables.conf'.

include "/etc/nftables/packt.nft" ←
```

```
[packt@jupiter ~]$ systemctl status firewalld
● firewalld.service - firewalld - dynamic firewall daemon
  Loaded: loaded (/usr/lib/systemd/system/firewalld.service; enabled; vendor p
  Active: active (running) since Mon 2020-12-07 18:10:45 PST; 1 day 19h ago
    Docs: man:firewalld(1)
 Main PID: 1054 (firewalld)
   Tasks: 2 (limit: 23810)
  Memory: 32.0M
  CGroup: /system.slice/firewalld.service
          └─1054 /usr/libexec/platform-python -s /usr/sbin/firewalld --nofork
```

```
[packt@jupiter ~]$ sudo firewall-cmd --get-zones
block dmz drop external home internal libvirt public trusted work
```

```
trusted
  target: ACCEPT
  icmp-block-inversion: no
  interfaces:
  sources:
  services:
  ports:
  protocols:
  masquerade: no
  forward-ports:
  source-ports:
  icmp-blocks:
  rich rules:

work
  target: default
  icmp-block-inversion: no
  interfaces:
  sources:
  services: cockpit dhcpv6-client ssh
  ports:
  protocols:
  masquerade: no
  forward-ports:
  source-ports:
  icmp-blocks:
  rich rules:
```

```
[packt@jupiter ~]$ sudo firewall-cmd --get-active-zones
libvirt
  interfaces: virbr0
public
  interfaces: ens33
```

```
[packt@jupiter ~]$ sudo firewall-cmd --get-default-zone
public
```

```
[packt@jupiter ~]$ sudo firewall-cmd --zone=public --add-rich-rule='rule protocol value="icmp" reject'
success
```

```
[packt@jupiter ~]$ sudo firewall-cmd --info-zone=public
public (active)
target: default
icmp-block-inversion: no
interfaces: ens33
sources:
services: cockpit dhcpv6-client ssh
ports:
protocols:
masquerade: no
forward-ports:
source-ports:
icmp-blocks:
rich rules:
    rule protocol value="icmp" reject
```

```
[packt@jupiter ~]$ sudo firewall-cmd --list-services
cockpit dhcpv6-client ssh
```

```
[packt@jupiter ~]$ sudo firewall-cmd --list-ports
8443/tcp
```

```
packt@neptune:~$ sudo ufw status
Status: inactive
```

```
packt@neptune:~$ sudo ufw enable
Command may disrupt existing ssh connections. Proceed with operation (y/n)? █
```

```
packt@neptune:~$ sudo ufw allow ssh
Skipping adding existing rule
Skipping adding existing rule (v6)
```



```
packt@neptune:~$ sudo ufw enable
Command may disrupt existing ssh connections. Proceed with operation (y/n)? y
Firewall is active and enabled on system startup
```

```
packt@neptune:~$ sudo ufw status verbose
Status: active
Logging: on (low)
Default: deny (incoming), allow (outgoing), disabled (routed)
New profiles: skip

To Action From
--
80,443/tcp (Nginx Full) ALLOW IN Anywhere
22/tcp ALLOW IN Anywhere
80,443/tcp (Nginx Full (v6)) ALLOW IN Anywhere (v6)
22/tcp (v6) ALLOW IN Anywhere (v6)
```

```
packt@neptune:~$ sudo ufw app list
Available applications:
CUPS
Nginx Full
Nginx HTTP
Nginx HTTPS
OpenSSH
```

```
packt@neptune:~$ sudo ufw deny http
Rule added
Rule added (v6)
```

```
packt@neptune:~$ sudo ufw status verbose
Status: active
Logging: on (low)
Default: deny (incoming), allow (outgoing), disabled (routed)
New profiles: skip

To Action From
--
80,443/tcp (Nginx Full) ALLOW IN Anywhere
22/tcp ALLOW IN Anywhere
80/tcp DENY IN Anywhere
80,443/tcp (Nginx Full (v6)) ALLOW IN Anywhere (v6)
22/tcp (v6) ALLOW IN Anywhere (v6)
80/tcp (v6) DENY IN Anywhere (v6)
```

```
packt@neptune:~$ sudo ufw status numbered
Status: active

To Action From
--
[ 1] Nginx Full ALLOW IN Anywhere
[ 2] OpenSSH ALLOW IN Anywhere
[ 3] 80/tcp DENY IN Anywhere
[ 4] Nginx Full (v6) ALLOW IN Anywhere (v6)
[ 5] OpenSSH (v6) ALLOW IN Anywhere (v6)
[ 6] 80/tcp (v6) DENY IN Anywhere (v6)
```

```
packt@neptune:~$ sudo ufw delete 1
Deleting:
allow 'Nginx Full'
Proceed with operation (y/n)? y
Rule deleted
```

```
packt@neptune:~$ sudo ufw status numbered
Status: active

      To      Action      From
      --      -
[ 1] OpenSSH  ALLOW IN    Anywhere
[ 2] 80/tcp    DENY IN     Anywhere
[ 3] Nginx Full (v6)  ALLOW IN    Anywhere (v6)
[ 4] OpenSSH (v6)  ALLOW IN    Anywhere (v6)
[ 5] 80/tcp (v6)  DENY IN     Anywhere (v6)
```

```
packt@neptune:~$ sudo ufw status
Status: active

To      Action      From
--      -
OpenSSH  ALLOW       Anywhere
80/tcp   DENY       Anywhere
Nginx HTTPS  ALLOW       Anywhere
OpenSSH (v6)  ALLOW       Anywhere (v6)
80/tcp (v6)  DENY       Anywhere (v6)
Nginx HTTPS (v6)  ALLOW       Anywhere (v6)
```

```
packt@neptune:~$ grep -i ufw /var/log/syslog
Dec 11 10:34:55 neptune kernel: [114517.668532] [UFW BLOCK] IN=ens33 OUT= MAC=00:0c:29:27:15:24:16:9d:99:d7:b3:64:08:00 SRC=172.16.191.1 DST=172.16.191.4 LEN=60 TOS=0x10 PREC=0x00 TTL=64 ID=0 PROTO=TCP SPT=61297 DPT=80 WINDOW=65534 RES=0x00 ACK PSH FIN URGP=0
```

Chapter 10: Disaster Recovery, Diagnostics, and Troubleshooting.

Types of Backup		Methods of Backup	
Full backup	Backing up all the files in the destination target	Manual backup	User initiated, not necessary on a reliable schedule
Incremental backup	Backing up all the files that changed from the last backup	Local automated backup	Automated backup, on a schedule, more reliable, targeting external drives
Differential backup	Backing up all the files that changed from the previous full backup	Remote automated backup	Automated backup, on a schedule, targeting external drives over the network

```
Disk /dev/sda: 111,81 GiB, 120034123776 bytes, 234441648 sectors
Disk model: ADATA SU650
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: 649F2DAA-BC79-4D52-98DD-E12BA7EFDBC1
```

```
Device      Start      End        Sectors    Size Type
/dev/sda1   2048      1050623   1048576    512M EFI System
/dev/sda2   1050624   234440703 233390080 111,3G Linux filesystem
```

```
Disk /dev/sdb: 114,58 GiB, 123010547712 bytes, 240254976 sectors
Disk model: Ultra
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: dos
Disk identifier: 0x2eaf4dc0
```

Device	Boot	Start	End	Sectors	Size	Id	Type
/dev/sdb1		2048	240254975	240252928	114,6G	83	Linux

```
alexandru@asus:~$ sudo dd if=/dev/sda of=/dev/sdb conv=noerror,sync status=progress
63941508608 bytes (64 GB, 60 GiB) copied, 6080 s, 10,5 MB/s_
```

```
alexandru@asus:~$ sudo ddrescue -n /dev/sda /dev/sdb rescue.map --force
GNU ddrescue 1.23
Press Ctrl-C to interrupt
      ipos: 120034 MB, non-trimmed:      0 B,  current rate: 21848 kB/s
      opos: 120034 MB, non-scraped:     0 B,  average rate: 40118 kB/s
non-tried:      0 B,  bad-sector:      0 B,  error rate:      0 B/s
      rescued: 120034 MB,  bad areas:    0,      run time:      49m 51s
pct rescued: 100.00%, read errors:      0,  remaining time:      n/a
                                time since last successful read:      n/a
Finished
```

```
GNU nano 4.8 /etc/exports
# /etc/exports: the access control list for filesystems which may be exported
# to NFS clients.  See exports(5).
#
# Example for NFSv2 and NFSv3:
# /srv/homes hostname1(rw,sync,no_subtree_check) hostname2(ro,sync,no_sub
#
# Example for NFSv4:
# /srv/nfs4 gss/krb5i(rw,sync,fsid=0,crossmnt,no_subtree_check)
# /srv/nfs4/homes gss/krb5i(rw,sync,no_subtree_check)
#
/home/export/shares 192.168.0.0/24(rw,sync,no_subtree_check)
/home/export/rear 192.168.0.0/24(rw,sync,no_subtree_check)
```

```
packt@neptune:/home/export/shares$ sudo nano /etc/exports
[sudo] password for packt:
packt@neptune:/home/export/shares$ sudo systemctl restart nfs-kernel-server.service
packt@neptune:/home/export/shares$ sudo exportfs -s
/home/export/shares 192.168.0.0/24(rw,wdelay,root_squash,no_subtree_check,sec=sys,rw,secure,root_squash,no_all_squash)
/home/export/rear 192.168.0.0/24(rw,wdelay,root_squash,no_subtree_check,sec=sys,rw,secure,root_squash,no_all_squash)
```

```
GNU nano 4.8 /etc/rear/local.conf
# Default is to create Relax-and-Recover rescue media as ISO image
# set OUTPUT to change that
# set BACKUP to activate an automated (backup and) restore of your data
# Possible configuration values can be found in /usr/share/rear/conf/default.conf
#
# This file (local.conf) is intended for manual configuration. For configuration
# through packages and other automated means we recommend creating a new
# file named site.conf next to this file and to leave the local.conf as it is.
# Our packages will never ship with a site.conf.
OUTPUT=ISO
OUTPUT_URL=nfs://192.168.0.244/home/export/rear
BACKUP=NETFS
BACKUP_URL=nfs://192.168.0.244/home/export/rear_
```

```
packt@neptune: /home/export/rear$ ls -la
total 12
drwxr-xr-x 3 nobody nogroup 4096 dec 13 14:50 .
drwxr-xr-x 4 root root 4096 dec 13 13:38 ..
drwxr-x--- 2 nobody nogroup 4096 dec 13 15:13 asus
packt@neptune: /home/export/rear$ sudo ls -la asus/
[sudo] password for packt:
total 6224928
drwxr-x--- 2 nobody nogroup 4096 dec 13 15:13 .
drwxr-xr-x 3 nobody nogroup 4096 dec 13 14:50 ..
-rw----- 1 nobody nogroup 202 dec 13 14:52 README
-rw----- 1 nobody nogroup 261 dec 13 14:52 VERSION
-rw----- 1 nobody nogroup 18008493 dec 13 15:13 backup.log
-rw----- 1 nobody nogroup 5944884170 dec 13 15:13 backup.tar.gz
-rw----- 1 nobody nogroup 409520128 dec 13 14:52 rear-asus.iso
-rw----- 1 nobody nogroup 1883329 dec 13 14:52 rear-asus.log
```

```
root@asus:~# rear format -- --efi /dev/sdb
USB device /dev/sdb is not formatted with ext2/3/4 or btrfs filesystem
Type exactly 'Yes' to format /dev/sdb with ext3 filesystem
(default 'No' timeout 300 seconds)
Yes_
```

```
OUTPUT=USB
# OUTPUT_URL=nfs://192.168.0.244/home/export/rear
BACKUP=NETFS
BACKUP_URL="usb:///dev/disk/by-label/REAR-000"
# BACKUP_URL=nfs://192.168.0.244/home/export/rear
```

```

packt@neptune:~$ df -h
Filesystem      Size  Used Avail Use% Mounted on
udev            3,8G   0  3,8G   0% /dev
tmpfs           768M  3,4M  765M   1% /run
/dev/nvme0n1p2 468G  17G  429G   4% /
tmpfs           3,8G   0  3,8G   0% /dev/shm
tmpfs           5,0M  4,0K  5,0M   1% /run/lock
tmpfs           3,8G   0  3,8G   0% /sys/fs/cgroup
/dev/loop1       56M   56M    0 100% /snap/core18/1932
/dev/loop3      256M  256M    0 100% /snap/gnome-3-34-1804/36
/dev/loop2      163M  163M    0 100% /snap/gnome-3-28-1804/145
/dev/loop4      218M  218M    0 100% /snap/gnome-3-34-1804/60
/dev/loop5       65M   65M    0 100% /snap/gtk-common-themes/1513
/dev/loop0       56M   56M    0 100% /snap/core18/1885
/dev/loop6       65M   65M    0 100% /snap/gtk-common-themes/1514
/dev/loop7       50M   50M    0 100% /snap/snap-store/467
/dev/nvme0n1p1  511M  7,8M  504M   2% /boot/efi
/dev/loop8       32M   32M    0 100% /snap/snapd/10492
/dev/loop9       52M   52M    0 100% /snap/snap-store/498
/dev/loop10      32M   32M    0 100% /snap/snapd/10238
tmpfs           768M  24K  768M   1% /run/user/125
tmpfs           768M  8,0K  768M   1% /run/user/1000

```

```

root@neptune:/home/packt# du -h /home | sort -rh | head -5
6,2G    /home
6,0G    /home/export/rear/asus
6,0G    /home/export/rear
6,0G    /home/export
221M    /home/packt

```

```

packt@neptune:~$ df -i /home
Filesystem      Inodes  IUsed   IFree IUse% Mounted on
/dev/nvme0n1p2 31227904 293448 30934456   1% /

```



```
packt@neptune:~$ free -h
              total        used         free       shared  buff/cache   available
Mem:          7,5Gi        763Mi        289Mi        126Mi        6,5Gi        6,3Gi
Swap:         2,0Gi         6,0Mi        2,0Gi
```

```
top - 17:33:07 up 3 days, 15:57, 1 user, load average: 0,00, 0,00, 0,00
Tasks: 288 total, 1 running, 287 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.0 us, 0.0 sy, 0.0 ni, 100.0 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 7674,1 total, 294,2 free, 757,2 used, 6622,7 buff/cache
MiB Swap: 2048,0 total, 2042,0 free, 6,0 used. 6487,8 avail Mem
```

memory statistics

PID	USER	PR	NI	VIRT	RES	S	MEM	SHR	SHR%	TIME	COMMAND
758	root	20	0	128740	10368	9528	S	0,3	0,1	0:45.30	thermald
946	mysql	20	0	1775676	88876	17952	S	0,3	1,1	8:47.50	mysqld
19622	root	20	0	0	0	0	S	0,3	0,0	0:13.73	usb-sto+
40934	packt	20	0	16564	4260	3492	R	0,3	0,1	0:00.08	top
1	root	20	0	171160	13308	8476	S	0,0	0,2	0:12.76	systemd
2	root	20	0	0	0	0	S	0,0	0,0	0:00.18	kthreadd
3	root	0	-20	0	0	0	I	0,0	0,0	0:00.00	rcu_gp
4	root	0	-20	0	0	0	I	0,0	0,0	0:00.00	rcu_par+
6	root	0	-20	0	0	0	I	0,0	0,0	0:00.00	kworker+
9	root	0	-20	0	0	0	I	0,0	0,0	0:00.00	mm_perc+
10	root	20	0	0	0	0	S	0,0	0,0	0:00.61	ksoftir+
11	root	20	0	0	0	0	I	0,0	0,0	0:57.03	rcu_sch+
12	root	rt	0	0	0	0	S	0,0	0,0	0:02.04	migrati+
13	root	-51	0	0	0	0	S	0,0	0,0	0:00.00	idle_in+
14	root	20	0	0	0	0	S	0,0	0,0	0:00.00	cpuhp/0
15	root	20	0	0	0	0	S	0,0	0,0	0:00.00	cpuhp/1
16	root	-51	0	0	0	0	S	0,0	0,0	0:00.00	idle_in+
17	root	rt	0	0	0	0	S	0,0	0,0	0:02.21	migrati+

```
packt@neptune:~$ vmstat
procs -----memory----- --swap-- -----io----- -system-- -----cpu-----
 r b  swpd  free  buff  cache  si  so  bi  bo  in  cs  us  sy  id  wa  st
 0 0  6144 291644 433616 6355144  0  0  1  4  12  6  0  0 100  0  0
```

```
packt@neptune:~$ vmstat -a
procs -----memory----- --swap-- -----io----- -system-- -----cpu-----
 r b  swpd  free  inact  active  si  so  bi  bo  in  cs  us  sy  id  wa  st
 1 0  2560 232944 5123284 1210084  0  0  0  4  12  7  0  0 100  0
 0
```

```
packt@neptune:~$ vmstat -s
7858288 K total memory
778160 K used memory
1196848 K active memory
5123084 K inactive memory
247664 K free memory
437184 K buffer memory
6395280 K swap cache
2097148 K total swap
2560 K used swap
2094588 K free swap
```

```
packt@neptune:~$ sar
Cannot open /var/log/sysstat/sa16: No such file or directory
Please check if data collecting is enabled
```

```
packt@neptune:~$ sudo systemctl start sysstat
packt@neptune:~$ sudo systemctl enable sysstat
Synchronizing state of sysstat.service with SysV service script with /lib/systemd/
systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable sysstat
```

```
packt@neptune:~$ sudo sar -r 2 5
[sudo] password for packt:
Linux 5.4.0-58-generic (neptune)      16.12.2020      _x86_64_      (8 CPU)

22:08:41  kbmemfree  kbavail  kbmempused  %memused  kbbuffers  kbcached  kbcommit  %commit  kbactive  kbinact  kbdirty
22:08:43    238160    6603272    580400      7,39     438496    5562120    4168672    41,87    1116436    5252800    264
22:08:45    238160    6603272    580400      7,39     438496    5562120    4168672    41,87    1116436    5252800    264
22:08:47    238160    6603272    580392      7,39     438504    5562120    4168672    41,87    1116488    5252800     0
22:08:49    238160    6603272    580392      7,39     438504    5562120    4168672    41,87    1116488    5252800     0
22:08:51    238160    6603272    580392      7,39     438504    5562120    4168672    41,87    1116488    5252800     0
Average:    238160    6603272    580395      7,39     438501    5562120    4168672    41,87    1116467    5252800    106
```

```

top - 23:21:13 up 3 days, 21:45, 1 user, load average: 0,00, 0,00, 0,00
Tasks: 285 total, 1 running, 284 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0,1 us, 0,1 sy, 0,0 ni, 99,8 id, 0,0 wa, 0,0 hi, 0,0 si, 0,0 st
MiB Mem : 7674,1 total, 235,6 free, 756,0 used, 6682,5 buff/cache
MiB Swap: 2048,0 total, 2045,5 free, 2,5 used. 6453,1 avail Mem

```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
1153	gdm	20	0	4344124	171236	90852	S	0,7	2,2	2:45.98	gnome-shell
44986	root	20	0	0	0	0	I	0,3	0,0	0:00.18	kworker/u16:+
45129	packt	20	0	16568	4396	3628	R	0,3	0,1	0:00.09	top
1	root	20	0	171160	13328	8476	S	0,0	0,2	0:14.35	systemd
2	root	20	0	0	0	0	S	0,0	0,0	0:00.19	kthreadd
3	root	0	-20	0	0	0	I	0,0	0,0	0:00.00	rcu_gp
4	root	0	-20	0	0	0	I	0,0	0,0	0:00.00	rcu_par_gp
6	root	0	-20	0	0	0	I	0,0	0,0	0:00.00	kworker/0:0H+
9	root	0	-20	0	0	0	I	0,0	0,0	0:00.00	mm_percpu_wq
10	root	20	0	0	0	0	S	0,0	0,0	0:00.65	ksoftirqd/0
11	root	20	0	0	0	0	I	0,0	0,0	1:01.04	rcu_sched
12	root	rt	0	0	0	0	S	0,0	0,0	0:02.18	migration/0
13	root	-51	0	0	0	0	S	0,0	0,0	0:00.00	idle_inject/0
14	root	20	0	0	0	0	S	0,0	0,0	0:00.00	cpuhp/0
15	root	20	0	0	0	0	S	0,0	0,0	0:00.00	cpuhp/1
16	root	-51	0	0	0	0	S	0,0	0,0	0:00.00	idle_inject/1
17	root	rt	0	0	0	0	S	0,0	0,0	0:02.35	migration/1
18	root	20	0	0	0	0	S	0,0	0,0	0:01.05	ksoftirqd/1
20	root	0	-20	0	0	0	I	0,0	0,0	0:00.00	kworker/1:0H+

```
packt@neptune:~$ iostat
```

```
Linux 5.4.0-58-generic (neptune) 17.12.2020 _x86_64_ (8 CPU)
```

```

avg-cpu:  %user   %nice %system %iowait  %steal   %idle
            0,06    0,00    0,07    0,00    0,00   99,87

```

Device	tps	kB_read/s	kB_wrtn/s	kB_dscd/s	kB_read	kB_wrtn	kB_dscd
loop0	0,00	0,00	0,00	0,00	520	0	0
loop1	0,00	0,00	0,00	0,00	522	0	0
loop10	0,00	0,00	0,00	0,00	340	0	0
loop11	0,00	0,00	0,00	0,00	4	0	0
loop2	0,00	0,00	0,00	0,00	1135	0	0
loop3	0,00	0,00	0,00	0,00	1087	0	0
loop4	0,00	0,00	0,00	0,00	1173	0	0
loop5	0,00	0,00	0,00	0,00	1620	0	0
loop6	0,00	0,00	0,00	0,00	1679	0	0
loop7	0,00	0,00	0,00	0,00	576	0	0
loop8	0,04	0,04	0,00	0,00	13649	0	0
loop9	0,00	0,00	0,00	0,00	579	0	0
nvme0n1	1,16	3,78	29,20	1380,11	1299529	10037549	474382048
sda	0,00	0,01	0,00	0,00	2128	0	0

```

packt@neptune:~$ sudo apt search iotop
Sorting... Done
Full Text Search... Done
iotop/focal,now 0.6-24-g733f3f8-1 amd64 [installed]
  simple top-like I/O monitor

```

TID	PRI0	USER	DISK READ	DISK WRITE	SWAPIN	IO>	COMMAND
Total DISK READ:		0.00 B/s	Total DISK WRITE:		14.75 K/s		
Current DISK READ:		0.00 B/s	Current DISK WRITE:		22.13 K/s		
268	be/3	root	0.00 B/s	14.75 K/s	0.00 %	0.10 %	[jbd2/nvme0n1p2-]
1	be/4	root	0.00 B/s	0.00 B/s	0.00 %	0.00 %	init splash
2	be/4	root	0.00 B/s	0.00 B/s	0.00 %	0.00 %	[kthreadd]
3	be/0	root	0.00 B/s	0.00 B/s	0.00 %	0.00 %	[rcu_gp]
4	be/0	root	0.00 B/s	0.00 B/s	0.00 %	0.00 %	[rcu_par_gp]
6	be/0	root	0.00 B/s	0.00 B/s	0.00 %	0.00 %	[kworker/0:0H-kblockd]
9	be/0	root	0.00 B/s	0.00 B/s	0.00 %	0.00 %	[mm_percpu_wq]
10	be/4	root	0.00 B/s	0.00 B/s	0.00 %	0.00 %	[ksoftirqd/0]
11	be/4	root	0.00 B/s	0.00 B/s	0.00 %	0.00 %	[rcu_sched]
12	rt/4	root	0.00 B/s	0.00 B/s	0.00 %	0.00 %	[migration/0]
13	rt/4	root	0.00 B/s	0.00 B/s	0.00 %	0.00 %	[idle_inject/0]
14	be/4	root	0.00 B/s	0.00 B/s	0.00 %	0.00 %	[cpuhp/0]
15	be/4	root	0.00 B/s	0.00 B/s	0.00 %	0.00 %	[cpuhp/1]
16	rt/4	root	0.00 B/s	0.00 B/s	0.00 %	0.00 %	[idle_inject/1]
17	rt/4	root	0.00 B/s	0.00 B/s	0.00 %	0.00 %	[migration/1]
18	be/4	root	0.00 B/s	0.00 B/s	0.00 %	0.00 %	[ksoftirqd/1]

```

packt@neptune:~$ sudo sar 2 5
Linux 5.4.0-58-generic (neptune)          17.12.2020          _x86_64_          (8 CPU)

```

02:16:41	CPU	%user	%nice	%system	%iowait	%steal	%idle
02:16:43	all	0,00	0,00	0,00	0,00	0,00	100,00
02:16:45	all	0,06	0,00	0,00	0,00	0,00	99,94
02:16:47	all	0,00	0,00	0,31	0,00	0,00	99,69
02:16:49	all	0,00	0,00	0,00	0,00	0,00	100,00
02:16:51	all	0,12	0,00	0,00	0,00	0,00	99,88
Average:	all	0,04	0,00	0,06	0,00	0,00	99,90

```
packt@neptune:~$ ping -c 4 google.com
PING google.com (172.217.22.14) 56(84) bytes of data:
64 bytes from fra16s14-in-f14.1e100.net (172.217.22.14): icmp_seq=1 ttl=111 time=32.3 ms
64 bytes from fra16s14-in-f14.1e100.net (172.217.22.14): icmp_seq=2 ttl=111 time=31.9 ms
64 bytes from fra16s14-in-f14.1e100.net (172.217.22.14): icmp_seq=3 ttl=111 time=32.6 ms
64 bytes from fra16s14-in-f14.1e100.net (172.217.22.14): icmp_seq=4 ttl=111 time=32.0 ms

--- google.com ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3002ms
```

```
packt@neptune:~$ ip link show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN mode DEFAULT group de
fault qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
2: eno1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP mode DEFAULT
group default qlen 1000
    link/ether 08:00:27:00:00:00 brd ff:ff:ff:ff:ff:ff
3: wlp0s20f3: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue state DOWN mode
DORMANT group default qlen 1000
    link/ether 8c:8e:90:00:00:00 brd ff:ff:ff:ff:ff:ff
```

```
packt@neptune:~$ ethtool eno1
Settings for eno1:
    Supported ports: [ TP ]
    Supported link modes:   10baseT/Half 10baseT/Full
                           100baseT/Half 100baseT/Full
                           1000baseT/Full
    Supported pause frame use: No
    Supports auto-negotiation: Yes
    Supported FEC modes: Not reported
    Advertised link modes:  10baseT/Half 10baseT/Full
                           100baseT/Half 100baseT/Full
                           1000baseT/Full
    Advertised pause frame use: No
    Advertised auto-negotiation: Yes
    Advertised FEC modes: Not reported
    Speed: 1000Mb/s
    Duplex: Full
    Port: Twisted Pair
    PHYAD: 1
    Transceiver: internal
    Auto-negotiation: on
    MDI-X: on (auto)
Cannot get wake-on-lan settings: Operation not permitted
    Current message level: 0x00000007 (7)
                           drv probe link
    Link detected: yes
```

```
packt@neptune:~$ arp -a
? (192.168.0.217) at 08:00:27:00:00:00 [ether] on eno1
? (192.168.0.210) at 08:00:27:00:00:00 [ether] on eno1
? (192.168.0.175) at 08:00:27:00:00:00 [ether] on eno1
? (192.168.0.220) at 08:00:27:00:00:00 [ether] on eno1
? (192.168.0.205) at 08:00:27:00:00:00 [ether] on eno1
? (192.168.0.186) at 08:00:27:00:00:00 [ether] on eno1
? (192.168.0.170) at 08:00:27:00:00:00 [ether] on eno1
? (192.168.0.172) at 08:00:27:00:00:00 [ether] on eno1
_gateway (192.168.0.1) at 08:00:27:00:00:00 [ether] on eno1
```

```

packt@neptune:~$ ip neighbor show
192.168.0.217 dev eno1 lladdr [REDACTED] REACHABLE
192.168.0.210 dev eno1 lladdr [REDACTED] STALE
192.168.0.175 dev eno1 lladdr [REDACTED] STALE
192.168.0.220 dev eno1 lladdr [REDACTED] STALE
192.168.0.205 dev eno1 lladdr [REDACTED] STALE
192.168.0.186 dev eno1 lladdr [REDACTED] STALE
192.168.0.170 dev eno1 lladdr [REDACTED] STALE
192.168.0.172 dev eno1 lladdr [REDACTED] STALE
192.168.0.1 dev eno1 lladdr [REDACTED] STALE

```

```

packt@neptune:~$ ip route show
default via 192.168.0.1 dev eno1 proto dhcp metric 100
169.254.0.0/16 dev eno1 scope link metric 1000
192.168.0.0/24 dev eno1 proto kernel scope link src 192.168.0.244 metric 100

```

```

packt@neptune:~$ traceroute google.com
traceroute to google.com (216.58.205.238), 30 hops max, 60 byte packets
 1  _gateway (192.168.0.1)  0.623 ms  0.441 ms  0.694 ms
 2  [REDACTED].next-gen.ro ([REDACTED])  4.638 ms  4.956 ms  4.929 ms
 3  [REDACTED].next-gen.ro ([REDACTED])  3.258 ms  3.507 ms  3.730 ms
 4  [REDACTED].next-gen.ro ([REDACTED])  2.863 ms  4.792 ms  2.810 ms
 5  [REDACTED].next-gen.ro ([REDACTED])  4.917 ms  5.053 ms  5.270 ms
 6  bucuresti.nxddata.br01.next-gen.ro ([REDACTED])  4.655 ms  3.638 ms  3.816 ms
 7  10.19.141.193 (10.19.141.193)  2.248 ms  1.943 ms  2.211 ms
 8  * * *
 9  10.0.240.186 (10.0.240.186)  28.743 ms  29.263 ms  29.231 ms
10  10.0.240.125 (10.0.240.125)  32.431 ms  57.240.0.110.ap.yournet.ne.jp (110.0.240.57)
   29.734 ms  10.0.240.125 (10.0.240.125)  32.637 ms
11  92.87.30.13 (92.87.30.13)  30.908 ms  30.937 ms  29.525 ms
12  * 10.252.43.30 (10.252.43.30)  30.654 ms *
13  74.125.37.98 (74.125.37.98)  28.107 ms  74.125.37.124 (74.125.37.124)  32.775 ms  74.12
   5.37.196 (74.125.37.196)  30.686 ms
14  108.170.252.82 (108.170.252.82)  30.470 ms  108.170.252.83 (108.170.252.83)  30.689 ms
   31.106 ms
15  209.85.252.214 (209.85.252.214)  31.104 ms fra15s24-in-f14.1e100.net (216.58.205.238)
   29.002 ms  108.170.238.60 (108.170.238.60)  29.598 ms

```

```

packt@neptune:~$ tracepath google.com
1?: [LOCALHOST] pmtu 1500
1: _gateway 0.685ms
1: _gateway 0.673ms
2: █ █ █ █ █ █ next-gen.ro 2.957ms
3: █ █ █ █ █ █ .next-gen.ro 2.360ms
4: █ █ █ █ █ █ ext-gen.ro 11.696ms
5: no reply
6: bucuresti.nxdata.br01.next-gen.ro 3.734ms
7: 10.19.141.193 2.550ms
8: no reply
9: 10.0.200.2 28.828ms asymm 11
10: 10.0.240.145 33.099ms
11: 92.87.30.13 29.735ms asymm 15
^C

```

```

packt@neptune:~$ tracepath -n google.com
1?: [LOCALHOST] pmtu 1500
1: 192.168.0.1 1.026ms
1: 192.168.0.1 0.658ms
2: █ █ █ █ █ █ 3.009ms
3: █ █ █ █ █ █ 2.931ms
4: █ █ █ █ █ █ 2.459ms
5: no reply
6: 81.22.150.2 3.858ms
7: 10.19.141.193 2.590ms
8: no reply
9: 10.0.200.2 28.951ms asymm 11
10: 10.0.240.9 31.620ms
11: 92.87.30.13 32.359ms asymm 15
^C

```



```
packt@neptune:~$ nslookup google.com
Server:          127.0.0.53
Address:         127.0.0.53#53

Non-authoritative answer:
Name:   google.com
Address: 172.217.22.14
Name:   google.com
Address: 2a00:1450:4001:81a::200e

packt@neptune:~$ ping -c 4 google.com
PING google.com (172.217.22.14) 56(84) bytes of data:
64 bytes from fra16s14-in-f14.1e100.net (172.217.22.14): icmp_seq=1 ttl=111 time=32.2 ms
64 bytes from fra16s14-in-f14.1e100.net (172.217.22.14): icmp_seq=2 ttl=111 time=32.1 ms
64 bytes from fra16s14-in-f14.1e100.net (172.217.22.14): icmp_seq=3 ttl=111 time=32.1 ms
64 bytes from fra16s14-in-f14.1e100.net (172.217.22.14): icmp_seq=4 ttl=111 time=32.0 ms

--- google.com ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3005ms
```

```
packt@neptune:~$ ss -t
State      Recv-Q      Send-Q      Local Address:Port      Peer Address:Port      Process
ESTAB      0            0            192.168.0.244:ssh       192.168.0.217:50281

packt@neptune:~$ ss -u
Recv-Q     Send-Q           Local Address:Port      Peer Address:Port      Process
0          0                192.168.0.244%eno1:bootpc  192.168.0.1:bootps
```

```
packt@neptune:~$ ss -ltu
```

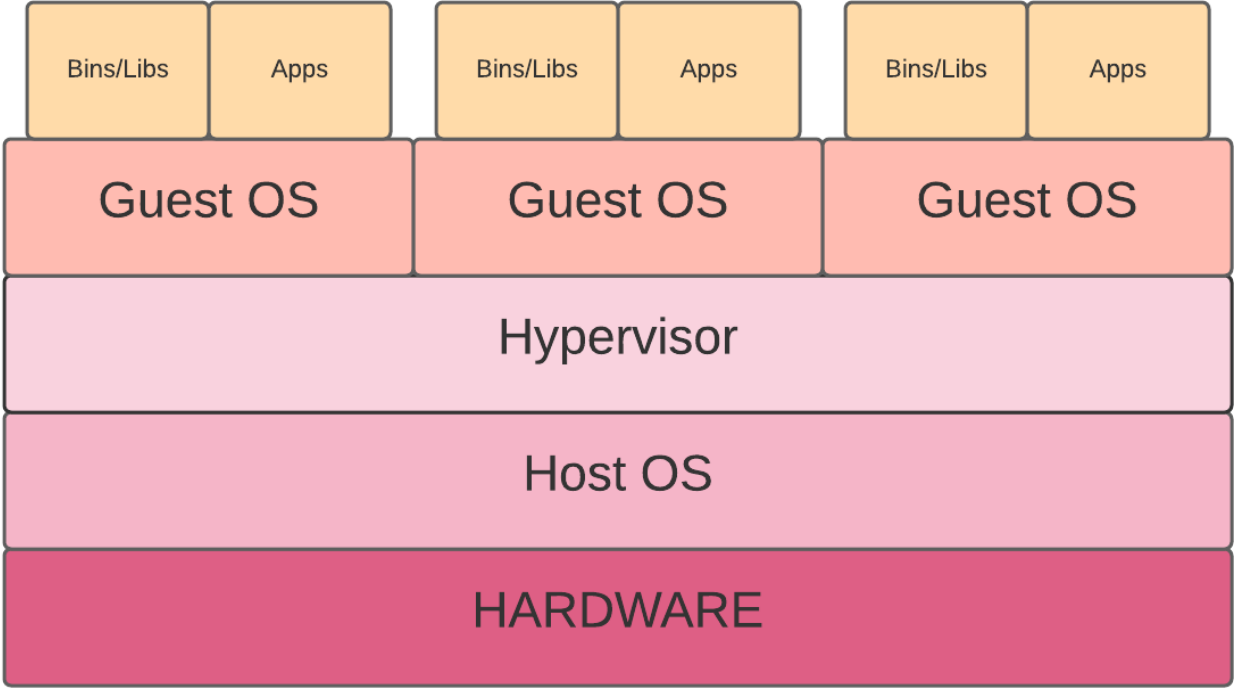
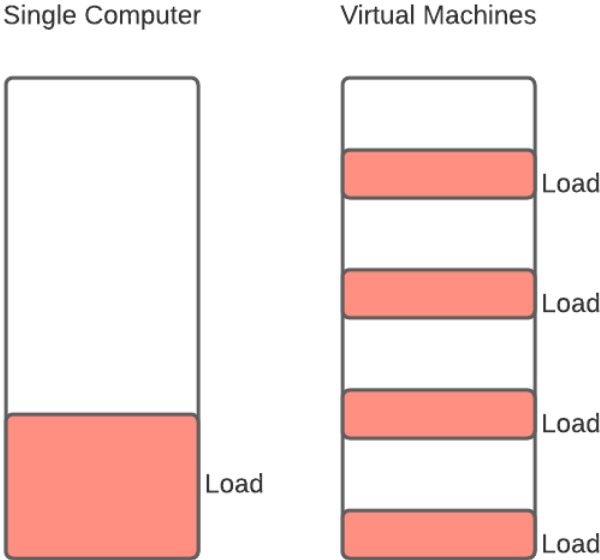
Netid	State	Recv-Q	Send-Q	Local Address:Port	Peer Address:Port	Process
udp	UNCONN	0	0	127.0.0.53%lo:domain	0.0.0.0:*	
udp	UNCONN	0	0	0.0.0.0:ntp	0.0.0.0:*	
udp	UNCONN	0	0	192.168.0.255:netbios-ns	0.0.0.0:*	
udp	UNCONN	0	0	192.168.0.244:netbios-ns	0.0.0.0:*	
udp	UNCONN	0	0	0.0.0.0:netbios-ns	0.0.0.0:*	
udp	UNCONN	0	0	192.168.0.255:netbios-dgm	0.0.0.0:*	
udp	UNCONN	0	0	192.168.0.244:netbios-dgm	0.0.0.0:*	
udp	UNCONN	0	0	0.0.0.0:netbios-dgm	0.0.0.0:*	
udp	UNCONN	0	0	127.0.0.1:323	0.0.0.0:*	
udp	UNCONN	0	0	0.0.0.0:631	0.0.0.0:*	
tcp	LISTEN	0	50	127.0.0.1:microsoft-ds	0.0.0.0:*	
tcp	LISTEN	0	50	192.168.0.244:microsoft-ds	0.0.0.0:*	
tcp	LISTEN	0	64	0.0.0.0:nfs	0.0.0.0:*	
tcp	LISTEN	0	4096	0.0.0.0:52101	0.0.0.0:*	
tcp	LISTEN	0	64	0.0.0.0:41001	0.0.0.0:*	
tcp	LISTEN	0	80	127.0.0.1:mysql	0.0.0.0:*	
tcp	LISTEN	0	50	127.0.0.1:netbios-ssn	0.0.0.0:*	
tcp	LISTEN	0	50	192.168.0.244:netbios-ssn	0.0.0.0:*	
tcp	LISTEN	0	4096	0.0.0.0:50347	0.0.0.0:*	
tcp	LISTEN	0	4096	0.0.0.0:sunrpc	0.0.0.0:*	
tcp	LISTEN	0	4096	127.0.0.53%lo:domain	0.0.0.0:*	
tcp	LISTEN	0	128	0.0.0.0:ssh	0.0.0.0:*	
tcp	LISTEN	0	5	0.0.0.0:ipp	0.0.0.0:*	
tcp	LISTEN	0	4096	0.0.0.0:40955	0.0.0.0:*	
tcp	LISTEN	0	64	[::]:42847	[::]:*	
tcp	LISTEN	0	64	[::]:nfs	[::]:*	
tcp	LISTEN	0	4096	[::]:41603	[::]:*	
tcp	LISTEN	0	4096	[::]:36453	[::]:*	
tcp	LISTEN	0	4096	[::]:sunrpc	[::]:*	
tcp	LISTEN	0	511	*:http	*:*	
tcp	LISTEN	0	4096	[::]:39731	[::]:*	
tcp	LISTEN	0	32	*:ftp	*:*	
tcp	LISTEN	0	128	[::]:ssh	[::]:*	
tcp	LISTEN	0	5	[::]:ipp	[::]:*	

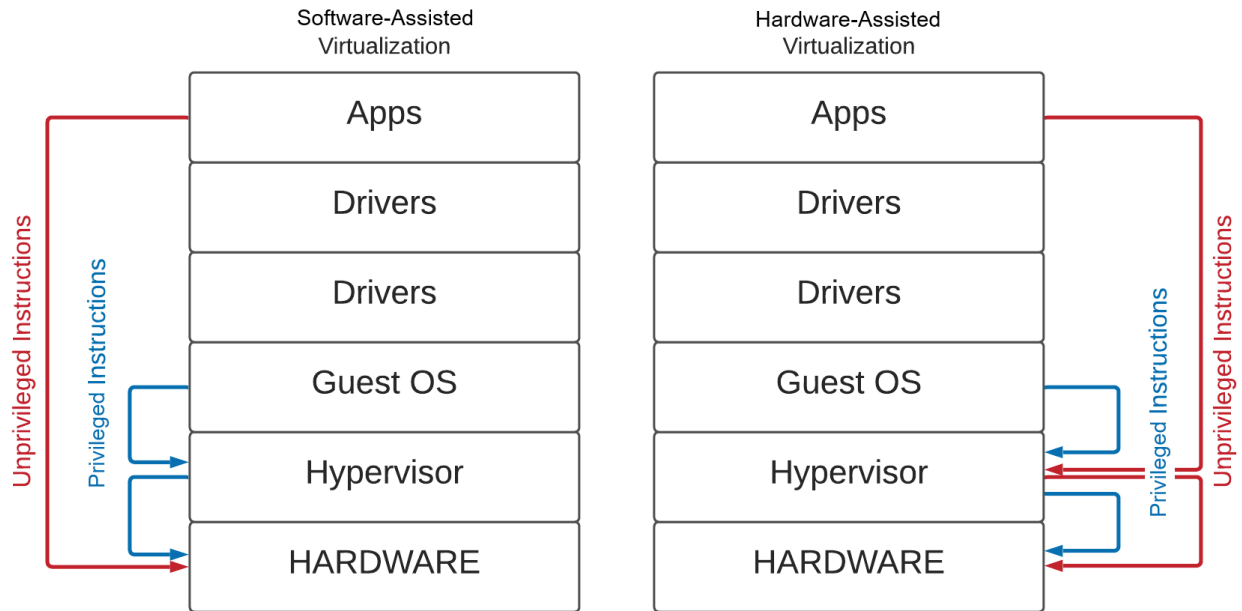
```
packt@neptune:~$ sudo dmidecode -t 17
Handle 0x0038, DMI type 17, 84 bytes
Memory Device
    Array Handle: 0x0037
    Error Information Handle: Not Provided
    Total Width: 64 bits
    Data Width: 64 bits
    Size: 4096 MB
    Form Factor: SODIMM
    Set: None
    Locator: SODIMM1
    Bank Locator: Memory Channel A
    Type: DDR4
    Type Detail: Synchronous
    Speed: 2400 MT/s
    Rank: 1
    Configured Memory Speed: 2133 MT/s
```

```
packt@neptune:~$ lsblk
NAME                MAJ:MIN RM   SIZE RO TYPE MOUNTPOINT
sda                  8:0    1 115,6G  0 disk
└─sda1                8:1    1 115,6G  0 part
nvme0n1              259:0    0   477G  0 disk
├─nvme0n1p1          259:1    0   512M  0 part /boot/efi
└─nvme0n1p2          259:2    0 476,4G  0 part /
```

```
packt@neptune:~$ lscpu
Architecture:          x86_64
CPU op-mode(s):       32-bit, 64-bit
Byte Order:            Little Endian
Address sizes:         39 bits physical, 48 bits virtual
CPU(s):                8
On-line CPU(s) list:  0-7
Thread(s) per core:   2
Core(s) per socket:   4
Socket(s):             1
NUMA node(s):         1
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 142
Model name:            Intel(R) Core(TM) i5-10210U CPU @ 1.60GHz
Stepping:              12
CPU MHz:               631.463
CPU max MHz:           4200,0000
CPU min MHz:           400,0000
BogoMIPS:              4199.88
Virtualization:        VT-x
```

Chapter 11: Working with Containers and Virtual Machines.





```
[packt@jupiter ~]$ sudo yum install qemu-kvm
Last metadata expiration check: 0:23:00 ago on Fri 01 Jan 2021 11:43:41 AM EET.
Package qemu-kvm-15:4.2.0-34.module_el8.3.0+555+a55c8938.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
```

```
[packt@jupiter ~]$ sudo yum install libvirt libvirt-client virt-manager virt-install virt-viewer
[sudo] password for packt:
Last metadata expiration check: 0:34:37 ago on Fri 01 Jan 2021 11:43:41 AM EET.
Package libvirt-6.0.0-28.module_el8.3.0+555+a55c8938.x86_64 is already installed.
Package libvirt-client-6.0.0-28.module_el8.3.0+555+a55c8938.x86_64 is already installed.
Package virt-manager-2.2.1-3.el8.noarch is already installed.
Package virt-install-2.2.1-3.el8.noarch is already installed.
Package virt-viewer-9.0-4.el8.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
```

```
[packt@jupiter ~]$ sudo virt-host-validate
[sudo] password for packt:
setlocale: No such file or directory
QEMU: Checking for hardware virtualization : PASS
QEMU: Checking if device /dev/kvm exists : PASS
QEMU: Checking if device /dev/kvm is accessible : PASS
QEMU: Checking if device /dev/vhost-net exists : PASS
QEMU: Checking if device /dev/net/tun exists : PASS
QEMU: Checking for cgroup 'cpu' controller support : PASS
QEMU: Checking for cgroup 'cpuacct' controller support : PASS
QEMU: Checking for cgroup 'cpuset' controller support : PASS
QEMU: Checking for cgroup 'memory' controller support : PASS
QEMU: Checking for cgroup 'devices' controller support : PASS
QEMU: Checking for cgroup 'blkio' controller support : PASS
QEMU: Checking for device assignment IOMMU support : PASS
QEMU: Checking if IOMMU is enabled by kernel : WARN (IOMMU appears to be disabled in kernel. Add intel_iommu=on to kernel cmdline arguments)
QEMU: Checking for secure guest support : WARN (Unknown if this platform has Secure Guest support)
```

```
GRUB_TIMEOUT=5
GRUB_DISTRIBUTOR="$(sed 's, release .*$,g' /etc/system-release)"
GRUB_DEFAULT=saved
GRUB_DISABLE_SUBMENU=true
GRUB_TERMINAL_OUTPUT="console"
GRUB_CMDLINE_LINUX="crashkernel=auto resume=/dev/mapper/cl-swap rd.lvm.lv=cl/root rd.lvm.lv=cl/swap rhgb quiet intel_iommu=on"
GRUB_DISABLE_RECOVERY="true"
GRUB_ENABLE_BLSCFG=true
```

```
[packt@jupiter ~]$ sudo grub2-mkconfig -o /boot/grub2/grub.cfg
Generating grub configuration file ...
done
```

```
[packt@jupiter ~]$ sudo virt-host-validate
[sudo] password for packt:
setlocale: No such file or directory
QEMU: Checking for hardware virtualization : PASS
QEMU: Checking if device /dev/kvm exists : PASS
QEMU: Checking if device /dev/kvm is accessible : PASS
QEMU: Checking if device /dev/vhost-net exists : PASS
QEMU: Checking if device /dev/net/tun exists : PASS
QEMU: Checking for cgroup 'cpu' controller support : PASS
QEMU: Checking for cgroup 'cpuacct' controller support : PASS
QEMU: Checking for cgroup 'cpuset' controller support : PASS
QEMU: Checking for cgroup 'memory' controller support : PASS
QEMU: Checking for cgroup 'devices' controller support : PASS
QEMU: Checking for cgroup 'blkio' controller support : PASS
QEMU: Checking for device assignment IOMMU support : PASS
QEMU: Checking if IOMMU is enabled by kernel : PASS
QEMU: Checking for secure guest support : WARN
(Unknown if this platform has Secure Guest support)
```

```
[root@jupiter Downloads]# wget https://cdimage.debian.org/debian-cd/current/amd64/iso-cd/debian-10.7.0-amd64-netinst.iso
--2021-01-01 14:41:22-- https://cdimage.debian.org/debian-cd/current/amd64/iso-cd/debian-10.7.0-amd64-netinst.iso
Resolving cdimage.debian.org (cdimage.debian.org)... 194.71.11.165, 194.71.11.173, 2001:6b0:19::165, ...
Connecting to cdimage.debian.org (cdimage.debian.org)|194.71.11.165|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 352321536 (336M) [application/x-iso9660-image]
Saving to: 'debian-10.7.0-amd64-netinst.iso'

debian-10.7.0-amd64- 100%[=====>] 336.00M  41.6MB/s   in 9.1s

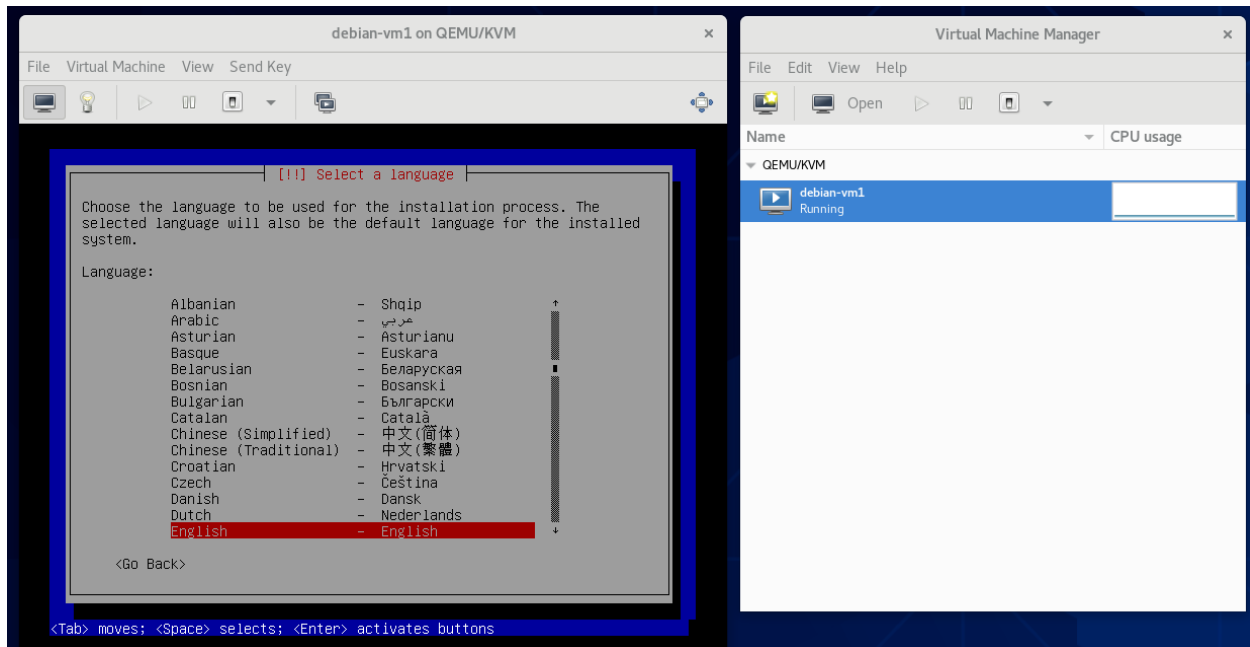
2021-01-01 14:41:32 (36.8 MB/s) - 'debian-10.7.0-amd64-netinst.iso' saved [352321536/352321536]
```

```
[root@jupiter Downloads]# osinfo-query os
```

Short ID	Name	Version	ID
alpinelinux3.5	Alpine Linux 3.5	3.5	http://alpinelinux.org/alpinelinux/3.5
alpinelinux3.6	Alpine Linux 3.6	3.6	http://alpinelinux.org/alpinelinux/3.6
alpinelinux3.7	Alpine Linux 3.7	3.7	http://alpinelinux.org/alpinelinux/3.7
alpinelinux3.8	Alpine Linux 3.8	3.8	http://alpinelinux.org/alpinelinux/3.8

```
WARNING Graphics requested but DISPLAY is not set. Not running virt-viewer.
WARNING No console to launch for the guest, defaulting to --wait -1

Starting install...
```



```
[root@localhost packt]# virsh list
Id      Name      State
-----
1       Debian-vm running
```

```
[root@localhost packt]# virsh destroy Debian-vm
Domain Debian-vm destroyed
```

```
[root@localhost packt]# virsh list
Id      Name      State
-----
```

```
[root@localhost packt]# virsh reboot Debian-vm
Domain Debian-vm is being rebooted
```



```
[root@localhost packt]# virsh suspend Debian-vm
Domain Debian-vm suspended
```

```
[root@localhost packt]# virsh list
```

Id	Name	State
2	Debian-vm	paused

```
[root@localhost packt]# virsh start Debian-vm
Domain Debian-vm started
```

```
[root@localhost packt]# virsh list
```

Id	Name	State
3	Debian-vm	running

```
[root@localhost packt]# virsh list
Id Name State
-----
3 Debian-vm paused

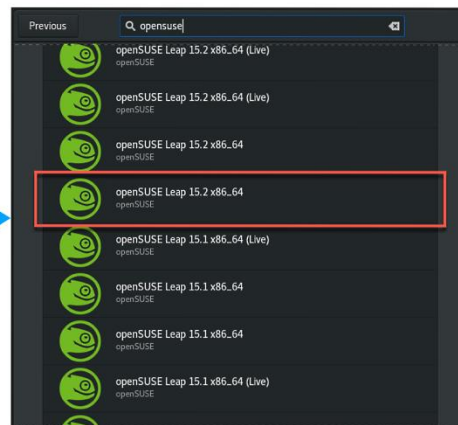
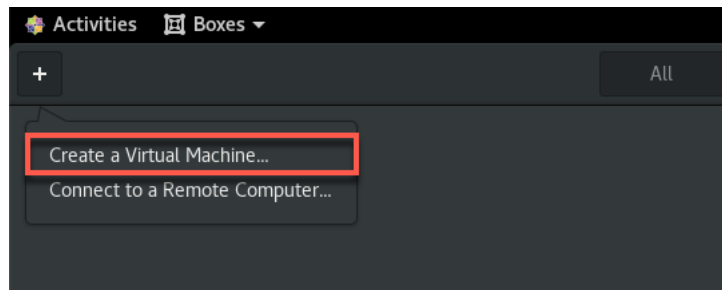
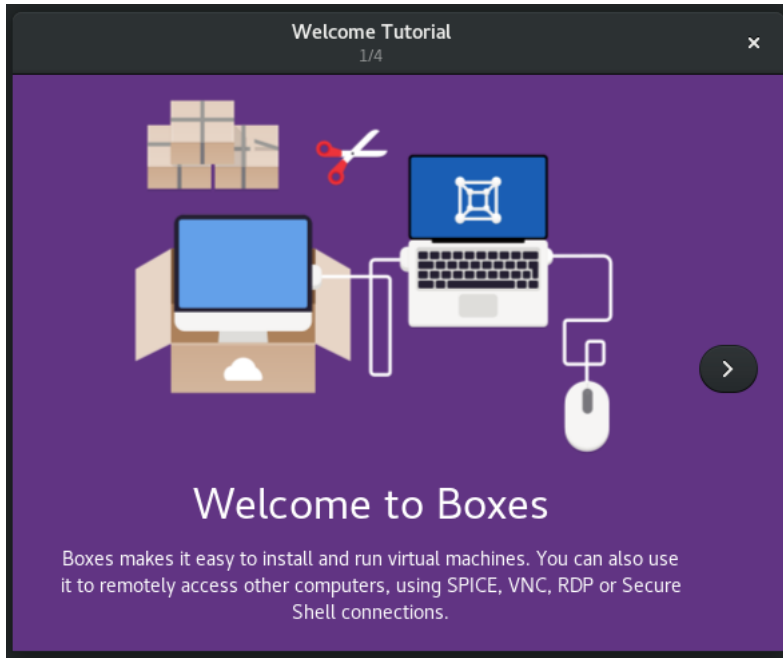
[root@localhost packt]# virsh resume Debian-vm
Domain Debian-vm resumed

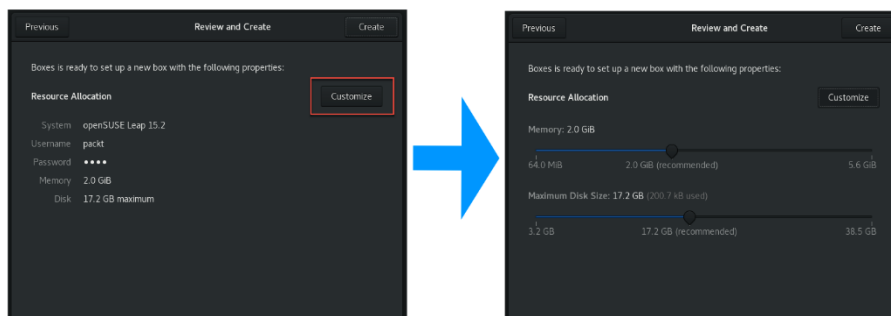
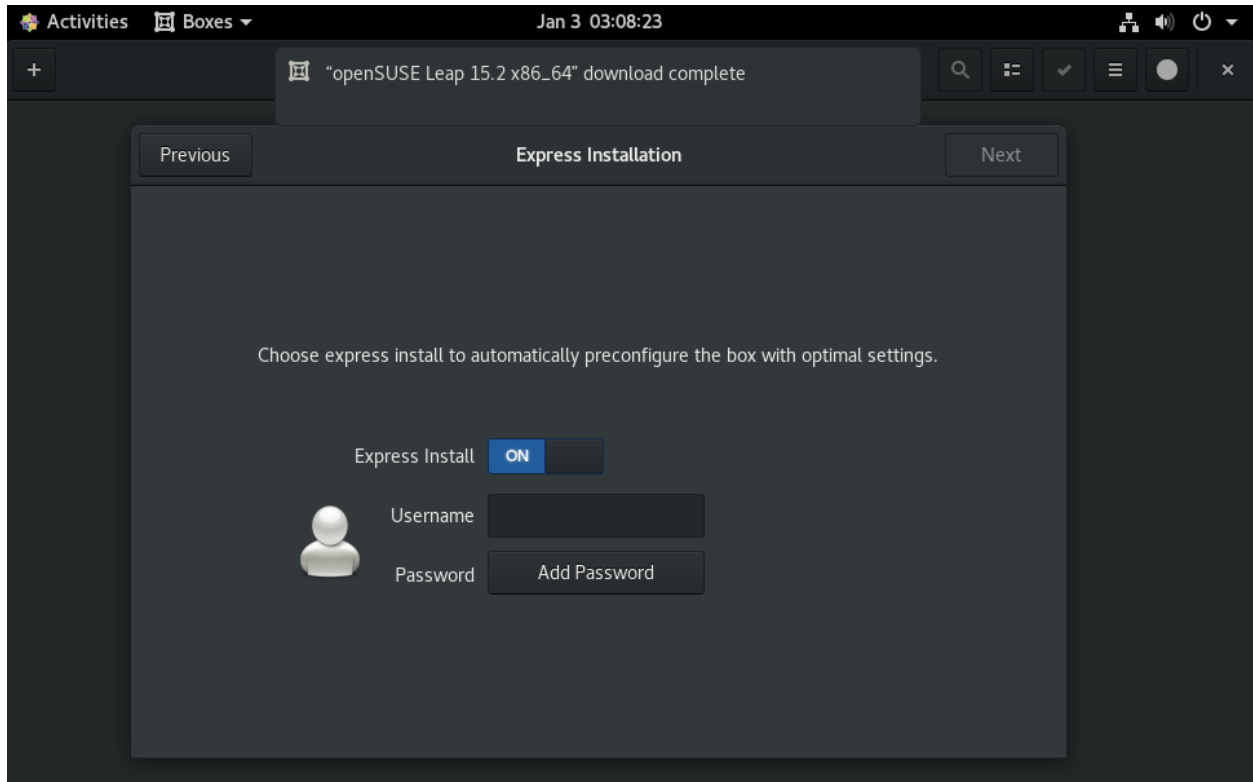
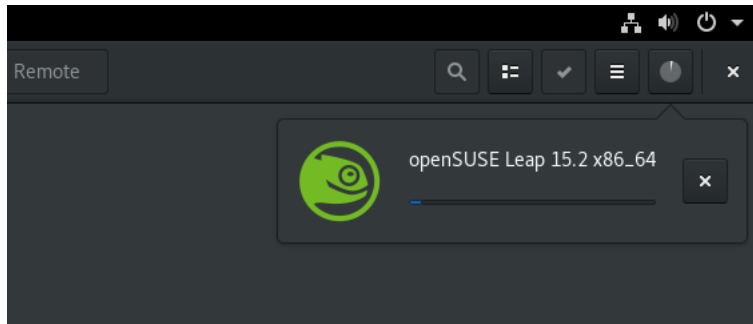
[root@localhost packt]# virsh list
Id Name State
-----
3 Debian-vm running
```

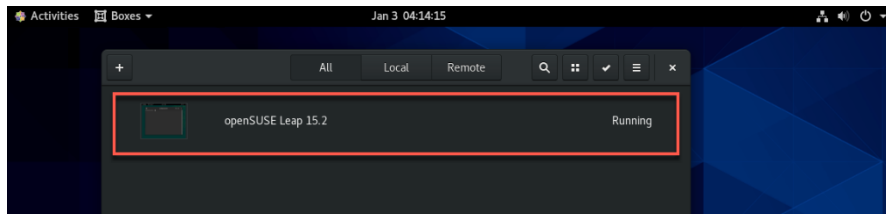
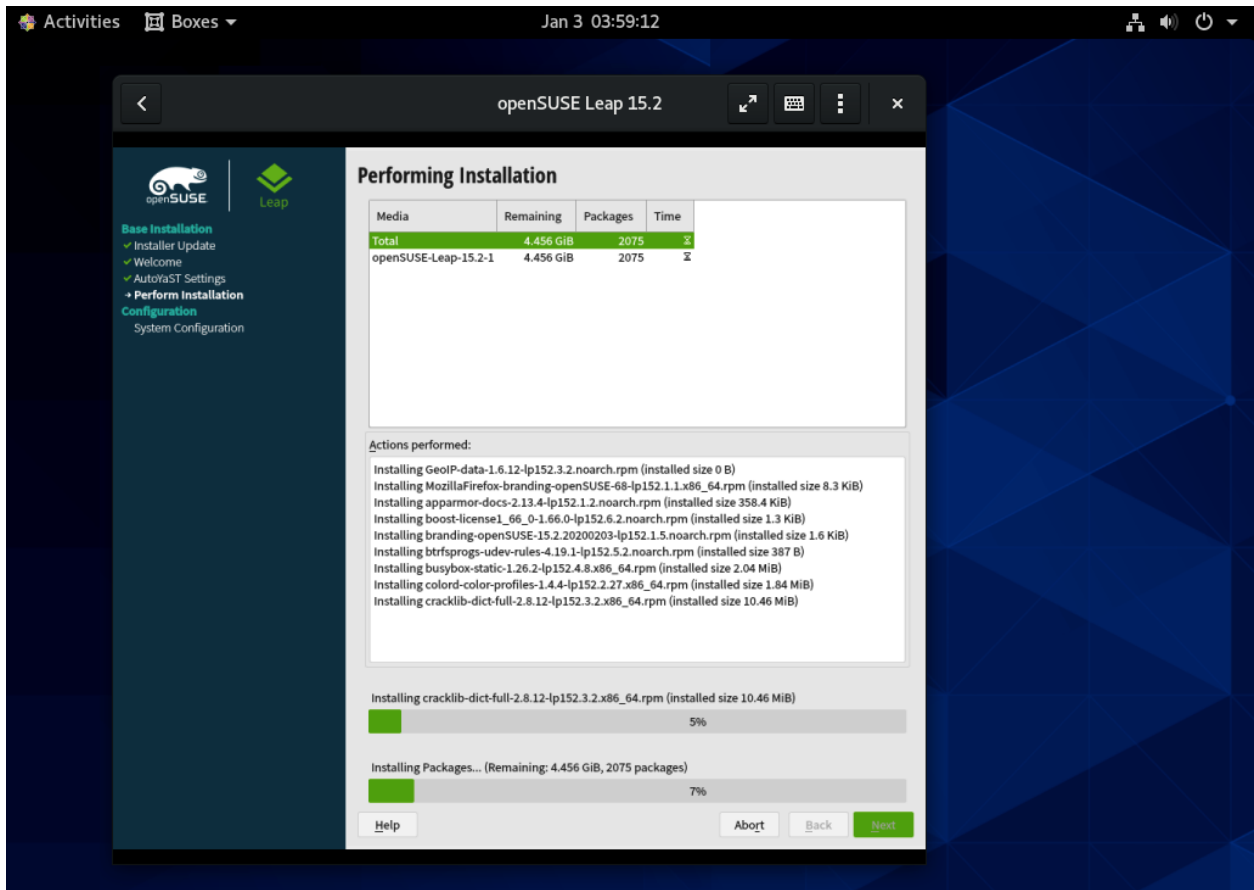
```
[root@localhost packt]# virsh list
```

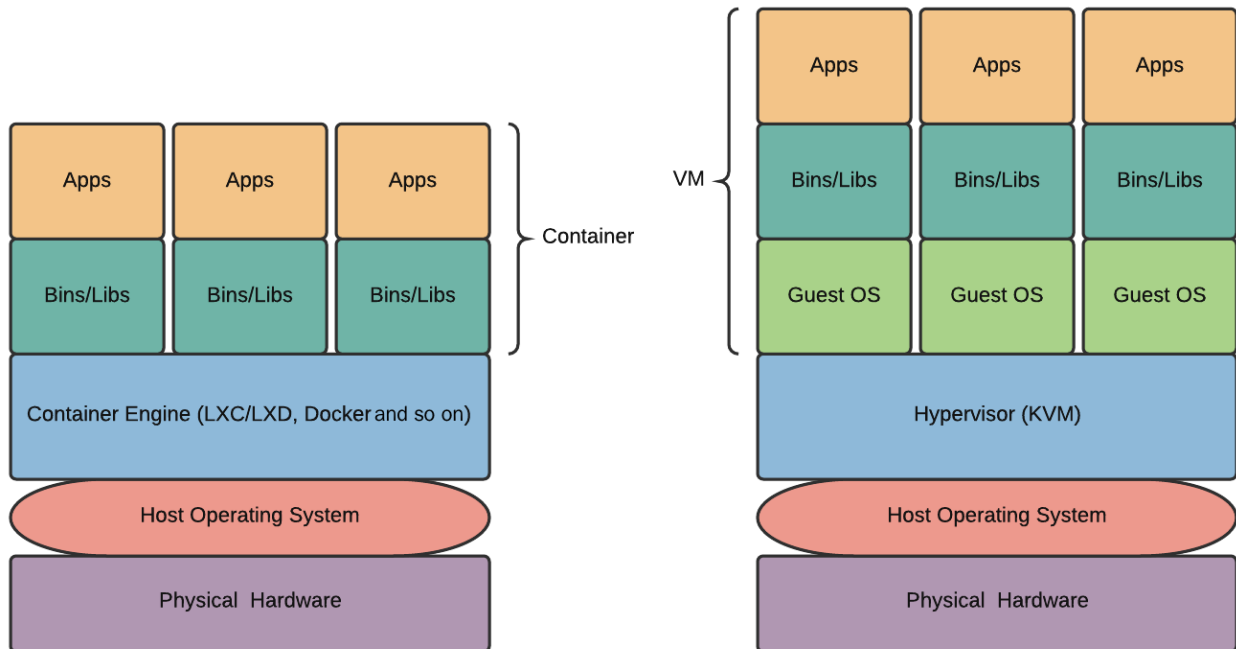
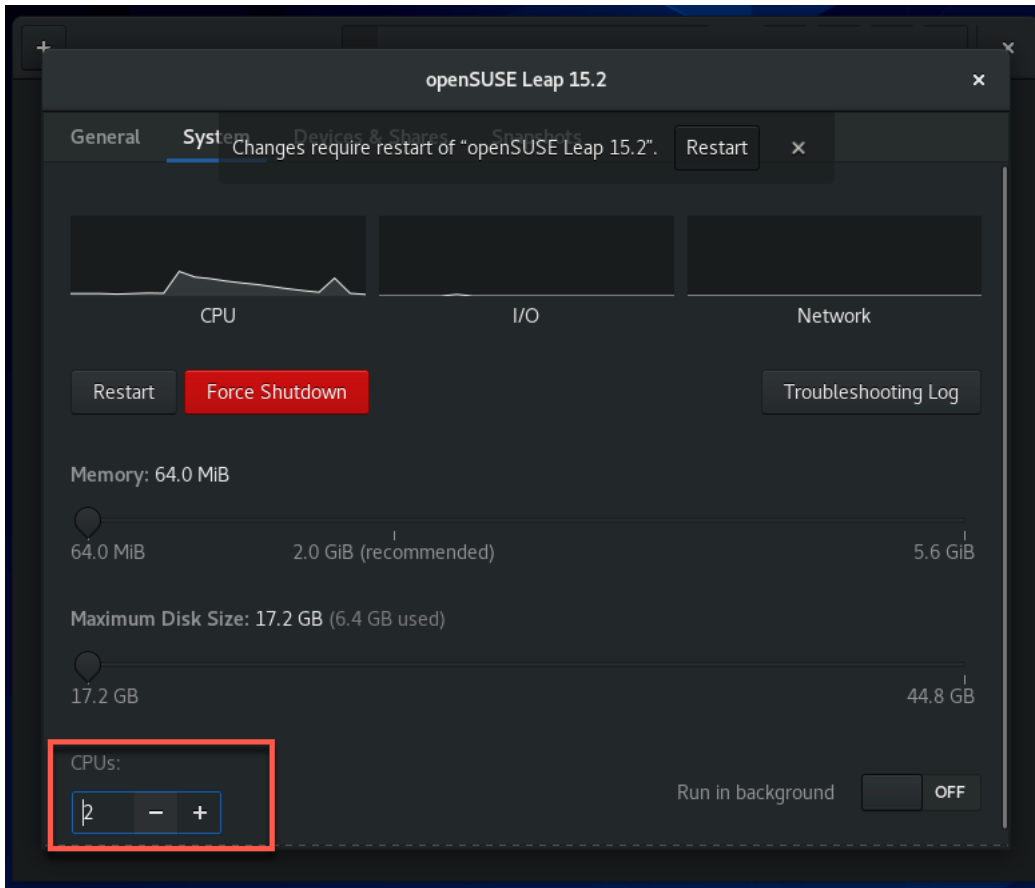
Id	Name	State
3	Debian-vm	running

```
[root@localhost packt]# virsh undefine Debian-vm
Domain Debian-vm has been undefined
```







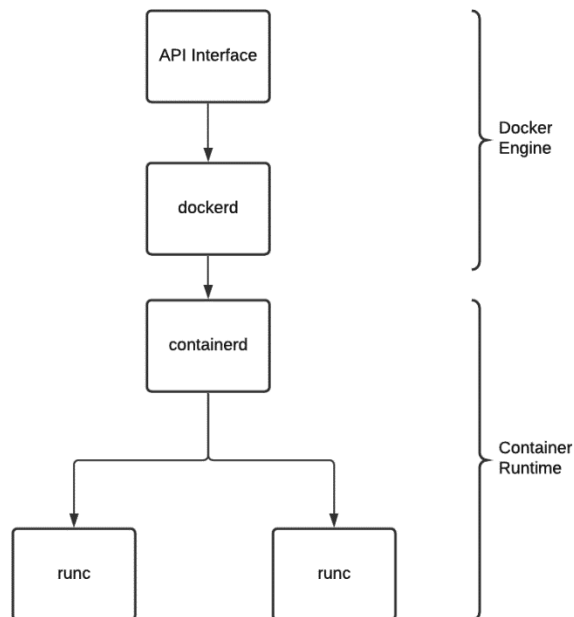
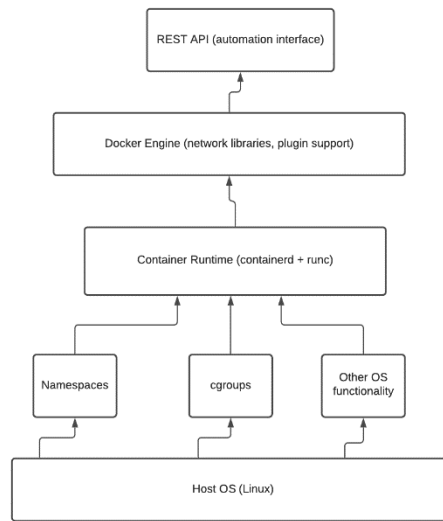


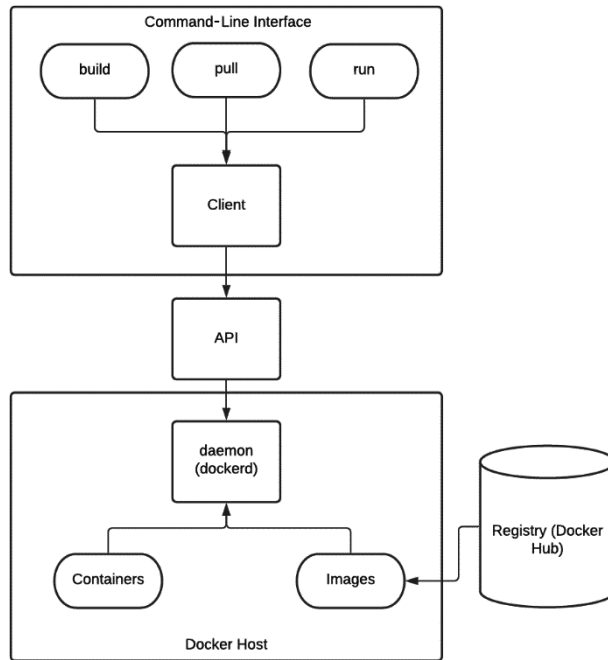
Containers versus Virtual Machines

```

packt@neptune:~$ lsns
      NS TYPE      NPROCS   PID USER  COMMAND
4026531835 cgroup    16    6144 packt /lib/systemd/systemd --user
4026531836 pid       16    6144 packt /lib/systemd/systemd --user
4026531837 user      16    6144 packt /lib/systemd/systemd --user
4026531838 uts       16    6144 packt /lib/systemd/systemd --user
4026531839 ipc       16    6144 packt /lib/systemd/systemd --user
4026531840 mnt       16    6144 packt /lib/systemd/systemd --user
4026532008 net       16    6144 packt /lib/systemd/systemd --user

```





```
packt@neptune:~$ curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo
apt-key add -
OK
```

```
packt@neptune:~$ sudo add-apt-repository "deb [arch=amd64] https://download.dock
er.com/linux/ubuntu $(lsb_release -cs) stable"
```

```
packt@neptune:~$ sudo apt update -y
Hit:1 http://ro.archive.ubuntu.com/ubuntu focal InRelease
Hit:2 http://security.ubuntu.com/ubuntu focal-security InRelease
Hit:3 http://ro.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:4 https://download.docker.com/linux/ubuntu focal InRelease
Hit:5 http://ro.archive.ubuntu.com/ubuntu focal-backports InRelease
```

```
packt@neptune:~$ sudo apt install docker-ce docker-ce-cli containerd.io
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  docker-ce-rootless-extras git git-man liberror-perl pigz slirp4netns
Suggested packages:
  aufs-tools cgroupfs-mount | cgroup-lite git-daemon-run | git-daemon-sysvinit
  git-doc git-el git-email git-gui gitk gitweb git-cvs git-mediawiki git-svn
The following NEW packages will be installed:
  containerd.io docker-ce docker-ce-cli docker-ce-rootless-extras git git-man
  liberror-perl pigz slirp4netns
0 upgraded, 9 newly installed, 0 to remove and 0 not upgraded.
Need to get 109 MB of archives.
After this operation, 488 MB of additional disk space will be used.
Do you want to continue? [Y/n]
```

```
packt@neptune:~$ apt-cache policy docker-ce
docker-ce:
  Installed: 5:20.10.2~3-0~ubuntu-focal
  Candidate: 5:20.10.2~3-0~ubuntu-focal
  Version table:
*** 5:20.10.2~3-0~ubuntu-focal 500
    500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
    100 /var/lib/dpkg/status
```

```
packt@neptune:~$ sudo systemctl status docker
[sudo] password for packt:
● docker.service - Docker Application Container Engine
  Loaded: loaded (/lib/systemd/system/docker.service; enabled; vendor preset)
  Active: active (running) since Sat 2021-01-09 14:31:35 EET; 21min ago
  TriggeredBy: ● docker.socket
    Docs: https://docs.docker.com
  Main PID: 7638 (dockerd)
    Tasks: 16
  Memory: 44.2M
  CGroup: /system.slice/docker.service
          └─7638 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/cont
```



```
packt@neptune:~$ sudo usermod -aG docker ${USER}
packt@neptune:~$ groups
packt adm cdrom sudo dip plugdev lpadmin lxd sambashare docker
```

```
packt@neptune:~$ sudo systemctl enable docker
Synchronizing state of docker.service with SysV service script with /lib/systemd
/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable docker
```

```
packt@neptune:~$ docker run hello-world
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
0e03bdcc26d7: Pull complete
Digest: sha256:1a523af650137b8acddaed439c17d684df61ee4d74feac151b5b337bd29e7eec
Status: Downloaded newer image for hello-world:latest
```

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:

1. The Docker client contacted the Docker daemon.
2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
(amd64)
3. The Docker daemon created a new container from that image which runs the executable that produces the output you are currently reading.
4. The Docker daemon streamed that output to the Docker client, which sent it to your terminal.

To try something more ambitious, you can run an Ubuntu container with:

```
$ docker run -it ubuntu bash
```

```

packt@neptune:~$ docker search ubuntu
NAME                                DESCRIPTION                                STARS  OFFICIAL  AUTOMATED
ubuntu                              Ubuntu is a Debian-based Linux operating sys... 11708  [OK]
dorowu/ubuntu-desktop-lxde-vnc      Docker image to provide HTML5 VNC interface ... 487    [OK]
websphere-liberty                   WebSphere Liberty multi-architecture images ... 266    [OK]
rastasheep/ubuntu-ssh                Dockerized SSH service, built on top of offi... 249    [OK]
consol/ubuntu-xfce-vnc               Ubuntu container with "headless" VNC session... 229    [OK]
ubuntu-upstart                       Upstart is an event-based replacement for th... 110    [OK]
neurodebian                          NeuroDebian provides neuroscience research s... 78     [OK]
landiinternet/ubuntu-16-nginx-php-phpmysql-5  ubuntu-16-nginx-php-phpmysql-5             50     [OK]
ubuntu-debootstrap                   debootstrap --variant=minbase --components=m... 44     [OK]
open-liberty                         Open Liberty multi-architecture images based... 42     [OK]
nuagebec/ubuntu                     Simple always updated Ubuntu docker images w... 24
i386/ubuntu                          Ubuntu is a Debian-based Linux operating sys... 24
landiinternet/ubuntu-16-apache-php-5.6  ubuntu-16-apache-php-5.6                   14     [OK]
landiinternet/ubuntu-16-apache-php-7.0  ubuntu-16-apache-php-7.0                   13     [OK]
landiinternet/ubuntu-16-nginx-php-phpmysql-mariadb-10  ubuntu-16-nginx-php-phpmysql-mariadb-10    11     [OK]
landiinternet/ubuntu-16-nginx-php-5.6-wordpress-4  ubuntu-16-nginx-php-5.6-wordpress-4        8     [OK]
landiinternet/ubuntu-16-apache-php-7.1  ubuntu-16-apache-php-7.1                   6     [OK]
darksheer/ubuntu                    Base Ubuntu Image -- Updated hourly         5     [OK]
pivotaldata/ubuntu                  A quick freshening-up of the base Ubuntu doc... 4
landiinternet/ubuntu-16-nginx-php-7.0  ubuntu-16-nginx-php-7.0                   4     [OK]
pivotaldata/ubuntu16.04-build        Ubuntu 16.04 image for GPDB compilation      2
smarterentry/ubuntu                  ubuntu with smarterentry                    1     [OK]
pivotaldata/ubuntu-gpdb-dev          Ubuntu images for GPDB development          1
landiinternet/ubuntu-16-php-7.1       ubuntu-16-php-7.1                           1     [OK]
pivotaldata/ubuntu16.04-test         Ubuntu 16.04 image for GPDB testing         0

```

```

packt@neptune:~$ docker pull ubuntu
Using default tag: latest
latest: Pulling from library/ubuntu
da7391352a9b: Pull complete
14428a6d4bcd: Pull complete
2c2d948710f2: Pull complete
Digest: sha256:c95a8e48bf88e9849f3e0f723d9f49fa12c5a00cfc6e60d2bc99d87555295e4c
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest

```

```

packt@neptune:~$ docker images
REPOSITORY    TAG       IMAGE ID       CREATED        SIZE
ubuntu        latest   f643c72bc252  6 weeks ago   72.9MB
hello-world   latest   bf756fb1ae65  12 months ago 13.3kB

```

```

packt@neptune:~$ docker run -it ubuntu
root@d70e5ff728b1:/#

```

```

packt@neptune:~$ docker ps
CONTAINER ID   IMAGE     COMMAND             CREATED         STATUS         PORTS          NAMES
d70e5ff728b1  ubuntu   "/bin/bash"        12 minutes ago Up 12 minutes   hopeful_ramanujan
packt@neptune:~$ docker ps -a
CONTAINER ID   IMAGE     COMMAND             CREATED         STATUS         PORTS          NAMES
d70e5ff728b1  ubuntu   "/bin/bash"        27 minutes ago Up 27 minutes   hopeful_ramanujan
d31545dc6fde  hello-world  "/hello"           6 hours ago    Exited (0) 6 hours ago    serene_kapitsa
packt@neptune:~$ docker ps -l
CONTAINER ID   IMAGE     COMMAND             CREATED         STATUS         PORTS          NAMES
d70e5ff728b1  ubuntu   "/bin/bash"        27 minutes ago Up 27 minutes   hopeful_ramanujan

```

```

packt@neptune:~$ docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
packt@neptune:~$ docker start hopeful_ramanujan
hopeful_ramanujan
packt@neptune:~$ docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
d70e5ff728b1  ubuntu   "/bin/bash"   About an hour ago   Up 3 seconds
hopeful_ramanujan
packt@neptune:~$ docker stop hopeful_ramanujan
hopeful_ramanujan
packt@neptune:~$ docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
packt@neptune:~$ docker rm hopeful_ramanujan
hopeful_ramanujan

```

```

packt@neptune:~$ docker images
REPOSITORY    TAG       IMAGE ID       CREATED        SIZE
ubuntu        latest   f643c72bc252   6 weeks ago   72.9MB
hello-world   latest   bf756fb1ae65   12 months ago 13.3kB
packt@neptune:~$ docker run -it ubuntu
root@29a56bb3ed4e:/# python -v
bash: python: command not found
root@29a56bb3ed4e:/# python3 -v
bash: python3: command not found

```

```

packt@neptune:~$ docker commit -m "added python 3 to ubuntu" -a "packt user" 47f75b9281d1 packt/ubuntu-python3
sha256:8c93d9ac6e7591d6d036fceeaa999bc215c4b8628c3c5f96d2732855abc25d14
packt@neptune:~$ docker images
REPOSITORY          TAG       IMAGE ID       CREATED        SIZE
packt/ubuntu-python3 latest   8c93d9ac6e75   14 seconds ago 144MB
ubuntu              latest   f643c72bc252   6 weeks ago   72.9MB
hello-world         latest   bf756fb1ae65   12 months ago 13.3kB

```

```
packt@neptune:~$ sudo wget https://www.free-css.com/assets/files/free-css-templates/download/page262/focus.zip
--2021-01-10 23:17:51-- https://www.free-css.com/assets/files/free-css-templates/download/page262/focus.zip
Resolving www.free-css.com (www.free-css.com)... 217.160.0.242, 2001:8d8:100f:f000::28f
Connecting to www.free-css.com (www.free-css.com)|217.160.0.242|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 911837 (890K) [application/zip]
Saving to: 'focus.zip'

focus.zip          100%[=====>] 890,47K  4,30MB/s   in 0,2s

2021-01-10 23:17:52 (4,30 MB/s) - 'focus.zip' saved [911837/911837]
```

GNU nano 4.8	Dockerfile	Modified
FROM nginx		
COPY . /usr/share/nginx/html_		

```
packt@neptune:~/focus$ nano Dockerfile
packt@neptune:~/focus$ ls
Dockerfile  css  images  index.html  js
packt@neptune:~/focus$ docker build -t static-website .
Sending build context to Docker daemon 1.921MB
Step 1/2 : FROM nginx
latest: Pulling from library/nginx
6ec7b7d162b2: Pull complete
cb420a90068e: Pull complete
2766c0bf2b07: Pull complete
e05167b6a99d: Pull complete
70ac9d795e79: Pull complete
Digest: sha256:4cf620a5c81390ee209398ecc18e5fb9dd0f5155cd82adcbae532fec94006fb9
Status: Downloaded newer image for nginx:latest
---> ae2feff98a0c
Step 2/2 : COPY . /usr/share/nginx/html
---> 25437390a7a1
Successfully built 25437390a7a1
Successfully tagged static-website:latest
```

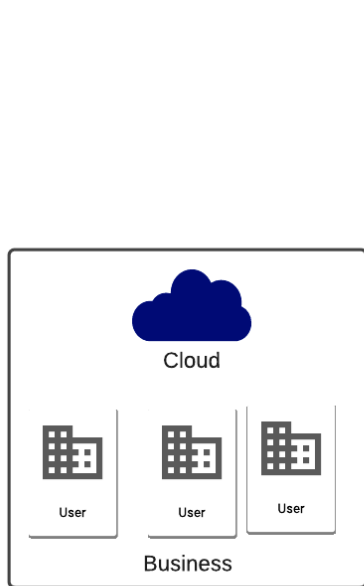
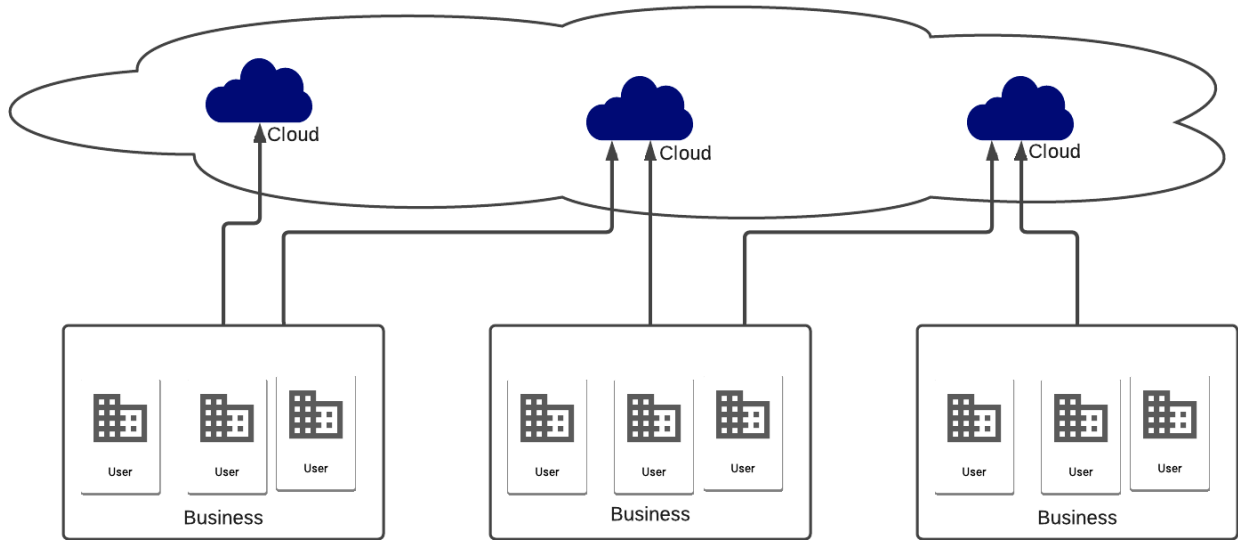
```
packt@neptune:~/focus$ docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
static-website	latest	25437390a7a1	12 minutes ago	135MB
packt/ubuntu-python3	latest	8c93d9ac6e75	3 hours ago	144MB
nginx	latest	ae2feff98a0c	3 weeks ago	133MB
ubuntu	latest	f643c72bc252	6 weeks ago	72.9MB
hello-world	latest	bf756fb1ae65	12 months ago	13.3kB

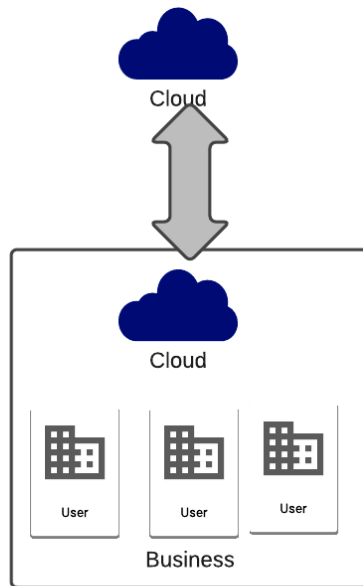
```
packt@neptune:~/focus$ docker run -it -d -p 8080:80 static-website  
7af4bcf4b3e898e189c1458cd7c31f4c5c89e5170d8acdcb79a6ef7386641db4
```

Chapter 12: Cloud Computing Essentials.

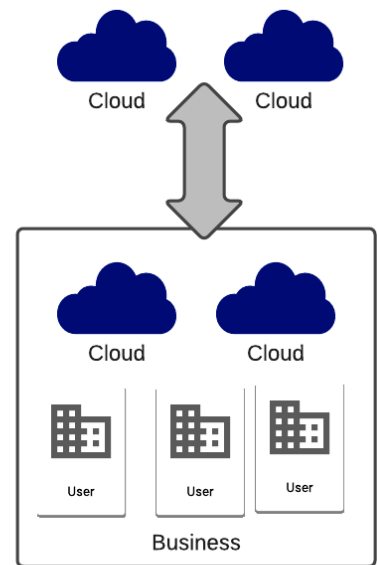
PUBLIC CLOUD



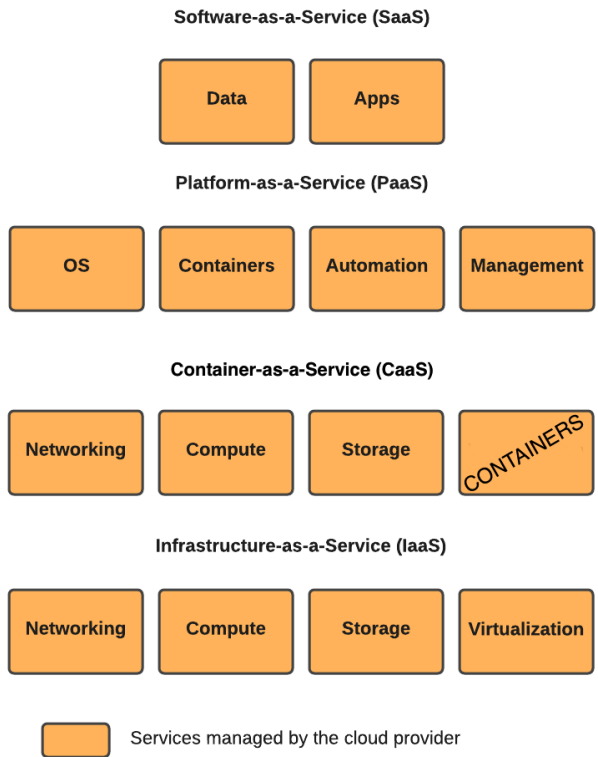
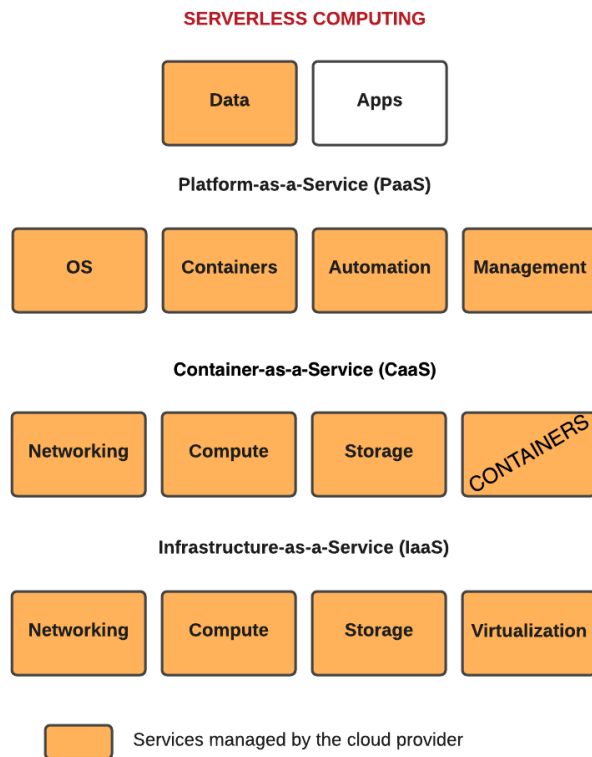
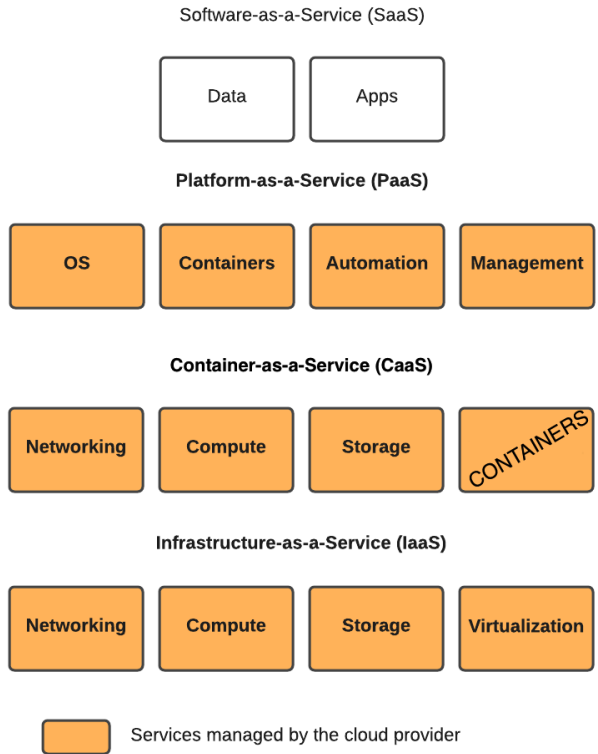
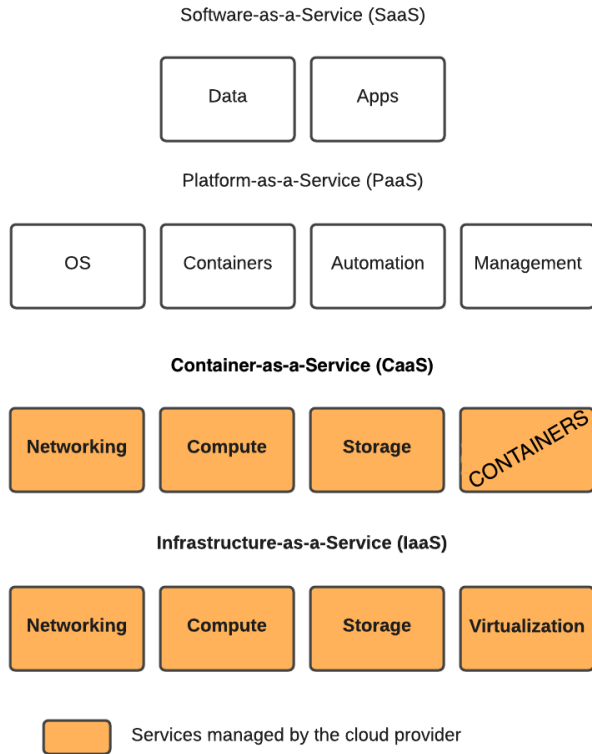
PRIVATE CLOUD

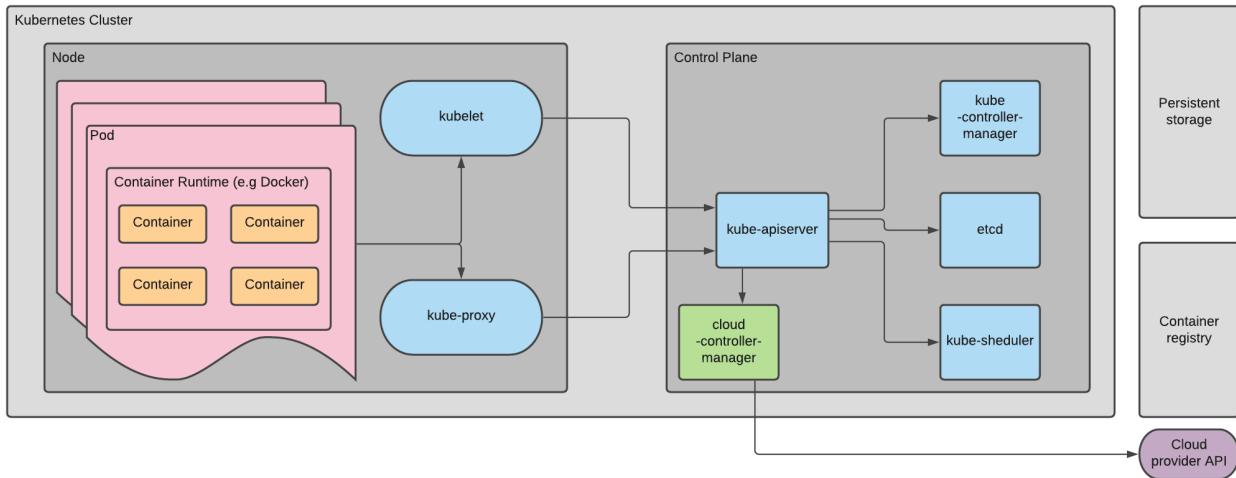
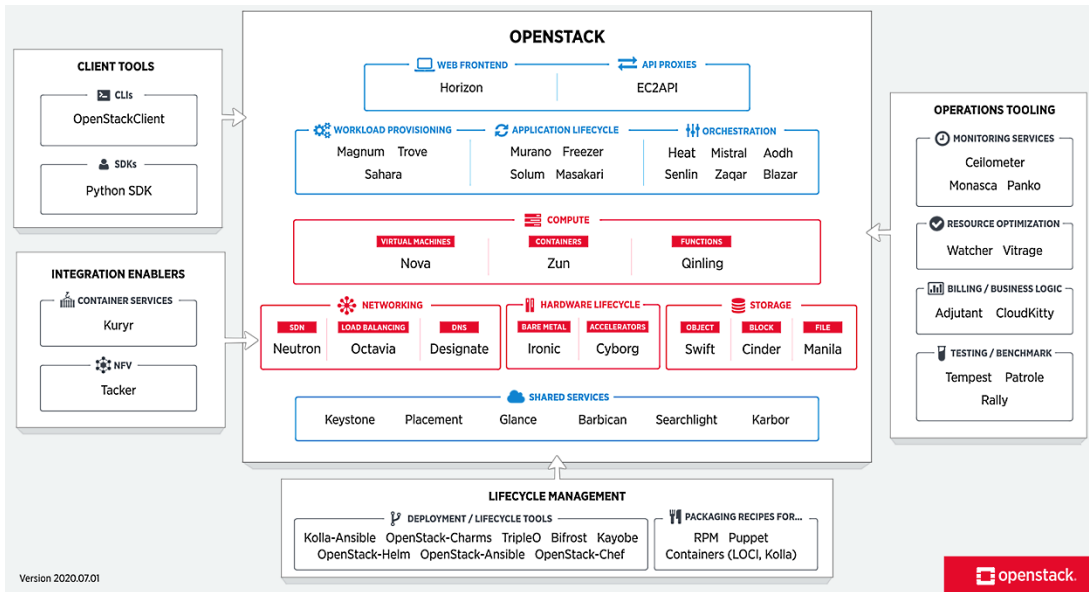


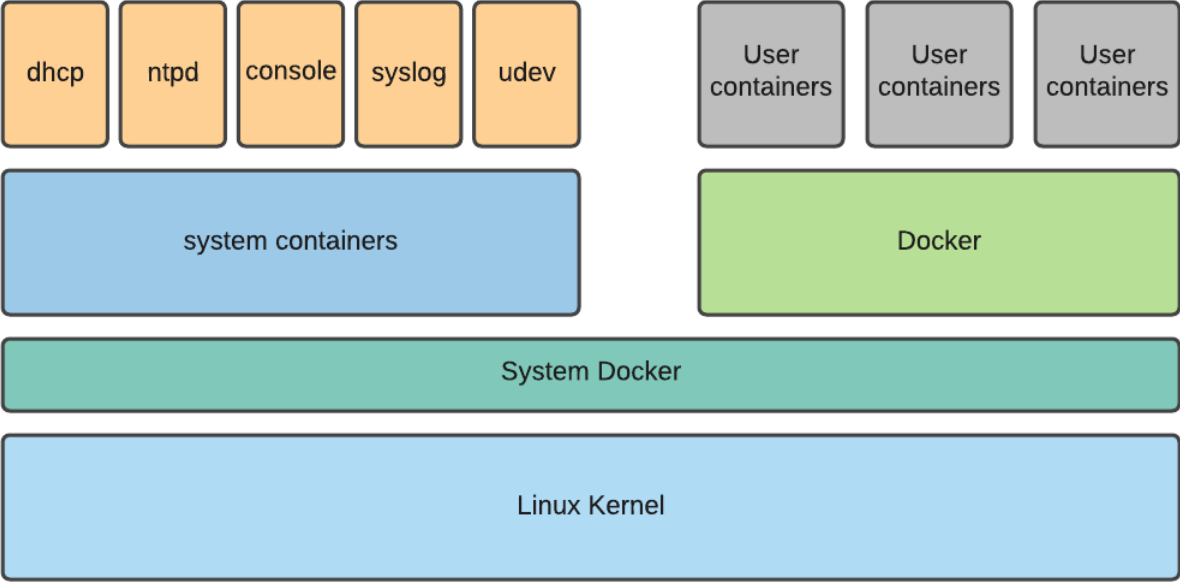
HYBRID CLOUD

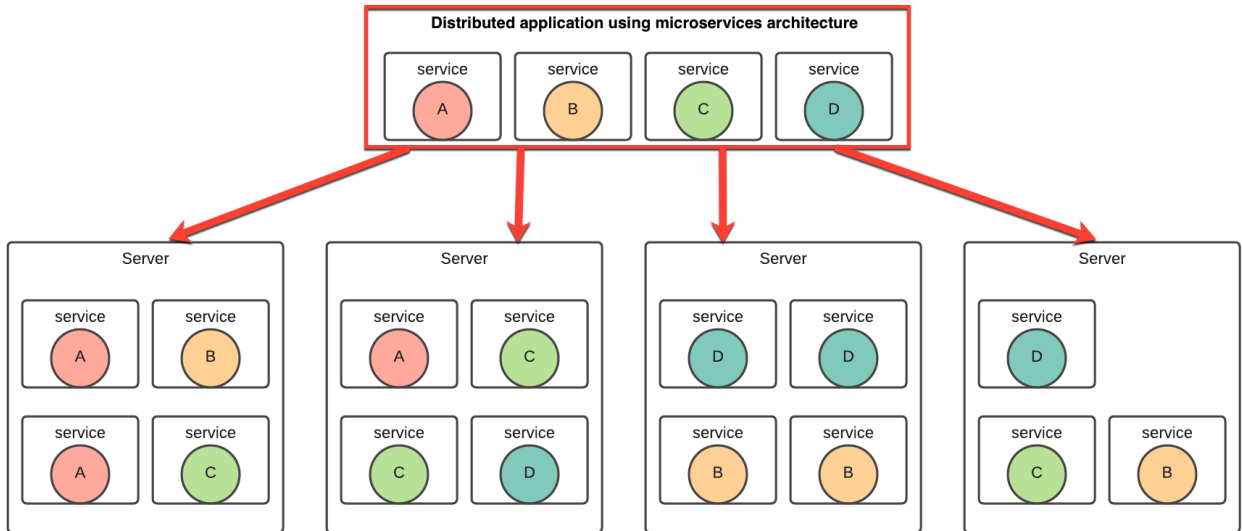
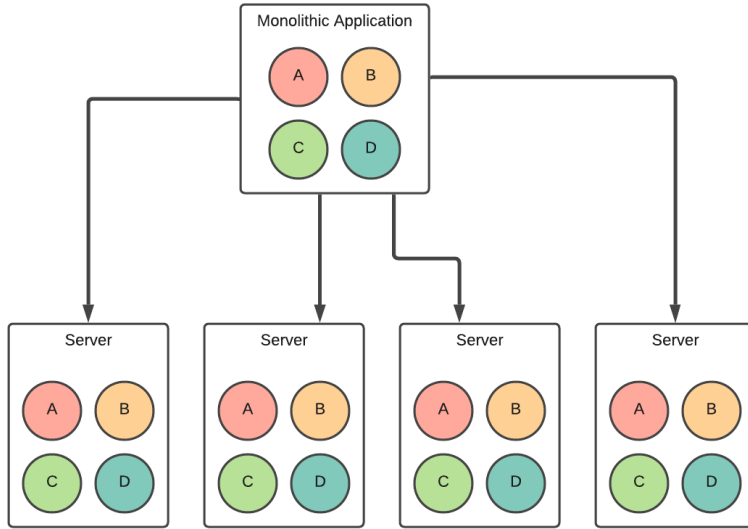


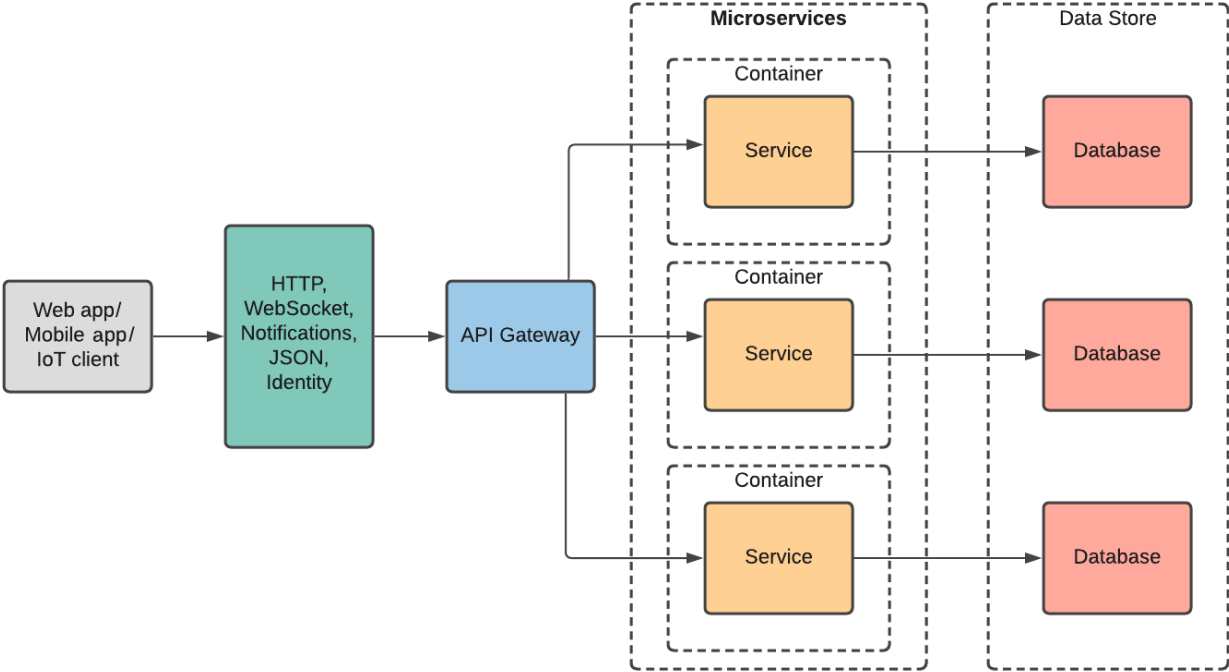
MULTI CLOUD



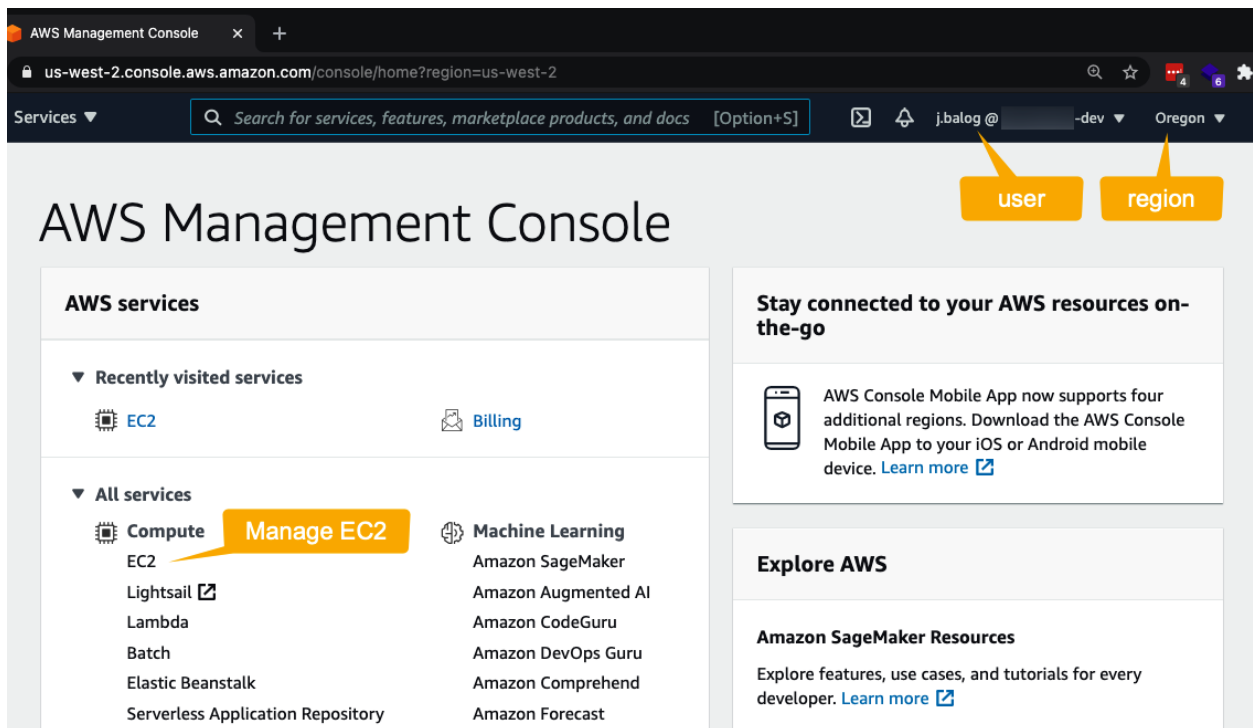
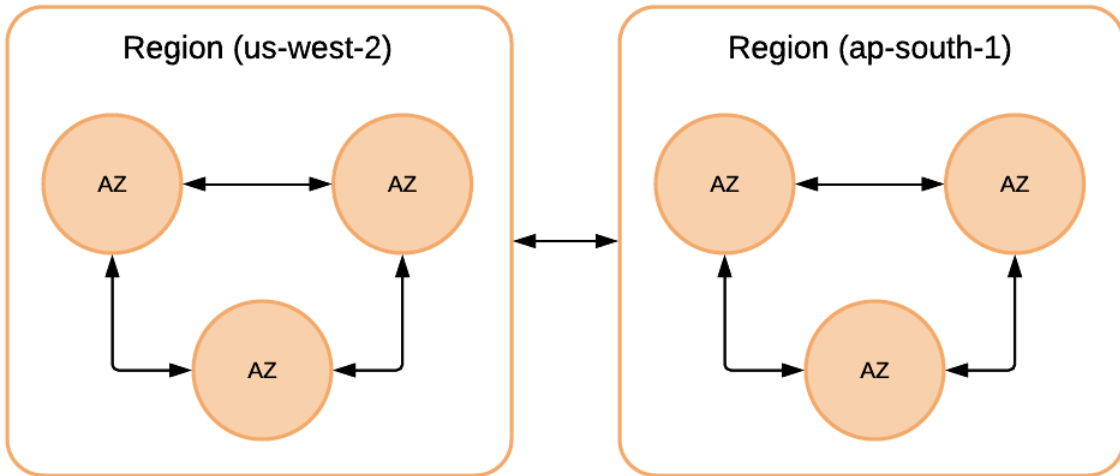








Chapter 13: Deploying to the Cloud with AWS and Azure.



▼ Instances

▼ Images

You are using the following Amazon EC2 resources in the US West (Oregon) Region:

Instances (running)	6	Dedicated Hosts	0
Elastic IPs	5	Instances	18
Key pairs	55	Load balancers	1
Placement groups	2	Security groups	88
Snapshots	6	Volumes	26

📘 Easily size, configure, and deploy Microsoft SQL Server Always On availability groups on AWS using the AWS Launch Wizard for SQL Server. [Learn more](#)

Launch instance

To get started, launch an Amazon EC2 instance, which is a virtual server in the cloud.

[Launch instance](#)

Note: Your instances will launch in the US West (Oregon) Region



Amazon Linux
Free tier eligible

Amazon Linux 2 AMI (HVM), SSD Volume Type - ami-0e999cbd62129e3b1 (64-bit x86) / ami-05c53e3ce52089c5c (64-bit Arm)

Amazon Linux 2 comes with five years support. It provides Linux kernel 4.14 tuned for optimal performance on Amazon EC2, systemd 219, GCC 7.3, Glibc 2.26, Binutils 2.29.1, and the latest software packages through extras. This AMI is the successor of the Amazon Linux AMI that is approaching end of life on December 31, 2020 and has been removed from this wizard.

Root device type: ebs Virtualization type: hvm ENA Enabled: Yes

Select

- 64-bit (x86)
- 64-bit (Arm)

Step 2: Choose an Instance Type

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instances are virtual servers that can run applications. They have varying combinations of CPU, memory, storage, and networking capacity, and give you the flexibility to choose the appropriate mix of resources for your applications. [Learn more](#) about instance types and how they can meet your computing needs.

Filter by: All instance families Current generation Show/Hide Columns

Currently selected: t2.micro (- ECUs, 1 vCPUs, 2.5 GHz, -, 1 GiB memory, EBS only)

	Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance	IPv6 Support
<input type="checkbox"/>	t2	t2.nano	1	0.5	EBS only	-	Low to Moderate	Yes
<input checked="" type="checkbox"/>	t2	t2.micro <small>Free tier eligible</small>	1	1	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	t2	t2.small	1	2	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	t2	t2.medium	2	4	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	t2	t2.large	2	8	EBS only	-	Low to Moderate	Yes

Cancel Previous Review and Launch Next: Configure Instance Details

Step 3: Configure Instance Details

Number of instances [Launch into Auto Scaling Group](#)

Purchasing option Request Spot instances

Network [Create new VPC](#)

Subnet [Create new subnet](#)

Auto-assign Public IP

Placement group Add instance to placement group

Capacity Reservation

Domain join directory [Create new directory](#)

IAM role [Create new IAM role](#)

CPU options Specify CPU options

Shutdown behavior

Cancel Previous Review and Launch Next: Add Storage

Step 4: Add Storage

Your instance will be launched with the following storage device settings. You can attach additional EBS volumes and instance store volumes to your instance, or edit the settings of the root volume. You can also attach additional EBS volumes after launching an instance, but not instance store volumes. [Learn more](#) about storage options in Amazon EC2.

Volume Type	Device	Snapshot	Size (GiB)	Volume Type	IOPS	Throughput (MB/s)	Delete on Termination	Encryption
Root	/dev/xvda	snap-036485f7aaef475e2	8	General Purpose S	100 / 3000	N/A	<input checked="" type="checkbox"/>	Not Encrypted

[Add New Volume](#)

Step 5: Add Tags

A tag consists of a case-sensitive key-value pair. For example, you could define a tag with key = Name and value = Webserver.

A copy of a tag can be applied to volumes, instances or both.

Tags will be applied to all instances and volumes. [Learn more](#) about tagging your Amazon EC2 resources.

Key	Value	Instances	Volumes	Network Interfaces
env	packt	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

[Add another tag](#) (Up to 50 tags maximum)

Step 6: Configure Security Group

A security group is a set of firewall rules that control the traffic for your instance. On this page, you can add rules to allow specific traffic to reach your instance. For example, if you want to set up a web server and allow Internet traffic to reach your instance, add rules that allow unrestricted access to the HTTP and HTTPS ports. You can create a new security group or select from an existing one below. [Learn more](#) about Amazon EC2 security groups.

- Assign a security group: Create a new security group
 Select an existing security group

Security group name:
Description:

Type	Protocol	Port Range	Source	Description
SSH	TCP	22	Custom 0.0.0.0/0	e.g. SSH for Admin Desktop

[Add Rule](#)

[Cancel](#) [Previous](#) [Review and Launch](#)

Step 7: Review Instance Launch

AMI Details

[Edit AMI](#)

Amazon Linux 2 AMI (HVM), SSD Volume Type - ami-0e999cbd62129e3b1

Free tier eligible

Amazon Linux 2 comes with five years support. It provides Linux kernel 4.14 tuned for optimal performance on Amazon EC2, systemd 219, GCC 7.3, Glibc 2.26, Binutils 2.29.1, and the latest software packages through extras. This AMI is the successor of the Amazon Linux AMI that is a...

Root Device Type: ebs Virtualization type: hvm

Instance Type

[Edit instance type](#)

Instance Type	ECUs	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
t2.micro	-	1	1	EBS only	-	Low to Moderate

Security Groups

[Edit security groups](#)

Security group name launch-wizard-20
Description launch-wizard-20 created 2021-02-16T16:09:01.682-08:00

Type <i>i</i>	Protocol <i>i</i>	Port Range <i>i</i>	Source <i>i</i>	Description <i>i</i>
SSH	TCP	22	0.0.0.0/0	

Instance Details

[Edit instance details](#)

[Cancel](#) [Previous](#) [Launch](#)

Select an existing key pair or create a new key pair



A key pair consists of a **public key** that AWS stores, and a **private key file** that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you to securely SSH into your instance.

Note: The selected key pair will be added to the set of keys authorized for this instance. Learn more about [removing existing key pairs from a public AMI](#).

Create a new key pair ▼

Key pair name

packt-ec2

[Download Key Pair](#)



You have to download the **private key file** (*.pem file) before you can continue. **Store it in a secure and accessible location.** You will not be able to download the file again after it's created.

[Cancel](#)

[Launch Instances](#)

Instances (1/1) Info Refresh Connect Instance state Actions Launch instances

Filter instances < 1 > Settings

env: packt Clear filters

<input checked="" type="checkbox"/>	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone
<input checked="" type="checkbox"/>	-	i-0cce7af9f2f1add27	Running	t2.micro	2/2 checks ...	No alarms +	us-west-2b

Instance: i-0cce7af9f2f1add27

Details Security Networking Storage Status checks Monitoring Tags

Instance summary Info

Instance ID	Public IPv4 address	Private IPv4 addresses
i-0cce7af9f2f1add27	34.220.165.82 open address	172.31.25.43
Instance state	Public IPv4 DNS	Private IPv4 DNS
Running	ec2-34-220-165-82.us-west-2.compute.amazonaws.com open address	ip-172-31-25-43.us-west-2.compute.internal

Purchase Reserved Instances

Only show offerings that reserve capacity

Platform **Linux/UNIX** Tenancy **Default** Offering Class **Convertible**

Instance Type **t2.micro** Term **1 months - 1...** Payment Option **All Upfront** Search

Seller	Term	Effective Rate	Upfront Price	Hourly Rate	Payment Option	Offering Class	Quantity Available	Desired Quantity	Normalized units per hour	
AWS	12 months	\$0.008	\$68.00	\$0.000	All Upfront	convertible	Unlimited	<input type="text" value="1"/>	0.5	Add to Cart

New EC2 Experience Tell us what you think

EC2 Dashboard New

Events New

Tags

Limits

INSTANCES

- Instances
- Instance Types
- Launch Templates
- Spot Requests** New
- Savings Plans
- Reserved Instances

EC2 > Spot Requests > Request Spot Instances

Request Spot Instances

Tell us your application or task need

To help us identify the most appropriate compute capacity for your job, select the closest match for your application or task need.

Load balancing workloads

Launch instances of the same size, in any Availability Zone. Good for running web services.

Flexible workloads

Launch instances of any size, in any Availability Zone. Good for running batch and CI/CD jobs.

Big data workloads

Launch instances of any size, in a single Availability Zone. Good for MapReduce jobs.

Defined duration workloads

Launch instances into a Spot block for 1 to 6 hours.

Step 3: Configure Instance Details

CPU options ⓘ Specify CPU options

Shutdown behavior ⓘ Stop

Stop - Hibernate behavior ⓘ Enable hibernation as an additional stop behavior

Enable termination protection ⓘ Protect against accidental termination

Monitoring ⓘ Enable CloudWatch detailed monitoring
Additional charges apply.

Tenancy ⓘ ✓ Shared - Run a shared hardware instance
Dedicated - Run a Dedicated instance
Dedicated host - Launch this instance on a Dedicated host
Additional charges apply.

Elastic Inference ⓘ Unlimited
Additional charges may apply

Credit specification ⓘ Unlimited
Additional charges may apply

Cancel Previous **Review and Launch** Next: Add Storage

- Instance Types
- Launch Templates
- Spot Requests
- Savings Plans
- Reserved Instances
- Dedicated Hosts**

EC2 > Dedicated Hosts

Dedicated Hosts

Refresh Dedicated Host Reservations Config recording ⊗ Off Actions Allocate Dedicated Host

< 1 > Settings

- New EC2 Experience** Tell us what you think
- EC2 Dashboard **New**
- Events
- Tags
- Limits
- ▼ **Instances**
- Instances** **New**
- Instance Types
- Launch Templates
- Spot Requests

Instances (1/1) Info Refresh Connect Instance state Actions Launch instances

env: packt Clear filters

<input checked="" type="checkbox"/>	Name	Instance ID	Instance state	Instance type
<input checked="" type="checkbox"/>	-	i-Occe7af9f2f1add27	Running	t2.micro

Actions dropdown menu:

- Connect
- View details
- Manage instance state
- Instance settings
- Networking
- Security
- Image and templates**
- Monitor and troubleshoot

Image and templates sub-menu:

- Create image
- Create template from instance
- Launch more like this

- Reserved Instances
- Dedicated Hosts
- Scheduled Instances
- Capacity Reservations

▼ Images

AMIs

▼ Elastic Block Store

- Volumes
- Snapshots
- Lifecycle Manager

▼ Network & Security

- Security Groups **New**
- Elastic IPs **New**
- Placement Groups
- Key Pairs
- Network Interfaces **New**

EC2 > Placement groups > Create placement group

Create placement group

Placement group settings

Name

packt

Placement strategy

Determines how the instances are placed on the underlying hardware.

Choose strategy

Cluster

Spread

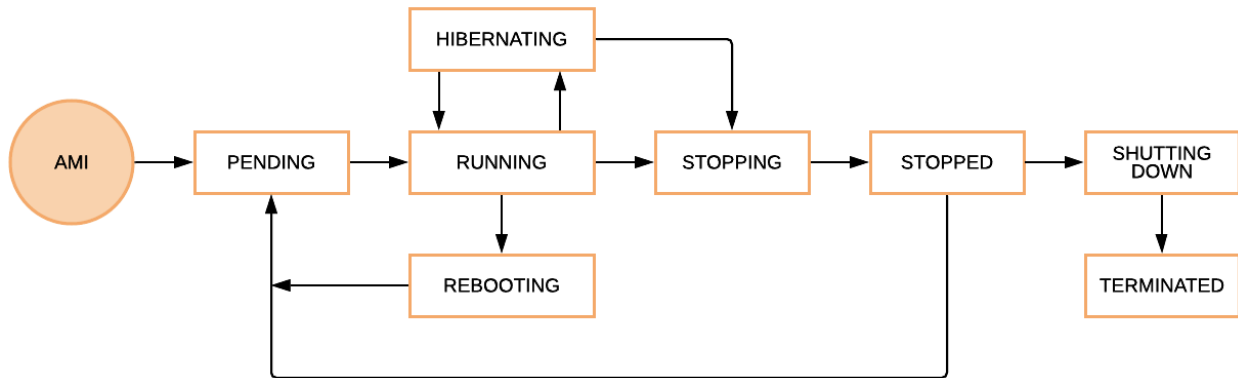
Partition

Add tag

You can add 50 more tags.

Cancel

Create group



<input checked="" type="checkbox"/>	Name ▾	Instance ID	Instance state ▾	Instance type ▾	Status check	Alarm status
<input checked="" type="checkbox"/>	-	i-0cce7af9f2f1add27	✔ Running 🔍	t2.micro	✔ 2/2 checks ...	No alarms +

Instance: i-0cce7af9f2f1add27

Details | Security | Networking | Storage | Status checks | Monitoring | Tags

▼ Instance summary [Info](#)

Instance ID	Public IPv4 address	Private IPv4 addresses
i-0cce7af9f2f1add27	34.220.165.82 open address	172.31.25.43
Instance state	Public IPv4 DNS	Private IPv4 DNS
✔ Running	ec2-34-220-165-82.us-west-2.compute.amazonaws.com open address	ip-172-31-25-43.us-west-2.compute.internal

Instances (1/1) [Info](#) **Connect** Instance state ▾ Actions ▾ **Launch instances** ▾

🔍 Filter instances < 1 > ⚙️

env: packt ✕

<input checked="" type="checkbox"/>	Name ▾	Instance ID	Instance state ▾	Instance type ▾	Status check	Alarm status
<input checked="" type="checkbox"/>	-	i-0cce7af9f2f1add27	✔ Running 🔍	t2.micro	✔ 2/2 checks ...	No alarms +

Connect to instance [Info](#)

Connect to your instance i-0cce7af9f2f1add27 using any of these options

EC2 Instance Connect


Session Manager

SSH client

Instance ID

 [i-0cce7af9f2f1add27](#)


1. Open an SSH client.
2. Locate your private key file. The key used to launch this instance is packt-ec2.pem
3. Run this command, if necessary, to ensure your key is not publicly viewable.

 `chmod 400 packt-ec2.pem`

4. Connect to your instance using its Public DNS:

 `ec2-34-220-165-82.us-west-2.compute.amazonaws.com`

Example:

 `ssh -i "packt-ec2.pem" ec2-user@ec2-34-220-165-82.us-west-2.compute.amazonaws.com`

```
➔ packt ssh -i aws/packt-ec2.pem ec2-user@34.220.165.82
Last login: Thu Feb 18 22:57:17 2021 from 50.47.133.167

  _ | _ | _ )
  _ | (   /   Amazon Linux 2 AMI
  _ | \  | _ |

https://aws.amazon.com/amazon-linux-2/
[ec2-user@ip-172-31-25-43 ~]$
```

<input checked="" type="checkbox"/>	Name	Instance ID	Instance state	Instance type	Status check	Alarm status
<input checked="" type="checkbox"/>	-	i-0cce7af9f2f1add27	Running	t2.micro	2/2 checks ...	No alarms +

☰
🖨️ 📄 🗑️

Details
Security
Networking
Storage
Status checks
Monitoring
Tags

▼ Security details

IAM Role -	Owner ID 📄 477583744065	Launch time Tue Feb 16 2021 17:40:30 GMT-0800 (Pacific Standard Time)
Security groups 📄 sg-085a5bad81621f926 (launch-wizard-20) ←		

▼ Inbound rules

< 1 >

Port range	Protocol	Source	Security groups
22	TCP	0.0.0.0/0	launch-wizard-20

▶ Outbound rules

Inbound rules
Outbound rules
Tags

Inbound rules

Edit inbound rules

Type	Protocol	Port range	Source	Description - optional
SSH	TCP	22	0.0.0.0/0	-

Inbound rules [Info](#)

Type Info	Protocol Info	Port range Info	Source Info	Description - optional Info		
HTTP ▼	TCP	80	Custom ▼	<input type="text" value="0.0.0.0/0"/> ✕		Delete
HTTPS ▲ <input type="text" value="Q"/> HTTPS	TCP	443	Custom ▼	<input type="text" value="Q"/>		Delete

Create Volume

Volume Type ⓘ

Size (GiB) (Min: 1 GiB, Max: 16384 GiB) ⓘ

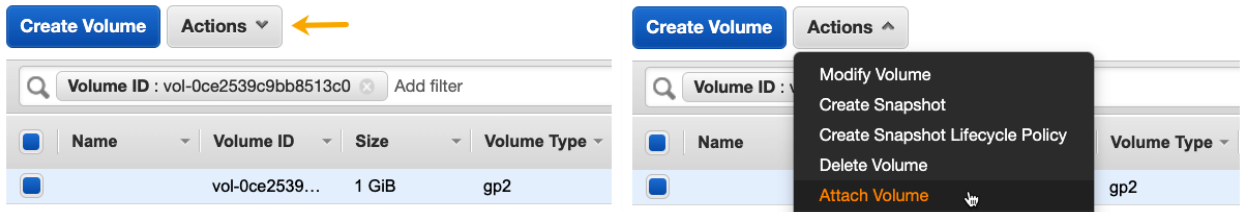
IOPS 100 / 3000 (Baseline of 3 IOPS per GiB with a minimum of 100 IOPS, burstable to 3000 IOPS) ⓘ

Throughput (MB/s) Not applicable ⓘ

Availability Zone* ⓘ

Snapshot ID ⓘ ⓘ

Encryption Encrypt this volume



Attach Volume

Volume ⓘ vol-0ce2539c9bb8513c0 in us-west-2b

Instance ⓘ ⓘ in us-west-2b

Device ⓘ

Linux Devices: /dev/sdf through /dev/sdp

Volume ID	Size	Volume Type	IOPS	Availability Zone	State
vol-0ce2539...	1 GiB	gp2	100	us-west-2b	  in-use

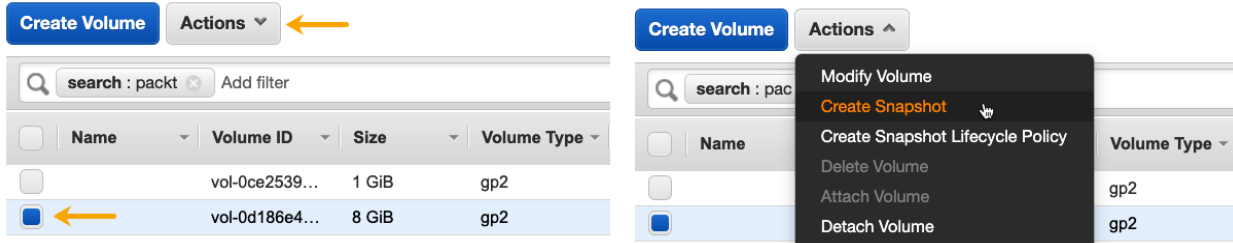
```
[ec2-user@ip-172-31-25-43 ~]$ lsblk
NAME        MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
xvda        202:0    0   8G  0 disk
└─xvda1     202:1    0   8G  0 part /
xvdf        202:80   0   1G  0 disk
```

```
[ec2-user@ip-172-31-25-43 ~]$ sudo file -s /dev/xvdf
/dev/xvdf: data
```

```
[ec2-user@ip-172-31-25-43 ~]$ sudo mkfs -t xfs /dev/xvdf
meta-data=/dev/xvdf          isize=512    agcount=4, agsize=65536 blks
                =               sectsz=512   attr=2, projid32bit=1
                =               crc=1        finobt=1, sparse=0
data        =               bsize=4096  blocks=262144, imaxpct=25
                =               sunit=0      swidth=0 blks
naming      =version 2      bsize=4096  ascii-ci=0  ftype=1
log         =internal log  bsize=4096  blocks=2560, version=2
                =               sectsz=512   sunit=0 blks, lazy-count=1
realtime    =none          extsz=4096  blocks=0,   rtextents=0
```

```
[ec2-user@ip-172-31-25-43 ~]$ sudo file -s /dev/xvdf
/dev/xvdf: SGI XFS filesystem data (blksz 4096, inosz 512, v2 dirs)
```

```
[ec2-user@ip-172-31-25-43 ~]$ sudo touch /packt/README.md
[ec2-user@ip-172-31-25-43 ~]$ ls -la /packt
total 0
drwxr-xr-x  2 root root  23 Feb 20 00:10 .
dr-xr-xr-x 19 root root 270 Feb 20 00:07 ..
-rw-r--r--  1 root root   0 Feb 20 00:10 README.md
```

[Volumes](#) > Create Snapshot

Create Snapshot

Volume vol-0d186e402d2f54fd0 ⓘ

Description ⓘ

Encrypted Not Encrypted ⓘ

<input type="checkbox"/>	Name	Snapshot ID	Size	Description	Status
<input type="checkbox"/>		→ snap-0ddd84ea954adfb17	8 GiB	packt-backup	● completed

Create Volume

Volume Type ⓘ

Size (GiB) (Min: 1 GiB, Max: 16384 GiB) ⓘ

IOPS 100 / 3000 (Baseline of 3 IOPS per GiB with a minimum of 100 IOPS, burstable to 3000 IOPS) ⓘ

Throughput (MB/s) Not applicable ⓘ

Availability Zone* ⓘ

Snapshot ID ⓘ

<input type="checkbox"/>	Name	Volume ID	Size	Volume Type	Snapshot	Availability Zone	State
<input checked="" type="checkbox"/>	→	vol-09a979c...	8 GiB	gp2	→ snap-0ddd84ea954adfb17	us-west-2b →	available
<input type="checkbox"/>		vol-0ce2539...	1 GiB	gp2		us-west-2b	in-use
<input type="checkbox"/>		vol-0d186e4...	8 GiB	gp2	snap-036485f7aaef475e2	us-west-2b	in-use

<input type="checkbox"/>	Name	Volume ID	Size	Volume Type	Snapshot	Availability Zone	State
<input checked="" type="checkbox"/>		vol-09a979c...	8 GiB	gp2		s-west-2b	available
<input type="checkbox"/>		vol-0ce2539...	1 GiB	gp2		s-west-2b	in-use
<input type="checkbox"/>		vol-0d186e4...	8 GiB	gp2		s-west-2b	available

- Modify Volume
- Create Snapshot
- Create Snapshot Lifecycle Policy
- Delete Volume
- Attach Volume

Attach Volume

Volume ⓘ vol-09a979c8a89e4fe61 in us-west-2b

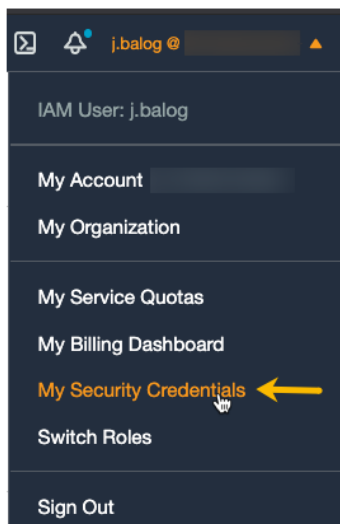
Instance ⓘ ← in us-west-2b

Device ⓘ ←

Linux Devices: /dev/sdf through /dev/sdp

```
packt@neptune:~$ aws --version
aws-cli/2.1.27 Python/3.7.3 Linux/5.4.0-65-generic exe/x86_64.ubuntu.20 prompt/off
```

```
packt@neptune:~$ aws configure
AWS Access Key ID [None]: ██████████
AWS Secret Access Key [None]: ██████████
Default region name [None]: us-west-2
Default output format [None]:
```



AWS IAM credentials | AWS CodeCommit credentials | Amazon MCS credentials

Password for console access

As an IAM user, you need a password to access the AWS Management Console. We recommend [more](#)

Access keys for CLI, SDK, & API access

Use access keys to make programmatic calls to AWS from the AWS CLI, Tools for PowerShell, maximum of two access keys (active or inactive) at a time.

For your protection, you should never share your secret keys with anyone. As a best practice, **If you lose or forget your secret key, you cannot retrieve it. Instead, create a new access**

←

```
{
  "InstanceId": "i-0cce7af9f2f1add27",
  "ImageId": "ami-0e999cbd62129e3b1",
  "BlockDeviceMappings": [
    {
      "DeviceName": "/dev/sdf", ←
      "Ebs": {
        "AttachTime": "2021-02-19T22:59:54+00:00",
        "DeleteOnTermination": false,
        "Status": "attached",
        "VolumeId": "vol-0ce2539c9bb8513c0"
      }
    },
    {
      "DeviceName": "/dev/xvda", ←
      "Ebs": {
        "AttachTime": "2021-02-20T01:59:10+00:00",
        "DeleteOnTermination": false,
        "Status": "attached",
        "VolumeId": "vol-09a979c8a89e4fe61"
      }
    }
  ]
}
```

```
packt@neptune:~$ aws ec2 describe-instances \
> --filters "Name=image-id,Values=ami-0e999cbd62129e3b1"
{
  "Reservations": [
    {
      "Groups": [],
      "Instances": [
        {
          "AmiLaunchIndex": 0,
          "ImageId": "ami-0e999cbd62129e3b1",
          "InstanceId": "i-0cce7af9f2f1add27",
          "InstanceType": "t2.micro",
          "KeyName": "packt-ec2",
          "LaunchTime": "2021-02-20T01:59:28+00:00",
          "Monitoring": {
            "State": "disabled"
          },
          "Placement": {
            "AvailabilityZone": "us-west-2b",
            "GroupName": "",
            "Tenancy": "default"
          },
        },
      ],
    },
  ],
}
```

```
packt@neptune:~$ aws ec2 describe-instances \
> --filters "Name=instance-id,Values=i-0cce7af9f2f1add27" \
> --query "Reservations[].Instances[].SecurityGroups[]"
[
  {
    "GroupName": "launch-wizard-20",
    "GroupId": "sg-085a5bad81621f926"
  }
]
```

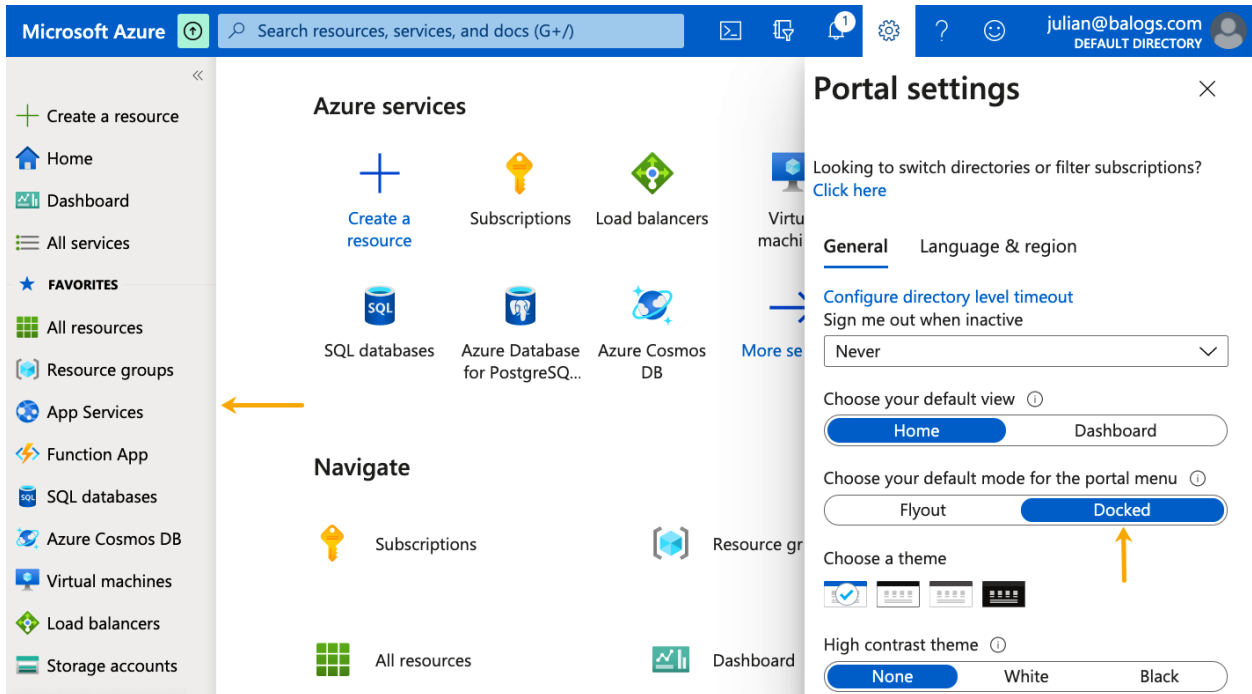
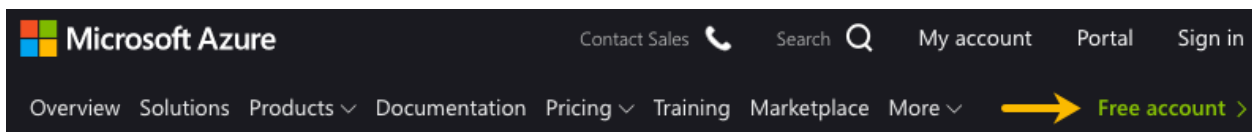
```
packt@neptune:~$ aws ec2 run-instances \  
> --image-id ami-0e999cbd62129e3b1\  
> --count 1 \  
> --instance-type t1.micro \  
> --key-name packt-ec2 \  
> --security-group-ids sg-085a5bad81621f926  
{  
  "Groups": [],  
  "Instances": [  
    {  
      "AmiLaunchIndex": 0,  
      "ImageId": "ami-0e999cbd62129e3b1",  
      "InstanceId": "i-0e1692c9dfdf07a8d",  
      "InstanceType": "t1.micro",  
      "KeyName": "packt-ec2",  
      "LaunchTime": "2021-02-22T09:15:17+00:00",  
    }  
  ]  
}
```

```
packt@neptune:~$ aws ec2 describe-instances \  
> --filters "Name=tag-key,Values=env" \  
> --filters "Name=tag-value,Values=packt" \  
> --query "Reservations[].Instances[].InstanceId"  
[  
  "i-0e1692c9dfdf07a8d",  
  "i-0cce7af9f2f1add27"  
]
```

```
packt@neptune:~$ aws ec2 create-volume \  
> --volume-type gp2 \  
> --size 8 \  
> --availability-zone us-west-2b  
{  
  "AvailabilityZone": "us-west-2b",  
  "CreateTime": "2021-02-23T00:39:58+00:00",  
  "Encrypted": false,  
  "Size": 8,  
  "SnapshotId": "",  
  "State": "creating",  
  "VolumeId": "vol-0b05bf6d96810cf80",  
  "Iops": 100,  
  "Tags": [],  
  "VolumeType": "gp2",  
  "MultiAttachEnabled": false  
}
```

```
packt@neptune:~$ aws ec2 attach-volume \  
> --volume-id vol-0b05bf6d96810cf80 \  
> --instance-id i-0e1692c9dfdf07a8d \  
> --device /dev/sdf  
{  
  "AttachTime": "2021-02-23T01:16:07.100000+00:00",  
  "Device": "/dev/sdf",  
  "InstanceId": "i-0e1692c9dfdf07a8d",  
  "State": "attaching",  
  "VolumeId": "vol-0b05bf6d96810cf80"  
}
```

```
packt@neptune:~$ aws ec2 terminate-instances --instance-ids i-0e1692c9dfdf07a8d
{
  "TerminatingInstances": [
    {
      "CurrentState": {
        "Code": 32,
        "Name": "shutting-down" ←
      },
      "InstanceId": "i-0e1692c9dfdf07a8d", ←
      "PreviousState": {
        "Code": 16,
        "Name": "running"
      }
    }
  ]
}
```





+ Create a resource ←

Home

Dashboard

All services

Azure services

→ +
Create a resource



Subscriptions

Home >

New

Blockchain

Compute

Containers

Databases

Developer Tools

DevOps

Identity

Integration

Internet of Things



Kubernetes Service
Quickstarts + tutorials



Function App
Quickstarts + tutorials



Ubuntu Server 18.04 LTS
Learn more



Red Hat Enterprise Linux 8.2 (LVM)
Learn more ←



Create a virtual machine

- Basics**
- Disks
- Networking
- Management
- Advanced
- Tags
- Review + create

Create a virtual machine that runs Linux or Windows. Select an image from Azure marketplace or use your own customized image. Complete the Basics tab then Review + create tab for full customization. [Learn more](#)

Project details

Select the subscription to manage deployment of your resources.

Subscription * ⓘ

Resource group * ⓘ

A resource group is a container that holds related resources for an Azure solution.

Name *

[Create new](#)

Subscription * ⓘ

Resource group * ⓘ

Free Azure Subscription

(New) packt-demo

[Create new](#)

Instance details

Virtual machine name * ⓘ

Region * ⓘ

Availability options ⓘ

Image * ⓘ

Size * ⓘ

packt-rhel

(US) West US

No infrastructure redundancy required

 Red Hat Enterprise Linux 8.2 (LVM) - Gen1

[See all images](#)

Standard_A2_v2 - 2 vcpus, 4 GiB memory (\$66.43/month)

[See all sizes](#)

Administrator account

Authentication type ⓘ

- SSH public key
 Password

i Azure now automatically generates an SSH key pair for you and allows you to store it for future use. It is a fast, simple, and secure way to connect to your virtual machine.

Username * ⓘ

packt ✓

SSH public key source

Generate new key pair ✓

Key pair name *

packt-rhel ✓

Inbound port rules

Select which virtual machine network ports are accessible from the public internet. You can specify more limited or granular network access on the Networking tab.

Public inbound ports * ⓘ

- None
 Allow selected ports

Select inbound ports *

SSH (22) ✓

⚠ This will allow all IP addresses to access your virtual machine. This is only recommended for testing. Use the Advanced controls in the Networking tab to create rules to limit inbound traffic to known IP addresses.

Review + create



< Previous

Next : Disks >

✓ Validation passed

Basics Disks Networking Management Advanced Tags Review + create

PRODUCT DETAILS

Standard A2 v2

by Microsoft

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Retail price 0.0910 USD/hr

[Pricing for other VM sizes](#)

TERMS

By clicking "Create", I (a) agree to the legal terms and privacy statement(s) associated with the Marketplace offering(s) listed above; (b) authorize Microsoft to bill my current payment method for the fees associated with the offering(s), with the same billing frequency as my Azure subscription; and (c) agree that Microsoft may share my contact, usage and transactional information with the provider(s) of the offering(s) for support, billing and other transactional activities. Microsoft does not provide rights for third-party offerings. See the [Azure Marketplace Terms](#) for additional details.

Create

< Previous

Next >

[Download a template for automation](#)

Generate new key pair

i An SSH key pair contains both a public key and a private key. **Azure doesn't store the private key.** After the SSH key resource is created, you won't be able to download the private key again. [Learn more](#) ↗

[Download private key and create resource](#)

[Return to create a virtual machine](#)

✔ Deployment succeeded

6:02 PM ✕

Deployment 'CreateVm-RedHat.RHEL-8.2-20210220174446' to resource group 'packt-demo' was successful.

[Go to resource](#)

[Pin to dashboard](#)

✔ Your deployment is complete



Deployment name: CreateVm-RedHat.RHEL-8.2-20210220174446
Subscription: [Free Azure Subscription](#)
Resource group: [packt-demo](#)

Start time:
Correlation

^ Deployment details [\(Download\)](#)

Resource	Type	Status
✔ packt-rhel	Microsoft.Compute/virtual...	OK
✔ packt-rhel330	Microsoft.Network/networ...	Created
✔ packt-rhel-ip	Microsoft.Network/publicl...	OK
✔ packt-demo-vnet	Microsoft.Network/virtual...	OK
✔ packt-rhel-nsg	Microsoft.Network/networ...	OK

Function App

SQL databases

Azure Cosmos DB

Virtual machines

1 items

<input type="checkbox"/>	Name ↑↓	Type ↑↓	Status
<input type="checkbox"/>	packt-rhel	Virtual machine	Running

Search (Cmd+)

Connect Start Restart Stop Capture Delete Refresh

- Overview
- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems

Essentials

Resource group (change) packt-demo
Status Running
Location West US
Operating system Linux (redhat 8.2)
Size Standard A2 v2 (2 vcpus, 4 GiB memory)
Public IP address 104.40.68.161

```
➔ packt ssh -i azure/packt-rhel.pem packt@104.40.68.161
Activate the web console with: systemctl enable --now cockpit.socket

This system is not registered to Red Hat Insights. See https://cloud.redhat.com/
To register this system, run: insights-client --register
```

- Settings
- Networking
- Connect
- Disks
- Size
- Security
- Advisor recommendations
- Extensions
- Continuous delivery
- Availability + scaling

VM Size	Family	vCPUs	RAM (GiB)	Data disks
A-Series v2 Best suited for entry level workloads (development or test)				
A1_v2	General purpose	1	2	2
A2_v2	General purpose	2	4	4
A2m_v2	General purpose	2	16	4
A4_v2	General purpose	4	8	8
A4m_v2	General purpose	4	32	8

Prices presented are estimates in your local currency that include only Azure infrastructure costs and any di location. The prices don't include any applicable software costs. Final charges will appear in your local curre views. [View Azure pricing calculator.](#)

- Settings
- Networking
- Connect
- Disks
- Size
- Security
- Advisor recommendations

Data disks

Filter by name

Showing 1 of 1 attached data disks

+ Create and attach a new disk Attach existing disks

LUN	Disk name	Storage type	Size (GiB)
0	packt-disk	Standard SSD	4



packt-rhel | Disks

Virtual machine

>>



Save



Discard



Refresh



Additional settings

```
[packt@packt-rhel ~]$ lsblk
NAME                MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
sda                  8:0    0   64G  0 disk
├─sda1                8:1    0   500M  0 part /boot
├─sda2                8:2    0   63G  0 part
│   └─rootvg-tmplv    253:0   0    2G  0 lvm  /tmp
│       └─rootvg-usr1v 253:1   0   10G  0 lvm  /usr
│           └─rootvg-homelv 253:2   0    1G  0 lvm  /home
│               └─rootvg-varlv 253:3   0    8G  0 lvm  /var
│                   └─rootvg-rootlv 253:4   0    2G  0 lvm  /
├─sda14              8:14   0    4M  0 part
├─sda15              8:15   0   495M  0 part /boot/efi
└─sdb                  8:16   0   10G  0 disk
    └─sdb1              8:17   0   10G  0 part /mnt
sdc                  8:32   0    4G  0 disk ←
```

Create a managed disk



Basics Encryption Networking Advanced Tags Review + create

Select the disk type and size needed for your workload. Azure disks are designed for 99.999% availability. Azure managed disks encrypt your data at rest, by default, using Storage Service Encryption. [Learn more about disks.](#)

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * ⓘ	Free Azure Subscription
Resource group * ⓘ	packt-demo

[Create new](#)

Disk details

Disk name * ⓘ	packt-man ✓
Region * ⓘ	(US) West US
Availability zone	None
Source type ⓘ	None
Size * ⓘ	256 GiB Standard SSD ← Change size

Review + create

< Previous

Next : Encryption >

Settings

Networking

Connect

Disks

Size

Security

Advisor recommendations

Extensions

Continuous delivery

Availability + scaling

Configuration

Identity

Data disks

Filter by name

Showing 2 of 2 attached data disks

+ Create and attach a new disk **Attach existing disks**

LUN ⓘ	Disk name	Storage type	Size (GiB)
0	packt-disk	Standard SSD	4
1	<input type="text"/>	Standard SSD	-

Type to start filtering...

Disks in resource group 'PACKT-DEMO'

[PACKT-MAN](#) ←

size: 256 GiB, storageType: StandardSSD_LRS, disk shares used: 0 of 1

Disks

Size

Security

Advisor recommendations

Extensions

+ Create and attach a new disk Attach existing disks

LUN ⓘ	Disk name	Storage type	Size (GiB)
0	packt-disk	Standard SSD	4
1	packt-man	Standard SSD	256

Create a resource group



Basics Tags Review + create

Resource group - A container that holds related resources for an Azure solution. The resource group can include all the resources for the solution, or only those resources that you want to manage as a group. You decide how you want to allocate resources to resource groups based on what makes the most sense for your organization. [Learn more](#)

Project details

Subscription * ⓘ

Resource group * ⓘ

Resource details

Region * ⓘ

Review + create

< Previous

Next : Tags >

Essentials Assign tags view

Filter for any field... Type == all Location Move to another resource group Move

Showing 1 to 9 of 9 records. Show hidden types

<input type="checkbox"/>	Name	Type	Location
<input type="checkbox"/>	packt-demo-vnet	Virtual network	West US
<input checked="" type="checkbox"/>	packt-disk	Disk	West US
<input checked="" type="checkbox"/>	packt-man	Disk	West US
<input checked="" type="checkbox"/>	packt-rhel	Virtual machine	West US
<input type="checkbox"/>	packt-rhel	SSH key	West US
<input checked="" type="checkbox"/>	packt-rhel-ip	Public IP address	West US
<input checked="" type="checkbox"/>	packt-rhel-nsg	Network security group	West US
<input checked="" type="checkbox"/>	packt-rhel330	Network interface	West US
<input checked="" type="checkbox"/>	packt-rhel_OsDisk_1_555226c465644e6d9e5440c286...	Disk	West US



- Assign tags
- Move
- Delete
- Export template
- Feedback
- Open in mobile

- Move to another resource group
- Move to another subscription
- Move to another region

Move resources



Resources to move

<input checked="" type="checkbox"/> Select all		Type
<input checked="" type="checkbox"/>	packt-rhel	Virtual machine
<input checked="" type="checkbox"/>	packt-man	Disk
<input checked="" type="checkbox"/>	packt-disk	Disk
<input checked="" type="checkbox"/>	packt-rhel-ip	Public IP address
<input checked="" type="checkbox"/>	packt-rhel-nsg	Network security group
<input checked="" type="checkbox"/>	packt-rhel330	Network interface
<input checked="" type="checkbox"/>	packt-rhel_OsDisk_1_555226c465644e6d9e5440c286eb5394	Disk

Move these resources to

Resource group *

packt

[Create a new group](#)

I understand that tools and scripts associated with moved resources will not work until I update them to use new resource IDs

OK

packt-demo

Resource group



» [+](#) Add [≡](#) Edit columns [🗑](#) Delete resource group [🔄](#) Refresh [⬇](#) Export to CSV [🔗](#) Open query | ...

Essentials

Refresh

[JSON View](#)

Filter for any field...

Type == all

Location == all

[+](#) Add filter

Showing 1 to 2 of 2 records.

Show hidden types

No grouping

List view

Name

Type

Location

packt-demo-vnet

Virtual network

West US



packt-rhel

SSH key

West US



 **packt**
Resource group



» [+](#) Add [≡](#) Edit columns [🗑](#) Delete resource group [🔄](#) Refresh [↓](#) Export to CSV [🔗](#) Open query | ...





Essentials

[JSON View](#)

Filter for any field... Type == all Location == all [+ Add filter](#)

Showing 1 to 14 of 14 records. Show hidden types No grouping

List view










<input type="checkbox"/> Name ↑↓	Type ↑↓	Location ↑↓	
<input type="checkbox"/>  packt-vnet	Virtual network	West US	...
 <input type="checkbox"/>  packt-rhel	Virtual machine	West US	...
<input type="checkbox"/>  packt-ubuntu	Virtual machine	West US	...

 **packt-rhel | Redeploy + reapply**
Virtual machine



Search (Cmd+/) <<

Support + troubleshooting

-  Resource health
-  Boot diagnostics
-  Performance diagnostics
-  Reset password
-  **Redeploy + reapply**
-  Serial console
-  Connection troubleshoot
-  Red Hat Customer Portal
-  New support request

Can't connect to your virtual machine?

Redeploy

Try redeploying your virtual machine, which will migrate it to a new Azure host. If you continue, the virtual machine will be restarted and you will lose any data on the temporary drive. While the redeployment is in progress, the virtual machine will be unavailable. [Learn more about Redeploy](#)

Redeploy

Virtual machine in a failed state?

Reapply

Try reapplying your virtual machine's state. This operation will rerun VM provisioning and help solve the VM failed state, in case when VM provisioning failed while executing a previous VM action. [Learn more about Reapply](#)

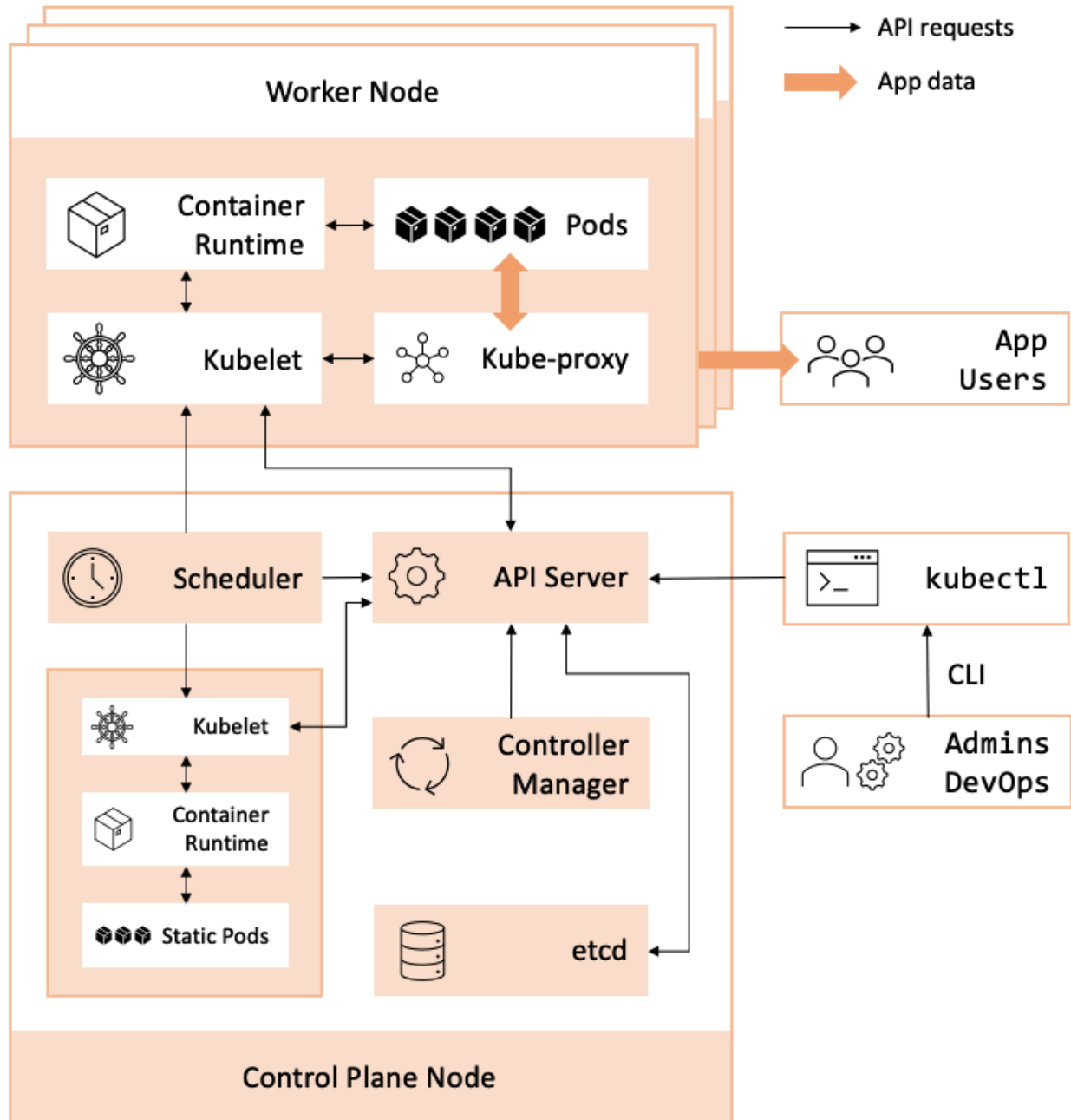
Reapply

```
packt@neptune:~$ az login
To sign in, use a web browser to open the page https://microsoft.com/devicelogin
[
  {
    "cloudName": "AzureCloud",
    "homeTenantId": "████████████████████████████████████████",
    "id": "████████████████████████████████████████",
    "isDefault": true,
    "managedByTenants": [],
    "name": "Free Azure Subscription",
    "state": "Enabled",
    "tenantId": "████████████████████████████████████████",
    "user": {
      "name": "julian@balogs.com",
      "type": "user"
    }
  }
]
```

```
packt@neptune:~$ az group create --name packt-dev --location westus
{
  "id": "/subscriptions/138189e1-26c3-49f1-a2d9-2caa56d946c7/resourceGroups/packt-dev",
  "location": "westus",
  "managedBy": null,
  "name": "packt-dev",
  "properties": {
    "provisioningState": "Succeeded"
  },
  "tags": null,
  "type": "Microsoft.Resources/resourceGroups"
}
```

```
packt@neptune:~$ az vm create \  
> --resource-group packt-dev \  
> --name packt-ubuntu-dev \  
> --image UbuntuLTS \  
> --admin-username packt \  
> --generate-ssh-keys  
Command group 'vm' is experimental and under development. Reference and support levels:  
https://aka.ms/CLI\_refstatus  
SSH key files '/home/packt/.ssh/id_rsa' and '/home/packt/.ssh/id_rsa.pub' have been gene  
rated under ~/.ssh to allow SSH access to the VM. If using machines without permanent st  
orage, back up your keys to a safe location.  
{- Finished ..  
  "fqdns": "",  
  "id": "/subscriptions/138189e1-26c3-49f1-a2d9-2caa56d946c7/resourceGroups/packt-dev/pr  
oviders/Microsoft.Compute/virtualMachines/packt-ubuntu-dev",  
  "location": "westus",  
  "macAddress": "00-0D-3A-35-CD-F4",  
  "powerState": "VM running",  
  "privateIpAddress": "10.0.0.4",  
  "publicIpAddress": "168.62.197.46",  
  "resourceGroup": "packt-dev",  
  "zones": ""  
}
```

Chapter 14: Deploying Applications with Kubernetes.



```
packt@neptune:~$ sudo snap install microk8s --classic
[sudo] password for packt:
microk8s (1.20/stable) v1.20.2 from Canonical✓ installed
```



```

packt@k8s-cp1:~$ cat /etc/hosts
127.0.0.1      k8s-cp1 localhost
172.16.191.6  k8s-cp1
172.16.191.8  k8s-n1
172.16.191.9  k8s-n2
172.16.191.10 k8s-n3

```

Control-plane node(s)

Protocol	Direction	Port Range	Purpose	Used By
TCP	Inbound	6443*	Kubernetes API server	All
TCP	Inbound	2379-2380	etcd server client API	kube-apiserver, etcd
TCP	Inbound	10250	kubelet API	Self, Control plane
TCP	Inbound	10251	kube-scheduler	Self
TCP	Inbound	10252	kube-controller-manager	Self

Worker node(s)

Protocol	Direction	Port Range	Purpose	Used By
TCP	Inbound	10250	kubelet API	Self, Control plane
TCP	Inbound	30000-32767	NodePort Services†	All

```

packt@k8s-n2:~$ cat /etc/fstab
# /etc/fstab: static file system information.
#
# Use 'blkid' to print the universally unique identifier for a
# device; this may be used with UUID= as a more robust way to name devices
# that works even if disks are added and removed. See fstab(5).
#
# <file system> <mount point> <type> <options> <dump> <pass>
# / was on /dev/ubuntu-vg/ubuntu-lv during curtin installation
/dev/disk/by-id/dm-uuid-LVM-QeopJJysMacrQZRUIzifQzWe8L0kvi7ljzEaNHJX1Uhvmtt0up4BN3TGd0fW0u1Bb /
ext4 defaults 0 0
# /boot was on /dev/sda2 during curtin installation
/dev/disk/by-uuid/822fdd70-06c6-43d3-a802-16587ec5276e /boot ext4 defaults 0 0
# /swap.img none swap sw 0 0

```

```

[plugins."io.containerd.grpc.v1.cri".containerd.runtimes]
[plugins."io.containerd.grpc.v1.cri".containerd.runtimes.runc]
runtime_type = "io.containerd.runc.v1"
runtime_engine = ""
runtime_root = ""
privileged_without_host_devices = false
[plugins."io.containerd.grpc.v1.cri".containerd.runtimes.runc.options]
SystemdCgroup = true

```

```

packt@k8s-cp1:~$ sudo systemctl status containerd
● containerd.service - containerd container runtime
   Loaded: loaded (/lib/systemd/system/containerd.service; enabled; vendor preset: enabled)
   Active: active (running) since Sat 2021-03-13 04:11:52 UTC; 1h 0min ago
     Docs: https://containerd.io
   Main PID: 8747 (containerd)
    Tasks: 11
   Memory: 21.3M
   CGroup: /system.slice/containerd.service
           └─8747 /usr/bin/containerd

```

```

packt@k8s-cp1:~$ sudo systemctl status kubelet
● kubelet.service - kubelet: The Kubernetes Node Agent
   Loaded: loaded (/lib/systemd/system/kubelet.service; enabled; vendor preset: enabled)
   Drop-In: /etc/systemd/system/kubelet.service.d
           └─10-kubeadm.conf
   Active: activating (auto-restart) (Result: exit-code) since Sat 2021-03-13 05:16:52 UTC
     Docs: https://kubernetes.io/docs/home/
   Process: 16208 ExecStart=/usr/bin/kubelet $KUBELET_KUBECONFIG_ARGS $KUBELET_CONFIG_ARGS
   Main PID: 16208 (code=exited, status=255/EXCEPTION)

Mar 13 05:16:52 k8s-cp1 systemd[1]: kubelet.service: Main process exited, code=exited, statu
Mar 13 05:16:52 k8s-cp1 systemd[1]: kubelet.service: Failed with result 'exit-code'.

```

```
packt@k8s-cp1:~$ kubeadm config print init-defaults | tee k8s-config.yaml
W0314 10:21:37.985924 164502 kubelet.go:200] cannot automatically set CgroupDriver when starting the Kubelet: cannot execute 'docker info -f {{.CgroupDriver}}': executable file not found in $PATH
apiVersion: kubeadm.k8s.io/v1beta2
bootstrapTokens:
- groups:
  - system:bootstrappers:kubeadm:default-node-token
  token: abcdef.0123456789abcdef
  ttl: 24h0m0s
  usages:
  - signing
  - authentication
```

```
localAPIEndpoint:
  advertiseAddress: 1.2.3.4 ←
  bindPort: 6443
```

```
nodeRegistration:
  criSocket: /var/run/dockershim.sock ←
  name: k8s-cp1
```

```
imageRepository: k8s.gcr.io
kind: ClusterConfiguration
kubernetesVersion: v1.20.0 ←
```

```
packt@k8s-cp1:~$ kubeadm version
kubeadm version: &version.Info{Major:"1", Minor:"20", GitVersion:"v1.20.4", GitCommit:"e87da0bd6e03ec3fea7933c4b5263d151aafd07c", GitTreeState:"clean", BuildDate:"2021-02-18T16:09:38Z", GoVersion:"go1.15.8", Compiler:"gc", Platform:"linux/amd64"}
```

```
---
apiVersion: kubelet.config.k8s.io/v1beta1
kind: KubeletConfiguration
cgroupDriver: systemd
```

Your Kubernetes control-plane has initialized successfully!

To start using your cluster, you need to run the following as a regular user:

```
mkdir -p $HOME/.kube
sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config
sudo chown $(id -u):$(id -g) $HOME/.kube/config
```



Alternatively, if you are the root user, you can run:

```
export KUBECONFIG=/etc/kubernetes/admin.conf
```

You should now deploy a pod network to the cluster.

Run "kubectl apply -f [podnetwork].yaml" with one of the options listed at:
<https://kubernetes.io/docs/concepts/cluster-administration/addons/>



Then you can join any number of worker nodes by running the following on each as root:

```
kubeadm join 172.16.191.6:6443 --token abcdef.0123456789abcdef \
--discovery-token-ca-cert-hash sha256:bf5d3a2b9526e98f7403ec4a07cf052b961b3201913c040cd4e6e28f8818d8c2
```

```
packt@k8s-cp1:~$ kubectl get pods --all-namespaces
```

NAMESPACE	NAME	READY	STATUS	RESTARTS	AGE
kube-system	calico-kube-controllers-69496d8b75-vqhhm	1/1	Running	0	6m44s
kube-system	calico-node-l7tz6	1/1	Running	0	6m44s
kube-system	coredns-74ff55c5b-562j5	1/1	Running	0	46m
kube-system	coredns-74ff55c5b-nffjj	1/1	Running	0	46m
kube-system	etcd-k8s-cp1	1/1	Running	0	46m
kube-system	kube-apiserver-k8s-cp1	1/1	Running	0	46m
kube-system	kube-controller-manager-k8s-cp1	1/1	Running	0	46m
kube-system	kube-proxy-7tdx2	1/1	Running	0	46m
kube-system	kube-scheduler-k8s-cp1	1/1	Running	0	46m

```
packt@k8s-cp1:~$ kubectl get nodes
```

NAME	STATUS	ROLES	AGE	VERSION
k8s-cp1	Ready	control-plane,master	71m	v1.20.4

```
packt@k8s-cp1:~$ sudo systemctl status kubelet
● kubelet.service - kubelet: The Kubernetes Node Agent
   Loaded: loaded (/lib/systemd/system/kubelet.service; enabled; vendor preset: enabled)
   Drop-In: /etc/systemd/system/kubelet.service.d
            └─10-kubeadm.conf
   Active: active (running) since Sun 2021-03-14 11:52:38 UTC; 1h 20min ago
     Docs: https://kubernetes.io/docs/home/
  Main PID: 178172 (kubelet)
    Tasks: 15 (limit: 2248)
   Memory: 53.9M
   CGroup: /system.slice/kubelet.service
            └─178172 /usr/bin/kubelet --bootstrap-kubeconfig=/etc/kubernetes/bootstrap-kube
```

```
packt@k8s-cp1:~$ ls /etc/kubernetes/manifests/
etcd.yaml kube-apiserver.yaml kube-controller-manager.yaml kube-scheduler.yaml
```

```
packt@k8s-cp1:~$ kubeadm token list
TOKEN          TTL          EXPIRES          USAGES
DESCRIPTION    EXTRA GROUPS
abcdef.0123456789abcdef 13h          2021-03-15T11:52:38Z authentication,signing
<none>
system:bootstrappers:kubeadm:default-node-token
```

```
packt@k8s-cp1:~$ openssl x509 -pubkey -in /etc/kubernetes/pki/ca.crt | \
> openssl rsa -pubin -outform der 2>/dev/null | \
> openssl dgst -sha256 -hex | sed 's/^\.* //'
bf5d3a2b9526e98f7403ec4a07cf052b961b3201913c040cd4e6e28f8818d8c2
```

This node has joined the cluster:

- * Certificate signing request was sent to apiserver and a response was received.
- * The Kubelet was informed of the new secure connection details.

Run 'kubectl get nodes' on the control-plane to see this node join the cluster.

```
packt@k8s-cp1:~$ kubectl get nodes
NAME        STATUS    ROLES          AGE   VERSION
k8s-cp1    Ready    control-plane,master 11h   v1.20.4
k8s-n1     Ready    <none>         44s   v1.20.4
```

```
packt@k8s-cp1:~$ kubectl get nodes --watch
```

NAME	STATUS	ROLES	AGE	VERSION
k8s-cp1	Ready	control-plane,master	11h	v1.20.4
k8s-n1	Ready	<none>	14m	v1.20.4
k8s-n2	NotReady	<none>	12s	v1.20.4
k8s-n2	Ready	<none>	20s	v1.20.4

```
packt@k8s-cp1:~$ kubectl get nodes
```

NAME	STATUS	ROLES	AGE	VERSION
k8s-cp1	Ready	control-plane,master	11h	v1.20.4
k8s-n1	Ready	<none>	25m	v1.20.4
k8s-n2	Ready	<none>	10m	v1.20.4
k8s-n3	Ready	<none>	32s	v1.20.4

```
waiting for CloudFormation stack "eksctl-k8s-packt-nodegroup-ng-4ed82a9d"
waiting for the control plane availability...
saved kubeconfig as "/home/packt/.kube/config"
no tasks
all EKS cluster resources for "k8s-packt" have been created
nodegroup "ng-4ed82a9d" has 2 node(s)
node "ip-192-168-11-249.us-west-2.compute.internal" is ready
node "ip-192-168-49-141.us-west-2.compute.internal" is ready
waiting for at least 2 node(s) to become ready in "ng-4ed82a9d"
nodegroup "ng-4ed82a9d" has 2 node(s)
node "ip-192-168-11-249.us-west-2.compute.internal" is ready
node "ip-192-168-49-141.us-west-2.compute.internal" is ready
kubectl command should work with "/home/packt/.kube/config", try 'kubectl get nodes'
EKS cluster "k8s-packt" in "us-west-2" region is ready
```

```
[packt@jupiter ~]$ kubectl config get-contexts
```

CURRENT	NAME	CLUSTER
* ←	iam-root-account@k8s-packt.us-west-2.eksctl.io	k8s-packt.us-west-2.eksctl.io

```
[packt@jupiter ~]$ kubectl get nodes
```

NAME	STATUS	ROLES	AGE	VERSION
ip-192-168-11-249.us-west-2.compute.internal	Ready	<none>	89s	v1.18.9-eks-d1db3c
ip-192-168-49-141.us-west-2.compute.internal	Ready	<none>	90s	v1.18.9-eks-d1db3c

```
[packt@jupiter ~]$ kubectl get pods --all-namespaces
```

NAMESPACE	NAME	READY	STATUS	RESTARTS	AGE
kube-system	aws-node-dzk5g	1/1	Running	0	2m7s
kube-system	aws-node-zj78h	1/1	Running	0	2m8s
kube-system	coredns-559b5db75d-52fjr	1/1	Running	0	7m9s
kube-system	coredns-559b5db75d-t8gnv	1/1	Running	0	7m9s
kube-system	kube-proxy-d22z1	1/1	Running	0	2m8s
kube-system	kube-proxy-fxggv	1/1	Running	0	2m7s

Amazon Container Services

- Amazon ECS
 - Clusters
 - Task definitions
- Amazon EKS
 - Clusters**
- Amazon ECR
 - Repositories

EKS > Clusters > k8s-packt

k8s-packt

Active Refresh Delete cluster

Info A new Kubernetes version is available for this cluster. [Learn more](#) Update now

Overview | Workloads | Configuration

Nodes (2) [Info](#)

< 1 >

Node name	Instance type	Node Group	Created	Status
ip-192-168-11-249.us-west-2.compute.internal	m5.large	ng-4ed82a9d	an hour ago	Ready
ip-192-168-49-141.us-west-2.compute.internal	m5.large	ng-4ed82a9d	an hour ago	Ready

```
packt@neptune:~$ kubectl config get-contexts
```

CURRENT	NAME	CLUSTER
* ➔	arn:aws:eks:us-west-2:106842557074:cluster/k8s-packt	arn:aws:eks:us-west-2:k8s-packt
	k8s-packt-aks	k8s-packt

```
packt@neptune:~$ kubectl config get-contexts
```

CURRENT	NAME	CLUSTER
	k8s-packt-aks	k8s-packt
* ➔	k8s-packt-eks	arn:aws:eks:us-west-2:106842557074:cluster/k8s-packt

```
packt@neptune:~$ az group create --name "k8s-packt" --location westus
{
  "id": "/subscriptions/138189e1-26c3-49f1-a2d9-2caa56d946c7/resourceGroups/k8s-packt",
  "location": "westus",
  "managedBy": null,
  "name": "k8s-packt",
  "properties": {
    "provisioningState": "Succeeded"
  },
  "tags": null,
  "type": "Microsoft.Resources/resourceGroups"
}
```

```
packt@neptune:~$ az aks get-versions --location westus -o table
KubernetesVersion    Upgrades
-----
1.20.2(preview)      None available
1.19.7                1.20.2(preview)
1.19.6                1.19.7, 1.20.2(preview)
1.18.14               1.19.6, 1.19.7
1.18.10               1.18.14, 1.19.6, 1.19.7
1.17.16               1.18.10, 1.18.14
1.17.13               1.17.16, 1.18.10, 1.18.14
```

```
packt@neptune:~$ az aks get-credentials \
> --resource-group "k8s-packt" \
> --name "k8s-packt"
Merged "k8s-packt" as current context in /home/packt/.kube/config
```

```
packt@neptune:~$ kubectl config get-contexts
CURRENT  NAME          CLUSTER  AUTHINFO  NAMESPACE
* ← k8s-packt  k8s-packt  clusterUser_k8s-packt_k8s-packt
```

```
packt@neptune:~$ kubectl get nodes
NAME                                STATUS  ROLES  AGE   VERSION
aks-nodepool1-88379849-vmss000000  Ready  agent  135m  v1.18.14
aks-nodepool1-88379849-vmss000001  Ready  agent  135m  v1.18.14
```



```
packt@neptune:~$ kubectl get pods --all-namespaces
NAMESPACE   NAME                                     READY   STATUS    RESTARTS   AGE
kube-system  coredns-748cdb7bf4-5l9pg               1/1     Running   0           145m
kube-system  coredns-748cdb7bf4-8gqst               1/1     Running   0           145m
kube-system  coredns-autoscaler-868b684fd4-ws2zk    1/1     Running   0           145m
kube-system  kube-proxy-74lc2                        1/1     Running   0           145m
kube-system  kube-proxy-c85b6                        1/1     Running   0           145m
kube-system  metrics-server-58fdc875d5-sqzxt        1/1     Running   0           145m
kube-system  tunnelfront-7948cfb9c-ctxcn            1/1     Running   0           145m
```

Microsoft Azure Upgrade Search resources, services, and docs (G+)

Home > Kubernetes services > **Kubernetes services** << Default Directory

+ Add Manage view ...

Filter for any field...

Name	...
k8s-packt	...

k8s-packt Kubernetes service

Search (Cmd+/) Connect Delete Refresh

- Overview
- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems
- Security

Essentials

- Resource group (change) **k8s-packt**
- Status Succeeded
- Location West US
- Subscription (change) **Free Azure Subscription**

```
[packt@jupiter ~]$ kubectl config get-contexts
CURRENT  NAME          CLUSTER                AUTHINFO
* → k8s-packt    k8s-packt              clusterUser_k8s-packt_k8s-packt
k8s-packt-eks k8s-packt.us-west-2.eksctl.io iam-root-account@k8s-packt.us-west-2.eksctl.io
```

```
[packt@jupiter ~]$ kubectl config get-contexts
CURRENT  NAME          CLUSTER                AUTHINFO
* k8s-packt-aks k8s-packt              clusterUser_k8s-packt_k8s-packt
k8s-packt-eks k8s-packt.us-west-2.eksctl.io iam-root-account@k8s-packt.us-west-2.eksctl.io
```

	operation	resource		options
kubectl	[command]	[TYPE]	[NAME]	[flags]
-----	-----	-----	-----	-----
kubectl	get	Pods	packt-web	--output=wide
kubectl	create	service	packt-svc	--dry-run

```
packt@neptune:~$ kubectl config get-contexts
CURRENT  NAME                CLUSTER
*        k8s-packt-aks      k8s-packt
* →      k8s-packt-eks      arn:aws:eks:us-west-2:106842557074:cluster/k8s-packt
* →      kubernetes-admin@kubernetes  kubernetes
```

```
packt@neptune:~$ kubectl config get-contexts
CURRENT  NAME                CLUSTER
* →      k8s-packt           kubernetes
*        k8s-packt-aks      k8s-packt
*        k8s-packt-eks      arn:aws:eks:us-west-2:106842557074:cluster/k8s-packt
```

```
packt@neptune:~$ kubectl get nodes -o wide
NAME      STATUS  ROLES                AGE    VERSION  INTERNAL-IP
k8s-cp1   Ready   control-plane,master  5d11h  v1.20.4  172.16.191.6
k8s-n1    Ready   <none>                4d23h  v1.20.4  172.16.191.8
k8s-n2    Ready   <none>                4d23h  v1.20.4  172.16.191.9
k8s-n3    Ready   <none>                4d23h  v1.20.4  172.16.191.10
```

```
packt@neptune:~$ kubectl get pods --all-namespaces
```

NAMESPACE	NAME	READY	STATUS	RESTARTS	AGE
kube-system	calico-kube-controllers-69496d8b75-vqhhm	1/1	Running	0	5d10h
kube-system	calico-node-4bqh7	1/1	Running	0	4d23h
kube-system	calico-node-8vpqf	1/1	Running	0	4d23h
kube-system	calico-node-l7tz6	1/1	Running	0	5d10h
kube-system	calico-node-vsqq4	1/1	Running	0	5d
kube-system	coredns-74ff55c5b-562j5	1/1	Running	0	5d11h
kube-system	coredns-74ff55c5b-nffjj	1/1	Running	0	5d11h
kube-system	etcd-k8s-cp1	1/1	Running	0	5d11h
kube-system	kube-apiserver-k8s-cp1	1/1	Running	5	5d11h
kube-system	kube-controller-manager-k8s-cp1	1/1	Running	7	5d11h
kube-system	kube-proxy-7tdx2	1/1	Running	0	5d11h
kube-system	kube-proxy-8bdzg	1/1	Running	0	5d
kube-system	kube-proxy-bnnhc	1/1	Running	0	4d23h
kube-system	kube-proxy-gvj15	1/1	Running	0	4d23h
kube-system	kube-scheduler-k8s-cp1	1/1	Running	6	5d11h

```
packt@neptune:~$ kubectl api-resources | more
```

NAME	SHORTNAMES	APIVERSION	NAMESPACED
bindings		v1	true
componentstatuses	cs	v1	false
configmaps	cm	v1	true
endpoints	ep	v1	true
events	ev	v1	true
limitranges	limits	v1	true
namespaces	ns	v1	false
nodes	no	v1	false

```
packt@neptune:~$ kubectl get pods -o wide
```

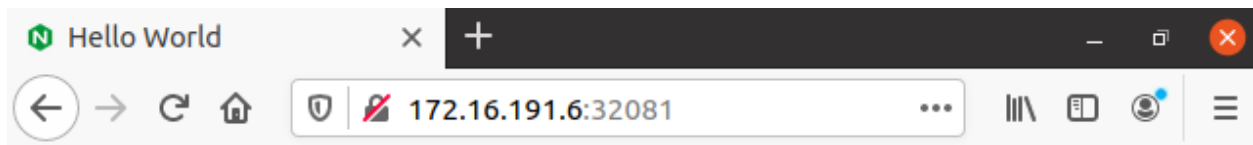
NAME	READY	STATUS	RESTARTS	AGE	IP	NODE
packt-5dc77bb9bf-bnzsc	1/1	Running	0	29m	192.168.111.193	k8s-n2
packt-web	1/1	Running	0	3m37s	192.168.215.66	k8s-n1

```
packt@k8s-n1:~$ sudo crictl --runtime-endpoint unix:///run/containerd/containerd.sock ps
```

CONTAINER ID	IMAGE	CREATED	STATE	NAME
01c9bcbc9701c	aedf47d433f18	About an hour ago	Running	packt-web
42d2568413aa8	50b52cdadbcf0	5 days ago	Running	calico-node
e4623a0f654dd	c29e6c5830670	5 days ago	Running	kube-proxy

```
/ # ps aux
PID  USER    TIME  COMMAND
  1  root    0:00  nginx: master process nginx -g daemon off;
  6  nginx  0:00  nginx: worker process
```

```
packt@neptune:~$ kubectl get service packt
NAME      TYPE      CLUSTER-IP      EXTERNAL-IP      PORT(S)          AGE
packt     NodePort  10.103.172.205  <none>           80:32081/TCP    18m
```



NGINX

Server address: 192.168.111.193:80

Server name: packt-5dc77bb9bf-bnzsc

Date: 21/Mar/2021:12:37:47 +0000

URI: /

Auto Refresh

Request ID: 86d2f7818c2d0ed38c075dfb1062d216
© NGINX, Inc. 2018

```
packt@neptune:~$ kubectl get pods -l app=packt
```

NAME	READY	STATUS	RESTARTS	AGE
packt-5dc77bb9bf-6ggtf	1/1	Running	0	7m36s
packt-5dc77bb9bf-bnzsc	1/1	Running	0	17h
packt-5dc77bb9bf-brqpb	1/1	Running	0	7m36s
packt-5dc77bb9bf-csc89	1/1	Running	0	7m36s
packt-5dc77bb9bf-gv4lk	1/1	Running	0	7m36s
packt-5dc77bb9bf-hzsf8	1/1	Running	0	7m36s
packt-5dc77bb9bf-j4l5h	1/1	Running	0	7m36s
packt-5dc77bb9bf-qtxmf	1/1	Running	0	7m36s
packt-5dc77bb9bf-vp5hj	1/1	Running	0	7m36s
packt-5dc77bb9bf-zfxcj	1/1	Running	0	7m36s

NGINX Logo	NGINX Logo	NGINX Logo
Server address: 192.168.57.208:80	Server address: 192.168.215.71:80	Server address: 192.168.57.205:80
Server name: packt-5dc77bb9bf-hzsf8	Server name: packt-5dc77bb9bf-zfxcj	Server name: packt-5dc77bb9bf-vp5hj
Date: 21/Mar/2021:19:54:33 +0000	Date: 21/Mar/2021:19:57:16 +0000	Date: 21/Mar/2021:19:55:07 +0000
URI: /	URI: /	URI: /

```
packt@neptune:~$ kubectl get pods -l app=packt
```

NAME	READY	STATUS	RESTARTS	AGE
packt-5dc77bb9bf-6ggtf	1/1	Running	0	6h31m
packt-5dc77bb9bf-bnzsc	1/1	Running	0	24h
packt-5dc77bb9bf-csc89	1/1	Running	0	6h31m

```
packt@neptune:~$ kubectl get all
```

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
service/kubernetes	ClusterIP	10.96.0.1	<none>	443/TCP	7d8h

```
packt@neptune:~$ kubectl get all -l app=packt
```

NAME	READY	STATUS	RESTARTS	AGE
pod/packt-6c89655654-k54k5	1/1	Running	0	3m21s

NAME	READY	UP-TO-DATE	AVAILABLE	AGE
deployment.apps/packt	1/1	1	1	3m21s

NAME	DESIRED	CURRENT	READY	AGE
replicaset.apps/packt-6c89655654	1	1	1	3m21s

```
packt@neptune:~$ kubectl get all -l app=packt
NAME                                READY   STATUS    RESTARTS   AGE
pod/packt-6c89655654-k54k5         1/1    Running   0           40m

NAME                                TYPE          CLUSTER-IP   EXTERNAL-IP   PORT(S)    AGE
service/packt                       NodePort     10.106.46.48 <none>        80:31168/TCP 13m

NAME                                READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/packt               1/1     1             1           40m

NAME                                DESIRED   CURRENT   READY   AGE
replicaset.apps/packt-6c89655654    1         1         1       40m
```



NGINX

Server address: 192.168.215.72:80

Server name: packt-6c89655654-k54k5

Date: 22/Mar/2021:00:05:00 +0000

URI: /

Auto Refresh

```
packt@neptune:~$ kubectl get all -l app=packt
NAME                                READY   STATUS    RESTARTS   AGE
pod/packt-6c89655654-5rktw         1/1    Running   0           3m28s
pod/packt-6c89655654-6bcw2         1/1    Running   0           3m28s
pod/packt-6c89655654-9c5rd         1/1    Running   0           3m28s
pod/packt-6c89655654-fhxtc         1/1    Running   0           3m28s
pod/packt-6c89655654-k54k5         1/1    Running   0           68m
pod/packt-6c89655654-nqnjb         1/1    Running   0           3m28s
pod/packt-6c89655654-pfvtn         1/1    Running   0           3m28s
pod/packt-6c89655654-psl7z         1/1    Running   0           3m28s
pod/packt-6c89655654-sl9nn         1/1    Running   0           3m28s
pod/packt-6c89655654-t57cs         1/1    Running   0           3m28s

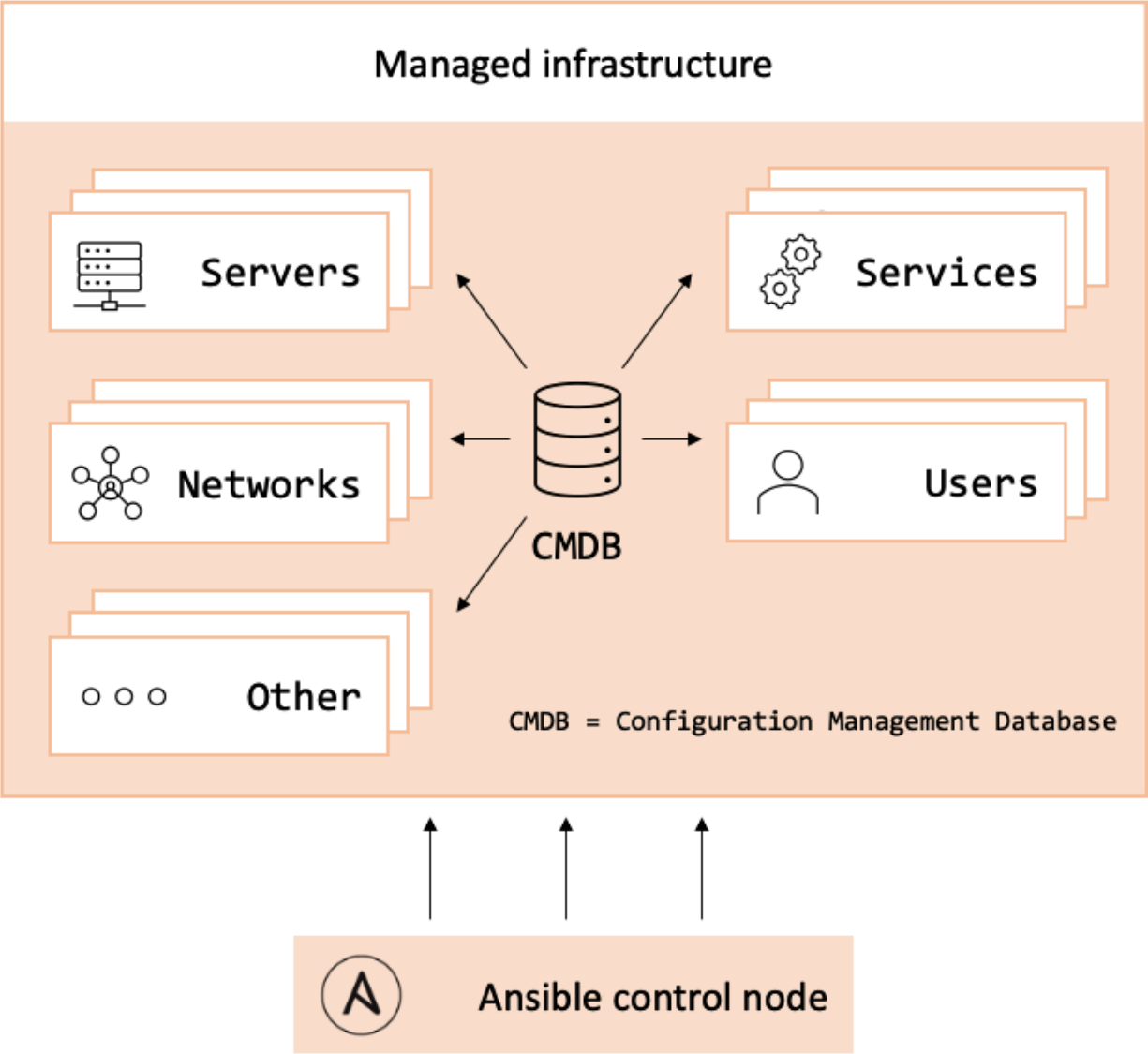
NAME                                TYPE          CLUSTER-IP    EXTERNAL-IP   PORT(S)          AGE
service/packt                        NodePort      10.106.46.48  <none>        80:31168/TCP    41m

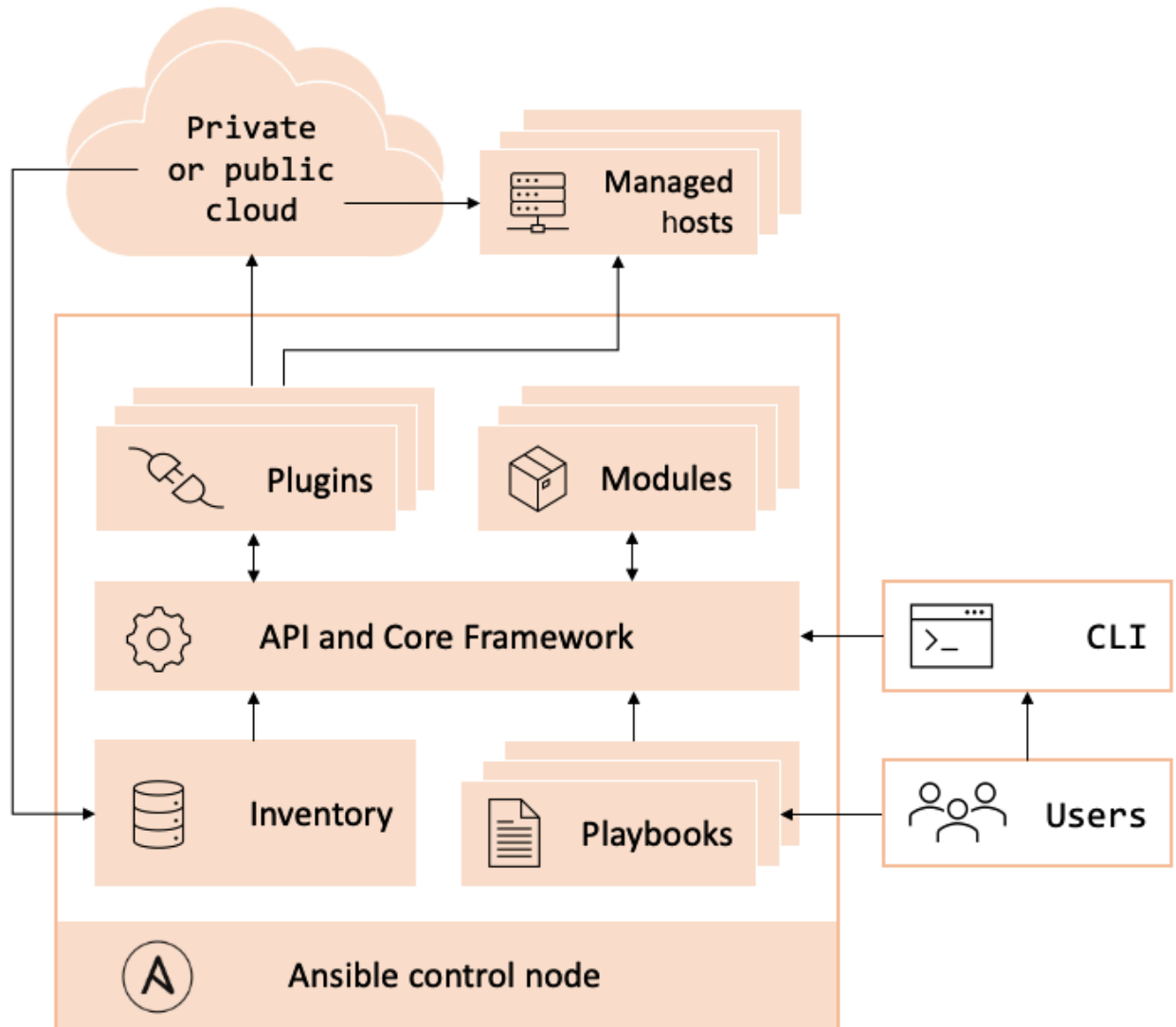
NAME                                READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/packt                10/10   10            10          68m

NAME                                DESIRED   CURRENT   READY   AGE
replicaset.apps/packt-6c89655654    10        10        10      68m
```

```
spec:
  progressDeadlineSeconds: 600
  replicas: 3
```

Chapter 15: Automating Workflows with Ansible.





```

packt@neptune:~$ ansible --version
ansible 2.10.7
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['/home/packt/.ansible/plugins/modules', '/usr/share/ansible/plugins/modules']
  ansible python module location = /home/packt/.local/lib/python3.8/site-packages/ansible
  executable location = /home/packt/.local/bin/ansible
  python version = 3.8.5 (default, Jan 27 2021, 15:41:15) [GCC 9.3.0]

```

```
[webservers]
web1
web2

[databases]
db1
db2

[ubuntu]
web1
db1

[centos]
web2
db2

[platforms:children]
ubuntu
centos
```

```
packt@neptune:~/ansible$ cat hosts
[webservers]
web1
web2

[databases]
db1
db2

[ubuntu]
web1
db1

[centos]
web2
db2

[platforms:children]
ubuntu
centos
```

```
packt@neptune:~/ansible$ cat hosts.yml
all:
  children:
    webservers:
      hosts:
        web1
        web2
    databases:
      hosts:
        db1
        db2
    platforms:
      children:
        ubuntu:
          hosts:
            web1
            db1
        centos:
          hosts:
            web2
            db2
```

```
web1 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
```

```
web1 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "append": false,
  "changed": false,
  "comment": "Packt",
  "group": 1000,
  "home": "/home/packt",
  "move_home": false,
  "name": "packt",
  "shell": "/bin/bash",
  "state": "present",
  "uid": 1000
}
```

```
web1 | CHANGED => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": true,
  "comment": "",
  "create_home": true,
  "group": 1001,
  "home": "/home/webuser",
  "name": "webuser",
  "shell": "/bin/sh",
  "state": "present",
  "system": false,
  "uid": 1001
}
```

```
web1 | CHANGED => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": true,
  "comment": "",
  "create_home": true,
  "group": 1001,
  "home": "/home/webuser",
  "name": "webuser",
  "password": "NOT_LOGGING_PASSWORD",
  "shell": "/bin/sh",
  "state": "present",
  "system": false,
  "uid": 1001
}
```

```
web1 | CHANGED => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": true,
  "force": true,
  "name": "webuser",
  "remove": true,
  "state": "absent",
  "stderr": "userdel: webuser mail spool (/var/mail/webuser) not found\n",
  "stderr_lines": [
    "userdel: webuser mail spool (/var/mail/webuser) not found"
  ]
}
```

```
web2 | CHANGED => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/libexec/platform-python"
  },
  "changed": true,
  "msg": "",
  "rc": 0,
  "results": [
    "Installed: nginx-mod-http-xslt-filter-1:1.14.1-9.module_el8.0.0+184+e34fea82.x86_64",
    "Installed: nginx-mod-mail-1:1.14.1-9.module_el8.0.0+184+e34fea82.x86_64",
    "Installed: nginx-mod-stream-1:1.14.1-9.module_el8.0.0+184+e34fea82.x86_64",
    "Installed: nginx-1:1.14.1-9.module_el8.0.0+184+e34fea82.x86_64",
    "Installed: nginx-all-modules-1:1.14.1-9.module_el8.0.0+184+e34fea82.noarch",
    "Installed: nginx-mod-http-image-filter-1:1.14.1-9.module_el8.0.0+184+e34fea82.x86_64",
    "Installed: nginx-mod-http-perl-1:1.14.1-9.module_el8.0.0+184+e34fea82.x86_64"
  ]
}
```

```
db2 | CHANGED => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/libexec/platform-python"
  },
  "changed": true,
  "msg": "",
  "rc": 0,
  "results": [
    "Installed: mysql-server-8.0.21-1.module_el8.2.0+493+63b41e36.x86_64"
  ]
}
```

```
web1 | CHANGED => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": true,
  "name": "nginx",
  "state": "started",
  "status": {
    "ActiveEnterTimestamp": "Tue 2021-04-06 04:12:23 UTC",
    "ActiveEnterTimestampMonotonic": "10249321",
    "ActiveExitTimestampMonotonic": "0",
    "ActiveState": "active",
  }
}
```

```
web1 | CHANGED => {
  "changed": true,
  "elapsed": 14,
  "rebooted": true
}
web2 | CHANGED => {
  "changed": true,
  "elapsed": 25,
  "rebooted": true
}
```

```

1  ---
2  - name: Create a specific user on all web servers
3    hosts: webservers
4    become: yes
5    tasks:
6      - name: Create the 'webuser' account
7        user:
8          name: webuser
9          state: present

```

```
packt@neptune:~/ansible$ ansible-playbook create-user.yml
```

```

PLAY [Create a specific user on all web servers] *****

TASK [Gathering Facts] *****
ok: [web2]
ok: [web1]

TASK [Create the 'webuser' account] *****
changed: [web1]
changed: [web2]

PLAY RECAP *****
web1      : ok=2    changed=1    unreachable=0    failed=0    skipped=0
           rescued=0    ignored=0

web2      : ok=2    changed=1    unreachable=0    failed=0    skipped=0
           rescued=0    ignored=0

```

```

1  ---
2  - name: Delete a specific user on all web servers
3    hosts: webservers
4    become: yes
5    tasks:
6      - name: Delete the 'webuser' account
7        user:
8          name: webuser
9          remove: yes
10         force: yes
11         state: absent

```

```

packt@neptune:~/ansible$ ansible-playbook delete-user.yml --limit ubuntu
PLAY [Delete a specific user on all web servers] *****
TASK [Gathering Facts] *****
ok: [web1]
TASK [Delete the 'webuser' account] *****
ok: [web1]
PLAY RECAP *****
web1 : ok=2    changed=0    unreachable=0    failed=0    skipped=0
      rescued=0    ignored=0

```

```

packt@neptune:~/ansible$ ansible-playbook delete-user.yml
PLAY [Delete a specific user on all web servers] *****
TASK [Gathering Facts] *****
ok: [web1]
ok: [web2]
TASK [Delete the 'webuser' account] *****
ok: [web1]
changed: [web2]
PLAY RECAP *****
web1 : ok=2    changed=0    unreachable=0    failed=0    skipped=0
      rescued=0    ignored=0
web2 : ok=2    changed=1    unreachable=0    failed=0    skipped=0
      rescued=0    ignored=0

```

```

1  ---
2  - name: Create a specific user on all web servers
3    hosts: webservers
4    become: yes
5    tasks:
6      - name: Create the '{{ username }}' account
7        user:
8          name: "{{ username }}"
9          state: present

```

```

1  ---
2  - name: Create a specific user on all web servers
3    hosts: webservers
4    become: yes
5    vars:
6      username: webuser
7    tasks:
8      - name: Create the '{{ username }}' account
9        user:
10         name: "{{ username }}"
11         state: present

```

```

TASK [Create the 'webuser' account] *****
changed: [web1]
changed: [web2]

```

```

1  ---
2  - name: Delete a specific user on all web servers
3    hosts: webservers
4    become: yes
5    vars:
6      username: webuser
7    tasks:
8      - name: Delete the '{{ username }}' account
9        user:
10         name: "{{ username }}"
11         remove: yes
12         force: yes
13         state: absent

```

```

TASK [Delete the 'webuser' account] *****
changed: [web1]
changed: [web2]

```



```
packt@neptune:~/ansible$ tree
```

```
├── ansible.cfg
├── create-user.yml
├── delete-user.yml
├── group_vars
│   └── webservers.yml
└── hosts
```

```
1 ---
2 - name: Create a specific user on all web servers
3   hosts: webservers
4   become: yes
5   tasks:
6     - name: Create the '{{ username }}' account
7       user:
8         name: "{{ username }}"
9         password: "{{ password | password_hash('sha512') }}"
10        update_password: always
11        state: present
```

```
1 ---
2 username: webuser
3 password: changeit! ←
```

```
1 ---
2 webuser:
3   password: changeit!
```

```
1 ---
2 username: webuser
3 comment: Regular web user
```

```
packt@neptune:~/ansible$ cat passwords.yml
$ANSIBLE_VAULT;1.1;AES256
64333563326435633135323362313733633731383965303364613237363362326432646632636265
3065613334333738313866333638613163616363323466330a396566613032623531653136633535
37363932383166323866363237623066623234356434633532613237393465393831646139393139
3838633263343535380a386264646431313930383333613034616437376634643732306135396263
62306238383037636132356264326231663438613832393061336234653261386561663535316463
6166323235393337343234623261333365376439613630633937
```

```
packt@neptune:~/ansible$ ansible-vault view passwords.yml
Vault password:
-----
webuser: { password: changeit! }
```

```
1  ---
2  - name: Create a specific user on all web servers
3    hosts: webservers
4    become: yes
5    tasks:
6      - name: Get the password for {{ username }} from Vault
7        include_vars:
8          file: passwords.yml
9
10     - name: Debug password for {{ username }}
11       debug:
12         msg: "{{ vars[username]['password'] }}"
```

```
TASK [Get the password for webuser from Vault] *****
ok: [web1]
ok: [web2]

TASK [Debug password for webuser] *****
ok: [web1] => {
  "msg": "changeit!"
}
ok: [web2] => {
  "msg": "changeit!"
}
```

```

1  ---
2  - name: Create a specific user on all web servers
3    hosts: webservers
4    become: yes
5    vars:
6      password: "{{ vars[username]['password'] }}"
7    tasks:
8      - name: Get the password for {{ username }} from Vault
9        include_vars:
10       file: passwords.yml
11
12     - name: Debug password for {{ username }}
13       debug:
14         msg: "{{ password }}"
15       no_log: true
16
17     - name: Create the '{{ username }}' account
18       user:
19         name: "{{ username }}"
20         comment: "{{ comment }}"
21         password: "{{ password | password_hash('sha512') }}"
22         update_password: always
23         state: present

```

```

1  ---
2  - name: Create users on webservers
3    hosts: webservers
4    become: yes
5    tasks:
6      - name: Create the 'webuser' account
7        user:
8          name: webuser
9          state: present
10     - name: Create the 'webadmin' account
11       user:
12         name: webadmin
13         state: present
14     - name: Create the 'webdev' account
15       user:
16         name: webdev
17         state: present

```

create-users1

```

1  ---
2  - name: Create users on webservers
3    hosts: webservers
4    become: yes
5    vars:
6      users:
7        - webuser
8        - webadmin
9        - webdev
10   tasks:
11     - name: Create the '{{ item }}' account
12       user:
13         name: "{{ item }}"
14         state: present
15     loop: "{{ users }}"

```

create-users2

```
1 ---
2 - name: Delete users on webserver
3   hosts: webserver
4   become: yes
5   vars:
6     users:
7       - webuser
8       - webadmin
9       - webdev
10  tasks:
11    - name: Delete user
12      user:
13        name: "{{ item }}"
14        state: absent
15        remove: yes
16        force: yes
17      loop: "{{ users }}"
```

```
PLAY [Create users on webserver] *****
TASK [Gathering Facts] *****
ok: [web1]

TASK [Create the 'webuser' account] *****
changed: [web1]

TASK [Create the 'webadmin' account] *****
changed: [web1]

TASK [Create the 'webdev' account] *****
changed: [web1]

PLAY RECAP *****
web1 : ok=4  changed=3  unreachable=0  failed=0  skipped=0
      rescued=0  ignored=0
```

```

PLAY [Create users on webservers] *****
TASK [Gathering Facts] *****
ok: [web1]

TASK [Create the '{{item}}' account] *****
changed: [web1] => (item=webuser)
changed: [web1] => (item=webadmin)
changed: [web1] => (item=webdev)

PLAY RECAP *****
web1 : ok=2    changed=1    unreachable=0    failed=0    skipped=0
      rescued=0    ignored=0

```

```

---
# Passwords are stored in passwords.yml
webusers:
- username: webuser
  comment: Regular web user

- username: webadmin
  comment: Web administrator

- username: webdev
  comment: Web developer

```

users.yml

```

---
# Usernames match the records in webusers.yml.
# The order doesn't matter!
webuser:
  password: bb37e5d1

webadmin:
  password: 7705b8a4

webdev:
  password: 8365b176

```

passwords.yml

```

1  ---
2  - name: Create users on webservers
3    hosts: webservers
4    become: yes
5    tasks:
6      - name: Load users
7        include_vars:
8          file: users.yml
9          name: users
10     - name: Load passwords
11       include_vars:
12         file: passwords.yml
13         name: passwords
14     - name: Create user accounts
15       user:
16         name: "{{ item.username }}"
17         comment: "{{ item.comment }}"
18         password: "{{ passwords[item.username]['password'] | password_hash('sha512') }}"
19         update_password: always
20         state: present
21         loop: "{{ users.webusers }}"

```

```
TASK [Gathering Facts] *****
ok: [web2]
ok: [web1]

TASK [Load users] *****
ok: [web1]
ok: [web2]

TASK [Load passwords] *****
ok: [web1]
ok: [web2]

TASK [Create user accounts] *****
changed: [web1] => (item={'username': 'webuser', 'comment': 'Regular web user'})
changed: [web1] => (item={'username': 'webadmin', 'comment': 'Web administrator'})
changed: [web2] => (item={'username': 'webuser', 'comment': 'Regular web user'})
changed: [web1] => (item={'username': 'webdev', 'comment': 'Web developer'})
changed: [web2] => (item={'username': 'webadmin', 'comment': 'Web administrator'})
changed: [web2] => (item={'username': 'webdev', 'comment': 'Web developer'})
```

```
1  ---
2  - name: Install system updates
3    hosts: all
4    become: yes
5
6    tasks:
7      - name: Install CentOS system updates
8        yum: name=* state=latest update_cache=yes
9          when: ansible_distribution == "CentOS"
10
11     - name: Install Ubuntu system updates
12       apt: upgrade=dist update_cache=yes
13       when: ansible_distribution == "Ubuntu"
```

```

TASK [Gathering Facts] *****
ok: [web2]
ok: [web1]
ok: [db1]
ok: [db2]

TASK [Install CentOS system updates] *****
skipping: [web1]
skipping: [db1]
ok: [db2]
ok: [web2]

TASK [Install Ubuntu system updates] *****
skipping: [web2]
skipping: [db2]
ok: [web1]
ok: [db1]

```

```

-----
# Passwords are stored in passwords.yml
webusers:
- username: webuser
  | comment: Regular web user

- username: webadmin
  | comment: Web administrator

- username: webdev
  | comment: Web developer

dbusers:
- username: dbuser
  | comment: Regular database user

- username: dbadmin
  | comment: Database administrator

- username: dbdev
  | comment: Database developer

```

users.yml

```

-----
# Usernames should match the records in
# the webusers.yml file. The order
# doesn't matter.

# Web user passwords.
webuser:
  | password: bb37e5d1
webadmin:
  | password: 7705b8a4
webdev:
  | password: 8365b176

# Database user passwords.
dbuser:
  | password: 4695b3db
dbadmin:
  | password: 99057ee9
dbdev:
  | password: a966ada8

```

passwords.yml

```
1 ---
2 - name: Create users
3   hosts: all
4   become: yes
5   tasks:
6     - name: Load users
7       include_vars:
8         file: users.yml
9         name: users
10    - name: Load passwords
11      include_vars:
12        file: passwords.yml
13        name: passwords
14    - name: Create web user accounts
15      user:
16        name: "{{ item.username }}"
17        comment: "{{ item.comment }}"
18        password: "{{ passwords[item.username]['password'] | password_hash('sha512') }}"
19        update_password: always
20        state: present
21      loop: "{{ users.webusers }}"
22      when: "'webservers' in group_names"
23  - name: Create database user accounts
24    user:
25      name: "{{ item.username }}"
26      comment: "{{ item.comment }}"
27      password: "{{ passwords[item.username]['password'] | password_hash('sha512') }}"
28      update_password: always
29      state: present
30      loop: "{{ users.dbusers }}"
31      when: "'databases' in group_names"
```



```

TASK [Create web user accounts] *****
skipping: [db1] => (item={'username': 'webuser', 'comment': 'Regular web user'})
skipping: [db1] => (item={'username': 'webadmin', 'comment': 'Web administrator'})
skipping: [db1] => (item={'username': 'webdev', 'comment': 'Web developer'})
skipping: [db2] => (item={'username': 'webuser', 'comment': 'Regular web user'})
skipping: [db2] => (item={'username': 'webadmin', 'comment': 'Web administrator'})
skipping: [db2] => (item={'username': 'webdev', 'comment': 'Web developer'})
changed: [web1] => (item={'username': 'webuser', 'comment': 'Regular web user'})
changed: [web1] => (item={'username': 'webadmin', 'comment': 'Web administrator'})
changed: [web2] => (item={'username': 'webuser', 'comment': 'Regular web user'})
changed: [web1] => (item={'username': 'webdev', 'comment': 'Web developer'})
changed: [web2] => (item={'username': 'webadmin', 'comment': 'Web administrator'})
changed: [web2] => (item={'username': 'webdev', 'comment': 'Web developer'})

TASK [Create database user accounts] *****
skipping: [web1] => (item={'username': 'dbuser', 'comment': 'Regular database user'})
skipping: [web1] => (item={'username': 'dbadmin', 'comment': 'Database administrator'})
skipping: [web1] => (item={'username': 'dbdev', 'comment': 'Database developer'})
skipping: [web2] => (item={'username': 'dbuser', 'comment': 'Regular database user'})
skipping: [web2] => (item={'username': 'dbadmin', 'comment': 'Database administrator'})
skipping: [web2] => (item={'username': 'dbdev', 'comment': 'Database developer'})
changed: [db1] => (item={'username': 'dbuser', 'comment': 'Regular database user'})
changed: [db1] => (item={'username': 'dbadmin', 'comment': 'Database administrator'})
changed: [db2] => (item={'username': 'dbuser', 'comment': 'Regular database user'})
changed: [db1] => (item={'username': 'dbdev', 'comment': 'Database developer'})
changed: [db2] => (item={'username': 'dbadmin', 'comment': 'Database administrator'})
changed: [db2] => (item={'username': 'dbdev', 'comment': 'Database developer'})

```

```

1 ---
2 - name: Detect if the number of users exceeds the limit
3   hosts: all
4   become: yes
5   vars:
6     max_allowed: 30
7   tasks:
8     - name: Count all users
9       shell: "getent passwd | wc -l"
10      register: count
11     - name: Debug number of users
12       debug:
13         msg: "Number of users: {{ count.stdout }}. Limit: {{ max_allowed }}"
14     - name: Detect limit
15       debug:
16         msg: "Maximum number of users reached!"
17     when: count.stdout | int > max_allowed

```

```

TASK [Gathering Facts] *****
ok: [web1]

TASK [Count all users] *****
changed: [web1]

TASK [Debug number of users] *****
ok: [web1] => {
  "msg": "Number of users: 36. Limit: 30"
}

TASK [Detect limit] *****
ok: [web1] => {
  "msg": "Maximum number of users reached!"
}

```

```

TASK [Gathering Facts] *****
ok: [web1]

TASK [Count all users] *****
changed: [web1]

TASK [Debug number of users] *****
ok: [web1] => {
  "msg": "Number of users: 36. Limit: 50"
}

TASK [Detect limit] *****
skipping: [web1]

```

```

1  {# We could pass these variables from the playbook #}
2  {% set date = '2021-04-08' %}
3  {% set start_time = date ~ 'T02:00:00-0800' %}
4  {% set end_time = date ~ 'T03:00:00-0800' %}
5
6  {% set fmt = '%Y-%m-%dT%H:%M:%S%Z' %}
7  {% set start = (start_time | to_datetime(format=fmt)) %}
8  {% set end = (end_time | to_datetime(format=fmt)) %}
9
10 {# We could also use the {{ inventory_hostname }} special variable #}
11 {{ ansible_facts.fqdn }} ({{ ansible_facts.default_ipv4.address }}) will
    be down for maintenance on {{ start.strftime('%A, %B %-d, %Y') }}, between
    {{ start.strftime('%-I') }} - {{ end.strftime('%-I %p (%Z)') }}.

```

```

1  ---
2  - name: Update the message of the day
3    hosts: all
4    become: yes
5    tasks:
6      - name: Deploy the 'motd' template
7        template:
8          src: motd.j2
9          dest: /etc/motd
10         owner: root
11         group: root
12         mode: 0644

```

```

packt@neptune:~/ansible$ ansible web1 -a "cat /etc/motd"
web1 | CHANGED | rc=0 >>

```

```

web1 (172.16.191.12) will be down for maintenance on Thursday, April 8, 2021,
between 2 - 3 AM (UTC-08:00).

```

```

web1 (172.16.191.12) will be down for maintenance on Thursday, April 8, 2021,
between 2 - 3 AM (UTC-08:00).
Last login: Thu Apr  8 08:33:37 2021 from 172.16.191.11
packt@web1:~$ █

```

```

1  {% set start_time_ = date ~ 'T' ~ start_time ~ utc %}
2  {% set end_time_ = date ~ 'T' ~ end_time ~ utc %}
3
4  {% set fmt = '%Y-%m-%dT%H:%M:%S%z' %}
5  {% set start = (start_time_ | to_datetime(format=fmt)) %}
6  {% set end = (end_time_ | to_datetime(format=fmt)) %}
7
8  {{ ansible_facts.fqdn }} ({{ ansible_facts.default_ipv4.address }}) will
be down for maintenance on {{ start.strftime('%A, %B %-d, %Y') }}, between
{{ start.strftime('%-I') }} - {{ end.strftime('%-I %p (%Z)') }}.

```

```
1 ---
2 - name: Update the message of the day
3   hosts: all
4   become: yes
5   vars:
6     date: "2021-04-08"
7     start_time: "02:00:00"
8     end_time: "03:00:00"
9     utc: "-0800"
10  tasks:
11    - name: Deploy the 'motd' template
12      template:
13        src: motd.j2
14        dest: /etc/motd
15        owner: root
16        group: root
17        mode: 0644
```

```
1 # This file is autogenerated!
2
3 127.0.0.1 {{ inventory_hostname }} localhost
4
5 {% for host in groups['all'] %}
6 {% if host != inventory_hostname %}
7 {{ hostvars[host].ansible_facts.default_ipv4.address }} {{ host }}
8 {% endif %}
9 {% endfor %}
```

```
1  ---
2  - name: Update the hosts file
3    hosts: all
4    become: yes
5    tasks:
6      - name: Deploy the 'hosts' template
7        template:
8          src: hosts.j2
9          dest: /etc/hosts
10         owner: root
11         group: root
12         mode: 0644
```

```
# This file is autogenerated!

127.0.0.1 web1 localhost

172.16.191.14 web2
172.16.191.13 db1
172.16.191.15 db2
```

```
packt@web1:~$ ping db2
PING db2 (172.16.191.15) 56(84) bytes of data.
64 bytes from db2 (172.16.191.15): icmp_seq=1 ttl=64 time=0.322 ms
64 bytes from db2 (172.16.191.15): icmp_seq=2 ttl=64 time=0.641 ms
64 bytes from db2 (172.16.191.15): icmp_seq=3 ttl=64 time=0.588 ms
```

```
packt@neptune:~/ansible$ tree
.
├── ansible.cfg
├── create-users ←
│   ├── defaults
│   │   └── main.yml
│   ├── files
│   ├── handlers
│   │   └── main.yml
│   ├── meta
│   │   └── main.yml
│   ├── README.md
│   ├── tasks
│   │   └── main.yml
│   ├── templates
│   ├── tests
│   │   ├── inventory
│   │   └── test.yml
│   └── vars
│       └── main.yml
└── hosts
```

```
---
# Example user accounts.
# Passwords are stored in passwords.yml
list:
- username: testuser
  comment: Test user

- username: testadmin
  comment: Test admin

- username: testdev
  comment: Test dev
users.yml
```

```
1 ---
2 # Example user passwords.
3 # Usernames match the records in users.yml.
4 # The order doesn't matter.
5 testuser:
6   password: bb37e5d1
7
8 testadmin:
9   password: 7705b8a4
10
11 testdev:
12   password: 8365b176
passwords.yml
```

```
1 ---
2 - name: Create users with passwords
3   hosts: all
4   become: yes
5   vars:
6     users_file: users.yml
7     passwords_file: passwords.yml
8   tasks:
9     - name: Load users
10      include_vars:
11        file: "{{ users_file }}"
12        name: users
13     - name: Load passwords
14      include_vars:
15        file: "{{ passwords_file }}"
16        name: passwords
17     - name: Create user accounts
18      user:
19        name: "{{ item.username }}"
20        comment: "{{ item.comment }}"
21        password: "{{ passwords[item.username]['password'] | password_hash('sha512') }}"
22        update_password: always
23        state: present
24      loop: "{{ users.list }}"
```

```
1 ---
2 users_file: users.yml
3 passwords_file: passwords.yml
```

defaults/main.yml

```
1 ---
2 - name: Load users
3   include_vars:
4     file: "{{ users_file }}"
5     name: users
6 - name: Load passwords
7   include_vars:
8     file: "{{ passwords_file }}"
9     name: passwords
10 - name: Create user accounts
11   user:
12     name: "{{ item.username }}"
13     comment: "{{ item.comment }}"
14     password: "{{ passwords[item.username]['password'] | password_hash('sha512') }}"
15     update_password: always
16     state: present
17   loop: "{{ users.list }}"
```

tasks/main.yml

```
1 ---
2 - hosts: all
3   become: yes
4   roles:
5     - role: create-users
6   vars:
7     users_file: users.yml
8     passwords_file: passwords.yml
```

tests/test.yml

```
1 ---
2 - hosts: all
3   become: yes
4   tasks:
5     - name: Create users
6       include_role:
7         name: create-users
8       vars:
9         users_file: users.yml
10        passwords_file: passwords.yml
```



```
1 ---
2 - hosts: all
3   become: yes
4   tasks:
5     - name: Create users
6       include_role:
7         name: create-users
```

The screenshot shows the Galaxy web interface. At the top, there is a navigation bar with the Galaxy logo and links for About, Help, Documentation, and Login. Below this is a dark sidebar with navigation options: Home, Search, and Community. The main content area displays a 'Home' header and a 'Most Popular' section. This section features a grid of category icons and labels: System, Development, Networking, Cloud, Database, Monitoring, Packaging, Playbook Bundles, Security, and Web.

Q Search

nginx ^ Filters (1535 results)

Type Filter by Collection or Role... Best Match

1535 Results Active filters: **Deprecated: False** **Type: Role** [Clear All Filters](#)

Roles 1535



geerlingguy

nginx

Nginx installation for Linux, FreeBSD and OpenBSD.

build passing

4.6 / 5 Score 5575042 Downloads
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balancer development load nginx proxy reverse web



nginxinc

nginx

Official Ansible role for NGINX

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Details

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Info

Minimum Ansible Version 2.9

Installation `$ ansible-galaxy install nginxinc.nginx`

Last Commit 3 months ago

Last Import 3 months ago

Tags development install nginx opensource oss plus server web

Content Score

Quality Score 5 / 5

Last scored 3 months ago. [Show Details](#)

Community Score 2.7 / 5

Based on 10 surveys. [Show Details](#)

Tell us about this role

```
1 ---
2 - name: Install NGINX on all webserver
3   hosts: webserver
4   become: yes
5   tasks:
6     - name: Install NGINX
7       include_role:
8         name: nginxinc.nginx
9       vars:
10        nginx_debug_output: true
11        nginx_selinux: true
12        nginx_selinux_tcp_ports:
13          - "80"
14          - "443"
```

```
1 ---
2 - hosts: webservers
3   become: true
4
5   tasks:
6     - name: Configure Ubuntu firewall
7       include_role:
8         name: weareinteractive.ufw
9       vars:
10        ufw_rules:
11          - logging: "full"
12            - rule: allow
13              to_port: "80"
14                proto: tcp
15        when: ansible_distribution == "Ubuntu"
16
17     - name: Configure CentOS firewall
18       include_role:
19         name: flatkey.firewalld
20       vars:
21        default_zone: public
22        firewalld_service_rules:
23          http:
24            state: enabled
25            zone: public
26            permanent: true
27            immediate: true
28        when: ansible_distribution == "CentOS"
```