

Day1

What is dual/multi booting with boot loader utilities?

- boot loader is a system utility that is installed in Master Boot Record(MBR) in your hard disk
- Master Boot Loader is typically 512 bytes, hence the boot utility size will have fit within the 512 bytes
- Examples
 - LILO
 - GRUB 1
 - GRUB 2
- when a system is booted, the BIOS(Basic Input Output System) - POST(Power On Self Test) once completed, the BIOS will instruct the CPU to run the boot loader utility
- the boot loader utility then scans your hard disk looking for OS, if there are multiple OS installed on your system, then it gives a menu for you to choose the OS you wish to boot into
- though many OS can be installed only one OS can be active at point of time

What is Hypervisor?

- is virtualization technology
- supports running many Operating System on the same laptop/desktop/workstation/server
- many OS can be active at the same time
- hardware/software technology
- Processors
 - AMD (Advanced Micro Devices) - General Purpose Processors - Virtualization Feature is called AMD-V
 - Intel - General Purpose Processors - Virtualization Feature - VT-X
 - Apple Silicon(ARM Processor) - Embedded
- there are 2 types
 - Type 1
 - Bare-metal hypervisor
 - no OS is required to install this type of Hypervisor
 - meant for Servers
 - Type 2
 - For laptops/desktops/workstations
 - requires Host OS (could be any of these OS - Unix, Linux, Mac or Windows)
- this type of virtualization is called heavy-weight virtualization
 - because each Virtual machine has to be allocated with dedicated hardware resources
 - CPU Cores
 - RAM
 - Storage - Hard disk
 - Graphics Card
 - Network Card
- each Virtual machine represents one fully functional Operating System
- Examples
 - VMWare

- Fusion (Mac OS-X)
- Workstation (Linux & Windows)
- vSphere/vCenter - Bare-metal Hypervisors
- Oracle VirtualBox - Free works in Linux/Mac/Windows
- Parallels (Mac OS-X)
- Microsoft Hyper-V

What is Container Technology?

- is an application virtualization technology
- each container represents one application process
- though it may look and behave like OS in some cases, technically it is an application
- it doesn't have OS Kernel
- one container represents one application
- many containers can run within an OS
- this type of virtualization is considered lightweight virtualization as they don't require dedicated hardware resources
- containers running in the same OS share the hardware resources in that OS just like how other normal applications share hardware resources
- containers depend on Linux Kernel Features
 1. Namespace
 - helps in isolating one container from other containers
 2. Control Groups (CGroups)
 - used to apply resource quota restrictions
 - we can limit how many CPU cores at the max a container can utilize
 - we can limit how much RAM at the max one container can utilize

What is a Container Engine?

- a high-level user-friendly software that manages container/images
- it depends on Container Runtime to manage containers
- Examples
 - Docker
 - Podman
- Docker Container Engine depends on runC Container Runtime
- Podman Container Engine depends on CRI-O Container Runtime

What is Container Runtime?

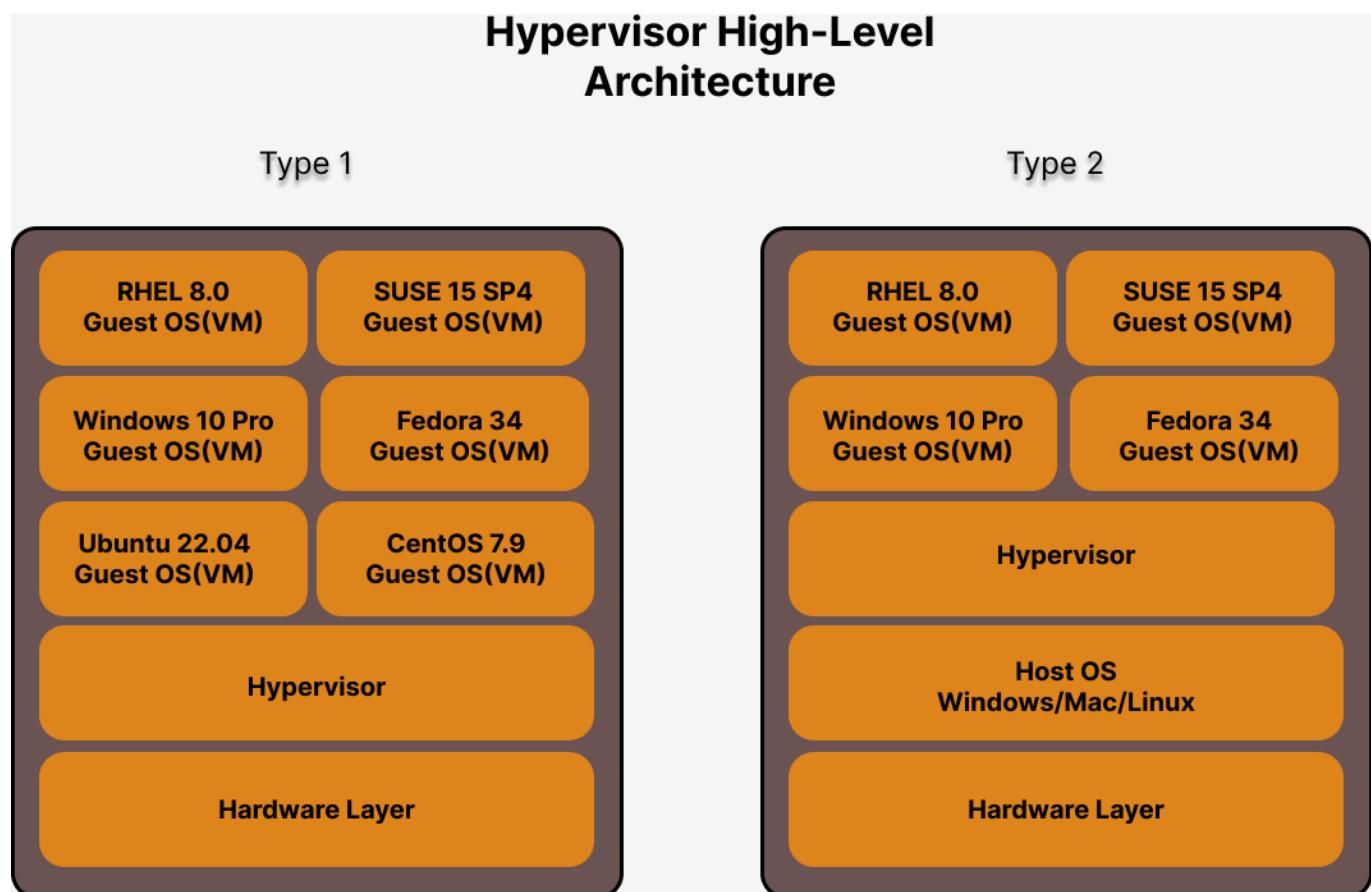
- a software that manages containers
 - creating a container
 - listing a container
 - stop/start/restarting/kill/abort/delete container
- depends on OS Kernel to create/manage containers
- they are low-level software which isn't user-friendly
- hence normally no end-users directly use the container runtime
- Examples
 - runC

- CRI-O

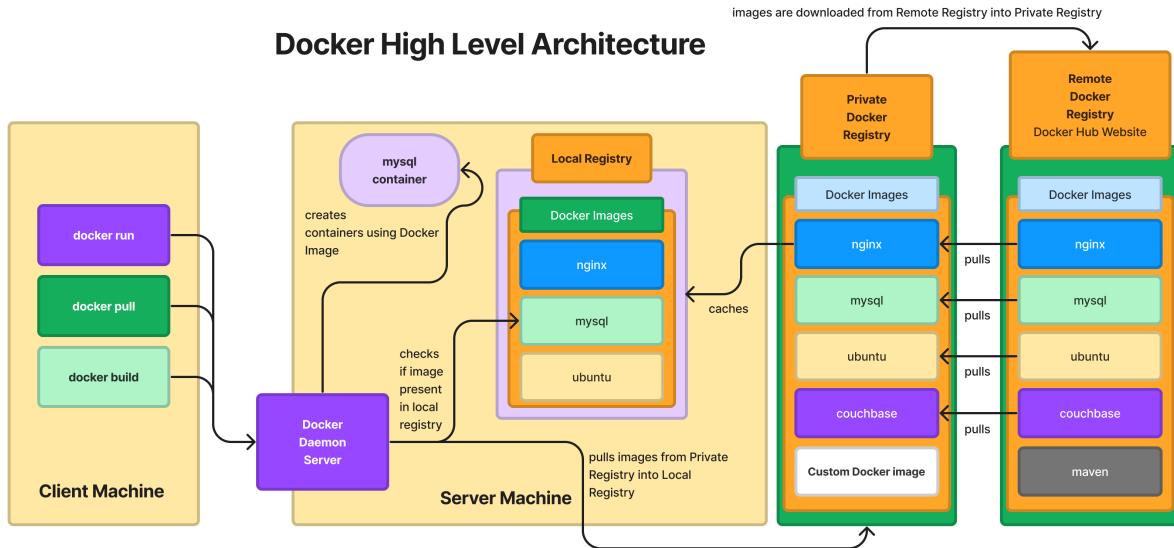
What is Docker?

- a high-level software that depends on Linux Kernel to support application virtualization
- a Container Engine
- it is user-friendly tool to manage docker images/containers
- is developed in Go programming language by the company Docker Inc
- comes in 2 flavours
 1. Docker Community Edition - Docker CE (Free)
 2. Docker Enterprise Edition - Docker EE (Paid)
- follows client/server architecture client tool
 - docker server tool
 - runs as a service called dockerd in linux
- the end-users need not have to know low-level kernel stuffs to work in containers
- Docker depends on containerd which depends on Container Runtime called runC

Hypervisor High-Level Architecture



Docker High-Level Architecture



What is Docker Local Registry?

- is a directory in your local machine
- in Linux machines `/var/lib/docker` is the directory that acts as a Local Docker Registry
- Docker Registries has a collection of many Docker Images

What is Docker Private Registry?

- Docker Private Registry has collection of many Proprietary Docker Images and other third party open source and paid images
- this can be setup using either JFrog Artifactory or Sonatype Nexus
- for testing/learning purpose you could also try `registry:2` docker image from Docker Hub Remote Registry
- this is setup for your entire organization, so that images can be shared by all the teams with your company

What is Docker Remote Registry?

- aka Remote Docker Registry
- it is a Website maintained by Docker Inc organization
- it has many open-source and third-party docker images
- the images can be freely downloaded and used by anyone
- Website url - hub.docker.com

What is Docker Image?

- it is similar to Windows ISO Operating System image we burn in DVDs
- using the Windows 11 Installer DVD/ISO Image, we can install Windows 11 in many laptops/desktops/workstation/servers
- similar to that, Docker Image is required to create containers

- Example
 - Using mysql docker image, we can create 1-to-many mysql docker containers
 - Using nginx docker image, we can create many nginx docker containers
- in other words, it is a specification of Docker container

What is Docker Container?

- running instance of a Docker Image
- each container represents one application
- container is not OS
- container has its own file system
- container has its own port range (0 - 65535)
- container has its own network stack (7 OSI Layers)
- container has its own virtual network card
- container has its own Private IP address
- it has one application binary with all its dependent libraries pre-installed
- it comes with basic minimum tools

What type of applications can be containerized?

- Web Server
- Application Server
- DB servers
- REST API
- SOAP API
- Message Queue Servers
- Microservices, etc.,

Docker Commands

Demo - Installing Docker CE in CentOS 7.9

```
[root@localhost ~]# docker --version
bash: docker: command not found...
[root@localhost ~]# sudo yum install -y yum-utils
Loaded plugins: fastestmirror, langpacks
Loading mirror speeds from cached hostfile
epel/x86_64/metalink
* base: mirrors.nxtgen.com
* epel: excellmedia.net
* extras: mirrors.nxtgen.com
* updates: centos.excellmedia.net
base
extras
updates
Package yum-utils-1.1.31-54.el7_8.noarch already installed and latest version
Nothing to do
[root@localhost ~]# sudo yum-config-manager --add-repo https://download.docker.com/linux/centos/docker-ce.repo
Loaded plugins: fastestmirror, langpacks
adding repo from: https://download.docker.com/linux/centos/docker-ce.repo
grabbing file https://download.docker.com/linux/centos/docker-ce.repo to /etc/yum.repos.d/docker-ce.repo
repo saved to /etc/yum.repos.d/docker-ce.repo
[root@localhost ~]# sudo yum install docker-ce docker-ce-cli containerd.io docker-buildx-plugin docker-compose-plugin
Loaded plugins: fastestmirror, langpacks
Loading mirror speeds from cached hostfile
* base: centos.mirror.net.in

```

Activate Windows
Go to Settings to activate Windows.

```
--> Processing Dependency: libfuse3.so.3(FUSE_3.0)(64bit) for package: fuse-overlayfs-0.7.2-6.el7_8.x86_64
--> Processing Dependency: libfuse3.so.3()(64bit) for package: fuse-overlayfs-0.7.2-6.el7_8.x86_64
-->> Package slirp4netns.x86_64 0:0.4.3-4.el7_8 will be installed
-->> Running transaction check
-->> Package fuse3libs.x86_64 0:3.6.1-4.el7 will be installed
-->> Finished Dependency Resolution

Dependencies Resolved

=====
Package           Arch      Version            Repository      Size
=====
Installing:
containerd.io     x86_64    1.6.22-3.1.el7   docker-ce-stable 34 M
docker-buildx-plugin x86_64  0.11.2-1.el7    docker-ce-stable 13 M
docker-ce          x86_64    3:24.0.6-1.el7  docker-ce-stable 24 M
docker-ce-cli      x86_64    1:24.0.6-1.el7  docker-ce-stable 13 M
docker-compose-plugin x86_64  2.21.0-1.el7   docker-ce-stable 13 M
Installing for dependencies:
container-selinux  noarch    2:2.119.2-1.911c772.el7_8 extras        40 k
docker-ce-rootless-extras x86_64  24.0.6-1.el7    docker-ce-stable 9.1 M
fuse-overlayfs    x86_64    0.7.2-6.el7_8    extras        54 k
fuse3libs         x86_64    3.6.1-4.el7    extras        Activate Windows 82 k
slirp4netns       x86_64    0.4.3-4.el7_8  extras        Go to Settings to activate Win 81 k
```

```

Verifying : 2:container-selinux-2.119.2-1.911c772.el7_8.noarch          4/10
Verifying : docker-ce-rootless-extras-24.0.6-1.el7.x86_64                5/10
Verifying : 3:docker-ce-24.0.6-1.el7.x86_64                            6/10
Verifying : containerd.io-1.6.22-3.1.el7.x86_64                         7/10
Verifying : docker-buildx-plugin-0.11.2-1.el7.x86_64                     8/10
Verifying : fuse-overlayfs-0.7.2-6.el7.8.x86_64                         9/10
Verifying : 1:docker-ce-cli-24.0.6-1.el7.x86_64                         10/10

Installed:
  containerd.io.x86_64 0:1.6.22-3.1.el7                               docker-buildx-plugin.x86_64 0:0.11.2-1.el7
  docker-ce.x86_64 3:24.0.6-1.el7                                     docker-ce-cli.x86_64 1:24.0.6-1.el7
  docker-compose-plugin.x86_64 0:2.21.0-1.el7

Dependency Installed:
  container-selinux.noarch 2:2.119.2-1.911c772.el7_8                  docker-ce-rootless-extras.x86_64 0:24.0.6-1.el7
  fuse-overlayfs.x86_64 0:0.7.2-6.el7_8                                fuse3-libs.x86_64 0:3.6.1-4.el7
  slirp4netns.x86_64 0:0.4.3-4.el7_8

Complete!
[root@localhost ~]# docker --version
Docker version 24.0.6, build ed223bc
[root@localhost ~]# docker images
Cannot connect to the Docker daemon at unix:///var/run/docker.sock. Is the docker daemon running?
[root@localhost ~]# systemctl enable docker
Created symlink from /etc/systemd/system/multi-user.target.wants/docker.service to /usr/lib/systemd/system/docker.service.
[root@localhost ~]# systemctl start docker
[root@localhost ~]# systemctl status docker
● docker.service - Docker Application Container Engine
  Loaded: loaded (/usr/lib/systemd/system/docker.service; enabled; vendor preset: disabled)
  Active: active (running) since Mon 2023-09-11 12:35:18 IST; 5s ago
    Docs: https://docs.docker.com
 Main PID: 26182 (dockerd)
   Tasks: 36
     Memory: 50.5M
      CGroup: /system.slice/docker.service
              └─26182 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/containerd.sock

Sep 11 12:35:17 localhost.localdomain systemd[1]: Starting Docker Application Container Engine...
Sep 11 12:35:17 localhost.localdomain dockerd[26182]: time="2023-09-11T12:35:17.330569321+05:30" le...up"
Sep 11 12:35:17 localhost.localdomain dockerd[26182]: time="2023-09-11T12:35:17.372678929+05:30" le...t."
Sep 11 12:35:18 localhost.localdomain dockerd[26182]: time="2023-09-11T12:35:18.237218624+05:30" le...ng"
Sep 11 12:35:18 localhost.localdomain dockerd[26182]: time="2023-09-11T12:35:18.336791130+05:30" le...e."
Sep 11 12:35:18 localhost.localdomain dockerd[26182]: time="2023-09-11T12:35:18.367016500+05:30" le...o 6

```

```

Complete!
[root@localhost ~]# docker --version
Docker version 24.0.6, build ed223bc
[root@localhost ~]# docker images
Cannot connect to the Docker daemon at unix:///var/run/docker.sock. Is the docker daemon running?
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  Active: active (running) since Mon 2023-09-11 12:35:18 IST; 5s ago
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Sep 11 12:35:17 localhost.localdomain dockerd[26182]: time="2023-09-11T12:35:17.330569321+05:30" le...up"
Sep 11 12:35:17 localhost.localdomain dockerd[26182]: time="2023-09-11T12:35:17.372678929+05:30" le...t."
Sep 11 12:35:18 localhost.localdomain dockerd[26182]: time="2023-09-11T12:35:18.237218624+05:30" le...ng"
Sep 11 12:35:18 localhost.localdomain dockerd[26182]: time="2023-09-11T12:35:18.336791130+05:30" le...e."
Sep 11 12:35:18 localhost.localdomain dockerd[26182]: time="2023-09-11T12:35:18.367016500+05:30" le...o 6

```

The screenshot shows a terminal window titled 'root@localhost ~#'. The window displays several log entries from 'dockerd' and 'systemd' processes, indicating the Docker engine has started. It then shows the execution of the 'usermod' command to add users 'user15' through 'user21' to the 'docker' group. Finally, it lists the local Docker images.

```
Sep 11 12:35:18 localhost.localdomain dockerd[26182]: time="2023-09-11T12:35:18.367046500+05:30" le...0.6
Sep 11 12:35:18 localhost.localdomain dockerd[26182]: time="2023-09-11T12:35:18.367716503+05:30" le...on"
Sep 11 12:35:18 localhost.localdomain dockerd[26182]: time="2023-09-11T12:35:18.394541203+05:30" le...ck"
Sep 11 12:35:18 localhost.localdomain systemd[1]: Started Docker Application Container Engine.
Hint: Some lines were ellipsized, use -l to show in full.
[root@localhost ~]# ls -l /home
total 20
drwx----- 15 rps rps 4096 Sep  9 00:58 rps
drwx----- 19 user15 user15 4096 Sep 11 12:18 user15
drwx-----  4 user16 user16 140 Sep  9 18:54 user16
drwx----- 19 user17 user17 4096 Sep 11 12:31 user17
drwx-----  4 user18 user18 140 Sep  9 18:54 user18
drwx----- 19 user19 user19 4096 Sep 11 12:26 user19
drwx----- 19 user20 user20 4096 Sep 11 12:25 user20
drwx-----  4 user21 user21 140 Sep  9 18:55 user21
[root@localhost ~]# usermod -aG docker user15
[root@localhost ~]# usermod -aG docker user16
[root@localhost ~]# usermod -aG docker user17
[root@localhost ~]# usermod -aG docker user18
[root@localhost ~]# usermod -aG docker user19
[root@localhost ~]# usermod -aG docker user20
[root@localhost ~]# usermod -aG docker user21
[root@localhost ~]# docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
[root@localhost ~]#
```

Lab - Checking your docker version on the CentOS Lab machine

```
docker --version
```

Expected output

```
└─(jegan@tektutor.org)-[~/openshift-sep-2023]
└─$ docker --version
Docker version 20.10.25+dfsg1, build b82b9f3
```

Lab - Listing docker images in your local docker registry

```
docker images
```

Expected output

```
jegan@tektutor: ~/openshift-sep-2023
jegan@tektutor: ~/ansible-sep-2023
jegan@tektutor: ~/openshift-sep-2023

[jegan@tektutor.org] - [~/openshift-sep-2023]
$ docker --version
Docker version 20.10.25+dfsg1, build b82b9f3

[jegan@tektutor.org] - [~/openshift-sep-2023]
$ docker images
REPOSITORY          TAG      IMAGE ID      CREATED       SIZE
tektutor/ansible-centos-node    latest   758c48f5a98f  5 days ago   428MB
tektutor/ansible-ubuntu-node    latest   7e779b4b95bb  5 days ago   220MB
nginx                latest   eea7b3dcba7e  3 weeks ago   187MB
ubuntu               22.04   c6b84b685f35  3 weeks ago   77.8MB
hello-world          latest   9c7a54a9a43c  4 months ago  13.3kB
centos              7.9.2009  eeb6ee3f44bd  24 months ago  204MB
ubuntu               16.04   b6f507652425  2 years ago   135MB

[jegan@tektutor.org] - [~/openshift-sep-2023]
$
```

Lab - Docker Remote Registry

Navigate to the below URL in your CentOS web browser

Expected output

Docker Con 2023: Our annual developer event is back — online & in person. [Learn more.](#)

Build and Ship any Application Anywhere

Docker Hub is the world's easiest way to create, manage, and deliver your team's container applications.

Create your account

Signing up for Docker is fast and free.

Email

Username

Password

Send me occasional product updates and announcements.

This site is protected by reCAPTCHA and the Google [Privacy Policy](#) and [Terms of Service](#) apply.

[Sign Up](#)

By creating an account I agree to the [Subscription Service Agreement](#), [Privacy Policy](#), [Data Processing Terms](#).

[Cookies Settings](#) [Reject All](#) [Accept All Cookies](#)

By clicking "Accept All Cookies", you agree to the storing of cookies on your device to enhance site navigation, analyze site usage, and assist in our marketing efforts.

Click on Explore link in the hub.docker.com website, you will get below page

The screenshot shows the Docker Hub search results for 'alpine'. There are three main cards displayed:

- alpine**: Docker Official Image, 1B+ pulls, 10K+ stars. Updated 9 days ago. A minimal Docker image based on Alpine Linux with a complete package index and only 5 ...
- nginx**: Docker Official Image, 1B+ pulls, 10K+ stars. Updated 3 days ago. Official build of Nginx.
- busybox**: Docker Official Image, 1B+ pulls, 3.1K stars. Updated 2 months ago. Busybox base image.

On the left, there are filters for Products (Images, Extensions, Plugins), Trusted Content (Docker Official Image, Verified Publisher, Sponsored OSS), Operating Systems (Linux, Windows), and Architectures (ARM). On the right, there is a dropdown menu set to 'Suggested'.

Lab - Download docker image from Docker Hub Remote Registry to Docker Local registry

```
docker pull mysql:latest
docker images
```

Expected output

```
jegan@tektutor: ~
jegan@tektutor: ~
[jegan@tektutor.org] - [~/openshift-sep-2023]
$ docker --version
Docker version 20.10.25+dfsg1, build b82b9f3

[jegan@tektutor.org] - [~/openshift-sep-2023]
$ docker images
REPOSITORY          TAG      IMAGE ID      CREATED       SIZE
tektutor/ansible-centos-node  latest   758c48f5a98f  5 days ago   428MB
tektutor/ansible-ubuntu-node  latest   7e779b4b95bb  5 days ago   220MB
nginx              latest   eea7b3dcbab7e  3 weeks ago   187MB
ubuntu             22.04   c6b84b685f35  3 weeks ago   77.8MB
hello-world        latest   9c7a54a9a43c  4 months ago  13.3kB
centos            7.9.2009  eeb6ee3f44bd  24 months ago  204MB
ubuntu             16.04   b6f507652425  2 years ago   135MB

[jegan@tektutor.org] - [~/openshift-sep-2023]
$ docker pull mysql:latest
latest: Pulling from library/mysql
b193354265ba: Pull complete
14a15c0bb358: Pull complete
02da291ad1e4: Pull complete
9a89a1d664ee: Pull complete
a24ae6513051: Pull complete
b85424247193: Pull complete
9a240a3b3d51: Pull complete
8bf57120f71f: Pull complete
c64090e82a0b: Extracting [=====]
af7c7515d542: Download complete
```

```
jegan@tektutor: ~/openshift-sep-2023
jegan@tektutor: ~/ansible-sep-2023
jegan@tektutor: ~/openshift-sep-2023

$ docker images
REPOSITORY          TAG      IMAGE ID      CREATED     SIZE
tektutor/ansible-centos-node    latest   758c48f5a98f  5 days ago  428MB
tektutor/ansible-ubuntu-node    latest   7e779b4b95bb  5 days ago  220MB
nginx               latest   eea7b3dcba7e  3 weeks ago  187MB
ubuntu              22.04   c6b84b685f35  3 weeks ago  77.8MB
hello-world         latest   9c7a54a9a43c  4 months ago 13.3kB
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(jegan@tektutor.org)-[~/openshift-sep-2023]
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latest: Pulling from library/mysql
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02da291ad1e4: Pull complete
9a89a1d664ee: Pull complete
a24ae6513051: Pull complete
b85424247193: Pull complete
9a240a3b3d51: Pull complete
8bf57120f71f: Pull complete
c64090e82a0b: Pull complete
af7c7515d542: Pull complete
Digest: sha256:c0455ac041844b5e65cd08571387fa5b50ab2a6179557fd938298cab13acf0dd
Status: Downloaded newer image for mysql:latest
docker.io/library/mysql:latest

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ 

(jegan@tektutor.org)-[~/openshift-sep-2023]
jegan@tektutor: ~/openshift-sep-2023
jegan@tektutor: ~/ansible-sep-2023
jegan@tektutor: ~/openshift-sep-2023

latest: Pulling from library/mysql
b193354265ba: Pull complete
14a15c0bb358: Pull complete
02da291ad1e4: Pull complete
9a89a1d664ee: Pull complete
a24ae6513051: Pull complete
b85424247193: Pull complete
9a240a3b3d51: Pull complete
8bf57120f71f: Pull complete
c64090e82a0b: Pull complete
af7c7515d542: Pull complete
Digest: sha256:c0455ac041844b5e65cd08571387fa5b50ab2a6179557fd938298cab13acf0dd
Status: Downloaded newer image for mysql:latest
docker.io/library/mysql:latest

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker images
REPOSITORY          TAG      IMAGE ID      CREATED     SIZE
tektutor/ansible-centos-node    latest   758c48f5a98f  5 days ago  428MB
tektutor/ansible-ubuntu-node    latest   7e779b4b95bb  5 days ago  220MB
nginx               latest   eea7b3dcba7e  3 weeks ago  187MB
ubuntu              22.04   c6b84b685f35  3 weeks ago  77.8MB
mysql               latest   99afc808f15b  4 weeks ago  577MB
hello-world         latest   9c7a54a9a43c  4 months ago 13.3kB
centos              7.9.2009 eeb6ee3f44bd  24 months ago 204MB
ubuntu              16.04   b6f507652425  2 years ago  135MB

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ 
```

Lab - Deleting docker image from your local docker registry

```
docker images
docker rmi hello-world:latest
docker images
```

Expected output

```
jegan@tektutor: ~/openshift-sep-2023
jegan@tektutor: ~
jegan@tektutor: ~/ansible-sep-2023
jegan@tektutor: ~

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker images
REPOSITORY          TAG      IMAGE ID      CREATED        SIZE
tektutor/ansible-centos-node    latest   758c48f5a98f  5 days ago   428MB
tektutor/ansible-ubuntu-node    latest   7e779b4b95bb  6 days ago   220MB
nginx                latest   eea7b3dcba7e  3 weeks ago   187MB
ubuntu               22.04   c6b84b685f35  3 weeks ago   77.8MB
mysql                latest   99afc808f15b  4 weeks ago   577MB
hello-world           latest   9c7a54a9a43c  4 months ago  13.3kB
centos               7.9.2009  eeb6ee3f44bd  24 months ago  204MB
ubuntu               16.04   b6f507652425  2 years ago   135MB

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker rmi hello-world:latest
Untagged: hello-world:latest
Untagged: hello-world@sha256:dcba6daec718f547568c562956fa47e1b03673dd010fe6ee58ca8067676031d1c
Deleted: sha256:9c7a54a9a43cca047013b82af109fe963fde787f63f9e016fdcc3384500c2823d
Deleted: sha256:01bb4fce3eb1b56b05adf99504dafd31907a5aadac736e36b27595c8b92f07ff1

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker images
REPOSITORY          TAG      IMAGE ID      CREATED        SIZE
tektutor/ansible-centos-node    latest   758c48f5a98f  5 days ago   428MB
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nginx                latest   eea7b3dcba7e  3 weeks ago   187MB
ubuntu               22.04   c6b84b685f35  3 weeks ago   77.8MB
mysql                latest   99afc808f15b  4 weeks ago   577MB
centos               7.9.2009  eeb6ee3f44bd  24 months ago  204MB
ubuntu               16.04   b6f507652425  2 years ago   135MB

(jegan@tektutor.org)-[~/openshift-sep-2023]
$
```

Lab - Creating your first container

Listing and check if hello-world:latest docker image is present in your local docker registry

```
docker images
```

Expected output

```
(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker images
REPOSITORY          TAG      IMAGE ID      CREATED        SIZE
tektutor/ansible-centos-node    latest   758c48f5a98f  5 days ago   428MB
tektutor/ansible-ubuntu-node    latest   7e779b4b95bb  6 days ago   220MB
nginx                latest   eea7b3dcba7e  3 weeks ago   187MB
ubuntu               22.04   c6b84b685f35  3 weeks ago   77.8MB
mysql                latest   99afc808f15b  4 weeks ago   577MB
centos               7.9.2009  eeb6ee3f44bd  24 months ago  204MB
ubuntu               16.04   b6f507652425  2 years ago   135MB
```

You can now create a container

```
docker run hello-world:latest
```

Expected output

```
└──(jegan@tektutor.org)-[~/openshift-sep-2023]
  └─$ docker run hello-world:latest
    Unable to find image 'hello-world:latest' locally
    latest: Pulling from library/hello-world
    719385e32844: Pull complete
    Digest:
    sha256:dcba6daec718f547568c562956fa47e1b03673dd010fe6ee58ca806767031d1c
    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
```

Share images, automate workflows, and more with a free Docker ID:

```
https://hub.docker.com/
```

For more examples and ideas, visit:

```
https://docs.docker.com/get-started/
```

You can now check the above command first downloaded hello-world:latest image into your local registry

```
docker images
```

Expected output

```
└──(jegan@tektutor.org)-[~/openshift-sep-2023]
  └─$ docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED
SIZE			
tektutor/ansible-centos-node	latest	758c48f5a98f	5 days ago
428MB			
tektutor/ansible-ubuntu-node	latest	7e779b4b95bb	6 days ago
220MB			
nginx	latest	eea7b3dcba7e	3 weeks ago
187MB			
ubuntu	22.04	c6b84b685f35	3 weeks ago
77.8MB			
mysql	latest	99afc808f15b	4 weeks ago
577MB			
hello-world	latest	9c7a54a9a43c	4 months ago
13.3kB			
centos	7.9.2009	eeb6ee3f44bd	24 months ago
204MB			
ubuntu	16.04	b6f507652425	2 years ago
135MB			

You can see the running containers with the below command

```
docker ps
```

If you wish to see all containers even if they aren't running

```
docker ps -a
```

Expected output

```
(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker images
REPOSITORY          TAG      IMAGE ID      CREATED       SIZE
tektutor/ansible-centos-node    latest   758c48f5a98f  5 days ago   428MB
tektutor/ansible-ubuntu-node    latest   7e779b4b95bb  6 days ago   220MB
nginx                latest   eea7b3dcba7e  3 weeks ago   187MB
ubuntu               22.04   c6b84b685f35  3 weeks ago   77.8MB
mysql                latest   99afc808f15b  4 weeks ago   577MB
hello-world          latest   9c7a54a9a43c  4 months ago  13.3kB
centos              7.9.2009  eeb6ee3f44bd  24 months ago 204MB
ubuntu               16.04   b6f507652425  2 years ago   135MB

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker ps
CONTAINER ID        IMAGE           COMMAND        CREATED          STATUS          PORTS          NAMES
(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker ps -a
CONTAINER ID        IMAGE           COMMAND        CREATED          STATUS          PORTS          NAMES
b0cb8640b429        hello-world:latest "hello"      9 minutes ago   Exited (0) 9 minutes ago
                                            NAMES
                                            vigorous_panini

(jegan@tektutor.org)-[~/openshift-sep-2023]
$
```

Lab - Renaming an existing container

```
docker rename <old-name> <new-name>
docker rename vigorous_panini hello1_container
```

Expected output

The screenshot shows a terminal window with three tabs. The current tab is titled '(jegan@tektutor.org)-[~/openshift-sep-2023]'. It displays the command history and output for renaming a container:

```
(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker images
REPOSITORY          TAG      IMAGE ID      CREATED       SIZE
tektutor/ansible-centos-node    latest   758c48f5a98f  5 days ago   428MB
tektutor/ansible-ubuntu-node    latest   7e779b4b95bb  6 days ago   220MB
nginx               latest   eea7b3dcb47e  3 weeks ago  187MB
ubuntu              22.04   c6b84b685f35  3 weeks ago  77.8MB
mysql               latest   99afc808f15b  4 weeks ago  577MB
hello-world         latest   9c7a54a9a43c  4 months ago 13.3kB
centos              7.9.2009  eeb6ee3f44bd  24 months ago 204MB
ubuntu              16.04   b6f507652425  2 years ago  135MB

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker ps
CONTAINER ID        IMAGE           COMMAND      CREATED     STATUS        PORTS     NAMES
b0cb8640b429        hello-world:latest "/hello"   9 minutes ago   Exited (0) 9 minutes ago          vigorous_panini

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker rename vigorous_panini hello1_container

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker ps -a
CONTAINER ID        IMAGE           COMMAND      CREATED     STATUS        PORTS     NAMES
b0cb8640b429        hello-world:latest "/hello"   10 minutes ago  Exited (0) 10 minutes ago          hello1_container

(jegan@tektutor.org)-[~/openshift-sep-2023]
$
```

Lab - Creating a container with specific name and hostname

```
docker run --name jegan-hello-container --hostname jegan-hello-container
hello-world:latest
```

Expected output

```
jegan@tektutor: ~/openshift-sep-2023
jegan@tektutor: ~/ansible-sep-2023
jegan@tektutor: ~/openshift-sep-2023

$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
b0cb8640b429 hello-world:latest "/hello" 10 minutes ago Exited (0) 10 minutes ago
hello1_container

[jegan@tektutor.org]-(~/openshift-sep-2023)
$ docker run --name jegan-hello-container --hostname jegan-hello-container 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

Share images, automate workflows, and more with a free Docker ID:
https://hub.docker.com/

For more examples and ideas, visit:
https://docs.docker.com/get-started/
```

[jegan@tektutor.org]-(~/openshift-sep-2023)

\$

[jegan@tektutor.org]-(~/openshift-sep-2023)

```
$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
89a5d29e1853 hello-world:latest "/hello" 7 seconds ago Exited (0) 7 seconds ago
b0cb8640b429 hello-world:latest "/hello" 15 minutes ago Exited (0) 15 minutes ago
jegan-hello-container
hello1_container
```

[jegan@tektutor.org]-(~/openshift-sep-2023)

\$

Lab - Deleting exited containers

```
docker ps -a
docker rm hello1_container jegan-hello-container
docker ps -a
```

Expected output

```
jegan@tektutor: ~/openshift-sep-2023
jegan@tektutor: ~/ansible-sep-2023
jegan@tektutor: ~/openshift-sep-2023

[jegan@tektutor.org]-(~/openshift-sep-2023)
$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
89a5d29e1853 hello-world:latest "/hello" 53 minutes ago Exited (0) 53 minutes ago
b0cb8640b429 hello-world:latest "/hello" About an hour ago Exited (0) About an hour ago
jegan-hello-container
hello1_container

[jegan@tektutor.org]-(~/openshift-sep-2023)
$ docker rm hello1_container jegan-hello-container
hello1_container
jegan-hello-container

[jegan@tektutor.org]-(~/openshift-sep-2023)
$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
```

Lab - Creating containers and run them in the background

```
docker run -dit --name ubuntu1 --hostname ubuntu1 ubuntu:22.04 /bin/bash
docker run -dit --name ubuntu2 --hostname ubuntu2 ubuntu:22.04 /bin/bash
docker ps
```

In the above command,

```
dit - means deattached interactive terminal i.e run the container in the
background
name - name of the container
hostname - any user-defined hostname you wish to assign to your container
ubuntu:22.04 - is the docker image using which the container will be
created
/bin/bash - indicates we would to run/launch bash terminal inside the
container as default application
host
```

Expected output

The screenshot shows a terminal window with three tabs. The current tab is titled 'jegan@tektutor: ~/openshift-sep-2023'. The terminal history shows:

```
(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker run -dit --name ubuntu1 --hostname ubuntu1 ubuntu:22.04 /bin/bash
ca67a2e5731849acdeb14b2882dd7839b642644405051b046dcf2ef1083397c6

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker run -dit --name ubuntu2 --hostname ubuntu2 ubuntu:22.04 /bin/bash
f6101773efe6b8cc9b1f7c2406a50ea07795aa079e34beff15576c8fdd0cec37

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker ps
CONTAINER ID   IMAGE      COMMAND     CREATED        STATUS       PORTS     NAMES
f6101773efe6   ubuntu:22.04  "/bin/bash"  3 seconds ago  Up 3 seconds          ubuntu2
ca67a2e57318   ubuntu:22.04  "/bin/bash"  11 seconds ago Up 10 seconds         ubuntu1

(jegan@tektutor.org)-[~/openshift-sep-2023]
$
```

Lab - Getting inside container that is running in background

```
docker ps
docker exec -it ubuntu1 /bin/bash
hostname
hostname -i
ls
exit
```

Expected output

The screenshot shows a terminal window with four tabs. The active tab displays the output of a Docker command:

```
(jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
f6101773ef66 ubuntu:22.04 "/bin/bash" 14 minutes ago Up 14 minutes
ca67a2e57318 ubuntu:22.04 "/bin/bash" 14 minutes ago Up 14 minutes
ubuntu2
ubuntu1
```

Below this, another tab shows the result of running Docker inside a container:

```
(jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
$ docker exec -it ubuntu1 /bin/bash
root@ubuntu1:/# hostname
ubuntu1
root@ubuntu1:/# hostname -i
172.17.0.2
root@ubuntu1:/# ls
bin boot dev etc home lib lib32 lib64 libx32 media mnt opt proc root run sbin srv sys tmp usr var
root@ubuntu1:/# ifconfig
bash: ifconfig: command not found
root@ubuntu1:/# apt update && apt install net-tools
Get:1 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Get:2 http://archive.ubuntu.com/ubuntu jammy InRelease [270 kB]
Get:3 http://security.ubuntu.com/ubuntu jammy-security/restricted amd64 Packages [1059 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]
Get:5 http://security.ubuntu.com/ubuntu jammy-security/multiverse amd64 Packages [44.0 kB]
Get:6 http://security.ubuntu.com/ubuntu jammy-security/main amd64 Packages [962 kB]
Get:7 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 Packages [993 kB]
Get:8 http://archive.ubuntu.com/ubuntu jammy-backports InRelease [109 kB]
Get:9 http://archive.ubuntu.com/ubuntu jammy/universe amd64 Packages [17.5 MB]
Get:10 http://archive.ubuntu.com/ubuntu jammy/main amd64 Packages [1792 kB]
Get:11 http://archive.ubuntu.com/ubuntu jammy/restricted amd64 Packages [164 kB]
Get:12 http://archive.ubuntu.com/ubuntu jammy/multiverse amd64 Packages [266 kB]
Get:13 http://archive.ubuntu.com/ubuntu jammy-updates/multiverse amd64 Packages [49.8 kB]
Get:14 http://archive.ubuntu.com/ubuntu jammy-updates/restricted amd64 Packages [1079 kB]
Get:15 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 Packages [1254 kB]
Get:16 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 Packages [1230 kB]
```

```

root@ubuntu1:~| jegan@tektutor:~/ansible-sep-2023| root@ubuntu1:/| jegan@tektutor:~/openshift-sep-2023/Day1|
Get:15 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 Packages [1254 kB]
Get:16 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 Packages [1230 kB]
Get:17 http://archive.ubuntu.com/ubuntu jammy-backports/universe amd64 Packages [28.1 kB]
Get:18 http://archive.ubuntu.com/ubuntu jammy-backports/main amd64 Packages [50.3 kB]
Fetched 27.1 MB in 6s (4691 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
All packages are up to date.
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
 net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 204 kB of archives.
After this operation, 819 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu jammy/main amd64 net-tools amd64 1.60+git20181103.0eebece-1ubuntu5 [204 kB]
Fetched 204 kB in 1s (137 kB/s)
debconf: delaying package configuration, since apt-utils is not installed
Selecting previously unselected package net-tools.
(Reading database ... 4395 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20181103.0eebece-1ubuntu5_amd64.deb ...
Unpacking net-tools (1.60+git20181103.0eebece-1ubuntu5) ...
Setting up net-tools (1.60+git20181103.0eebece-1ubuntu5) ...
root@ubuntu1:/# ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.17.0.2 netmask 255.255.0.0 broadcast 172.17.255.255
        ether 02:42:ac:11:00:02 txqueuelen 0 (Ethernet)
        RX packets 6968 bytes 27720091 (27.7 MB)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 4738 bytes 317136 (317.1 KB)
        TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

jegan@tektutor:~| jegan@tektutor:~/ansible-sep-2023| jegan@tektutor:~/openshift-sep-2023/Day1| jegan@tektutor:~/openshift-sep-2023/Day1|
net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 204 kB of archives.
After this operation, 819 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu jammy/main amd64 net-tools amd64 1.60+git20181103.0eebece-1ubuntu5 [204 kB]
Fetched 204 kB in 1s (137 kB/s)
debconf: delaying package configuration, since apt-utils is not installed
Selecting previously unselected package net-tools.
(Reading database ... 4395 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20181103.0eebece-1ubuntu5_amd64.deb ...
Unpacking net-tools (1.60+git20181103.0eebece-1ubuntu5) ...
Setting up net-tools (1.60+git20181103.0eebece-1ubuntu5) ...
root@ubuntu1:/# ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.17.0.2 netmask 255.255.0.0 broadcast 172.17.255.255
        ether 02:42:ac:11:00:02 txqueuelen 0 (Ethernet)
        RX packets 6968 bytes 27720091 (27.7 MB)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 4738 bytes 317136 (317.1 KB)
        TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
        loop txqueuelen 1000 (Local Loopback)
        RX packets 0 bytes 0 (0.0 B)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 0 bytes 0 (0.0 B)
        TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

root@ubuntu1:/# exit
exit

[jegan@ tektutor.org)-[~/openshift-sep-2023/Day1] $
```

Lab - Creating a container in interactive mode

```
docker run -it --name ubuntu3 --hostname ubuntu3 ubuntu:22.04 /bin/bash
exit
```

Exiting from the shell will lead to exiting the container, as `/bin/bash` is the default application running inside container.

Expected output

```
jegan@tektutor:~ | jegan@tektutor:~/ansible-sep-2023 | jegan@tektutor:~/openshift-sep-2023/Day1 | jegan@tektutor:~/openshift-sep-2023/Day1
RX packets 0 bytes 0 (0.0 B)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 0 bytes 0 (0.0 B)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

root@ubuntu1:/# exit
exit

[jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
f6101773ef6 ubuntu:22.04 "/bin/bash" 31 minutes ago Up 31 minutes
ca67a2e57318 ubuntu:22.04 "/bin/bash" 31 minutes ago Up 31 minutes
ubuntu2
ubuntu1

[jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
$ docker run -it --name ubuntu3 --hostname ubuntu3 ubuntu:22.04 /bin/bash
root@ubuntu3:/# ls
bin boot dev etc home lib lib32 lib64 libx32 media mnt opt proc root run sbin srv sys tmp usr var
root@ubuntu3:/# hostname
ubuntu3
root@ubuntu3:/# hostname -i
172.17.0.4
root@ubuntu3:/# exit
exit

[jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
35cd428ba68b ubuntu:22.04 "/bin/bash" About a minute ago Exited (0) 36 seconds ago
f6101773ef6 ubuntu:22.04 "/bin/bash" 34 minutes ago Up 34 minutes
ca67a2e57318 ubuntu:22.04 "/bin/bash" 34 minutes ago Up 34 minutes
ubuntu3
ubuntu2
ubuntu1

[jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
```

Lab - Starting an exited container

```
docker ps
docker ps -a
docker start ubuntu3
docker ps
```

Expected output

```
jegan@tektutor:~ | jegan@tektutor:~/ansible-sep-2023 | jegan@tektutor:~/openshift-sep-2023/Day1 | jegan@tektutor:~/openshift-sep-2023/Day1
[jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
f6101773ef6 ubuntu:22.04 "/bin/bash" 37 minutes ago Up 37 minutes
ca67a2e57318 ubuntu:22.04 "/bin/bash" 37 minutes ago Up 37 minutes
ubuntu2
ubuntu1

[jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
35cd428ba68b ubuntu:22.04 "/bin/bash" 5 minutes ago Exited (0) 3 minutes ago
f6101773ef6 ubuntu:22.04 "/bin/bash" 37 minutes ago Up 37 minutes
ca67a2e57318 ubuntu:22.04 "/bin/bash" 37 minutes ago Up 37 minutes
ubuntu3
ubuntu2
ubuntu1

[jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
$ docker start ubuntu3
ubuntu3

[jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
35cd428ba68b ubuntu:22.04 "/bin/bash" 5 minutes ago Up 3 seconds
f6101773ef6 ubuntu:22.04 "/bin/bash" 37 minutes ago Up 37 minutes
ca67a2e57318 ubuntu:22.04 "/bin/bash" 37 minutes ago Up 37 minutes
ubuntu3
ubuntu2
ubuntu1

[jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
```

Lab - Starting multiple containers

```
docker ps
docker ps -a
docker start ubuntu1 ubuntu2 ubuntu3
```

Expected output

The screenshot shows a terminal window with four tabs, all titled 'jegan@tektutor: ~/openshift-sep-2023/Day1'. The terminal content is as follows:

```
(jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
(jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
35cd428ba68b ubuntu:22.04 "/bin/bash" 13 minutes ago Exited (137) 5 minutes ago
f6101773ef66 ubuntu:22.04 "/bin/bash" 45 minutes ago Exited (137) 5 minutes ago
ca67a2e57318 ubuntu:22.04 "/bin/bash" 45 minutes ago Exited (137) 5 minutes ago
(jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
$ docker start ubuntu1 ubuntu2 ubuntu3
ubuntu1
ubuntu2
ubuntu3
(jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
35cd428ba68b ubuntu:22.04 "/bin/bash" 13 minutes ago Up 2 seconds
f6101773ef66 ubuntu:22.04 "/bin/bash" 45 minutes ago Up 2 seconds
ca67a2e57318 ubuntu:22.04 "/bin/bash" 45 minutes ago Up 3 seconds
```

Lab - Stopping running containers

```
docker ps
docker stop ubuntu1
docker ps
docker stop ubuntu2 ubuntu3
docker ps -a
```

Expected output

The screenshot shows a terminal window with four tabs. The active tab displays the output of a Docker command:

```
jegan@tektutor: ~$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
35cd428ba68b ubuntu:22.04 "/bin/bash" 7 minutes ago Up 2 minutes
f6101773ef66 ubuntu:22.04 "/bin/bash" 39 minutes ago Up 39 minutes
ca67a2e57318 ubuntu:22.04 "/bin/bash" 39 minutes ago Up 39 minutes
```

Below this, the user runs `docker stop ubuntu1`, which stops the `ubuntu1` container. The terminal then shows the stopped state of `ubuntu1`:

```
jegan@tektutor.org: ~/openshift-sep-2023/Day1
$ docker stop ubuntu1
ubuntu1
```

The user then runs `docker ps` again, showing that `ubuntu1` is now listed as stopped:

```
jegan@tektutor.org: ~/openshift-sep-2023/Day1
$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
35cd428ba68b ubuntu:22.04 "/bin/bash" 7 minutes ago Up 2 minutes
f6101773ef66 ubuntu:22.04 "/bin/bash" 40 minutes ago Up 40 minutes
```

The user then runs `docker stop ubuntu2` and `ubuntu3`, stopping both containers. The terminal shows the stopped states of `ubuntu2` and `ubuntu3`:

```
jegan@tektutor.org: ~/openshift-sep-2023/Day1
$ docker stop ubuntu2 ubuntu3
ubuntu2
ubuntu3
```

Finally, the user runs `docker ps -a`, showing all containers, including the stopped ones:

```
jegan@tektutor.org: ~/openshift-sep-2023/Day1
$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
35cd428ba68b ubuntu:22.04 "/bin/bash" 8 minutes ago Exited (137) 3 seconds ago
f6101773ef66 ubuntu:22.04 "/bin/bash" 40 minutes ago Exited (137) 3 seconds ago
ca67a2e57318 ubuntu:22.04 "/bin/bash" 40 minutes ago Exited (137) 32 seconds ago
```

Lab - Stopping and Starting multiple containers without calling out their names

```
docker ps
docker ps -q
docker stop $(docker ps -q)
docker ps
docker ps -a
docker ps -aq
docker start $(docker ps -aq)
docker ps
```

Expected output

```
jegan@tektutor: ~
jegan@tektutor: ~/ansible-sep-2023
jegan@tektutor: ~/openshift-sep-2023/Day1
jegan@tektutor: ~/openshift-sep-2023/Day1
jegan@tektutor: ~/openshift-sep-2023/Day1

[jegan@tektutor.org]-[~/openshift-sep-2023/Day1]
$ docker ps -q
35cd428ba68b
f6101773e6e6
ca67a2e57318

[jegan@tektutor.org]-[~/openshift-sep-2023/Day1]
$ docker stop $(docker ps -q)
35cd428ba68b
f6101773e6e6
ca67a2e57318

[jegan@tektutor.org]-[~/openshift-sep-2023/Day1]
$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
[jegan@tektutor.org]-[~/openshift-sep-2023/Day1]
$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
35cd428ba68b ubuntu:22.04 "/bin/bash" 13 minutes ago Up 2 seconds 0.0.0.0:49153->4280/tcp ubuntu3
f6101773e6e6 ubuntu:22.04 "/bin/bash" 45 minutes ago Up 2 seconds 0.0.0.0:49154->4280/tcp ubuntu2
ca67a2e57318 ubuntu:22.04 "/bin/bash" 45 minutes ago Up 3 seconds 0.0.0.0:49155->4280/tcp ubuntu1

[jegan@tektutor.org]-[~/openshift-sep-2023/Day1]
$ docker ps -aq
35cd428ba68b
f6101773e6e6
ca67a2e57318

[jegan@tektutor.org]-[~/openshift-sep-2023/Day1]
$ docker start $(docker ps -aq)
35cd428ba68b
f6101773e6e6
ca67a2e57318

[jegan@tektutor.org]-[~/openshift-sep-2023/Day1]
$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
35cd428ba68b ubuntu:22.04 "/bin/bash" 18 minutes ago Up 4 seconds 0.0.0.0:49153->4280/tcp ubuntu3
f6101773e6e6 ubuntu:22.04 "/bin/bash" 50 minutes ago Up 4 seconds 0.0.0.0:49154->4280/tcp ubuntu2
ca67a2e57318 ubuntu:22.04 "/bin/bash" 50 minutes ago Up 4 seconds 0.0.0.0:49155->4280/tcp ubuntu1

[jegan@tektutor.org]-[~/openshift-sep-2023/Day1]
$
```

Lab - Deleting multiple containers gracefully without calling out their names

```
docker ps
docker rm $(docker ps -q)
docker stop $(docker ps -q) && docker rm $(docker ps -aq)
docker ps -a
```

Expected output

```
jegan@tektutor: ~
jegan@tektutor: ~/ansible-sep-2023
jegan@tektutor: ~/openshift-sep-2023/Day1
jegan@tektutor: ~/openshift-sep-2023/Day1
jegan@tektutor: ~/openshift-sep-2023/Day1

[jegan@tektutor.org]-[~/openshift-sep-2023/Day1]
$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
35cd428ba68b ubuntu:22.04 "/bin/bash" 25 minutes ago Up About a minute
f6101773e6e6 ubuntu:22.04 "/bin/bash" 57 minutes ago Up About a minute
ca67a2e57318 ubuntu:22.04 "/bin/bash" 57 minutes ago Up About a minute

[jegan@tektutor.org]-[~/openshift-sep-2023/Day1]
$ docker rm $(docker ps -q)
Error response from daemon: You cannot remove a running container 35cd428ba68bd4e2ef3ade6be1ba9b996307e1d68d9116107bd80a5feb638d69. Stop the container before attempting removal or force remove
Error response from daemon: You cannot remove a running container f6101773e6e6b8cc9b1f7c2406a50ea07795aa079e34beff15576c8ffd0cec37. Stop the container before attempting removal or force remove
Error response from daemon: You cannot remove a running container ca67a2e5731849acdeb14b2882dd7839b642644405051b046dcf2ef1083397c6. Stop the container before attempting removal or force remove

[jegan@tektutor.org]-[~/openshift-sep-2023/Day1]
$ docker stop $(docker ps -q) && docker rm $(docker ps -aq)
35cd428ba68b
f6101773e6e6
ca67a2e57318
35cd428ba68b
f6101773e6e6
ca67a2e57318

[jegan@tektutor.org]-[~/openshift-sep-2023/Day1]
$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
[jegan@tektutor.org]-[~/openshift-sep-2023/Day1]
$
```

Lab - Deleting multiple containers forcibly without calling out their names

```
docker run -dit --name ubuntu1 --hostname ubuntu1 ubuntu:22.04 /bin/bash
docker run -dit --name ubuntu2 --hostname ubuntu2 ubuntu:22.04 /bin/bash
docker run -dit --name ubuntu3 --hostname ubuntu3 ubuntu:22.04 /bin/bash
docker ps
docker rm -f $(docker ps -aq)
docker ps -a
```

Expected output

The screenshot shows a terminal window with four tabs at the top: 'jegan@tektutor: ~', 'jegan@tektutor: ~/ansible-sep-2023', 'jegan@tektutor: ~/openshift-sep-2023/Day1', and 'jegan@tektutor: ~/openshift-sep-2023/Day1'. The main pane displays the following command sequence:

```
(jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
$ docker run -dit --name ubuntu1 --hostname ubuntu1 ubuntu:22.04 /bin/bash
07511b57d393e2632b2ec710d6447d72c7a73c457ab532e2595b7e0fec602a3a

(jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
$ docker run -dit --name ubuntu2 --hostname ubuntu2 ubuntu:22.04 /bin/bash
e536aebb7fffc78df0ecbb7429b280639e0a21c4b74b0a8e033ec14c3bc52de

(jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
$ docker run -dit --name ubuntu3 --hostname ubuntu3 ubuntu:22.04 /bin/bash
1fd2459558256cd70b2d7a703e801efa914fcf824c3027eb60d2a7f6ee9096cf

(jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
1fd245955825 ubuntu:22.04 "/bin/bash" 3 seconds ago Up 3 seconds
e536aebb7fffc ubuntu:22.04 "/bin/bash" 9 seconds ago Up 8 seconds
07511b57d393 ubuntu:22.04 "/bin/bash" 15 seconds ago Up 14 seconds

(jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
$ docker rm -f $(docker ps -aq)
1fd245955825
e536aebb7fffc
07511b57d393

(jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES

(jegan@tektutor.org)-[~/openshift-sep-2023/Day1]
$
```

Lab - Finding IP address of a running container

```
docker ps
docker inspect ubuntu1 | grep IPA
docker inspect -f {{.NetworkSettings.IPAddress}} ubuntu2
docker inspect -f {{.NetworkSettings.IPAddress}} ubuntu3
```

Expected output

```

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ set -o vi

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker run -dit --name ubuntu1 --hostname ubuntu1 ubuntu:22.04 /bin/bash
3149a9d33b92dfc555ff02496c8a5fb2308d109c3ebc3d356ca3c8603765f15f

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker run -dit --name ubuntu2 --hostname ubuntu2 ubuntu:22.04 /bin/bash
a2acf18ae94c2ecbf2c768ae7bca046354b3b8bb217f84c7ea32b34c479c30

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker run -dit --name ubuntu3 --hostname ubuntu3 ubuntu:22.04 /bin/bash
eb0c4e45aaef2727c735d0b9e0ea8c7a3ed4cta6c9a29dafdb2843b0db49776

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
eb0c4e45aaef ubuntu:22.04 "/bin/bash" 3 seconds ago Up 2 seconds
a2acf18ae94 ubuntu:22.04 "/bin/bash" 8 seconds ago Up 8 seconds
3149a9d33b92 ubuntu:22.04 "/bin/bash" 13 seconds ago Up 12 seconds

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker inspect ubuntu1 | grep IPA
  "SecondaryIPAddresses": null,
  "IPAddress": "172.17.0.2",
  "IPAMConfig": null,
  "IPAddress": "172.17.0.2",

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker inspect -f {{.NetworkSettings.IPAddress}} ubuntu2
172.17.0.3

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker inspect -f {{.NetworkSettings.IPAddress}} ubuntu3
172.17.0.4

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ 

```

Lab - Creating 3 centos containers

```

docker ps
docker run -dit --name centos1 --hostname centos1 centos:centos7.9.2009
/bin/bash
docker run -dit --name centos2 --hostname centos2 centos:centos7.9.2009
/bin/bash
docker run -dit --name centos3 --hostname centos3 centos:centos7.9.2009
/bin/bash
docker ps

```

Expected output

```
jegan@tektutor: ~/openshift-sep-2023
jegan@tektutor: ~/ansible-sep-2023
jegan@tektutor: ~/openshift-sep-2023
jegan@tektutor: ~/openshift-sep-2023/Day1

[jegan@tektutor.org] - [~/openshift-sep-2023]
$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
eb0c4e45aaef ubuntu:22.04 "/bin/bash" 5 minutes ago Up 5 minutes
a2acfa18ae94 ubuntu:22.04 "/bin/bash" 5 minutes ago Up 5 minutes
3149a9d33b92 ubuntu:22.04 "/bin/bash" 5 minutes ago Up 5 minutes

[jegan@tektutor.org] - [~/openshift-sep-2023]
$ docker run -dit --name centos1 --hostname centos1 centos:centos7.9.2009 /bin/bash
Unable to find image 'centos:centos7.9.2009' locally
centos7.9.2009: Pulling from library/centos
Digest: sha256:be65f488b7764ad3638f236b7b515b3678369a5124c47b8d32916d6487418ea4
Status: Downloaded newer image for centos:centos7.9.2009
d184bf2321ff2de06fb61101eb319ceee809237591c773b1572f6e7f7fd2ff

[jegan@tektutor.org] - [~/openshift-sep-2023]
$ docker run -dit --name centos2 --hostname centos2 centos:centos7.9.2009 /bin/bash
4fbfa75ed00b000b11027298a38b2932023968c15ee984e535d93c681ced8cb44d3

[jegan@tektutor.org] - [~/openshift-sep-2023]
$ docker run -dit --name centos3 --hostname centos3 centos:centos7.9.2009 /bin/bash
ff44c150dafdf898085335779d3aeb381c9222674956aa242867a0161642181

[jegan@tektutor.org] - [~/openshift-sep-2023]
$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
ff44c150dafdf centos:centos7.9.2009 "/bin/bash" 2 seconds ago Up 1 second
4fbfa75ed000 centos:centos7.9.2009 "/bin/bash" 8 seconds ago Up 7 seconds
df84bf2321ff centos:centos7.9.2009 "/bin/bash" 14 seconds ago Up 13 seconds
eb0c4e45aaef ubuntu:22.04 "/bin/bash" 5 minutes ago Up 5 minutes
a2acfa18ae94 ubuntu:22.04 "/bin/bash" 6 minutes ago Up 6 minutes
3149a9d33b92 ubuntu:22.04 "/bin/bash" 6 minutes ago Up 6 minutes

[jegan@tektutor.org] - [~/openshift-sep-2023]
```

Lab - List containers name that matches a name pattern

```
docker ps -f "name=ubuntu"
docker ps -f "name=centos"
docker ps -f "name=c"
```

Expected output

```
jegan@tektutor: ~/openshift-sep-2023
jegan@tektutor: ~/ansible-sep-2023
jegan@tektutor: ~/openshift-sep-2023
jegan@tektutor: ~/openshift-sep-2023/Day1

[jegan@tektutor.org] - [~/openshift-sep-2023]
$ # List all running containers whose name starts with ubuntu
[jegan@tektutor.org] - [~/openshift-sep-2023]
$ docker ps -f "name=ubuntu"
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
eb0c4e45aaef ubuntu:22.04 "/bin/bash" 18 minutes ago Up 18 minutes
a2acfa18ae94 ubuntu:22.04 "/bin/bash" 18 minutes ago Up 18 minutes
3149a9d33b92 ubuntu:22.04 "/bin/bash" 18 minutes ago Up 18 minutes

[jegan@tektutor.org] - [~/openshift-sep-2023]
$ # List all running containers whose name starts with centos
[jegan@tektutor.org] - [~/openshift-sep-2023]
$ docker ps -f "name=centos"
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
ff44c150dafdf centos:centos7.9.2009 "/bin/bash" 12 minutes ago Up 12 minutes
4fbfa75ed000 centos:centos7.9.2009 "/bin/bash" 12 minutes ago Up 12 minutes
df84bf2321ff centos:centos7.9.2009 "/bin/bash" 12 minutes ago Up 12 minutes

[jegan@tektutor.org] - [~/openshift-sep-2023]
$ # List all running containers whose name starts with c
[jegan@tektutor.org] - [~/openshift-sep-2023]
$ docker ps -f "name=c"
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
bc394fc6e18 centos:centos7.9.2009 "/bin/bash" 5 minutes ago Up 5 minutes
ff44c150dafdf centos:centos7.9.2009 "/bin/bash" 12 minutes ago Up 12 minutes
4fbfa75ed000 centos:centos7.9.2009 "/bin/bash" 12 minutes ago Up 12 minutes
df84bf2321ff centos:centos7.9.2009 "/bin/bash" 12 minutes ago Up 12 minutes

[jegan@tektutor.org] - [~/openshift-sep-2023]
```

Lab - Listing all containers whose image name matches a given value

```
docker ps | grep centos:centos7.9.2009  
docker ps | grep ubuntu:22.04
```

Expected output

The screenshot shows a terminal window with four tabs. The active tab displays the command `docker ps | grep centos:centos7.9.2009`, listing four containers named c1, centos3, centos2, and centos1. The other tabs show the results of `docker ps | grep ubuntu:22.04`, listing three containers named ubuntu3, ubuntu2, and ubuntu1. The terminal prompt is `(jegan@tektutor.org)-[~/openshift-sep-2023]`.

```
jegan@tektutor:~ | jegan@tektutor:~/ansible-sep-2023 | jegan@tektutor:~/openshift-sep-2023 | jegan@tektutor:~/openshift-sep-2023/Day1  
$ docker ps | grep centos:centos7.9.2009  
bc394fc6e18 centos:centos7.9.2009 "/bin/bash" 10 minutes ago Up 10 minutes c1  
ff44c150dafd centos:centos7.9.2009 "/bin/bash" 16 minutes ago Up 16 minutes centos3  
4bfba75ed000 centos:centos7.9.2009 "/bin/bash" 17 minutes ago Up 17 minutes centos2  
df84bf2321ff centos:centos7.9.2009 "/bin/bash" 17 minutes ago Up 17 minutes centos1  
  
(jegan@tektutor.org)-[~/openshift-sep-2023]  
$ docker ps | grep ubuntu:22.04  
eb0c4e45aaef ubuntu:22.04 "/bin/bash" 23 minutes ago Up 23 minutes ubuntu3  
a2acfa18ae94 ubuntu:22.04 "/bin/bash" 23 minutes ago Up 23 minutes ubuntu2  
3149ad33b92 ubuntu:22.04 "/bin/bash" 23 minutes ago Up 23 minutes ubuntu1  
  
(jegan@tektutor.org)-[~/openshift-sep-2023]  
$
```

Lab - Creating a mysql db server container

When prompts for password, type "root@123" without the double quotes.

```
docker ps -a  
docker run -d --name mysql --hostname mysql -e MYSQL_ROOT_PASSWORD=root@123  
mysql:latest  
docker ps  
docker exec -it mysql sh  
mysql -u root -p
```

Expected output

```
jegan@tektutor: ~/openshift-sep-2023
jegan@tektutor: ~/ansible-sep-2023
jegan@tektutor: ~/openshift-sep-2023
jegan@tektutor: ~/openshift-sep-2023/Day1

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker run -d --name mysql --hostname mysql -e MYSQL_ROOT_PASSWORD=root@123 mysql:latest
c5ad933244ea463544570319a1e678943ec8f3cfb26552b9f1650da7527be1a

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
c5ad933244ea463544570319a1e678943ec8f3cfb26552b9f1650da7527be1a mysql:latest "docker-entrypoint.s..." 3 seconds ago Up 2 seconds 3306/tcp, 33060/tcp mysql

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker exec -it mysql sh
sh-4.4# mysql -u root -p
Enter password:
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 8
Server version: 8.1.0 MySQL Community Server - GPL

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affiliates. Other names may be trademarks of their respective
owners.

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

mysql> 
```

Checking default databases in mysql server and creating a new database named tektutor

```
SHOW DATABASES;
CREATE DATABASE tektutor;
SHOW DATABASES;
USE tektutor
```

Expected output

```
jegan@tektutor: ~/openshift-sep-2023
jegan@tektutor: ~/ansible-sep-2023
jegan@tektutor: ~/openshift-sep-2023
jegan@tektutor: ~/openshift-sep-2023/Day1

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker run -d --name mysql --hostname mysql -e MYSQL_ROOT_PASSWORD=root@123 mysql:latest
c5ad933244ea463544570319a1e678943ec8f3cfb26552b9f1650da7527be1a

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
c5ad933244ea463544570319a1e678943ec8f3cfb26552b9f1650da7527be1a mysql:latest "docker-entrypoint.s..." 3 seconds ago Up 2 seconds 3306/tcp, 33060/tcp mysql

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker exec -it mysql sh
sh-4.4# mysql -u root -p
Enter password:
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 8
Server version: 8.1.0 MySQL Community Server - GPL

Copyright (c) 2000, 2023, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

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

mysql> SHOW DATABASES;
+-----+
| Database |
+-----+
| information_schema |
| mysql |
| performance_schema |
| sys |
+-----+
4 rows in set (0.01 sec)

mysql> CREATE DATABASE tektutor;
Query OK, 1 row affected (0.00 sec)

mysql> SHOW DATABASES;
+-----+
| Database |
+-----+
| information_schema |
| mysql |
| performance_schema |
| sys |
| tektutor |
+-----+
5 rows in set (0.00 sec)

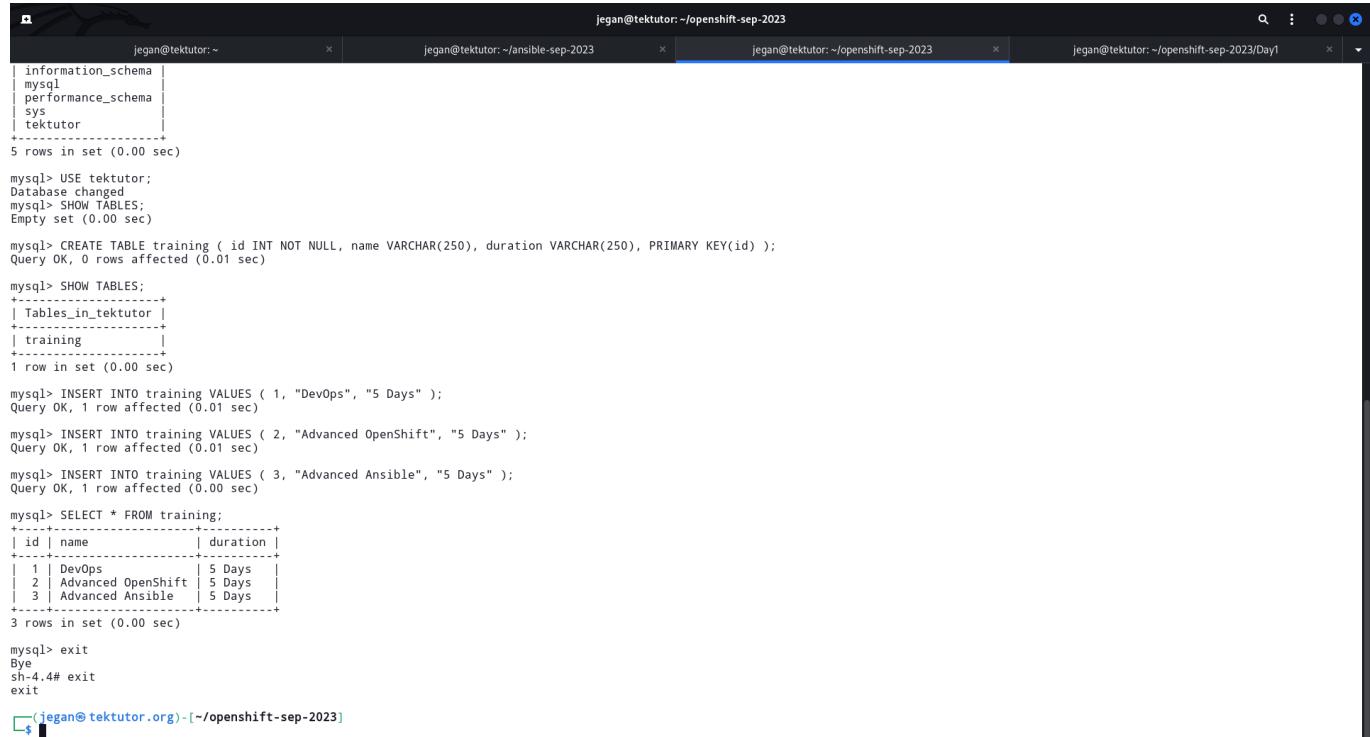
mysql> USE tektutor;
Database changed
mysql> SHOW TABLES;
Empty set (0.00 sec)

mysql> CREATE TABLE training ( id INT NOT NULL, name VARCHAR(250), duration VARCHAR(250), PRIMARY KEY(id) );
Query OK, 0 rows affected (0.00 sec)
```

Creating table inside tektutor database and inserting some records into training table.

```
CREATE TABLE training ( id INT NOT NULL, name VARCHAR(250), duration
VARCHAR(250), PRIMARY KEY(id) );
SHOW TABLES;
INSERT INTO training VALUES ( 1, "DevOps", "5 Days" );
INSERT INTO training VALUES ( 2, "Advanced OpenShift", "5 Days" );
INSERT INTO training VALUES ( 3, "Advanced Ansible", "5 Days" );
SELECT * FROM training;
exit
```

Expected output



The screenshot shows a terminal window with four tabs. The first tab shows the MySQL command-line interface with the following session history:

```
jegan@tektutor:~$ mysql -u root -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 12
Server version: 8.0.23 MySQL Community Server - GPL

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affiliates. Other names may be trademarks of their respective
owners.

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

mysql> USE tektutor;
Database changed
mysql> SHOW TABLES;
Empty set (0.00 sec)

mysql> CREATE TABLE training ( id INT NOT NULL, name VARCHAR(250), duration VARCHAR(250), PRIMARY KEY(id) );
Query OK, 0 rows affected (0.01 sec)

mysql> SHOW TABLES;
+-----+
| Tables_in_tektutor |
+-----+
| training |
+-----+
1 row in set (0.00 sec)

mysql> INSERT INTO training VALUES ( 1, "DevOps", "5 Days" );
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO training VALUES ( 2, "Advanced OpenShift", "5 Days" );
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO training VALUES ( 3, "Advanced Ansible", "5 Days" );
Query OK, 1 row affected (0.00 sec)

mysql> SELECT * FROM training;
+----+-----+-----+
| id | name | duration |
+----+-----+-----+
| 1  | DevOps | 5 Days |
| 2  | Advanced OpenShift | 5 Days |
| 3  | Advanced Ansible | 5 Days |
+----+-----+-----+
3 rows in set (0.00 sec)

mysql> exit
Bye
sh-4.4# exit
exit
```

The second tab shows the directory structure of the /openshift-sep-2023/ansible folder. The third tab shows the directory structure of the /openshift-sep-2023 folder. The fourth tab shows the directory structure of the /openshift-sep-2023/Day1 folder.

Lab - Checking mysql db server logs

```
docker ps
docker logs mysql
```

Expected output

```
(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
c5ad9332444e mysql:latest "docker-entrypoint.s..." 22 minutes ago Up 22 minutes 3306/tcp, 33060/tcp mysql

(jegan@tektutor.org)-[~/openshift-sep-2023]
$ docker logs mysql
2023-09-11 10:19:46+00:00 [Note] [Entrypoint]: Entrypoint script for MySQL Server 8.1.0-1.el8 started.
2023-09-11 10:19:46+00:00 [Note] [Entrypoint]: Switching to dedicated user 'mysql'
2023-09-11 10:19:46+00:00 [Note] [Entrypoint]: Entrypoint script for MySQL Server 8.1.0-1.el8 started.
2023-09-11 10:19:46+00:00 [Note] [Entrypoint]: Initializing database files
2023-09-11T10:19:46:803753Z 0 [System] [MY-01017] [Server] MySQL Server Initialization - start.
2023-09-11T10:19:46:805971Z 0 [Warning] [MY-010068] [Server] The syntax '--skip-host-cache' is deprecated and will be removed in a future release. Please use SET GLOBAL host_cache_size= instead.
2023-09-11T10:19:46:806090Z 0 [System] [MY-013169] [Server] /usr/sbin/mysqld (mysqld 8.1.0) initializing of server in progress as process 80
2023-09-11T10:19:46:813308Z 1 [System] [MY-013576] [InnoDB] InnoDB initialization has started.
2023-09-11T10:19:47:061584Z 1 [System] [MY-013577] [InnoDB] InnoDB initialization has ended.
2023-09-11T10:19:48:036236Z 6 [Warning] [MY-010453] [Server] root@localhost is created with an empty password ! Please consider switching off the --initialize-insecure option.
2023-09-11T10:19:50:135935Z 0 [System] [MY-015018] [Server] MySQL Server Initialization - end.
2023-09-11 10:19:50+00:00 [Note] [Entrypoint]: Database files initialized
2023-09-11 10:19:50+00:00 [Note] [Entrypoint]: Starting temporary server
2023-09-11T10:19:50:222747Z 0 [System] [MY-015015] [Server] MySQL Server - start.
2023-09-11T10:19:50:443940Z 0 [Warning] [MY-010068] [Server] The syntax '--skip-host-cache' is deprecated and will be removed in a future release. Please use SET GLOBAL host_cache_size= instead.
2023-09-11T10:19:50:445759Z 0 [System] [MY-010116] [Server] /usr/sbin/mysqld (mysqld 8.1.0) starting as process 124
2023-09-11T10:19:50:460525Z 1 [System] [MY-013576] [InnoDB] InnoDB initialization has started.
2023-09-11T10:19:50:567678Z 1 [System] [MY-013577] [InnoDB] InnoDB initialization has ended.
2023-09-11T10:19:50:809868Z 0 [Warning] [MY-010068] [Server] CA certificate ca.pem is self signed.
2023-09-11T10:19:50:809900Z 0 [System] [MY-013602] [Server] Channel mysql_main configured to support TLS. Encrypted connections are now supported for this channel.
2023-09-11T10:19:50:811731Z 0 [Warning] [MY-011810] [Server] Insecure configuration for --pid-file: Location '/var/run/mysqld' in the path is accessible to all OS users. Consider choosing a different directory.
2023-09-11T10:19:50:829779Z 0 [System] [MY-011323] [Server] X Plugin ready for connections. Socket: /var/run/mysqld/mysqld.sock
2023-09-11T10:19:50:829853Z 0 [System] [MY-010931] [Server] /usr/sbin/mysqld: ready for connections. Version: '8.1.0' socket: '/var/run/mysqld/mysqld.sock' port: 0 MySQL Community Server - GPL.
2023-09-11T10:19:50:831466Z 0 [System] [MY-015016] [Server] MySQL Server - end.
2023-09-11 10:19:50+00:00 [Note] [Entrypoint]: Temporary server started.
'/var/lib/mysql/mysql.sock' -> '/var/run/mysqld/mysqld.sock'
Warning: Unable to load '/usr/share/zoneinfo/iso3166.tab' as time zone. Skipping it.
Warning: Unable to load '/usr/share/zoneinfo/leap-seconds.list' as time zone. Skipping it.
2023-09-11 10:19:52+00:00 [Note] [Entrypoint]: Stopping temporary server
2023-09-11T10:19:52:372325Z 10 [System] [MY-013172] [Server] Received SHUTDOWN from user root. Shutting down mysqld (Version: 8.1.0).
2023-09-11T10:19:53:362772Z 0 [System] [MY-010910] [Server] /usr/sbin/mysqld: Shutdown complete (mysqld 8.1.0) MySQL Community Server - GPL.
2023-09-11T10:19:53:365960Z 0 [System] [MY-015016] [Server] MySQL Server - end.
2023-09-11 10:19:53+00:00 [Note] [Entrypoint]: Temporary server stopped

2023-09-11 10:19:53+00:00 [Note] [Entrypoint]: MySQL init process done. Ready for start up.

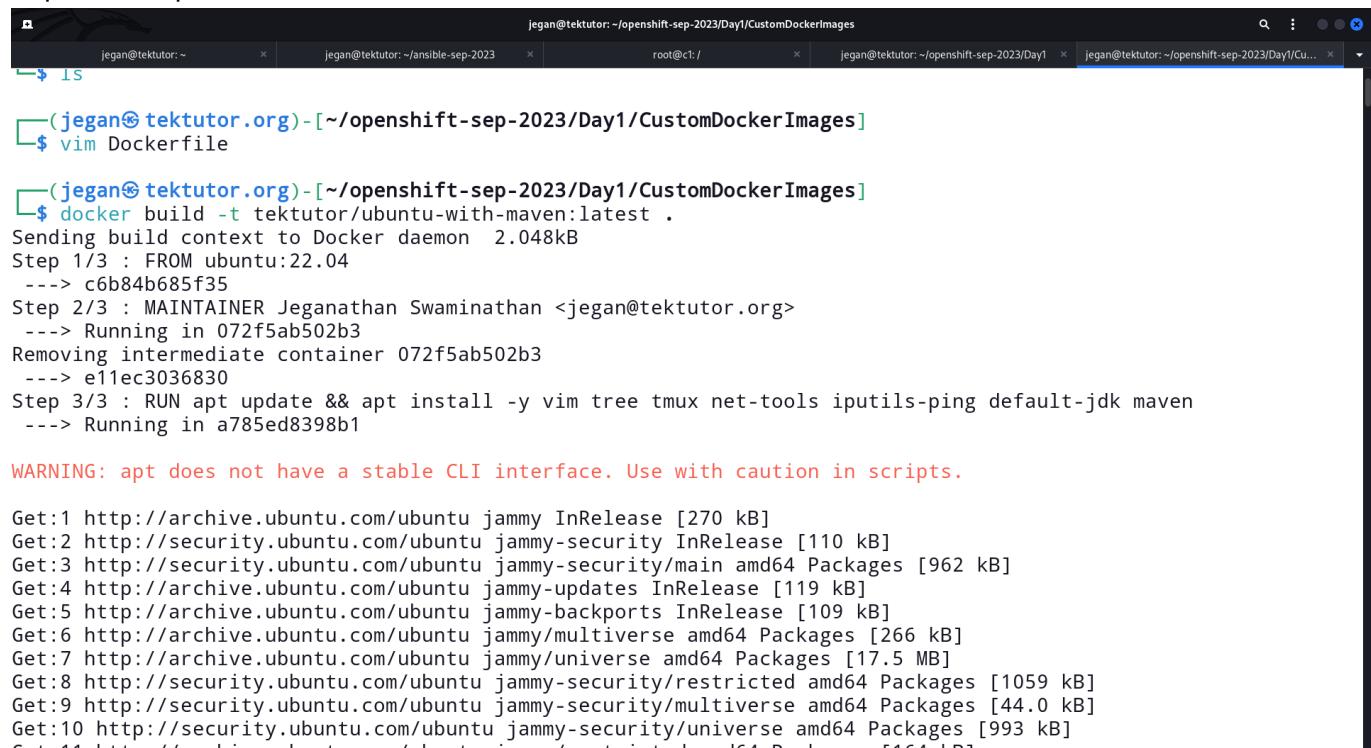
2023-09-11T10:19:53:392450Z 0 [System] [MY-015015] [Server] MySQL Server - start.
2023-09-11T10:19:53:616026Z 0 [Warning] [MY-011068] [Server] The syntax '--skip-host-cache' is deprecated and will be removed in a future release. Please use SET GLOBAL host_cache_size= instead.
2023-09-11T10:19:53:618193Z 0 [System] [MY-010116] [Server] /usr/sbin/mysqld (mysqld 8.1.0) starting as process 1
2023-09-11T10:19:53:627112Z 1 [System] [MY-013576] [InnoDB] InnoDB initialization has started.
2023-09-11T10:19:53:734188Z 1 [System] [MY-013577] [InnoDB] InnoDB initialization has ended.
2023-09-11T10:19:53:943850Z 0 [Warning] [MY-010068] [Server] CA certificate ca.pem is self signed.
2023-09-11T10:19:53:943887Z 0 [System] [MY-013602] [Server] Channel mysql_main configured to support TLS. Encrypted connections are now supported for this channel.
2023-09-11T10:19:53:945722Z 0 [Warning] [MY-011810] [Server] Insecure configuration for --pid-file: Location '/var/run/mysqld' in the path is accessible to all OS users. Consider choosing a different directory.
2023-09-11T10:19:53:969500Z 0 [System] [MY-011323] [Server] X Plugin ready for connections. Bind-address: '::' port: 33060, socket: /var/run/mysqld/mysqld.sock
2023-09-11T10:19:53:969601Z 0 [System] [MY-010931] [Server] /usr/sbin/mysqld: ready for connections. Version: '8.1.0' socket: '/var/run/mysqld/mysqld.sock' port: 3306 MySQL Community Server - GPL.

(jegan@tektutor.org)-[~/openshift-sep-2023]
$
```

Lab - Creating a Custom Docker Image with all the tools we need for our project

```
cd ~/openshift-sep-2023
git pull
cd Day1/CustomDockerImages
docker build -t tektutor/ubuntu-with-maven:latest .
```

Expected output



The screenshot shows a terminal window with multiple tabs open. The active tab is titled 'jegan@tektutor: ~/openshift-sep-2023/Day1/CustomDockerImages'. The command history shows:

```
jegan@tektutor: ~
jegan@tektutor: ~/ansible-sep-2023
root@c1: /
jegan@tektutor: ~/openshift-sep-2023/Day1
jegan@tektutor: ~/openshift-sep-2023/Day1/Cu...
```

The user runs 'ls' and then 'vim Dockerfile'. The Dockerfile content is:

```
(jegan@tektutor.org)-[~/openshift-sep-2023/Day1/CustomDockerImages]
$ vim Dockerfile
```

The user then runs 'docker build -t tektutor/ubuntu-with-maven:latest .' and observes the build process:

```
$ docker build -t tektutor/ubuntu-with-maven:latest .
Sending build context to Docker daemon 2.048kB
Step 1/3 : FROM ubuntu:22.04
--> c6b84b685f35
Step 2/3 : MAINTAINER Jeganathan Swaminathan <jegan@tektutor.org>
--> Running in 072f5ab502b3
Removing intermediate container 072f5ab502b3
--> e11ec3036830
Step 3/3 : RUN apt update && apt install -y vim tree tmux net-tools iputils-ping default-jdk maven
--> Running in a785ed8398b1
```

A warning message follows:

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

The final output shows the download of various packages:

```
Get:1 http://archive.ubuntu.com/ubuntu jammy InRelease [270 kB]
Get:2 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Get:3 http://security.ubuntu.com/ubuntu jammy-security/main amd64 Packages [962 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]
Get:5 http://archive.ubuntu.com/ubuntu jammy-backports InRelease [109 kB]
Get:6 http://archive.ubuntu.com/ubuntu jammy/multiverse amd64 Packages [266 kB]
Get:7 http://archive.ubuntu.com/ubuntu jammy/universe amd64 Packages [17.5 MB]
Get:8 http://security.ubuntu.com/ubuntu jammy-security/restricted amd64 Packages [1059 kB]
Get:9 http://security.ubuntu.com/ubuntu jammy-security/multiverse amd64 Packages [44.0 kB]
Get:10 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 Packages [993 kB]
Get:11 http://archive.ubuntu.com/ubuntu jammy/restricted amd64 Packages [164 kB]
```

```
jegan@tekutor: ~ x jegan@tekutor: ~/ansible-sep-2023 x root@c1:/ x jegan@tekutor: ~/openshift-sep-2023/Day1/CustomDockerImages x jegan@tekutor: ~/openshift-sep-2023/Day1/Cu...
```

libfontenc libfreetypepeb libgeronimo-annotation-1.3-spec-java
libgeronimo-interceptor-3.0-spec-java libgif7 libgirepository-1.0-1 libgl1
libgl1-amber-dri libgl1-mesa-dri libglapi-mesa libglib2.0-0 libglib2.0-data
libglvnd0 libglx-mesa0 libglx0 libgraphite2-3 libguava-java
libguice-java libharfbuzz0b libhawtjni-runtime-java libice-dev libice6
libicu70 libip4tc2 libjansi-java libjansi-native-java libjpeg-turbo8
libjpeg libjsn-c5 libjsr305-java libkmod2 liblcms2-2 liblvm15
libmaven-parent-java libmaven-resolver-java libmaven-shared-utils-java
libmaven3-core-java libmdc1 libmpdec3 libnsp4 libnss-system libnss3
libpam-cap libpam-system libplacecl libpsclite libplexus-cipher-java
libplexus-classworlds-java libplexus-component-annotations-java
libplexus-interpolation-java libplexus-sec-dispatcher-java
libplexus-util32-java libpng16-16 libpthread-stubs0-dev libpython3 stdlib
libpython3.10 libpython3.10-minimal libpython3.10-stdlib libreadline8
libsensors-config libsnsrs5 libsisu-inject-java libsisu-plexus-java
libssl4j-java libsm-dev libsm6 libsound23 libsqlite3-0 libutempter0
libwagon-jar-java libwagon-http-shaded-java libwagon-provider-api-java
libxml2-6 libxml2-6-dev libxml2-xcb1 libxau-dev libxau6 libxaw7
libxcb-dri2-0 libxcb-dri3-0 libxcb-glx0 libxcb-present0 libxcb-randr0
libxcb-shape0 libxcb-shm0 libxcb-sync1 libxcb-xfixes0 libxcb1 libxcb1-dev
libxcbcomposite1 libxdmcp-dev libxdmcp6 libxext6 libxfixes3 libxft2 libxi6
libxinerama1 libxbkf1 libxm12 libxmui libxpm4 libxrandr2
libxrender1 libxshmfence1 libxt-dev libxt6 libxtst6 libxv1 libxxf86dga1
libxxf86vm1 maven media-types net-tools networkd-dispatcher openjdk-11-jdk
openjdk-11-jdk-headless openjdk-11-jre openjdk-11-jre-headless openssl
python3 python3-dbus python3-gi python3-minimal python3.10
python3.10-minimal readline-common session-migration shared-mime-info
systemd systemd-timesyncd tmux tree uc f vim vim-common
vim-runtime x11-common x11-utils x1proto-dev xdg-user-dirs
xorg-sgml-doctools xtrans-dev xxd
0 upgraded, 208 newly installed, 0 to remove and 0 not upgraded.
Need to get 217 MB of archives.
After this operation, 622 MB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libpython3.10-minimal amd64 3.10.12-1-22.04.2 [811 kB]
Get:2 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libxpax1 amd64 2.4.7-1ubuntu0.2 [91.0 kB]
Get:3 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libxpm4 python3.10-minimal amd64 3.10.12-1-22.04.2 [2258 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 python3-minimal amd64 3.10.6-1-22.04 [24.3 kB]
Get:5 http://archive.ubuntu.com/ubuntu jammy/main amd64 media-type-all 7.0.0 [25.5 kB]
Get:6 http://archive.ubuntu.com/ubuntu jammy/main amd64 libmpdec3 amd64 2.5.1-2build2 [86.8 kB]
Get:7 http://archive.ubuntu.com/ubuntu jammy/main amd64 readline-common all 8.1.2-1 [53.5 kB]
Get:8 http://archive.ubuntu.com/ubuntu jammy/main amd64 libxext8 amd64 8.1.2-1 [153 kB]
Get:9 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libsqlite3-0 amd64 3.37.2-2ubuntu0.1 [641 kB]
Get:10 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libpython3.10-stdlib amd64 3.10.12-1-22.04.2 [1849 kB]
Get:11 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 python3.10 amd64 3.10.12-1-22.04.2 [509 kB]
Get:12 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libpython3-stdlib amd64 3.10.6-1-22.04 [6910 B]
Get:13 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 python3 amd64 3.10.6-1-22.04 [22.8 kB]
Get:14 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libaparmor1 amd64 3.0.4-2ubuntu2.2 [39.2 kB]
Get:15 http://archive.ubuntu.com/ubuntu jammy/main amd64 libargon2-1 amd64 0-20171227-0.3 [19.5 kB]
Get:16 http://archive.ubuntu.com/ubuntu jammy/main amd64 libdevmapper1.02.1 amd64 2:1.02.175-2.1ubuntu4 [139 kB]
Get:17 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libjansson-c5 amd64 0.15-3-ubuntu1.22.04.2 [33.5 kB]
Get:18 http://archive.ubuntu.com/ubuntu iammv-updates/main amd64 libcrvptsetup12 amd64 2:2.4.3-1ubuntu1.1 [211 kB]

```
jegan@tekutor: ~ x jegan@tekutor: ~/ansible-sep-2023 x root@c1:/ x jegan@tekutor: ~/openshift-sep-2023/Day1/CustomDockerImages x jegan@tekutor: ~/openshift-sep-2023/Day1/Cu...
```

Adding debian:SecureSign_RootCA11.pem
Adding debian:TBITAK_Kamu_SM_SSL_Kok_Sertifikasi_-_Surum_1.pem
Adding debian:HARICA_TLS_RSA_Root_CA_2021.pem
Adding debian:HPK1_Root_CA_-G1.pem
Adding debian:Atos_TrustedRoot_2011.pem
Adding debian:GLOBALTRUST_2020.pem
Adding debian:Nelock_Arany_=Class_Gold_=Fótanúsítvány.pem
Adding debian:DigiCert_Global_Root_G3.pem
Adding debian:DigiCert_Global_ECC_P256_Certification_Authority.pem
Adding debian:ISRG_Root.pem
Adding debian:UCA_ExtendedValidation_Root.pem
Adding debian:DigiCert_Assured_ID_Root_G3.pem
Adding debian:AffirmTrust_Premium_ECC.pem
Adding debian:QuoVadis_Root_CA_2_G3.pem
Adding debian:Security_Communication_RootCA3.pem
Adding debian:NAVER_Global_Root_CertificationAuthority.pem
Adding debian:CFC_A_EV_ROOT.pem
Adding debian:E-Tugra_Global_Root_CA_ECC_v3.pem
Adding debian:certSIGN_ROOT_CA.pem
done.
Setting up default-jde (2:1.11-72build2) ...
Processing triggers for libc-bin (2.35-0ubuntu3.1) ...
Processing triggers for ca-certificates (20230311ubuntu0.22.04.1) ...
Updating Certificates in /etc/ssl/certs...
0 added, 0 removed; done.
Running hooks in /etc/ca-certificates/update.d...
done.
Removing intermediate container a785ed8398b1
--> 5d9ebbb760a2
Successfully built 5d9ebbb760a2
Successfully tagged tekutor/ubuntu-with-maven:latest

```
[jegan@tekutor.org]-[~/openshift-sep-2023/Day1/CustomDockerImages]
$ docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
tekutor/ubuntu-with-maven	latest	5d9ebbb760a2	8 seconds ago	749MB
tekutor/ansible-centos-node	latest	758c48f5a9bf	5 days ago	428MB
tekutor/ansible-ubuntu-node	latest	7e779bb95bb	6 days ago	220MB
nginx	latest	eeab7b3dcba7e	3 weeks ago	187MB
ubuntu	22.04	c6b84b685f35	3 weeks ago	77.8MB
mysql	latest	99afc808f15b	4 weeks ago	577MB
hello-world	latest	9c7a54a943c	4 months ago	13.3kB
centos	7.9.2009	eeb6ee3f44bd	24 months ago	204MB
centos	centos7.9.2009	eeb6ee3f44bd	24 months ago	204MB
ubuntu	16.04	b6f507652425	2 years ago	135MB

```
[jegan@tekutor.org]-[~/openshift-sep-2023/Day1/CustomDockerImages]
$ source ~/.zshrc
```