

EXPERIMENT : 8

Date of Performance	
Date of Submission	

AIM

To understand Docker Architecture and Container Life Cycle, install Docker and execute docker commands to manage images and interact with containers

PROBLEM DEFINITION

Gain insight into Docker architecture and container lifecycle, including installing Docker and managing images and containers.

THEORY

Jenkins is an open-source automation tool created with Java. It is extensively used as a Continuous Integration (CI) and Continuous Deployment (CD) tool.

Maven:

- Maven primarily provides developers with:
 1. A comprehensive, reusable, and easily maintainable model for projects.
 2. Plugins or tools to interact with and operate within this model.
- Maven is a POM (Project Object Model)-based build automation and project management tool written in Java. However, it is compatible with projects written in C#, Python, Ruby, etc.

A few Maven features worth mentioning are:

1. Maven can be used to build projects into predefined output types like .jar, .war, metadata, etc.
2. Maven can automatically download necessary files from the repository when building a project.

Selenium Using Maven in Jenkins

Selenium is a widely used test automation framework for validating web applications across different combinations of browsers, platforms, and devices (or emulators). It is extensively used for testing areas such as functional testing, end-to-end testing, and more.

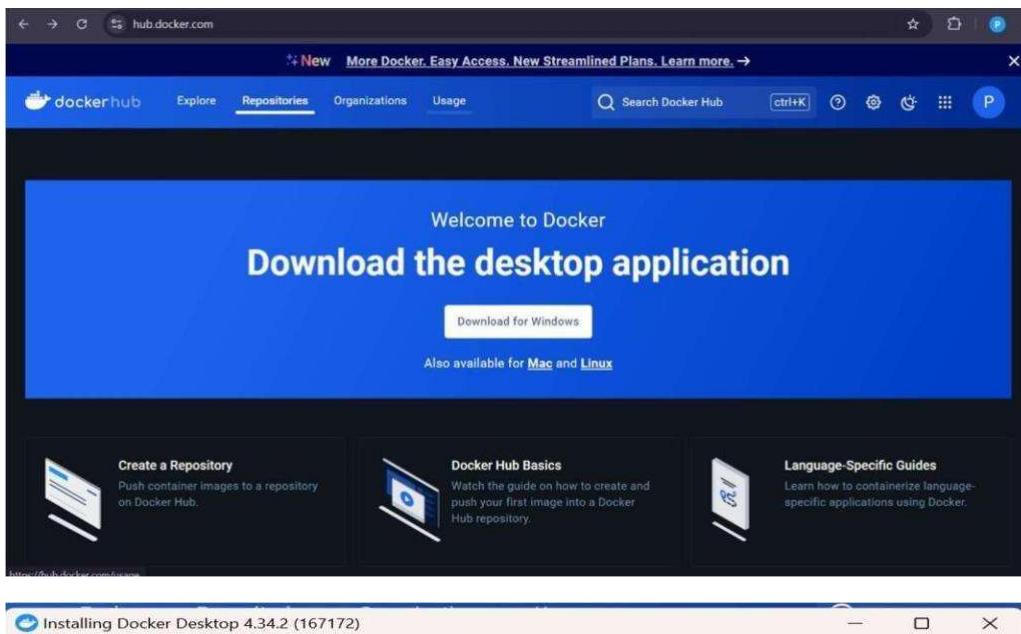
Why Jenkins and Selenium?

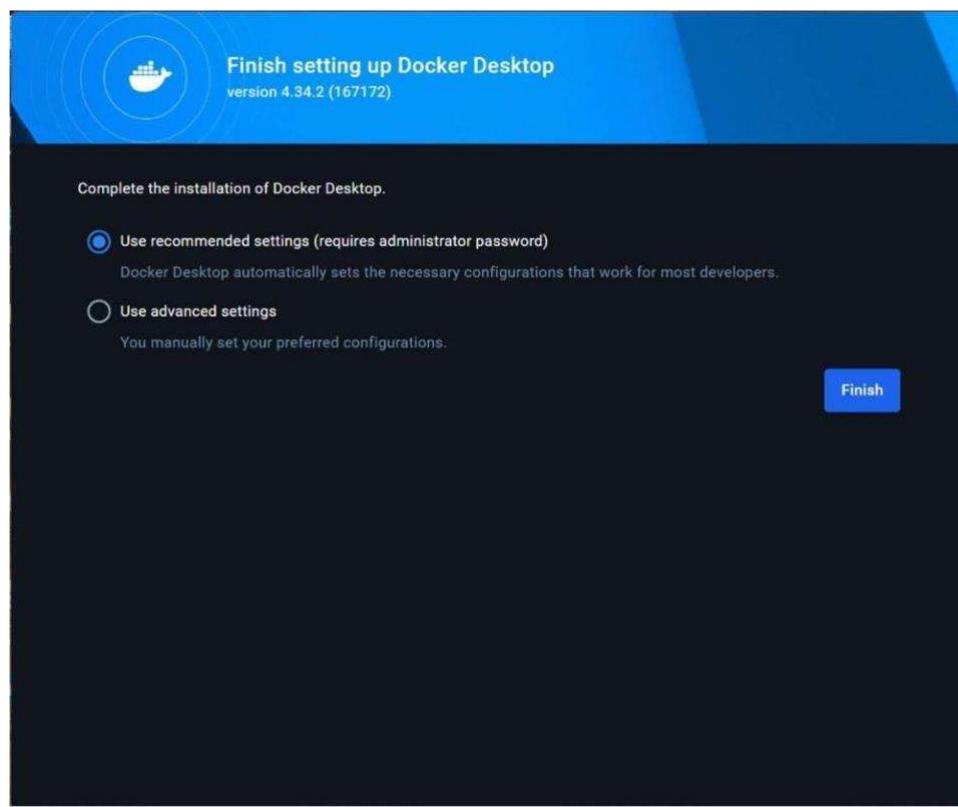
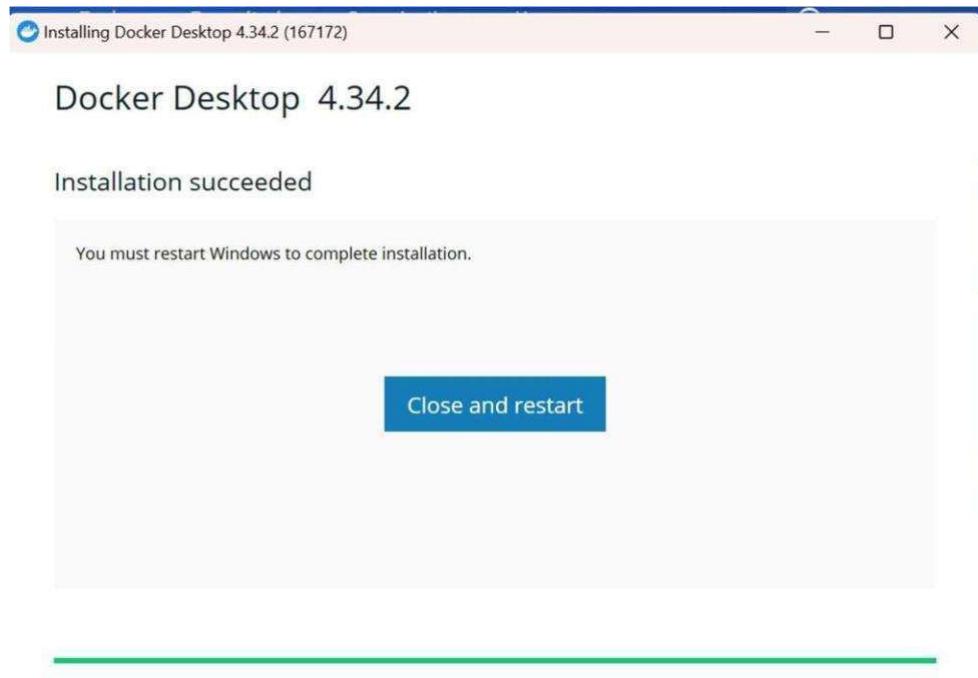
- Running Selenium tests in Jenkins allows you to execute your tests every time your software changes and deploy the software to new environments when the tests pass.

Advantages of Using Maven and Jenkins with Selenium:

- Whenever a change is made in the implementation, the changes are deployed in the test environment. Automation testing is performed continuously, and developers are kept informed about the build and test stage results.
- Test suites comprising many test scenarios might take a longer duration for testing. In such cases, a nightly build run can be scheduled for build and execution on the Jenkins server.

OUTPUT





Docker –version, docker ps, docker run

```
C:\Users\Piyush>docker --version
Docker version 27.2.0, build 3ab4256

C:\Users\Piyush>docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED            STATUS              PORTS               NAMES
C:\Users\Piyush>docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
hello-world         latest              91fb4b041da2   17 months ago    24.4kB

C:\Users\Piyush>docker run hello-world
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/
```

C:\Users\Piyush>

Docker login, docker search apache

```
C:\Users\Piyush>docker login
Authenticating with existing credentials...
Login Succeeded

C:\Users\Piyush>docker search apache
NAME                           DESCRIPTION                                     STARS      OFFICIAL
apache/airflow                  Apache Airflow                               540
apache/superset                 Apache Superset                            267
apache/nifi                      Apache Nifi unofficial binary build       295
apache/tika                      Container images for Apache Tika Server (htt... 35
apache/zeppelin                  Apache Zeppelin                            176
apache/druid                     Apache Druid                                58
apache/arrow-dev                 Apache Arrow convenience images for developm... 3
apache/skywalking-ui             Apache SkyWalking Web UI                   105
bitnami/apache                  Bitnami container image for Apache           94
apache/skywalking-oap-server     Apache SkyWalking OAP Server                159
apache/apisix                   Apache APISIX: Cloud-Native API Gateway    92
apache/cassandra-testing-ubuntu2004-javall-w-dependencies https://github.com/apache/cassandra-builds/t... 1
apache/nifi-registry             Unofficial convenience binaries for Apache N... 43
apache/couchdb                  Unofficial convenience binaries for CouchDB,... 26
apache/spark                     Apache Spark                                75
apache/fineract                  Apache Fineract                            14
apache/apisix-dashboard         https://github.com/apache/apisix-dashboard    36
apache/yunikorn                  Apache YuniKorn                             2
apache/kafka                     Apache Kafka                                79
apache/solr-operator             A Kubernetes Operator to manage and maintain... 2
apache/cassandra-testing-ubuntu2004-javall https://github.com/apache/cassandra-builds/t... 2
apache/camel-k                   Apache Camel                               7
apache/karaf                     Apache Karaf                                6
apache/pegasus                  Apache Pegasus (incubating)                  4
apache/beam_python3.8_sdk        Apache Beam SDK - Python 3.8                  9
```

Docker search redis

```
C:\Users\Piyush>docker search redis
NAME                  DESCRIPTION                                     STARS      OFFICIAL
redis                Redis is the world's fastest data platform f... 13029      [OK]
redis/redis-stack-server   redis-stack-server installs a Redis server w... 83
redis/redis-stack       redis-stack installs a Redis server with add... 118
redis/redisinsight     Redis Insight - our best official GUI for Re... 17
bitnami/redis          Bitnami container image for Redis           303
circleci/redis         CircleCI images for Redis             17
redislabs/redis        Clustered in-memory database engine compatib... 42
cimg/redis            2
bitnamiccharts/redis   2
redis/rdi-monitor     0
redis/rdi-api          0
ubuntu/redis           Redis, an open source key-value store. Long-... 22
rapidfort/redis        RapidFort optimized, hardened image for Redi... 21
webhippie/redis        Docker image for redis                   11
redis/rdi-operator    0
redis/rdi-processor   0
elestio/redis          Redis, verified and packaged by Elestio      1
jumpserver/redis       Redis is an open source key-value store that... 1
redis/rdi-cli          0
redis/rdi-collector-initializer   Init container for RDI Collector 0
drud/redis             redis                                         0
jelastic/redis          An image of the Redis database server mainta... 0
datasense/redis         0
sameersbn/redis         84
wodby/redis            Redis container image with orchestration 2
```

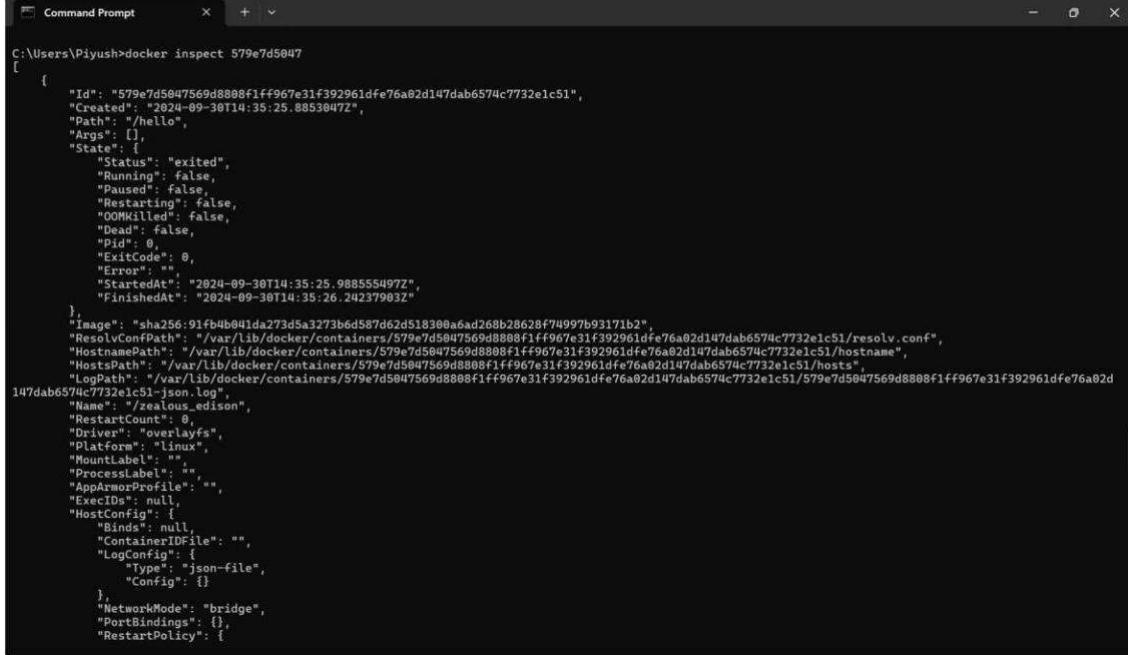
Docker stats

Docker network ls

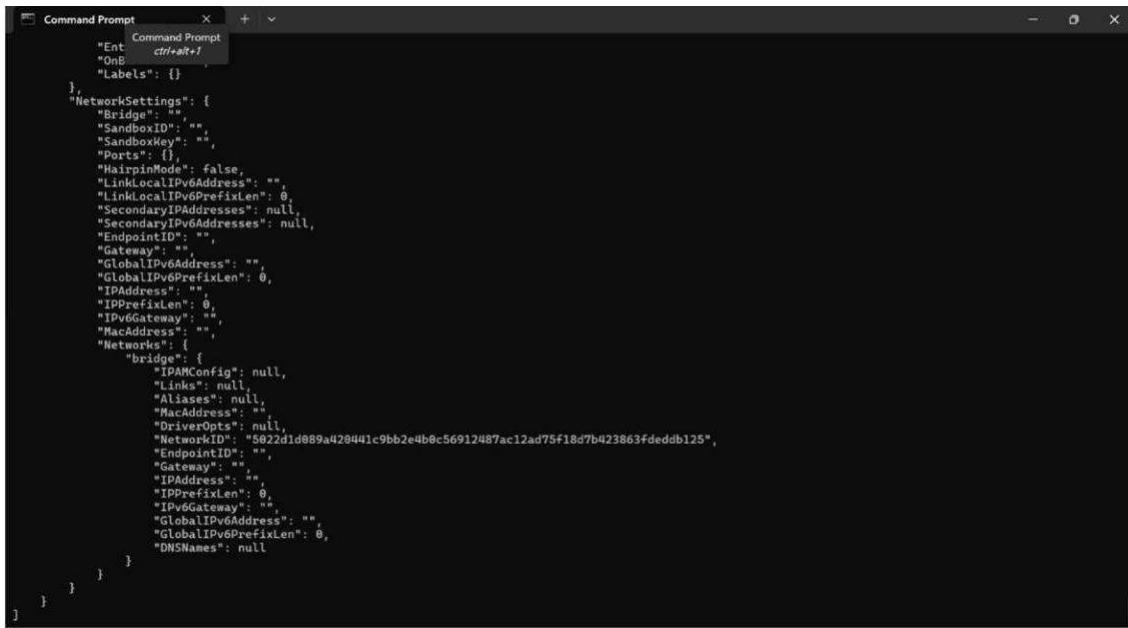
```
C:\Users\Piyush>docker network ls
NETWORK ID      NAME     DRIVER      SCOPE
5022d1d089a4    bridge   bridge      local
be13d7356d63    host     host       local
d5e0275a9668    none     null       local

C:\Users\Piyush>docker volume ls
DRIVER      VOLUME NAME
```

Docker inspect

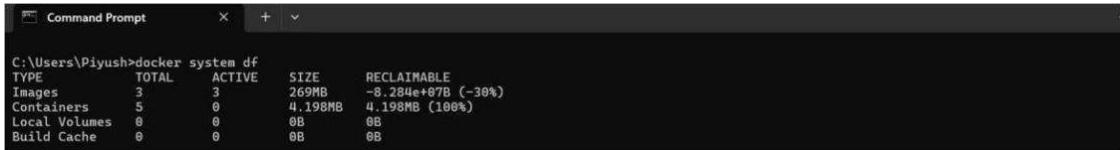


```
C:\Users\Piyush>docker inspect 579e7d5047
[{"Id": "579e7d5047569d8808f1ff967e31f392961dfe76a02d147dab6574c7732e1c51",
 "Created": "2024-09-30T14:35:25.885304Z",
 "Path": "/hello",
 "Args": [],
 "State": {
   "Status": "exited",
   "Running": false,
   "Paused": false,
   "Restarting": false,
   "OOMKilled": false,
   "Dead": false,
   "Pid": 0,
   "ExitCode": 0,
   "Error": "",
   "StartedAt": "2024-09-30T14:35:25.988555497Z",
   "FinishedAt": "2024-09-30T14:35:26.242379032Z"
 },
 "Image": "sha256:91fb1b041da273d5a3273b6d587d62d51830aa5ad268b28628f74997b93171b2",
 "ResolvConfPath": "/var/lib/docker/containers/579e7d5047569d8808f1ff967e31f392961dfe76a02d147dab6574c7732e1c51/resolv.conf",
 "HostnamePath": "/var/lib/docker/containers/579e7d5047569d8808f1ff967e31f392961dfe76a02d147dab6574c7732e1c51/hostname",
 "HostsPath": "/var/lib/docker/containers/579e7d5047569d8808f1ff967e31f392961dfe76a02d147dab6574c7732e1c51/hosts",
 "LogPath": "/var/lib/docker/containers/579e7d5047569d8808f1ff967e31f392961dfe76a02d147dab6574c7732e1c51/579e7d5047569d8808f1ff967e31f392961dfe76a02d147dab6574c7732e1c51/579e7d5047569d8808f1ff967e31f392961dfe76a02d147dab6574c7732e1c51/json.log",
 "Name": "/zealous_edison",
 "RestartCount": 0,
 "Driver": "overlayfs",
 "Platform": "linux",
 "MountLabel": "",
 "ProcessLabel": "",
 "AppArmorProfile": "",
 "ExecIDs": null,
 "HostConfig": {
   "Binds": null,
   "ContainerIDFile": "",
   "LogConfig": {
     "Type": "json-file",
     "Config": {}
   },
   "NetworkMode": "bridge",
   "PortBindings": {},
   "RestartPolicy": {
     "Name": "on-failure",
     "MaximumRetryCount": 3
   }
 }]
```



```
C:\Users\Piyush>docker inspect 579e7d5047
[{"Id": "579e7d5047569d8808f1ff967e31f392961dfe76a02d147dab6574c7732e1c51",
 "Created": "2024-09-30T14:35:25.885304Z",
 "Path": "/hello",
 "Args": [],
 "State": {
   "Status": "exited",
   "Running": false,
   "Paused": false,
   "Restarting": false,
   "OOMKilled": false,
   "Dead": false,
   "Pid": 0,
   "ExitCode": 0,
   "Error": "",
   "StartedAt": "2024-09-30T14:35:25.988555497Z",
   "FinishedAt": "2024-09-30T14:35:26.242379032Z"
 },
 "Image": "sha256:91fb1b041da273d5a3273b6d587d62d51830aa5ad268b28628f74997b93171b2",
 "ResolvConfPath": "/var/lib/docker/containers/579e7d5047569d8808f1ff967e31f392961dfe76a02d147dab6574c7732e1c51/resolv.conf",
 "HostnamePath": "/var/lib/docker/containers/579e7d5047569d8808f1ff967e31f392961dfe76a02d147dab6574c7732e1c51/hostname",
 "HostsPath": "/var/lib/docker/containers/579e7d5047569d8808f1ff967e31f392961dfe76a02d147dab6574c7732e1c51/hosts",
 "LogPath": "/var/lib/docker/containers/579e7d5047569d8808f1ff967e31f392961dfe76a02d147dab6574c7732e1c51/579e7d5047569d8808f1ff967e31f392961dfe76a02d147dab6574c7732e1c51/579e7d5047569d8808f1ff967e31f392961dfe76a02d147dab6574c7732e1c51/579e7d5047569d8808f1ff967e31f392961dfe76a02d147dab6574c7732e1c51/json.log",
 "Name": "/zealous_edison",
 "RestartCount": 0,
 "Driver": "overlayfs",
 "Platform": "linux",
 "MountLabel": "",
 "ProcessLabel": "",
 "AppArmorProfile": "",
 "ExecIDs": null,
 "HostConfig": {
   "Binds": null,
   "ContainerIDFile": "",
   "LogConfig": {
     "Type": "json-file",
     "Config": {}
   },
   "NetworkMode": "bridge",
   "PortBindings": {},
   "RestartPolicy": {
     "Name": "on-failure",
     "MaximumRetryCount": 3
   }
 }]
```

Docker system df



```
C:\Users\Piyush>docker system df
TYPE      TOTAL    ACTIVE    SIZE    RECLAIMABLE
Images      3        3     269MB   -8.284e+07B (-30%)
Containers   5        0     4.198MB  4.198MB (100%)
Local Volumes  0        0      0B      0B
Build Cache  0        0      0B      0B
```

Docker info

```
C:\Users\Piyush>docker info
Client:
  Version:    27.2.0
  Context:    desktop-linux
  Debug Mode: false
Plugins:
  buildx: Docker Buildx (Docker Inc.)
    Version: v0.16.2-desktop.1
    Path:   C:\Program Files\Docker\cli-plugins\docker-buildx.exe
  compose: Docker Compose (Docker Inc.)
    Version: v2.29.2-desktop.2
    Path:   C:\Program Files\Docker\cli-plugins\docker-compose.exe
  debug: Get a shell into any image or container (Docker Inc.)
    Version: 0.0.30
    Path:   C:\Program Files\Docker\cli-plugins\docker-debug.exe
  desktop: Docker Desktop commands (Alpha) (Docker Inc.)
    Version: v0.0.15
    Path:   C:\Program Files\Docker\cli-plugins\docker-desktop.exe
  dev: Docker Dev Environments (Docker Inc.)
    Version: v0.1.2
    Path:   C:\Program Files\Docker\cli-plugins\docker-dev.exe
  extension: Manage Docker extensions (Docker Inc.)
    Version: v0.0.28
    Path:   C:\Program Files\Docker\cli-plugins\docker-extension.exe
  feedback: Provide feedback, right in your terminal! (Docker Inc.)
    Version: v1.0.5
    Path:   C:\Program Files\Docker\cli-plugins\docker-feedback.exe
  init: Creates Docker-related starter files for your project (Docker Inc.)
    Version: v1.3.0
    Path:   C:\Program Files\Docker\cli-plugins\docker-init.exe
  sbom: View the packaged-based Software Bill Of Materials (SBOM) for an image (Anchore Inc.)
    Version: 0.6.0
    Path:   C:\Program Files\Docker\cli-plugins\docker-sbom.exe
  scout: Docker Scout (Docker Inc.)
    Version: v1.13.0
    Path:   C:\Program Files\Docker\cli-plugins\docker-scout.exe
```

```
Logging Driver: json-file
Cgroup Driver: cgroups
Cgroup Version: 1
Plugins:
  Volume: local
  Network: bridge host ipvlan macvlan null overlay
    Log: awslogs fluentd gcplogs gelf journald json-file local splunk syslog
  Swarm: inactive
  Runtimes: io.containerd.runc.v2 nvidia runc
  Default Runtime: runc
  Init: docker-init
  Containerd Version: 8fc6bcff51318944179630522a095cc9dbf9f353
  runc Version: v1.13.0-g58aa920
  init Version: de40ad0
  Security Options:
    seccomp
      Profile: unconfined
  Kernel Version: 5.15.153.1-microsoft-standard-WSL2
  Operating System: Docker Desktop
  OSType: linux
  Architecture: x86_64
  CPUs: 14
  Total Memory: 7.573GiB
  Name: docker-desktop
  ID: 10e03a38-4142-b186-6eed9a791eca
  Docker Root Dir: /var/lib/docker
  Debug Mode: false
  HTTP Proxy: http.docker.internal:3128
  HTTPS Proxy: https.docker.internal:3128
  No Proxy: hubproxy.docker.internal
  Labels:
    com.docker.desktop.address=npipe://\\.\pipe\docker_cli
  Experimental: false
  Insecure Registries:
    hubproxy.docker.internal:5555
    127.0.0.0/8
  Live Restore Enabled: false

WARNING: No blkio throttle.read_bps_device support
WARNING: No blkio throttle.write_bps_device support
WARNING: No blkio throttle.read_iops_device support
WARNING: No blkio throttle.write_iops_device support
WARNING: daemon is not using the default seccomp profile
```

CONCLUSION:

As a result, we understood Docker architecture and container life cycle by installing Docker and executing commands to manage images and interact with containers effectively.