

Docker

The goal

Following are the goals of this hands-on:

1. Working knowledge of EC2 instances with Ubuntu
2. Installing docker from scratch
3. Working with images and containers
4. Understanding the docker ecosystem

Create an Ubuntu Instance:

The screenshot shows the AWS EC2 Management console. On the left, there's a navigation sidebar with links like EC2 Dashboard, Events, Instances (selected), Images, Elastic Block Store, Network & Security, Load Balancing, CloudShell, Feedback, and Language. The main content area has a header "Instances (1/3) info" with a search bar. Below it is a table with three rows. The first row has a checkbox next to "new". The second row has a checked checkbox next to "Docker_Aug8", which is highlighted in blue. The third row has an unchecked checkbox next to "Y724". The table columns include Name, Instance ID, Instance state, Instance type, Status check, Alarm status, Availability Zone, Public IPv4 DNS, Public IPv4 IP, and Elastic IP. At the bottom of the table, there are tabs for Details, Security, Networking, Storage, Status checks, Monitoring, and Tags. Under the Details tab, there's a section for "Instance summary" with fields for Instance ID (i-0ae5e862f3d3798f3), Public IPv4 address (3.89.218.111), Private IPv4 address (172.31.93.1), and Instance state (Pending). There's also a note about the IP name being ip-172-31-93-1.ec2.internal.

Connecting to the Instance through PUTTY:

```
ubuntu@ip-172-31-93-1:~  
Using username "ubuntu"  
Authenticating with public key "Aug8"  
Welcome to Ubuntu 22.04.2 LTS (GNU/Linux 5.19.0-1025-aws x86_64)  
  
* Documentation: https://help.ubuntu.com  
* Management: https://landscape.canonical.com  
* Support: https://ubuntu.com/advantage  
  
System information as of Wed Aug 2 01:25:59 UTC 2023  
  
System load: 0.15087890625 Processes: 105  
Usage of /: 20.6% of 7.57GB Users logged in: 0  
Memory usage: 12% IPv4 address for eth0: 172.31.93.1  
Swap usage: 0%  
  
Expanded Security Maintenance for Applications is not enabled.  
0 updates can be applied immediately.  
  
Enable ESM Apps to receive additional future security updates.  
See https://ubuntu.com/esm or run: sudo pro status  
  
The list of available updates is more than a week old.  
To check for new updates run: sudo apt update  
  
The programs included with the Ubuntu system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*copyright.  
  
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by  
applicable law.  
  
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.  
ubuntu@ip-172-31-93-1:~$
```

Installing Docker on Ubuntu Instance:

```
ubuntu@ip-172-31-93-1:~  
Fetching 72.4 MB in 2s (46.8 MB/s)  
Preconfiguring packages ...  
Selecting previously unselected package pigz.  
(Reading database ... 64295 files and directories currently installed.)  
Preparing to unpack .../0-pigz_2.6-1_amd64.deb ...  
Unpacking pigz (2.6-1) ...  
Selecting previously unselected package bridge-utils.  
Preparing to unpack .../1-bridge-utils_1.7-lubuntu3_amd64.deb ...  
Unpacking bridge-utils (1.7-lubuntu3) ...  
Selecting previously unselected package runc.  
Preparing to unpack .../2-runc_1.1.0-lubuntu22.04.3_amd64.deb ...  
Unpacking runc (1.1.0-lubuntu22.04.3)  
Selecting previously unselected package containerd.  
Preparing to unpack .../3-containerd_1.6.12-lubuntu1~22.04.3_amd64.deb ...  
Unpacking containerd (1.6.12-lubuntu1~22.04.3) ...  
Selecting previously unselected package dns-root-data.  
Preparing to unpack .../4-dns-root-data_2021011101_all.deb ...  
Unpacking dns-root-data (2021011101) ...  
Selecting previously unselected package dnsmasq-base.  
Preparing to unpack .../5-dnsmasq-base_2.86-1.lubuntu0.3_amd64.deb ...  
Unpacking dnsmasq-base (2.86-1.lubuntu0.3) ...  
Selecting previously unselected package docker.io.  
Preparing to unpack .../6-docker.io_20.10.21-lubuntu1~22.04.3_amd64.deb ...  
Unpacking docker.io (20.10.21-lubuntu1~22.04.3) ...  
Selecting previously unselected package ubuntu-fan.  
Preparing to unpack .../7-ubuntu-fan_0.12.16_all.deb ...  
Unpacking ubuntu-fan (0.12.16) ...  
Setting up dnsmasq-base (2.86-1.lubuntu0.3) ...  
Setting up runc (1.1.4-lubuntu1~22.04.3) ...  
Setting up dns-root-data (2021011101) ...  
Setting up bridge-utils (1.7-lubuntu3) ...  
Setting up pigz (2.6-1) ...  
Setting up containerd (1.6.12-lubuntu1~22.04.3) ...  
Created symlink /etc/systemd/system/multi-user.target.wants/containerd.service → /lib/systemd/system/containerd.service.  
Setting up ubuntu-fan (0.12.16) ...  
Created symlink /etc/systemd/system/multi-user.target.wants/ubuntu-fan.service → /lib/systemd/system/ubuntu-fan.service.  
Setting up docker.io (20.10.21-lubuntu1~22.04.3) ...  
Adding group 'docker' (GID 122) ...  
Done.  
Created symlink /etc/systemd/system/multi-user.target.wants/docker.service → /lib/systemd/system/docker.service.  
Created symlink /etc/systemd/system/sockets.target.wants/docker.socket → /lib/systemd/system/docker.socket.  
Processing triggers for dbus (1.12.20-lubuntu4.1) ...  
Processing triggers for man-db (2.10.2-1) ...  
Scanning processes...  
Scanning Linux images...  
  
Running kernel seems to be up-to-date.  
  
No services need to be restarted.  
  
No containers need to be restarted.  
  
No user sessions are running outdated binaries.  
  
No VM guests are running outdated hypervisor (qemu) binaries on this host.  
ubuntu@ip-172-31-93-1:~$
```

Installing busybox:latest Image “Helloworld”

```
ubuntu@ip-172-31-93-1:/opt$ 

Expanded Security Maintenance for Applications is not enabled.

98 updates can be applied immediately.
64 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

Last login: Wed Aug 2 01:28:45 2023 from 72.180.237.154
ubuntu@ip-172-31-93-1:~$ docker version
Client:
  Version:          20.10.21
  API version:      1.41
  Go version:       go1.18.1
  Git commit:       20.10.21-0ubuntu1~22.04.3
  Built:            Thu Apr 27 05:57:17 2023
  OS/Arch:          linux/amd64
  Context:           default
  Experimental:     true

Server:
  Engine:
    Version:          20.10.21
    API version:      1.41 (minimum version 1.12)
    Go version:       go1.18.1
    Git commit:       20.10.21-0ubuntu1~22.04.3
    Built:            Thu Apr 27 05:57:25 2023
    OS/Arch:          linux/amd64
    Experimental:     false
  containerd:
    Version:          1.6.12-0ubuntu1~22.04.3
    GitCommit:        04c490098f5b: Pull complete
  runc:
    Version:          1.1.4-0ubuntu1~22.04.3
    GitCommit:        901c27885a1402e: Pull complete
  docker-init:
    Version:          0.19.0
    GitCommit:        952b5a18c51d35
ubuntu@ip-172-31-93-1:~$ sudo chown ubuntu:ubuntu -R /opt
chown: invalid group: 'ubuntu:ubuntu'
ubuntu@ip-172-31-93-1:~$ cd /opt
ubuntu@ip-172-31-93-1:~$ sudo chown ubuntu:ubuntu -R /opt
ubuntu@ip-172-31-93-1:~$ ./opt$ docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
ubuntu@ip-172-31-93-1:~$ ./opt$ docker run --rm busybox:latest /bin/echo "Hello world"
Unable to find image 'busybox:latest' locally
latest: Pulling from library/busybox
3f4d90098f5b: Pull complete
Digest: sha256:3fbfc632167424a6d997e74f52b87d7cc478225cffac6bc977eedfe51c7f4e79
Status: Downloaded newer image for busybox:latest
Hello world
ubuntu@ip-172-31-93-1:~$ ./opt$ 
```

Successfully tagged “Helloworld:latest”

```
ubuntu@ip-172-31-93-1:/opt$ 

0000K ..... 0% 25.5M 0s
0050K ..... 0% 45.9M 0s
0100K ..... 0% 262M 0s
0150K ..... 0% 240M 0s
0200K ..... 0% 272M 0s
0250K ..... 0% 274M 0s
0300K ..... 0% 264M 0s
0350K ..... 0% 229M 0s
0400K ..... 0% 273M 0s
0450K ..... 0% 274M 0s
0500K ..... 0% 279M 0s
0550K ..... 0% 248M 0s
0600K ..... 0% 237M 0s
0650K ..... 0% 268M 0s
0700K ..... 0% 271M 0s
0750K ..... 0% 230M 0s
0800K ..... 0% 278M 0s
0850K ..... 0% 238M 0s
0900K ..... 0% 275M 0s
0950K ..... 0% 5.06M 0s
0900K ..... 0% 11.8M 0s
0950K ..... 0% 39.3M 0s
09100K ..... 0% 267M 0s
09200K ..... 0% 215M 0s
09300K ..... 0% 271M 0s
09400K ..... 0% 279M 0s
09500K ..... 0% 230M 0s
09350K ..... 0% 221M 0s
09400K ..... 0% 272M 0s
09450K ..... 0% 278M 0s
09500K ..... 0% 257M 0s
09550K ..... 0% 219M 0s
09600K ..... 100% 330M=0.2s

2023-08-02 01:33:05 (38.7 MB/s) - 'HelloWorld.war' saved [9852807/9852807]

openjdk version "11.0.16" 2022-07-19
OpenJDK Runtime Environment 18.9 (build 11.0.16+8)
OpenJDK 64-Bit Server VM 18.9 (build 11.0.16+8, mixed mode, sharing)
Removing intermediate container 3f4206babaf
-> 5236b3e90917
Step 5/7 : WORKDIR /opt/tomcat/webapps
-> Running in c0fea8d0ec69
Removing intermediate container c0fea8d0ec69
-> c7c0d2305e23
Step 6/7 : EXPOSE 8080
-> Running in 84081633bcfd
Removing intermediate container 84081633bcfd
-> 8f5853990e68
Step 7/7 : CMD ["/opt/tomcat/bin/catalina.sh", "run"]
-> Running in 54c307a9bcb6
Removing intermediate container 54c307a9bcb6
-> fb96c2cc1d9
Successfully built fb96c2cc1d9
Successfully tagged helloworld:latest
ubuntu@ip-172-31-93-1:~$ 
```

Running helloworld container on detached mode (-d) and mapping to port 80:8080(-p)

```
ubuntu@ip-172-31-93-1:/opt
8100K ..... 84% 262M 0s
8150K ..... 85% 240M 0s
8200K ..... 85% 272M 0s
8250K ..... 86% 274M 0s
8300K ..... 86% 264M 0s
8350K ..... 87% 229M 0s
8400K ..... 87% 273M 0s
8450K ..... 88% 274M 0s
8500K ..... 88% 279M 0s
8550K ..... 89% 248M 0s
8600K ..... 89% 237M 0s
8650K ..... 90% 268M 0s
8700K ..... 90% 271M 0s
8750K ..... 91% 230M 0s
8800K ..... 91% 278M 0s
8850K ..... 92% 238M 0s
8900K ..... 93% 273M 0s
8950K ..... 93% 5.06M 0s
9000K ..... 94% 11.8M 0s
9050K ..... 94% 39.3M 0s
9100K ..... 95% 267M 0s
9150K ..... 95% 215M 0s
9200K ..... 96% 271M 0s
9250K ..... 96% 279M 0s
9300K ..... 97% 279M 0s
9350K ..... 97% 221M 0s
9400K ..... 98% 272M 0s
9450K ..... 98% 278M 0s
9500K ..... 99% 257M 0s
9550K ..... 99% 219M 0s
9600K ..... 100% 330M=0.2s

2023-08-02 01:33:05 (38.7 MB/s) - 'HelloWorld.war' saved [9852807/9852807]

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Removing intermediate container 3f4206bab0f
-> 5236b3e09017
Step 5/7 : WORKDIR /opt/tomcat/webapps
--> Running in c0fea8d0ec69
Removing intermediate container c0fea8d0ec69
-> c7c0d2305e23
Step 6/7 : EXPOSE 8080
--> Running in 84081633bcfd
Removing intermediate container 84081633bcfd
-> 8f5853990e68
Step 7/7 : CMD ["/opt/tomcat/bin/catalina.sh", "run"]
--> Running in 54c307a9bcb6
Removing intermediate container 54c307a9bcb6
-> fb96c22cc1d9
Successfully built fb96c22cc1d9
Successfully tagged helloworld:latest
ubuntu@ip-172-31-93-1:/opt$ docker run -d -p 80:8080 helloworld
135dc776dbd04a64d7aeb3e514297eb4e4a46b90a997a45e52ee43cbd5460a450
ubuntu@ip-172-31-93-1:/opt$
```

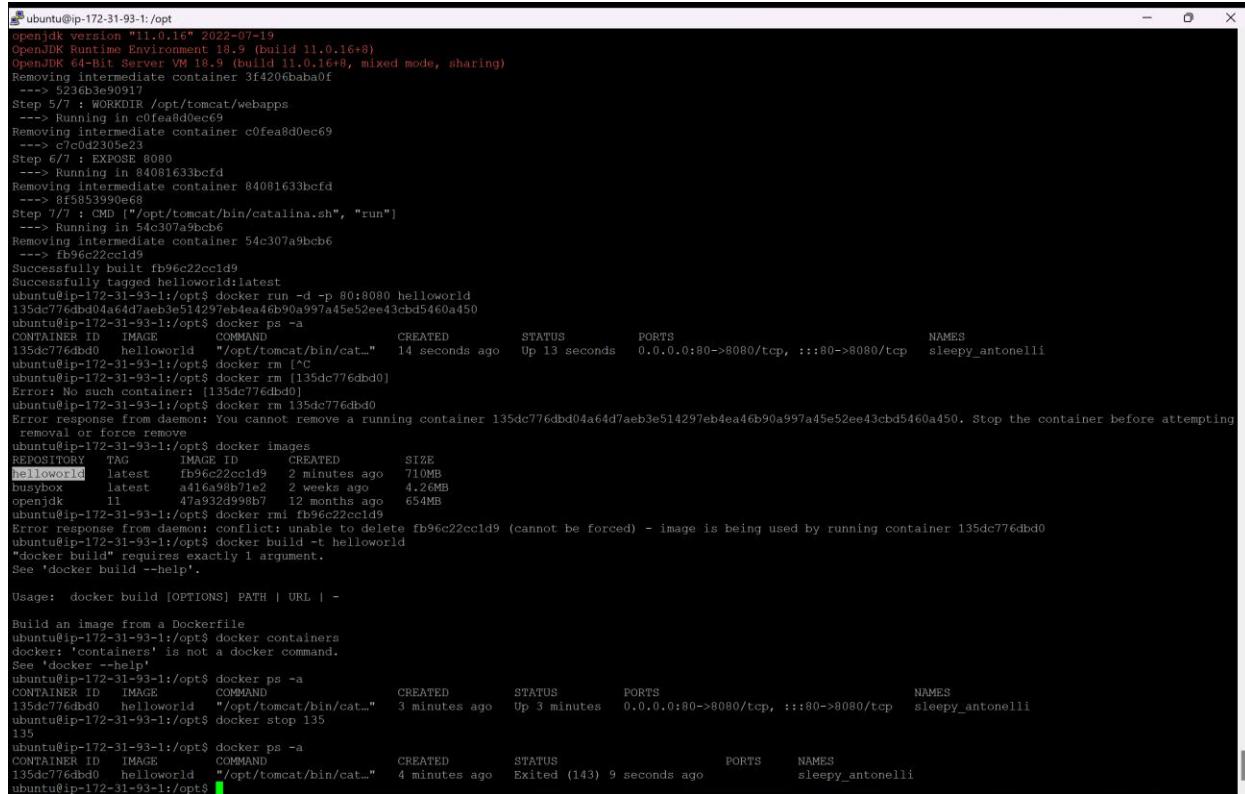
Docker ps -a showing the container is up and running

```
ubuntu@ip-172-31-93-1:/opt
8250K ..... 96% 274M 0s
8300K ..... 86% 264M 0s
8350K ..... 87% 229M 0s
8400K ..... 87% 273M 0s
8450K ..... 88% 274M 0s
8500K ..... 88% 279M 0s
8550K ..... 89% 248M 0s
8600K ..... 89% 237M 0s
8650K ..... 90% 268M 0s
8700K ..... 90% 271M 0s
8750K ..... 91% 230M 0s
8800K ..... 91% 278M 0s
8850K ..... 92% 238M 0s
8900K ..... 93% 275M 0s
8950K ..... 93% 5.06M 0s
9000K ..... 94% 11.8M 0s
9050K ..... 94% 39.3M 0s
9100K ..... 95% 267M 0s
9150K ..... 95% 215M 0s
9200K ..... 96% 271M 0s
9250K ..... 96% 279M 0s
9300K ..... 97% 279M 0s
9350K ..... 97% 221M 0s
9400K ..... 98% 272M 0s
9450K ..... 98% 278M 0s
9500K ..... 99% 257M 0s
9550K ..... 99% 219M 0s
9600K ..... 100% 330M=0.2s

2023-08-02 01:33:05 (38.7 MB/s) - 'HelloWorld.war' saved [9852807/9852807]

openjdk version "11.0.16" 2022-07-19
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Step 5/7 : WORKDIR /opt/tomcat/webapps
--> Running in c0fea8d0ec69
Removing intermediate container c0fea8d0ec69
-> c7c0d2305e23
Step 6/7 : EXPOSE 8080
--> Running in 84081633bcfd
Removing intermediate container 84081633bcfd
-> 8f5853990e68
Step 7/7 : CMD ["/opt/tomcat/bin/catalina.sh", "run"]
--> Running in 54c307a9bcb6
Removing intermediate container 54c307a9bcb6
-> fb96c22cc1d9
Successfully built fb96c22cc1d9
Successfully tagged helloworld:latest
ubuntu@ip-172-31-93-1:/opt$ docker run -d -p 80:8080 helloworld
135dc776dbd04a64d7aeb3e514297eb4e4a46b90a997a45e52ee43cbd5460a450
ubuntu@ip-172-31-93-1:/opt$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
135dc776dbd0 helloworld "/opt/tomcat/bin/cat..." 14 seconds ago Up 13 seconds 0.0.0.0:80->8080/tcp, :::80->8080/tcp sleepy_antonelli
ubuntu@ip-172-31-93-1:/opt$
```

Docker container stopped



```
ubuntu@ip-172-31-93-1:/opt
openjdk version "11.0.16" 2022-07-19
OpenJDK Runtime Environment 18.9 (build 11.0.16+8)
OpenJDK 64-Bit Server VM 18.9 (build 11.0.16+8, mixed mode, sharing)
Removing intermediate container 3f4206babaf
--> 5236bbe90917
Step 5/7 : WORKDIR /opt/tomcat/webapps
--> Running in c0fea8d0ec69
Removing intermediate container c0fea8d0ec69
--> c7c0d2305e23
Step 6/7 : EXPOSE 8080
--> Running in 84081633bcfd
Removing intermediate container 84081633bcfd
--> 8f5853990668
Step 7/7 : CMD ["/opt/tomcat/bin/catalina.sh", "run"]
--> Running in 54c307a9bcb6
Removing intermediate container 54c307a9bcb6
--> fb96c22cc1d9
Successfully built fb96c22cc1d9
Successfully tagged helloworld:latest
ubuntu@ip-172-31-93-1:/opt$ docker run -d -p 80:8080 helloworld
135dc776dbd04a6d7aeb3e514297eb4ea46b90a997a45e52ee43cbd5460a450
ubuntu@ip-172-31-93-1:/opt$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
135dc776dbd0 helloworld "/opt/tomcat/bin/cat..." 14 seconds ago Up 13 seconds 0.0.0.0:80->8080/tcp, :::80->8080/tcp sleepy_antonelli
ubuntu@ip-172-31-93-1:/opt$ docker rm [135dc776dbd0]
Error: No such container: [135dc776dbd0]
ubuntu@ip-172-31-93-1:/opt$ docker rm 135dc776dbd0
Error response from daemon: You cannot remove a running container 135dc776dbd04a6d7aeb3e514297eb4ea46b90a997a45e52ee43cbd5460a450. Stop the container before attempting removal or force remove
ubuntu@ip-172-31-93-1:/opt$ docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
hellworld latest fb96c22cc1d9 2 minutes ago 710MB
busybox latest a416a98b71e2 2 weeks ago 4.26MB
openjdk 11 47a932d998b7 12 months ago 654MB
ubuntu@ip-172-31-93-1:/opt$ docker rmi fb96c22cc1d9
Error response from daemon: conflict: unable to delete fb96c22cc1d9 (cannot be forced) - image is being used by running container 135dc776dbd0
ubuntu@ip-172-31-93-1:/opt$ docker build -t helloworld
"docker build" requires exactly 1 argument.
See 'docker build --help'.
Usage: docker build [OPTIONS] PATH | URL | -
Build an image from a Dockerfile
ubuntu@ip-172-31-93-1:/opt$ docker containers
docker: 'containers' is not a docker command.
See 'docker --help'.
ubuntu@ip-172-31-93-1:/opt$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
135dc776dbd0 helloworld "/opt/tomcat/bin/cat..." 3 minutes ago Up 3 minutes 0.0.0.0:80->8080/tcp, :::80->8080/tcp sleepy_antonelli
ubuntu@ip-172-31-93-1:/opt$ docker stop 135
135
ubuntu@ip-172-31-93-1:/opt$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
135dc776dbd0 helloworld "/opt/tomcat/bin/cat..." 4 minutes ago Exited (143) 9 seconds ago sleepy_antonelli
ubuntu@ip-172-31-93-1:/opt$
```

Docker started once again

```
ubuntu@ip-172-31-93-1:/opt$ Step 5/7 : WORKDIR /opt/tomcat/webapps
--> Running in c0fea8d0ec69
Removing intermediate container c0fea8d0ec69
--> c7c0d2305e23
Step 6/7 : EXPOSE 8080
--> Running in 84081633bcfd
Removing intermediate container 84081633bcfd
--> 8f5853990e68
Step 7/7 : CMD ["./opt/tomcat/bin/catalina.sh", "run"]
--> Running in 54c307a9bc6
Removing intermediate container 54c307a9bc6
--> fb96c22cc1d9
Successfully built fb96c22cc1d9
Successfully tagged helloworld:latest
ubuntu@ip-172-31-93-1:/opt$ docker run -d -p 80:8080 helloworld
135dc776dbd04a64d7aebe3e514297eb4ea46b90a997a45e52ee43cbd460a450
ubuntu@ip-172-31-93-1:/opt$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
135dc776dbd0 helloworld "/opt/tomcat/bin/cat..." 14 seconds ago Up 13 seconds 0.0.0.0:80->8080/tcp, :::80->8080/tcp sleepy_antonelli
ubuntu@ip-172-31-93-1:/opt$ docker rm [^C]
ubuntu@ip-172-31-93-1:/opt$ docker rm 135dc776dbd0
Error: No such container: [135dc776dbd0]
ubuntu@ip-172-31-93-1:/opt$ docker rm 135dc776dbd0
Error response from daemon: You cannot remove a running container 135dc776dbd04a64d7aebe3e514297eb4ea46b90a997a45e52ee43cbd460a450. Stop the container before attempting removal or force remove
ubuntu@ip-172-31-93-1:/opt$ docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
helloworld latest fb96c22cc1d9 2 minutes ago 710MB
busybox latest a416a98b71e2 2 weeks ago 4.26MB
openjdk 11 47a932d998b7 12 months ago 654MB
ubuntu@ip-172-31-93-1:/opt$ docker rmi fb96c22cc1d9
Error response from daemon: conflict: unable to delete fb96c22cc1d9 (cannot be forced) - image is being used by running container 135dc776dbd0
ubuntu@ip-172-31-93-1:/opt$ docker build -t helloworld
"docker build" requires exactly 1 argument.
See 'docker build --help'.

Usage: docker build [OPTIONS] PATH | URL | -

Build an image from a Dockerfile
ubuntu@ip-172-31-93-1:/opt$ docker containers
docker: "containers" is not a docker command.
See 'docker --help'.
ubuntu@ip-172-31-93-1:/opt$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
135dc776dbd0 helloworld "/opt/tomcat/bin/cat..." 3 minutes ago Up 3 minutes 0.0.0.0:80->8080/tcp, :::80->8080/tcp sleepy_antonelli
ubuntu@ip-172-31-93-1:/opt$ docker stop 135
135
ubuntu@ip-172-31-93-1:/opt$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
135dc776dbd0 helloworld "/opt/tomcat/bin/cat..." 4 minutes ago Exited (143) 9 seconds ago 0.0.0.0:80->8080/tcp, :::80->8080/tcp sleepy_antonelli
ubuntu@ip-172-31-93-1:/opt$ docker start 135
135
ubuntu@ip-172-31-93-1:/opt$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
135dc776dbd0 helloworld "/opt/tomcat/bin/cat..." 4 minutes ago Up 4 seconds 0.0.0.0:80->8080/tcp, :::80->8080/tcp sleepy_antonelli
ubuntu@ip-172-31-93-1:/opt$
```

Accessing the Apache Tomcat webpage through the publicIP

The screenshot shows a web browser window with the Apache Tomcat 9.0.53 homepage loaded. The URL in the address bar is 3.89.218.111. The page has a light blue header with the Apache logo and navigation links for Home, Documentation, Configuration, Examples, Wiki, and Mailing Lists. A green banner at the top says, "If you're seeing this, you've successfully installed Tomcat. Congratulations!". Below this is a cartoon cat icon. To the right of the banner are three buttons: Server Status, Manager App, and Host Manager. The main content area is divided into several sections:

- Developer Quick Start:** Includes links to Tomcat Setup, Realms & AAA, Examples, and JDBI Data Sources.
- Documentation:** Links to Tomcat 9.0 Documentation, Tomcat 9.0 Configuration, and Tomcat Wiki.
- Getting Help:** Links to FAQ and Mailing Lists, and information about tomcat-announce, tomcat-users, tomcat-dev, and tomcat-jira mailing lists.
- Managing Tomcat:** Information about security access to the manager webapp and a link to \$CATALINA_HOME/conf/tomcat-users.xml.
- Release Notes:** Links to ChangeLog, Migration Guide, and Security Notices.
- Documentation:** Links to Tomcat 9.0 Documentation, Tomcat 9.0 Configuration, and Tomcat Wiki.
- Getting Help:** Links to FAQ and Mailing Lists, and information about tomcat-announce, tomcat-users, tomcat-dev, and tomcat-jira mailing lists.
- Other Downloads:** Links to Tomcat Connectors, Tomcat Native, Tomcat Native, and Tomcat Native.
- Other Documentation:** Links to Tomcat Connectors, mod_jk Documentation, Tomcat Native, and Tomcat Native.
- Get Involved:** Links to Opennew, Source Repositories, Mailing Lists, and WWW.
- Miscellaneous:** Links to Contact, Legal, Sponsorship, and Thanks.
- Apache Software Foundation:** Links to Who We Are, Heritage, Apache Home, and Resources.

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