Dvs Technologies Aws & Devops

Compiled and Scrutinized by

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Words To The Students

Though we have taken utmost efforts to present you this book error free, but still it may contain some errors or mistakes. Students are encouraged to bring, if there are any mistakes or errors in this document to our notice. So that it may be rectified in the next edition of this document.

"Suppressing your doubts is Hindering your growth".

We urge you to work hard and make use of the facilities we are providing to you, because there is no substitute for hard work. We wish you all the best for your future.

"The grass isn't greener on the other side; the grass is greener where you water it."

You and your suggestions are valuable to us; Help us to serve you better. In case of any suggestions, grievance, or complaints, please feel free to write us your suggestions, grievance and feedback on the following

Dvs.training@gmail.com

1. Introduction to Docker:

Learning the Basics of Docker:

Docker is an open-source Project that automates the deployment of applications inside software containers, by providing an additional layer of abstraction and automation of operating system-level virtualization on Linux.

So basically, it is a tool (or a set of tools depending on how you look at it) that packages up an application and all its dependencies in a "virtual container" so that it can be run on any linux
system or distribution.

When would we use Dockers:

There are lot of reasons to use docker. Although you will generally hear about docker used in conjunction with development and deployment of applications,

there are tons of examples for use:

*** Configuration simplification**
*** Enhance Developer Productivity**
*** Server Consolidation and management**
*** Applicaiton isolation**
*** Rapid Deployment**
*** Build Management**

Keep in mind these are only a few use cases. We are going to explore many more during our course!!

Containers vs. Virtual Machines::

What is a virtual Machine:

In basic terms, a virtual machine is an emulation of a specific computer system type. They operate based on the architecture and functions of that real computer system type and its implementation can involve specialized hardware, software or both.
when you think of a virtual machine , you probably think of vmware, citrix and or virtual box. Virtualization software allows you to setup one operating system with another. Although they both share the same physical hardware, the virtual machine is isolated from that hardware and has to communicate with it through something called a Hypervisor.

An aws instance is one type of virtual Machine!

What is a container?

A container is exactly what you might except it to be based on the general definition of the word. It is an entirely isolated set of packages, libraries and/or applications that are completely independent from its surroundings. In the simplest example, you place your leftovers in a plastic container and then set it on the table. Although the table lends the platform on which the leftover are resting upon, they are independent of the table itself. What you do to one does not necessarily affect the other (although in certain instances it can)

What is the difference important?

As in most things in life, the importance is in perspective. From the perspective of getting the most performance out of hardware purchased, virtualization was invented to allow us to share but segregate server instances from each other. This way, we could protect one operating system from another without letting space CPU cycles, memory or disk space go to waste. Now, virtualization is becoming more granular. We have virtual servers, but they are based on emulating virtual hardware through a hypervisor. This means that they are heavy in terms of system requirements. Containers however, use shared operating systems and more efficient in system resource terms.

Docker Architecture:

Docker is a client-server application where both the daemon and client can be run on the same system or you can connect a docker client with a remote docker daemon. Docker clients and daemos comunicate via sockets or through a RESTFful API(representational state transfer- it is a stateless transfer over httpd of a web page containing an XML file that descirbles and includes the desired content).

The main components of Docker are:

daemon
client
Docker.io registry

See the docker architecture picture you saved to the dockers directory.

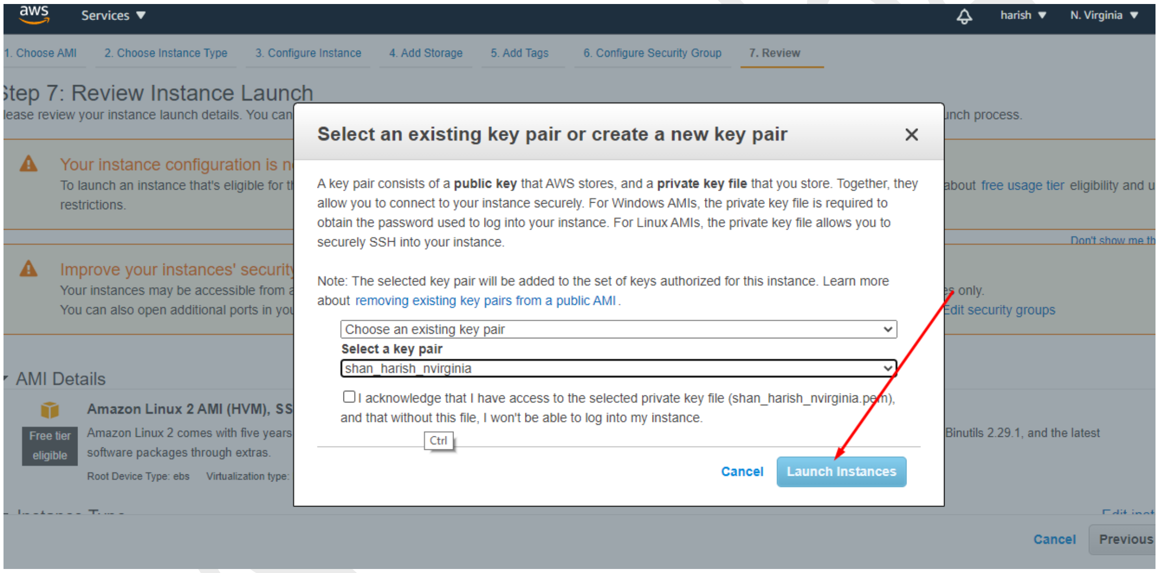
From the picture we can conclude that docker engine manages all the resource allocations for the applications, there is no necessasity to install a new OS and install application on

top of it. This will not save our resources like memory,disk & hardware as well as our precious time to install and configure the OS :)
Hasn't this already been done ?

Many companies already have this concept before but Docker hit the right spot in right time. PFB companies which are already using this concept.

FreeBSD :-> Jails
Sun(and now oracle) Solaris :-> Zones
Google :-> IMctfy
Openvz

2. Installation



Select an existing key pair or create a new key pair ✕

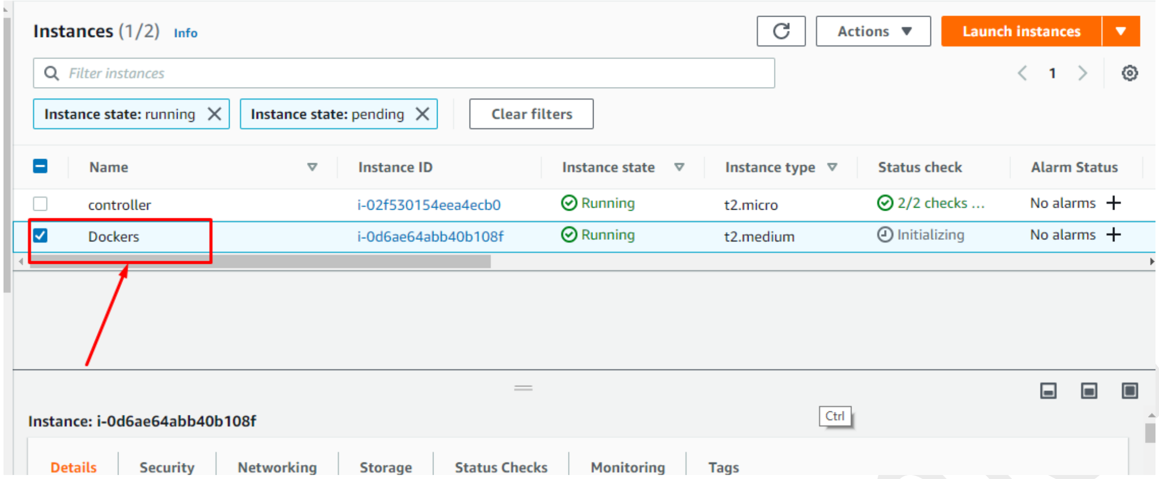
A key pair consists of a **public key** that AWS stores, and a **private key file** that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key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

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

Choose an existing key pair

Select a key pair
shan_harish_nvirginia

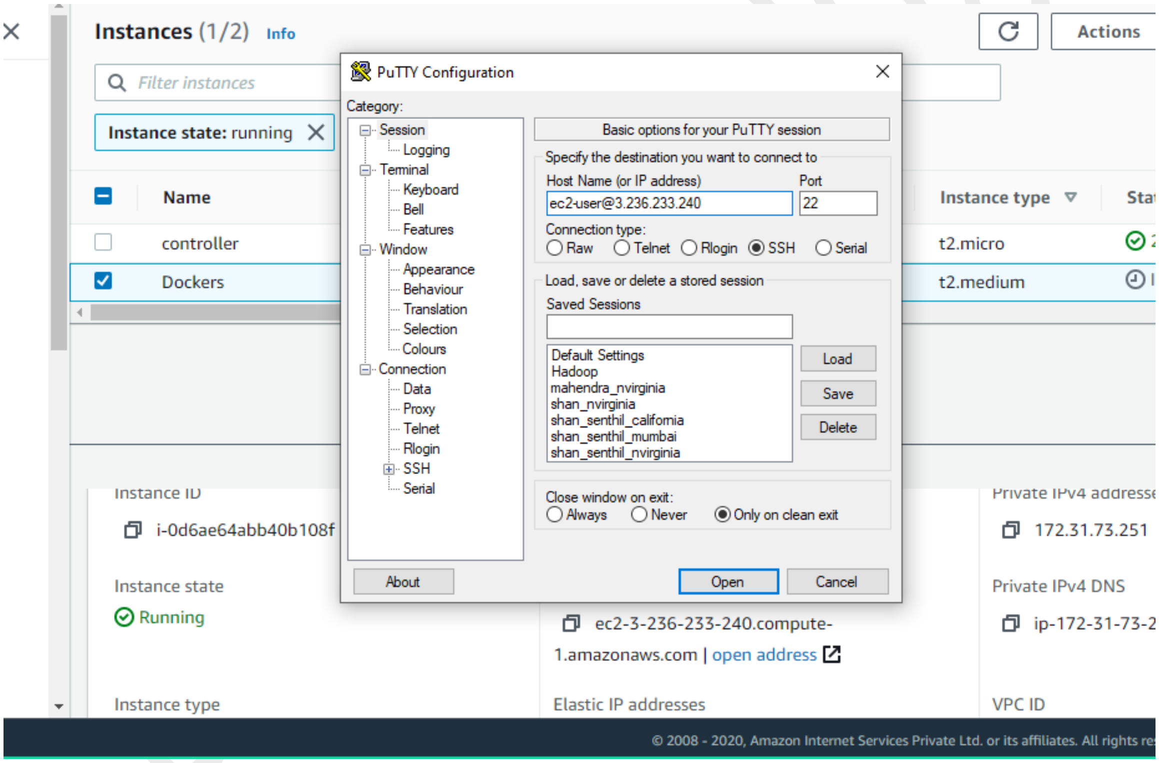
☐ I acknowledge that I have access to the selected private key file (shan_harish_nvirginia.pem), and that without this file, I won't be able to log into my instance.



Instances (1/2) Info

☐	Name	Instance ID	Instance state	Instance type	Status check	Alarm Status
☐	controller	i-02f530154eea4ecb0	✓ Running	t2.micro	✓ 2/2 checks ...	No alarms +
☑	Dockers	i-0d6ae64abb40b108f	✓ Running	t2.medium	Initializing	No alarms +

Instance: i-0d6ae64abb40b108f



PuTTY Configuration

Basic options for your PuTTY session

Specify the destination you want to connect to

Host Name (or IP address): ec2-user@3.236.233.240

Port: 22

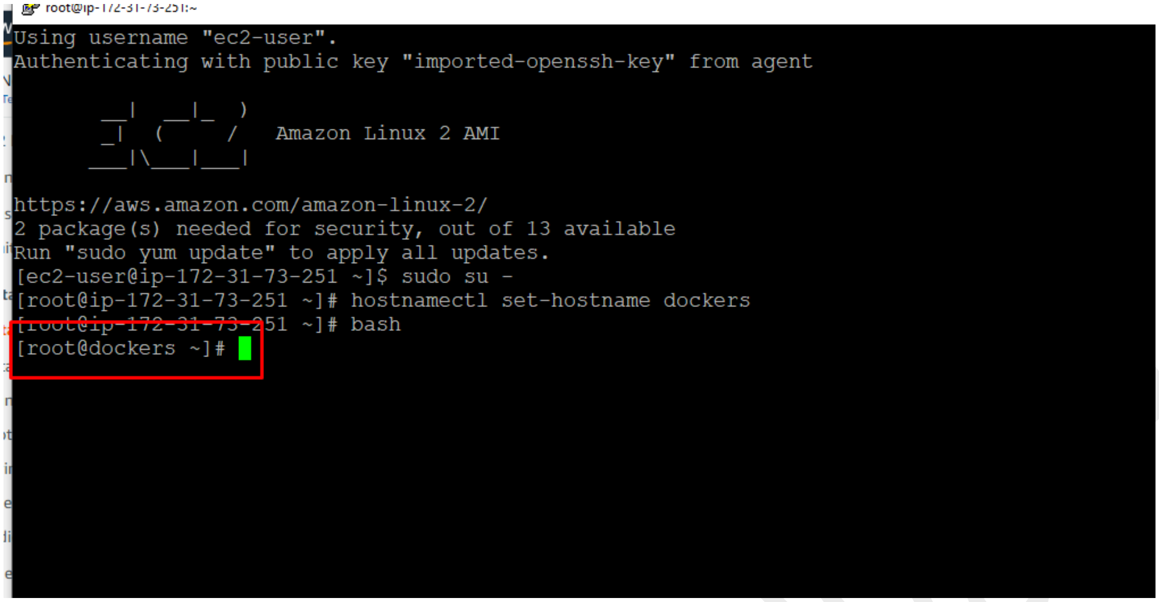
Connection type: ○ Raw ○ Telnet ○ Rlogin ● SSH ○ Serial

Load, save or delete a stored session

Saved Sessions

Default Settings
Hadoop
mahendra_nvirginia
shan_nvirginia
shan_senthil_california
shan_senthil_mumbai
shan_senthil_nvirginia

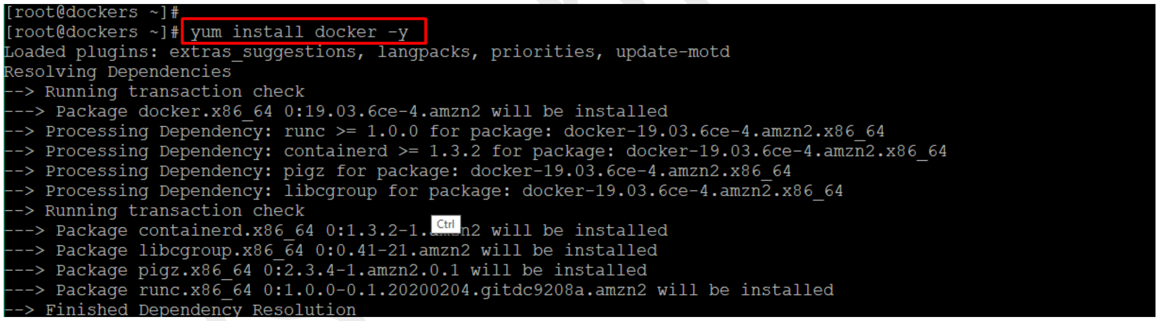
Close window on exit: ○ Always ○ Never ● Only on clean exit



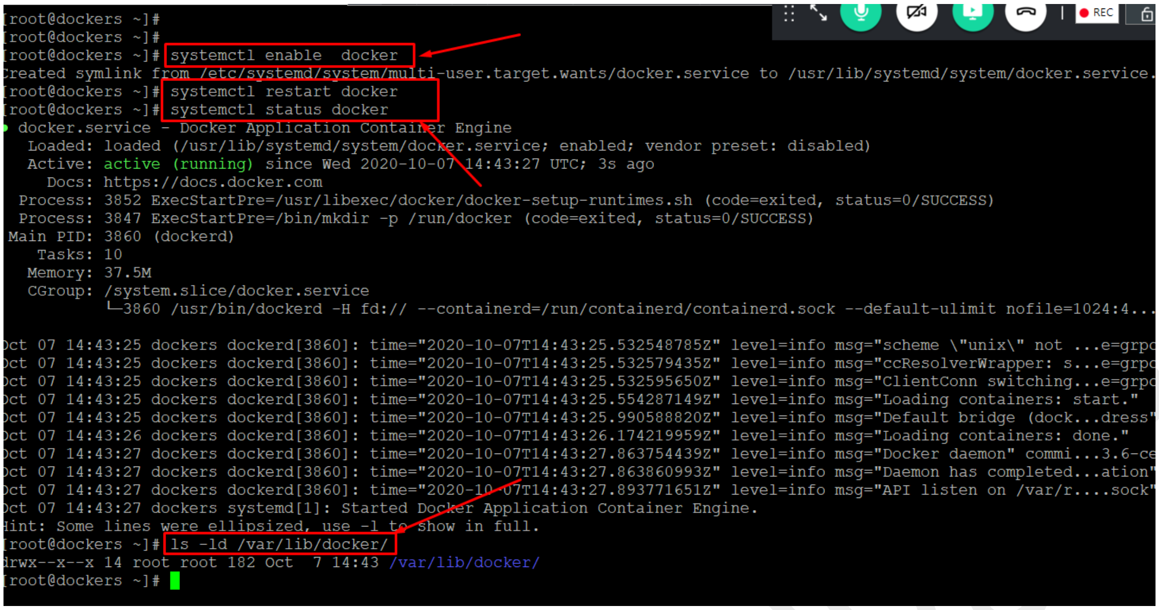
root@ip-172-31-73-251:~

```
Using username "ec2-user".
Authenticating with public key "imported-openssh-key" from agent

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

https://aws.amazon.com/amazon-linux-2/
2 package(s) needed for security, out of 13 available
Run "sudo yum update" to apply all updates.
[ec2-user@ip-172-31-73-251 ~]$ sudo su -
[root@ip-172-31-73-251 ~]# hostnamectl set-hostname dockers
[root@ip-172-31-73-251 ~]# bash
[root@dockers ~]#
```

Installation:



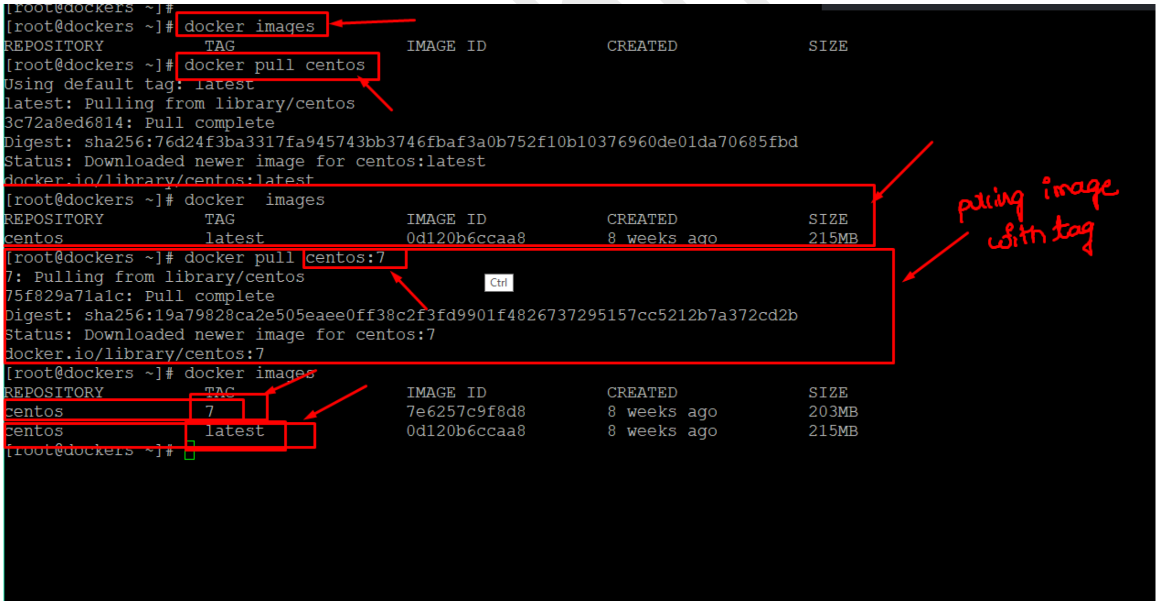
```
[root@dockers ~]#
[root@dockers ~]# yum install docker -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
Resolving Dependencies
--> Running transaction check
---> Package docker.x86_64 0:19.03.6ce-4.amzn2 will be installed
--> Processing Dependency: runc >= 1.0.0 for package: docker-19.03.6ce-4.amzn2.x86_64
--> Processing Dependency: containerd >= 1.3.2 for package: docker-19.03.6ce-4.amzn2.x86_64
--> Processing Dependency: pigz for package: docker-19.03.6ce-4.amzn2.x86_64
--> Processing Dependency: libcgroup for package: docker-19.03.6ce-4.amzn2.x86_64
--> Running transaction check
---> Package containerd.x86_64 0:1.3.2-1.amzn2 will be installed
---> Package libcgroup.x86_64 0:0.41-21.amzn2 will be installed
---> Package pigz.x86_64 0:2.3.4-1.amzn2.0.1 will be installed
---> Package runc.x86_64 0:1.0.0-0.1.20200204.gitdc9208a.amzn2 will be installed
--> Finished Dependency Resolution
```



```
[root@dockers ~]#
[root@dockers ~]#
[root@dockers ~]# systemctl enable  docker
Created symlink from /etc/systemd/system/multi-user.target.wants/docker.service to /usr/lib/systemd/system/docker.service.
[root@dockers ~]# systemctl restart docker
[root@dockers ~]# 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 Wed 2020-10-07 14:43:27 UTC; 3s ago
     Docs: https://docs.docker.com
  Process: 3852 ExecStartPre=/usr/libexec/docker/docker-setup-runtimes.sh (code=exited, status=0/SUCCESS)
  Process: 3847 ExecStartPre=/bin/mkdir -p /run/docker (code=exited, status=0/SUCCESS)
 Main PID: 3860 (dockerd)
    Tasks: 10
   Memory: 37.5M
   CGroup: /system.slice/docker.service
           └─3860 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/containerd.sock --default-ulimit nofile=1024:4...

Oct 07 14:43:25 dockers dockerd[3860]: time="2020-10-07T14:43:25.532548785Z" level=info msg="scheme \"unix\" not ...e=grpc
Oct 07 14:43:25 dockers dockerd[3860]: time="2020-10-07T14:43:25.532579435Z" level=info msg="ccResolverWrapper: s...e=grpc
Oct 07 14:43:25 dockers dockerd[3860]: time="2020-10-07T14:43:25.532595650Z" level=info msg="ClientConn switching...e=grpc
Oct 07 14:43:25 dockers dockerd[3860]: time="2020-10-07T14:43:25.554287149Z" level=info msg="Loading containers: start."
Oct 07 14:43:25 dockers dockerd[3860]: time="2020-10-07T14:43:25.990588820Z" level=info msg="Default bridge (dock...dress"
Oct 07 14:43:26 dockers dockerd[3860]: time="2020-10-07T14:43:26.174219959Z" level=info msg="Loading containers: done."
Oct 07 14:43:27 dockers dockerd[3860]: time="2020-10-07T14:43:27.863754439Z" level=info msg="Docker daemon" commi...3.6-ce
Oct 07 14:43:27 dockers dockerd[3860]: time="2020-10-07T14:43:27.863860993Z" level=info msg="Daemon has completed...ation"
Oct 07 14:43:27 dockers dockerd[3860]: time="2020-10-07T14:43:27.893771651Z" level=info msg="API listen on /var/r....sock"
Oct 07 14:43:27 dockers systemd[1]: Started Docker Application Container Engine.
Hint: Some lines were ellipsized, use -l to show in full.
[root@dockers ~]# ls -ld /var/lib/docker/
drwx--x--x 14 root root 182 Oct  7 14:43 /var/lib/docker/
[root@dockers ~]#
```

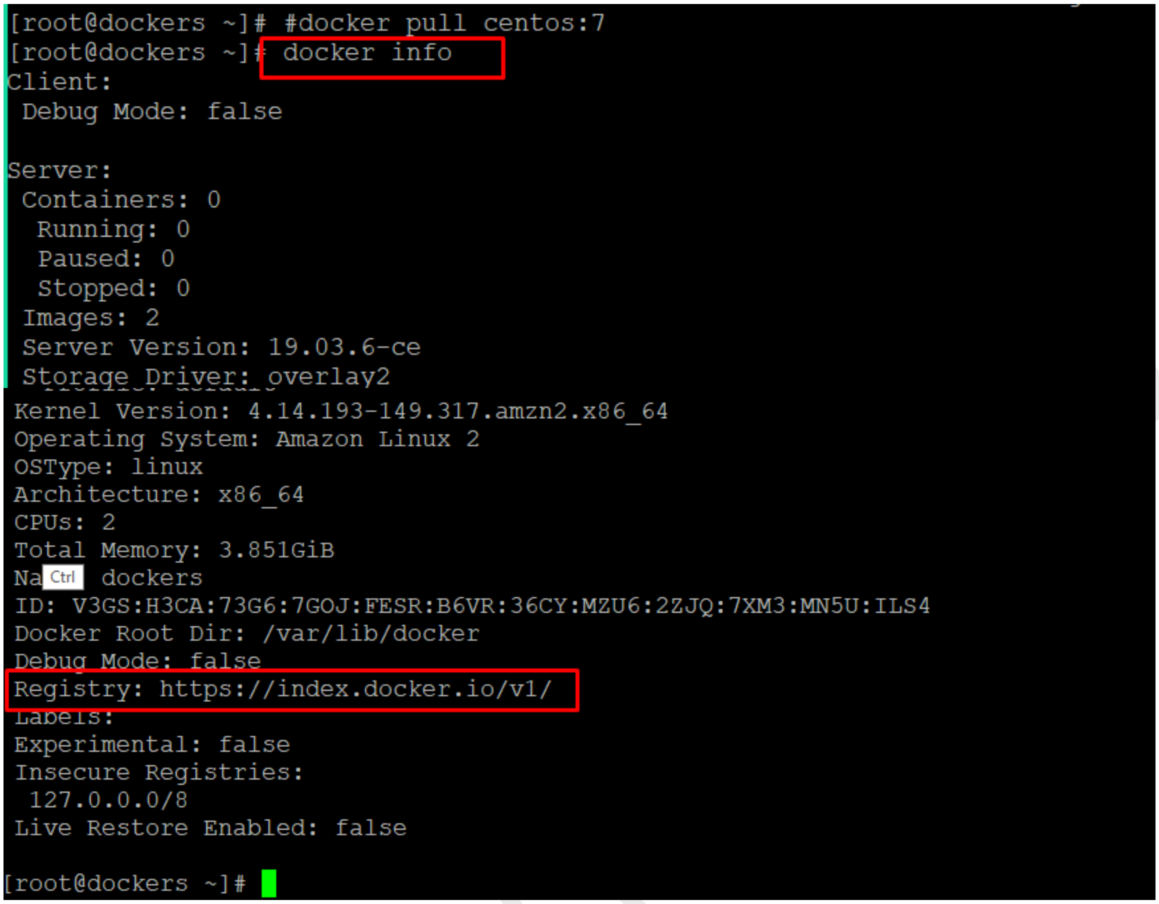
3. Working with Docker

Pulling an Image:



```
[root@dockers ~]#
[root@dockers ~]# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
[root@dockers ~]# docker pull centos
Using default tag: latest
latest: Pulling from library/centos
3c72a8ed6814: Pull complete
Digest: sha256:76d24f3ba3317fa945743bb3746fbaf3a0b752f10b10376960de01da70685fbd
Status: Downloaded newer image for centos:latest
docker.io/library/centos:latest
[root@dockers ~]# docker  images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
centos              latest              0d120b6ccaa8        8 weeks ago         215MB
[root@dockers ~]# docker pull centos:7
7: Pulling from library/centos
75f829a71a1c: Pull complete
Digest: sha256:19a79828ca2e505eaee0ff38c2f3fd9901f4826737295157cc5212b7a372cd2b
Status: Downloaded newer image for centos:7
docker.io/library/centos:7
[root@dockers ~]# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
centos              7                   7e6257c9f8d8        8 weeks ago         203MB
centos              latest              0d120b6ccaa8        8 weeks ago         215MB
[root@dockers ~]#
```

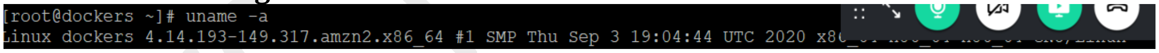
puling image with tag



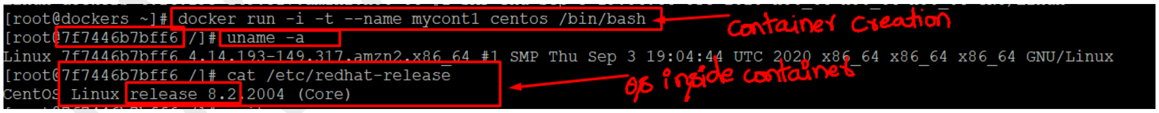
```
[root@dockers ~]# #docker pull centos:7
[root@dockers ~]# docker info
Client:
 Debug Mode: false

Server:
 Containers: 0
  Running: 0
  Paused: 0
  Stopped: 0
 Images: 2
 Server Version: 19.03.6-ce
 Storage Driver: overlay2
 Kernel Version: 4.14.193-149.317.amzn2.x86_64
 Operating System: Amazon Linux 2
 OSType: linux
 Architecture: x86_64
 CPUs: 2
 Total Memory: 3.851GiB
 Na Ctrl dockers
 ID: V3GS:H3CA:73G6:7GOJ:FESR:B6VR:36CY:MZU6:2ZJQ:7XM3:MN5U:ILS4
 Docker Root Dir: /var/lib/docker
 Debug Mode: false
 Registry: https://index.docker.io/v1/
 Labels:
 Experimental: false
 Insecure Registries:
  127.0.0.0/8
 Live Restore Enabled: false

[root@dockers ~]#
```

Creating Container:

Base machine Image:

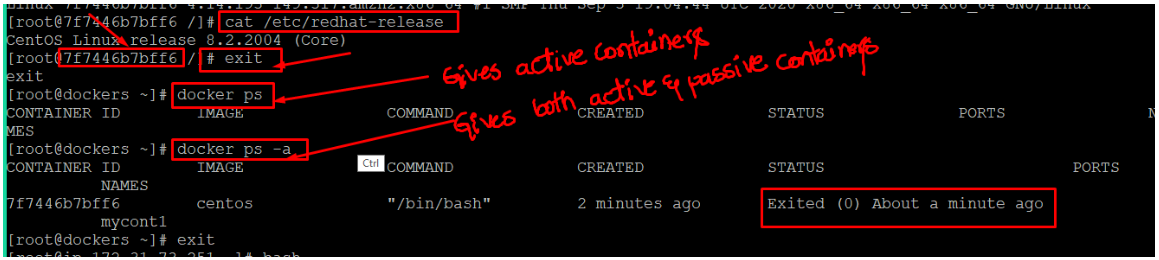


```
[root@dockers ~]# uname -a
Linux dockers 4.14.193-149.317.amzn2.x86_64 #1 SMP Thu Sep 3 19:04:44 UTC 2020 x86_64 x86_64 x86_64 GNU/Linux
```



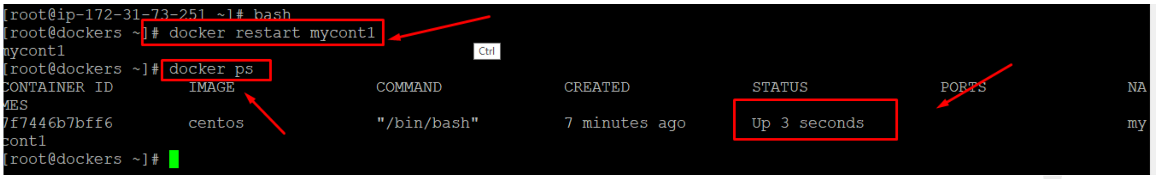
```
[root@dockers ~]# docker run -i -t --name mycont1 centos /bin/bash
[root@7f7446b7bff6 /]# uname -a
Linux 7f7446b7bff6 4.14.193-149.317.amzn2.x86_64 #1 SMP Thu Sep 3 19:04:44 UTC 2020 x86_64 x86_64 x86_64 GNU/Linux
[root@7f7446b7bff6 /]# cat /etc/redhat-release
CentOS Linux release 8.2.2004 (Core)
```

Now lets exit from the container & lets see what will happen:

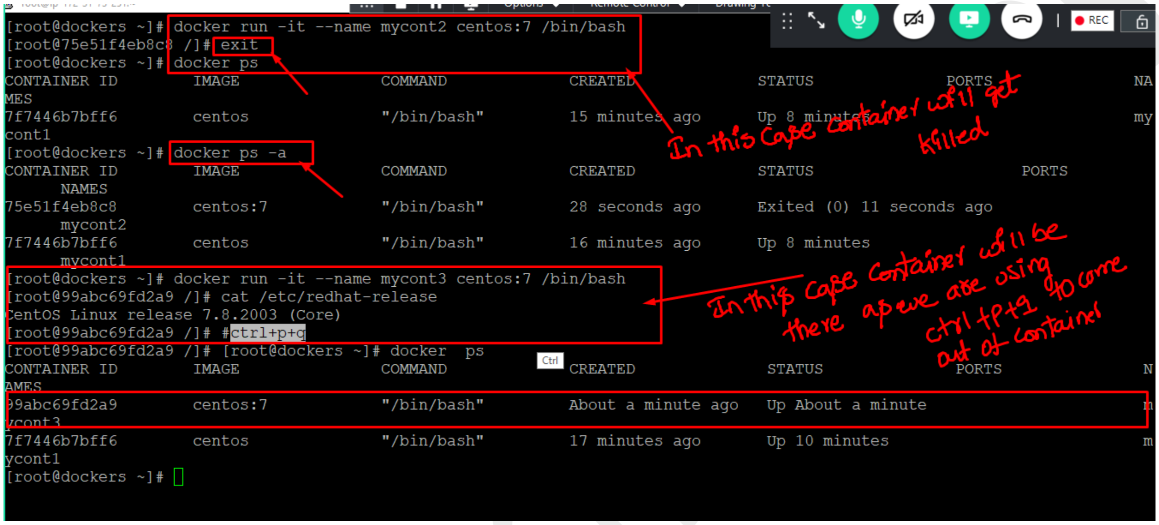


```
[root@7f7446b7bff6 /]# cat /etc/redhat-release
CentOS Linux release 8.2.2004 (Core)
[root@7f7446b7bff6 /]# exit
exit
[root@dockers ~]# docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS               N
MES
[root@dockers ~]# docker ps -a
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS                          PORTS
          NAMES
7f7446b7bff6        centos              "/bin/bash"         2 minutes ago       Exited (0) About a minute ago
          mycont1
[root@dockers ~]# exit
```

Restart a container:



```
[root@ip-172-31-73-251 ~]# bash
[root@dockers ~]# docker restart mycont1
mycont1
[root@dockers ~]# docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS               NA
MES
7f7446b7bff6        centos              "/bin/bash"         7 minutes ago       Up 3 seconds                            my
cont1
[root@dockers ~]#
```

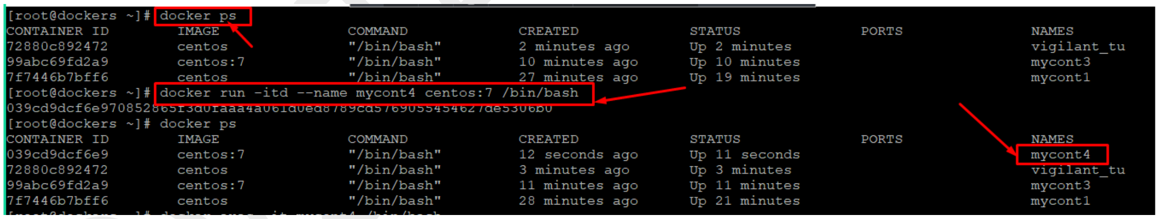


```
[root@dockers ~]# docker run -it --name mycont2 centos:7 /bin/bash
[root@75e51f4eb8c8 /]# exit
[root@dockers ~]# docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS               NA
MES
7f7446b7bff6        centos              "/bin/bash"         15 minutes ago      Up 8 minutes                            my
cont1
[root@dockers ~]# docker ps -a
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS                      PORTS
      NAMES
75e51f4eb8c8        centos:7            "/bin/bash"         28 seconds ago      Exited (0) 11 seconds ago
      mycont2
7f7446b7bff6        centos              "/bin/bash"         16 minutes ago      Up 8 minutes
      mycont1
[root@dockers ~]# docker run -it --name mycont3 centos:7 /bin/bash
[root@99abc69fd2a9 /]# cat /etc/redhat-release
CentOS Linux release 7.8.2003 (Core)
[root@99abc69fd2a9 /]# #ctrl+p+q
[root@99abc69fd2a9 /]# [root@dockers ~]# docker  ps
CONTAINER ID        IMAGE               COMMAND             CREATED              STATUS               PORTS               N
AMES
99abc69fd2a9        centos:7            "/bin/bash"         About a minute ago   Up About a minute                        m
ycont3
7f7446b7bff6        centos              "/bin/bash"         17 minutes ago       Up 10 minutes                            m
ycont1
[root@dockers ~]#
```

In this Case container will get killed

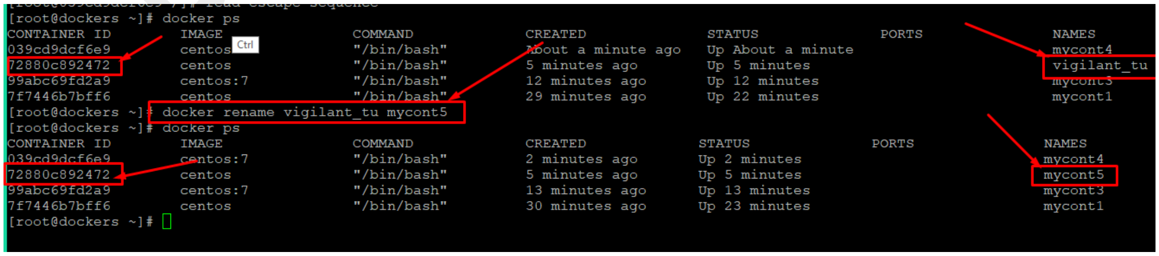
In this case container will be there as we are using ctrl +p+q to come out of container

Running container in detached mode:



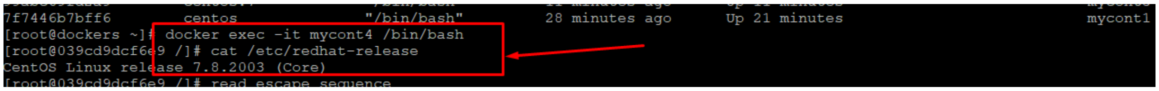
```
[root@dockers ~]# docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS               NAMES
72880c892472        centos              "/bin/bash"         2 minutes ago       Up 2 minutes                            vigilant_tu
99abc69fd2a9        centos:7            "/bin/bash"         10 minutes ago      Up 10 minutes                           mycont3
7f7446b7bff6        centos              "/bin/bash"         27 minutes ago      Up 19 minutes                           mycont1
[root@dockers ~]# docker run -itd --name mycont4 centos:7 /bin/bash
039cd9dcf6e970852865f3d0faaa4a061d0ed8789cd576905545462 7de5306b0
[root@dockers ~]# docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS               NAMES
039cd9dcf6e9        centos:7            "/bin/bash"         12 seconds ago      Up 11 seconds                           mycont4
72880c892472        centos              "/bin/bash"         3 minutes ago       Up 3 minutes                            vigilant_tu
99abc69fd2a9        centos:7            "/bin/bash"         11 minutes ago      Up 11 minutes                           mycont3
7f7446b7bff6        centos              "/bin/bash"         28 minutes ago      Up 21 minutes                           mycont1
```

Renaming a container:



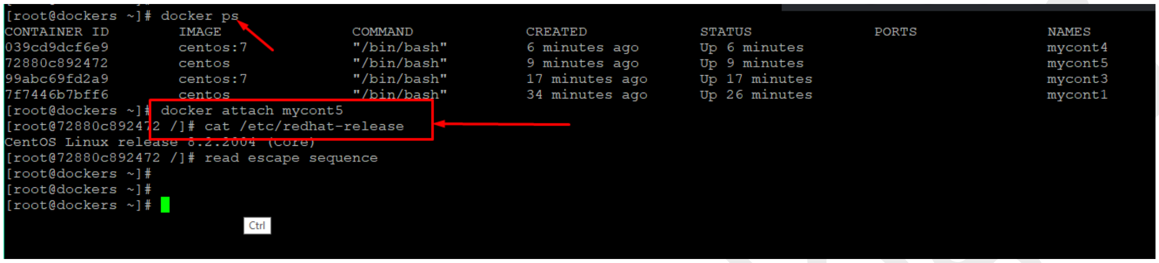
```
[root@dockers ~]# docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED              STATUS              PORTS               NAMES
039cd9dcf6e9        centos              "/bin/bash"         About a minute ago   Up About a minute                       mycont4
72880c892472        centos              "/bin/bash"         5 minutes ago        Up 5 minutes                            vigilant_tu
99abc69fd2a9        centos:7            "/bin/bash"         12 minutes ago       Up 12 minutes                           mycont3
7f7446b7bff6        centos              "/bin/bash"         29 minutes ago       Up 22 minutes                           mycont1
[root@dockers ~]# docker rename vigilant_tu mycont5
[root@dockers ~]# docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS               NAMES
039cd9dcf6e9        centos:7            "/bin/bash"         2 minutes ago       Up 2 minutes                            mycont4
72880c892472        centos              "/bin/bash"         5 minutes ago       Up 5 minutes                            mycont5
99abc69fd2a9        centos:7            "/bin/bash"         13 minutes ago      Up 13 minutes                           mycont3
7f7446b7bff6        centos              "/bin/bash"         30 minutes ago      Up 23 minutes                           mycont1
[root@dockers ~]#
```

Login in to the container:



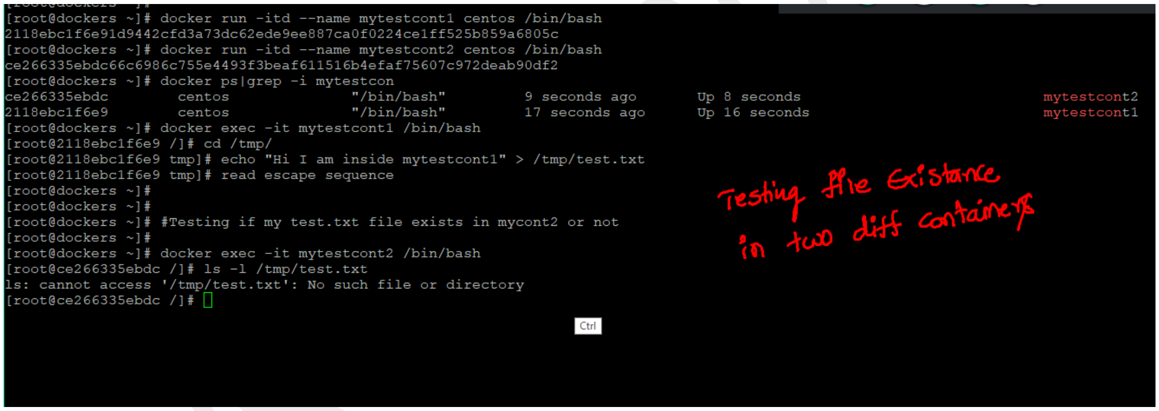
```
7f7446b7bff6        centos              "/bin/bash"         28 minutes ago      Up 21 minutes                           mycont1
[root@dockers ~]# docker exec -it mycont4 /bin/bash
[root@039cd9dcf6e9 /]# cat /etc/redhat-release
CentOS Linux release 7.8.2003 (Core)
[root@039cd9dcf6e9 /]# read escape sequence
```

OR



```
[root@dockers ~]# docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS               NAMES
039cd9dcf6e9        centos:7            "/bin/bash"         6 minutes ago       Up 6 minutes                            mycont4
72880c892472        centos              "/bin/bash"         9 minutes ago       Up 9 minutes                            mycont5
99abc69fd2a9        centos:7            "/bin/bash"         17 minutes ago      Up 17 minutes                           mycont3
7f7446b7bff6        centos              "/bin/bash"         34 minutes ago      Up 26 minutes                           mycont1
[root@dockers ~]# docker attach mycont5
[root@72880c892472 /]# cat /etc/redhat-release
CentOS Linux release 8.2.2004 (Core)
[root@72880c892472 /]# read escape sequence
[root@dockers ~]#
[root@dockers ~]#
[root@dockers ~]#
```

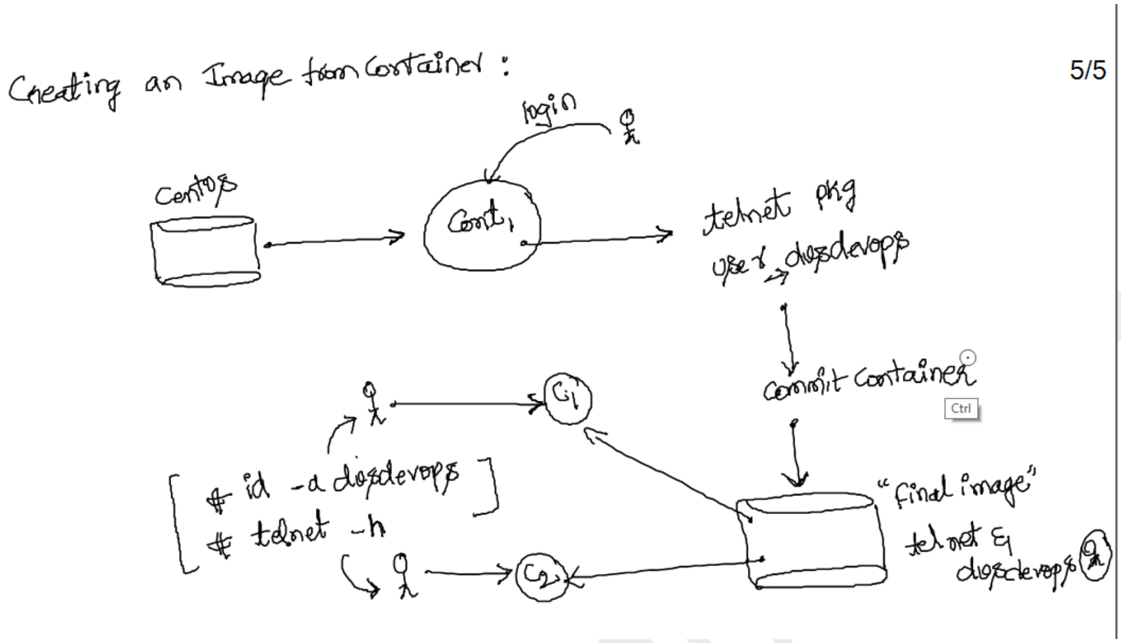
Testing the test.txt file existence in two different containers:



```
[root@dockers ~]# docker run -itd --name mytestcont1 centos /bin/bash
2118ebc1f6e91d9442cfd3a73dc62ede9ee887ca0f0224ce1ff525b859a6805c
[root@dockers ~]# docker run -itd --name mytestcont2 centos /bin/bash
ce266335ebdc66c6986c755e4493f3beaf611516b4efaf75607c972deab90df2
[root@dockers ~]# docker ps|grep -i mytestcon
ce266335ebdc        centos              "/bin/bash"         9 seconds ago       Up 8 seconds                            mytestcont2
2118ebc1f6e9        centos              "/bin/bash"         17 seconds ago      Up 16 seconds                           mytestcont1
[root@dockers ~]# docker exec -it mytestcont1 /bin/bash
[root@2118ebc1f6e9 /]# cd /tmp/
[root@2118ebc1f6e9 tmp]# echo "Hi I am inside mytestcont1" > /tmp/test.txt
[root@2118ebc1f6e9 tmp]# read escape sequence
[root@dockers ~]#
[root@dockers ~]#
[root@dockers ~]# #Testing if my test.txt file exists in mycont2 or not
[root@dockers ~]#
[root@dockers ~]# docker exec -it mytestcont2 /bin/bash
[root@ce266335ebdc /]# ls -l /tmp/test.txt
ls: cannot access '/tmp/test.txt': No such file or directory
[root@ce266335ebdc /]#
```

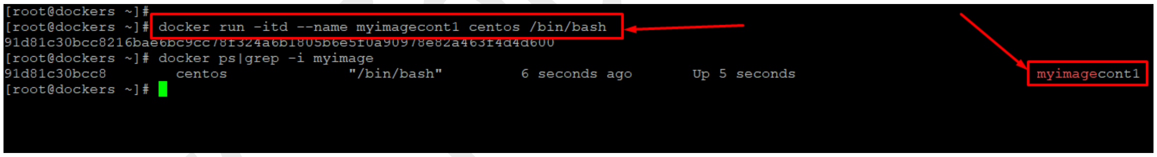
Testing the Existance
in two diff containers

4. Image Customization



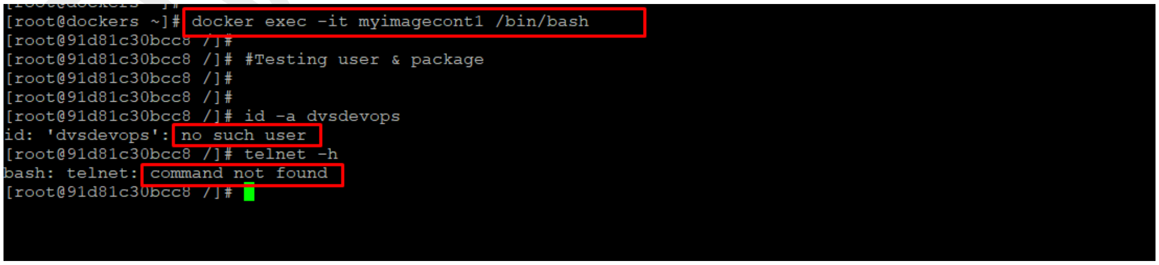
1. Create an image from container:

1 Creating a container from centos7 image:



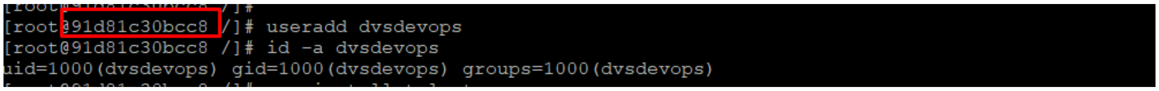
```
[root@dockers ~]#
[root@dockers ~]# docker run -itd --name myimagecont1 centos /bin/bash
91d81c30bcc8216bae6bc9cc781324a6b1805b6e5f0a90978e82a463f4d4d600
[root@dockers ~]# docker ps|grep -i myimage
91d81c30bcc8        centos              "/bin/bash"         6 seconds ago       Up 5 seconds                                                myimagecont1
[root@dockers ~]#
```

2 Login in to the container & testing the user & package

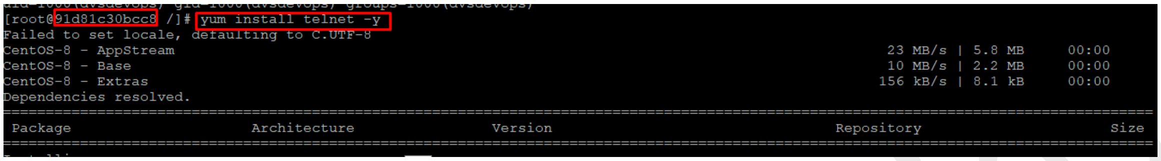


```
[root@dockers ~]#
[root@dockers ~]# docker exec -it myimagecont1 /bin/bash
[root@91d81c30bcc8 /]#
[root@91d81c30bcc8 /]# #Testing user & package
[root@91d81c30bcc8 /]#
[root@91d81c30bcc8 /]#
[root@91d81c30bcc8 /]# id -a dvsdevops
id: 'dvsdevops': no such user
[root@91d81c30bcc8 /]# telnet -h
bash: telnet: command not found
[root@91d81c30bcc8 /]#
```

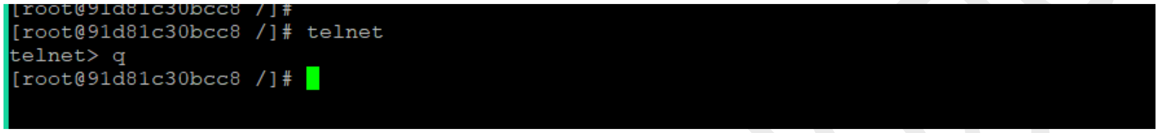
3 Creating user & installing telnet package inside the above container



```
[root@91d81c30bcc8 /]# useradd dvsdevops
[root@91d81c30bcc8 /]# id -a dvsdevops
uid=1000(dvsdevops) gid=1000(dvsdevops) groups=1000(dvsdevops)
```

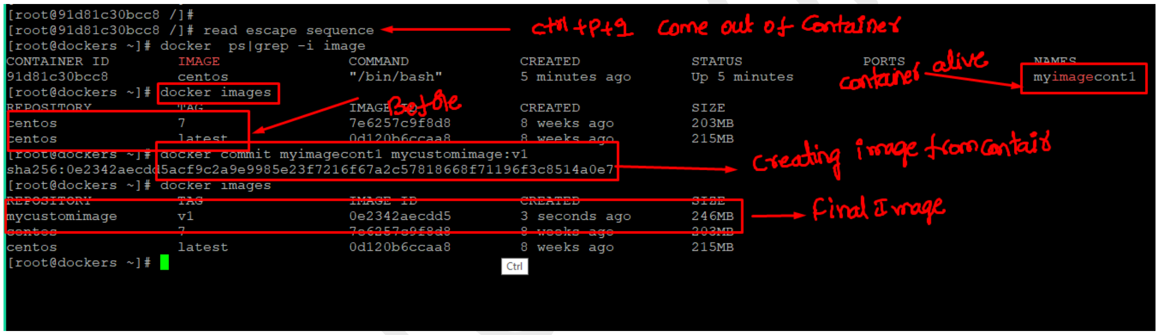


```
[root@91d81c30bcc8 /]# yum install telnet -y
Failed to set locale, defaulting to C.UTF-8
CentOS-8 - AppStream                                                    23 MB/s | 5.8 MB     00:00
CentOS-8 - Base                                                         10 MB/s | 2.2 MB     00:00
CentOS-8 - Extras                                                      156 kB/s | 8.1 kB     00:00
Dependencies resolved.
=====================================================================================================
 Package                  Architecture          Version                        Repository       Size
=====================================================================================================
```



```
[root@91d81c30bcc8 /]# telnet
telnet> q
[root@91d81c30bcc8 /]#
```

4 creating image from container:



```
[root@91d81c30bcc8 /]#
[root@91d81c30bcc8 /]# read escape sequence
[root@dockers ~]# docker  ps|grep -i image
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS               NAMES
91d81c30bcc8        centos              "/bin/bash"         5 minutes ago       Up 5 minutes                            myimagecont1
[root@dockers ~]# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
centos              7                   7e6257c9f8d8        8 weeks ago         203MB
centos              latest              0d120b6ccaa8        8 weeks ago         215MB
[root@dockers ~]# docker commit myimagecont1 mycustomimage:v1
sha256:0e2342aecdd5acf9c2a9e9985e23f7216f67a2c57818668f71196f3c8514a0e7
[root@dockers ~]# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
mycustomimage       v1                  0e2342aecdd5        3 seconds ago       246MB
centos              7                   7e6257c9f8d8        8 weeks ago         203MB
centos              latest              0d120b6ccaa8        8 weeks ago         215MB
[root@dockers ~]#
```

ctrl+p+q Come out of Container

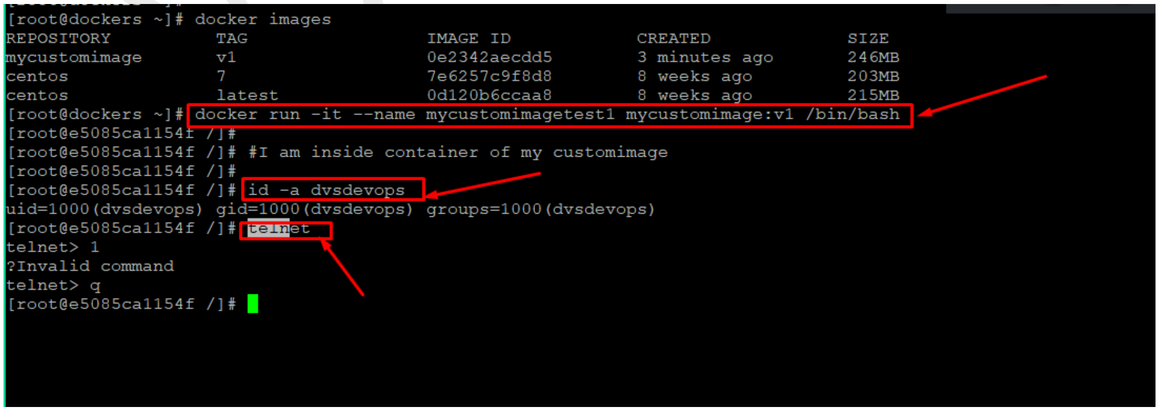
container alive

Before

Creating image from contair

Final Image

5 Testing customized image:



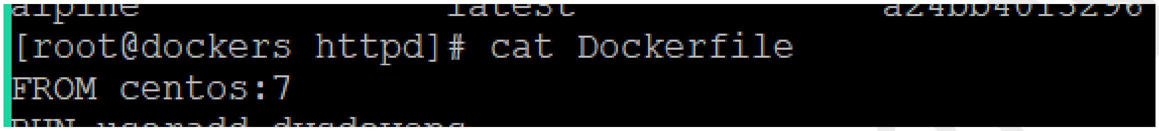
```
[root@dockers ~]# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
mycustomimage       v1                  0e2342aecdd5        3 minutes ago       246MB
centos              7                   7e6257c9f8d8        8 weeks ago         203MB
centos              latest              0d120b6ccaa8        8 weeks ago         215MB
[root@dockers ~]# docker run -it --name mycustomimagetest1 mycustomimage:v1 /bin/bash
[root@e5085ca1154f /]#
[root@e5085ca1154f /]# #I am inside container of my customimage
[root@e5085ca1154f /]#
[root@e5085ca1154f /]# id -a dvsdevops
uid=1000(dvsdevops) gid=1000(dvsdevops) groups=1000(dvsdevops)
[root@e5085ca1154f /]# telnet
telnet> 1
?Invalid command
telnet> q
[root@e5085ca1154f /]#
```

Drawback with this approach is we don't have history of changes what we are performing for creating the image. Hence we always opt for Dockerfile

Image creation using Dockerfile:

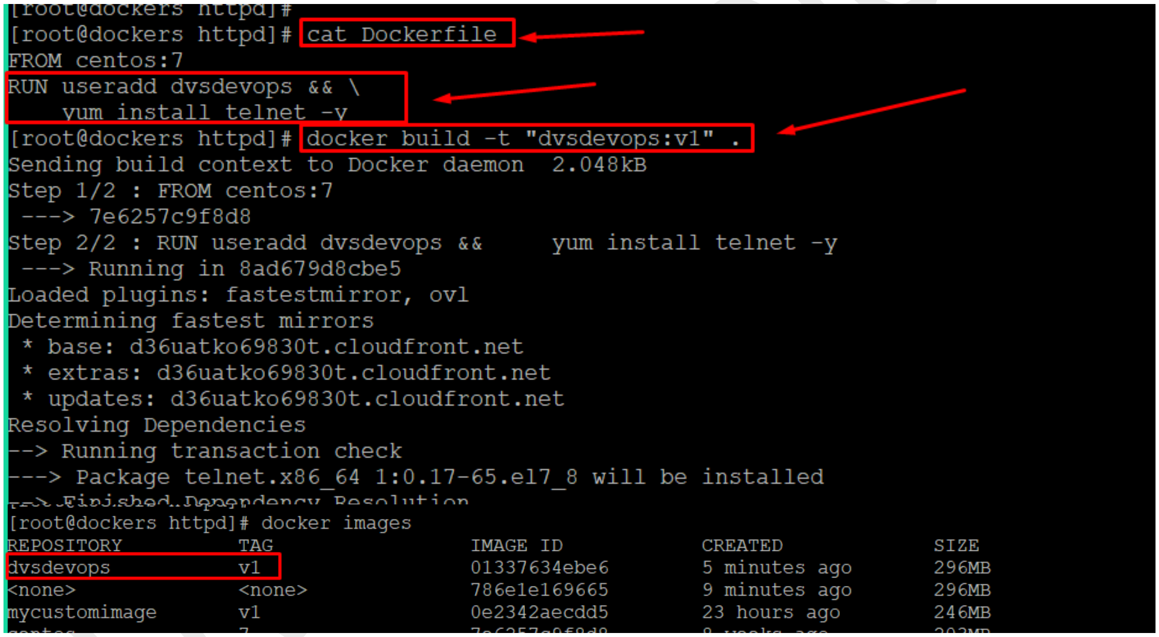
Dockerfile references:

FROM:



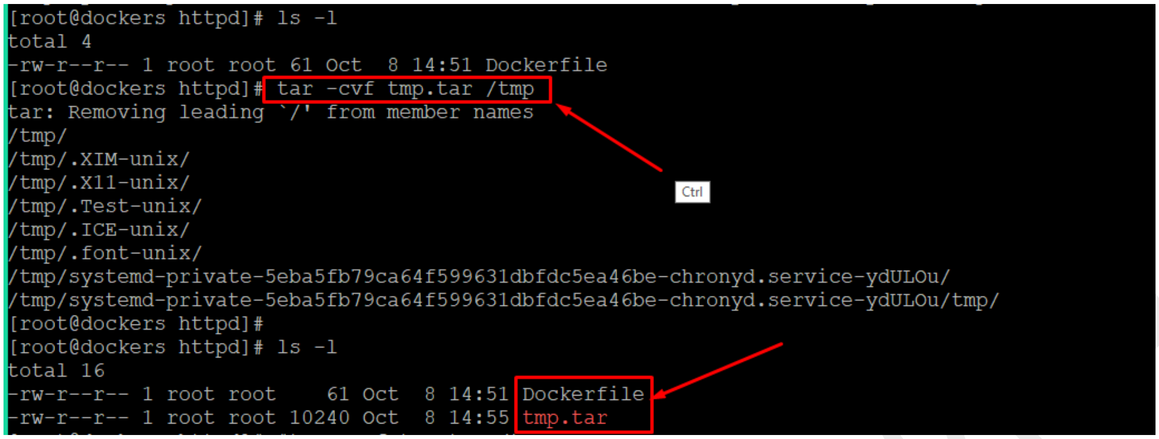
```
alpine                  latest              a24bb4013296
[root@dockers httpd]# cat Dockerfile
FROM centos:7
RUN useradd dvsdevops
```

RUN:

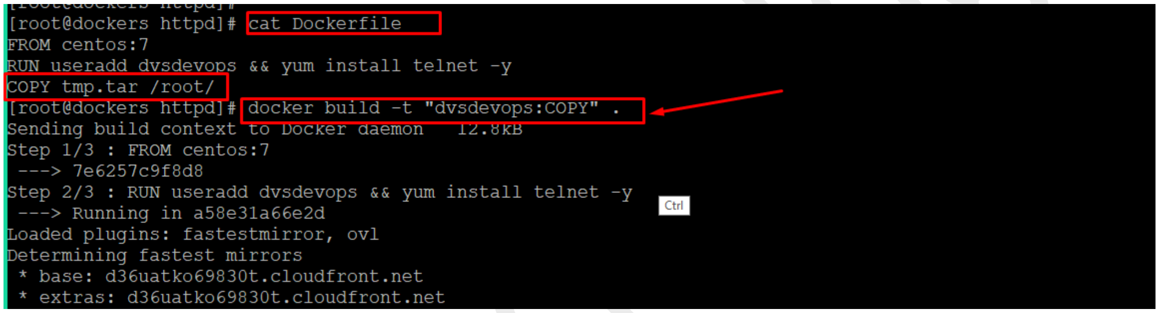


```
[root@dockers httpd]#
[root@dockers httpd]# cat Dockerfile
FROM centos:7
RUN useradd dvsdevops && \
    yum install telnet -y
[root@dockers httpd]# docker build -t "dvsdevops:v1" .
Sending build context to Docker daemon  2.048kB
Step 1/2 : FROM centos:7
 ---> 7e6257c9f8d8
Step 2/2 : RUN useradd dvsdevops &&     yum install telnet -y
 ---> Running in 8ad679d8cbe5
Loaded plugins: fastestmirror, ovl
Determining fastest mirrors
 * base: d36uatko69830t.cloudfront.net
 * extras: d36uatko69830t.cloudfront.net
 * updates: d36uatko69830t.cloudfront.net
Resolving Dependencies
--> Running transaction check
---> Package telnet.x86_64 1:0.17-65.el7_8 will be installed
--> Finished Dependency Resolution
[root@dockers httpd]# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
dvsdevops           v1                  01337634ebe6        5 minutes ago       296MB
<none>              <none>              786e1e169665        9 minutes ago       296MB
mycustomimage       v1                  0e2342aecdd5        23 hours ago        246MB
centos              7                   7e6257c9f8d8        8 weeks ago         203MB
```

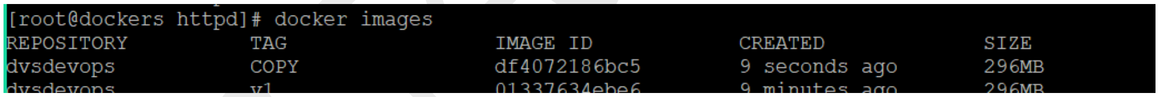
COPY:



```
[root@dockers httpd]# ls -l
total 4
-rw-r--r-- 1 root root 61 Oct  8 14:51 Dockerfile
[root@dockers httpd]# tar -cvf tmp.tar /tmp
tar: Removing leading `/' from member names
/tmp/
/tmp/.XIM-unix/
/tmp/.X11-unix/
/tmp/.Test-unix/
/tmp/.ICE-unix/
/tmp/.font-unix/
/tmp/systemd-private-5eba5fb79ca64f599631dbfdc5ea46be-chronyd.service-ydULOu/
/tmp/systemd-private-5eba5fb79ca64f599631dbfdc5ea46be-chronyd.service-ydULOu/tmp/
[root@dockers httpd]#
[root@dockers httpd]# ls -l
total 16
-rw-r--r-- 1 root root    61 Oct  8 14:51 Dockerfile
-rw-r--r-- 1 root root 10240 Oct  8 14:55 tmp.tar
```

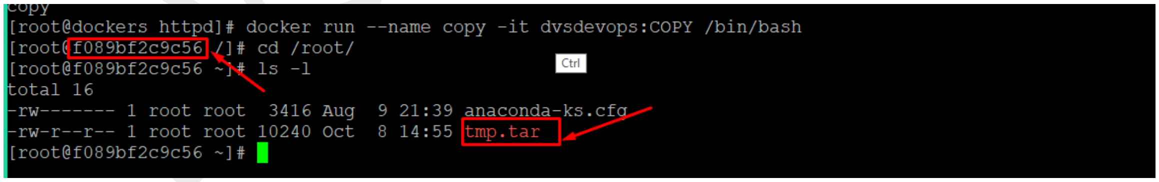


```
[root@dockers httpd]#
[root@dockers httpd]# cat Dockerfile
FROM centos:7
RUN useradd dvsdevops && yum install telnet -y
COPY tmp.tar /root/
[root@dockers httpd]# docker build -t "dvsdevops:COPY" .
Sending build context to Docker daemon   12.8kB
Step 1/3 : FROM centos:7
 ---> 7e6257c9f8d8
Step 2/3 : RUN useradd dvsdevops && yum install telnet -y
 ---> Running in a58e31a66e2d
Loaded plugins: fastestmirror, ovl
Determining fastest mirrors
 * base: d36uatko69830t.cloudfront.net
 * extras: d36uatko69830t.cloudfront.net
```



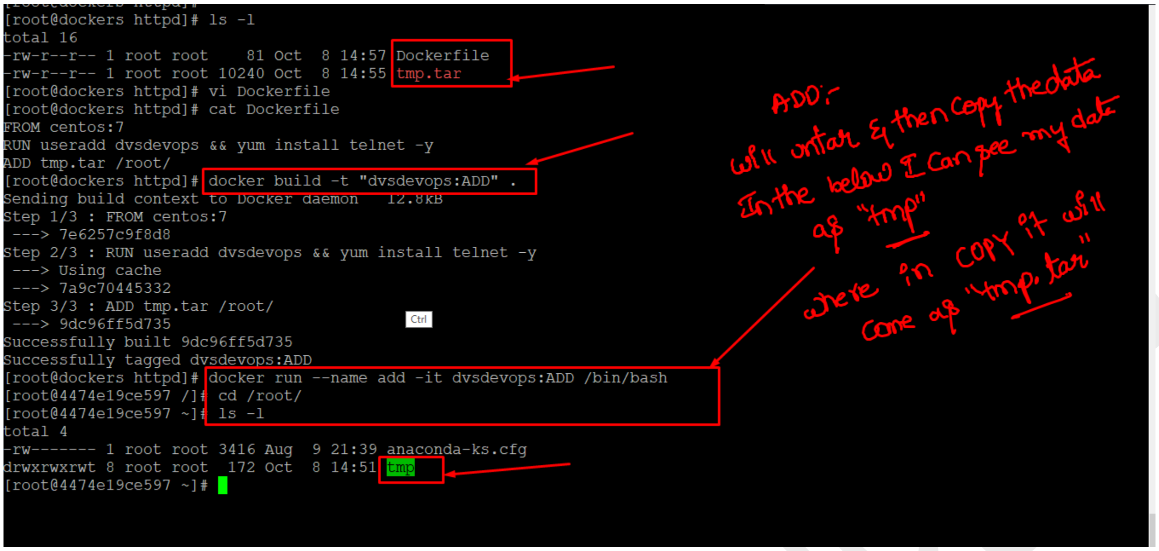
```
[root@dockers httpd]# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
dvsdevops           COPY                df4072186bc5        9 seconds ago       296MB
dvsdevops           v1                  01337634ebe6        9 minutes ago       296MB
```

Final testing:



```
copy
[root@dockers httpd]# docker run --name copy -it dvsdevops:COPY /bin/bash
[root@f089bf2c9c56 /]# cd /root/
[root@f089bf2c9c56 ~]# ls -l
total 16
-rw------- 1 root root  3416 Aug  9 21:39 anaconda-ks.cfg
-rw-r--r-- 1 root root 10240 Oct  8 14:55 tmp.tar
[root@f089bf2c9c56 ~]#
```

ADD:

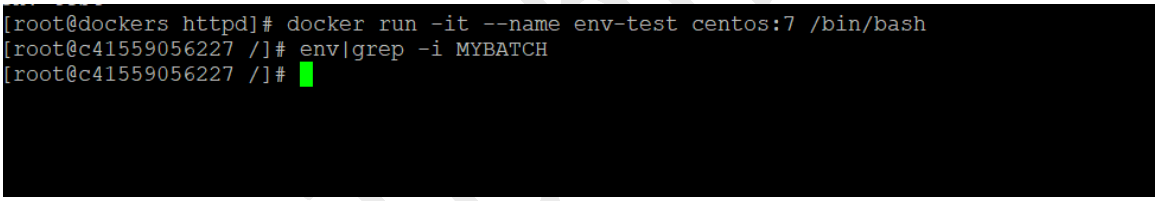


```
[root@dockers httpd]# ls -l
total 16
-rw-r--r-- 1 root root    81 Oct  8 14:57 Dockerfile
-rw-r--r-- 1 root root 10240 Oct  8 14:55 tmp.tar
[root@dockers httpd]# vi Dockerfile
[root@dockers httpd]# cat Dockerfile
FROM centos:7
RUN useradd dvsdevops && yum install telnet -y
ADD tmp.tar /root/
[root@dockers httpd]# docker build -t "dvsdevops:ADD" .
Sending build context to Docker daemon   12.8kB
Step 1/3 : FROM centos:7
 ---> 7e6257c9f8d8
Step 2/3 : RUN useradd dvsdevops && yum install telnet -y
 ---> Using cache
 ---> 7a9c70445332
Step 3/3 : ADD tmp.tar /root/
 ---> 9dc96ff5d735
Successfully built 9dc96ff5d735
Successfully tagged dvsdevops:ADD
[root@dockers httpd]# docker run --name add -it dvsdevops:ADD /bin/bash
[root@4474e19ce597 /]# cd /root/
[root@4474e19ce597 ~]# ls -l
total 4
-rw------- 1 root root 3416 Aug  9 21:39 anaconda-ks.cfg
drwxrwxrwt 8 root root  172 Oct  8 14:51 tmp
[root@4474e19ce597 ~]#
```

ADD:-
will untar & then copy the data
In the below I Can see my data
as "tmp"
where in COPY it will
Come as "tmp.tar"

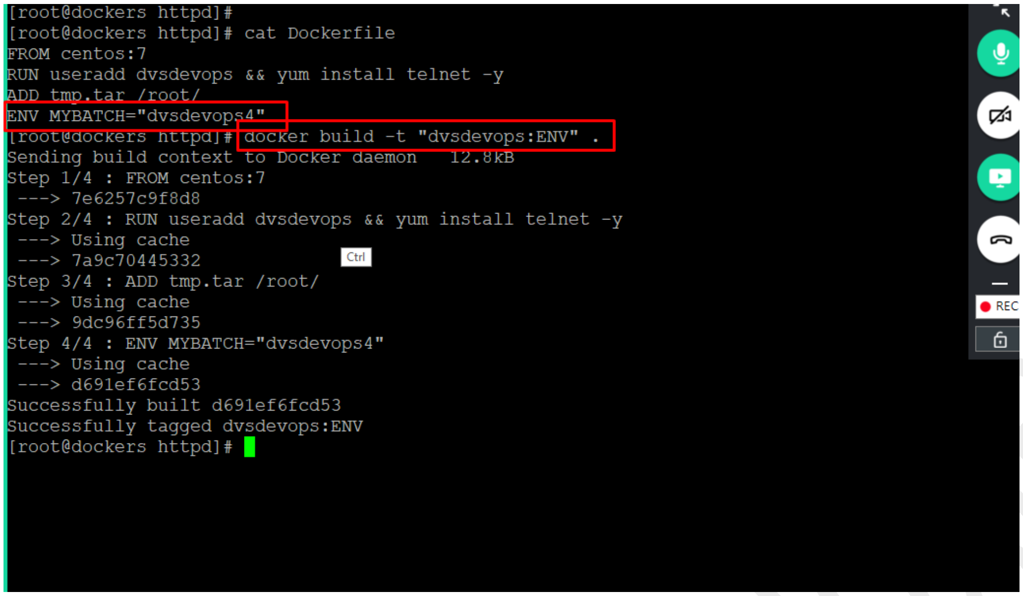
ENV:

Before in centos:7 image:

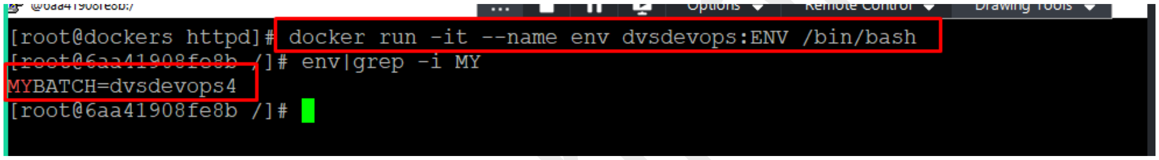


```
[root@dockers httpd]# docker run -it --name env-test centos:7 /bin/bash
[root@c41559056227 /]# env|grep -i MYBATCH
[root@c41559056227 /]#
```

After in our custom image:

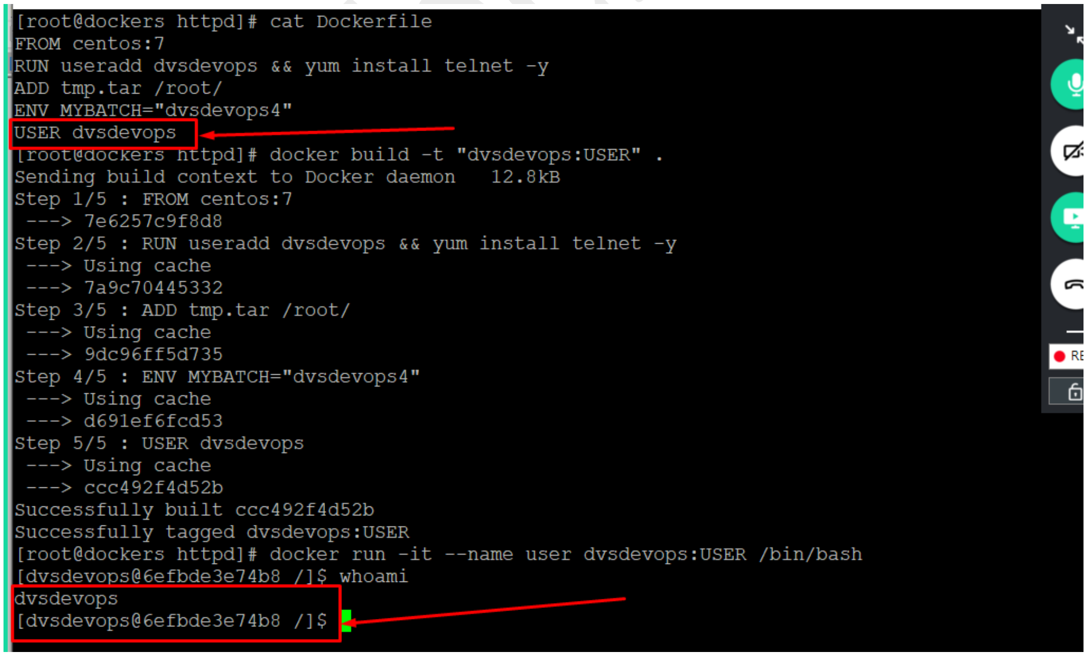


```
[root@dockers httpd]#
[root@dockers httpd]# cat Dockerfile
FROM centos:7
RUN useradd dvsdevops && yum install telnet -y
ADD tmp.tar /root/
ENV MYBATCH="dvsdevops4"
[root@dockers httpd]# docker build -t "dvsdevops:ENV" .
Sending build context to Docker daemon   12.8kB
Step 1/4 : FROM centos:7
 ---> 7e6257c9f8d8
Step 2/4 : RUN useradd dvsdevops && yum install telnet -y
 ---> Using cache
 ---> 7a9c70445332
Step 3/4 : ADD tmp.tar /root/
 ---> Using cache
 ---> 9dc96ff5d735
Step 4/4 : ENV MYBATCH="dvsdevops4"
 ---> Using cache
 ---> d691ef6fcd53
Successfully built d691ef6fcd53
Successfully tagged dvsdevops:ENV
[root@dockers httpd]#
```



```
[root@dockers httpd]# docker run -it --name env dvsdevops:ENV /bin/bash
[root@6aa41908fe8b /]# env|grep -i MY
MYBATCH=dvsdevops4
[root@6aa41908fe8b /]#
```

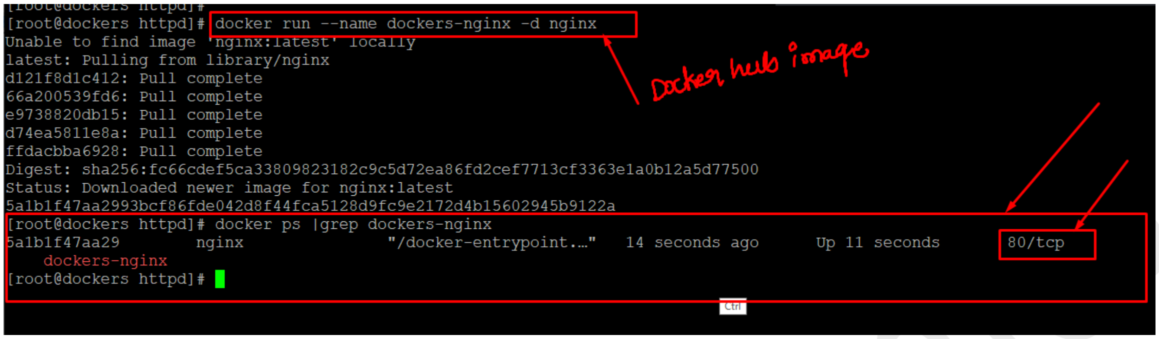
USER:



```
[root@dockers httpd]# cat Dockerfile
FROM centos:7
RUN useradd dvsdevops && yum install telnet -y
ADD tmp.tar /root/
ENV MYBATCH="dvsdevops4"
USER dvsdevops
[root@dockers httpd]# docker build -t "dvsdevops:USER" .
Sending build context to Docker daemon   12.8kB
Step 1/5 : FROM centos:7
 ---> 7e6257c9f8d8
Step 2/5 : RUN useradd dvsdevops && yum install telnet -y
 ---> Using cache
 ---> 7a9c70445332
Step 3/5 : ADD tmp.tar /root/
 ---> Using cache
 ---> 9dc96ff5d735
Step 4/5 : ENV MYBATCH="dvsdevops4"
 ---> Using cache
 ---> d691ef6fcd53
Step 5/5 : USER dvsdevops
 ---> Using cache
 ---> ccc492f4d52b
Successfully built ccc492f4d52b
Successfully tagged dvsdevops:USER
[root@dockers httpd]# docker run -it --name user dvsdevops:USER /bin/bash
[dvsdevops@6efbde3e74b8 /]$ whoami
dvsdevops
[dvsdevops@6efbde3e74b8 /]$
```

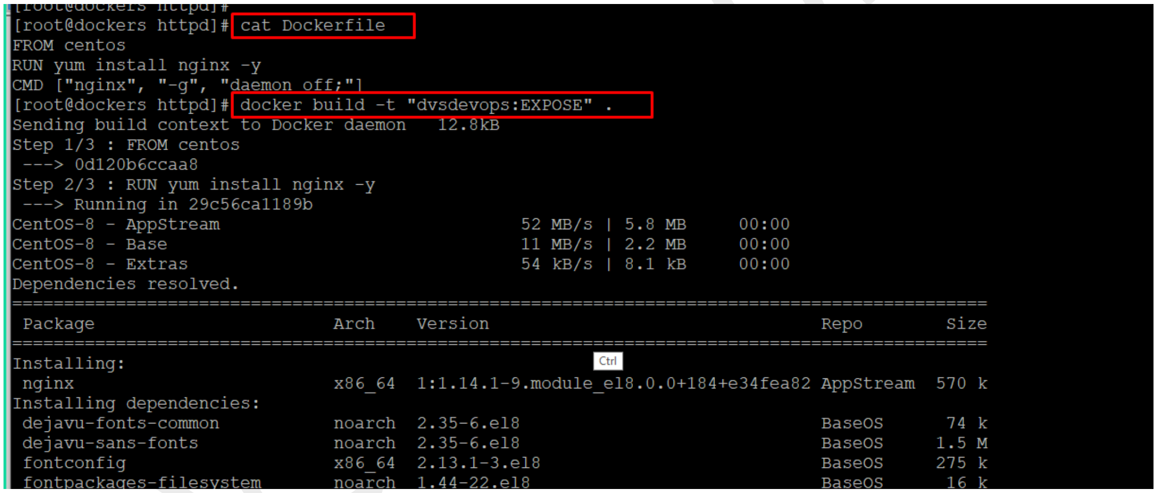
EXPOSE:

General container from nginx image:

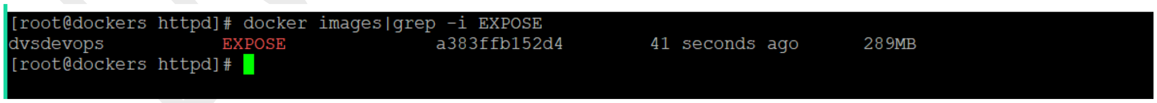


```
[root@dockers httpd]#
[root@dockers httpd]# docker run --name dockers-nginx -d nginx
Unable to find image 'nginx:latest' locally
latest: Pulling from library/nginx
d121f8d1c412: Pull complete
66a200539fd6: Pull complete
e9738820db15: Pull complete
d74ea5811e8a: Pull complete
ffdacbba6928: Pull complete
Digest: sha256:fc66cdef5ca33809823182c9c5d72ea86fd2cef7713cf3363e1a0b12a5d77500
Status: Downloaded newer image for nginx:latest
5a1b1f47aa2993bcf86fde042d8f44fca5128d9fc9e2172d4b15602945b9122a
[root@dockers httpd]# docker ps |grep dockers-nginx
5a1b1f47aa29        nginx               "/docker-entrypoint.…"   14 seconds ago      Up 11 seconds       80/tcp
    dockers-nginx
[root@dockers httpd]# 
```

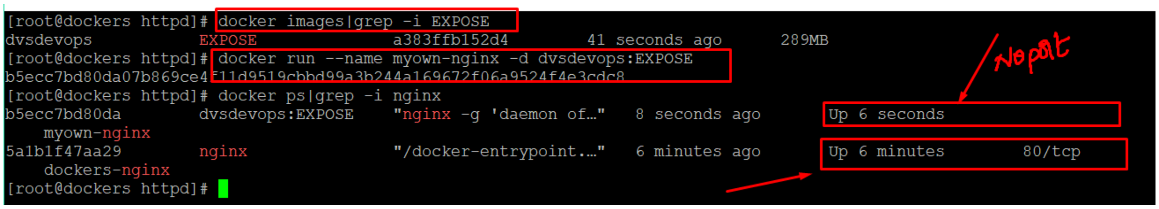
Let's build our own Nginx:



```
[root@dockers httpd]#
[root@dockers httpd]# cat Dockerfile
FROM centos
RUN yum install nginx -y
CMD ["nginx", "-g", "daemon off;"]
[root@dockers httpd]# docker build -t "dvsdevops:EXPOSE" .
Sending build context to Docker daemon   12.8kB
Step 1/3 : FROM centos
 ---> 0d120b6ccaa8
Step 2/3 : RUN yum install nginx -y
 ---> Running in 29c56ca1189b
CentOS-8 - AppStream                            52 MB/s | 5.8 MB     00:00
CentOS-8 - Base                                 11 MB/s | 2.2 MB     00:00
CentOS-8 - Extras                               54 kB/s | 8.1 kB     00:00
Dependencies resolved.
================================================================================
 Package                        Arch    Version                           Repo        Size
================================================================================
Installing:
 nginx                          x86_64  1:1.14.1-9.module_el8.0.0+184+e34fea82 AppStream  570 k
Installing dependencies:
 dejavu-fonts-common            noarch  2.35-6.el8                        BaseOS      74 k
 dejavu-sans-fonts              noarch  2.35-6.el8                        BaseOS     1.5 M
 fontconfig                     x86_64  2.13.1-3.el8                      BaseOS     275 k
 fontpackages-filesystem        noarch  1.44-22.el8                       BaseOS      16 k
```

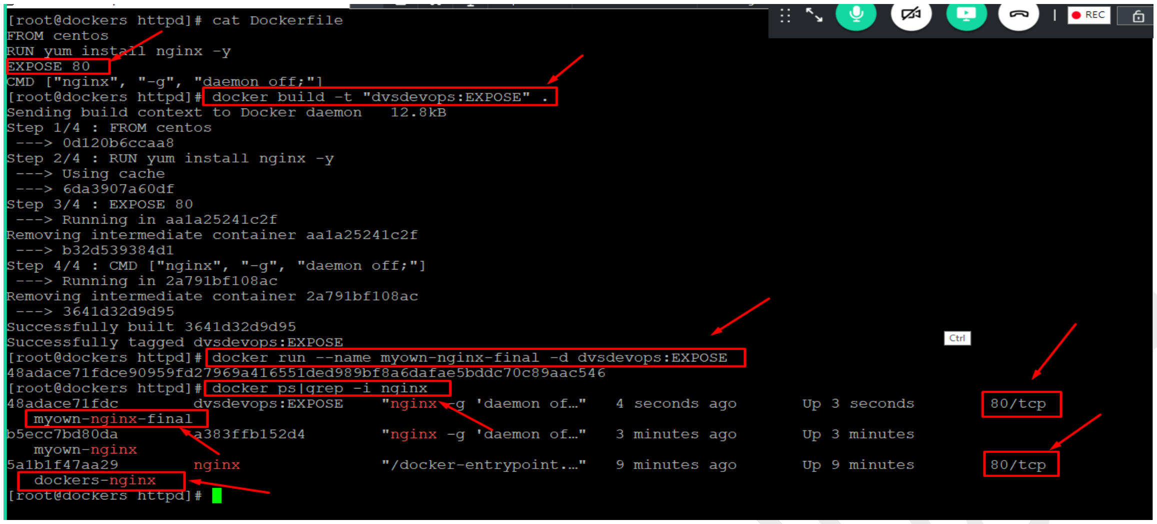


```
[root@dockers httpd]# docker images|grep -i EXPOSE
dvsdevops           EXPOSE              a383ffb152d4        41 seconds ago      289MB
[root@dockers httpd]# 
```



```
[root@dockers httpd]# docker images|grep -i EXPOSE
dvsdevops           EXPOSE              a383ffb152d4        41 seconds ago      289MB
[root@dockers httpd]# docker run --name myown-nginx -d dvsdevops:EXPOSE
b5ecc7bd80da07b869ce4f11d9519cbbd99a3b244a169672f06a9524f4e3cdc8
[root@dockers httpd]# docker ps|grep -i nginx
b5ecc7bd80da        dvsdevops:EXPOSE    "nginx -g 'daemon of…"   8 seconds ago       Up 6 seconds
    myown-nginx
5a1b1f47aa29        nginx               "/docker-entrypoint.…"   6 minutes ago       Up 6 minutes        80/tcp
    dockers-nginx
[root@dockers httpd]# 
```

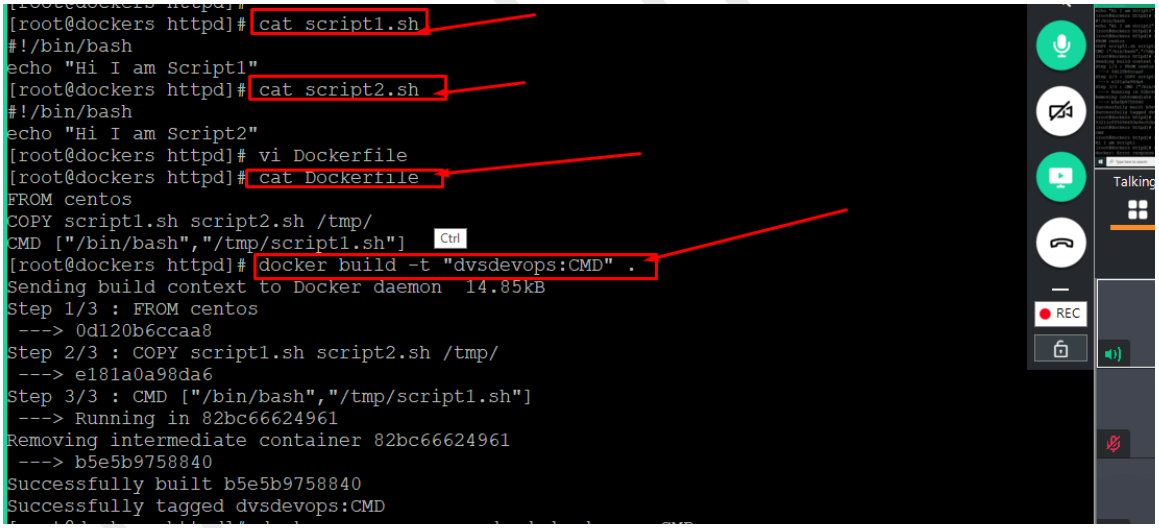
Final Code:



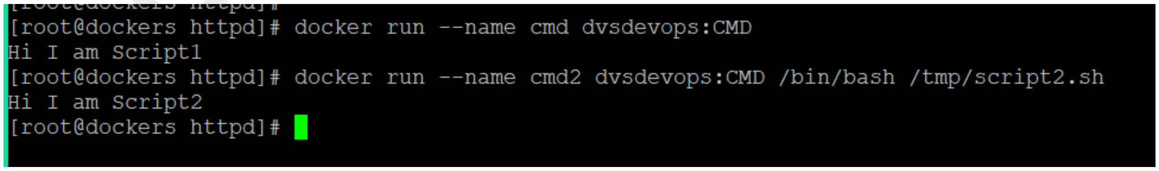
```
[root@dockers httpd]# cat Dockerfile
FROM centos
RUN yum install nginx -y
EXPOSE 80
CMD ["nginx", "-g", "daemon off;"]
[root@dockers httpd]# docker build -t "dvsdevops:EXPOSE" .
Sending build context to Docker daemon   12.8kB
Step 1/4 : FROM centos
 ---> 0d120b6ccaa8
Step 2/4 : RUN yum install nginx -y
 ---> Using cache
 ---> 6da3907a60df
Step 3/4 : EXPOSE 80
 ---> Running in aa1a25241c2f
Removing intermediate container aa1a25241c2f
 ---> b32d539384d1
Step 4/4 : CMD ["nginx", "-g", "daemon off;"]
 ---> Running in 2a791bf108ac
Removing intermediate container 2a791bf108ac
 ---> 3641d32d9d95
Successfully built 3641d32d9d95
Successfully tagged dvsdevops:EXPOSE
[root@dockers httpd]# docker run --name myown-nginx-final -d dvsdevops:EXPOSE
48adace71fdce90959fd27969a416551ded989bf8a6dafae5bddc70c89aac546
[root@dockers httpd]# docker ps|grep -i nginx
48adace71fdc        dvsdevops:EXPOSE    "nginx -g 'daemon of…"   4 seconds ago       Up 3 seconds        80/tcp
   myown-nginx-final
b5ecc7bd80da        a383ffb152d4        "nginx -g 'daemon of…"   3 minutes ago       Up 3 minutes
   myown-nginx
5a1b1f47aa29        nginx               "/docker-entrypoint.…"   9 minutes ago       Up 9 minutes        80/tcp
   dockers-nginx
[root@dockers httpd]#
```

CMD & ENTRYPOINT:

CMD:

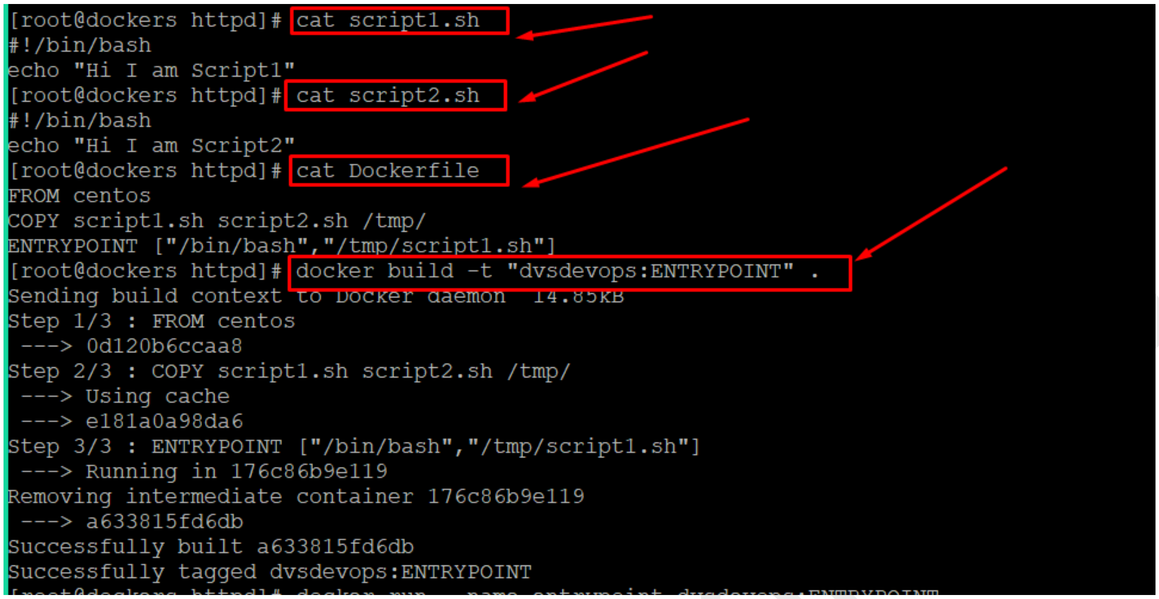


```
[root@dockers httpd]# cat script1.sh
#!/bin/bash
echo "Hi I am Script1"
[root@dockers httpd]# cat script2.sh
#!/bin/bash
echo "Hi I am Script2"
[root@dockers httpd]# vi Dockerfile
[root@dockers httpd]# cat Dockerfile
FROM centos
COPY script1.sh script2.sh /tmp/
CMD ["/bin/bash","/tmp/script1.sh"]
[root@dockers httpd]# docker build -t "dvsdevops:CMD" .
Sending build context to Docker daemon  14.85kB
Step 1/3 : FROM centos
 ---> 0d120b6ccaa8
Step 2/3 : COPY script1.sh script2.sh /tmp/
 ---> e181a0a98da6
Step 3/3 : CMD ["/bin/bash","/tmp/script1.sh"]
 ---> Running in 82bc66624961
Removing intermediate container 82bc66624961
 ---> b5e5b9758840
Successfully built b5e5b9758840
Successfully tagged dvsdevops:CMD
```

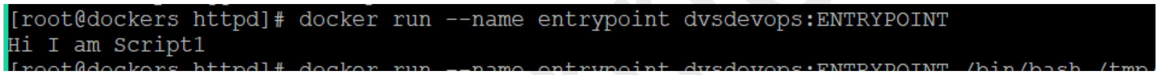


```
[root@dockers httpd]# docker run --name cmd dvsdevops:CMD
Hi I am Script1
[root@dockers httpd]# docker run --name cmd2 dvsdevops:CMD /bin/bash /tmp/script2.sh
Hi I am Script2
[root@dockers httpd]#
```

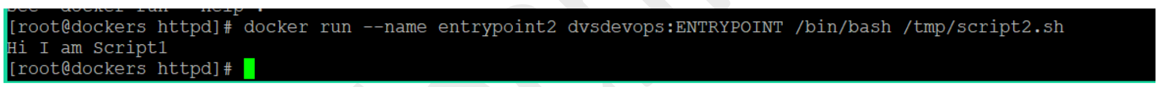
ENTRYPOINT:



```
[root@dockers httpd]# cat script1.sh
#!/bin/bash
echo "Hi I am Script1"
[root@dockers httpd]# cat script2.sh
#!/bin/bash
echo "Hi I am Script2"
[root@dockers httpd]# cat Dockerfile
FROM centos
COPY script1.sh script2.sh /tmp/
ENTRYPOINT ["/bin/bash","/tmp/script1.sh"]
[root@dockers httpd]# docker build -t "dvsdevops:ENTRYPOINT" .
Sending build context to Docker daemon  14.85kB
Step 1/3 : FROM centos
 ---> 0d120b6ccaa8
Step 2/3 : COPY script1.sh script2.sh /tmp/
 ---> Using cache
 ---> e181a0a98da6
Step 3/3 : ENTRYPOINT ["/bin/bash","/tmp/script1.sh"]
 ---> Running in 176c86b9e119
Removing intermediate container 176c86b9e119
 ---> a633815fd6db
Successfully built a633815fd6db
Successfully tagged dvsdevops:ENTRYPOINT
[root@dockers httpd]# docker run --name entrypoint dvsdevops:ENTRYPOINT
```



```
[root@dockers httpd]# docker run --name entrypoint dvsdevops:ENTRYPOINT
Hi I am Script1
[root@dockers httpd]# docker run --name entrypoint dvsdevops:ENTRYPOINT /bin/bash /tmp
```

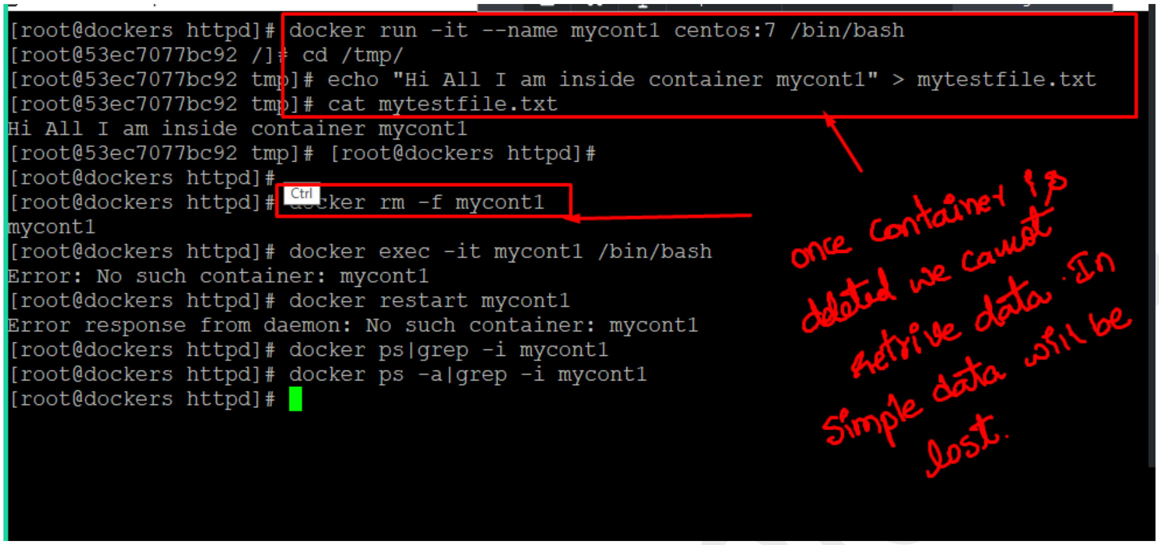


```
See 'docker run --help'.
[root@dockers httpd]# docker run --name entrypoint2 dvsdevops:ENTRYPOINT /bin/bash /tmp/script2.sh
Hi I am Script1
[root@dockers httpd]# 
```

FINAL CODE:

FROM centos
RUN yum install telnet nginx -y && useradd test1
ENV myenv=100
ADD tmp.tar /tmp/
COPY tmp.tar /tmp/
EXPOSE 80
VOLUME ["/usr/share/nginx/html"]
CMD ["nginx", "-g", "daemon off;"]

5. Storage Management

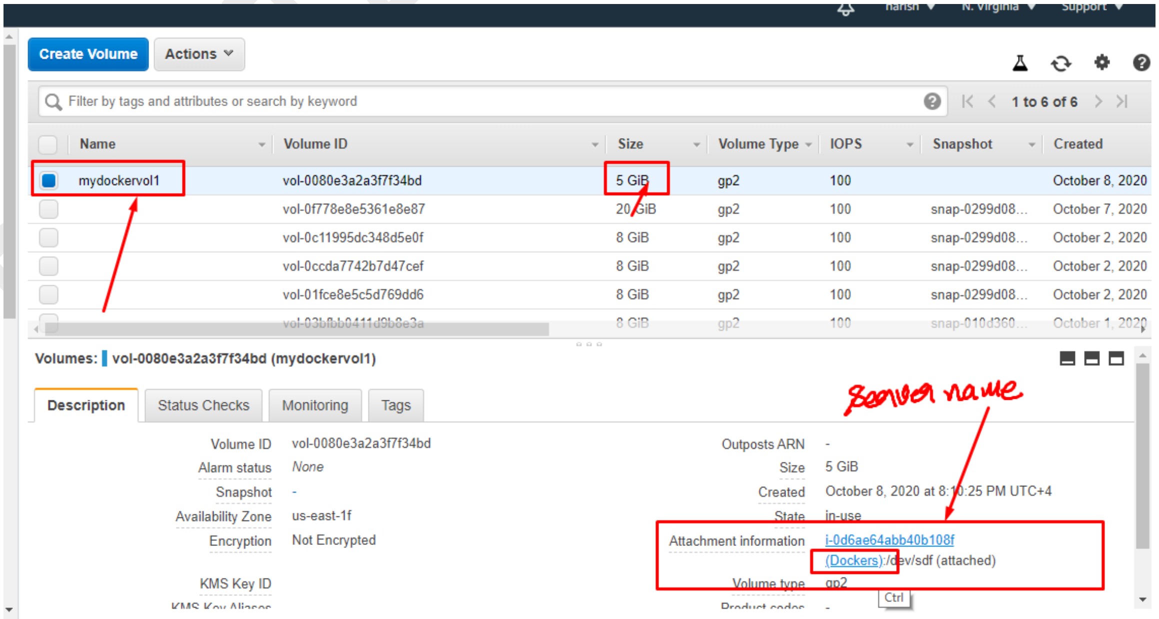


```
[root@dockers httpd]# docker run -it --name mycont1 centos:7 /bin/bash
[root@53ec7077bc92 /]# cd /tmp/
[root@53ec7077bc92 tmp]# echo "Hi All I am inside container mycont1" > mytestfile.txt
[root@53ec7077bc92 tmp]# cat mytestfile.txt
Hi All I am inside container mycont1
[root@53ec7077bc92 tmp]# [root@dockers httpd]#
[root@dockers httpd]#
[root@dockers httpd]# docker rm -f mycont1
mycont1
[root@dockers httpd]# docker exec -it mycont1 /bin/bash
Error: No such container: mycont1
[root@dockers httpd]# docker restart mycont1
Error response from daemon: No such container: mycont1
[root@dockers httpd]# docker ps|grep -i mycont1
[root@dockers httpd]# docker ps -a|grep -i mycont1
[root@dockers httpd]#
```

once container is deleted we cannot retrive data. In simple data will be lost.

Let's create our container with our own volume so that data will be persistent & we can retrieve the data even if the container crashes or gets delete using below.

1. Add a disk



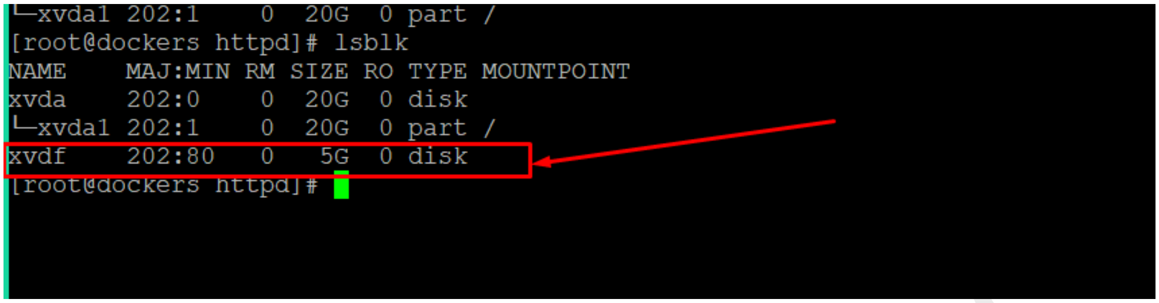
	Name	Volume ID	Size	Volume Type	IOPS	Snapshot	Created
☑	mydockervol1	vol-0080e3a2a3f7f34bd	5 GiB	gp2	100		October 8, 2020
□		vol-0f778e8e5361e8e87	20 GiB	gp2	100	snap-0299d08...	October 7, 2020
□		vol-0c11995dc348d5e0f	8 GiB	gp2	100	snap-0299d08...	October 2, 2020
□		vol-0ccda7742b7d47cef	8 GiB	gp2	100	snap-0299d08...	October 2, 2020
□		vol-01fce8e5c5d769dd6	8 GiB	gp2	100	snap-0299d08...	October 2, 2020
□		vol-03bfbb0411d9b8e3a	8 GiB	gp2	100	snap-010d360...	October 1, 2020

Volumes: vol-0080e3a2a3f7f34bd (mydockervol1)

Volume ID vol-0080e3a2a3f7f34bd
Alarm status *None*
Snapshot -
Availability Zone us-east-1f
Encryption Not Encrypted
KMS Key ID
KMS Key Aliases

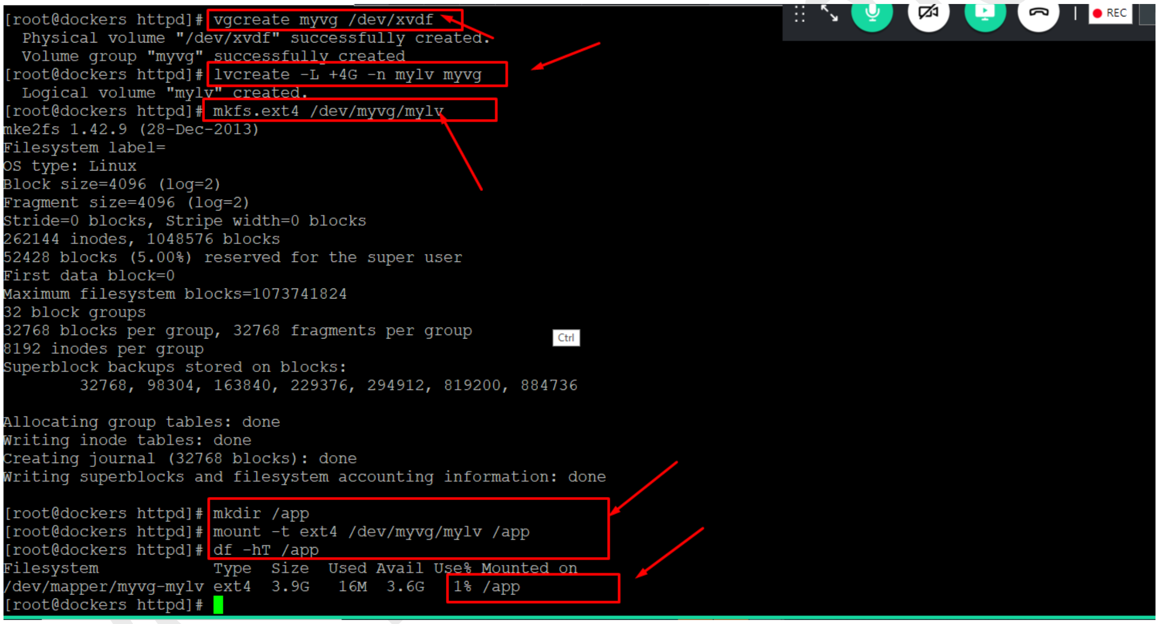
Outposts ARN -
Size 5 GiB
Created October 8, 2020 at 8:10:25 PM UTC+4
State in-use
Attachment information i-0d6ae64abb40b108f (Dockers):/dev/sdf (attached)
Volume type gp2
Product codes -

Server name



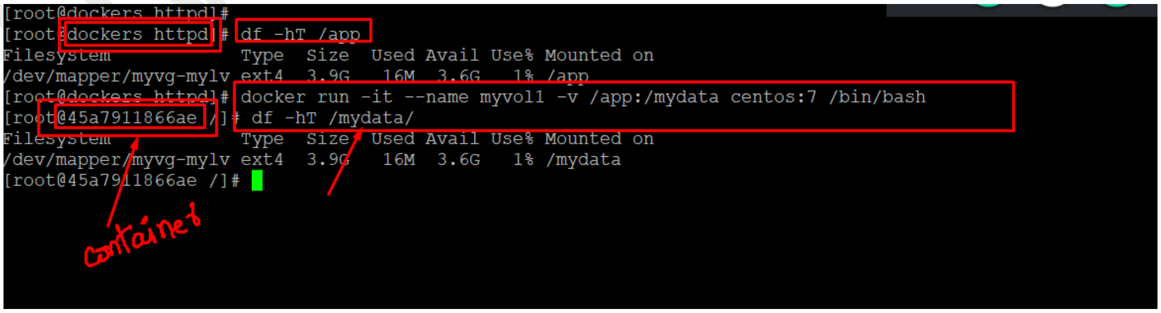
```
└─xvda1 202:1    0  20G  0 part /
[root@dockers httpd]# lsblk
NAME    MAJ:MIN RM SIZE RO TYPE MOUNTPOINT
xvda    202:0    0  20G  0 disk
└─xvda1 202:1    0  20G  0 part /
xvdf    202:80   0   5G  0 disk
[root@dockers httpd]#
```

2. Create a file system:



```
[root@dockers httpd]# vgcreate myvg /dev/xvdf
  Physical volume "/dev/xvdf" successfully created.
  Volume group "myvg" successfully created
[root@dockers httpd]# lvcreate -L +4G -n mylv myvg
  Logical volume "mylv" created.
[root@dockers httpd]# mkfs.ext4 /dev/myvg/mylv
mke2fs 1.42.9 (28-Dec-2013)
Filesystem label=
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
Stride=0 blocks, Stripe width=0 blocks
262144 inodes, 1048576 blocks
52428 blocks (5.00%) reserved for the super user
First data block=0
Maximum filesystem blocks=1073741824
32 block groups
32768 blocks per group, 32768 fragments per group
8192 inodes per group
Superblock backups stored on blocks:
        32768, 98304, 163840, 229376, 294912, 819200, 884736

Allocating group tables: done
Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done

[root@dockers httpd]# mkdir /app
[root@dockers httpd]# mount -t ext4 /dev/myvg/mylv /app
[root@dockers httpd]# df -hT /app
Filesystem            Type  Size  Used Avail Use% Mounted on
/dev/mapper/myvg-mylv ext4  3.9G   16M  3.6G   1% /app
[root@dockers httpd]#
```

3. Create a container mapping the volume to the above filesystem

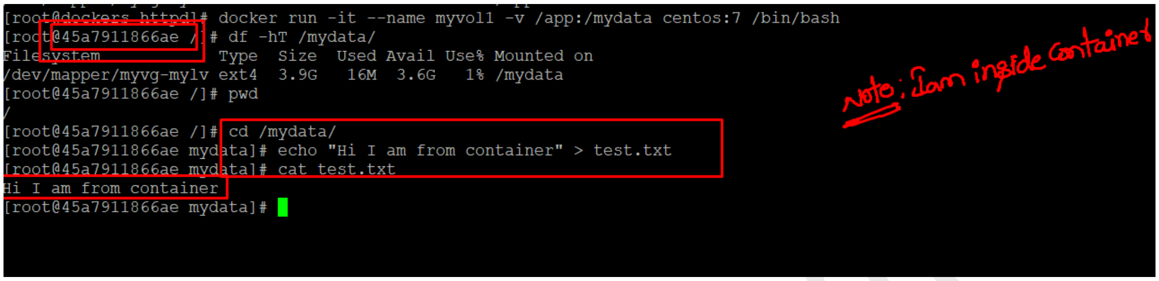


```
[root@dockers httpd]#
[root@dockers httpd]# df -hT /app
Filesystem            Type  Size  Used Avail Use% Mounted on
/dev/mapper/myvg-mylv ext4  3.9G   16M  3.6G   1% /app
[root@dockers httpd]# docker run -it --name myvol1 -v /app:/mydata centos:7 /bin/bash
[root@45a7911866ae /]# df -hT /mydata/
Filesystem            Type  Size  Used Avail Use% Mounted on
/dev/mapper/myvg-mylv ext4  3.9G   16M  3.6G   1% /mydata
[root@45a7911866ae /]#
```

4. Testing the data existence

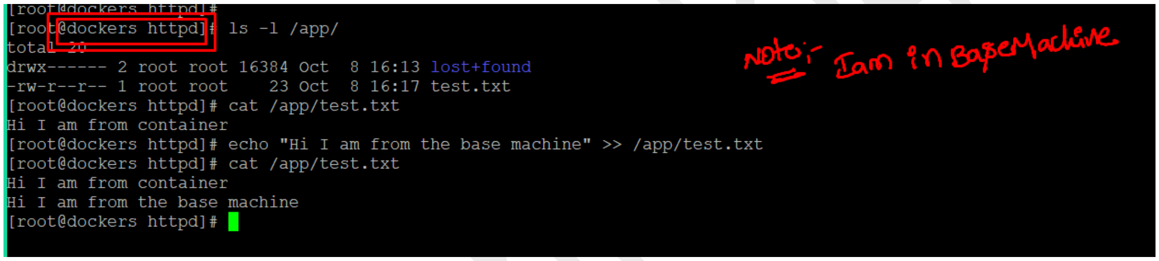
Let's create some file from the container:

Note: "-v"



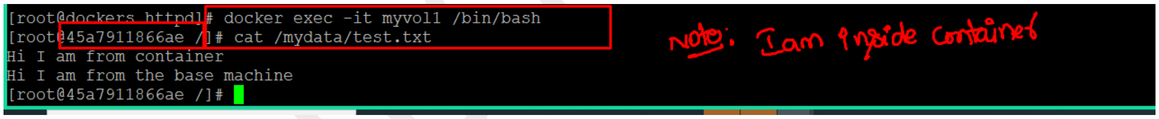
```
[root@dockers httpd]# docker run -it --name myvol1 -v /app:/mydata centos:7 /bin/bash
[root@45a7911866ae /]# df -hT /mydata/
Filesystem           Type  Size  Used Avail Use% Mounted on
/dev/mapper/myvg-mylv ext4  3.9G   16M  3.6G   1% /mydata
[root@45a7911866ae /]# pwd
/
[root@45a7911866ae /]# cd /mydata/
[root@45a7911866ae mydata]# echo "Hi I am from container" > test.txt
[root@45a7911866ae mydata]# cat test.txt
Hi I am from container
[root@45a7911866ae mydata]#
```

Note: Iam inside Container



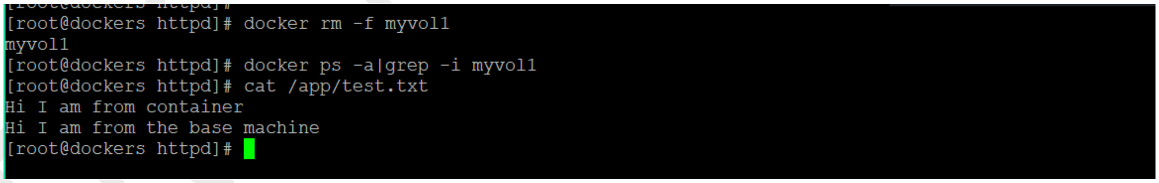
```
[root@dockers httpd]#
[root@dockers httpd]# ls -l /app/
total 20
drwx------ 2 root root 16384 Oct  8 16:13 lost+found
-rw-r--r-- 1 root root    23 Oct  8 16:17 test.txt
[root@dockers httpd]# cat /app/test.txt
Hi I am from container
[root@dockers httpd]# echo "Hi I am from the base machine" >> /app/test.txt
[root@dockers httpd]# cat /app/test.txt
Hi I am from container
Hi I am from the base machine
[root@dockers httpd]#
```

Note:- Iam in BaseMachine



```
[root@dockers httpd]# docker exec -it myvol1 /bin/bash
[root@45a7911866ae /]# cat /mydata/test.txt
Hi I am from container
Hi I am from the base machine
[root@45a7911866ae /]#
```

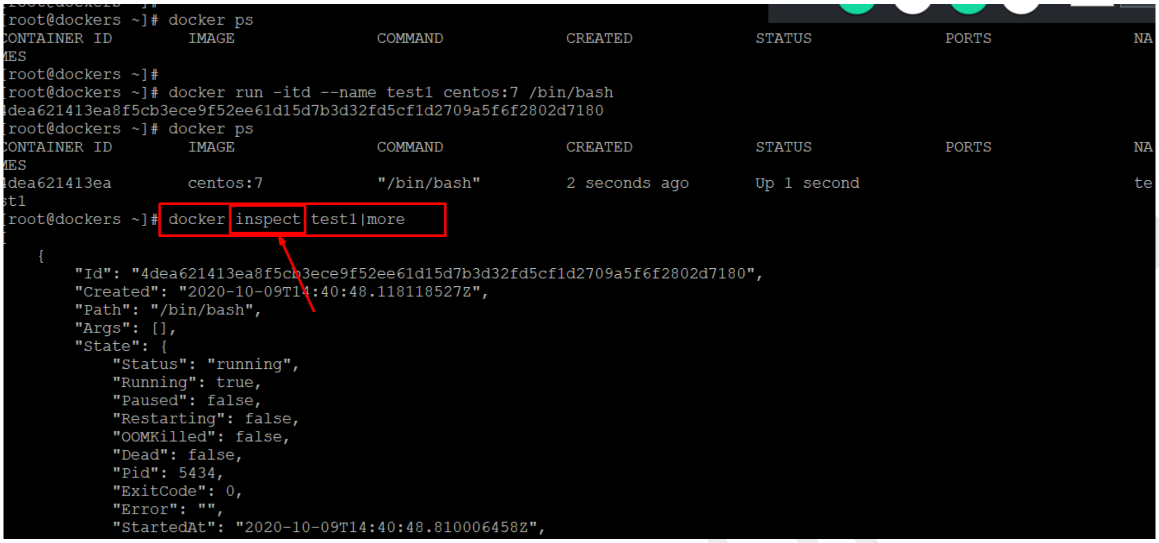
Note: Iam inside Container



```
[root@dockers httpd]# docker rm -f myvol1
myvol1
[root@dockers httpd]# docker ps -a|grep -i myvol1
[root@dockers httpd]# cat /app/test.txt
Hi I am from container
Hi I am from the base machine
[root@dockers httpd]#
```

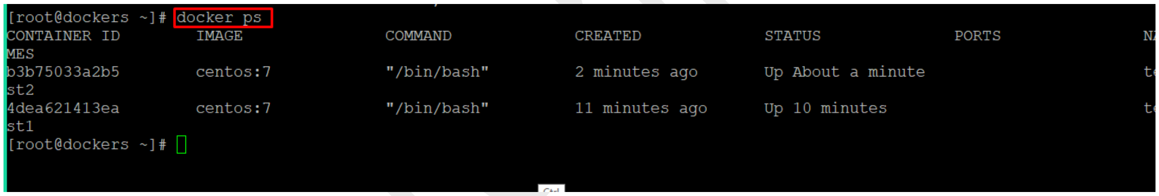
6. Network Management

Gathering container details:

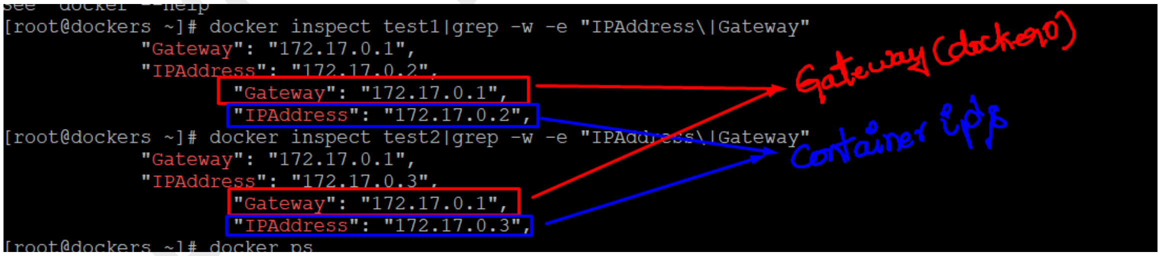


```
[root@dockers ~]#
[root@dockers ~]# docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS               NA
MES
[root@dockers ~]#
[root@dockers ~]# docker run -itd --name test1 centos:7 /bin/bash
4dea621413ea8f5cb3ece9f52ee61d15d7b3d32fd5cf1d2709a5f6f2802d7180
[root@dockers ~]# docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS               NA
MES
4dea621413ea        centos:7            "/bin/bash"         2 seconds ago       Up 1 second                             te
st1
[root@dockers ~]# docker inspect test1|more
[
    {
        "Id": "4dea621413ea8f5cb3ece9f52ee61d15d7b3d32fd5cf1d2709a5f6f2802d7180",
        "Created": "2020-10-09T14:40:48.118118527Z",
        "Path": "/bin/bash",
        "Args": [],
        "State": {
            "Status": "running",
            "Running": true,
            "Paused": false,
            "Restarting": false,
            "OOMKilled": false,
            "Dead": false,
            "Pid": 5434,
            "ExitCode": 0,
            "Error": "",
            "StartedAt": "2020-10-09T14:40:48.810006458Z",
```

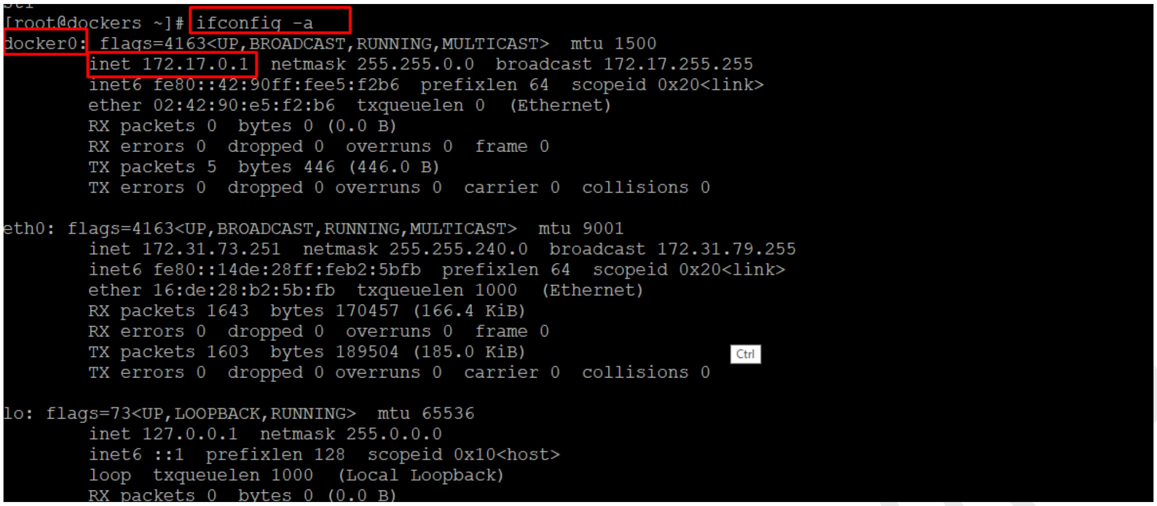
Let's check the ipaddress & gateway for the containers:



```
[root@dockers ~]# docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS               NA
MES
b3b75033a2b5        centos:7            "/bin/bash"         2 minutes ago       Up About a minute                       te
st2
4dea621413ea        centos:7            "/bin/bash"         11 minutes ago      Up 10 minutes                           te
st1
[root@dockers ~]#
```

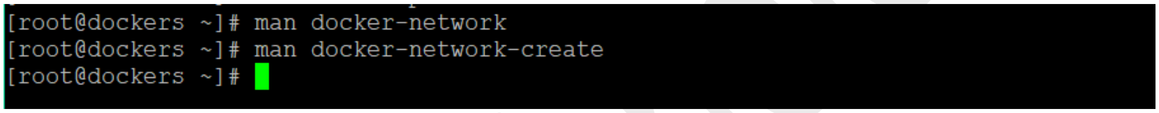


```
see  docker --help
[root@dockers ~]# docker inspect test1|grep -w -e "IPAddress\|Gateway"
            "Gateway": "172.17.0.1",
            "IPAddress": "172.17.0.2",
                    "Gateway": "172.17.0.1",
                    "IPAddress": "172.17.0.2",
[root@dockers ~]# docker inspect test2|grep -w -e "IPAddress\|Gateway"
            "Gateway": "172.17.0.1",
            "IPAddress": "172.17.0.3",
                    "Gateway": "172.17.0.1",
                    "IPAddress": "172.17.0.3",
[root@dockers ~]# docker ps
```



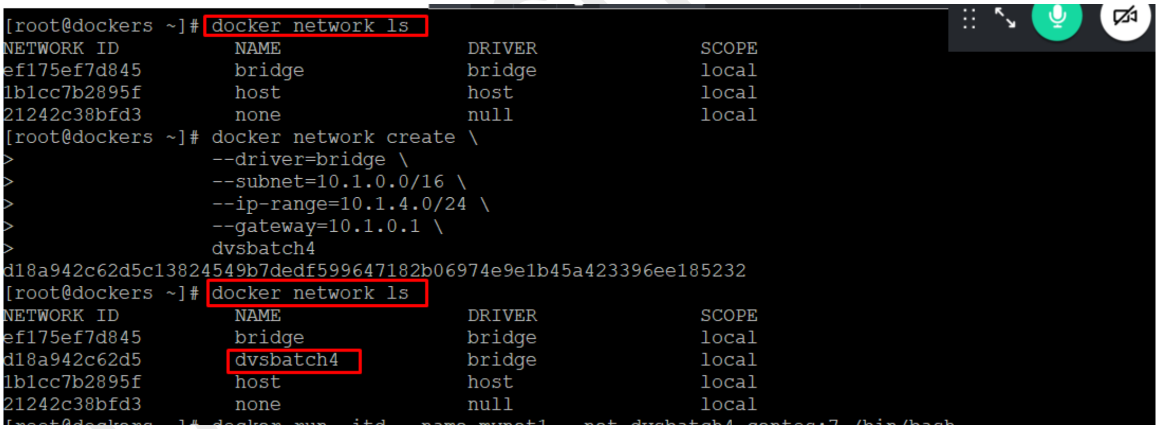
```
[root@dockers ~]# ifconfig -a
docker0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 172.17.0.1  netmask 255.255.0.0  broadcast 172.17.255.255
        inet6 fe80::42:90ff:fee5:f2b6  prefixlen 64  scopeid 0x20<link>
        ether 02:42:90:e5:f2:b6  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 5  bytes 446 (446.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 9001
        inet 172.31.73.251  netmask 255.255.240.0  broadcast 172.31.79.255
        inet6 fe80::14de:28ff:feb2:5bfb  prefixlen 64  scopeid 0x20<link>
        ether 16:de:28:b2:5b:fb  txqueuelen 1000  (Ethernet)
        RX packets 1643  bytes 170457 (166.4 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1603  bytes 189504 (185.0 KiB)
        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
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 0  bytes 0 (0.0 B)
```

Man Page for Docker:



```
[root@dockers ~]# man docker-network
[root@dockers ~]# man docker-network-create
[root@dockers ~]#
```

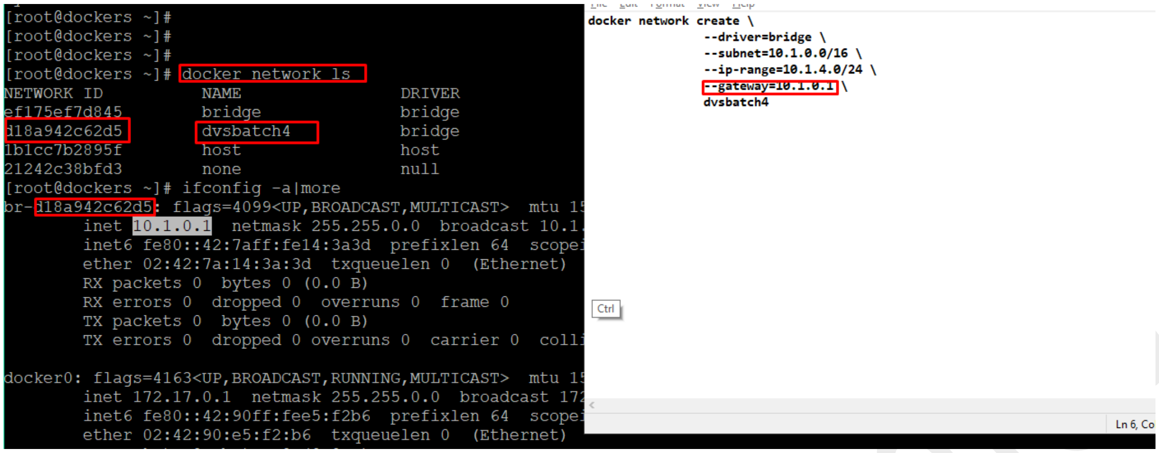
Creating custom Adatper:



```
[root@dockers ~]# docker network ls
NETWORK ID          NAME                DRIVER              SCOPE
ef175ef7d845        bridge              bridge              local
1b1cc7b2895f        host                host                local
21242c38bfd3        none                null                local
[root@dockers ~]# docker network create \
>                 --driver=bridge \
>                 --subnet=10.1.0.0/16 \
>                 --ip-range=10.1.4.0/24 \
>                 --gateway=10.1.0.1 \
>                 dvsbatch4
d18a942c62d5c13824549b7dedf599647182b06974e9e1b45a423396ee185232
[root@dockers ~]# docker network ls
NETWORK ID          NAME                DRIVER              SCOPE
ef175ef7d845        bridge              bridge              local
d18a942c62d5        dvsbatch4           bridge              local
1b1cc7b2895f        host                host                local
21242c38bfd3        none                null                local
[root@dockers ~]# docker run -itd --name mynat1 --net dvsbatch4 centos:7 /bin/bash
```

Command:

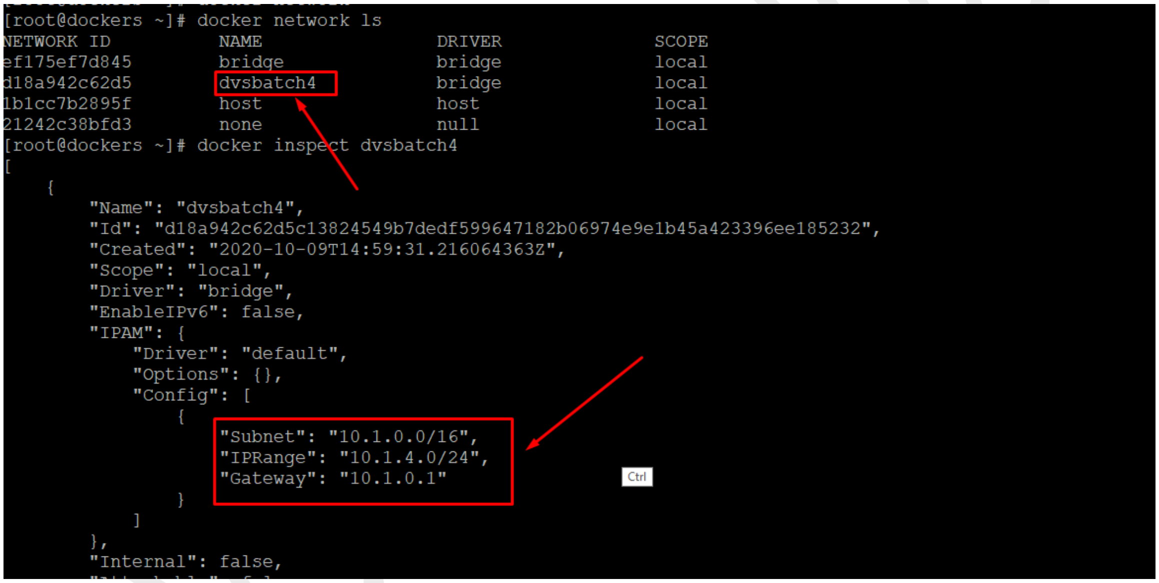
docker network create \
--driver=bridge \
--subnet=10.1.0.0/16 \
--ip-range=10.1.4.0/24 \
--gateway=10.1.0.1 \
dvsbatch4



```
[root@dockers ~]#
[root@dockers ~]#
[root@dockers ~]#
[root@dockers ~]# docker network ls
NETWORK ID          NAME                DRIVER
ef175ef7d845        bridge              bridge
d18a942c62d5        dvsbatch4           bridge
1b1cc7b2895f        host                host
21242c38bfd3        none                null
[root@dockers ~]# ifconfig -a|more
br-d18a942c62d5: flags=4099<UP,BROADCAST,MULTICAST>  mtu 15
        inet 10.1.0.1  netmask 255.255.0.0  broadcast 10.1.
        inet6 fe80::42:7aff:fe14:3a3d  prefixlen 64  scopei
        ether 02:42:7a:14:3a:3d  txqueuelen 0  (Ethernet)
        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  colli

docker0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 15
        inet 172.17.0.1  netmask 255.255.0.0  broadcast 172
        inet6 fe80::42:90ff:fee5:f2b6  prefixlen 64  scopei
        ether 02:42:90:e5:f2:b6  txqueuelen 0  (Ethernet)
```

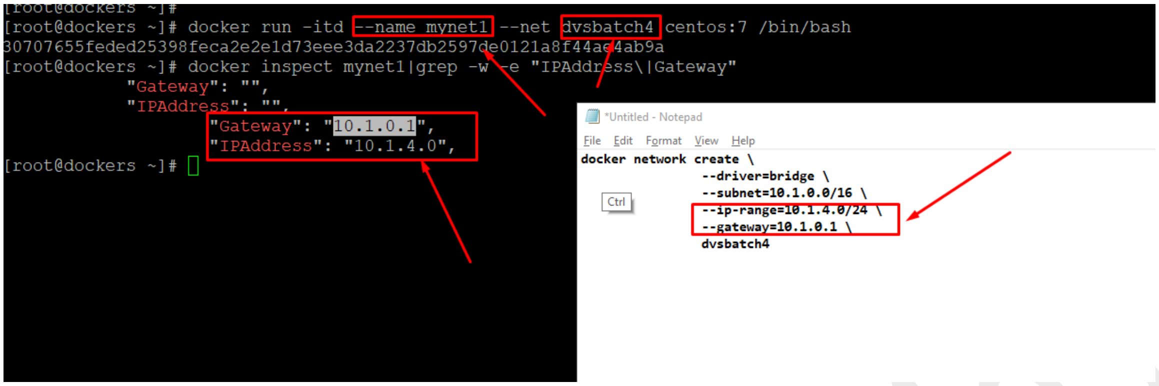
```
docker network create \
                --driver=bridge \
                --subnet=10.1.0.0/16 \
                --ip-range=10.1.4.0/24 \
                --gateway=10.1.0.1 \
                dvsbatch4
```

Inspecting adapter details:



```
[root@dockers ~]# docker network ls
NETWORK ID          NAME                DRIVER              SCOPE
ef175ef7d845        bridge              bridge              local
d18a942c62d5        dvsbatch4           bridge              local
1b1cc7b2895f        host                host                local
21242c38bfd3        none                null                local
[root@dockers ~]# docker inspect dvsbatch4
[
    {
        "Name": "dvsbatch4",
        "Id": "d18a942c62d5c13824549b7dedf599647182b06974e9e1b45a423396ee185232",
        "Created": "2020-10-09T14:59:31.216064363Z",
        "Scope": "local",
        "Driver": "bridge",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": {},
            "Config": [
                {
                    "Subnet": "10.1.0.0/16",
                    "IPRange": "10.1.4.0/24",
                    "Gateway": "10.1.0.1"
                }
            ]
        },
        "Internal": false,
```

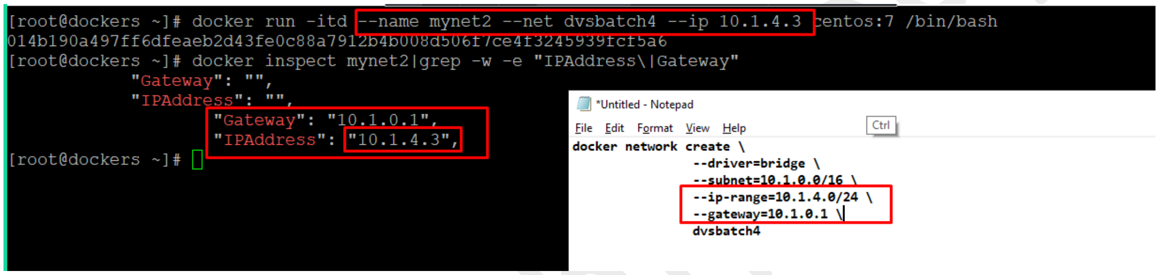
Creating a container with custom network:



```
[root@dockers ~]#
[root@dockers ~]# docker run -itd --name mynet1 --net dvsbatch4 centos:7 /bin/bash
30707655feded25398feca2e2e1d73eee3da2237db2597de0121a8f44ae4ab9a
[root@dockers ~]# docker inspect mynet1|grep -w -e "IPAddress\|Gateway"
            "Gateway": "",
            "IPAddress": "",
                    "Gateway": "10.1.0.1",
                    "IPAddress": "10.1.4.0",
[root@dockers ~]#
```

```
docker network create \
            --driver=bridge \
            --subnet=10.1.0.0/16 \
            --ip-range=10.1.4.0/24 \
            --gateway=10.1.0.1 \
            dvsbatch4
```

Creating a container from custom ipaddress from the custom adatper:

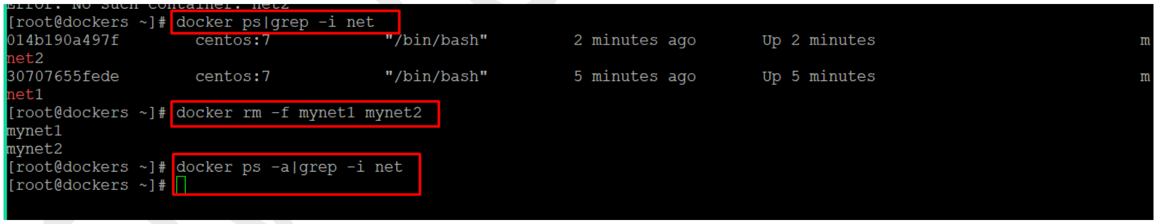


```
[root@dockers ~]# docker run -itd --name mynet2 --net dvsbatch4 --ip 10.1.4.3 centos:7 /bin/bash
014b190a497ff6dfeaeb2d43fe0c88a7912b4b008d506f7ce4f3245939fcf5a6
[root@dockers ~]# docker inspect mynet2|grep -w -e "IPAddress\|Gateway"
            "Gateway": "",
            "IPAddress": "",
                    "Gateway": "10.1.0.1",
                    "IPAddress": "10.1.4.3",
[root@dockers ~]#
```

```
docker network create \
            --driver=bridge \
            --subnet=10.1.0.0/16 \
            --ip-range=10.1.4.0/24 \
            --gateway=10.1.0.1 \
            dvsbatch4
```

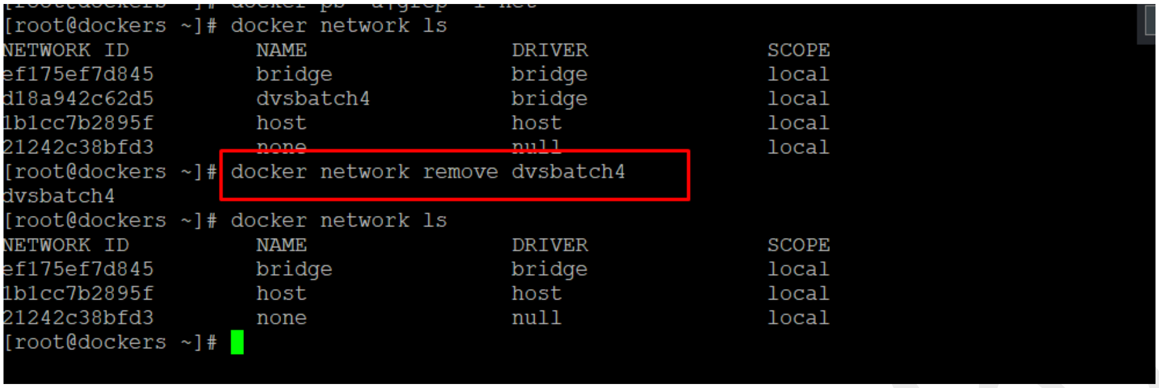
Delete our containers & network:

Removing containers:



```
Error: No such container: net2
[root@dockers ~]# docker ps|grep -i net
014b190a497f        centos:7            "/bin/bash"         2 minutes ago       Up 2 minutes                            m
net2
30707655fede        centos:7            "/bin/bash"         5 minutes ago       Up 5 minutes                            m
net1
[root@dockers ~]# docker rm -f mynet1 mynet2
mynet1
mynet2
[root@dockers ~]# docker ps -a|grep -i net
[root@dockers ~]#
```

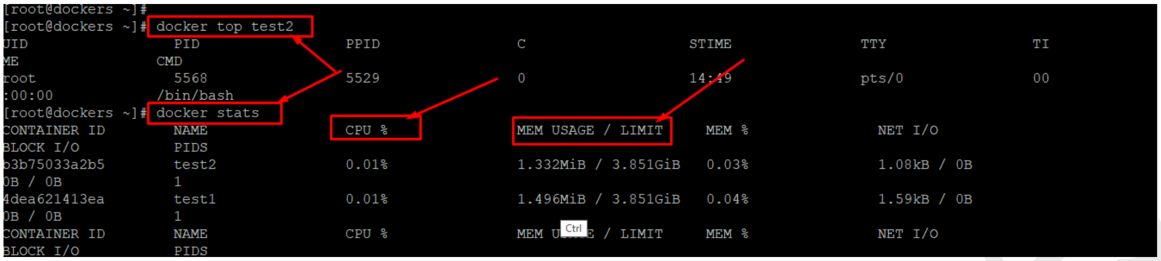
Removing the network:



```
[root@dockers ~]# docker network ls
NETWORK ID          NAME                DRIVER              SCOPE
ef175ef7d845        bridge              bridge              local
d18a942c62d5        dvsbatch4           bridge              local
1b1cc7b2895f        host                host                local
21242c38bfd3        none                null                local
[root@dockers ~]# docker network remove dvsbatch4
dvsbatch4
[root@dockers ~]# docker network ls
NETWORK ID          NAME                DRIVER              SCOPE
ef175ef7d845        bridge              bridge              local
1b1cc7b2895f        host                host                local
21242c38bfd3        none                null                local
[root@dockers ~]#
```

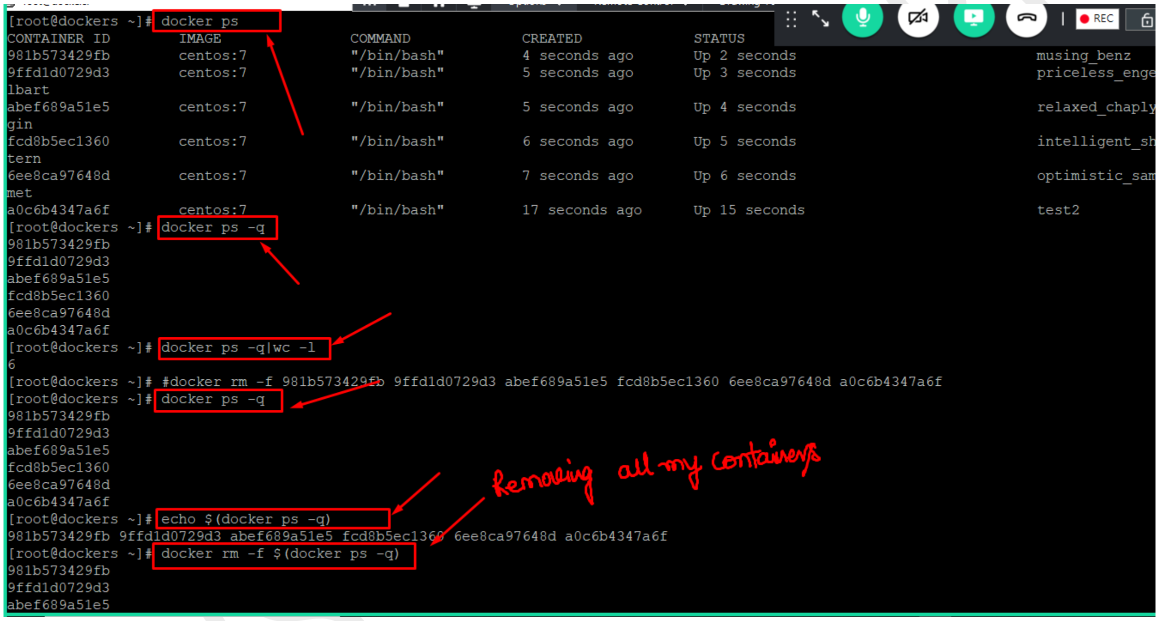
7. Monitoring Docker containers & housekeeping

Verifying CPU & Memory usage:



```
[root@dockers ~]#
[root@dockers ~]# docker top test2
UID                 PID                 PPID                C                   STIME               TTY                 TI
ME                  CMD
root                5568                5529                0                   14:49               pts/0               00
:00:00              /bin/bash
[root@dockers ~]# docker stats
CONTAINER ID        NAME                CPU %               MEM USAGE / LIMIT     MEM %               NET I/O
BLOCK I/O           PIDS
b3b75033a2b5        test2               0.01%               1.332MiB / 3.851GiB   0.03%               1.08kB / 0B
0B / 0B             1
4dea621413ea        test1               0.01%               1.496MiB / 3.851GiB   0.04%               1.59kB / 0B
0B / 0B             1
CONTAINER ID        NAME                CPU %               MEM USAGE / LIMIT     MEM %               NET I/O
BLOCK I/O           PIDS
```

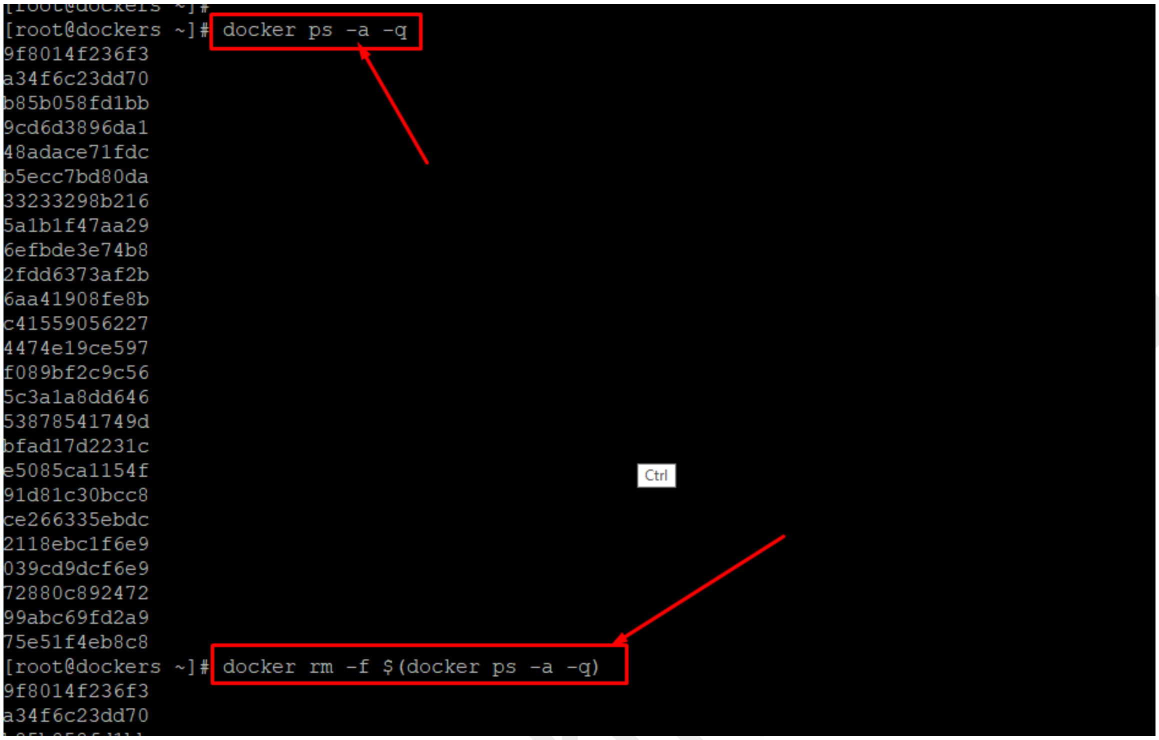
Removing Active Containers:



```
[root@dockers ~]# docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS                                  NAMES
981b573429fb        centos:7            "/bin/bash"         4 seconds ago       Up 2 seconds                            musing_benz
9ffd1d0729d3        centos:7            "/bin/bash"         5 seconds ago       Up 3 seconds                            priceless_enge
lbart
abef689a51e5        centos:7            "/bin/bash"         5 seconds ago       Up 4 seconds                            relaxed_chaply
gin
fcd8b5ec1360        centos:7            "/bin/bash"         6 seconds ago       Up 5 seconds                            intelligent_sh
tern
6ee8ca97648d        centos:7            "/bin/bash"         7 seconds ago       Up 6 seconds                            optimistic_sam
met
a0c6b4347a6f        centos:7            "/bin/bash"         17 seconds ago      Up 15 seconds                           test2
[root@dockers ~]# docker ps -q
981b573429fb
9ffd1d0729d3
abef689a51e5
fcd8b5ec1360
6ee8ca97648d
a0c6b4347a6f
[root@dockers ~]# docker ps -q|wc -l
6
[root@dockers ~]# #docker rm -f 981b573429fb 9ffd1d0729d3 abef689a51e5 fcd8b5ec1360 6ee8ca97648d a0c6b4347a6f
[root@dockers ~]# docker ps -q
981b573429fb
9ffd1d0729d3
abef689a51e5
fcd8b5ec1360
6ee8ca97648d
a0c6b4347a6f
[root@dockers ~]# echo $(docker ps -q)
981b573429fb 9ffd1d0729d3 abef689a51e5 fcd8b5ec1360 6ee8ca97648d a0c6b4347a6f
[root@dockers ~]# docker rm -f $(docker ps -q)
981b573429fb
9ffd1d0729d3
abef689a51e5
```

Removing all my containers

Removing Passive Containers:

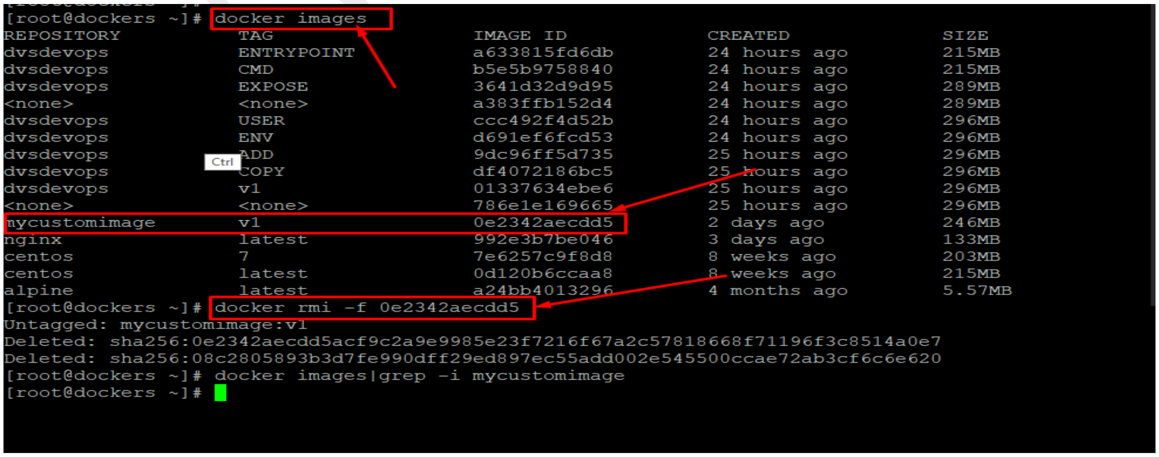


```
[root@dockers ~]# docker ps -a -q
9f8014f236f3
a34f6c23dd70
b85b058fd1bb
9cd6d3896da1
48adace71fdc
b5ecc7bd80da
33233298b216
5a1b1f47aa29
6efbde3e74b8
2fdd6373af2b
6aa41908fe8b
c41559056227
4474e19ce597
f089bf2c9c56
5c3a1a8dd646
53878541749d
bfad17d2231c
e5085ca1154f
91d81c30bcc8
ce266335ebdc
2118ebc1f6e9
039cd9dcf6e9
72880c892472
99abc69fd2a9
75e51f4eb8c8
[root@dockers ~]# docker rm -f $(docker ps -a -q)
9f8014f236f3
a34f6c23dd70
```

Note: If you want to print only passive/Exited container id's then use the below docker ps -a|grep -i exited|awk '{print $1}'

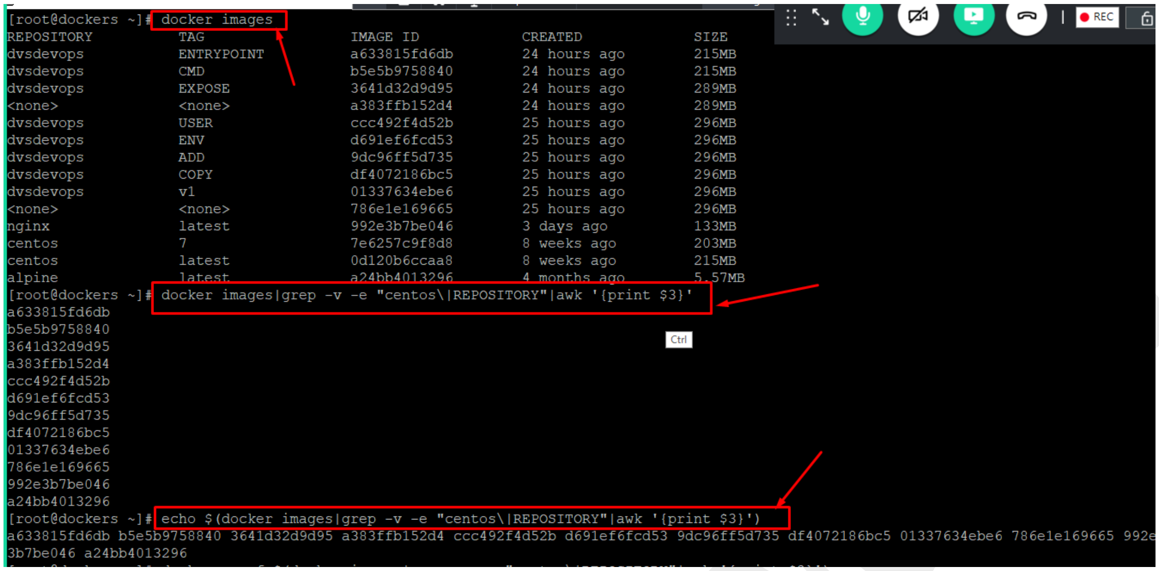
Removing Images:

Command: docker rmi -f <imageid>

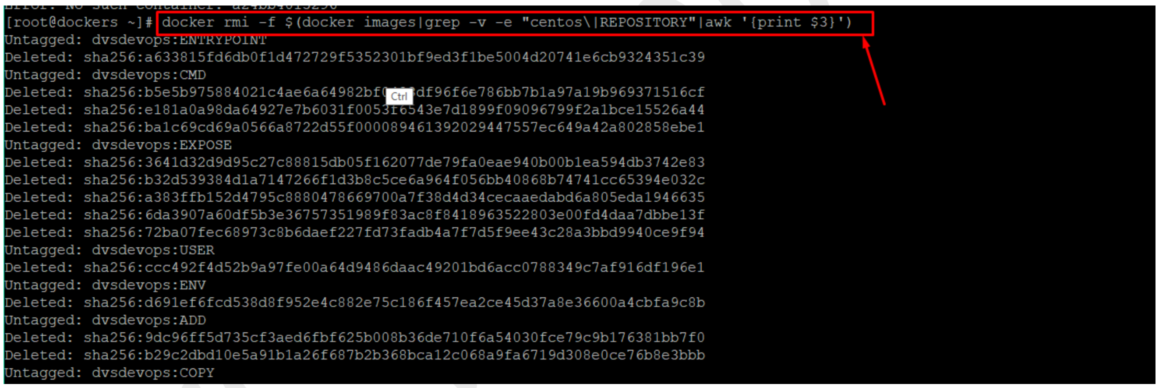


```
[root@dockers ~]# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
dvsdevops           ENTRYPOINT          a633815fd6db        24 hours ago        215MB
dvsdevops           CMD                 b5e5b9758840        24 hours ago        215MB
dvsdevops           EXPOSE              3641d32d9d95        24 hours ago        289MB
<none>              <none>              a383ffb152d4        24 hours ago        289MB
dvsdevops           USER                ccc492f4d52b        24 hours ago        296MB
dvsdevops           ENV                 d691ef6fcd53        24 hours ago        296MB
dvsdevops           ADD                 9dc96ff5d735        25 hours ago        296MB
dvsdevops           COPY                df4072186bc5        25 hours ago        296MB
dvsdevops           v1                  01337634ebe6        25 hours ago        296MB
<none>              <none>              786e1e169665        25 hours ago        296MB
mycustomimage       v1                  0e2342aecdd5        2 days ago          246MB
nginx               latest              992e3b7be046        3 days ago          133MB
centos              7                   7e6257c9f8d8        8 weeks ago         203MB
centos              latest              0d120b6ccaa8        8 weeks ago         215MB
alpine              latest              a24bb4013296        4 months ago        5.57MB
[root@dockers ~]# docker rmi -f 0e2342aecdd5
Untagged: mycustomimage:v1
Deleted: sha256:0e2342aecdd5acf9c2a9e9985e23f7216f67a2c57818668f71196f3c8514a0e7
Deleted: sha256:08c2805893b3d7fe990dff29ed897ec55add002e545500ccae72ab3cf6c6e620
[root@dockers ~]# docker images|grep -i mycustomimage
[root@dockers ~]#
```

Want to delete all the images except centos:



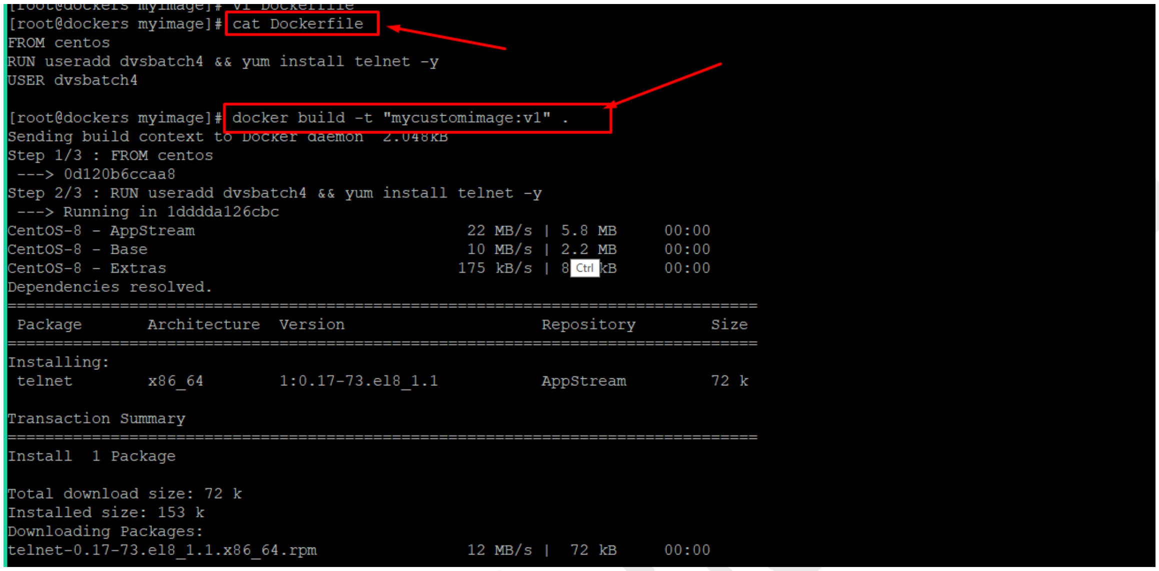
```
[root@dockers ~]# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
dvsdevops           ENTRYPOINT          a633815fd6db        24 hours ago        215MB
dvsdevops           CMD                 b5e5b9758840        24 hours ago        215MB
dvsdevops           EXPOSE              3641d32d9d95        24 hours ago        289MB
<none>              <none>              a383ffb152d4        24 hours ago        289MB
dvsdevops           USER                ccc492f4d52b        25 hours ago        296MB
dvsdevops           ENV                 d691ef6fcd53        25 hours ago        296MB
dvsdevops           ADD                 9dc96ff5d735        25 hours ago        296MB
dvsdevops           COPY                df4072186bc5        25 hours ago        296MB
dvsdevops           v1                  01337634ebe6        25 hours ago        296MB
<none>              <none>              786e1e169665        25 hours ago        296MB
nginx               latest              992e3b7be046        3 days ago          133MB
centos              7                   7e6257c9f8d8        8 weeks ago         203MB
centos              latest              0d120b6ccaa8        8 weeks ago         215MB
alpine              latest              a24bb4013296        4 months ago        5.57MB
[root@dockers ~]# docker images|grep -v -e "centos\|REPOSITORY"|awk '{print $3}'
a633815fd6db
b5e5b9758840
3641d32d9d95
a383ffb152d4
ccc492f4d52b
d691ef6fcd53
9dc96ff5d735
df4072186bc5
01337634ebe6
786e1e169665
992e3b7be046
a24bb4013296
[root@dockers ~]# echo $(docker images|grep -v -e "centos\|REPOSITORY"|awk '{print $3}')
a633815fd6db b5e5b9758840 3641d32d9d95 a383ffb152d4 ccc492f4d52b d691ef6fcd53 9dc96ff5d735 df4072186bc5 01337634ebe6 786e1e169665 992e
3b7be046 a24bb4013296
```



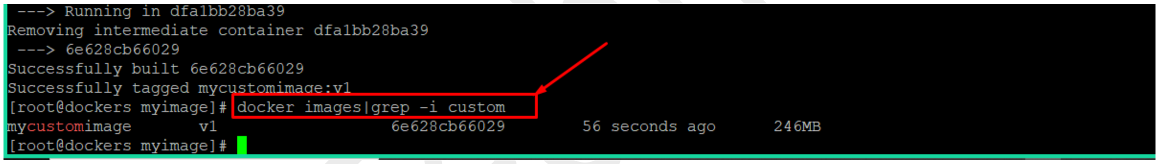
```
Error: No such container: a24bb4013296
[root@dockers ~]# docker rmi -f $(docker images|grep -v -e "centos\|REPOSITORY"|awk '{print $3}')
Untagged: dvsdevops:ENTRYPOINT
Deleted: sha256:a633815fd6db0f1d472729f5352301bf9ed3f1be5004d20741e6cb9324351c39
Untagged: dvsdevops:CMD
Deleted: sha256:b5e5b975884021c4ae6a64982bf0[illegible]df96f6e786bb7b1a97a19b969371516cf
Deleted: sha256:e181a0a98da64927e7b6031f0053f6543e7d1899f09096799f2a1bce15526a44
Deleted: sha256:ba1c69cd69a0566a8722d55f0000894613920294447557ec649a42a802858ebe1
Untagged: dvsdevops:EXPOSE
Deleted: sha256:3641d32d9d95c27c88815db05f162077de79fa0eae940b00b1ea594db3742e83
Deleted: sha256:b32d539384d1a7147266f1d3b8c5ce6a964f056bb40868b74741cc65394e032c
Deleted: sha256:a383ffb152d4795c8880478669700a7f38d4d34cecaaedabd6a805eda1946635
Deleted: sha256:6da3907a60df5b3e36757351989f83ac8f8418963522803e00fd4daa7dbbe13f
Deleted: sha256:72ba07fec68973c8b6daef227fd73fadb4a7f7d5f9ee43c28a3bbd9940ce9f94
Untagged: dvsdevops:USER
Deleted: sha256:ccc492f4d52b9a97fe00a64d9486daac49201bd6acc0788349c7af916df196e1
Untagged: dvsdevops:ENV
Deleted: sha256:d691ef6fcd538d8f952e4c882e75c186f457ea2ce45d37a8e36600a4cbfa9c8b
Untagged: dvsdevops:ADD
Deleted: sha256:9dc96ff5d735cf3aed6fbf625b008b36de710f6a54030fce79c9b176381bb7f0
Deleted: sha256:b29c2dbd10e5a91b1a26f687b2b368bca12c068a9fa6719d308e0ce76b8e3bbb
Untagged: dvsdevops:COPY
```

8. Working with docker registry

Let’s build our own image & perform the below.

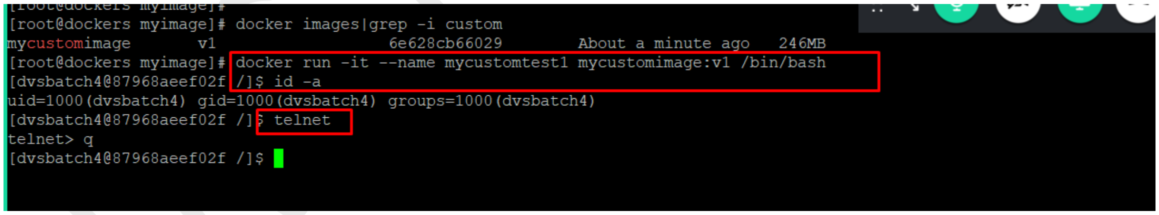


```
[root@dockers myimage]# vi Dockerfile
[root@dockers myimage]# cat Dockerfile
FROM centos
RUN useradd dvsbatch4 && yum install telnet -y
USER dvsbatch4

[root@dockers myimage]# docker build -t "mycustomimage:v1" .
Sending build context to Docker daemon  2.048kB
Step 1/3 : FROM centos
 ---> 0d120b6ccaa8
Step 2/3 : RUN useradd dvsbatch4 && yum install telnet -y
 ---> Running in 1dddda126cbc
CentOS-8 - AppStream                            22 MB/s | 5.8 MB     00:00
CentOS-8 - Base                                 10 MB/s | 2.2 MB     00:00
CentOS-8 - Extras                              175 kB/s | 8 Ctrl kB     00:00
Dependencies resolved.
================================================================================
 Package       Architecture  Version                      Repository       Size
================================================================================
Installing:
 telnet        x86_64        1:0.17-73.el8_1.1            AppStream        72 k

Transaction Summary
================================================================================
Install  1 Package

Total download size: 72 k
Installed size: 153 k
Downloading Packages:
telnet-0.17-73.el8_1.1.x86_64.rpm               12 MB/s |  72 kB     00:00
```



```
 ---> Running in dfa1bb28ba39
Removing intermediate container dfa1bb28ba39
 ---> 6e628cb66029
Successfully built 6e628cb66029
Successfully tagged mycustomimage:v1
[root@dockers myimage]# docker images|grep -i custom
mycustomimage       v1                  6e628cb66029        56 seconds ago      246MB
[root@dockers myimage]# 
```

Testing my image configuration via a container:



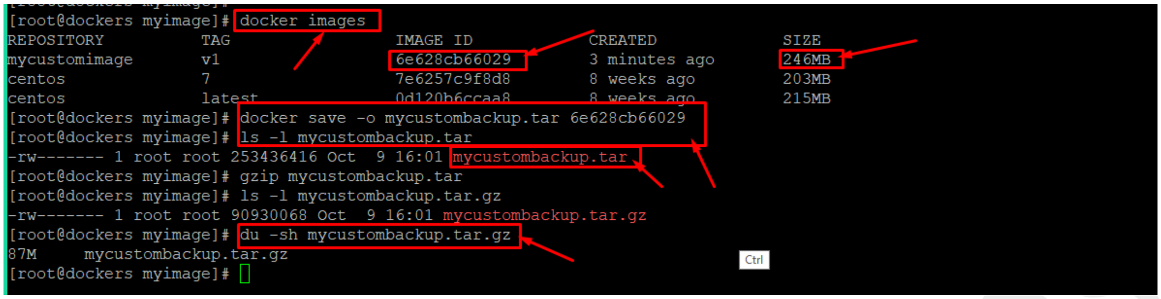
```
[root@dockers myimage]#
[root@dockers myimage]# docker images|grep -i custom
mycustomimage       v1                  6e628cb66029        About a minute ago   246MB
[root@dockers myimage]# docker run -it --name mycustomtest1 mycustomimage:v1 /bin/bash
[dvsbatch4@87968aeef02f /]$ id -a
uid=1000(dvsbatch4) gid=1000(dvsbatch4) groups=1000(dvsbatch4)
[dvsbatch4@87968aeef02f /]$ telnet
telnet> q
[dvsbatch4@87968aeef02f /]$ 
```

Let's save out image as below:

1st way via tar:

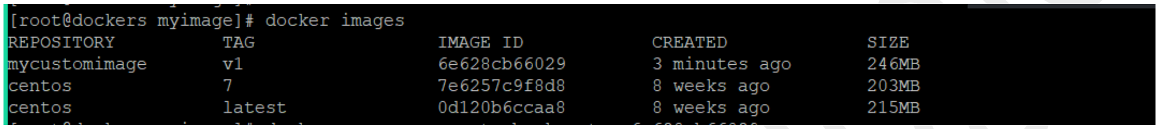
1. **docker save -o myimage.tar mycustom**
2. **docker load -i myimage.tar**

Creating a backup from the existing image:

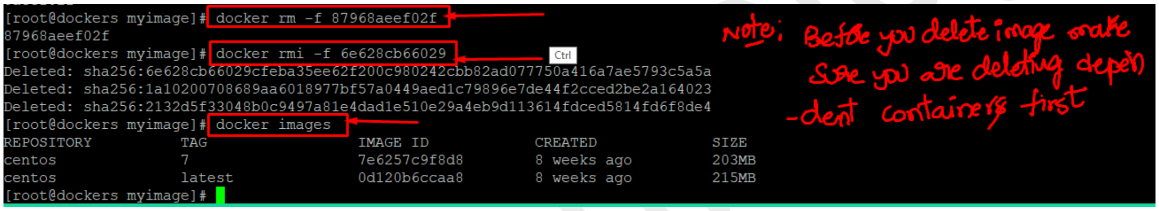


```
[root@dockers myimage]# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
mycustomimage       v1                  6e628cb66029        3 minutes ago       246MB
centos              7                   7e6257c9f8d8        8 weeks ago         203MB
centos              latest              0d120b6ccaa8        8 weeks ago         215MB
[root@dockers myimage]# docker save -o mycustombackup.tar 6e628cb66029
[root@dockers myimage]# ls -l mycustombackup.tar
-rw------- 1 root root 253436416 Oct  9 16:01 mycustombackup.tar
[root@dockers myimage]# gzip mycustombackup.tar
[root@dockers myimage]# ls -l mycustombackup.tar.gz
-rw------- 1 root root 90930068 Oct  9 16:01 mycustombackup.tar.gz
[root@dockers myimage]# du -sh mycustombackup.tar.gz
87M     mycustombackup.tar.gz
[root@dockers myimage]# 
```

Verification:



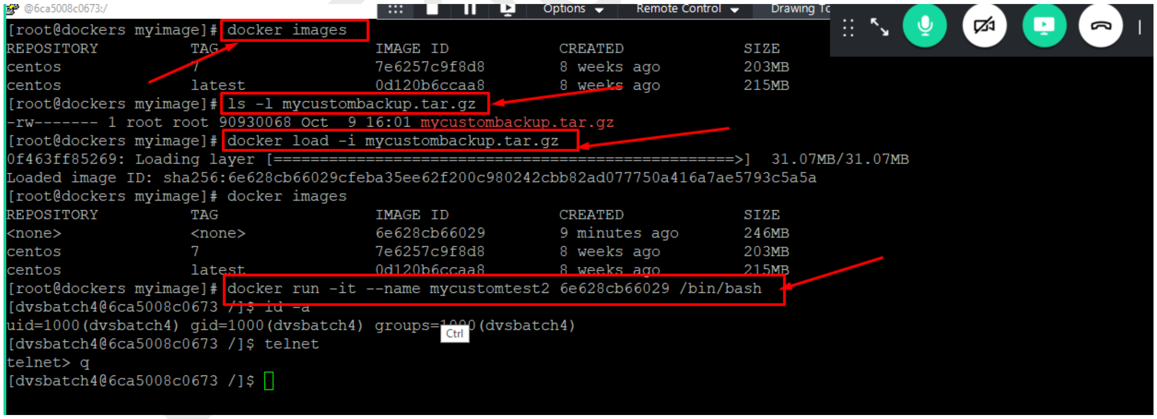
```
[root@dockers myimage]# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
mycustomimage       v1                  6e628cb66029        3 minutes ago       246MB
centos              7                   7e6257c9f8d8        8 weeks ago         203MB
centos              latest              0d120b6ccaa8        8 weeks ago         215MB
```



```
[root@dockers myimage]# docker rm -f 87968aeef02f
87968aeef02f
[root@dockers myimage]# docker rmi -f 6e628cb66029
Deleted: sha256:6e628cb66029cfeba35ee62f200c980242cbb82ad077750a416a7ae5793c5a5a
Deleted: sha256:1a10200708689aa6018977bf57a0449aed1c79896e7de44f2cced2be2a164023
Deleted: sha256:2132d5f33048b0c9497a81e4dad1e510e29a4eb9d113614fdced5814fd6f8de4
[root@dockers myimage]# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
centos              7                   7e6257c9f8d8        8 weeks ago         203MB
centos              latest              0d120b6ccaa8        8 weeks ago         215MB
[root@dockers myimage]# 
```

Note; Befoe you delete image make
Sure you are deleting depen
-dent containers first

Now load the image to the system using below.



```
[root@dockers myimage]# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
centos              7                   7e6257c9f8d8        8 weeks ago         203MB
centos              latest              0d120b6ccaa8        8 weeks ago         215MB
[root@dockers myimage]# ls -l mycustombackup.tar.gz
-rw------- 1 root root 90930068 Oct  9 16:01 mycustombackup.tar.gz
[root@dockers myimage]# docker load -i mycustombackup.tar.gz
0f463ff85269: Loading layer [==================================================>]  31.07MB/31.07MB
Loaded image ID: sha256:6e628cb66029cfeba35ee62f200c980242cbb82ad077750a416a7ae5793c5a5a
[root@dockers myimage]# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
<none>              <none>              6e628cb66029        9 minutes ago       246MB
centos              7                   7e6257c9f8d8        8 weeks ago         203MB
centos              latest              0d120b6ccaa8        8 weeks ago         215MB
[root@dockers myimage]# docker run -it --name mycustomtest2 6e628cb66029 /bin/bash
[dvsbatch4@6ca5008c0673 /]$ id -a
uid=1000(dvsbatch4) gid=1000(dvsbatch4) groups=1000(dvsbatch4)
[dvsbatch4@6ca5008c0673 /]$ telnet
telnet> q
[dvsbatch4@6ca5008c0673 /]$ 
```

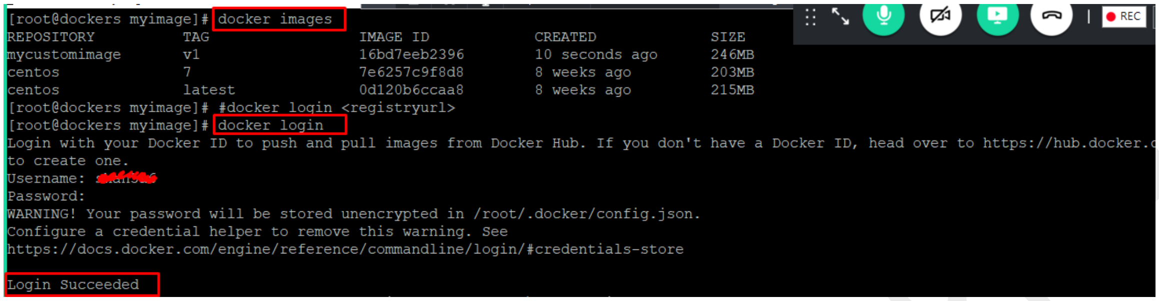
2nd Way via Dockerhub:

1. **Customize one docker image and try to tag it & push it to docker hub**
2. **Save & load the images locally**

3. Remove the local image & pull the dockerhub image pushed from step 1 & show the output.

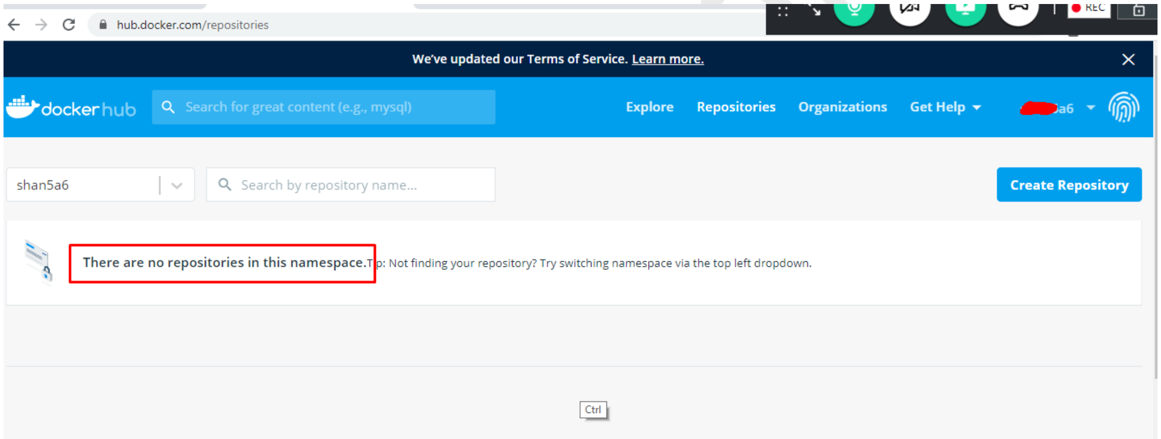
Note: User docker login & logout to login to the dockerhub

Login to the dockerhub:



```
[root@dockers myimage]# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
mycustomimage       v1                  16bd7eeb2396        10 seconds ago      246MB
centos              7                   7e6257c9f8d8        8 weeks ago         203MB
centos              latest              0d120b6ccaa8        8 weeks ago         215MB
[root@dockers myimage]# #docker login <registryurl>
[root@dockers myimage]# docker login
Login with your Docker ID to push and pull images from Docker Hub. If you don't have a Docker ID, head over to https://hub.docker.c
to create one.
Username: [redacted]
Password:
WARNING! Your password will be stored unencrypted in /root/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

Login Succeeded
```

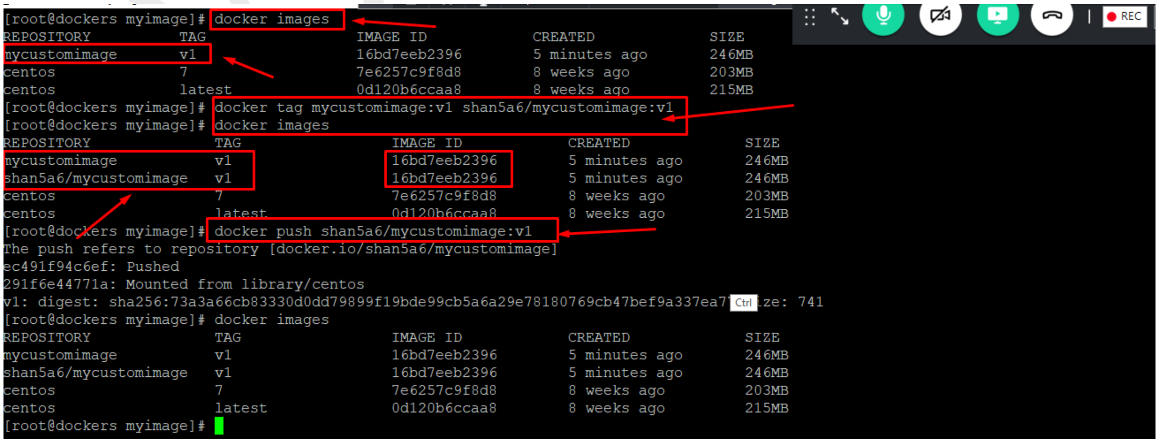
Before pushing image:



hub.docker.com/repositories
We've updated our Terms of Service. Learn more.
docker hub
Search for great content (e.g., mysql)
Explore
Repositories
Organizations
Get Help
[redacted]a6
shan5a6
Search by repository name...
Create Repository
Ctrl
REC

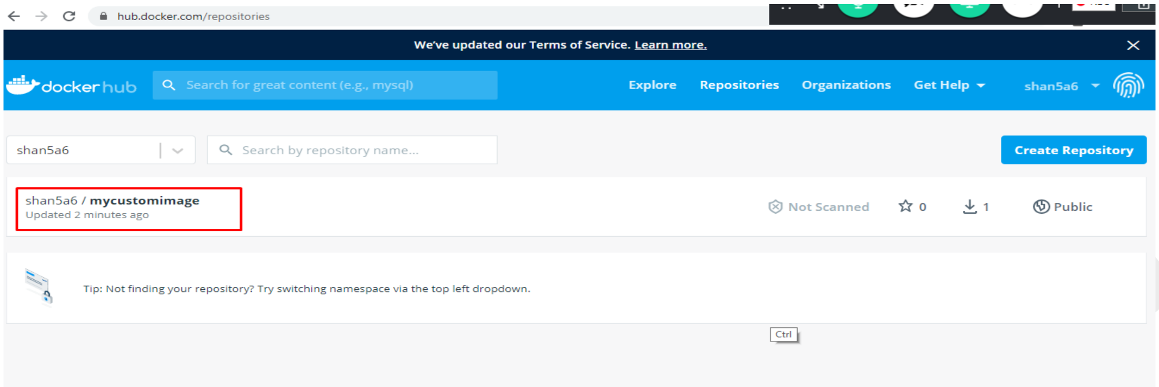
There are no repositories in this namespace. Tip: Not finding your repository? Try switching namespace via the top left dropdown.

Pushing image to dockerhub:



```
[root@dockers myimage]# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
mycustomimage       v1                  16bd7eeb2396        5 minutes ago       246MB
centos              7                   7e6257c9f8d8        8 weeks ago         203MB
centos              latest              0d120b6ccaa8        8 weeks ago         215MB
[root@dockers myimage]# docker tag mycustomimage:v1 shan5a6/mycustomimage:v1
[root@dockers myimage]# docker images
REPOSITORY              TAG                 IMAGE ID            CREATED             SIZE
mycustomimage           v1                  16bd7eeb2396        5 minutes ago       246MB
shan5a6/mycustomimage   v1                  16bd7eeb2396        5 minutes ago       246MB
centos                  7                   7e6257c9f8d8        8 weeks ago         203MB
centos                  latest              0d120b6ccaa8        8 weeks ago         215MB
[root@dockers myimage]# docker push shan5a6/mycustomimage:v1
The push refers to repository [docker.io/shan5a6/mycustomimage]
ec491f94c6ef: Pushed
291f6e44771a: Mounted from library/centos
v1: digest: sha256:73a3a66cb83330d0dd79899f19bde99cb5a6a29e78180769cb47bef9a337ea7 Ctrl ize: 741
[root@dockers myimage]# docker images
REPOSITORY              TAG                 IMAGE ID            CREATED             SIZE
mycustomimage           v1                  16bd7eeb2396        5 minutes ago       246MB
shan5a6/mycustomimage   v1                  16bd7eeb2396        5 minutes ago       246MB
centos                  7                   7e6257c9f8d8        8 weeks ago         203MB
centos                  latest              0d120b6ccaa8        8 weeks ago         215MB
[root@dockers myimage]#
```

Now if you verify in the dockerhub console:



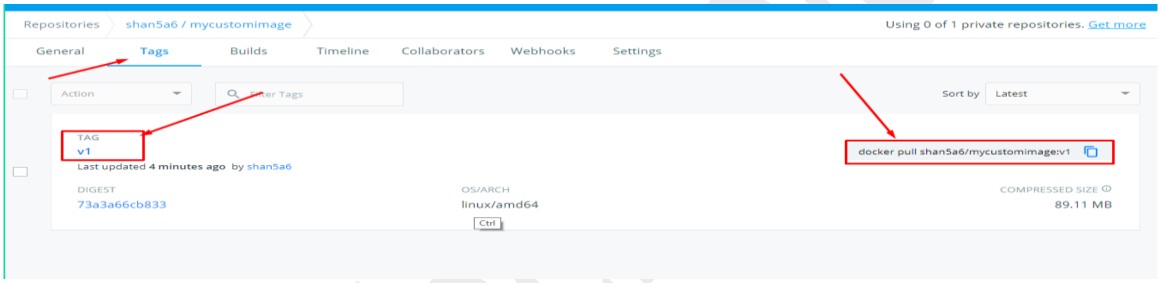
We've updated our Terms of Service. Learn more.

shan5a6

shan5a6 / **mycustomimage**
Updated 2 minutes ago

Tip: Not finding your repository? Try switching namespace via the top left dropdown.

Verify the tags for the pushed image:



Using 0 of 1 private repositories. Get more

TAG
v1
Last updated **4 minutes ago** by shan5a6

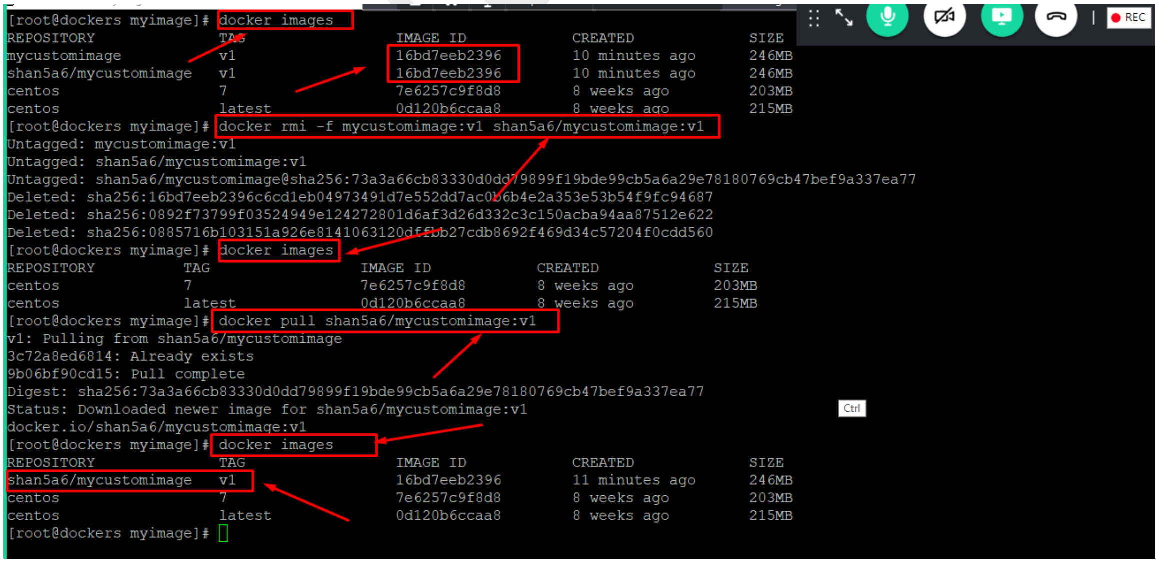
DIGEST
73a3a66cb833

OS/ARCH
linux/amd64

COMPRESSED SIZE
89.11 MB

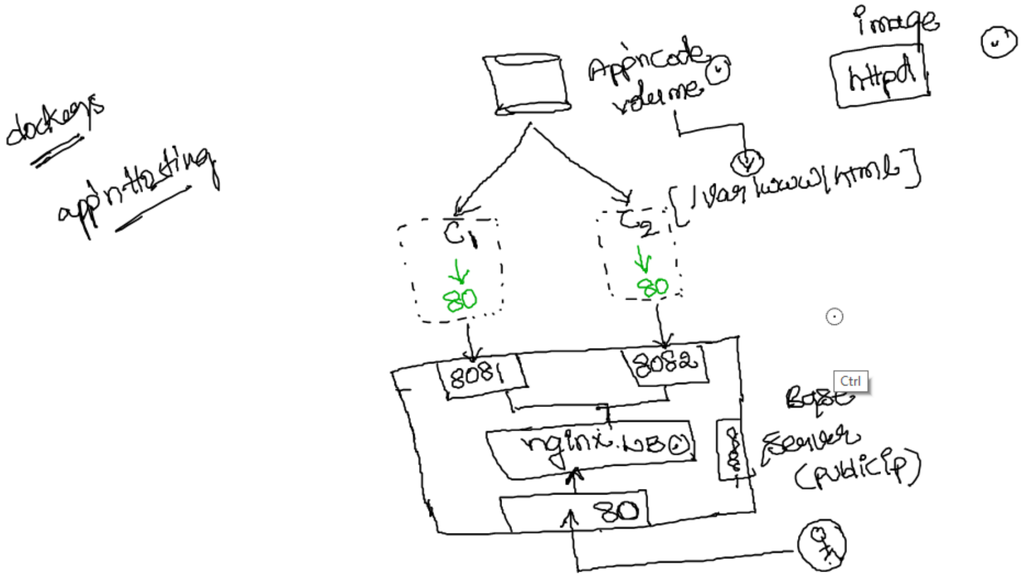
docker pull shan5a6/mycustomimage:v1

Final testing:

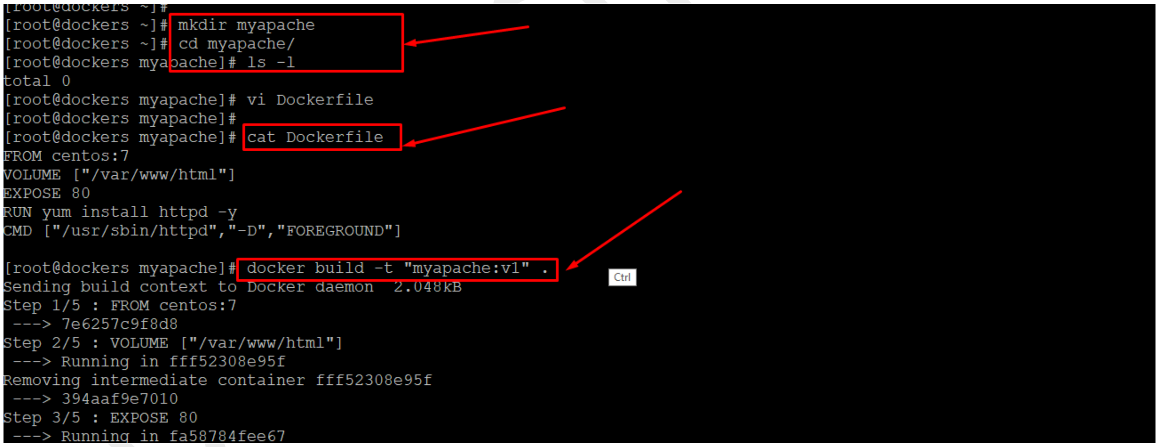


```
[root@dockers myimage]# docker images
REPOSITORY              TAG                 IMAGE ID            CREATED             SIZE
mycustomimage           v1                  16bd7eeb2396        10 minutes ago      246MB
shan5a6/mycustomimage   v1                  16bd7eeb2396        10 minutes ago      246MB
centos                  7                   7e6257c9f8d8        8 weeks ago         203MB
centos                  latest              0d120b6ccaa8        8 weeks ago         215MB
[root@dockers myimage]# docker rmi -f mycustomimage:v1 shan5a6/mycustomimage:v1
Untagged: mycustomimage:v1
Untagged: shan5a6/mycustomimage:v1
Untagged: shan5a6/mycustomimage@sha256:73a3a66cb83330d0dd79899f19bde99cb5a6a29e78180769cb47bef9a337ea77
Deleted: sha256:16bd7eeb2396c6cd1eb04973491d7e552dd7ac0b6b4e2a353e53b54f9fc94687
Deleted: sha256:0892f73799f03524949e124272801d6af3d26d332c3c150acba94aa87512e622
Deleted: sha256:0885716b103151a926e8141063120dffbb27cdb8692f469d34c57204f0cdd560
[root@dockers myimage]# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
centos              7                   7e6257c9f8d8        8 weeks ago         203MB
centos              latest              0d120b6ccaa8        8 weeks ago         215MB
[root@dockers myimage]# docker pull shan5a6/mycustomimage:v1
v1: Pulling from shan5a6/mycustomimage
3c72a8ed6814: Already exists
9b06bf90cd15: Pull complete
Digest: sha256:73a3a66cb83330d0dd79899f19bde99cb5a6a29e78180769cb47bef9a337ea77
Status: Downloaded newer image for shan5a6/mycustomimage:v1
docker.io/shan5a6/mycustomimage:v1
[root@dockers myimage]# docker images
REPOSITORY              TAG                 IMAGE ID            CREATED             SIZE
shan5a6/mycustomimage   v1                  16bd7eeb2396        11 minutes ago      246MB
centos                  7                   7e6257c9f8d8        8 weeks ago         203MB
centos                  latest              0d120b6ccaa8        8 weeks ago         215MB
[root@dockers myimage]#
```

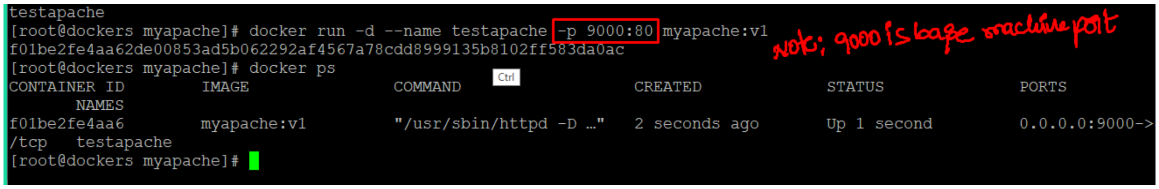
9. Application Hosting



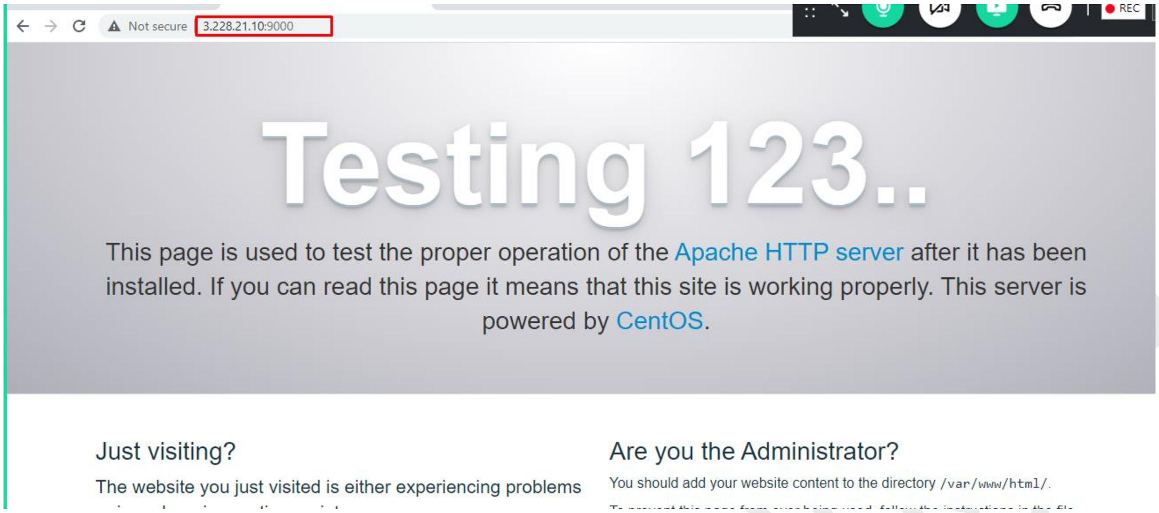
Let's build our own apache image:


```
[root@dockers ~]#
[root@dockers ~]# mkdir myapache
[root@dockers ~]# cd myapache/
[root@dockers myapache]# ls -l
total 0
[root@dockers myapache]# vi Dockerfile
[root@dockers myapache]#
[root@dockers myapache]# cat Dockerfile
FROM centos:7
VOLUME ["/var/www/html"]
EXPOSE 80
RUN yum install httpd -y
CMD ["/usr/sbin/httpd","-D","FOREGROUND"]

[root@dockers myapache]# docker build -t "myapache:v1" .
Sending build context to Docker daemon  2.048kB
Step 1/5 : FROM centos:7
 ---> 7e6257c9f8d8
Step 2/5 : VOLUME ["/var/www/html"]
 ---> Running in fff52308e95f
Removing intermediate container fff52308e95f
 ---> 394aaf9e7010
Step 3/5 : EXPOSE 80
 ---> Running in fa58784fee67
```

Testing our docker image:


```
testapache
[root@dockers myapache]# docker run -d --name testapache -p 9000:80 myapache:v1
f01be2fe4aa62de00853ad5b062292af4567a78cdd8999135b8102ff583da0ac
[root@dockers myapache]# docker ps
CONTAINER ID        IMAGE               COMMAND                  CREATED             STATUS              PORTS
       NAMES
f01be2fe4aa6        myapache:v1         "/usr/sbin/httpd -D …"   2 seconds ago       Up 1 second         0.0.0.0:9000->
/tcp   testapache
[root@dockers myapache]# █
```

note; 9000 is base machine port



Testing 123..

This page is used to test the proper operation of the Apache HTTP server after it has been installed. If you can read this page it means that this site is working properly. This server is powered by CentOS.

Just visiting?

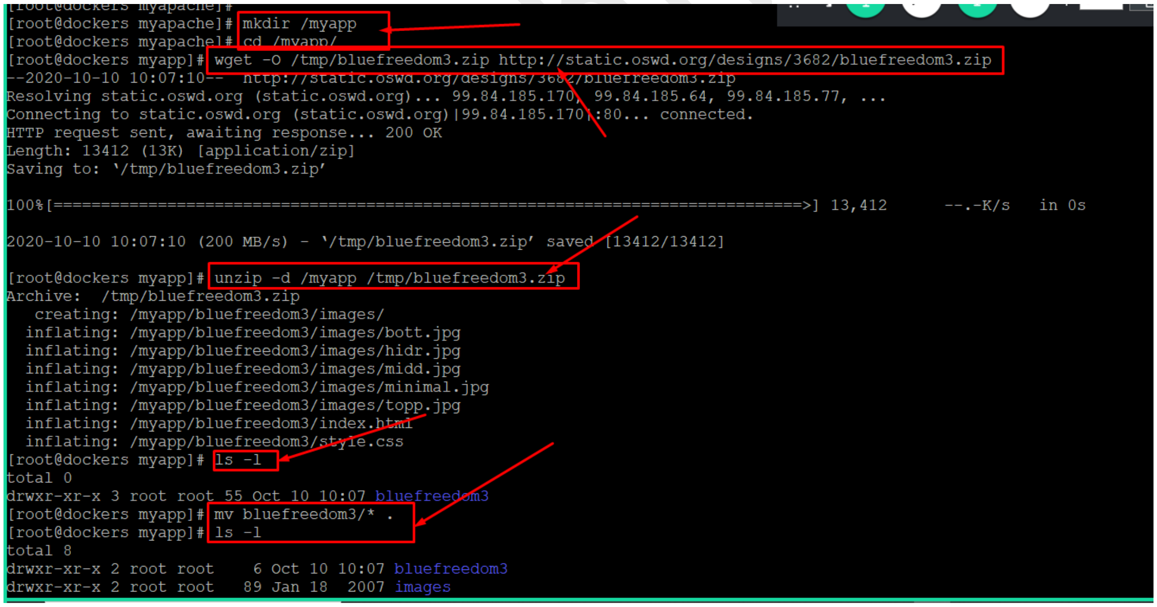
The website you just visited is either experiencing problems

Are you the Administrator?

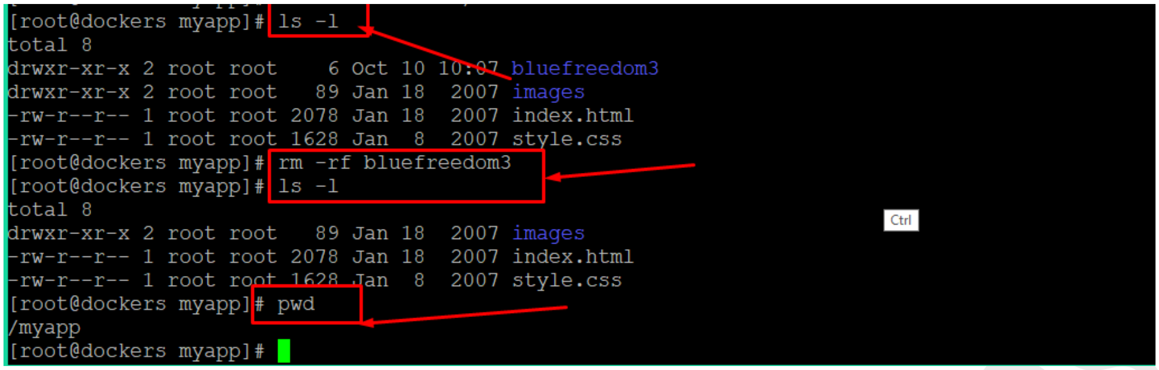
You should add your website content to the directory /var/www/html/.

Let's configure out application as defined above:

Downloading application code:

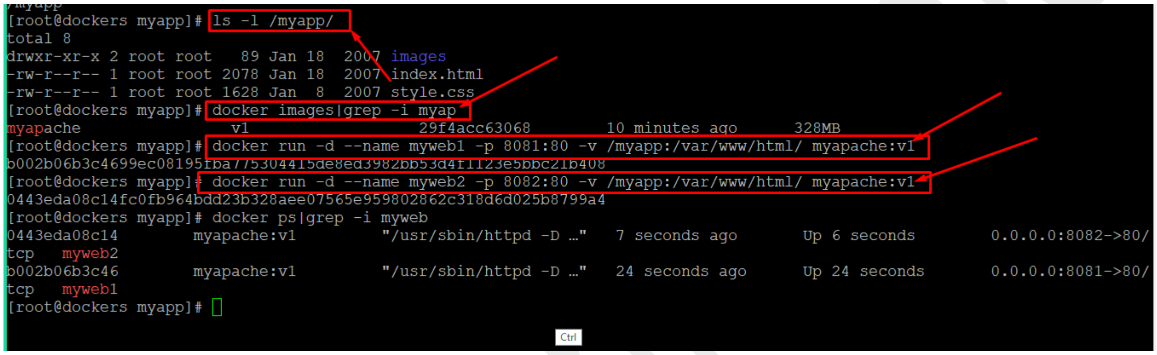


```
[root@dockers myapache]#
[root@dockers myapache]# mkdir /myapp
[root@dockers myapache]# cd /myapp/
[root@dockers myapp]# wget -O /tmp/bluefreedom3.zip http://static.oswd.org/designs/3682/bluefreedom3.zip
--2020-10-10 10:07:10--  http://static.oswd.org/designs/3682/bluefreedom3.zip
Resolving static.oswd.org (static.oswd.org)... 99.84.185.170, 99.84.185.64, 99.84.185.77, ...
Connecting to static.oswd.org (static.oswd.org)|99.84.185.170|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 13412 (13K) [application/zip]
Saving to: '/tmp/bluefreedom3.zip'

100%[==============================================================================>] 13,412      --.-K/s   in 0s

2020-10-10 10:07:10 (200 MB/s) - '/tmp/bluefreedom3.zip' saved [13412/13412]

[root@dockers myapp]# unzip -d /myapp /tmp/bluefreedom3.zip
Archive:  /tmp/bluefreedom3.zip
   creating: /myapp/bluefreedom3/images/
  inflating: /myapp/bluefreedom3/images/bott.jpg
  inflating: /myapp/bluefreedom3/images/hidr.jpg
  inflating: /myapp/bluefreedom3/images/midd.jpg
  inflating: /myapp/bluefreedom3/images/minimal.jpg
  inflating: /myapp/bluefreedom3/images/topp.jpg
  inflating: /myapp/bluefreedom3/index.html
  inflating: /myapp/bluefreedom3/style.css
[root@dockers myapp]# ls -l
total 0
drwxr-xr-x 3 root root 55 Oct 10 10:07 bluefreedom3
[root@dockers myapp]# mv bluefreedom3/* .
[root@dockers myapp]# ls -l
total 8
drwxr-xr-x 2 root root    6 Oct 10 10:07 bluefreedom3
drwxr-xr-x 2 root root   89 Jan 18  2007 images
```



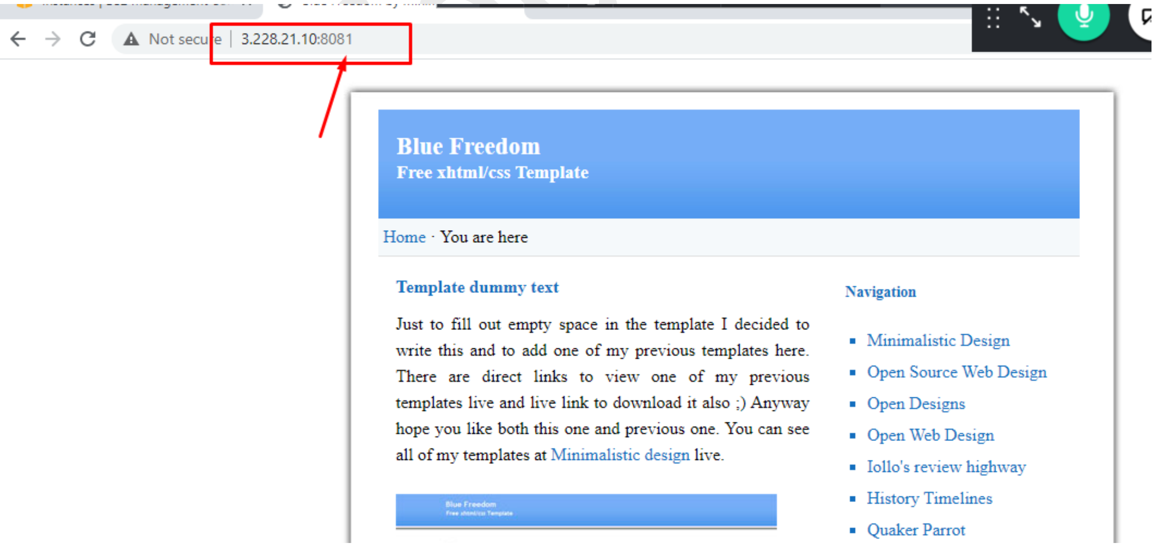
```
[root@dockers myapp]# ls -l
total 8
drwxr-xr-x 2 root root    6 Oct 10 10:07 bluefreedom3
drwxr-xr-x 2 root root   89 Jan 18  2007 images
-rw-r--r-- 1 root root 2078 Jan 18  2007 index.html
-rw-r--r-- 1 root root 1628 Jan  8  2007 style.css
[root@dockers myapp]# rm -rf bluefreedom3
[root@dockers myapp]# ls -l
total 8
drwxr-xr-x 2 root root   89 Jan 18  2007 images
-rw-r--r-- 1 root root 2078 Jan 18  2007 index.html
-rw-r--r-- 1 root root 1628 Jan  8  2007 style.css
[root@dockers myapp]# pwd
/myapp
[root@dockers myapp]#
```

Let's spin up the containers:



```
[root@dockers myapp]# ls -l /myapp/
total 8
drwxr-xr-x 2 root root   89 Jan 18  2007 images
-rw-r--r-- 1 root root 2078 Jan 18  2007 index.html
-rw-r--r-- 1 root root 1628 Jan  8  2007 style.css
[root@dockers myapp]# docker images|grep -i myap
myapache                  v1                 29f4acc63068        10 minutes ago      328MB
[root@dockers myapp]# docker run -d --name myweb1 -p 8081:80 -v /myapp:/var/www/html/ myapache:v1
b002b06b3c4699ec08195fba775304415de8ed3982bb53d4f1123e5bbc21b408
[root@dockers myapp]# docker run -d --name myweb2 -p 8082:80 -v /myapp:/var/www/html/ myapache:v1
0443eda08c14fc0fb964bdd23b328aee07565e959802862c318d6d025b8799a4
[root@dockers myapp]# docker ps|grep -i myweb
0443eda08c14        myapache:v1         "/usr/sbin/httpd -D …"   7 seconds ago       Up 6 seconds        0.0.0.0:8082->80/
tcp   myweb2
b002b06b3c46        myapache:v1         "/usr/sbin/httpd -D …"   24 seconds ago      Up 24 seconds       0.0.0.0:8081->80/
tcp   myweb1
[root@dockers myapp]#
```

Testing the application on containers:



Blue Freedom

Free xhtml/css Template

Home · You are here

Template dummy text

Just to fill out empty space in the template I decided to write this and to add one of my previous templates here. There are direct links to view one of my previous templates live and live link to download it also ;) Anyway hope you like both this one and previous one. You can see all of my templates at Minimalistic design live.

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- Open Source Web Design
- Open Designs
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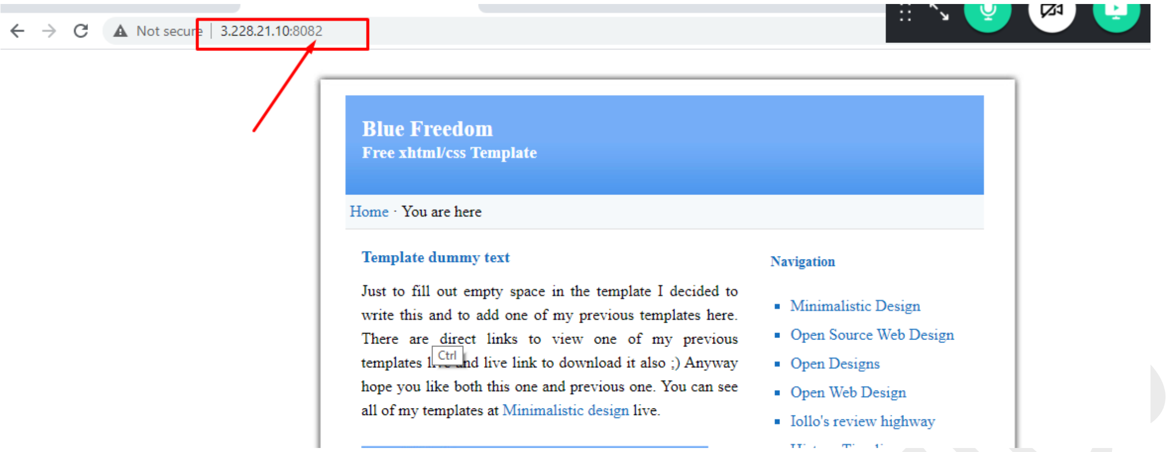
- Iollo's review highway
- History Timelines
- Quaker Parrot



Not secure | 3.228.21.10:8082

Blue Freedom
Free xhtml/css Template

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Template dummy text

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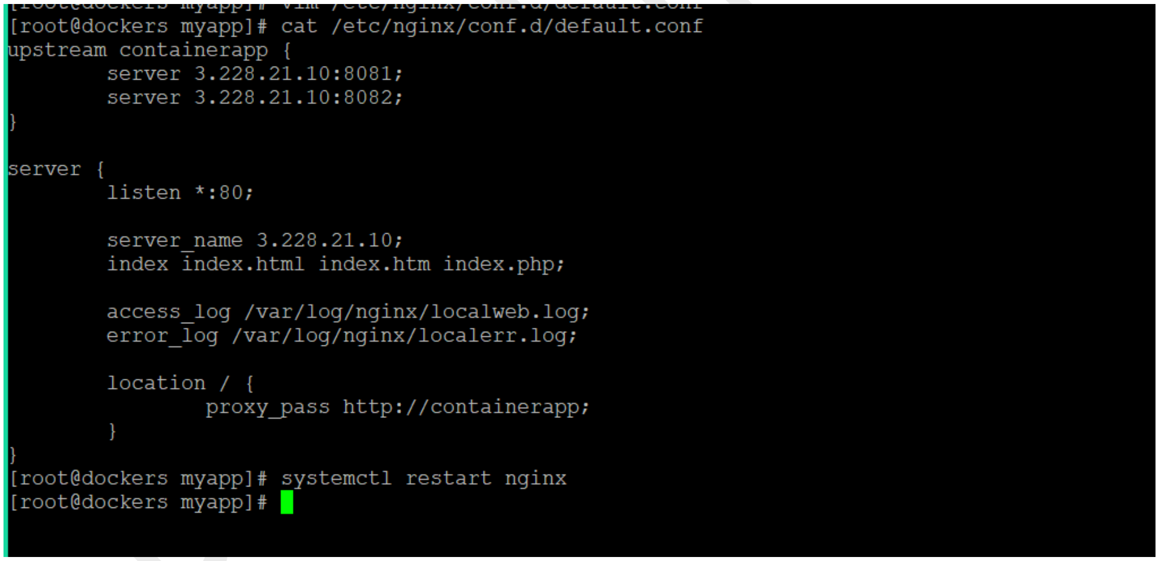
- Iollo's review highway

Now let's bring the Nginx LB on top of these two containers:

amazon-linux-extras install nginx1.12 -y
systemctl enable nginx
systemctl restart nginx



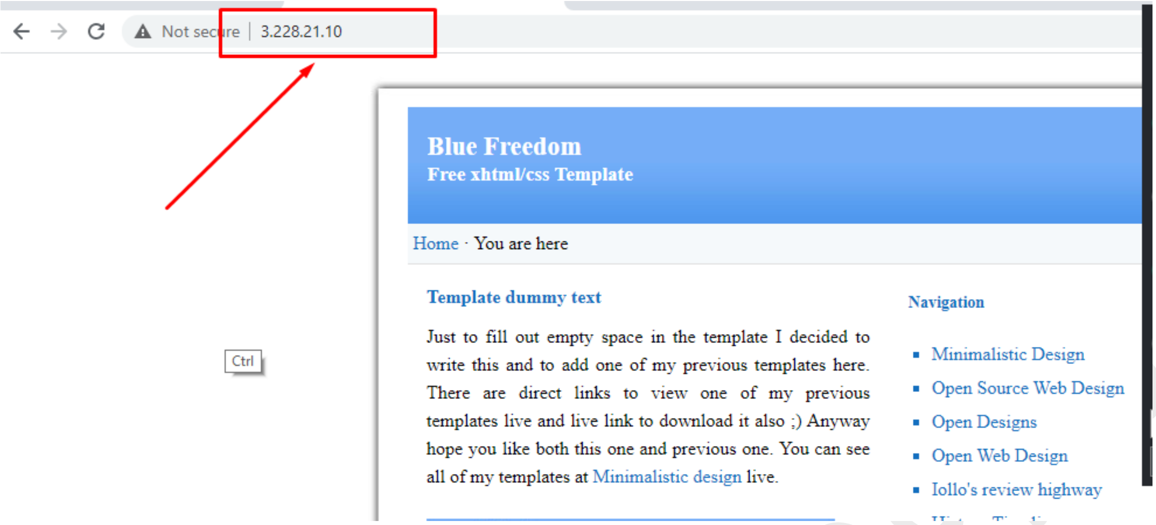
```
[root@dockers myapp]# vim /etc/nginx/conf.d/default.conf
[root@dockers myapp]# cat /etc/nginx/conf.d/default.conf
upstream containerapp {
        server 3.228.21.10:8081;
        server 3.228.21.10:8082;
}

server {
        listen *:80;

        server_name 3.228.21.10;
        index index.html index.htm index.php;

        access_log /var/log/nginx/localweb.log;
        error_log /var/log/nginx/localerr.log;

        location / {
                proxy_pass http://containerapp;
        }
}
[root@dockers myapp]# systemctl restart nginx
[root@dockers myapp]#
```



Blue Freedom
Free xhtml/css Template

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Template dummy text

Just to fill out empty space in the template I decided to write this and to add one of my previous templates here. There are direct links to view one of my previous templates live and live link to download it also ;) Anyway hope you like both this one and previous one. You can see all of my templates at Minimalistic design live.

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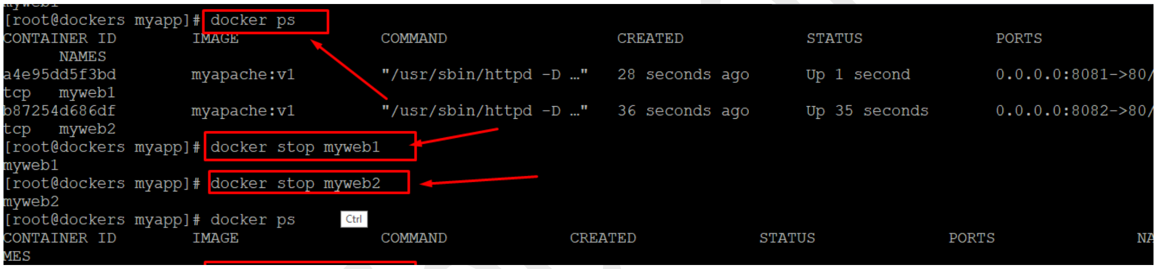
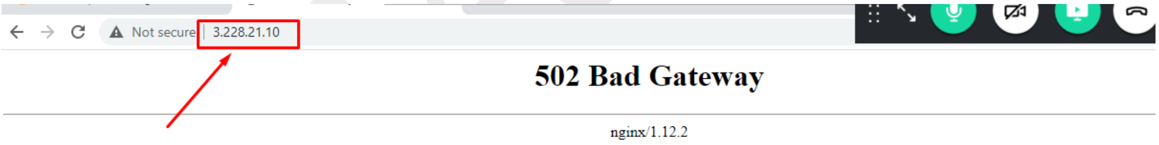
Testing our Application:

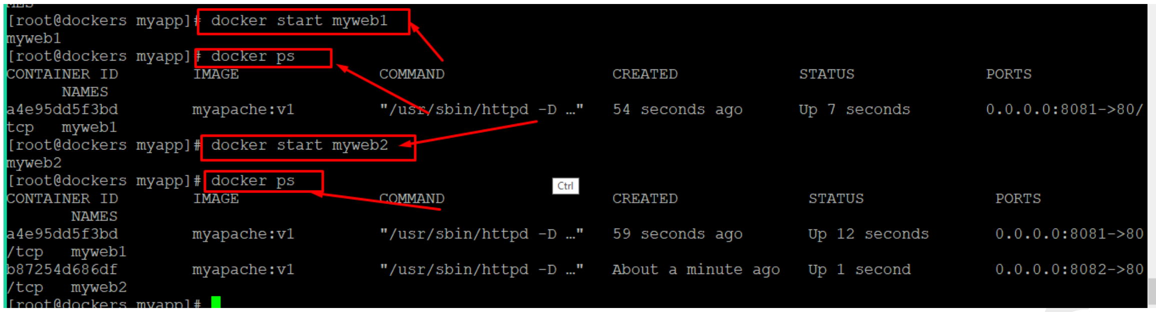


```
[root@dockers myapp]# docker ps
CONTAINER ID        IMAGE               COMMAND                  CREATED             STATUS              PORTS
      NAMES
a4e95dd5f3bd        myapache:v1         "/usr/sbin/httpd -D …"   28 seconds ago      Up 1 second         0.0.0.0:8081->80/
tcp   myweb1
b87254d686df        myapache:v1         "/usr/sbin/httpd -D …"   36 seconds ago      Up 35 seconds       0.0.0.0:8082->80/
tcp   myweb2
[root@dockers myapp]# docker stop myweb1
myweb1
[root@dockers myapp]# docker stop myweb2
myweb2
[root@dockers myapp]# docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS               NA
MES
```

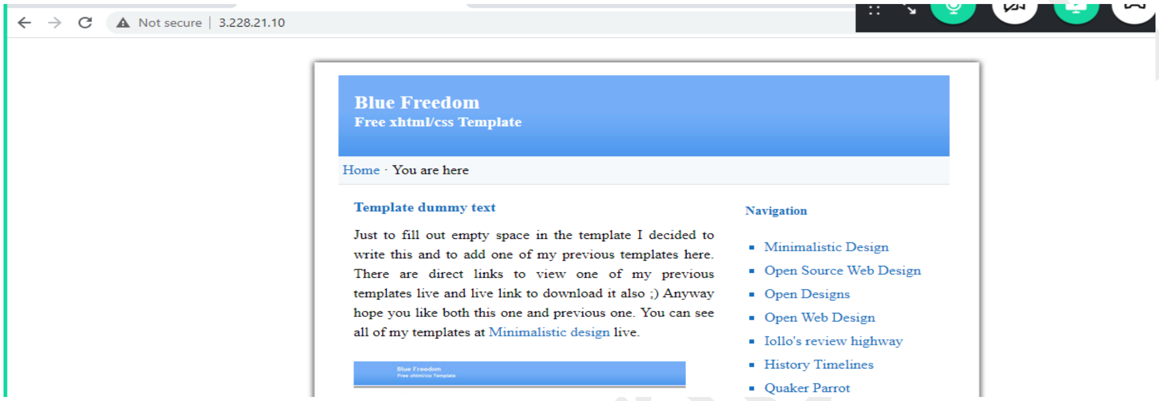


502 Bad Gateway

nginx/1.12.2



```
[root@dockers myapp]# docker start myweb1
myweb1
[root@dockers myapp]# docker ps
CONTAINER ID        IMAGE               COMMAND                  CREATED             STATUS              PORTS
      NAMES
a4e95dd5f3bd        myapache:v1         "/usr/sbin/httpd -D …"   54 seconds ago      Up 7 seconds        0.0.0.0:8081->80/
tcp   myweb1
[root@dockers myapp]# docker start myweb2
myweb2
[root@dockers myapp]# docker ps
CONTAINER ID        IMAGE               COMMAND                  CREATED             STATUS              PORTS
       NAMES
a4e95dd5f3bd        myapache:v1         "/usr/sbin/httpd -D …"   59 seconds ago      Up 12 seconds       0.0.0.0:8081->80
/tcp   myweb1
b87254d686df        myapache:v1         "/usr/sbin/httpd -D …"   About a minute ago  Up 1 second         0.0.0.0:8082->80
/tcp   myweb2
[root@dockers myapp]#
```



Blue Freedom
Free xhtml/css Template

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Template dummy text

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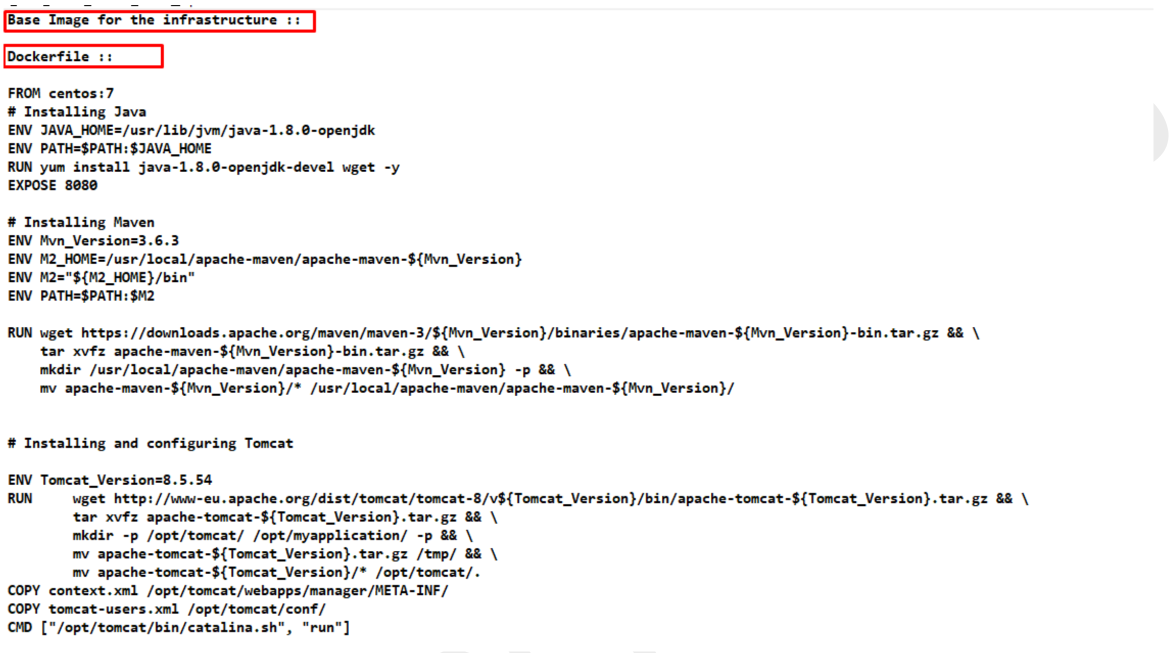
10. Migrating on prem Java Based applications to Dockers

Source code you can download from "https://github.com/shan5a6/javaDockerDeployment.git"

Base Image for the infrastructure:



```
Base Image for the infrastructure ::

Dockerfile ::

FROM centos:7
# Installing Java
ENV JAVA_HOME=/usr/lib/jvm/java-1.8.0-openjdk
ENV PATH=$PATH:$JAVA_HOME
RUN yum install java-1.8.0-openjdk-devel wget -y
EXPOSE 8080

# Installing Maven
ENV Mvn_Version=3.6.3
ENV M2_HOME=/usr/local/apache-maven/apache-maven-${Mvn_Version}
ENV M2="${M2_HOME}/bin"
ENV PATH=$PATH:$M2

RUN wget https://downloads.apache.org/maven/maven-3/${Mvn_Version}/binaries/apache-maven-${Mvn_Version}-bin.tar.gz && \
    tar xvfz apache-maven-${Mvn_Version}-bin.tar.gz && \
    mkdir /usr/local/apache-maven/apache-maven-${Mvn_Version} -p && \
    mv apache-maven-${Mvn_Version}/* /usr/local/apache-maven/apache-maven-${Mvn_Version}/


# Installing and configuring Tomcat

ENV Tomcat_Version=8.5.54
RUN     wget http://www-eu.apache.org/dist/tomcat/tomcat-8/v${Tomcat_Version}/bin/apache-tomcat-${Tomcat_Version}.tar.gz && \
        tar xvfz apache-tomcat-${Tomcat_Version}.tar.gz && \
        mkdir -p /opt/tomcat/ /opt/myapplication/ -p && \
        mv apache-tomcat-${Tomcat_Version}.tar.gz /tmp/ && \
        mv apache-tomcat-${Tomcat_Version}/* /opt/tomcat/.
COPY context.xml /opt/tomcat/webapps/manager/META-INF/
COPY tomcat-users.xml /opt/tomcat/conf/
CMD ["/opt/tomcat/bin/catalina.sh", "run"]
```

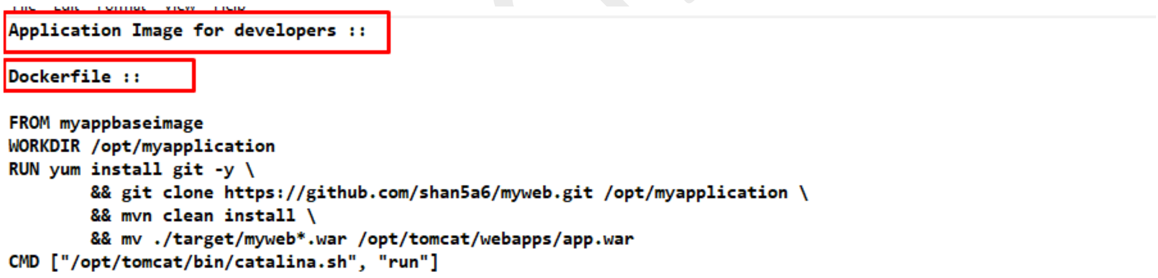
Dockerfile:

```
FROM centos:7
# Installing Java
ENV JAVA_HOME=/usr/lib/jvm/java-1.8.0-openjdk
ENV PATH=$PATH:$JAVA_HOME
RUN yum install java-1.8.0-openjdk-devel wget -y
EXPOSE 8080

# Installing Maven
ENV Mvn_Version=3.6.3
ENV M2_HOME=/usr/local/apache-maven/apache-maven-${Mvn_Version}
ENV M2="${M2_HOME}/bin"
ENV PATH=$PATH:$M2
```

```
RUN wget https://downloads.apache.org/maven/maven-3/${Mvn_Version}/binaries/apache-maven-${Mvn_Version}-bin.tar.gz && \
    tar xvfz apache-maven-${Mvn_Version}-bin.tar.gz && \
    mkdir /usr/local/apache-maven/apache-maven-${Mvn_Version} -p && \
    mv apache-maven-${Mvn_Version}/* /usr/local/apache-maven/apache-maven-${Mvn_Version}/
```

```
# Installing and configuring Tomcat

ENV Tomcat_Version=8.5.54
RUN      wget http://www-eu.apache.org/dist/tomcat/tomcat-8/v${Tomcat_Version}/bin/apache-tomcat-${Tomcat_Version}.tar.gz && \
         tar xvfz apache-tomcat-${Tomcat_Version}.tar.gz && \
        mkdir -p /opt/tomcat/ /opt/myapplication/ -p && \
         mv apache-tomcat-${Tomcat_Version}.tar.gz /tmp/ && \
         mv apache-tomcat-${Tomcat_Version}/* /opt/tomcat/.
COPY context.xml /opt/tomcat/webapps/manager/META-INF/
COPY tomcat-users.xml /opt/tomcat/conf/
CMD ["/opt/tomcat/bin/catalina.sh", "run"]
```

Application Image for developers:



Application Image for developers ::

Dockerfile ::

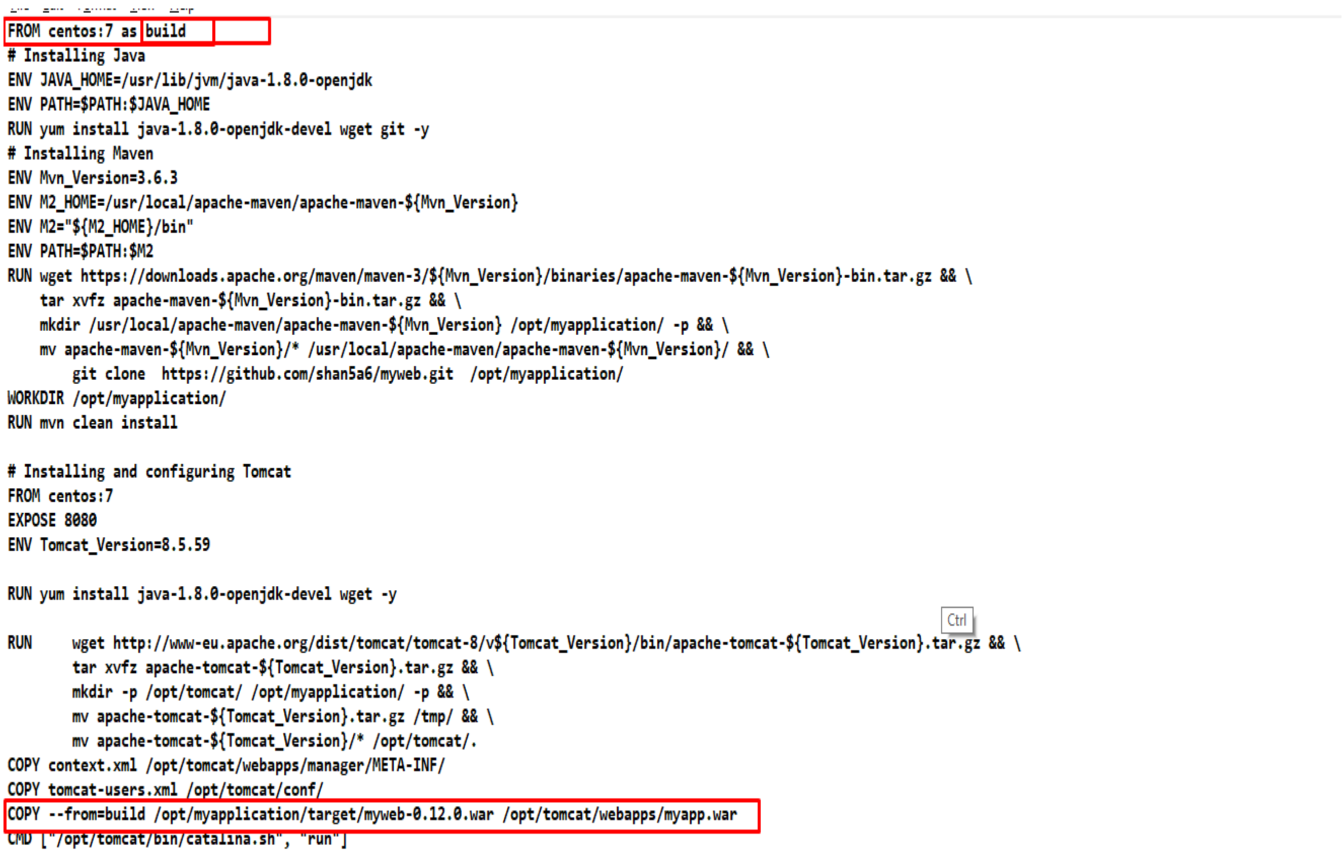
```
FROM myappbaseimage
WORKDIR /opt/myapplication
RUN yum install git -y \
        && git clone https://github.com/shan5a6/myweb.git /opt/myapplication \
        && mvn clean install \
        && mv ./target/myweb*.war /opt/tomcat/webapps/app.war
CMD ["/opt/tomcat/bin/catalina.sh", "run"]
```

Dockerfile:

```
FROM myappbaseimage
WORKDIR /opt/myapplication
RUN yum install git -y \
       && git clone https://github.com/shan5a6/myweb.git /opt/myapplication \
       && mvn clean install \
       && mv ./target/myweb*.war /opt/tomcat/webapps/app.war
CMD ["/opt/tomcat/bin/catalina.sh", "run"]
```

11. Multistage Builds

Multi stage build helps to reduce the size of the images i.e., we are gonna divide our docker images in to build & run images.



```
FROM centos:7 as build
# Installing Java
ENV JAVA_HOME=/usr/lib/jvm/java-1.8.0-openjdk
ENV PATH=$PATH:$JAVA_HOME
RUN yum install java-1.8.0-openjdk-devel wget git -y
# Installing Maven
ENV Mvn_Version=3.6.3
ENV M2_HOME=/usr/local/apache-maven/apache-maven-${Mvn_Version}
ENV M2="${M2_HOME}/bin"
ENV PATH=$PATH:$M2
RUN wget https://downloads.apache.org/maven/maven-3/${Mvn_Version}/binaries/apache-maven-${Mvn_Version}-bin.tar.gz && \
    tar xvfz apache-maven-${Mvn_Version}-bin.tar.gz && \
    mkdir /usr/local/apache-maven/apache-maven-${Mvn_Version} /opt/myapplication/ -p && \
    mv apache-maven-${Mvn_Version}/* /usr/local/apache-maven/apache-maven-${Mvn_Version}/ && \
        git clone  https://github.com/shan5a6/myweb.git  /opt/myapplication/
WORKDIR /opt/myapplication/
RUN mvn clean install

# Installing and configuring Tomcat
FROM centos:7
EXPOSE 8080
ENV Tomcat_Version=8.5.59

RUN yum install java-1.8.0-openjdk-devel wget -y

RUN     wget http://www-eu.apache.org/dist/tomcat/tomcat-8/v${Tomcat_Version}/bin/apache-tomcat-${Tomcat_Version}.tar.gz && \
        tar xvfz apache-tomcat-${Tomcat_Version}.tar.gz && \
        mkdir -p /opt/tomcat/ /opt/myapplication/ -p && \
        mv apache-tomcat-${Tomcat_Version}.tar.gz /tmp/ && \
        mv apache-tomcat-${Tomcat_Version}/* /opt/tomcat/.
COPY context.xml /opt/tomcat/webapps/manager/META-INF/
COPY tomcat-users.xml /opt/tomcat/conf/
COPY --from=build /opt/myapplication/target/myweb-0.12.0.war /opt/tomcat/webapps/myapp.war
CMD ["/opt/tomcat/bin/catalina.sh", "run"]
```

Code:

```
FROM centos:7 as build
# Installing Java
ENV JAVA_HOME=/usr/lib/jvm/java-1.8.0-openjdk
ENV PATH=$PATH:$JAVA_HOME
RUN yum install java-1.8.0-openjdk-devel wget git -y


# Installing Maven
ENV Mvn_Version=3.6.3
ENV M2_HOME=/usr/local/apache-maven/apache-maven-${Mvn_Version}
ENV M2="${M2_HOME}/bin"
ENV PATH=$PATH:$M2
```

```
RUN wget https://downloads.apache.org/maven/maven-3/${Mvn_Version}/binaries/apache-maven-${Mvn_Version}-bin.tar.gz && \
   tar xvfz apache-maven-${Mvn_Version}-bin.tar.gz && \
   mkdir /usr/local/apache-maven/apache-maven-${Mvn_Version} /opt/myapplication/ -p && \
   mv apache-maven-${Mvn_Version}/* /usr/local/apache-maven/apache-maven-${Mvn_Version}/ && \
       git clone  https://github.com/shan5a6/myweb.git  /opt/myapplication/
WORKDIR /opt/myapplication/
RUN mvn clean install

# Installing and configuring Tomcat
FROM centos:7
EXPOSE 8080
ENV Tomcat_Version=8.5.59

RUN yum install java-1.8.0-openjdk-devel wget -y

RUN     wget http://www-eu.apache.org/dist/tomcat/tomcat-8/v${Tomcat_Version}/bin/apache-tomcat-${Tomcat_Version}.tar.gz && \
      tar xvfz apache-tomcat-${Tomcat_Version}.tar.gz && \
      mkdir -p /opt/tomcat/ /opt/myapplication/ -p && \
      mv apache-tomcat-${Tomcat_Version}.tar.gz /tmp/ && \
      mv apache-tomcat-${Tomcat_Version}/* /opt/tomcat/.
COPY context.xml /opt/tomcat/webapps/manager/META-INF/
COPY tomcat-users.xml /opt/tomcat/conf/
COPY --from=build /opt/myapplication/target/myweb-0.12.0.war /opt/tomcat/webapps/myapp.war
CMD ["/opt/tomcat/bin/catalina.sh", "run"]
```