

 VIT Vidyalankar Institute of Technology ACCREDITED A+ BY NAAC	Department of Information Technology
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Semester	B.E. Semester VIII – INFT
Subject	DevOps Lab
Subject Professor In -charge	Prof. Rohit Barve

Student Name	Nupur Sawarkar
Roll Number	18101B0030
Grade and Subject Teacher's Signature	

Experiment Number	3	
Experiment Title	To Install and Configure Docker for creating Containers.	
Resources / Apparatus Required	Hardware: <ul style="list-style-type: none"> • Intel Core i3/i5/i7 Processor with Intel VT-X support. • 4 GB RAM • 500 GB Hard disks 	Software: Operating systems: Linux
Theory	<p>DOCKER</p> <p>Docker is an open-source containerization platform. It enables developers to package applications into containers—standardized executable components combining application source code with the operating system (OS) libraries and dependencies required to run that code in any environment. Containers simplify delivery of distributed applications, and have become increasingly</p>	

popular as organizations shift to cloud-native development and hybrid multicloud environments.

Developers can create containers without Docker, but the platform makes it easier, simpler, and safer to build, deploy and manage containers. Docker is essentially a toolkit that enables developers to build, deploy, run, update, and stop containers using simple commands and work-saving automation through a single API.

CONTAINER

Containers are made possible by process isolation and virtualization capabilities built into the Linux kernel. These capabilities – such as control *groups* (Cgroups) for allocating resources among processes, and *namespaces* for restricting a processes access or visibility into other resources or areas of the system – enable multiple application components to share the resources of a single instance of the host operating system in much the same way that a hypervisor enables multiple virtual machines (VMs) to share the CPU, memory and other resources of a single hardware server.

Steps

sudo apt-get install docker.io

The sudo command is used to ensure that the command runs with root access.

Apt -get This method installs packages from the Internet on to the Linux system.

```
nupur_sawarkar@LAPTOP-592C8JDN: ~  
nupur_sawarkar@LAPTOP-592C8JDN:~$ sudo apt-get install docker.io  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following additional packages will be installed:  
  bridge-utils containerd dns-root-data dnsmasq-base libidn11 pigz runc ubuntu-fan  
Suggested packages:  
  ifupdown aufs-tools cgroupfs-mount | cgroup-lite debootstrap docker-doc rinse zfs-fuse | zfsutils  
The following NEW packages will be installed:  
  bridge-utils containerd dns-root-data dnsmasq-base docker.io libidn11 pigz runc ubuntu-fan  
0 upgraded, 9 newly installed, 0 to remove and 9 not upgraded.  
Need to get 74.5 MB of archives.  
After this operation, 361 MB of additional disk space will be used.  
Do you want to continue? [Y/n] y  
Get:1 http://archive.ubuntu.com/ubuntu focal/universe amd64 pigz amd64 2.4-1 [57.4 kB]  
Get:2 http://archive.ubuntu.com/ubuntu focal/main amd64 bridge-utils amd64 1.6-2ubuntu1 [30.5 kB]  
Get:3 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 runc amd64 1.0.1-0ubuntu2~20.04.1 [4155 kB]  
Get:4 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 containerd amd64 1.5.5-0ubuntu3~20.04.1 [33.0 MB]  
Get:5 http://archive.ubuntu.com/ubuntu focal/main amd64 dns-root-data all 2019052802 [5300 B]  
Get:6 http://archive.ubuntu.com/ubuntu focal/main amd64 libidn11 amd64 1.33-2.2ubuntu2 [46.2 kB]  
Get:7 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 dnsmasq-base amd64 2.80-1.1ubuntu1.4 [315 kB]  
Get:8 http://archive.ubuntu.com/ubuntu focal-updates/universe amd64 docker.io amd64 20.10.7-0ubuntu5~20.04.2 [36.9 MB]  
Get:9 http://archive.ubuntu.com/ubuntu focal/main amd64 ubuntu-fan all 0.12.13 [34.5 kB]  
Fetched 74.5 MB in 18s (4140 kB/s)  
Preconfiguring packages ...  
Selecting previously unselected package pigz.  
(Reading database ... 32299 files and directories currently installed.)  
Preparing to unpack .../0-pigz_2.4-1_amd64.deb ...  
Unpacking pigz (2.4-1) ...  
Selecting previously unselected package bridge-utils.
```

sudo docker --version

It is used to ensure the Docker command returns the Docker version installed.

```
nupur_sawarkar@LAPTOP-592C8JDN: ~  
nupur_sawarkar@LAPTOP-592C8JDN:~$ sudo docker --version  
[sudo] password for nupur_sawarkar:  
Docker version 20.10.7, build 20.10.7-0ubuntu5~20.04.2  
nupur_sawarkar@LAPTOP-592C8JDN:~$ sudo docker run hello  
Unable to find image 'hello:latest' locally  
docker: Error response from daemon: pull access denied for hello, repository does not exist or may require 'docker login'  
': denied: requested access to the resource is denied.  
See 'docker run --help'.  
nupur_sawarkar@LAPTOP-592C8JDN:~$ sudo docker pull ubuntu  
Using default tag: latest  
latest: Pulling from library/ubuntu  
08c01a0ec47e: Pull complete  
Digest: sha256:669e010b58baf5beb2836b253c1fd5768333f0d1dbcb834f7c07a4dc93f474be  
Status: Downloaded newer image for ubuntu:latest  
docker.io/library/ubuntu:latest  
nupur_sawarkar@LAPTOP-592C8JDN:~$
```

sudo docker pull ubuntu

sudo docker images

This command is used to display all the images currently installed on the system.

sudo docker run -it -d ubuntu

This command is used to create a container from an image.

sudo docker ps

This command is used to list the running containers.

```
root@116d2afda285: /
See 'docker run --help'.
hupur_sawarkar@LAPTOP-592C83DN:~$ sudo docker pull ubuntu
Using default tag: latest
latest: Pulling from library/ubuntu
08c01a0ec47e: Pull complete
Digest: sha256:669e010b58baf5beb2836b253c1fd5768333f0d1dbcb834f7c07a4dc93f474be
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest
hupur_sawarkar@LAPTOP-592C83DN:~$ sudo docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
ubuntu latest 54c9d81cbb44 3 weeks ago 72.8MB
hupur_sawarkar@LAPTOP-592C83DN:~$ sudo docker run -it -d
"docker run" requires at least 1 argument.
See 'docker run --help'.

Usage: docker run [OPTIONS] IMAGE [COMMAND] [ARG...]

Run a command in a new container
hupur_sawarkar@LAPTOP-592C83DN:~$ sudo docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
116d2afda2858a7bc895052a2fe393aa8f137fce6f897d7dfd65e553aa612d68
hupur_sawarkar@LAPTOP-592C83DN:~$ sudo docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
116d2afda285 ubuntu "bash" About a minute ago Up 59 seconds awesome_sanderson
```

sudo docker exec -it 'Container Id' bash

This command is used to access the running container.

```
root@116d2afda285:/
mupur_sawarkar@LAPTOP-592C0JDN:~$ sudo docker exec -it 116d2afda285 bash
root@116d2afda285:/# apt-get update
Get:1 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:2 http://archive.ubuntu.com/ubuntu focal InRelease [265 kB]
Get:3 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 Packages [25.8 kB]
Get:4 http://archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:5 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [1580 kB]
Get:6 http://archive.ubuntu.com/ubuntu focal-backports InRelease [108 kB]
Get:7 http://archive.ubuntu.com/ubuntu focal/universe amd64 Packages [11.3 MB]
Get:8 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 Packages [982 kB]
Get:9 http://security.ubuntu.com/ubuntu focal-security/universe amd64 Packages [842 kB]
Get:10 http://archive.ubuntu.com/ubuntu focal/main amd64 Packages [1275 kB]
Get:11 http://archive.ubuntu.com/ubuntu focal/restricted amd64 Packages [33.4 kB]
Get:12 http://archive.ubuntu.com/ubuntu focal/multiverse amd64 Packages [177 kB]
Get:13 http://archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [1136 kB]
Get:14 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [2008 kB]
Get:15 http://archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 Packages [29.4 kB]
Get:16 http://archive.ubuntu.com/ubuntu focal-updates/restricted amd64 Packages [1052 kB]
Get:17 http://archive.ubuntu.com/ubuntu focal-backports/universe amd64 Packages [25.2 kB]
Get:18 http://archive.ubuntu.com/ubuntu focal-backports/main amd64 Packages [50.8 kB]
Fetched 21.2 MB in 6s (3549 kB/s)
Reading package lists... Done
root@116d2afda285:/#
```

Apt-get install apache2

To install apache2

```
root@116d2afda285:/# apt-get install apache2
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  apache2-bin apache2-data apache2-utils ca-certificates file krb5-locales libapr1 libaprutil1 libaprutil1-dbd-sqlite3
  libaprutil1-ldap libasn1-8-heimdal libbrotli1 libcurl4 libexpat1 libgdbm-compat4 libgdbm6 libgssapi-krb5-2
  libgssapi3-heimdal libhcrypto4-heimdal libheimbase1-heimdal libheimntlm0-heimdal libhx509-5-heimdal libicu66
  libjansson4 libk5crypto3 libkeyutils1 libkrb5-26-heimdal libkrb5-3 libkrb5support0 libldap-2.4-2 libldap-common
  liblua5.2-0 libmagic-mgc libmagic1 libnghttp2-14 libperl5.30 libpsl5 libroken18-heimdal librtmp1 libsasl2-2
  libsasl2-modules libsasl2-modules-db libsasl2-modules-gssapi-mit libsasl2-modules-gssapi-heimdal libsasl2-modules-ldap
  libsasl2-modules-otp libsasl2-modules-sql libssh-4 libssl1.1 libwind0-heimdal libxml2 mime-support netbase
  openssl perl perl-modules-5.30 publicsuffix ssl-cert tzdata xz-utils
Suggested packages:
  apache2-doc apache2-suexec-pristine | apache2-suexec-custom www-browser ufw gdbm-l10n krb5-doc krb5-user
  libsasl2-modules-gssapi-mit | libsasl2-modules-gssapi-heimdal libsasl2-modules-ldap libsasl2-modules-otp
  libsasl2-modules-sql perl-doc libterm-readline-gnu-perl | libterm-readline-perl-perl make libb-debug-perl
  liblocale-codes-perl openssl-blacklist
The following NEW packages will be installed:
  apache2 apache2-bin apache2-data apache2-utils ca-certificates file krb5-locales libapr1 libaprutil1
  libaprutil1-dbd-sqlite3 libaprutil1-ldap libasn1-8-heimdal libbrotli1 libcurl4 libexpat1 libgdbm-compat4 libgdbm6
  libgssapi-krb5-2 libgssapi3-heimdal libhcrypto4-heimdal libheimbase1-heimdal libheimntlm0-heimdal libhx509-5-heimdal
  libicu66 libjansson4 libk5crypto3 libkeyutils1 libkrb5-26-heimdal libkrb5-3 libkrb5support0 libldap-2.4-2
  libldap-common liblua5.2-0 libmagic-mgc libmagic1 libnghttp2-14 libperl5.30 libpsl5 libroken18-heimdal librtmp1
  libsasl2-2 libsasl2-modules libsasl2-modules-db libsasl2-modules-gssapi-mit libsasl2-modules-gssapi-heimdal
  libsasl2-modules-ldap libsasl2-modules-otp libsasl2-modules-sql libssh-4 libssl1.1 libwind0-heimdal libxml2
  mime-support netbase openssl perl perl-modules-5.30 publicsuffix ssl-cert tzdata xz-utils
0 upgraded, 57 newly installed, 0 to remove and 10 not upgraded.
Need to get 24.1 MB of archives.
After this operation, 117 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 perl-modules-5.30 all 5.30.0-9ubuntu0.2 [2738 kB]
```

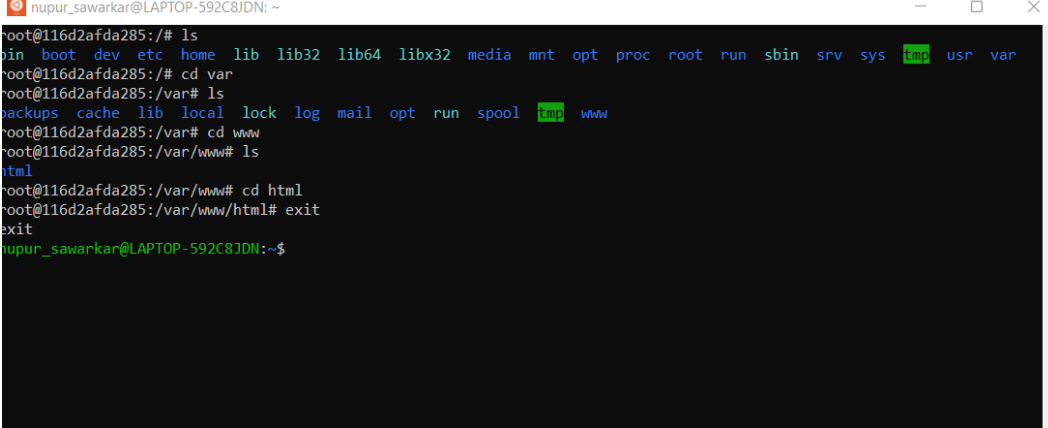
Service apache2 start

To start the service

```
root@116d2afda285:/# service apache2 start
* Starting Apache httpd web server apache2
AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 172.17.0.2. Set the 'ServerName' directive globally to suppress this message
*
root@116d2afda285:/# ls
bin boot dev etc home lib lib32 lib64 libx32 media mnt opt proc root run sbin srv sys tmp usr var
root@116d2afda285:/#
```

exit

To exit the container.

A terminal window titled 'nupur_sawarkar@LAPTOP-592C8JDN: ~' with standard window controls. The terminal shows a root shell inside a container with ID 116d2afda285. The user runs 'ls' showing system directories, 'cd var', 'ls' showing subdirectories including 'tmp', 'cd www', 'ls' showing 'html', 'cd html', and finally 'exit'. The prompt returns to the host machine.

```
nupur_sawarkar@LAPTOP-592C8JDN: ~  
root@116d2afda285:/# ls  
bin boot dev etc home lib lib32 lib64 libx32 media mnt opt proc root run sbin srv sys tmp usr var  
root@116d2afda285:/# cd var  
root@116d2afda285:/var# ls  
backups cache lib local lock log mail opt run spool tmp www  
root@116d2afda285:/var# cd www  
root@116d2afda285:/var/www# ls  
html  
root@116d2afda285:/var/www# cd html  
root@116d2afda285:/var/www/html# exit  
exit  
nupur_sawarkar@LAPTOP-592C8JDN:~$
```

Conclusion:

Thus installed and configured Docker for creating container.