



Department of Computer Science and Engineering (Data Science)

Subject: Data Engineering (DJ19DSL604)

AY: 2022-23

Experiment 2

(Infrastructure Implementation)

Name : Rishabh Singhvi

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BATCH : D2

Aim: Hands on experience of Dockers and Kubernetes.

Theory:

Docker Overview

Docker is an open platform for developing, shipping, and running applications. Docker enables you to separate your applications from your infrastructure so you can deliver software quickly. With Docker, you can manage your infrastructure in the same ways you manage your applications. By taking advantage of Docker's methodologies for shipping, testing, and deploying code quickly, you can significantly reduce the delay between writing code and running it in production.

The Docker Platform

Docker provides the ability to package and run an application in a loosely isolated environment called a container. The isolation and security allows you to run many containers simultaneously on a given host. Containers are lightweight and contain everything needed to run the application, so you do not need to rely on what is currently installed on the host. You can easily share containers while you work, and be sure that everyone you share with gets the same container that works in the same way.

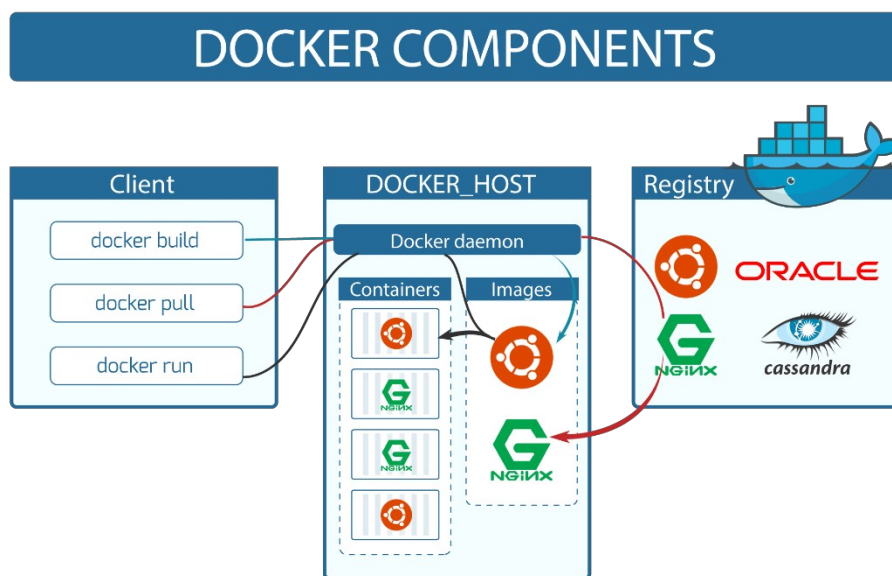
Docker provides tooling and a platform to manage the lifecycle of your containers:

- Develop your application and its supporting components using containers.



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- The container becomes the unit for distributing and testing your application.
- When you're ready, deploy your application into your production environment, as a container or an orchestrated service. This works the same whether your production environment is a local data center, a cloud provider, or a hybrid of the two.



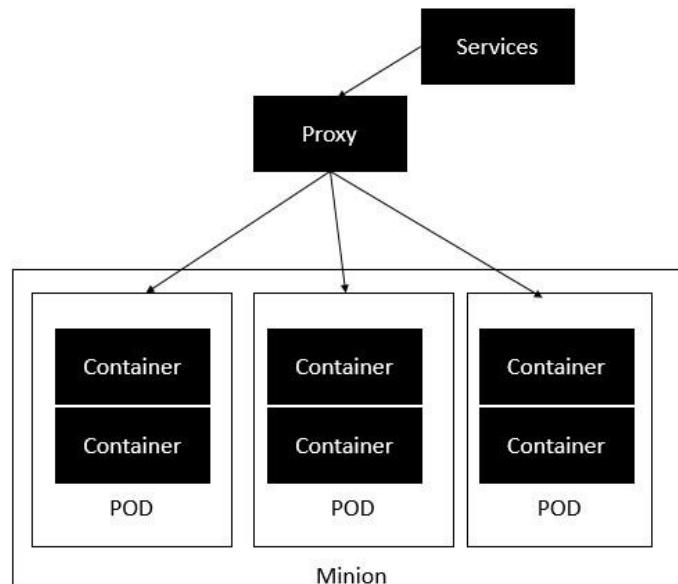
Kubernetes

Kubernetes is an orchestration framework for Docker containers which helps expose containers as services to the outside world. For example, you can have two services – One service would contain nginx and mongoDB, and another service would contain nginx and redis. Each service can have an IP or service point which can be connected by other applications. Kubernetes is then used to manage these services.

The following diagram shows in a simplistic format how Kubernetes works from an architecture point of view.



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The minion is the node on which all the services run. You can have many minions running at one point in time. Each minion will host one or more POD. Each POD is like hosting a service. Each POD then contains the Docker containers. Each POD can host a different set of Docker containers. The proxy is then used to control the exposing of these services to the outside world.

Kubernetes has several components in its architecture. The role of each component is explained below & minus;

etcd – This component is a highly available key-value store that is used for storing shared configuration and service discovery. Here the various applications will be able to connect to the services via the discovery service.

Flannel – This is a backend network which is required for the containers.

kube-apiserver – This is an API which can be used to orchestrate the Docker containers.

kube-controller-manager – This is used to control the Kubernetes services.

kube-scheduler – This is used to schedule the containers on hosts.



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Kubelet – This is used to control the launching of containers via manifest files.

kube-proxy – This is used to provide network proxy services to the outside world.

Lab Assignment:

1. Installation of Docker and Kubernetes on Ubuntu 20.4.5.
2. Group Activity (3 students): Create two Docker containers. One with an OS image and another with Node.js and React.
3. Develop a website in one Docker Container, share it with your team mates and allow parallel corrections from all team members.
4. Connect both the Dockers through Kubernetes and show how new request is handled.

EXPERIMENT : 2

Name : Rishabh Singhvi SAPID : 60009210206

Dockers :

```
cseds-student@csedsstudent-cv115:~$ sudo apt install docker-ce
[sudo] password for cseds-student:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  genders libflashrom1 libfdt1-2 libgenders0
Use 'sudo apt autoremove' to remove them.
Suggested packages:
  aufs-tools cgroupfs-mount | cgroup-lite
The following packages will be upgraded:
  docker-ce
1 upgraded, 0 newly installed, 0 to remove and 128 not upgraded.
Need to get 22.0 MB of archives.
After this operation, 65.0 kB of additional disk space will be used.
Get:1 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-ce amd64 5:23.0.3-1-ubuntu.20.04-focal [22.0 MB]
Fetched 22.0 MB in 19s (1,138 kB/s)
(Reading database ... 254575 files and directories currently installed.)
Preparing to unpack .../docker-ce_5:23.0.3-1-ubuntu.20.04-focal.deb ...
Unpacking docker-ce (5:23.0.3-1-ubuntu.20.04-focal) over (5:23.0.1-1-ubuntu.20.04-focal) ...
Setting up docker-ce (5:23.0.3-1-ubuntu.20.04-focal) ...
cseds-student@csedsstudent-cv115:~$ sudo systemctl status docker
● docker.service - Docker Application Container Engine
   Loaded: loaded (/lib/systemd/system/docker.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2023-04-12 11:34:38 IST; 4s ago
     TriggeredBy: ● docker.socket
   Docs: https://docs.docker.com
   Main PID: 5362 (dockerd)
   Tasks: 17
   Memory: 26.2M
   CPUs: 495ms
   CGroup: /system.slice/docker.service
           └─5362 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/containerd.sock

Apr 12 11:34:37 csedsstudent-cv115 dockerd[5362]: time="2023-04-12T11:34:37.765538698+05:30" level=info msg="[core] [Channel #4] Channel Connectivity change to READY" module=grpc
Apr 12 11:34:37 csedsstudent-cv115 dockerd[5362]: time="2023-04-12T11:34:37.826535507+05:30" level=info msg="[graphdriver] using prior storage driver: overlay2"
Apr 12 11:34:37 csedsstudent-cv115 dockerd[5362]: time="2023-04-12T11:34:37.839569727+05:30" level=info msg="Loading containers: start."
Apr 12 11:34:38 csedsstudent-cv115 dockerd[5362]: time="2023-04-12T11:34:38.394846283+05:30" level=info msg="Default bridge (docker0) is assigned with an IP address 172.17.0.0/16. Daemon option --bip ca
Apr 12 11:34:38 csedsstudent-cv115 dockerd[5362]: time="2023-04-12T11:34:38.489927756+05:30" level=info msg="Loading containers: done."
Apr 12 11:34:38 csedsstudent-cv115 dockerd[5362]: time="2023-04-12T11:34:38.507190378+05:30" level=info msg="Docker daemon" commit=59118bf graphdriver=overlay2 version=23.0.3
Apr 12 11:34:38 csedsstudent-cv115 dockerd[5362]: time="2023-04-12T11:34:38.507437222+05:30" level=info msg="Daemon has completed initialization"
Apr 12 11:34:38 csedsstudent-cv115 dockerd[5362]: time="2023-04-12T11:34:38.533062540+05:30" level=info msg="[core] [Server #7] Server created" module=grpc
Apr 12 11:34:38 csedsstudent-cv115 systemd[1]: Started Docker Application Container Engine.
Apr 12 11:34:38 csedsstudent-cv115 dockerd[5362]: time="2023-04-12T11:34:38.538997636+05:30" level=info msg="API listen on /run/docker.sock"
lines 1-22/22 (END)
```

2.

```
cseds-student@csedsstudent-cv115:~$ docker --help
--tlsca string      Path to TLS certificate file (default "/home/cseds-student/.docker/cert.pem")
--tlskey string     Path to TLS key file (default "/home/cseds-student/.docker/key.pem")
--tlsverify         Use TLS and verify the remote
-v, --version       Print version information and quit

Run 'docker COMMAND --help' for more information on a command.

For more help on how to use Docker, head to https://docs.docker.com/go/guides/

cseds-student@csedsstudent-cv115:~$ docker info
Client:
 Context: default
 Debug Mode: false
 Plugins:
  buildx: Docker Buildx (Docker Inc.)
    Version: v0.10.3
    Path: /usr/lib/docker/cli-plugins/docker-buildx
  compose: Docker Compose (Docker Inc.)
    Version: v2.15.1
    Path: /usr/lib/docker/cli-plugins/docker-compose
  dev: Docker Dev Environments (Docker Inc.)
    Version: v0.1.0
    Path: /usr/lib/docker/cli-plugins/docker-dev
  extension: Manages Docker extensions (Docker Inc.)
    Version: v0.2.18
    Path: /usr/lib/docker/cli-plugins/docker-extension
  sbom: View the packaged-based Software Bill Of Materials (SBOM) for an image (Anchore Inc.)
    Version: 0.6.0
    Path: /usr/lib/docker/cli-plugins/docker-sbom
  scan: Docker Scan (Docker Inc.)
    Version: v0.25.0
    Path: /usr/lib/docker/cli-plugins/docker-scan
  scout: Command line tool for Docker Scout (Docker Inc.)
    Version: v0.6.0
    Path: /usr/lib/docker/cli-plugins/docker-scout

Server:
 Containers: 8
  Running: 0
  Paused: 0
  Stopped: 8
 Images: 8
 Server Version: 23.0.3
 Storage Driver: overlay2
  Backing Filesystem: extfs
  Supports d_type: true
  Using metacopy: false
  Native Overlay Diff: true
  userxattr: false
 Logging Driver: json-file
 Cgroup Driver: systemd
 Cgroup Version: 2
 Plugins:
  Volume: local
  Network: bridge host ipvlan macvlan null overlay
  Log: awslogs fluentd gcplogs gelf journald json-file local logentries splunk syslog
 Swarm: inactive
```

```

Network: bridge host ipvlan macvlan null overlay
Log: awslogs fluentd gcplogs gelf journald json-file local logentries splunk syslog
Swarm: inactive
Runtimes: io.containerd.runc.v2 runc
Default Runtime: runc
Init Binary: docker-init
containerd version: 2456e983eb9e37e47538f59ea18f2043c9a73640
runc version: v1.1.4-0-g5fd4c4d
init version: de40ad0
Security Options:
  apparmor
  seccomp
   Profile: builtin
  cgroups
Kernel Version: 5.19.0-38-generic
Operating System: Ubuntu 22.04.1 LTS
OSType: linux
Architecture: x86_64
CPUs: 12
Total Memory: 7.459GiB
Name: cseedsstudent-cv115
ID: ci8d4e8e-c278-4bcf-b09e-7065b82dcdf0
Docker Root Dir: /var/lib/docker
Debug Mode: false
Username: tanayaparwal
Registry: https://index.docker.io/v1/
Experimental: false
Insecure Registries:
  127.0.0.0/8
Live Restore Enabled: false

cseeds-student@cseedsstudent-cv115:~$ docker run hello-world

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
1. The Docker client contacted the Docker daemon.
2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
   (amd64)
3. The Docker daemon created a new container from that image which runs the
   executable that produces the output you are currently reading.
4. The Docker daemon streamed that output to the Docker client, which sent it
   to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
$ docker run -it ubuntu bash

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

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

cseeds-student@cseedsstudent-cv115:~$

```

4.

```

Insecure Registries:
  127.0.0.0/8
Live Restore Enabled: false

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cseeds-student@cseedsstudent-cv115:~$ docker search ubuntu

```

NAME	DESCRIPTION	STARS	OFFICIAL	AUTOMATED
ubuntu	Ubuntu is a Debian-based Linux operating sys...	15825	[OK]	
webosphere-liberty	Webosphere Liberty multi-architecture images	293	[OK]	
open-liberty	Open Liberty multi-architecture images based...	59	[OK]	
neurodebian	NeuroDebian provides neuroscience research s...	99	[OK]	
ubuntu-debootstrap	DEPRECATED: use "ubuntu" instead	50	[OK]	
ubuntu-upstart	DEPRECATED: as is Upstart (find other proces...	112	[OK]	
ubuntu/nginx	Nginx, a high-performance reverse proxy & we...	84		
ubuntu/cortex	Cortex provides storage for Prometheus. Long...	3		
ubuntu/squid	Squid is a caching proxy for the Web. Long-t...	54		
ubuntu/apache2	Apache, a secure & extensible open-source HT...	57		
ubuntu/mysql	MySQL open source fast, stable, multi-thread...	45		
ubuntu/kafka	Apache Kafka, a distributed event streaming ...	29		
ubuntu/bind9	BIND 9 is a very flexible, full-featured DNS...	51		
ubuntu/redis	Redis, an open source key-value store. Long...	17		
ubuntu/prometheus	Prometheus is a systems and service monitor...	40		
ubuntu/postgres	PostgreSQL is an open source object-relatio...	27		
ubuntu/zookeeper	ZooKeeper maintains configuration informatio...	5		
ubuntu/grafana	Grafana, a feature rich metrics dashboard &...	9		
ubuntu/memcached	Memcached, in-memory keyvalue store for sma...	5		
ubuntu/prometheus-alertmanager	Alertmanager handles client alerts from Prom...	8		
ubuntu/dotnet-deps	Chiselled Ubuntu for self-contained .NET & A...	7		
ubuntu/dotnet-runtime	Chiselled Ubuntu runtime image for .NET apps...	5		
ubuntu/cassandra	Cassandra, an open source NoSQL distributed ...	2		
ubuntu/dotnet-aspnet	Chiselled Ubuntu runtime image for ASP.NET a...	4		
ubuntu/telegraf	Telegraf collects, processes, aggregates & w...	4		

```

cseeds-student@cseedsstudent-cv115:~$

```

5.


```

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   (and4)
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ubuntu              Ubuntu is a Debian-based Linux operating sys... 15825     [OK]
websphere-liberty   Websphere Liberty multi-architecture images ... 293       [OK]
open-liberty        Open Liberty multi-architecture images based... 59         [OK]
neurodebian         NeuroDebian provides neuroscience research s... 99         [OK]
ubuntu-debootstrap  DEPRECATED: use "ubuntu" instead                58         [OK]
ubuntu-upstart      DEPRECATED, as is Upstart (find other proces... 112        [OK]
ubuntu/nginx        Nginx, a high-performance reverse proxy & we... 84
ubuntu/cortex       Cortex provides storage for Prometheus. Long-... 3
ubuntu/squid        Squid is a caching proxy for the Web. Long-t... 54
ubuntu/apache2      Apache, a secure & extensible open-source HT... 57
ubuntu/mysql        MySQL open source fast, stable, multi-thread... 45
ubuntu/kafka        Apache Kafka, a distributed event streaming ... 29
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ubuntu/memcached    Memcached, in-memory keyvalue store for sma... 5
ubuntu/prometheus-alertmanager Alertmanager handles client alerts from Prom... 8
ubuntu/dotnet-deps  Chiselled Ubuntu for self-contained .NET & A... 7
ubuntu/dotnet-runtime Chiselled Ubuntu runtime image for .NET apps... 5
ubuntu/cassandra    Cassandra, an open source NoSQL distributed ... 2
ubuntu/dotnet-aspnet Chiselled Ubuntu runtime image for ASP.NET a... 4
ubuntu/telegraf     Telegraf collects, processes, aggregates & w... 4

cseds-student@csedsstudent-cv115:~$ docker pull ubuntu
Using default tag: latest
latest: Pulling from library/ubuntu
Digest: sha256:6721c14fa74f07bd27cc59d69a7fa9aeff8e28ea118ef3babc295a0428a6d21
Status: Image is up to date for ubuntu:latest
docker.io/library/ubuntu:latest
cseds-student@csedsstudent-cv115:~$

```

6.

```

To try something more ambitious, you can run an Ubuntu container with:
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ubuntu-upstart      DEPRECATED, as is Upstart (find other proces... 112        [OK]
ubuntu/nginx        Nginx, a high-performance reverse proxy & we... 84
ubuntu/cortex       Cortex provides storage for Prometheus. Long-... 3
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ubuntu/mysql        MySQL open source fast, stable, multi-thread... 45
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ubuntu/prometheus-alertmanager Alertmanager handles client alerts from Prom... 8
ubuntu/dotnet-deps  Chiselled Ubuntu for self-contained .NET & A... 7
ubuntu/dotnet-runtime Chiselled Ubuntu runtime image for .NET apps... 5
ubuntu/cassandra    Cassandra, an open source NoSQL distributed ... 2
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ubuntu/telegraf     Telegraf collects, processes, aggregates & w... 4

cseds-student@csedsstudent-cv115:~$ docker pull ubuntu
Using default tag: latest
latest: Pulling from library/ubuntu
Digest: sha256:6721c14fa74f07bd27cc59d69a7fa9aeff8e28ea118ef3babc295a0428a6d21
Status: Image is up to date for ubuntu:latest
docker.io/library/ubuntu:latest

cseds-student@csedsstudent-cv115:~$ docker images
REPOSITORY          TAG             IMAGE ID          CREATED          SIZE
ankitiladva/ubuntu-nodejs   latest         8c646221473b     3 weeks ago     264MB
cseds-student/ubuntu-nodejs latest         3180a7153a47     4 weeks ago     264MB
tanayagarwal/ubuntu-nodejs  latest         3180a7153a47     4 weeks ago     264MB
repository/new_image_name   latest         3a4991591f4a     4 weeks ago     264MB
sarvyl23/ubuntu-nodejs     latest         a24978778e4b     5 weeks ago     13.3kB
ubuntu               latest         08d22c8eb15      5 weeks ago     77.8MB
ubuntu               <none>         74f2314a03de     6 weeks ago     77.8MB
gcr.io/k8s-minikube/kicbase v0.0.37        01ccc65ff7f7     2 months ago     1.15GB
hello-world          latest         feb5d9fea0a5     18 months ago   13.3kB

cseds-student@csedsstudent-cv115:~$

```

7.

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REPOSITORY          TAG          IMAGE ID          CREATED           SIZE
ankitiladva/ubuntu-nodejs   latest       ac646221473b     3 weeks ago      204MB
cseds-student/ubuntu-nodejs latest       3180a7153a47     4 weeks ago      204MB
tanayagarwal/ubuntu-nodejs  latest       3180a7153a47     4 weeks ago      204MB
repository/new_image       latest       3a499159151f4     4 weeks ago      204MB
sarvyl23/ubuntu-nodejs     latest       a24978778e4b     5 weeks ago      13.3kB
ubuntu                   latest       08d22c8ceb15     5 weeks ago      77.8MB
gcr.io/k8s-minikube/kicbase  v0.0.37     01c8ce65ffff     2 months ago     1.15GB
hello-world              latest       feb5d9fea6a5     18 months ago    13.3kB

cseds-student@csedsstudent-cv115:~$ docker run -it ubuntu
root@048acff057ab:/# apt update
Get:1 http://archive.ubuntu.com/ubuntu jammy InRelease [270 kB]
Get:2 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Get:3 http://archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy-backports InRelease [108 kB]
Get:5 http://security.ubuntu.com/ubuntu jammy-security/restricted amd64 Packages [914 kB]
Get:6 http://archive.ubuntu.com/ubuntu jammy/multiverse amd64 Packages [266 kB]
Get:7 http://archive.ubuntu.com/ubuntu jammy/main amd64 Packages [1792 kB]
Get:8 http://security.ubuntu.com/ubuntu jammy-security/multiverse amd64 Packages [23.2 kB]
Get:9 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 Packages [909 kB]
Get:10 http://archive.ubuntu.com/ubuntu jammy/universe amd64 Packages [17.5 MB]
Get:11 http://security.ubuntu.com/ubuntu jammy-security/main amd64 Packages [917 kB]
Get:12 http://archive.ubuntu.com/ubuntu jammy/restricted amd64 Packages [164 kB]
Get:13 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 Packages [1256 kB]
Get:14 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 Packages [1149 kB]
Get:15 http://archive.ubuntu.com/ubuntu jammy-updates/restricted amd64 Packages [907 kB]
Get:16 http://archive.ubuntu.com/ubuntu jammy-updates/multiverse amd64 Packages [28.6 kB]
Get:17 http://archive.ubuntu.com/ubuntu jammy-backports/main amd64 Packages [49.0 kB]
Get:18 http://archive.ubuntu.com/ubuntu jammy-backports/universe amd64 Packages [23.3 kB]
Fetched 26.5 MB in 26s (1036 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
2 packages can be upgraded. Run 'apt list --upgradable' to see them.

root@048acff057ab:/# apt install nodejs
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  ca-certificates javascript-common libbrotli1 libc-ares2 libicu70 libjs-highlight.js libnghttp2-14 libnss7 libuv1 nodejs-doc openssl
Suggested packages:
  apache2 | lighttpd | httpd npm
The following NEW packages will be installed:
  ca-certificates javascript-common libbrotli1 libc-ares2 libicu70 libjs-highlight.js libnghttp2-14 libnss7 libuv1 nodejs nodejs-doc openssl
0 upgraded, 12 newly installed, 0 to remove and 2 not upgraded.
Need to get 26.1 MB of archives.
After this operation, 93.0 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 openssl amd64 3.0.2-0ubuntu1.8 [1184 kB]
Get:2 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 ca-certificates all 20211016ubuntu0.22.04.1 [144 kB]
Get:3 http://archive.ubuntu.com/ubuntu jammy/main amd64 libbrotli1 amd64 1.0.9-2 [309 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy/main amd64 libnghttp2-14 amd64 1.43.0-1build3 [76.3 kB]
Get:5 http://archive.ubuntu.com/ubuntu jammy/main amd64 libuv1 amd64 1.43.0-1 [93.1 kB]
Get:6 http://archive.ubuntu.com/ubuntu jammy/main amd64 javascript-common all 11+nmu1 [593 B]
Get:7 http://archive.ubuntu.com/ubuntu jammy/main amd64 libbrotli1 amd64 1.0.9-2build1 [315 kB]

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8.

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Setting up libuv1:amd64 (1.43.0-1) ...
Setting up libjs-highlight.js (9.18.5+dfsg1-1) ...
Setting up openssl (3.0.2-0ubuntu1.8) ...
Setting up libicu70:amd64 (70.1-2) ...
Setting up libnss7:amd64 (2.22.9-dfsg-1ubuntu3) ...
Setting up ca-certificates (20211016ubuntu0.22.04.1) ...
debconf: unable to initialize frontend: Dialog
debconf: (No usable dialog-like program is installed, so the dialog based frontend cannot be used. at /usr/share/perl5/Debconf/FrontEnd/Dialog.pm line 78.)
debconf: falling back to frontend: Readline
debconf: unable to initialize frontend: Readline
debconf: (Can't locate Term/ReadLine.pm in @INC (you may need to install the Term::ReadLine module) (@INC contains: /etc/perl /usr/local/lib/x86_64-linux-gnu/perl/5.34.0 /usr/local/share/perl/5.34.0 /usr/lib/x86_64-linux-gnu/perl/5.34 /usr/share/perl/5.34 /usr/lib/x86_64-linux-gnu/perl-base /usr/lib/x86_64-linux-gnu/perl/5.34 /usr/share/perl/5.34 /usr/local/lib/site_perl) at /usr/share/perl5/Debconf/FrontEnd/Readline.pm line 7.)
debconf: falling back to frontend: Teletype
Updating certificates in /etc/ssl/certs...
124 added, 0 removed; done.
Setting up nodejs-doc (12.22.9-dfsg-1ubuntu3) ...
Setting up nodejs (12.22.9-dfsg-1ubuntu3) ...
update-alternatives: using /usr/bin/nodejs to provide /usr/bin/js (js) in auto mode
update-alternatives: warning: skip creation of /usr/share/man/man1/js.1.gz because associated file /usr/share/man/man1/nodejs.1.gz (of link group js) doesn't exist
Processing triggers for libc-bin (2.35-0ubuntu1) ...
Processing triggers for ca-certificates (20211016ubuntu0.22.04.1) ...
Updating certificates in /etc/ssl/certs...
0 added, 0 removed; done.
Running hooks in /etc/ca-certificates/update.d...
done.

root@048acff057ab:/# node -v
v12.22.9
root@048acff057ab:/# docker ps
bash: docker: command not found
root@048acff057ab:/# ^C
root@048acff057ab:/# ^C
root@048acff057ab:/# exit
exit

cseds-student@csedsstudent-cv115:~$ docker ps
CONTAINER ID   IMAGE          COMMAND                  CREATED        STATUS        PORTS        NAMES
048acff057ab   ubuntu        "/bin/bash"             3 minutes ago   Exited (130) 12 seconds ago           determined_wright
a9621e1b96c5   hello-world   "hello"                 4 minutes ago   Exited (0) 4 minutes ago           tender_khorana
1254eb7a03d0   ubuntu        "/bin/bash"             3 weeks ago     Exited (0) 3 weeks ago           funny_galot
5c038f5f1bcc   hello-world   "hello"                 3 weeks ago     Exited (0) 3 weeks ago           heuristics_germain
e7ec0cd53de2   74f2314a03de  "/bin/bash"             4 weeks ago     Exited (137) 4 weeks ago           kind_moore
23ebd059e43e   gcr.io/k8s-minikube/kicbase:v0.0.37  "/usr/local/bin/entr..." 4 weeks ago     Exited (137) 4 weeks ago           minikube
2e4c91c1e0be   74f2314a03de  "/bin/bash"             4 weeks ago     Exited (137) 4 weeks ago           quirky_dawdney
c5df0ad24182   hello-world   "hello"                 4 weeks ago     Exited (0) 4 weeks ago           great_boyd
8fe07a19ecb4   hello-world   "hello"                 5 weeks ago     Exited (0) 5 weeks ago           kind_jones
70bf8b792ef1   hello-world   "hello"                 5 weeks ago     Exited (0) 5 weeks ago           practical_ferni

cseds-student@csedsstudent-cv115:~$ docker ps -l
CONTAINER ID   IMAGE          COMMAND                  STATUS        PORTS        NAMES
048acff057ab   ubuntu        "/bin/bash"             3 minutes ago   Exited (130) 20 seconds ago           determined_wright
cseds-student@csedsstudent-cv115:~$ docker start 1c08a7a0dd0e4
Error response from daemon: No such container: 1c08a7a0dd0e4
Error: failed to start containers: 1c08a7a0dd0e4
cseds-student@csedsstudent-cv115:~$

```

9.

10.

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debconf: (No usable dialog-like program is installed, so the dialog based frontend cannot be used. at /usr/share/perl5/Debconf/FrontEnd/Dialog.pm line 78.)
debconf: falling back to frontend: Readline
debconf: unable to initialize frontend: Readline
debconf: (Can't locate Term/Readline.pm in @INC (you may need to install the Term::Readline module) (/etc/perl:/usr/local/lib/x86_64-linux-gnu/perl/5.34.0:/usr/local/share/perl/5.34.0:/usr/lib/x86_64-linux-gnu/perl5/5.34:/usr/share/perl5:/usr/lib/x86_64-linux-gnu/perl-base:/usr/lib/x86_64-linux-gnu/perl/5.34:/usr/share/perl/5.34:/usr/local/lib/site_perl) at /usr/share/perl5/Debconf/FrontEnd/Readline.pm line 7.)
debconf: falling back to frontend: Teletype
Updating certificates in /etc/ssl/certs...
124 added, 0 removed; done.
Setting up nodejs-doc (12.22.9-dfsg-1ubuntu3) ...
Setting up nodejs (12.22.9-dfsg-1ubuntu3) ...
update-alternatives: using /usr/bin/nodejs to provide /usr/bin/js (js) in auto mode
update-alternatives: warning: skip creation of /usr/share/man/man1/js.1.gz because associated file /usr/share/man/man1/nodejs.1.gz (of link group js) doesn't exist
Processing triggers for libc-bin (2.35-0ubuntu3.1) ...
Processing triggers for ca-certificates (20211016ubuntu0.22.04.1) ...
Updating certificates in /etc/ssl/certs...
0 added, 0 removed; done.
Running hooks in /etc/ca-certificates/update.d...
done.
root@048acff057ab:/# node -v
v12.22.9
root@048acff057ab:/# docker ps
bash: docker: command not found
root@048acff057ab:/# ^C
root@048acff057ab:/# ^C
root@048acff057ab:/# exit
exit
cseds-student@csedsstudent-cv115:~$ docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
cseds-student@csedsstudent-cv115:~$ docker ps -a
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
048acff057ab   ubuntu   "/bin/bash"   3 minutes ago   Exited (130) 12 seconds ago   8080   determined_wright
99021e1936c5   hello-world   "/hello"   4 minutes ago   Exited (0) 4 minutes ago   8080   tender_khorana
1254cb7ea30d   ubuntu   "/bin/bash"   3 weeks ago   Exited (137) 3 weeks ago   8080   funny_galois
5c038f5f1bcc   hello-world   "/hello"   3 weeks ago   Exited (0) 3 weeks ago   8080   heuristic_germain
e7ec0cd53de2   74f2314a03de   "/bin/bash"   4 weeks ago   Exited (137) 4 weeks ago   8080   kind_moore
23e0d659e43e   gcr.io/k8s-minikube/kicbase:v0.0.37   "/usr/local/bin/entr..."   4 weeks ago   Exited (137) 4 weeks ago   8080   minikube
2e4c91c1e0be   74f2314a03de   "/bin/bash"   4 weeks ago   Exited (137) 4 weeks ago   8080   quirky_dewdney
c5df0ad24182   hello-world   "/hello"   4 weeks ago   Exited (0) 4 weeks ago   8080   great_boyd
8fe07a19ecb4   hello-world   "/hello"   5 weeks ago   Exited (0) 5 weeks ago   8080   kind_jones
70bf0b792ef1   hello-world   "/hello"   5 weeks ago   Exited (0) 5 weeks ago   8080   practical_fermi
cseds-student@csedsstudent-cv115:~$ docker ps -l
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
048acff057ab   ubuntu   "/bin/bash"   3 minutes ago   Exited (130) 20 seconds ago   8080   determined_wright
cseds-student@csedsstudent-cv115:~$ docker start 1c08a7a0d0e4
Error response from daemon: No such container: 1c08a7a0d0e4
Error: failed to start containers: 1c08a7a0d0e4
cseds-student@csedsstudent-cv115:~$ docker stop quizzical_ncnulty
Error response from daemon: No such container: quizzical_ncnulty
cseds-student@csedsstudent-cv115:~$ docker rm youthful_curlie
Error response from daemon: No such container: youthful_curlie
cseds-student@csedsstudent-cv115:~$ docker commit -m "added Node.js" -a "sanny" d9b100f2f036 sanny/ubuntu-nodejs
sha256:7ec136ee0c9217944f7d6d0d0a086a0484b14f9a45aa19cde4e711a551d0d3
cseds-student@csedsstudent-cv115:~$

```