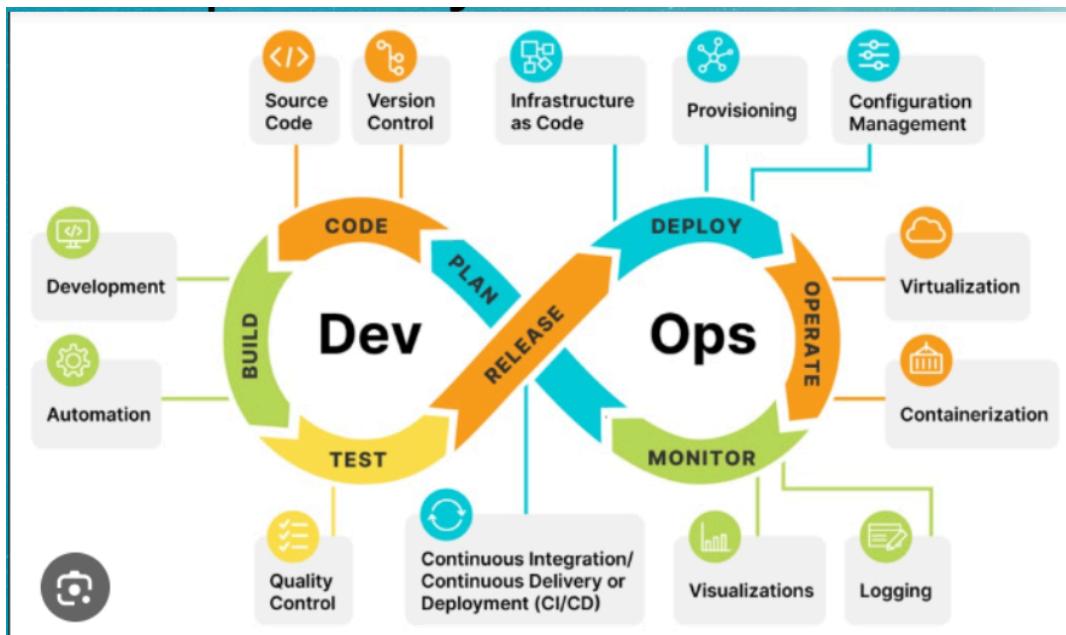


DevOps - Docker - Kubernetes

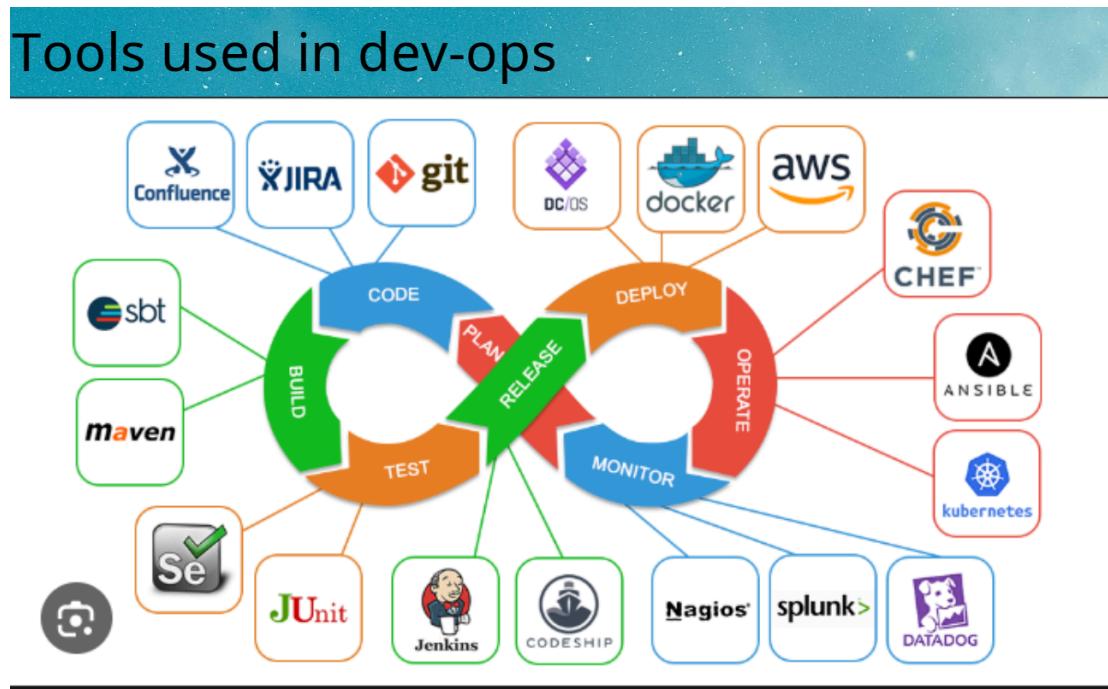
DevOps

Architecture

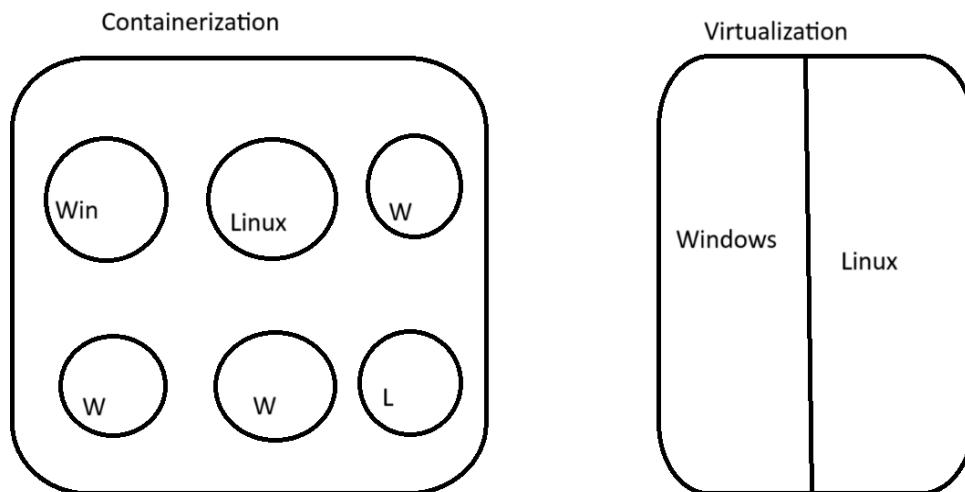


Tools

Tools used in DevOps



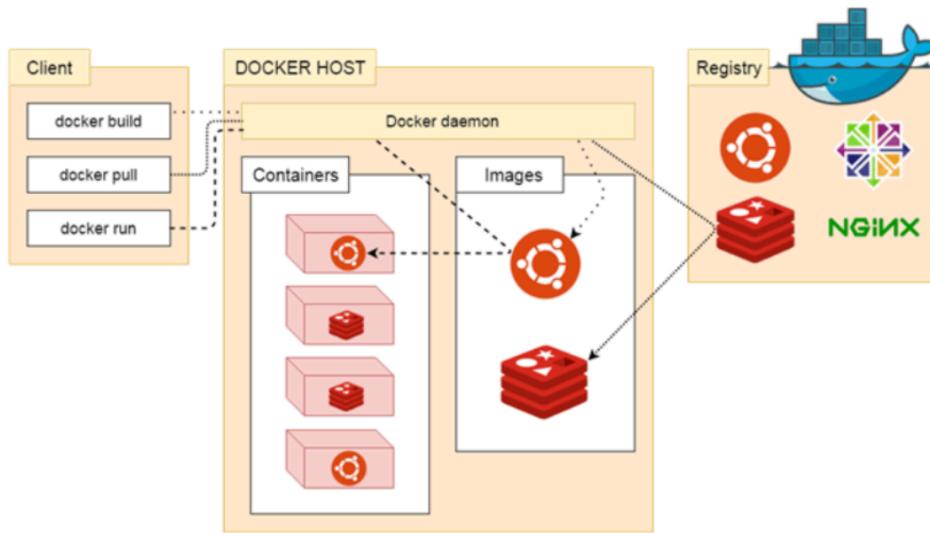
Containerization vs Virtualization



Docker

Architecture

Docker – Architecture.



Docker Version

```
C:\Users\Administrator>docker version
Client:
  Cloud integration: v1.0.35+desktop.13
  Version:          26.0.0
  API version:     1.45
  Go version:      go1.21.8
  Git commit:      2ae903e
  Built:           Wed Mar 20 15:18:56 2024
  OS/Arch:         windows/amd64
  Context:         default

Server: Docker Desktop 4.29.0 (145265)
Engine:
  Version:          26.0.0
  API version:     1.45 (minimum version 1.24)
  Go version:      go1.21.8
  Git commit:      8b79278
  Built:           Wed Mar 20 15:18:01 2024
  OS/Arch:         linux/amd64
  Experimental:   false
  containerd:
    Version:        1.6.28
    GitCommit:      ae07eda36dd25f8a1b98dfbf587313b99c0190bb
  runc:
    Version:        1.1.12
    GitCommit:      v1.1.12-0-g51d5e94
  docker-init:
    Version:        0.19.0
    GitCommit:      de40ad0
```

Activate Windows
Go to Settings to activate Windows.

Docker Pull

It pulls the image from registry to the docker machine or docker server.

```
C:\Users\Administrator>docker pull hello-world
Using default tag: latest
latest: Pulling from library/hello-world
Digest: sha256:a26bff933ddc26d5cdf7faa98b4ae1e3ec20c4985e6f87ac0973052224d24302
Status: Image is up to date for hello-world:latest
docker.io/library/hello-world:latest

What's Next?
View a summary of image vulnerabilities and recommendations → docker scout quickview hello-world
```

Activate Windows
Go to Settings to activate Windows.

Docker Images

It displays the list of docker images.

```
C:\Users\Administrator>docker images
REPOSITORY          TAG      IMAGE ID      CREATED       SIZE
ubuntu              latest   bf3dc08bfed0  10 days ago  76.2MB
docker/desktop-kubernetes
  439MB
registry.k8s.io/kube-apiserver
  127MB
registry.k8s.io/kube-controller-manager
  122MB
registry.k8s.io/kube-proxy
  82.3MB
registry.k8s.io/kube-scheduler
  59.5MB
registry.k8s.io/kube-apiserver
  127MB
docker/welcome-to-docker
  18.6MB
registry.k8s.io/etcd
  148MB
registry.k8s.io/coredns/coredns
  59.8MB
docker/desktop-vpnkit-controller
  36.2MB
hello-world          latest   d2c94e258dcb  12 months ago  13.3kB
registry.k8s.io/pause
  744kB
docker/desktop-storage-provisioner
  41.9MB

99f89471f470  3 years ago
```

Activate Windows
Go to Settings to activate Windows.

Docker Run

It executes the images in a container

```
C:\Users\Administrator>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/
```

Docker ps -a

It displays all the containers in the system

```
C:\Users\Administrator>docker ps -a
CONTAINER ID        IMAGE       COMMAND       CREATED          STATUS           PORTS     NAMES
bcbc85173b1c        hello-world "/hello"    About a minute ago   Exited (0) About a minute ago
198b46ee6751        ubuntu      "/bin/bash"  5 hours ago      Up 4 minutes
de9afeb41e98        hello-world "/hello"    6 hours ago      Exited (0) 3 minutes ago
8b9198f95a15        hello-world "/hello"    6 hours ago      Exited (0) 3 minutes ago
```

Pulling Ubuntu from Registry

```
C:\Users\Administrator>docker pull ubuntu
Using default tag: latest
latest: Pulling from library/ubuntu
Digest: sha256:3f85b7caad41a95462cf5b787d8a04604c8262cdcdf9a472b8c52ef83375fe15
Status: Image is up to date for ubuntu:latest
docker.io/library/ubuntu:latest

What's Next?
  View a summary of image vulnerabilities and recommendations → docker scout quickview ubuntu

C:\Users\Administrator>docker images ubuntu
REPOSITORY        TAG         IMAGE ID      CREATED          SIZE
ubuntu            latest      bf3dc08bfed0  10 days ago   76.2MB
```

Docker run -it ubuntu

```
C:\Users\Administrator>docker run -it ubuntu
root@15c0b0376e20:/#
root@15c0b0376e20:/#
root@15c0b0376e20:/#
root@15c0b0376e20:/# ls -l
total 48
lrwxrwxrwx 1 root root 7 Apr 22 13:08 bin -> /usr/bin
drwxr-xr-x 2 root root 4096 Apr 22 13:08 boot
drwxr-xr-x 5 root root 360 May 10 11:50 dev
drwxr-xr-x 1 root root 4096 May 10 11:50 etc
drwxr-xr-x 3 root root 4096 Apr 29 14:05 home
lrwxrwxrwx 1 root root 7 Apr 22 13:08 lib -> /usr/lib
lrwxrwxrwx 1 root root 9 Apr 22 13:08 lib64 -> /usr/lib64
drwxr-xr-x 2 root root 4096 Apr 29 14:02 media
drwxr-xr-x 2 root root 4096 Apr 29 14:02 mnt
drwxr-xr-x 2 root root 4096 Apr 29 14:02 opt
dr-xr-xr-x 231 root root 0 May 10 11:50 proc
drwxr-xr-x 2 root root 4096 Apr 29 14:05 root
drwxr-xr-x 4 root root 4096 Apr 29 14:05 run
lrwxrwxrwx 1 root root 8 Apr 22 13:08 sbin -> /usr/sbin
drwxr-xr-x 2 root root 4096 Apr 29 14:02 srv
dr-xr-xr-x 11 root root 0 May 10 11:50 sys
drwxrwxrwt 2 root root 4096 Apr 29 14:05 tmp
drwxr-xr-x 12 root root 4096 Apr 29 14:02 usr
drwxr-xr-x 11 root root 4096 Apr 29 14:05 var
root@15c0b0376e20:/#
```

Docker Container ls

It displays only running container

```
C:\Users\Administrator>docker container ls
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
15c0b0376e20 ubuntu "/bin/bash" 2 minutes ago Up 2 minutes gifted_merkle
198b46ee6751 ubuntu "/bin/bash" 5 hours ago Up 9 minutes recursing_raman
```

Docker Top

It displays top processes running inside a container

```
C:\Users\Administrator>docker top 198b46ee6751
UID PID PPID C STIME TTY TIME CMD
root 1724 1703 0 11:43 ? 00:00:00 /bin/bash
```

Docker Stop

It stops the running container

```
C:\Users\Administrator>docker stop 198b46ee6751
198b46ee6751

C:\Users\Administrator>docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
15c0b0376e20 ubuntu "/bin/bash" 7 minutes ago Up 7 minutes gifted_merkle
bcbc85173b1c hello-world "/hello" 12 minutes ago Exited (0) 12 minutes ago loving_kare
198b46ee6751 ubuntu "/bin/bash" 5 hours ago Exited (137) 23 seconds ago recursing_raman
de9afeb41e98 hello-world "/hello" 6 hours ago Exited (0) 14 minutes ago eager_rubin
8b0198f95a15 hello-world "/hello" 6 hours ago Exited (0) 14 minutes ago adoring_gauss
```

Docker Kill

It kills the container

```
C:\Users\Administrator>docker kill 6dd78ed4fda8  
6dd78ed4fda8
```

Docker Execute

It executes the given command in the given container.

```
C:\Users\Administrator>docker exec 15c0b0376e20 ls  
bin  
boot  
dev  
etc  
home  
lib  
lib64  
media  
mnt  
opt  
proc  
root  
run  
sbin  
srv  
sys  
tmp  
usr  
var
```

Docker Info

It provides information about Client and docker server

```
C:\Users\Administrator>docker info  
Client:  
  Version:  26.0.0  
  Context:  default  
  Debug Mode: false  
Plugins:  
  buildx: Docker Buildx (Docker Inc.)  
    Version: v0.13.1-desktop.1  
    Path:   C:\Program Files\Docker\cli-plugins\docker-buildx.exe  
compose: Docker Compose (Docker Inc.)  
  Version: v2.26.1-desktop.1  
  Path:   C:\Program Files\Docker\cli-plugins\docker-compose.exe  
debug: Get a shell into any image or container. (Docker Inc.)  
  Version: 0.0.27  
  Path:   C:\Program Files\Docker\cli-plugins\docker-debug.exe  
dev: Docker Dev Environments (Docker Inc.)  
  Version: v0.1.2  
  Path:   C:\Program Files\Docker\cli-plugins\docker-dev.exe  
extension: Manages Docker extensions (Docker Inc.)  
  Version: v0.2.23  
  Path:   C:\Program Files\Docker\cli-plugins\docker-extension.exe  
feedback: Provide feedback, right in your terminal! (Docker Inc.)  
  Version: v1.0.4  
  Path:   C:\Program Files\Docker\cli-plugins\docker-feedback.exe  
init: Creates Docker-related starter files for your project (Docker Inc.)  
  Version: v1.1.0  
  Path:   C:\Program Files\Docker\cli-plugins\docker-init.exe  
sbom: View the packaged-based Software Bill Of Materials (SBOM) for an image (Anchore Inc.)  
  Version: 0.6.0
```

```
Path: C:\Program Files\Docker\cli-plugins\docker-sbm.exe
scout: Docker Scout (Docker Inc.)
Version: v1.6.3
Path: C:\Program Files\Docker\cli-plugins\docker-scout.exe

Server:
Containers: 41
Running: 35
Paused: 0
Stopped: 6
Images: 14
Server Version: 26.0.0
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: cgroupfs
Cgroup Version: 1
Plugins:
Volume: local
Network: bridge host ipvlan macvlan null overlay
Log: awslogs fluentd gcplogs gelf journald json-file local splunk syslog
Swarm: inactive
Runtimes: io.containerd.runc.v2 runc
Default Runtime: runc
Init Binary: docker-init
containerd version: ae07eda36dd25f8a1b98dfbf587313b99c0190bb
```

```
runc version: v1.1.12-0-g51d5e94
init version: de40ad0
Security Options:
seccomp
Profile: unconfined
Kernel Version: 5.15.146.1-microsoft-standard-WSL2
Operating System: Docker Desktop
OSType: linux
Architecture: x86_64
CPUs: 4
Total Memory: 7.759GiB
Name: docker-desktop
ID: 7f5a2900-b799-4fc8-a8a2-0152d4c45d08
Docker Root Dir: /var/lib/docker
Debug Mode: false
HTTP Proxy: http.docker.internal:3128
HTTPS Proxy: https.docker.internal:3128
No Proxy: hubproxy.docker.internal
Labels:
com.docker.desktop.address=npipe://\\.\pipe\docker_cli
Experimental: false
Insecure Registries:
hubproxy.docker.internal:5555
127.0.0.0/8
Live Restore Enabled: false
```

Docker Logs

It provides the logs of the container

```
C:\Users\Administrator>docker logs
"docker logs" requires exactly 1 argument.
See 'docker logs --help'.

Usage: docker logs [OPTIONS] CONTAINER
Fetch the logs of a container

C:\Users\Administrator>docker logs --help
Usage: docker logs [OPTIONS] CONTAINER
Fetch the logs of a container

Aliases:
  docker container logs, docker logs

Options:
  --details      Show extra details provided to logs
  -f, --follow   Follow log output
  --since string Show logs since timestamp (e.g.
                  "2013-01-02T13:23:37Z") or relative (e.g. "42m"
                  for 42 minutes)
  -n, --tail string Number of lines to show from the end of the logs
                      (default "all")
  -t, --timestamps Show timestamps
  --until string  Show logs before a timestamp (e.g.
                  "2013-01-02T13:23:37Z") or relative (e.g. "42m"
                  for 42 minutes)
```

Docker Inspect

It gives more detailed information about the container

```
C:\Users\Administrator>docker inspect 15c0b0376e20
[{"Id": "15c0b0376e20cee0123b8247e548ef9960b3b7240fc24a63e52eea69095330c5",
 "Created": "2024-05-10T11:50:25.775045164Z",
 "Path": "/bin/bash",
 "Args": [],
 "State": {
     "Status": "running",
     "Running": true,
     "Paused": false,
     "Restarting": false,
     "OOMKilled": false,
     "Dead": false,
     "Pid": 3201,
     "ExitCode": 0,
     "Error": "",
     "StartedAt": "2024-05-10T11:50:26.256412439Z",
     "FinishedAt": "2001-01-01T00:00:00Z"
 },
 "Image": "sha256:bf3dc08bfed031182827888bb15977e316ad797ee2ccb63b4c7a57fdfe7eb31d",
 "ResolvConfPath": "/var/lib/docker/containers/15c0b0376e20cee0123b8247e548ef9960b3b7240fc24a63e52eea69095330c5/resolv.conf",
 "HostnamePath": "/var/lib/docker/containers/15c0b0376e20cee0123b8247e548ef9960b3b7240fc24a63e52eea69095330c5/hostname",
 "HostsPath": "/var/lib/docker/containers/15c0b0376e20cee0123b8247e548ef9960b3b7240fc24a63e52eea69095330c5/hosts",
 "LogPath": "/var/lib/docker/containers/15c0b0376e20cee0123b8247e548ef9960b3b7240fc24a63e52eea69095330c5/15c0b0376e20cee0123b8247e548ef9960b3b7240fc24a63e52eea69095330c5/json.log",
 "Name": "gifted_merkle",
 "RestartCount": 0,
 "Driver": "overlay2",
 "Platform": "linux",
 "MountLabel": "",
 "ProcessLabel": "",
 "AppArmorProfile": "",
 "ExecIDs": null,
 "HostConfig": {
     "Binds": null,
     "ContainerIDFile": "",
     "LogConfig": {
         "Type": "json-file",
         "Config": {}
     },
     "NetworkMode": "default",
     "PortBindings": {},
     "RestartPolicy": {
         "Name": "no",
         "MaximumRetryCount": 0
     },
     "AutoRemove": false,
     "VolumeDriver": "",
     "VolumesFrom": null,
     "ConsoleSize": [
         34,
         149
     ],
     "CapAdd": null,
     "CapDrop": null,
     "CgroupsnsMode": "host",
     "Dns": [],
     "DnsOptions": [],
     "DnsSearch": [],
     "ExtraHosts": null,
     "GroupAdd": null,
     "IpcMode": "private",
     "Cgroup": "",
     "Links": null,
     "OomScoreAdj": 0
 }
```

```
"PidMode": "",
"Privileged": false,
"PublishAllPorts": false,
"ReadonlyRootfs": false,
"SecurityOpt": null,
"UTSMode": "",
"UsernsMode": "",
"ShmSize": 67108864,
"Runtime": "runc",
"Isolation": "",
"CpuShares": 0,
"Memory": 0,
"NanoCpus": 0,
"CgroupParent": "",
"BlkioWeight": 0,
"BlkioWeightDevice": [],
"BlkioDeviceReadBps": [],
"BlkioDeviceWriteBps": [],
"BlkioDeviceReadIOPS": [],
"BlkioDeviceWriteIOPS": [],
"CpuPeriod": 0,
"CpuQuota": 0,
"CpuRealtimePeriod": 0,
"CpuRealtimeRuntime": 0,
"CpusetCpus": "",
"CpusetMems": "",
"Devices": [],
"DeviceCgroupRules": null,
"DeviceRequests": null,
"MemoryReservation": 0,
"MemorySwap": 0,
"MemorySwappiness": null,
"OomKillDisable": false,
"Ulimits": [
    {
        "hard": 65536,
        "soft": 65536
    }
],
"PidSlice": 0,
"PidSliceLimit": null,
"Ulimits": [],
"CpuCount": 0,
"CpuPercent": 0,
"IOMaximumIOPS": 0,
"IOMaximumBandwidth": 0,
"MaskedPaths": [
    "/proc/asound",
    "/proc/acpi",
    "/proc/kcore",
    "/proc/keys",
    "/proc/latency_stats",
    "/proc/timer_list",
    "/proc/timer_stats",
    "/proc/sched_debug",
    "/proc/scsi",
    "/sys/firmware",
    "/sys/devices/virtual/powercap"
],
"ReadonlyPaths": [
    "/proc/bus",
    "/proc/fs",
    "/proc/irq",
    "/proc/sys",
    "/proc/sysrq-trigger"
],
"GraphDriver": {
    "Data": {
        "LowerDir": "/var/lib/docker/overlay2/71259a79245c1048c712ee36ddb97a85610ccf93241bedf6499958acfcaf0200-init/diff:/var/lib/docker/overl
ay2/3e3ac4369fa388424516d0bc961f1c43e390d4fb7a68c134d468d072cffb52c6/diff",
        "MergedDir": "/var/lib/docker/overlay2/71259a79245c1048c712ee36ddb97a85610ccf93241bedf6499958acfcaf0200/merged",
        "UpperDir": "/var/lib/docker/overlay2/71259a79245c1048c712ee36ddb97a85610ccf93241bedf6499958acfcaf0200/diff"
    }
}
```

```

        "WorkDir": "/var/lib/docker/overlay2/71259a79245c1048c712ee36ddb97a85610ccf93241bedf6499958acfcaf0200/work"
    },
    "Name": "overlay2"
},
"Mounts": [],
"Config": {
    "Hostname": "15c0b0376e20",
    "Domainname": "",
    "User": "",
    "AttachStdin": true,
    "AttachStdout": true,
    "AttachStderr": true,
    "Tty": true,
    "OpenStdin": true,
    "StdinOnce": true,
    "Env": [
        "PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin"
    ],
    "Cmd": [
        "/bin/bash"
    ],
    "Image": "ubuntu",
    "Volumes": null,
    "WorkingDir": "",
    "Entrypoint": null,
    "OnBuild": null,
    "Labels": {
        "org.opencontainers.image.ref.name": "ubuntu",
        "org.opencontainers.image.version": "24.04"
    }
},
"NetworkSettings": {
    "Bridge": "",
    "ContainerID": "c9f61465f8022a00ecd2ae71a76663ba93f61fe03549803d25055b2f725b712",
    "SandboxKey": "/var/run/docker/netns/c9f61465f802",
    "Ports": {},
    "HairpinMode": false,
    "LinkLocalIPv6Address": "",
    "LinkLocalIPv6PrefixLen": 0,
    "SecondaryIPAddresses": null,
    "SecondaryIPv6Addresses": null,
    "EndpointID": "24bceee5ddbbc569af4be4ed508b6b04c53f45dfdc2f97dd32403184ae066045",
    "Gateway": "172.17.0.1",
    "GlobalIPv6Address": "",
    "GlobalIPv6PrefixLen": 0,
    "IPAddress": "172.17.0.3",
    "IPPrefixLen": 16,
    "IPv6Gateway": "",
    "MacAddress": "02:42:ac:11:00:03",
    "Networks": {
        "bridge": {
            "IPAMConfig": null,
            "Links": null,
            "Aliases": null,
            "MacAddress": "02:42:ac:11:00:03",
            "NetworkID": "0f12eaec9bc4146314ef32f34bd2790103e3782712fe6e4d9f47ebac3ac75178",
            "EndpointID": "24bceee5ddbbc569af4be4ed508b6b04c53f45dfdc2f97dd32403184ae066045",
            "Gateway": "172.17.0.1",
            "IPAddress": "172.17.0.3",
            "IPPrefixLen": 16,
            "IPv6Gateway": "",
            "GlobalIPv6Address": "",
            "GlobalIPv6PrefixLen": 0,
            "DriverOpts": null,
            "DNSNames": null
        }
    }
}

```

Docker RM

It removes the container

C:\Users\Administrator>docker ps -a						
CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
6dd78ed4fd48	ubuntu	"/bin/bash"	2 hours ago	Exited (137)	2 hours ago	gallant_golick
15c0b0376e20	ubuntu	"/bin/bash"	2 hours ago	Up 2 hours		gifted_merkle
bcbc85173b1c	hello-world	"/hello"	3 hours ago	Exited (0)	3 hours ago	loving_kare
198b46ee6751	ubuntu	"/bin/bash"	8 hours ago	Exited (137)	2 hours ago	recursing_raman
de9afeb41e98	hello-world	"/hello"	8 hours ago	Exited (0)	3 hours ago	eager_rubin
8b919f895a15	hello-world	"/hello"	9 hours ago	Exited (0)	3 hours ago	adoring_gauss

```
C:\Users\Administrator>docker rm 6dd78ed4fda8
6dd78ed4fda8

C:\Users\Administrator>docker ps -a
CONTAINER ID   IMAGE      COMMAND     CREATED      STATUS          PORTS   NAMES
15c0b0376e20   ubuntu     "/bin/bash"  2 hours ago  Up 2 hours   gifted_merkle
bcbc85173b1c   hello-world "/hello"    3 hours ago  Exited (0) 3 hours ago   loving_kare
198b46ee6751   ubuntu     "/bin/bash"  8 hours ago  Exited (137) 2 hours ago   recursing_raman
de9afeb41e98   hello-world "/hello"    8 hours ago  Exited (0) 3 hours ago   eager_rubin
8b9198f95a15   hello-world "/hello"    9 hours ago  Exited (0) 3 hours ago   adoring_gauss
```

Docker RMI

Removes the image from the list of images. Image should not be referenced by any container. If it is referencing then that container should be removed first with docker rm command and then use docker rmi to remove the image from the server.

```
C:\Users\Administrator>docker rmi
"docker rmi" requires at least 1 argument.
See 'docker rmi --help'.

Usage: docker rmi [OPTIONS] IMAGE [IMAGE...]

Remove one or more images

C:\Users\Administrator>docker rmi --help

Usage: docker rmi [OPTIONS] IMAGE [IMAGE...]

Remove one or more images

Aliases:
  docker image rm, docker image remove, docker rmi

Options:
  -f, --force      Force removal of the image
  --no-prune     Do not delete untagged parents
```

```
C:\Users\Administrator>docker images
REPOSITORY           TAG      IMAGE ID      CREATED
SIZE
ubuntu              latest   bf3dc08bfed0  10 days ago
76.2MB
docker/desktop-kubernetes
  439MB
kubernetes-v1.29.2-cni-v1.4.0-critools-v1.29.0-cri-dockerd-v0.3.11-1-debian   v1.29.2   15340d8e9882  2 months ago
127MB
registry.k8s.io/kube-apiserver   v1.29.2   8a9000f98a52  2 months ago
122MB
registry.k8s.io/kube-controller-manager   v1.29.2   138fb5a3a2e3  2 months ago
9344fce2372f  2 months ago
registry.k8s.io/kube-proxy       v1.29.2   6fc5e6b7218c  2 months ago
82.3MB
registry.k8s.io/kube-scheduler   v1.29.2   53b148a9d196  3 months ago
59.5MB
registry.k8s.io/kube-apiserver   v1.29.1   c1f619b6477e  6 months ago
127MB
docke/welcome-to-docker        latest   a0eed15eed44  6 months ago
18.6MB
registry.k8s.io/etcd            3.5.10-0   cbb01a7bd410  8 months ago
148MB
registry.k8s.io/coredns/coredns v1.11.1   556098075b3d  12 months ago
59.8MB
docker/desktop-vpnkit-controller
  36.2MB
dc331cb22850be0cdd97c84a9cfecaf44a1afb6
latest
d2c94e258dcb  12 months ago
13.3kB
registry.k8s.io/pause           3.9      e6f181688397  19 months ago
744kB
docker/desktop-storage-provisioner
  41.9MB
v2.0                           99f89471f470  3 years ago
```

Docker Help

```
C:\Users\Administrator>docker help

Usage: docker [OPTIONS] COMMAND
A self-sufficient runtime for containers

Common Commands:
  run      Create and run a new container from an image
  exec    Execute a command in a running container
  ps      List containers
  build   Build an image from a Dockerfile
  pull    Download an image from a registry
  push    Upload an image to a registry
  images  List images
  login   Log in to a registry
  logout  Log out from a registry
  search  Search Docker Hub for images
  version Show the Docker version information
  info    Display system-wide information

Management Commands:
  builder  Manage builds
  buildx* Docker Buildx
  compose* Docker Compose
  container Manage containers
  context   Manage contexts
  debug*   Get a shell into any image or container.
  dev*     Docker Dev Environments
  extension* Manages Docker extensions
  feedback* Provide feedback, right in your terminal!
  image    Manage images
  init*   Creates Docker-related starter files for your project
  manifest Manage Docker image manifests and manifest lists

network  Manage networks
plugin   Manage plugins
sbom*   View the packaged-based Software Bill Of Materials (SBOM) for an image
scout*  Docker Scout
system   Manage Docker
trust    Manage trust on Docker images
volume   Manage volumes

Swarm Commands:
  swarm   Manage Swarm

Commands:
  attach   Attach local standard input, output, and error streams to a running container
  commit   Create a new image from a container's changes
  cp       Copy files/folders between a container and the local filesystem
  create   Create a new container
  diff     Inspect changes to files or directories on a container's filesystem
  events   Get real time events from the server
  export   Export a container's filesystem as a tar archive
  history  Show the history of an image
  import   Import the contents from a tarball to create a filesystem image
  inspect  Return low-level information on Docker objects
  kill     Kill one or more running containers
  load    Load an image from a tar archive or STDIN
  logs    Fetch the logs of a container
  pause   Pause all processes within one or more containers
  port    List port mappings or a specific mapping for the container
  rename  Rename a container
  restart Restart one or more containers
  rm     Remove one or more containers
  rmi    Remove one or more images
  save   Save one or more images to a tar archive (streamed to STDOUT by default)
  start  Start one or more stopped containers
```

```
stats      Display a live stream of container(s) resource usage statistics
stop       Stop one or more running containers
tag        Create a tag TARGET_IMAGE that refers to SOURCE_IMAGE
top        Display the running processes of a container
unpause    Unpause all processes within one or more containers
update     Update configuration of one or more containers
wait       Block until one or more containers stop, then print their exit codes

Global Options:
  --config string      Location of client config files (default "C:\\\\Users\\\\Administrator\\\\.docker")
  -c, --context string   Name of the context to use to connect to the
                        daemon (overrides DOCKER_HOST env var and
                        default context set with "docker context use")
  -D, --debug          Enable debug mode
  -H, --host list      Daemon socket to connect to
  -l, --log-level string  Set the logging level ("debug", "info",
                        "warn", "error", "fatal") (default "info")
  --tls                Use TLS; implied by --tlsverify
  --tlscacert string   Trust certs signed only by this CA (default
                        "C:\\\\Users\\\\Administrator\\\\.docker\\\\ca.pem")
  --tlscert string     Path to TLS certificate file (default
                        "C:\\\\Users\\\\Administrator\\\\.docker\\\\cert.pem")
  --tlskey string       Path to TLS key file (default
                        "C:\\\\Users\\\\Administrator\\\\.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/
```

Docker Build with DockerFile

Dockerfile.txt



Dockerfile - Notepad

File Edit Format View Help

```
FROM ubuntu
Maintainer Soumyajit Mondal soumyajitmondal16101999@gmail.com
RUN apt-get update
CMD ["echo", "Hello , Welcome to Docker file..."]
```

Docker build . -t ubuntu -f Dockerfile.txt

```
C:\Users\Administrator>docker build . -t ubuntu -f Dockerfile.txt
[+] Building 65.9s (6/6) FINISHED
=> [internal] load build definition from Dockerfile.txt
=> => transferring dockerfile: 188B
=> [internal] load metadata for docker.io/library/ubuntu:latest
=> [internal] load .dockerrcignore
=> => transferring context: 2B
=> [1/2] FROM docker.io/library/ubuntu:latest
=> [2/2] RUN apt-get update
=> exporting to image
=> => exporting layers
=> => writing image sha256:bf054119ced762b1cca30ab0dc00c961f3b0e764755e18f45e39a037cb861908
=> => naming to docker.io/library/ubuntu

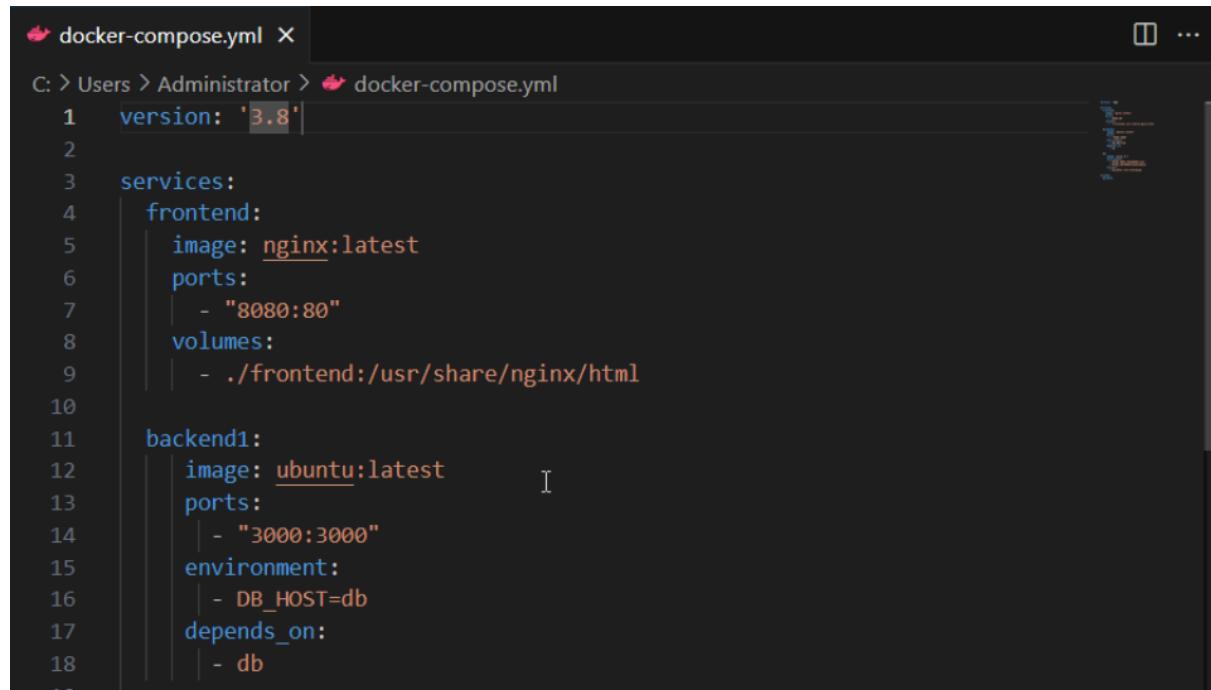
docker:default
  0.0s
  0.0s
  0.0s
  0.1s
  0.0s
  0.0s
  64.7s
  0.6s
  0.4s
  0.0s
  0.0s

What's Next?
  View a summary of image vulnerabilities and recommendations → docker scout quickview
```

Docker run ubuntu

```
C:\Users\Administrator>docker run ubuntu
Hello , Welcome to Docker file...  
Acti
```

Docker Compose



```
docker-compose.yml x ...
```

```
C: > Users > Administrator > docker-compose.yml
1   version: '3.8'
2
3   services:
4     frontend:
5       image: nginx:latest
6       ports:
7         - "8080:80"
8       volumes:
9         - ./frontend:/usr/share/nginx/html
10
11    backend1:
12      image: ubuntu:latest
13      ports:
14        - "3000:3000"
15      environment:
16        - DB_HOST=db
17      depends_on:
18        - db
```

```

20  db:
21    image: mysql:5.7
22    environment:
23      - MYSQL_ROOT_PASSWORD=root
24      - MYSQL_DATABASE=mydatabase
25    volumes:
26      - db_data:/var/lib/mysql
27
28  volumes:
29    db_data:

```

Docker compose up

```

C:\Users\Administrator>docker compose up
[+] Running 20/20
  □ frontend Pulled
  □ b0a0cf830b12 Pull complete   32.1s
  □ 4d84de5fb9b2 Pull complete   17.5s
  □ 2818b7b6a9db Pull complete   18.7s
  □ 1e5314d67f16 Pull complete   15.3s
  □ 8066e07ce4f2 Pull complete   16.3s
  □ 05f7109fea9e Pull complete   17.5s
  □ e58cbd904f7f Pull complete   18.6s
  □ db Pulled                  18.7s
  □ 20e4dcae4c69 Pull complete   73.1s
  □ 1c56c3d4ce74 Pull complete   10.0s
  □ e9f03a1c24ce Pull complete   0.9s
  □ 68c3898c2015 Pull complete   1.2s
  □ 6b95a940e7b6 Pull complete   3.0s
  □ 90986bb8de6e Pull complete   3.0s
  □ ae71319cb779 Pull complete   2.3s
  □ ffc89e9dfdf88 Pull complete   3.6s
  □ 43d05e938198 Pull complete   10.2s
  □ 06492d298fba Pull complete   5.6s
  □ df9a4d85569b Pull complete   14.2s
  □ 06492d298fba Pull complete   11.2s
  □ df9a4d85569b Pull complete   12.7s
[+] Running 2/5
  □ Network administrator_default   Created
  □ Volume "administrator_db_data"   Created
  - Container administrator-frontend-1 Created   0.3s
  - Container administrator-db-1     Created   0.1s
  - Container administrator-backend-1 Created   4.0s
  - Container administrator-backend-1 Created   4.0s
Attaching to backend1-1, db-1, frontend-1
db-1  | 2024-05-13 11:04:10+00:00 [Note] [Entrypoint]: Entrypoint script for MySQL Server 5.7.44-1.el7 started.
Error response from daemon: Ports are not available: exposing port TCP 0.0.0.0:8080 -> 0.0.0.0:0: listen tcp 0.0.0.0:8080: bind: Only one usage of ea
ch socket address (protocol/network address/port) is normally permitted.

```

Verify whether the images are downloaded by docker compose with docker images command.

REPOSITORY	TAG	IMAGE ID	CREATED
ubuntu	latest	bf054119ced7	About an hour
ago	112MB	1d668e06f1e5	9 days ago
nginx	latest	bfd3dc08bfed0	13 days ago
ubuntu	<none>	15340d8e9882	2 months ago
76.2MB	kubernetes-v1.29.2-cni-v1.4.0-critools-v1.29.0-cri-dockerd-v0.3.11-1-debian	8a9000f98a52	2 months ago
docker/desktop-kubernetes	439MB	138fb5a3a2e3	2 months ago
registry.k8s.io/kube-apiserver	v1.29.2	6fc5e6b7218c	2 months ago
127MB	registry.k8s.io/kube-controller-manager	9344fce2372f	2 months ago
122MB	registry.k8s.io/kube-scheduler	53b148a9d196	3 months ago
59.5MB	registry.k8s.io/kube-proxy	5107333e08a8	5 months ago
82.3MB	registry.k8s.io/kube-apiserver	c1f619b6477e	6 months ago
127MB	mysql	a0eed15seed44	6 months ago
501MB	5.7	cbb01a7bd410	9 months ago
18.6MB	docker/welcome-to-docker	556098075b3d	12 months ago
148MB	registry.k8s.io/etcdd	d2c94e258dc9	12 months ago
59.8MB	registry.k8s.io/coredns/coredns	e6f181688397	19 months ago
36.2MB	docker/desktop-vpnkit-controller	99f89471f470	3 years ago
13.3kB	hello-world		
744kB	registry.k8s.io/pause		
41.9MB	docker/desktop-storage-provisioner		

docker ps -a

Verify that containers are brought up by docker compose command using
docker ps -a

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
87dfffcc77473	ubuntu:latest	"echo 'Hello , Welco..."	21 minutes ago	Created		administrator-backend
d1-1						
cd9348228407	mysql:5.7	"docker-entrypoint.s..."	21 minutes ago	Up 21 minutes	3306/tcp, 33060/tcp	administrator-db-1
807b06335ef	nginx:latest	"/docker-entrypoint..."	21 minutes ago	Created		administrator-fronte
nd-1						
c3879c3ac6fa	ubuntu	"echo 'Hello , Welco..."	About an hour ago	Exited (0) About an hour ago		wizardly_swartz
38589f746353	bfd3dc08bfed0	"/bin/bash"	About an hour ago	Up About an hour		epic_grothendieck
cfc18002abe	bfd3dc08bfed0	"/bin/bash"	2 hours ago	Up 2 hours		epic_haslett
15c0b0376e20	bfd3dc08bfed0	"/bin/bash"	3 days ago	Up 3 days		gifted_merkle
bcbc85173b1c	hello-world	"/hello"	3 days ago	Exited (0) 3 days ago		loving_kare
198b46ee6751	bfd3dc08bfed0	"/bin/bash"	3 days ago	Exited (137) 2 days ago		recurring_raman
de9afeb41e98	hello-world	"/hello"	3 days ago	Exited (0) 3 days ago		eager_rubin
8b9198f95a15	hello-world	"/hello"	3 days ago	Exited (0) 3 days ago		adoring_gauss

Docker Volume

Docker volumes are **file systems mounted on Docker containers to preserve data generated by the running container.**

Docker volumes are a widely used and useful tool for ensuring data persistence while working in containers.

```
C:\Users\Administrator>docker volume ls
DRIVER      VOLUME NAME
local      administrator_db_data

C:\Users\Administrator>docker volume create my_volume
my_volume

C:\Users\Administrator>docker volume ls
DRIVER      VOLUME NAME
local      administrator_db_data
local      my_volume
```

Kubernetes

Node Information

```
C:\Users\Administrator>kubectl get node
NAME           STATUS   ROLES      AGE   VERSION
docker-desktop   Ready    control-plane   5d    v1.29.2
```

Describe Node

```
C:\Users\Administrator>kubectl describe node docker-desktop
Name:           docker-desktop
Roles:          control-plane
Labels:         beta.kubernetes.io/arch=amd64
                beta.kubernetes.io/os=linux
                kubernetes.io/arch=amd64
                kubernetes.io/hostname=docker-desktop
                kubernetes.io/os=linux
                node-role.kubernetes.io/control-plane=
Annotations:    node.kubernetes.io/exclude-from-external-load-balancers=
                kubeadm.alpha.kubernetes.io/cri-socket: unix:///var/run/cri-dockerd.sock
                node.alpha.kubernetes.io/ttl: 0
                volumes.kubernetes.io/controller-managed-attach-detach: true
CreationTimestamp: Thu, 09 May 2024 15:19:12 +0530
Taints:         <none>
Unschedulable:  false
Lease:
  HolderIdentity: docker-desktop
  AcquireTime:    <unset>
  RenewTime:     Tue, 14 May 2024 15:31:27 +0530
Conditions:
  Type        Status  LastHeartbeatTime          LastTransitionTime        Reason           Message
  ----        -----  -----                      -----                  -----           -----
  MemoryPressure  False   Tue, 14 May 2024 15:31:20 +0530  Thu, 09 May 2024 15:19:05 +0530  KubeletHasSufficientMemory  kubelet has sufficient me
  DiskPressure   False   Tue, 14 May 2024 15:31:20 +0530  Thu, 09 May 2024 15:19:05 +0530  KubeletHasNoDiskPressure  kubelet has no disk press
  PIDPressure   False   Tue, 14 May 2024 15:31:20 +0530  Thu, 09 May 2024 15:19:05 +0530  KubeletHasSufficientPID    kubelet has sufficient PI
  Ready         True    Tue, 14 May 2024 15:31:20 +0530  Thu, 09 May 2024 15:19:12 +0530  KubeletReady               kubelet is posting ready
Addresses:
  InternalIP:  192.168.65.3
  Hostname:    docker-desktop
Capacity:
  cpu:          4
  ephemeral-storage: 1055762868Ki
  hugepages-1Gi: 0
  hugepages-2Mi: 0
  memory:       8135580Ki
  pods:         110
Allocatable:
  cpu:          4
  ephemeral-storage: 972991057538
  hugepages-1Gi: 0
  hugepages-2Mi: 0
  memory:       8033180Ki
  pods:         110
System Info:
  Machine ID:      88ee013c-eb8c-4461-b824-b83dedfad317
  System UUID:      88ee013c-eb8c-4461-b824-b83dedfad317
  Boot ID:         d318d44f-90d2-4a56-929a-3c277d0851db
  Kernel Version:  5.15.146.1-microsoft-standard-WSL2
  OS Image:        Docker Desktop
  Operating System: linux
  Architecture:   amd64
  Container Runtime Version: docker://26.0.0
  Kubelet Version:  v1.29.2
  Kube-Proxy Version: v1.29.2
  Non-terminated Pods: (10 in total)
```

Namespace	Name	CPU Requests	CPU Limits	Memory Requests	Memory Limits	Age
default	mypod	0 (0%)	0 (0%)	0 (0%)	0 (0%)	4h32m
kube-system	coredns-76f75df574-rk4sv	100m (2%)	0 (0%)	70Mi (0%)	170Mi (2%)	5d
kube-system	coredns-76f75df574-zclb6	100m (2%)	0 (0%)	70Mi (0%)	170Mi (2%)	5d
kube-system	etcd-docker-desktop	100m (2%)	0 (0%)	100Mi (1%)	0 (0%)	5d
kube-system	kube-apiserver-docker-desktop	250m (6%)	0 (0%)	0 (0%)	0 (0%)	5d
kube-system	kube-controller-manager-docker-desktop	200m (5%)	0 (0%)	0 (0%)	0 (0%)	5d
kube-system	kube-proxy-rhw5h	0 (0%)	0 (0%)	0 (0%)	0 (0%)	5d
kube-system	kube-scheduler-docker-desktop	100m (2%)	0 (0%)	0 (0%)	0 (0%)	5d
kube-system	storage-provisioner	0 (0%)	0 (0%)	0 (0%)	0 (0%)	5d
kube-system	vpnkit-controller	0 (0%)	0 (0%)	0 (0%)	0 (0%)	5d
Allocated resources:						
(Total limits may be over 100 percent, i.e., overcommitted.)						
Resource	Requests	Limits				
cpu	850m (21%)	0 (0%)				
memory	240Mi (3%)	340Mi (4%)				
ephemeral-storage	0 (0%)	0 (0%)				
hugepages-1Gi	0 (0%)	0 (0%)				
hugepages-2Mi	0 (0%)	0 (0%)				
Events:	<none>					

Cluster Info

```
C:\Users\Administrator>kubectl cluster-info
Kubernetes control plane is running at https://kubernetes.docker.internal:6443
CoreDNS is running at https://kubernetes.docker.internal:6443/api/v1/namespaces/kube-system/services/kube-dns:dns/proxy

To further debug and diagnose cluster problems, use 'kubectl cluster-info dump'.
```

API Resources

NAME	SHORTNAMES	APIVERSION	NAMESPACED	KIND
bindings	v1		true	Binding
componentstatuses	cs	v1	false	ComponentStatus
configmaps	cm	v1	true	ConfigMap
endpoints	ep	v1	true	Endpoints
events	ev	v1	true	Event
limitranges	limits	v1	true	LimitRange
namespaces	ns	v1	false	Namespace
nodes	no	v1	false	Node
persistentvolumeclaims	pvc	v1	true	PersistentVolumeClaim
persistentvolumes	pv	v1	false	PersistentVolume
pods	po	v1	true	Pod
podtemplates		v1	true	PodTemplate
replicationcontrollers	rc	v1	true	ReplicationController
resourcequotas	quota	v1	true	ResourceQuota
secrets		v1	true	Secret
serviceaccounts	sa	v1	true	ServiceAccount
services	svc	v1	true	Service
mutatingwebhookconfigurations		admissionregistration.k8s.io/v1	false	MutatingWebhookConfiguration
validatingwebhookconfigurations		admissionregistration.k8s.io/v1	false	ValidatingWebhookConfiguration
customresourcedefinitions	crd,crds	apiextensions.k8s.io/v1	false	CustomResourceDefinition
apiservices		apiregistration.k8s.io/v1	false	APIService
controllerrevisions		apps/v1	true	ControllerRevision
daemonsets	ds	apps/v1	true	DaemonSet
deployments	deploy	apps/v1	true	Deployment
replicasetss	rs	apps/v1	true	ReplicaSet
statefulsets	sts	apps/v1	true	StatefulSet
selfsubjectreviews		authentication.k8s.io/v1	false	SelfSubjectReview
tokenreviews		authentication.k8s.io/v1	false	TokenReview
localsubjectaccessreviews		authorization.k8s.io/v1	true	LocalSubjectAccessReview
selfsubjectaccessreviews		authorization.k8s.io/v1	false	SelfSubjectAccessReview
selfsubjectrulesreviews		authorization.k8s.io/v1	false	SelfSubjectRulesReview

Activate Windows

Please activate Windows to Settings to activate Windows.

subjectaccessreviews		authorization.k8s.io/v1	false	SubjectAccessReview
horizontalpodautoscalers	hpa	autoscaling/v2	true	HorizontalPodAutoscaler
cronjobs	cj	batch/v1	true	CronJob
jobs		batch/v1	true	Job
certificatesigningrequests	csr	certificates.k8s.io/v1	false	CertificateSigningRequest
leases		coordination.k8s.io/v1	true	Lease
endpointslices		discovery.k8s.io/v1	true	EndpointSlice
events	ev	events.k8s.io/v1	true	Event
flowschemas		flowcontrol.apiserver.k8s.io/v1	false	FlowSchema
prioritylevelconfigurations		flowcontrol.apiserver.k8s.io/v1	false	PriorityLevelConfiguration
ingressclasses		networking.k8s.io/v1	false	IngressClass
ingresses	ing	networking.k8s.io/v1	true	Ingress
networkpolicies	netpol	networking.k8s.io/v1	true	NetworkPolicy
runtimeclasses		node.k8s.io/v1	false	RuntimeClass
poddisruptionbudgets		policy/v1	true	PodDisruptionBudget
clusterrolebindings		rbac.authorization.k8s.io/v1	false	ClusterRoleBinding
clusterroles		rbac.authorization.k8s.io/v1	false	ClusterRole
rolebindings		rbac.authorization.k8s.io/v1	true	RoleBinding
roles		rbac.authorization.k8s.io/v1	true	Role
priorityclasses	pc	scheduling.k8s.io/v1	false	PriorityClass
csidrivers		storage.k8s.io/v1	false	CSIDriver
csinodes		storage.k8s.io/v1	false	CSINode
csistoragecapacities		storage.k8s.io/v1	true	CSIStorageCapacity
storageclasses	sc	storage.k8s.io/v1	false	StorageClass
volumeattachments		storage.k8s.io/v1	false	VolumeAttachment

API Versions

```
C:\Users\Administrator>kubectl api-versions
admissionregistration.k8s.io/v1
apiextensions.k8s.io/v1
apiregistration.k8s.io/v1
apps/v1
authentication.k8s.io/v1
authorization.k8s.io/v1
autoscaling/v1
autoscaling/v2
batch/v1
certificates.k8s.io/v1
coordination.k8s.io/v1
discovery.k8s.io/v1
events.k8s.io/v1
flowcontrol.apiserver.k8s.io/v1
flowcontrol.apiserver.k8s.io/v1beta3
networking.k8s.io/v1
node.k8s.io/v1
policy/v1
rbac.authorization.k8s.io/v1
scheduling.k8s.io/v1
storage.k8s.io/v1
v1
```

Activate W
Go to Settings

PODS

Create a POD & Get info about POD

```
C:\Users\Administrator>kubectl get pods
NAME      READY   STATUS    RESTARTS   AGE
mypod    1/1     Running   0          4h41m
```

Describe POD

```
C:\Users\Administrator>kubectl describe pod mypod
Name:           mypod
Namespace:      default
Priority:      0
Service Account: default
Node:          docker-desktop/192.168.65.3
Start Time:    Tue, 14 May 2024 10:58:41 +0530
Labels:        run=mypod
Annotations:   <none>
Status:        Running
IP:            10.1.0.10
IPs:
  IP:  10.1.0.10
Containers:
  mypod:
    Container ID:  docker://095f2b79d15d020716a12e5c617c38ee0dfb85873abe707eb221c19b5d69292b
    Image:         nginx
    Image ID:     docker-pullable://nginx@sha256:32e76d4f34f80e479964a0fb4c5b4f6967b5322c8d004e9cf0cb81c93510766
    Port:          <none>
    Host Port:    <none>
    State:        Running
      Started:   Tue, 14 May 2024 10:58:45 +0530
    Ready:        True
    Restart Count: 0
    Environment:  <none>
    Mounts:
      /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-xvqh (ro)
```

```
Conditions:
  Type          Status
  PodReadyToStartContainers  True
  Initialized    True
  Ready          True
  ContainersReady  True
  PodScheduled   True
Volumes:
  kube-api-access-xvqh:
    Type:           Projected (a volume that contains injected data from multiple sources)
    TokenExpirationSeconds: 3607
    ConfigMapName:   kube-root-ca.crt
    ConfigMapOptional: <nil>
    DownwardAPI:    true
  QoS Class:      BestEffort
  Node-Selectors: <none>
  Tolerations:   node.kubernetes.io/not-ready:NoExecute op=Exists for 300s
                 node.kubernetes.io/unreachable:NoExecute op=Exists for 300s
Events:
```

Executes Command in POD

```
C:\Users\Administrator>kubectl exec mypod -- ls
bin
boot
dev
docker-entrypoint.d
docker-entrypoint.sh
etc
home
lib
lib64
media
mnt
opt
proc
root
run
sbin
srv
sys
tmp
usr
var
```

Activate Windows

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Execute in interactive mode

```
C:\Users\Administrator>kubectl exec -it mypod /bin/sh
kubectl exec [POD] [COMMAND] is DEPRECATED and will be removed in a future version. Use kubectl exec [POD] -- [COMMAND] instead.
#
#
#
# pwd
/
# ls
bin  boot  dev  docker-entrypoint.d  docker-entrypoint.sh  etc  home  lib  lib64  media  mnt  opt  proc  root  run  sbin  srv  sys  tmp  usr  var
# -
```

Show Labels for POD

```
C:\Users\Administrator>kubectl get pods
NAME     READY   STATUS    RESTARTS   AGE
mypo...  1/1     Running   0          4h47m

C:\Users\Administrator>kubectl get pod --show-labels
NAME     READY   STATUS    RESTARTS   AGE      LABELS
mypo...  1/1     Running   0          4h47m   run=mypo...
```

POD info in JSON format

```
C:\Users\Administrator>kubectl get pod -o=json
{
  "apiVersion": "v1",
  "items": [
    {
      "apiVersion": "v1",
      "kind": "Pod",
      "metadata": {
        "creationTimestamp": "2024-05-14T05:28:41Z",
        "labels": {
          "run": "mypo..."
        },
        "name": "mypo...",
        "namespace": "default",
        "resourceVersion": "542407",
        "uid": "84314467-595d-4a8d-b333-b657086ce3b2"
      },
      "spec": {
        "containers": [
          {
            "image": "nginx",
            "imagePullPolicy": "Always",
            "name": "mypo...",
            "resources": {},
            "terminationMessagePath": "/dev/termination-log",
            "terminationMessagePolicy": "File",
            "volumeMounts": [
              {
                "mountPath": "/var/run/secrets/kubernetes.io/serviceaccount",
                "name": "kube-api-access-xvqh",
                "readOnly": true
              }
            ]
          }
        ]
      }
    }
  ]
}
```

Activate Windows
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```
        ],
    },
],
"dnsPolicy": "ClusterFirst",
"enableServiceLinks": true,
"nodeName": "docker-desktop",
"preemptionPolicy": "PreemptLowerPriority",
"priority": 0,
"restartPolicy": "Always",
"schedulerName": "default-scheduler",
"securityContext": {},
"serviceAccount": "default",
"serviceAccountName": "default",
"terminationGracePeriodSeconds": 30,
"tolerations": [
    {
        "effect": "NoExecute",
        "key": "node.kubernetes.io/not-ready",
        "operator": "Exists",
        "tolerationSeconds": 300
    },
    {
        "effect": "NoExecute",
        "key": "node.kubernetes.io/unreachable",
        "operator": "Exists",
        "tolerationSeconds": 300
    }
],
"volumes": [
{
    "name": "kube-api-access-xvqh",
    "projected": {
        "defaultMode": 420,

```

Activate Windows
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```
        "sources": [
            {
                "serviceAccountToken": {
                    "expirationSeconds": 3607,
                    "path": "token"
                }
            },
            {
                "configMap": {
                    "items": [
                        {
                            "key": "ca.crt",
                            "path": "ca.crt"
                        }
                    ],
                    "name": "kube-root-ca.crt"
                }
            },
            {
                "downwardAPI": {
                    "items": [
                        {
                            "fieldRef": {
                                "apiVersion": "v1",
                                "fieldPath": "metadata.namespace"
                            },
                            "path": "namespace"
                        }
                    ]
                }
            }
        ]
    }
}
```

Activate Windows
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```
        ],
      ],
    ],
  },
  "status": {
    "conditions": [
      {
        "lastProbeTime": null,
        "lastTransitionTime": "2024-05-14T05:28:46Z",
        "status": "True",
        "type": "PodReadyToStartContainers"
      },
      {
        "lastProbeTime": null,
        "lastTransitionTime": "2024-05-14T05:28:41Z",
        "status": "True",
        "type": "Initialized"
      },
      {
        "lastProbeTime": null,
        "lastTransitionTime": "2024-05-14T05:28:46Z",
        "status": "True",
        "type": "Ready"
      },
      {
        "lastProbeTime": null,
        "lastTransitionTime": "2024-05-14T05:28:46Z",
        "status": "True",
        "type": "ContainersReady"
      },
      {

```

Activate Windows
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```
        "lastProbeTime": null,
        "lastTransitionTime": "2024-05-14T05:28:46Z",
        "status": "True",
        "type": "ContainersReady"
      },
      {
        "lastProbeTime": null,
        "lastTransitionTime": "2024-05-14T05:28:41Z",
        "status": "True",
        "type": "PodScheduled"
      }
    ],
    "containerStatuses": [
      {
        "containerID": "docker://095f2b79d15d020716a12e5c617c38ee0dfb85873abe707eb221c19b5d69292b",
        "image": "nginx:latest",
        "imageID": "docker-pullable://nginx@sha256:32e76d4f34f80e479964a0fb4c5b4f6967b5322c8d004e9cf0cb81c93510766",
        "lastState": {},
        "name": "mypod",
        "ready": true,
        "restartCount": 0,
        "started": true,
        "state": {
          "running": {
            "startedAt": "2024-05-14T05:28:45Z"
          }
        }
      }
    ],
    "hostIP": "192.168.65.3",
    "hostIPs": [
      {
        "ip": "192.168.65.3"

```

Activate Windows
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```
    ],
    "hostIP": "192.168.65.3",
    "hostIPs": [
      {
        "ip": "192.168.65.3"
      }
    ],
    "phase": "Running",
    "podIP": "10.1.0.10",
    "podIPs": [
      {
        "ip": "10.1.0.10"
      }
    ],
    "qosClass": "BestEffort",
    "startTime": "2024-05-14T05:28:41Z"
  }
},
{
  "kind": "List",
  "metadata": {
    "resourceVersion": ""
  }
}
```

POD info in YAML format

```
C:\Users\Administrator>kubectl get pod -o=yaml
apiVersion: v1
items:
- apiVersion: v1
  kind: Pod
  metadata:
    creationTimestamp: "2024-05-14T05:28:41Z"
    labels:
      run: mypod
    name: mypod
    namespace: default
    resourceVersion: "542407"
    uid: 84314467-595d-4a8d-b333-b657086ce3b2
  spec:
    containers:
      - image: nginx
        imagePullPolicy: Always
        name: mypod
        resources: {}
        terminationMessagePath: /dev/termination-log
        terminationMessagePolicy: File
        volumeMounts:
          - mountPath: /var/run/secrets/kubernetes.io/serviceaccount
            name: kube-api-access-xvqh
            readOnly: true
        dnsPolicy: ClusterFirst
        enableServiceLinks: true
        nodeName: docker-desktop
        preemptionPolicy: PreemptLowerPriority
        priority: 0
        restartPolicy: Always
        schedulerName: default-scheduler
        securityContext: {}
        serviceAccount: default
```

Activate Windows
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```
serviceAccountName: default
terminationGracePeriodSeconds: 30
tolerations:
- effect: NoExecute
  key: node.kubernetes.io/not-ready
  operator: Exists
  tolerationSeconds: 300
- effect: NoExecute
  key: node.kubernetes.io/unreachable
  operator: Exists
  tolerationSeconds: 300
volumes:
- name: kube-api-access-xvqh
  projected:
    defaultMode: 420
    sources:
      - serviceAccountToken:
          expirationSeconds: 3607
          path: token
      - configMap:
          items:
            - key: ca.crt
              path: ca.crt
          name: kube-root-ca.crt
      - downwardAPI:
          items:
            - fieldRef:
                apiVersion: v1
                fieldPath: metadata.namespace
                path: namespace
```

Activate Windows

```

status:
conditions:
- lastProbeTime: null
  lastTransitionTime: "2024-05-14T05:28:46Z"
  status: "True"
  type: PodReadyToStartContainers
- lastProbeTime: null
  lastTransitionTime: "2024-05-14T05:28:41Z"
  status: "True"
  type: Initialized
- lastProbeTime: null
  lastTransitionTime: "2024-05-14T05:28:46Z"
  status: "True"
  type: Ready
- lastProbeTime: null
  lastTransitionTime: "2024-05-14T05:28:46Z"
  status: "True"
  type: ContainersReady
- lastProbeTime: null
  lastTransitionTime: "2024-05-14T05:28:41Z"
  status: "True"
  type: PodScheduled
containerStatuses:
- containerID: docker://095f2b79d15d020716a12e5c617c38ee0dfb85873abe707eb221c19b5d69292b
  image: nginx:latest
  imageID: docker-pullable://nginx@sha256:32e76d4f34f80e479964a0fb4c5b4f6967b5322c8d004e9cf0cb81c93510766
  lastState: {}
  name: mypod
  ready: true
  restartCount: 0
  started: true

```

Activate Windows

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```

state:
  running:
    startedAt: "2024-05-14T05:28:45Z"
hostIP: 192.168.65.3
hostIPs:
- ip: 192.168.65.3
phase: Running
podIP: 10.1.0.10
podIPs:
- ip: 10.1.0.10
  qosClass: BestEffort
  startTime: "2024-05-14T05:28:41Z"
kind: List
metadata:
  resourceVersion: ""

```

Activate Windows

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POD info in WIDE format

NAME	READY	STATUS	RESTARTS	AGE	IP	NODE	NOMINATED NODE	READINESS GATES
mypod	1/1	Running	0	4h54m	10.1.0.10	docker-desktop	<none>	<none>

Get POD logs

```

C:\Users\Administrator>kubectl logs mypod
/docker-entrypoint.sh: /docker-entrypoint.d/ is not empty, will attempt to perform configuration
/docker-entrypoint.sh: Looking for shell scripts in /docker-entrypoint.d/
/docker-entrypoint.sh: Launching /docker-entrypoint.d/10-listen-on-ipv6-by-default.sh
10-listen-on-ipv6-by-default.sh: info: Getting the checksum of /etc/nginx/conf.d/default.conf
10-listen-on-ipv6-by-default.sh: info: Enabled listen on IPv6 in /etc/nginx/conf.d/default.conf
/docker-entrypoint.sh: Sourcing /docker-entrypoint.d/15-local-resolvers.envsh
/docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
/docker-entrypoint.sh: Launching /docker-entrypoint.d/30-tune-worker-processes.sh
/docker-entrypoint.sh: Configuration complete; ready for start up
2024/05/14 05:28:45 [notice] 1#1: using the "epoll" event method
2024/05/14 05:28:45 [notice] 1#1: nginx/1.25.5
2024/05/14 05:28:45 [notice] 1#1: built by gcc 12.2.0 (Debian 12.2.0-14)
2024/05/14 05:28:45 [notice] 1#1: OS: Linux 5.15.146.1-microsoft-standard-WSL2
2024/05/14 05:28:45 [notice] 1#1: getrlimit(RLIMIT_NOFILE): 1048576:1048576
2024/05/14 05:28:45 [notice] 1#1: start worker processes
2024/05/14 05:28:45 [notice] 1#1: start worker process 30
2024/05/14 05:28:45 [notice] 1#1: start worker process 31
2024/05/14 05:28:45 [notice] 1#1: start worker process 32
2024/05/14 05:28:45 [notice] 1#1: start worker process 33

```

Get logs from last 1 hour

```
C:\Users\Administrator>kubectl logs --since=1h mypod
C:\Users\Administrator>kubectl logs --since=5h mypod
/docker-entrypoint.sh: /docker-entrypoint.d/ is not empty, will attempt to perform configuration
/docker-entrypoint.sh: Looking for shell scripts in /docker-entrypoint.d/
/docker-entrypoint.sh: Launching /docker-entrypoint.d/10-listen-on-ipv6-by-default.sh
10-listen-on-ipv6-by-default.sh: info: Getting the checksum of /etc/nginx/conf.d/default.conf
10-listen-on-ipv6-by-default.sh: info: Enabled listen on IPv6 in /etc/nginx/conf.d/default.conf
/docker-entrypoint.sh: Sourcing /docker-entrypoint.d/15-local-resolvers.envsh
/docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
/docker-entrypoint.sh: Launching /docker-entrypoint.d/30-tune-worker-processes.sh
/docker-entrypoint.sh: Configuration complete; ready for start up
2024/05/14 05:28:45 [notice] 1#1: using the "epoll" event method
2024/05/14 05:28:45 [notice] 1#1: nginx/1.25.5
2024/05/14 05:28:45 [notice] 1#1: built by gcc 12.2.0 (Debian 12.2.0-14)
2024/05/14 05:28:45 [notice] 1#1: OS: Linux 5.15.146.1-microsoft-standard-WSL2
2024/05/14 05:28:45 [notice] 1#1: getrlimit(RLIMIT_NOFILE): 1048576:1048576
2024/05/14 05:28:45 [notice] 1#1: start worker processes
2024/05/14 05:28:45 [notice] 1#1: start worker process 30
2024/05/14 05:28:45 [notice] 1#1: start worker process 31
2024/05/14 05:28:45 [notice] 1#1: start worker process 32
2024/05/14 05:28:45 [notice] 1#1: start worker process 33
```

Activate Windows

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Display last n lines of logs from POD

```
C:\Users\Administrator>kubectl logs --tail=10 mypod
2024/05/14 05:28:45 [notice] 1#1: using the "epoll" event method
2024/05/14 05:28:45 [notice] 1#1: nginx/1.25.5
2024/05/14 05:28:45 [notice] 1#1: built by gcc 12.2.0 (Debian 12.2.0-14)
2024/05/14 05:28:45 [notice] 1#1: OS: Linux 5.15.146.1-microsoft-standard-WSL2
2024/05/14 05:28:45 [notice] 1#1: getrlimit(RLIMIT_NOFILE): 1048576:1048576
2024/05/14 05:28:45 [notice] 1#1: start worker processes
2024/05/14 05:28:45 [notice] 1#1: start worker process 30
2024/05/14 05:28:45 [notice] 1#1: start worker process 31
2024/05/14 05:28:45 [notice] 1#1: start worker process 32
2024/05/14 05:28:45 [notice] 1#1: start worker process 33
```

Create a Deployment

```
C:\Users\Administrator>kubectl create deployment --image nginx test-rs
deployment.apps/test-rs created

C:\Users\Administrator>kubectl get deployment
NAME      READY   UP-TO-DATE   AVAILABLE   AGE
test-rs   1/1     1           1           11s
```

Describe Deployment

```
C:\Users\Administrator>kubectl describe deployment
Name:            test-rs
Namespace:       default
CreationTimestamp: Tue, 14 May 2024 15:58:52 +0530
Labels:          app=test-rs
Annotations:    deployment.kubernetes.io/revision: 1
Selector:        app=test-rs
Replicas:       1 desired | 1 updated | 1 total | 1 available | 0 unavailable
StrategyType:   RollingUpdate
MinReadySeconds: 0
RollingUpdateStrategy: 25% max unavailable, 25% max surge
Pod Template:
  Labels:  app=test-rs
  Containers:
    nginx:
      Image:    nginx
      Port:     <none>
      Host Port: <none>
      Environment: <none>
      Mounts:    <none>
      Volumes:   <none>
  Conditions:
    Type      Status  Reason
    ----      ----  -----
    Available  True    MinimumReplicasAvailable
    Progressing True   NewReplicaSetAvailable
OldReplicaSets: <none>
NewReplicaSet:  test-rs-7d87ff65fc (1/1 replicas created)
Events:
  Type  Reason             Age   From           Message
  ----  ----              ----  ----           -----
  Normal  ScalingReplicaSet 13m  deployment-controller  Scaled up replica set test-rs-7d87ff65fc to 1
```

Activate Windows

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Kubectl get all

```
C:\Users\Administrator>kubectl get all
NAME                               READY   STATUS    RESTARTS   AGE
pod/mypod                         1/1    Running   0          5h14m
pod/test-rs-7d87ff65fc-7mn8l      1/1    Running   0          14m

NAME            TYPE        CLUSTER-IP   EXTERNAL-IP   PORT(S)   AGE
service/kubernetes   ClusterIP   10.96.0.1   <none>       443/TCP   5d

NAME           READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/test-rs   1/1     1           1          14m

NAME           DESIRED  CURRENT   READY   AGE
replicaset.apps/test-rs-7d87ff65fc  1        1         1        14m
```

Delete Deployment

```
C:\Users\Administrator>kubectl delete deployment test-rs
deployment.apps "test-rs" deleted

C:\Users\Administrator>kubectl get all
NAME      READY   STATUS    RESTARTS   AGE
pod/mypod  1/1    Running   0          5h16m

NAME            TYPE        CLUSTER-IP   EXTERNAL-IP   PORT(S)   AGE
service/kubernetes   ClusterIP   10.96.0.1   <none>       443/TCP   5d
```

Single Container

SingleContainer.yaml file

```
C: > Users > Administrator > ! SingleContainer.yaml
1  apiVersion: v1
2  kind: Pod
3  metadata:
4    name: redis
5    labels:
6      app: redis-app
7  spec:
8    containers:
9      - name: redis-image
10     image: redis
```

Kubectl apply

```
C:\Users\Administrator>kubectl apply -f SingleContainer.yml
pod/redis created

C:\Users\Administrator>kubectl get all pods
error: you must specify only one resource

C:\Users\Administrator>kubectl apply -f SingleContainer.yml
pod/redis unchanged

C:\Users\Administrator>kubectl get pods
NAME      READY   STATUS    RESTARTS   AGE
mymod     1/1     Running   0          5h24m
redis     1/1     Running   0          38s

C:\Users\Administrator>docker ps -a
CONTAINER ID   IMAGE           COMMAND                  CREATED        STATUS        PORTS     NAMES
2e3ae7613683   redis           "docker-entrypoint.s..."  39 seconds ago  Up 38 seconds   k8s_redis-image_redis_default
t_75ea62a0-1a67-4f04-bc03-6b91ee7c66c3_0   095f2b79d15d   nginx        "/docker-entrypoint..."  5 hours ago   Up 5 hours   k8s_mypod_mypod_default_8431
4467-595d-4a8d-b333-b657086ce3b2_0   87dfffcc77473   ubuntu:latest   "echo 'Hello , Welco..."  24 hours ago  Exited (0) 23 hours ago   administrator-backend1-1
cd9348228407   mysql:5.7      "docker-entrypoint.s..."  24 hours ago  Up 24 hours   3306/tcp, 33060/tcp   administrator-db-1
807b063352ef   nginx:latest   "/docker-entrypoint..."  24 hours ago  Created       administrator-frontend-1
c3879c3ac6fa   ubuntu         "echo 'Hello , Welco..."  25 hours ago  Exited (0) 25 hours ago   wizardly_swartz
38589f746353   bf3dc08bfed0   "/bin/bash"      25 hours ago  Up 25 hours   epic_grothendieck
cf8c18002abe   bf3dc08bfed0   "/bin/bash"      25 hours ago  Up 25 hours   epic_haslett
15c0b0376e20   bf3dc08bfed0   "/bin/bash"      3 days ago   Up 3 days    gifted_merkle
bcbc85173b1c   hello-world   "/hello"       3 days ago   Exited (0) 3 days ago   loving_kare
198b46ee6751   bf3dc08bfed0   "/bin/bash"      4 days ago   Exited (137) 3 days ago   recursing_raman
de9afeb41e98   hello-world   "/hello"       4 days ago   Exited (0) 3 days ago   regal_wala
8b9198f95a15   hello-world   "/hello"       4 days ago   Exited (0) 3 days ago   adoring_gauss
Activating Windows
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```

Kubectl describe POD Command

```
C:\Users\Administrator>kubectl describe pod redis
Name:           redis
Namespace:      default
Priority:       0
Service Account: default
Node:           docker-desktop/192.168.65.3
Start Time:     Tue, 14 May 2024 16:22:27 +0530
Labels:          app=redis-app
Annotations:    <none>
Status:         Running
IP:             10.1.0.12
IPs:
  IP: 10.1.0.12
Containers:
  redis-image:
    Container ID:  docker://2e3ae7613683c76a4726b10d3d8543e224759492d7833e7391115870943a63e4
    Image:         redis
    Image ID:     docker-pullable://redis@sha256:a7fccbb58a01ad5ede0d1734b27fef09eca4f9d81e10266a6807374a77bf51
    Port:          <none>
    Host Port:    <none>
    State:        Running
    Started:     Tue, 14 May 2024 16:22:38 +0530
    Ready:        True
    Restart Count: 0
    Environment:  <none>
    Mounts:
      /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-g8hxm (ro)
```

```

    , var, /var/secrets/kube-test-10/serviceaccount from kube-api-access-gomax (Pod)
Conditions:
  Type        Status
  PodReadyToStartContainers  True
  Initialized   True
  Ready        True
  ContainersReady  True
  PodScheduled  True
Volumes:
  kube-api-access-g8hxmm:
    Type:      Projected (a volume that contains injected data from multiple sources)
    TokenExpirationSeconds: 3607
    ConfigMapName:          kube-root-ca.crt
    ConfigMapOptional:      <nil>
    DownwardAPI:            true
  QoS Class:      BestEffort
  Node-Selectors: <none>
  Tolerations:    node.kubernetes.io/not-ready:NoExecute op=Exists for 300s
                  node.kubernetes.io/unreachable:NoExecute op=Exists for 300s
Events:
  Type     Reason   Age   From           Message
  ----   -----   ---   ----           -----
  Normal  Scheduled  4m10s default-scheduler  Successfully assigned default/redis to docker-desktop
  Normal  Pulling    4m9s  kubelet         Pulling image "redis"
  Normal  Pulled     4m   kubelet         Successfully pulled image "redis" in 9.013s (9.013s including waiting)
  Normal  Created    4m   kubelet         Created container redis-image
  Normal  Started   3m59s kubelet         Started container redis-image

```

Delete the POD

```

C:\Users\Administrator>kubectl delete pod redis
pod "redis" deleted

C:\Users\Administrator>kubectl get pods
NAME      READY   STATUS    RESTARTS   AGE
mypod    1/1     Running   0          5h29m

```

Multi Container

MultiContainer.yml

```

C: > Users > Administrator > ! MultiContainer.yml
1  apiVersion: v1
2  kind: Pod
3  metadata:
4    name: redismulticontainer
5    labels:
6      app: redis-app
7  spec:
8    containers:
9      - name: redis-image
10     image: redis
11      - name: nginx
12     image: nginx

```

Kubectl apply

```
C:\Users\Administrator>kubectl apply -f MultiContainer.yml
pod/redismulticontainer created

C:\Users\Administrator>kubectl get pods
NAME             READY   STATUS    RESTARTS   AGE
mypod           1/1     Running   0          5h34m
redismulticontainer   2/2     Running   0          85s
```

Describe POD MultiContainer

```
C:\Users\Administrator>kubectl describe pod redismulticontainer
Name:           redismulticontainer
Namespace:      default
Priority:       0
Service Account: default
Node:           docker-desktop/192.168.65.3
Start Time:     Tue, 14 May 2024 16:32:05 +0530
Labels:         app=redis-app
Annotations:    <none>
Status:        Running
IP:            10.1.0.13
IPs:
  IP: 10.1.0.13
Containers:
  redis-image:
    Container ID: docker://dabec4ed4464dea81b0579ba120d65f585d35031e6e4a9cf49bb2f0637694209
    Image:          redis
    Image ID:      docker-pullable://redis@sha256:a7fccbb58a01ad5ede0d1734b27fe09eca4f9d81e10266a6807374a77bf51
    Port:          <none>
    Host Port:    <none>
    State:        Running
      Started:   Tue, 14 May 2024 16:32:09 +0530
    Ready:        True
    Restart Count: 0
    Environment:  <none>
    Mounts:
      /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-zdzm4 (ro)
  nginx:
    Container ID: docker://a38df6fb848924171e3b38395d31531e27fe220d7cffd0451645e61eb96d80ca
    Image:          nginx
    Image ID:      docker-pullable://nginx@sha256:32e76d4f34f80e479964a0fb4c5b4f6967b5322c8d004e9cf0cb81c93510766
    Port:          <none>
    Host Port:    <none>
Conditions:
  Type        Status
  PodReadyToStartContainers  True
  Initialized  True
  Ready        True
  ContainersReady  True
  PodScheduled  True
Volumes:
  kube-api-access-zdzm4:
    Type:          Projected (a volume that contains injected data from multiple sources)
    TokenExpirationSeconds: 3607
    ConfigMapName:  kube-root-ca.crt
    ConfigMapOptional: <nil>
    DownwardAPI:   true
  QoS Class:  BestEffort
  Node-Selectors:  <none>
  Tolerations:   node.kubernetes.io/not-ready:NoExecute op=Exists for 300s
                 node.kubernetes.io/unreachable:NoExecute op=Exists for 300s
Events:
  Type  Reason  Age   From      Message
  ----  -----  ---   ----      -----
  Normal Scheduled  3m13s  default-scheduler  Successfully assigned default/redismulticontainer to docker-desktop
  Normal Pulling   3m12s  kubeblet   Pulling image "redis"
  Normal Pulled    3m9s   kubeblet   Successfully pulled image "redis" in 3.032s (3.032s including waiting)
  Normal Created   3m9s   kubeblet   Created container redis-image
  Normal Started   3m8s   kubeblet   Started container redis-image
  Normal Pulling   3m8s   kubeblet   Pulling image "nginx"
  Normal Pulled    3m6s   kubeblet   Successfully pulled image "nginx" in 2.405s (2.405s including waiting)
  Normal Created   3m6s   kubeblet   Created container nginx
```

Delete the POD

```
C:\Users\Administrator>kubectl delete pod redismulticontainer
pod "redismulticontainer" deleted

C:\Users\Administrator>kubectl get pods
NAME      READY   STATUS    RESTARTS   AGE
mypod    1/1     Running   0          5h39m
```

Service

Service.yml file

```
C: > Users > Administrator > ! Service.yml
1  apiVersion: v1
2  kind: Service
3  metadata:
4    name: nginxservice
5  spec:
6    selector:
7      app: nginx
8    ports:
9      - protocol: TCP
10     port: 80
11     targetPort: 80
12     type: LoadBalancer
```

Run the service

```
C:\Users\Administrator>kubectl apply -f Service.yml
service/nginxservice created
```

Verify the service

```
C:\Users\Administrator>kubectl get service
NAME      TYPE        CLUSTER-IP   EXTERNAL-IP   PORT(S)      AGE
kubernetes   ClusterIP   10.96.0.1   <none>       443/TCP     6d23h
nginxservice   LoadBalancer  10.98.187.85  localhost   80:30296/TCP  2m1s

C:\Users\Administrator>kubectl describe service nginxservice
Name:           nginxservice
Namespace:      default
Labels:          <none>
Annotations:    <none>
Selector:        app=nginx
Type:           LoadBalancer
IP Family Policy: SingleStack
IP Families:   IPv4
IP:             10.98.187.85
IPs:            10.98.187.85
LoadBalancer Ingress: localhost
Port:           <unset>  80/TCP
TargetPort:     80/TCP
NodePort:       <unset>  30296/TCP
Endpoints:      <none>
Session Affinity: None
External Traffic Policy: Cluster
Events:
```

Delete the Service

```
C:\Users\Administrator>kubectl delete service nginxservice
service "nginxservice" deleted

C:\Users\Administrator>kubectl get service
NAME      TYPE      CLUSTER-IP    EXTERNAL-IP    PORT(S)    AGE
kubernetes  ClusterIP  10.96.0.1    <none>        443/TCP   6d23h
```

ReplicaSet

ReplicaSettemp.yml

```
C: > Users > Administrator > ! Replicasettemp.yml
1  apiVersion: apps/v1
2  kind: ReplicaSet
3  metadata:
4    name: frontend
5    labels:
6      app: nginx
7      tier: frontend
8  spec:
9    replicas: 5
10   selector:
11     matchLabels:
12       tier: frontend
13   template:
14     metadata:
15       labels:
16         tier: frontend
17     spec:
18       containers:
19         - name: nginx
20           image: nginx:latest
21           ports:
22             - containerPort: 80
```

Activate Windows

Create and verify ReplicaSet



Delete ReplicaSet

```
C:\Users\Administrator>kubectl delete Replicaset/frontend  
replicaset.apps "frontend" deleted  
  
C:\Users\Administrator>kubectl get replicaset  
No resources found in default namespace.  
  
C:\Users\Administrator>kubectl get pods  
NAME      READY   STATUS    RESTARTS   AGE  
mypod     1/1     Running   0          2d4h
```

Batch Job

Job1.yml file

```
C: > Users > Administrator > ! job1.yml  
1  apiVersion: batch/v1  
2  kind: Job  
3  metadata:  
4  |  name: pi-calculator  
5  spec:  
6  |  template:  
7  |  |  spec:  
8  |  |  |  containers:  
9  |  |  |  - name: pi-calculator  
10 |  |  |  |  image: perl:5.34.0  
11 |  |  |  |  command: ["perl","-Mbignum=bpi","wle"]  
12 |  |  |  restartPolicy: Never  
13 |  |  |  completions: 1|
```

Run and Verify

```
C:\Users\Administrator>kubectl apply -f job1.yml  
job.batch/pi-calculator created  
  
C:\Users\Administrator>kubectl get pods  
NAME           READY   STATUS    RESTARTS   AGE  
mypod         1/1     Running   0          2d4h  
pi-calculator-gsz2f  0/1     ContainerCreating   0          7s
```

```
C:\Users\Administrator>kubectl get all
NAME                      READY   STATUS        RESTARTS   AGE
pod/mypod                 1/1     Running      0          2d4h
pod/pi-calculator-gsz2f   0/1     ContainerCreating   0          57s

NAME            TYPE        CLUSTER-IP   EXTERNAL-IP   PORT(S)   AGE
service/kubernetes   ClusterIP   10.96.0.1    <none>       443/TCP   7d

NAME            COMPLETIONS   DURATION   AGE
job.batch/pi-calculator  0/1           57s        57s
```

Delete

```
C:\Users\Administrator>kubectl delete job.batch/pi-calculator
job.batch "pi-calculator" deleted
```

Deployment

Deployment1.yml

```
C: > Users > Administrator > Deployment1.yml
 1  apiVersion: apps/v1
 2  kind: Deployment
 3  metadata:
 4  |   name: my-nginx-deployment
 5  spec:
 6  |   replicas: 3
 7  |   selector:
 8  |   |   matchLabels:
 9  |   |   |   app: my-nginx
10  |   template:
11  |   |   metadata:
12  |   |   |   labels:
13  |   |   |   |   app: my-nginx
14  |   |   spec:
15  |   |   |   containers:
16  |   |   |   |   name: nginx
17  |   |   |   |   image: nginx:latest
18  |   |   |   ports:
19  |   |   |   |   - containerPort: 80
```

Run and Verify

```
C:\Users\Administrator>kubectl apply -f Deployment1.yml
deployment.apps/my-nginx-deployment created

C:\Users\Administrator>kubectl get deployment
NAME           READY   UP-TO-DATE   AVAILABLE   AGE
my-nginx-deployment   3/3     3          3          12s

C:\Users\Administrator>kubectl get pods
NAME                           READY   STATUS    RESTARTS   AGE
my-nginx-deployment-6b7cc7446b-b7zpg   1/1     Running   0          24s
my-nginx-deployment-6b7cc7446b-s449j   1/1     Running   0          24s
my-nginx-deployment-6b7cc7446b-z9q5x   1/1     Running   0          24s
mypod                         1/1     Running   0          2d5h
```

Volume

Volume1.yaml

```
C: > Users > Administrator > ! volume1.yaml
1  apiVersion: v1
2  kind: PersistentVolumeClaim
3  metadata:
4    name: my-hostpath-pv
5  spec:
6    accessModes:
7      - ReadWriteOnce
8
9    resources:
10      requests:
11        storage: 2Gi
```

Run and Verify

```
C:\Users\Administrator>kubectl apply -f volume1.yaml
persistentvolumeclaim/my-hostpath-pv created

C:\Users\Administrator>kubectl get pvc
NAME      STATUS   VOLUME                                     CAPACITY  ACCESS MODES  STORAGECLASS  VOLUMEATTRIBUTESCLASS  AGE
my-hostpath-pv  Bound   pvc-1b85d695-59dc-484e-82ba-87812b19efa8  2Gi       RWO          hostpath        <unset>          25s

C:\Users\Administrator>kubectl describe pvc/my-hostpath-pv
Name:         my-hostpath-pv
Namespace:    default
StorageClass: hostpath
Status:       Bound
Volume:      pvc-1b85d695-59dc-484e-82ba-87812b19efa8
Labels:       <none>
Annotations: pv.kubernetes.io/bind-completed: yes
              pv.kubernetes.io/bound-by-controller: yes
              volume.beta.kubernetes.io/storage-provisioner: docker.io/hostpath
              volume.kubernetes.io/storage-provisioner: docker.io/hostpath
Finalizers:  [kubernetes.io/pvc-protection]
Capacity:    2Gi
Access Modes: RWO
VolumeMode:  Filesystem
Used By:    <none>
Events:
  Type    Reason            Age   From               Message
  ----  -----            ----  ----
  Normal  ExternalProvisioning  47s   persistentvolume-controller  Waiting for a volume to be created by either the external provisioner 'docker.io/hostpath' or manually by the system administrator. If volume creation is delayed, please verify that the provisioner is running and correctly registered.
  Normal  Provisioning        47s   docker.io/hostpath_storage-provisioner_4693fc15-9743-4304-92a5-61b7a3a581a4  External provisioner is provision
  Normal  Provisioning        47s   docker.io/hostpath_storage-provisioner_4693fc15-9743-4304-92a5-61b7a3a581a4  Go to Settings to activate Windows.
  Normal  ProvisioningSucceeded 47s   docker.io/hostpath_storage-provisioner_4693fc15-9743-4304-92a5-61b7a3a581a4  Successfully provisioned volume p
```

```
C:\Users\Administrator>kubectl get all
NAME                                         READY   STATUS    RESTARTS   AGE
pod/my-nginx-deployment-6b7cc7446b-b7zpg   1/1     Running   0          8m24s
pod/my-nginx-deployment-6b7cc7446b-s449j   1/1     Running   0          8m24s
pod/my-nginx-deployment-6b7cc7446b-z9q5x   1/1     Running   0          8m24s
pod/mypod                                    1/1     Running   0          2d5h

NAME           TYPE      CLUSTER-IP   EXTERNAL-IP   PORT(S)   AGE
service/kubernetes   ClusterIP  10.96.0.1   <none>        443/TCP   7d1h

NAME                           READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/my-nginx-deployment   3/3     3           3           8m24s

NAME                           DESIRED   CURRENT   READY   AGE
replicaset.apps/my-nginx-deployment-6b7cc7446b   3         3         3         8m24s
```

Rollout and Rollback

Rollout

```
C:\Users\Administrator>kubectl rollout status deployment/my-nginx-deployment
deployment "my-nginx-deployment" successfully rolled out

C:\Users\Administrator>kubectl rollout history deployment/my-nginx-deployment
deployment.apps/my-nginx-deployment
REVISION  CHANGE-CAUSE
1          <none>
```

```
C:\Users\Administrator>kubectl rollout history deployment/my-nginx-deployment --revision=1
deployment.apps/my-nginx-deployment with revision #1
Pod Template:
  Labels:      app=my-nginx
               pod-template-hash=6b7cc7446b
  Containers:
    nginx:
      Image:      nginx:latest
      Port:       80/TCP
      Host Port:  0/TCP
      Environment: <none>
      Mounts:     <none>
      Volumes:    <none>
```

Manually Scaling of Deployment PODS

```
C:\Users\Administrator>kubectl scale --replicas=10 deployment/my-nginx-deployment
deployment.apps/my-nginx-deployment scaled

C:\Users\Administrator>kubectl get pods
NAME          READY   STATUS    RESTARTS   AGE
my-nginx-deployment-6b7cc7446b-2lkn1   1/1     Running   0          13s
my-nginx-deployment-6b7cc7446b-4l2wh   1/1     Running   0          13s
my-nginx-deployment-6b7cc7446b-7trld   0/1     ContainerCreating   0          13s
my-nginx-deployment-6b7cc7446b-b7zpg   1/1     Running   0          17m
my-nginx-deployment-6b7cc7446b-f6d15   0/1     ContainerCreating   0          13s
my-nginx-deployment-6b7cc7446b-hc5cm   1/1     Running   0          13s
my-nginx-deployment-6b7cc7446b-k2494   0/1     ContainerCreating   0          13s
my-nginx-deployment-6b7cc7446b-qsk4k   0/1     ContainerCreating   0          13s
my-nginx-deployment-6b7cc7446b-s449j   1/1     Running   0          17m
my-nginx-deployment-6b7cc7446b-z9q5x   1/1     Running   0          17m
mypod          1/1     Running   0          2d5h
```

AutoScaling

Delete Old Deployment

```
C:\Users\Administrator>kubectl delete deployment/my-nginx-deployment  
deployment.apps "my-nginx-deployment" deleted
```

Apply New Deployment

```
C:\Users\Administrator>kubectl apply -f Deployment1.yml  
deployment.apps/my-nginx-deployment created
```

Autoscale the PODS

```
C:\Users\Administrator>kubectl autoscale deployment my-nginx-deployment --min=15 --max=20  
horizontalpodautoscaler.autoscaling/my-nginx-deployment autoscaled
```

Verify Autoscale

```
C:\Users\Administrator>kubectl get pods  
NAME                               READY   STATUS    RESTARTS   AGE  
my-nginx-deployment-6b7cc7446b-6q847  1/1     Running   0          4m45s  
my-nginx-deployment-6b7cc7446b-94gql  1/1     Running   0          4m45s  
my-nginx-deployment-6b7cc7446b-p6plf  1/1     Running   0          4m45s  
mypod                             1/1     Running   0          2d5h
```

Verify that HPA

```
C:\Users\Administrator>kubectl get all  
NAME                               READY   STATUS    RESTARTS   AGE  
pod/my-nginx-deployment-6b7cc7446b-6q847  1/1     Running   0          5m44s  
pod/my-nginx-deployment-6b7cc7446b-6s52f  0/1     ContainerCreating   0          27s  
pod/my-nginx-deployment-6b7cc7446b-94gal  1/1     Running   0          5m44s  
pod/my-nginx-deployment-6b7cc7446b-bzzqt  1/1     Running   0          27s  
pod/my-nginx-deployment-6b7cc7446b-hmmbn  1/1     Running   0          27s  
pod/my-nginx-deployment-6b7cc7446b-kq196  1/1     Running   0          27s  
pod/my-nginx-deployment-6b7cc7446b-m9wdk  0/1     ContainerCreating   0          27s  
pod/my-nginx-deployment-6b7cc7446b-p6plf  1/1     Running   0          5m44s  
pod/my-nginx-deployment-6b7cc7446b-rb48x  1/1     Running   0          27s  
pod/my-nginx-deployment-6b7cc7446b-tlqr7  1/1     Running   0          27s  
pod/my-nginx-deployment-6b7cc7446b-tn2wt  1/1     Running   0          28s  
pod/my-nginx-deployment-6b7cc7446b-v4wk5  0/1     ContainerCreating   0          27s  
pod/my-nginx-deployment-6b7cc7446b-vj5tg  1/1     Running   0          27s  
pod/my-nginx-deployment-6b7cc7446b-xntfd  1/1     Running   0          27s  
pod/my-nginx-deployment-6b7cc7446b-z8f6f  1/1     Running   0          27s  
pod/mypod                           1/1     Running   0          2d5h  
  
NAME           TYPE      CLUSTER-IP   EXTERNAL-IP   PORT(S)   AGE  
service/kubernetes   ClusterIP  10.96.0.1  <none>        443/TCP   7d1h  
  
NAME                               READY   UP-TO-DATE   AVAILABLE   AGE  
deployment.apps/my-nginx-deployment  12/15  15           12          5m44s  
  
NAME           DESIRED   CURRENT   READY   AGE  
replicaset.apps/my-nginx-deployment-6b7cc7446b  15      15         12       5m44s  
  
NAME           REFERENCE   TARGETS   MINPODS   MAXPODS   REPLICAS   AGE  
horizontalpodautoscaler.autoscaling/my-nginx-deployment  Deployment/my-nginx-deployment  <unknown>/80%  15        20        3          88s  
Go to Settings to activate Windows.
```

Delete

```
C:\Users\Administrator>kubectl delete deployment my-nginx-deployment  
deployment.apps "my-nginx-deployment" deleted
```