Create a docker swarm service


```
einfochips@AHMLPT1707:~$ sudo docker swarm leave
Error response from daemon: You are attempting to leave the swarm on a node that
 is participating as a manager. Removing the last manager erases all current sta
te of the swarm. Use `--force` to ignore this message.
einfochips@AHMLPT1707:~$ sudo docker swarm leave --force
Node left the swarm.
einfochips@AHMLPT1707:~$ sudo docker swarm init
Swarm initialized: current node (bisqtflupr2r4sout2gwab3nm) is now a manager.

To add a worker to this swarm, run the following command:

    docker swarm join --token SWMTKN-1-678wtehnft44qaf0vrxml2g4ry1wu526e8cprcxg4
dybtpozhr-drdfulvv6iuue3c8fkh48eq84 192.168.232.140:2377

To add a manager to this swarm, run 'docker swarm join-token manager' and follow
 the instructions.

einfochips@AHMLPT1707:~$ sudo docker service create --name nginx-service --publi
sh 8080:80 nginx
sbfs4ckumj0c986tht5sorx65
overall progress: 1 out of 1 tasks
1/1: running
verify: Service converged
einfochips@AHMLPT1707:~$
```

Setup kubernetes using minikube
Starting minikube.


```
To add a manager to this swarm, run 'docker swarm join-token manager' and follow
 the instructions.

einfochips@AHMLPT1707:~$ sudo docker service create --name nginx-service --publi
sh 8080:80 nginx
sbfs4ckumj0c986tht5sorx65
overall progress: 1 out of 1 tasks
1/1: running
verify: Service converged
einfochips@AHMLPT1707:~$ sudo minikube start
sudo: minikube: command not found
einfochips@AHMLPT1707:~$ minikube start
minikube: command not found
einfochips@AHMLPT1707:~$ minikube --version
minikube: command not found
einfochips@AHMLPT1707:~$ curl -LO https://storage.googleapis.com/minikube/releas
es/latest/minikube-linux-amd64
sudo install minikube-linux-amd64 /usr/local/bin/minikube && rm minikube-linux-a
md64
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100 91.1M  100 91.1M    0      0   356k      0  0:04:21  0:04:21 --:--:--  357k
einfochips@AHMLPT1707:~$
```

```
        Enabled addons: storage-provisioner, default-storageclass
        kubectl not found. If you need it, try: 'minikube kubectl -- get pods -A'
        Done! kubectl is now configured to use "minikube" cluster and "default" name
space by default
einfochips@AHMLPT1707:~$ nano webapp-deployment.yaml
einfochips@AHMLPT1707:~$ kubectl apply -f webapp-deployment.yaml
Command 'kubectl' not found, but can be installed with:
sudo snap install kubectl
einfochips@AHMLPT1707:~$ sudo snap install kubectl
[sudo] password for einfochips:
error: This revision of snap "kubectl" was published using classic confinement
       and thus may perform arbitrary system changes outside of the security
       sandbox that snaps are usually confined to, which may put your system at
       risk.

       If you understand and want to proceed repeat the command including
       --classic.
einfochips@AHMLPT1707:~$  curl -LO "https://dl.k8s.io/release/$(curl -L -s https
://dl.k8s.io/release/stable.txt)/bin/linux/amd64/kubectl"
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100   138  100   138    0     0    295      0 --:--:-- --:--:-- --:--:--   295
100 49.0M  100 49.0M    0     0    342k      0  0:02:26  0:02:26 --:--:--  356k
einfochips@AHMLPT1707:~$
```

```
einfochips@AHMLPT1707:~$ curl -LO "https://dl.k8s.io/release/$(curl -L -s https:
//dl.k8s.io/release/stable.txt)/bin/linux/amd64/kubectl.sha256"
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100   138  100   138    0     0    282      0 --:--:-- --:--:-- --:--:--   282
100    64  100    64    0     0     87      0 --:--:-- --:--:-- --:--:--    87
einfochips@AHMLPT1707:~$ curl -LO "https://dl.k8s.io/release/$(curl -L -s https:
//dl.k8s.io/release/stable.txt)/bin/linux/amd64/kubectl.sha256"
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100   138  100   138    0     0    294      0 --:--:-- --:--:-- --:--:--   294
100    64  100    64    0     0     93      0 --:--:-- --:--:-- --:--:--    93
einfochips@AHMLPT1707:~$ echo "$(cat kubectl.sha256)  kubectl" | sha256sum --che
ck
kubectl: OK
einfochips@AHMLPT1707:~$ sudo install -o root -g root -m 0755 kubectl /usr/local
/bin/kubectl
einfochips@AHMLPT1707:~$ kubectl version
Client Version: v1.30.2
Kustomize Version: v5.0.4-0.20230601165947-6ce0bf390ce3
Server Version: v1.30.0
einfochips@AHMLPT1707:~$ kubectl apply -f webapp-deployment.yaml
deployment.apps/webapp created
einfochips@AHMLPT1707:~$
```

Expose the Deployment

```
                                Dload  Upload   Total   Spent    Left  Speed
100   138  100   138    0     0    282      0 --:--:-- --:--:-- --:--:--   282
100    64  100    64    0     0     87      0 --:--:-- --:--:-- --:--:--    87
einfochips@AHMLPT1707:~$ curl -LO "https://dl.k8s.io/release/$(curl -L -s https:
//dl.k8s.io/release/stable.txt)/bin/linux/amd64/kubectl.sha256"
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                Dload  Upload   Total   Spent    Left  Speed
100   138  100   138    0     0    294      0 --:--:-- --:--:-- --:--:--   294
100    64  100    64    0     0     93      0 --:--:-- --:--:-- --:--:--    93
einfochips@AHMLPT1707:~$ echo "$(cat kubectl.sha256)  kubectl" | sha256sum --che
ck
kubectl: OK
einfochips@AHMLPT1707:~$ sudo install -o root -g root -m 0755 kubectl /usr/local
/bin/kubectl
einfochips@AHMLPT1707:~$ kubectl version
Client Version: v1.30.2
Kustomize Version: v5.0.4-0.20230601165947-6ce0bf390ce3
Server Version: v1.30.0
einfochips@AHMLPT1707:~$ kubectl apply -f webapp-deployment.yaml
deployment.apps/webapp created
einfochips@AHMLPT1707:~$ kubectl expose deployment webapp --type=NodePort --port
=80
service/webapp exposed
einfochips@AHMLPT1707:~$
```

Deploy a Web Application Using Docker Compose

Create a docker-compose.yml File

```
Client Version: v1.30.2
Kustomize Version: v5.0.4-0.20230601165947-6ce0bf390ce3
Server Version: v1.30.0
einfochips@AHMLPT1707:~$ kubectl apply -f webapp-deployment.yaml
deployment.apps/webapp created
einfochips@AHMLPT1707:~$ kubectl expose deployment webapp --type=NodePort --port
=80
service/webapp exposed
einfochips@AHMLPT1707:~$ nano docker-compose.yml
einfochips@AHMLPT1707:~$ docker-compose up -d
[+] Running 1/1
 ✔ web Pulled                                                            2.7s
[+] Running 0/0
 ⠿ Network einfochips_default  Creating                                  0.1s
WARN[0003] Found orphan containers ([einfochips-wordpress-1 einfochips-db-1]) fo
[+] Running 3/3 If you removed or renamed this service in your compose file, you
 ✔ Network einfochips_default   Created                                  0.1s
 ✔ Volume "einfochips_webdata"  Created                                  0.0s
 ✔ Container einfochips-web-1    Created                                  0.0s
Error response from daemon: driver failed programming external connectivity on e
ndpoint einfochips-web-1 (46865424b34b48540212da84245672c5385a06a36ce0bf7fe8d3c3
8da6768544): Error starting userland proxy: listen tcp4 0.0.0.0:8080: bind: addr
ess already in use
einfochips@AHMLPT1707:~$
```

```
[+] Running 0/0
 ⠿ Network einfochips_default  Creating                                  0.1s
WARN[0003] Found orphan containers ([einfochips-wordpress-1 einfochips-db-1]) fo
[+] Running 3/3 If you removed or renamed this service in your compose file, you
 ✔ Network einfochips_default   Created                                  0.1s
 ✔ Volume "einfochips_webdata"  Created                                  0.0s
 ✔ Container einfochips-web-1    Created                                  0.0s
Error response from daemon: driver failed programming external connectivity on e
ndpoint einfochips-web-1 (46865424b34b48540212da84245672c5385a06a36ce0bf7fe8d3c3
8da6768544): Error starting userland proxy: listen tcp4 0.0.0.0:8080: bind: addr
ess already in use
einfochips@AHMLPT1707:~$ nano docker-compose.yml
einfochips@AHMLPT1707:~$ docker-compose down
[+] Running 2/2
 ✔ Container einfochips-web-1   Removed                                  0.0s
 ✔ Network einfochips_default   Removed                                  0.4s
einfochips@AHMLPT1707:~$ docker-compose up -d
[+] Running 0/0
 ⠿ Network einfochips_default  Creating                                  0.1s
WARN[0000] Found orphan containers ([einfochips-wordpress-1 einfochips-db-1]) fo
[+] Running 2/2 If you removed or renamed this service in your compose file, you
 ✔ Network einfochips_default   Created                                  0.1s
 ✔ Container einfochips-web-1    Started                                  0.0s
einfochips@AHMLPT1707:~$
```

Use a Single Shared Volume Across Multiple Containers

4.1 Update docker-compose.yml to Use a Shared Volume

```
compose file, you can run this command with the --remove-orphans flag to clean i
t up.
[+] Running 1/2
  ✔ Container einfochips-web2-1  Running                                    0.0s
  ⠴ Container einfochips-web1-1  Starting                                   0.1s
Error response from daemon: driver failed programming external connectivity on e
ndpoint einfochips-web1-1 (05f413050076388011ab6173ba522e00737fac760349ef8df766d
7b63b38eaf6): Bind for 0.0.0.0:8081 failed: port is already allocated
einfochips@AHMLPT1707:~$ docker-compose down
[+] Running 3/2
  ✔ Container einfochips-web2-1  Removed                                    0.5s
  ✔ Container einfochips-web1-1  Removed                                    0.0s
  ! Network einfochips_default   Resource i...                             0.0s
einfochips@AHMLPT1707:~$ docker-compose up -d
WARN[0000] Found orphan containers ([einfochips-web-1 einfochips-wordpress-1 ein
fochips-db-1]) for this project. If you removed or renamed this service in your
compose file, you can run this command with the --remove-orphans flag to clean i
t up.
[+] Running 2/2
  ✔ Container einfochips-web1-1  Created                                    0.0s
  ✔ Container einfochips-web2-1  Started                                    0.0s
Error response from daemon: driver failed programming external connectivity on e
ndpoint einfochips-web1-1 (f69680832ee7fcbd9a6b83713d244908a59048b533bbb876835f0
d1264c0cd04): Bind for 0.0.0.0:8081 failed: port is already allocated
```

Automate the Entire Process Using Advanced Shell Scripting

```
bash: ./deply.sh: No such file or directory
einfochips@AHMLPT1707:~$ ./deploy.sh
Error response from daemon: This node is already part of a swarm. Use "docker sw
arm leave" to leave this swarm and join another one.
Error response from daemon: rpc error: code = InvalidArgument desc = port '8080'
 is already in use by service 'nginx-service' (sbfs4ckumj0c986tht5sorx65) as an
ingress port
😄  minikube v1.33.1 on Ubuntu 22.04
✨  Using the docker driver based on existing profile
^[[A👍  Starting "minikube" primary control-plane node in "minikube" cluster
🚜  Pulling base image v0.0.44 ...
🏃  Updating the running docker "minikube" container ...
🐳  Preparing Kubernetes v1.30.0 on Docker 26.1.1 ...
🔎  Verifying Kubernetes components...
    ▪ Using image gcr.io/k8s-minikube/storage-provisioner:v5
🌟  Enabled addons: storage-provisioner, default-storageclass
🏄  Done! kubectl is now configured to use "minikube" cluster and "default" name
space by default
deployment.apps/webapp unchanged
Error from server (AlreadyExists): services "webapp" already exists
stat /home/einfochips/docker-compose-single-volume.yml: no such file or director
y
Deployment completed successfully!
einfochips@AHMLPT1707:~$ ./deploy.sh
```
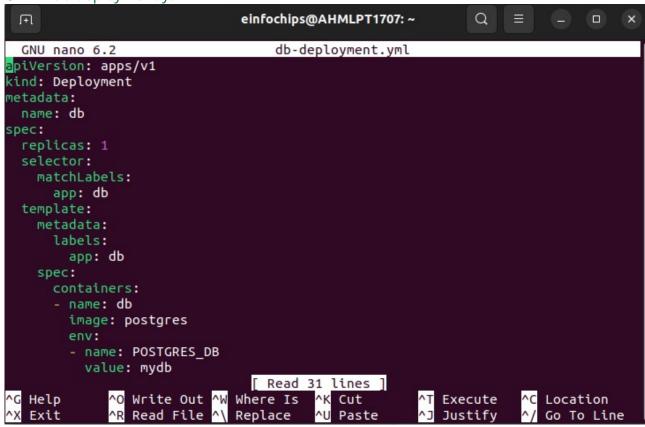
Project 2:

Swarm initialization


```
     Verifying Kubernetes components...
     ■ Using image gcr.io/k8s-minikube/storage-provisioner:v5
     Enabled addons: storage-provisioner, default-storageclass
     Done! kubectl is now configured to use "minikube" cluster and "default" name
space by default
deployment.apps/webapp unchanged
Error from server (AlreadyExists): services "webapp" already exists
stat /home/einfochips/docker-compose-single-volume.yml: no such file or director
y
Deployment completed successfully!
einfochips@AHMLPT1707:~$ docker swarm leave --force
Node left the swarm.
einfochips@AHMLPT1707:~$ docker swarm init
Swarm initialized: current node (y0q7ihkyw3by47zssqui6egjs) is now a manager.

To add a worker to this swarm, run the following command:

    docker swarm join --token SWMTKN-1-5smt68he489gg1hfhh8xzt9c2s8111nfbd3hjyz5t
criqehf7v-ccwwb82leu2prvy73f67rvisf 192.168.232.140:2377

To add a manager to this swarm, run 'docker swarm join-token manager' and follow
 the instructions.

einfochips@AHMLPT1707:~$
```

backend-deployment.yml


```
  GNU nano 6.2                    backend-deployment.yml *
apiVersion: apps/v1
kind: Deployment
metadata:
  name: backend
spec:
  replicas: 2
  selector:
    matchLabels:
      app: backend
  template:
    metadata:
      labels:
        app: backend
    spec:
      containers:
      - name: backend
        image: mybackendimage
        ports:
        - containerPort: 80
        volumeMounts:

^G Help       ^O Write Out  ^W Where Is   ^K Cut        ^T Execute    ^C Location
^X Exit       ^R Read File  ^\ Replace    ^U Paste      ^J Justify    ^/ Go To Line
```

Create db-deployment.yaml:

```
  GNU nano 6.2                        db-deployment.yml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: db
spec:
  replicas: 1
  selector:
    matchLabels:
      app: db
  template:
    metadata:
      labels:
        app: db
    spec:
      containers:
      - name: db
        image: postgres
        env:
        - name: POSTGRES_DB
          value: mydb
                              [ Read 31 lines ]
^G Help       ^O Write Out ^W Where Is  ^K Cut       ^T Execute   ^C Location
^X Exit       ^R Read File ^\ Replace   ^U Paste     ^J Justify   ^/ Go To Line
```

Apply the deployments

```
Error from server (BadRequest): error when creating "shared-pvc.yml": Persistent
VolumeClaim in version "v1" cannot be handled as a PersistentVolumeClaim: strict
 decoding error: unknown field "Create db-pvc.yaml"
deployment.apps/frontend created
deployment.apps/frontend unchanged
deployment.apps/backend created
deployment.apps/db created
einfochips@AHMLPT1707:~$ nano shared-pvc.yml
einfochips@AHMLPT1707:~$ kubectl apply -f shared-pvc.yml
Error from server (BadRequest): error when creating "shared-pvc.yml": Persistent
VolumeClaim in version "v1" cannot be handled as a PersistentVolumeClaim: strict
 decoding error: unknown field "Create db-pvc.yaml"
einfochips@AHMLPT1707:~$ nano shared-pvc.yml
einfochips@AHMLPT1707:~$ kubectl apply -f shared-pvc.yml
persistentvolumeclaim/shared-pvc created
einfochips@AHMLPT1707:~$ kubectl apply -f db-pvc.yml
deployment.apps/frontend unchanged
einfochips@AHMLPT1707:~$ kubectl apply -f frontend-deployment.yml
deployment.apps/frontend unchanged
einfochips@AHMLPT1707:~$ kubectl apply -f backend-deployment.yml
deployment.apps/backend unchanged
einfochips@AHMLPT1707:~$ kubectl apply -f db-deployment.yml
deployment.apps/db unchanged
einfochips@AHMLPT1707:~$
```