TRAINOCATE

OpenShift: Hands-On Examples

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This lab serves to solidify the understanding of container architecture principles covered in the course.

Document Convention:

Ellipses (...)	Due to its excessive length, some of the output produced on the command lines have been abbreviated.
Red Arrow (←)	Pay special attention to these lines. The trainer will explain them in detail.
INPUT	The text that is **Bold**, *Italic*, and in **Dark Green** should be completed using your specific information.

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Lab 1: Managing a Pod

In this Lab, we will cover the following topics:

- Creating and deleting a Project.
- Creating a Pod using command line and YAML.
- Understanding resource definitions and getting help on syntax.
- Editing Pod definitions.
- Executing commands in a container of a running Pod.
- Monitoring events in a Project.
- Deleting resources by name or by label.

---

1. Login to the cluster

```
[user@host ~]$ oc login -u kubeadmin -p pytTS...XpX https://api.crc.testing:6443
```

OR

```
[user@host ~]$ oc login -u kubeadmin https://api.ocp.example.com:6443
Username: kubeadmin
Password: pytTS-GGXrX-h2EdQ-VHXpX
```

2. Check/verify current login user

```
[user@host ~]$ oc whoami
kubeadmin
```

3. Create three projects named *testing*, *one* and *two*.

```
[user@host ~]$ oc new-project testing
[user@host ~]$ oc new-project one
[user@host ~]$ oc new-project two
```

4. Listing projects
   a. List all projects that the user can access.

```
[user@host ~]$ oc projects
```

OR

```
[user@host ~]$ oc get projects
```

   b. Check which is our current/active project.

```
[user@host ~]$ oc project
```

Note:

- Use the `oc api-resources` command to discover the resource names, short names and determine whether they are namespace-dependent or not.

5. Delete project *one* and *two*. Make sure *testing* is the current project.

```
[user@host ~]$ oc delete project one
[user@host ~]$ oc delete project two
[user@host ~]$ oc project testing
```

6. Create a new pod
   a. Name it testing
   b. Use the image *registry.access.redhat.com/ubi8/ubi:latest*.

```
[user@host ~]$ oc run testing --image registry.access.redhat.com/ubi8/ubi
pod/testing created

[user@host ~]$ oc get pods
NAME           READY   STATUS        RESTARTS       AGE
testing        0/1     Completed     0              2s
```

Note:

- The *latest* tag is optional and doesn't need to be typed.
- The status shows completed because there is nothing running in the container.
- Try running `oc get pods -o wide`

7. Get more details from the pod. Look through the information provided by the output of the command.

```
[user@host ~]$ oc describe pod/testing
```

8. Continuously check the pod. Why is it continuously looping between Completed and CrashLoopBackOff?
   a. Watch for changes. You can break it with <CTRL>+C after a few lines of output.

```
[user@host ~]$ oc get po -w
NAME    READY   STATUS              RESTARTS       AGE
testing   0/1  CrashLoopBackOff   3 (46s ago)   93s
testing   0/1  Completed            4 (53s ago)   100s
testing   0/1  CrashLoopBackOff   4 (15s ago)   115s
```

   b. Check the pod's restart policy by looking at the resource definition of the pod. Every resource in openshift/kubernetes is defined by their resource definition (including the *node* resource type)

```
[user@host ~]$ oc get po testing -o yaml
...
  restartPolicy: Always
...
```

Note:

- Learning points: basic structure of resource definition apiVersion, metadata, kind, spec.
- If you like JSON instead of YAML, use `oc get po testing -o json`.
- To learn pod resource definition syntax use `oc explain pod.spec`.
- The restartPolicy can only be set to Always(default), Never or OnFailure. It can be set by editing the resource definition or using the `--restart` option of the `oc run` command.

9. Cleanup. Delete the pod.

```
[user@host ~]$ oc delete po testing
```

10. Create a new Pod named, *myubi* using the image *quay.io/kelvinlai/myubi:latest*. BEFORE you run the commands, get the instructor to set the repository to private. We will be monitoring the events for this pod creation.
    a. Monitor the events for your current project.

    ```
    [user@host ~]$ oc get events -w
    ```

    b. Open another terminal/PowerShell and create the pod.

    ```
    [user@host ~]$ oc run myubi --image quay.io/kelvinlai/myubi:latest
    pod/testing created
    ```

    c. Check the status of the container. Depending on how fast you type the command, you might see these status: *ContainerCreating, ErrImagePull, ImagePullBackOff.* It means there is a problem pulling the image. Check the events in your first terminal.

    ```
    [user@host ~]$ oc get po
    NAME          READY   STATUS              RESTARTS      AGE
    pod/myubi     1/1     ImagePullBackOff    0             12m
    ```

    d. Now, get the instructor to set the repository to public. The pods will successfully pull the image and the status will change to Running. **Question**: Why did the pod not exit like before in Step 5?

e. Check what is running inside the pod.

```
[user@host ~]$ oc rsh myubi ps -ef
UID          PID    PPID  C STIME TTY     TIME          CMD
1000660+     1      0  0 08:50 ?         00:00:00      sleep infinity
1000660+     13     0  0 09:34 pts/0     00:00:00      ps -ef
```

OR

```
[user@host ~]$ oc rsh myubi

sh-5.1$ ps -ef
UID          PID    PPID  C STIME TTY           TIME CMD
1000660+     1      0  0 08:50 ?         00:00:00          /usr/bin/coreutils
--coreutils-prog-shebang=sleep /usr/bin/sleep infinity
1000660+     18     0  1 10:02 pts/0     00:00:00 /bin/sh
1000660+     23     18  0 10:02 pts/0    00:00:00 ps -ef

sh-5.1$ exit
exit
[user@host ~]$
```

11. Save the resource definition to a file and create *mypod* from that file. After *mypod* is created, add a label *abc=def* to it. Clean up by deleting the pod.

a. Export the resource definition to a file and edit it to make appropriate changes. Windows users, replace ***vi*** with ***notepad***.

```
[user@host ~]$ oc get po myubi -o yaml > mypod.yaml

[user@host ~]$ vi mypod.yaml
apiVersion: v1
kind: Pod
metadata:
  labels:
    run: myubi
  name: mypod
spec:
  containers:
  - image: quay.io/kelvinlai/myubi      ← image reference
    name: mycontainer
```

b. Create the pod.

```
[user@host ~]$ oc create -f mypod.yaml
```

c. Add the *abc=def* label to the pod. Save and exit.

```
[user@host ~]$ oc edit pod mypod
...
  labels:
    run: myubi
    abc: def
  name: mypod
...
```

OR

```
[user@host ~]$ oc label pod mypod abc=def
...
```

Note:

- To remove the label: **oc label pod mypod abc-**

d. Check the pod has the new label.

```
[user@host ~]$ oc describe po mypod
```

e. Check the pod has the new label.

```
[user@host ~]$ oc delete po -l abc=def
pod "mypod" deleted
```

12. Lab completed. We will be using *myubi* pod as a testing platform for subsequent labs. Deleted pods in Step 8 and 10e will not be auto-created because there is no *replicationcontroller* or *replicaset* resource defined.

Lab 2: Dangers of cluster admin

In this Lab, we will cover the following topics:

- Security threat of performing deployment as cluster admin.
- The importance of logging out.
- Deleting everything.

---

1. Login to the cluster

```
[user@host ~]$ oc login -u developer -p developer https://api.ocp.example.com:6443
```

2. Create a new project named *dcproj*.

```
[user@host ~]$ oc new-project dcproj
```

3. Create a Pod, *myweb-dc* using the image *quay.io/kelvinlai/myweb:openshift*.

```
[user@host ~]$ oc run myweb-dc --image quay.io/kelvinlai/myweb:openshift
pod/myweb-dc created
[user@host ~]$
```

4. Verify.

```
[user@host ~]$ oc get po
NAME    READY    STATUS        RESTARTS       AGE
myweb-dc    1/1        Running    0           27s
```

5. Login as kubeadmin

```
[user@host ~]$ oc login -u kubeadmin
```

Note:

- You can access the *kubeadmin* account without entering a password due to the token saved in the *~/.kube/config* file. To maintain security, always remember to log out once you have completed your tasks.

6. Repeat Step 3, but name the Pod *myweb-ca*. You may use history recall (up arrow key) and change the name of the pod before executing the command.

```
[user@host ~]$ oc run myweb-ca --image quay.io/kelvinlai/myweb:openshift
pod/myweb-ca created
```

7. Now, log in again as the developer user and list all the pods. Check who is the process owner for both the pods.

```
[user@host ~]$ oc login -u developer
[user@host ~]$ oc get po
NAME          READY   STATUS        RESTARTS      AGE
myweb-ca      1/1     Running       0             18s
myweb-dc      1/1     Running       0             88s
[user@host ~]$ oc rsh myweb-dc whoami
1000740000
[user@host ~]$ oc rsh myweb-ca whoami
root
```

8. Now clean up by deleting everything.

```
[user@host ~]$ oc delete all --all
pod "myweb-ca" deleted
pod "myweb-dc" deleted
[user@host ~]$ oc get all
```

Note:

- `oc get all` doesn't really list all resources. Instead it lists all legacy user resources such as dc, deploy, rc, rs, pod, svc, daemonset, statefulset, jobs, cronjobs and hpa.
  Reference:
  https://github.com/openshift/origin/blob/release-3.7/vendor/k8s.io/kubernetes/pkg/kubectl/resource/categories.go#L113-L123

9. (Optional) Repeat from step 3 using *myweb:non_openshift* to observe the results.
   Summary:
   As cluster-admin
   * able to oc run dangerous images… myweb:non_openshift
   * if using oc create deploy or deploymentconfig it will fail.
   As a regular user
   * running application using oc run, oc create deploy or dc will all fail.

Lab 3: Creating a Deployment

In this Lab, we will cover the following topics:

- Create a Deployment and Service.
- Verify auto healing.
- Investigate the resource definition of all the resources.
- Access Pod by using service and pod's ip.
- Creating service, and getting endpoints.
- Give external access by creating a route

1. Create a deployment named *myweb* using *quay.io/kelvinlai/myweb:openshift*.

```
[user@host ~]$ oc login -u developer
[user@host ~]$ oc create deploy myweb --image quay.io/kelvinlai/myweb:openshift
deployment.apps/myweb created

[user@host ~]$ oc get all
NAME                          READY   STATUS        RESTARTS      AGE
pod/myweb-c687b9f4d-872gj     1/1     Running 0             75s

NAME                   READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/myweb 1/1     1              1             75s

NAME                                  DESIRED   CURRENT   READY   AGE
replicaset.apps/myweb-c687b9f4d   1         1       1       75s

[user@host ~]$
```

2. Try deleting the pod and see what happens.

```
[user@host ~]$ oc delete po myweb-c687b9f4d-872gj
pod "myweb-c687b9f4d-872gj" deleted

[user@host ~]$ oc get all
NAME                          READY   STATUS        RESTARTS      AGE
pod/myweb-c687b9f4d-9vpr4     1/1     Running 0             4s

NAME                   READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/myweb 1/1     1              1             99s

NAME                                  DESIRED   CURRENT   READY   AGE
replicaset.apps/myweb-c687b9f4d   1         1       1       99s

[user@host ~]$
```

3. Now try deleting the replicaset and see what happens.

```
[user@host ~]$ oc delete rs myweb-c687b9f4d
replicaset.apps "myweb-c687b9f4d" deleted

[user@host ~]$ oc get all

NAME                          READY   STATUS RESTARTS   AGE
pod/myweb-c687b9f4d-2k9xh   1/1     Running   0          4s
NAME                  READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/myweb   1/1  1             1             2m4s
NAME                                DESIRED   CURRENT   READY   AGE
replicaset.apps/myweb-c687b9f4d   1         1       1       4s

[user@host ~]$
```

4. Finally, try deleting the deployment.

```
[user@host ~]$ oc delete deployment myweb
deployment.apps "myweb" deleted

[user@host ~]$ oc get all

No resources found in dcproj namespace.
[user@host ~]$
```

When there is a deployment or deployment configuration (dc/deploy), always prioritize addressing it. Only handle the replication controller (rc) or replica set (rs) if no dc/deploy exists. And finally, only address the Pod directly if there is no rc or rs.

5. Recreate the deployment *myweb*. We will be using it for the service and route testing.

```
[user@host ~]$ oc create deploy myweb --image quay.io/kelvinlai/myweb:openshift
deployment.apps/myweb created

[user@host ~]$ oc get all
NAME                       READY   STATUS      RESTARTS   AGE
pod/myweb-c687b9f4d-pdhwf   1/1  Running   0          9s
NAME                       READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/myweb   1/1      1             1             9s
NAME                                DESIRED   CURRENT   READY   AGE
replicaset.apps/myweb-c687b9f4d   1           1       1       9s

[user@host ~]$
```

6. Investigate the deployment, replicaset and pod resource definition.

```
[user@host ~]$ oc get deploy myweb -o yaml
...
[user@host ~]$ oc get rs myweb-c687b9f4d -o yaml
...
[user@host ~]$ oc get po myweb-c687b9f4d-pdhwf -o yaml
...
```

Note:

- Notice that the deployment doesn't have any 'ports' being declared. This is expected. The `oc create deploy` command does not read the exposed port metadata information from the image. This is true, regardless of weather you have an EXPOSE or io.openshift.expose-service LABEL declared in the Containerfile that was used to create that image.
- Notice the relationship of deploy, rs and pod's resource definition.

7. Get the Pod's IP

```
[user@host ~]$ oc get po -o wide
NAME                    READY   STATUS RESTARTS   AGE   IP
NODE   NOMINATED NODE   READINESS GATES
myweb-c687b9f4d-pdhwf   1/1  Running   0          39s   10.217.0.103   crc     <none>
       <none>
[user@host ~]$
```

8. As the kubeadmin user, try accessing the myweb website from the myubi pod. You should be able to access the website using the Pod's IP address.

```
[user@host ~]$ oc login -u kubeadmin
Logged into "https://api.crc.testing:6443" as "kubeadmin" using existing credentials.
You have access to 68 projects, the list has been suppressed. You can list all
projects with 'oc projects'
Using project "dcproj".
[user@host ~]$ oc get po -n testing
NAME    READY   STATUS RESTARTS   AGE
myubi   1/1    Running   1          12h

[user@host ~]$ oc rsh -n testing myubi curl 10.217.0.103:8080
Hello World
```

Note:

- When accessing another pod from a different namespace, you have to specify the namespace first before referring to the pod name or else the command will fail to find the pod.

9. Try accessing it from the local machine. This will fail, because the local machine does not belong to the cluster.

```
[user@host ~]$ curl 10.217.0.103:8080
```

10. Log back in as developer.

```
[user@host ~]$ oc login -u developer
Logged into "https://api.crc.testing:6443" as "developer" using existing credentials.
You have one project on this server: "dcproj"
Using project "dcproj".
```

11. Next try scaling the replicaset. You may use the `oc scale` command or `oc edit` to change the replicas of the replicaset.

```
[user@host ~]$ oc scale rs myweb-c687b9f4d --replicas=2
replicaset.apps/myweb-c687b9f4d scaled
[user@host ~]$ oc get po
NAME                    READY   STATUS RESTARTS   AGE
myweb-c687b9f4d-pdhwf   1/1     Running   0          15m
[user@host ~]$
```

Note:

- It may appear that the command doesn't work because only one pod is running. However, if you monitor the events in real-time using `oc get events -w` in another terminal, you'll see that the underlying issue is related to the deployment. Since a replica set (rs) is created by the deployment and the deployment has its replicas set to 1, the replica set will be reset to 1 by the deployment.

12. Now, do it the right way by scaling the deployment.

```
[user@host ~]$ oc scale deploy myweb --replicas 2
deployment.apps/myweb scaled
[user@host ~]$ oc get all
NAME                            READY   STATUS RESTARTS   AGE
pod/myweb-c687b9f4d-pdhwf       1/1     Running   0          16m
pod/myweb-c687b9f4d-qdb24       0/1     Pending   0          4s
NAME            TYPE            CLUSTER-IP     EXTERNAL-IP   PORT(S) AGE
service/myweb   ClusterIP       10.217.5.34    <none>        8080/TCP   4m29s
NAME                    READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/myweb   1/2     2            1           16m
NAME                                DESIRED   CURRENT   READY   AGE
replicaset.apps/myweb-c687b9f4d     2         2         1       16m
```

13. Create a service. You need to specify the port number as the deployment didn't have the containers exposed port information.

```
[user@host ~]$ oc expose deployment myweb --port 8080
service/myweb exposed
[user@host ~]$ oc get svc
NAME           TYPE           CLUSTER-IP     EXTERNAL-IP    PORT(S) AGE
service/myweb   ClusterIP   10.217.5.34   <none>          8080/TCP   8s
[user@host ~]$ oc describe svc myweb
...
[user@host ~]$ oc get svc myweb -o yaml
```

14. Check the service and endpoints.

```
[user@host ~]$ oc get po -o wide
NAME                   READY   STATUS RESTARTS   AGE   IP           NODE   NOMINATED NODE
READINESS GATES
myweb-c687b9f4d-pdhwf   1/1  Running   0          17m   10.217.0.103   crc     <none>
        <none>
myweb-c687b9f4d-qdb24   1/1  Running   0          57s   10.217.0.120   crc     <none>
        <none>
[user@host ~]$ oc get svc
NAME    TYPE           CLUSTER-IP     EXTERNAL-IP    PORT(S) AGE
myweb   ClusterIP   10.217.5.34   <none>          8080/TCP   6m10s
[user@host ~]$ oc get endpoints
NAME    ENDPOINTS                                   AGE
myweb   10.217.0.103:8080,10.217.0.120:8080   6m13s
```

15. Test the service using ip and internal DNS name of the service. Check the internal service variables injected by kubernetes into the Pod.

```
[user@host ~]$ oc login -u kubeadmin
Logged into "https://api.crc.testing:6443" as "kubeadmin" using existing credentials.
You have access to 68 projects, the list has been suppressed. You can list all
projects with 'oc projects'
Using project "dcproj".
[user@host ~]$ oc -n testing rsh myubi
# curl 10.217.0.103:8080
Hello World
# curl 10.217.0.120:8080
Hello World
# curl myweb.dcproj.svc:8080
Hello World
# env | grep SERVICE_HOST
MYWEB_SERVICE_HOST = 10.217.5.34
# env | grep SERVICE_PORT
MYWEB_SERVICE_PORT = 8080
# exit
```

Note:

- The internal dns domain is cluster.local. All services can be referenced by *SERVICE_NAME.PROJECT_NAME.svc[.cluster.local]*.

16. Login again as developer. Create and test the route resource.

```
[user@host ~]$ oc login -u developer
Logged into "https://api.crc.testing:6443" as "developer" using existing credentials.
You have one project on this server: "dcproj"
Using project "dcproj".

[user@host ~]$ oc get all
NAME                          READY   STATUS RESTARTS   AGE
pod/myweb-c687b9f4d-pdhwf   1/1     Running   0          21m
pod/myweb-c687b9f4d-qdb24   1/1     Running   0          4m37s
NAME           TYPE           CLUSTER-IP     EXTERNAL-IP   PORT(S) AGE
service/myweb   ClusterIP   10.217.5.34   <none>         8080/TCP   9m2s
NAME                  READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/myweb   2/2  2             2             21m
NAME                                DESIRED   CURRENT   READY   AGE
replicaset.apps/myweb-c687b9f4d   2         2       2       21m

[user@host ~]$ oc expose svc myweb
route/myweb exposed
[user@host ~]$ oc get route
NAME                                HOST/PORT                    PATH   SERVICES
PORT   TERMINATION   WILDCARD
route.route.openshift.io/myweb   myweb-dcproj.apps-crc.testing          myweb   8080
       None
[user@host ~]$ oc get route myweb -o yaml
...
[user@host ~]$ curl myweb-dcproj.apps-crc.testing
Hello World
```

Lab 4: Deploying application

In this Lab, we will cover the following topics:

- Managed life cycle application
- Source-To-Image(S2I) through BuildConfig
- Parameter passing to applications
- Inter-project communication
- Port forwarding
- Image Stream
- Setting environment variables during and after application creation
- Tips on simple yaml creation.

Create two projects, one to host the database using an existing ImageStream and the other, a web application that makes use of the database.

1. Login as the developer and create a project using your id, `USERNAME-dbproj`

```
[user@host ~]$ oc login -u developer
[user@host ~]$ oc new-project kel-dbproj
Now using project "kel-dbproj" on server "https://api.cluster.kel-ocp.com:6443".
...
```

2. List the imagestreams that are available and search for mysql. Windows user replace `grep` with `FindStr`

```
[user@host ~]$ oc get is -n openshift | grep mysql
mysql
image-registry.openshift-image-registry.svc:5000/openshift/mysql
       8.0,8.0-el7,8.0-el8,8.0-el9,latest                      25 hours ago
```

3. Learn how to use the new-app command. Look at the syntax at the bottom. Windows user, replace `tail -4` with `Select-Object -Last 4`.

```
[user@host ~]$ oc new-app --help | tail -4
Usage:
  oc new-app (IMAGE | IMAGESTREAM | TEMPLATE | PATH | URL ...) [flags] [options]

Use "oc options" for a list of global command-line options (applies to all commands).
```

4. Create the application named mydb using the mysql:latest imagestreamtag.

```
[user@host ~]$ oc new-app mysql --name mydb

--> Creating resources ...
       deployment.apps "mydb" created
       service "mydb" created
--> Success
       Application is not exposed. You can expose services to the outside world by
executing one or more of the commands below:
       'oc expose service/mydb'
       Run 'oc status' to view your app.
```

5. Check the resources. There will be an error from the pod.

```
[user@host ~]$ oc get all
Warning: apps.openshift.io/v1 DeploymentConfig is deprecated in v4.14+, unavailable in
v4.10000+
NAME                          READY   STATUS    RESTARTS    AGE
pod/mydb-5dd7cfd5f5-mc8cw   0/1     Error   3 (37s ago)   70s

NAME           TYPE           CLUSTER-IP     EXTERNAL-IP   PORT(S) AGE
service/mydb   ClusterIP   172.30.166.181   <none>        3306/TCP   71s

NAME                  READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/mydb   0/1   1              0              71s

NAME                                  DESIRED   CURRENT   READY   AGE
replicaset.apps/mydb-5bbddc857b   1         0       0       71s
replicaset.apps/mydb-5dd7cfd5f5   1         1       0       71s
```

Note:

- Notice that when we deploy an application using the new-app command, OpenShift will automatically help us create the service if images metadata contain the exposed port information.

6. Investigate what caused the failure. You can either check the logs of the pod or the deployment.

```
[user@host ~]$ oc logs mydb-5dd7cfd5f5-mc8cw
=> sourcing 20-validate-variables.sh ...
You must either specify the following environment variables:
  MYSQL_USER (regex: '^[a-zA-Z0-9_]+$')
  MYSQL_PASSWORD (regex: '^[a-zA-Z0-9_~!@#$%^&*()-=<>,.?;:|]+$')
  MYSQL_DATABASE (regex: '^[a-zA-Z0-9_]+$')
...
```

7. The mysql pod needs to have environment variables to help us initialize the database. In order to protect our information, we will be using a secret. Create the secret and check the resource definition.

```
[user@host ~]$ oc create secret generic dbsecret --from-literal MYSQL_USER=albert
--from-literal MYSQL_PASSWORD=einstein --from-literal MYSQL_DATABASE=okd
secret/dbsecret created
[user@host ~]$ oc get secret
NAME                          TYPE                                  DATA   AGE
...
dbsecret                      Opaque                                3      11s
...
[user@host ~]$ oc get secret dbsecret -o yaml
apiVersion: v1
data:
  MYSQL_DATABASE: bXlkYg==
  MYSQL_PASSWORD: ZWluc3RlaW4=
  MYSQL_USER: YWxiZXJ0
kind: Secret
metadata:
  creationTimestamp: "2024-06-26T15:35:39Z"
  name: dbsecret
  namespace: kel-dbproj
  resourceVersion: "314496"
  uid: 8796ee49-d87e-460b-8ef0-b4e5e52a3a8b
type: Opaque
```

Note:

- You may use --help to find the syntax of the commands:
  `oc create secret --help | tail -5`
  `oc create secret generic --help | tail -5`
- Secrets are just simple base64 encoding. You can decode it using -d option. Eg. `echo bXlkYg== | base64 -d`

8. Pass in the secret as environment variables to the deployment.

```
[user@host ~]$ oc set env deploy/mydb --from secret/dbsecret
deployment.apps/mydb updated
```

Note:

- Learn how to set environment: `oc set env --help`

9. Verify the deployment. A new rs will be created and the pod which is deployed will now be running.

```
[user@host ~]$ oc get all
Warning: apps.openshift.io/v1 DeploymentConfig is deprecated in v4.14+, unavailable in
v4.10000+
NAME                          READY   STATUS RESTARTS   AGE
pod/mydb-84fd78f9d8-jtlg8   1/1     Running   0          6s

NAME           TYPE           CLUSTER-IP     EXTERNAL-IP   PORT(S) AGE
service/mydb   ClusterIP   172.30.166.181   <none>        3306/TCP   12m

NAME                  READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/mydb   1/1   1              1             12m

NAME                                 DESIRED   CURRENT   READY   AGE
replicaset.apps/mydb-5bbddc857b   0         0       0       12m
replicaset.apps/mydb-5dd7cfd5f5   0         0       0       12m
replicaset.apps/mydb-84fd78f9d8   1         1       1       6s
```

10. You may check the pod to see that the secret was passed as environment variables.

```
[user@host ~]$ oc rsh mydb-84fd78f9d8-jtlg8 env | grep MYSQL
MYSQL_USER=albert
MYSQL_DATABASE=mydb
MYSQL_PASSWORD=einstein
MYSQL_VERSION=8.0
MYSQL_PREFIX=/usr
```

11. Create the web application project, **USERNAME-webproj**

```
[user@host ~]$ oc new-project kel-webproj
```

12. The application we will deploy is using php. Check what php builder images are available. Windows users replace grep with FindStr.

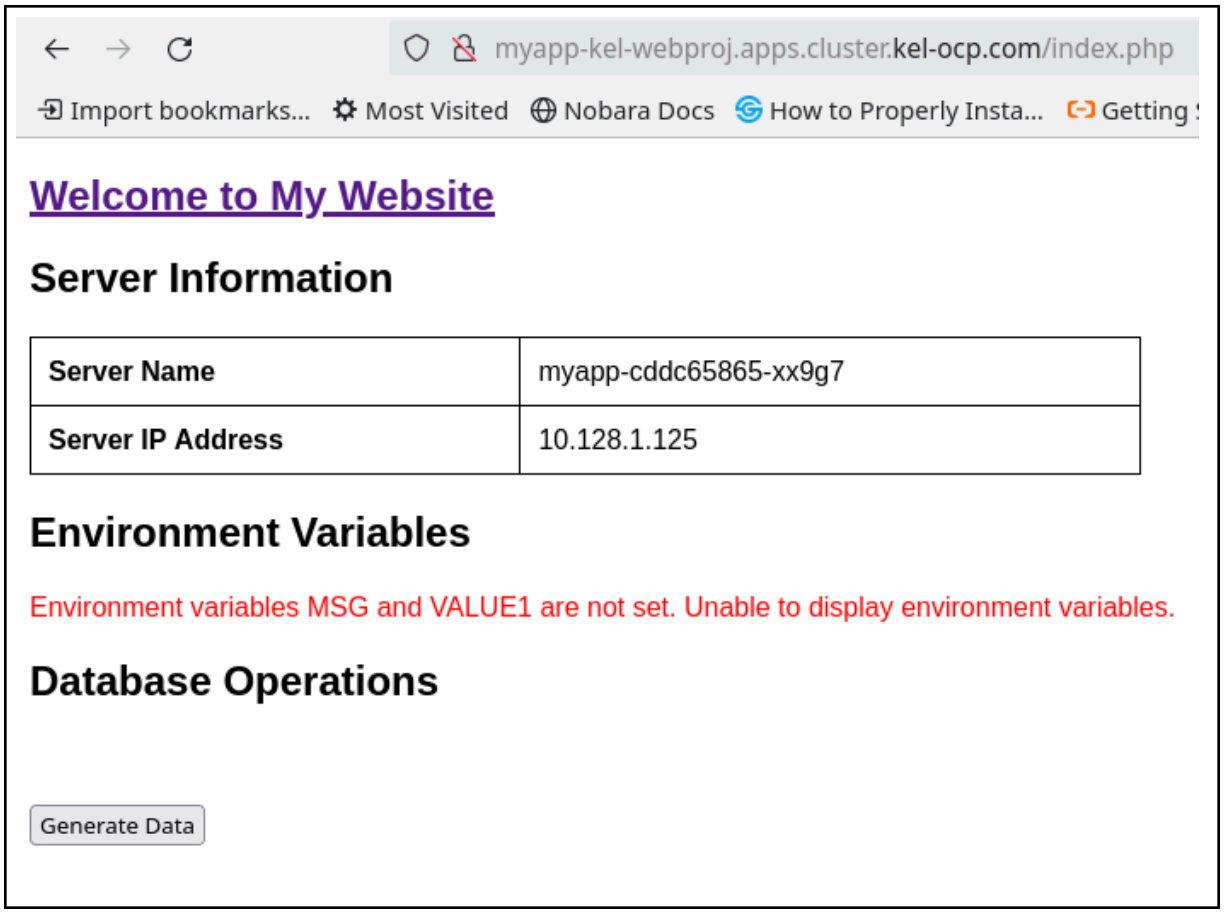
```
[user@host ~]$ oc get is -n openshift | grep php
php
image-registry.openshift-image-registry.svc:5000/openshift/php
       7.3,7.3-ubi7,7.4-ubi8,8.0-ubi8,8.0-ubi9 + 1 more...      25 hours ago
```

13. Create the application. Best method of forcing the new-app to disable auto detection of which builder image to use, is by using the tilde(~) symbol to separate the builder image tag to use and the source code. Let us try passing in the DB connection info as variables from the command line now.

```
[user@host ~]$ oc new-app --name myapp php:7.4-ubi8~https://github.com/kelvinlnx/myphp
-e DB_HOST=mydb.kel-dbproj.svc -e DB_USER=albert -e DB_PASS=einstein -e DB_NAME=okd
--> Found image d25c7b9 (31 hours old) in image stream "openshift/php" under tag
"7.4-ubi8" for "php:7.4-ubi8"

        Tags: builder, php, php74, php-74

        * A source build using source code from https://github.com/kelvinlnx/myphp will
be created
        * The resulting image will be pushed to image stream tag "myapp:latest"
        * Use 'oc start-build' to trigger a new build

--> Creating resources ...
        imagestream.image.openshift.io "myapp" created
        buildconfig.build.openshift.io "myapp" created
        deployment.apps "myapp" created
        service "myapp" created
--> Success
        Build scheduled, use 'oc logs -f buildconfig/myapp' to track its progress.
        Application is not exposed. You can expose services to the outside world by
executing one or more of the commands below:
        'oc expose service/myapp'
        Run 'oc status' to view your app.
[user@host ~]$ oc get all
NAME                  READY   STATUS RESTARTS   AGE
pod/myapp-1-build   1/1      Running   0          37s

NAME           TYPE           CLUSTER-IP     EXTERNAL-IP   PORT(S)               AGE
service/myapp   ClusterIP   172.30.194.74   <none>        8080/TCP,8443/TCP   37s

NAME                  READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/myapp   0/1  0             0             37s

NAME                                DESIRED   CURRENT   READY   AGE
replicaset.apps/myapp-79b9cd7b6c   1        0       0      37s

NAME                                TYPE    FROM    LATEST
buildconfig.build.openshift.io/myapp   Source   Git       1

NAME                                TYPE    FROM           STATUS  STARTED
DURATION
build.build.openshift.io/myapp-1   Source   Git@fb2e8ba   Running   38 seconds ago

NAME                                IMAGE REPOSITORY
        TAGS   UPDATED
imagestream.image.openshift.io/myapp
image-registry.openshift-image-registry.svc:5000/kel-webproj/myapp
```

14. Create a route and use your browser to browse to the website.

```
[user@host ~]$ oc expose svc myapp
route/myapp exposed
[user@host ~]$ oc get route
NAME    HOST/PORT                                    PATH    SERVICES    PORT
TERMINATION    WILDCARD
myapp    myapp-kel-webproj.apps.cluster.kel-ocp.com        myapp   8080-tcp
None

[user@host ~]$
```



15. (Optional) Create a configmap that holds the 2 variables, MSG and VALUE1. Pass them into the deployment as environment variables.

Lab 5: Persistent Storage

Continuation from Lab 4, we will be adding a persistent volume to the myapp web application.

1. Visiting the route for the application at `myapp-kel-webproj.apps.cluster.kel-ocp.com` shows us that the mount point /opt/data doesn't exists under the Persistent Volume Test section. Do not close the page, we will be refreshing it later.

   Persistent Volume Test

   Contents of /opt/data

   Warning: The directory /opt/data does not exist.

2. First find out what storage class is available for us.

```
[user@host ~]$ oc get sc
NAME                  PROVISIONER           RECLAIMPOLICY   VOLUMEBINDINGMODE
ALLOWVOLUMEEXPANSION   AGE
ssd-csi               pd.csi.storage.gke.io   Delete      WaitForFirstConsumer   true
       46h
standard-csi (default)   pd.csi.storage.gke.io   Delete          WaitForFirstConsumer
true                  46h
```

3. Update the deployment to use persistent storage mounted on /opt/data with a minimum size of 100M. Name the volume myvol and the pvc as mypvc.

```
[user@host ~]$ oc set volume deploy/myapp --add --mount-path /opt/data --claim-class
standard-csi --claim-size 100M --name myvol --claim-name mypvc
deployment.apps/myapp volume updated
```

Note:

- To list all deployment and the volumes defined on them run the command:
  `oc set volume deploy --all`
- For development purposes, to simulate a mount point without using persistent storage, you may use empty dir volume.
  `oc set volume deploy/myapp --add --mount-path=/opt/somedir`

4. The deployment will rollout a new replicaset because adding a mount path is a config change trigger. Config changes are changes made to the template. Once the new pods are deployed, refresh the browser page on Step 1.

```
[user@host ~]$ oc get deploy,rs,po,pvc
NAME                  READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/myapp   1/1  1             1             9h

NAME                                  DESIRED   CURRENT   READY   AGE
replicaset.apps/myapp-69b8d8d576   0        0       0       17m
replicaset.apps/myapp-6df594b599   1        1       1       80s

NAME                          READY   STATUS        RESTARTS   AGE
pod/myapp-2-build             0/1     Completed   0          7h24m
pod/myapp-3-build             0/1     Completed   0          6h42m
pod/myapp-6df594b599-2tb7s    1/1     Running       0        80s

NAME                                  STATUS   VOLUME
CAPACITY   ACCESS MODES   STORAGECLASS   AGE
persistentvolumeclaim/mypvc         Bound  pvc-332b1274-9940-44fc-8d04-9dfe3b83e217
1Gi     RWO            standard-csi   80s
```

Persistent Volume Test

Contents of /opt/data

- lost+found

5. List volumes defined on all deployment in the current project.

```
[user@host ~]$ oc set volume deploy --all
 myapp
  pvc/mypvc (allocated 1GiB) as myvol
        mounted at /opt/data
[user@host ~]$
```

6. Create a file in the persistent storage. Reload the browser page.

```
[user@host ~]$ oc get po
NAME                    READY   STATUS        RESTARTS   AGE
...
myapp-6df594b599-2tb7s   1/1        Running        0       41m
[user@host ~]$ oc rsh myapp-6df594b599-2tb7s touch /opt/data/somefile
[user@host ~]$
```

Persistent Volume Test

Contents of /opt/data

- lost+found
- somefile

7. Delete the pod. Refresh the browser page once the new pod is up. You will notice that even though the pod was deleted, the data is still there.

```
[user@host ~]$ oc delete po myapp-6df594b599-2tb7s
pod "myapp-6df594b599-2tb7s" deleted
[user@host ~]$ oc get po
NAME                    READY   STATUS        RESTARTS   AGE
myapp-6df594b599-n7xv4   1/1        Running        0       22s
```

Persistent Volume Test

Contents of /opt/data

- lost+found
- somefile

8. (Optional) Login as cluster-admin and check the pv that was created by the storage class. The pv would be bound by the mypvc PersitentVolumeClaim that was created by you in step 3 above.

Lab 6: Role Based Access Control (RBAC)

In OpenShift we can assign a ClusterRole permission to a user, for a project or all projects. In order to add a role to a single project we use the oc adm policy add-role-to-user command with a -n PROJECT option. If it is for all projects then we should use the oc adm policy add-cluster-role-to-user command. Refer to the diagram in the workshop document.

1. Login as your user to the cluster.

```
[user@host ~]$ oc login -u kelvin -p redhat https://api.cluster.kel-ocp.com:6443
Login successful.
```

2. List the projects that you have permission to access.

```
[user@host ~]$ oc projects
You have access to the following projects and can switch between them with ' project
<projectname>':

       julie-dbproj
       julie-webproj
  * kel-testing

Using project "kel-testing" on server "https://api.cluster.kel-ocp.com:6443".
```

3. Role is a namespaced resource (oc api-resources command). Check if there are any roles in your current project.

```
[user@host ~]$ oc get roles
No resources found in kel-testing namespace.
```

4. Now check what are the ClusterRoles created by the installer.

```
[user@host ~]$ oc get clusterroles
NAME                                   CREATED AT
admin                                  2024-06-25T14:07:13Z
basic-user                             2024-06-25T14:17:42Z
cluster-admin                          2024-06-25T14:07:13Z
edit                                   2024-06-25T14:07:13Z
self-provisioner                       2024-06-25T14:17:42Z
view                                   2024-06-25T14:07:13Z
...
```

Note:

- Use oc describe to learn what actions (verb) that can be performed on a specific resource.
- The listed clusterroles above (highlighed in red) are some of the common clusterroles.

- The *self-provisioner* clusterrole allows the creation of projects. This is the default role that is granted to anyone who has been authenticated by oauth. These uses belong to the *system:authenticated:oauth virtual group*. The *kubeadmin* user is a *virtual user* created during installation. You can show this by describing the *self-provisioners* clusterrolebinding resource.

5. Next, login to your cluster-admin account.

```
[user@host ~]$ oc login -u super-kelvin
Using project "kel-testing".
```

6. Grant your user the permission to view the openshift-image-registry project.

```
[user@host ~]$ oc adm policy add-role-to-user view kelvin -n openshift-image-registry
clusterrole.rbac.authorization.k8s.io/view added: "kelvin"
[user@host ~]$ oc login -u kelvin
Using project "kel-testing".
[user@host ~]$ oc projects
You have access to the following projects and can switch between them with ' project
<projectname>':

       julie-dbproj
       julie-webproj
  * kel-testing
       openshift-image-registry

Using project "kel-testing" on server "https://api.cluster.kel-ocp.com:6443".
```

7. Now grant your user the view permission for the whole cluster (all projects).

```
[user@host ~]$ oc login -u super-kelvin
Using project "kel-testing".
[user@host ~]$ oc adm policy add-cluster-role-to-user view kelvin
clusterrole.rbac.authorization.k8s.io/view added: "kelvin"
[user@host ~]$ oc login -u kelvin
Using project "kel-testing".
[user@host ~]$ oc projects
You have access to the following projects and can switch between them with ' project
<projectname>':
       default
       openshift
       openshift-apiserver
       openshift-apiserver-operator
...
```

8. Remove the view role for all projects from kelvin.

```
[user@host ~]$ oc login -u super-kelvin
Using project "kel-testing".
[user@host ~]$ oc adm policy remove-cluster-role-from-user view kelvin
clusterrole.rbac.authorization.k8s.io/view removed: "kelvin"
```

9. Even though you have removed the view role for all projects from the user, do not forget that cluster scope and project scope are 2 separate categories. You have to remove the view permission that you specifically granted for the openshift-image-project. Remove the permission.

```
[user@host ~]$ oc get rolebinding -n openshift-image-registry
NAME                                ROLE                                AGE
cluster-image-registry-operator   Role/cluster-image-registry-operator   2d
node-ca                             Role/node-ca                        2d
prometheus-k8s                      Role/prometheus-k8s                 2d
system:deployers                    ClusterRole/system:deployer         47h
system:image-builders               ClusterRole/system:image-builder    47h
system:image-pullers                ClusterRole/system:image-puller     47h
view                                ClusterRole/view                    2m31s
[user@host ~]$ oc describe rolebinding view -n openshift-image-registry
Name:         view
Labels:       <none>
Annotations:  <none>
Role:
  Kind:  ClusterRole
  Name:  view
Subjects:
  Kind  Name   Namespace
  ----  ----   ---------
  User  kelvin
[user@host ~]$ oc adm policy remove-role-from-user view kelvin -n
openshift-image-registry
clusterrole.rbac.authorization.k8s.io/view removed: "kelvin"
[user@host ~]$ oc get rolebinding -n openshift-image-registry
NAME                                ROLE                                AGE
cluster-image-registry-operator   Role/cluster-image-registry-operator   2d
node-ca                             Role/node-ca                        2d
prometheus-k8s                      Role/prometheus-k8s                 2d
system:deployers                    ClusterRole/system:deployer         47h
system:image-builders               ClusterRole/system:image-builder    47h
system:image-pullers                ClusterRole/system:image-puller     47h
```

10. Verify that the user no longer have permission.

```
[user@host ~]$ oc login -u kelvin
Using project "kel-testing".
[user@host ~]$ oc projects
You have access to the following projects and can switch between them with ' project
<projectname>':

       julie-dbproj
       julie-webproj
  * kel-testing
[user@host ~]$
```

Lab 7: SA and SCC

We will now use cleanup the testing project that we created earlier and attempt to start the pod using an image that would break the security policy. We will learn how to create a service account to grant the deployment the necessary permission to perform that task.

1. Login as your user and make sure you are in the testing project. Delete all the resources there.

```
[user@host ~]$ oc login -u kelvin -p redhat https://api.cluster.kel-ocp.com:6443
[user@host ~]$ oc project kel-testing

[user@host ~]$ oc delete all --all
pod "abc-69d5b76f9b-tf2rb" deleted
deployment.apps "abc" deleted
Warning: apps.openshift.io/v1 DeploymentConfig is deprecated in v4.14+, unavailable in
v4.10000+
```

2. Now create the dangerweb application using the image from the repository *quay.io/kelvinlai/myweb:non_openshift*.

```
[user@host ~]$ oc new-app --name dangerweb --image
quay.io/kelvinlai/myweb:non_openshift
--> Found container image c10ca8b (7 months old) from quay.io for
"quay.io/kelvinlai/myweb:non_openshift"

       Red Hat Universal Base Image 8
       ------------------------------
       The Universal Base Image is designed and engineered to be the base layer for
all of your containerized applications, middleware and utilities. This base image is
freely redistributable, but Red Hat only supports Red Hat technologies through
subscriptions for Red Hat products. This image is maintained by Red Hat and updated
regularly.

       Tags: base rhel8

       * An image stream tag will be created as "dangerweb:non_openshift" that will
track this image

--> Creating resources ...
       imagestream.image.openshift.io "dangerweb" created
       deployment.apps "dangerweb" created
       service "dangerweb" created
--> Success
       Application is not exposed. You can expose services to the outside world by
executing one or more of the commands below:
       'oc expose service/dangerweb'
       Run 'oc status' to view your app.
```

3. OpenShift will prevent the pod from starting.

```
[user@host ~]$ oc get po
NAME                          READY   STATUS              RESTARTS      AGE
dangerweb-59dd788969-7s5v2    0/1     CrashLoopBackOff    2 (18s ago)   35s
```

4. Prepare a serviceaccount for the cluster-admin to grant you the appropriate security context constraints.

```
[user@host ~]$ oc create serviceaccount mysa
serviceaccount/mysa created
```

5. Login as your cluster-admin. Find out the scc that is needed and grant it to the service account that was created in the previous step.

```
[user@host ~]$ oc login -u super-kelvin
WARNING: Using insecure TLS client config. Setting this option is not supported!

Logged into "https://api.cluster.kel-ocp.com:6443" as "super-kelvin" using existing
credentials.

You have access to 104 projects, the list has been suppressed. You can list all
projects with 'oc projects'

Using project "kel-testing".
[user@host ~]$ oc adm policy scc-subject-review deploy/dangerweb
RESOURCE              ALLOWED BY
<unknown>/dangerweb   anyuid
[user@host ~]$ oc adm policy add-scc-to-user anyuid mysa
clusterrole.rbac.authorization.k8s.io/system:openshift:scc:anyuid added: "mysa"
```

6. Login back as your user and assign the service account to the deployment.

```
[user@host ~]$ oc login -u kelvin
WARNING: Using insecure TLS client config. Setting this option is not supported!

Logged into "https://api.cluster.kel-ocp.com:6443" as "kelvin" using existing
credentials.

You have access to the following projects and can switch between them with 'oc project
<projectname>':

       julie-dbproj
       julie-webproj
  * kel-testing

Using project "kel-testing".
[user@host ~]$ oc set serviceaccount deploy/dangerweb mysa
deployment.apps/dangerweb serviceaccount updated
```

7. Check that the pod is running now. *myweb:non_openshift* was created with the user being set to *root* and this was why the security policy was preventing the container from starting the process as root. Now we have allowed it. This is why it is dangerous to simply assign a scc without verifying the reason.

```
[user@host ~]$ oc get po
NAME                          READY    STATUS RESTARTS    AGE
dangerweb-58797b6b89-228hn    1/1     Running    0           4s
[user@host ~]$ oc rsh dangerweb-58797b6b89-228hn whoami
root
[user@host ~]$
```

Lab 8: Network Policies

On a fresh installation of OpenShift 4, there are no NetworkPolicies. Since the Pods all belong to the same network, it is very dangerous for your project to be left alone. We will first create a policy to deny any access to our database project. Then we will create another policy to only allow the specific pods from the webproj project to access the database.

1. Login as your cluster-admin and select the dbproj project.

```
[user@host ~]$ oc login -u super-kelvin -p redhat https://api.cluster.kel-ocp.com:6443
[user@host ~]$ oc project julie-dbproj
```

2. Create a label for both the dbproj and webproj namespaces. Change back to your normal user after the labeling.

```
[user@host ~]$ oc label namespace/julie-dbproj mynet=dbproject
namespace/julie-dbproj labeled
[user@host ~]$ oc label namespace/julie-webproj mynet=webproject
namespace/julie-webproj labeled
[user@host ~]$ oc login -u kelvin
```

Note:

- You can try to label the project instead of the namespace. The command will fail.
- After labeling the namespace describing the namespace or project will display the newly created labels.

3. (Optional) Verify what is the selector for the deployment in both projects. The default label which will be created for pods are normally linked to the deployment name, deployment=DEPLOY_NAME.

```
[user@host ~]$ oc get deploy
NAME    READY    UP-TO-DATE    AVAILABLE    AGE
mydb    1/1      1              1              13h
[user@host ~]$ oc describe deploy/mydb | grep Selector
Selector:             deployment=mydb
[user@host ~]$ oc get deploy -n julie-webproj
NAME    READY    UP-TO-DATE    AVAILABLE    AGE
myapp    1/1     1              1              12h
[user@host ~]$ oc describe deploy/myapp -n julie-webproj | grep Selector
Selector:             deployment=myapp
```

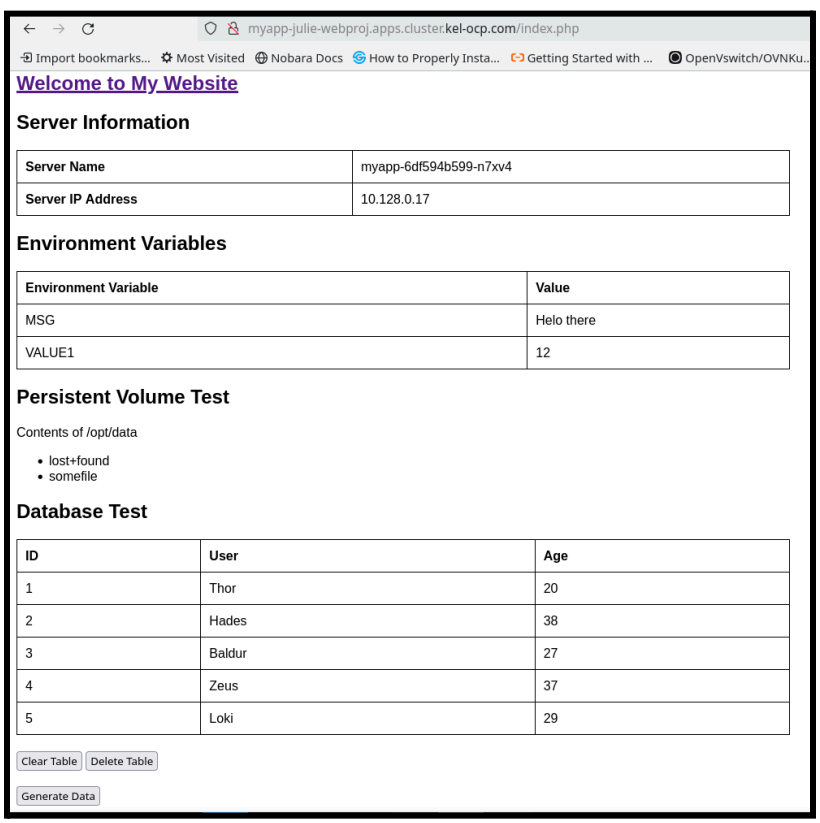
4. Now create the deny-all networkpolicy (netpol) and apply it.

```
[user@host ~]$ vi deny-all.yaml
[user@host ~]$ cat deny-all.yaml
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
  name: deny-all
spec:
  podSelector: {}
  policyTypes:
  - Ingress
  - Egress
  ingress: []
  egress: []
[user@host ~]$ oc create -f deny-all.yaml
networkpolicy.networking.k8s.io/deny-all created
[user@host ~]$ oc get networkpolicy
NAME    POD-SELECTOR   AGE
deny-all   <none>            8s
[user@host ~]$ oc get networkpolicy deny-all -o yaml
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
  creationTimestamp: "2024-06-27T15:59:56Z"
  generation: 1
  name: deny-all
  namespace: julie-dbproj
  resourceVersion: "759870"
  uid: d71d4270-3776-46fe-86ff-72bb6f8c2c38
spec:
  podSelector: {}
  policyTypes:
  - Ingress
  - Egress
[user@host ~]$
```

5. Test your myapp web application. Refresh the page. This will take a bit of time before you get a Gateway error.

6. Now create a network policy to only allow the myapp pod from the webproj project. Reload the webpage after you create the policy. It should load without problems now.

```
[user@host ~]$ vi allow-myapp-from-webproject.yaml
[user@host ~]$ cat allow-myapp-from-webproject.yaml
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
  name: allow-myapp-pod-from-webproject
spec:
  podSelector:
    matchLabels:
      deployment: mydb
  ingress:
    - from:
      - namespaceSelector:
          matchLabels:
            mynet: webproject
        podSelector:
          matchLabels:
            deployment: myapp
      ports:
       - port: 3306
         protocol: TCP
[user@host ~]$ oc create -f allow-myapp-from-webproject.yaml
networkpolicy.networking.k8s.io/allow-myapp-pod-from-webproject created
[user@host ~]$ oc get netpol
```



Lab: Quota

In this lab we will attempt to scale the db to two pods when there is a quota implemented.

1. Login as your cluster-admin. Make sure you are in the dbproj.

```
[user@host ~]$ oc login -u super-kelvin -p redhat https://api.cluster.kel-ocp.com:6443
[user@host ~]$ oc project julie-dbproj
lNow using project "julie-dbproj" on server "https://api.cluster.kel-ocp.com:6443".
[user@host ~]$ oc get all
Warning: apps.openshift.io/v1 DeploymentConfig is deprecated in v4.14+, unavailable in
v4.10000+
NAME                          READY   STATUS RESTARTS   AGE
pod/mydb-f46444b8-s5vf8   1/1       Running   0           14h

NAME           TYPE           CLUSTER-IP     EXTERNAL-IP   PORT(S) AGE
service/mydb   ClusterIP   172.30.255.136   <none>        3306/TCP   14h

NAME                  READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/mydb   1/1   1             1             14h

NAME                                DESIRED   CURRENT   READY   AGE
replicaset.apps/mydb-5bbddc857b   0         0       0       14h
replicaset.apps/mydb-5dd7cfd5f5   0         0       0       14h
replicaset.apps/mydb-f46444b8       1       1       1       14h
```

2. Create the quota.

```
[user@host ~]$ oc create quota two-pod --hard cpu=500m,memory=1G,pods=2
resourcequota/two-pod created
[user@host ~]$ oc get quota
NAME    AGE   REQUEST                       LIMIT
two-pod   12s   cpu: 0/500m, memory: 0/1G   ,pods: 0/2
```

3. Try to scale the deployment to have 2 replicas.

```
[user@host ~]$ oc scale --replicas 2 deploy/mydb
deployment.apps/mydb scaled
[user@host ~]$ oc get all
NAME                          READY   STATUS RESTARTS   AGE
pod/mydb-f46444b8-s5vf8   1/1       Running   0           14h

NAME           TYPE           CLUSTER-IP     EXTERNAL-IP   PORT(S) AGE
service/mydb   ClusterIP   172.30.255.136   <none>        3306/TCP   14h

NAME                  READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/mydb   1/2   1             1             14h

NAME                                DESIRED   CURRENT   READY   AGE
replicaset.apps/mydb-5bbddc857b   0         0       0       14h
replicaset.apps/mydb-5dd7cfd5f5   0         0       0       14h
replicaset.apps/mydb-f46444b8       2       1       1       14h
```

4. List the events to find out the reason.

```
[user@host ~]$ oc get events
LAST SEEN   TYPE      REASON                OBJECT                        MESSAGE
17s           Warning   FailedCreate       replicaset/mydb-f46444b8   Error creating:
pods "mydb-f46444b8-m4sgw" is forbidden: failed quota: two-pod: must specify cpu for:
mysql; memory for: mysql
```

5. Declare your resource consumption in the deployment. Any project admin can create a resource request. You can try this using your user instead of the cluster-admin.

```
[user@host ~]$ oc login -u kelvin
[user@host ~]$ oc set resources --requests cpu=50m,memory=5M deploy/mydb
deployment.apps/mydb resource requirements updated
[user@host ~]$ oc get all
Warning: apps.openshift.io/v1 DeploymentConfig is deprecated in v4.14+, unavailable in
v4.10000+
NAME                          READY   STATUS               RESTARTS   AGE
pod/mydb-5b7774f54d-5mxt2   0/1     ContainerCreating   0        1s
pod/mydb-5b7774f54d-fc5t8   1/1     Running               0       3s
pod/mydb-f46444b8-s5vf8      1/1     Running               0       14h

NAME           TYPE           CLUSTER-IP     EXTERNAL-IP   PORT(S) AGE
service/mydb   ClusterIP   172.30.255.136   <none>        3306/TCP   14h

NAME                  READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/mydb   2/2   2              2              14h

NAME                                 DESIRED   CURRENT   READY   AGE
replicaset.apps/mydb-5b7774f54d   2         2       1       3s
replicaset.apps/mydb-5bbddc857b   0         0       0       14h
replicaset.apps/mydb-5dd7cfd5f5   0         0       0       14h
replicaset.apps/mydb-f46444b8       1       1       1       14h
[user@host ~]$
```