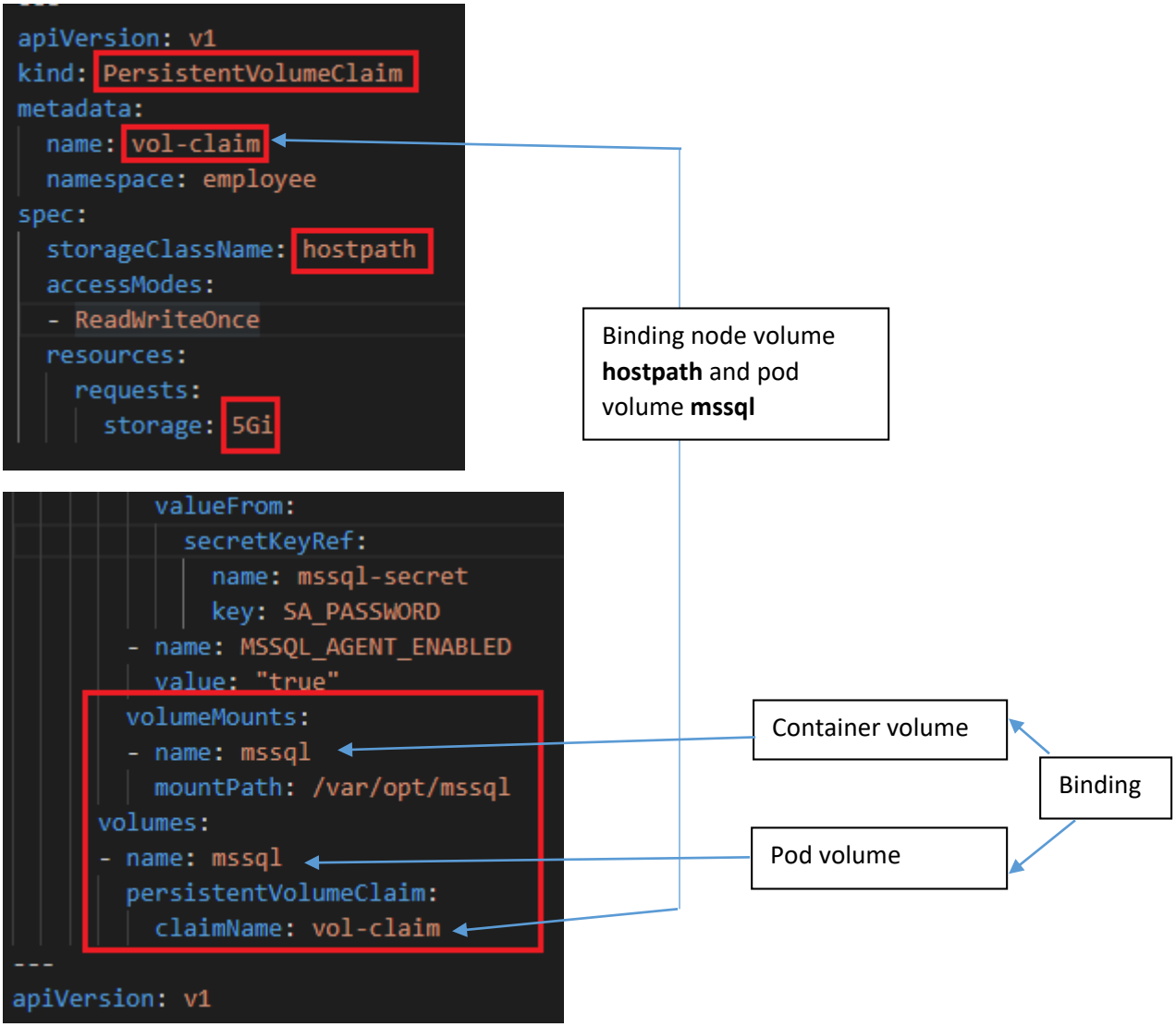
Lesson5 - Create persistent volume

In this lesson we will deploy MSSQL with persistent volume for high availability.

kubectl get storageclass

```
PS C:\Kuberneties\EmployeesManagement\Employees> kubectl get storageclass
NAME                 PROVISIONER          RECLAIMPOLICY   VOLUMEBINDINGMODE   ALLOWVOLUMEEXPANSION   AGE
hostpath (default)   docker.io/hostpath   Delete          Immediate           false                  5d4h
PS C:\Kuberneties\EmployeesManagement\Employees>
```

We added to **mssql-deploy-with-secret-and-PV.yml** the section below:



kubectl create namespace employee

kubectl create secret generic mssql-secret --namespace=employee --from-literal='ConnectionString="server=mssql-service;Initial Catalog=EmployeeDB;Persist Security Info=False;User ID=sa;Password=MyDemoPwd2021!;MultipleActiveResultSets=true"' --from-literal='SA_PASSWORD=MyDemoPwd2021!'

kubectl apply -f .\mssql-deploy-with-secret-and-PV.yml

```
PS C:\Kuberneties\EmployeesManagement\manifests> kubectl apply -f .\mssql-deploy-with-secret-and-PV.yml
deployment.apps/mssql-deployment created
service/mssql-service created
persistentvolumeclaim/vol-claim created
PS C:\Kuberneties\EmployeesManagement\manifests>
```

kubectl get pv -n employee

```
PS C:\Kuberneties\EmployeesManagement\manifests> kubectl get pv -n employee
NAME                                       CAPACITY   ACCESS MODES   RECLAIM POLICY   STATUS   CLAIM                 STORAGECLASS   REASON   AGE
pvc-1a247447-48eb-46c3-ad7f-add854c1151f   5Gi        RWO            Delete           Bound    employee/vol-claim    hostpath                118s
PS C:\Kuberneties\EmployeesManagement\manifests>
```

kubectl get pvc -n employee

```
PS C:\Kuberneties\EmployeesManagement\manifests> kubectl get pvc -n employee
NAME        STATUS   VOLUME                                     CAPACITY   ACCESS MODES   STORAGECLASS   AGE
vol-claim   Bound    pvc-1a247447-48eb-46c3-ad7f-add854c1151f   5Gi        RWO            hostpath       3m3s
PS C:\Kuberneties\EmployeesManagement\manifests>
```

kubectl get all -n employee

```
PS C:\Kuberneties\EmployeesManagement\manifests> kubectl get all -n employee
NAME                                    READY   STATUS    RESTARTS   AGE
pod/mssql-deployment-6bcb97764c-2tpl4   1/1     Running   0          4m18s

NAME                    TYPE           CLUSTER-IP       EXTERNAL-IP   PORT(S)          AGE
service/mssql-service   LoadBalancer   10.102.148.234   localhost     1433:30123/TCP   4m18s

NAME                                READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/mssql-deployment    1/1     1            1           4m18s

NAME                                           DESIRED   CURRENT   READY   AGE
replicaset.apps/mssql-deployment-6bcb97764c    1         1         1       4m18s
PS C:\Kuberneties\EmployeesManagement\manifests>
```

cd ..

cd Employees

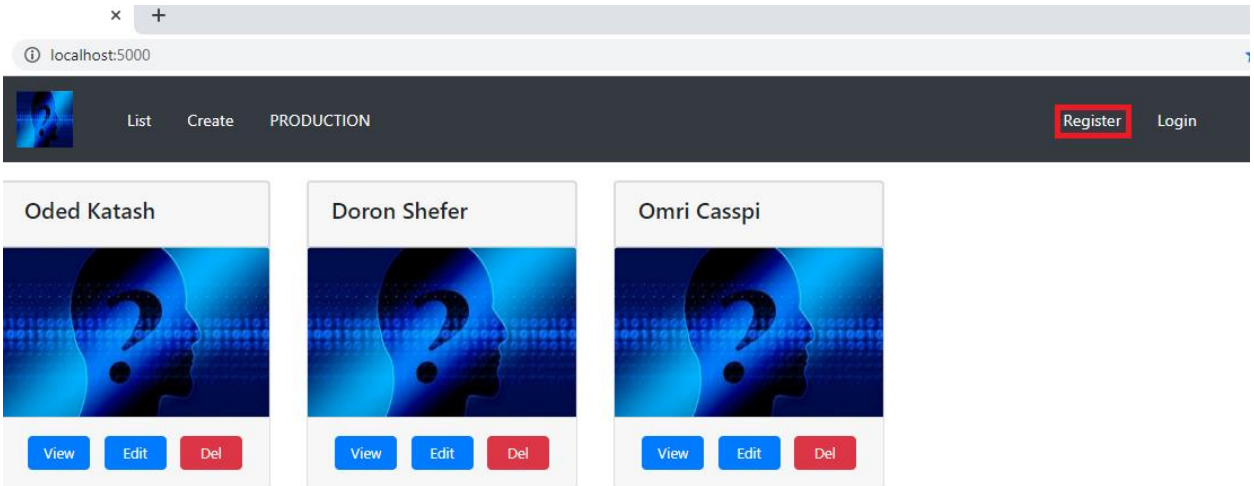
dotnet ef database update (creates **EmployeeDB** database in our MSSQL server with initial data.)

```
PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL

PS C:\employee\employeemanagement\manifests> cd ..
PS C:\employee\employeemanagement> cd .\Employees\
PS C:\employee\employeemanagement\Employees> dotnet ef database update
Build started...
Build succeeded.
Done.
PS C:\employee\employeemanagement\Employees>
```

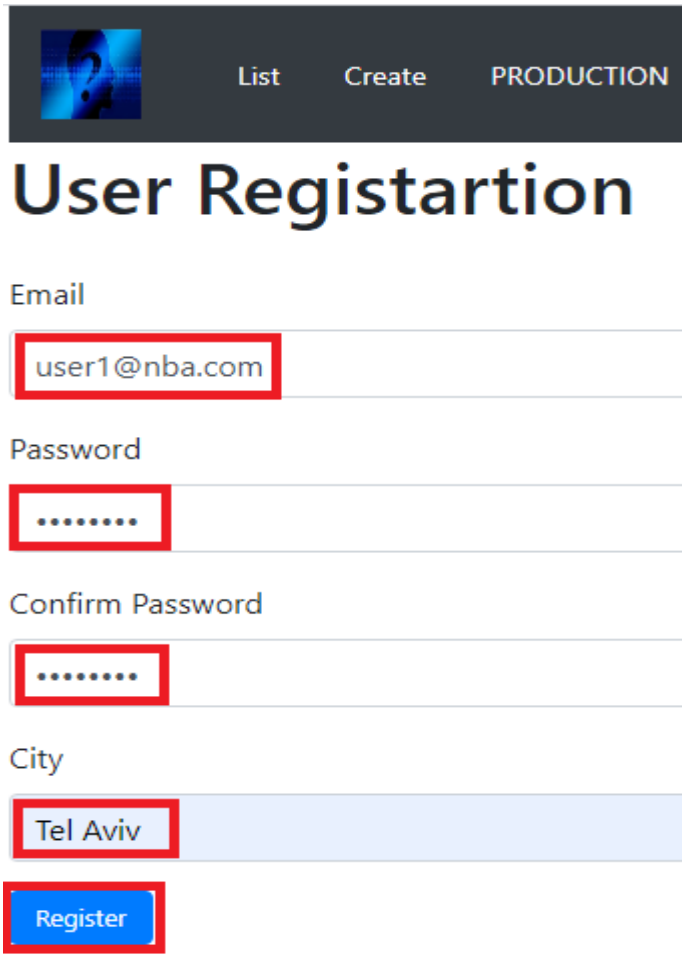
dotnet build & **dotnet run**

```
Try the new cross-platform PowerShell https://aka.ms/pscore6
PS C:\employee> cd .\employeemanagement\
PS C:\employee\employeemanagement> cd .\Employees\
PS C:\employee\employeemanagement\Employees> dotnet build
Microsoft (R) Build Engine version 16.7.2+b60ddb6f4 for .NET
Copyright (C) Microsoft Corporation. All rights reserved.

  Determining projects to restore...
  Restored C:\employee\employeemanagement\Employees\Employees.csproj (in 1.56 sec).
  Employees -> C:\employee\employeemanagement\Employees\bin\Debug\netcoreapp3.1\Employees.dll
  Employees -> C:\employee\employeemanagement\Employees\bin\Debug\netcoreapp3.1\Employees.Views.dll

Build succeeded.
    0 Warning(s)
    0 Error(s)

Time Elapsed 00:00:30.76
PS C:\employee\employeemanagement\Employees> dotnet run
```

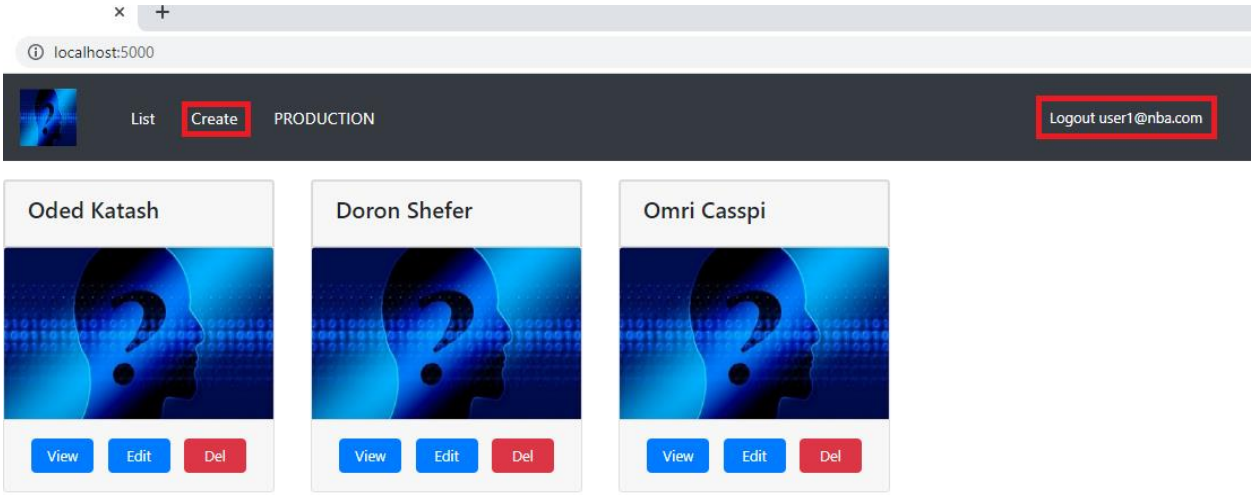
Open chrome – http://localhost:5000 and click **Register**.



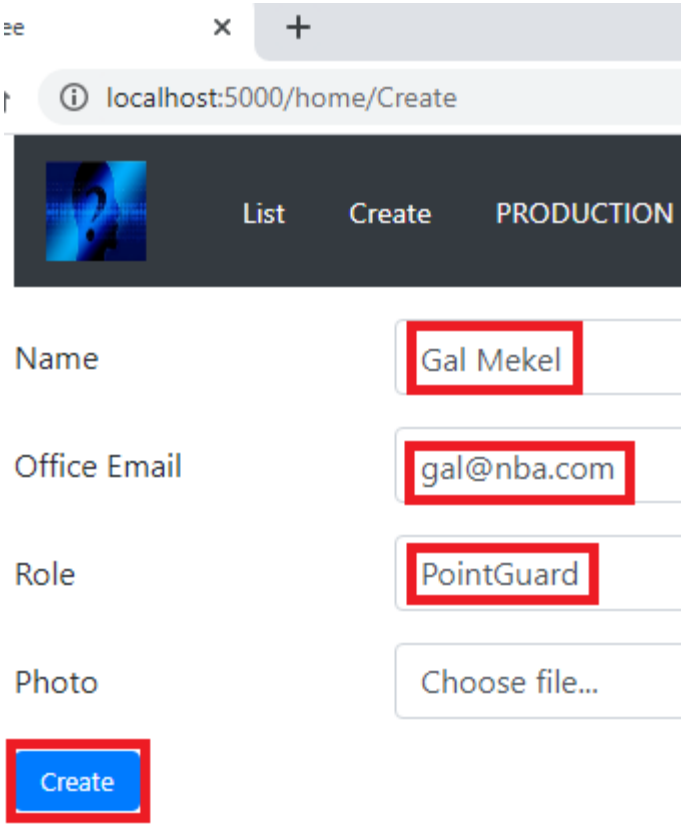
Enter the user details in the screen below and click **Register**.



The user is logged in. Click **Create** in order to create new employee.

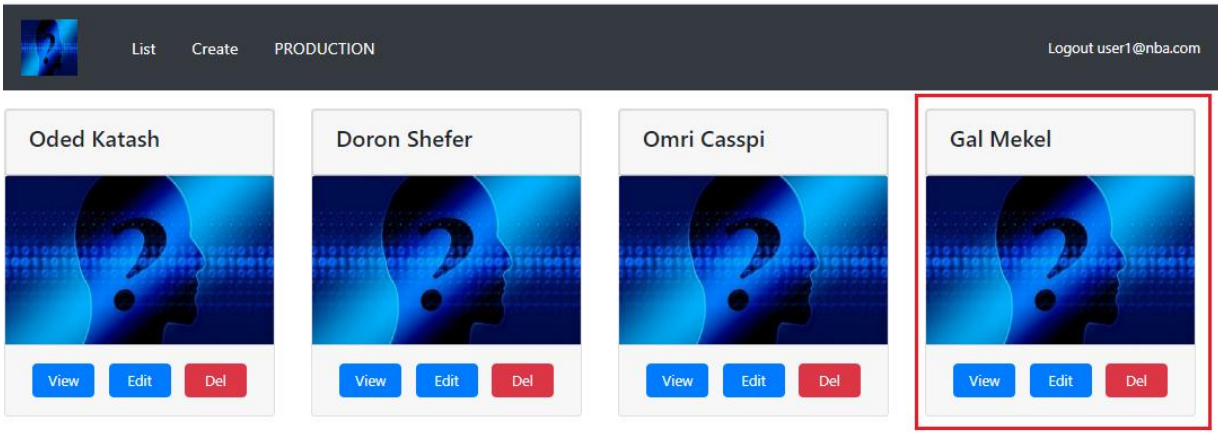


Enter the employee details and click **Create**.

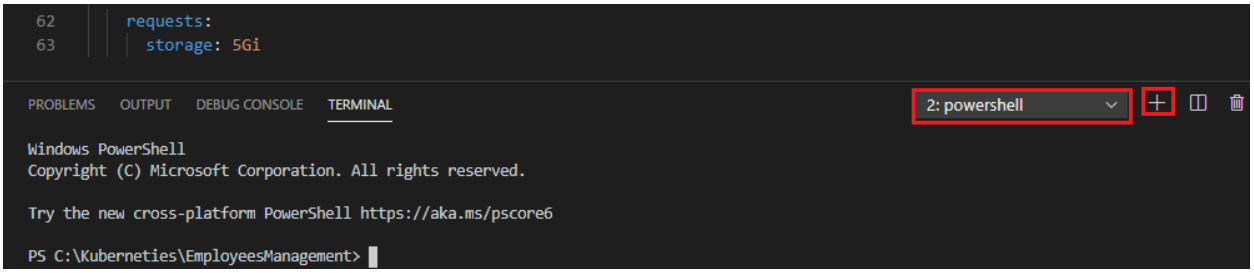


Click **Back**.

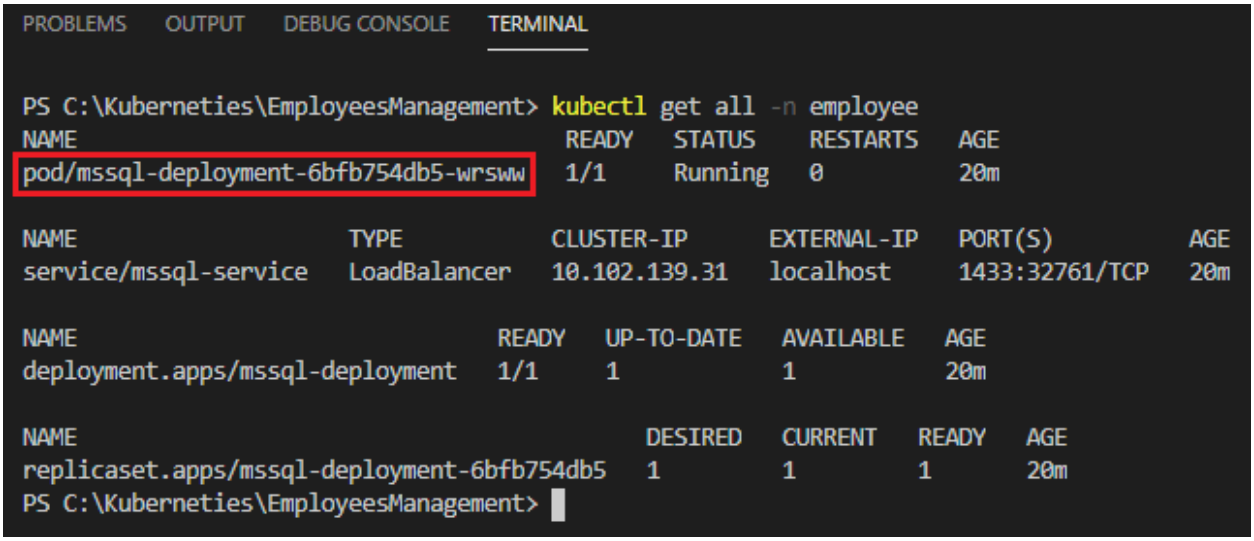
The user is created.



Click **"+"** in the terminal in order to open another PowerShell command prompt



kubectl get all -n employee



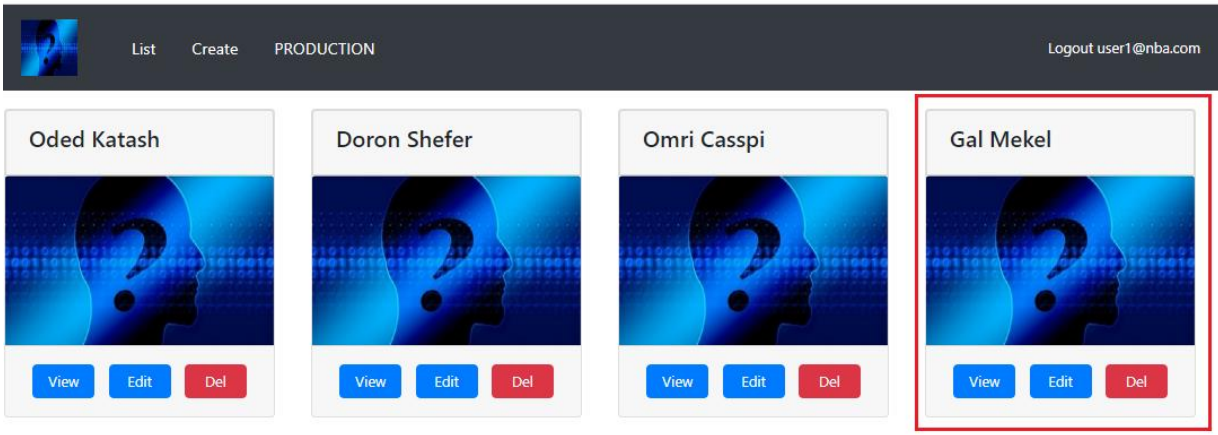
kubectl delete pod/mssql-deployment-6bfb754db5-wrsww -n employee

```
PS C:\Kuberneties\EmployeesManagement> kubectl delete pod/mssql-deployment-6bfb754db5-wrsww -n employee
pod "mssql-deployment-6bfb754db5-wrsww" deleted
PS C:\Kuberneties\EmployeesManagement>
```

kubectl get all -n employee (a new mssql pod is created based on the required state of the deployment replicaset)

```
PS C:\Kuberneties\EmployeesManagement> kubectl get all -n employee
NAME                                  READY   STATUS    RESTARTS   AGE
pod/mssql-deployment-6bcb97764c-dfphx 1/1     Running   0          6m7s

NAME                    TYPE           CLUSTER-IP      EXTERNAL-IP   PORT(S)          AGE
service/mssql-service   LoadBalancer   10.102.148.234  localhost     1433:30123/TCP   4d19h

NAME                                READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/mssql-deployment    1/1     1            1           4d19h

NAME                                           DESIRED   CURRENT   READY   AGE
replicaset.apps/mssql-deployment-6bcb97764c    1         1         1       4d19h
PS C:\Kuberneties\EmployeesManagement>
```

Refresh the page and see that the database and its data remains.



Connect to mssql pod database file:

kubectl -n employee exec -it mssql-deployment-6bcb97764c-dfphx -- /bin/sh

ls -ltr /var/opt/mssql/data

```
PS C:\Kuberneties\EmployeesManagement> kubectl -n employee exec -it mssql-deployment-6bcb97764c-dfphx -- /bin/sh
# ls -ltr /var/opt/mssql/data
total 71176
-rw-r----- 1 root root  4194304 Feb  2 10:29 master.mdf
-rw-r----- 1 root root  8388608 Feb  2 10:30 modellog.ldf
-rw-r----- 1 root root  8388608 Feb  2 10:30 model.mdf
-rw-r----- 1 root root  8388608 Feb  2 10:30 tempdb.mdf
-rw-r----- 1 root root  8388608 Feb  2 10:30 EmployeeDB.mdf
-rw-r----- 1 root root 15466496 Feb  2 10:30 msdbdata.mdf
-rw-r----- 1 root root   786432 Feb  2 10:30 msdblog.ldf
-rw-r----- 1 root root  8388608 Feb  2 10:30 templog.ldf
-rw-r----- 1 root root  2097152 Feb  2 10:35 mastlog.ldf
-rw-r----- 1 root root  8388608 Feb  2 10:37 EmployeeDB_log.ldf
#
```

Exit

Connect to docker-desktop persistent volume with database files that bound to mssql pod:

docker run -it --rm --privileged --pid=host justincormack/nsenter1

cd /var/lib/k8s-pvs/vol-claim

ls (see the name of the persistent volume pvc-1a247447-48eb-46c3-ad7f-add854c1151f)

cd pvc-1a247447-48eb-46c3-ad7f-add854c1151f

ls -ltr (see the database files are the same as in mssql pod)

```
PS C:\Kuberneties\EmployeesManagement> docker run -it --rm --privileged --pid=host justincormack/nsenter1
/ # cd /var/lib/k8s-pvs/vol-claim
/var/lib/k8s-pvs/vol-claim # ls
pvc-1a247447-48eb-46c3-ad7f-add854c1151f
/var/lib/k8s-pvs/vol-claim # cd pvc-1a247447-48eb-46c3-ad7f-add854c1151f/
/var/lib/k8s-pvs/vol-claim/pvc-1a247447-48eb-46c3-ad7f-add854c1151f # ls -ltr
total 12
drwxr-xr-x    2 root     root          4096 Jan 28 14:50 secrets
drwxr-xr-x    2 root     root          4096 Feb  2 10:22 data
drwxr-xr-x    2 root     root          4096 Feb  2 10:43 log
/var/lib/k8s-pvs/vol-claim/pvc-1a247447-48eb-46c3-ad7f-add854c1151f # cd data
/var/lib/k8s-pvs/vol-claim/pvc-1a247447-48eb-46c3-ad7f-add854c1151f/data # ls -ltr
total 71176
-rw-r-----    1 root     root       4194304 Feb  2 10:29 master.mdf
-rw-r-----    1 root     root       8388608 Feb  2 10:30 modellog.ldf
-rw-r-----    1 root     root       8388608 Feb  2 10:30 model.mdf
-rw-r-----    1 root     root       8388608 Feb  2 10:30 tempdb.mdf
-rw-r-----    1 root     root       8388608 Feb  2 10:30 EmployeeDB.mdf
-rw-r-----    1 root     root      15466496 Feb  2 10:30 msdbdata.mdf
-rw-r-----    1 root     root       8388608 Feb  2 10:30 templog.ldf
-rw-r-----    1 root     root        786432 Feb  2 10:30 msdblog.ldf
-rw-r-----    1 root     root       8388608 Feb  2 10:37 EmployeeDB_log.ldf
-rw-r-----    1 root     root       2097152 Feb  2 10:43 mastlog.ldf
/var/lib/k8s-pvs/vol-claim/pvc-1a247447-48eb-46c3-ad7f-add854c1151f/data #
```

Done!