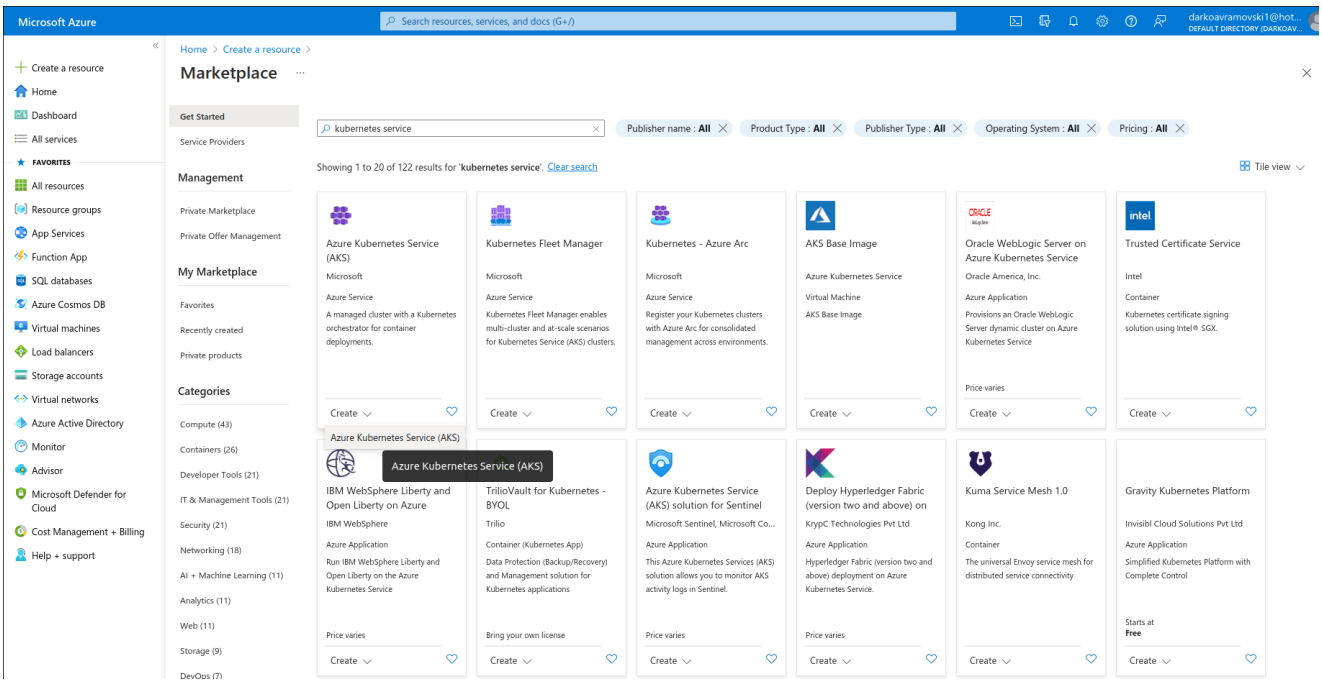
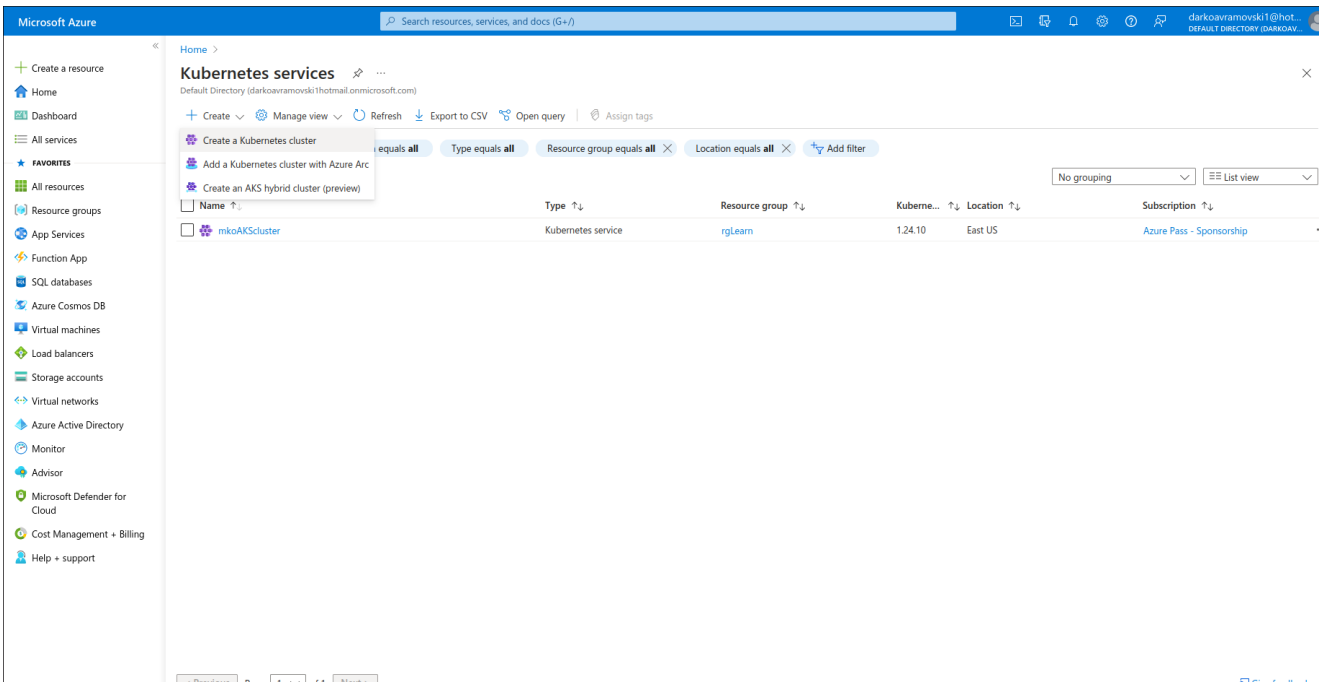
Exercise: PodsPods are the smallest, most basic deployable objects in Kubernetes. A Pod represents a single instance of a running process in your cluster. Pods contain one or more containers, such as Docker containers. Although you want deploy pods directly (static pods), knowledge for defining pods manifest files will be used for defining more complex Kubernetes resources like Controllers.

Practice1: Simple pods operations

Login to your Azure portal and crete AKS cluster, navigate to Kubernetes services / Create Cluster





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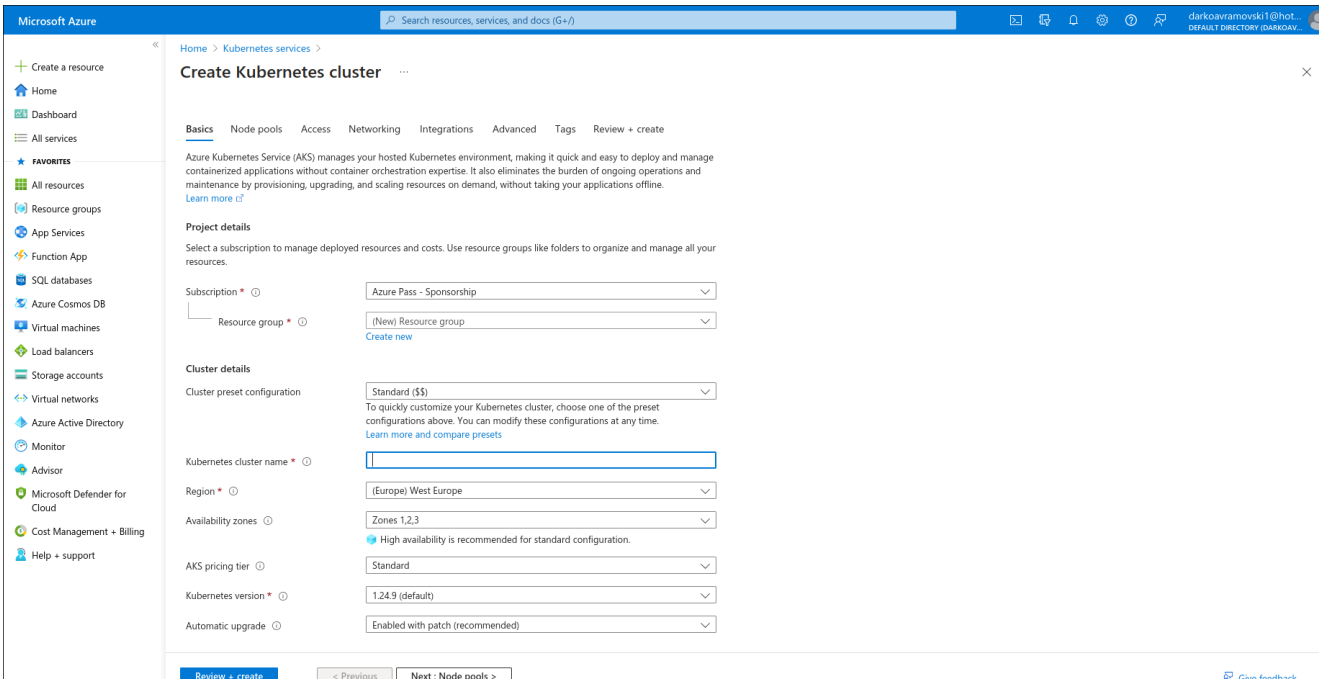

When we created the clusted we can connect to the cluster, click Connect new windows will popup on the right side of the screen there we have details how to connect to our cluster

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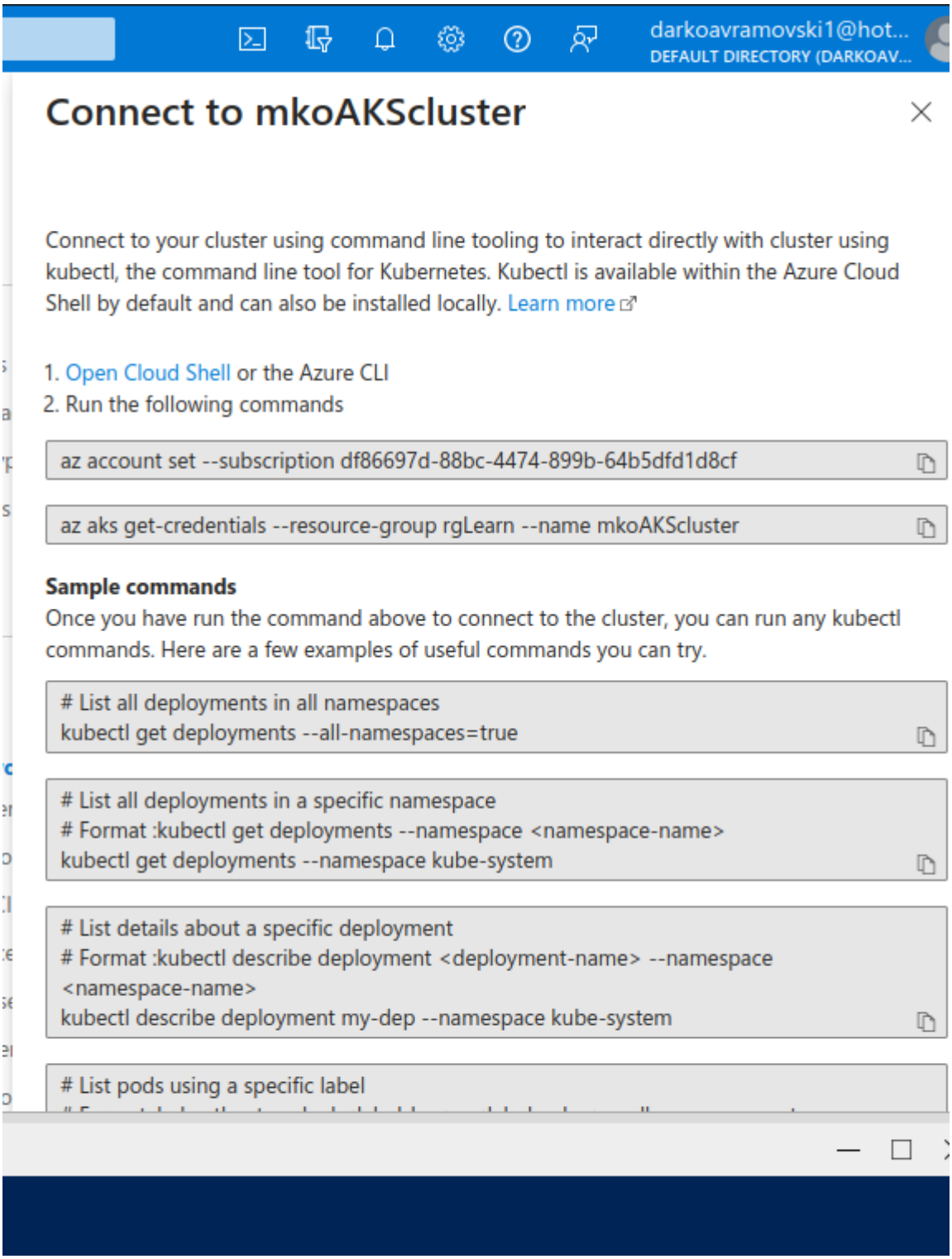
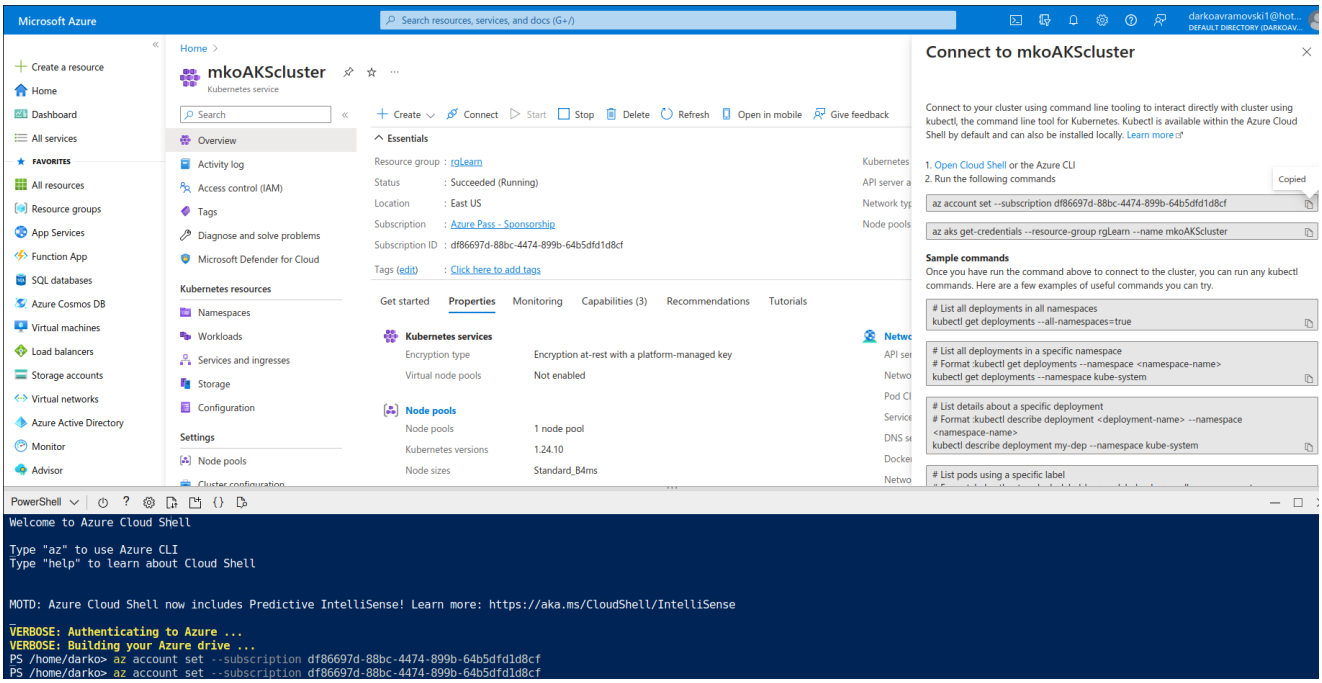


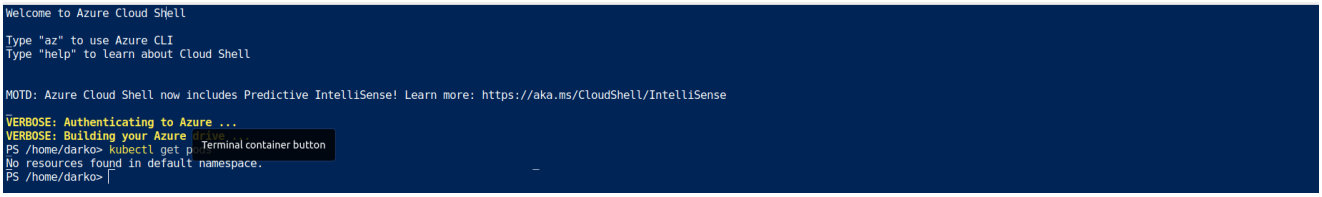
Next open PowerShell and Run the following commands.

```
az account set --subscription df86697d-88bc-4474-899b-64b5dfd1d8cf
az aks get-credentials --resource-group rgLearn --name mkoAKScluster
```



check for active pods run command

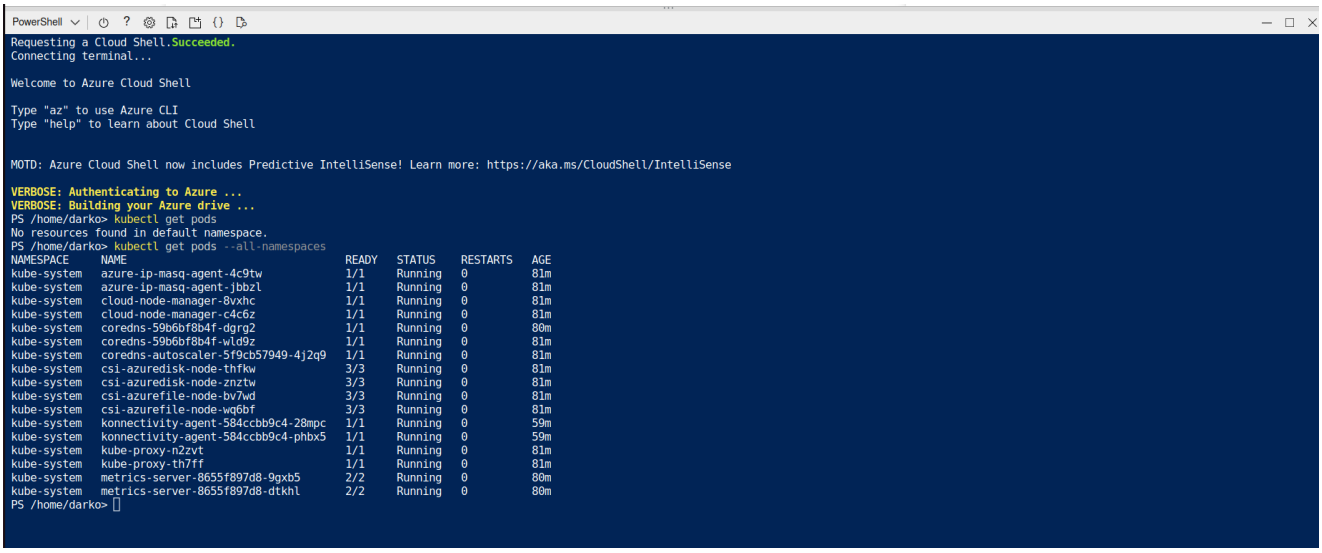
kubectl get pods



We dont see any active pods

Now check all namespaces. Run .

kubectl get pods –all-namespace



How many pods do you see? Who deployed these pods? Why are they deployed?

Now let`s deploy the first pod imperative approach.

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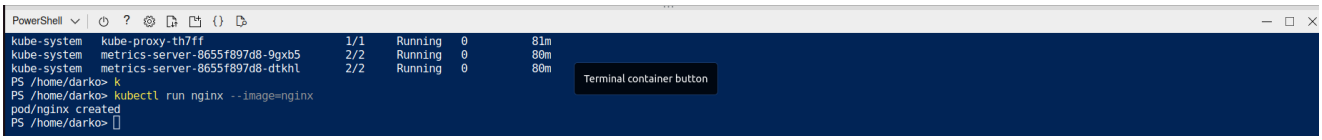
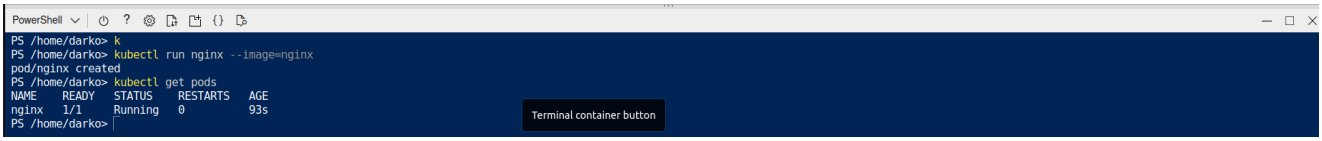
```
kubectl run nginx --image=nginx
```



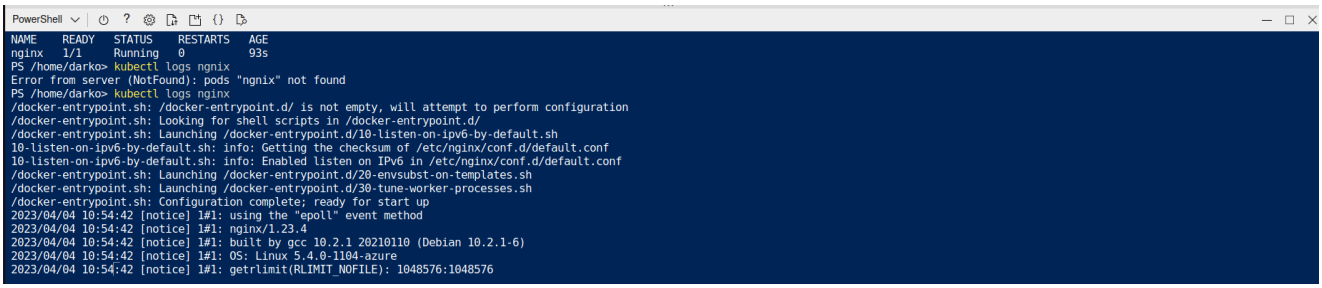
Now we can check for active pods. run command **kubectl get pods**

```
kubectl get pods*
```



Now we can see logs from the pod we created in powershell type

```
kubectl ngnix logs
```



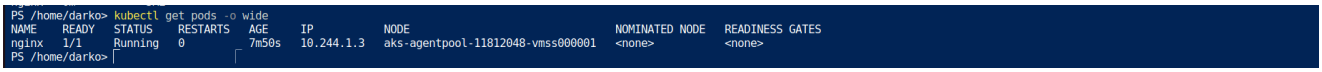
To view the resources consumption **kubectl top pod nginx**

PROF

```
kubectl top pod nginx
```

You can check the status of the nodes and list all pods of the kube-system namespace as follows:

```
kubectl get pods -o wide
```



More detailed info about run **kubectl describe pod nginx**

```
kubectl describe pod nginx
```

```
PowerShell
Labels:           run=nginx
Annotations:      <none>
Status:           Running
IP:               10.244.1.3
IPs:
  IP:  10.244.1.3
Containers:
  nginx:
    Container ID:   containerd://17ed6605baeda14e3ff8e23b5f6a9c889c924127dcd99b568192068eb0ba3b10
    Image:          nginx
    Image ID:       docker.io/library/nginx@sha256:2ab30d6ac53580a6db8b657abf0f68d75360ff5cc1670a85acb5bd85ba1b19c0
    Port:           <none>
    Host Port:      <none>
    State:          Running
      Started:      Tue, 04 Apr 2023 10:54:42 +0000
    Ready:          True
    Restart Count:  0
    Environment:    <none>
    Mounts:
      /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-zmbn7 (ro)
Conditions:
  Type              Status
  Initialized       True
  Ready             True
  ContainersReady   True
  PodScheduled      True
Volumes:
  kube-api-access-zmbn7:
    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  18m   default-scheduler  Successfully assigned default/nginx to aks-agentpool-11812048-vmss000001
  Normal  Pulling    18m   kubelet            Pulling image "nginx"
  Normal  Pulled     18m   kubelet            Successfully pulled image "nginx" in 3.004499223s
  Normal  Created    18m   kubelet            Created container nginx
  Normal  Started    18m   kubelet            Started container nginx
PS /home/darko>
```

To delete the pod that i created run **kubectl delete pod nginx**

```
kubectl delete pods nginx
```

Create cluster k8

Let’s find the image used on one of the corednspods under the kube-system namespace

```
kubectl get pods --namespace kube-system
```

PROF

```
PS /home/darko> kubectl get pods --namespace kube-system
NAME                                  READY   STATUS    RESTARTS   AGE
azure-ip-masq-agent-4c9tw             1/1     Running   0          134m
azure-ip-masq-agent-jbbzl             1/1     Running   0          134m
cloud-node-manager-8vxhc              1/1     Running   0          134m
cloud-node-manager-c4c6z              1/1     Running   0          134m
coredns-59b6bf8b4f-dgrg2              1/1     Running   0          133m
coredns-59b6bf8b4f-wld9z              1/1     Running   0          134m
coredns-autoscaler-5f9cb57949-4j2q9   1/1     Running   0          134m
csi-azuredisk-node-thfkw              3/3     Running   0          134m
csi-azuredisk-node-znztw              3/3     Running   0          134m
csi-azurefile-node-bv7wd              3/3     Running   0          134m
csi-azurefile-node-wq6bf              3/3     Running   0          134m
konnectivity-agent-584ccbb9c4-28mpc   1/1     Running   0          112m
konnectivity-agent-584ccbb9c4-phbx5   1/1     Running   0          112m
kube-proxy-n2zvt                      1/1     Running   0          134m
kube-proxy-th7ff                      1/1     Running   0          134m
metrics-server-8655f897d8-9gxb5       2/2     Running   0          133m
metrics-server-8655f897d8-dtkhl       2/2     Running   0          133m
PS /home/darko>
```

Once again list all pods under all namespaces.

```
kubectl get pods --all-namespaces
```

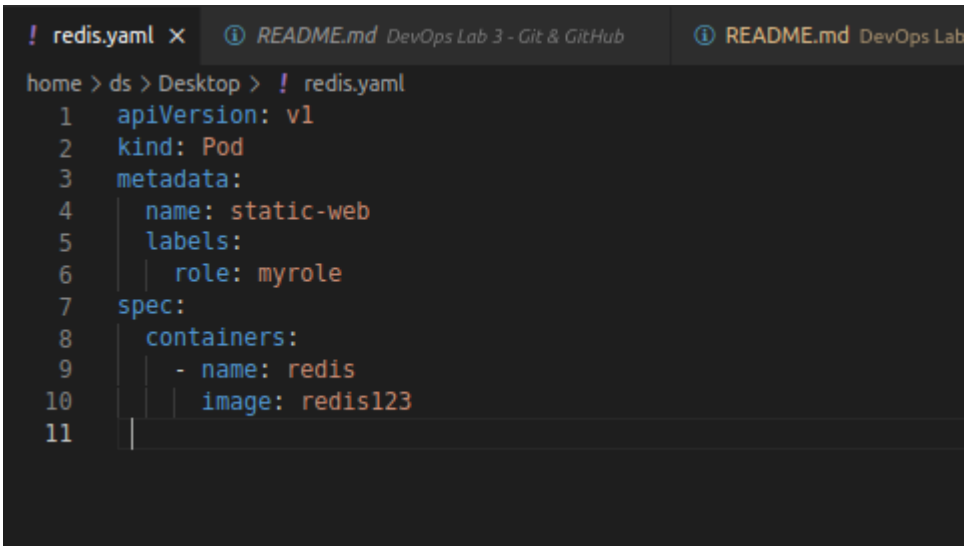
Note one of the coredns pods. Now run kubectl describe pod -n kube-system. Replace the place holder with noted name.

```
kubectl describe pod coredns-59b6bf8b4f-dgrg2  --namespace kube-system
```

Practice2: Working with pod manifest files

Now it is time to deploy pod using manifest file (declarative approach). Copy the following code block on your local computer in a file called redis.yaml:

Connect to your cluster, and upload the file that you created redis.yaml and runn **kubectl create -f redis.yaml** fix the erros that you got in redis.yaml and run again the same command.




```
apiVersion: v1
kind: Pod
metadata:
name: static-web
labels:
    role: myrole
spec:
containers:
    - name: redis
    image: redis123
```

PROF

The pod is not running

```
MOTD: Azure Cloud Shell now includes Predictive IntelliSense! Learn more: https://aka.ms/CloudShell/IntelliSense

VERBOSE: Authenticating to Azure ...
VERBOSE: Building your Azure drive ...
PS /home/darko> kubectl create -f redis.yaml
Error from server (AlreadyExists): error when creating "redis.yaml": pods "static-web" already exists
PS /home/darko> kubectl get pods
NAME          READY   STATUS             RESTARTS   AGE
static-web    0/1     ImagePullBackOff   0          23m
PS /home/darko>
```

Terminal container button

Check the events associated with this pod. Run the kubectl describe pod static-web command. What are the events showing? Why your pod is not running?

we get following error

pull access denied, repository does not exist or may require authorization: server message: insufficient_scope: authorization failed

```
  Type     Reason            Age                From               Message
  ----     ------            ----               ----               -------
  Warning  FailedScheduling  26m                default-scheduler  0/2 nodes are available: 1 node(s) had untolerated taint {node.cloudprovider.kubernetes.io/uninitialized: true}, 1 node(s) had untoler
ated taint {node.kubernetes.io/network-unavailable: }. preemption: 0/2 nodes are available: 2 Preemption is not helpful for scheduling.
  Normal   Scheduled         25m                default-scheduler  Successfully assigned default/static-web to aks-agentpool-11812048-vmss000002
  Normal   Pulling           24m (x4 over 25m)  kubelet            Pulling image "redis123"
  Warning  Failed            24m (x4 over 25m)  kubelet            Failed to pull image "redis123": rpc error: code = Unknown desc = failed to pull and unpack image "docker.io/library/redis123:latest":
 failed to resolve reference "docker.io/library/redis123:latest": pull access denied, repository does not exist or may require authorization: server message: insufficient_scope: authorization failed
  Warning  Failed            24m (x4 over 25m)  kubelet            Error: ErrImagePull
  Warning  Failed            23m (x6 over 25m)  kubelet            Error: ImagePullBackOff
  Normal   BackOff           28s (x107 over 25m)  kubelet          Back-off pulling image "redis123"
PS /home/darko> kubectl delete pod static-web
pod "static-web" deleted
PS /home/darko>
```

Find the correct image (check the Docker hub page) and correct it in the manifest.Locate the image information and put the correct image name. Redeploy the pod (fist run kubectl delete pod static-web to delete the pod, then run kubectl create once again).

Fix the erros in redis.yaml file upload and run again **kubectl create -f redis.yaml**

```
! redis.yaml ×   ⓘ README.md M
home > ds > Desktop > ! redis.yaml
1  apiVersion: v1
2  kind: Pod
3  metadata:
4    name: static-web
5    labels:
6      role: myrole
7  spec:
8    containers:
9      - name: redis
10       image: redis:5.0.4
11
12
```

```
PS /home/darko> kubectl create -f redis.yaml
pod/static-web created
PS /home/darko> kubectl get pods
NAME          READY   STATUS    RESTARTS   AGE
static-web    1/1     Running   0          9s
PS /home/darko>
```

Now you can delete the pod. Try to delete it using the kubectl delete –f redis.yaml.

```
kubectl delete –f redis.yaml.
```

Your next task is to create and test nginx pod definition. Your definition should use the nginx official image, should use label named app with valuefrontend and should publish port 80. Make sure you complete this task because we will use this template in our next Labs. Your nginx pod should be running without any issues.

```
VERBOSE: Authenticating to Azure ...
VERBOSE: Building your Azure drive ...
PS /home/darko> kubectl describe deployment frontend
Name:                   frontend
Namespace:              default
CreationTimestamp:      Wed, 05 Apr 2023 09:14:30 +0000
Labels:                 <none>
Annotations:            deployment.kubernetes.io/revision: 1
Selector:               app=nginx
Replicas:               2 desired | 2 updated | 2 total | 2 available | 0 unavailable
StrategyType:           RollingUpdate
MinReadySeconds:        0
RollingUpdateStrategy:  25% max unavailable, 25% max surge
Pod Template:
  Labels:  app=nginx
  Containers:
   nginx:
    Image:        nginx:1.14.2
    Port:         80/TCP
    Host Port:    0/TCP
    Environment:  <none>
    Mounts:       <none>
  Volumes:        <none>
Conditions:
  Type           Status  Reason
  ----           ------  ------
  Available      True    MinimumReplicasAvailable
  Progressing    True    NewReplicaSetAvailable
OldReplicaSets:  <none>
NewReplicaSet:   frontend-6595874d85 (2/2 replicas created)
Events:
  Type    Reason             Age   From                   Message
  ----    ------             ----  ----                   -------
  Normal  ScalingReplicaSet  108s  deployment-controller  Scaled up replica set frontend-6595874d85 to 2
PS /home/darko>
```

Practice3: Multi-container pods

Once finished you can try to create multi-container pod definition. Your multi-container pod should use redis and nginx containers with port 6379 and 80 published respectively. Label name should be app with value web.

Note that in reality there is no sense to put the redis and nginx under the same pod but it can be done for the purpose of learning.

redis.yaml ⓘ README.md M ! nginx.yaml ×

me > ds > Desktop > ! nginx.yaml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: webapp
  labels:
    name: app
spec:
  containers:
  - name: nginx-container
    image: nginx:1.14.2
    ports:
    - containerPort: 80
      hostPort: 8080
  - name: redis
    image: redis:5.0.4
```

```
kubectl create -f nginx.yaml
```

```
PowerShell
/usr/bin/mv: cannot stat 'nginx.yml': No such file or directory
PS /home/darko> kubectl create -f nginx.yaml
error: unable to decode "nginx.yaml": json: cannot unmarshal string into Go struct field ObjectMeta.metadata.labels of type map[string]string
PS /home/darko> rm nginx.yaml
PS /home/darko> kubectl create -f nginx.yaml
error: error validating "nginx.yaml": error validating data: Validati Terminal container button abels): invalid type for io.k8s.apimachinery.pkg.apis.meta.v1.ObjectMeta.labels: got "string", expected
f you choose to ignore these errors, turn validation off with --validate=false
PS /home/darko> rm nginx.yaml
PS /home/darko> ls
clouddrive  Microsoft  redis.yaml
PS /home/darko> kubectl create -f nginx.yaml
pod/webapp created
PS /home/darko>
```

PROF

Verify deployments

```
error: the server doesn't have a resource type "deployments"
PS /home/darko> kubectl get deployments
NAME               READY   UP-TO-DATE   AVAILABLE   AGE
nginx-deployment   2/2     2            2           48m
PS /home/darko>
```

```
NAME                                READY   STATUS    RESTARTS   AGE
nginx-deployment-6595874d85-6mt6l   1/1     Running   0          25m
nginx-deployment-6595874d85-ncxrm   1/1     Running   0          25m
webapp                              2/2     Running   0          8m8s
Show Applications
PS /home/darko>
```

Delete all the pods under the default namespace.
Don't delete any of the manifest files you have created so far.

Practice4: Probes

First we will create and test liveness probe with exec test.
Create a file named probes_exec.yaml with following content: