Lab 08

Laboratory Exercise

Part 1: Explore Minikube in Ubuntu

Watch this video to understand what is Kubernetes.

https://www.youtube.com/watch?v=l_lWfipUimk

Watch this video to understand what is Minikube.

https://www.youtube.com/watch?v=E2pP1MOfo3g

LAB EXERCISE

This LAB exercise guide you in using Minikube. Minikube is an open-source tool that was developed to enable developers and system administrators to run a single cluster of Kubernetes on their local machine.

Minikube starts a single node Kubernetes cluster locally with small resource utilization.

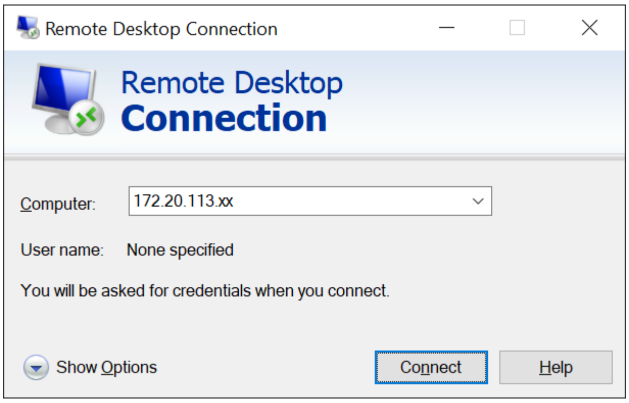
Time to Complete

Approximately 30 Minutes

From your machine logged-in to RP VPN, run Remote Desktop Connection to connect to the ubuntu Linux Virtual Machine (VM). Please login based on your assigned VM as shown below:

S/N	Name	VM	IP Address	User Name	Password
1	ABDUL SALIM BIN ABDUL RASHITH	LABC03 - 172.20.115.50	172.20.115.50	dockeradm	docker!2
2	CASPER LEOW YU HAN (LIAO YU HANG)	LABC03 - 172.20.115.51	172.20.115.51	dockeradm	docker!2
3	CHAN JUN ZHI, GLENN	LABC03 - 172.20.115.52	172.20.115.52	dockeradm	docker!2
4	CHIA WAI TAT	LABC03 - 172.20.115.53	172.20.115.53	dockeradm	docker!2
5	HOI WAI TECK	LABC03 - 172.20.115.54	172.20.115.54	dockeradm	docker!2
6	KOH JIN CAI DAEMIAN	LABC03 - 172.20.115.55	172.20.115.55	dockeradm	docker!2

7	KYAW KYAW OO	LABC03 - 172.20.115.56	172.20.115.56	dockeradm	docker!2
8	LUM YOKE FAI	LABC03 - 172.20.115.57	172.20.115.57	dockeradm	docker!2
9	MUHAMMAD FADHLI BIN MOHAMED NOOR	LABC03 - 172.20.115.58	172.20.115.58	dockeradm	docker!2
10	MUHAMMAD HILMEE BIN MD ALI	LABC03 - 172.20.115.59	172.20.115.59	dockeradm	docker!2
11	NG SAY WEE	LABC03 - 172.20.115.60	172.20.115.60	dockeradm	docker!2
12	NGUI WEILY	LABC03 - 172.20.115.61	172.20.115.61	dockeradm	docker!2
13	NU'MAN HARITH BIN NORRAIMI	LABC03 - 172.20.115.62	172.20.115.62	dockeradm	docker!2
14	RULY JANUAR FACHMI	LABC03 - 172.20.115.76	172.20.115.76	dockeradm	docker!2
15	SEAH SHIH WEI GEROME	LABC03 - 172.20.115.64	172.20.115.64	dockeradm	docker!2
16	SEAN CHENG ZHI WEI	LABC03 - 172.20.115.65	172.20.115.65	dockeradm	docker!2
17	SEY KOK SIONG	LABC03 - 172.20.115.66	172.20.115.66	dockeradm	docker!2
18	TAN JOON YEE DOUGLAS	LABC03 - 172.20.115.67	172.20.115.67	dockeradm	docker!2
19	WU WAI TENG VANESSA	LABC03 - 172.20.115.68	172.20.115.68	dockeradm	docker!2
20	YAP KOON SING	LABC03 - 172.20.115.69	172.20.115.69	dockeradm	docker!2
21	YE CHENG LIM	LABC03 - 172.20.115.70	172.20.115.70	dockeradm	docker!2
22	SHAIFUL BIN ABDUL KARIM	LABC03 - 172.20.115.71	172.20.115.71	dockeradm	docker!2
23	CHAI RU YI	LABC03 - 172.20.115.72	172.20.115.72	dockeradm	docker!2
24	JWAY HWEE LING JULIE	LABC03 - 172.20.115.73	172.20.115.73	dockeradm	docker!2
25	SAMANTHA TEO XING YEE	LABC03 - 172.20.115.74	172.20.115.74	dockeradm	docker!2
26	ZIL AZZA HILMIAH BINTE RADUAN	LABC03 - 172.20.115.75	172.20.115.75	dockeradm	docker!2



Computer: 172.20.113.xx

User name: None specified

You will be asked for credentials when you connect.

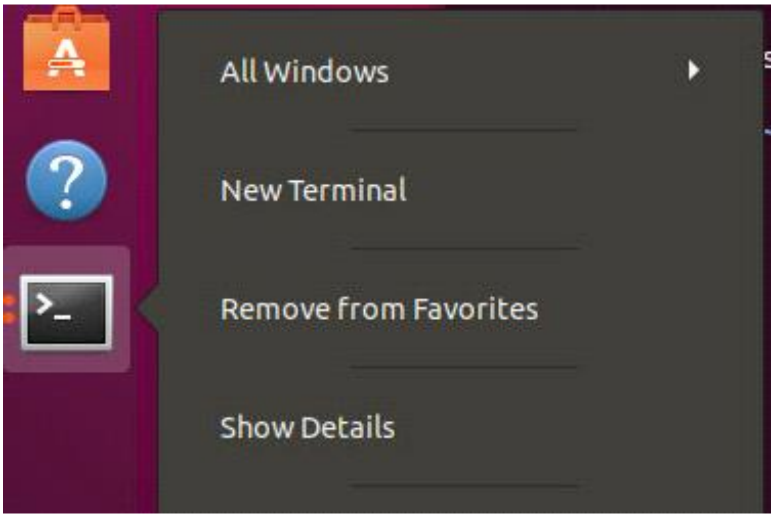
Replace xx with the IP address of the VM that you have been assigned.

Exploring MiniKube on a Virtual Machine

In the segment, we will be exploring the following:

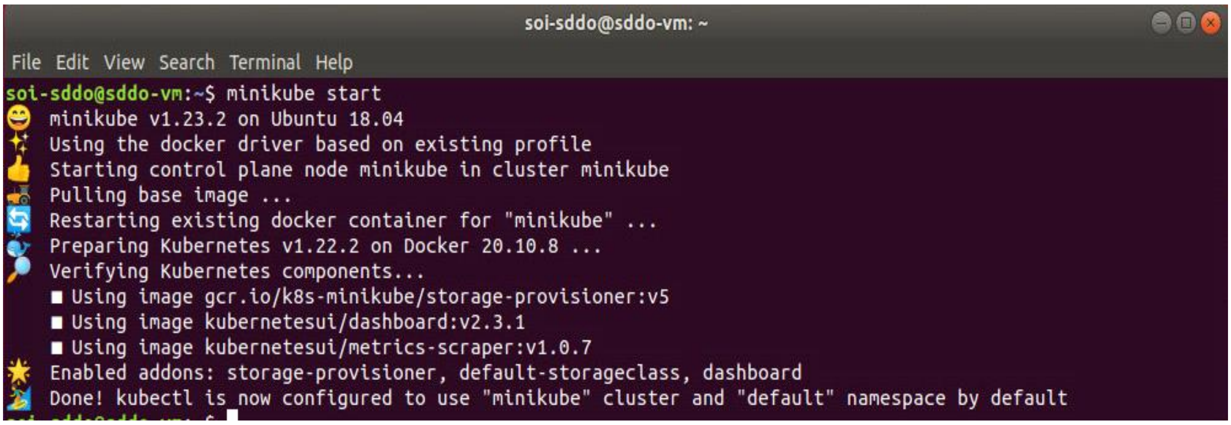
a. How to launch Minikube.
b. Run a single cluster of Kubernetes.

1. Login to the VM using username "dockeradm" and password “docker!2”.
2. In the desktop space, “right mouse click” and select “Open Terminal”.



Launch Kubernetes Cluster locally - Minikube start

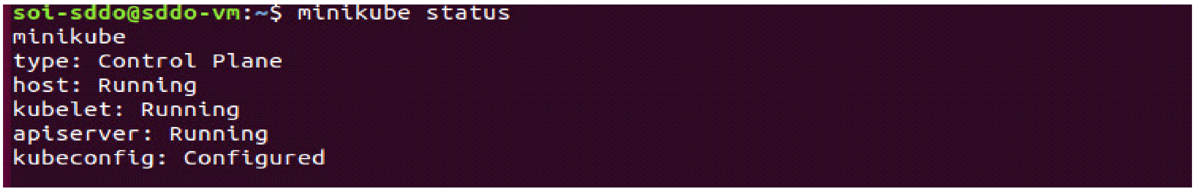
3. From the command prompt on windows execute "minikube start”



```
soi-sddo@sddo-vm:~$ minikube start
😄  minikube v1.23.2 on Ubuntu 18.04
✨  Using the docker driver based on existing profile
👍  Starting control plane node minikube in cluster minikube
🚜  Pulling base image ...
🔄  Restarting existing docker container for "minikube" ...
🐳  Preparing Kubernetes v1.22.2 on Docker 20.10.8 ...
🔎  Verifying Kubernetes components...
    ▪ Using image gcr.io/k8s-minikube/storage-provisioner:v5
    ▪ Using image kubernetesui/dashboard:v2.3.1
    ▪ Using image kubernetesui/metrics-scraper:v1.0.7
🌟  Enabled addons: storage-provisioner, default-storageclass, dashboard
🏄  Done! kubectl is now configured to use "minikube" cluster and "default" namespace by default
```

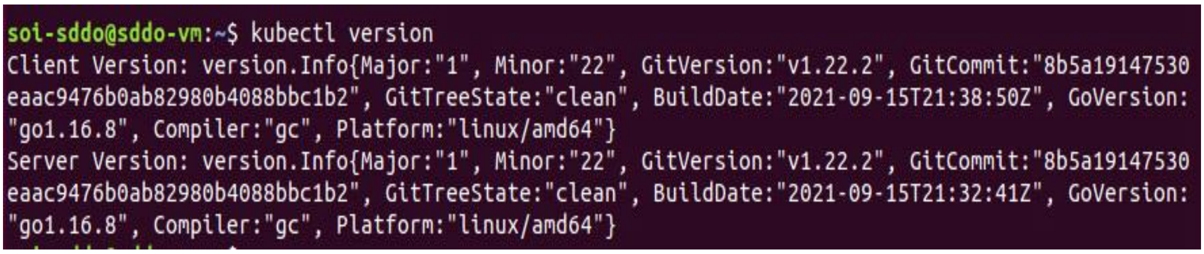
Minikube commands

3.1. Check the status of minikube using command “minikube status”



```
soi-sddo@sddo-vm:~$ minikube status
minikube
type: Control Plane
host: Running
kubelet: Running
apiserver: Running
kubeconfig: Configured
```

3.2. From the above command prompt execute "kubectl version"



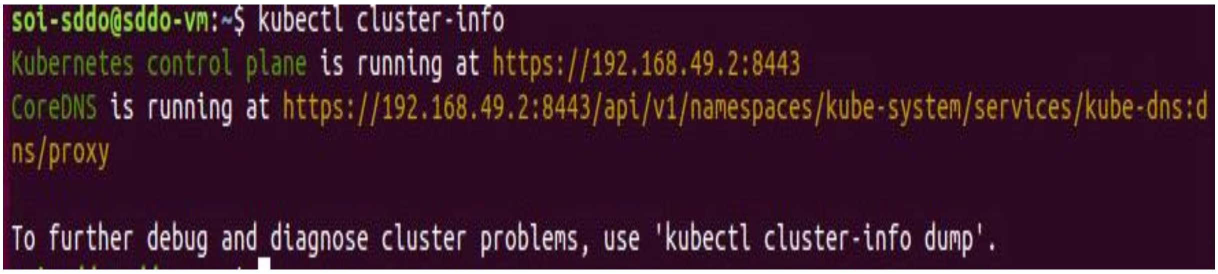
```
soi-sddo@sddo-vm:~$ kubectl version
Client Version: version.Info{Major:"1", Minor:"22", GitVersion:"v1.22.2", GitCommit:"8b5a19147530
eaac9476b0ab82980b4088bbc1b2", GitTreeState:"clean", BuildDate:"2021-09-15T21:38:50Z", GoVersion:
"go1.16.8", Compiler:"gc", Platform:"linux/amd64"}
Server Version: version.Info{Major:"1", Minor:"22", GitVersion:"v1.22.2", GitCommit:"8b5a19147530
eaac9476b0ab82980b4088bbc1b2", GitTreeState:"clean", BuildDate:"2021-09-15T21:32:41Z", GoVersion:
"go1.16.8", Compiler:"gc", Platform:"linux/amd64"}
```

OK, kubectl is configured and we can see both the version of the client and as well as the server.

The client version is the kubectl version; the server version is the Kubernetes version installed on the master. You can also see details about the build.

Output will show both client and server versions

3.3. Use the kubectl CLI to get the cluster information: “kubectl cluster-info”

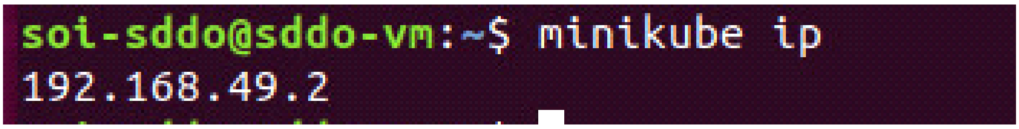


```
soi-sddo@sddo-vm:~$ kubectl cluster-info
Kubernetes control plane is running at https://192.168.49.2:8443
CoreDNS is running at https://192.168.49.2:8443/api/v1/namespaces/kube-system/services/kube-dns:d
ns/proxy

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

Cluster IP Address

4. Get the IP address of the cluster via the ip command “minikube ip”

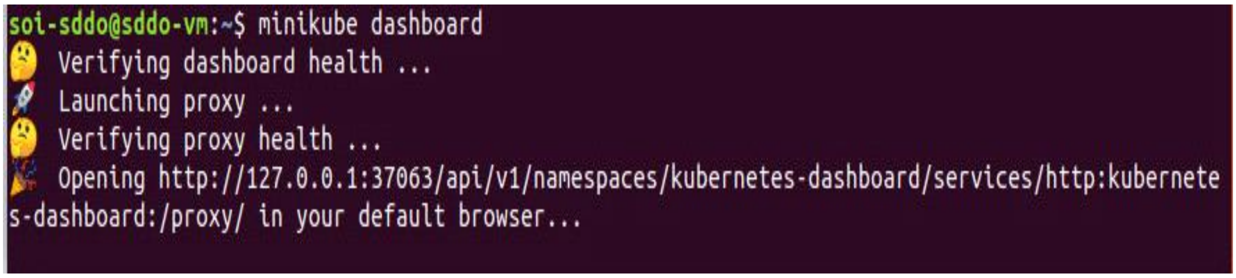


```
soi-sddo@sddo-vm:~$ minikube ip
192.168.49.2
```

Kubernetes Dashboard

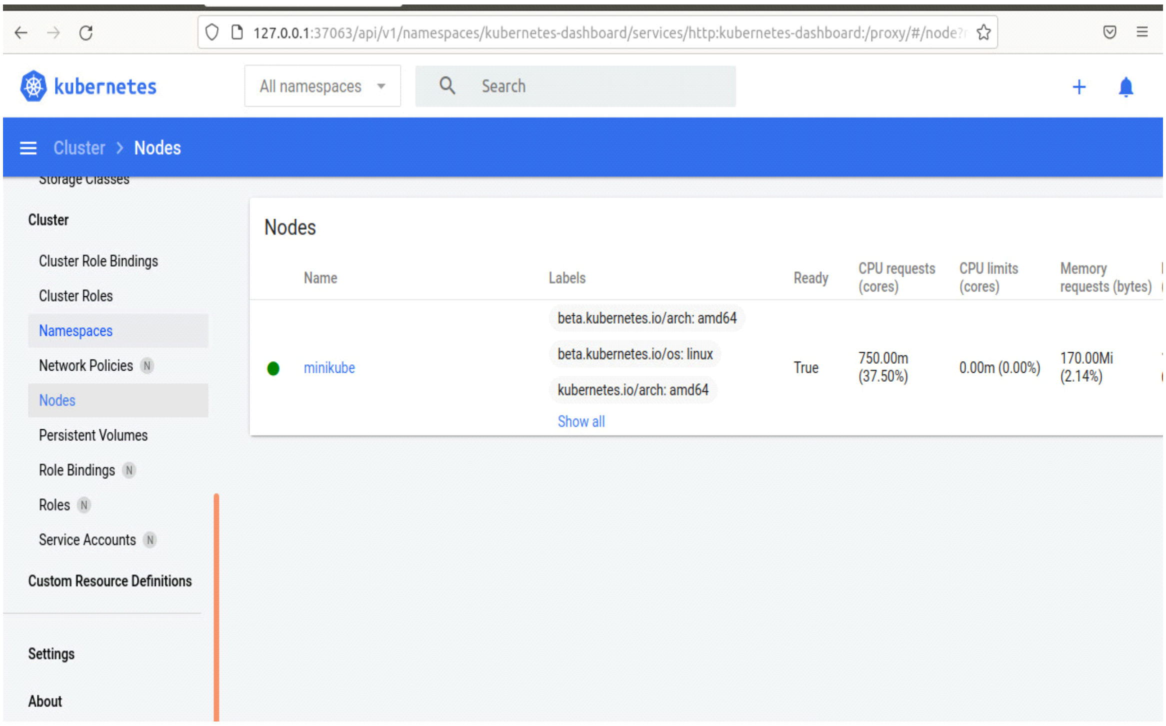
Note: If you installed minikube locally, run minikube start. Before you run minikube dashboard, you should open a new terminal, start minikube dashboard there, and then switch back to the main terminal.

4.1. Launch the Kubernetes Dashboard at any point via the dashboard command as shown below: “minikube dashboard”



```
soi-sddo@sddo-vm:~$ minikube dashboard
🤔  Verifying dashboard health ...
🚀  Launching proxy ...
🤔  Verifying proxy health ...
🎉  Opening http://127.0.0.1:37063/api/v1/namespaces/kubernetes-dashboard/services/http:kubernete
s-dashboard:/proxy/ in your default browser...
```

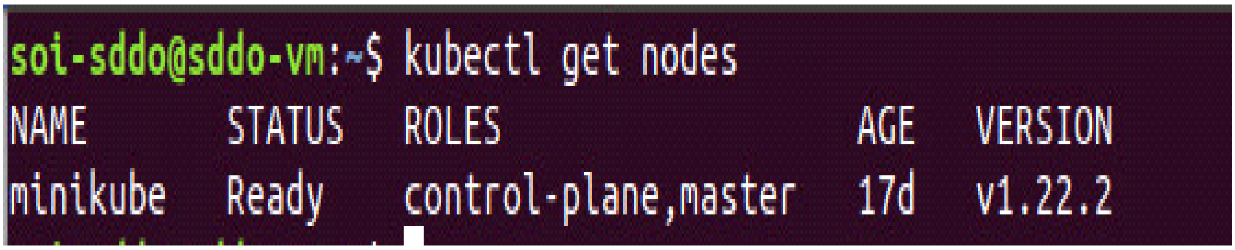
4.2. Click on the Node link and you will see that information:



Nodes

	Name	Labels	Ready	CPU requests (cores)	CPU limits (cores)	Memory requests (bytes)
●	minikube	beta.kubernetes.io/arch: amd64 beta.kubernetes.io/os: linux kubernetes.io/arch: amd64 Show all	True	750.00m (37.50%)	0.00m (0.00%)	170.00Mi (2.14%)

4.3. The above node information can also be obtained by using the kubectl CLI to get the list of nodes “kubectl get nodes” on a new terminal.



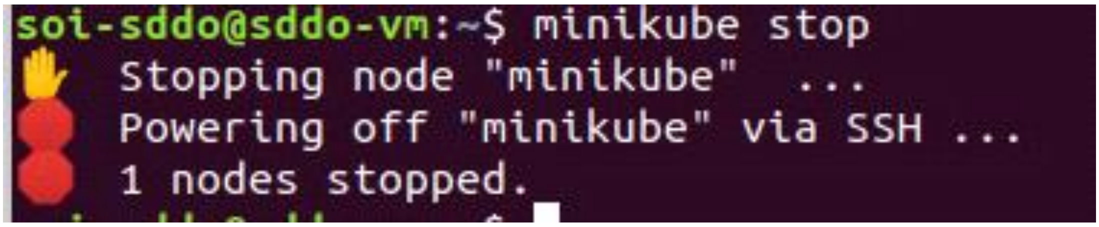
```
soi-sddo@sddo-vm:~$ kubectl get nodes
NAME       STATUS   ROLES                  AGE   VERSION
minikube   Ready    control-plane,master   17d   v1.22.2
```

Now we have only one node, and we can see that its status is ready (it is ready to accept applications for deployment).

Kubernetes will choose where to deploy our application based on Node available resources.

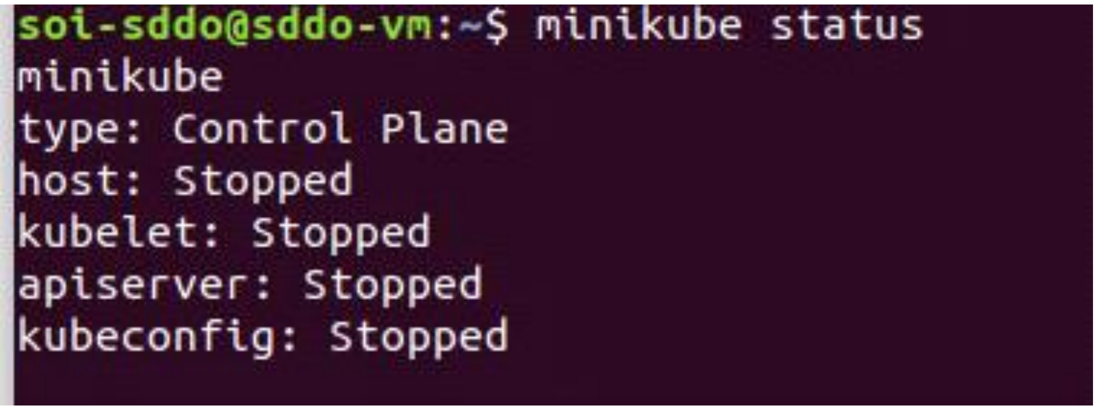
Stop the Kubernetes Cluster

5.1. Run the below command to stop the Kubernetes cluster using command “minikube stop”



```
soi-sddo@sddo-vm:~$ minikube stop
✋  Stopping node "minikube"  ...
🛑  Powering off "minikube" via SSH ...
🛑  1 nodes stopped.
```

5.2. Check the status of cluster using minikube command “minikube status”



```
soi-sddo@sddo-vm:~$ minikube status
minikube
type: Control Plane
host: Stopped
kubelet: Stopped
apiserver: Stopped
kubeconfig: Stopped
```

Part 2: Kubectl Commands

This LAB exercise is to practice the kubectl commands to work with Kubernetes deployment

Please refer to this kubectl cheat sheet for details of the various kubectl commands and options:
Ref: https://phoenixnap.com/kb/kubectl-commands-cheat-sheet

kubectl Cheat Sheet.pdf

Time to Complete

Approximately 30 Minutes

What You Need
Kubernetes Cluster should be running. If not start the cluster using the command “minikube start”

Kubectl Commands

1. Open a terminal as dockeradm.
2. Check the Kubernetes cluster status using the “**minikube status**” command.
3. If the cluster is not running, start the cluster using command “**minikube start**”.
4. Show merged kube config settings using the command “**kubectl config view**”.

Deploy first app
We need to provide the deployment name and app image location (include the full repository url for images hosted outside Docker hub).

5.1 Start a single instance of nginx using the command “**kubectl create deployment nginx --image=nginx**”.

Great! You just deployed your first application by creating a deployment. This performed a few things for you:

- searched for a suitable node where an instance of the application could be run (we have only 1 available node)
- scheduled the application to run on that Node
- configured the cluster to reschedule the instance on a new Node when needed

6. Get the POD documents using the command “**kubectl explain pods**” for pod manifests.

7. View and find resources using below commands.

Pods that are running inside Kubernetes are running on a private, isolated network. By default they are visible from other pods and services within the same kubernetes cluster, but not outside that network. When we use kubectl, we're interacting through an API endpoint to communicate with our application.

Commands	Screenshot of resources
# List all services in the namespaces **kubectl get services**	

# List all pods in all namespaces **kubectl get pods --all-namespaces**	
# List all pods in the namespace, with more details **kubectl get pods -o wide**	
#List a particular deployment **kubectl get deployment nginx**	
# Describe commands with verbose output **kubectl describe pods nginx**	
# Retrieve nginx logs **kubectl logs <nginx pods>**	

8. Print the supported versions of API on the cluster using the command: **kubectl api-versions**

9. Displays the cluster Info using the command:
kubectl cluster-info

10. Display the current context of the cluster using the command :
kubectl config current-context

11. Create new Pods that send a message in stdout.

11.1. Create a directory using the command: **mkdir pods**

11.2. vi ~/pods/01_pods.yaml

```
apiVersion: v1
kind: Pod
metadata:
 name: busybox-logs
spec:
  containers:
  - name: busybox
    image: busybox
    command: ["/bin/sh"]
    args: ["-c", "echo \"$(date) - INFO - My first logs output on
$(hostname)\""]
#   restartPolicy: Never
```

Create the resource based on the previous yaml file definition.

```
kubectl create -f ~/data/pods/01_pods.yaml
```

Get the logs of the busybox-logs Pod created previously.

```
kubectl logs busybox-logs
```

--End of Lab Exercise --

Those documentations can help you to go further in this topic :

- Kubernetes official HYPERLINK "https://kubernetes.io/docs/reference/kubectl/cheatsheet/"cheat sheet documentation
- Kubectl official Reference documentation
- Kubernetes official documentation HYPERLINK "https://kubernetes.io/docs/concepts/workloads/pods/pod-overview/"pod overview
- Kubernetes official documentation on HYPERLINK "https://kubernetes.io/docs/concepts/overview/object-management-kubectl/overview/"object management
- Kubernetes official documentation on HYPERLINK "https://kubernetes.io/docs/tasks/access-application-cluster/list-all-running-container-images/"list pods
- Kubernetes official documentation on HYPERLINK "https://kubernetes.io/docs/tasks/debug-application-cluster/debug-application-introspection/#using-kubectl-describe-pod-to-fetch-details-about-pods"introspection and debugging
- Kubernetes official documentation on HYPERLINK "https://kubernetes.io/docs/tasks/debug-application-cluster/get-shell-running-container/"getting a shell to a running container
- Kubernetes official documentation on HYPERLINK "https://kubernetes.io/docs/concepts/cluster-administration/manage-deployment/"resources management