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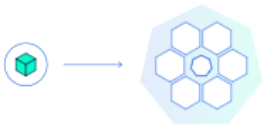
Submission Date: 20/05/2024

KUBERNETES BASICS LAB 4

Kubernetes Basics Modules

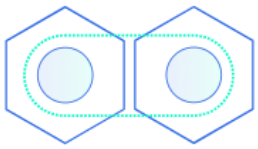
1. Create a Kubernetes cluster



2. Deploy an app

3. Explore your app

4. Expose your app publicly



5. Scale up your app

6. Update your app

Create Kubernetes Cluster

```
Windows PowerShell
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PS C:\WINDOWS\system32> docker context use default
>>
default
Current context is now "default"
PS C:\WINDOWS\system32> docker context ls
>>
NAME                TYPE                DESCRIPTION                               DOCKER ENDPOINT                         KUBERNETES ENDPOINT   ORCHESTRATOR
default *           moby                Current DOCKER_HOST based configuration   npipe:////./pipe/docker_engine
desktop-linux       moby                Docker Desktop                            npipe:////./pipe/dockerDesktopLinuxEngine
PS C:\WINDOWS\system32> minikube start --driver=docker
>>
* minikube v1.33.1 on Microsoft Windows 11 Pro 10.0.22000.2538 Build 22000.2538
* Using the docker driver based on user configuration
* Using Docker Desktop driver with root privileges
* Starting "minikube" primary control-plane node in "minikube" cluster
* Pulling base image v0.0.44 ...
* Downloading Kubernetes v1.30.0 preload ...
    > index.docker.io/kicbase/sta...:  481.58 MiB / 481.58 MiB  100.00% 7.97 Mi
    > preloaded-images-k8s-v18-v1...:  342.90 MiB / 342.90 MiB  100.00% 4.97 Mi
```

```
PS C:\WINDOWS\system32> curl.exe -LO "https://dl.k8s.io/release/v1.30.0/bin/windows/amd64/kubectl.exe"
>>
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100   138  100   138    0     0    399      0 --:--:-- --:--:-- --:--:--   401
 75 50.3M   75 38.0M    0     0   827k      0  0:01:02  0:00:47  0:00:15  250k
```

```
Administrator: Windows PowerShell
PS C:\WINDOWS\system32> curl.exe -LO "https://dl.k8s.io/release/v1.30.0/bin/windows/amd64/kubectl.exe"
>>
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100   138  100   138    0     0    399      0 --:--:-- --:--:-- --:--:--   401
100 50.3M  100 50.3M    0     0   551k      0  0:01:33  0:01:33 --:--:--  567k
PS C:\WINDOWS\system32> curl.exe -LO "https://dl.k8s.io/v1.30.0/bin/windows/amd64/kubectl.exe.sha256"
>>
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100   138  100   138    0     0    367      0 --:--:-- --:--:-- --:--:--   368
100    64  100    64    0     0    104      0 --:--:-- --:--:-- --:--:--   104
PS C:\WINDOWS\system32> CertUtil -hashfile kubectl.exe SHA256
>> type kubectl.exe.sha256
>>
SHA256 hash of kubectl.exe:
e0e72bf37bf563fdea4a6070b07e2fbaa818aa02ed38c5d10d9ce146106cab70
CertUtil: -hashfile command completed successfully.
e0e72bf37bf563fdea4a6070b07e2fbaa818aa02ed38c5d10d9ce146106cab70
PS C:\WINDOWS\system32>
PS C:\WINDOWS\system32> $(Get-FileHash -Algorithm SHA256 .\kubectl.exe).Hash -eq $(Get-Content .\kubectl.exe.sha256)
>>
True
PS C:\WINDOWS\system32> move kubectl.exe C:\Windows\System32
>>
PS C:\WINDOWS\system32> kubectl version --client
>>
Client Version: v1.30.0
Kustomize Version: v5.0.4-0.20230601165947-6ce0bf390ce3
PS C:\WINDOWS\system32>
PS C:\WINDOWS\system32> mkdir ~/.kube
>>
mkdir : An item with the specified name C:\Users\OreOluwa\.kube already exists.
At line:1 char:1
+ mkdir ~/.kube
+ ~~~~~~~~~~~~~
    + CategoryInfo          : ResourceExists: (C:\Users\OreOluwa\.kube:String) [New-Item], IOException
    + FullyQualifiedErrorId : DirectoryExist,Microsoft.PowerShell.Commands.NewItemCommand

PS C:\WINDOWS\system32> kubectl cluster-info
>>
Kubernetes control plane is running at https://127.0.0.1:51475
CoreDNS is running at https://127.0.0.1:51475/api/v1/namespaces/kube-system/services/kube-dns:dns/proxy

To further debug and diagnose cluster problems, use 'kubectl cluster-info dump'.
PS C:\WINDOWS\system32> minikube start
>>
* minikube v1.33.1 on Microsoft Windows 11 Pro 10.0.22000.2538 Build 22000.2538
* Using the  driver based on existing profile

X Exiting due to DRV_UNSUPPORTED_OS: The driver '' is not supported on windows/amd64

PS C:\WINDOWS\system32>
```

Create Deployment

```
Administrator: Windows PowerShell
Windows PowerShell
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PS C:\WINDOWS\system32> curl.exe http://127.0.0.1:8001/version
>>
{
  "major": "1",
  "minor": "30",
  "gitVersion": "v1.30.0",
  "gitCommit": "7c48c2bd72b9bf5c44d21d7338cc7bea77d0ad2a",
  "gitTreeState": "clean",
  "buildDate": "2024-04-17T17:27:03Z",
  "goVersion": "go1.22.2",
  "compiler": "gc",
  "platform": "linux/amd64"
}
PS C:\WINDOWS\system32> kubectl get pods
>>
NAME                                  READY   STATUS    RESTARTS   AGE
kubernetes-bootcamp-644c5687f4-2sdr6   1/1     Running   0          7m39s
PS C:\WINDOWS\system32> kubectl logs kubernetes-bootcamp-644c5687f4-2sdr6
Kubernetes Bootcamp App Started At: 2024-05-27T12:02:02.110Z | Running On:  kubernetes-bootcamp-644c5687f4-2sdr6

PS C:\WINDOWS\system32> $POD_NAME=$(kubectl get pods -o go-template --template '{{range .items}}{{.metadata.name}}{{"\n"}}{{end}}')
>> echo Name of the Pod: $POD_NAME
>>
error: error parsing template {{range .items}}{{.metadata.name}}{{\n}}{{end}}, template: output:1: unexpected "\\" in command
Name
of
the                     $POD_NAME = kubectl get pods -o jsonpath="{.items[0].metadata.name}"
>> echo "Name of the Pod: $POD_NAME"
>> $POD_NAME = kubectl get pods -o jsonpath="{.items[0].metadata.name}"
>> echo "Name of the Pod: $POD_NAME"
>>
Name of the Pod: kubernetes-bootcamp-644c5687f4-2sdr6
Name of the Pod: kubernetes-bootcamp-644c5687f4-2sdr6
PS C:\WINDOWS\system32>
PS C:\WINDOWS\system32> curl.exe http://localhost:8001/api/v1/namespaces/default/pods/$POD_NAME/proxy/
>>
{
  "kind": "Status",
  "apiVersion": "v1",
  "metadata": {},
  "status": "Failure",
  "message": "error trying to reach service: dial tcp 10.244.0.5:80: connect: connection refused",
  "reason": "ServiceUnavailable",
  "code": 503
}
PS C:\WINDOWS\system32>
```
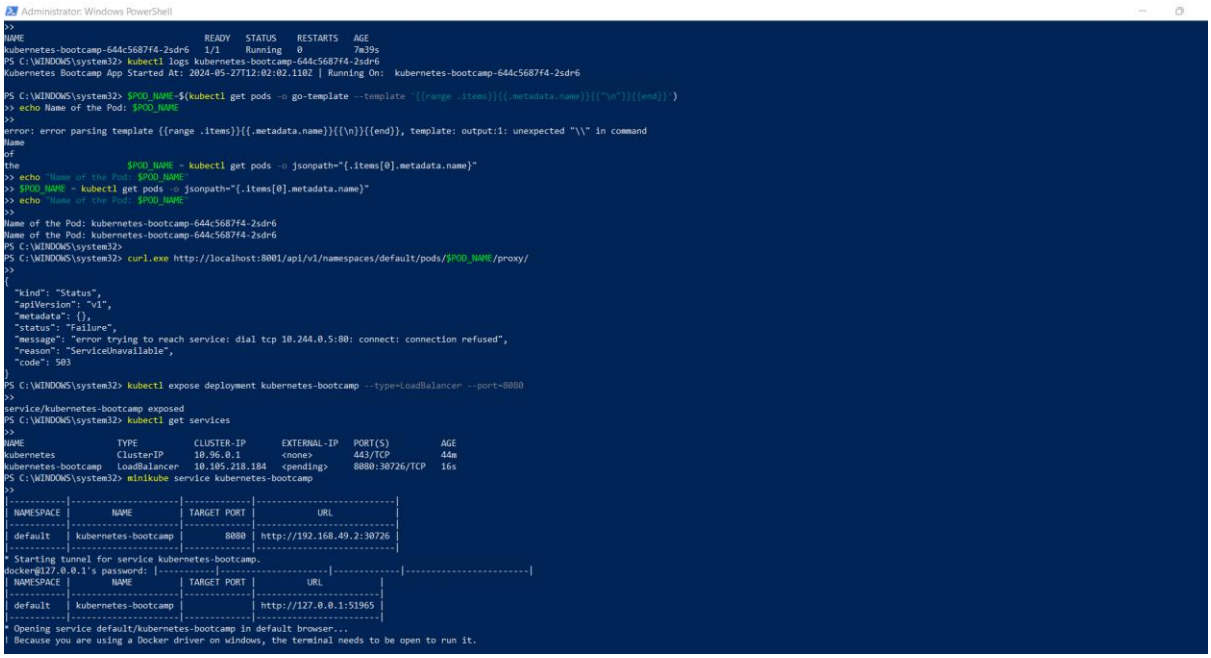
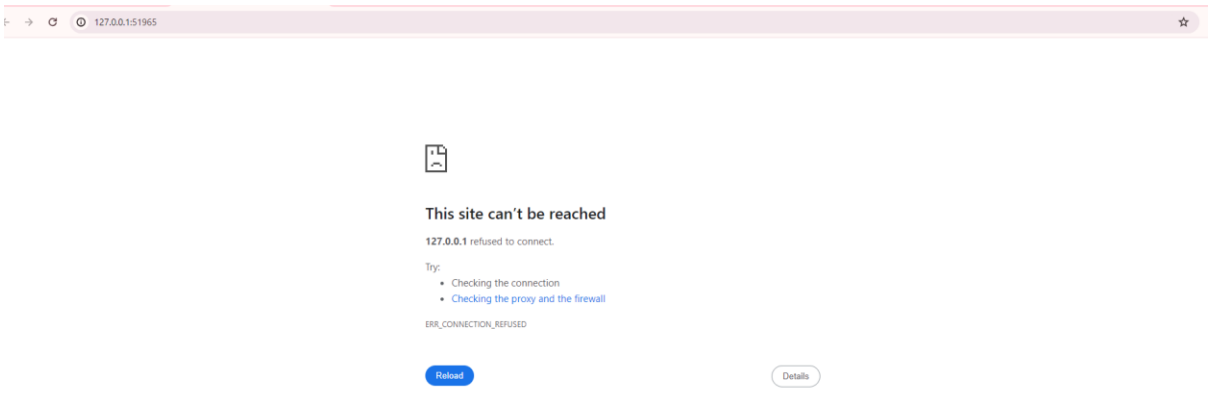

Viewing the application





Application exposed but connection refused

Kubernetes Deployment Report

Objective: The primary objective was to set up a Minikube environment on a Windows machine and deploy a simple Kubernetes application using `kubectl`. The application chosen for deployment was a basic "kubernetes-bootcamp" app.

Achievements:

1. **Environment Setup:**

- Successfully installed Minikube and Docker Desktop on a Windows machine.
- Initialized a Minikube cluster and verified its status.

2. **Deployment Configuration:**

- Created deployment and service YAML files for the `kubernetes-bootcamp` application.
- Applied the configuration files using `kubectl` commands.
- Verified the creation and running status of the pods and services.

3. **Service Exposure:**

- Used `minikube service` command to expose the service.
- Attempted to access the application via the provided URL.

Challenges Faced:

1. **File Permission Issues:**

- Encountered permissions error when attempting to write YAML files directly in `C:\Windows\System32`. This was resolved by switching to a user directory with appropriate write permissions.

2. **Service Access Problems:**

- Faced difficulties accessing the deployed service through `localhost` due to potential network or Docker configuration issues.
- Attempts to use `minikube tunnel` and `kubectl port-forward` to expose the service were made but resulted in connection errors.

3. **Performance Delays:**

- Experienced unusually long times for Docker commands, possibly indicating performance issues with the Docker service or system resources.

4. **Network Configuration:**

- Minikube and Docker networking presented challenges in ensuring proper routing and exposure of services.

Conclusion: The project successfully demonstrated setting up a Kubernetes environment using Minikube and deploying an application. However, there were significant challenges, particularly related to file permissions and network configuration, which hindered seamless access to the deployed application. Further troubleshooting and optimization of the Docker and Minikube network settings would be required to fully resolve these issues.