

BCDV

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Student Name: Harsh Bhavsar  
Student ID: 101440339

Term: Winter 2024

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BCDV 4032 – Building scalable blockchain applications

lab-2

Section 1 – Full-stack Ethereum using Docker containers

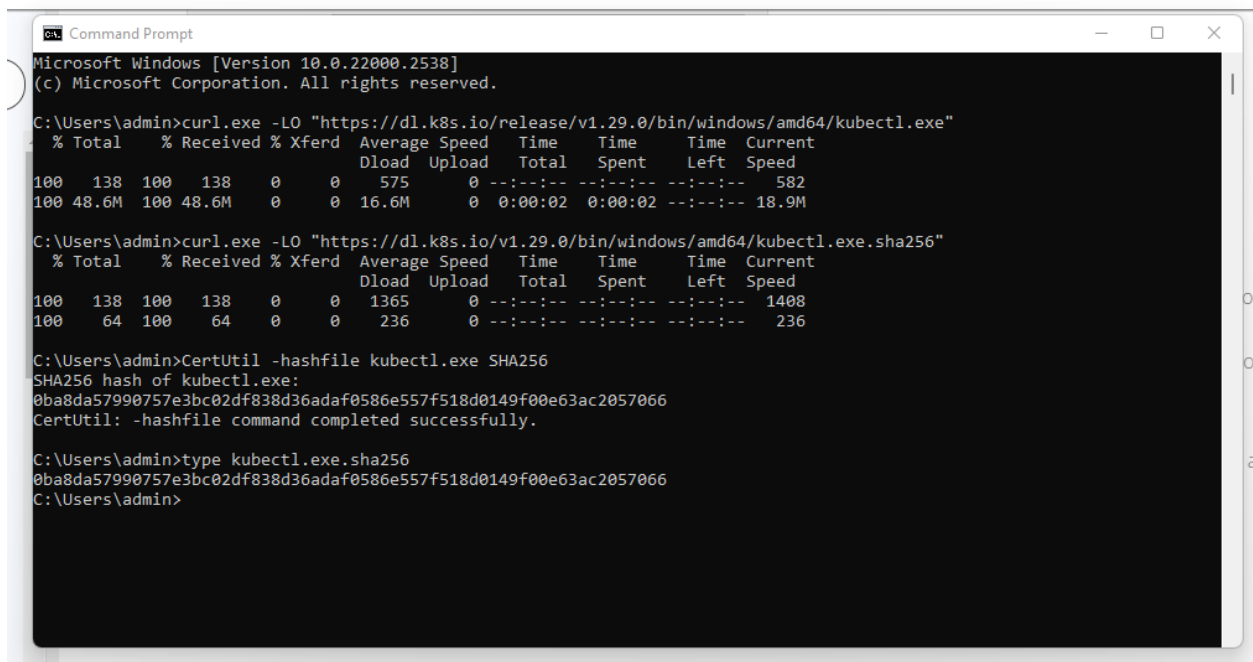
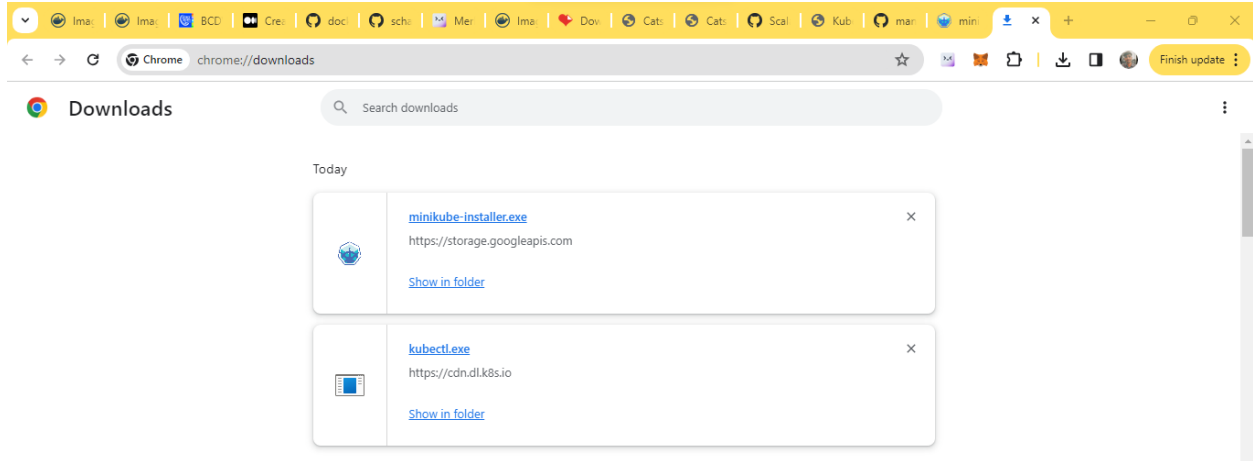
Video: in the lab-2 folder

Section-2- – Kubernetes and Minikube Installation Screenshots

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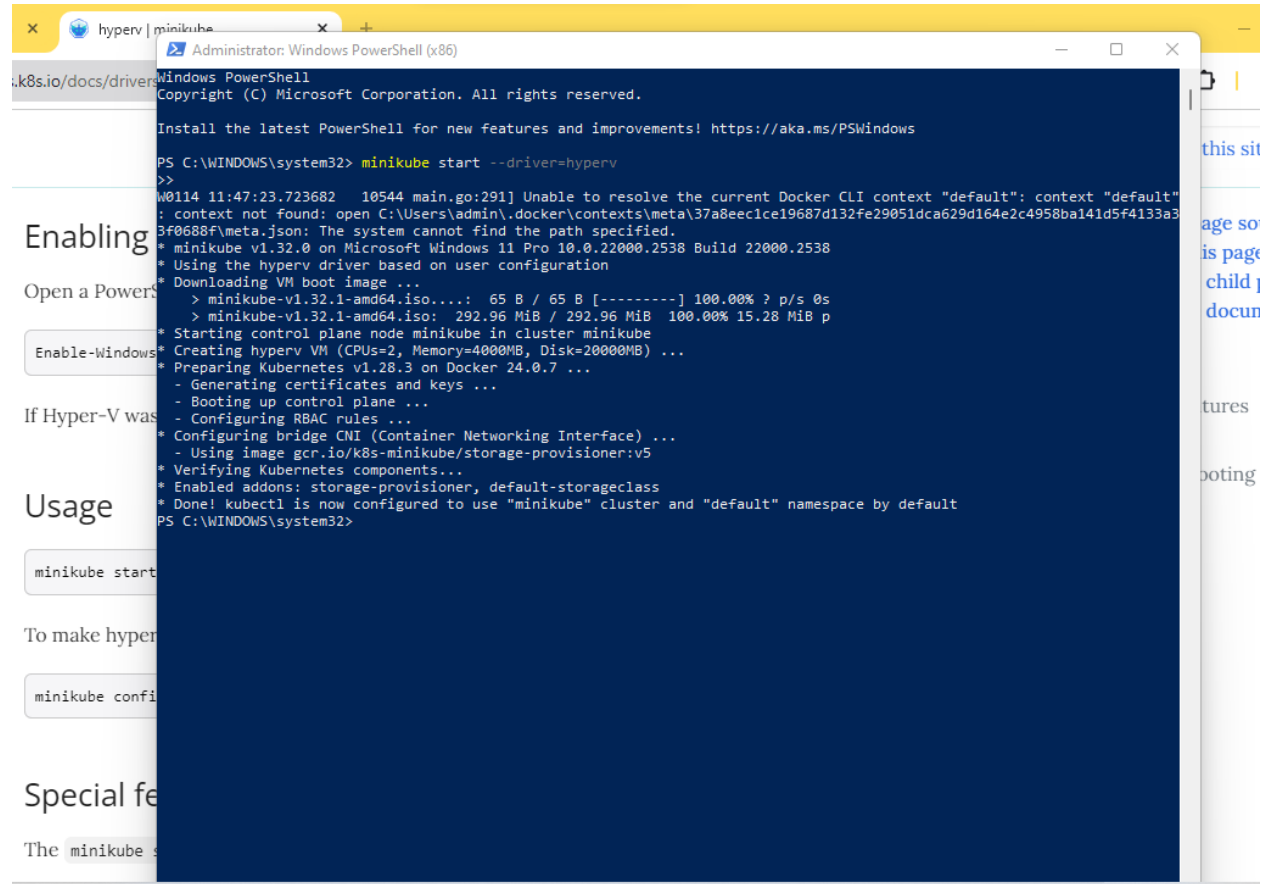
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```
Administrator: Windows PowerShell (x86)
Windows PowerShell
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Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\WINDOWS\system32> minikube start --driver=hyperv
>>
W0114 11:47:23.723682 10544 main.go:291] Unable to resolve the current Docker CLI context "default": context "default"
: context not found: open C:\Users\admin\.docker\contexts\meta\37a8eec1ce19687d132fe29051dca629d164e2c4958ba141d5f4133a3
3f0688f\meta.json: The system cannot find the path specified.
* minikube v1.32.0 on Microsoft Windows 11 Pro 10.0.22000.2538 Buildl 22000.2538
* Using the hyperv driver based on user configuration
* Downloading VM boot image ...
  > minikube-v1.32.1-amd64.iso....: 65 B / 65 B [-----] 100.00% ? p/s 0s
  > minikube-v1.32.1-amd64.iso: 292.96 MiB / 292.96 MiB 100.00% 15.28 MiB p
* Starting control plane node minikube in cluster minikube
* Creating hyperv VM (CPUs=2, Memory=4000MB, Disk=20000MB) ...
* Preparing Kubernetes v1.28.3 on Docker 24.0.7 ...
  - Generating certificates and keys ...
  - Booting up control plane ...
  - Configuring RBAC rules ...
* Configuring bridge CNI (Container Networking Interface) ...
  - Using image gcr.io/k8s-minikube/storage-provisioner:v5
* Verifying Kubernetes components...
* Enabled addons: storage-provisioner, default-storageclass
* Done! kubectl is now configured to use "minikube" cluster and "default" namespace by default
PS C:\WINDOWS\system32>
```

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PS C:\WINDOWS\system32> minikube start --driver=hyperv
>>
W0114 11:47:23.723682 10544 main.go:291] Unable to resolve the current Docker CLI context "default": context "default"
not found: open C:\Users\admin\.docker\contexts\meta\37a8eec1ce19687d132fe29051dca629d164e2c4958ba141d5f4133a3
3f0688f\meta.json: The system cannot find the path specified.
* minikube v1.32.0 on Microsoft Windows 11 Pro 10.0.22000.2538 Build 22000.2538
* Using the hyperv driver based on user configuration
* Downloading VM boot image ...
  > minikube-v1.32.1-amd64.iso....: 65 B / 65 B [-----] 100.00% ? p/s 0s
  > minikube-v1.32.1-amd64.iso: 292.96 MiB / 292.96 MiB 100.00% 15.28 MiB p
* Starting control plane node minikube in cluster minikube
* Creating hyperv VM (CPUs=2, Memory=4000MB, Disk=20000MB) ...
* Preparing Kubernetes v1.28.3 on Docker 24.0.7 ...
  - Generating certificates and keys ...
  - Booting up control plane ...
  - Configuring RBAC rules ...
* Configuring bridge CNI (Container Networking Interface) ...
  - Using image gcr.io/k8s-minikube/storage-provisioner:v5
* Verifying Kubernetes components...
* Enabled addons: storage-provisioner, default-storageclass
* Done! kubectl is now configured to use "minikube" cluster and "default" namespace by default
PS C:\WINDOWS\system32> minikube config set driver hyperv
>>
W0114 11:51:47.308168 2144 main.go:291] Unable to resolve the current Docker CLI context "default": context "default"
not found: open C:\Users\admin\.docker\contexts\meta\37a8eec1ce19687d132fe29051dca629d164e2c4958ba141d5f4133a3
3f0688f\meta.json: The system cannot find the path specified.
! These changes will take effect upon a minikube delete and then a minikube start
PS C:\WINDOWS\system32> kubectl get po -A
>>
NAMESPACE   NAME                                READY   STATUS    RESTARTS   AGE
kube-system  coredns-5dd5756b68-hzfhc           1/1     Running   0           93s
kube-system  etcd-minikube                       1/1     Running   0           2m
kube-system  kube-apiserver-minikube             1/1     Running   0          105s
kube-system  kube-controller-manager-minikube    1/1     Running   1 (116s ago) 118s
kube-system  kube-proxy-jg6mz                   1/1     Running   0           93s
kube-system  kube-scheduler-minikube             1/1     Running   0          114s
kube-system  storage-provisioner                 1/1     Running   0           99s
PS C:\WINDOWS\system32>
```

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```
ge_start minikube
Administrator: Windows PowerShell (x86)
/ ! These changes will take effect upon a minikube delete and then a minikube start
PS C:\WINDOWS\system32> kubectl get po -A
>>
NAMESPACE      NAME                                READY   STATUS    RESTARTS   AGE
kube-system     coredns-5dd5756b68-hzfhc           1/1     Running   0           93s
kube-system     etcd-minikube                       1/1     Running   0           2m
kube-system     kube-apiserver-minikube             1/1     Running   0           105s
kube-system     kube-controller-manager-minikube    1/1     Running   1 (116s ago) 118s
kube-system     kube-proxy-jg6mz                   1/1     Running   0           93s
kube-system     kube-scheduler-minikube             1/1     Running   0           114s
kube-system     storage-provisioner                 1/1     Running   0           99s
PS C:\WINDOWS\system32> minikube kubectl -- get po -A
>>
W0114 11:52:56.256939 6276 main.go:291] Unable to resolve the current Docker CLI context "default": context "default"
: context not found: open C:\Users\admin\.docker\contexts\meta\37a8eec1ce19687d132fe29051dca629d164e2c4958ba141d5f4133a3
3f0688f\meta.json: The system cannot find the path specified.
> kubectl.exe.sha256: 64 B / 64 B [-----] 100.00% ? p/s 0s
> kubectl.exe: 48.25 MiB / 48.25 MiB [-----] 100.00% 7.80 MiB p/s 6.4s
NAMESPACE      NAME                                READY   STATUS    RESTARTS   AGE
kube-system     coredns-5dd5756b68-hzfhc           1/1     Running   0           2m16s
kube-system     etcd-minikube                       1/1     Running   0           2m43s
kube-system     kube-apiserver-minikube             1/1     Running   0           2m28s
kube-system     kube-controller-manager-minikube    1/1     Running   1 (2m39s ago) 2m41s
kube-system     kube-proxy-jg6mz                   1/1     Running   0           2m16s
kube-system     kube-scheduler-minikube             1/1     Running   0           2m37s
kube-system     storage-provisioner                 1/1     Running   0           2m22s
PS C:\WINDOWS\system32>
```

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```
Administrator: Windows PowerShell (x86)
PS C:\WINDOWS\system32> kubectl version
Client Version: v1.28.2
Kustomize Version: v5.0.4-0.20230601165947-6ce0bf390ce3
Server Version: v1.28.3
PS C:\WINDOWS\system32> kubectl cluster-info
Kubernetes control plane is running at https://172.28.28.87:8443
CoreDNS is running at https://172.28.28.87:8443/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> kubectl get po -A
NAMESPACE      NAME                                READY   STATUS    RESTARTS   AGE
kube-system    coredns-5dd5756b68-hzfhc          1/1     Running   0           5m14s
kube-system    etcd-minikube                     1/1     Running   0           5m41s
kube-system    kube-apiserver-minikube           1/1     Running   0           5m26s
kube-system    kube-controller-manager-minikube  1/1     Running   1 (5m37s ago) 5m39s
kube-system    kube-proxy-jg6mz                  1/1     Running   0           5m14s
kube-system    kube-scheduler-minikube           1/1     Running   0           5m35s
kube-system    storage-provisioner               1/1     Running   0           5m20s
PS C:\WINDOWS\system32>
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```
minikube start | minikube
BCDV_4032_101504708/1ab_02
Administrator: Windows PowerShell (x86)
Server Version: v1.28.3
PS C:\WINDOWS\system32> kubectl cluster-info
Kubernetes control plane is running at https://172.28.28.87:8443
CoreDNS is running at https://172.28.28.87:8443/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> kubectl get po -A
NAMESPACE   NAME                                READY   STATUS    RESTARTS   AGE
kube-system  coredns-5dd5756b68-hzfhc           1/1     Running   0           5m14s
kube-system  etcd-minikube                      1/1     Running   0           5m41s
kube-system  kube-apiserver-minikube            1/1     Running   0           5m26s
kube-system  kube-controller-manager-minikube   1/1     Running   1 (5m37s ago) 5m39s
kube-system  kube-proxy-jg6mz                  1/1     Running   0           5m14s
kube-system  kube-scheduler-minikube            1/1     Running   0           5m35s
kube-system  storage-provisioner                1/1     Running   0           5m20s
PS C:\WINDOWS\system32> minikube dashboard
W0114 11:57:12.411675    7288 main.go:291] Unable to resolve the current Docker CLI context "default": context "default"
: context not found: open C:\Users\admin\.docker\contexts\meta\37a8eec1ce19687d132fe29051dca629d164e2c4958ba141d5f4133a3
3f0688f\meta.json: The system cannot find the path specified.
* Enabling dashboard ...
  - Using image docker.io/kubernetesui/metrics-scraper:v1.0.8
  - Using image docker.io/kubernetesui/dashboard:v2.7.0
* Some dashboard features require the metrics-server addon. To enable all features please run:

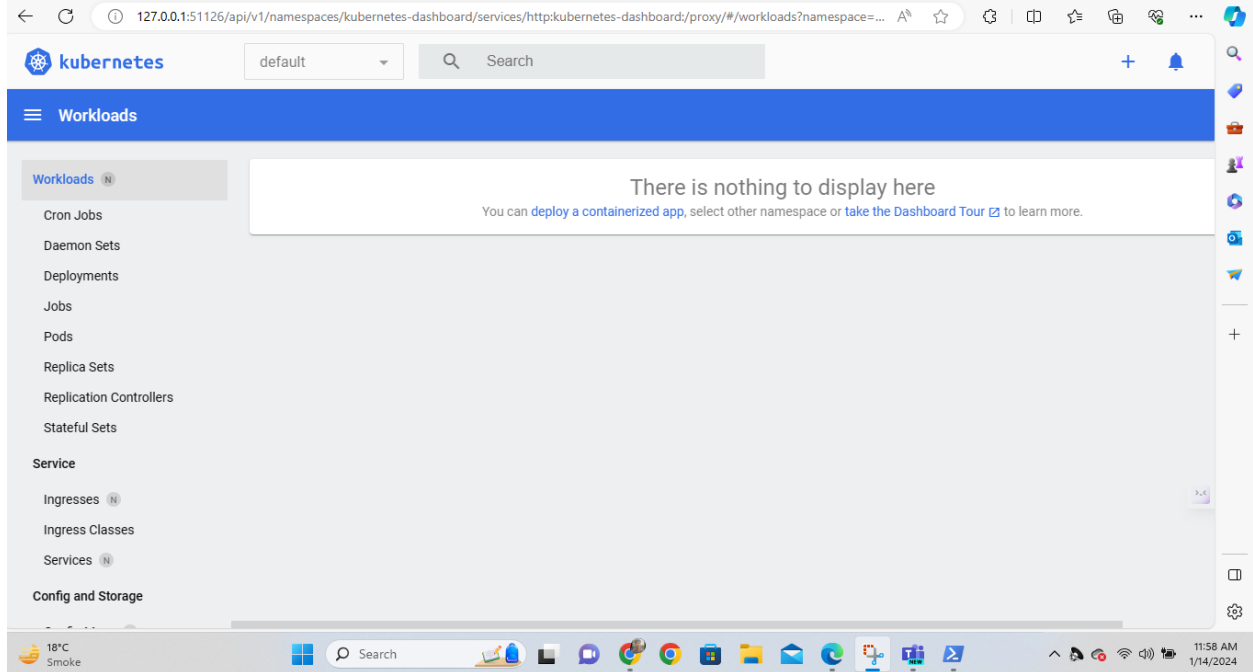
    minikube addons enable metrics-server

* Verifying dashboard health ...
* Launching proxy ...
* Verifying proxy health ...
* Opening http://127.0.0.1:51126/api/v1/namespaces/kubernetes-dashboard/services/http:kubernetes-dashboard:/proxy/ in yo
ur default browser...
```

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```
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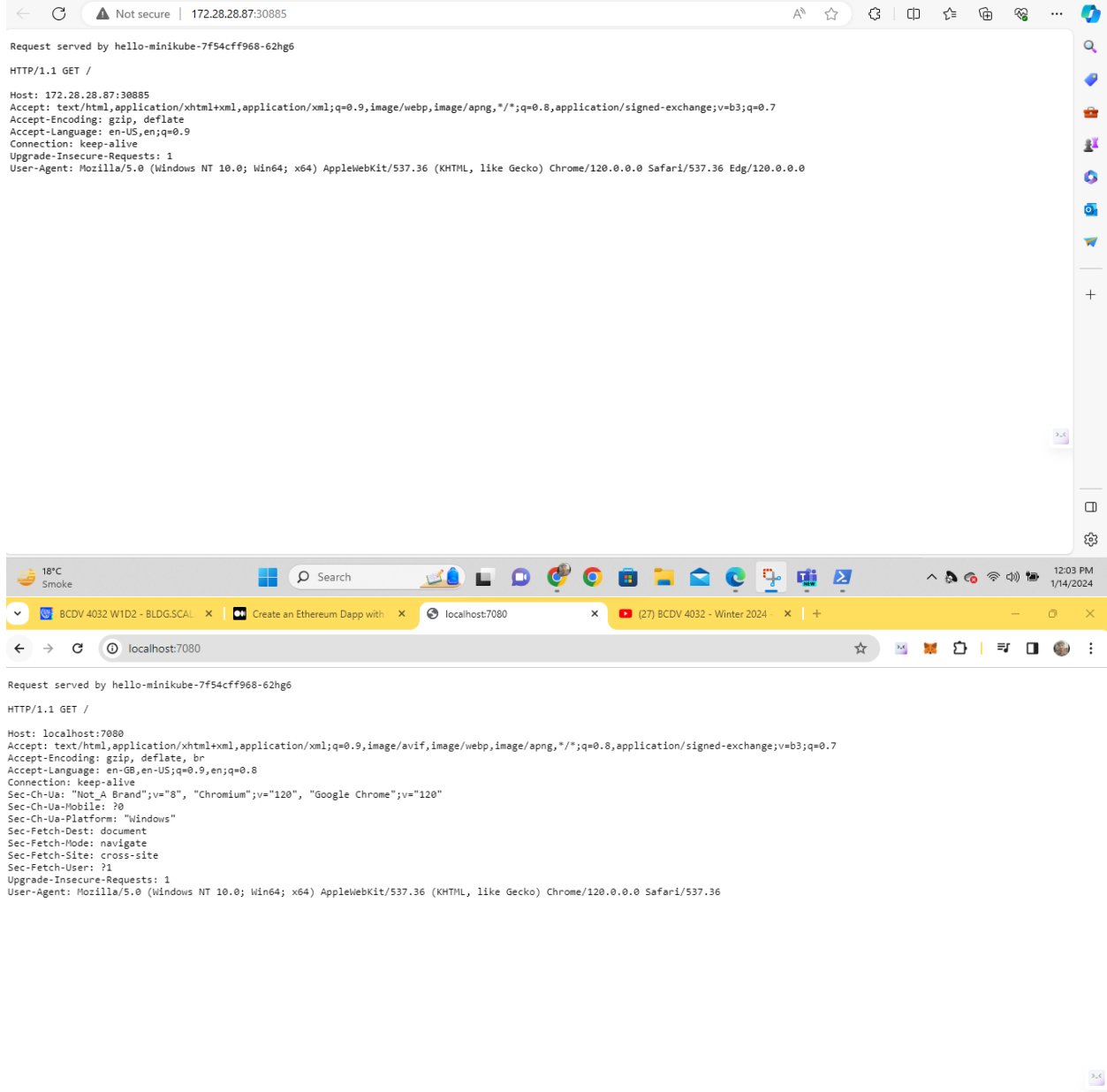
H: Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\WINDOWS\system32> kubectl create deployment hello-minikube --image=kicbase/echo-server:1.0
deployment.apps/hello-minikube created
PS C:\WINDOWS\system32> kubectl expose deployment hello-minikube --type=NodePort --port=8080
service/hello-minikube exposed
PS C:\WINDOWS\system32> kubectl get services hello-minikube
>>
NAME                TYPE        CLUSTER-IP    EXTERNAL-IP    PORT(S)          AGE
hello-minikube      NodePort    10.104.184.219 <none>         8080:30885/TCP   14s
PS C:\WINDOWS\system32> minikube service hello-minikube
>>
W0114 12:02:43.981530 2884 main.go:291] Unable to resolve the current Docker CLI context "default": context "default"
: context not found: open C:\Users\admin\.docker\contexts\meta\37a8eec1ce19687d132fe29051dca629d164e2c4958ba141d5f4133a3
3f0688f\meta.json: The system cannot find the path specified.
-----|-----|-----|-----|
| NAMESPACE | NAME       | TARGET PORT | URL               |
-----|-----|-----|-----|
| default   | hello-minikube | 8080        | http://172.28.28.87:30885 |
-----|-----|-----|-----|
* Opening service default/hello-minikube in default browser...
PS C:\WINDOWS\system32>
```

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PS C:\WINDOWS\system32> minikube service hello-minikube
>>
W0114 12:31:54.881889 12932 main.go:291] Unable to resolve the current Docker CLI context "default":
context "default": context not found: open C:\Users\admin\.docker\contexts\meta\37a8eec1ce19687d132fe
29051dca629d164e2c4958ba141d5f4133a33f0688f\meta.json: The system cannot find the path specified.
-----|-----|-----|-----|
| NAMESPACE | NAME       | TARGET PORT | URL                |
|-----|-----|-----|-----|
| default   | hello-minikube | 8080        | http://172.28.28.87:30885 |
|-----|-----|-----|-----|
* Opening service default/hello-minikube in default browser...
PS C:\WINDOWS\system32> kubectl port-forward service/hello-minikube 7080:8080
>>
Forwarding from 127.0.0.1:7080 -> 8080
Forwarding from [::1]:7080 -> 8080
Handling connection for 7080
Handling connection for 7080
```

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```
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PS C:\WINDOWS\system32> kubectl get po -A

```

| NAMESPACE | NAME | READY | STATUS | RESTARTS | AGE |
|----------------------|--|-------|---------|-------------|-----|
| default | hello-minikube-7f54cff968-62hg6 | 1/1 | Running | 0 | 56m |
| kube-system | coredns-5dd5756b68-hzfhc | 1/1 | Running | 0 | 67m |
| kube-system | etcd-minikube | 1/1 | Running | 0 | 67m |
| kube-system | kube-apiserver-minikube | 1/1 | Running | 0 | 67m |
| kube-system | kube-controller-manager-minikube | 1/1 | Running | 1 (67m ago) | 67m |
| kube-system | kube-proxy-jg6mz | 1/1 | Running | 0 | 67m |
| kube-system | kube-scheduler-minikube | 1/1 | Running | 0 | 67m |
| kube-system | storage-provisioner | 1/1 | Running | 1 (41m ago) | 67m |
| kubernetes-dashboard | dashboard-metrics-scraper-7fd5cb4ddc-5xdjh | 1/1 | Running | 0 | 61m |
| kubernetes-dashboard | kubernetes-dashboard-8694d4445c-gxxpt | 1/1 | Running | 0 | 61m |

```
PS C:\WINDOWS\system32>
```

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PS C:\WINDOWS\system32> kubectl get po -A
NAMESPACE          NAME                                READY   STATUS    RESTARTS   AGE
default            hello-minikube-7f54cff968-62hg6    1/1     Running   0           56m
kube-system        coredns-5dd5756b68-hzfhc          1/1     Running   0           67m
kube-system        etcd-minikube                      1/1     Running   0           67m
kube-system        kube-apiserver-minikube            1/1     Running   0           67m
kube-system        kube-controller-manager-minikube   1/1     Running   1 (67m ago)  67m
kube-system        kube-proxy-jg6mz                   1/1     Running   0           67m
kube-system        kube-scheduler-minikube            1/1     Running   0           67m
kube-system        storage-provisioner                 1/1     Running   1 (41m ago)  67m
kubernetes-dashboard dashboard-metrics-scraper-7fd5cb4ddc-5xdjh 1/1     Running   0           61m
kubernetes-dashboard kubernetes-dashboard-8694d4445c-gxxpt 1/1     Running   0           61m

PS C:\WINDOWS\system32> minikube stop
W0114 12:59:22.627214 12156 main.go:291] Unable to resolve the current Docker CLI context "default": context "default"
: context not found: open C:\Users\admin\.docker\contexts\meta\37a8eec1ce19687d132fe29051dca629d164e2c4958ba141d5f4133a3
3f0688f\meta.json: The system cannot find the path specified.
* Stopping node "minikube" ...
* Powering off "minikube" via SSH ...
* 1 node stopped.
PS C:\WINDOWS\system32>
```

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```
Administrator: Windows PowerShell (x86)
Windows PowerShell
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PS C:\WINDOWS\system32> kubectl get po -A
NAMESPACE      NAME                                READY   STATUS    RESTARTS   AGE
default        hello-minikube-7f54cff968-62hg6    1/1     Running   0           56m
kube-system    coredns-5dd5756b68-hzfhc          1/1     Running   0           67m
kube-system    etcd-minikube                      1/1     Running   0           67m
kube-system    kube-apiserver-minikube            1/1     Running   0           67m
kube-system    kube-controller-manager-minikube   1/1     Running   1 (67m ago)  67m
kube-system    kube-proxy-jg6mz                   1/1     Running   0           67m
kube-system    kube-scheduler-minikube            1/1     Running   0           67m
kube-system    storage-provisioner                1/1     Running   1 (41m ago)  67m
kubernetes-dashboard  dashboard-metrics-scraper-7fd5cb4ddc-5xdjh  1/1     Running   0           61m
kubernetes-dashboard  kubernetes-dashboard-8694d4445c-gxxpt       1/1     Running   0           61m
PS C:\WINDOWS\system32> minikube stop
W0114 12:59:22.627214 12156 main.go:291] Unable to resolve the current Docker CLI context "default": context "default"
: context not found: open C:\Users\admin\.docker\contexts\meta\37a8eec1ce19687d132fe29051dca629d164e2c4958ba141d5f4133a3
3f0688f\meta.json: The system cannot find the path specified.
* Stopping node "minikube" ...
* Powering off "minikube" via SSH ...
* 1 node stopped.
PS C:\WINDOWS\system32> kubectl get po -A
E0114 13:00:31.874294 4392 memcache.go:265] couldn't get current server API group list: Get "http://localhost:8080/ap
i?timeout=32s": dial tcp [::1]:8080: connectex: No connection could be made because the target machine actively refused
it.
E0114 13:00:34.209684 4392 memcache.go:265] couldn't get current server API group list: Get "http://localhost:8080/ap
i?timeout=32s": dial tcp [::1]:8080: connectex: No connection could be made because the target machine actively refused
it.
E0114 13:00:36.546908 4392 memcache.go:265] couldn't get current server API group list: Get "http://localhost:8080/ap
i?timeout=32s": dial tcp [::1]:8080: connectex: No connection could be made because the target machine actively refused
it.
E0114 13:00:38.862842 4392 memcache.go:265] couldn't get current server API group list: Get "http://localhost:8080/ap
i?timeout=32s": dial tcp [::1]:8080: connectex: No connection could be made because the target machine actively refused
it.
E0114 13:00:41.204504 4392 memcache.go:265] couldn't get current server API group list: Get "http://localhost:8080/ap
i?timeout=32s": dial tcp [::1]:8080: connectex: No connection could be made because the target machine actively refused
it.
Unable to connect to the server: dial tcp [::1]:8080: connectex: No connection could be made because the target machine
actively refused it.
PS C:\WINDOWS\system32>
```

Section 3 – Quiz

Q 1 – Understand what Kubernetes doesn't do from here (<https://kubernetes.io/docs/concepts/overview/>) and explain in your own words. Do not copy and paste from the website.

Ans – Based on the Kubernetes documentation, here are 10 key points about what Kubernetes doesn't do:

1. **Not a Traditional OS:** Kubernetes is not an operating system; it works on top of an OS.
2. **No Hardware Layer Management:** It does not manage the hardware layer.
3. **Doesn't Limit Types of Applications:** Kubernetes doesn't restrict the types of applications it supports.
4. **No Data Processing Workloads:** It doesn't deploy source code or handle data processing workloads directly.
5. **No Application-Level Services:** Kubernetes does not offer application-level services like middleware, databases, or cluster storage.
6. **Doesn't Dictate Logging/Monitoring Solutions:** It does not offer logging or monitoring solutions but can integrate with them.
7. **No Prescribing Deployment Methods:** Kubernetes does not prescribe deployment methods for applications.
8. **No CI/CD Workflow Management:** It does not manage continuous integration and deployment (CI/CD) workflows.
9. **Doesn't Provide Machine Configuration:** Kubernetes doesn't configure machines.

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10.No Limitation on Programming Languages: It doesn't limit the programming languages or frameworks you can use.

Q 2 – What other Orchestration tools are available other than Kubernetes?

Ans – Other orchestration tools available in addition to Kubernetes include:

- 1. Docker Swarm**
- 2. Apache Mesos**
- 3. OpenShift**
- 4. Nomad**
- 5. Rancher**