

Lab Report: Kubernetes

Student information

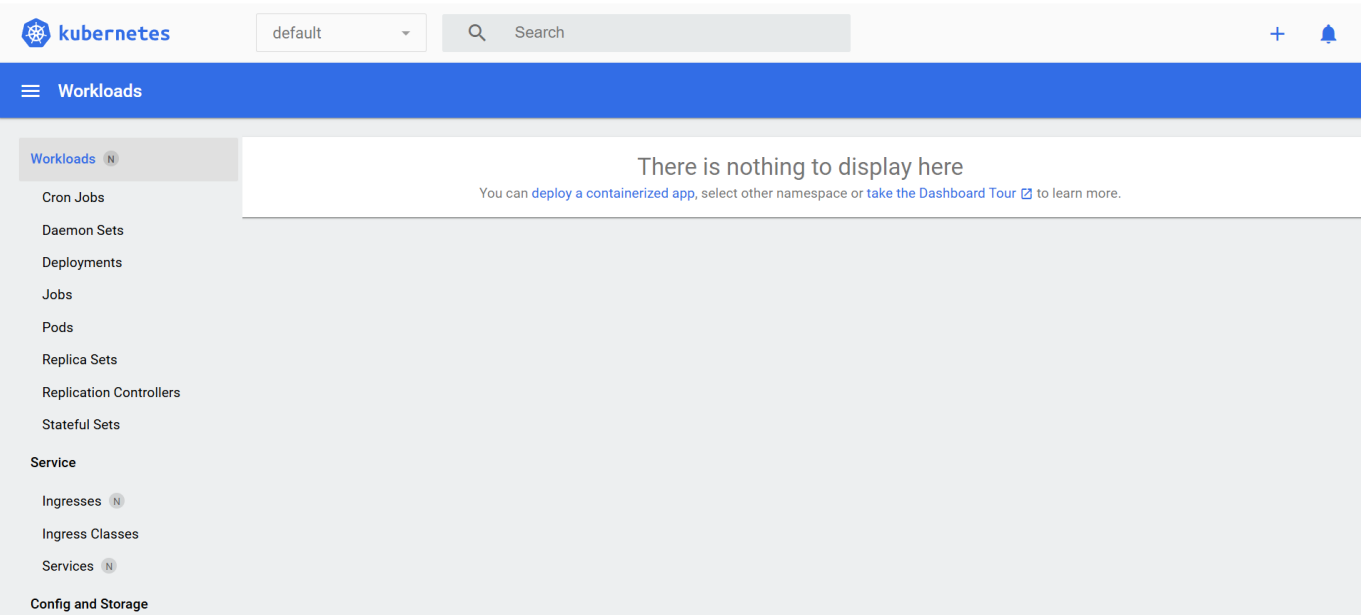
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Assignment description

Er werkt gewerkt met Kubernetes voor meerdere container op te zetten in een minikube cluster. Het meeste werk gebeurde via de command line en via .yaml bestanden. We hebben geleerd hoe je containers deployed en labeled. Ook hebben we gezien hoe je jobs en cronjobs kunt uitvoeren. Hoe je parameters kunt aanpassen via de Yaml of de command line. Op het einde werd een webserver van kubernetes online gezet. Het doel was om te leren werken met kubernetes en hier wat containers mee op te zetten.

Proof of work done

```
minikube v1.34.0 on Microsoft Windows 11 Home 10.0.22631.4541 Build 22631.4541
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 v0.0.45 ...
Downloading Kubernetes v1.31.0 preload ...
> preloaded-images-k8s-v18-v1...: 326.69 MiB / 326.69 MiB 100.00% 3.49 Mi
> gcr.io/k8s-minikube/kicbase...: 487.90 MiB / 487.90 MiB 100.00% 4.94 Mi
Creating docker container (CPUs=2, Memory=3500MB) ...
Failing to connect to https://registry.k8s.io/ from both inside the minikube container and host machine
To pull new external images, you may need to configure a proxy: https://minikube.sigs.k8s.io/docs/reference/networking/proxy/
Preparing Kubernetes v1.31.0 on Docker 27.2.0 ...
  Generating certificates and keys ...
  Booting up control plane ...
  Configuring RBAC rules ...
Configuring bridge CNI (Container Networking Interface) ...
Verifying Kubernetes components...
  Using image gcr.io/k8s-minikube/storage-provisioner:v5
Enabled addons: storage-provisioner, default-storageclass
Done! kubectrl is now configured to use "minikube" cluster and "default" namespace by default
PS C:\Users\Xander> minikube status
minikube
type: Control Plane
host: Running
kubelet: Running
apiserver: Running
kubeconfig: Configured
PS C:\Users\Xander>
```





The image shows a development environment with a VS Code editor and a terminal window. The VS Code editor displays a file named `04-kubernetes.md` with the following content:

```
1 # Cheat sheets and checklists
101 ## Labo 4 - Kubernetes
102
103 | Taak | Commando |
104 | Real time (zo goed als) service opvragen | while (1) { kubectl get all; sleep 1 } |
105 kubectl get deployments
106 kubectl get all
107 kubectl get nodes
108 kubectl get pods
109 kubectl create deployment hello-node --image=registry.k8s.io/e2e-test-images/agnhost:2.39 -- /agnhost netexec
110 --http-port=8080
111 minikube start
minikube dashboard
```

The terminal window shows the output of the commands:

```
PS C:\Users\Xander\mlops-2425-xvanderlinden> kubectl get events
NAME READY UP-TO-DATE AVAILABLE AGE
hello-node 1/1 1 1 4m44s
LAST SEEN TYPE REASON OBJECT MESSAGE
7m25s Normal Scheduled pod/hello-node-66d457cb86-k45gr Successfully assigned default/hello-node-66d457cb86-k45gr to minikube
7m25s Normal Pulled pod/hello-node-66d457cb86-k45gr Pulling image "registry.k8s.io/e2e-test-images/agnhost:2.39"
7m20s Normal Pulled pod/hello-node-66d457cb86-k45gr Successfully pulled image "registry.k8s.io/e2e-test-images/agnhost:2.39" in 5.439s (5.439s including waiting). Image size: 126872991 bytes.
7m19s Normal Created pod/hello-node-66d457cb86-k45gr Created container agnhost
7m19s Normal Started pod/hello-node-66d457cb86-k45gr Started container agnhost
7m26s Normal SuccessfulCreate replicaset/hello-node-66d457cb86 Created pod: hello-node-66d457cb86-k45gr
7m26s Normal ScalingReplicaSet deployment/hello-node Scaled up replica set hello-node-66d457cb86 to 1
PS C:\Users\Xander\mlops-2425-xvanderlinden> kubectl get pods
NAME READY STATUS RESTARTS AGE
hello-node-66d457cb86-k45gr 1/1 Running 0 7m35s
PS C:\Users\Xander\mlops-2425-xvanderlinden>
```

The terminal window also shows the output of the `minikube dashboard` command:

```
minikube dashboard
minikube service hello-node
minikube start
minikube dashboard
kubectl logs hello-node-66d457cb86-k45gr
```

The terminal window also shows the output of the `minikube service hello-node` command:

```
minikube service hello-node
Starting tunnel for service hello-node.
NAMESPACE NAME TARGET PORT URL
default hello-node http://127.0.0.1:57916
Opening service default/hello-node in default browser...
! Because you are using a Docker driver on windows, the terminal needs to be open to run it.
```

The screenshot shows a VS Code editor with a project named 'mlops-2425-xvanderlinden'. The Explorer pane on the left shows the project structure, including files like 'ml_workflow.ipynb', '.gitignore', 'cheat-sheet.md', and 'echo-allyml'. The main editor shows the 'echo-allyml' file, which contains a table of deployment and service details.

NAME	READY	UP-TO-DATE	AVAILABLE	AGE
deployment.apps/echo-all-deployment	2/3	3	2	2m13s
deployment.apps/echo-deployment	1/1	1	1	6m40s
deployment.apps/hello-node	1/1	1	1	31m

NAME	DESIRED	CURRENT	READY	AGE
replicaset.apps/echo-all-deployment-78cdcd9dbf	3	3	2	2m13s
replicaset.apps/echo-deployment-78cdcd9dbf	1	1	1	6m40s
replicaset.apps/hello-node-66d457cb86	1	1	1	31m

NAME	READY	STATUS	RESTARTS	AGE
pod/echo-all-deployment-78cdcd9dbf-5p76z	1/1	Running	0	2m14s
pod/echo-all-deployment-78cdcd9dbf-6d55c	1/1	Running	0	2s
pod/echo-all-deployment-78cdcd9dbf-nm4b5	1/1	Running	0	2m14s
pod/echo-deployment-78cdcd9dbf-9q6s7	1/1	Running	0	6m41s
pod/hello-node-66d457cb86-k45gr	1/1	Running	0	31m

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
service/echo-all-service	LoadBalancer	10.105.3.57	<pending>	8080:32204/TCP	2m14s
service/echo-service	NodePort	10.110.79.156	<none>	8080:31472/TCP	6m41s
service/hello-node	LoadBalancer	10.99.91.60	<pending>	8080:30213/TCP	16m
service/kubernetes	ClusterIP	10.96.0.1	<none>	443/TCP	22h

```
PS C:\Users\Xander\mlops-2425-xvanderlinden> for ($i = 1; $i -le 10; $i++) { curl http://127.0.0.1:59584/ }
>>

StatusCode      : 200
StatusDescription : OK
Content         : NOW: 2024-11-25 12:40:13.773902183 +0000 UTC m=+2794.521454199
RawContent      : HTTP/1.1 200 OK
                  Content-Length: 62
                  Content-Type: text/plain; charset=utf-8
                  Date: Mon, 25 Nov 2024 12:40:13 GMT

                  NOW: 2024-11-25 12:40:13.773902183 +0000 UTC m=+2794.521454199
Forms           : {}
Headers         : {[Content-Length, 62], [Content-Type, text/plain; charset=utf-8], [Date, Mon, 25 Nov 2024
                  12:40:13 GMT]}
Images          : {}
InputFields     : {}
Links           : {}
ParsedHtml      : mshtml.HTMLDocumentClass
RawContentLength : 62
```

```
10.244.0.1:46984 | GET /
10.244.0.1:46984 | GET /
PS C:\Users\Xander\mlops-2425-xvanderlinden> kubectl logs hello-node-66d457cb86-k45gr
I1125 11:53:39.392446      1 log.go:195] Started HTTP server on port 8080
I1125 11:53:39.392830      1 log.go:195] Started UDP server on port 8081
I1125 12:09:04.323097      1 log.go:195] GET /
I1125 12:09:04.397813      1 log.go:195] GET /
I1125 12:39:41.260163      1 log.go:195] GET /
I1125 12:39:41.333491      1 log.go:195] GET /
I1125 12:40:13.773864      1 log.go:195] GET /
I1125 12:40:14.122540      1 log.go:195] GET /
I1125 12:40:14.180488      1 log.go:195] GET /
I1125 12:40:14.233176      1 log.go:195] GET /
I1125 12:40:14.284948      1 log.go:195] GET /
I1125 12:40:14.336854      1 log.go:195] GET /
I1125 12:40:14.426800      1 log.go:195] GET /
I1125 12:40:14.505854      1 log.go:195] GET /
I1125 12:40:14.580111      1 log.go:195] GET /
I1125 12:40:14.660117      1 log.go:195] GET /
PS C:\Users\Xander\mlops-2425-xvanderlinden>
```

```

reports > 04-Kubernetes.md > # Lab Report: SUBJECT
1 # Lab Report: SUBJECT
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36 ## 4.4
37
38 - Select pods in the production environment
39 [kubectl get pods -l env=production]
40 - Select pods *not* in the production environment
41 [kubectl get pods -l 'env!=production'] ⚠ MD038/no-space-in-code: Spaces inside code span element
42 - Select pods in the development and acceptance environment (remark that logically, this is the same
43 as the previous question, but you need to formulate your selector query differently)
44 - Select pods with release version 2.0
45 - Select pods owned by the API-team with release version 2.0
46 - Delete all pods in the development environment

PROBLEMS 9 OUTPUT DEBUG CONSOLE TERMINAL PORTS GITLENS
PS C:\Users\Xander\mlOps-2425-xvanderlinden\resources\04-kubernetes\4.3> kubectl get pods -l env=production
NAME      READY   STATUS    RESTARTS   AGE
api-prod   1/1     Running   0           12m
db-prod    1/1     Running   0           12m
fe-prod    1/1     Running   0           12m
PS C:\Users\Xander\mlOps-2425-xvanderlinden\resources\04-kubernetes\4.3> kubectl get pods -l 'env!=production'
NAME                READY   STATUS    RESTARTS   AGE
api-acceptance      1/1     Running   0           16m
api-dev              1/1     Running   0           16m
db-acceptance        1/1     Running   0           16m
db-dev               1/1     Running   0           16m
echo-all-deployment-78cdcd9dbf-8zzqt  1/1     Running   0           52m
echo-all-deployment-78cdcd9dbf-j58fr  1/1     Running   0           52m
echo-all-deployment-78cdcd9dbf-nm4b5  1/1     Running   0           154m
echo-deployment-78cdcd9dbf-9q6s7      1/1     Running   0           159m
fe-acceptance        1/1     Running   0           16m
fe-dev               1/1     Running   0           16m
hello-node-66d457cb86-k45gr           1/1     Running   0           34m
PS C:\Users\Xander\mlOps-2425-xvanderlinden\resources\04-kubernetes\4.3>

```

```

assignments > 04-kubernetes.md > # Lab 4: Container orchestration with Kubernetes
1 # Lab 4: Container orchestration with Kubernetes
218 ## 4.4. Jobs
219 option to follow the logs.
220
221 If you want to run a job periodically, it's called a CronJob. Follow the tutorial [Running automated
222 tasks with CronJobs](https://kubernetes.io/docs/tasks/job/automated-tasks-with-cron-jobs/). The
223 necessary manifest file is available in the directory [../kubernetes/4.4](../kubernetes/4.4). Keep lab
224 notes!
225
226 ## 4.5. Deploy a multi-tier web application
227
228 Next up is a more complex example: a multi-tier web application. The application consists of three
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Reflection

Deze opdracht heeft mijn begrip van kubernetes vergroot. Dit gaat nuttig zijn voor de volgende labo's en op de werkvloer. Het was allemaal nog wat nieuw maar door de cheatsheet zal ik hopelijk de commando's onthouden voor verder gebruik.

4.4 vragen

- Select pods in the production environment `kubectl get pods -l env=production`
- Select pods *not* in the production environment `kubectl get pods -l 'env!=production'`
- Select pods in the development and acceptance environment (remark that logically, this is the same as the previous question, but you need to formulate your selector query differently) `kubectl get pods -l 'env in (development, acceptance)'`
- Select pods with release version 2.0 `kubectl get pods -l release_version=2.0`
- Select pods owned by the API-team with release version 2.0 `kubectl get pods -l team=api,release_version=2.0`
- Delete all pods in the development environment `kubectl delete pods -l env=development`
- What is the quickest way to launch the pods you just deleted? `kubectl apply -f 4.3/example-pods-with-labels.yml`

Resources

<https://kubernetes.io/docs/concepts/overview/working-with-objects/labels/>

<https://kubernetes.io/docs/concepts/configuration/overview/>