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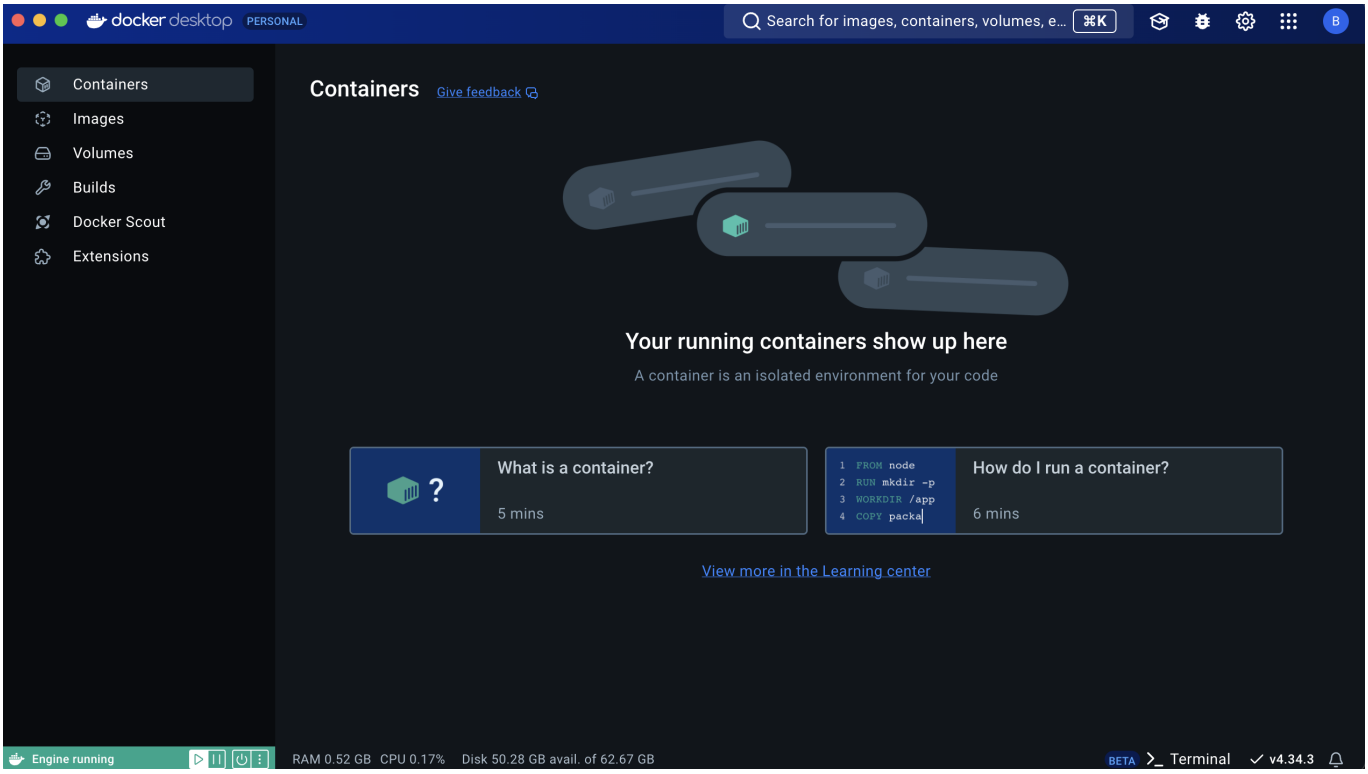
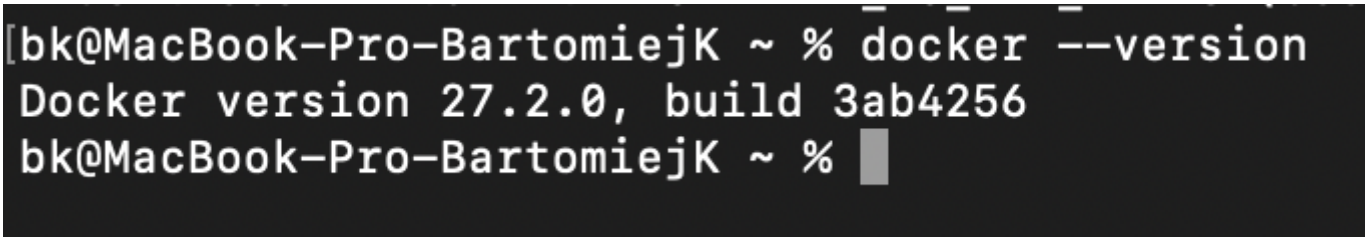
Prerequisites

Docker installation



Docker version



Kubernetes installation

```
bk@MacBook-Pro-BartomiejK ~ % brew install kubectl
==> Auto-updating Homebrew...
Adjust how often this is run with HOMEBREW_AUTO_UPDATE_SECS or disable with
HOMEBREW_NO_AUTO_UPDATE. Hide these hints with HOMEBREW_NO_ENV_HINTS (see `man brew`).
==> Auto-updated Homebrew!
Updated 2 taps (homebrew/core and homebrew/cask).
==> New Formulae
action-docs                distill-cli                kubetail                   markdown-oxide             sequoia-sq                 vipsdisp
ansible-builder            fcft                       langgraph-cli              minijinja-cli              sf                         wasi-libc
boring                     foot                       lbfgspp                    node@22                    sleek                      wasi-runtimes
carapace                   hawkeye                    libmsquic                  python-freethreading       surfer                     wasm-component-ld
clickhouse-sql-parser      icu4c@74                   libspelling@0.2            rip2                       termscp                    zizmor
dipc                       icu4c@76                   localai                    rust-script                tex-fmt                    zsh-system-clipboard
==> New Casks
adlock                     follow@alpha               font-mynaui-icons          langgraph-studio           singlebox                  yellowdot
claude                     follow@nightly             font-zpix                  lets                       sketchup
cocoapacketanalyzer        font-doto                  github-copilot-for-xcode   mailbird                   unraid-usb-creator-next
dockside                   font-faculty-glyphic       huggingchat                mailsteward                viz
follow                     font-greybeard             huly                       morisawa-desktop-manager   webkinz
==> Deleted Installed Formulae
icu4c ✘

You have 47 outdated formulae installed.

==> Downloading https://ghcr.io/v2/homebrew/core/kubernetes-cli/manifests/1.31.2
######################################################################################################################################################################## 100.0%
==> Fetching kubernetes-cli
==> Downloading https://ghcr.io/v2/homebrew/core/kubernetes-cli/blobs/sha256:96b8120ae14250531c3263f9af97b94e77f812b3966ba7ac7de83c4ce19c866c
######################################################################################################################################################################## 100.0%
==> Pouring kubernetes-cli--1.31.2.arm64_sequoia.bottle.tar.gz
==> Caveats
zsh completions have been installed to:
  /opt/homebrew/share/zsh/site-functions
==> Summary
🍺  /opt/homebrew/Cellar/kubernetes-cli/1.31.2: 237 files, 60.2MB
==> Running `brew cleanup kubernetes-cli`...
Disable this behaviour by setting HOMEBREW_NO_INSTALL_CLEANUP.
Hide these hints with HOMEBREW_NO_ENV_HINTS (see `man brew`).
bk@MacBook-Pro-BartomiejK ~ %
```

Kubernetes version

```
bk@MacBook-Pro-BartomiejK ~ % kubectl version --client
Client Version: v1.30.2
Kustomize Version: v5.0.4-0.20230601165947-6ce0bf390ce3
bk@MacBook-Pro-BartomiejK ~ %
```

Minikube

```
bk@MacBook-Pro-BartomiejK docker_files_section % minikube start

😄  minikube v1.34.0 na Darwin 15.1 (arm64)
✨  Automatycznie wybrano sterownik docker
📌  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...:  307.61 MiB / 307.61 MiB  100.00% 8.25 Mi
    > gcr.io/k8s-minikube/kicbase...:  441.45 MiB / 441.45 MiB  100.00% 5.25 Mi
🔥  Creating docker container (CPUs=2, Memory=7790MB) ...
🐳  Przygotowywanie Kubernetesa v1.31.0 na Docker 27.2.0...
    ▪ Generating certificates and keys ...
    ▪ Uruchamianie płaszczyzny kontrolnej ...
    ▪ Konfigurowanie zasad RBAC ...
🔗  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! kubectl is now configured to use "minikube" cluster and "default" namespace by default
bk@MacBook-Pro-BartomiejK docker_files_section %
```

```
bk@MacBook-Pro-BartomiejK docker_files_section % minikube kubectl -- get po -A

    > kubectl.sha256:  64 B / 64 B [------------------------] 100.00% ? p/s 0s
    > kubectl:  53.94 MiB / 53.94 MiB [-------------] 100.00% 9.09 MiB p/s 6.1s
NAMESPACE     NAME                               READY   STATUS    RESTARTS   AGE
kube-system   coredns-6f6b679f8f-grm2m           1/1     Running   0          78s
kube-system   etcd-minikube                      1/1     Running   0          83s
kube-system   kube-apiserver-minikube            1/1     Running   0          84s
kube-system   kube-controller-manager-minikube   1/1     Running   0          83s
kube-system   kube-proxy-8tnm9                   1/1     Running   0          78s
kube-system   kube-scheduler-minikube            1/1     Running   0          84s
kube-system   storage-provisioner                1/1     Running   0          82s
bk@MacBook-Pro-BartomiejK docker_files_section %
```

Assignments

Dockerize AWS-CLI

1. Create a Dockerfile with aws-cli, built from source files (using tar.gz file / make)

```
[+] Building 72.0s (9/9) FINISHED                                                          docker:desktop-linux
 => [internal] load build definition from Dockerfile                                                       0.0s
 => => transferring dockerfile: 627B                                                                       0.0s
 => [internal] load metadata for docker.io/library/python:3.8-alpine                                       2.4s
 => [auth] library/python:pull token for registry-1.docker.io                                              0.0s
 => [internal] load .dockerignore                                                                          0.0s
 => => transferring context: 2B                                                                            0.0s
 => [builder 1/2] FROM docker.io/library/python:3.8-alpine@sha256:3d93b1f77efce339aa77db726656872517b0d67837989aa7c4b35bd5ae7e81ba  2.3s
 => => resolve docker.io/library/python:3.8-alpine@sha256:3d93b1f77efce339aa77db726656872517b0d67837989aa7c4b35bd5ae7e81ba  0.0s
 => => sha256:6cfd366dbc53a2b83e7757be346b01d35ccd730de9c2f0552b5c1e51f779d9d0 249B / 249B                 0.3s
 => => sha256:3d93b1f77efce339aa77db726656872517b0d67837989aa7c4b35bd5ae7e81ba 10.29kB / 10.29kB           0.0s
 => => sha256:b67ef8bb357c456c34b2cafb1127a4ddcf596069daf43c85cdee34e19c46fc8c 1.74kB / 1.74kB             0.0s
 => => sha256:83001c624401aa11580c97e56c54d556f580e847c90e6ff5efbc3da54cb2eb77 4.95kB / 4.95kB             0.0s
 => => sha256:f0d3d23155cbbb3aca6949baedd1935e7ad9f792b943689e594e2efc8a828dec 457.46kB / 457.46kB         0.5s
 => => sha256:fcbf6bf9f4c3fd6e39f9d7615cf202f9ccd6e5d9a8f555120dde9e3b459b68f2 14.31MB / 14.31MB           1.8s
 => => extracting sha256:f0d3d23155cbbb3aca6949baedd1935e7ad9f792b943689e594e2efc8a828dec                  0.1s
 => => extracting sha256:fcbf6bf9f4c3fd6e39f9d7615cf202f9ccd6e5d9a8f555120dde9e3b459b68f2                  0.4s
 => => extracting sha256:6cfd366dbc53a2b83e7757be346b01d35ccd730de9c2f0552b5c1e51f779d9d0                  0.0s
 => [builder 2/2] RUN apk add --no-cache     curl     make     cmake     gcc     g++     libc-dev     libffi-dev     openssl-dev     && curl https://aws  65.2s
 => [stage-1 2/3] RUN apk --no-cache add groff                                                             1.7s
 => [stage-1 3/3] COPY --from=builder /opt/aws-cli/ /opt/aws-cli/                                          0.8s
 => exporting to image                                                                                     0.8s
 => => exporting layers                                                                                    0.8s
 => => writing image sha256:22a60b49d679fdebef2adbaeecfe3036b670bb2954a40b3fd538f266847c9359               0.0s
 => => naming to docker.io/library/awscli-alpine                                                           0.0s
```

```
bk@MacBook-Pro-BartomiejK docker_files_section % docker run --rm -it awscli-alpine --version
aws-cli/2.10.1 Python/3.8.20 Linux/6.10.4-linuxkit source-sandbox/aarch64.alpine.3 prompt/off
bk@MacBook-Pro-BartomiejK docker_files_section %
```

2. Build an image based on your Dockerfile and test it enabling -v option, buckets creation and listing

```
bk@MacBook-Pro-BartomiejK docker_files_section % docker run --rm -v ~/.aws:/root/.aws aws-cli s3 ls

2024-11-03 15:45:53 bartekkruczekbucket
2024-10-28 08:16:10 bk-lab-bucket-20231015
bk@MacBook-Pro-BartomiejK docker_files_section %
```

Kubernetes deployment

1. Create a cluster -> kind used

```
bk@MacBook-Pro-BartomiejK Lab_5 (04.11.2024) % kind create cluster --name=lscdocker
Creating cluster "lscdocker" ...
 ✓ Ensuring node image (kindest/node:v1.31.2) 🖼
 ✓ Preparing nodes 📦
 ✓ Writing configuration 📜
 ✓ Starting control-plane 🕹️
 ✓ Installing CNI 🔌
 ✓ Installing StorageClass 💾
Set kubectl context to "kind-lscdocker"
You can now use your cluster with:

kubectl cluster-info --context kind-lscdocker

Have a nice day! 👋
```

```
bk@MacBook-Pro-BartomiejK Lab_5 (04.11.2024) % helm install nfs-server-provisioner nfs-ganesha-server-and-external-provisioner/nfs-server-provisioner --set=stor
ageClass.name=lscdocker
NAME: nfs-server-provisioner
LAST DEPLOYED: Tue Nov 12 14:51:49 2024
NAMESPACE: default
STATUS: deployed
REVISION: 1
TEST SUITE: None
NOTES:
The NFS Provisioner service has now been installed.

A storage class named 'lscdocker' has now been created
and is available to provision dynamic volumes.

You can use this storageclass by creating a `PersistentVolumeClaim` with the
correct storageClassName attribute. For example:

    ---
    kind: PersistentVolumeClaim
    apiVersion: v1
    metadata:
      name: test-dynamic-volume-claim
    spec:
      storageClassName: "lscdocker"
      accessModes:
        - ReadWriteOnce
      resources:
        requests:
          storage: 100Mi
```

2. Using helm install an NFS server and provisioner

```
bk@MacBook-Pro-BartomiejK docker_files_section % helm repo add nfs-ganesha-server-and-external-provisioner https://kubernetes-sigs.github.io/nfs-ganesha-server-
and-external-provisioner/
"nfs-ganesha-server-and-external-provisioner" has been added to your repositories
bk@MacBook-Pro-BartomiejK docker_files_section % helm install my-release nfs-ganesha-server-and-external-provisioner/nfs-server-provisioner
NAME: my-release
LAST DEPLOYED: Sun Nov 10 19:51:02 2024
NAMESPACE: default
STATUS: deployed
REVISION: 1
TEST SUITE: None
NOTES:
The NFS Provisioner service has now been installed.

A storage class named 'nfs' has now been created
and is available to provision dynamic volumes.

You can use this storageclass by creating a `PersistentVolumeClaim` with the
correct storageClassName attribute. For example:

    ---
    kind: PersistentVolumeClaim
    apiVersion: v1
    metadata:
      name: test-dynamic-volume-claim
    spec:
      storageClassName: "nfs"
      accessModes:
        - ReadWriteOnce
      resources:
        requests:
          storage: 100Mi
```

3. PVC creation

```
bk@MacBook-Pro-BartomiejK Lab_5 (04.11.2024) % kubectl apply --context kind-lscdocker --filename=lscpvc.yaml
persistentvolumeclaim/lsc-lab5-pvc created
bk@MacBook-Pro-BartomiejK Lab_5 (04.11.2024) % kubectl get pvc
NAME          STATUS   VOLUME                                     CAPACITY   ACCESS MODES   STORAGECLASS   VOLUMEATTRIBUTESCLASS   AGE
lsc-lab5-pvc  Bound    pvc-3840657d-5213-4251-8448-52b8e706d824   1Gi        RWX            lscdocker      <unset>                 8s
bk@MacBook-Pro-BartomiejK Lab_5 (04.11.2024) %
```

4. Deployment with HTTP server

```
bk@MacBook-Pro-BartomiejK Lab_5 (04.11.2024) % kubectl apply --context kind-lscdocker --filename=lscdeployment.yaml
deployment.apps/nginx-deployment created
bk@MacBook-Pro-BartomiejK Lab_5 (04.11.2024) % kubectl get deployment
NAME               READY   UP-TO-DATE   AVAILABLE   AGE
nginx-deployment   1/2     2            1           7s
bk@MacBook-Pro-BartomiejK Lab_5 (04.11.2024) % kubectl get deployment
NAME               READY   UP-TO-DATE   AVAILABLE   AGE
nginx-deployment   2/2     2            2           18s
bk@MacBook-Pro-BartomiejK Lab_5 (04.11.2024) % kubectl get deployment
NAME               READY   UP-TO-DATE   AVAILABLE   AGE
nginx-deployment   2/2     2            2           20s
bk@MacBook-Pro-BartomiejK Lab_5 (04.11.2024) %
```

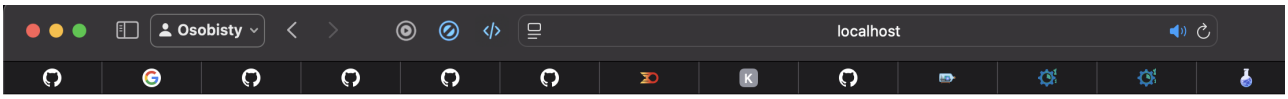
5. Service creation

```
bk@MacBook-Pro-BartomiejK Lab_5 (04.11.2024) % kubectl apply --context kind-lscdocker --filename=lscservice.yaml
service/nginx-service created
bk@MacBook-Pro-BartomiejK Lab_5 (04.11.2024) % kubectl get service
NAME                     TYPE        CLUSTER-IP     EXTERNAL-IP   PORT(S)
                AGE
kubernetes               ClusterIP   10.96.0.1      <none>        443/TCP
                30m
nfs-server-provisioner   ClusterIP   10.96.77.193   <none>        2049/TCP,2049/UDP,32803/TCP,32803/UDP,20048/TCP,20048/UDP,875/TCP,875/UDP,111/TCP,111/UDP,662/
TCP,662/UDP   15m
nginx-service            NodePort    10.96.89.193   <none>        80:30000/TCP
                6s
```

6. Copy job creation

```
bk@MacBook-Pro-BartomiejK Lab_5 (04.11.2024) % kubectl apply --context kind-lscdocker --filename=lsccopyjob.yaml
job.batch/copy-content-job created
bk@MacBook-Pro-BartomiejK Lab_5 (04.11.2024) % kubectl get job
NAME               STATUS     COMPLETIONS   DURATION   AGE
copy-content-job   Complete   1/1           6s         8s
bk@MacBook-Pro-BartomiejK Lab_5 (04.11.2024) %
```

7. Testing HTTP server



Hello from Kubernetes!