



kubernetes

Kubernetes training

Itenium

Jan Wielemans
jan.wielemans@devgem.be



kubernetes

Vlamingen veroveren de wereld met wc die 'voelt' en dan spoelt

Het slimste kamertje

Vijftien jaar geleden gooiden ze al hoge ogen in 'De bedenkers' op Eén met urinoirs waarmee je kon gamen. Vandaag veroveren vier vrienden uit Wilrijk de wereld met Buddy. Een slimme wc, die 'voelt' wat er in de pot zit en op basis daarvan weet hoeveel of hoe weinig er gespoeld moet worden. Tot in Singapore wordt er zo water bespaard.

CHRISTINE DE HERDT

De Buddy oogt als een gewoon toilet met een strak design. Alleen de tablet die erboven hangt, doet iets anders vermoeden. Drukknoppen om door te spoelen zijn er niet. Wel sensoren. "Die scannen of er iemand op het toilet zit", legt medeoprichter Jan Vander Elst van het bedrijf IPEE uit. "Ook achter het keramisch oppervlak zit een systeem dat detecteert of het toilet echt gebruikt wordt. Aan de hand van het zoutgehalte in de pot moet het hoeveel er precies in het toilet belandt." Afhankelijk van wat er in de pot belandt, spoelt de wc dan zelf zoveel als nodig, maar ook niet meer.

Duurzame ontwikkelden industriel ingenieurs Bart Geraets (50) en Jan Wielemans (49), handelingenieur Jan Vander Elst (41) en productontwikkelaar Jan Schoeters (38) een straf staaltje technologie. Een waar er - alleen bij effectief gebruik - contactloos wordt doorgespoeld. "We wilden innovatief in een wereld die vrij conservatief is. Weet je dat de spooibak met de twee rondjes al meer dan veertig jaar bestaat?", zegt Jan.

Te saai op de pot

Het idee ooit iets te doen met toiletten is ontstaan, juist, op het toilet. "Bart vond het er saai. Konden we daar niks leuks doen?", vertelt Jan. En dus bedachten ze een systeem om al plassend een computerspelletje te spelen door urinestralen te mikken op de sensoren. Ze haalden er de halve finale van 'De bedenkers' op Eén mee in 2007. Later stonden ze met hun uitvinding op beurzen en festivals.

Hun gekke ideeën werden serieuzer. Hun ambitie ook. Vander Elst: "Op een moment dat er nog geen sprake was van wereldwijde droogtoiletronen wil al niet duurzaamheid en water besparen bezig." Zelf levensnoodzakelijk thema. "Het toiletverbruik maakt voor een gezin van vier een derde van de waterrekening uit. Centen worden letterlijk weggespoeld."

anderen in het Taipei Dome in Taiwan, in een pretpark in de buurt van Londen en in Kinelpolis, dat zo 50 procent op de waterfactuur kan besparen. Met de Buddy willen ze de technologie nog meer finesseën, samen met een onderzoeksgruppe van de Universiteit Antwerpen.

De luchthaven van Zaventem heeft zeventien Buddy's laten plaatsen in de vertrekhal. Ook in de vlieghaven van Singapore staan zo opgesteld. "Voor bedrijven komt er nog een extra functie bij. Wanneer er een toilet verstopt zit, wordt automatisch een seinje naar de onderhoudsopleg gestuurd, die dan meteen kan uitrukken."

De feedback is positief. Er wordt minder verspild. "Dat is onze voornaamste missie geworden. We willen het wereldwijde waterverbruik terugdringen."



(v.l.n.r.) Jan Vander Elst, Jan Schoeters en Jan Wielemans bij hun Buddy, die spoelt als er gespoeld moet worden, maar ook niet te veel.

JAN VANDER ELST MEDEOPRICHTER IPEE

"Het toiletverbruik maakt voor een gezin van vier een derde van de waterrekening uit. Centen worden letterlijk weggespoeld"

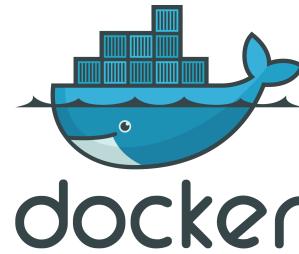
1 Achter de tablet boven de wc zitten sensoren die meten of er iemand de wc gebruikt, en of die zit of staat.

2 De informatie wordt optisch doorgestuurd naar de tablet. Die analyseert hoeveel water er gespoeld moet worden.

3 Achter het toilet zit een sensor die meten wat er precies in de pot belandt.

Jan Wielemans
jan.wielemans@devgem.be

Hands-on Architect
Head of Product Development @ IPEE



Evening 1
24/11/2022



kubernetes



kubernetes

Evening 2
22/12/2022



Debugging



Istio





kubernetes

Day 2

I need your input today

- Istio
- More debugging?
- Local Kubernetes development?
(what is your flow)
 - Local cluster installation?
 - Tilt?
- Application development?
 - External service endpoints?
 - Network policies (in Istio?)
 - Service Accounts/RBAC?



kubernetes



Don't Panic: Kubernetes and Docker

Wednesday, December 02, 2020

Update: Kubernetes support for Docker via `dockershim` is now removed. For more information, read the [removal FAQ](#). You can also discuss the deprecation via a dedicated [GitHub issue](#).

Authors: Jorge Castro, Duffie Cooley, Kat Cosgrove, Justin Garrison, Noah Kantrowitz, Bob Killen, Rey Lejano, Dan "POP" Papandrea, Jeffrey Sica, Davanum "Dims" Srinivas

Kubernetes is [deprecating Docker](#) as a container runtime after v1.20.

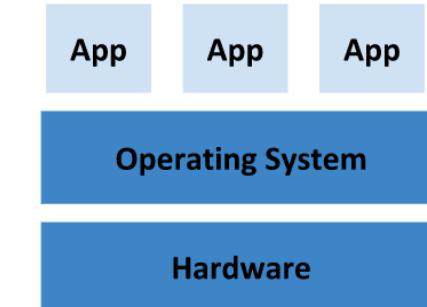
You do not need to panic. It's not as dramatic as it sounds.

TL;DR Docker as an underlying runtime is being deprecated in favor of runtimes that use the [Container Runtime Interface \(CRI\)](#) created for Kubernetes. Docker-produced images will continue to work in your cluster with all runtimes, as they always have.

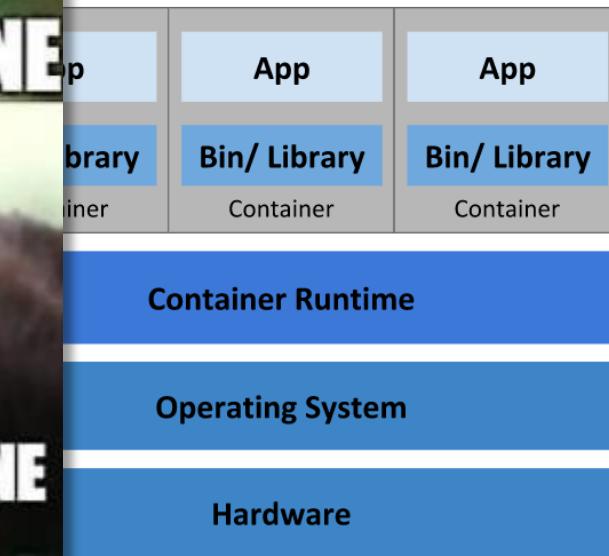
If you're an end-user of Kubernetes, not a whole lot will be changing for you. This doesn't mean the death of Docker, and it doesn't mean you can't, or shouldn't, use Docker as a development tool anymore. Docker is still a useful tool for building containers, and the images that result from running `docker build` can still run in your Kubernetes cluster.



kubernetes



Traditional Deployment

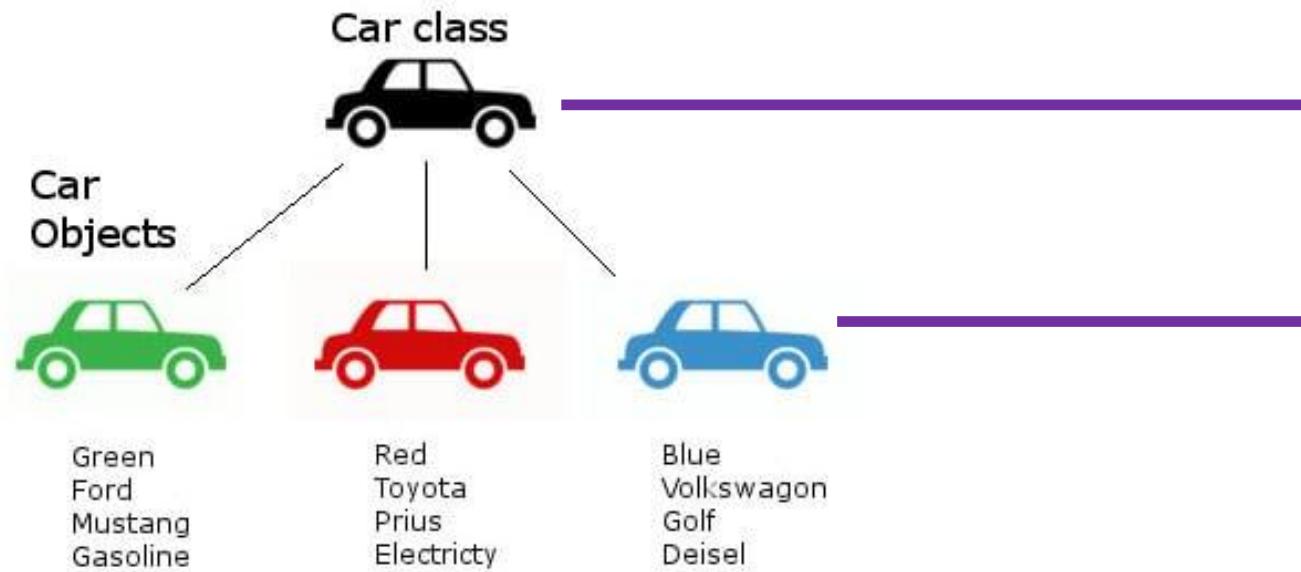


Container Deployment





kubernetes



Docker image
“the package”

Docker container
“the installed/running software”



kubernetes

A screenshot of a web browser showing the Docker Hub sign-up page. The page has a blue header with the Docker Hub logo and a search bar. Below the header, there's a large call-to-action button with the text "Build and Ship any Application Anywhere". To the right of this button is a "Sign Up" form. The form includes fields for "Docker ID", "Email", and "Password", along with a checkbox for receiving product updates and a reCAPTCHA verification. A "Sign Up" button is at the bottom of the form. At the very bottom of the page, there's a small note about agreeing to the Terms of Service, Privacy Policy, and Data Processing Terms.

Docker Hub is the world's easiest way to create, manage, and deliver your teams' container applications.

Sign Up Today

Already have an account? [Sign In](#)

Docker ID

Email

Password

Send me occasional product updates and announcements.

Ik ben geen robot reCAPTCHA

[Sign Up](#)

By creating an account, you agree to the [Terms of Service](#), [Privacy Policy](#), and [Data Processing Terms](#).

Docker Hub

“the package manager”

Docker Hub is the default public registry,
you can also have private registries



kubernetes

jeankedotcom's Profile - Docker

<https://hub.docker.com/u/jeankedotcom>

Docker Hub Search for great content (e.g., mysql)

Explore Sign In Pricing Get Started

jeankedotcom

Community User Joined May 28, 2015

Repositories Starred

Displaying 2 of 2 repositories

jeankedotcom/demo-frontend
By jeankedotcom • Updated 6 months ago
Frontend for the demo application.
Container 42 Downloads

jeankedotcom/demo-backend
By jeankedotcom • Updated 6 months ago
Demo backend for containers and clusters demo.
Container 228 Downloads



```
1 # show docker version
2 docker --version
3
4 # List all docker containers
5 docker container list --all
6
7 # List all docker images
8 docker image list
9
10 # pull latest nginx image from registry "docker hub"
11 docker pull nginx: latest
12
13 # run nginx in docker and map container port 80 to host port 1234
14 docker run -d -p 1234:80 nginx:latest
```

Docker CLI

Docker Desktop - Docker

https://www.docker.com/products/docker-desktop/

Docker Desktop

Install Docker Desktop – the fastest way to containerize applications.

Mac with Intel Chip Mac with Apple Chip

MOST COMMON

Also available for [Windows](#) and [Linux](#)

The Docker Subscription Service Agreement has been updated.



Our [Docker Subscription Service Agreement](#) includes a change to the terms for Docker Desktop

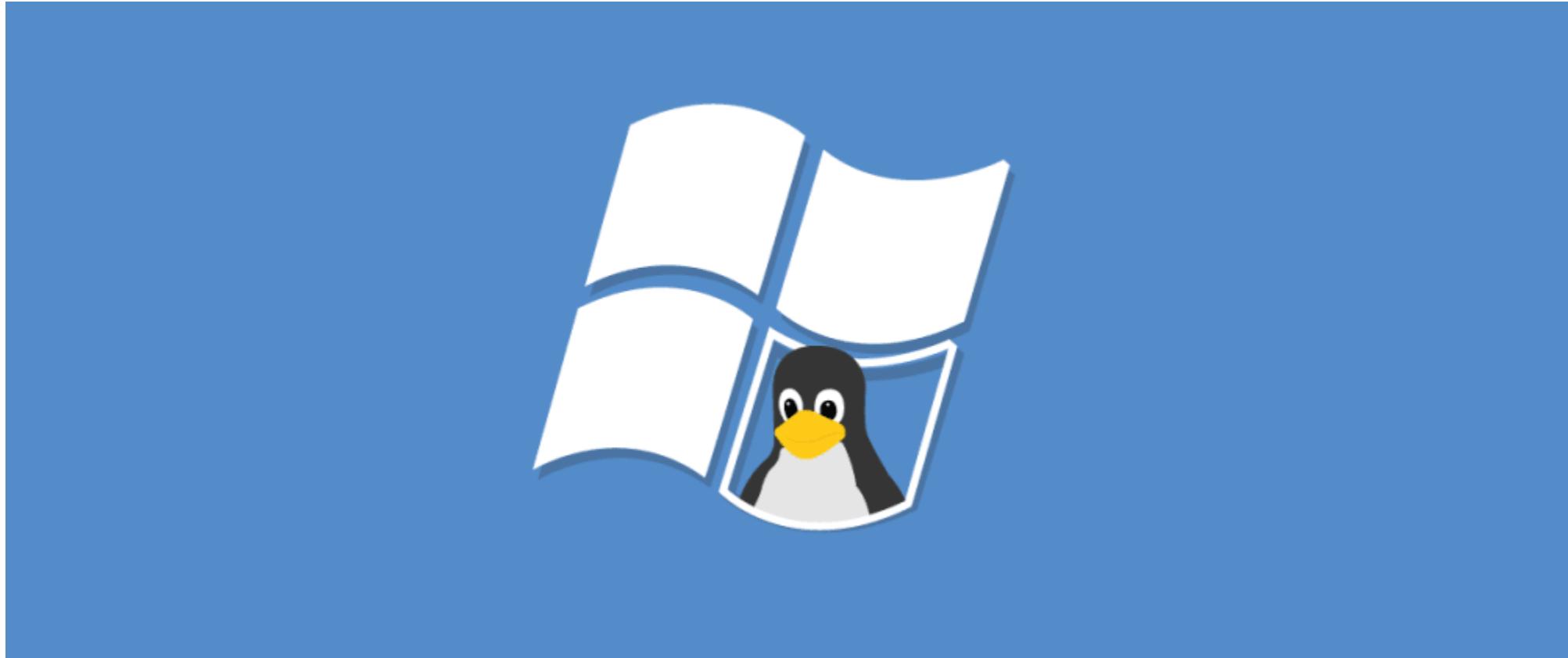
- It **remains free** for small businesses (fewer than 250 employees AND less than \$10 million in annual revenue), personal use, education, and non-commercial open source projects.
- It requires a paid subscription ([Pro, Team or Business](#)), for as little as \$5 per user per month, for professional use in larger businesses.
- The effective date of these terms is August 31, 2021.



kubernetes



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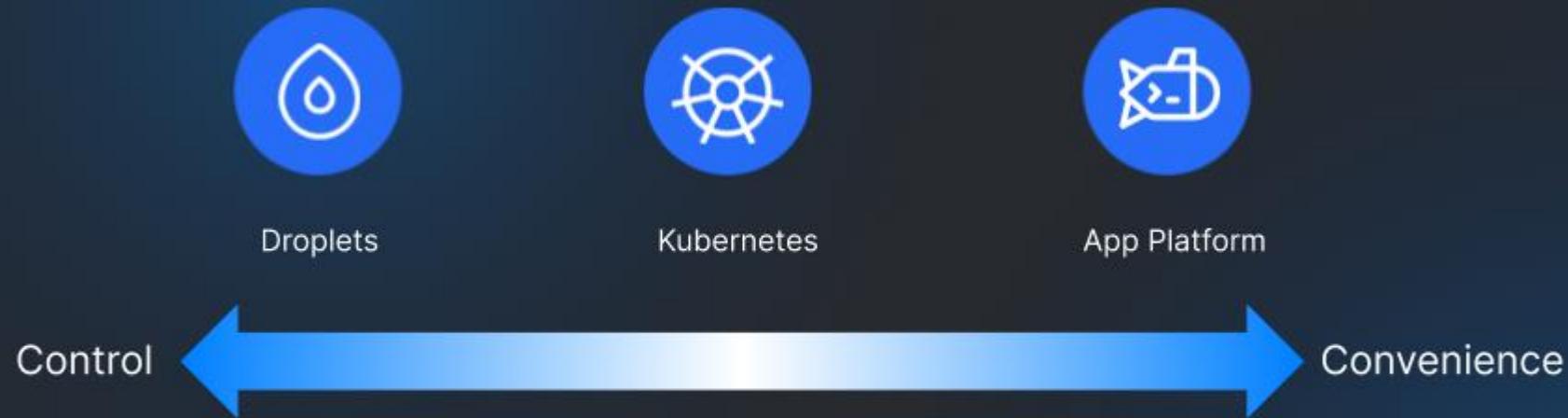


WSL2 (Windows Subsystem for Linux)



kubernetes

Simplicity with choice

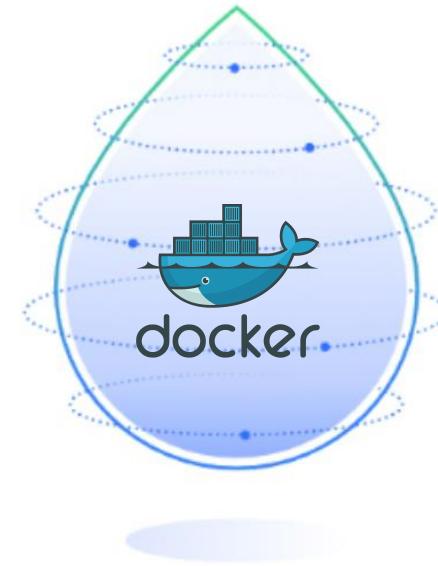
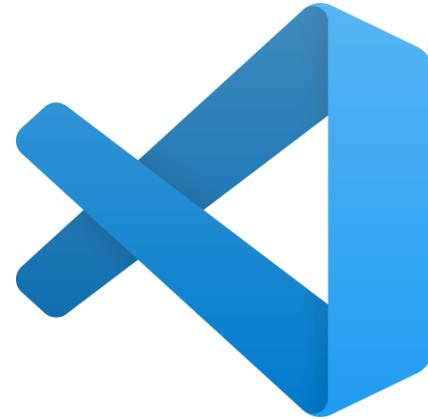


Developer of all skills. Apps of all scale.

Digital Ocean (the developer cloud)



kubernetes



VSCode with Remote Development Extension
for remote development over SSH

Droplet (cloud VM) with
Docker Engine on Linux

Exercise setup



Get Started X

>connect

- Remote-SSH: Connect to Host...
- CSharp: List processes on Docker connection
- CSharp: List processes on remote connection for attach
- Developer: Connection: Pause socket writing
- Developer: Connection: Trigger Reconnect
- Jupyter: Specify Jupyter Server for Connections
- Remote-SSH: Connect Current Window to Host...
- Remote-SSH: Kill Local Connection Server For Host...

recently used

other commands

Visual Editing

Start

- New File...
- Open File...
- Open Folder...
- Clone Git Repository...

Recent

- goca-training-2022 \\wsl.localhost\Ubuntu-20.04\root\devg...
- goca-training-2020 [WSL: Ubuntu-20.04] ~/devgem
- goca [SSH: 157.245.65.175] ~
- DP000-monorepo [WSL: Ubuntu-20.04] /root/IPEE/DP000
- Jeanke C:\Users\janwi\OneDrive\LogSeq
- More...

Walkthroughs

- Get Started with VS Code**
Discover the best customizations to make VS Code yours.
- Learn the Fundamentals**
Jump right into VS Code and get an overview of the must-have features.
- Boost your Productivity**
- Get Started with GitLens Updated**
- Introducing GitLens+ Features Updated**

More...

 Show welcome page on startup

kubernetes

CTRL + Shift + P
to open command pallet

Type connect

Click on
Remote-SSH: Connect to Host...

File Edit Selection View Go Run Terminal Help Get Started - Visual Studio Code

Select configured SSH host or enter user@host

root@159.65.192.158

▶ root@159.65.192.158

+ Add New SSH Host...

Configure SSH Hosts...

Visual Studio Code

Editing evolved

Start

- New File...
- Open File...
- Open Folder...
- Clone Git Repository...

Recent

- goca-training-2022 \\wsl.localhost\Ubuntu-20.04\root\devg...
- goca-training-2020 [WSL: Ubuntu-20.04] ~/devgem
- goca [SSH: 157.245.65.175] ~
- DP000-monorepo [WSL: Ubuntu-20.04] /root/IPEE/DP000
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More...

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More...

Show welcome page on startup

Type root@YOUR_IP_ADDRESS

Press the enter key

Visual Studio Code logo

Kubernetes logo

File Edit Selection View Go Terminal Help Get Started - Visual Studio Code

Select the platform of the remote host "159.65.192.158"

Linux (selected)

Windows

macOS

Visual Studio Code

Editing evolved

Start

- New File...
- Open File...
- Open Folder...

Recent

- goca-training-2022 \\wsl.localhost\Ubuntu-20.04\root\devg...
- goca-training-2020 [WSL: Ubuntu-20.04] ~/devgem
- goca [SSH: 157.245.65.175] ~
- DP000-monorepo [WSL: Ubuntu-20.04] /root/IPEE/DP000
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More...

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More...

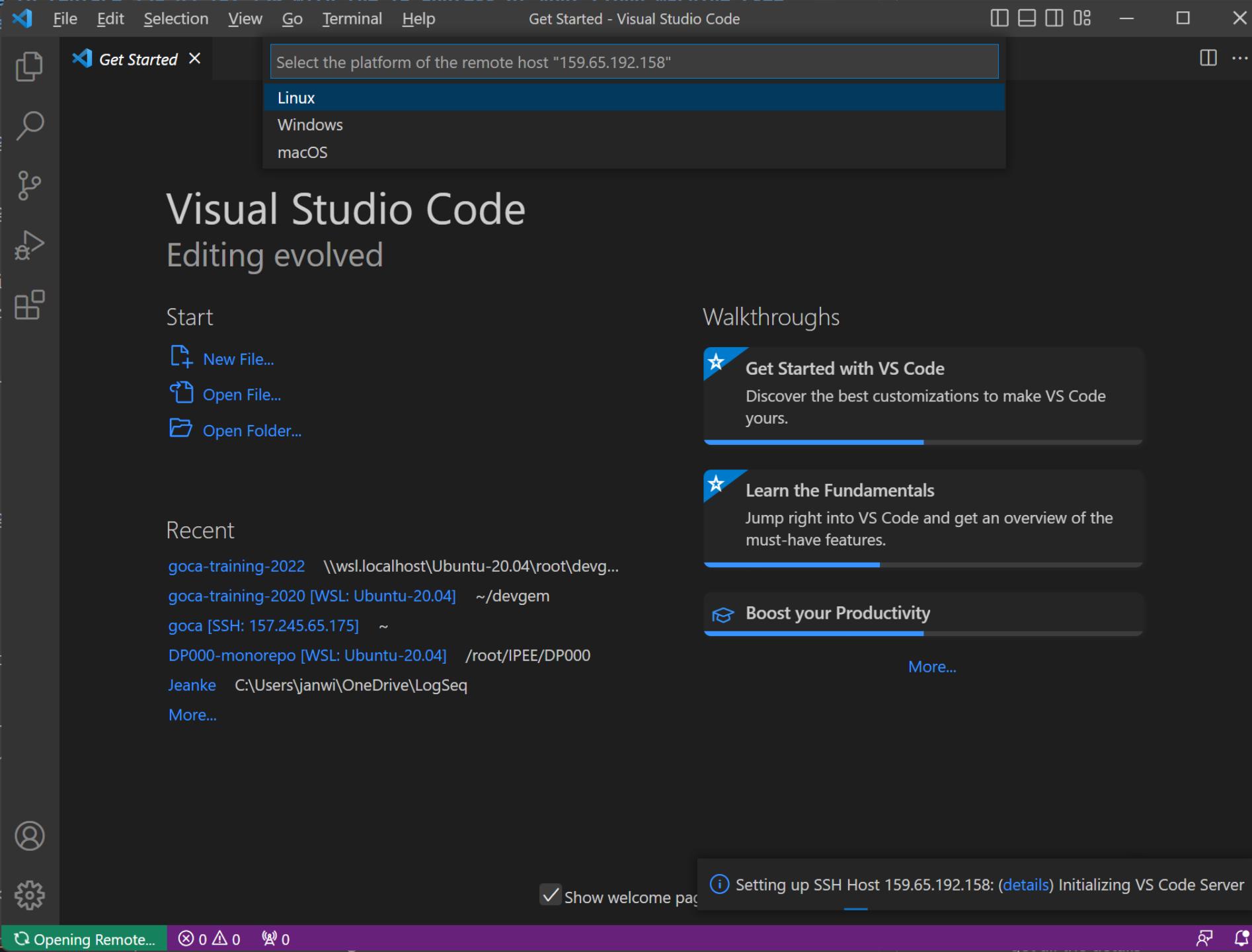
Show welcome page Setting up SSH Host 159.65.192.158: (details) Initializing VS Code Server

Opening Remote... ⊞ 0 ▲ 0 ⚡ 0

A new Visual Studio Code instance opens

Select Linux

kubernetes



File Edit Selection View Go Terminal Help Get Started - Visual Studio Code

Select the platform of the remote host "159.65.192.158"

Linux (selected)

Windows

macOS

Visual Studio Code

Editing evolved

Start

- New File...
- Open File...
- Open Folder...

Recent

- goca-training-2022 \\wsl.localhost\Ubuntu-20.04\root\devg...
- goca-training-2020 [WSL: Ubuntu-20.04] ~/devgem
- goca [SSH: 157.245.65.175] ~
- DP000-monorepo [WSL: Ubuntu-20.04] /root/IPEE/DP000
- Jeanke C:\Users\janwi\OneDrive\LogSeq

More...

Walkthroughs

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- Boost your Productivity**

More...

Show welcome page Setting up SSH Host 159.65.192.158: (details) Initializing VS Code Server

A new Visual Studio Code instance opens

Select Linux

Plugin asks “Are you sure?” select Continue

Enter your password and press enter

 kubernetes



Get Started X

Start

- New File...
- Open File...
- Open Folder...
- Clone Git Repository...

Recent

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
● root@docker-jan:~# docker version --format '{{.Server.Version}}'  
20.10.7  
○ root@docker-jan:~# █
```

Walkthroughs



Get Started with VS Code

Discover the best customizations to make VS Code yours.



Learn the Fundamentals

Jump right into VS Code and get an overview of the must-have features.

bash - root + ×

Menu: View > Terminal
or CTRL + `

type
docker --version
and enter



kubernetes



kubernetes

Demo time

Docker

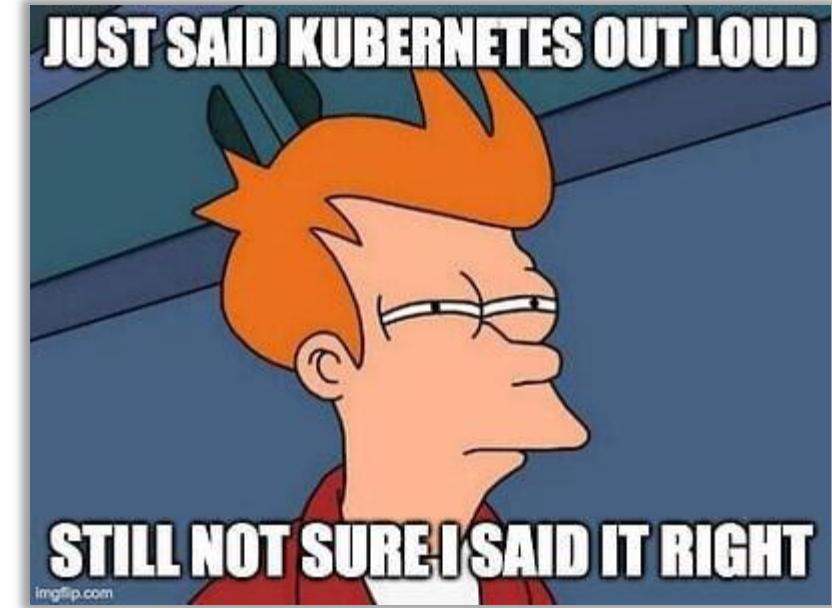
<https://gitlab.com/devgem/itenium-training-2022/>



kubernetes



kubernetes



Kubernetes

https://kubernetes.io

kubernetes Documentation Kubernetes Blog Training Partners Community Case Studies Versions English

KubeCon + CloudNativeCon NA 2022 Detroit, Michigan + Virtual.
5 days of incredible opportunities to collaborate, learn + share with the entire community!
October 24 - 28, 2022.

Kubernetes, also known as K8s, is an open-source system for automating deployment, scaling, and management of containerized applications.

It groups containers that make up an application into logical units for easy management and discovery. Kubernetes builds upon [15 years of experience of running production workloads at Google](#), combined with best-of-breed ideas and practices from the community.

Planet Scale
Designed on the same principles that allow Google to run billions of containers a week, Kubernetes can scale without increasing your operations team.

Never Outgrow
Whether testing locally or running a global enterprise, Kubernetes flexibility grows with you to deliver your applications consistently and easily no matter how complex your need is.



kubernetes



kubernetes

Computer cluster - Wikipedia

en.wikipedia.org/wiki/Computer_cluster

Article Talk Read Edit View history Search Wikipedia

Not logged in Talk Contributions Create account Log in

Computer cluster

From Wikipedia, the free encyclopedia

Not to be confused with [data cluster](#) or [grid computing](#).
"Cluster computing" redirects here. For the journal, see [Cluster Computing \(journal\)](#).

A **computer cluster** is a set of loosely or tightly connected computers that work together so that, in many respects, they can be viewed as a single system. Unlike [grid computers](#), computer clusters have each [node](#) set to perform the same task, controlled and scheduled by software.

The components of a cluster are usually connected to each other through fast [local area networks](#), with each [node](#) (computer used as a server) running its own instance of an [operating system](#). In most circumstances, all of the nodes use the same hardware^{[1][[better source needed](#)]} and the same operating system, although in some setups (e.g. using [Open Source Cluster Application Resources \(OSCAR\)](#)), different operating systems can be used on each computer, or different hardware.^[2]

Clusters are usually deployed to improve performance and availability over that of a single computer, while typically being much more cost-effective than single computers of comparable speed or availability.^[3]

Computer clusters emerged as a result of convergence of a number of computing trends including the availability of low-cost microprocessors, high-speed networks, and software for high-performance distributed computing.^[citation needed] They have a wide range of applicability and deployment, ranging from small business clusters with a handful of nodes to some of the fastest [supercomputers](#) in the world such as IBM's [Sequoia](#).^[4] Prior to the advent of clusters, single unit [fault tolerant mainframes](#) with [modular redundancy](#) were employed, but the lower upfront cost of clusters, and increased speed of network fabric has favoured the adoption of clusters. In contrast to high-reliability mainframes clusters are cheaper to scale out, but also have increased complexity in error handling, as in clusters error modes are not opaque to running programs.^[5]

Contents [hide]

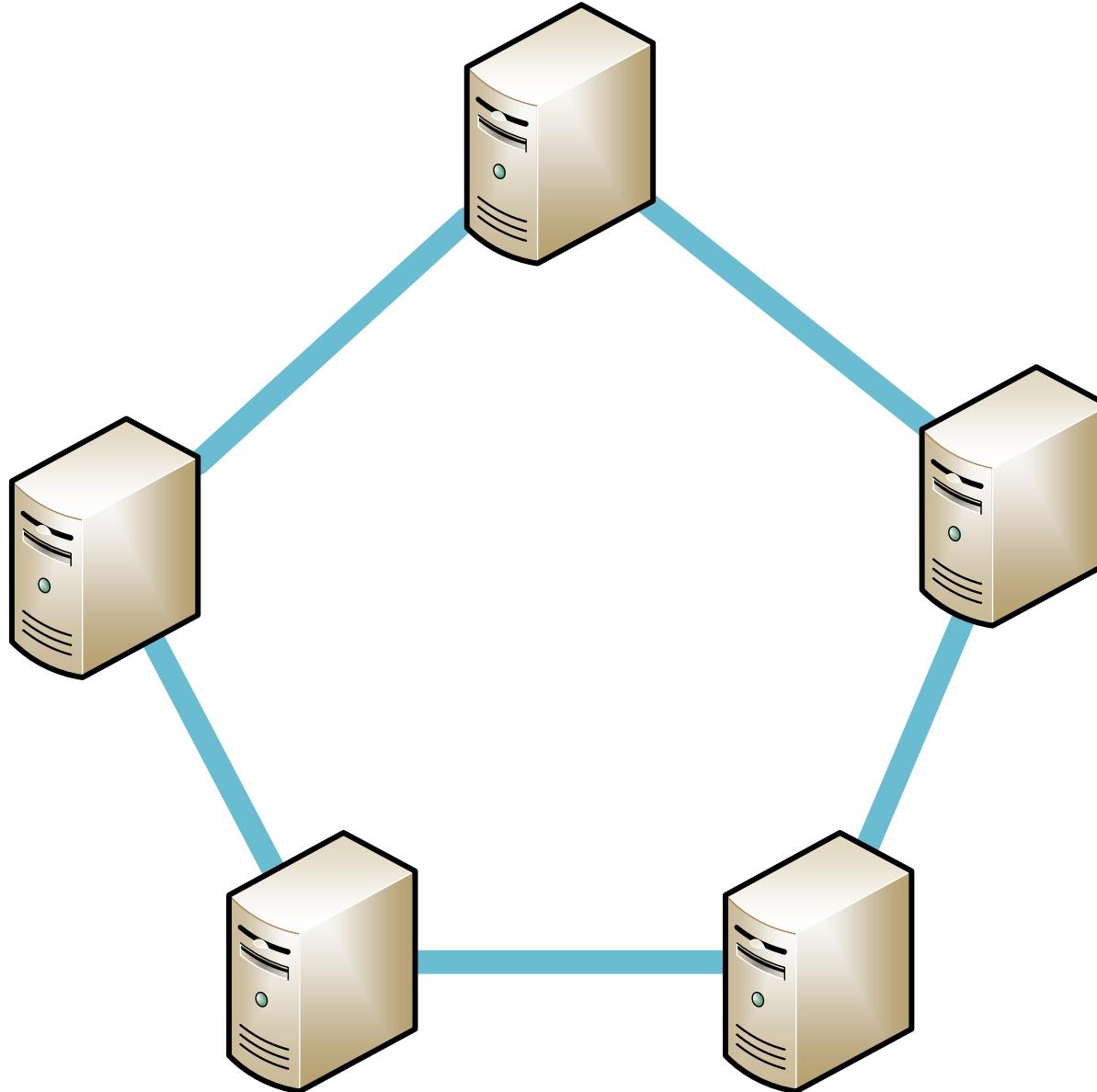
- 1 Basic concepts
- 2 History
- 3 Attributes of clusters
- 4 Benefits
- 5 Design and configuration
- 6 Data sharing and communication
 - 6.1 Data sharing
 - 6.2 Message passing and communication
- 7 Cluster management
 - 7.1 Task scheduling
 - 7.2 Node failure management
- 8 Software development and administration
 - 8.1 Parallel programming
 - 8.2 Debugging and monitoring
- 9 Implementations
- 10 Other approaches
- 11 See also
- 12 References


Technicians working on a large Linux cluster at the Chemnitz University of Technology, Germany


Sun Microsystems Solaris Cluster, with In-Row cooling

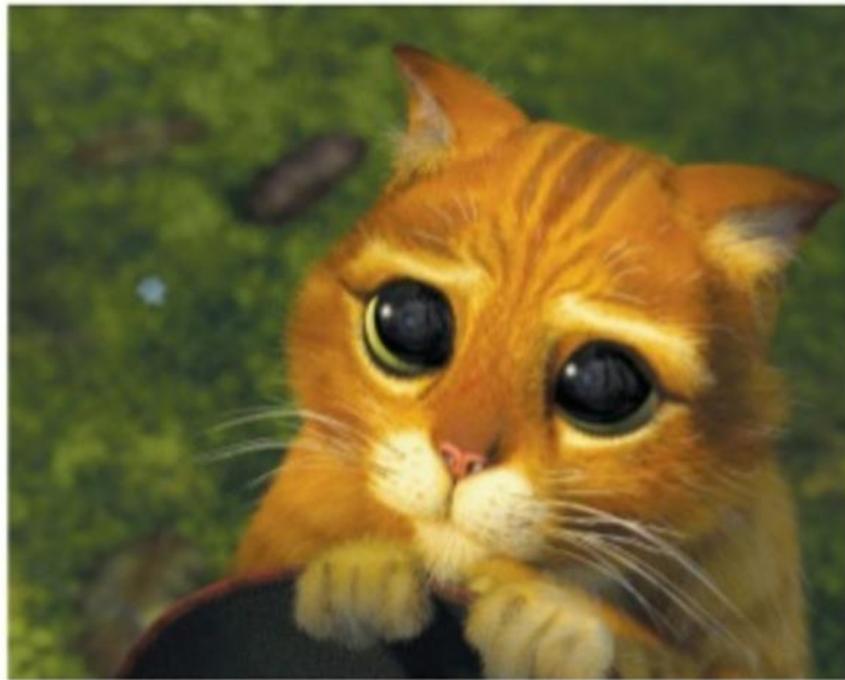


kubernetes





kubernetes



Pets versus Cattle

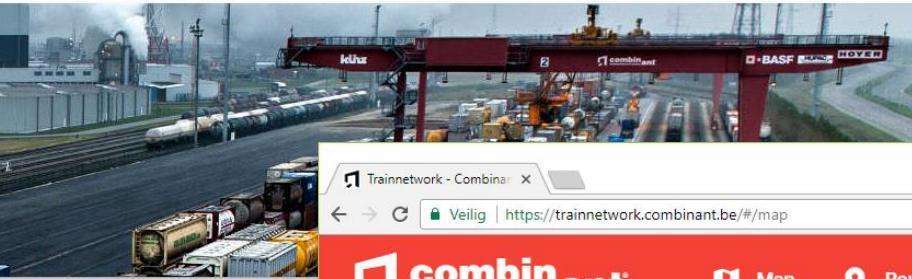


kubernetes

Combinant Veilig https://combinant.be

combinant combined terminal antwerp

Home Bedrijfsinfo Treinnetwerk Cetis Nieuws Twitter Contact English



Combinant (Combined Terminal Antwerp) access spoorterminal voor intermodale goederen gelegen in de Antwerpse haven.

Recent nieuws

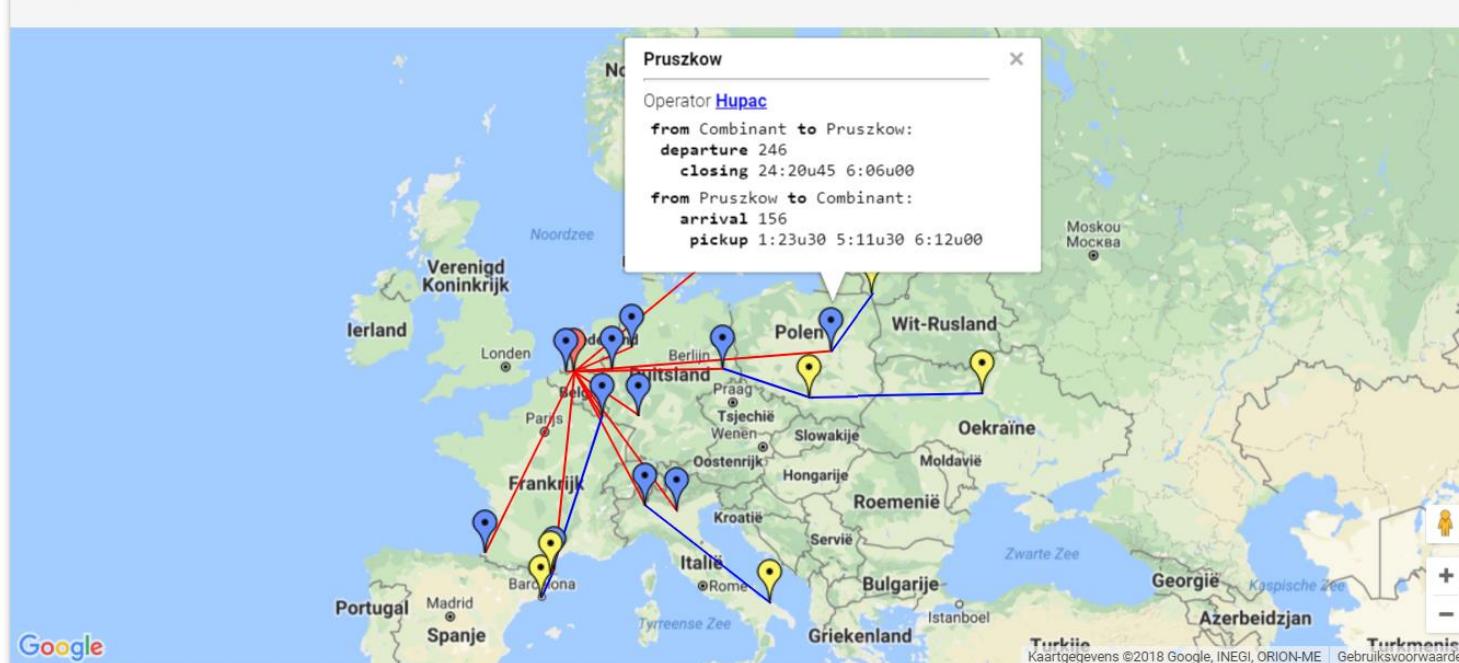
- Openingsuren Kerstmis Nieuwjaar 11/12/2017
- openingsuren feestdagen 2016- 2017 19/12/2016
- Combinant nv ZOEKT een loketbediende 14/12/2015
- NIEUW treinconnectie tussen Combinant 25/06/2015

Trainnetwork - Combinant Veilig https://trainnetwork.combinant.be/#/map

combinant combined terminal antwerp

Map Routes Operators Files Help Logout jan.wielemans@devgem.be

Map



Pruszkow

Operator **Hupac**

from Combinant to Pruszkow:
departure 246
closing 24:20u45 6:06u00

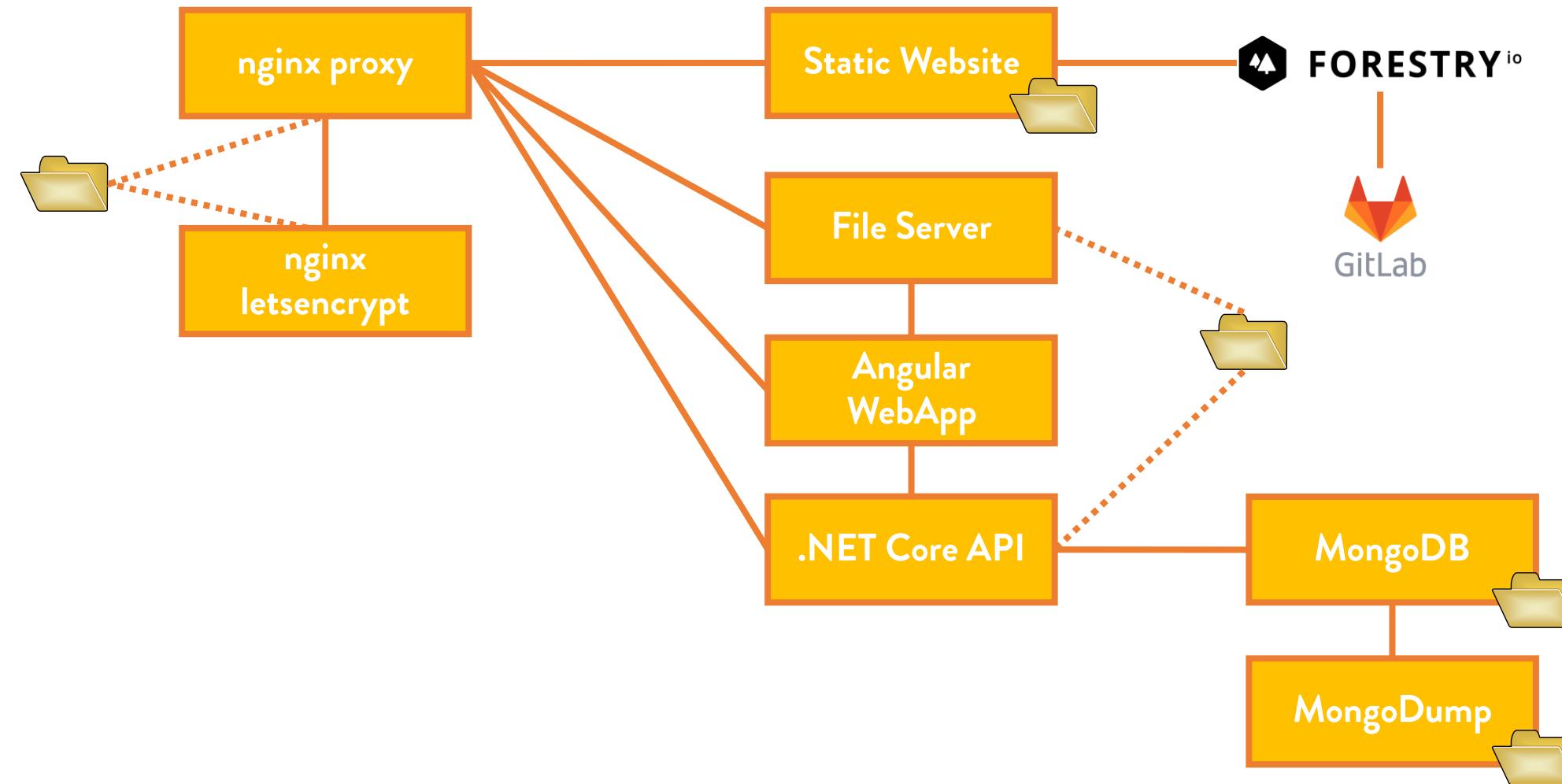
from Pruszkow to Combinant:
arrival 156
pickup 1:23u30 5:11u30 6:12u00

Google

Kaartgegevens ©2018 Google, INEGI, ORION-ME | Gebruiksvoorwaarden



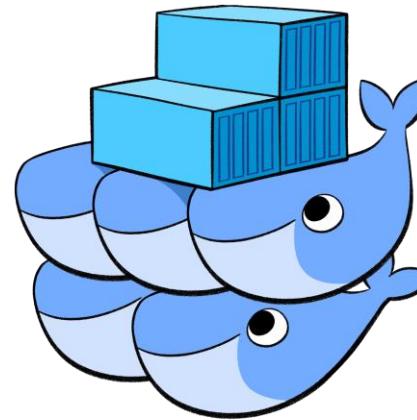
kubernetes





kubernetes

Alternatives



MESOS



MARATHON



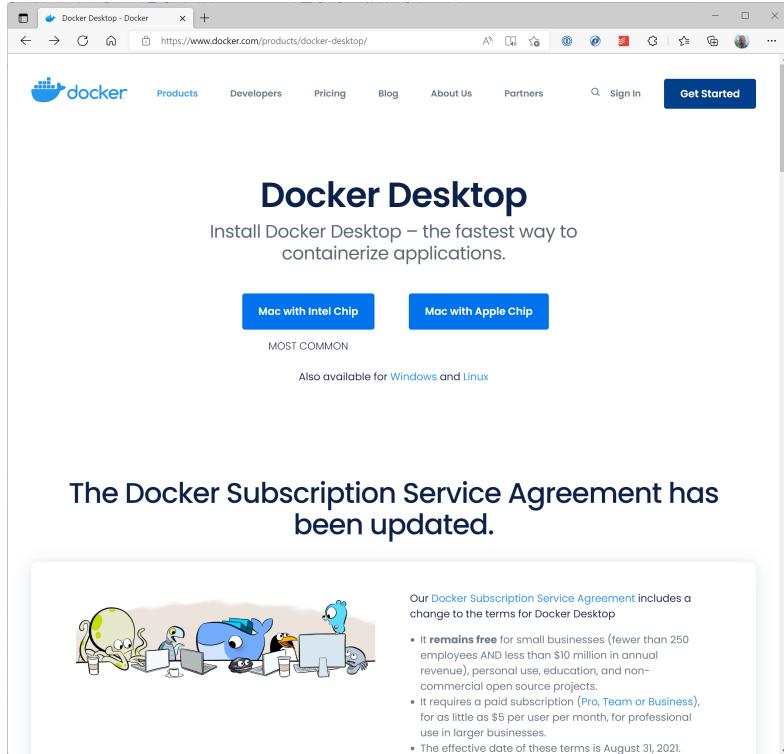
zalando



Why Kubernetes



Microsoft
Azure



Docker Desktop

Install Docker Desktop – the fastest way to containerize applications.

Mac with Intel Chip

Mac with Apple Chip

MOST COMMON

Also available for Windows and Linux

The Docker Subscription Service Agreement has been updated.

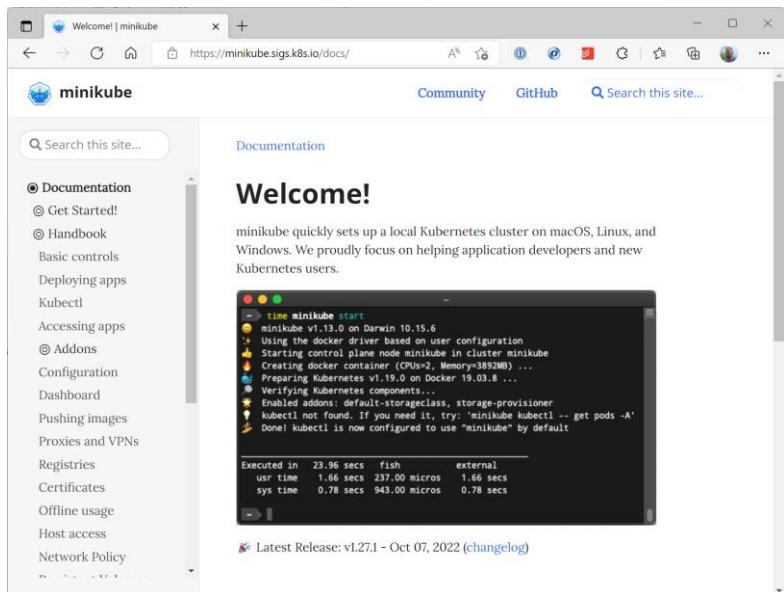
Our Docker Subscription Service Agreement includes a change to the terms for Docker Desktop

- It remains free for small businesses (fewer than 250 employees AND less than \$10 million in annual revenue), personal use, education, and non-commercial open source projects.
- It requires a paid subscription (Pro, Team or Business), for as little as \$5 per user per month, for professional use in larger businesses.

The effective date of these terms is August 31, 2021.



kubernetes



Welcome! | minikube

Community GitHub Search this site...

minikube

Documentation Get Started! Handbook Basic controls Deploying apps Kubectl Accessing apps Addons Configuration Dashboard Pushing images Proxies and VPNs Registries Certificates Offline usage Host access Network Policy

Documentation

Welcome!

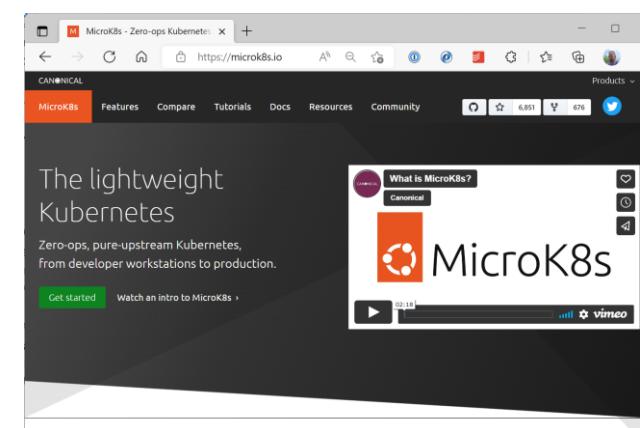
minikube quickly sets up a local Kubernetes cluster on macOS, Linux, and Windows. We proudly focus on helping application developers and new Kubernetes users.

```
time minikube start
minikube v1.13.0 on Darwin 10.15.6
Using the docker driver based on user configuration
Starting control plane node minikube in cluster minikube
Creating docker container (CPUs=2, Memory=3892MB) ...
Preparing Kubernetes v1.19.0 on Docker 19.03.8 ...
Verifying Kubernetes components...
Enabled addons: default-storageclass, storage-provisioner
kubectl not found. If you need it, try: "minikube kubectl -- get pods -A"
Done! minikube is now configured to use "minikube" by default
```

Executed in 23.96 secs fish external
usr time 1.66 secs 237.00 micros 1.66 secs
sys time 0.78 secs 943.00 micros 0.78 secs

Latest Release: v1.27.1 - Oct 07, 2022 (changelog)

WSL2 (Windows Subsystem for Linux)



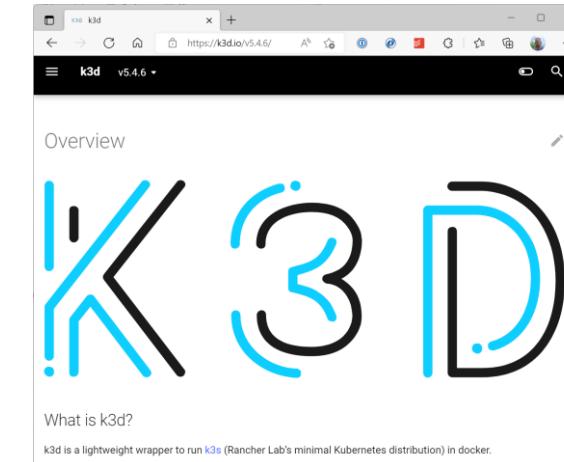
CANONICAL

MicroK8s Features Compare Tutorials Docs Resources Community

The lightweight Kubernetes

Zero-ops, pure-upstream Kubernetes, from developer workstations to production.

Get started Watch an intro to MicroK8s



k3d v5.4.6

Overview

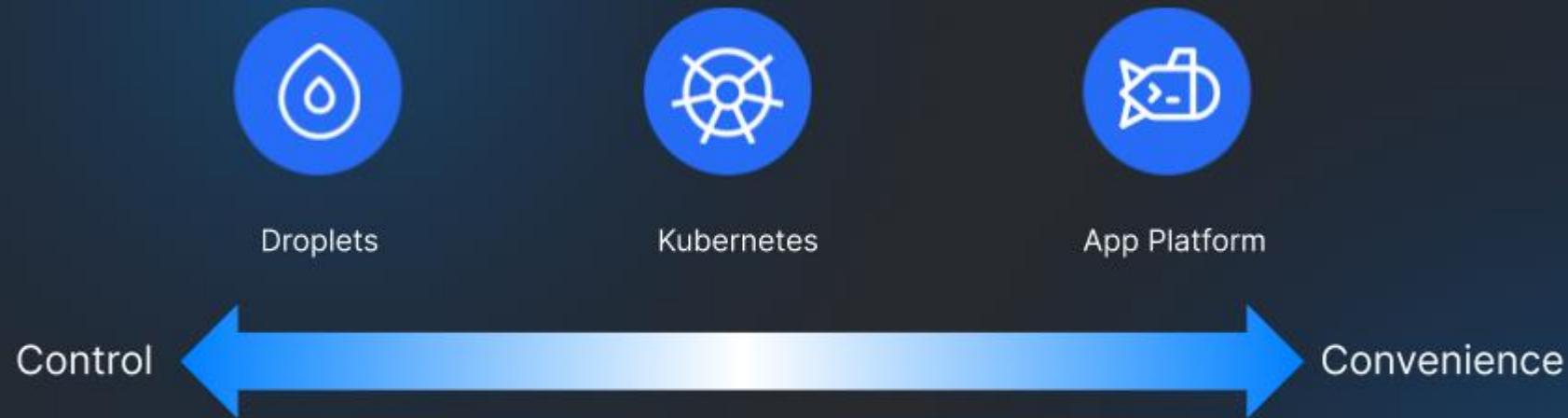
What is k3d?

k3d is a lightweight wrapper to run k3e (Rancher Lab's minimal Kubernetes distribution) in docker.



kubernetes

Simplicity with choice



Developer of all skills. Apps of all scale.

Digital Ocean (the developer cloud)



kubernetes

Google



open source

2014



CLOUD NATIVE
COMPUTING FOUNDATION



kubernetes



Borg
19 years experience



Google

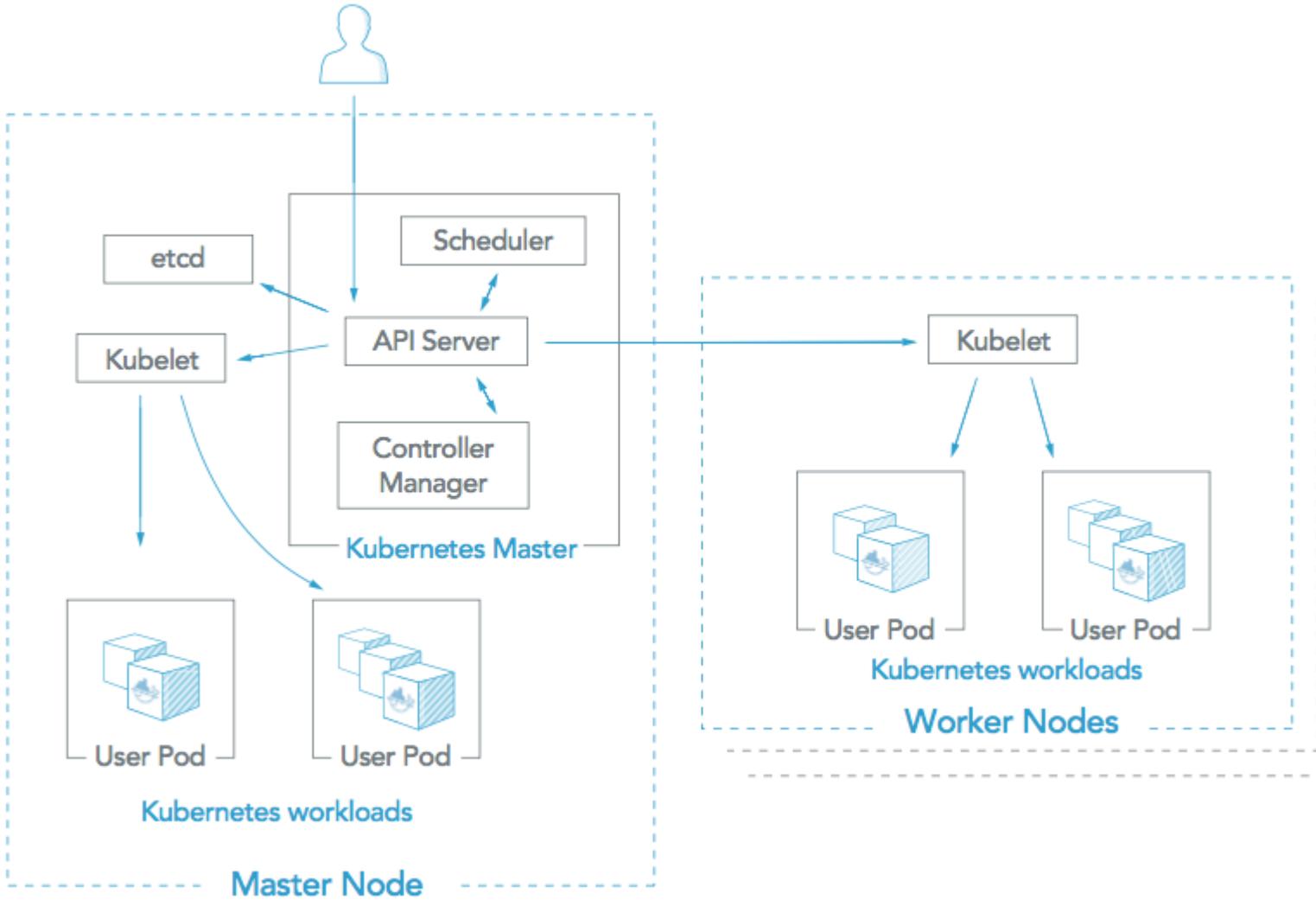


Google zoeken Ik doe een gok

Google aangeboden in: Français Deutsch English

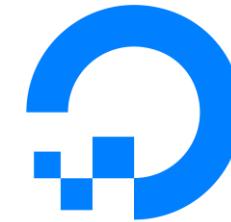
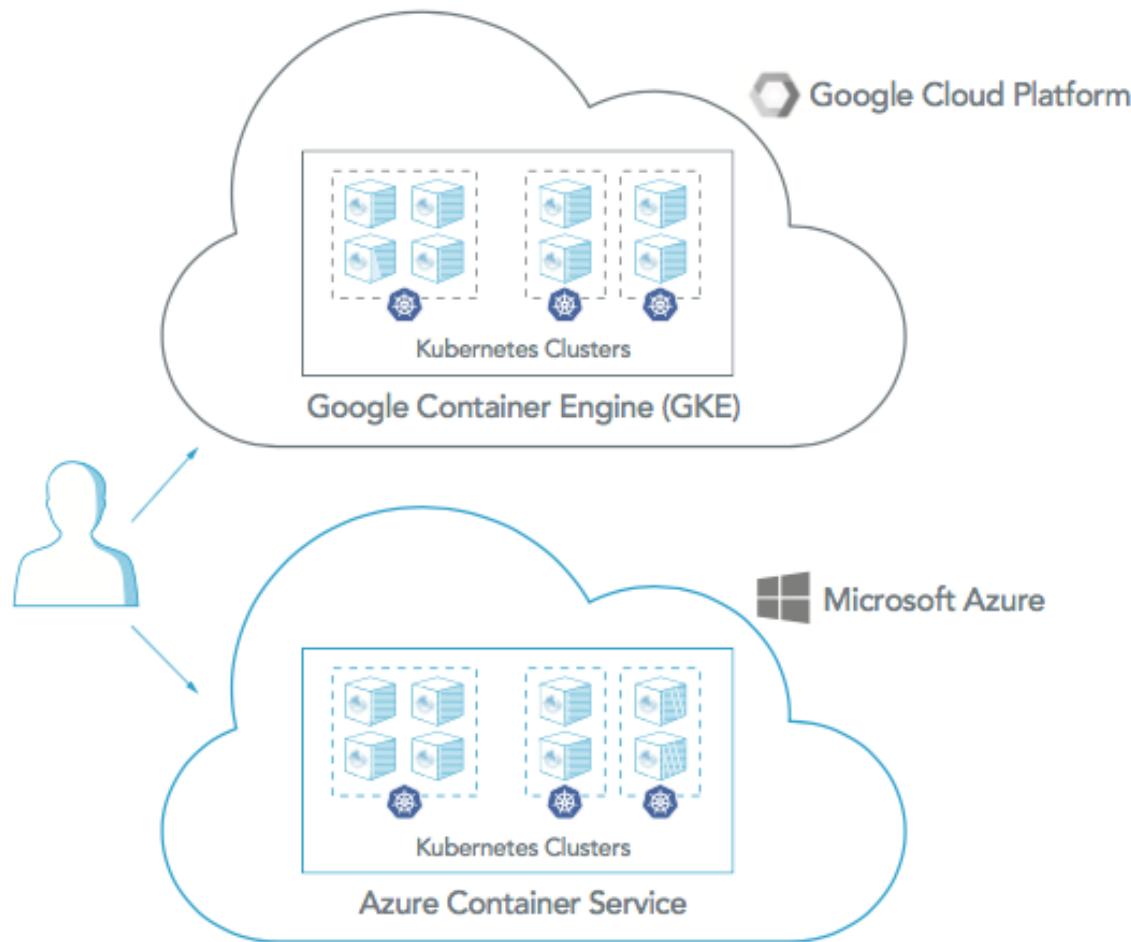


kubernetes





kubernetes



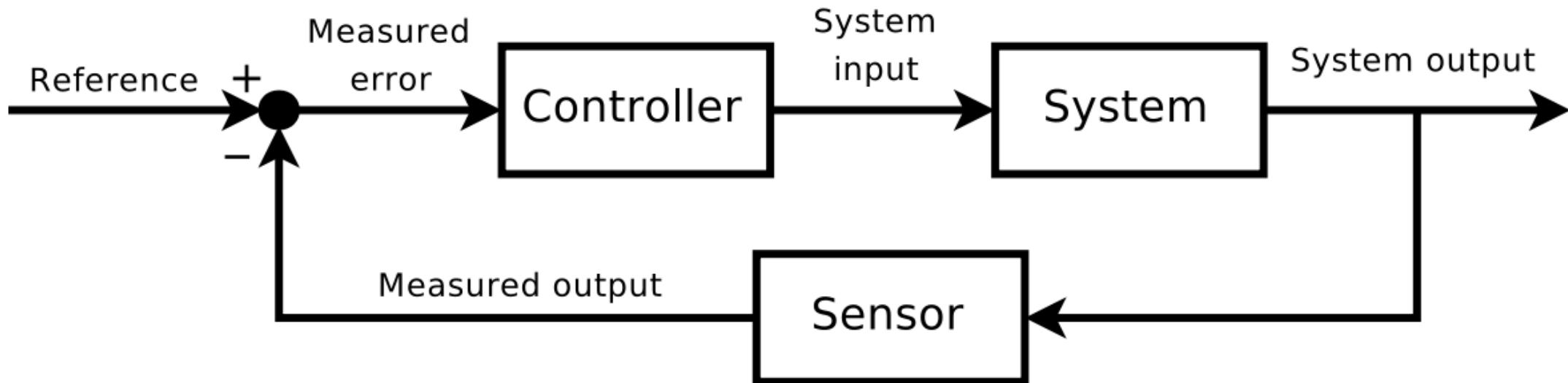
DigitalOcean



On Premise

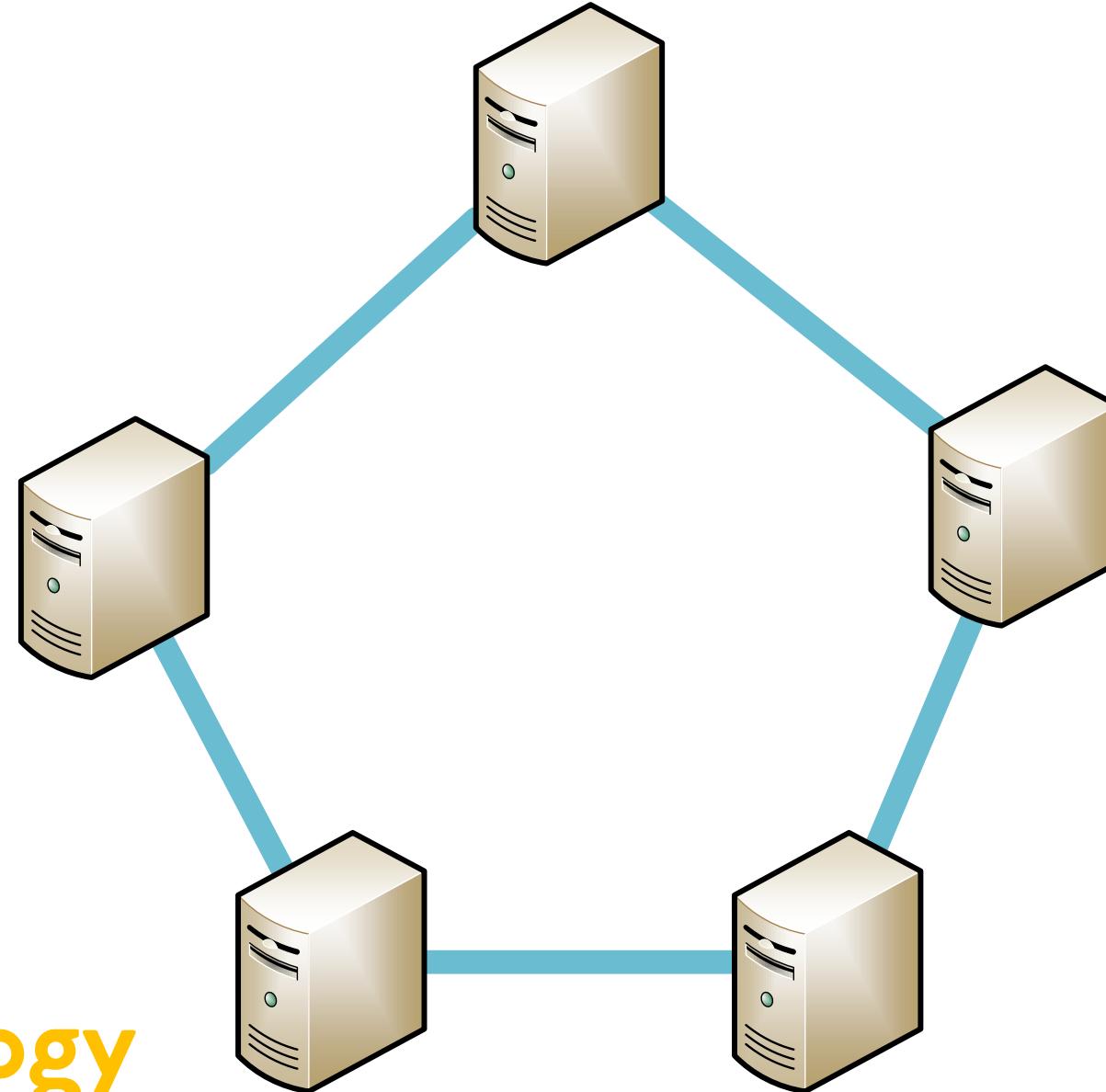


kubernetes





kubernetes



Incomplete analogy

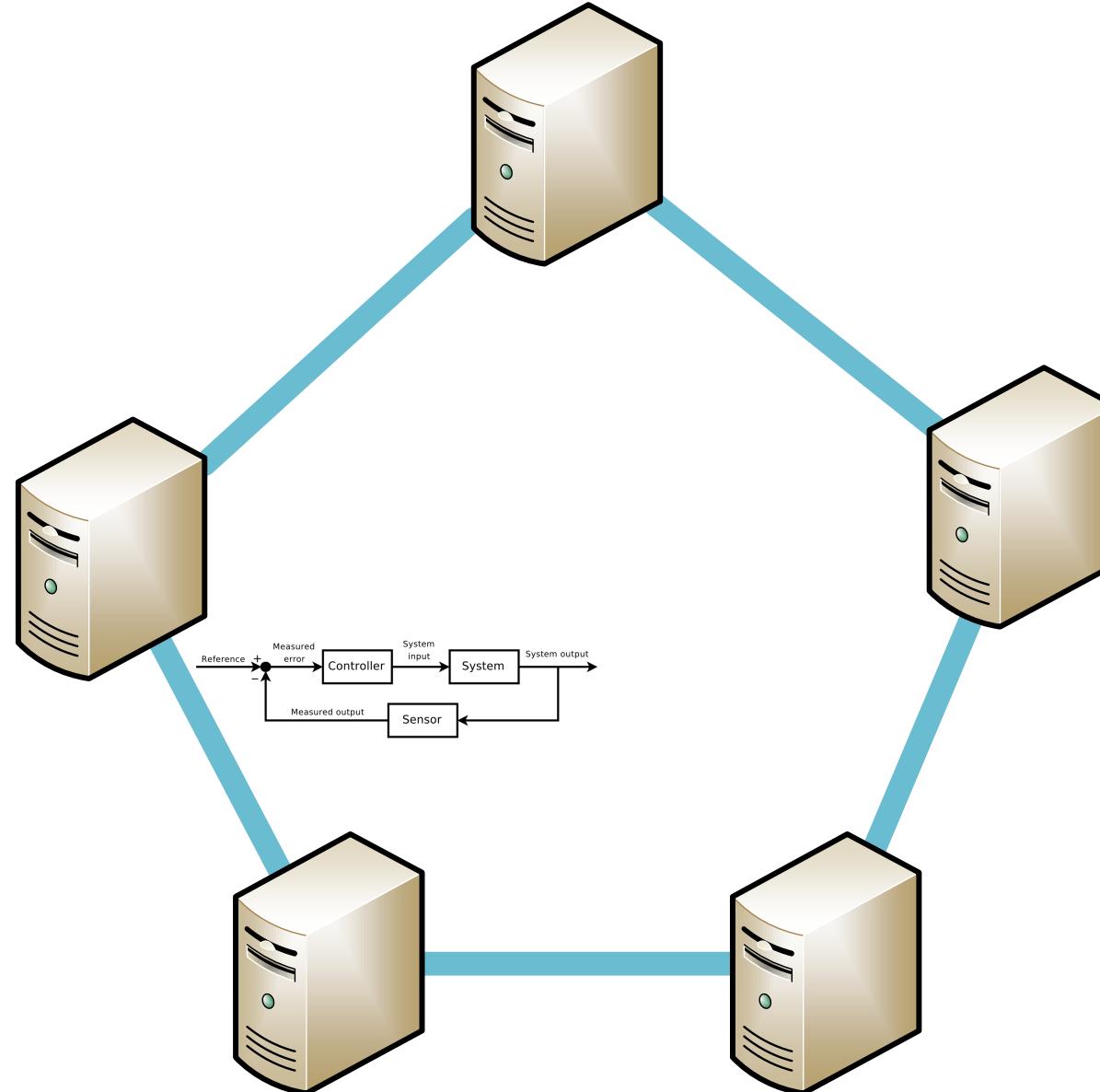
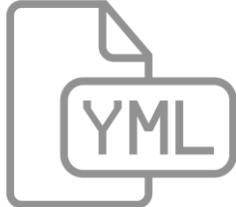


kubernetes

Docker Hub

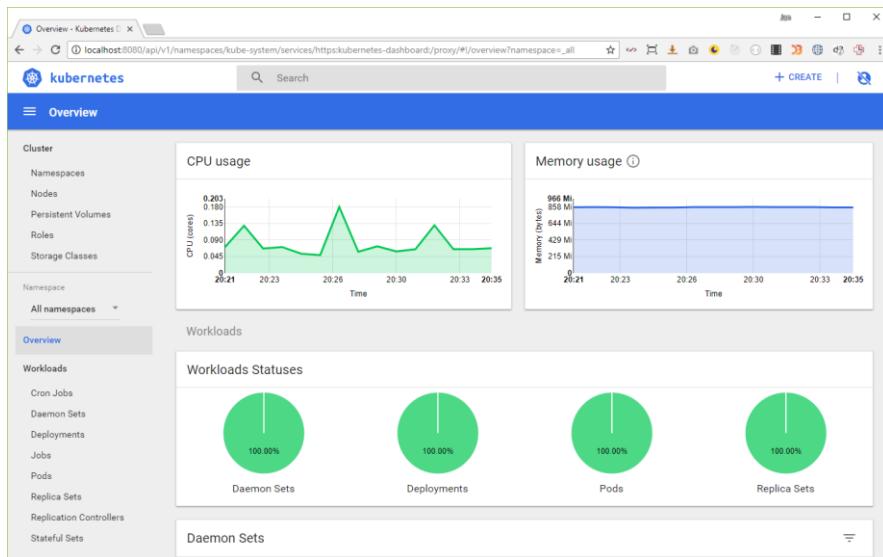


kubectl





kubernetes



Kubernetes dashboard

http://localhost:8001/api/v1/namespaces/kube-system/services/https:kubernetes-dashboard:/proxy/overview/namespaces/_all

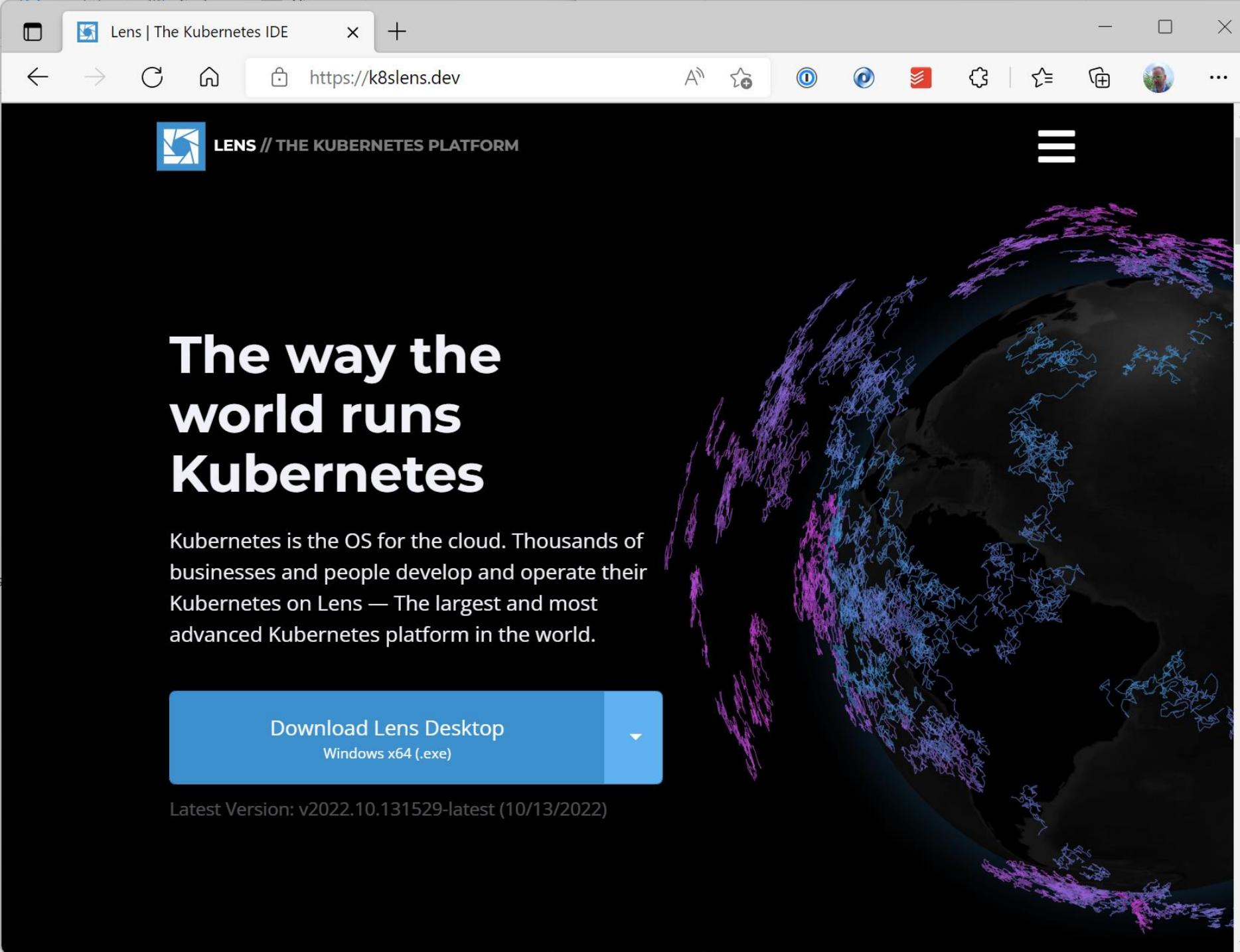
```
# start proxy  
kubectl proxy
```

Kubernetes CLI (command/file)

The figure shows a browser window displaying the JSON response of the '/apis' endpoint. The response is a large object with various API groups and their versions, such as 'apiregistration.k8s.io' with versions 'v1' and 'vbeta1', and 'extensions' with version 'vbeta1'.

```
{  
  "kind": "APIGroupList",  
  "apiVersion": "v1",  
  "groups": [  
    {  
      "name": "apiregistration.k8s.io",  
      "versions": [  
        {  
          "groupVersion": "apiregistration.k8s.io/vbeta1",  
          "version": "vbeta1"  
        }  
      ],  
      "preferredVersion": {  
        "groupVersion": "apiregistration.k8s.io/vbeta1",  
        "version": "vbeta1"  
      },  
      "serverAddressByClientCIDRs": null  
    },  
    {  
      "name": "extensions",  
      "versions": [  
        {  
          "groupVersion": "extensions/vbeta1",  
          "version": "vbeta1"  
        }  
      ],  
      "preferredVersion": {  
        "groupVersion": "extensions/vbeta1",  
        "version": "vbeta1"  
      },  
      "serverAddressByClientCIDRs": null  
    },  
    {  
      "name": "apps",  
      "versions": [  
        {  
          "groupVersion": "apps/v1",  
          "version": "v1"  
        }  
      ],  
      "preferredVersion": {  
        "groupVersion": "apps/v1",  
        "version": "v1"  
      },  
      "serverAddressByClientCIDRs": null  
    }  
  ]  
}
```

Kubernetes API

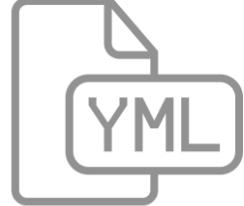


kubernetes

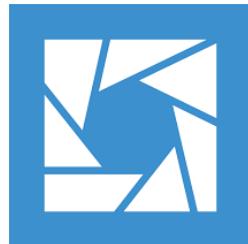


kubernetes

kubectl



kubectl on your local machine



Lens on your local machine



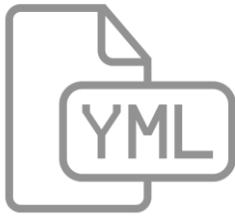
Kubernetes cluster
in the cloud with 1 master and 1 worker node
on Digital Ocean

Exercise setup

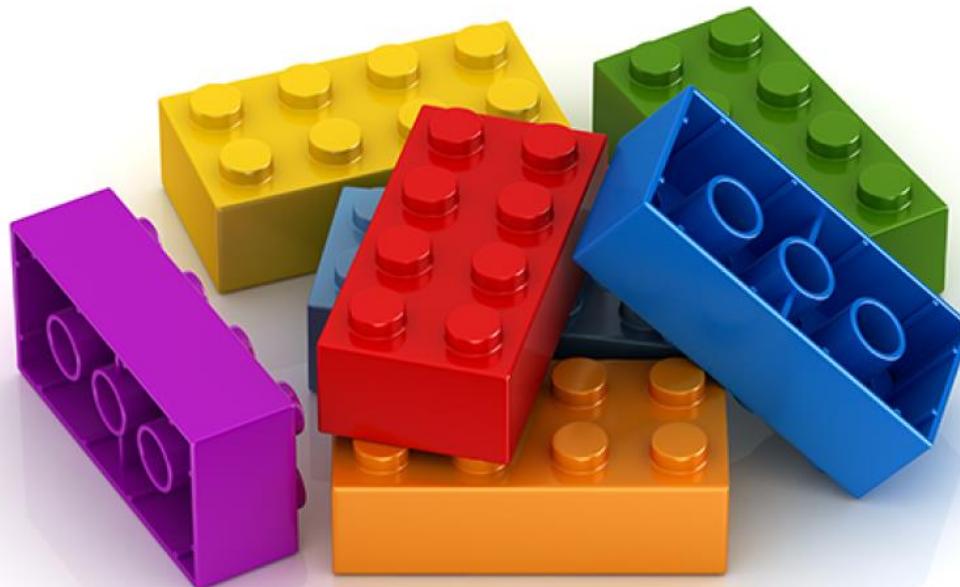


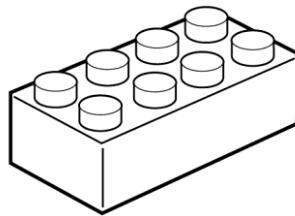
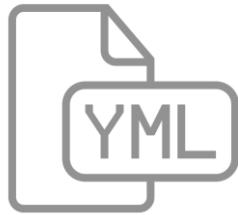
kubernetes

Demo time
connect to cluster



kubernetes





Pod

Pod

- metadata (e.g. tags)
- specs (e.g. resource limits)
- containers
- probing

my-app

```
apiVersion: v1
kind: Pod
metadata:
  name: my-app-pod
  labels:
    app: my-app-pod
spec:
  containers:
    - name: my-app-container
      image: devgem/my-app:3.0
      env:
        - name: my_message
          value: "Hello from Itenium on Kubernetes"
      resources:
        limits:
          cpu: 1500m
          memory: 1024Mi
        requests:
          cpu: 50m
          memory: 50Mi
```

```
kubectl apply -f kube/my-app-pod.yaml
```

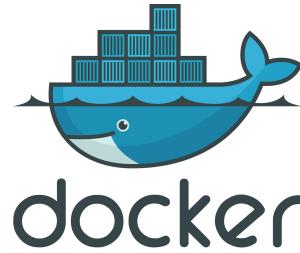


kubernetes

Demo time
Pod



kubernetes



kubernetes

Evening 1
24/11/2022



kubernetes

Evening 2
22/12/2022



Debugging



Istio