eficode

BUILDING A SCALABLE CLOUD NATIVE TRAINING PLATFORM

with Kubernetes

Or why pods are not VM's

Whoami

Sofus Albertsen

Consultant, Trainer, Speaker

We don't chop wood

We sharpen axes

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git

Terraform

JFrog ARTIFACTORY

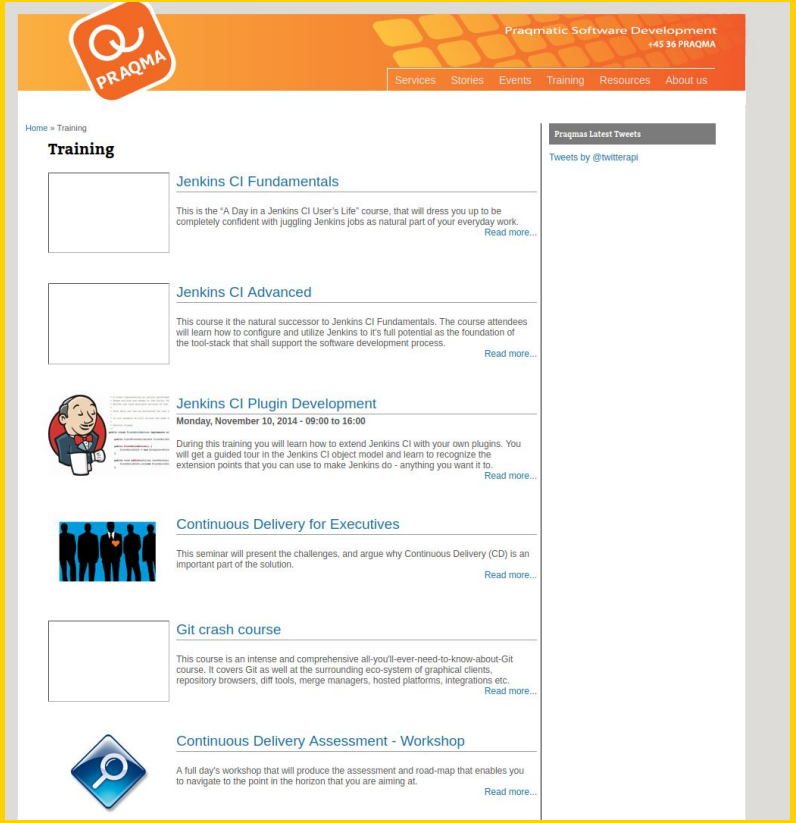
argo

HELM

Setting the scene

The History

10+ years of training



ENTER WESL -

Windows

Enterprise

Standard

Laptop

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WESL - the perfect fit

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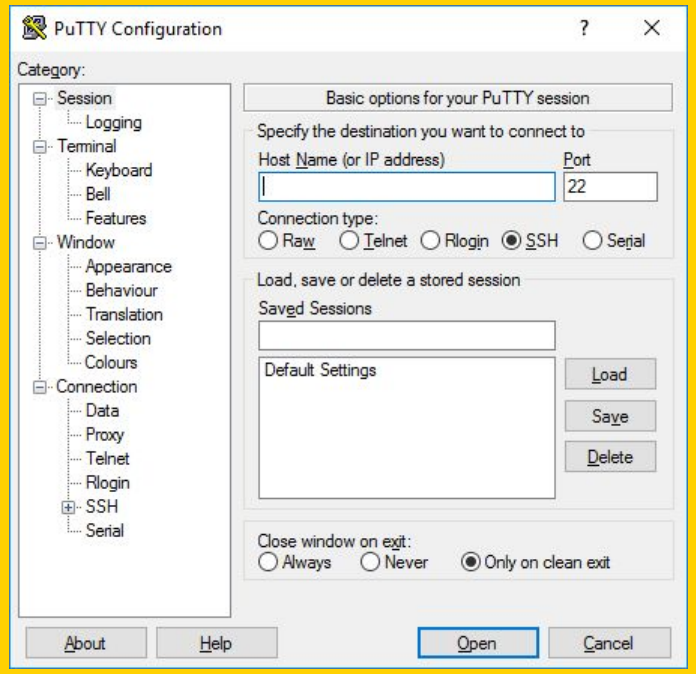
TODO

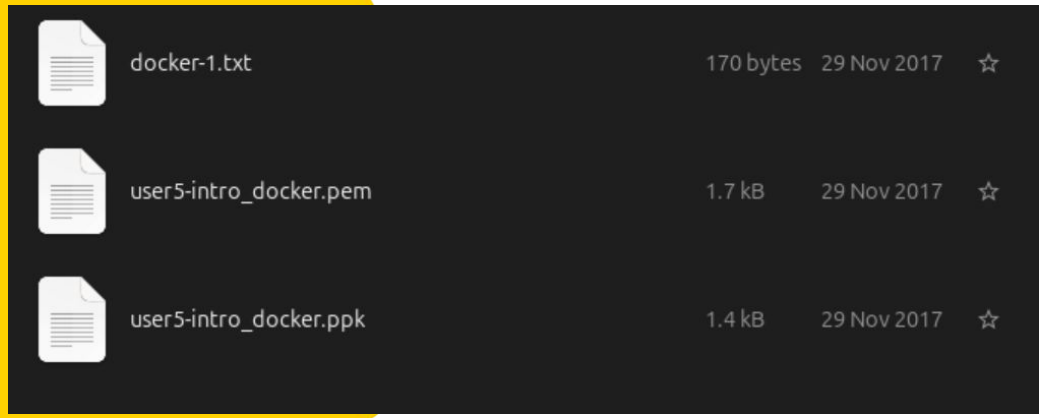
- [ ] *Install Docker*
- [ ] *Install Kubernetes*
- [ ] *Success!*

TODO

- [ ] Install Docker
- [ ] Install Kubernetes
- [ ] Success!

… And you get a machine!
And a lesson in PuTTY and SSH





IaC is king!

HashiCorp Terraform

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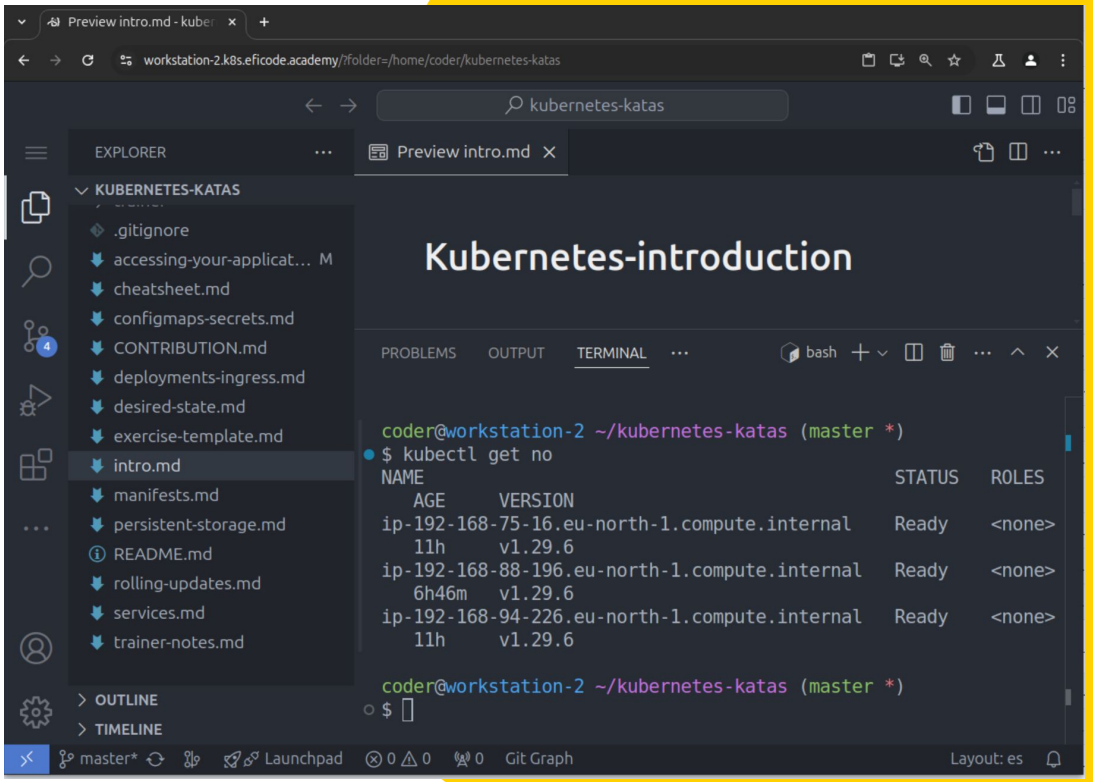
- Infrastructure as code (!)
  - Layered, modular approach
  - EKS cluster got included
- Introduction to URL!
- Visual studio code in a browser
- 100% connection rate within 10-15 minutes of setup



What could possibly go wrong?

And they lived happily ever after???

- It was magnificent!
- It was secure!
- It was....

  Totally unmaintainable!

Old implementation

Language	files	blank	comment	code
JSON	3	5	0	2925
HCL	44	366	52	1998
YAML	17	43	123	1815
Bourne Shell	21	285	56	1416
Markdown	6	229	0	595
Python	1	65	48	235
make	3	55	7	205
Dockerfile	1	0	1	11
SUM:	96	1048	287	9200

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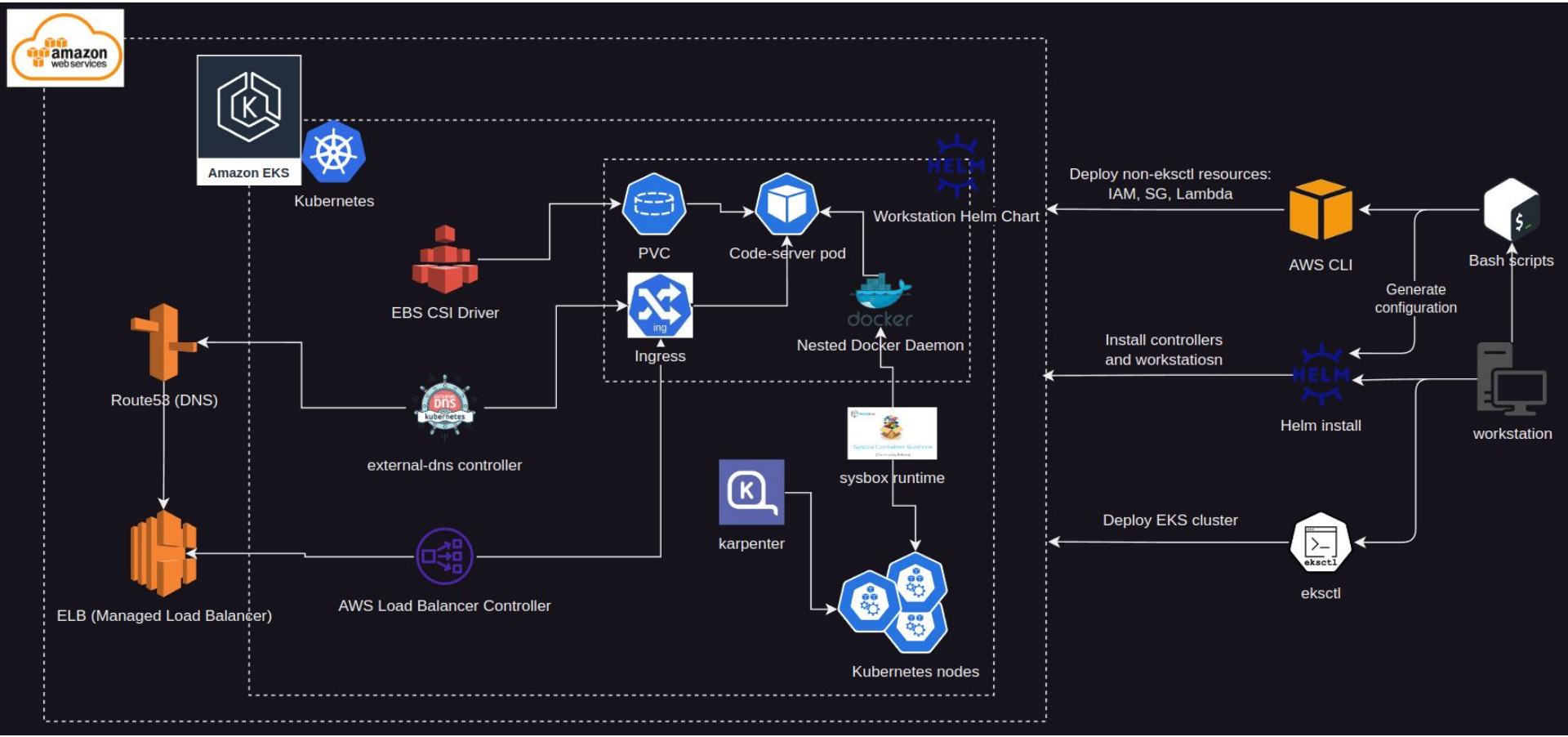
New implementation

Language	files	blank	comment	code
YAML	62	112	78	1769
Bourne Shell	51	353	219	1177
JSON	7	0	0	313
Python	3	46	47	167
Dockerfile	5	37	35	133
Markdown	2	57	0	122
Bourne Again Shell	3	43	69	93
HTML	1	0	0	10
Text	1	0	0	7
SUM:	135	648	448	3791

The task

- User:
  - Look and feel as a VM to the students.
- Infrastructure:
  - We wanted a platform build on top of Kubernetes.
  - Must work with all existing courses.
  - All additions as cloud native implemented as possible.
  - Everything should be declarative --> avoid running scripts to configure things.

The landscape



```yaml
apiVersion: eksctl.io/v1alpha5
kind: ClusterConfig

metadata:
 name: "soal-cluster"
 region: "eu-north-1"
 version: "1.29"

iam:
…
addons:
 - name: coredns
   version: "latest"
 - name: vpc-cni
   version: "latest"
 - name: kube-proxy
   version: "latest"
 - name: aws-ebs-csi-driver
   version: "latest"

nodeGroups:
 - name: "soal-cluster-default-workers"
   amiFamily: Ubuntu2004
   instanceType: "t3.xlarge"
   desiredCapacity: 2
   availabilityZones: ["eu-north-1a"]
   labels:
     owner: "sofus.albertsen"
     role: "workers"
     sysbox-install: "yes"
```

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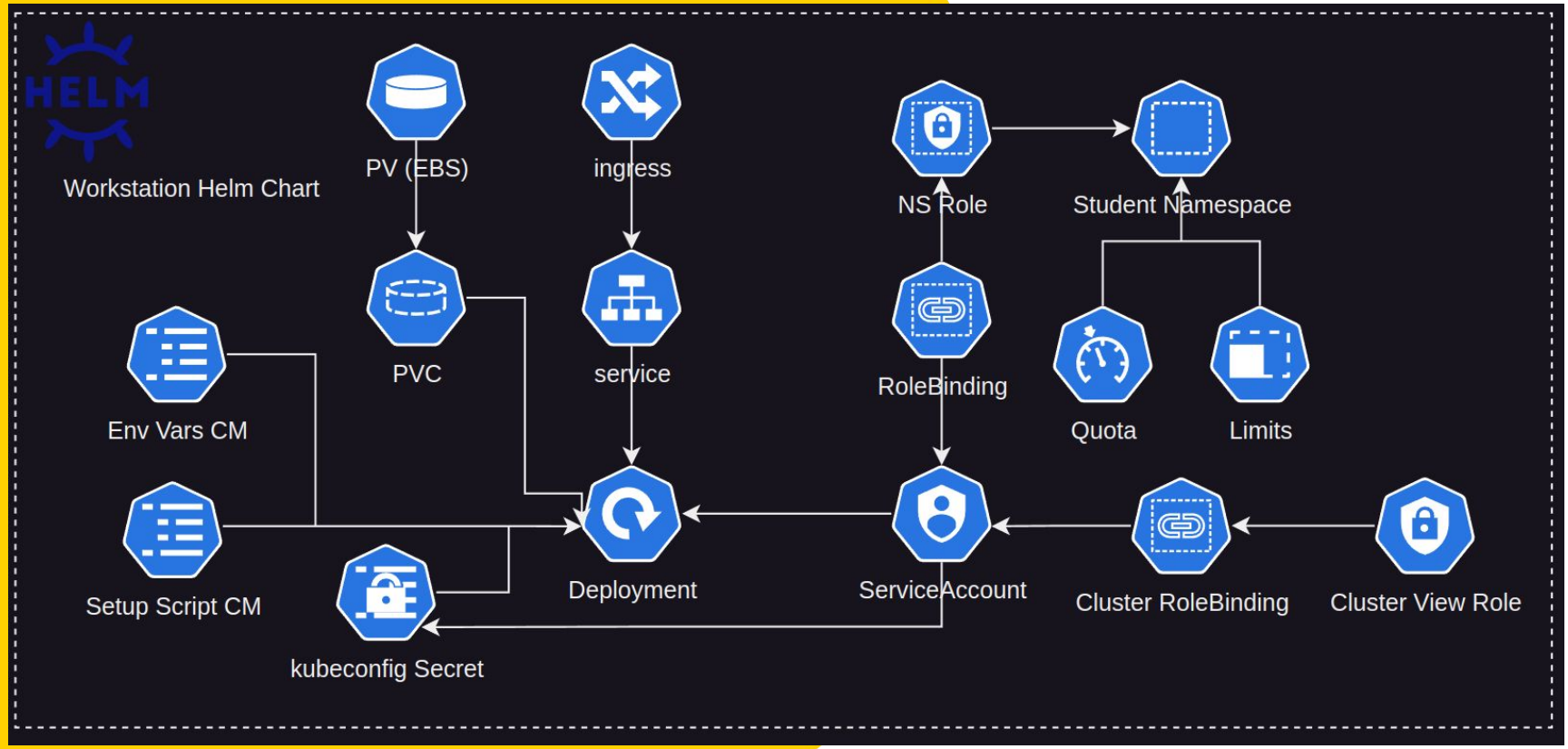
eksctl

- Simplified EKS Cluster Management
- Infrastructure as Code
- Opinionated (read: less config than Terraform)

Helm charts

```
# flags for tools
INSTALL_ARGO_CD="true"
INSTALL_ISTIO="false"
INSTALL_ARTIFACTORY="false"
FIREFOX_IN_DOCKER="false"
```

The workstation



Demo

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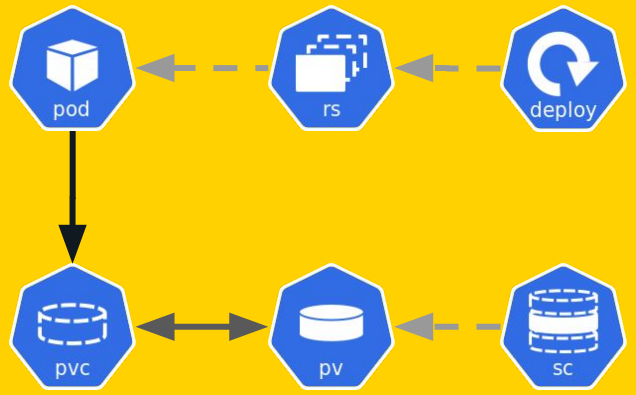
The struggles

Or why pods are not VM's

Image: **Tumblr's Tumbeasts**

Persistency

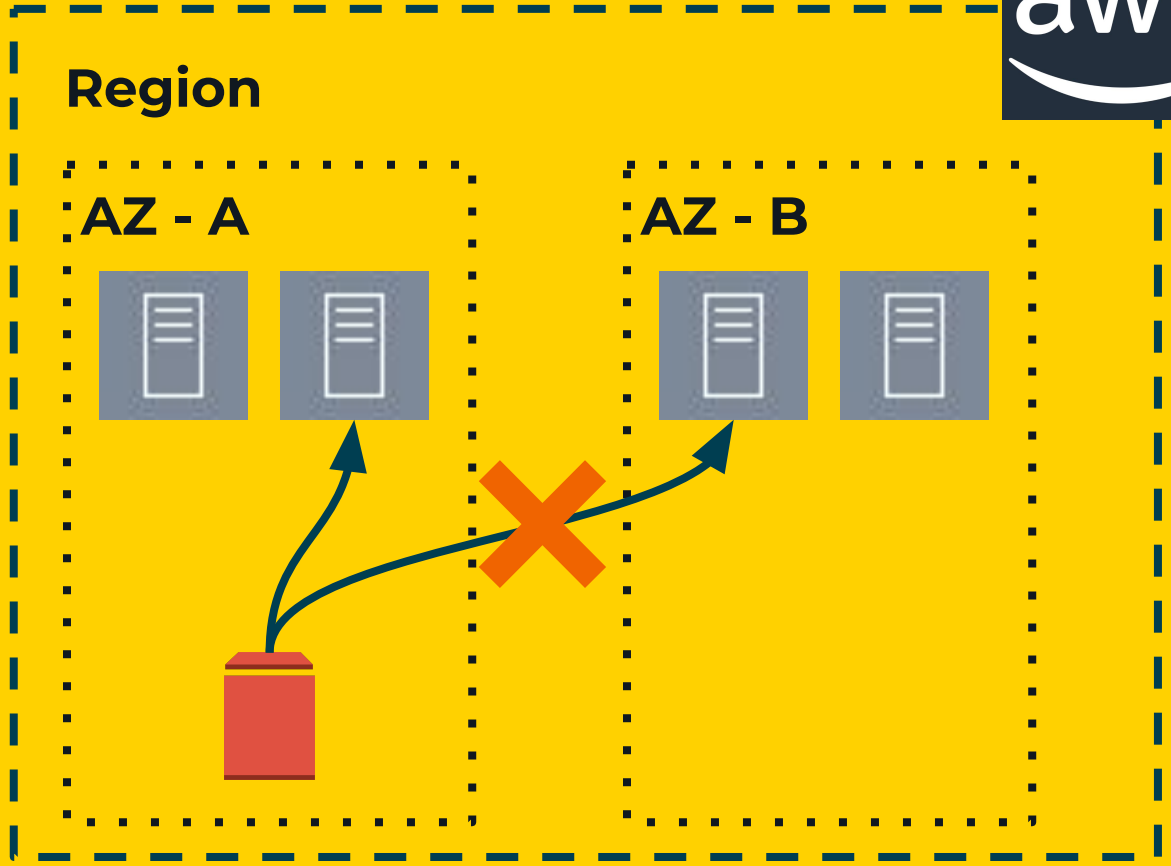


```
setup.sh: |
  #!/usr/bin/env bash

  FLAG_FILE="/home/coder/.setup_done"

  if [ -f "${FLAG_FILE}" ]; then
    echo "Setup has already been performed. Skipping..."
    exit 0
  fi

  echo "====================="
  echo "Running setup script"
  echo "====================="

  echo "--> copying inital /home/coder/ files back from
backup"
  sudo cp -r /coder-initial-home/coder /home/
…
   # Touch the flag file to indicate that the setup has been
performed
  touch ${FLAG_FILE}

  echo "========================="
  echo "Done running setup script"
  echo "========================="
```

Persistency

- PVC != Named Volumes
- What is in container gets deleted
- Needs trickeries to function

EBS != Region



Solution: All nodes in one AZ

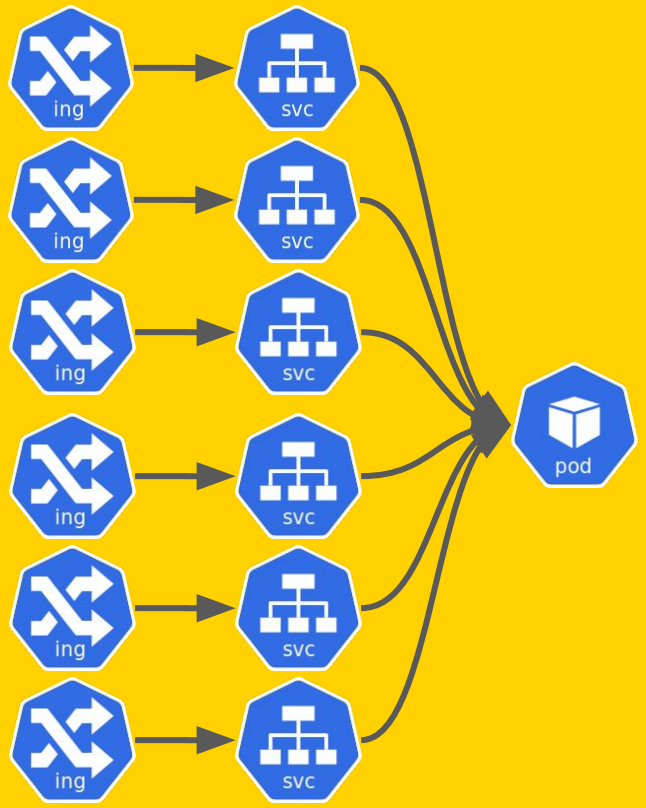
Ingress

100 workstations x 100 ports

=

10.000 Service +
10.000 Ingress

=
10.000 security groups in AWS
...And how many load balancers?



Solution: Create only a few ports

Docker in docker

Docker in docker

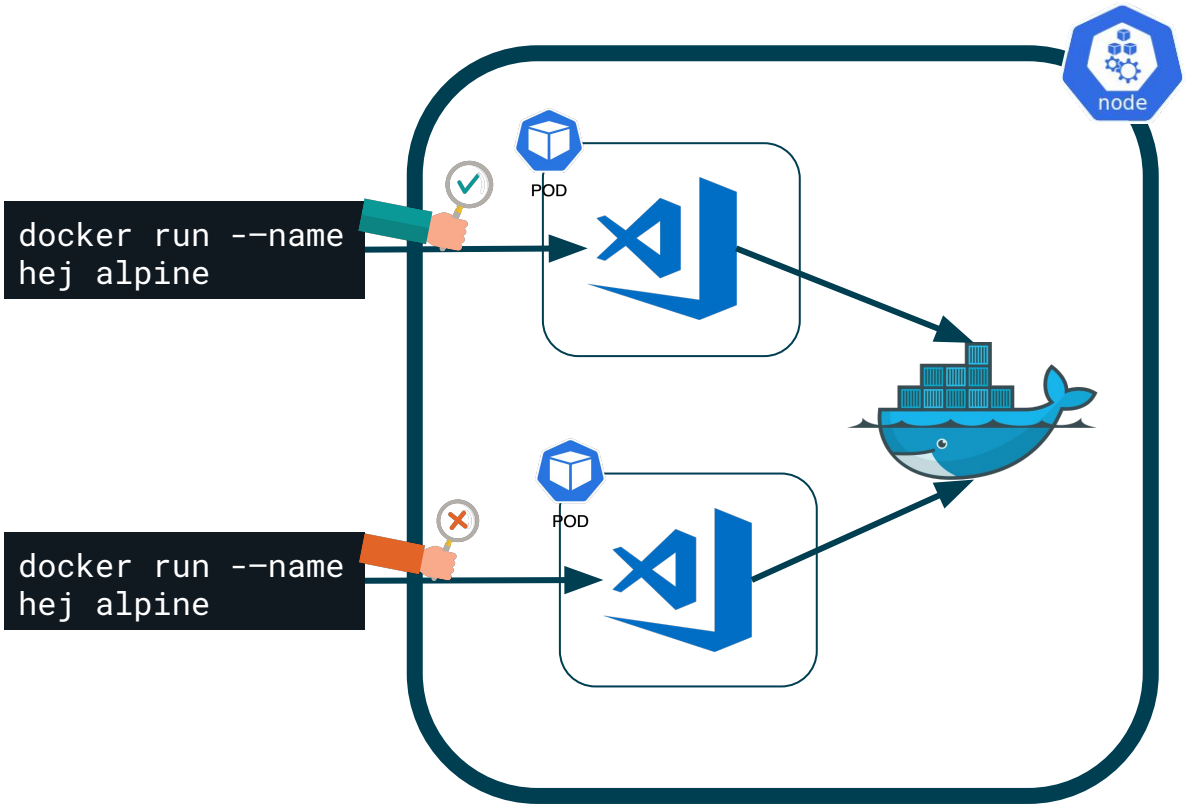
Docker outside of docke

Dind?

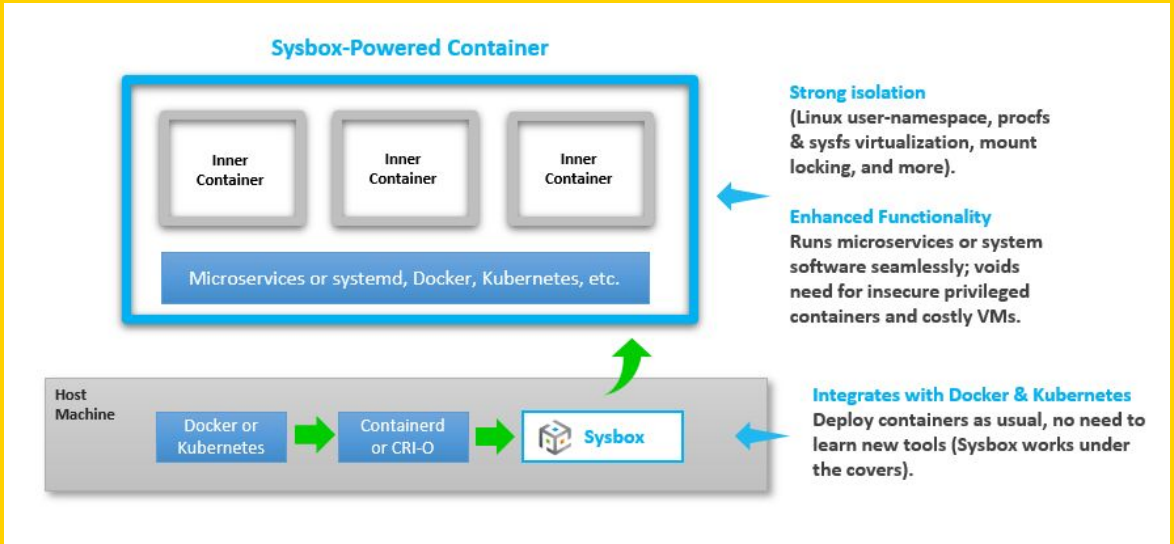
DouD?

Douh?

We need help.....



Docker in docker

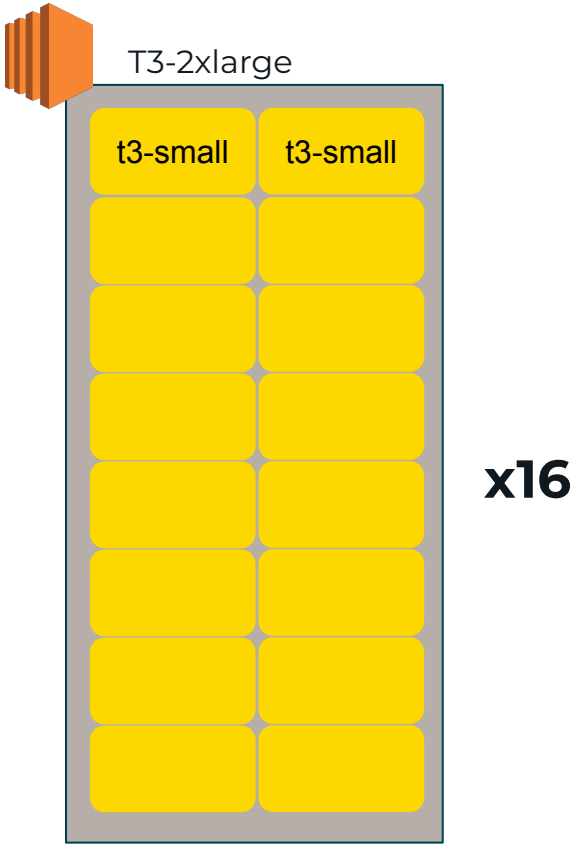


Sysbox

cri-o

The result

- Looks and feels like a VM!
- Less unstable
- Easier to use
- Easier to maintain*



x16

User= 2 Gigs mem, 2 CPU MAX

x21

User= 3 Gigs mem, 6 CPU MAX

Todo

Todo

Todo

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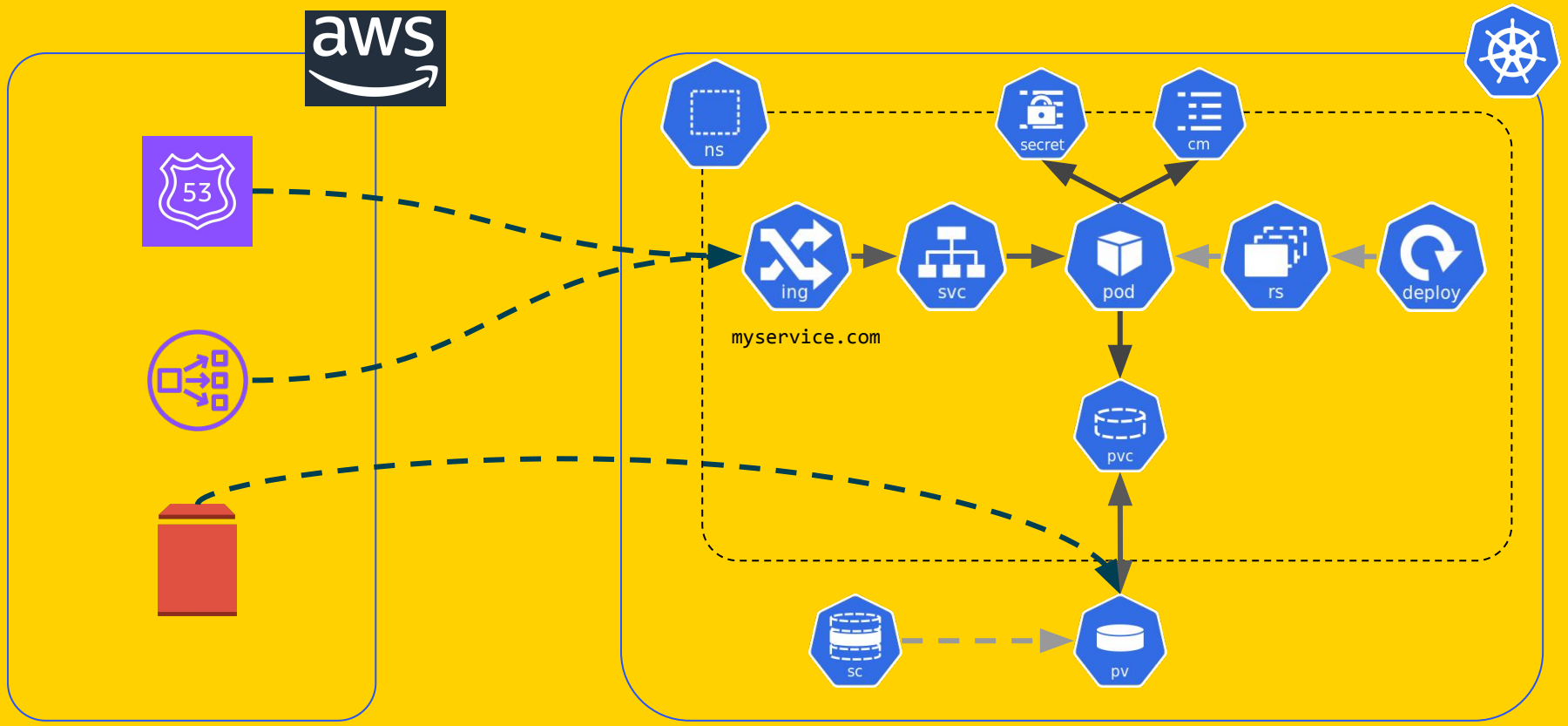

Reach out:

https://www.linkedin.com/in/sofusalbertsen/

Thank you ❤