EFFECTIVE PLATFORM BUILDING WITH KUBERNETES.

Wojciech Barczyński - SMACC.io | Hypatos.ai

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WOJCIECH BARCZYŃSKI

- Lead Software Developer & System Engineer
- K8S: 2.5 years @ startups
- Before: Openstack, SAP R&D
- + Visiting lecturer and Trainer

SMACC

Hypatos

Github: wojciech12 | Linked: IN | HP: wbarczynski.pl | T: @wbarczynski

STORY

- Lyke - [12.2016 - 07.2017]
- SMACC - [10.2017 - present]

My Role: Leading the change, implementing it

WHY WE LIKE KUBERNETES?

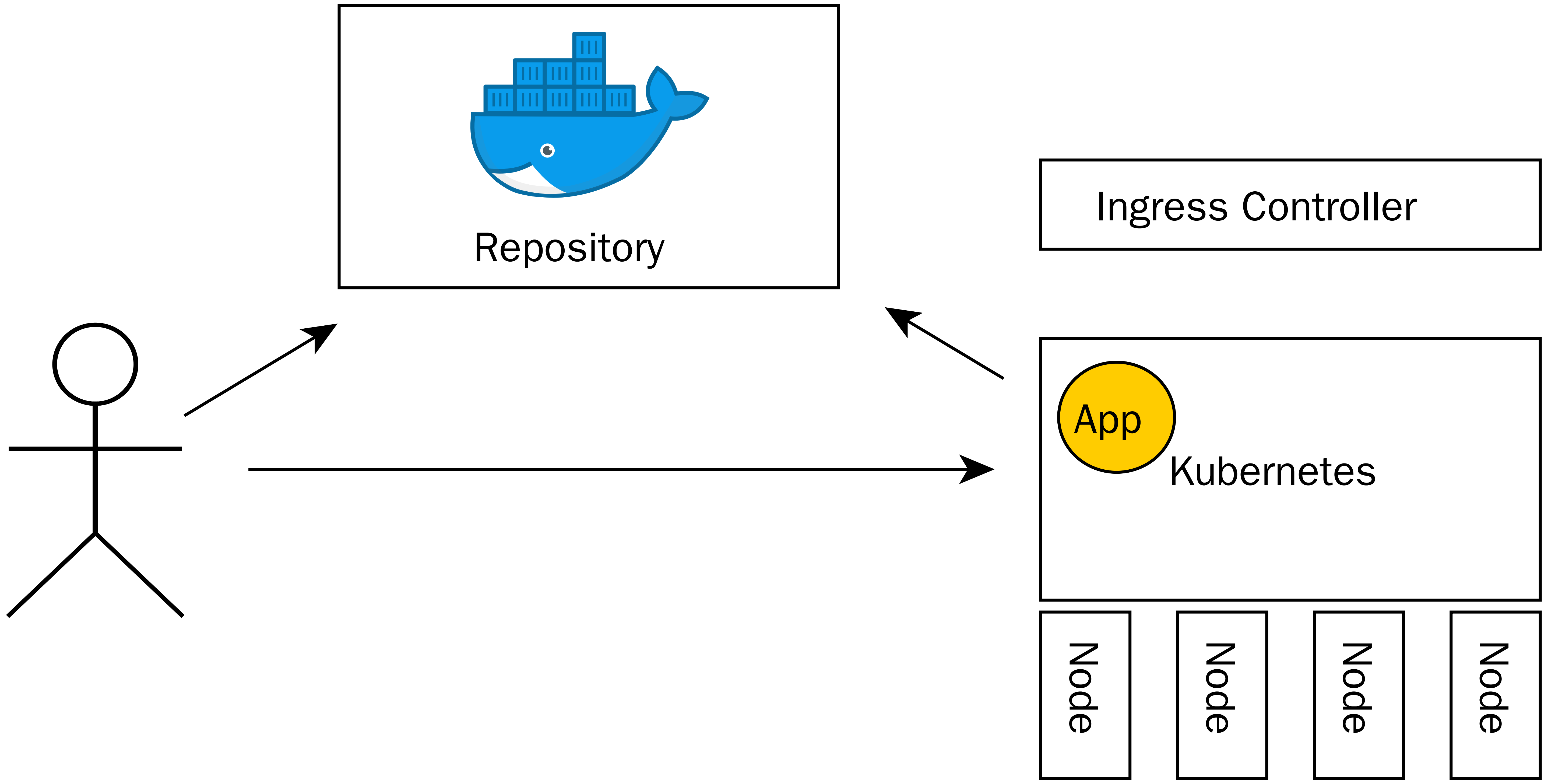
FOR ME

- Data center as a black box
- Lingua Franca
- Batteries included
- Learn-as-you-go experience
- Independent from IaaS provider

Notice: not a silver bullet

BLACK BOX

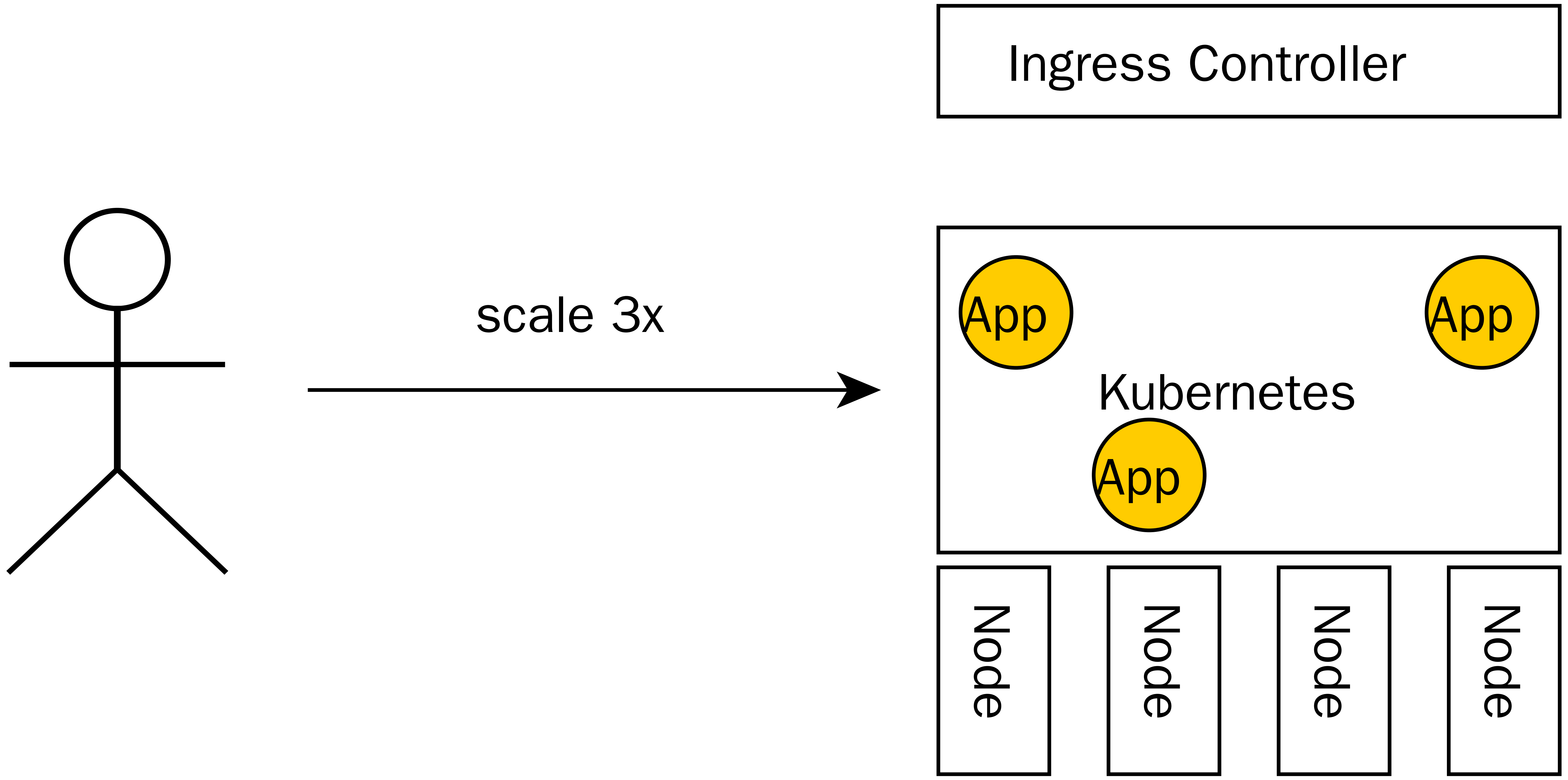
Deploy!



`make docker_push; kubectl create -f app-srv-dpl.yaml`

BLACK BOX

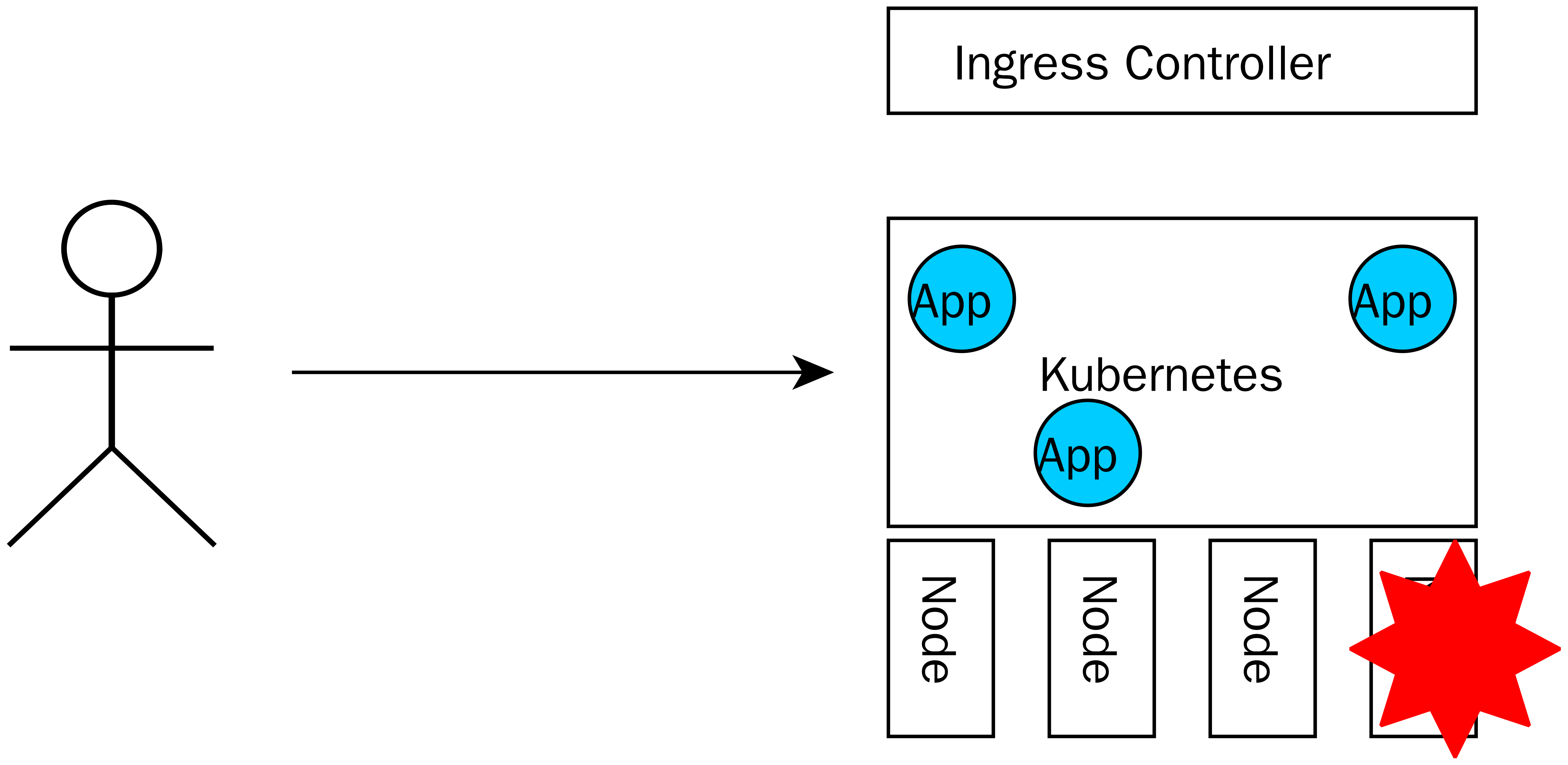
Scale up! Scale down!



```
kubectl --replicas=3 -f app-srv-dpl.yaml
```

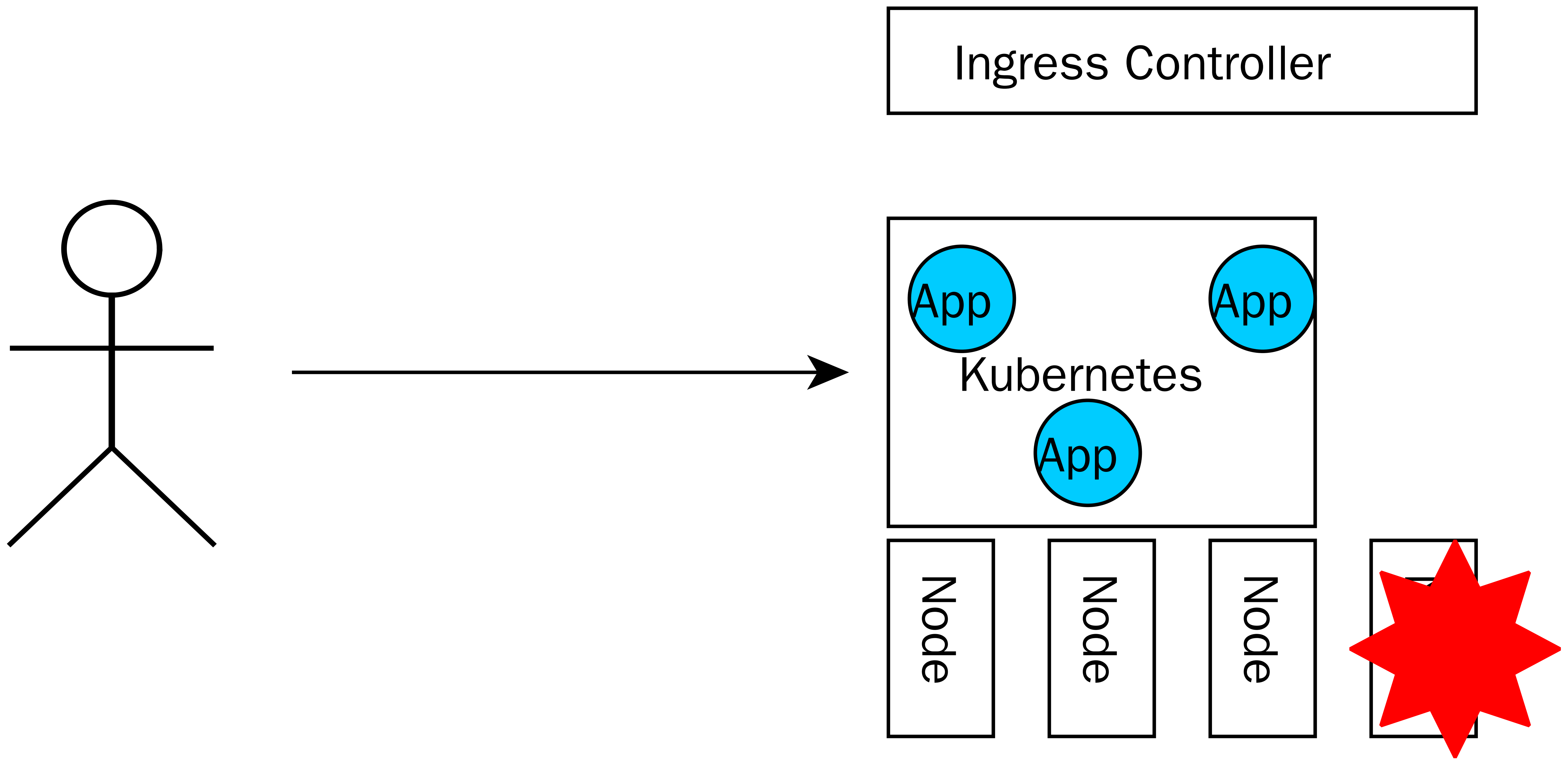
BLACK BOX

Resistance and Migrations



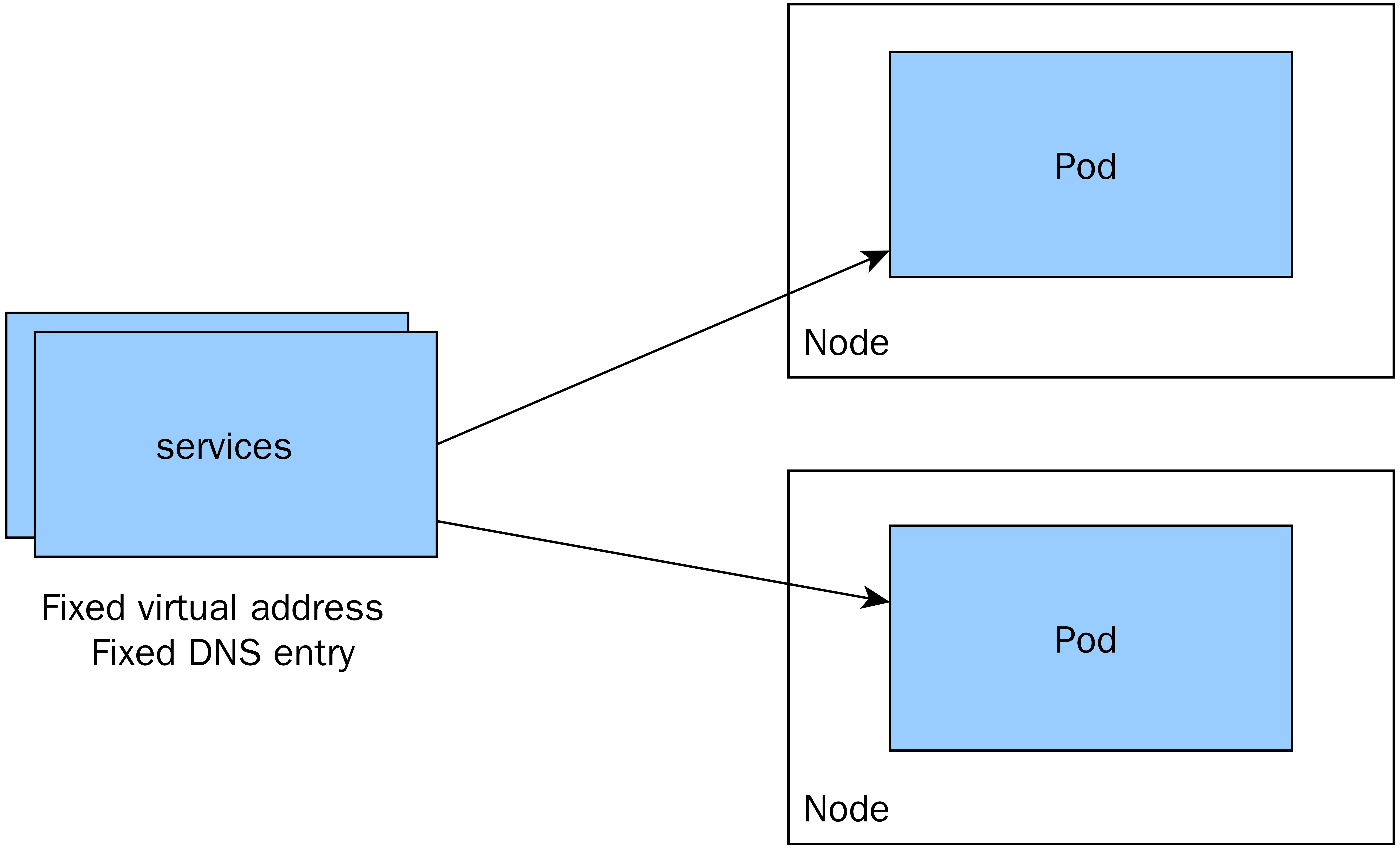
BLACK BOX

Resistance and Migrations

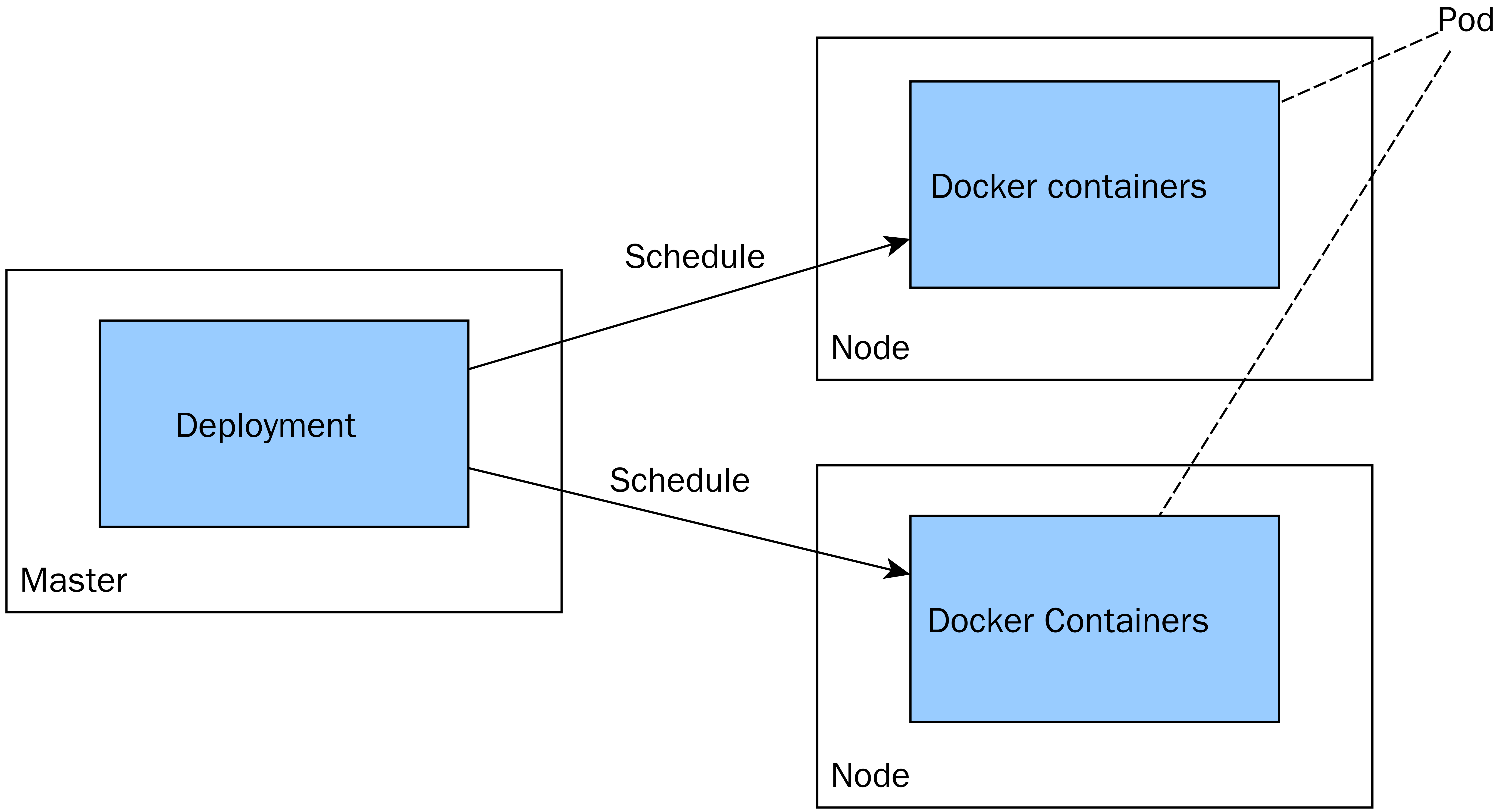


and much more: load balancing

LINGUA FRANCA



LINGUA FRANCA

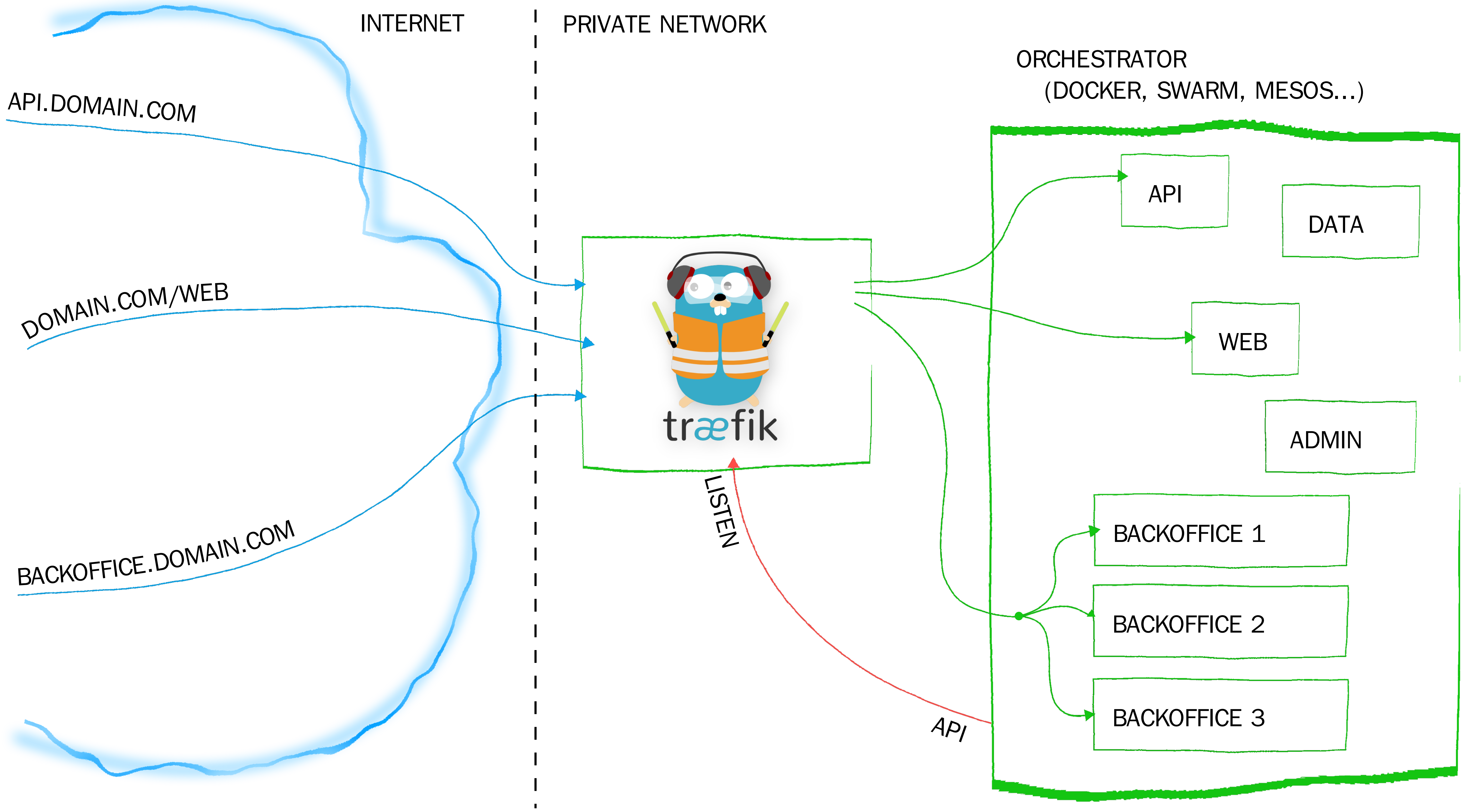


LIGUA FRANCA

Pattern	Target App Service
api.smacc.io/v1/users	users-v1
api.smacc.io/v2/users	users-v2
smacc.io	web

LINGUA FRANCA

Ingress Controller:



Drop-in: traefik, nginx, haproxy, envoy...

BATTERIES

Service Discovery:

- service injected to DNS:
  `curl http://users/list`
- labels:
  `name=value`
- annotations:
  `prometheus.io/scrape: "true"`

SERVICE DISCOVERY

- Loosely couple components
- Auto-wiring with logging and monitoring
- Integration

Learn-as-you-go experience

Monitoring? Ingress?

1. Drop-in: traefik, nginx, ...
2. oooo ruuuuns!
3. Make a hell of mistakes
4. Get the right one or It is OK for now

Learn-as-you-go experience

Where to start?

➡ With service and deployment

Learn-as-you-go experience

memcached in k8s?

➡ statefulset

Learn-as-you-go experience

My pod takes all memory
➡ resource & limits

My ML-based app has slow start.

Users noticed downtime.

LONG LIVE GIT!

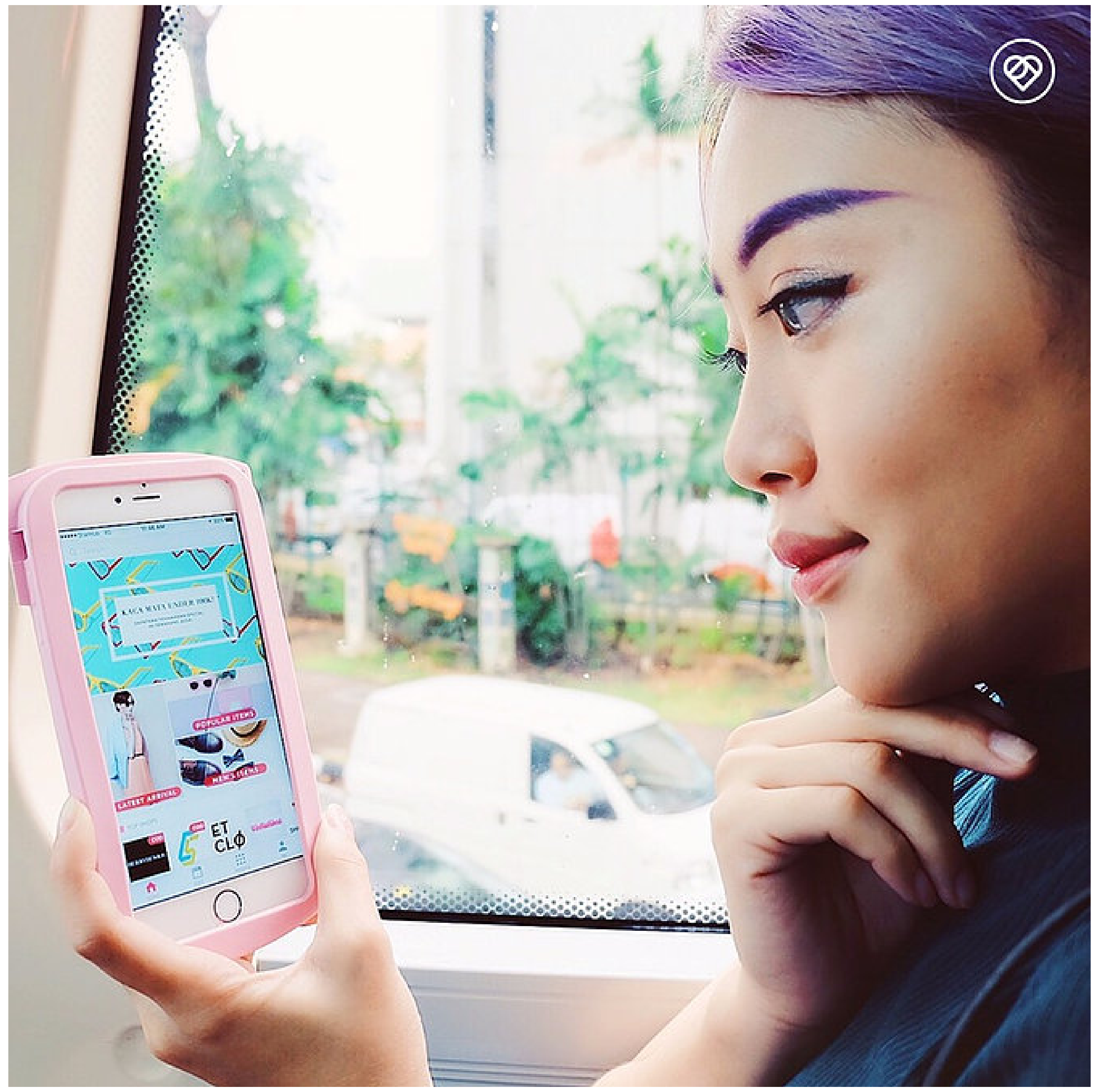
- All yaml in your service git
- Integration with e.g.:
  - monitoring, alarming
  - ingress-controller
- Forget about infrastructure... almost

DevOps Culture Dream!

LYKE

LYKE

- E-commerce Indonesia
- Mobile-only
- 50k+ users
- 2M downloads
- Top 10 Fashion Apps Google Play Store



http://www.news.getlyke.com/single-post/2016/12/02/Introducing-the-New-Beautiful-LYKE

Now JollyChic Indonesia

GOOD PARTS

- Fast Growth
- A/B Testing
- Data-driven
- Product Manager, UI Designer, Mobile Dev, and tester - one body

CHALLENGES

- 50+ VMs in Amazon, 1 VM - 1 App
- 65% Idle machine $$$
- Puppet with manual deployment process
- Fear, Forgotten components
- Performance issues

APPROACH

1. Simplify Infrastructure
2. Change the Development Practices (12factor + kubernetes)
3. Change the Work Organization

see: Conway's law

SIMPLIFY

1. Kubernetes with Google Kubernetes Engine
2. Terraform for all new
3. Database-as-a-service

SIMPLIFY

1. Prometheus, AlertManager, and Grafana
2. Elasticsearch-Fluentd-Kibana
3. Google Identity-Aware-Proxy
   to protect all dev dashboards
4. 3rd party SaaS: statuscake and opsgenie

One person efford

CONTINUOUS DEPLOYMENT

- branch-based:
  - master
  - staging
  - production
- repo independent

TRAVISCI

1. Tests
2. Build docker
3. Deploy to Google Container Registry
4. Deploy to k8s only new docker
5. no config/secrets applied

GIT REPO

```
|- tools
|    |- kube-service.yaml
|    \- kube-deployment.yaml
|
|- Dockerfile
|- VERSION
\- Makefile
```

Makefile

```
SERVICE_NAME=v-connector
GCP_DOCKER_REGISTRY=eu.gcr.io
test: test_short test_integration

run_local:

docker_build: docker_push

kube_create_config:

kube_apply:

kube_deploy:
```

Copy&Paste from the project to project

1. CLEAN UP

- Single script for repo - Makefile [1]
- Resurrect the README

[1] With zsh or bash auto-completion plug-in in your terminal.

2. GET BACK ALL THE KNOWLEDGE

Extract from:

- Puppet, ... ➡ Dockerfile
- Running Instances ➡ Dockerfile, README.rst
- Nagios, ... ➡ README.rst + `checks/`

3. INTRODUCE RUN_LOCAL

- `make run_local`
- A nice section on how to run in README.rst
- with `docker-compose`

The most crucial point.

4. GET TO KUBERNETES

- `make kube_create_config`
- `make kube_apply`
- Generate the yaml files if your envs differ

secrets from gopass (password manager)

5. CONTINUOUS DEPLOYMENT

Travis:

- the same Makefile as dev use

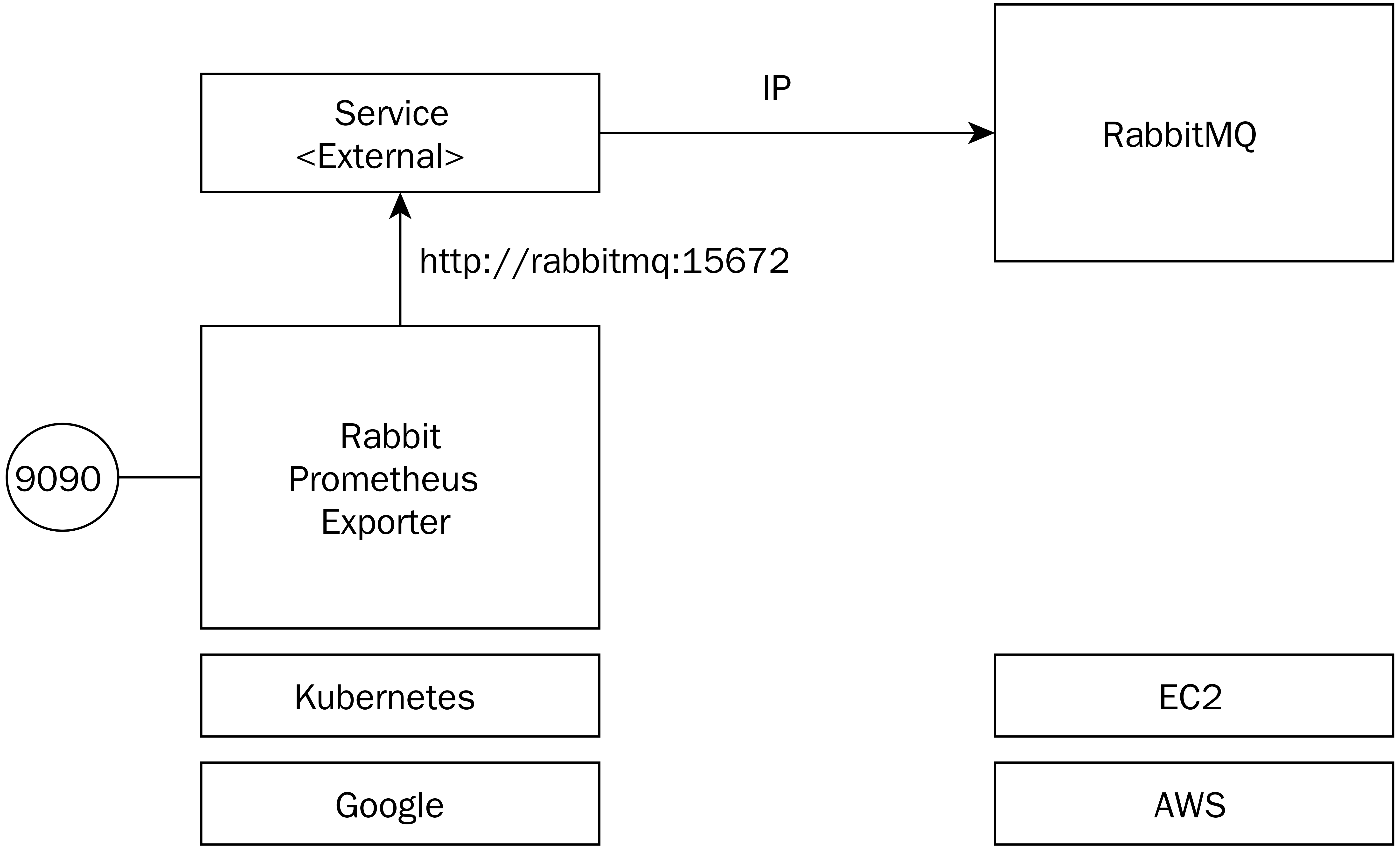
6. KEEP IT RUNNING

Bridge the new with old:

- Use External Services in Kubernetes
- Expose k8s in the Legacy [1]

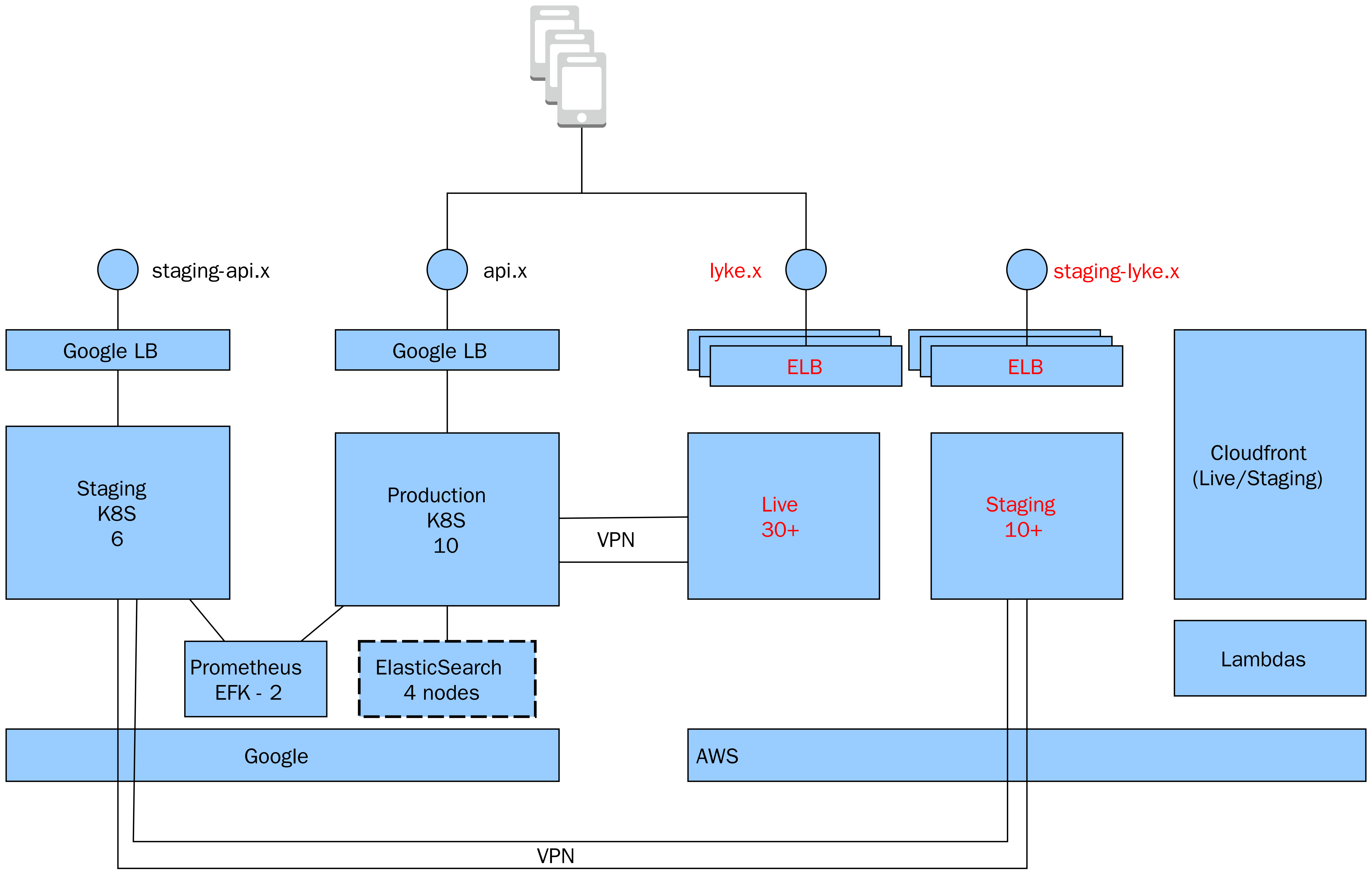
[1] hard coded IP:PORT, considered: K8S events to Consul

Bridge the new with old



Monitor legacy with new stack

Architecture During Migration



7. INTRODUCE SMOKE-TEST

```
TARGET_URL=127.0.0 make smoke_test
TARGET_URL=api.example.com/users make smoke_test
```

8. SERVICE SELF-AWARE

Add to old services:

1. *metrics/*
2. *health/*
3. *info/*

9. MOVE TO MICRO-SERVICES

Offload Legacy:

- Keep the lights on
- New functionality to micro-services

WHAT WORKED

1. Copy&Paste Makefile and k8s yaml
2. Separate deployments a good transition strategy

WHAT DID NOT WORK

1. Too many PoC, cut to 2 weeks max
2. Doing it with too small steps
3. Push back to k8s yaml [*]
4. Alert rules too hard to write

[*] With coaching, I thought, it is OK

DO DIFFERENT

1. Move data day one
2. Make devs know it is a transition stage
3. Teach earlier about resources
4. EFK could wait
5. All-hands for a paid-XXX% weekend for migration

SMACC

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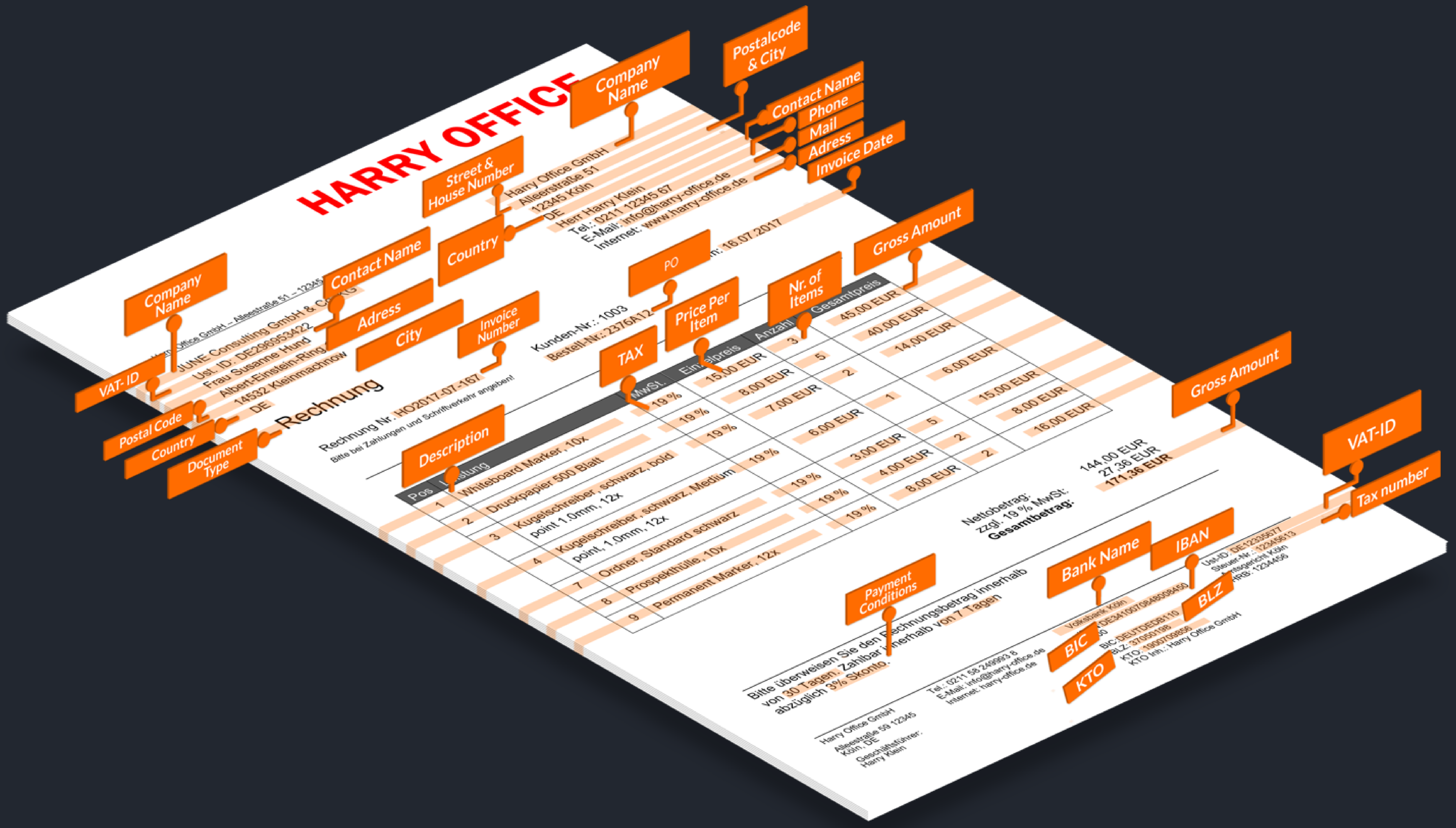
Problem SMACC solves



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…m: 16.07.2017

Rechnung

Rechnung Nr. HO2017-07-167
Bitte bei Zahlungen und Schriftverkehr angeben!

Pos	Leistung	MwSt.	Einzelpreis	Anzahl	Gesamtpreis
1	Whiteboard Marker, 10x	19 %	15,00 EUR	3	45,00 EUR
2	Druckpapier 500 Blatt	19 %	8,00 EUR	5	40,00 EUR
3	Kugelschreiber, schwarz, bold point 1.0mm, 12x	19 %	7,00 EUR	2	14,00 EUR
4	Kugelschreiber, schwarz, Medium point, 1,0mm, 12x	19 %	6,00 EUR	1	6,00 EUR
7	Ordner, Standard schwarz	19 %	3,00 EUR	5	15,00 EUR
8	Prospekthülle, 10x	19 %	4,00 EUR	2	8,00 EUR
9	Permanent Marker, 12x	19 %	8,00 EUR	2	16,00 EUR

Nettobetrag: 144,00 EUR
zzgl. 19 % MwSt: 27,36 EUR
Gesamtbetrag: 171,36 EUR

Bitte überweisen Sie den Rechnungsbetrag innerhalb von 30 Tagen. Zahlbar innerhalb von 7 Tagen abzüglich 3% Skonto.

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Deutsche Bank

AOK
Die Gesundheitskasse.

HelloFresh

BMB
巴三巴
GRUPPE

Deloitte.

EY

accenture

McKinsey&Company

SMACC

STORY

1. Legacy on AWS and AWS ECS :/
2. Self-hosted K8S on ProfitBricks (PB)
3. ooo... K8S can use Azure Active Directory :D

STORY

4. Get to Microsoft ScaleUp
5. Welcome Azure!
6. Luckily. AKS
7. Easy migration from PB to AKS

AZURE KUBERNETES SERVICE

- Independent from IaaS
- Plug and play
- Integration with GPU
- Our OnPrem = Our OnCloud

SIMPLICITY

- az aks CLI for setting k8s - README.rst
- Terraform for everything else
- Secrets: 1Password and gopass.pw

Terraform also sets our AWS

DIFFERENCE ☠

- Two teams in Berlin and Warsaw
- Me in Warsaw

NEW EXPERIENCE

Devs do not:

- like TravisCI, Makefiles, Yamls
- feel it is too much hasle

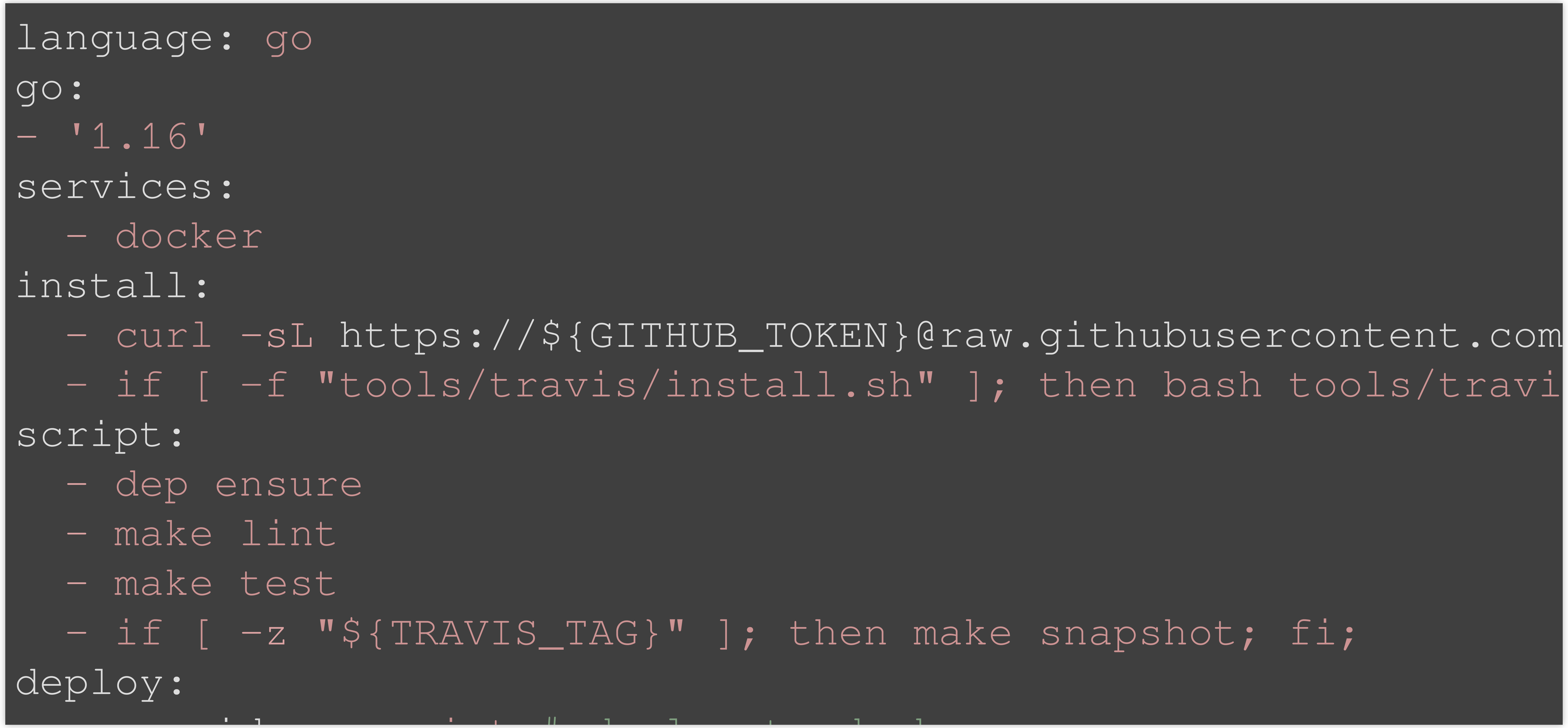
Transition from PB to AKS was painful

SOLUTION

- make everything ligther
- c&p without modifications
- hide the k8s, remove magic
- deploy on *tag*

Similar to the Kelsey Hightower approach

Repo .travis.yml



```
language: go
go:
- '1.16'
services:
  - docker
install:
  - curl -sL https://${GITHUB_TOKEN}@raw.githubusercontent.com
  - if [ -f "tools/travis/install.sh" ]; then bash tools/travi
script:
  - dep ensure
  - make lint
  - make test
  - if [ -z "${TRAVIS_TAG}" ]; then make snapshot; fi;
deploy:
```

Makefile

```
|- tools
|    |- Makefile
|    |- kube-service.yaml
|    \- kube-deployment.yaml
|
|- Dockerfile
\- Makefile
```

Makefile only tasks for dev

CONTINUOUS DEPLOYMENT

- Github
- TravisCI
- hub.docker.com
- AKS

CONTINUOUS DEPLOYMENT

1. `git tag` and `push`
2. smacc-platform.git
3. Deploy to staging
4. PR to production

KUBERNETES

- Pure, generated, kubernetes config
- 2x kubernetes operators

WHAT WORKED

- Hiding k8s
- Understandable CD process

WOULD DO DIFFERENT

- More sensitive to feedback

NEXT

- Acceptance tests listen on k8s events
- Deployment tool based on missy
- Keeping an eye on Istio

K8S - Linux / App server?

- Out-of-box integration
- Lingua Franca - AWS Service Operator
- Learn as you go
- onPremise = onCloud = OnLocal (e.g., kube-desktop)

K8S - Linux / App server?

- Do not terrorize your devs with K8S
- No free lunch... app must be smarter
- On VM vs K8S vs Lambdas?

THANK YOU. QUESTIONS?

ps. We are hiring.

```
def distance_matrix(regions):
    """ Computes a distance matrix against a region list """
    tuples = [r.as_tuple() for r in regions]
    return cdist(tuples, tuples, region_distance)


def clusterize(words, **kwargs):
    # TODO: write a cool docstring here
    db = DBSCAN(metric="precomputed", **kwargs)
    X = distance_matrix([Region.from_word(w) for w in words])
    labels = [int(l) for l in db.fit_predict(X)]
```

github.com/wojciech12/talk_cloudnative_and_kubernetes_waw

```
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```

BACKUP SLIDES

```
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```

CHANGE THE WORK ORGANIZATION

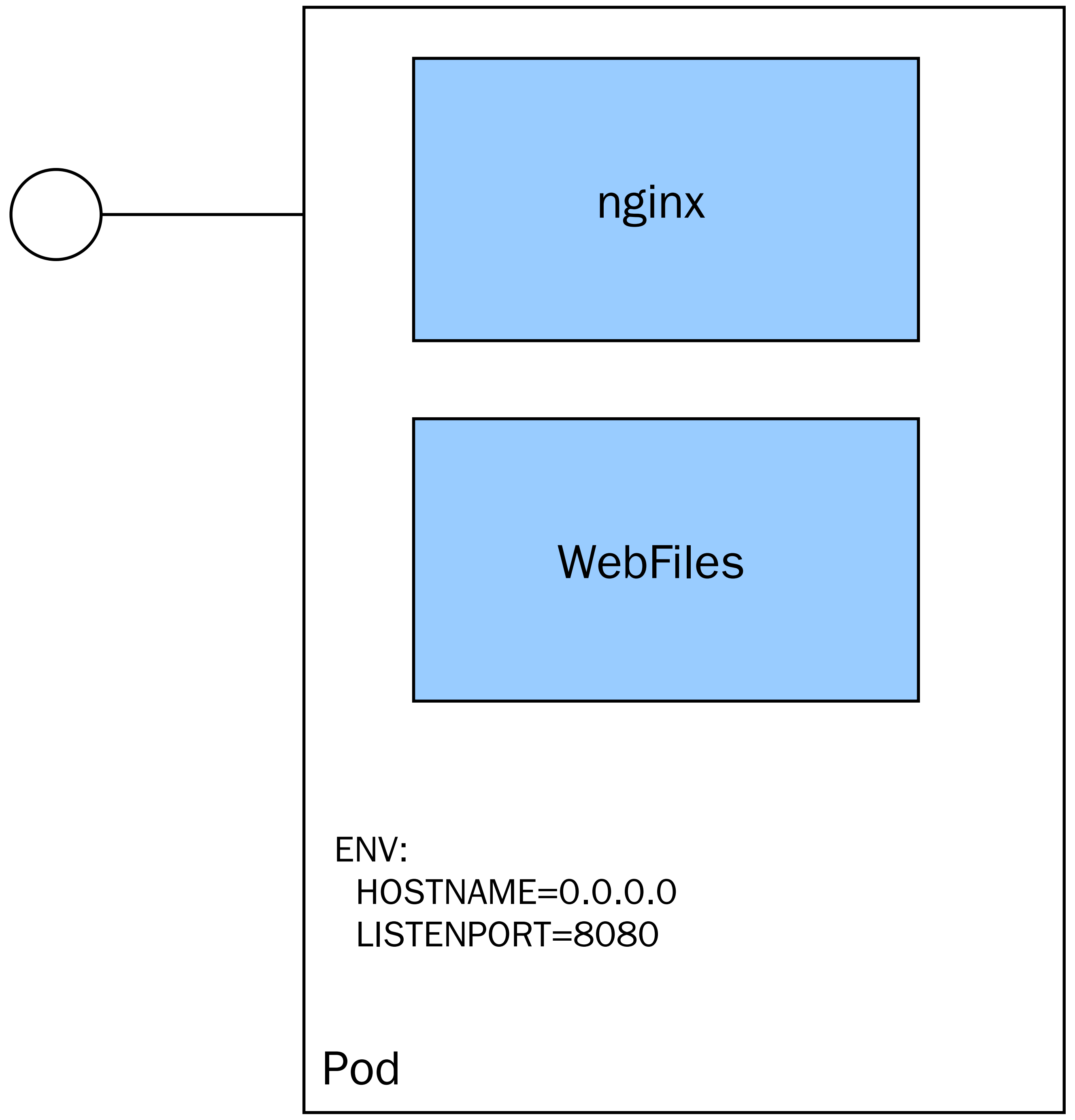
- From Scrum
- To Kanban
- from Kanban to Squads

For the next talk

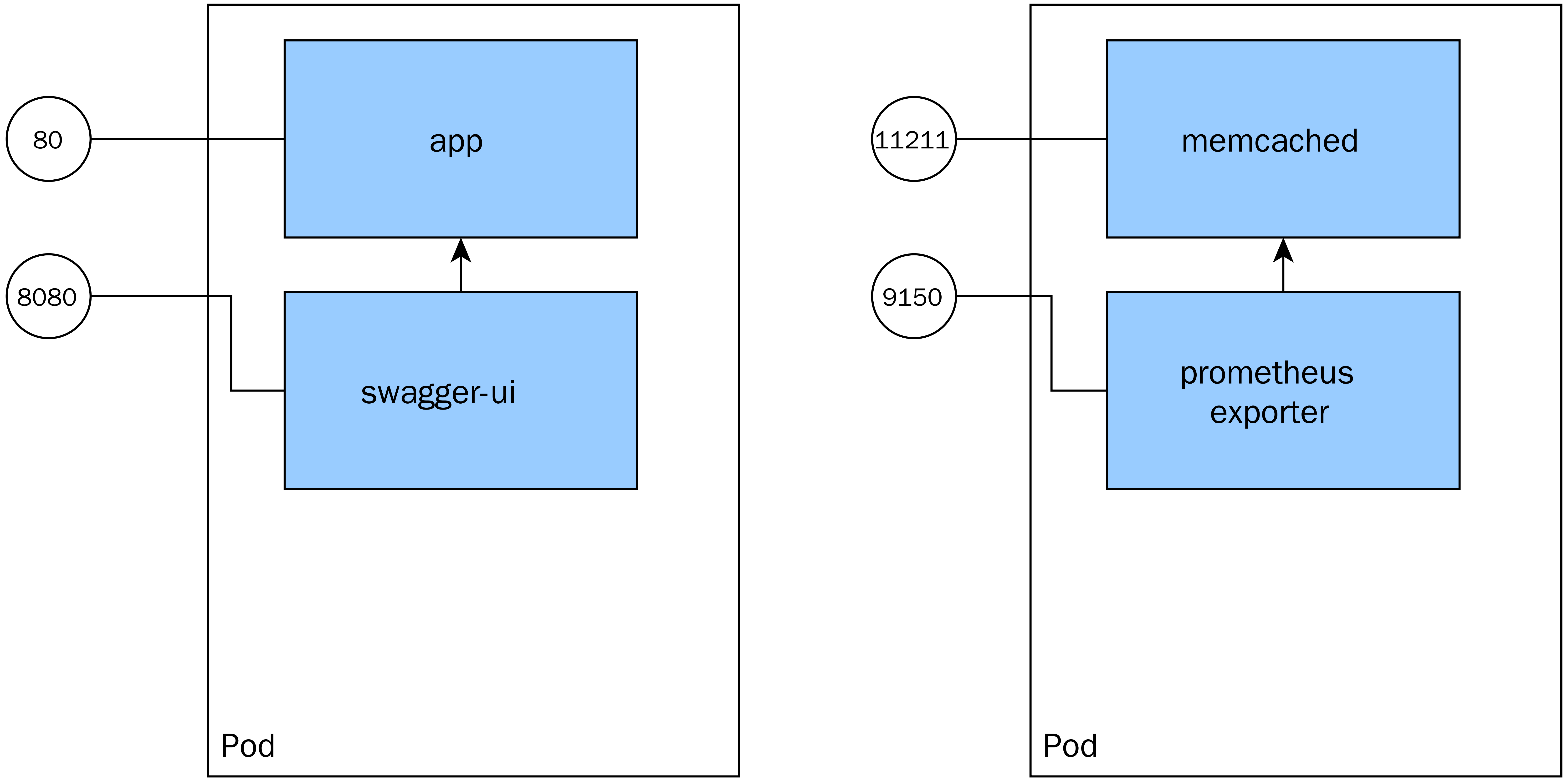
KUBERNETES CONCEPTS

PODS

- See each other on localhost
- Live and die together
- Can expose multiple ports



SIDE-CARS


80
app
8080
swagger-ui
Pod
11211
memcached
9150
prometheus exporter
Pod

BASIC CONCEPTS

Name	Purpose	
Service	Interface	Entry point (Service Name)
Deployment	Factory	How many pods, which pods
Pod	Implementation	1+ docker running