Kubernetes, Resistance is Futile

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- High level overview
- Talk revolves around my time with MLP
- MLP = Machine Learning Platform
Setup and premise

- ING has 60000 employees
- 18000 working in Tech
- Offices in 40 countries
- Serving 38 million customers
Setup and premise

★ ING has 60000 employees
★ 18000 working in Tech
★ Offices in 40 countries
★ Serving 38 million customers

★ Not as easy to deploy workloads to Prod
★ Even more complicated for a data scientists
★ MLP serves as a model hosting platform
Setup and premise

do your thing

- ING has 60000 employees
- 18000 working in Tech
- Offices in 40 countries
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Python + Docker > Docker Compose
Ansible > Docker Compose > VM’s
Kubernetes 😊
VM setup problems & annoyances
VM setup problems & annoyances

★ VM patching, risk, security operations taking a lot of our time

★ VM’s treated like pets, deployment & development too long and error prone

★ Developed "chameleon", mimicking Prod VM’s in a local container

★ Risk on horizon if there was a sudden & exponential growth of MLP

★ Large number of unplanned migrations
Making K8s migration a possibility
Making K8s migration a possibility

★ Containerize everything!

★ The more open source/CNCF software you use, the better

★ Spread the principles of SRE among all team members
  ☆ Building a football/soccer team, not having a single striker or a goalie
  ☆ Anyone being able to pick up anything, while sticking to their expertise
Making K8s migration a possibility

★ Containerize everything!

★ The more open source/CNCF software you use, the better

★ Spread the principles of SRE among all team members

★ Document everything
"Idea is only 5%, the rest of it (95%) is execution"
Resistance to the idea & unwelcoming circumstances

★ Team wasn’t onboard with move to Kubernetes

★ Research, POC’s & demos of MLP v2 as part of ING “mastery days”
  ☆ MLP v2 on ArgoCD or Helm charts, Kustomize instead of Ansible?
Resistance to the idea & unwelcoming circumstances

- Team wasn’t onboard with move to Kubernetes
- Research, POC’s & demos of MLP v2 as part of ING “mastery days”
- Demonstrate how existing problems can be fixed with K8s
- Attempt to go to public cloud
Resistance to the idea & unwelcoming circumstances

- ★ Attempt to go to public cloud on GKE (Google Kubernetes Engine)
  - ☆ ICHP (ING Container Hosting Platform) as a destination target?
  - ☆ Move to the cloud, MLP GKE POC
Resistance to the idea & unwelcoming circumstances

★ Failed attempt to go to public cloud on GKE (Google Kubernetes Engine)
☆ ICHP (ING Container Hosting Platform) as a destination target?
☆ Move to the cloud, MLP GKE POC (success!)
☆ “Schrems 2” law dispute stopped us in our tracks, but things are better now
Why migrate to Kubernetes?
Why migrate to Kubernetes?

★ Eliminate need for patching, other VM maintenance

★ A lot of great out of box features: HPA, cluster autoscaling, service discovery ...

★ No need to spend time creating your own tooling, like service discovery

★ Fits ING’s ambition to go green

★ Once you’re on K8s, you can seamlessly move anywhere
Meanwhile, in my private life ...

★ **auto-cpufreq** is trending as #1 on Hacker News
★ Under the load, my blog crashes
★ Inability to scale in current setup on VM’s
★ Work in progress: [wp-k8s](https://foolcontrol.org/?p=3754) project (scalable WordPress on Kubernetes)
★ Fix the scalability issue in minutes by moving to K8s
★ Birth of wp-k8s project for GKE: [foolcontrol.org/?p=3754](https://foolcontrol.org/?p=3754)
Meanwhile, in my private life ...

★ wp-k8s: WordPress on privately hosted Kubernetes cluster (RPI 4 + Synology): foolcontrol.org/?p=4004

★ Potentially useful project for the attendees: atuf.app (Amsterdam Toilet & Urinal Finder)
Hitting the wall

- ★ Shared my private life K8s event & learnings with the team
- ★ More and more time needed to keep the lights on in current setup
- ★ Influx of a lot of big models which are requesting a lot of resources
- ★ Inability to grow at scale in current setup
Hitting the wall

★ Shared my private life K8s event & learnings with the team

★ More and more time needed to keep the lights on in current setup

★ Influx of a lot of big models which are requesting a lot of resources

★ Inability to grow at scale in current setup

☆ 1. Hire more people to keep scaling in current setup?
☆ 2. Move to Kubernetes?
Decision has been made to migrate to K8s

★ Create a design page, with acceptance criteria and scope of work

★ Conclude research and choose your target destination

☆ **ICHP** (ING Container Hosting Platform) vs **DAP** (Data Analytics Platform) Kubernetes cluster

☆ Option 1: **DAP** Kubernetes cluster:
  ☆ Vanilla Kubernetes, dedicated nVidia GPU cores, part of our area, match made in heaven?

☆ Option 2: **ICHP**:
  ☆ Stable, running in multiple zones, handles huge portion of risk & maintenance
Decision has been made to migrate to K8s

★ Create a design page, with acceptance criteria and scope of work

★ Conclude research and choose your target destination

★ At this point, it was a “just do it”. Step consisting of putting all the pieces together
Takeaways
Takeaways

★ During the migration, best approach is run 2 setup in parallel

★ Good monitoring & alerting setup will go a long way

★ Be brutally pragmatic, stick to the vision & design

★ Whole journey will take time

★ Perseverance and not giving up, re-evaluate the landscape
Keep in mind that everything changes, certain ideas along with certain circumstances will match the changes in the landscape, and it might lead to a perfect storm as it did in the MLP's case.
Thank you / Questions

★ Slides available on: foolcontrol.org

★ Questions & comments about the talk: adnan.hodzic@ing.com

★ Connect with me on LinkedIn: https://linkedin.com/in/adnanhodzic

★ Visit us at ING booth (S75):

☆ Meet today’s ING Speakers, ask any remaining questions to Adnan, Diana or Thijs (Wed: 18:30 – 19:30)

☆ Meet the ING Speaker: “Kubernetes, Resistance is Futile” Adnan Hodzic (Thu: 15:30 – 16:30)

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