The Elephant in the Kubernetes Room
Team Interactions at Scale

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Velocity Conference 2019, Berlin

#VelocityConf
TeamTopologies.com
@TeamTopologies
Team Topologies

Organizing business and technology teams for fast flow

Matthew Skelton & Manuel Pais

IT Revolution Press (2019)

https://teamtopologies.com
Kubernetes as a platform
Melanie Cebula, infrastructure engineer at Airbnb, gave a talk at QCon London [slides PDF] about the internal tooling and strategies Airbnb adopted to support over 1000 engineers concurrently configuring and deploying over 250 critical services to Kubernetes (at a frequency of about 500 deploys per day on average). One key enabler was a layer of abstraction and generation of Kubernetes configuration from higher level primitives using standardized environments and namespaces (and automated validations whenever possible). Also critical was the automation of common workflows for engineers and using the same tools across all environments.

Melanie's talk: https://www.infoq.com/presentations/airbnb-kubernetes-services
How Airbnb Simplified the Kubernetes Workflow for 1000+ Engineers

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How Airbnb Simplified the Kubernetes Workflow for 1000+ Engineers

Melanie Cebula, Infrastructure Engineer at Airbnb, described the process of developing and deploying over 250 services per day (6-7 per hour on average). One key enabler for this was using higher level primitives using the same tools across all services.

Example QCon Query:

- **time**: must
- **from**: 2019-03-07T11:58:48.402Z
- **author**: Manuel Pais
- **value**: "How Airbnb Simplified the Kubernetes Workflow for 1000+ Engineers"

Example QCon Result:

- **Value**: How Airbnb Simplified the Kubernetes Workflow for 1000+ Engineers
- **Count**: 23401
- **Author**: Manuel Pais
- **Published Date**: 2019/03/08 16:30:00

Example URL Query:

- **Count**: 6230
- **Author**: N/A
- **Published Date**: unpublished

Example URL Result:

- **Value**: DevOps and Cloud InfoQ Trends Report - February 2019
- **Count**: 226
- **Author**: Daniel Bryant
- **Published Date**: 2019/02/21 16:02:00
Kubernetes platform

microservices

ops complexity
Kubernetes platform
deploy & run
abstractions
Still need to...

... set up hosts

... create/destroy clusters

... update to new K8s versions

... decide on namespaces vs clusters

<insert your fav chore here>
Still need to...

... set up hosts

... create/destroy clusters

... update to new K8s versions

... decide on namespaces vs clusters

... worry about security!
Who is responsible?
Who is responsible?

Who is impacted?
Dev and Ops: a fragile equilibrium
devopstopologies.com
Team Cognitive Load
If I had to do it all over again, I might leverage something like Kubernetes, but it would be hidden underneath some change management system, and would be considered an implementation detail.

Thinking back, I was able to do 95% of what we call Cloud Native with a bunch of VMs, an application server, and configuration management tools.

Once I integrated with the change management process so could the rest of the organization.
“Cognitive load is the total amount of mental effort being used in the working memory”

- John Sweller
Cognitive load

Intrinsic (skills)

Extraneous (mechanics)

Germane (business focus)
Cognitive load

Intrinsic (skills)

Extraneous (mechanics)

Germane (business focus)
Convergence to Kubernetes

Standardisation to Scale

Paul Ingles  Follow
Jun 18, 2018 · 13 min read

Source: https://medium.com/@pingles/convergence-to-kubernetes-137ffa7ea2bc
Low-level AWS service calls (EC2, IAM, STS, Autoscaling, etc.) from January 2015 to January 2017
Low-level AWS service calls since Kubernetes adoption in January 2017
“We didn’t change our organization because we wanted to use Kubernetes, we used Kubernetes because we wanted to change our organization.”

- Paul Ingles
“The best part of my day is when I update 10 different YAML files to deploy a one-line code change.”
“The best part of my day is when I update 10 different YAML files to deploy a one-line code change.”

– No One, Ever
sets params per environment

Project
Apps
Containers
Files
Volumes
Dockerfile

other files
access params

---
version: 29.14.0

project:
  name: bonk

environments:
  production:
    params:
      replicas: 10

  staging:
    params:
      replicas: 1

workload:
  deployment:
    replicas: {{ .Env.Params.replicas }}
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Stream-aligned team

Platform team
Stream-Aligned Team

Rapid Feedback

LIVE
Platform Purpose

enable stream-aligned teams to deliver work autonomously with self-service capabilities ...
Platform Purpose

... in order to reduce extraneous cognitive load on stream-aligned teams
“A digital platform is a foundation of self-service APIs, tools, services, knowledge and support which are arranged as a compelling internal product.”

– Evan Bottcher, 2018
A good platform is treated as a product (reliable, usable, fit for purpose)
Team Interactions
Dev team
Dev team
Dev team
Dev team
The diagram illustrates a process involving multiple steps and teams working towards generating Kubernetes configurations (k8s configs). The process begins with the Dev team, which feeds into a series of stages labeled 'Project,' 'Apps,' 'Containers,' 'Files,' 'Volumes,' and 'Dockerfile.' These stages are connected to the term 'kube-gen generate.' The output of this process is directed towards the 'Platform,' which is the ultimate destination of the configuration. The diagram also highlights the concept of 'cognitive load' and 'service boundary.'
Collaboration
strong collaboration with stream-aligned teams for any new service or evolution
Collaboration

X-as-a-service
Platform as a Product

- on-call support
- service status pages
- suitable comms channels
- response time for incidents
- downtime planned & announced
Platform Behaviors

great product management

fast prototyping

fast feedback
AGREE OR DISAGREE

BUILD
I can effectively build my software.
I have the tools to validate my software.

DELIVER
I can reliably deliver my software to dev, stage, and prod.
I can efficiently manage my cloud infrastructure.

RUN
I can measure the operational metrics of my services.
In understand the cost of running my service.

COMPPELLING
I feel platform tools are consistently improving.
I can voice problems that result in improvements.
My tools are best in class.
generating k8s configs

Dev team

Dev team

Dev team

Dev team

kube-gen generate

Platform

@MELANIECEBULA

Kubernetes cluster
More platform examples

Zalando Kubernetes at Zalando
Mercedes DevOps Adoption at Mercedes-Benz.io
Twilio Platforms at Twilio: Unlocking Developer Effectiveness
Adidas Where Cloud Native Meets the Sporting Goods Industry
ITV ITV's Common Platform v2 Better, Faster, Cheaper, Happier
MAN Truck & Bus How to Manage Cloud Infrastructure at MAN Truck & Bus
Farfetch UX I DevOps - The Trojan Horse for Implementing a DevOps Culture
Team Topologies Fundamentals
with Manuel Pais
1-day training course
8 Nov 2019, Berlin, Germany
Details: teamtopologies.com/events
20% discount: VELOCITY20
teamtopologies.com/events
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The elephant in the Kubernetes room: Team interactions

Manuel Pais (Independent)
16:45-17:25 Wednesday, 6 November 2019
Location: Hall A1
Kubernetes

Who is this presentation for?
• CTOs, CIOs, and other leaders, heads of departments, managers, team leaders, and engineers

Session page on conference website

O'Reilly Events App