Creating an Effective Developer Experience on Kubernetes

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tl;dr

The developer experience is primarily about minimising the friction from idea to code to delivering observable business value

How you construct your ‘platform’ impacts the developer experience greatly

High productivity (and fun) comes from intentionally designing experience of: local development, packaging apps, CI/CD, deployment control, and observability

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Previously: Academic, software developer (from startups to gov), consultant, CTO, trainer, conference tourist...

Leading change through technology and teams

DevEx 101

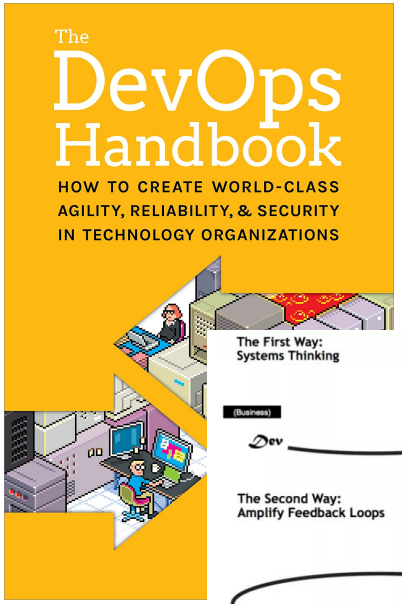
DevEx...

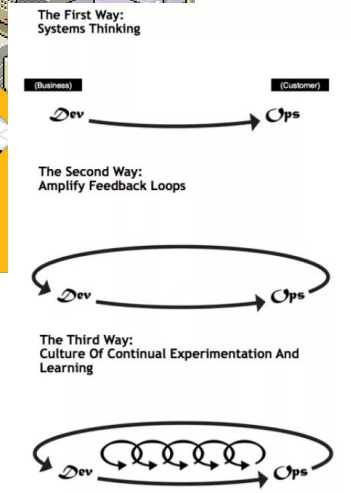
...reducing engineering friction between creating a hypothesis to delivering an observable experiment (or value) in production

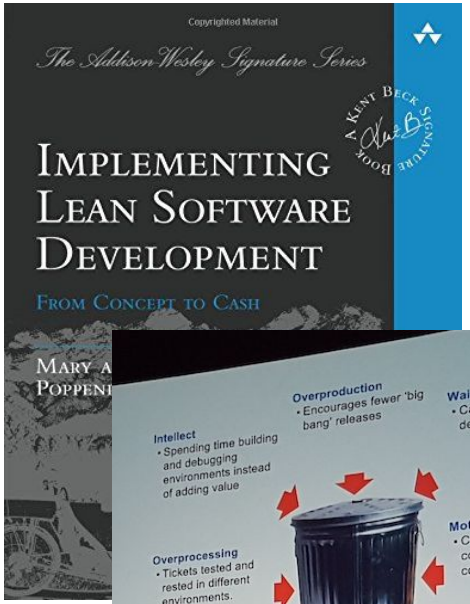
- Adrian Trenaman (SVP Engineering, HBC)

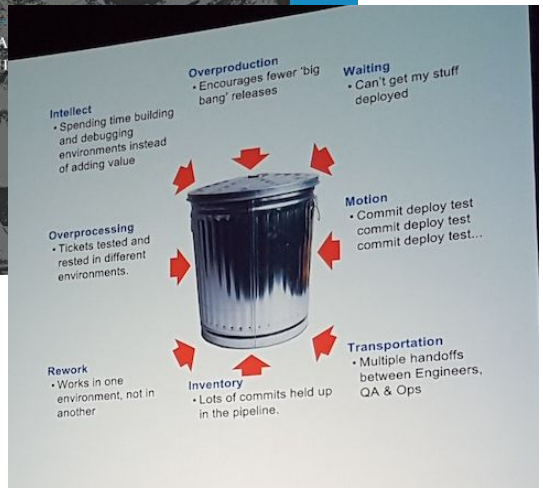
https://www.infoq.com/news/2017/07/remove-friction-dev-ex

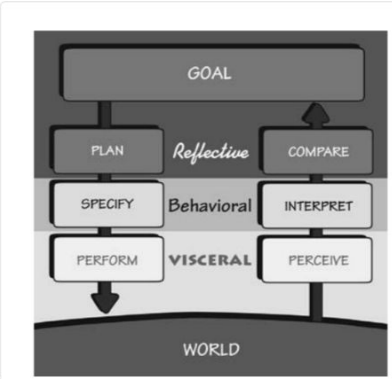
DevEx: DevOps, Lean, and UX







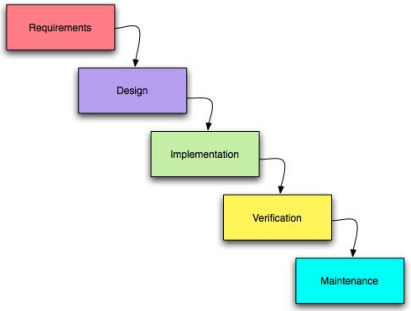


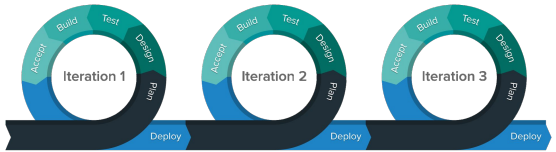


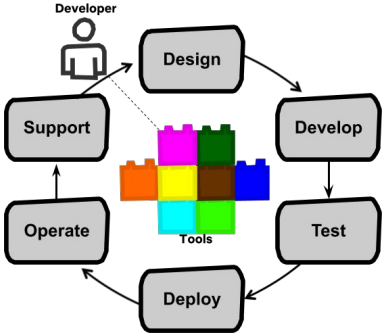
Levels of Processing and the Stages of the Action Cycle

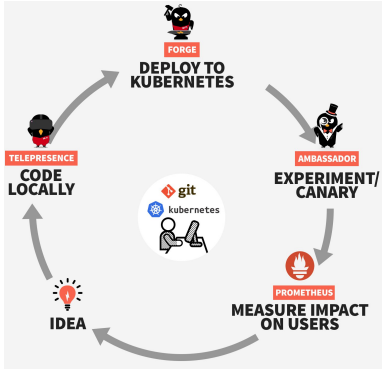
DevEx and Workflow

The Ideal Workflow

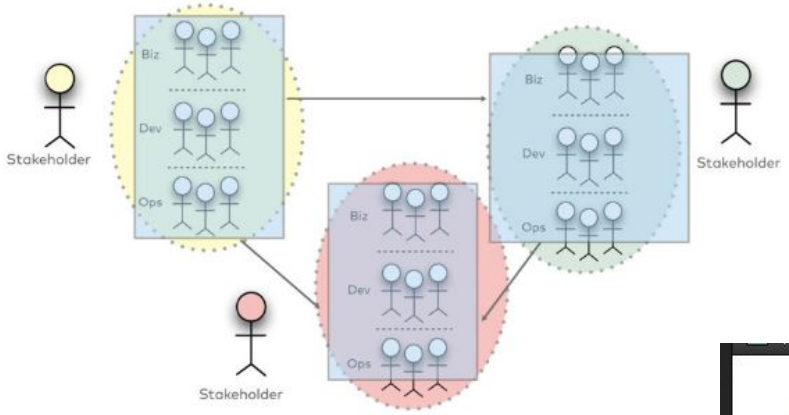






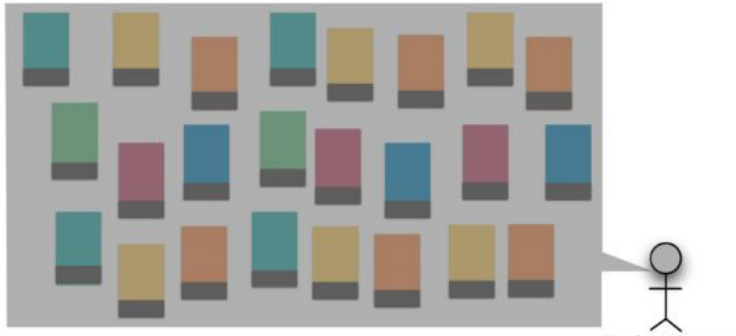


Pattern: Autonomous Cells

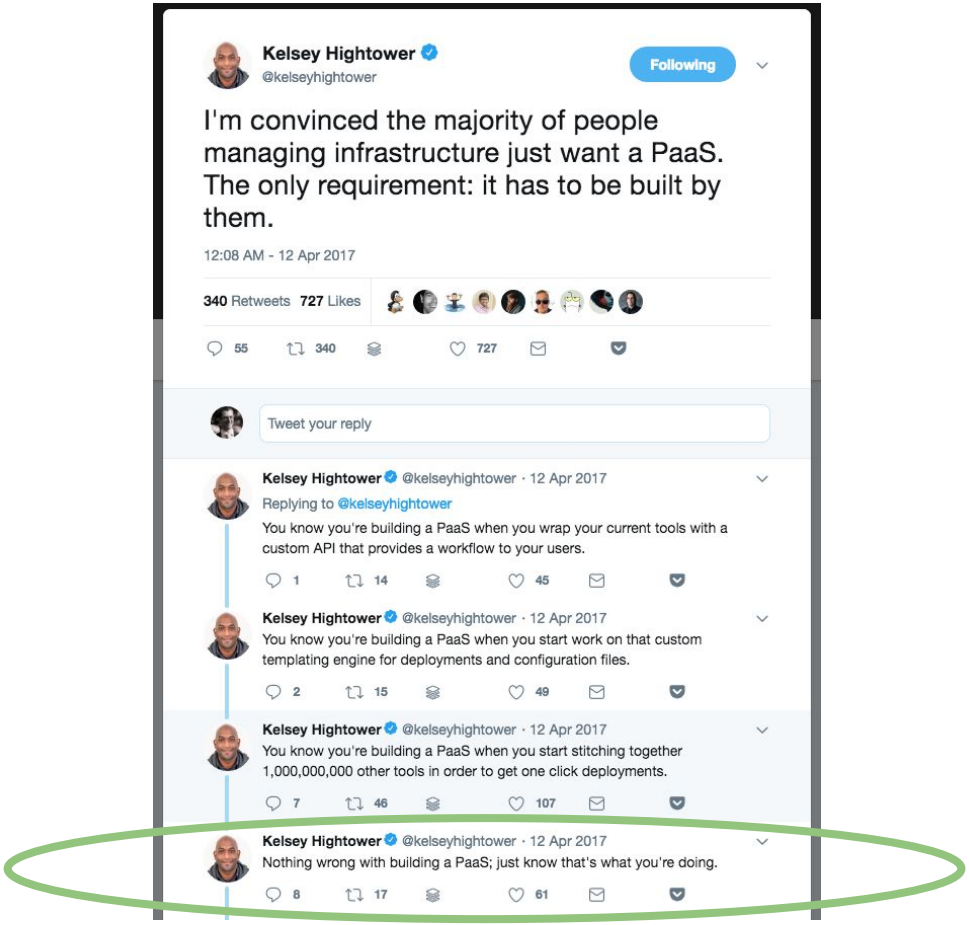


https://speakerdeck.com/stilkov/microservices-patterns-and-antipatterns-1

Antipattern: Micro Platform



The Platform Drives DevEx



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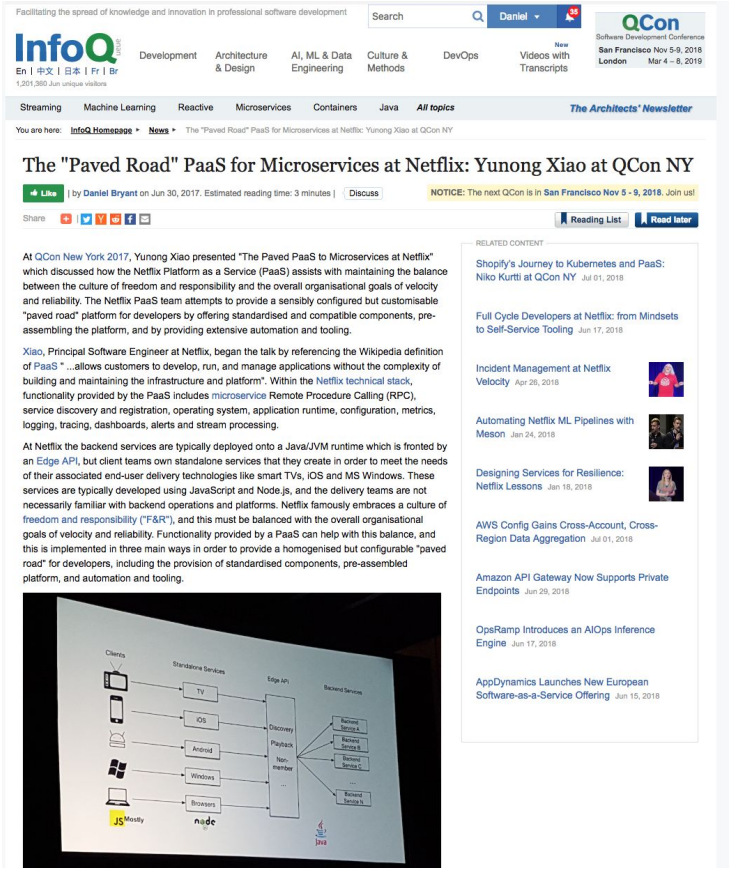

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The "Paved Road" PaaS for Microservices at Netflix: Yunong Xiao at QCon NY

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At QCon New York 2017, Yunong Xiao presented "The Paved PaaS to Microservices at Netflix" which discussed how the Netflix Platform as a Service (PaaS) assists with maintaining the balance between the culture of freedom and responsibility and the overall organisational goals of velocity and reliability. The Netflix PaaS team attempts to provide a sensibly configured but customisable "paved road" platform for developers by offering standardised and compatible components, pre-assembling the platform, and by providing extensive automation and tooling.

Xiao, Principal Software Engineer at Netflix, began the talk by referencing the Wikipedia definition of PaaS " ...allows customers to develop, run, and manage applications without the complexity of building and maintaining the infrastructure and platform". Within the Netflix technical stack, functionality provided by the PaaS includes microservice Remote Procedure Calling (RPC), service discovery and registration, operating system, application runtime, configuration, metrics, logging, tracing, dashboards, alerts and stream processing.

At Netflix the backend services are typically deployed onto a Java/JVM runtime which is fronted by an Edge API, but client teams own standalone services that they create in order to meet the needs of their associated end-user delivery technologies like smart TVs, iOS and MS Windows. These services are typically developed using JavaScript and Node.js, and the delivery teams are not necessarily familiar with backend operations and platforms. Netflix famously embraces a culture of freedom and responsibility ("F&R"), and this must be balanced with the overall organisational goals of velocity and reliability. Functionality provided by a PaaS can help with this balance, and this is implemented in three main ways in order to provide a homogenised but configurable "paved road" for developers, including the provision of standardised components, pre-assembled platform, and automation and tooling.

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At QCon New York, Niko Kurtti presented "Forced Evolution: Shopify's Journey to Kubernetes", and described the Shopify engineering team's journey to building their own PaaS with Kubernetes as the foundation. Key takeaways for other teams looking to build their own PaaS and associated developer workflow included: target hitting 80% of deployment and operational use cases; create patterns and hide the underlying platform complexity; educate and get people excited about the project; and be conscious of vendor lock-in.

Kurtti, production engineer at Shopify, began the talk by describing that Shopify is a rapidly growing Canadian e-commerce company that offers a proprietary e-commerce platform for online stores and retail point-of-sale systems. Shopify currently has 3000+ employees, and the company processed $26 billion in transactions in 2017. The underlying e-commerce software platform sees 80k+ requests per second during peak demand.

At the start of 2016 the engineering team was "running services everywhere", including within their own data centers (using Chef and Docker), on AWS (using Chef) and Heroku. Developers liked the developer experience of Heroku, and Kurtti commented that this platform actually scales quite well, with "simple UI sliders" to increase the number of instances and associated CPU and RAM. Although the platform team had defined service tiers and appropriate Service Level Objectives (SLOs) based on criticality to the business, there were many processes that were not scalable, and accordingly these presented challenges as the company grew.

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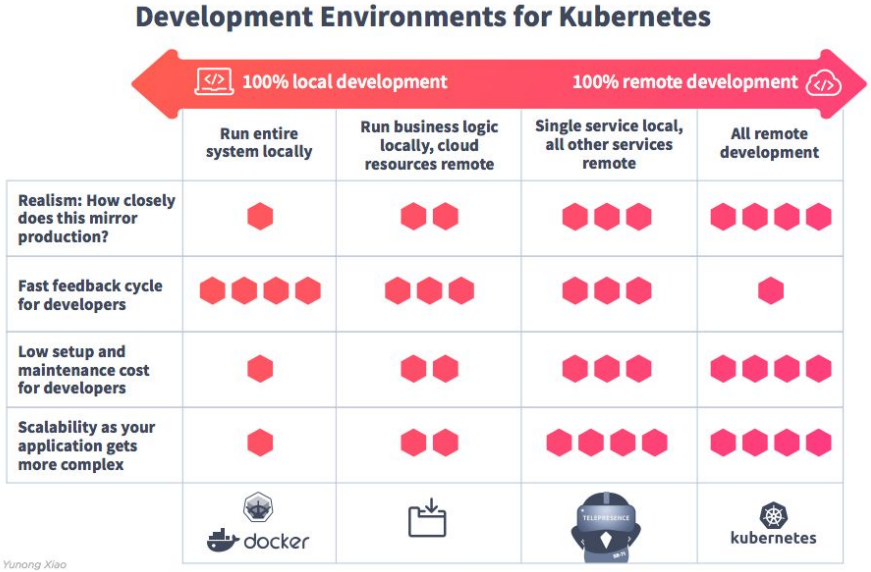
https://www.infoq.com/news/2018/07/shopify-kubernetes-paas

Should I Build a PaaS on k8s?

Key Questions to Ask...

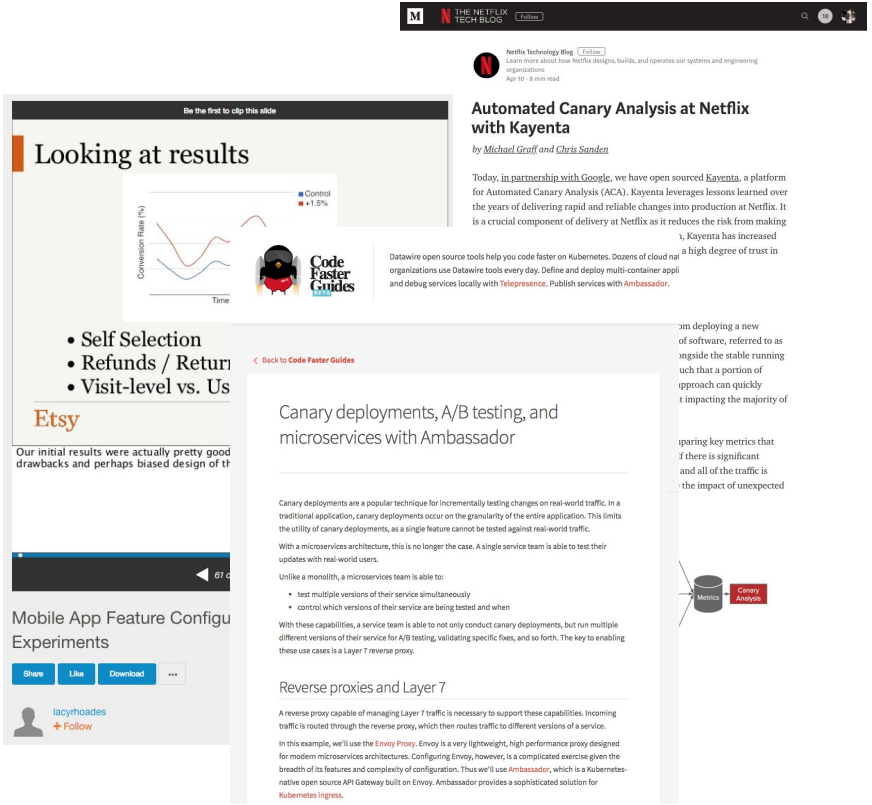
Develop and test services locally, or within the cluster (or both)?

- Working locally has many advantages
  - Reduce ops cost of multi-cluster
- Some want to maintain minimal local development envs
  - Or hide Docker/k8s from devs
- Local/remote container dev tools like Telepresence and Squash allow hybrid



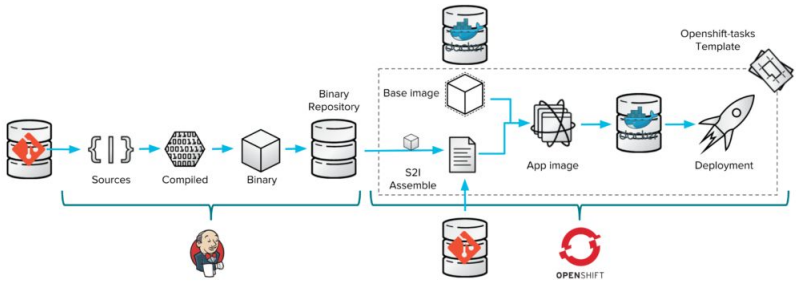
How quick do you need user feedback?

- Canary testing is very powerful
  - As is developing in prod and shadowing
  - K8s tools like Istio & Ambassador enable this
- Needs app and platform support
- Some teams can be nervous about testing in production (quite rightly!)



Do you want to implement “guide rails” for your development teams?

- Larger teams often want to provide comprehensive guide rails
- Startups and SMEs may instead value team independence
  - #YOLO
- Hybrid? Offer platform, but allow service teams freedom and responsibility

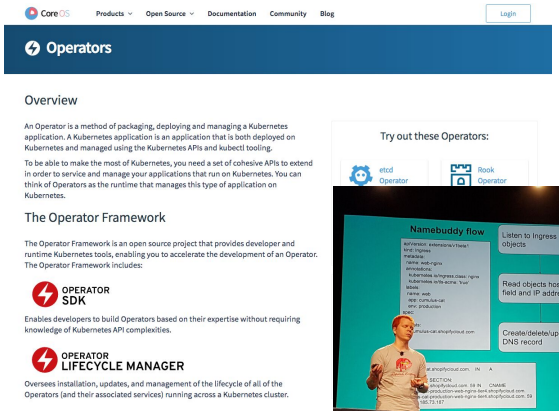


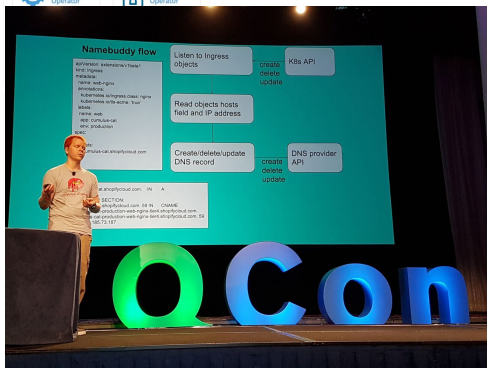
https://blog.openshift.com/multiple-deployment-methods-openshift/

Workflow Tooling and Techniques

Pattern: K8s as a Foundation

- Kubernetes becoming de facto CoaaS (the new cloud broker?)
  - Lots of hosted options





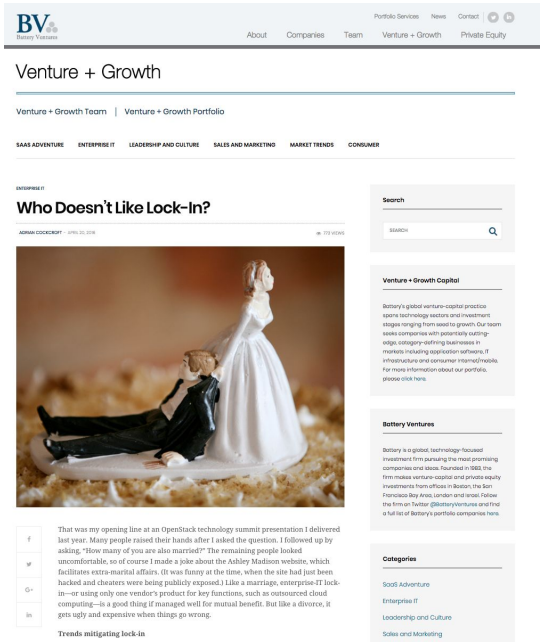
- Highly extensible
  - Custom Controllers
  - Operators
  - CloudBuddies

- Extension enables custom workflow
  - “Kubernetes Custom Resource, Controller and Operator Development Tools”

DIY K8s? What About Vendor Lock-in?

“Engineers go to great lengths to avoid vendor lock-in. The irony is that in doing so, ***they often become their own vendor…*** *with just as troublesome behaviour and rules”*

- Paraphrasing Adrian Cockcroft



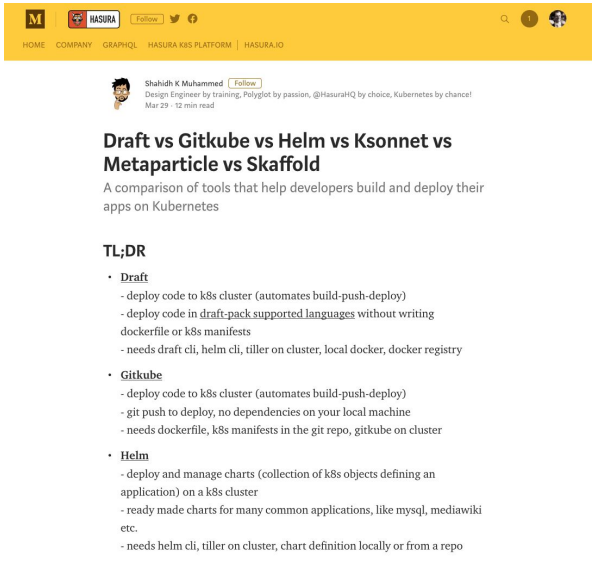
https://www.battery.com/powered/%EF%BB%BFwho-doesnt-like-lock-in/

Pattern: Automate Inner Dev Loop

- Draft
  - Automates “inner loop” build-push-deploy
  - Utilises Helm
- Gitkube
  - Automates build-push-deploy
  - Provides heroku / CF like experience
- Skaffold
  - Automates build-push-deploy
  - Watches source code
  - Provides “dev” and “run” (CD) modes
- ***Telepresence*** *(*)*
  - Enables local-to-prod development
- ***Helm*** *(*)*
  - Package manager for k8s
  - Deploy and manage (ready-made) charts
- Ksonnet
  - Define k8s manifests in jsonnet
  - Create composable config/services
- Metaparticle
  - “Standard library for cloud native apps”
  - Language-specific binding
- Ballerina
  - “Microservice programming language”
  - Annotations for package and deploy

(*) CNCF projects

Pattern: Automate Inner Dev Loop



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Shahidh K Muhammed Follow
Design Engineer by training, Polyglot by passion, @HasuraHQ by choice, Kubernetes by chance!
Mar 29 · 12 min read

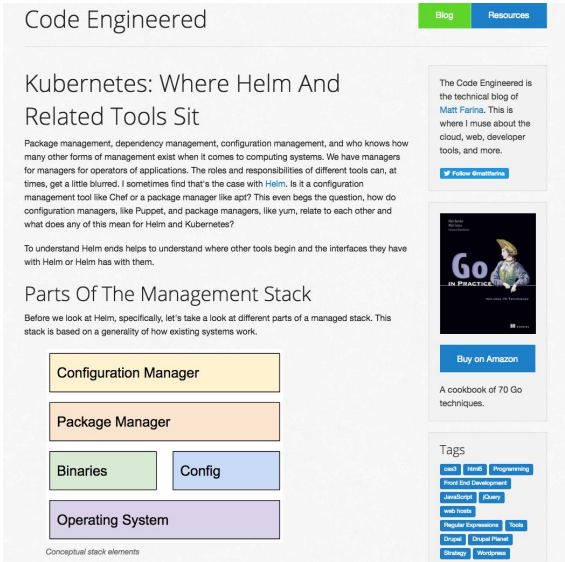
Draft vs Gitkube vs Helm vs Ksonnet vs Metaparticle vs Skaffold

A comparison of tools that help developers build and deploy their apps on Kubernetes

TL;DR

- **Draft**
  - deploy code to k8s cluster (automates build-push-deploy)
  - deploy code in draft-pack supported languages without writing dockerfile or k8s manifests
  - needs draft cli, helm cli, tiller on cluster, local docker, docker registry
- **Gitkube**
  - deploy code to k8s cluster (automates build-push-deploy)
  - git push to deploy, no dependencies on your local machine
  - needs dockerfile, k8s manifests in the git repo, gitkube on cluster
- **Helm**
  - deploy and manage charts (collection of k8s objects defining an application) on a k8s cluster
  - ready made charts for many common applications, like mysql, mediawiki etc.
  - needs helm cli, tiller on cluster, chart definition locally or from a repo

https://blog.hasura.io/draft-vs-gitkube-vs-helm-vs-ksonnet-vs-metaparticle-vs-skaffold-f5aa9561f948



Code Engineered

Blog Resources

Kubernetes: Where Helm And Related Tools Sit

Package management, dependency management, configuration management, and who knows how many other forms of management exist when it comes to computing systems. We have managers for managers for operators of applications. The roles and responsibilities of different tools can, at times, get a little blurred. I sometimes find that's the case with Helm. Is it a configuration management tool like Chef or a package manager like apt? This even begs the question, how do configuration managers, like Puppet, and package managers, like yum, relate to each other and what does any of this mean for Helm and Kubernetes?

To understand Helm ends helps to understand where other tools begin and the interfaces they have with Helm or Helm has with them.

Parts Of The Management Stack

Before we look at Helm, specifically, let's take a look at different parts of a managed stack. This stack is based on a generality of how existing systems work.

Conceptual stack elements

The Code Engineered is the technical blog of Matt Farina. This is where I muse about the cloud, web, developer tools, and more.

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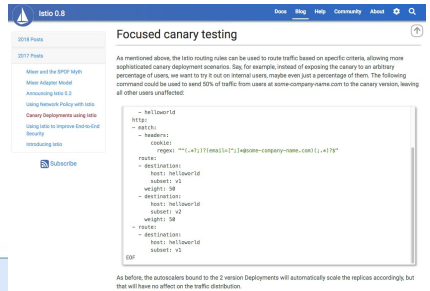
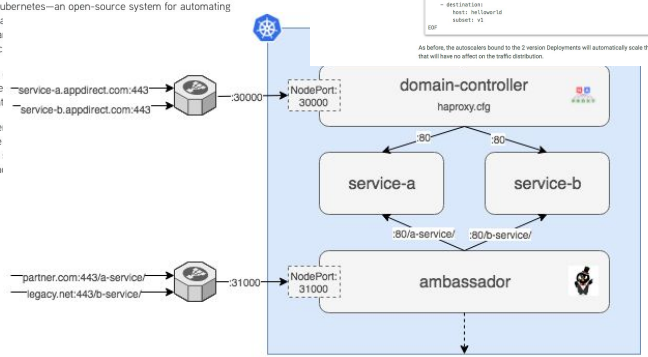
https://codeengineered.com/blog/2018/kubernetes-helm-related-tools/

Pattern: Envoy for Managing L7 Traffic

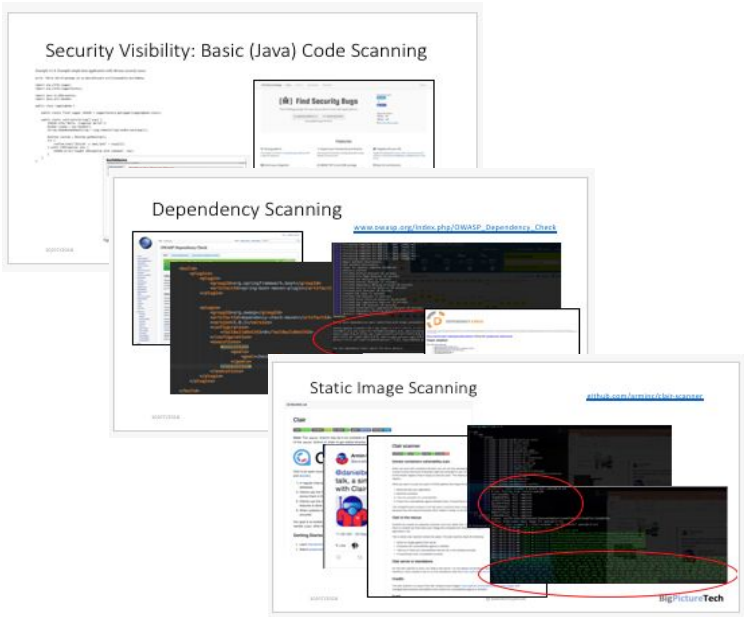
- Allows fine-grained deploy/release
- Enables real-time development in production (with shadowing)
- Many control planes (for Envoy)
  - Ambassador
  - Gloo
  - Istio





Pattern: CI/CD Enforces Policy

- Make is easy to do the right thing
  - Self-service pipeline creations
  - Bake-in hooks/slots for platform functionality
- Testing of NFRs is vital
  - Security, Performance, Quality
- Post-pipeline: Run chaos tests to codify properties and assert in production



https://www.slideshare.net/dbryant_uk/codemotion-rome-2018-continuous-delivery-with-containers-the-good-the-bad-and-the-ugly

Pattern: Observability > Testing

- Essential part of the platform and developer workflow/experience
  - Monitoring, logging and tracing
  - Bake-in hooks to scaffolding

- Global/service dashboards

- “Observability and Avoiding Alert Overload from Microservices at the Financial Times”

Conclusion

In Summary

The developer experience is primarily about minimising the friction from idea to code to delivering observable business value

How you construct your ‘platform’ impacts the developer experience greatly

You must intentionally curate the experience of: local development, packaging apps, CI/CD, deployment control, and observability

Thanks for Listening!

Questions, comments, thoughts...

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@danielbryantuk

More info: dzone.com/articles/creating-a-positive-developer-experience-for-conta

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