Platform Engineering 101: Building Internal Developer Platforms

Grace and Maarten

IBM & Red Hat

Agenda

13:30 - 13:45 Intro to workshop and hosts (15 mins)

13:45 - 14:25 Theory: Introductory presentation (40 mins)

- What is Platform Engineering?
- Internal Developer Platforms and Portals
- Tools to help

14:25 - 14:45 HandsOn: Set up RHDH and Openshift (20 mins)

14:45 - 15:00 Break (15 mins)

15:00 - 15:20 Theory: Deeper dive into RHDH (30 mins)

- Intro to Red Hat Developer Hub + differences with Backstage
- Software Templates
- Dynamic Plugins

15:30 - 15:50 HandsOn: Set up Liberty Software Template (20 mins)

15:50 - 16:00 HandsOn: Set up Quarkus Software Template (10 mins)

16:00 - 16:15 Break (15 mins)

16:15 - 16:30 HandsOn: Exploring custom dynamic plugins (15 mins)

16:30 - 16:50 HandsOn: Customisation of portal (20 mins)

16:50 - 17:00 Wrap up and summary

Workshop Hosts

Grace Jansen

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Introductory Presentation

Why Are We Here?

OOOH THE CLOUD

What Happened?!

Shift Left: Increasing cognitive load

It’s not just
app development
anymore

Dev
Ops
DevOps
FinOps
MLOps
GitOps
DataOps
DevSecOps
BizDevOps
BizDevSecOps
BizDevSecFinMLOps

Organizational Impact & Cognitive Load

Traditional App Delivery

Dev

Applications

App Deploy

App Build

Entitlement/Billing

Runtime

Java

Guest OS

Guest Virtualization

Clustering/HA

Host Virtualization

OS

Hardware

Ops

Key:

Dev Responsible

Ops Responsible

Organizational Impact & Cognitive Load

Traditional App Delivery

Dev

- Applications
- App Deploy
- App Build
- Entitlement/Billing
- Runtime
- Java
- Guest OS
- Guest Virtualization
- Clustering/HA
- Host Virtualization
- OS
- Hardware

Ops

Modern App Delivery

Usability

Observability

Quality

Dev

- Applications
- App Deploy
- App Build
- Entitlement/Billing
- Runtime
- Java
- Guest OS
- Guest Virtualization
- Clustering/HA
- Host Virtualization
- OS
- Hardware

Ops

Key:

- Dev Responsible
- Ops Responsible

Tools:
Too much choice

The Cloud-Native Grocery Store

Where’s Waldo?

or Wally?

Source: https://landscape.cncf.io/

The Cloud-Native Grocery Store

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Source: https://landscape.cncf.io/

Developer Struggles

1. CI/CD Tooling

- Steep learning curve – takes time
- Too many options
- OSS standards – still too many!
- Observability

Source: https://www.reddit.com/r/ProgrammerHumor/comments/lgmj45/adopting_cloud_native/

2. Container Management

- Offers portability and flexibility
- Many decisions needed
  - Which tools to use?
  - How to configure environments?
  - How to build our apps?
- Challenging to remain consistent and stick to best practices
- Operators & Cloud Native Buildpacks can help

Source: https://semaphoreci.com/blog/kubernetes-deployment

https://developer.ibm.com/articles/awb-containerizing-java-apps-with-cloud-native-buildpacks/

3. Security & Regulatory Requirements

- Compliance & regulatory awareness
- SBOM –what's in your application?
- Vulnerability awareness
  - Source code
  - Images
  - External libraries
- Trusted software supply chain
- Compromised credentials?
- Authentication & Authorization

Source: https://www.asylas.com/asylas/security-memes-our-year-end-humor-break/

Other Struggles

- Likely drowning in scripts and maintenance costs
- Can’t reach degree of automation wanted
- Key-person dependency
- Creating a new environment can be looooooong
- Environments can get blocked testing

https://humanitec.com/blog/impact-of-internal-developer-platforms

Source: https://tenor.com/view/penny-kaley-cuoco-see-laptop-gif-5375325

What developers are saying….

Top three causes of developer burnout:

1. Increasing workload/demand from other teams (39%)
2. Pressure of digital transformation (37%)
3. Requirement to learn new skills (35%)

76% of organizations say cognitive load is so high it causes angst and low productivity for developers.

https://twitter.com/intent/tweet?ref_src=twsrc%5Etfw%7Ctwcamp%5Etweetembed%7Ctwterm%5E1562349679660122112%7Ctwgr%5Ea1005affb9784baa8ed6ee07c455995f8ad267df%7Ctwcon%5Es1_&ref_url=https%3A%2F%2Fblog.gitguardian.com%2Fplatform-engineering-and-security-a-very-short-introduction%2F&in_reply_to=1562349679660122112

https://www.salesforce.com/uk/news/stories/new-research-shows-how-to-keep-developers-happy-amid-the-great-resignation/

But… How to overcome these struggles?

Platform Engineering

What is Platform Engineering?

Platform engineering is the discipline of designing and building toolchains and workflows that enable self-service capabilities for software engineering organizations in the cloud-native era. Platform engineers provide an integrated product most often referred to as an "**Internal Developer Platform**" covering the operational necessities of the entire lifecycle of an application.

- platformengineering.org

Source: https://medium.com/defense-unicorns/5-minute-devops-platform-engineering-dosent-replace-devops-599f2d61b66

Source: https://www.datocms-assets.com/2885/1693337739-whitepaper_the-6-pillars-of-platform-engineering_q3-23.pdf

The Platform Engineering recipe - Ingredients

- Integrated Development Environments
- Version Control Systems
- Resources - containers, databases, storage, compute, transit, etc.
- Runtimes and frameworks
- Artefact, container registry
- Kubernetes
- Observability
- Vulnerability scanners
- CI tools
- GitOps/CD tools
- Infrastructure as Code tools

List inspired by: https://www.configure8.io/blog/internal-developer-portal-vs-internal-developer-platform-whats-the-difference-and-why-both-matter

Bake your own Platform

Source: https://www.openxcell.com/devops/

So, what does this look like?

Internal Developer Platform (IDP)

What is an IDP?

An Internal Developer Platform (IDP) is a **central collection of tools, services and automated workflows** that enable development teams to be able to rapidly deploy and deliver software. These platforms **provide a service layer** that abstracts away the complexities of infrastructure management and application configuration.

Source: https://www.configure8.io/

Internal Developer Portal

What is an Internal Developer Portal?

An Internal Developer Portal is the **singular interface** to your developer platform - serves as the "face" of the Internal Developer Platform.

It allows developers to perform self-service operations and actions, and offers visibility into the infrastructure.

Source: https://www.configure8.io/

Internal Developer Platform
≠
Internal Developer Portals

https://platformweekly.com/issues/developer-portals-developer-platforms

Benefits for Devs

Organizational impact

Dev

Applications

Platform Engineering

App Build

App Deploy

Entitlement/Billing

Runtime

Java

Guest OS

Internal Developer
Platform
IDP

Ops

Entitlement/Billing

Guest Virtualization

Clustering/HA

Host Virtualization

OS

Hardware

Quantitative Dev Benefits

Impact	Before	After
Waiting times due to blocked environments decreased by 90%	4 hours/week per developer	24 minutes/week per developer
Average Deployment Frequency (up an average of 4X)	1.5 per week	6 per week
Visibility and transparency across teams, services and environments decreases transactional communication	Limited to your 15 minute daily scrum	Direct reaction based on activity of colleagues.
Onboarding time for new developers to delivery setup in hours	30 hours	4 hours
Lead time	13 days	4 days

https://humanitec.com/blog/impact-of-internal-developer-platforms

Good

- Increased developer autonomy
- Reduced time to market
- Improved developer satisfaction

Challenges

- Precise user authentication
- Building a scalable team
- Building self-serving solutions
- Ensuring alignment and standardization
- Compliance with security regulations

Bad

- Strain on platform engineering teams
- Difficulty managing standardiz-ation of configuratio ns/tools

Source: https://www.lyrid.io/post/platform-engineering-paving-golden-paths-to-developer-efficiency

Tools to Help

Reference architectures

Architecture is divided into subgroups

- Developer control plane
- Integration and delivery
- Monitoring and logging
- Security plane
- Resource plane

https://humanitec.com/reference-architectures

McKinsey's Internal Developer Platform reference architecture

IDP Tooling Landscape

Source: https://platformengineering.org/platform-tooling

Backstage

Backstage

https://backstage.io/

- CNCF incubating project
- Donated by Spotify
- An open platform for building developer portals
- Powered by a centralized software catalog
- Can customize with plugins

Red Hat Developer Hub

- Enterprise-grade, open developer platform for building developer portals
- Contains a supported and opinionated framework
- ~~Built on the Janus open-source project (which extends Backstage)~~
- Extends functionality through a set of predefined supported dynamic plug-ins

https://developers.redhat.com/rhdh

https://www.youtube.com/watch?v=tvVOC0mFR_4&t=182s

Examples: https://github.com/maarten-vandeperre/developer-hub-documentation

Other Options

Developer Portals & Service Catalogs	Claim
AutoCloud	Automatically generate secure Terraform code for anything
Backstage	An open platform for building developer portals
Compass from Atlassian	Developer experience platform and service catalog
configure8	An enterprise-grade developer portal solution
Cortex	Build reliable and innovative software at scale
OpsLevel	All your services, all in one interface
Port	A developer portal for all your services,software & resources
Roadie	Backstage as a service: adopt OSS without the overhead

October 24, 2023

KRATIX

configure8

AUTOCLOUD

cortex

port

Roadie

Compass

OpsLevel

https://internaldeveloperplatform.org/developer-portals/

Let IDPs guide you toward the future

HandsOn

Set up RHDH and Openshift

BREAK

Red Hat Developer Hub Deep Dive

Red Hat Developer Hub

- Enterprise-grade, open developer platform for building developer portals
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Examples: https://github.com/maarten-vandeperre/developer-hub-documentation

RHDH vs Backstage

Software Templates

Dynamic Plugins

Other Technologies we'll use

- OpenShift
- Helm Charts/Operators
- Open Liberty
- Quarkus
- ArgoCD

OpenShift

Helm Charts

- **Helm** is a package manager for Kubernetes (helps manage Kubernetes applications)
- Open-source project donated to the CNCF

- **Helm Charts** help define, install, and upgrade Kubernetes applications
- Each chart is a bundle with one or more Kubernetes manifests

Operators

Operators are software extensions that help manage cloud-native applications and their components.

- Key part of the Kubernetes ecosystem
- Designed for automation
- Make it easier to install and work across applications and software
- Reduce manual workload for Kubernetes users
- Provide consistency and stability

Image ref: https://www.cncf.io/blog/2022/06/15/kubernetes-operators-what-are-they-some-examples/

Open Liberty

Full-Stack Cloud-Native Java Runtime

Focus on code

Easy to make fast and iterative changes

Easy to write tests

True-to-production testing (as much as possible)

Ready for containers

Not-in-your-way tools and flexibility

Zero Migration

https://developer.ibm.com/articles/why-cloud-native-java-developers-love-liberty/

Quarkus

A Kubernetes Native Java stack tailored for OpenJDK HotSpot and GraalVM

https://quarkus.io/about/

https://www.youtube.com/watch?v=SQDR34KoC-8

ArgoCD

HandsOn

Set up Liberty Software Template

Flexible technologies (switch Quarkus)

BREAK

HandsOn

Exploring custom dynamic plugins

Customisation

Summary

Summary

- Cognitive load and demands on developers are ever-increasing as we move towards cloud-native development
- Developers can be supported and helped through…
  - Platform Engineering
  - Internal Developer Platforms (IDP)
  - Internal Developer Portals
  - Golden/Pathed Paths
- What this looks like will be specific to your organization
- Use the tools, technologies and examples already out there

Resources

Examples

- Netflix - https://www.youtube.com/watch?v=36FcxlPerdQ
- Humanitech - https://www.youtube.com/watch?v=Ky8LWwU2tt8
- Wise - https://platformengineering.org/talks-library/adopting-backstage-as-developer-portal
- Spotify - https://engineering.atspotify.com/2020/04/how-we-use-backstage-at-spotify/
- Project Polaris at Snyk - https://www.getambassador.io/kubernetes-expert-interviews/crystal-hirschorn or https://getdx.com/podcast/snyk-developer-experience
- Twillio and Snyk - https://www.getport.io/webinars/how-twilio-and-snyk-improve-the-developer-experience
- Veterans United Home Loans - https://www.youtube.com/watch?v=ZIGgs2hS3uA

Resources

- Platform Engineering Guide (InfoQ)
  - https://www.infoq.com/minibooks/platform-engineering-guide/
- PlatformCon (previous edition's recordings available)
- Platform Engineering Slack channel
  - https://platformengineering.org/slack-rd
- Platform Weekly newsletter
  - https://platformweekly.com/

Resources

- Benefits - https://digital-platform.playbook.ee/introduction/benefits-of-a-digital-platform
- Internal Developer Platform vs Internal Developer Portal - https://www.configure8.io/blog/internal-developer-portal-vs-internal-developer-platform-whats-the-difference-and-why-both-matter
- Tools for IDP creation - https://medium.com/contino-engineering/creating-your-internal-developer-platform-part-2-65ff217cecd6
- Why IDPs matter - https://developers.redhat.com/articles/2024/09/25/why-internal-developer-portals-matter#

Resources

- Trying it out yourself (for free)
  - https://developers.redhat.com/
  - https://developers.redhat.com/learn/openshift/deploy-red-hat-openshift-using-helm-charts
  - https://openliberty.io/start/
  - https://github.com/OpenLiberty/liberty-backstage-template/tree/main
  - https://github.com/maarten-vandeperre/developer-hub-documentation/tree/main

THANK YOU

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