

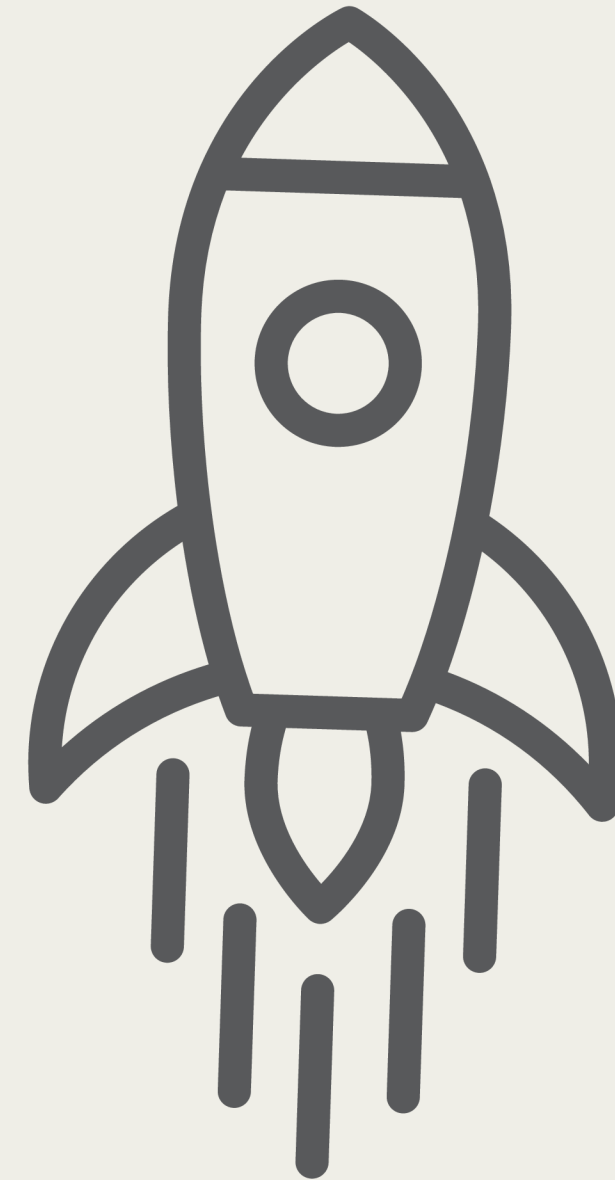
KinD and Terraform

A CASE STUDY

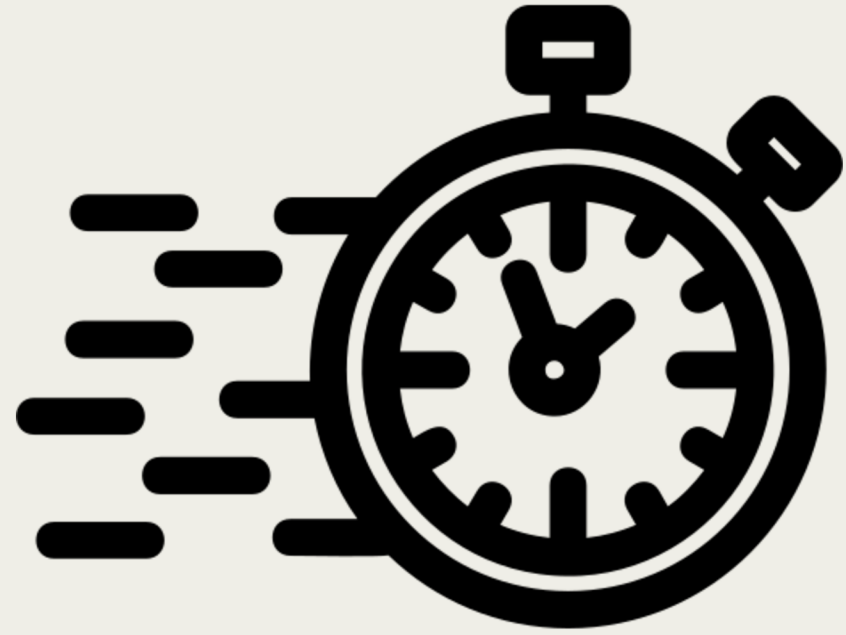
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AGENDA

- DevOps and Security
- Project Overview and Approach
 - The app itself
 - Docker + Kubernetes
 - Terraform
- Live Demo and Code



DEVOPS AND SECURITY



- **Optimized development**
Fast application delivery!

- **CI-CD pipeline:**
 - developer makes a change
 - Automated tests,
 - Deployment to test env
 - More automated tests
 - deploy to production



- **Infrastructure as code**
 - Declare **what** not *how*
- **Everything is a config file**
 - ressources, modules, etc
 - reusability
- **Single source of truth & consistency**

CIA

- **Confidentiality**
 - access control and namespaces
- **Integrity**
 - health checks
 - automated tests
- **Availability**
 - redundancy, load balancing

PROJECT OVERVIEW AND APPROACH

Deployment

Kubernetes application manifest

- Creates application namespaces
- Defines pods/containers with resource limits, health checks, and env vars
- Sets up networking
- Configures external access

Infrastructure

Terraform + KinD

- Orchestration, Resource provisioning, Workflow coordination
- KinD -> lightweight Kubernetes clusters using Docker containers
- Sets up a “skelton”
- Nginx for ingress
 - routes external traffic to the appropriate services inside the cluster
 - load balancing by distributing incoming requests across multiple replicas
 - single controlled entry point that can implement security policies

App

Java + Spring Boot

- Common in Enterprise applications
- Makes life easier:
 - Spring Security
 - JWT, Sessions, etc
 - Battle tested

COMMON SECURITY VULNERABILITIES

- Privilege escalation
 - Non-root containers
- DDoS and Resource exhaustion
 - Resource limits
 - Network segmentation (namespaces)
- Injection attacks (if user login is added)
 - Spring Security
- Network Attacks
 - Ingress controller (single entry point)
 - TLS/HTTPS, network policies (not implemented)
- Broken Access Control (not mitigated)
 - RBAC
 - session management, principle of least privilege



YAY live demo!
