DevSecOps

Part 1

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AMADEUS

Disclaimer

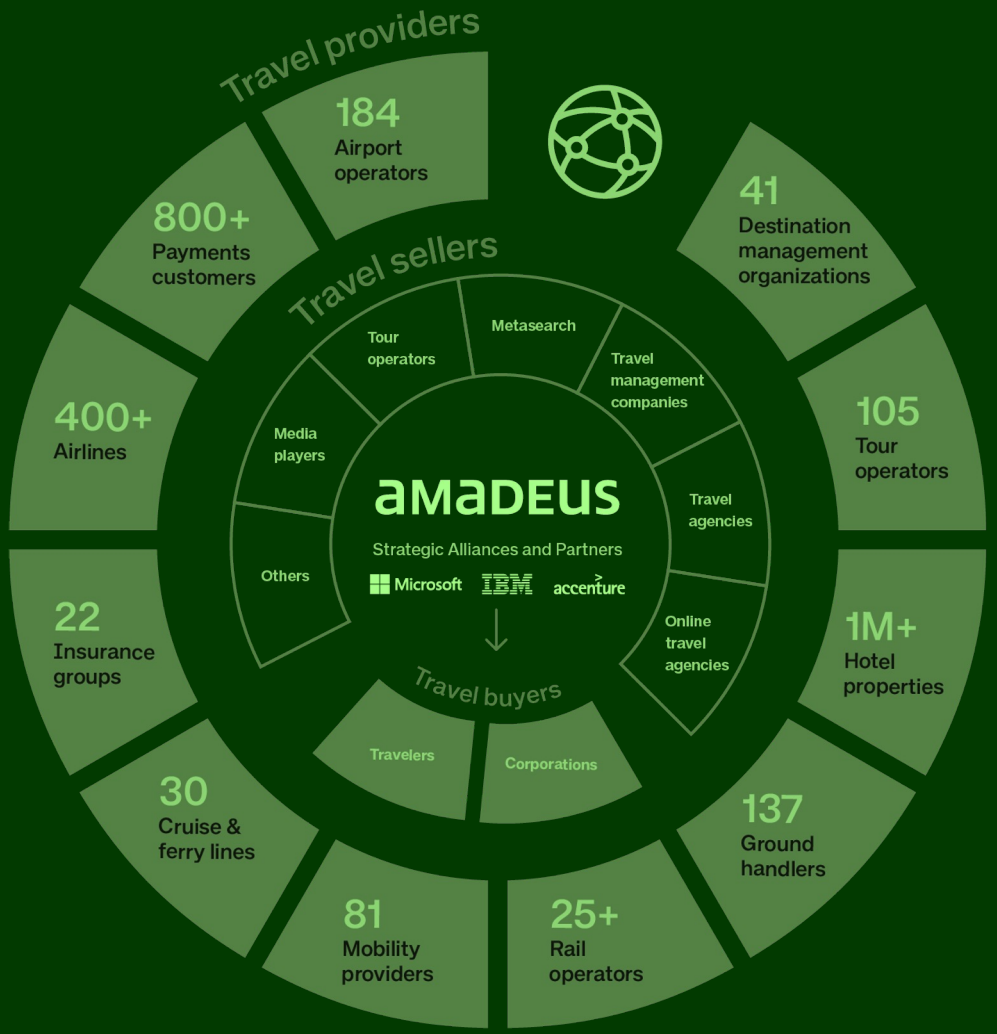
First thing first

- I'm not a teacher, I'm an engineer
  - 1st time teaching 😨
  - I don't know the usual organisation
- I love slides
  - But takes NOTES as not all in in slides
  - And I've got a very BAD handwriting, sorry
- DevSecOps is soooo wide
  - Don't expect an exhaustive tour
- I speak professional English
  - Please don't mind my bio-ti-foule French accent

Amadeus connects the travel ecosystem

4 millions
passengers
boarded per day

100 000 tps
peak inbound
traffic



More than
18,000
people worldwide

190+
countries

150+
nationalities

60+
languages

Who am i?

Benjamin Hilaire

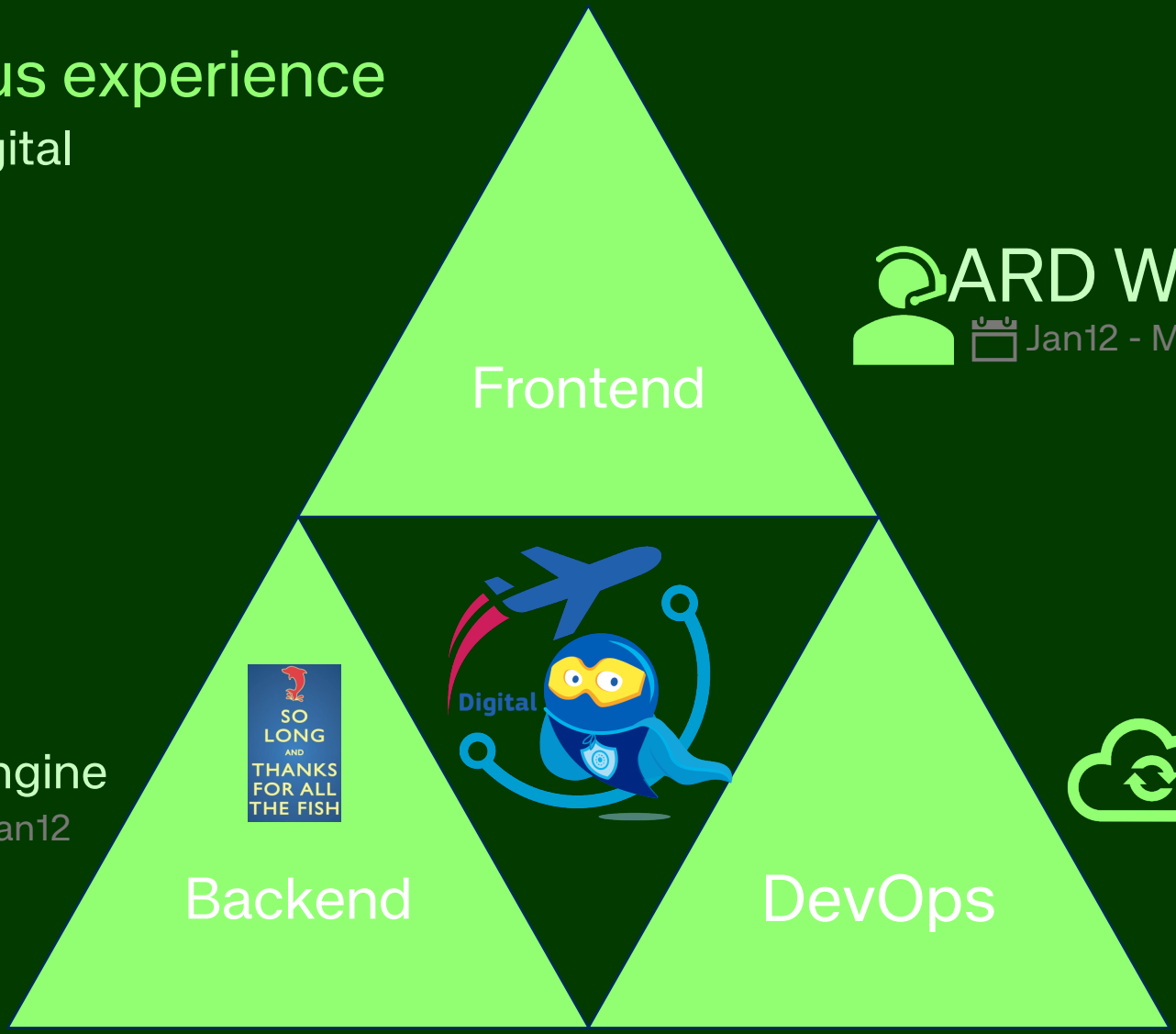
Lead Information Security Expert

Security Manager
Digital for Airlines

SDL Expert
Application Security Office

My Amadeus experience

10+ years in Digital



ARD Web

Jan12 - Mar17

Booking Engine

Aug09 - Jan12

Praxis

Mar17 – Jul19

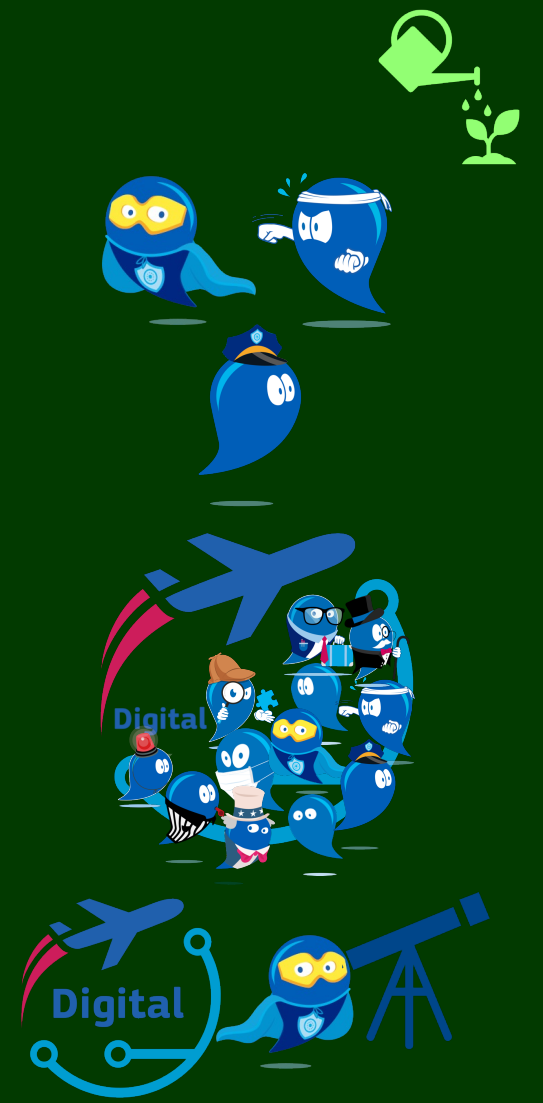
From reactive to proactive

Security maturity

Reacting to incident

Fixing our weaknesses

Security by design



Who are you ?

Quick round table
- Your name
- Your cursus
- Your dev background
- Your DevSecOps knowledge

DevSecOps

- **PART 1 – DevOps foundations**
- PART 2 – DevSecOps to secure software
- PART 3 – Securing DevSecOps
- PART 4 – Lab

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PART 1 - DevOps

- Software Development methodologies
- Cloud revolution
- CICD technics
- Everything as Code

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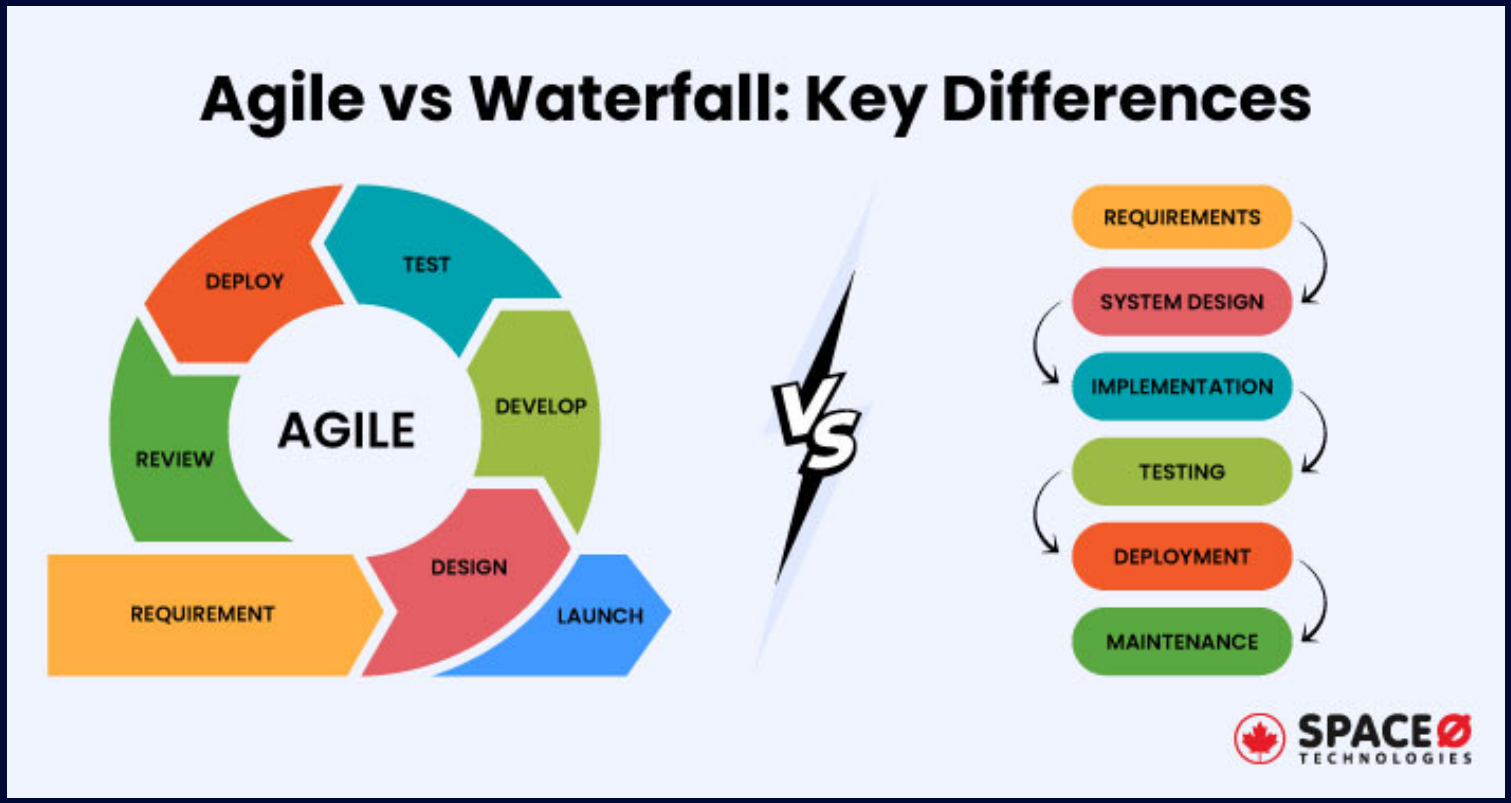
1.1 Software Development methodologies

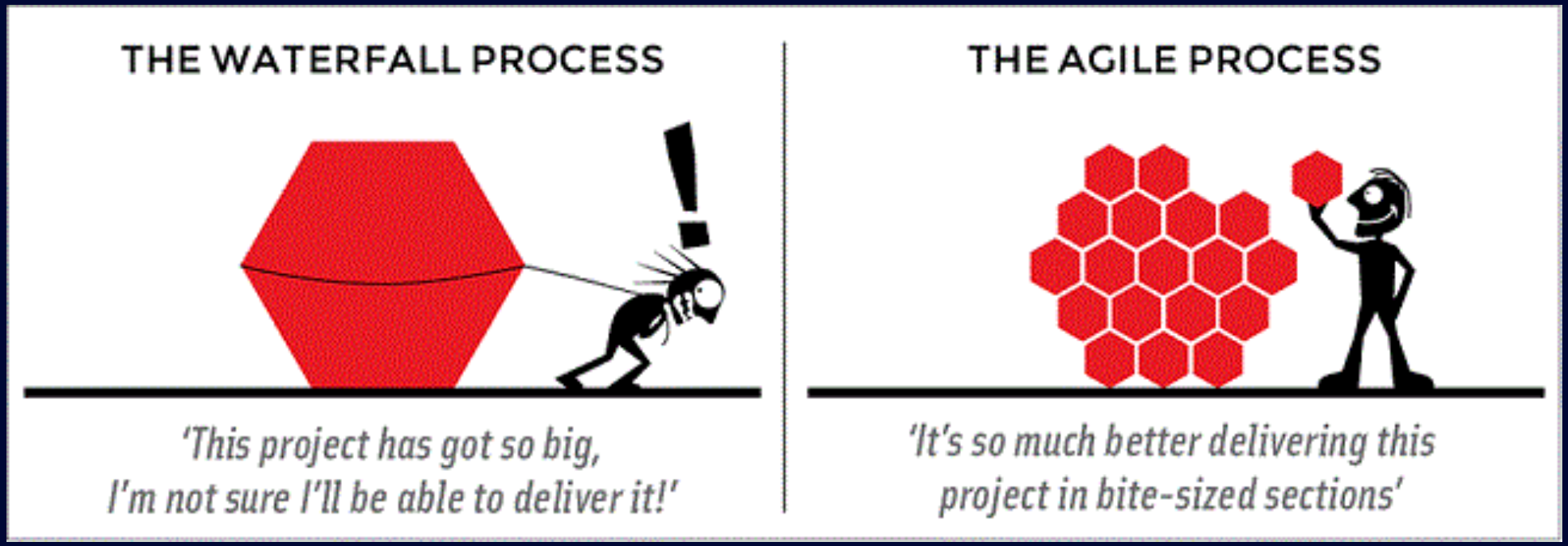
Waterfall vs Agile

Differences



Waterfall vs Agile

Goal



Waterfall vs Agile

Skills

Waterfall vs Agile

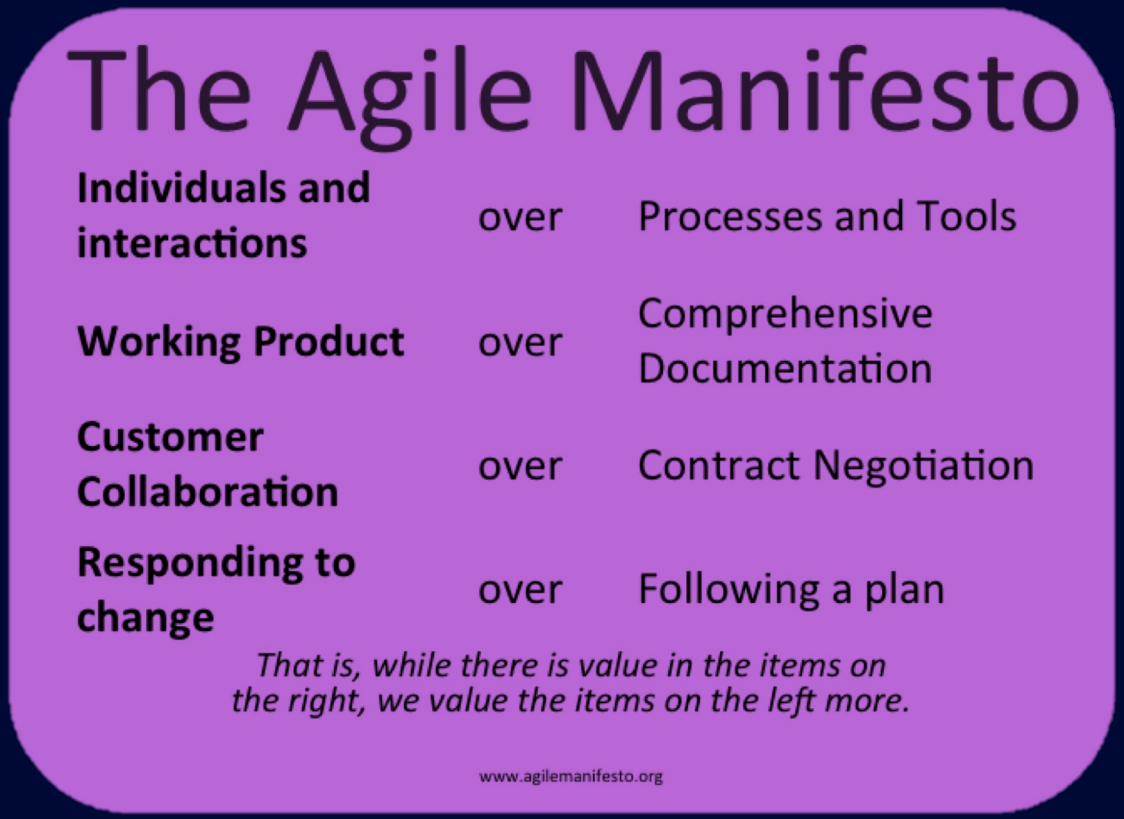
Added value

Challenge

How to release every 3 weeks ?

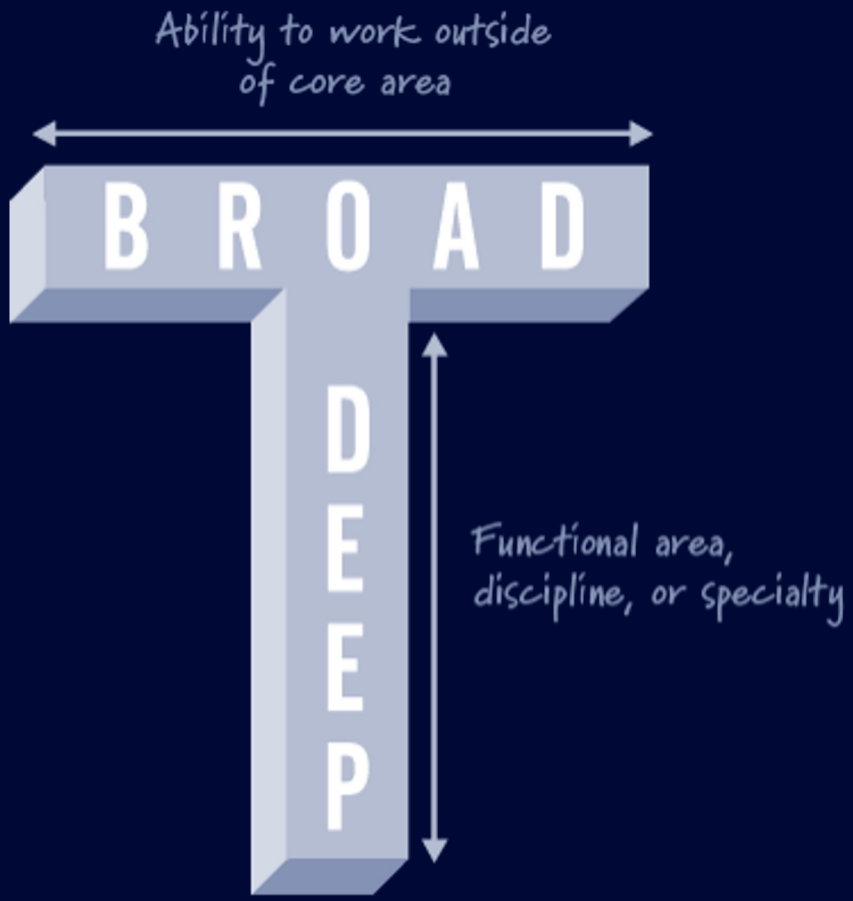
Waterfall vs Agile

Concepts



Waterfall vs Agile

Skills



Waterfall vs Agile

Why DevOps

Imagine

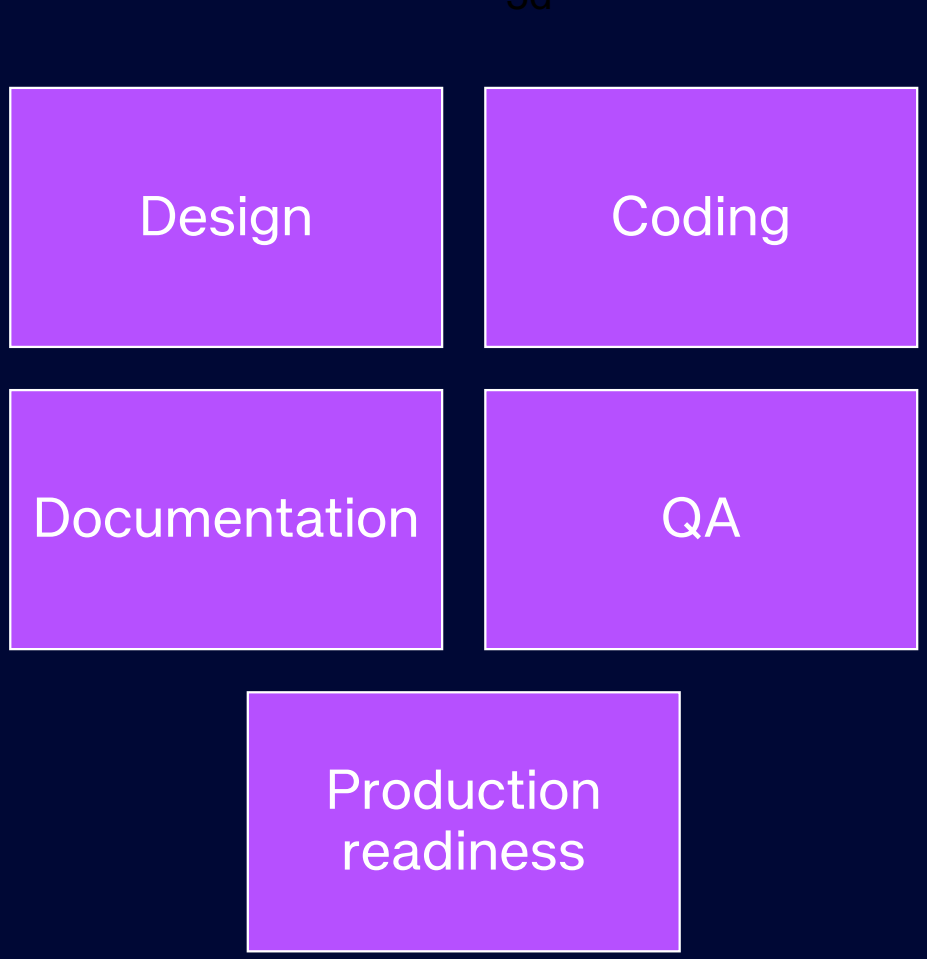
You got a complete skilled team, and you need to deliver a new simple webapp (in 2014)

Question

What are the development phases ?

Question

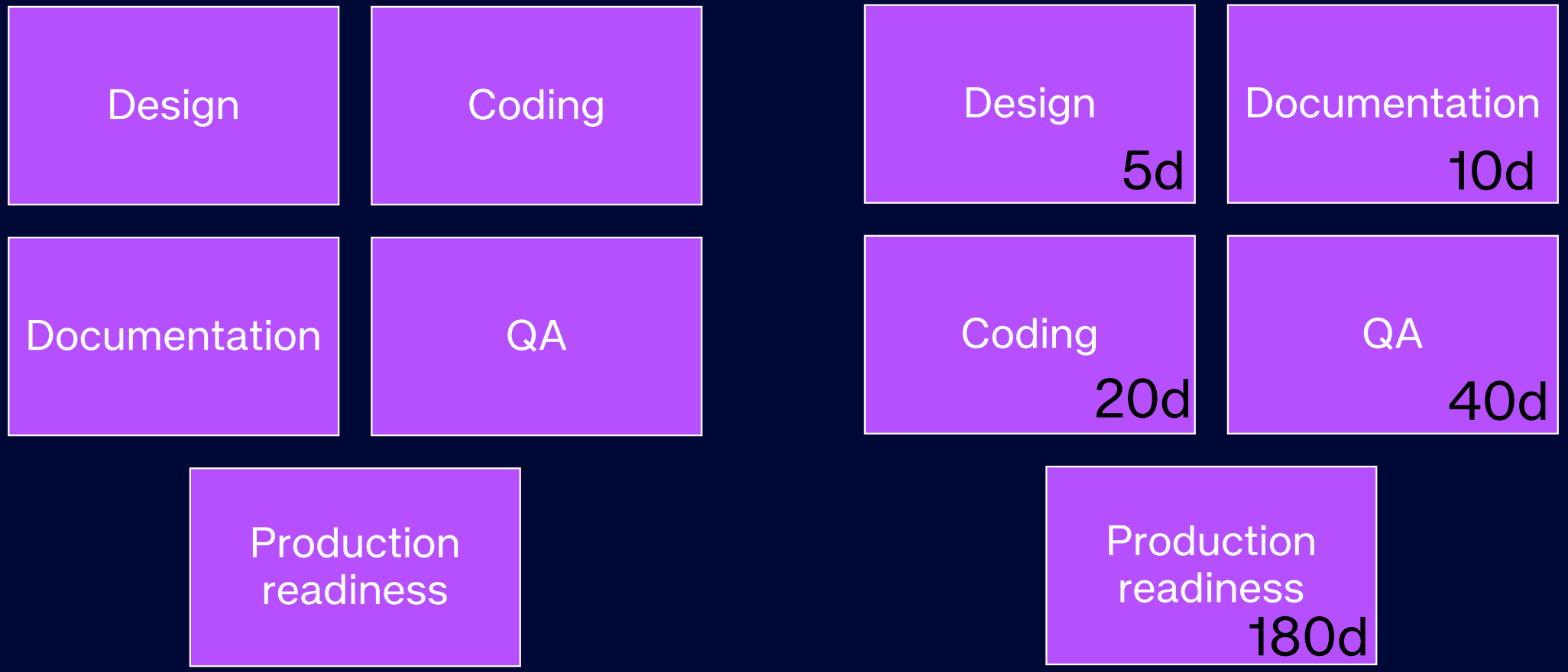
Can we sort the phase from faster to longer ?



Waterfall vs Agile

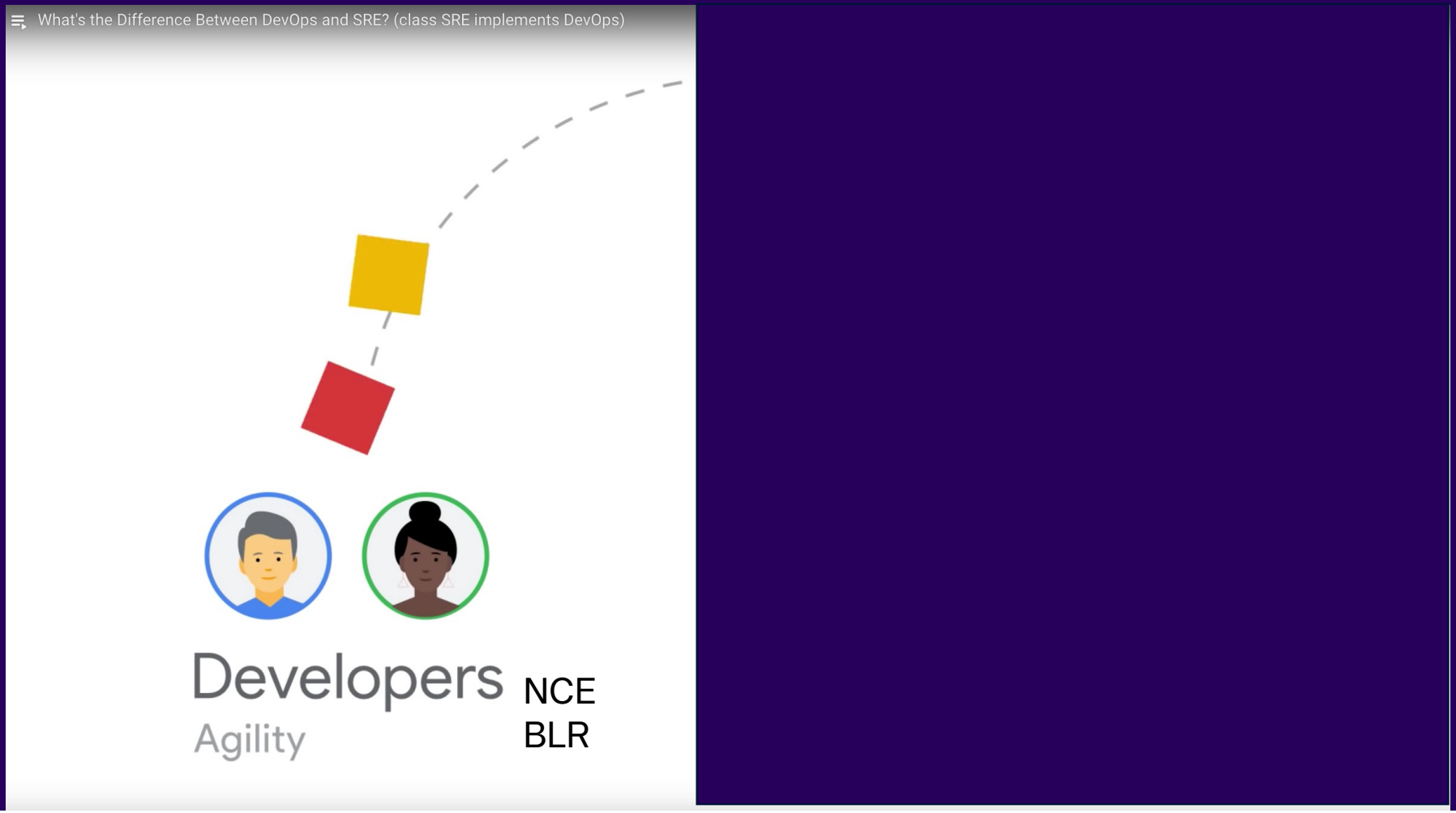
Why DevOps

5d



Why such difference ?

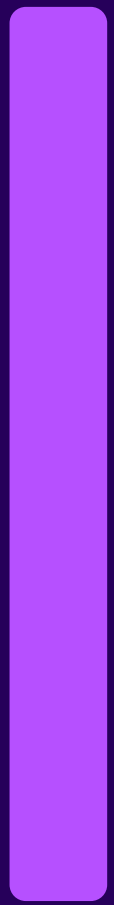
Developers throw code over the wall



Different role with different visions

_Developers

- Throw code
- No knowledge of the operations
- Responsible for feature
- Wants to move faster



•Operators

- Keep code running
- Little knowledge of the code
- Responsible for stability
- Wants to move slower

•Hard to maintain the communication and balance

Take away

Why DevOps

- **New methodology**
  - **Need agility**
  - **Reconcile Dev and Ops**
  - **Operations are too manual and takes too long**

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1.2 The Cloud revolution

My sample app

Good old times...

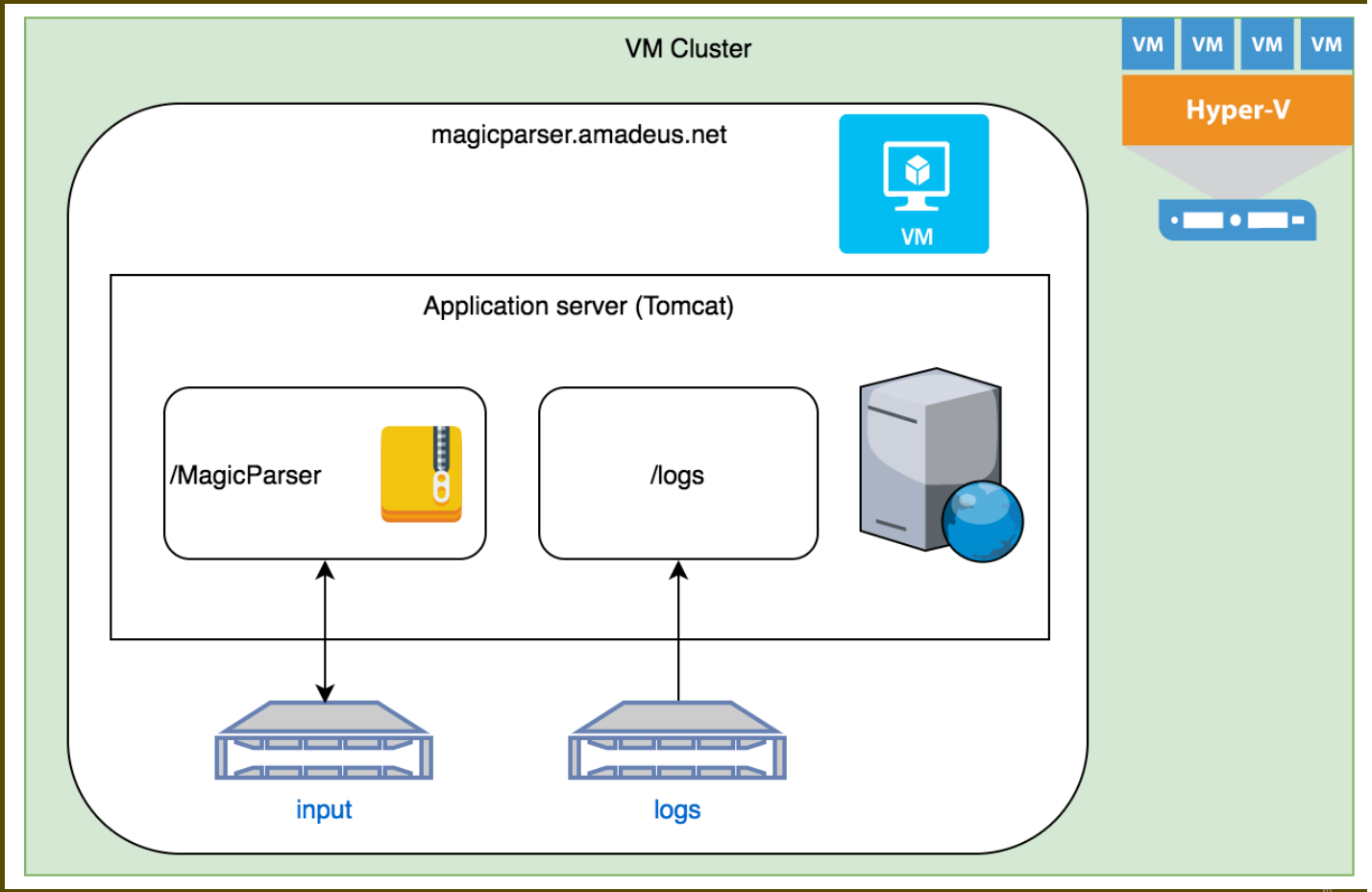
- Let's take an example
  - Tool I developped in 2012 😟
  - Java webapp + javascript (jquery)

⚠️ Presentation and screenshots from 2016

What is Magic Parser ?

Not only a war…

- magicparser.amadeus.net
  - Provided by VM team
  - Admin by us
- Tomcat 8.0
  - Installed/Config by us
- /MagicParser
  - Application war
- /logs
  - Where the HTML/JSON result is stored and served



Operational model

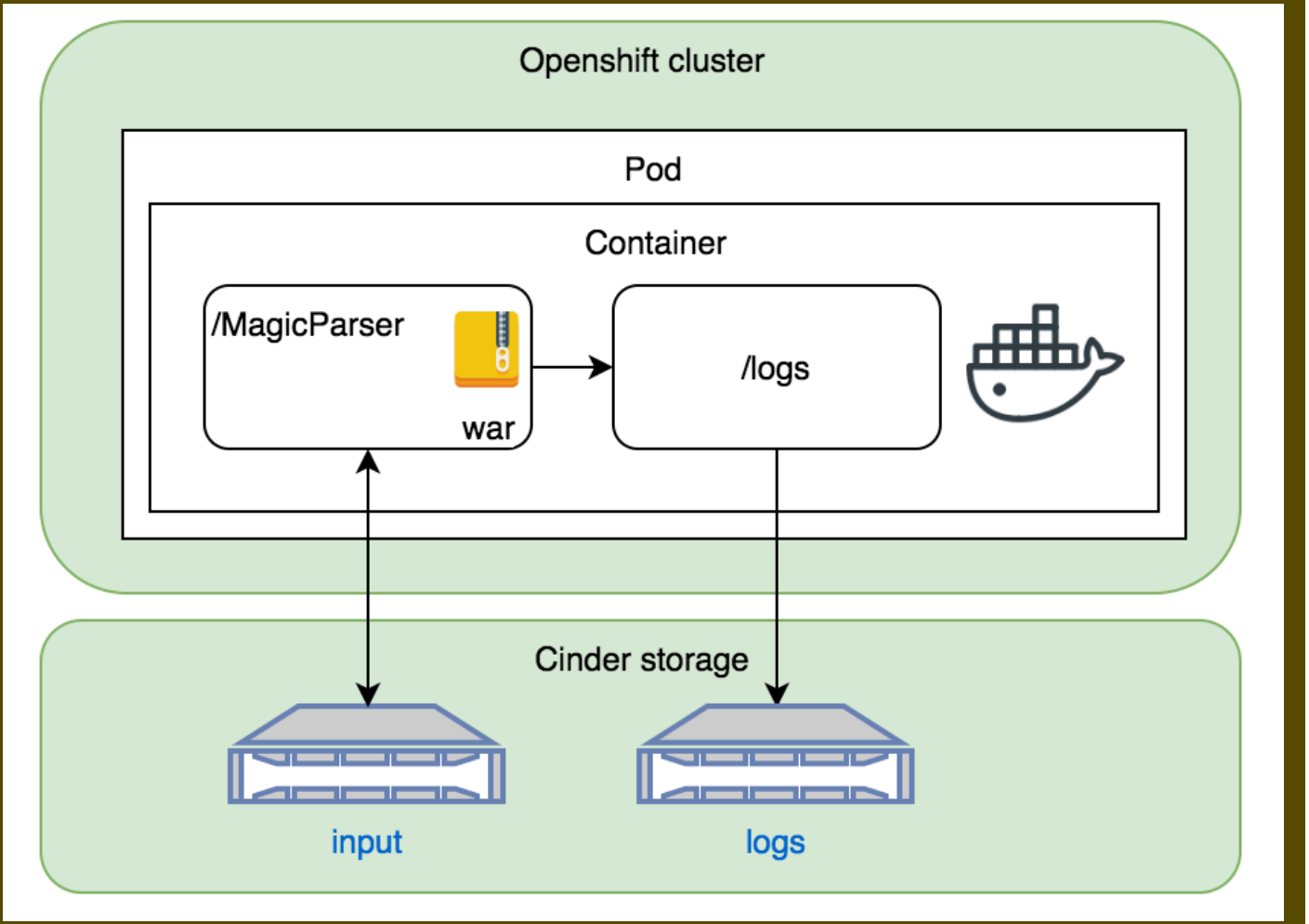
Building is not enough

- Setup
  - Initial installation of Tomcat 8.0 using unzip
  - Manual configuration of tomcat on the machine
  - Manual configuration of the appli (.properties) on the machine
- Test
  - All done in local or after deployment
- Deploy
  - Delete the war / Copy the new one
  - What if the new one is buggy ?
- Admin
  - Manual restart when the customer are not happy of the downtime
  - Apply security patch...once a year (or more)
  - No update of tomcat or java ever done

Magic Parser in Openshift (=kubernetes)

In green we trust the platform

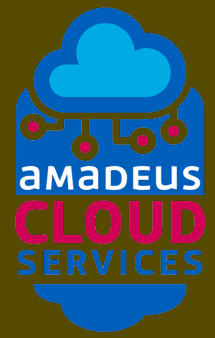
- Container
  - Docker image
- 'Pod' and storage
  - 'Blueprint' of the application deployment (json)
- Cinder storage is persistent volume provided by the platform



Operational model

Building is not enough

- Setup
  - Blueprints (json under source control) - HELM
- Test
  - Done in local and CI
- Deploy
  - One jenkins job to deploy
  - Openshift/Jenkins to fallback
- Admin
  - All is under source control
  - Automatic restart
  - Application server is the only thing to update (1 line of in Dockerfile)



How does a Dockerfile looks like ?

A container is both a VM and a process

JS uploader.js | { } magic-parser-volume-template.json | Dockerfile ● | { } du-volume.json

docker ▸ Dockerfile ▸ ...

```
1  # We inherit from a blank JBoss
2  FROM registry.access.redhat.com/jboss-eap-7/eap72-openjdk11-openshift-rhel8
3  # We play with our container to make /logs writables and target resource folder
4  ENV CONFIG_PATH /resources/
5  USER root
6  RUN mkdir -p /logs/input/temp && \
7      chgrp -R 0 /logs && \
8      chmod -R g=u /logs
9  USER jboss
10 # Copy resources folder into the container
11 COPY resources /resources
12 # Copy the war into /deployments to be deployed at runtime by JBoss
13 ADD MagicParser.war /deployments/
```

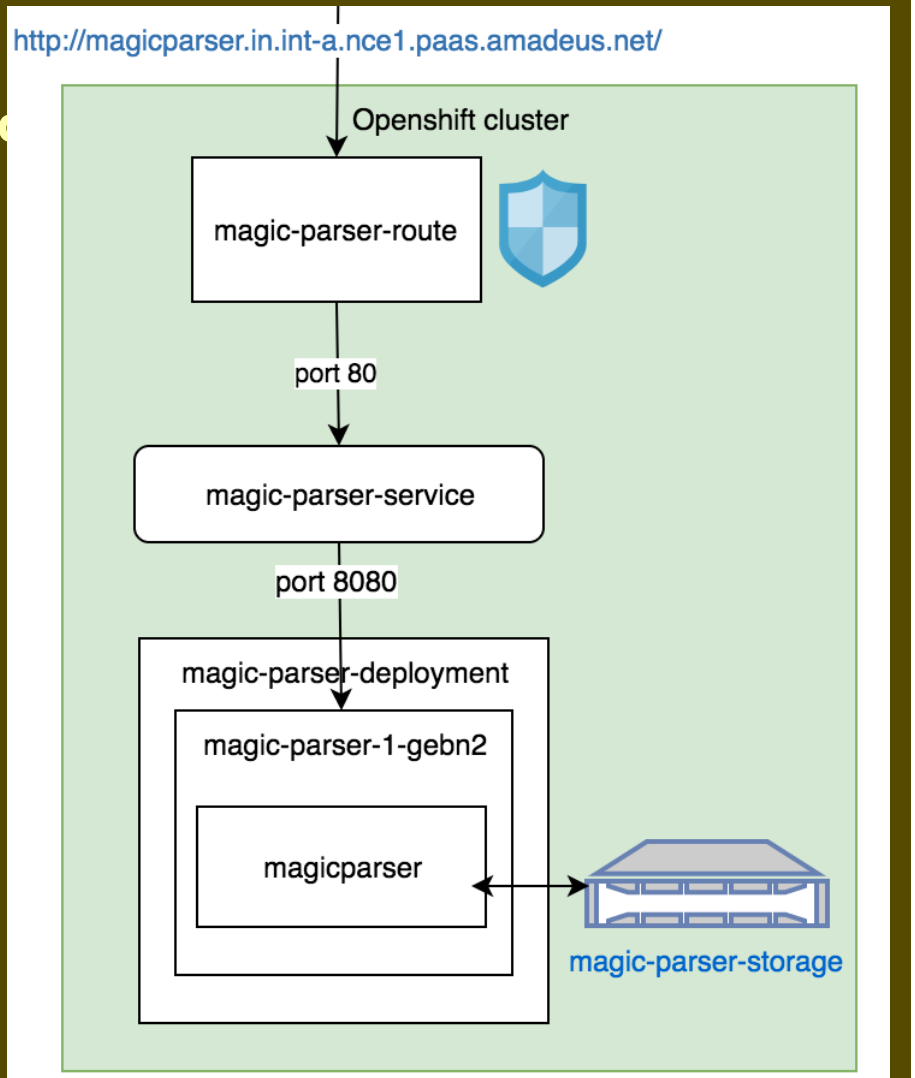
What’s missing ?

Docker != Cloud

How does a blueprint look like

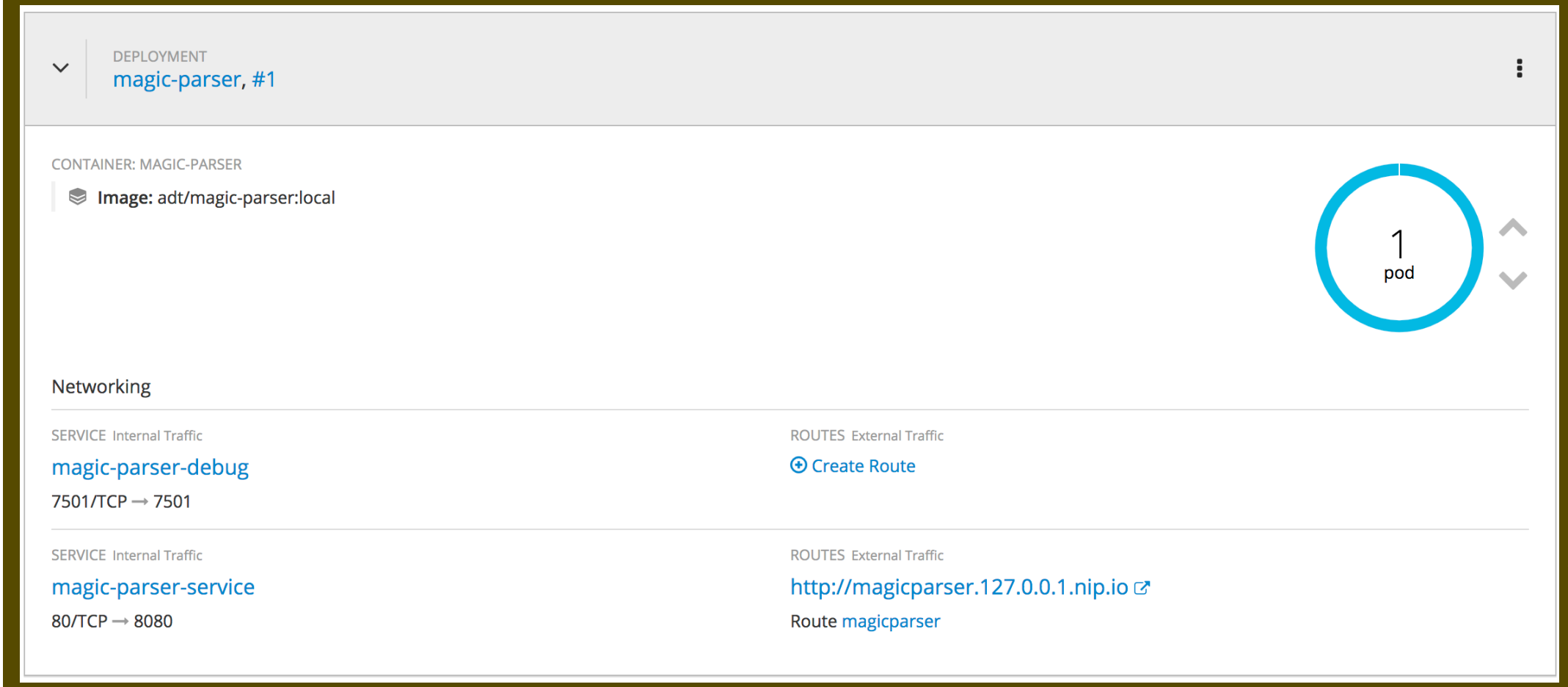
- **Container** magic-parser
  - Part of a multi-container **poc**
  - Mouting **persistent volume** ‘magic-parser’
  - Part of a **deployment**
  - Served by a **service**
  - Routed by a **route**

- All defined in an openshift **template**
  - Inject variable by environment
  - Not amadeus-specific, industry-standard



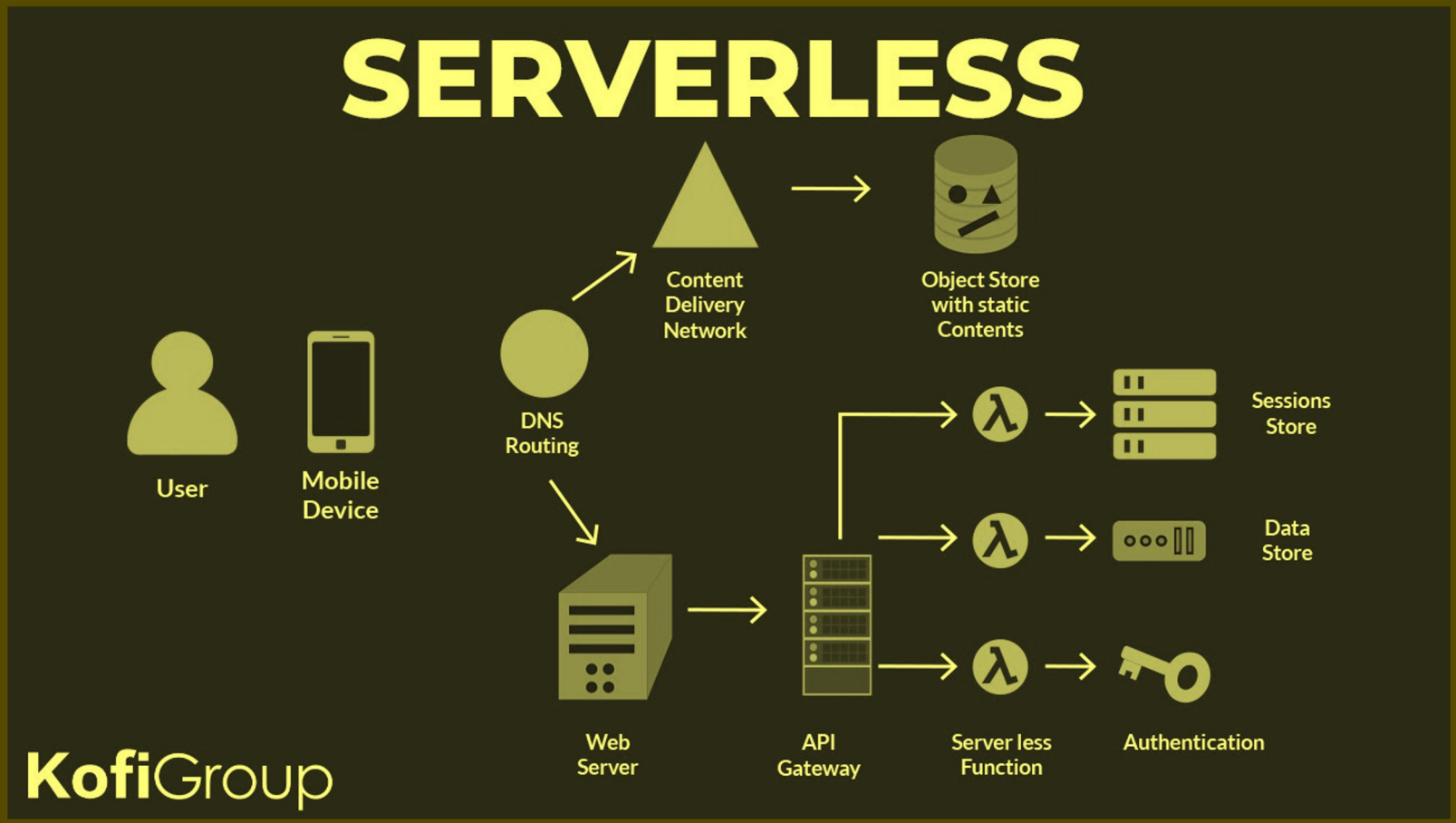
How does it look like in Openshift console

Local example



Cloud Native Applications

Going further



From Pets to Cattle

Usual image

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1.3
Continuous Integration
Continuous Delivery

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1.3. CICD

Let’s pause 30s

Copy/Pasting the war is working enough

- Why do I need CI/CD ?
  - Load in prod in 1 click
  - Fallback in 1 click
  - Don’t deploy something broken !
  - Migrate your tool to in 10 minutes
  - Enable HTTPS in 4 lines (3 in yaml)
  - Enable authentication in 10 minutes
  - Don’t spend 1 day creating an outdated operationnal doc but spent it to migrate your app

```
"tls": {
    "insecureEdgeTerminationPolicy": "Allow",
    "termination": "edge"
},
```

Use libraries and workflow

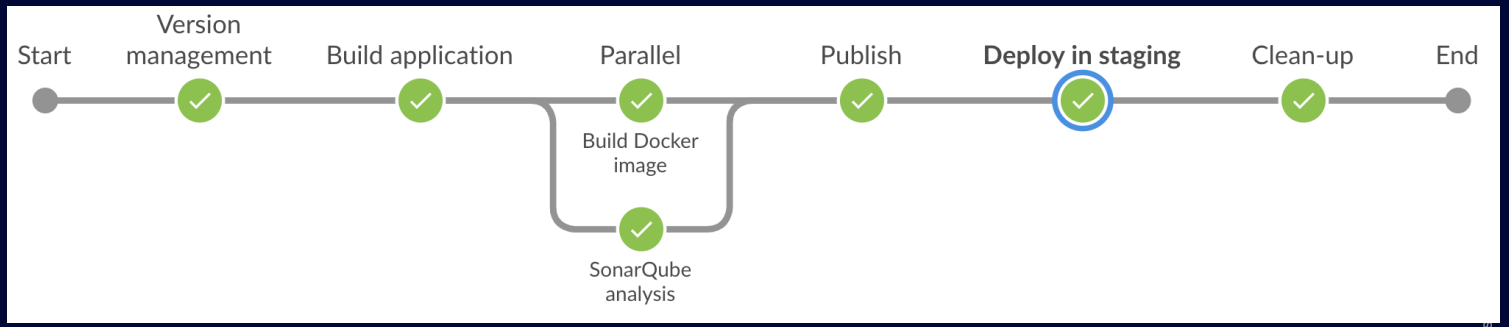
Many DEV did have the same issues as you

- Jenkins pipeline is using groovy scripts
  - Script can be shared (libraries)
  - Jenkinsfile can be shared (workflow)
  - SWB2 is providing to you the usage of both (1 workflow = 1 library)

- OpenShiftComponent library
  - Dedicated for tools CI/CD based on openshift template
  - Based on Deployment (Manager) Unit
  - Allow docker build/publication/promotion/deployment/undeployment

Tool pipeline

- Version management
  - Compute the version based on git tags and rules
- Build application
  - Mvn clean install
  - SonarQube analysis
- Build docker image
  - Docker build
- Publish
  - Publish docker image + deployment units + blueprint + env properties
- Deploy
  - Deploy your application using the blueprint on the target



Let's break it down : BUILD

Already atomic...

_Version management

- Use 'newVersion' to automatically compute the version based on git tags
- Create 'OpenshiftComponent'
- Add token for connection to openshift

```
execStage('Version management'){
  version = newVersion(['versionType': 'sem', 'branchingModel': ['master': '@{VERSION}-master', '.*'
  currentBuild.description = version
  oseComponent = new OpenShiftComponent('adt-magicparser',version,this)
  oseComponent.addTokenParameter('openShiftToken','magicparser-sa')
  oseComponent.addParameter('uid',oseComponent.getContinuousIntegrationName())
}
```

•Build

```
execStage('Build application'){
  sh 'mvn -B clean verify package -DskipStaging=true -DskipTests'
  sh 'cp viewer/target/MagicParser.war docker'
}
```

_Sonarqube

```
'SonarQube analysis': {
    sonarRunner([projectName: 'MagicParser', projectKey: 'com.amadeus.jcp.viewer.log:MagicParser', sonar_nature: 'mvn'])
},
```

•Docker build

```
'Build Docker image': {
    oseComponent.build("adt/magic-parser:${version}", 'docker')
}
```

Let's break it down : PUBLISH and DEPLOY

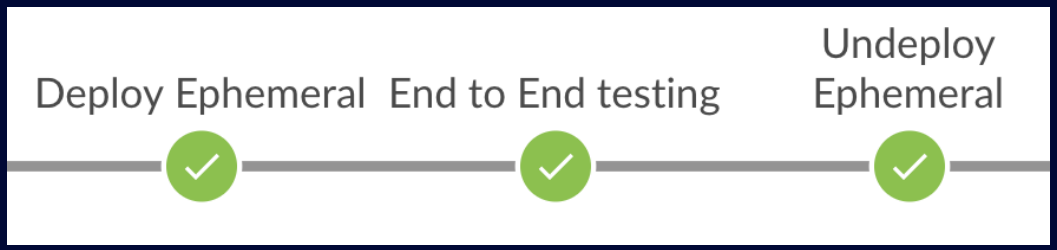
Already atomic...

_Publication reference

- docker
- deployment unit
- openshift template
- environment properties

```
execStage("Publish"){
  oseComponent.setDeploymentUnit('blueprints/du-novolume.json')
  oseComponent.setOpenshiftTemplate('blueprints/magic-parser-no-volume-template.json')
  // Here we put the additional du and template to be published
  oseComponent.setEnvironmentProperties('blueprints/staging.properties','blueprints/prod.properties',
  'blueprints/ephemeral.properties','blueprints/du-volume.json','blueprints/magic-parser-volume-template.json')
  oseComponent.publish()
}
```

- Validation
  - Not done for MP (see watchtower)



- Deployment

```
// Continuous deployment for master branch only
if (env.BRANCH_NAME.equals('master')){
  execStage('Deploy in staging'){
    oseComponent.deployInTarget('staging','magicparser=staging')
  }
}
```

How can I load on prod ?

Power of libraries

deploy-prod.groovy

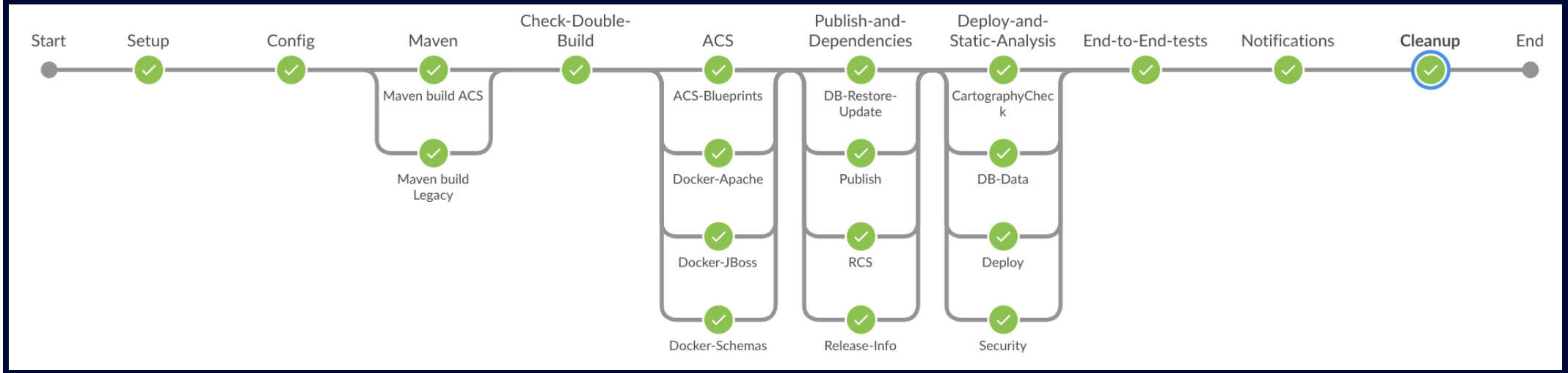
```groovy
#!/usr/bin/groovy
@Library(['pipeline-global-libraries', 'pipelinelibraries@16.0.36']) _

import com.amadeus.air.jenkins.openshift.OpenShiftComponent

execEnv('dockerhub.rnd.amadeus.net:5000/acs_praxis/jenkins-slave:3.3.0', 20) {
  // Prepare openshift component
  execStage("Set-up"){
    oseComponent = new OpenShiftComponent('adt-magicparser',env.VERSION,this)
    currentBuild.description = env.VERSION
    oseComponent.addTokenParameter('openShiftToken','magicparser-sa')
    // Download files needed for deployment
    oseComponent.setPublishedDeploymentUnit('du-volume.json')
    oseComponent.setPublishedOpenshiftTemplate('magic-parser-volume-template.json')
    oseComponent.setPublishedEnvironmentProperties('prod.properties')
  }
  execStage("Promote"){
    // Promote the file in order to be kept for a long time
    oseComponent.promote()
  }
  execStage("Load"){
    // Deploy in prod target using DeploymentManager
    oseComponent.deployInTarget('prod',"magicparser=prod")
  }
}
```

- Reuse the same library in the same spirit
- Every data is published and ready to be used
- Promotion done to make sure the artifact are kept a long time
- Load done using deployment manager and not via oc command

Real (and oudated) example



Key takeaways

- Scripts
  - BUILD (CI)
  - DEPLOY
  - TEST
  - VALIDATE and PROMOTE
  - LOAD in PRD (CD)
- Evolution of
  - MAKE, ANT, MAVEN, BASH,...

Old school CICD

(outdated)

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1.3.2 Modern CICD

Key takeaways

Stop scripting all CI

How can we improve ?

Modern CI

Stop scripting all CI

- CICD scripts are usually COPY/PASTE
  - Uses library to factorize code
  - Building 1 app or another is mostly the SAME *but* the name of the app (and few more things)
- What if we split the action (what we do, actual code) with the model (parameters we inject) ?

Modern CI

Enhanced copy/paste

- Workflows
  - Framework with variable
  - Actions re-usable
  - Action configurable
- Easy
  - Usage
  - Understanding
  - Maintenance

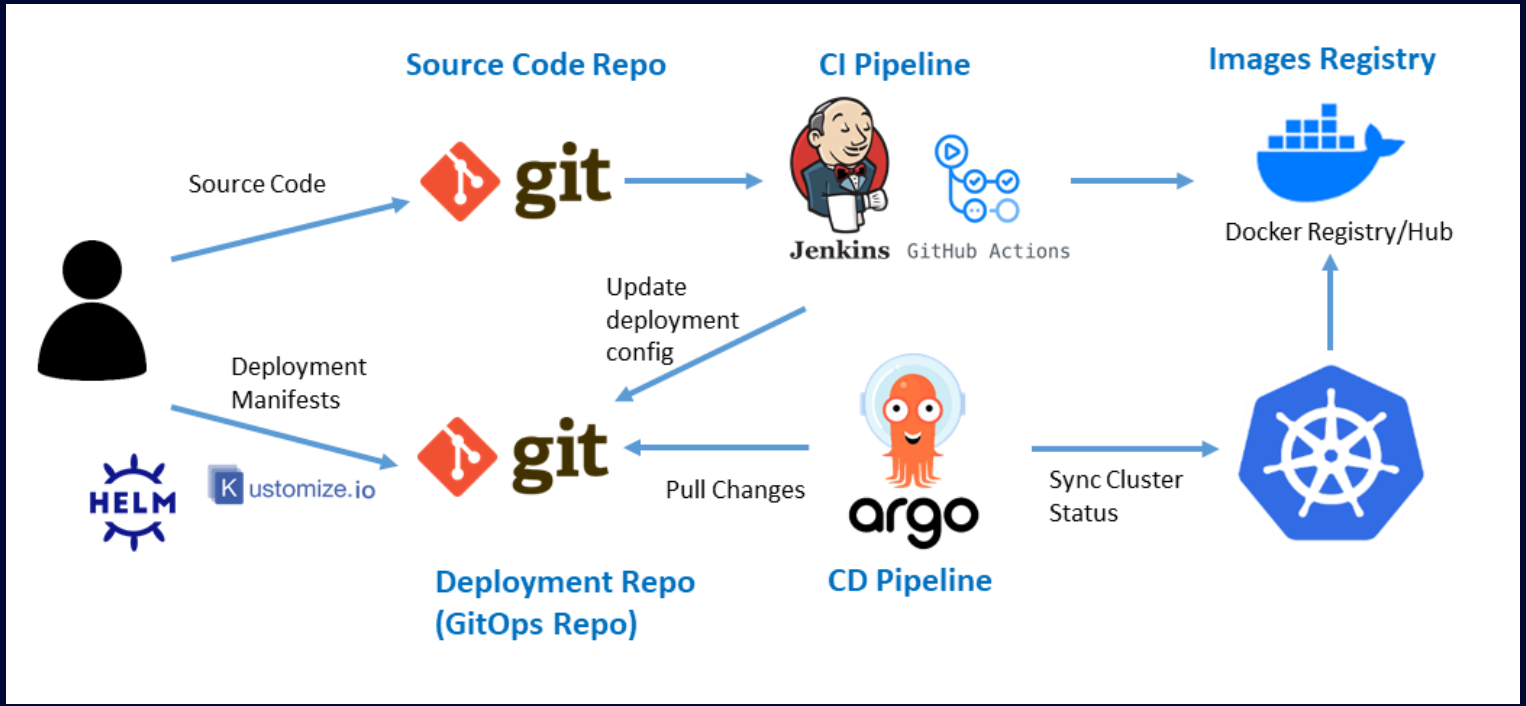
YAML

```yaml
name: GitHub Actions Demo
run-name: ${{ github.actor }} is testing out GitHub Actions 🚀
on: [push]
jobs:
  Explore-GitHub-Actions:
    runs-on: ubuntu-latest
    steps:
      - run: echo "🎉 The job was automatically triggered by a ${{
github.event_name }} event."
      - run: echo "🐧 This job is now running on a ${{ runner.os }} server
hosted by GitHub!"
      - run: echo "🔎 The name of your branch is ${{ github.ref }} and your
repository is ${{ github.repository }}."
      - name: Check out repository code
        uses: actions/checkout@v4
      - run: echo "💡 The ${{ github.repository }} repository has been cloned to
the runner."
      - run: echo "🖥️ The workflow is now ready to test your code on the
runner."
      - name: List files in the repository
        run: |
          ls ${{ github.workspace }}
      - run: echo "🍏 This job's status is ${{ job.status }}."
```

Modern CD

Stop scripting the CD

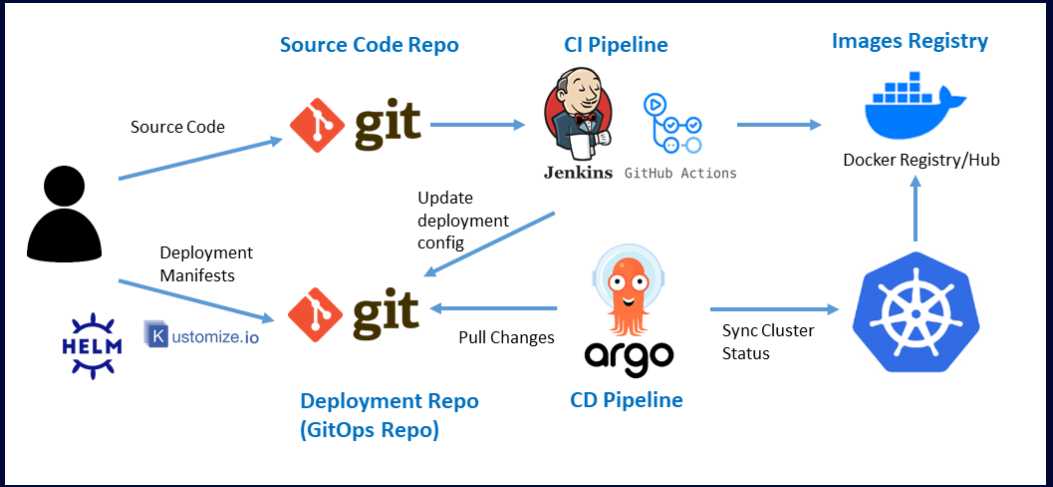
- Deploying is applying a blueprint
- Split SOURCE and BLUEPRINT
- Workflow builds artifact
- ArgoCD watches GIT and applies chart (blueprint)



Modern CD

Stop scripting the CD

Any idea why ArgoCD is much better than before ?



ArgoCD added value

Stop scripting all CI

- What if the containers take 61s to deploy (but timeout is 60s) ?
- What if an operator modify manually the value and forget to put it back ?
- Blueprint GIT must be the reference

Modern CICD

Key takeaway

- Split CI CODE and CI definition (YAML)
- Split CD from CI
- Let ArgoCD watch GIT and provide self-repair

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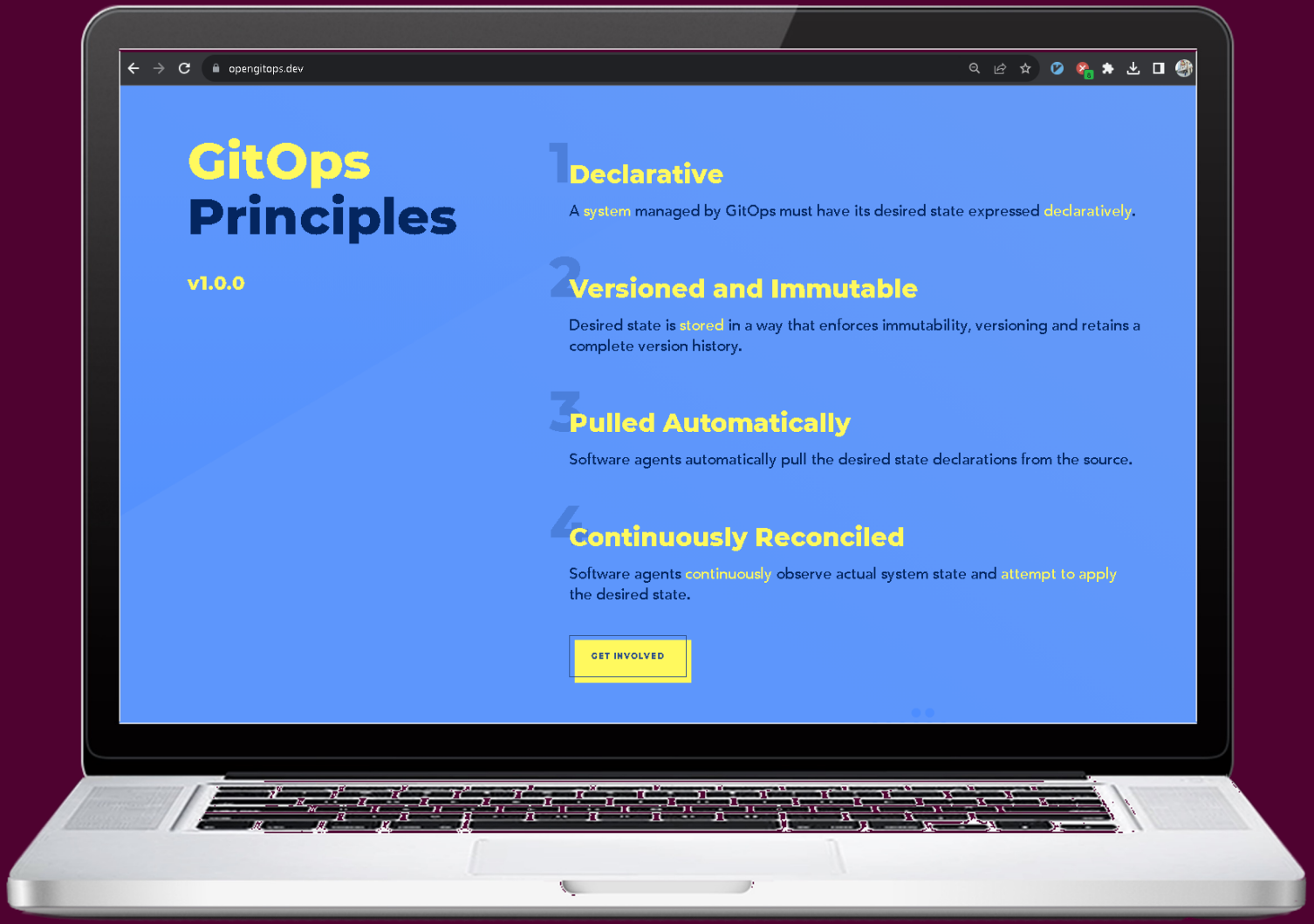
1.4 Everything as Code

GitOps

- GitOps
  - Split code and configuration
  - Developers (or 3rd party) are responsible of code
  - DevOps of their configuration
- Git advantages
  - Same tool as developers
    - Review process
    - Merge policies
    - Automated code validation
  - Full history and blame
  - Revert in one click
  - 1 PR for a full migration

GitOps



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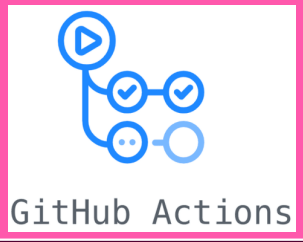
GitOps => Everything as Code

Any famous example ?

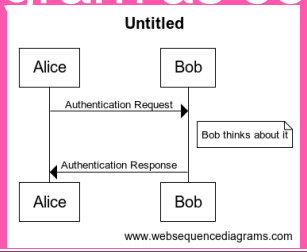
GitOps => Everything as Code

Pipeline as code



Infra as code

Diagram as code



Network as code

Dashboard as code

Grafana

...

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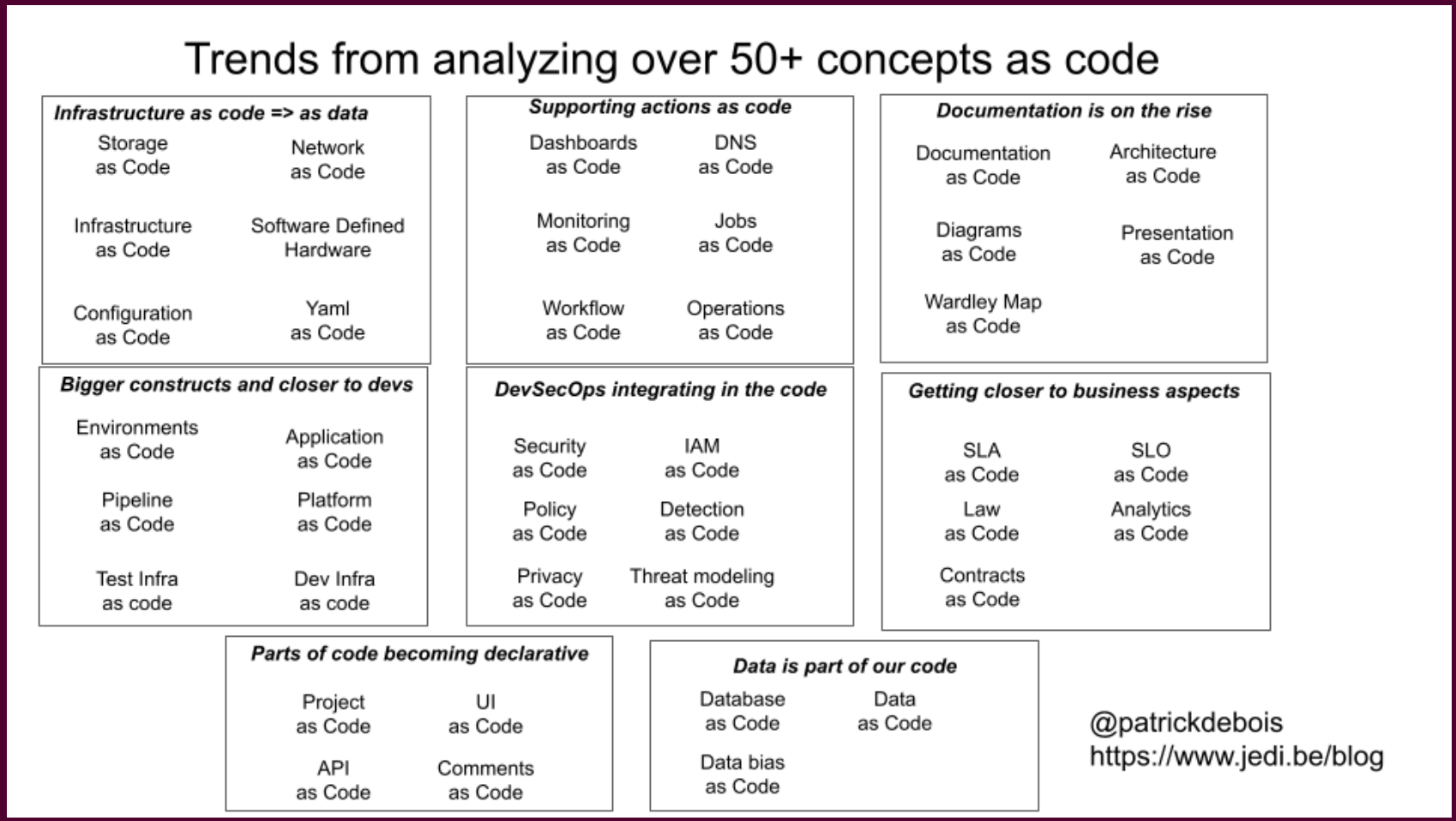
A piece of the as-code realm



Key takeaways

- GitOps
  - Backbone of DevOps
  - Allow team collaboration
  - Allow traceability
  - Allow repairing capability
- Now Everything as Code

Take away

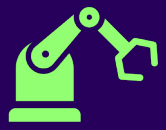
DevOps in 1 slide (don't miss it)

New methodology

- **Need agility**
- **Operations are too manual and takes too long**

Cloud revolution

- **From Pets to Cattle**
- **Binary can run everywhere (container)**
- **Topology is defined and can be cloned**



CICD

- **Continuous Integration**
  - **Build + Validate**
- **Continuous Deployment**
  - **Deploy based on topology**

GitOps

- **Git the is reference for all operation**
- **Config split from code**
- **Evolution to everything as code**

amadeus

Thank you