SCALING JENKINS WITH KUBERNETES

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ABOUT ME

Principal Software Engineer @ CloudBees

Author of Jenkins Kubernetes plugin

Long time OSS contributor at Apache Maven, Eclipse, Puppet,…

OUR USE CASE

Scaling Jenkins

Your mileage may vary

Kernel Sanders
@lstoll

The solution: Docker. The problem? You tell me.

BUT IT IS NOT TRIVIAL

SCALING JENKINS

Two options:

- More agents per master
- More masters

SCALING JENKINS: MORE AGENTS

- Pros
  - Multiple plugins to add more agents, even dynamically
- Cons
  - The master is still a SPOF
  - Handling multiple configurations, plugin versions,...
  - There is a limit on how many agents can be attached

SCALING JENKINS: MORE MASTERS

- Pros
  - Different sub-organizations can self service and operate independently
- Cons
  - Single Sign-On
  - Centralized configuration and operation

CLOUDBEES CORE

The best of both worlds

CloudBees Jenkins Operations Center with multiple masters

Dynamic agent creation in each master

&

We can run both Jenkins **masters and agents** in Kubernetes

STORAGE

Handling distributed storage

Masters can move when they are restarted

Jenkins masters need persistent storage, agents (*typically*) don't

Using `PersistentVolumeClaim` so you can provide any implementation

CAVEATS

- Performance

> *"Worst-case scenario for just about any commonly used network-based storage"*

- Lack of multi-AZ for block storage, ie. EBS AWS

NETWORKING

Jenkins masters open several ports

- HTTP
- JNLP agent

NETWORKING: HTTP

We use ingress rules and `nginx` ingress controller

- Operations Center
- Jenkins masters

Path based routing `cje.example.com/master1`

NETWORKING: JNLP

- Agents started dynamically in cluster can connect to masters internally
- Agents manually started outside cluster connect directly
  - Using `NodePort`

AGENTS WITH INFINITE* SCALE!

Jenkins Kubernetes Plugin

- Dynamic Jenkins agents, running as Pods
- Multi-container support
  - One Jenkins agent image, others custom
- Jenkins Pipeline support for both agent Pod definition and execution
- Persistent workspace
- Auto configured

ON DEMAND JENKINS AGENTS

```
podTemplate(label: 'mypod') {
  node('mypod') {
    sh 'Hello world!'
  }
}
```

GROUPING CONTAINERS (PODS)

```
podTemplate(label: 'maven', yaml: """
spec:
  containers:
  - name: maven
    image: maven:3.3.9-jdk-8-alpine
    command:
    - cat
    tty: true
"""
) {

  node('maven') {
    stage('Get a Maven project') {
      git 'https://github.com/jenkinsci/kubernetes-plugin.git'
      container('maven') {
        stage('Build a Maven project') {
          sh 'mvn -B clean package'
        }
      }
    }
  }
}
```

USING DECLARATIVE PIPELINE

```
pipeline {
  agent {
    kubernetes {
      label 'mypod'
      yaml """
spec:
  containers:
  - name: maven
    image: maven:3.3.9-jdk-8-alpine
    command: ['cat']
    tty: true
"""}}
  stages {
    stage('Run maven') {
      steps {
        container('maven') {
          sh 'mvn -version'
        }
      }}}
}
```

MULTI-LANGUAGE PIPELINE

```
podTemplate(label: 'maven-golang', yaml: """
apiVersion: v1
kind: Pod
spec:
  containers:
  - name: maven
    image: maven:3.3.9-jdk-8-alpine
    command: ['cat']
    tty: true
  - name: golang
    image: golang:1.8.0
    command: ['cat']
    tty: true
""") {
```

MULTI-LANGUAGE PIPELINE

```
node('maven-golang') {
  stage('Build a Maven project') {
    git 'https://github.com/jenkinsci/kubernetes-plugin.git'
    container('maven') {
      sh 'mvn -B clean package' }}

  stage('Build a Golang project') {
    git url: 'https://github.com/hashicorp/terraform.git'
    container('golang') {
      sh """
      mkdir -p /go/src/github.com/hashicorp
      ln -s `pwd` /go/src/github.com/hashicorp/terraform
      cd /go/src/github.com/hashicorp/terraform && make core
      """
    }}}}
```

PODS: SELENIUM

Example:

- Jenkins agent
- Maven build
- Selenium Hub with
  - Firefox
  - Chrome

5 containers

```
podTemplate(label: 'maven-selenium', yaml: """
apiVersion: v1
kind: Pod
spec:
  containers:
  - name: maven-firefox
    image: maven:3.3.9-jdk-8-alpine
    command: ['cat']
    tty: true
  - name: maven-chrome
    image: maven:3.3.9-jdk-8-alpine
    command: ['cat']
    tty: true
  - name: selenium-hub
    image: selenium/hub:3.4.0
"""
```

```
// because containers run in the same network space, we need
// make sure there are no port conflicts
// we also need to adapt the selenium images because they we
// designed to work with the --link option

- name: selenium-chrome
  image: selenium/node-chrome:3.4.0
  env:
  - name: HUB_PORT_4444_TCP_ADDR
    value: localhost
  - name: HUB_PORT_4444_TCP_PORT
    value: 4444
  - name: DISPLAY
    value: :99.0
  - name: SE_OPTS
    value: -port 5556
```

```
- name: selenium-firefox
  image: selenium/node-firefox:3.4.0
  env:
  - name: HUB_PORT_4444_TCP_ADDR
    value: localhost
  - name: HUB_PORT_4444_TCP_PORT
    value: 4444
  - name: DISPLAY
    value: :98.0
  - name: SE_OPTS
    value: -port 5557
```

```
node('maven-selenium') {
  stage('Checkout') {
    git 'https://github.com/carlossg/selenium-example.git'
    parallel (
```

```
        firefox: {
          container('maven-firefox') {
            stage('Test firefox') {
              sh """
              mvn -B clean test -Dselenium.browser=firefox \
                -Dsurefire.rerunFailingTestsCount=5 -Dsleep=0
              """
            }
          }
        },
```

```
chrome: {
  container('maven-chrome') {
    stage('Test chrome') {
      sh """
      mvn -B clean test -Dselenium.browser=chrome \
        -Dsurefire.rerunFailingTestsCount=5 -Dsleep=0
      """
    }
  }
}
```

DEPLOYING TO KUBERNETES

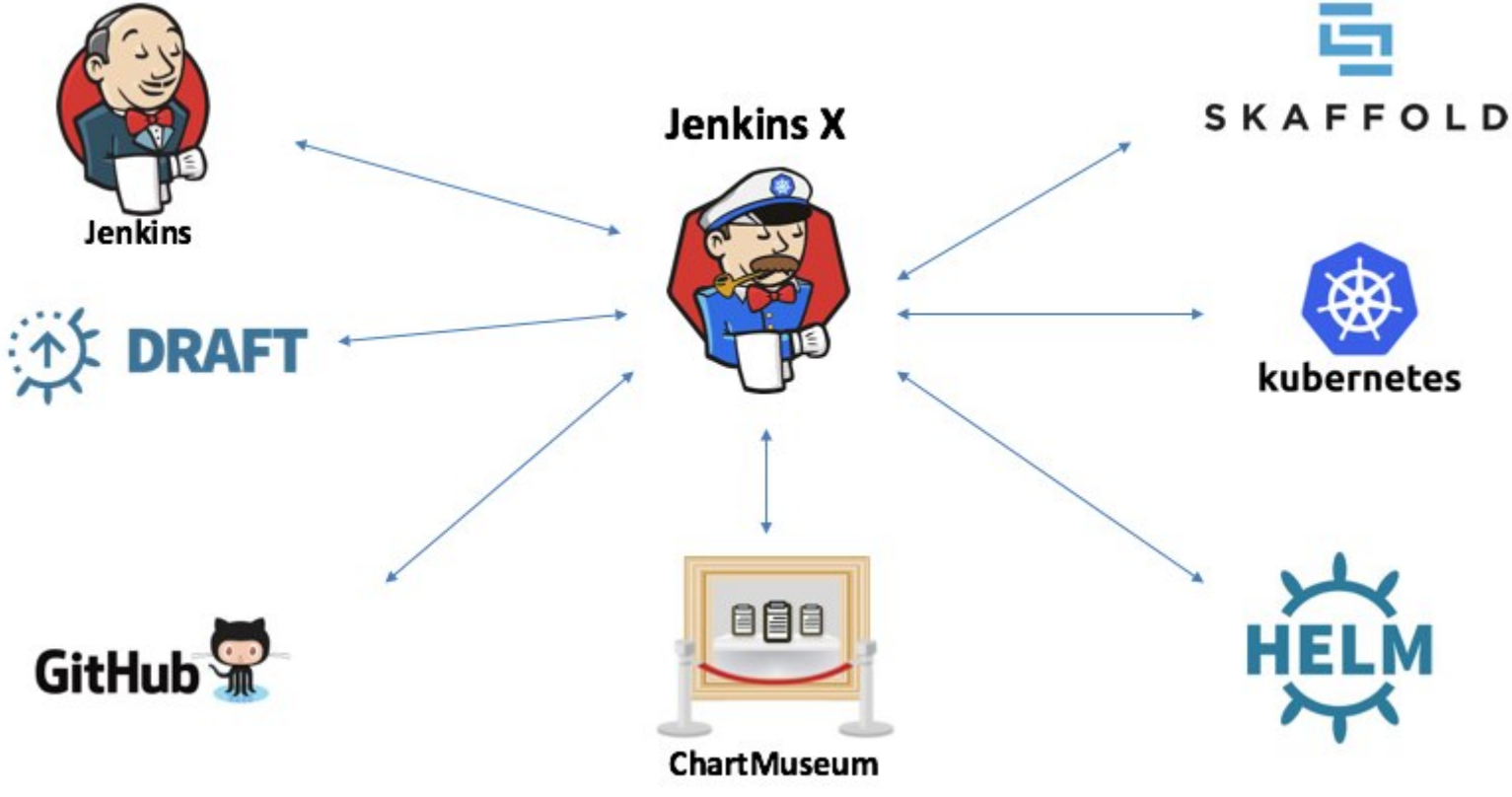
@DEVOPS_BORAT

DevOps Borat

To make error is human. To propagate error to all server in automatic way is #devops.

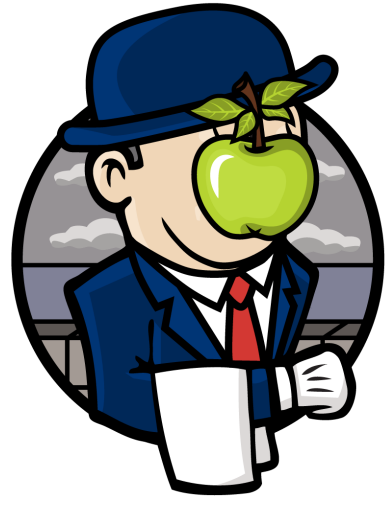
If you haven't automatically destroyed something by mistake, you are not automating enough

JENKINS X


Jenkins
Jenkins X
SKAFFOLD
DRAFT
kubernetes
GitHub
ChartMuseum
HELM

SERVERLESS JENKINS

- Pay per use
- "Infinite" scale
- Scale to zero
- Minimal operation costs



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