



Jenkins X Workshop



CloudBees | @CloudBees | cloudbees.com

Juni Mukherjee | @JuniTweets | continuity.world/gallery

Agenda: To Help Design Vibranium-grade Pipelines

- ❑ Intro
- ❑ Create cluster
 - ❑ Serverless Jenkins
 - ❑ Static Jenkins
- ❑ Create microservice app(s)
 - ❑ Go
 - ❑ Spring Boot
- ❑ Promote app(s)
 - ❑ GitOps
 - ❑ Staging
 - ❑ Production
- ❑ Recap and useful resources





Resources: Follow @cloudbees @jenkinsxio



[Whitepaper](#)

[Blog](#)

[Videos](#)

[Issues!](#)



We're Building An End-to-End Continuous Software Delivery System

www.cloudbees.com

DevOps World | Jenkins World
2019

@San Francisco, USA

@Lisbon, Europe

[CFP closes Mar 10!](#)



Product Suite



CloudBees
Core



CloudBees
CodeShip



CloudBees
DevOptics



CloudBees
Core



CloudBees
CodeShip



CloudBees
DevOptics



Pillars of Continuous Everything

Continuous Everything

CONTINUOUS
INTEGRATION



*Teams integrate
early and often*

CONTINUOUS
TESTING



*Automated tests
integrate with pipelines*

CONTINUOUS
DELIVERY



*Automated release of
products, some gates*

CONTINUOUS
DEPLOYMENT



*Release products with
no manual gates*



Jenkins Stats

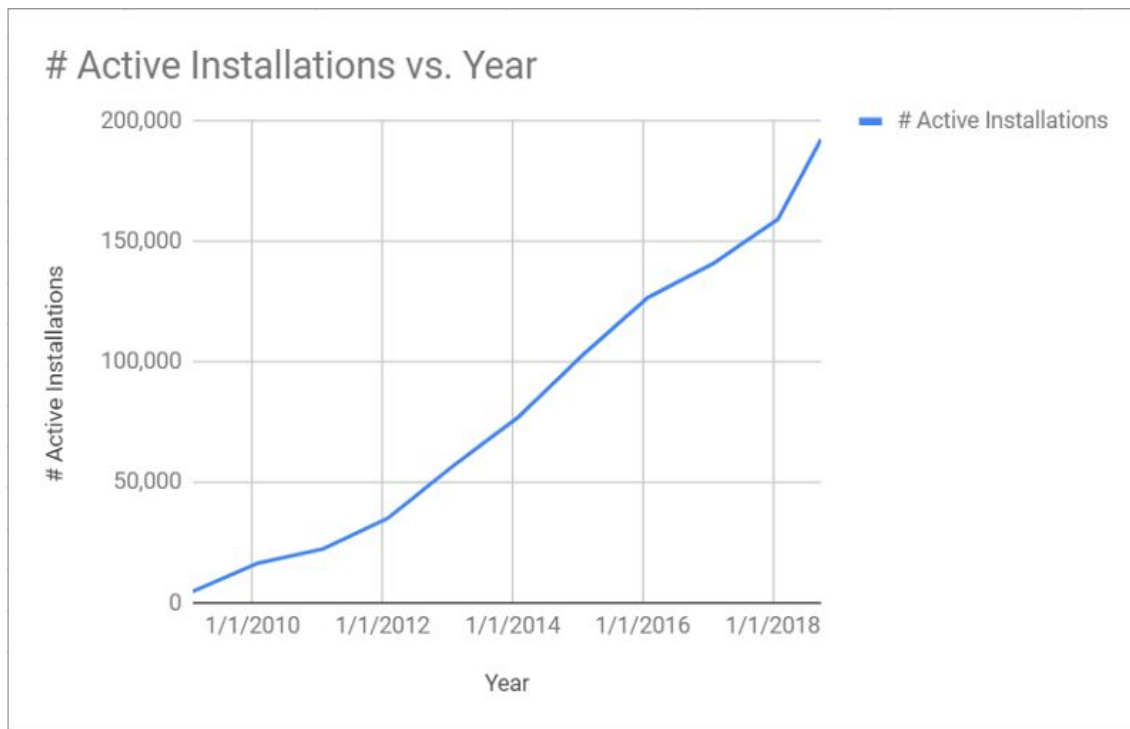


Jenkins

<https://stats.jenkins.io/>

@jenkinsci

@cloudbees



Why Jenkins X?

<https://jenkins-x.io/getting-started/>

<https://devops.com/4th-annual-devops-dozen-winners-announced/>

@jenkinsxio @cloudbees



Jenkins X



Jenkins and Jenkins X



OSS supported largely by CloudBees



Jenkins

Jenkins assumes JVM

Before cloud and containers



Jenkins X assumes Kubernetes

Based on cloud and containers



Challenges With Jenkins

Designed before cloud, containers and cloud native



#1

The Jenkins server is a Single Point of Failure, in particular git webhook events are missed during any maintenance downtime

#2

Jenkins servers can run out of disk space and require scripting and/or manual cleanups by people to keep the lights on

#3

Plugin version mismatches can cause conflicts during upgrades. Jenkins becomes brittle.



Enter Jenkins X!



Develop **AND** deliver cloud native applications for Kubernetes

#1

Ephemeral pipeline avoids the filesystem filling up and eventually running out of disk space

#2

We could reduce our cloud bills by only running pipelines when a build is needed

#3

Provide disaster recovery strategy where all job configuration is stored in git



Jenkins X and CRDs

Jenkins X extends Kubernetes with Custom Resource Definitions (CRDs)

Kubernetes resources are editable by users via RBAC. Define the namespace and which users can CRUD.

- ❑ Baked in
 - ❑ pod

- ❑ Jenkins X Custom
 - ❑ Environment
 - ❑ jx CLI
 - ❑ Pipeline Activity
 - ❑





Jenkins X: Containers, Container Orchestration, Cloud

- Performance comparison between containers and VMs
 - Docker: de facto leader in containerization
 - Kubernetes: de facto leader in container orchestration
 - **Kubernetes + Continuous Everything = Jenkins X!**

IBM Research Report

[https://domino.research.ibm.com/library/cyberdig.nsf/papers/0929052195DD819C85257D2300681E7B/\\$File/rc25482.pdf](https://domino.research.ibm.com/library/cyberdig.nsf/papers/0929052195DD819C85257D2300681E7B/$File/rc25482.pdf)

Jenkins X Benefits

Jenkins X Benefits

Eases Setup



Enables Autonomous Teams



Delivers Software Releases Faster



Boosts Team Productivity



Improves Software Release Predictability



Promotes Tighter Audit Trails

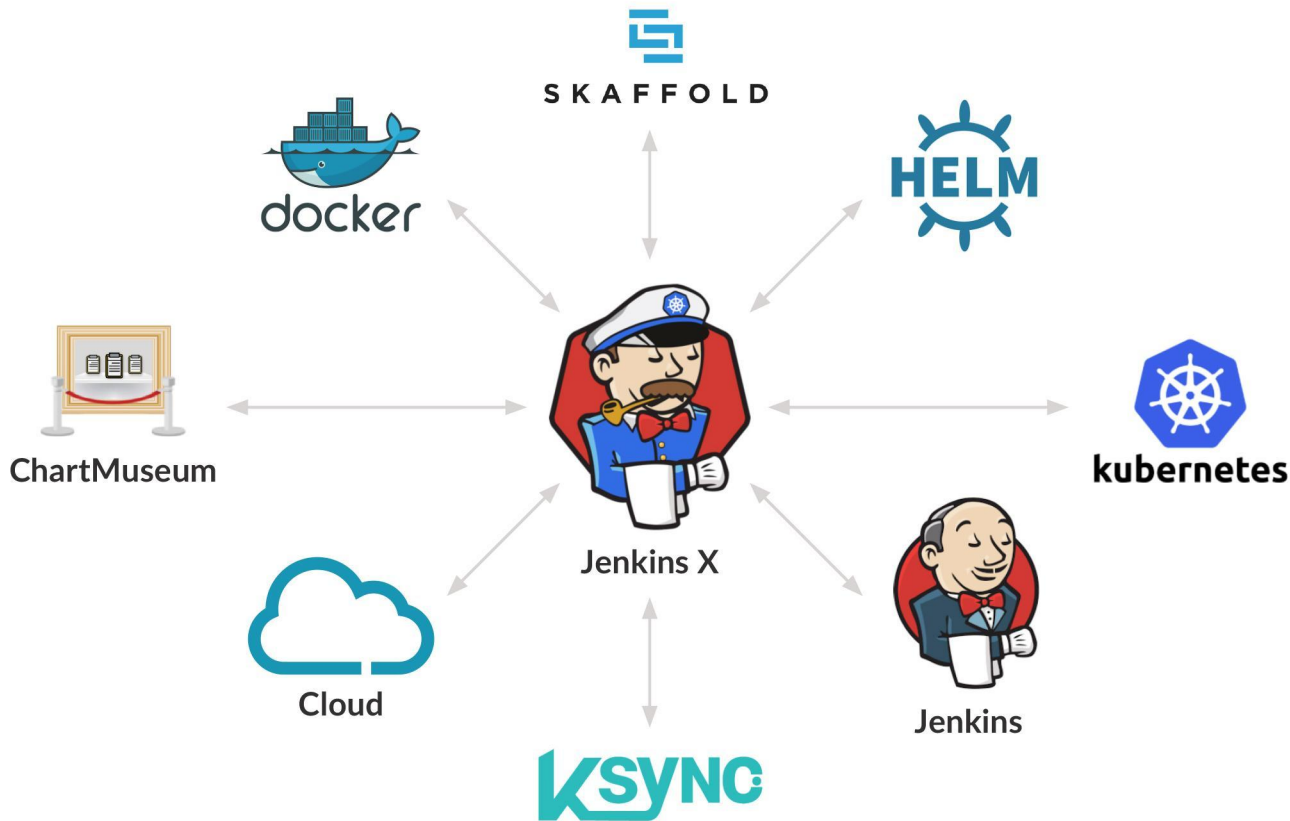


Enhances Business Sustainability





Jenkins X Ecosystem



Source: CloudBees, Inc.

Install “jx” CLI

<https://jenkins-x.io/getting-started/install/>

Google Cloud Console (GCP) | Laptop

Find the latest release: <https://github.com/jenkins-x/jx/releases/>

```
rm -rf ~/.jx  
rm -rf ~/.kube
```

```
curl -L https://github.com/jenkins-x/jx/releases/download/v1.3.933/jx-linux-amd64.tar.gz | tar xzv
```

```
sudo mv jx /usr/local/bin
```




Cloudy With a Chance of Kubernetes

Google Cloud Platform marketing-dev

Home Marketplace Billing APIs & Services Support IAM & admin Getting started Security COMPUTE App Engine Compute Engine Kubernetes Engine Cloud Functions STORAGE Bigtable Datastore Firestore

DASHBOARD ACTIVITY CUSTOMIZE

Project info

Project name: marketing-dev
Project ID: marketing-dev-207700
Project number: 595442632708

Go to project settings

Compute Engine

CPU (%)

instance/cpu/utilization: 0.791

Go to the Compute Engine dashboard

Google Cloud Platform status

All services normal

Go to Cloud status dashboard

Billing

Estimated charges: USD \$183.36
For the billing period Sep 1 – 10, 2018

View detailed charges

Error Reporting

Top errors in last 24 hours

```
Welcome to Cloud Shell! Type "help" to get started.
Your Cloud Platform project in this session is set to marketing-dev-207700.
Use "gcloud config set project [PROJECT_ID]" to change to a different project.
jmkherjee@cloudshell:~ (marketing-dev-207700) $ jx
-bash: jx: command not found
jmkherjee@cloudshell:~ (marketing-dev-207700) $ curl -L https://github.com/jenkins-x/jx/releases/download/v1.3.244/jx-linux-amd64.tar.gz | tar xz
% Total % Received % Xferd Average Speed Time Time Current
Dload Upload Total Spent Left Speed
100 612 0 612 0 0 2354 0 --:--:-- --:--:-- --:--:-- 2362
0 28.7M 0 0 0 0 0 0 --:--:-- --:--:-- --:--:-- 0jx
100 28.7M 100 28.7M 0 0 5655k 0 0:00:05 0:00:05 --:--:-- 6419k
jmkherjee@cloudshell:~ (marketing-dev-207700) $ sudo mv jx /usr/local/bin
jmkherjee@cloudshell:~ (marketing-dev-207700) $ jx --version
1.3.244
jmkherjee@cloudshell:~ (marketing-dev-207700) $
```

jx --help: Powerful CLI Lets You Take Control

```
Junis-MBP:react-dwjjw juni$ jx --help
```

Installing:

```
install          Install Jenkins X in the current Kubernetes cluster
uninstall        Uninstall the Jenkins X platform
upgrade          Upgrades a resource
create cluster   Create a new kubernetes cluster
update cluster   Updates an existing kubernetes cluster
create jenkins token Adds a new username and api token for a Jenkins server
init             Init Jenkins X
```

Adding Projects to Jenkins X:

```
import           Imports a local project or git repository into Jenkins
create archetype Create a new app from a Maven Archetype and import the generated code into git and Jenkins for CI/CD
create spring    Create a new spring boot application and import the generated code into git and Jenkins for CI/CD
create lile      Create a new lile based application and import the generated code into git and Jenkins for CI/CD
create micro     Create a new micro based application and import the generated code into git and Jenkins for CI/CD
create quickstart Create a new app from a Quickstart and import the generated code into git and Jenkins for CI/CD
create quickstartlocation Create a location of quickstarts for your team
```

Addons:

```
create addon     Creates an addon
create token addon Adds a new token/login for a user for a given addon
delete addon     Deletes one or many addons
delete token addon Deletes one or more api tokens for a user on an issue addon server
```

Git:

```
create git server Creates a new git server URL
delete git server Deletes one or more git servers
create git token  Adds a new API token for a user on a git server
delete git token  Deletes one or more api tokens for a user on a git server
repository        Opens the web page for the current git repository in a browser
```

Working with Kubernetes:

```
compliance       Run compliance tests against Kubernetes cluster
completion        Output shell completion code for the given shell (bash or zsh)
context           View or change the current kubernetes context (kubernetes cluster)
environment       View or change the current environment in the current kubernetes cluster
team             View or change the current team in the current kubernetes cluster
namespace        View or change the current namespace context in the current kubernetes cluster
prompt           Generate the command line prompt for the current team and environment
```



jx version: Upgrade

```
Junis-MacBook-Pro:go-warriors juni$ jx version
NAME                VERSION
jx                  1.3.272
jenkins x platform 0.0.3321
kubernetes cluster v1.11.6-gke.2
kubectrl            v1.10.1
helm client         v2.9.0+gf6025bb
helm server         v2.9.0+gf6025bb
git                 git version 2.15.1 (Apple Git-101)

A new jx version is available: 1.3.836
? Would you like to upgrade to the new jx version? Yes

Junis-MacBook-Pro:go-warriors juni$ jx version
NAME                VERSION
jx                  1.3.836
jenkins x platform 0.0.3321
Kubernetes cluster v1.11.6-gke.2
kubectrl            v1.10.1
helm client         v2.9.0+gf6025bb
helm server         v2.9.0+gf6025bb
git                 git version 2.15.1 (Apple Git-101)
Operating System   Mac OS X 10.13.3 build 17D47
```

Create a Cluster

Google Kubernetes Engine (GKE)
Google Cloud Platform (GCP)

<https://jenkins-x.io/getting-started/create-cluster/>

```
jx create cluster gke -n $NAME -p $GCP_PROJECT -z $ZONE -m $MACHINE  
--min-num-nodes $MIN_NODES --max-num-nodes $MAX_NODES  
--default-admin-password=$PASSWORD --default-environment-prefix $NAME
```

Jenkins X: Pluggable Workloads

❑ Universal Workload

- ❑ Merge to master generates new versioned artifacts
- ❑ PRs run CI tests

❑ Kubernetes Workload

- ❑ Merge to master generates new versioned artifacts, docker image and Helm charts
- ❑ Promotes new version through environments via GitOps
- ❑ PRs run CI tests and generates preview environments

Jenkins X: Static Jenkins and Serverless Jenkins

- ❑ Traditional Jenkins. Always on. Constantly hogging memory.
- ❑ JVM-based. Single point of failure.
- ❑ Designed before cloud and containers.
- ❑ Jenkins orchestrates.
- ❑ Major Git providers supported.

Jenkins X: Static Jenkins and Serverless Jenkins

- ❑ Uses Knative Build and Prow for implementation.
- ❑ No static Jenkins Master. Lower cost.
- ❑ Isolated containers. Builds don't conflict.
 - ❑ No concurrency issue (other than allocating a build number)
- ❑ Ephemeral. Spins up when needed. Elastic.
 - ❑ Workspace goes away.
- ❑ Kubernetes orchestrates resources.
 - ❑ Builds trigger instantly unless you are short of cluster capacity/quota
- ❑ GitHub supported. And more Git providers coming along.



Custom War Packager

- ❑ Customize Jenkins images
- ❑ Define customizations using YAML
- ❑ Custom set of plugins
- ❑ Git-ty
 - ❑ Config as code
 - ❑ GitOps

Jenkinsfile Runner

- ❑ One shot Jenkins pipeline executor
- ❑ Spin up, spin down

GitHub Organization | Jenkins X Bot | Jenkins X User


The screenshot shows the GitHub organization page for 'jenkinsxworkshop'. The browser's address bar shows the URL 'https://github.com/jenkinsxworkshop'. The organization's profile picture is a cartoon character holding a sign that says 'THE JENKINSX PROJECT'. Below the profile picture, there are navigation tabs for 'Repositories 14', 'People 2', 'Teams 0', 'Projects 0', and 'Settings'. A search bar is present with the text 'Find a repository...'. To the right of the search bar are filters for 'Type: All' and 'Language: All', and a 'Customize pinned repositories' button with a 'New' button. The main content area displays a list of repositories with their names, languages, and update times. On the right side, there are two sidebars: 'Top languages' showing 'Makefile', 'Smarty', and 'Java'; and 'People' showing 'juni Butler' (Juni - Jenkins X Bot) and 'powerofcontinuity' (Juni - Jenkins X User), with an 'Invite someone' button below.

Chrome File Edit View History Bookmarks People Window Help

Inbox - [mukherjee@cloud] x Juni's copy of FY20 Produ... x Jenkins X Workshop - Go... x kube cd screens - Google x juni Butler (Juni Mukherjee) x jenkinsxworkshop x Manage resources - Goog... x Jenkins X Workshop - Juni x

GitHub, Inc. [US] | https://github.com/jenkinsxworkshop

Search or jump to... Pull requests Issues Marketplace Explore

 jenkinsxworkshop

Repositories 14 People 2 Teams 0 Projects 0 Settings

Find a repository... Type: All Language: All Customize pinned repositories New

environment-feb27wedstatic-production
● Makefile Apache-2.0 Updated 17 hours ago

environment-feb27wedstatic-staging
● Makefile Apache-2.0 Updated 19 hours ago

gostaticjenkins
● Smarty Updated 19 hours ago


gostaticsanjose
● Smarty 1 Updated 20 hours ago


gosanjose
● Smarty 1 Updated 21 hours ago

environment-feb27wed-staging

Top languages
● Makefile ● Smarty ● Java

People 2 >

 **juni Butler**
Juni - Jenkins X Bot

 **powerofcontinuity**
Juni - Jenkins X User

Invite someone

Create a Cluster: GKE @ GCP

Google Cloud Console (GCC)

```
jx create cluster gke -n mar4serverless -p mar4serverless -z us-west1-a -m  
n1-standard-2 --min-num-nodes 3 --max-num-nodes 5  
--default-admin-password=admin --default-environment-prefix mar4serverless  
--skip-login
```

Laptop

```
jx create cluster gke -n mar4serverless -p mar4serverless -z us-west1-a -m  
n1-standard-2 --min-num-nodes 3 --max-num-nodes 5  
--default-admin-password=admin --default-environment-prefix mar4serverless
```



Customize Your Jenkins X Installation

Jenkins X uses smart defaults. However, allows tuning.

- ❑ Artifact repository - Nexus
- ❑ Jenkins image to customize plugins
- ❑ Docker registry

<https://jenkins-x.io/getting-started/config/>

Feel Your Way Around

- ❑ `kubectl get nodes`
- ❑ `kubectl get pods`
 - ❑ `kubectl get pods $POD_NAME -oyaml`
- ❑ `jx get env (Promote: Auto | Manual)`
- ❑ `jx --help | grep env (jx create env | jx edit env | jx delete env | ...)`
- ❑ `jx logs`
- ❑ `jx get build logs`
- ❑ `jx get applications`



Develop and Deliver an Application on Kubernetes!

1. `jx create quickstart (greenfield app)`
 2. `jx import (brownfield app)`
3. `jx create issue -t "title" --body "body"`

Feel Your Way Around

- ❑ `kubectl get nodes`
- ❑ `kubectl get pods`
 - ❑ `kubectl get pods $POD_NAME -oyaml`
- ❑ `jx get env (Promote: Auto | Manual)`
- ❑ `jx --help | grep env (jx create env | jx edit env | jx delete env | ...)`
- ❑ `jx logs`
- ❑ `jx get build logs`
- ❑ `jx get applications`





GitOps: Keep Calm and Git On!

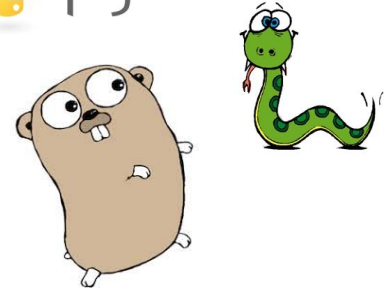


- Pretty Gitty. App, version, env, conf, ...
- Changes are made via PRs
- Declarative specification for each environment
 - Convergence properties of Kubernetes come in handy.
 - Eventual consistency: ACID vs BASE!

GitOps: Dev, With a Dash of Ops!

<https://www.cloudbees.com/blog/gitops-dev-dash-ops>

jx Quickstarts: Jumpstart Your Journey



CloudBees Core for Kubernetes CD

Sign up for Limited Availability: <https://pages.cloudbees.com/K8s>

SSO

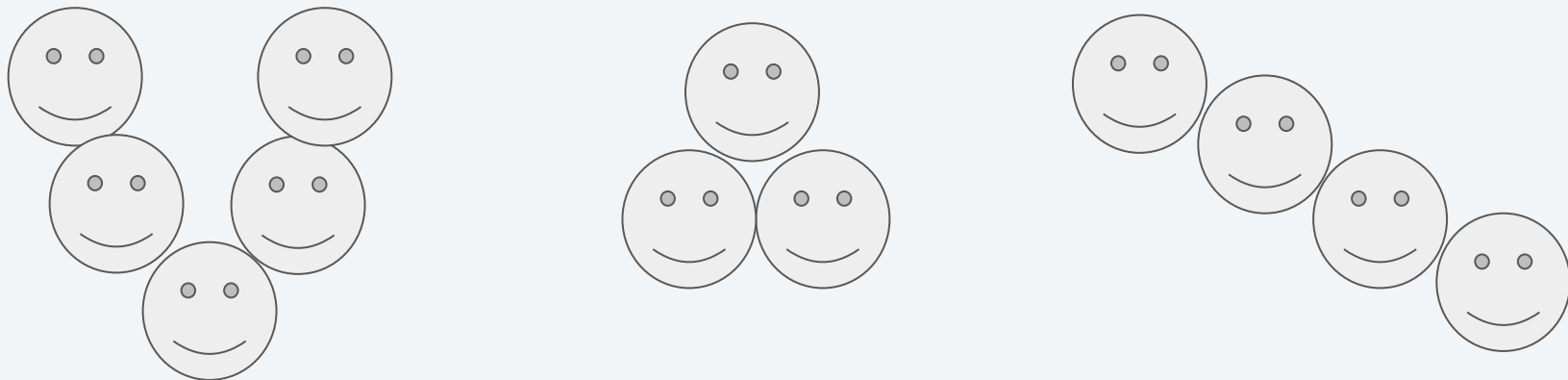
```
jx create addon cloudbees --sso  
User: "demo", Password: "cdxpreview"
```

```
jx cloudbees
```



Organization and Teams

A cluster can have multiple teams.



Each team can have either Static Jenkins or Serverless Jenkins.

Jenkinsfile

Pipeline DSL

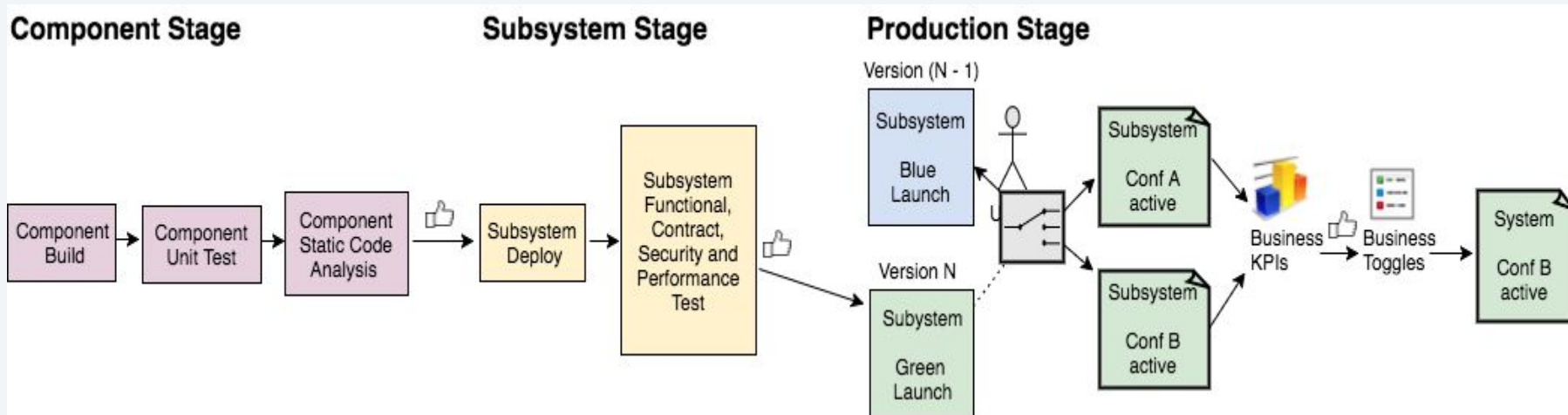
Declarative Pipeline Syntax
(vs. Scripted Pipeline Syntax)

Sharing Reusable Functionality Between Pipelines

- ❑ Shared Pipeline Libraries
 - ❑ Shared Docker Images



Linear Footprint vs. Graphical



What can microservices bring to DevOps

<https://dzone.com/articles/what-can-microservices-bring-to-devops>



Continuous Everything

CONTINUOUS
INTEGRATION



*Teams integrate
early and often*

CONTINUOUS
TESTING



*Automated tests
integrate with
pipelines*

CONTINUOUS
DELIVERY



*Products are ready
to be released
with some gates*

CONTINUOUS
DEPLOYMENT



*Release products
with no
manual gates*

CONTINUOUS
ANALYTICS
AND INSIGHTS



*Data derived from
pipelines feed to
teams and complete
the feedback loop*

CONTINUOUS
GOVERNANCE



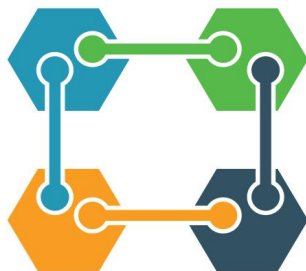
*Pipelines flow
continuously once
protocols are met*

Source: CloudBees, Inc.

Pillars of Continuous Everything



Indices Over Singular Metrics



Stability Index = function
of (check in to go live,
of escaped defects,
customer delight)



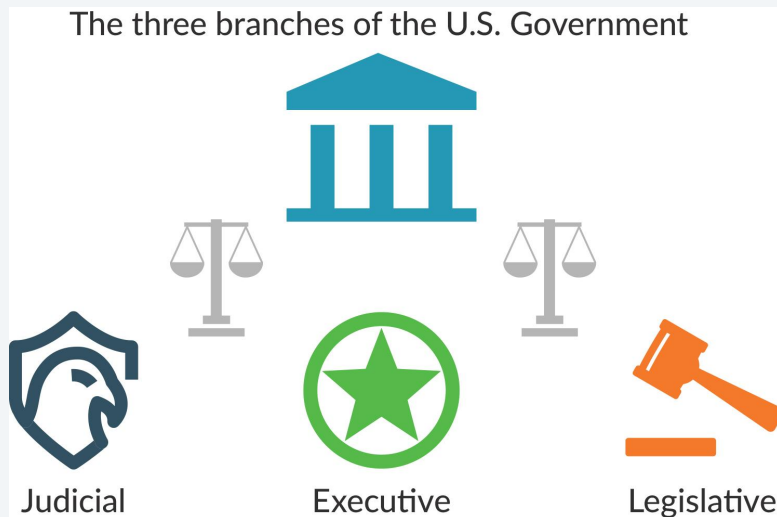
Code Quality Index =
function of (cyclomatic
complexity, code duplication,
unit test coverage)

Be wary of setting goals with Code Coverage

<http://blog.ploeh.dk/2015/11/16/code-coverage-is-a-useless-target-measure/>



Segregation of Duties (SoD)



Continuous Governance: Guardrails for Continuous Everything

<https://www.cloudbees.com/resource/ebook/continuous-governance-guardrails-continuous-everything>

Update Your App in a Branch

```
git checkout -b workshop  
vim main.go  
git add main.go  
git commit -m "changing the message"  
git push -u origin workshop
```

```
jx get applications
```


Promote Your Application to Production

```
jx promote $NAME --version $VERSION --env $ENV -b
```

```
jx promote go-warriors --version 0.0.1 --env production -b
```

```
jx get applications
```



Rollback Your Application

Caution: Try to roll forward!

```
jx promote $NAME --version $VERSION --env $ENV -b
```

```
jx promote go-warriors --version 0.0.1 --env production -b
```

```
jx get applications
```

[Optional] Delete Your Cluster

```
gcloud container clusters delete $NAME --zone $ZONE --quiet
```

```
gcloud container clusters delete alps --zone us-west1-a --quiet
```

```
rm -rf ~/.jx/
```

```
rm -rf ~/.kube/
```

Recap of Continuous Everything



Recap of Jenkins X Benefits

Jenkins X Benefits

Eases Setup



Enables Autonomous Teams



Delivers Software Releases Faster



Boosts Team Productivity



Improves Software Release Predictability



Promotes Tighter Audit Trails



Enhances Business Sustainability





Hang With The Jenkins X Community

The Kubernetes community [hangs out on Slack](#) at kubernetes.slack.com and we have rooms there to chat about all things Jenkins X:

- [#jenkins-x-user](#) for users of Jenkins X
- [#jenkins-x-dev](#) for developers of Jenkins X

We meet every other Thursday at 4pm GMT / 11am US Eastern / 8am US Pacific

<https://zoom.us/j/761659948>. Feel free to [add your questions to the doc](#) or hangout live and ask chat in person.



Submit Your Story

www.cloudbees.com

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@San Francisco, USA
@Lisbon, Europe

[CFP closes Mar 10!](#)





Resources: Follow @cloudbees @jenkinsxio



[Whitepaper](#)

[Blog](#)

[Videos](#)

[Issues!](#)

Thank you!

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<https://continuity.world/gallery>