Introduction to Jenkins

Patrick Wolf

Jenkins World

A global DevOps event

2017

Patrick Wolf

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Audience

- New Jenkins Users
- New Jenkins Admins

Schedule

08:30 - 09:15 - Jenkins Overview

09:15 - 10:00 - Installation and Configuration

10:00 - 10:30 - Q&A and Break

10:30 - 12:00 - Running Jobs and Pipeline

12:00 - 12:30 - Q&A

What is Jenkins?

Takeaways

- Understand Terminology
- Understand Big Picture
- Know Where to Get Help

Meet Jenkins

Jenkins is an open source automation server which enables developers around the world to reliably build, test, and deploy their software.

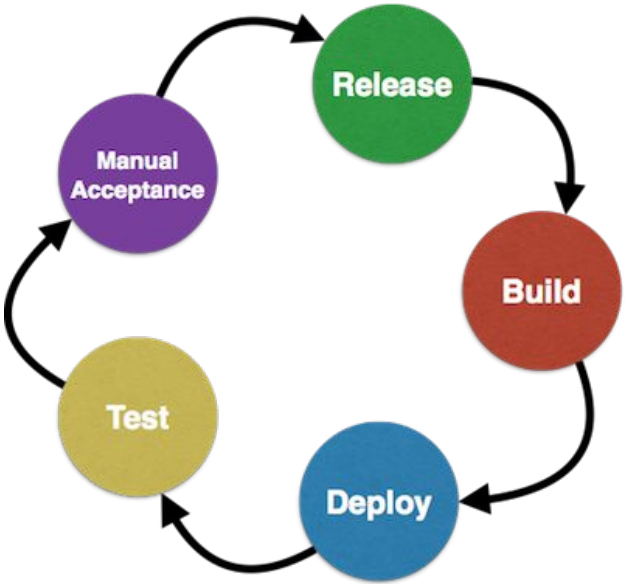
Why Do Continuous Integration

Continuous Integration doesn't get rid of bugs, but it does make them dramatically easier to find and remove.

— Martin Fowler

What is Continuous Delivery?

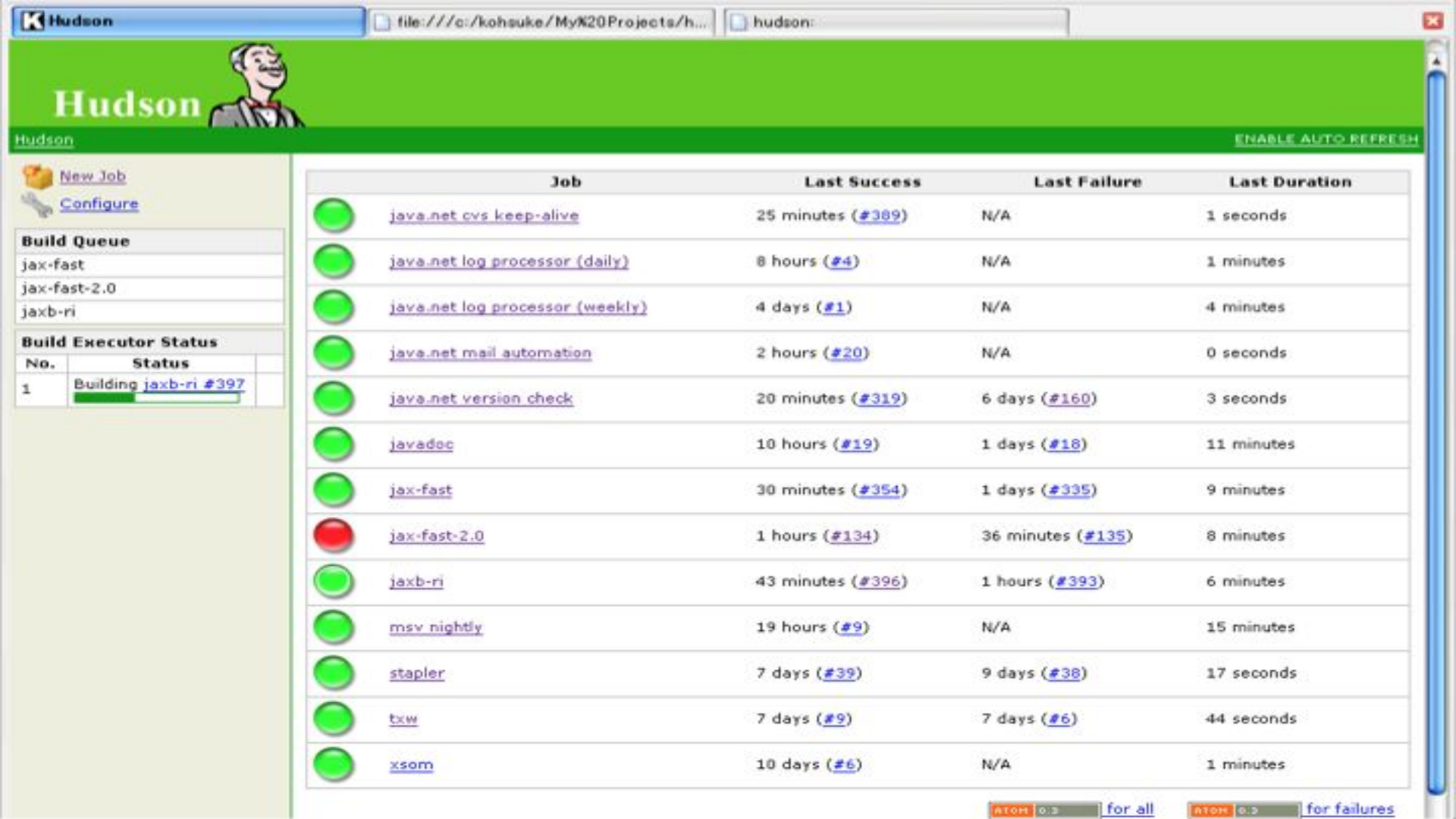
- Each change to the system can be released for production
- Delivery can be done at any time, on any environment



Meet Kohsuke

History

- #1 Continuous Integration and Delivery server
- Created by Kohsuke Kawaguchi in 2006
- Original project: "Hudson", renamed "Jenkins" in 2011
- An independent and active community
- 500+ releases to date
- 150,000+ active installations
- 300,000+ Jenkins servers
- 1,200+ plugins


Hudson
file:///c:/kohsuke/MyX20Projects/h...
hudson:
Hudson
Hudson
ENABLE AUTO REFRESH
New Job
Configure
Build Queue
jax-fast
jax-fast-2.0
jaxb-ri
Build Executor Status
No.
Status
1
Building jaxb-ri #397
Job
Last Success
Last Failure
Last Duration
java.net cvs keep-alive
25 minutes (#389)
N/A
1 seconds
java.net log processor (daily)
8 hours (#4)
N/A
1 minutes
java.net log processor (weekly)
4 days (#1)
N/A
4 minutes
java.net mail automation
2 hours (#20)
N/A
0 seconds
java.net version check
20 minutes (#319)
6 days (#160)
3 seconds
javadoc
10 hours (#19)
1 days (#18)
11 minutes
jax-fast
30 minutes (#354)
1 days (#335)
9 minutes
jax-fast-2.0
1 hours (#134)
36 minutes (#135)
8 minutes
jaxb-ri
43 minutes (#396)
1 hours (#393)
6 minutes
msv nightly
19 hours (#9)
N/A
15 minutes
stapler
7 days (#39)
9 days (#38)
17 seconds
txw
7 days (#9)
7 days (#6)
44 seconds
xsom
10 days (#6)
N/A
1 minutes
for all
for failures

JENKINS POPULARITY

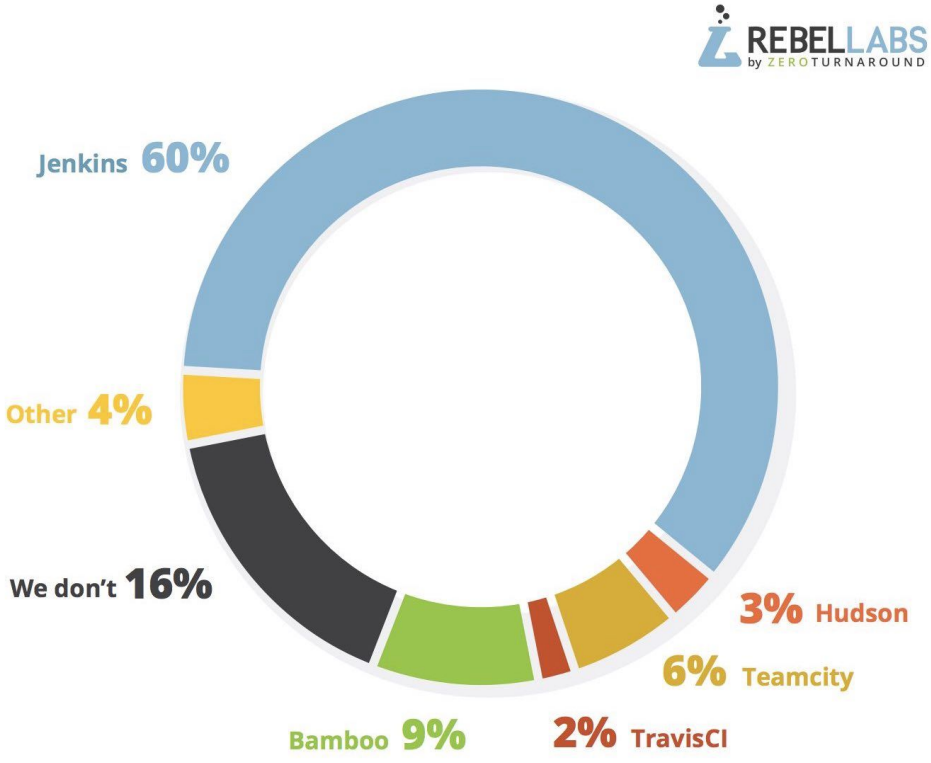
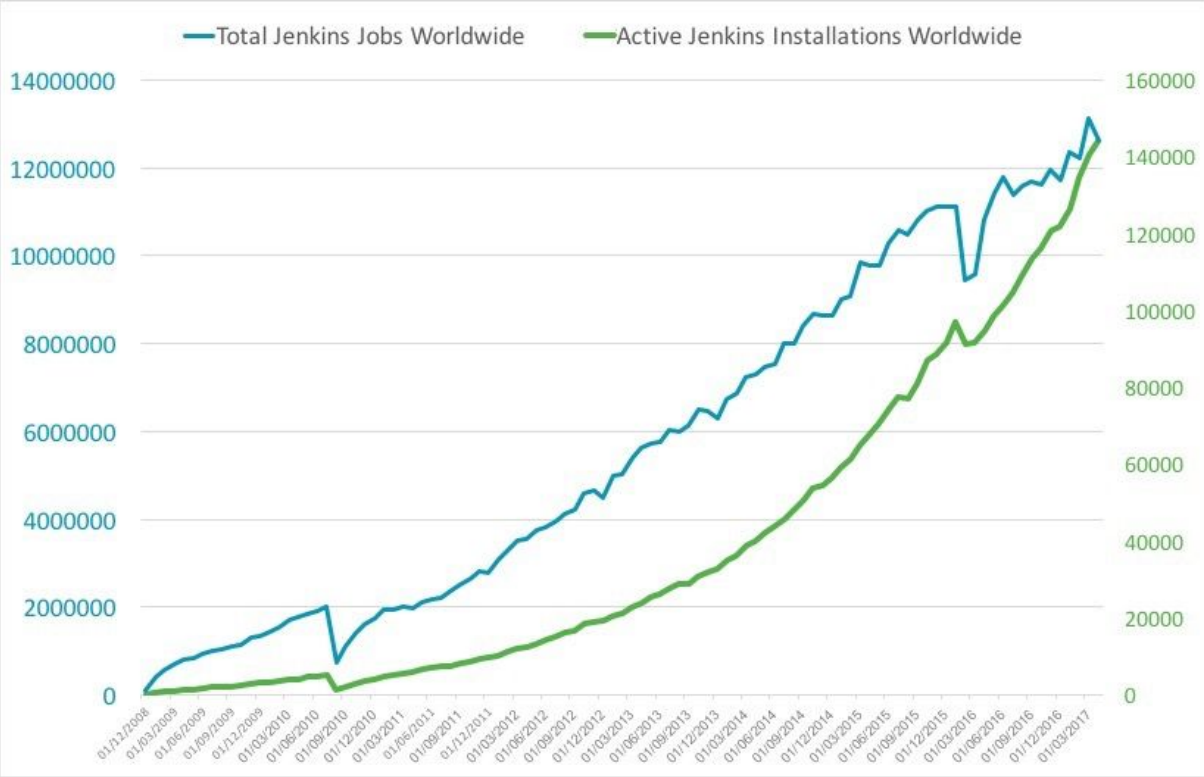


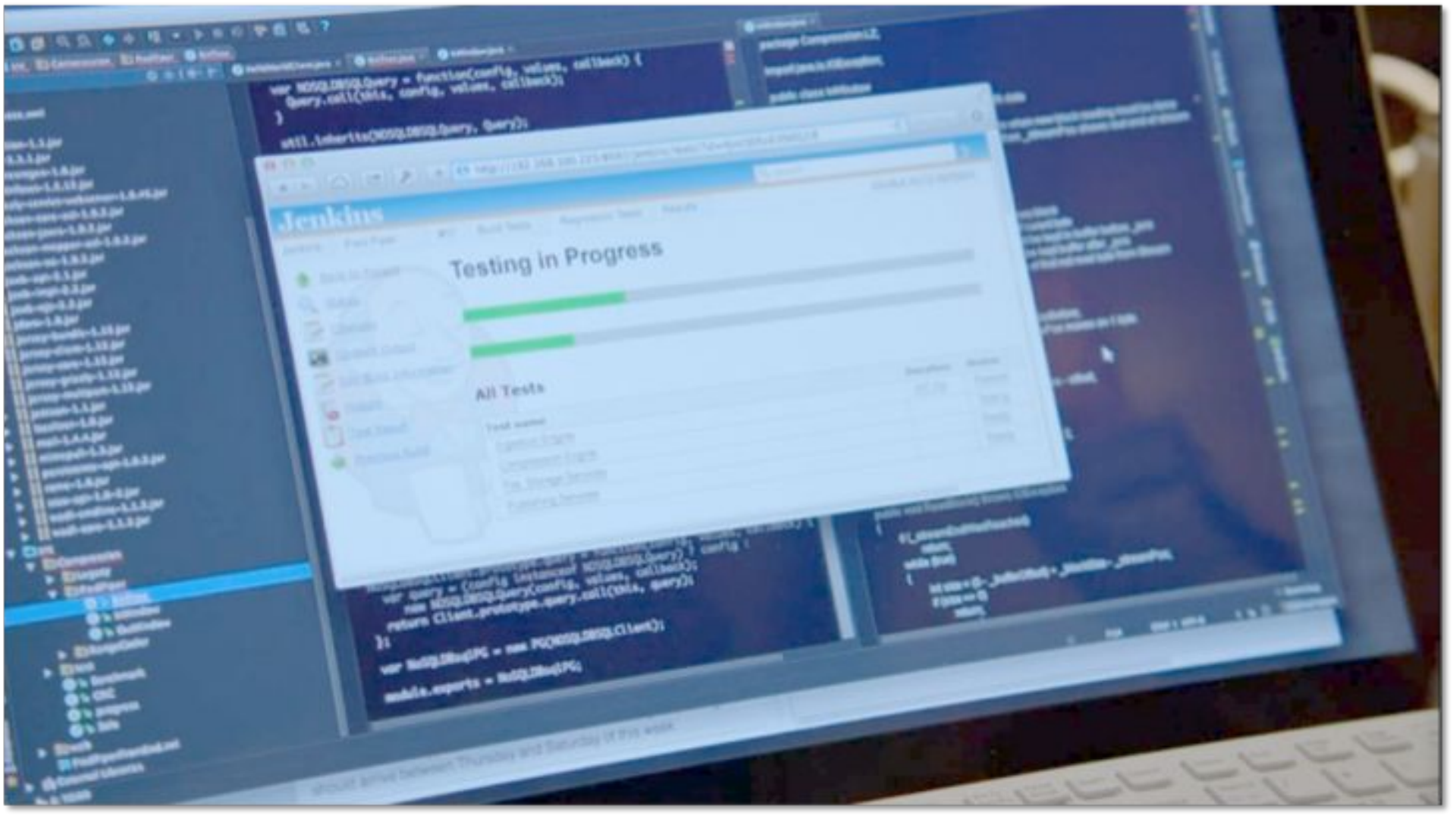
Figure 1.17 Continuous Integration Server Usage

Worldwide Adoption

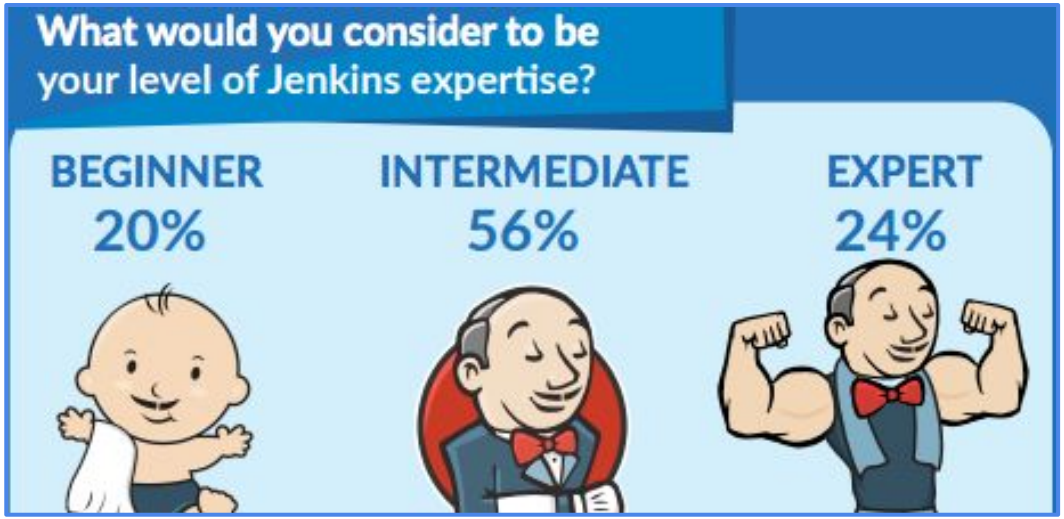


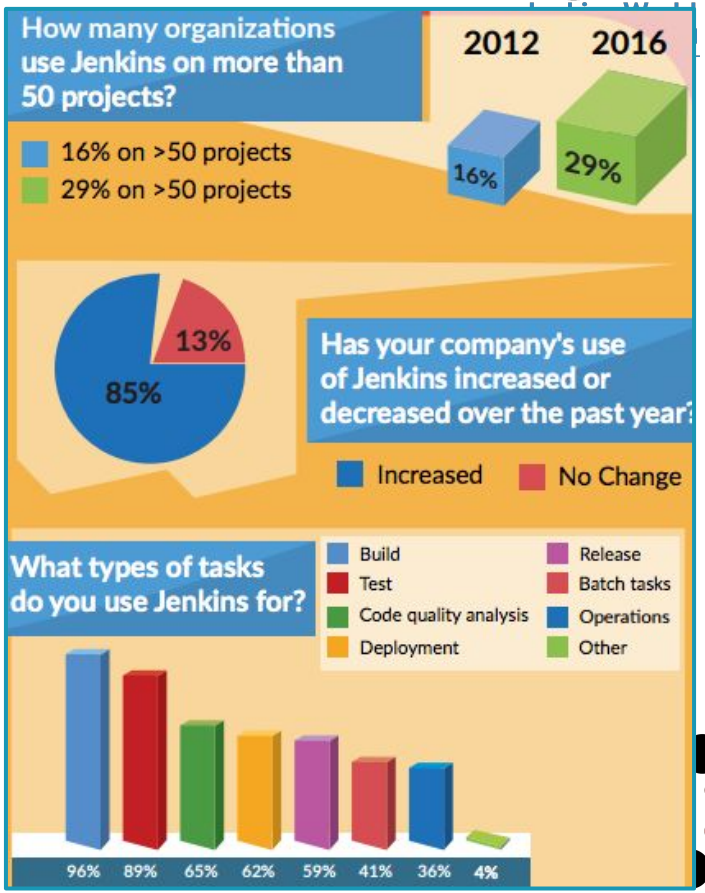
Source: http://stats.jenkins.io

SILICON VALLEY
facebook
hooli
ORACLE
hp
Google
YouTube

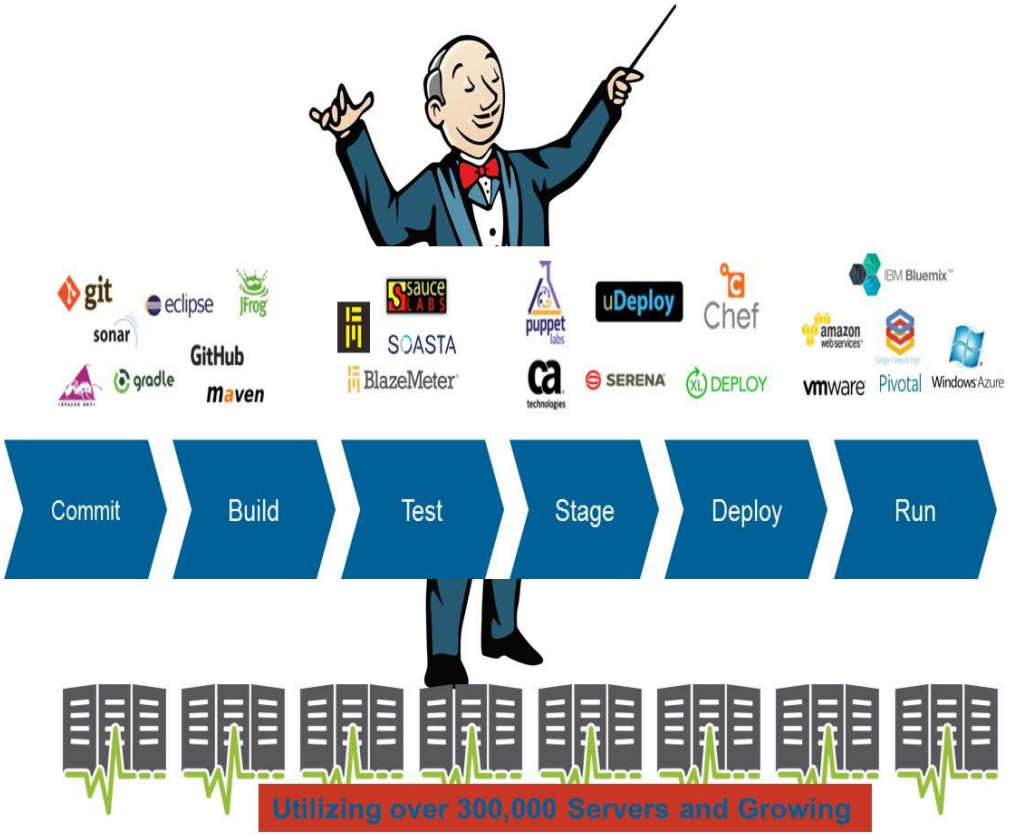

Jenkins
Testing in Progress
All Tests

Who? How?


What would you consider to be your level of Jenkins expertise?
BEGINNER
20%
INTERMEDIATE
56%
EXPERT
24%


How many organizations use Jenkins on more than 50 projects?
2012
2016
16% on >50 projects
29% on >50 projects
16%
29%
13%
85%
Has your company's use of Jenkins increased or decreased over the past year?
Increased
No Change
What types of tasks do you use Jenkins for?
Build
Test
Code quality analysis
Deployment
Release
Batch tasks
Operations
Other
96%
89%
65%
62%
59%
41%
36%
4%

Jenkins - Orchestrator



Plugins

- http://plugins.jenkins.io
- 1300+ Plugins
- Git or SCM
- Green Balls or Chuck Norris

Terminology

Agent

Node

Build

Slave

Executor

Master

Run

Queue

Job

Freestyle

Workspace

Remoting

Pipeline

Terminology

- Master - Jenkins Master
- Agent (Slave) - A Remote Node with Slave.jar installed
- Executor - A unique process
- Node - Any machine that can have an executor
- Workspace - A directory on a Node for doing work
- Job - A definition of a particular process
- Build/Run - A specific instance of a Job
- Queue - All Builds waiting for an Executor

Participate

https://jenkins.io/participate/

- https://accounts.jenkins.io/
- IRC (freenode)
  - #jenkins
  - #jenkins-infra
  - #jenkins-community
  - #jenkins-ux
- Email
  - jenkinsci-users@googlegroups.com
  - jenkinsci-dev@googlegroups.com

Installation

Takeaways

- What is Long Term Stable (LTS)?
- Where to get latest?
- Security Updates

Minimum Requirements

- Jenkins runs on:
  - Unix/BSD
  - Linux
  - Mac OS
  - Windows
- Java required:
  - 7 is the minimum version.
  - 8 recommended.

Installation Options

https://jenkins.io/download/

- Direct Azure
- Google Cloud
- Amazon AWS
- Docker
- WAR

Deploy Jenkins 2.60.3

Deploy to Azure

Download Jenkins 2.60.3 for:

Docker
FreeBSD
Gentoo
Mac OS X
OpenBSD
openSUSE
Red Hat/Fedora/CentOS
Ubuntu/Debian
Windows
Generic Java package (.war)

Commercial Options

- CloudBees Jenkins Team
  - https://www.cloudbees.com/products/cloudbees-jenkins-team
- CloudBees Jenkins Enterprise
  - https://www.cloudbees.com/products/cloudbees-jenkins-enterprise

Long Term Stable

https://jenkins.io/download/lts/

- Weekly Builds
- Quarterly LTS
- 3 LTS releases

Installing Agents

- SSH Agents
  - SSH Slaves Plugin
  - Poor Window Support
- JNLP Agents
  - JNLP4 Recommended
- Plugins
  - Swarm Agent
  - Docker Plugin
  - Kubernetes Plugin
  - Mesos Plugin
  - EC2 Plugin
  - Azure Plugin

Demo Installation

Security

Security Advisories

- https://jenkins.io/security/
- https://groups.google.com/forum/#!forum/jenkinsci-advisories
- CERT Team - jenkinsci-cert@googlegroups.com

Configuring & Managing Jenkins

Takeaways

- What are primary areas to configure
- How to setup Users
- How to setup Tools
- How to install Plugins
- How to setup Credentials

Managing Jenkins

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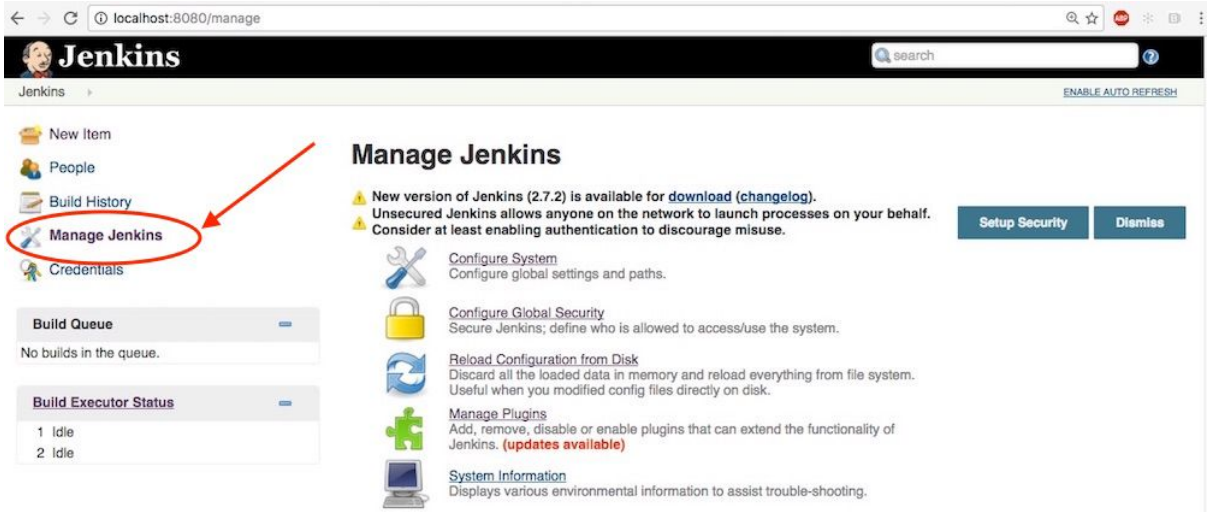
- Manage Jenkins page link in the left-menu
- Only visible by allowed users (administrator)
- Direct link: http://<jenkins-address>/manage



Nodes

- Monitoring
- Labels
- Limiting

Users

- Authentication
  - LDAP
  - Active Directory
  - GitHub OAuth
- Authorization
  - Role Strategy
  - Matrix Auth
  - CloudBees RBAC plugin

Tools

- Tools options (from Configure System):
- Tools configurations:
  - Depends on plugins installed
  - Tools locations (JDKs, Mavens, etc.)
  - Tools configuration (by default) for tools like SSHD, SCMs

- Automatic Installation
- Configure multiple versions

Plugins

https://plugins.jenkins.io

- A plugin is in format .hpi
- This is a JAR format with some special conventions (e.g. no web.xml)
- Maven knows how to handle the hpi format
  - Some plugin may be found using jpi
  - Plugins are versioned artifacts:
    You can upgrade and downgrade
  - They may have dependencies (mandatory or optional)
  - Plugins are located in ${JENKINS_HOME}/plugins
  - Both hpi files and un-archived versions

Credentials

- Connect Jenkins to the World
- Open to Developers
- Configure at Folder Level

Running Jobs

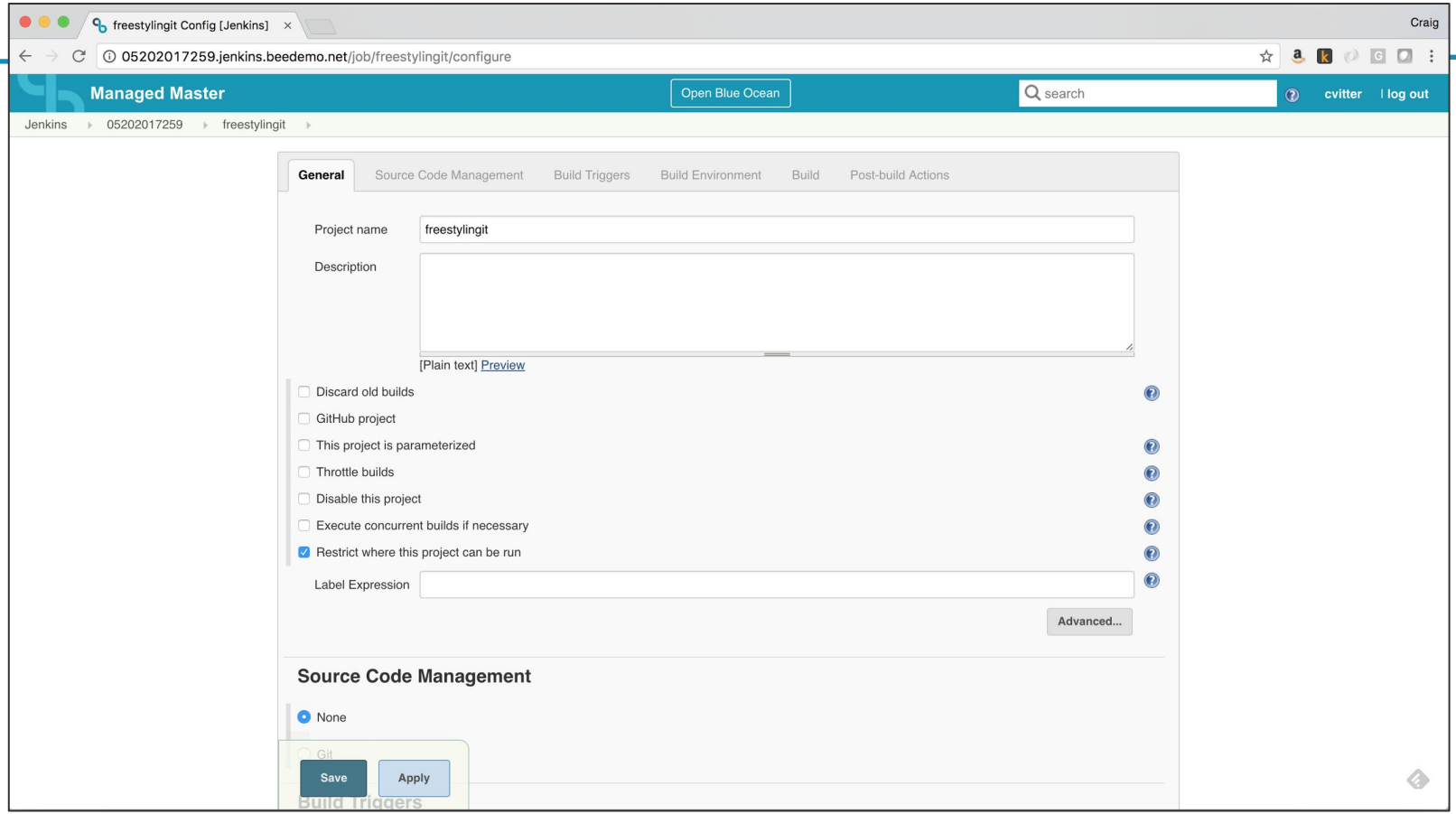
Takeaways

- What is a Freestyle Job
- What is a Pipeline
- Advantages of Both
- Writing a Pipeline

Important Plugins

- Parameterized Trigger Plugin
- JobDSL
- Promoted Builds Plugin

In the beginning there was the Freestyle job...



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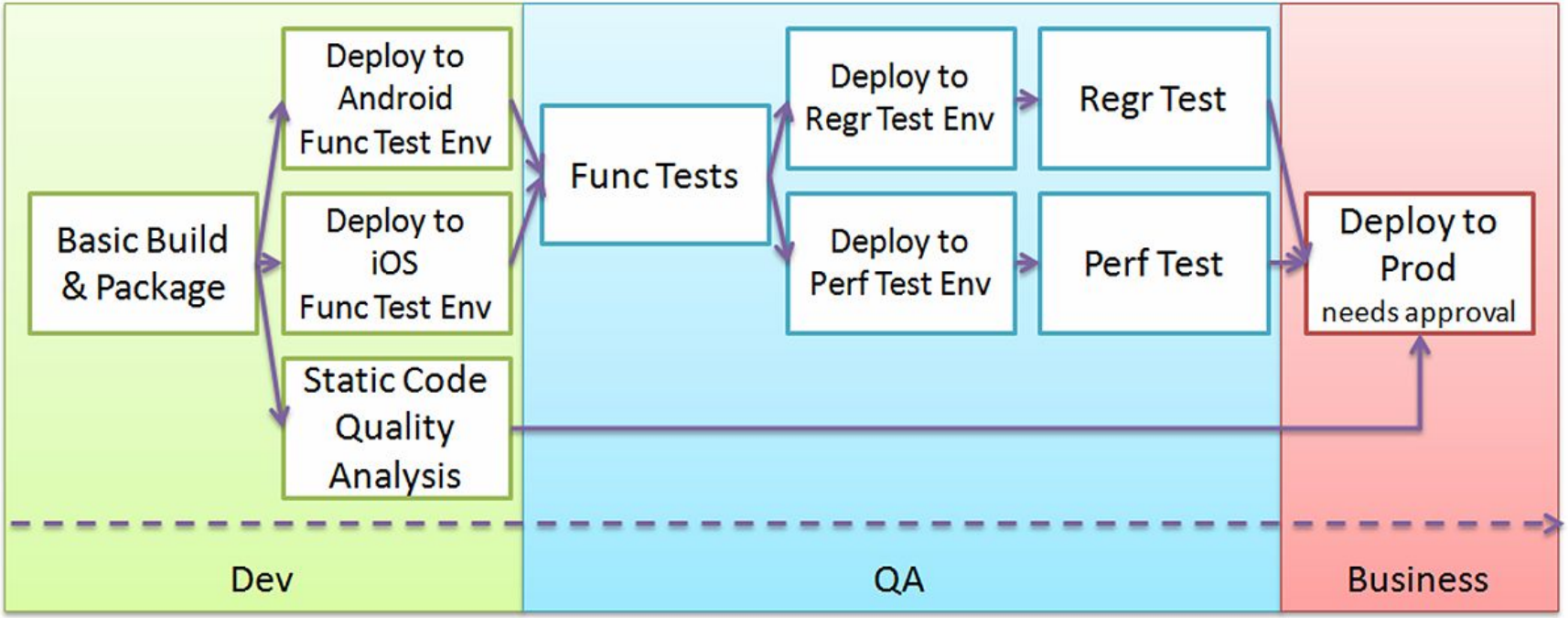
CD with Jenkins circa 2014



http://www.infoq.com/articles/orch-pipelines-jenkins

Problems with Freestyle Jobs

While the Freestyle job type has served the Hudson/Jenkins community well for years it has some major issues including:

- **UI Bound** - The configuration of a job is limited to what can be expressed via the limits of the Jenkins' UI and doesn't allow for building complicated workflows with features like:
  - Control over where builds are executed
  - Flow control (if-then-else, when, try-catch-finally)
  - Ability to run steps in parallel
- **Not Auditable** - The creation and editing of jobs isn't auditable without using additional plugins

Pipeline as Code - Jenkinsfile

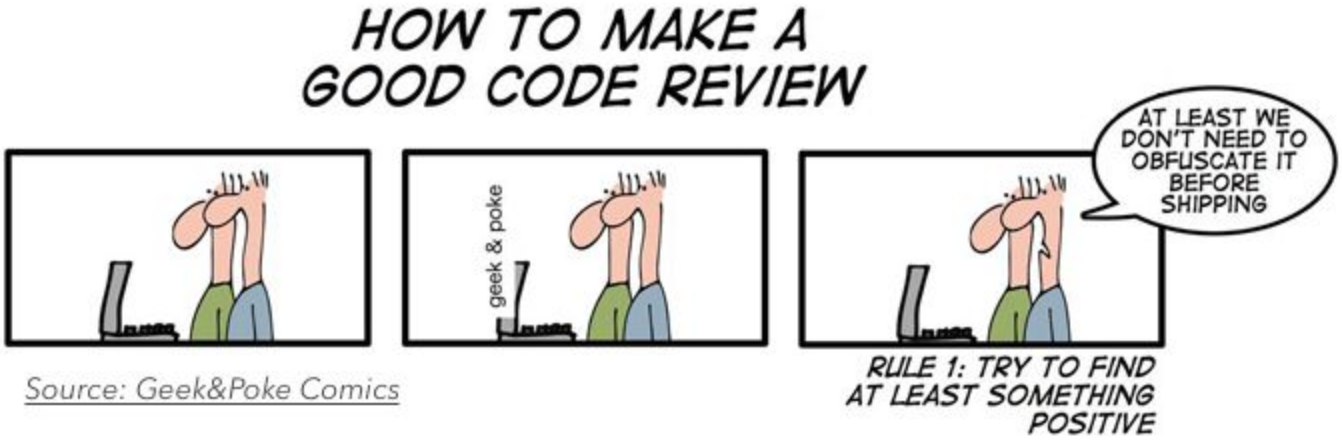
- Auditable
- Portable
- Durable
- Extensible
- DRY
- Automatic

"We are absolutely loving Jenkinsfiles and Github Organization Folders. It has revolutionized how we use Jenkins"

Fewer Snowflakes

- Consistency
- Reuse
- Focus on Application

Include all Stakeholders



Source: Geek&Poke Comics

Jenkins.io

Guided Tour

- Index
- **Create your first Pipeline**
- Running multiple steps
- Defining execution environments
- Using environment variables
- Recording test results and artifacts
- Cleaning up and notifications
- Deployment

User Handbook (PDF)

- Getting Started with Jenkins
- Using Jenkins
- Managing Jenkins
- Best Practices
- Pipeline
- Blue Ocean
- Jenkins Use-Cases
- Operating Jenkins
- Scaling Jenkins
- Appendix
- Glossary

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- Pipeline Syntax reference
- Pipeline Steps reference
- LTS Upgrade Guide

Recent Tutorials

- Pipeline Development Tools
- Getting Started with the Blue Ocean Dashboard
- Getting Started with Blue Ocean's Activity View

View all tutorials

Getting Started

Create your first Pipeline

Table of Contents
Create your first Pipeline
Quick Start Examples
Java
Node.js / JavaScript
Ruby
Python
PHP

To get started quickly with Pipeline:

1. Copy one of the examples below into your repository and name it `Jenkinsfile`
2. Click the **New Item** menu within Jenkins

3. Provide a name for your new item (e.g. **My Pipeline**) and select **Multibranch Pipeline**
4. Click the **Add Source** button, choose the type of repository you want to use and fill in the details.
5. Click the **Save** button and watch your first Pipeline run!

You may need to modify one of the example `Jenkinsfile`'s to make it run with your project. Try modifying the `sh` command to run the same command you would run on your local machine.

After you have setup your Pipeline, Jenkins will automatically detect any new Branches or Pull Requests that are created in your repository and start running Pipelines for them.

Continue to "Run multiple steps"

Quick Start Examples

Below are some easily copied and pasted examples of a simple Pipeline with various languages.

Java

Jenkinsfile (Declarative Pipeline)

```
pipeline {
    agent { docker 'maven:3.3.3' }
    stages {
        stage('build') {
            steps {
                sh 'mvn --version'
            }
        }
    }
}
```


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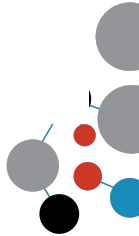
Pipeline Steps Reference

The following plugins offer Pipeline-compatible steps. Each plugin link offers more information about the parameters for each step.

- Android Signing Plugin
  - signAndroidApks: Sign Android APKs
- Ansible plugin
  - ansiblePlaybook: Invoke an ansible playbook
- AnsiColor
  - ansiColor: Color ANSI Console Output
- Artifactory Plugin
  - AddInteractivePromotion: Add Interactive promotion
  - ArtifactoryGradleBuild: run Artifactory gradle
  - ArtifactoryMavenBuild: run Artifactory maven
  - ConanAddRemote: Add new repo to Conan config
  - ConanAddUser: Add new user to Conan config
  - InitConanClient: Create Conan Client
  - MavenDescriptorStep: Get Artifactory Maven descriptor
  - RunConanCommand: Run a Conan command
  - artifactoryDistributeBuild: Distribute build
  - artifactoryDownload: Download artifacts
  - artifactoryPromoteBuild: Promote build
  - artifactoryUpload: Upload artifacts
  - collectEnv: Collect environment variables and system properties
  - dockerPullStep: Artifactory docker pull
  - dockerPushStep: Artifactory docker push
  - getArtifactoryServer: Get Artifactory server from Jenkins config
  - newArtifactoryServer: Returns new Artifactory server
  - newBuildInfo: New buildInfo
  - newGradleBuild: New Artifactory gradle executor
  - newMavenBuild: New Artifactory maven
  - publishBuildInfo: Publish build Info to Artifactory
  - xrayScanBuild: Xray build scanning
- AWS CodeBuild Plugin for Jenkins
  - awsCodeBuild: Invoke an AWS CodeBuild build
- Backlog plugin
  - backlogPullRequest: Notify Pull Request on Backlog
- BearyChat Plugin
  - bearychatSend: Send Bearychat Message
- Bitbucket Build Status Notifier Plugin
  - bitbucketStatusNotify: Notify a build status to BitBucket.
- Black Duck Hub Plugin for Jenkins
  - hub_scan: Black Duck Hub Integration
  - hub_scan_failure: Black Duck Hub Failure Conditions (Hub 3.0+)
- BlazeMeter plugin
  - blazeMeterTest: Runs test in BlazeMeter Cloud



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