

# DevOps 2TIN

## Chapter 5b

CI in jenkins



**DE HOGESCHOOL  
MET HET NETWERK**

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## CI in jenkins

Credential manager  
jenkinsfile (github)  
compiling code  
Global tool configuration  
unit testing  
artifacts  
input steps

# Wat is een Pipeline?



Definitie “deployment pipeline”:

(first defined by Jez Humble and David Farley in their book *Continuous Delivery: Reliable Software Releases Through Build, Test, and Deployment Automation*)

***It ensures that all code checked in to version control is automatically built and tested in a production-like environment.***

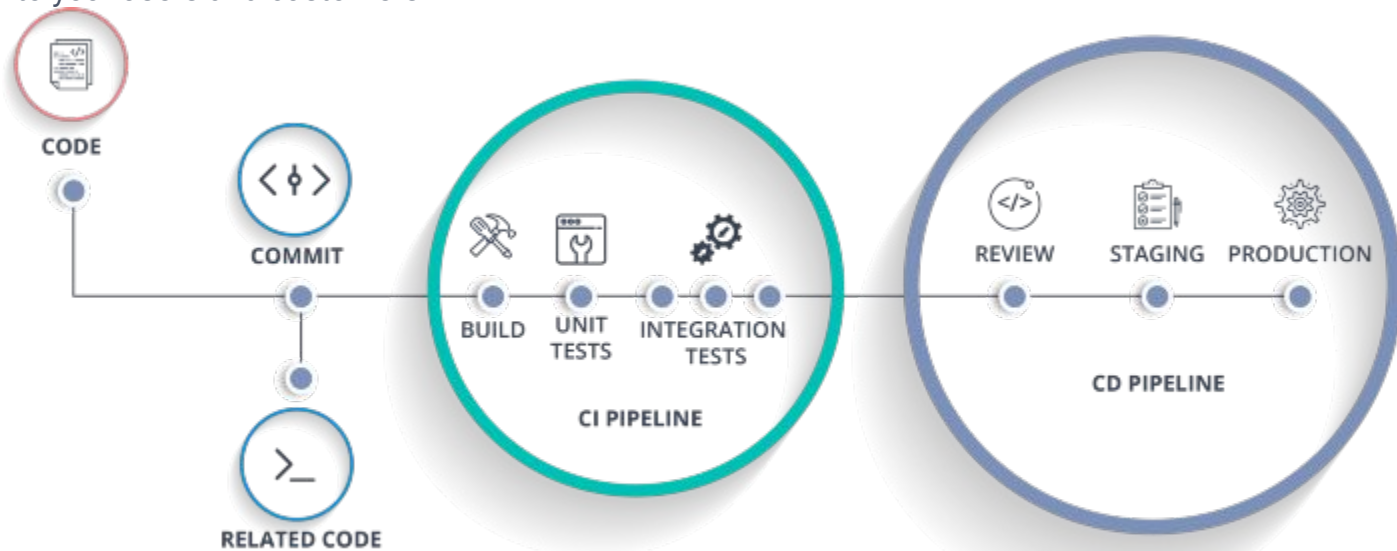
Sleutelwoorden:

- Alle Code
- Versiebeheer
- **Automatisch gebouwd**
- Automatisch getest
- Productie-waardige omgeving

# Recap: CI/CD pipeline



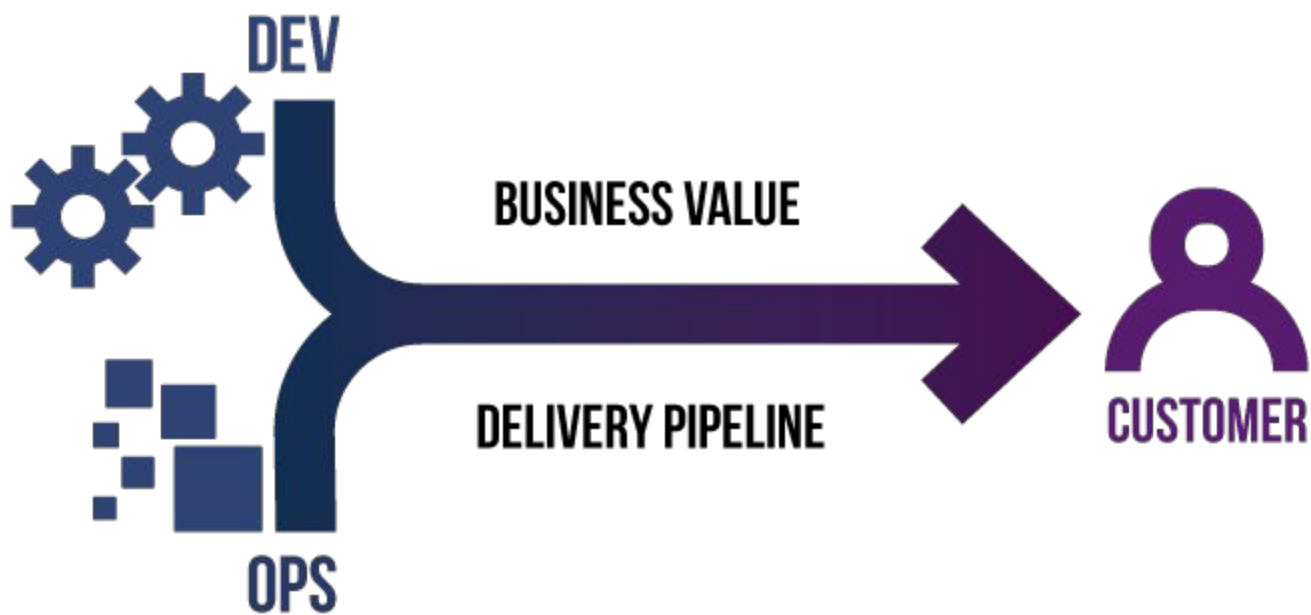
A **continuous delivery (CD) pipeline** is an automated expression of your process for getting software from version control right through to your users and customers.




Every change to your software (committed in source control) goes through a complex process on its way to being released. This process involves building the software in a reliable and repeatable manner, as well as progressing the built software (called a "build") through multiple stages of testing and deployment.


# THE FIRST WAY


## CREATE A DELIVERY SYSTEM





# Recap


 [Back to Dashboard](#)


 [Status](#)


 [Changes](#)


 [Start nu een bouwpoing](#)

 [Configureren](#)



 [Pipeline verwijderen](#)


 [Full Stage View](#)

 [Rename](#)

 [Pipeline Syntax](#)

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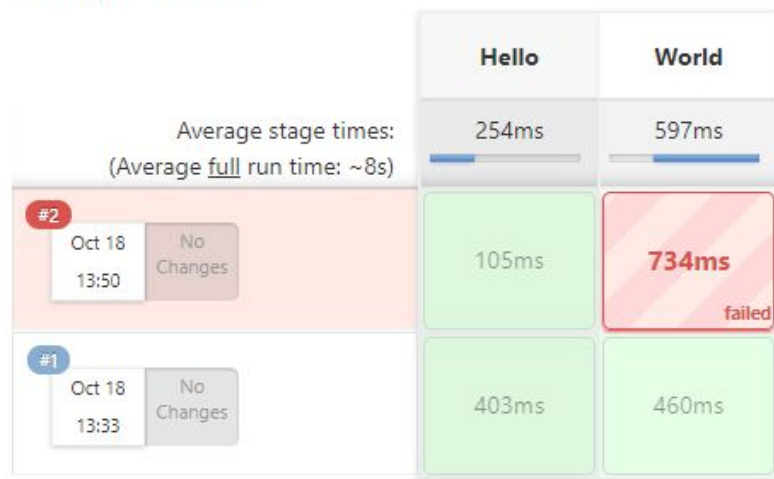
 **Overzicht Bouwpogingen** [trend](#) 

 **#2** [18-okt-2020 11:50](#)

## Pipeline test-pipeline-basics



### Stage View




# Recap


Jenkins > test-pipeline-basics > #2

 Back to Project

 Status

 Changes

 Console Output

 View as plain text

 Edit Build Information

 Delete build '#2'

 Restart from Stage

 Replay

 Pipeline Steps

 Workspaces

 Previous Build

## Console weergave

```
Started by user Dries Swinnen
Running in Durability level: MAX_SURVIVABILITY
[Pipeline] Start of Pipeline
[Pipeline] node
Running on Jenkins in /var/lib/jenkins/workspace/test-pipeline-basics
[Pipeline] {
[Pipeline] stage
[Pipeline] { (Hello)
[Pipeline] echo
Hello World
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (World)
[Pipeline] sh
+ rm testmap
rm: cannot remove 'testmap': Is a directory
[Pipeline] }
[Pipeline] // stage
[Pipeline] }
[Pipeline] // node
[Pipeline] End of Pipeline
ERROR: script returned exit code 1
Finished: FAILURE
```








# Jenkins - pipeline - credential manager



credentials in een veilige plaats opslaan:

 **Jenkins**

Jenkins

Credentials

New Item

People

Build History

Project Relationship

Check File Fingerprint

Manage Jenkins

My Views

Lockable Resources

**Credentials**

System

New View


Build Queue
















No builds in the queue.

Build Executor Status

1 Idle



2 Idle

 **Credentials**

T	P	Store ↓	Domain	ID	Name
		<a href="#">Jenkins</a>	<a href="#">(global)</a>	jenkins-cicd	
		<a href="#">Jenkins</a>	<a href="#">(global)</a>	git	
		<a href="#">Jenkins</a>	<a href="#">(global)</a>	phpApp	
		<a href="#">Jenkins</a>	<a href="#">(global)</a>	webserver	
		<a href="#">Jenkins</a>	<a href="#">(global)</a>	e3122469-bc76-4049-a56b-f85e644577e1	

Icon: [S](#) [M](#) [L](#)

Stores scoped to [Jenkins](#)

P	Store ↓	Domains
	<a href="#">Jenkins</a>	 <a href="#">(global)</a>

# Jenkins - pipeline - credential manager






 **Jenkins**

2

[admin](#) | [log out](#)

Jenkins > Credentials > System > TestDomain >

-  [Back to credential domains](#)
-  [Add Credentials](#)
-  [Configure](#)
-  [Delete domain](#)

## TestDomain

testDomain

ID	Name	Kind	Description
 <a href="#">TestNaamTestServer</a>	Testname 2/***** (Test description waar wel spaties mogen)	Username with password	Test description waar wel spaties mogen 

Icon: [S](#) [M](#) [L](#)

# Jenkins - pipeline - credential manager



Aanroepen credentials in jenkinsfile:

```
stage('Deploy') {  
    // A sleep to make sure we actually get a real difference!  
    sleep (30)  
    sshagent(credentials : ['webserver']) {  
  
        sh "scp -o StrictHostKeyChecking=no CurrentBuild.zip ubuntu@$instanceInfo$remotedir"  
        sh "ssh -T -o StrictHostKeyChecking=no ubuntu@$instanceInfo sudo unzip CurrentBuild.zip -d /var/www/html"  
    }  
}
```

```
[Pipeline] sshagent  
[ssh-agent] Using credentials ubuntu (webserver ssh key)  
[ssh-agent] Looking for ssh-agent implementation..  
[ssh-agent] Exec ssh-agent (binary ssh-agent on a remote machine)  
$ ssh-agent  
SSH_AUTH_SOCK=/tmp/ssh-UAasre7Xk0XS/agent.3227  
SSH_AGENT_PID=3230  
Running ssh-add (command line suppressed)  
Identity added: /var/jenkins_home/workspace/DevOps_Calculator@tmp/private_key_8600551491206348113.key (/var/jenkins_home/workspace/DevOps_Calculator@tmp/private_key_8600551491206348113.key)  
[ssh-agent] Started.  
[Pipeline] {  
[Pipeline] readFile  
[Pipeline] echo  
172.31.36.68  
[Pipeline] sh  
+ scp -o StrictHostKeyChecking=no CurrentBuild.zip ubuntu@172.31.36.68:.  
Warning: Permanently added '172.31.36.68' (ECDSA) to the list of known hosts.
```

# Jenkins - pipeline - jenkinsfile



**Pipeline**

Definition: Pipeline script from SCM

SCM: Git

Repositories

Repository URL: git@github.com:afx42/pipeline\_project.git

Credentials: afx42 (github access)

Advanced...

Add Repository

Branches to build

Branch Specifier (blank for 'any'): \*/master

Add Branch

Repository browser: (Auto)

Additional Behaviours: Add

Script Path: simple\_pipeline/jenkinsfile

Lightweight checkout ☒

[Pipeline Syntax](#)

main pipeline\_project / simple\_pipeline / jenkinsfile

d-ries Create Jenkinsfile

1 contributor

21 lines (20 sloc) 358 Bytes

```
1 pipeline {
2   agent any
3
4   stages {
5     stage('Build') {
6       steps {
7         echo 'Building..'
8       }
9     }
10    stage('Test') {
11      steps {
12        echo 'Testing..'
13      }
14    }
15    stage('Deploy') {
16      steps {
17        echo 'Deploying....'
18      }
19    }
20  }
21 }
```

# Jenkins - pipeline - Compiling code



- Java -> Maven

Script

```
1 pipeline {
2   agent any
3   stages {
4     stage('Build') {
5       steps {
6         git 'https://github.com/jglick/simple-maven-project-with-tests.git'
7
8         sh "mvn clean package"
9       }
10    }
11  }
```

## Stage Logs (Build)

✔ Git -- <https://github.com/jglick/simple-maven-project-with-tests.git> (self time 407ms)

❌ Shell Script -- mvn -Dmaven.test.failure.ignore=true clean package (self time 461ms)

```
+ mvn -Dmaven.test.failure.ignore=true clean package
/var/lib/jenkins/workspace/magic-unicorn-bicycle@tmp/durable-c2a01eab/script.sh: 1: mvn: not found
```

# Jenkins - pipeline - Compiling code



- Tools die gebruikt worden in de pipeline -> installeren op agents
  - Agent any = Jenkins kiest zelf; huidige jenkins server

```
$ cd /opt
$ wget https://apache.belnet.be/maven/maven-3/3.6.3/binaries/apache-maven-3.6.3-bin.tar.gz
$ sudo tar -xvzf ~/Downloads/apache-maven-3.6.3-bin.tar.gz
$ PATH="...:/opt/apache-maven-3.6.3/bin"
$ mvn --version
```

- Handmatig?

# Jenkins - pipeline - Global tool configuration



- Java -> Maven

## Pipeline

Definition

Pipeline script

Script

```
1 pipeline {
2   agent any
3
4   tools {
5     // Install the Maven version configured as "M3" and add it to the path.
6     maven "M3"
7   }
8
9   stages {
10    stage('Build') {
11      steps {
12        // Get some code from a GitHub repository
13        git 'https://github.com/jglick/simple-maven-project-with-tests.git'
14
15        // Run Maven on a Unix agent.
16        sh "mvn -Dmaven.test.failure.ignore=true clean package"
17
18        // To run Maven on a Windows agent, use:
19        sh "mvn -Dmaven.test.failure.ignore=true clean package"
```


GitHub + Maven


☒ Use Groovy Sandbox


Pipeline Syntax





# Jenkins - pipeline - Global tool configuration

 **Jenkins**





 1


 **Dries Swinnen**


 **log out**


Jenkins >


 New Item


 People

 Build History

 Manage Jenkins

 My Views

 Lockable Resources

 New View

Build Queue ^
















No builds in the queue.

Build Executor Status ^

1 Idle

2 Idle


All +


S	W	Name ↓	Last Success	Last Failure	Last Duration	
		<a href="#">magic-unicorn-bicycle</a>	N/A	N/A	N/A	
		<a href="#">poc-integrated-tests</a>	N/A	N/A	N/A	
		<a href="#">test-katalon</a>	N/A	11 days - #11	27 sec	
		<a href="#">test-pipeline-basics</a>	4 days 21 hr - #13	4 days 22 hr - #11	10 sec	
		<a href="#">test-spring-boot</a>	4 hr 5 min - #3	N/A	7.8 sec	


add description

Icon: S M L

Legend

 Atom feed for all

 Atom feed for failures

 Atom feed for just latest builds

REST API Jenkins 2.249.2

# Jenkins - pipeline - Global tool configuration

- Tools globaal definiëren (maven / Git / JDK / NPM / ...)
  - definitie in pipeline => Werkt ook altijd op de agent
- Niet beschikbaar via global tool configuration?
  - Plugin?
  - Handmatige installatie op server / agents

# Jenkins - pipeline - Compiling code / Installing dependencies



- React(of Angular) / NodeJS/... - NPM

**Pipeline**

Definition Pipeline script

Script

```
1 pipeline {
2   agent any
3
4   stages {
5     stage('Code pull') {
6       steps {
7         // Get some code from a GitHub repository
8         git branch: 'jenkins2-course',
9           url: 'https://github.com/jenkins-docs/simple-node-js-react-npm-app.git'
10      }
11    }
12    stage('build') {
13      steps {
14        nodejs('npm') {
15          echo "Performing npm build..."
16          sh 'npm install'
17        }
18      }
19    }
20  }
```

# Jenkins - pipeline - Unit testing



- hangt af van testrunner applicatie
  - Java => JUnit
  - NodeJS => Jest
  - Vaak integratie vanuit andere talen naar JUnit

```
stage('unittest'){  
    steps {  
        sh "mvn test"  
    }  
}
```

# Jenkins - pipeline - Unit testing



```
[Pipeline] sh
+ mvn test
[INFO] Scanning for projects...
[INFO]
[INFO] -----< test:simple-maven-project-with-tests >-----
[INFO] Building simple-maven-project-with-tests 1.0-SNAPSHOT
[INFO] -----[ jar ]-----
[INFO]
[INFO] --- maven-resources-plugin:2.6:resources (default-resources) @ simple-maven-project-with-tests ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory /var/lib/jenkins/workspace/magic-unicorn-bicycle/src/main/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.1:compile (default-compile) @ simple-maven-project-with-tests ---
[INFO] No sources to compile
[INFO]
[INFO] --- maven-resources-plugin:2.6:testResources (default-testResources) @ simple-maven-project-with-tests ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory /var/lib/jenkins/workspace/magic-unicorn-bicycle/src/test/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.1:testCompile (default-testCompile) @ simple-maven-project-with-tests ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- maven-surefire-plugin:2.18.1:test (default-test) @ simple-maven-project-with-tests ---
[INFO] Surefire report directory: /var/lib/jenkins/workspace/magic-unicorn-bicycle/target/surefire-reports

-----
T E S T S
-----

Running test.OtherTest
Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.012 sec - in test.OtherTest
-----
```

# Jenkins - pipeline - Unit testing - Rapporten



Jenkins › magic-unicorn-bicycle › #8 › Allocate node : Start › Workspace



Up



Status



Console Output



Workspace

## Workspace



target / surefire-reports /



test.OtherTest.txt	Oct 23, 2020 2:56:30 PM	279 B <a href="#">view</a>
test.SomeTest.txt	Oct 23, 2020 2:56:30 PM	277 B <a href="#">view</a>
TEST-test.OtherTest.xml	Oct 23, 2020 2:56:30 PM	4.80 KB <a href="#">view</a>
TEST-test.SomeTest.xml	Oct 23, 2020 2:56:30 PM	5.12 KB <a href="#">view</a>



(all files in zip)

# Jenkins - pipeline - Unit testing - Rapporten



```
stage('unittest'){
  steps {
    sh "mvn test"
    junit '**/target/surefire-reports/TEST-*.xml'
  }
}
```



# Jenkins - pipeline - Unit testing - Rapporten



Jenkins > magic-unicorn-bicycle

Back to Dashboard

Status

Changes

Build Now

Configure

Delete Pipeline

Full Stage View

Rename

Pipeline Syntax

Build History

trend ^

find

#8

Oct 23, 2020 2:56 PM

#7

Oct 23, 2020 2:54 PM

#6

Oct 23, 2020 2:53 PM

Pipeline magic-unicorn-bicycle

Last Successful Artifacts

simple-maven-project-with-tests-1.0-SNAPSHOT.jar


Recent Changes

1.72 view

KB

Test Result Trend

Failed Skipped Passed



Disable Project

Stage View

Average stage times:  
(Average full run time: ~12s)

Declarative: Tool Install	fetch code	build	unittest	Declarative: Post Actions
71ms	517ms	6s	4s	60ms
71ms	517ms	6s	4s	60ms

#8

Oct 23 16:56

No Changes

# Jenkins - pipeline - Unit testing - Rapporten

Jenkins

magic-unicorn-bicycle

#8

Back to Project

Status

Changes


Console Output

Edit Build Information

Delete build '#8'


Git Build Data

No Tags




**Build #8 (Oct 23, 2020 2:56:18 PM)**


Keep this build forever

 add description


Started 9 min 38 sec ago  
Took 12 sec




**Build Artifacts**

 simple-maven-project-with-tests-1.0-SNAPSHOT.jar

1.72 KB view




Started by user [Dries Swinnen](#)

 git

**Revision:** b3a39b21ac048d9298986e0d4a1d9f4dd185df8f

- refs/remotes/origin/master



**Test Result** (no failures)

# Jenkins - pipeline - Unit testing - Rapporten

The screenshot displays the Jenkins web interface for a build named 'magic-unicorn-bicycle' with ID '#8'. The top navigation bar includes the Jenkins logo, a search bar, and user information for 'Dries Swinnen'. The left sidebar contains various navigation links such as 'Back to Project', 'Status', 'Changes', 'Console Output', 'Edit Build Information', 'Delete build', 'Git Build Data', 'No Tags', 'Test Result', 'Restart from Stage', 'Replay', 'Pipeline Steps', 'Workspaces', and 'Previous Build'. The main content area shows a file explorer on the left with a tree view of the build's artifacts. The central part of the screen displays a grid of screenshots from the build process, including a file explorer view and a 'Pipeline test pipeline basics' stage view. The right sidebar provides build details, including a 'Keep this build forever' button, a description field, and build statistics: 'Started 10 min ago' and 'Took 12 sec'.

Jenkins

magic-unicorn-bicycle #8

Back to Project

Status

Changes

Console Output

Edit Build Information

Delete build '#8'

Git Build Data

No Tags

Test Result

Restart from Stage

Replay

Pipeline Steps

Workspaces

Previous Build

ShareX 13.2.1

Vastleggen

Uploaden

Workflows

Hulpmiddelen

Taken na vastleggen

Taken na uploaden

Bestemmingen

Taak instellingen...

Instellingen programma...

Instellingen sneltoetsen...

Screenshots map...

Geschiedenis...

Geschiedenis afbeeldingen...

Nieuws

Debug

Doneer...

Over...

qhrCcY2ST8.gif

tD2vmhmCR.gif

KL7z9J1klv.gif

QZPQGiqMIO.gif

A3A2izPtrC.gif

Pipeline test pipeline basics

Stage View

Keep this build forever

Add description

Started 10 min ago

Took 12 sec



# Jenkins - pipeline - Artifacts



Extern

Via plugins:

Updates

**Available**

Installed

Advanced

**Install** ↓

☐

[Publish Over CIFS](#)  
Send build artifacts to a windows share (CIFS/SMB/samba)

☐

[Publish Over Dropbox](#)  
Send build artifacts to a Dropbox account.

☐

[Publish Over FTP](#)  
Send build artifacts over FTP

☐

[Publish Over SSH](#)  
Send build artifacts over SSH

☐

[Infrastructure plugin for Publish Over X](#)  
Send build artifacts somewhere.

# Jenkins - pipeline - Input step



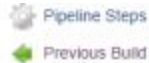
Interactieve steps: Vraag welke git branch gebuild moet worden:

A screenshot of the Jenkins web interface showing a pipeline step named 'Dynamicbranch' that is 'Paused for Input'. The left sidebar contains navigation links: 'Back to Project', 'Status', 'Changes', 'Console Output', 'Edit Build Information', 'Git Build Data', 'No Tags', 'Paused for Input' (highlighted), 'Thread Dump', 'Pause/resume', 'Replay', 'Pipeline Steps', and 'Previous Build'. The main content area is titled 'Please choose the branch to build'. It features a text input field labeled 'BRANCH\_NAME' containing 'continuous-delivery', a 'Validate!' button, and a dropdown menu. The dropdown menu is open, showing a list of git branches: 'continuous-delivery', 'continuous-delivery-demo', 'feature-history', 'feature-new-look-and-feel', 'game-history-feature', 'gameoflife-release-1' (highlighted), 'gameoflife-release-1.0.1', 'gameoflife-release-1.0.10', 'gameoflife-release-1.0.11', 'gameoflife-release-1.0.12', 'gameoflife-release-1.0.13', 'gameoflife-release-1.0.14', and 'gameoflife-release-1.0.15'.

# Jenkins - pipeline - Input step



Interactieve steps: Vraag welke git branch gebuild moet worden:



```
using GIT_ASKPASS to set credentials telcel
> git fetch --tags --progress https://github.com/zagadishreddy/game-of-life.git +refs/heads/*:refs/remotes/origin/*
> git rev-parse refs/remotes/origin/master^{commit} # timeout=10
> git rev-parse refs/remotes/origin/origin/master^{commit} # timeout=10
Checking out Revision c24bb1ae41bfd5980ce9f0aa8b9ae636b920c71fd (refs/remotes/origin/master)
> git config core.sparsecheckout # timeout=10
> git checkout -f c24bb1ae41bfd5980ce9f0aa8b9ae636b920c71fd
> git branch -a --no-abbrev # timeout=10
> git branch -D master # timeout=10
> git checkout -b master c24bb1ae41bfd5980ce9f0aa8b9ae636b920c71fd
Commit message: "Merge pull request #196 from GeraldScott/master"
> git rev-list --no-walk c24bb1ae41bfd5980ce9f0aa8b9ae636b920c71fd # timeout=10
[Pipeline] sh
[Dynamicbranch] Running shell script
+ git branch -r
+ awk '{print $1}' 'ORS=\n'
[Pipeline] sh
[Dynamicbranch] Running shell script
+ cut -d / -f 2 branches.txt
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (get build branch Parameter User Input)
[Pipeline] readFile
[Pipeline] echo
please click on the link here to chose the branch to build
[Pipeline] input
Input requested
```

<https://labs.tadigital.com/index.php/2018/07/18/list-the-git-branches-dynamically-in-jenkins-pipeline-job/>



# Recap



CloudBees

Clip slide

## Jenkins is the Hub of the CD/DevOps Ecosystem

Over  
1000 Jenkins  
Plugins



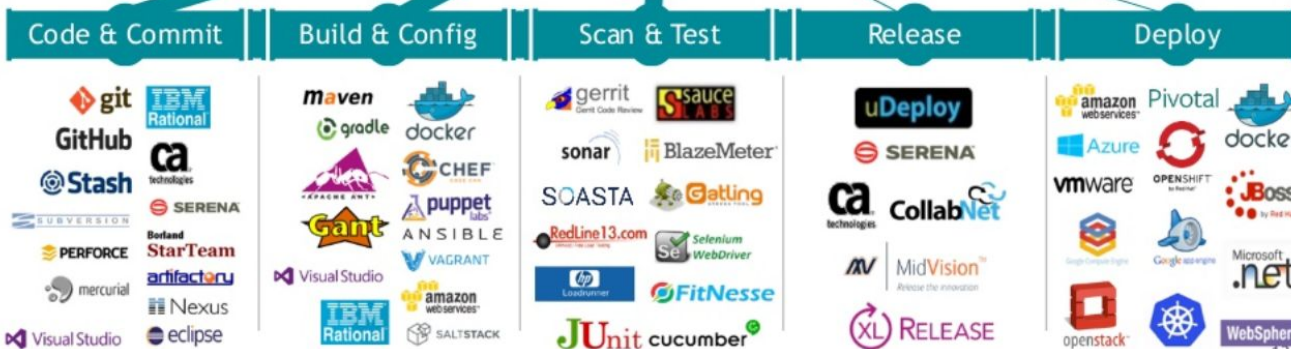
Integration  
with over 100  
DevOps Tools



Orchestration  
of the DevOps  
Toolchain



End-to-End  
CD Pipeline  
Management





# Assignments

## Jenkins - CI