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Delivery Flexibility: Pipeline as Code with Jenkins & Groovy

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Who Am I

- IT Director, American Tire Distributors
- Background
  - DevOps, CI/CD
  - Performance Engineering
  - Software Architect
  - Java Developer

David Maillet

American Tire Distributors

~80,000 customers

~200 suppliers

AMERICAN TIRE DISTRIBUTORS®

- 140 distribution centers
- 5,000 employees
- $4.5B in revenue (2017)

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Continuous Delivery Pipeline

Problem & Solution

- **Goal**:
  Quality attributes (maintainability, security, reliability) with the CI/CD platform

- **Solution**:
  Jenkins Multibranch Pipeline as code

Multibranch Pipelines

Implement different pipelines in different branches

Master:	**Pipeline v.1**
Develop:	**Pipeline v.2**
Feature-XYX:	**Pipeline v.3**

Technologies Used in This Sample

- Linux VM
- Jenkins
  - Pipeline plug-in
  - Blue Ocean plug-in
- GitHub source code repository
- Git

Multibranch Pipelines

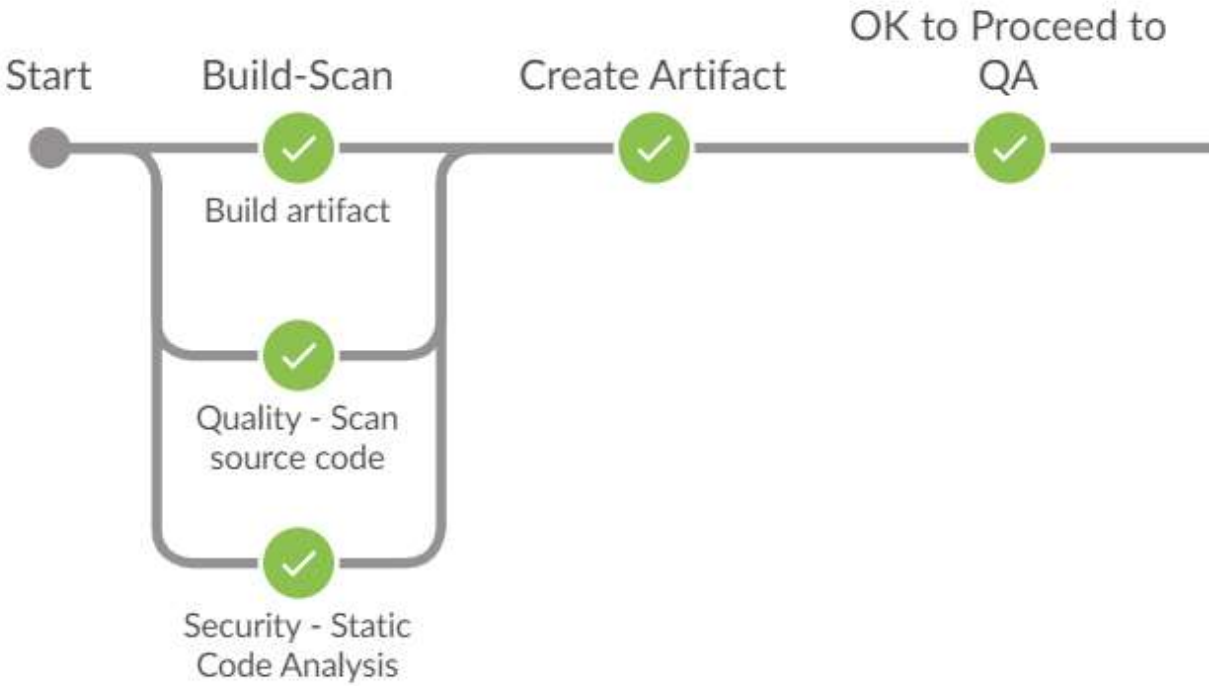
Pipeline defined in code – **Jenkinsfile**:

- Checked into source control with application code
- Text file

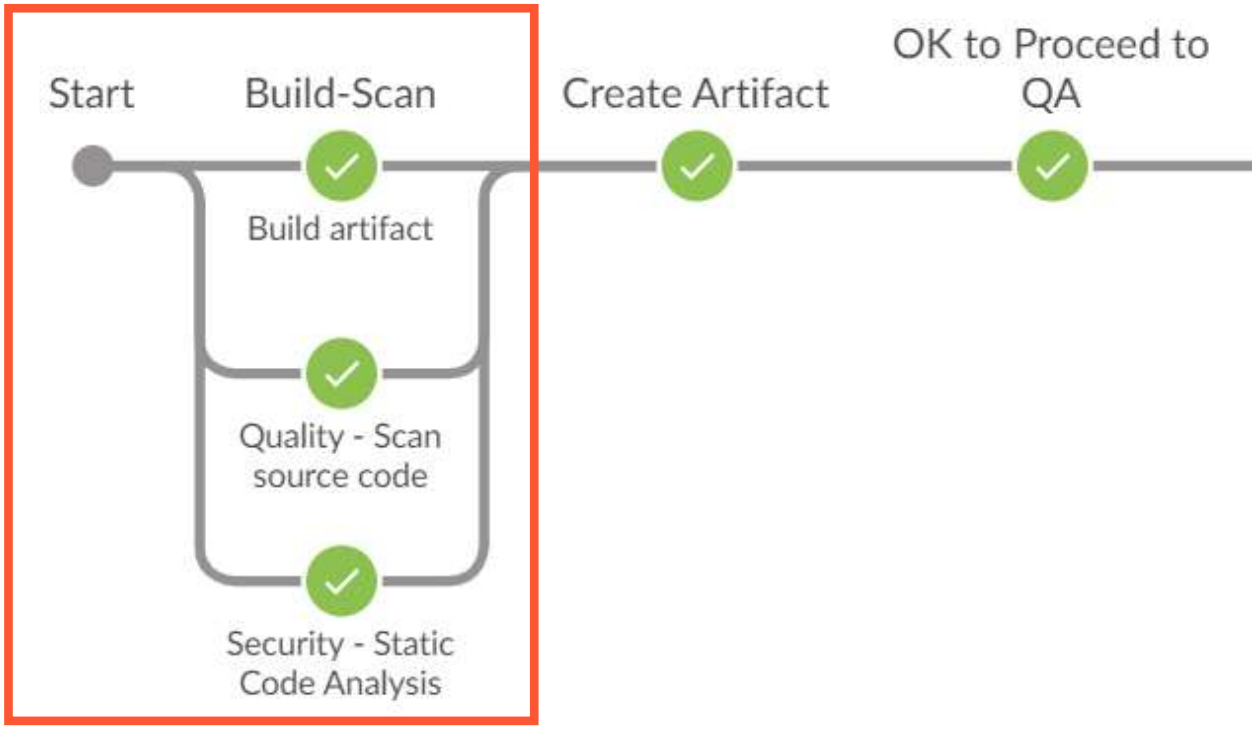
Benefits:

- Code review on the Pipeline
- Audit trail for the Pipeline
- Single source of truth for the Pipeline

Sample Pipeline

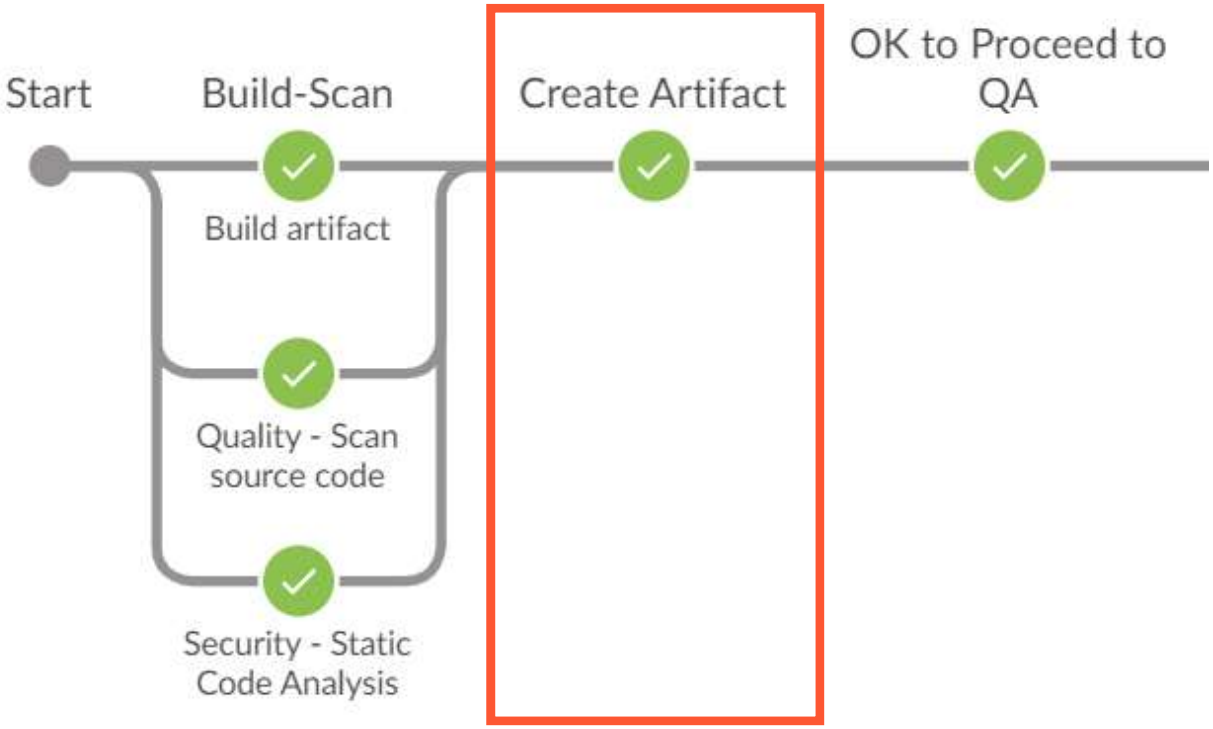


Sample Pipeline – Parallel Steps



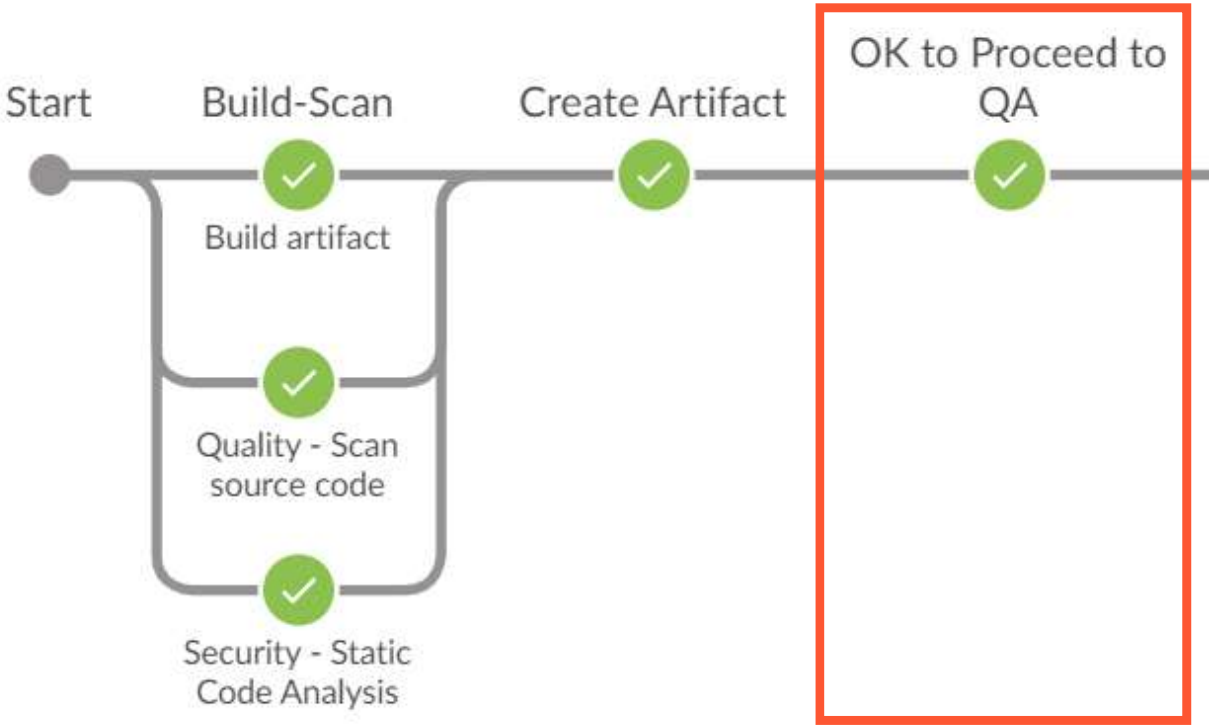
```
node {
  stage('Build-Scan’) {
     parallel(
       'Build artifact’: {
           echo "Build step"
           sh 'mvn clean verify'
        },
        'Quality - Scan source code’: {
           echo "Scan step"
           sh 'echo “Scan report shows success" > scan.txt'
        },
        'Security - Static Code Analysis’: {
           echo "Static Code Analysis step"
           sh 'echo “Security success" > security-scan.txt'
        }
     )
  }
```

Sample Pipeline – Linear Steps



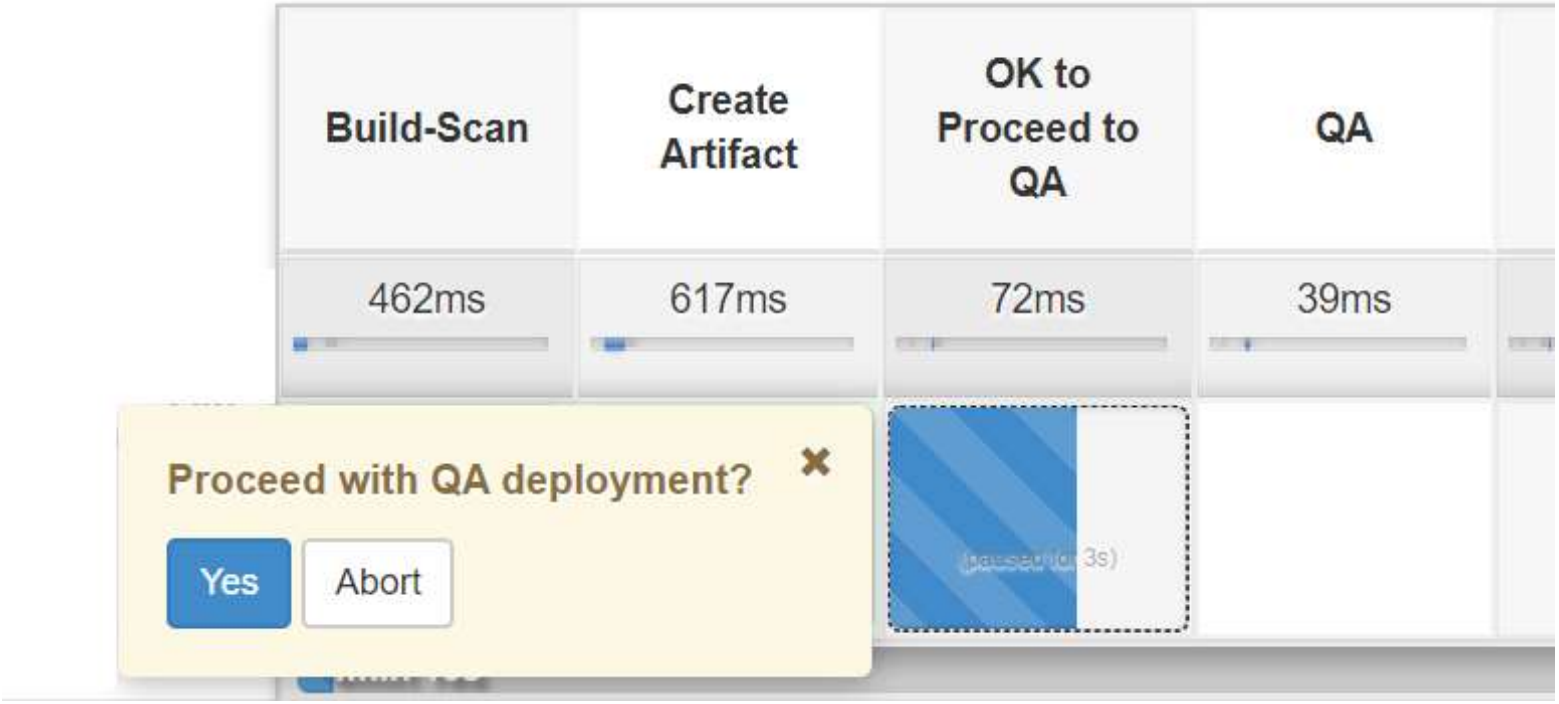
```
40   stage('Create Artifact’) {
41      echo "Creating artifact named: ${ARTIFACT_NAME}“
42      sh "tar -cvzf ${ARTIFACT_NAME} build.txt“
43      dir("${ARTIFACT_PATH}") {
44         sh "mv ../${ARTIFACT_NAME} .“
45      }
46   }
```

Sample Pipeline – Pause for Human



```
47   stage('OK to Proceed to QA’) {
48      input message: 'Proceed with QA deployment?', ok: 'Yes’
49   }
```

Support for Gates



Audit Approvals

```
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (OK to Proceed to QA)
[Pipeline] input
Proceed with QA deployment?
Yes or Abort
Approved by David Maillet
[Pipeline] }
[Pipeline] // stage
```

Conditional Logic

For example:

If using the Master branch

    Do something

Otherwise

    Do something else

```
stage('QA') {
    echo 'Deploy to QA’
    if (env.BRANCH_NAME == 'master') {
        echo 'Execute Full QA testing’
    } else {
        echo 'Execute Quick smoke test’
    }
}
```

Modularize for Maintainability

Define functions for commonly reused features.

Enables long-term faster modifications.

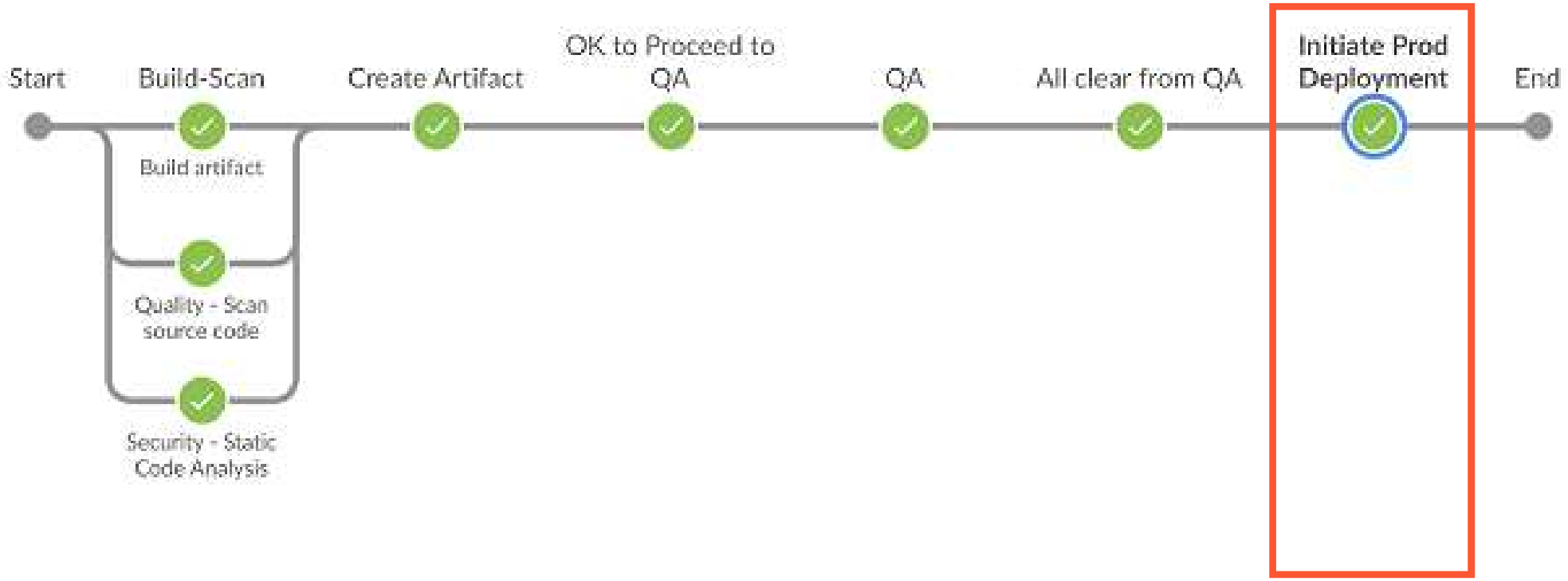
Our example:

- Pipeline sends message to communication channel

```
47   stage('OK to Proceed to QA’) {
48       notifyTeam("ECommerce",
                    "${ARTIFACT_NAME} is ready for QA")
49       input message: 'Proceed with QA deployment?', ok: 'Yes'
50   }
```

```
21  // *** Define functions ***
22
23  def notifyTeam(channel, message) {
24    echo "Message for ${channel}: ${message}“
25    build job: "Operations/Notification",
26          propagate: false, wait: false,
27          parameters:
28           [string(name: 'channel', value: "${channel}"),
29            string(name: 'text', value: "${message}")]
30  }
```

Call Another Pipeline



```
stage('Initiate Prod Deployment') {
   build job: "Operations/Prod-Deploy",
    propagate: true, wait: true, parameters:
      [string(name: 'artifact', value: "${ARTIFACT_NAME}"),
       string(name: 'branch', value: "${env.Branch_Name}"),
       string(name: 'pipelineBuildNumber’,
            value: "${env.BUILD_ID}")]
}
```

Pipeline Job

Multiple Branches

```
$ git branch
* develop
  master
```

Multiple Branches – Jenkins Multiple Jobs

Folder name: My Pipeline
Sample CI/CD

Branches (2) Pull Requests (0)

S	W	Name ↓	Last Success	Last Failure	Last Duration
		develop	24 min - #19	36 min - #17	4 min 28 sec
		master	1 mo 0 days - #2	1 mo 0 days - #1	3.1 sec

Create a New Branch

```
$ git checkout -b feature-123
Switched to a new branch 'feature-123'

$ git push --set-upstream origin feature-123
Total 0 (delta 0), reused 0 (delta 0)
* [new branch]      feature-123 -> feature-123
Branch 'feature-123' set up to track remote branch 'feature-123' from 'origin'.

$ git branch
  develop
* feature-123
  master
```

Jenkins Auto-created Job

Folder name: My Pipeline
Sample CI/CD

Branches (3) Pull Requests (0)

S	W	Name ↓	Last Success	Last Failure	Last Duration
		develop	1 hr 16 min - #19	1 hr 28 min - #17	4 min 28 sec
		feature-123	N/A	N/A	N/A
		master	1 mo 1 day - #2	1 mo 1 day - #1	3.1 sec

```
23  node {
24    stage('Build-Scan') {
25       parallel(
26         'Build artifact': {
27             echo "Build step"
28             sh 'echo "The build file" > build.txt'
29          },
30          'Quality - Scan source code': {
31             echo "Scan step"
32             sh 'echo "Scan report shows success" > scan.txt'
33          },
34          'Security - Static Code Analysis': {
35             echo "Static Code Analysis step"
36             sh 'echo "Security success" > security-scan.txt'
37          }
38       )
39    }
```

Add Security Code Scan

```
'Security - Static Code Analysis': {
    build job: "Security/Code-Scan", propagate: true, wait: true,
          parameters:
             [string(name: 'branch',
                     value:"${env.Branch_Name}"),
              string(name: 'pipelineBuildNumber',
                     value: "${env.BUILD_ID}")]
}
```


Each branch has its own Pipeline

Folder name: My Pipeline
Sample CI/CD

Branches (3) Pull Requests (0)

S	W	Name ↓	Last Success	Last Failure	Last Duration
		develop	2 days 8 hr - #19	2 days 8 hr - #17	4 min 28 sec
		feature-123	1 min 1 sec - #4	2 days 6 hr - #2	50 sec
		master	1 mo 3 days - #2	1 mo 3 days - #1	3.1 sec

Setup Jenkins

- Create Linux sandbox VM
- Open firewall for port 8080 (for Jenkins)
- Install Jenkins
- Configure Jenkins
  with Pipeline and Blue Ocean plug-in's

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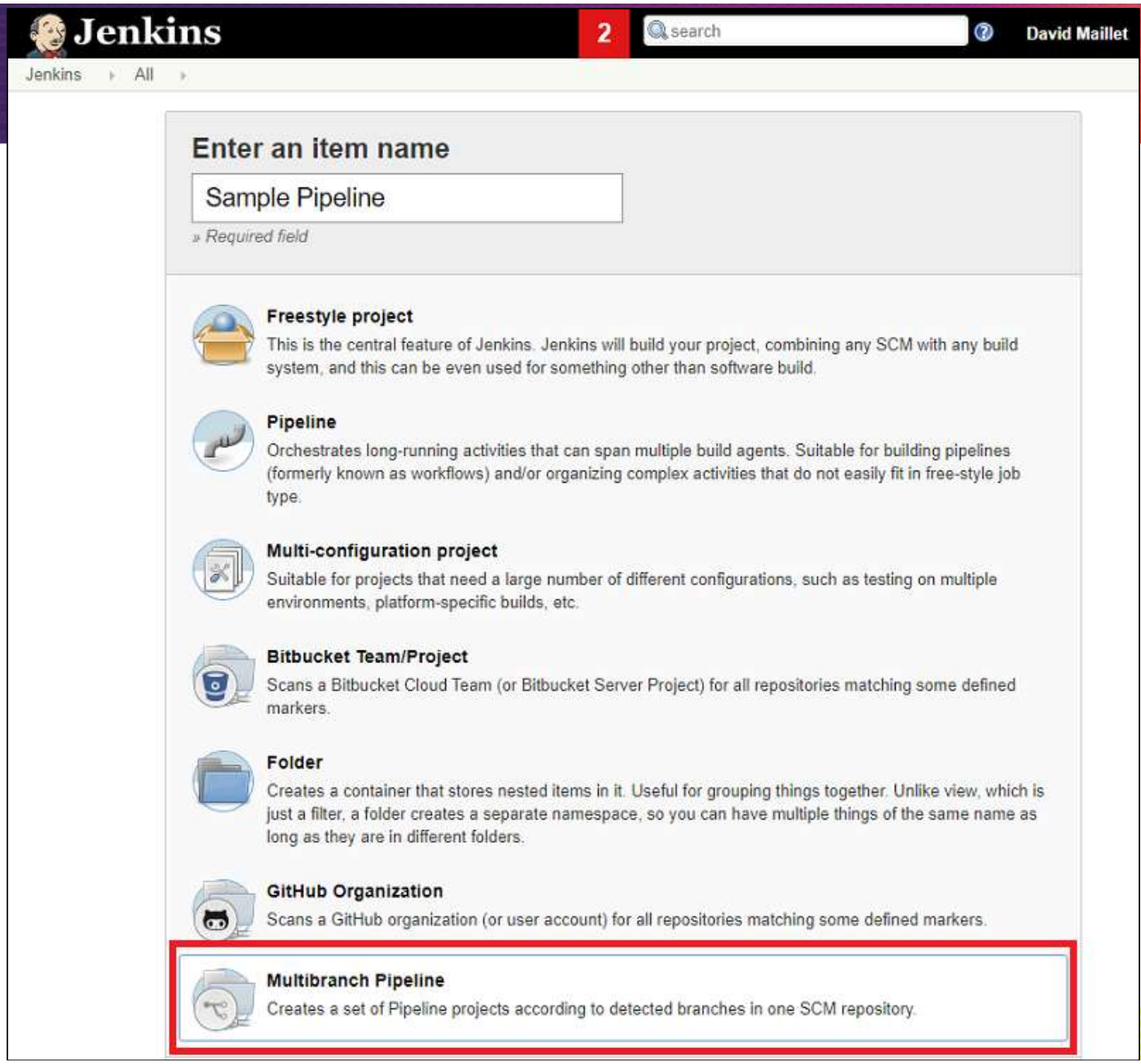
Create a new Multibranch Pipeline



Configure the Pipeline

Branch Sources

GitHub

Credentials

/****** (github)

Add

User

Repository HTTPS URL

Repository HTTPS URL

https://github.com/ /sample.git

Configure the Multibranch Pipeline

Build Configuration

Mode: by Jenkinsfile

Script Path: Jenkinsfile

Summary

- Everything is code
- Different pipelines for different branches
- Modularize for:
  - Maintainability
  - Reuse
  - Access control
- Pipeline code sits with application code
- Self-service

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Contact Info

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Sample File:

- https://github.com/dmaillet63/sample

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