

**(21CC505PC)**  
**SOFTWARE ENGINEERING LAB**  
**LAB EXERCISE - 6**

**CONTINUOUS INTEGRATION TOOLS**  
**TOPIC -3**

**BUILDING THE CI/CD SCRIPTED PIPELINE**  
**USING JENKINS FOR MAVEN JAVA PROJECT**  
**WITH POLL SCM**

## List of Experiments:

Do the following exercises for any one project given in the list of sample projects or any other projects?

1. Development of problem statement.
2. Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents.
3. Study and usage of any Design phase CASE tool
4. Creating the project and committing using Git and GitHub
5. Creating Maven Java and Maven Web project using Eclipse and Push them to GitHub.
6. Building the CI/CD pipeline using Jenkins for the project in the previous experiment.
7. Local Deployment of project using Docker, Kubernetes and Monitoring using Nagios tool.
8. Cloud Deployment of a project in the AWS Cloud using EC2 instance.



Go to Jenkins dashboard → click on new item

Dashboard [Jenkins] x budarajumadhurika/11-12-java x +

localhost:8080

Python Java YouTube Maps News Gmail Trinetra | Log in Conceptual model...

# Jenkins

Search ?

2 2 Madhurika Budaraju log out

## Dashboard

- New Item
- People New Item
- Build History
- Project Relationship
- Check File Fingerprint
- Manage Jenkins
- My Views
- New View

### Build Queue

No builds in the queue.

### Build Executor Status

localhost:8080/view/all/newJob

[Add description](#)

All JavaMaven\_Pipeline PresentMavenWeb\_pipeline PresentProjectNew\_pipeline javawebnew\_pipeline july\_pipeline

web\_pipeline +

S	W	Name ↓	Last Success	Last Failure	Last Duration
✓	☁	JavaMaven_build	1 yr 1 mo #2	1 yr 1 mo #1	11 sec ▶
✓	⚙	JavaMaven_test	1 yr 1 mo #1	N/A	5.7 sec ▶
✓	⚙	javawebnew_build	4 mo 5 days #5	N/A	30 sec ▶
✓	⚙	javawebnew_deploy	4 mo 5 days #5	N/A	3.5 sec ▶
✓	⚙	javawebnew_test	4 mo 5 days #5	N/A	8.1 sec ▶
✓	⚙	july_build	19 days #6	N/A	14 sec ▶

Activate Windows  
Go to Settings to activate Windows.



Give a name → select 3<sup>rd</sup> option pipeline → click ok

New Item [Jenkins]

localhost:8080/view/all/newJob

PythonJavaYouTubeMapsNewsGmailTrinetra | Log inConceptual model...

Jenkins

Search (CTRL+K)

2 2

Madhurika Budaraju

log out

Dashboard > All >

Enter an item name

» Required field

**Freestyle project**

This is the central feature of Jenkins. Jenkins will build your project, combining any SCM with any build system, and this can be even used for something other than software build.

**Maven project**

Build a maven project. Jenkins takes advantage of your POM files and drastically reduces the configuration.

**Pipeline**

Orchestrates long-running activities that can span multiple build agents. Suitable for building pipelines (formerly known as workflows) and/or organizing complex activities that do not easily fit in free-style job type.

**Configuration project**

Build projects that need a large number of different configurations, such as testing on multiple environments, platform-specific

OK



The pipeline dashboard looks like this → scroll to build triggers -> select build periodically

samplescriptjava Config [Jenkins]

samplescriptjava/src/main/java

localhost:8080/job/samplescriptjava/configure

Python

Java

YouTube

Maps

News

Gmail

Trinetra | Log in

Conceptual model...

Dashboard

samplescriptjava

Configuration

Configure

General

Advanced Project Options

Pipeline

☐ Throttle builds

**Build Triggers**

☐ Build after other projects are built

☒ Build periodically

Schedule

H/15 \* \* \* \*

Would last have run at Wednesday, 27 December, 2023 at 9:35:31 PM India Standard Time; would next run at Wednesday, 27 December, 2023 at 9:50:31 PM India Standard Time.

☐ Build whenever a SNAPSHOT dependency is built

☐ GitHub hook trigger for GITScm polling

☐ Poll SCM

Save

Apply





Click on schedule to know more about how to build periodically "Build Periodically" refers to a feature that allows you to schedule and automate the execution of a build job at regular intervals. It's a way to ensure that certain tasks, such as compiling code, running tests, or deploying software, are performed automatically and on a recurring basis.

The screenshot shows the Jenkins web interface for configuring a job named 'samplescriptjava'. The browser address bar indicates the URL is 'localhost:8080/job/samplescriptjava/configure'. The left sidebar shows the 'Configure' page with three tabs: 'General', 'Advanced Project Options', and 'Pipeline'. The 'General' tab is active. Under the 'Build' section, the 'Build periodically' checkbox is checked. The 'Schedule' field contains the cron expression 'H/15 \* \* \* \*'. Below the schedule field, a message states: 'Would last have run at Wednesday, 27 December, 2023 at 10:35:40 PM India Standard Time; would next run at Wednesday, 27 December, 2023 at 10:50:40 PM India Standard Time.' A detailed explanation of the cron syntax follows, listing the fields: MINUTE (0-59), HOUR (0-23), DOM (1-31), MONTH (1-12), and DOW (0-7, where 0 and 7 are Sunday). At the bottom, there are 'Save' and 'Apply' buttons.

Dashboard > samplescriptjava > Configuration

## Configure

- General
- Advanced Project Options
- Pipeline

☐ Build after other projects are built

☒ Build periodically ?

Schedule ?

H/15 \* \* \* \*

Would last have run at Wednesday, 27 December, 2023 at 10:35:40 PM India Standard Time; would next run at Wednesday, 27 December, 2023 at 10:50:40 PM India Standard Time.

This field follows the syntax of cron (with minor differences). Specifically, each line consists of 5 fields separated by TAB or whitespace:

MINUTE HOUR DOM MONTH DOW

MINUTE Minutes within the hour (0-59)  
HOUR The hour of the day (0-23)  
DOM The day of the month (1-31)  
MONTH The month (1-12)  
DOW The day of the week (0-7) where 0 and 7 are Sunday.

To specify multiple values for one field, the following operators are available. In the order of precedence,

[Save](#) [Apply](#)



The highlighted text helps us to build / trigger every 15 min i.e. for every 15 min it will trigger the build automatically even if there are no changes in the project.

samplescriptjava Config (Jenkins)

samplescriptjava/src/main/java

localhost:8080/job/samplescriptjava/configure

Python Java YouTube Maps News Gmail Trinetra | Log in Conceptual model...

Dashboard > samplescriptjava > Configuration

Configure

General

Advanced Project Options

Pipeline

The H symbol can be used with a range. For example, H H(0-7) \* \* \* \* means some time between 12:00 AM (midnight) to 7:59 AM. You can also use step intervals with H, with or without ranges.

The H symbol can be thought of as a random value over a range, but it actually is a hash of the job name, not a random function, so that the value remains stable for any given project.

Beware that for the day of month field, short cycles such as \*/3 or H/3 will not work consistently near the end of most months, due to variable month lengths. For example, \*/3 will run on the 1st, 4th, ...31st days of a long month, then again the next day of the next month. Hashes are always chosen in the 1-28 range, so H/3 will produce a gap between runs of between 3 and 6 days at the end of a month. (Longer cycles will also have inconsistent lengths but the effect may be relatively less noticeable.)

Empty lines and lines that start with # will be ignored as comments.

In addition, @yearly, @annually, @monthly, @weekly, @daily, @midnight, and @hourly are supported as convenient aliases. These use the hash system for automatic balancing. For example, @hourly is the same as H \* \* \* \* and could mean at any time during the hour. @midnight actually means some time between 12:00 AM and 2:59 AM.

Examples:

```
# Every fifteen minutes (perhaps at :07, :22, :37, :52):
H/15 * * * *
# Every ten minutes in the first half of every hour (three times, perhaps at :04, :14, :24):
H(0-29)/10 * * * *
# Once every two hours at 45 minutes past the hour starting at 9:45 AM and finishing at 3:45 PM every weekday:
45 9-16/2 * * 1-5
# Once in every two hour slot between 8 AM and 4 PM every weekday (perhaps at 9:38 AM, 11:38 AM, 1:38 PM, 3:38
```

Save

Apply



The highlighted text helps us to build / trigger every Min

samplescriptjava Config [Jenkins] x samplescriptjava/src/main/java x +

localhost:8080/job/samplescriptjava/configure

Python Java YouTube Maps News Gmail Trinetra | Log in Conceptual model...

Dashboard > samplescriptjava > Configuration

## Configure

- General
- Advanced Project Options
- Pipeline

☐ This project is parameterized ?

☐ Throttle builds ?

### Build Triggers

☐ Build after other projects are built ?

☒ Build periodically ?

Schedule ?

\*\*\*\*\*

📅 🕒

🔄

Would last have run at Wednesday, 27 December, 2023 at 10:35:40 PM India Standard Time; would next run at Wednesday, 27 December, 2023 at 10:50:40 PM India Standard Time.

This field follows the syntax of cron (with minor differences). Specifically, each line consists of 5 fields separated by TAB or whitespace:

MINUTE HOUR DOM MONTH DOW

Save Apply





Scroll down and go to pipeline and paste the script here

samplescriptjava Config [Jenkins] x budarajumadhurika/JavaMaven x +

localhost:8080/job/samplescriptjava/configure

Python Java YouTube Maps News Gmail Trinetra | Log in Conceptual model...

Dashboard > samplescriptjava > Configuration

## Configure

- General
- Advanced Project Options
- Pipeline**

Definition

Pipeline script

Script ?

```
1 pipeline {  
2   agent any  
3  
4   tools {  
5     // Configuring the Maven tool with the specified tool name 'MAVEN_HOME'  
6     maven 'MAVEN_HOME'  
7     // Configuring Git to use the Git Plugin  
8     git 'GIT_HOME'  
9   }  
10  
11   stages {  
12     stage('git repo & clean') {  
13       steps {  
14         bat "rmdir /s /q samplescriptjava"  
15         bat "git clone https://github.com/budarajumadhurika/samplescriptjava.git"  
16         bat "mvn clean -f samplescriptjava"  
17       }  
18     }  
19     stage('install') {  
20       steps {
```

☒ Use Groovy Sandbox ?

[Pipeline Syntax](#)

Save Apply



Apply and save

samplescriptjava Config (Jenkins)

budarajumadhurika/JavaMaven

localhost:8080/job/samplescriptjava/configure

PythonJavaYouTubeMapsNewsGmailTrinetra | Log inConceptual model...

Dashboard > samplescriptjava > Configuration

Configure

General

Advanced Project Options

Pipeline

Definition

Pipeline script

Script ?

```
16      bat "mvn clean -f samplescriptjava"
17    }
18  }
19  stage('install') {
20    steps {
21      bat "mvn install -f samplescriptjava"
22    }
23  }
24  stage('test') {
25    steps {
26      bat "mvn test -f samplescriptjava"
27    }
28  }
29  stage('package') {
30    steps {
31      bat "mvn package -f samplescriptjava"
32    }
33  }
34 }
35 }
```

☒ Use Groovy Sandbox ?

[Pipeline Syntax](#)

✓ Saved

Save

Apply



Click on build now

samplescriptjava [Jenkins]

budarajumadhurika/JavaMaven

localhost:8080/job/samplescriptjava/

PythonJavaYouTubeMapsNewsGmailTrinetra | Log inConceptual model...

Jenkins

Search (CTRL+K)

2 2

Madhurika Budaraju

log out

Dashboard > samplescriptjava >

Status

Changes

Build Now

Configure

Delete Pipeline

Full Stage View

Favorite

Open Blue Ocean

Rename

Pipeline Syntax

## samplescriptjava

Add description

Disable Project

### Stage View

No data available. This Pipeline has not yet run.

### Permalinks

Build History

trend



The build is successful

samplescriptjava [Jenkins]

budarajumadhurika/JavaMaven

localhost:8080/job/samplescriptjava/

PythonJavaYouTubeMapsNewsGmailTrinetra | Log inConceptual model...

SEARCH (CTRL+N)

log out

Dashboard > samplescriptjava >

Status

Changes

Build Now

Configure

Delete Pipeline

Full Stage View

Favorite

Open Blue Ocean

Rename

Pipeline Syntax

samplescriptjava

Add description

Disable Project

Stage View

Average stage times:  
(Average full run time: ~18s)

#20

Dec 28 24:55

No Changes

Declarative: Tool Install	git repo & clean	install	test	package
198ms	3s	5s	4s	4s
198ms	3s	5s	4s	4s

Build History

trend

Filter builds

- Last build (#20), 34 sec ago
- Last stable build (#20), 34 sec ago



I changed my code in GitHub as shown

samplescriptjava [Jenkins] x Editing samplescriptjava/src/main/java/in/kmit/ExampleJavaProject/App.java

github.com/budarajumadhurika/samplescriptjava/edit/main/src/main/java/in/kmit/ExampleJavaProject/App.java

Python Java YouTube Maps News Gmail Trinetra | Log in Conceptual model...

Code Issues Pull requests Actions Projects Wiki Security Insights Settings

Files

main + Q

Go to file t

- > .settings
- > src
  - > main/java/in/kmit/ExampleJavaProject
    - App.java
  - > test/java/in/kmit/ExampleJavaProject
- .gitignore
- README.md
- pom.xml

samplescriptjava / src / main / java / in / kmit / ExampleJavaProject

/ App.java in main

Cancel changes Commit changes...

Edit Preview Spaces 4 No wrap

```
1 package in.kmit.ExampleJavaProject;
2
3 /**
4  * Hello world!
5  *
6  */
7 public class App
8 {
9     public static void main( String[] args )
10    {
11        System.out.println( "Hello i did changes" );
12    }
13 }
14
```

Use Control + Shift + m to toggle the tab key moving focus. Alternatively, use esc then tab to move to the next interactive element on the page.





## Commit the changes

samplescriptjava [Jenkins] x Editing samplescriptjava/src/main/java/in/kmit/ExampleJavaProject/App.java

github.com/budarajumadhurika/samplescriptjava/edit/main/src/main/java/in/kmit/ExampleJavaProject/App.java

Python Java YouTube Maps News Gmail Trinetra | Log in Conceptual model...

Code Issues Pull requests Actions Projects Wiki Security Insights Settings

Files

main + Q

Go to file t

> .settings

> src

> main/java/in/kmit/ExampleJava...  
App.java

> test/java/in/kmit/ExampleJavaPr...

.gitignore  
README.md  
pom.xml

Commit changes

Commit message  
Update App.java

Extended description  
Add an optional extended description..

☒ Commit directly to the main branch

☐ Create a new branch for this commit and start a pull request  
[Learn more about pull requests](#)

Cancel Commit changes

Cancel changes Commit changes...

Spaces 4 No wrap

1

Use Control + Shift + M to toggle the tab key moving focus. Alternatively, use Esc then Tab to move to the next interactive element on the page.



Even if we do changes or not, every minute a new build is triggered as shown

samplescriptjava [Jenkins]

samplescriptjava/src/main/java

localhost:8080/job/samplescriptjava/

Python Java YouTube Maps News Gmail Trinetra | Log in Conceptual model...

Dashboard > samplescriptjava >

Build Now

Configure

Delete Pipeline

Full Stage View

Favorite

Open Blue Ocean

Rename

Pipeline Syntax

Build History

trend

Filter builds...

#21  
28-Dec-2023, 1:01 AM

#20  
28-Dec-2023, 12:55 AM

Disable Project

Stage View

Average stage times:  
(Average full run time: ~18s)

	Declarative: Tool Install	git repo & clean	install	test	package
Average	173ms	3s	2s	4s	4s
#21 Dec 28 01:01 No Changes	149ms	3s	667ms		
#20 Dec 28 24:55 No Changes	198ms	3s	5s	4s	4s

Permalinks

- Last build (#21), 0.11 sec ago
- Last stable build (#20), 5 min 13 sec ago
- Last successful build (#20), 5 min 13 sec ago
- Last completed build (#20), 5 min 13 sec ago



This is how it automatically builds → but let's leave it H/15 \* \* \* \* (to trigger every 15 min) or H \* \* 3 \* (to trigger every 3 months)

samplescriptjava [Jenkins] × samplescriptjava/src/main/java × +

localhost:8080/job/samplescriptjava/

Python Java YouTube Maps News Gmail Trinetra | Log in Conceptual model...

Dashboard > samplescriptjava >

Build Now

Configure

Delete Pipeline

Full Stage View

Open Blue Ocean

Rename

Pipeline Syntax

Disable Project

### Stage View

Average stage times:  
(Average full run time: ~25s)

	Declarative: Tool Install	git repo & clean	install	test	package
#10	140ms	790ms			
#9	161ms	3s	7s	5s	6s
#8	348ms	7s	9s	6s	7s
#7	125ms	3s	4s	3s	3s

Build History trend

Filter builds...

#10  
27-Dec-2023, 10:53 PM

#9  
27-Dec-2023, 10:50 PM

#8  
27-Dec-2023, 10:46 PM