



DevOps Lab/Even Sem 2023-23/Experiment 4

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Title of Experiment :

To understand Continuous Integration, install and configure Jenkins to setup a build Job.

Objective of Experiment :

To understand the importance of Jenkins to Build and deploy Software Applications on server environment

Outcome of Experiment :

To understand the importance of Jenkins to Build and deploy Software Applications on server environment

Problem Statement :

To understand Continuous Integration, install and configure Jenkins to setup a build Job.

Description / Theory :



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Jenkins, an open-source automation server, stands at the forefront of modern software development methodologies, championing Continuous Integration (CI) and Continuous Delivery (CD) practices. Launched in 2011, Jenkins has evolved into a versatile and robust tool, becoming an integral part of development pipelines across diverse industries.

Core Principles

1. Automation

Jenkins excels in automating repetitive tasks associated with building, testing, and deploying software. Developers can define pipelines that encompass the entire software delivery process, ensuring efficiency and reducing the risk of human error.

2. Extensibility

One of Jenkins' defining features is its vast array of plugins, enabling seamless integration with a wide spectrum of tools and technologies. Whether it's version control systems, testing frameworks, or deployment platforms, Jenkins offers extensibility that caters to the unique needs of different development teams.

Key Features

1. Pipelines

Jenkins Pipelines, defined as code, allow developers to express the entire build, test, and deployment process in a version-controlled script. This declarative approach ensures consistency across different environments and facilitates collaboration among team members.

2. Plugins

With over a thousand plugins available, Jenkins provides unparalleled flexibility. Developers can choose and integrate plugins to extend Jenkins' functionality, creating a tailored environment that aligns with the specific requirements of their projects.

3. Distributed Builds

Jenkins supports the distribution of build and test tasks across multiple machines, enabling parallel execution. This feature accelerates the development process, reducing build times and enhancing overall productivity.

4. Monitoring and Notifications



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Jenkins offers detailed monitoring capabilities, providing real-time insights into the status of builds and deployments. Additionally, it supports notifications through various channels, ensuring that teams stay informed about the progress and outcomes of their development processes.

Code and Output :

```
(student@AIDS210-5)-[~]
$ sudo wget -O /usr/share/keyrings/jenkins-keyring.asc \
  https://pkg.jenkins.io/debian-stable/jenkins.io-2023.key
--2024-02-01 09:40:47-- https://pkg.jenkins.io/debian-stable/jenkins.io-2023.key
Resolving pkg.jenkins.io (pkg.jenkins.io)... 151.101.2.133, 151.101.66.133, 151.101.130.133, ...
Connecting to pkg.jenkins.io (pkg.jenkins.io)[151.101.2.133]:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 3175 (3.1K) [application/pgp-keys]
Saving to: '/usr/share/keyrings/jenkins-keyring.asc'

/usr/share/keyrings/jenkins-keyring. 100%[=====]
=====>] 3.10K --.-KB/s in 0s

2024-02-01 09:40:47 (12.4 MB/s) - '/usr/share/keyrings/jenkins-keyring.asc' saved [3175/3175]

(student@AIDS210-5)-[~]
$ echo deb [signed-by=/usr/share/keyrings/jenkins-keyring.asc] \
  https://pkg.jenkins.io/debian-stable binary/ | sudo tee \
  /etc/apt/sources.list.d/jenkins.list > /dev/null

(student@AIDS210-5)-[~]
$ sudo apt-get update
sudo apt-get install fontconfig openjdk-17-jre
sudo apt-get install jenkins
Hit:1 http://packages.microsoft.com/repos/code stable InRelease
```

Activate Windows
Go to Settings to activate Windows.



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```
(dyotak@Dyotak)-[~]
$ jenkins
Running from: /usr/share/java/jenkins.war
webroot: /home/dyotak/.jenkins/war
2024-02-10 17:21:26.428+0000 [id=1] INFO winstone.Logger#logInternal: Beginning extract
ion from war file
2024-02-10 17:21:26.931+0000 [id=1] WARNING o.e.j.s.handler.ContextHandler#setContextPath:
Empty contextPath
2024-02-10 17:21:26.975+0000 [id=1] INFO org.eclipse.jetty.server.Server#doStart: jetty
-10.0.18; built: 2023-10-27T01:59:58.245Z; git: 8545fd9bf4cd0d0838f626b405fd4963441546b7; jvm
17.0.9+9-Debian-2
2024-02-10 17:21:27.184+0000 [id=1] INFO o.e.j.w.StandardDescriptorProcessor#visitServl
et: NO JSP Support for /, did not find org.eclipse.jetty.jsp.JettyJspServlet
2024-02-10 17:21:27.222+0000 [id=1] INFO o.e.j.s.s.DefaultSessionIdManager#doStart: Ses
sion workerName=node0
2024-02-10 17:21:27.557+0000 [id=1] INFO hudson.WebAppMain#contextInitialized: Jenkins
home directory: /home/dyotak/.jenkins found at: $user.home/.jenkins
2024-02-10 17:21:27.692+0000 [id=1] INFO o.e.j.s.handler.ContextHandler#doStart: Starte
d w.@50f40653{Jenkins v2.426.3,/,file:///home/dyotak/.jenkins/war/,AVAILABLE}{/home/dyotak/.je
nkins/war}
2024-02-10 17:21:27.702+0000 [id=1] INFO o.e.j.server.AbstractConnector#doStart: Starte
d ServerConnector@6c61a903{HTTP/1.1, (http/1.1)}{0.0.0.0:8080}
2024-02-10 17:21:27.718+0000 [id=1] INFO org.eclipse.jetty.server.Server#doStart: Start
ed Server@f99f5e0{STARTING}[10.0.18,sto=0] @1664ms
2024-02-10 17:21:27.719+0000 [id=27] INFO winstone.Logger#logInternal: Winstone Servlet

2024-02-10 17:21:28.474+0000 [id=49] INFO jenkins.InitReactorRunner$1#onAttained: System
config adapted
2024-02-10 17:21:28.475+0000 [id=51] INFO jenkins.InitReactorRunner$1#onAttained: Loaded
all jobs
2024-02-10 17:21:28.476+0000 [id=51] INFO jenkins.InitReactorRunner$1#onAttained: Config
uration for all jobs updated
2024-02-10 17:21:28.493+0000 [id=69] INFO hudson.util.Retrier#start: Attempt #1 to do th
e action check updates server
2024-02-10 17:21:28.729+0000 [id=37] INFO jenkins.install.SetupWizard#init:

*****
*****
*****

Jenkins initial setup is required. An admin user has been created and a password generated.
Please use the following password to proceed to installation:

59efd0731a1e4761b9205e41901a03cd

This may also be found at: /home/dyotak/.jenkins/secrets/initialAdminPassword

*****
*****
*****
```



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The image displays two sequential screenshots of the Jenkins web interface during its initial setup phase.

Top Screenshot: Getting Started - Unlock Jenkins

- Page Title:** Getting Started
- Section Header:** Unlock Jenkins
- Text:** To ensure Jenkins is securely set up by the administrator, a password has been written to the log (not sure where to find it?) and this file on the server:
`/home/dyotak/.jenkins/secrets/initialAdminPassword`
- Text:** Please copy the password from either location and paste it below.
- Form:** A text input field labeled "Administrator password" with a masked password (dots).
- Button:** A blue "Continue" button at the bottom right.

Bottom Screenshot: Getting Started - Customize Jenkins

- Page Title:** Getting Started
- Section Header:** Customize Jenkins
- Text:** Plugins extend Jenkins with additional features to support many different needs.
- Options:** Two selectable boxes are presented:
 - Install suggested plugins:** Install plugins the Jenkins community finds most useful.
 - Select plugins to install:** Select and install plugins most suitable for your needs.
- Footer:** Jenkins 2.426.3



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The image shows two screenshots of the Jenkins web interface. The top screenshot is the 'Getting Started' setup wizard for Jenkins 2.426.3. It prompts the user to 'Create First Admin User' with the following fields: Username (admin), Password (masked with dots), Confirm password (masked with dots), and Full name (dyotak mandar kachare). At the bottom, there are links for 'Skip and continue as admin' and a 'Save and Continue' button.

The bottom screenshot shows the Jenkins dashboard for a project named 'first-pipeline'. The left sidebar contains a menu with options: Status, Changes, Build Now, Configure, Delete Pipeline, Full Stage View, Rename, and Pipeline Syntax. The main content area shows the 'first-pipeline' status as 'my first pipeline' with an 'Edit description' link and a 'Disable Project' button. Below this, the 'Stage View' section displays a message: 'No data available. This Pipeline has not yet run.' The 'Permalinks' section is also visible. At the bottom, the 'Build History' section shows 'No builds'.



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Dashboard > first-pipeline > Configuration

Configure

General

Advanced Project Options

Pipeline

Build History

trend

Filter builds...

#2 10 Feb 2024, 23:04

#1 10 Feb 2024, 23:03

Atom feed for all

Atom feed for failures

my first pipeline

Edit description

Disable Project

Stage View

Average stage times:
(Average full run time: ~1s)

	Hello
#2 Feb 10 23:04 No Changes	103ms
#1 Feb 10 23:03 No Changes	70ms
	137ms

Permalinks

- Last build (#2), 20 sec ago
- Last stable build (#2), 20 sec ago

Pipeline script

Script ?

```
1 pipeline {  
2   agent any  
3  
4   stages {  
5     stage('Hello 1') {  
6       steps {  
7         echo 'Hello world 1'  
8       }  
9     }  
10    stage('Hello 2') {  
11      steps {  
12        echo 'Hello world 2'  
13      }  
14    }  
15    stage('Hello 3') {  
16      steps {  
17        echo 'Hello world 3'  
18      }  
19    }  
20    stage('Hello 4') {  
21      steps {  
22        echo 'Hello world 4'  
23      }  
24    }  
25  }  
26 }  
27
```

☒ Use Groovy Sandbox ?

Pipeline Syntax

Save Apply



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The screenshot displays the Jenkins web interface. The top navigation bar includes the Jenkins logo, a search bar, and user information for 'dyotak mandar kachare'. The main content area shows the configuration for a pipeline named 'first-pipeline'. On the left, a sidebar lists various actions: Status, Changes, Build Now, Configure, Delete Pipeline, Full Stage View, Rename, and Pipeline Syntax. The 'Build History' section shows a list of builds, with build #3 being the most recent. The 'Stage View' section provides a visual representation of the pipeline stages, including 'Hello 1', 'Hello 2', 'Hello 3', and 'Hello 4', with their respective execution times. The 'Permalinks' section lists links to the last build, last stable build, last successful build, and last completed build. The bottom section shows the 'Console Output' for the selected build, displaying the execution logs.

Jenkins Search (CTRL+K) dyotak mandar kachare log out

Dashboard > first-pipeline >

Status **first-pipeline** my first pipeline Edit description Disable Project

Stage View

Stage	Time
Hello 1	64ms
Hello 2	54ms
Hello 3	50ms
Hello 4	47ms

Average stage times: 64ms, 54ms, 50ms, 47ms
Average full run time: ~536ms

Build History trend

Build	Time
#3	10 Feb 2024, 23:07
#2	10 Feb 2024, 23:04
#1	10 Feb 2024, 23:03

Permalinks

- Last build (#2), 2 min 59 sec ago
- Last stable build (#2), 2 min 59 sec ago
- Last successful build (#2), 2 min 59 sec ago
- Last completed build (#2), 2 min 59 sec ago

Jenkins Search (CTRL+K) dyotak mandar kachare log out

Dashboard > first-pipeline > #4

Console Output

```
Started by user dyotak mandar kachare
[Pipeline] Start of Pipeline
[Pipeline] node
Running on Jenkins in /home/dyotak/.jenkins/workspace/first-pipeline
[Pipeline] {
[Pipeline] stage
[Pipeline] { (Hello 1)
[Pipeline] echo
Hello World 1
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Hello 2)
[Pipeline] echo
Hello World 2
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Hello 3)
[Pipeline] echo
Hello World 3
[Pipeline] }
[Pipeline] // stage
```

Results and Discussion :

Jenkins is very important tool when it comes to devops. Jenkins can perform a lot of task around 1500 different types of tasks out of which we will eventually learn and use 15-20 of them. Jenkins can pe run on windows/mac/linux but eventually you have to run it on a server.