



## Module Checklist

# Build Automation & CI/CD with Jenkins

By Techworld with Nana



# Video Overview

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Demo Projects	
Java Maven Project	<a href="https://gitlab.com/nanuchi/java-maven-app">https://gitlab.com/nanuchi/java-maven-app</a>
Jenkins Shared Library	<a href="https://gitlab.com/nanuchi/jenkins-shared-library">https://gitlab.com/nanuchi/jenkins-shared-library</a>

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## Introduction to Build Automation

- ☐ Watched video

## Install Jenkins

- ☐ Watched video
- ☐ **Demo executed**
  - ☐ Created a Server (Droplet) on DigitalOcean
  - ☐ Configured Firewall Rules to open port 22 and port 8080 for our new server
  - ☐ Installed Docker on DigitalOcean Droplet
  - ☐ Started Jenkins Docker container with named volume
  - ☐ Initialized Jenkins

### Useful Links:

- Jenkins Docker Image: <https://hub.docker.com/r/jenkins/jenkins>

### Useful Commands:

```
docker run -p 8080:8080 -p 50000:50000 -d -v
jenkins_home:/var/jenkins_home jenkins/jenkins:lts
docker volume inspect jenkins_home

# print the initialisation password
cat
/var/snap/docker/common/var-lib-docker/volumes/jenkins_home/
_data/secrets/initialAdminPassword
```

## Jenkins UI Tour

- ☐ Watched video



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## Install Build Tools

- ☐ Watched video
- ☐ **Demo executed**
  - ☐ Configured Plugin for Maven
  - ☐ Installed npm and node in Jenkins container

### Useful Links:

- Node Installation for Linux distributions: <https://github.com/nodesource/distributions>
- Jenkins Plugins: <https://plugins.jenkins.io/>

### Useful Commands:

```
# enter container as root
docker exec -u 0 -it a3f305b0b63f bash

# check with Linux distro container is running
cat /etc/issue

apt update
apt install curl

curl -sL https://deb.nodesource.com/setup_10.x -o nodesource_setup.sh
bash nodesource_setup.sh
apt install nodejs

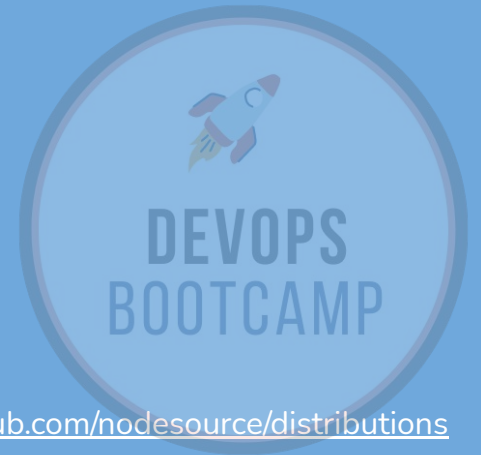
nodejs -v
npm -v
```

## Jenkins Basics Demo

- ☐ Watched video
- ☐ **Demo executed - create a simple Freestyle Job**
  - ☐ Configured Git Repository to checkout the code from
  - ☐ Configured Job to run tests and build Java Application

### Useful Links:

- Java-maven-app (master): <https://gitlab.com/nanuchi/java-maven-app>
- Java-maven-app: <https://gitlab.com/nanuchi/java-maven-app/-/tree/jenkins-jobs>



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## Docker in Jenkins

- ☐ Watched video
- ☐ **Demo executed - push Image to DockerHub Repository**
  - ☐ Made Docker available in Jenkins container (mount docker runtime inside container as a volume)
  - ☐ Fixed permissions on docker.sock
  - ☐ Configured Job to build Docker Image
  - ☐ Configured Job to push Image to DockerHub
    - ☐ Prerequisite: Account on DockerHub
    - ☐ Created a repository on DockerHub
    - ☐ Created Credentials for DockerHub in Jenkins UI
    - ☐ Tag Docker Image with your DockerHub repository, login and push to repository
- ☐ **Demo executed - push Image to Nexus Repository**
  - ☐ Configured “insecure-registries” on Droplet server (daemon.json file)
  - ☐ Fixed permission for docker.sock again after restart of Jenkins container
  - ☐ Created Credentials for Nexus in Jenkins UI
  - ☐ Tag Docker Image with your Nexus host and repository, login and push to repository

### Useful Links:

- Java-maven-app: <https://gitlab.com/nanuchi/java-maven-app/-/tree/jenkins-jobs>



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## Docker in Jenkins

### Useful Commands:

```
# create jenkins container with mounted docker
docker run -p 8080:8080 -p 50000:50000 -d -v jenkins_home:/var/jenkins_home -v
/var/run/docker.sock:/var/run/docker.sock -v $(which docker):/usr/bin/docker jenkins/jenkins:lts

# enter as root and modify docker.sock permission
docker exec -u 0 -it 0c73a1692b75 bash
chmod 666 /var/run/docker.run

# edit or create /etc/docker/daemon.json ON THE HOST
vim /etc/docker/daemon.json
{
  "insecure-registries" : ["167.99.248.163:8083"]
}

# restart docker
systemctl restart docker

# start container again
docker start 0c73a1692b75

# enter as root and modify docker.sock permission
docker exec -u 0 -it 0c73a1692b75 bash
chmod 666 /var/run/docker.run
```

## Freestyle to Pipeline Job

- ☐ Watched video

## Introduction to Pipeline Job

- ☐ Watched video
- ☐ Demo executed - create a basic Pipeline Job
  - ☐ Configured Git Repository
  - ☐ Created a valid Jenkinsfile with required fields

### Useful Links:

- Java-maven-app: <https://gitlab.com/nanuchi/java-maven-app/-/tree/jenkins-jobs>

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## Jenkinsfile Syntax

- ☐ Watched video
- ☐ **Demo executed**
  - ☐ Used Post attribute
  - ☐ Defined a Condition
  - ☐ Used an environment variable
  - ☐ Used Tools Attribute
  - ☐ Used a Parameter
  - ☐ Used an external Groovy Script
  - ☐ Used an Input Parameter



### Useful Links:

- List available environment variables: [<your-ip-of-jenkins>:8080/env-vars.html](http://<your-ip-of-jenkins>:8080/env-vars.html)
- Pipeline Syntax: <https://www.jenkins.io/doc/book/pipeline/syntax/>
- Jenkinsfile & Groovy example: <https://gitlab.com/nanuchi/java-maven-app/-/tree/jenkins-jobs/Jenkinsfile-syntax>

## Create full Pipeline

- ☐ Watched video
- ☐ **Demo executed - create a full Pipeline Job**
  - ☐ Build Jar
  - ☐ Build Docker Image
  - ☐ Push to private Repository DockerHub

### Useful Links:

- Jenkinsfile & Groovy example: <https://gitlab.com/nanuchi/java-maven-app/-/tree/jenkins-jobs/Jenkinsfile-simple-pipeline>

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## Introduction to Multibranch Job

- ☐ Watched video
- ☐ **Demo executed**
  - ☐ Added branch based logic in Jenkinsfile



## Wrap Up Jenkins Jobs

- ☐ Watched video

## Credentials in Jenkins

- ☐ Watched video

## Jenkins Shared Library

- ☐ Watched video
- ☐ **Demo executed**
  - ☐ Created Shared Library Project/Repository
  - ☐ Made Shared Library globally available in Jenkins
  - ☐ Used Shared Library in Jenkinsfile
  - ☐ Used Parameters in Shared Library
  - ☐ Extracted logic into Groovy Classes
  - ☐ Define Shared Library in Jenkinsfile directly (project scoped)

### Useful Links:

- Java-maven-app:  
<https://gitlab.com/nanuchi/java-maven-app/-/tree/jenkins-shared-lib>
- Jenkins-shared-library: <https://gitlab.com/nanuchi/jenkins-shared-library>



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## Trigger Jenkins Jobs - Webhooks

- ☐ Watched video
- ☐ Demo executed



## Versioning your application - Part I

- ☐ Watched video
- ☐ Demo executed: Increment version locally with maven build tool
- ☐ Demo executed: Increment version in Jenkins Pipeline
  - ☐ Configured Jenkinsfile to increment version
  - ☐ Adjusted Dockerfile file
  - ☐ Executed Jenkins Pipeline

### Useful Links:

- Maven Build-Helper Plugin:  
<https://www.mojohaus.org/build-helper-maven-plugin/parse-version-mojo.html>
- Java-maven-app:  
<https://gitlab.com/nanuchi/java-maven-app/-/tree/jenkins-jobs/Jenkinsfile-version-increment>

## Versioning your application - Part II

- ☐ Watched video
- ☐ Demo executed: Commit version upgrade from Jenkins to Git
- ☐ Demo executed: Ignore Jenkins Commit from Triggering Pipeline

### Useful Links:

- Java-maven-app:  
<https://gitlab.com/nanuchi/java-maven-app/-/tree/jenkins-jobs/Jenkinsfile-version-increment>

# More Resources...

## Best practices

### Pipeline Script/Jenkinsfile related best practices:

- Use Pipeline as Code: Store your Jenkinsfile in Git Repository (instead of inline script in Jenkins). Good for history, working in a team etc.
- Call your Pipeline Script the default name: Jenkinsfile
- Non-Setup work should occur within a stage block. Makes your builds easier to visualize, debug etc.
- Make sure to put `#!/usr/bin/env groovy` at the top of the file so that IDEs, GitHub diffs, etc properly detect the language and do syntax highlighting for you.
- Input Parameter: input shouldn't be done within a node block. It's recommended to use timeout for the input step in order to avoid waiting for an infinite amount of time, and also control structures (try/catch/finally).

### Other best practices:

- Use Automatic versioning
- Store common pipeline code in a Shared Library, so that it can be used by other projects/teams
- Best practices and how to put it to practice:  
<https://www.lambdatest.com/blog/jenkins-best-practices/>

