

Experiment – 1: Working with Maven: Creating a Maven Project, Understanding the POM File

Experiment – 2: Installing and Setting Up Gradle in IntelliJ IDEA

Experiment – 3: Working with Gradle: Setting Up a Gradle Project, Understanding Build Scripts

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Experiment – 5: Build and Run a Java Application with Maven, Migrate the Same Application to Gradle

Experiment – 6: Understanding and Working with Jenkins

Experiment - 1

Working with Maven: Creating a Maven Project, Understanding the POM File

Steps to Create a Maven Project in IntelliJ IDEA

1. Install Maven (if not already installed):

- Download Maven from the [official website](#).
- Set the `MAVEN_HOME` environment variable and update the system `PATH`.

2. Create a New Maven Project:

- Open IntelliJ IDEA.
- Go to `File > New > Project`.
- Select `Maven` from the project types.
- Choose `Create from Archetype` (optional) or proceed without.
- Set the project name and location, then click `Finish`.

3. Set Up the `pom.xml` File:

- The `pom.xml` file is where you define dependencies, plugins, and other configurations for your Maven project.
- Example of a basic `pom.xml`:

```
1 <project xmlns="http://maven.apache.org/POM/4.0.0"
2     xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
3     xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-
4     4.0.0.xsd">
5     <modelVersion>4.0.0</modelVersion>
6     <groupId>com.example</groupId>
7     <artifactId>simple-project</artifactId>
8     <version>1.0-SNAPSHOT</version>
9
10    <dependencies>
11        <!-- Add your dependencies here -->
12    </dependencies>
13
14 </project>
15
```

4. Add Dependencies for Selenium and TestNG:

- In the `pom.xml`, add Selenium and TestNG dependencies under the `<dependencies>` section.

```
1 <dependencies>
2   <dependency>
3     <groupId>org.seleniumhq.selenium</groupId>
4     <artifactId>selenium-java</artifactId>
5     <version>3.141.59</version>
6   </dependency>
7   <dependency>
8     <groupId>org.testng</groupId>
9     <artifactId>testng</artifactId>
10    <version>7.4.0</version>
11    <scope>test</scope>
12  </dependency>
13 </dependencies>
14
```

5. Create a Simple Website (HTML, CSS, and Logo):

- In the `src/main/resources` folder, create an `index.html` file, a `style.css` file, and place the `logo.png` image.

Example of a simple `index.html` : **COMMIT TO ACHIEVE**

```
1 <!DOCTYPE html>
2 <html lang="en">
3   <head>
4     <meta charset="UTF-8">
5     <meta name="viewport" content="width=device-width, initial-scale=1.0">
6     <title>My Simple Website</title>
7     <link rel="stylesheet" href="style.css">
8   </head>
9   <body>
10    <header>
11      
12    </header>
13    <h1>Welcome to My Simple Website</h1>
14  </body>
15 </html>
16
```

6. Upload the Website to GitHub:

- Initialize a Git repository in your project folder:

```
1 git init
2
```

- Add your files and commit them:

```
1 git add .
2 git commit -m "Initial commit"
3
```

- Create a GitHub repository and push the local project to GitHub:

```
1 git remote add origin <your-repository-url>
2 git push -u origin master
3
```

Experiment - 2

Installing and Setting Up Gradle in IntelliJ IDEA

- Creating a Gradle Project in IntelliJ IDEA

Step 1: Open IntelliJ IDEA and Create a New Project

1. Click on "New Project".
2. Select "Gradle" (under Java/Kotlin).
3. Choose **Groovy or Kotlin DSL (Domain Specific Language)** for the build script.
4. Set the **Group ID** (e.g., `com.example`).
5. Click **Finish**.

Step 2: Understanding Project Structure

```
1 my-gradle-project
2 |— build.gradle (Groovy Build Script)
3 |— settings.gradle
4 |— src
5 |   |— main
6 |   |   |— java
7 |   |   |— resources
8 |   |— test
9 |   |   |— java
10 |   |   |— resources
11
```

- Build and Run a Simple Java Application

Step 1: Modify `build.gradle` (Groovy DSL)

```
1 plugins {
2     id 'application'
3 }
4
5 repositories {
6     mavenCentral()
7 }
8
9 dependencies {
10     testImplementation 'org.junit.jupiter:junit-jupiter:5.8.1'
11 }
12
13 application {
14     mainClass = 'com.example.Main'
15 }
16
```

Step 2: Create `Main.java` in `src/main/java/com/example`

```
1 package com.example;
2
3 public class Main {
4     public static void main(String[] args) {
5         System.out.println("Hello from Gradle!");
6     }
7 }
8
```

Step 3: Build and Run the Project

- In IntelliJ IDEA, open the **Gradle tool window** (View → Tool Windows → Gradle).
- Click `Tasks > application > run`.
- Or run from terminal:

```
1 gradle run
```

Hosting a Static Website on GitHub Pages

Step 1: Create a `/docs` Directory

- Create `docs` inside the **root folder** (not in `src`).
- Add your **HTML, CSS, and images** inside `/docs`.

Step 2: Modify `build.gradle` to Copy Website Files (This is optional)

```
1 task copyWebsite(type: Copy) {  
2     from 'src/main/resources/website'  
3     into 'docs'  
4 }  
5
```

Step 3: Commit and Push to GitHub

```
1 git add .  
2 git commit -m "Deploy website using Gradle"  
3 git push origin main  
4
```

Step 4: Enable GitHub Pages

- Go to **GitHub Repo** → **Settings** → **Pages**.
- Select the `/docs` folder as the source.

Your website will be hosted at:

```
1 https://yourusername.github.io/repository-name/
```

Experiment - 3

Working with Gradle: Setting Up a Gradle Project, Understanding Build Scripts

Setting Up the Gradle Project

1. Click on "**New Project**".
2. Select "**Gradle**" (under Java/Kotlin).
3. Choose **Groovy or Kotlin DSL (Domain Specific Language)** for the build script.
4. Set the **Group ID** (e.g., `com.example`).
5. Click **Finish**.

- Understanding Project Structure

```
1 my-gradle-project
2 |— build.gradle (Groovy Build Script)
3 |— settings.gradle
4 |— src
5 |   |— main
6 |       |— java
7 |       |   |— resources
8 |   |— test
9 |       |— java
10 |       |— resources
11
```


- **Build and Run a Simple Java Application**

Step 1: Modify `build.gradle` **(Groovy DSL)**

```
1  plugins {  
2      id 'application'  
3  }  
4  
5  repositories {  
6      mavenCentral()  
7  }  
8  
9  dependencies {  
10     testImplementation 'org.junit.jupiter:junit-jupiter:5.8.1'  
11 }  
12  
13 application {  
14     mainClass = 'com.example.Main'  
15 }  
16
```

Step 2: Create `Main.java` **in** `src/main/java/com/example`

```
1  package com.example;  
2  
3  public class Main {  
4      public static void main(String[] args) {  
5          System.out.println("Hello from Gradle!");  
6      }  
7  }  
8
```

Step 3: Build and Run the Project

- In **IntelliJ IDEA**, open the **Gradle tool window** (View → Tool Windows → Gradle).
- Click `Tasks > application > run`.
- Or run from terminal:

```
1  gradle run
```

- **Hosting a Static Website on GitHub Pages**

Step 1: Create a `/docs` Directory

- Create `docs` inside the **root folder** (not in `src`).
- Add your **HTML, CSS, and images** inside `/docs`.

Step 2: Modify `build.gradle` to Copy Website Files (This is optional)

```
1 task copyWebsite(type: Copy) {  
2     from 'src/main/resources/website'  
3     into 'docs'  
4 }  
5
```

Step 3: Commit and Push to GitHub

```
1 git add .  
2 git commit -m "Deploy website using Gradle"  
3 git push origin main
```

Step 4: Enable GitHub Pages

- Go to **GitHub Repo → Settings → Pages**.
- Select the `/docs` **folder** as the source.

Your website will be hosted at:

```
1 https://yourusername.github.io/repository-name/  
2
```

Experiment - 4

Gradle Kotlin DSL: Setting Up & Building a Kotlin Project in IntelliJ IDEA

1 Setting Up the Gradle Project

Step 1: Create a New Project

1. Open **IntelliJ IDEA**.
2. Click on **File > New > Project**.
3. Select **Gradle** as the build system.
4. Choose **Kotlin** as the language.
5. Select **Gradle Kotlin DSL** (it will generate `build.gradle.kts`).
6. Name your project (e.g., `MVNGRDKOTLINDEMO`).
7. Set the **JDK** (use **JDK 17.0.4**, since that's your version).
8. Click **Finish**.

2 Understanding `build.gradle.kts`

After creating the project, the default `build.gradle.kts` file looks like this:

```
1 import org.jetbrains.kotlin.gradle.tasks.KotlinCompile
2
3 plugins {
4     kotlin("jvm") version "1.8.10" // Use latest stable Kotlin version
5     application
6 }
7
8 group = "org.example"
9 version = "1.0-SNAPSHOT"
10
```

```

11 repositories {
12     mavenCentral()
13 }
14
15 dependencies {
16     implementation(kotlin("stdlib")) // Kotlin Standard Library
17     testImplementation("org.junit.jupiter:junit-jupiter-api:5.8.2")
18     testRuntimeOnly("org.junit.jupiter:junit-jupiter-engine:5.8.2")
19 }
20
21 tasks.test {
22     useJUnitPlatform()
23 }
24
25 tasks.withType<KotlinCompile> {
26     kotlinOptions.jvmTarget = "17" // Match with your JDK version
27 }
28
29 application {
30     mainClass.set("MainKt") // Update this if using a package
31 }

```

3 Creating the Main Kotlin File

Now, create your `Main.kt` file inside `src/main/kotlin/`.

If you're using a package (e.g., `org.example`), it should look like:

```

1 package org.example
2
3 fun main() {
4     println("Hello, Gradle with Kotlin DSL!")
5 }
6

```

If you're **not** using a package, remove the `package` line and ensure `mainClass.set("MainKt")` in `build.gradle.kts`.

4 Building and Running the Project

Build the Project

```
1 ./gradlew build
2
```

Run the Project

```
1 ./gradlew run
2
```

5 Packaging as a JAR

To run the project without IntelliJ, we need a **JAR file**.

Step 1: Create a Fat (Uber) JAR

Modify `build.gradle.kts`:

```
1 tasks.register<Jar>("fatJar") {
2     archiveClassifier.set("all")
3     duplicatesStrategy = DuplicatesStrategy.EXCLUDE
4     manifest {
5         attributes["Main-Class"] = "MainKt"
6     }
7     from(configurations.runtimeClasspath.get().map { if (it.isDirectory) it else zipTree(it) })
8     with(tasks.jar.get() as CopySpec)
9 }
10
```

Step 2: Build the Fat JAR

```
1 ./gradlew fatJar
2
```

Step 3: Run the Fat JAR

```
1 java -jar build/libs/MVNGRDKOTLINDemo-1.0-SNAPSHOT-all.jar
2
```



Experiment - 5

Build and Run a Java Application with Maven, Migrate the Same Application to Gradle

Part 1: Create and Build a Java Application with Maven:

Step 1: Create a Maven Project in IntelliJ IDEA

1. Open IntelliJ IDEA

- Launch **IntelliJ IDEA** and click on **File** → **New** → **Project**. ✨

2. Select Maven

- In the **New Project** window, choose **Maven** from the options on the left.
- Check **Create from archetype** and select **maven-archetype-quickstart**.
- Click **Next**. 🏠

3. Enter Project Details


- **GroupId**: `com.example`
- **ArtifactId**: `MVNGRDLDEMO`
- Click **Next** and then **Finish**. ✨ **COMMIT TO ACHIEVE**

4. Wait for IntelliJ to Load Dependencies

- IntelliJ will automatically download the Maven dependencies, so just relax for a moment. 😊

Step 2: Update pom.xml to Add Build Plugin

To compile and package your project into a `.jar` file, you need to add the **Maven Compiler** and **Jar** plugins. 


1. Open the `pom.xml` file. 
2. Add the following inside the `<project>` tag:

```
1 <build>
2   <plugins>
3     <!-- Compiler Plugin -->
4     <plugin>
5       <groupId>org.apache.maven.plugins</groupId>
6       <artifactId>maven-compiler-plugin</artifactId>
7       <version>3.8.1</version>
8       <configuration>
9         <source>1.8</source>
10        <target>1.8</target>
11      </configuration>
12    </plugin>
13
14    <!-- Jar Plugin -->
15    <plugin>
16      <groupId>org.apache.maven.plugins</groupId>
17      <artifactId>maven-jar-plugin</artifactId>
18      <version>3.2.0</version>
19      <configuration>
20        <archive>
21          <manifest>
22            <mainClass>com.example.App</mainClass>
23          </manifest>
24        </archive>
25      </configuration>
26    </plugin>
27  </plugins>
28 </build>
```

{ [(CA)] }

Step 3: Build and Run the Maven Project

1. Open IntelliJ IDEA Terminal

Press **Alt + F12** to open the terminal. 

2. Compile and Package the Project

Run the following commands to build the project:

```
1 mvn clean compile
2 mvn package
3
```

3. Locate the JAR File

After running the above, your `.jar` file will be located at:

```
1 D:\Idea Projects\MVNGRDLDEMO\target\MVNGRDLDEMO-1.0-SNAPSHOT.jar
2
```

4. Run the JAR File

To run the generated JAR file, use:

```
1 java -jar target\MVNGRDLDEMO-1.0-SNAPSHOT.jar
2
```


Part 2: Migrate Maven Project to Gradle

Step 1: Initialize Gradle in Your Project

1. Open Terminal in IntelliJ IDEA

Make sure you're in the project directory:

```
1 cd "D:\Idea Projects\MVNGRDLDEMO"
```

2. Run Gradle Init Command

Execute the following command to migrate your Maven project to Gradle:

```
1 gradle init --type pom
2
```

This command will convert your Maven `pom.xml` into a Gradle `build.gradle` file. 🛠️

Step 2: Review and Update `build.gradle`

1. **Open** `build.gradle` in IntelliJ IDEA.
2. Ensure the following configurations are correct:

```
1 plugins {  
2     id 'java'  
3 }  
4  
5 group = 'com.example'  
6 version = '1.0-SNAPSHOT'  
7  
8 repositories {  
9     mavenCentral()  
10 }  
11  
12 dependencies {  
13     testImplementation 'junit:junit:4.13.2'  
14 }  
15  
16 jar {  
17     manifest {  
18         attributes(  
19             'Main-Class': 'com.example.App'  
20         )  
21     }  
22 }
```

Step 3: Build and Run the Gradle Project

1. Clean and Build the Project

To clean and build your Gradle project, run:

```
1 gradle clean build  
2
```

2. Run the Generated JAR File

Now, run the generated JAR file using:

```
1 java -jar build/libs/MVNGRDLDEMO-1.0-SNAPSHOT.jar  
2
```

Experiment - 6

Understanding and Working with Jenkins

Installation:

System Requirements

Memory 256 MB of RAM

Disk Space Depends on your projects

OS Windows, Mac, Ubuntu, Linux

Java 8 or 11 (JDK or JRE)

Installation on Windows

Watch This Video To Seamlessly Install Jenkins : Jenkins Installation - Step by Step Guide

Step 1 : Check Java is installed

Step 2 : Download Jenkins.war file

Step 3 : Goto cmd prompt and run command

java -jar jenkins.war --httpPort=8080

Step 4 : On browser goto <http://localhost:8080>

Step 5 : Provide admin password and complete the setup

Jenkins Configuration

How to change Home Directory

Step 1: Check your Jenkins Home > Manage Jenkins > Configure System

Step 2 : Create a new folder

Step 3 : Copy the data from old folder to new folder

Step 4 : Create/Update env variable JENKINS_HOME

Step 5 : Restart Jenkins

jenkins.xml

JENKINS_HOME

How to setup Git on Jenkins

Step 1 : Goto Manage Jenkins > Manage Plugins

Step 2 : Check if git is already installed in Installed tab

Step 3 : Else goto Available tab and search for git

Step 4 : Install Git

Step 5 : Check git option is present in Job Configuration

Create the first Job on Jenkins

How to connect to Git Remote Repository in Jenkins (GitHub)

Step 1 : Get the url of the remote repository

Step 2 : Add the git credentials on Jenkins

Step 3 : In the jobs configuration goto SCM and provide git repo url in git section

Step 4 : Add the credentials

Step 5 : Run job and check if the repository is cloned

How to use Command Line in Jenkins CLI

Faster, easier, integration

Step 1 : start Jenkins

Step 2 : goto Manage Jenkins - Configure Global Security - enable security

Step 3 : goto - http://localhost:8080/cli/

Step 4 : download jenkins-cli jar. Place at any location.

Step 5 : test the jenkins command line is working

```
java -jar jenkins-cli.jar -s http://localhost:8080 /help --username <userName> --password <password>
```

How to create Users + Manage + Assign Roles

Step 1 : Create new users

Step 2 : Configure users

Step 3 : Create and manage user roles Role Based Authorization Strategy Plugin - download – restart jenkins

Step 4 : Manage Jenkins - Configure Global Security - Authorization - Role Based Strategy

Step 5 : Create Roles and Assign roles to users

Step 6 : Validate authorization and authentication are working properly

How to create jenkinsfile

Build > Deploy > Test > Release

Jenkins file : Pipeline as a code

Step 1 : Start Jenkins

Step 2 : Install Pipeline Plugin

Step 3 : Create a new job

Step 4 : Create or get Jenkinsfile in Pipeline section

Step 5 : Run and check the output

Jenkins Pipeline

How to get jenkinsfile from Git SCM

Step 1 : Create a new job or use existing job (type : Pipeline)

Step 2 : Create a repository or GitHub

Step 3 : Add Jenkinsfile in the repo

Step 4 : Under Jenkins job > Pipeline section > Select Definition Pipeline script from SCM

Step 5 : Add repo and jenkinsfile location in the job under Pipeline section

Step 6 : Save & Run