

# How To Manual

**Recommended OS:** Windows 11 (64-bit)

This manual walks you through installing and configuring the core tools needed for a software engineering course project:

- Java (JDK)
- Apache Tomcat 9.1.xx
- Maven
- Node.js (v20+)
- JavaScript runtime & tooling
- Code editor (VS Code or Eclipse)
- Common post-installation configurations

## 1. System Prerequisites

Before starting, ensure:

- Windows 11 (64-bit)
- At least 8 GB RAM (16 GB recommended)
- Administrator access
- Stable internet connection

## 2. Install Java (JDK)

### 2.1 Download

- Install Java Development Kit (JDK) 17 or newer (LTS recommended)

### 2.2 Installation Steps

1. Run the installer
2. Use default installation path (recommended), E

Example: C:\Program Files\Java\jdk-17

### 2.3 Environment Variables

1. Open **System Properties** → **Advanced** → **Environment Variables**
2. Under **System Variables**, add: JAVA\_HOME = JDK installation path

3. Edit Path and add: %JAVA\_HOME%\bin

## 2.4 Verify Installation

Open Command Prompt:

```
java -version  
javac -version
```

## 3. Install Apache Maven

### 3.1 Download

- Download Apache Maven 3.9+ (binary zip)

### 3.2 Installation Steps

1. Extract zip to: C:\Program Files\Apache\maven

### 3.3 Environment Variables

1. Add system variable: MAVEN\_HOME = Maven directory
2. Add to Path: %MAVEN\_HOME%\bin

### 3.4 Verify Installation

```
mvn -version
```

## 4. Install Apache Tomcat 9.1.xx

### 4.1 Download

- Download Apache Tomcat 9.1.xx (Windows zip)

### 4.2 Installation Steps

1. Extract to: C:\Program Files\Apache\tomcat9

### 4.3 Configure Tomcat

#### Set JAVA\_HOME

- Ensure JAVA\_HOME is already configured (required for Tomcat)

#### **Optional: Set CATALINA\_HOME**

- Add system variable:
  - CATALINA\_HOME = Tomcat directory

#### **4.4 Start / Stop Tomcat**

- Run:
  - bin\startup.bat
  - bin\shutdown.bat

#### **4.5 Verify Installation**

Open browser: <http://localhost:8080>

### **5. Install Node.js (v20 or higher)**

#### **5.1 Download**

- Install **Node.js LTS (20+)**

#### **5.2 Installation Steps**

1. Run installer
2. Enable **npm** during installation

#### **5.3 Verify Installation**

```
node -v  
npm -v
```

### **6. JavaScript Tooling**

JavaScript is included with Node.js. Common tools:

#### **6.1 Install Common Packages**

```
npm install -g npm@latest  
npm install -g nodemon
```

#### **6.2 Verify**

```
nodemon -v
```

## 7. Install Code Editor

### Option A: Visual Studio Code (Recommended)

#### Installation

- Install VS Code (64-bit)

#### Recommended Extensions

- Java Extension Pack
- Maven for Java
- ESLint
- Prettier
- Node.js Extension Pack

#### Verify Java Integration

- Open a .java file
- Confirm IntelliSense and build support

### Option B: Eclipse IDE

#### Installation

- Install Eclipse IDE for Enterprise Java and Web Developers

#### Configuration

- Set JDK path: Window → Preferences → Java → Installed JREs
- Configure Maven: Preferences → Maven → Installations

## 8. Post-Installation Configurations

### 8.1 Git (Recommended)

```
git --version
```

### 8.2 Maven Settings (Optional)

- Configure settings.xml for proxies or repositories

## 8.3 Tomcat User Configuration

Edit conf/tomcat-users.xml:

```
<role rolename="manager-gui"/>
<user username="admin" password="password" roles="manager-gui"/>
```

Access Manager: <http://localhost:8080/manager>

## 8.4 Firewall / Port Check

- Ensure port **8080** is allowed

## 8.5 Project Folder Structure

Recommended:

```
project-root/
├── backend/ (Java, Maven)
├── frontend/ (Node.js, JS)
└── docs/
```

## 9. Common Issues & Fixes

| Issue                  | Solution                           |
|------------------------|------------------------------------|
| java not recognized    | Check JAVA_HOME and Path           |
| Tomcat fails to start  | Ensure no other app uses port 8080 |
| Maven build fails      | Run mvn clean install              |
| Node permission errors | Run terminal as Administrator      |

## 10. Verification Checklist

- Java installed and configured
- Maven working
- Tomcat running on localhost

- Node.js v20+ installed
- Code editor configured
- Sample project builds successfully

## 11. Conclusion

This setup provides a complete development environment using Java, JavaScript, Maven, Node.js, and Apache Tomcat on Windows 11. These are what were used during the for our project.

**End of Manual**