

## **Program -1: Introduction to Maven and Gradle: Overview of Build Automation Tools, Key Differences Between Maven and Gradle, Installation and Setup**

**Build Automation Tools:** Streamline the process of creating software, managing dependencies, compiling code, packaging, testing, and deploying applications with minimal human intervention. These tools are essential for modern software development practices, particularly in environments that emphasize efficiency and consistency.

### **Key Build Automation Tools:**

1. **Maven:** A robust project management and comprehension tool, Maven uses conventions for project layout and an XML file to manage project dependencies and other tasks. It's known for its reusable components, dependency management, and standardized build processes.
2. **Gradle:** Gradle is an open-source build automation system that builds upon the concepts of Apache Ant and Maven but introduces a Groovy-based domain-specific language (DSL) for project scripts, unlike Maven's XML. It's favored for its flexibility, performance, and user-friendliness.

### **Key differences between Maven and Gradle, highlighting their unique features and approaches to build automation:**

- i) Build Scripts   ii) Performance   iii) Flexibility   iv) Dependency Management
- v) Plugin Ecosystem

### **Installation and Environment Setup for Maven on Windows**

#### **1. Download Maven:**

- Visit the Apache Maven official website: <https://maven.apache.org/>
- Download the latest version of Maven in zip format.

#### **2. Extract the Files:**

- Extract the contents of the downloaded zip file to a directory of your choice, e.g.,  
**C:\Program Files\Maven**

#### **3. Set Up Environment Variable:**

- Right-click on the **Computer** icon on your desktop, select **Properties**.
- Click on **Advanced system settings**.
- In the System Properties window, click on the **Environment Variables** button.
- In the System Variables section, find and select the `Path` variable, then click on **Edit**.
- Add the Maven bin directory to the path:  
**C:\Program Files\Maven\apache-maven-3.x.x\bin**
- Click **OK** to close all dialogs.

#### 4. Verify Installation:

Open Command Prompt (cmd) and type:

```
mvn -version
```

## Installation and Environment Setup for Gradle on Windows

### 1. Download Gradle:

- Visit the Gradle Releases page: <https://gradle.org/>
- Download the latest version of Gradle in zip format.

### 2. Extract the Files:

- Extract the contents of the downloaded zip file to a directory of your choice, e.g., **C:\Program Files\Gradle**.

### 3. Set Up Environment Variable:

- Follow the same steps as for **Maven** to open the System Properties and Environment Variables dialog.
- Add the Gradle bin directory to the Path variable:

```
C:\Program Files\Gradle\gradle-6.x\bin.
```

- Ensure all dialogs are closed by clicking **OK**.

### 4. Verify Installation:

Open Command Prompt (cmd) and type:

```
gradle --version
```