Apache Maven Overview

1. What is Maven?

Apache Maven is a build automation and project management tool used primarily for Java projects. It simplifies project setup, dependency management, and build processes.

2. Key Features of Maven

- Project Object Model (POM) - Central configuration file (pom.xml).
- Dependency Management - Automatically handles project dependencies.
- Lifecycle and Plugins - Supports predefined build lifecycles and plugins.
- Convention Over Configuration - Uses standard directory structures.
- Multi-Module Project Support - Manages large projects efficiently.

3. Maven Build Lifecycle

- Clean Lifecycle - Cleans up previous build artifacts.
- Default Lifecycle - Handles project compilation, testing, and packaging.
- Site Lifecycle - Generates and deploys project documentation.

4. Common Maven Commands

- mvn clean - Removes generated files.
- mvn compile - Compiles the source code.
- mvn test - Runs unit tests.
- mvn package - Creates a JAR/WAR file.
- mvn install - Installs the package locally.
- mvn deploy - Uploads the package to a remote repository.

5. Maven Repository Types

- Local Repository - Stored on the developer's machine (.m2/repository).
- Central Repository - Default repository for downloading dependencies.
- Remote Repository - Custom repository for teams.

6. Directory Structure in Maven

```
project-root/
|-- src/
|   |-- main/java/  # Application source code
```

```
|   |-- main/resources/  # Configuration files
|   |-- test/java/  # Test source code
|-- target/  # Compiled files and artifacts
|-- pom.xml  # Project configuration file
```