What is GitHub Actions (in simple terms)

GitHub Actions lets you **run automated tasks** when something happens in your repo.

Examples:

- When code is pushed → build the app
- When a PR is created → run tests

These automated tasks are defined as **workflows** written in **YAML**.

Project Structure (Simple Java App)

We'll use a **very basic Java project**.

```
java-github-actions-demo/
├── src/
│   └── Main.java
├── pom.xml
└── .github/
    └── workflows/
        └── build.yml
```

Create a Simple Java Application

src/Main.java

```
public class Main {
    public static void main(String[] args) {
        System.out.println("Hello from GitHub Actions!");
    }
}
```

Add Maven Configuration

pom.xml

This tells Maven how to build your Java project.

```
<project xmlns="http://maven.apache.org/POM/4.0.0"
         xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
```

```
         xsi:schemaLocation="http://maven.apache.org/POM/4.0.0
         http://maven.apache.org/xsd/maven-4.0.0.xsd">

    <modelVersion>4.0.0</modelVersion>

    <groupId>com.example</groupId>
    <artifactId>github-actions-demo</artifactId>
    <version>1.0-SNAPSHOT</version>

    <properties>
        <maven.compiler.source>17</maven.compiler.source>
        <maven.compiler.target>17</maven.compiler.target>
    </properties>

</project>
```

Understanding GitHub Actions Components

Before writing the workflow, understand these terms:

Term	Meaning
Workflow	The automation (YAML file)
Job	A set of steps
Step	A single action or command
Runner	Machine that runs the job (Linux, Windows, Mac)
Action	Reusable code (e.g., setup Java)

Create the GitHub Actions Workflow

Create this file:

`.github/workflows/build.yml`

Basic Java Build Workflow (Explained Line-by-Line)

`build.yml`

```
name: Java Build Workflow
```

Name shown in GitHub Actions UI

```
on:
  push:
    branches:
      - main
```

Trigger workflow **when code is pushed to `main` branch**

```
jobs:
  build:
```

Define a job named **build**

```
    runs-on: ubuntu-latest
```

Job runs on a **Linux virtual machine**

```
    steps:
```

List of steps inside this job

Step 1: Checkout the Code

```
    - name: Checkout code
      uses: actions/checkout@v4
```

Downloads your repository code into the runner

Step 2: Setup Java

```
    - name: Set up JDK 17
      uses: actions/setup-java@v4
      with:
        java-version: '17'
        distribution: 'temurin'
```

Installs **Java 17** on the runner

Step 3: Build Using Maven

```
    - name: Build with Maven
      run: mvn clean package
```

Runs Maven build
Compiles Java code and creates a JAR file

Full Workflow File (Final)

```
name: Java Build Workflow

on:
```

```
  push:
    branches:
      - main

jobs:
  build:
    runs-on: ubuntu-latest

    steps:
      - name: Checkout code
        uses: actions/checkout@v4

      - name: Set up JDK 17
        uses: actions/setup-java@v4
        with:
          java-version: '17'
          distribution: 'temurin'

      - name: Build with Maven
        run: mvn clean package
```

What Happens When You Push Code?

GitHub detects a **push to main**
A Linux VM is created
Code is checked out
Java is installed
Maven builds the project

If build succeeds → green check
If build fails → red cross with logs

Where to See the Output

- Go to **GitHub Repo → Actions tab**
- Click on the workflow run
- Open **Build with Maven** step to see logs

Common Beginner Mistakes

Mistake	Fix
Wrong Java version	Match Java in `pom.xml`
Missing `.github/workflows`	Folder name must be exact
YAML indentation error	Use 2 spaces, not tabs

Maven not found	Use `setup-java` action