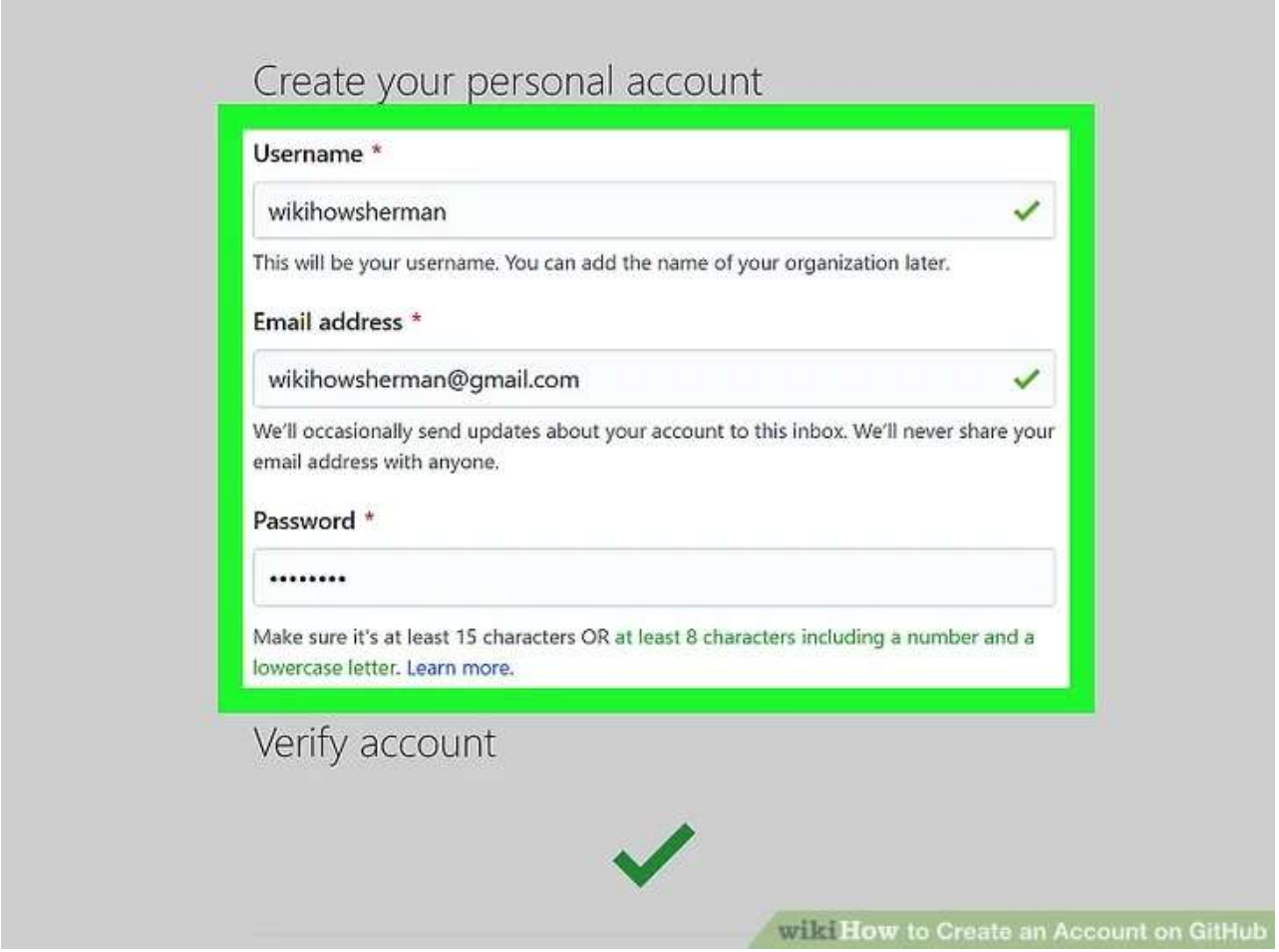
DevOps in Action

SCM Hands-on

Github - Create an account

- Go to https://github.com/join in a web browser.



Github - Create an account

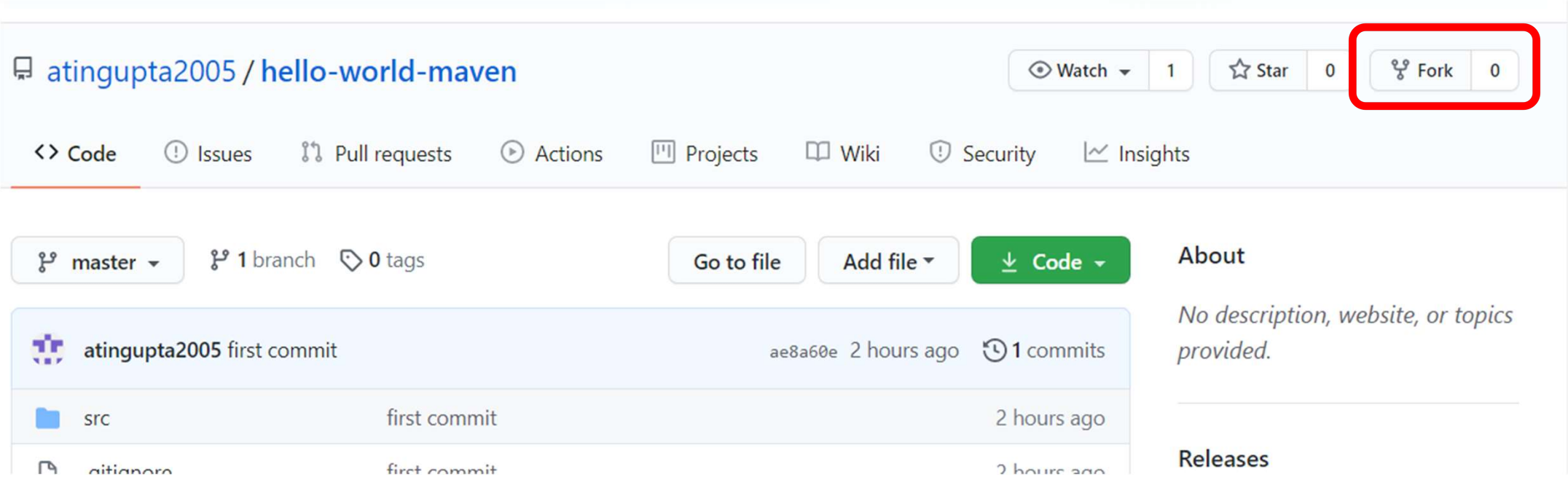
- **Enter your personal details**
- **Click the ”Create an account” button.**
- Complete the CAPTCHA puzzle.
- Click the “Verify email address” button in the message from GitHub.
- Select your preferences and click Submit.
- Open Inbox and search for email from - noreply@github.com
  - Click - “Verify Email Address”

GitHub Repositories

- Contain all the repositories on which the user is working.

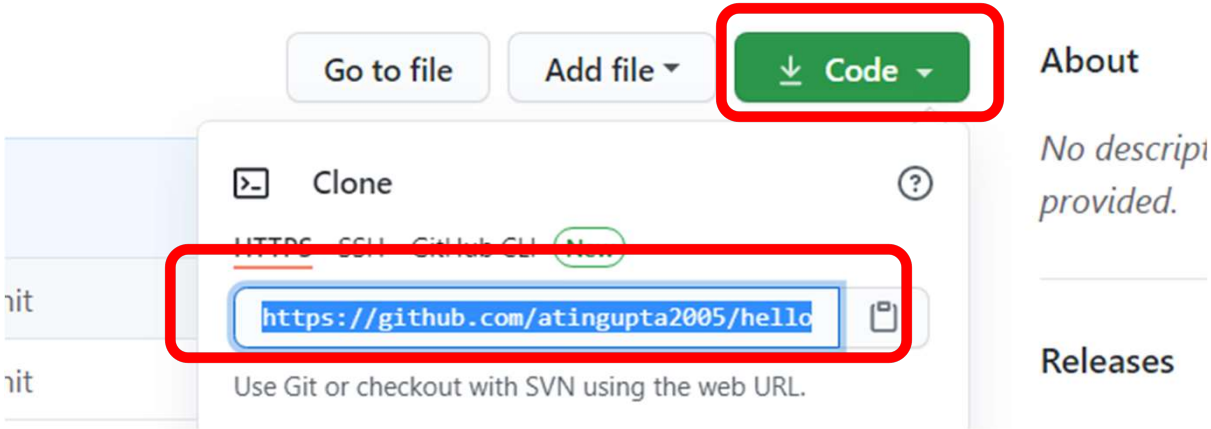
Github - fork your application code

- Visit - https://github.com/atingupta2005/hello-world-maven
- A fork is a copy of a repository.
- Forking a repository allows you to freely experiment with changes without affecting the original project.



Git clone the github code

- Cloning a repository pulls down a full copy of all the repository data that GitHub has at that point in time
- The git clone command is used to create a copy of a specific repository or branch within a repository.



Use maven to compile & package java source code

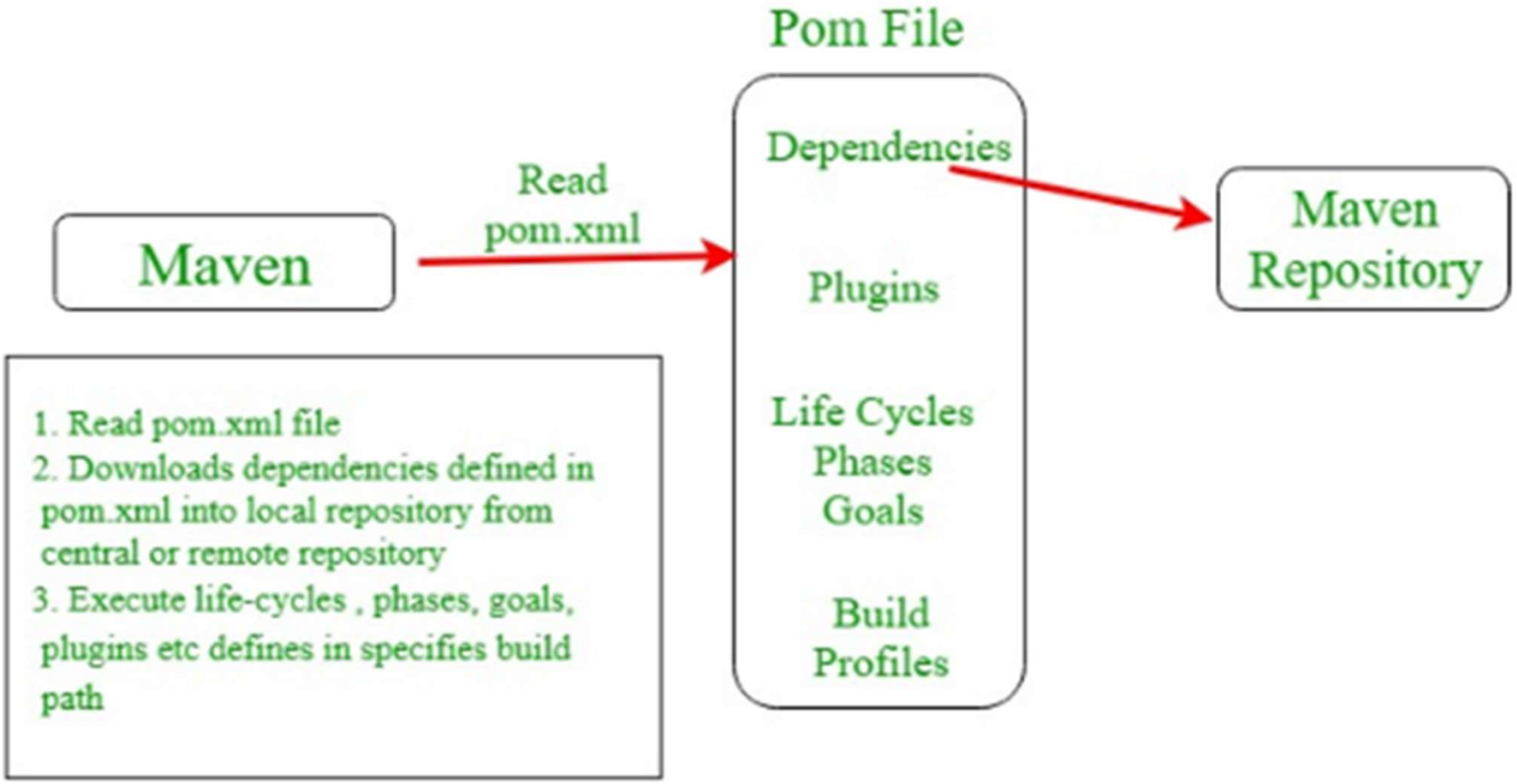
What is Maven?

- A powerful project management tool that is based on POM (Project Object Model)
- It is used for project build, dependency and documentation
- It can be used for building and managing any Java-based project

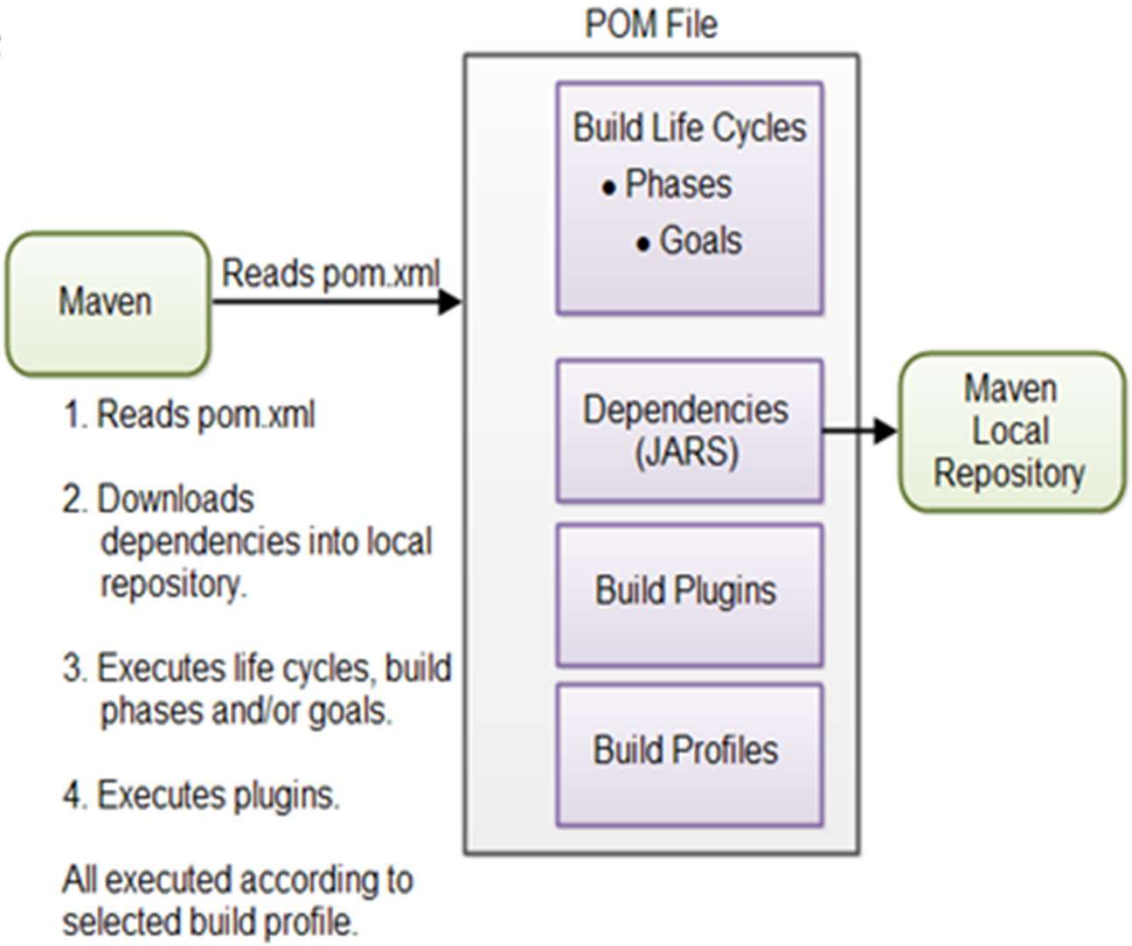
What can Maven do?

- Can easily build a project
- Can add jars, plugins and other dependencies based on needs
- Helpful in updating central repository of JAR's and other dependencies
- Can build any number of projects into packaging as JAR, WAR etc

How maven works?



Overview of Maven core concepts



Steps

- Install JDK 8
- Install Maven
- Set up the project
- Write a Test
- Go through the source code of maven project
- Define a simple Maven build - pom.xml
- Declare Dependencies
- Build Java code

Commands - Install maven

- sudo apt -y update
- # Check if java already installed?
- java --version

- #Run below steps if Java not installed
- sudo apt install -y openjdk-8-jdk

- # Install maven
- sudo apt install -y maven

Commands - Install jdk

- git clone https://github.com/atingupta2005/hello-world-maven.git
- cd hello-world-maven/
- mvn compile

Understanding Builds

- The process of translating source code into an executable application is called a build.

Build Tools

- Apache Maven: allows building application written in Java
- Gradle
- Ant
- NAnt
- MsBuild

Deploy .jar file manually

- # Make sure to cd into the project directory:
- pwd
  - /home/atingupta2005/hello-world-maven
- mvn package
- java -jar target/gs-maven-0.1.0.jar

Maven build lifecycle

- 1. Compile
  - Source code is compiled.
- 2. Test
  - Launches the unit test placed at src/test/java folder
- 3. Validate
  - To validate that the POM is correctly formed according to model version definition.
- 4. Package
  - To group the compiled code in the specified distributable format (jar, war, etc.).
- 5. Install
  - Installs packaged project into local repository. Then, it can be used by other projects.
- 6. Deploy
  - Similar to install
  - Puts the final package on the shared repository

Continuous Integration Tool

Jenkins - Deploy Jenkins on Ubuntu server

- Step 1: Install Java
- Step 2: Add the Jenkins Repository
- Step 3: Install Jenkins
- Step 4: Modify Firewall to Allow Jenkins
- Step 5: Set up Jenkins

Jenkins - Step 1: Install Java

- java --version

- #Run below steps if Java not installed
- sudo apt update
- sudo apt install -y openjdk-8-jdk

Jenkins - Step 2: Add the Jenkins Repository

- wget -q -O - https://pkg.jenkins.io/debian/jenkins.io.key | sudo apt-key add -
- sudo sh -c 'echo deb http://pkg.jenkins.io/debian-stable binary/ > /etc/apt/sources.list.d/jenkins.list'

Jenkins - Step 3: Install Jenkins

- sudo apt -y update
- sudo apt install -y jenkins
- systemctl status jenkins

Jenkins - Step 4: Modify Firewall to Allow Jenkins

- sudo ufw allow 8080
- sudo ufw status

- # Also make sure to add the port # 8080 in Inbound Rules in Azure/AWS Portal

Jenkins - Step 5: Set up Jenkins

- Visit:
  - http://your_ip_or_domain:8080

- Take password:
  - sudo cat /var/lib/jenkins/secrets/initialAdminPassword

- Copy the password from your terminal, paste it into the Administrator password field and click Continue.
- Click on the Install suggested plugins box
- Once the plugins are installed, you will be prompted to set up the first admin user
- Fill out all required information and click Save and Continue

Continuous Integration setup - Jenkins and Github

Introduction

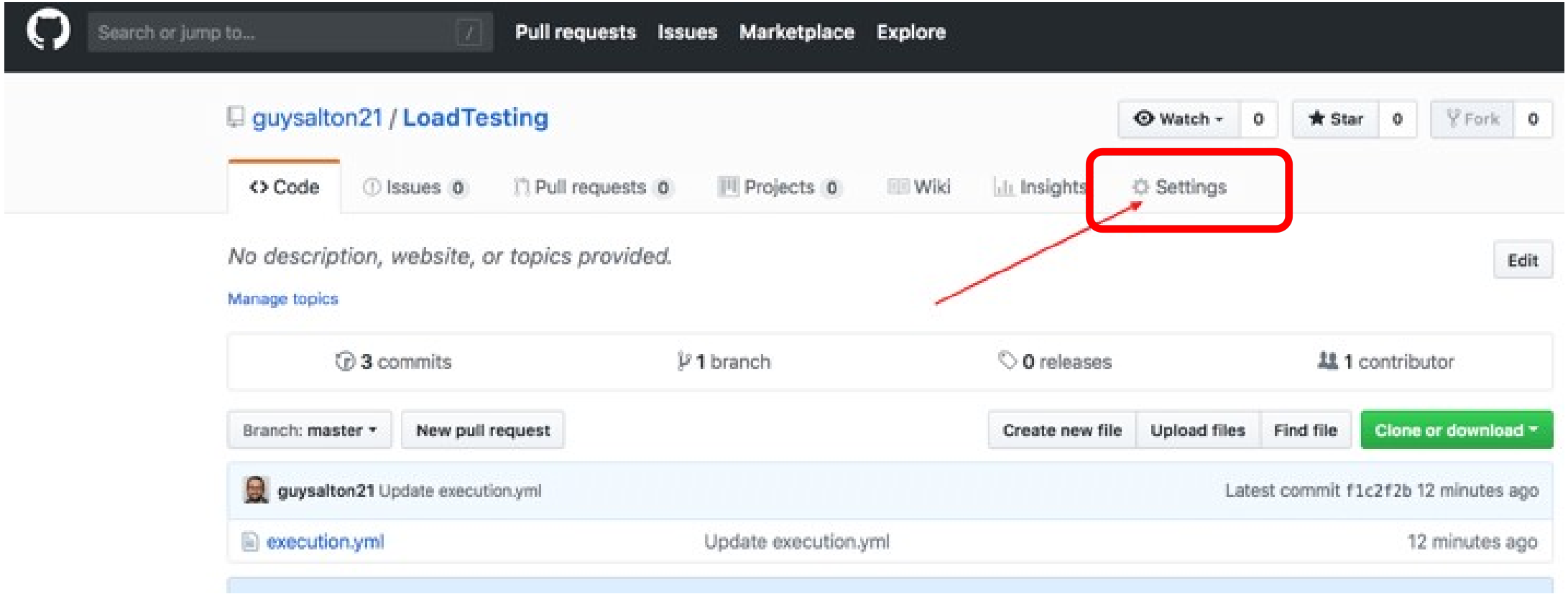
- One of the basic steps of implementing CI/CD is integrating your SCM (Source Control Management) tool with your CI tool.
- This saves you time and keeps your project updated all the time.
- One of the most popular and valuable SCM tools is GitHub.
- We will:
  - Schedule build
  - Pull code and data files from your GitHub repository to Jenkins machine
  - Automatically trigger each build on the Jenkins server, after each Commit on Git repository

Github Repo

- Fork Github repo:
  - https://github.com/atingupta2005/hello-world-maven

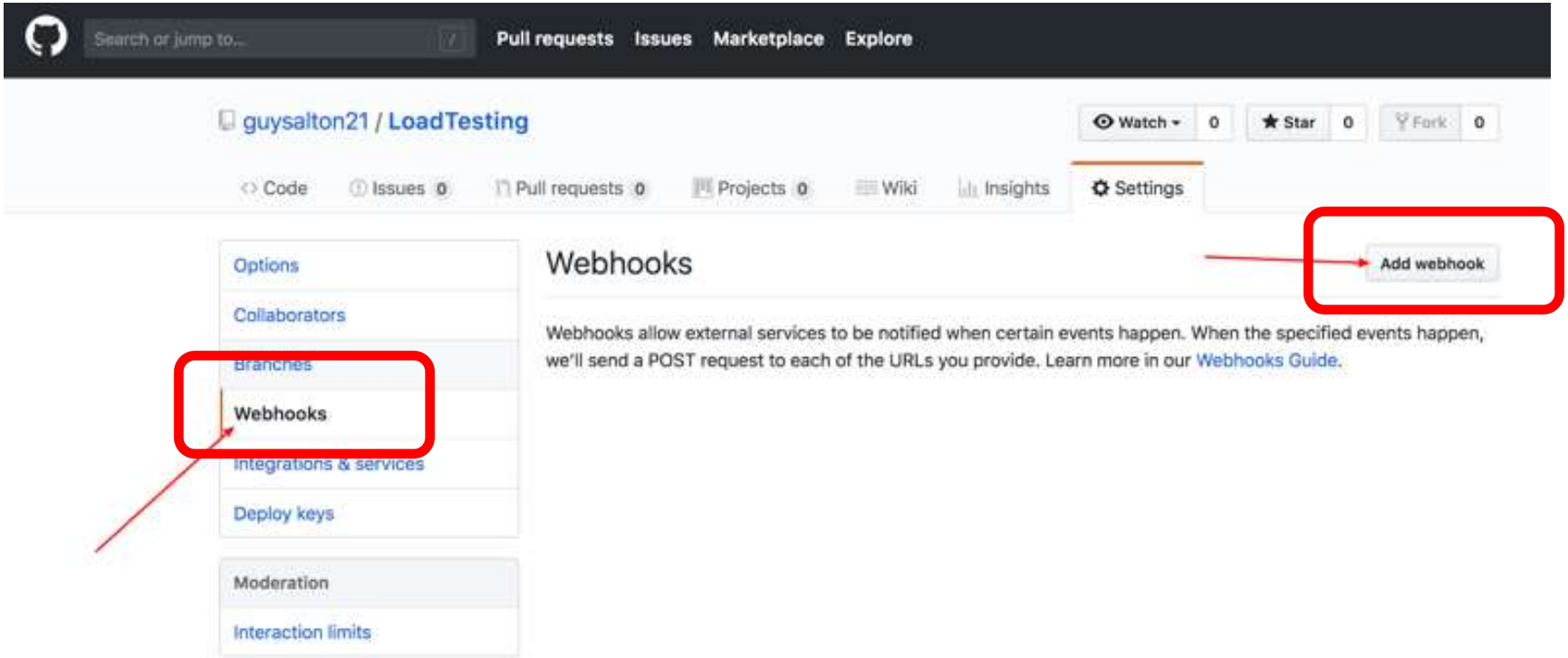
Configuring GitHub

- Go to your GitHub repository and click on 'Settings'.



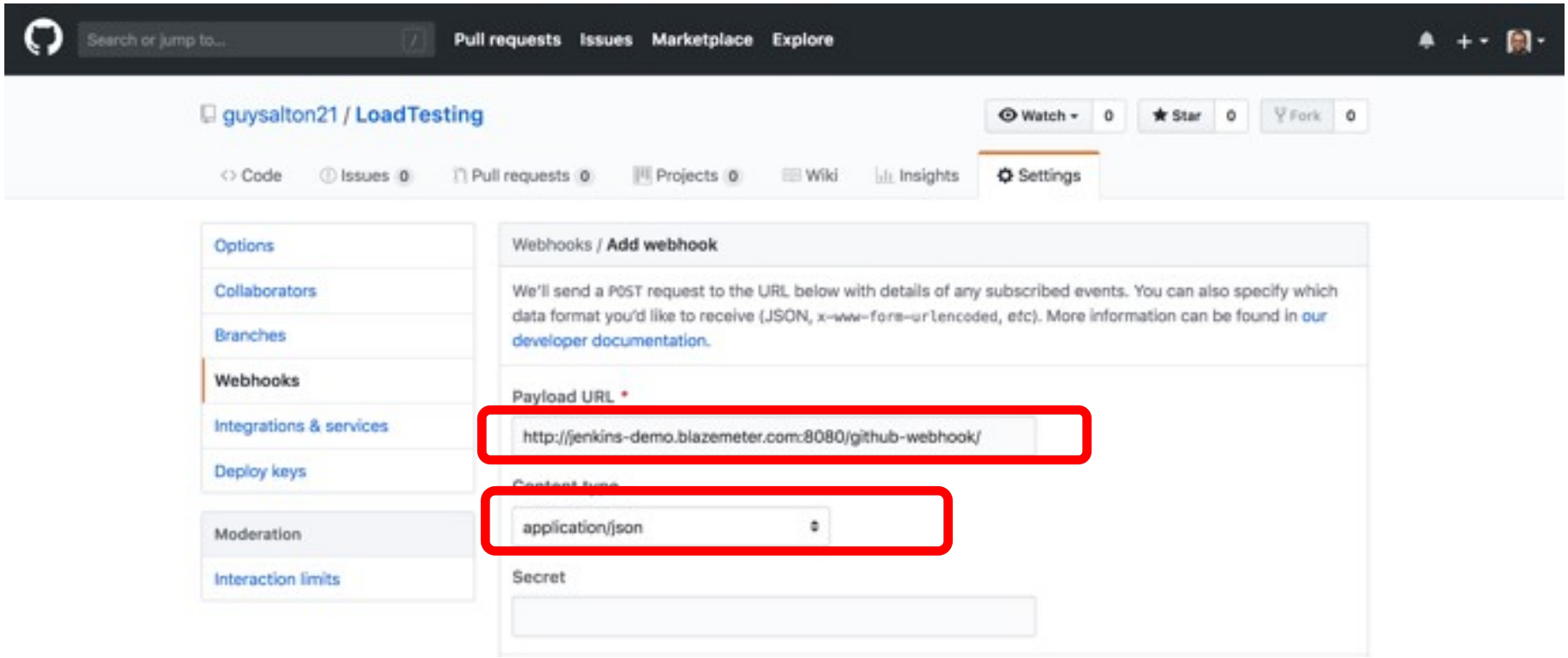
Configuring GitHub

- Step 2: Click on Webhooks and then click on 'Add webhook'.



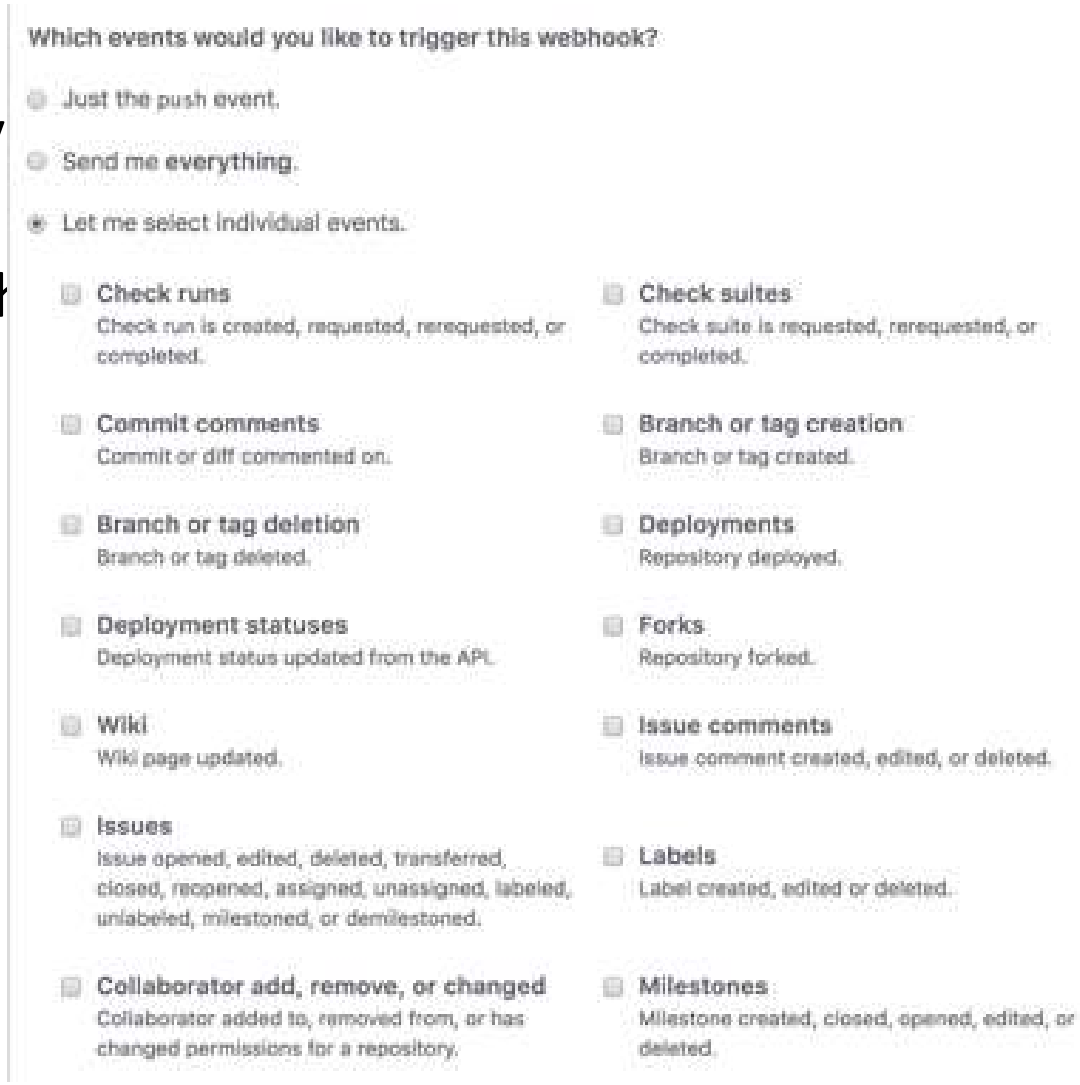
Configuring GitHub

- Step 3: in the 'Payload URL' field, paste your Jenkins environment URL.
- At the end of this URL add /github-webhook/
- In the 'Content type' select 'application/json' and leave the 'Secret' field empty.

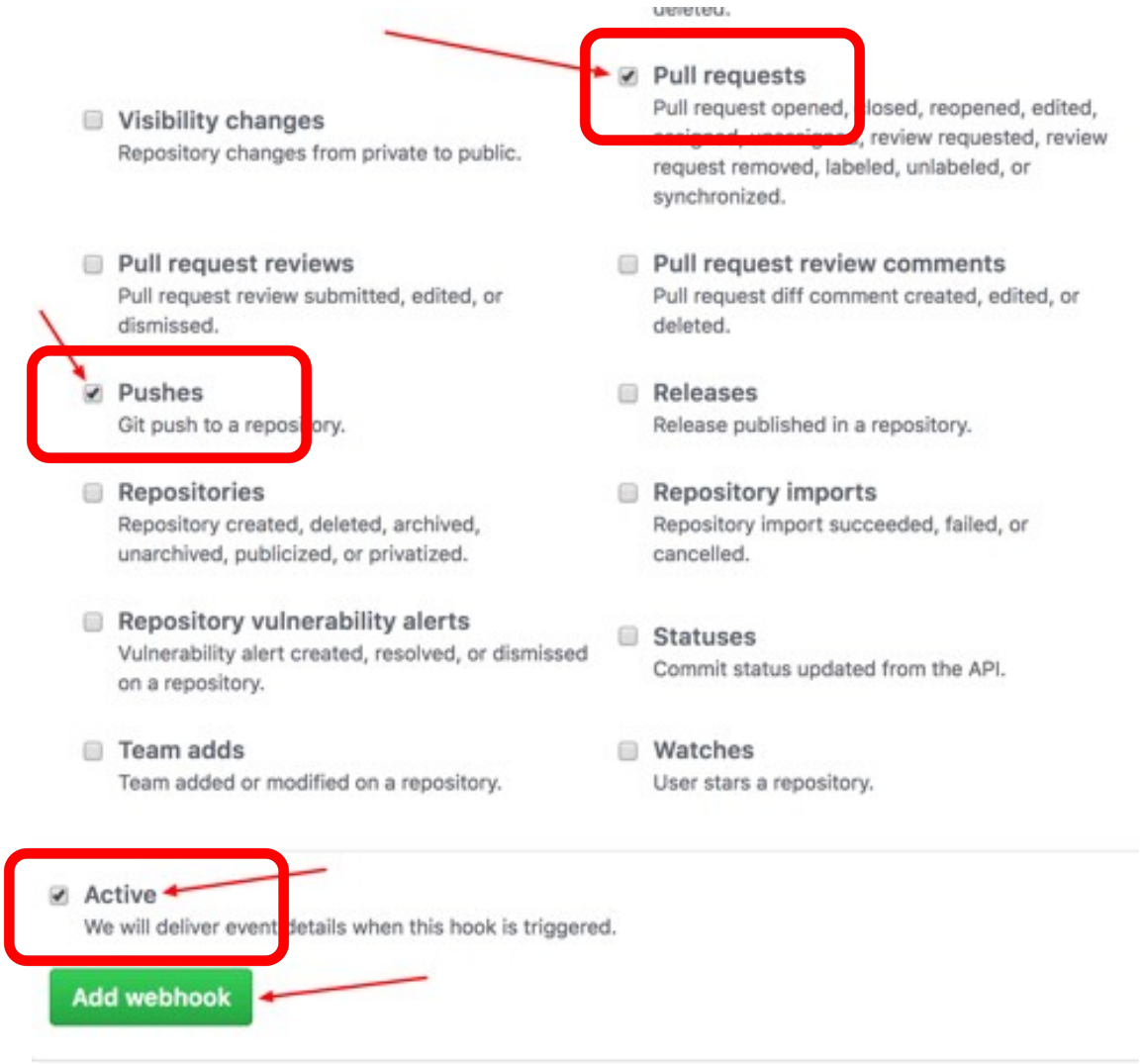


Configuring GitHub

- Step 4: in the 'Which events would y
  'Let me select individual events.'
- Then, check 'Pull Requests' and 'Push
- At the end of this option, make sure
  webhook'.



Configuring GitHub

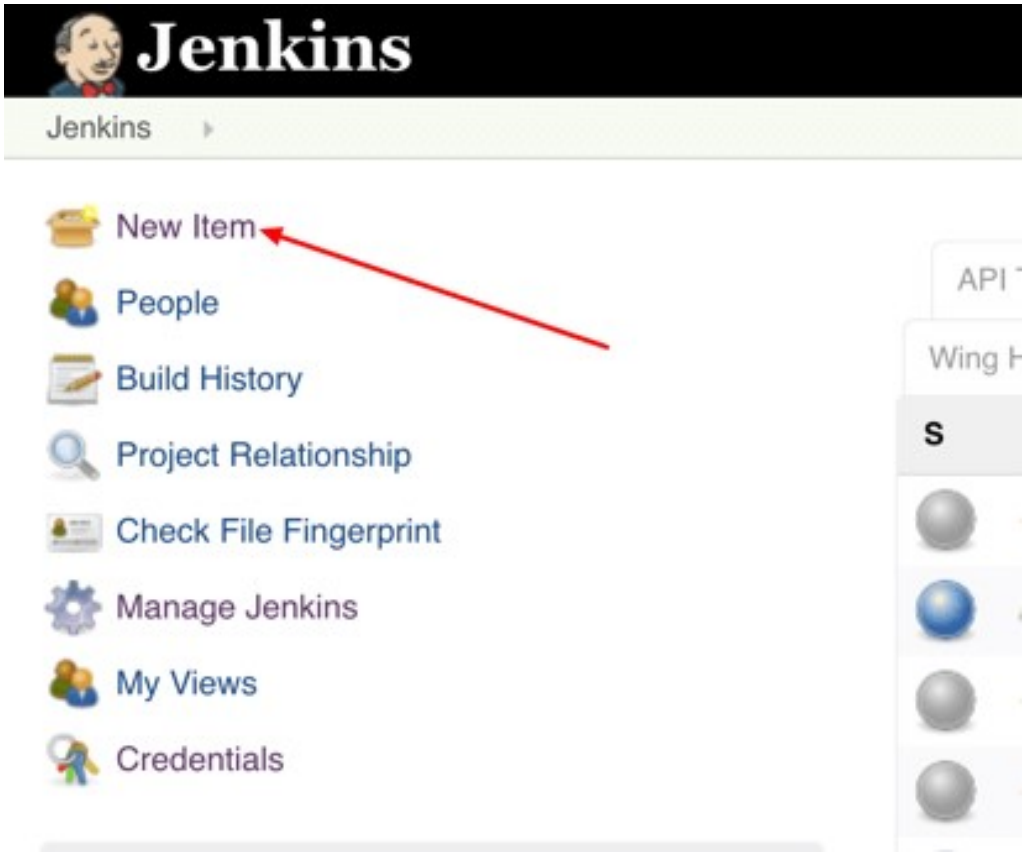


Configuring GitHub

- We're done with the configuration on GitHub's side! Now let's move on to Jenkins.

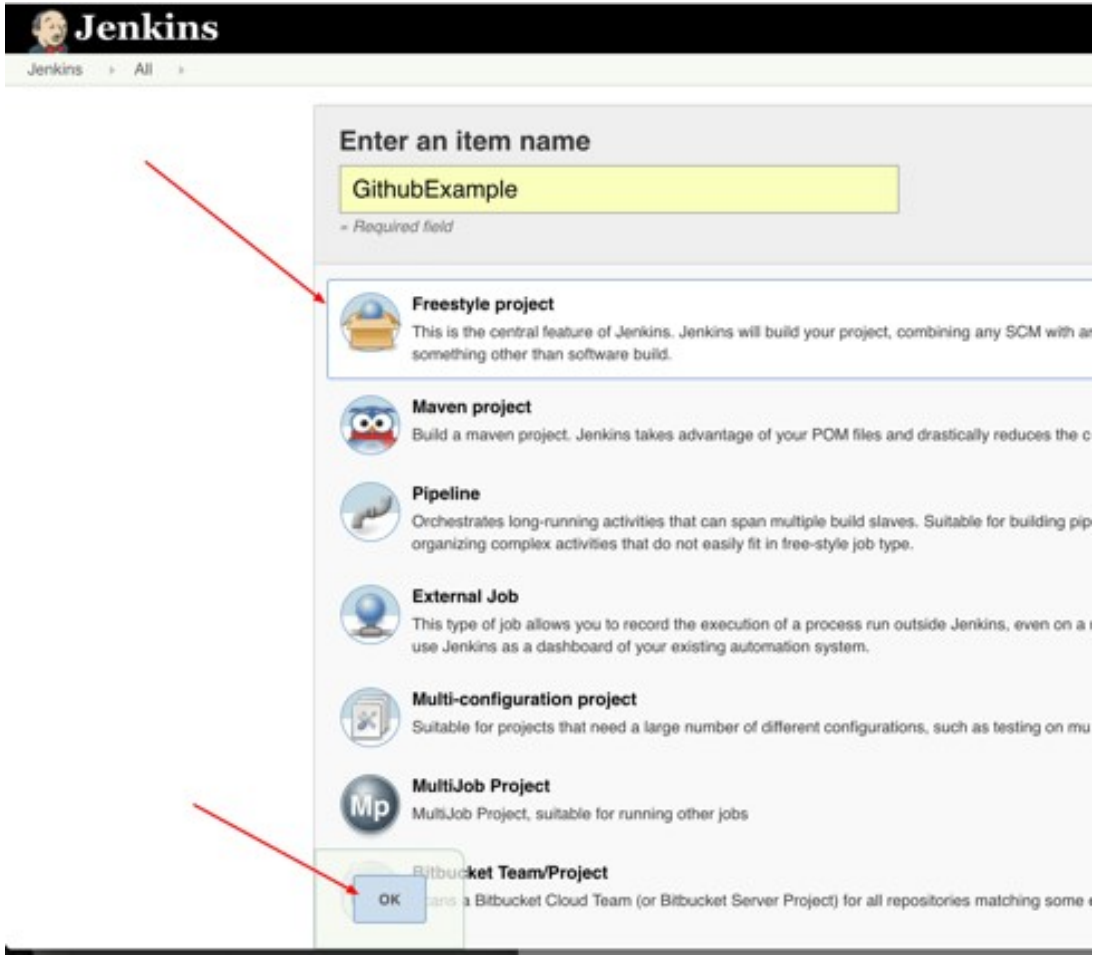
Configuring Jenkins

- Step 5: In Jenkins, click on 'New Item' to create a new project.



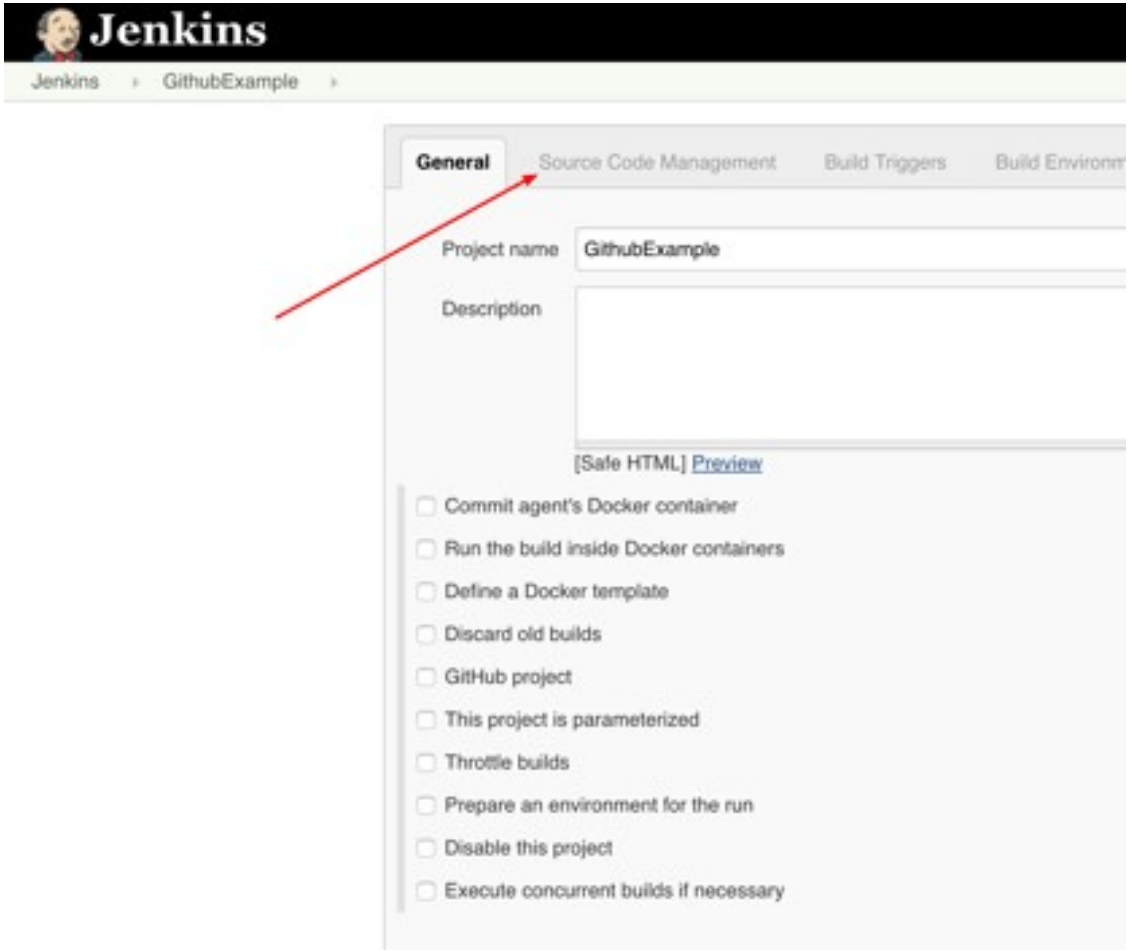
Configuring Jenkins

- Step 6: Give your project a name, them choose 'Freestyle project' and finally click on 'OK'.



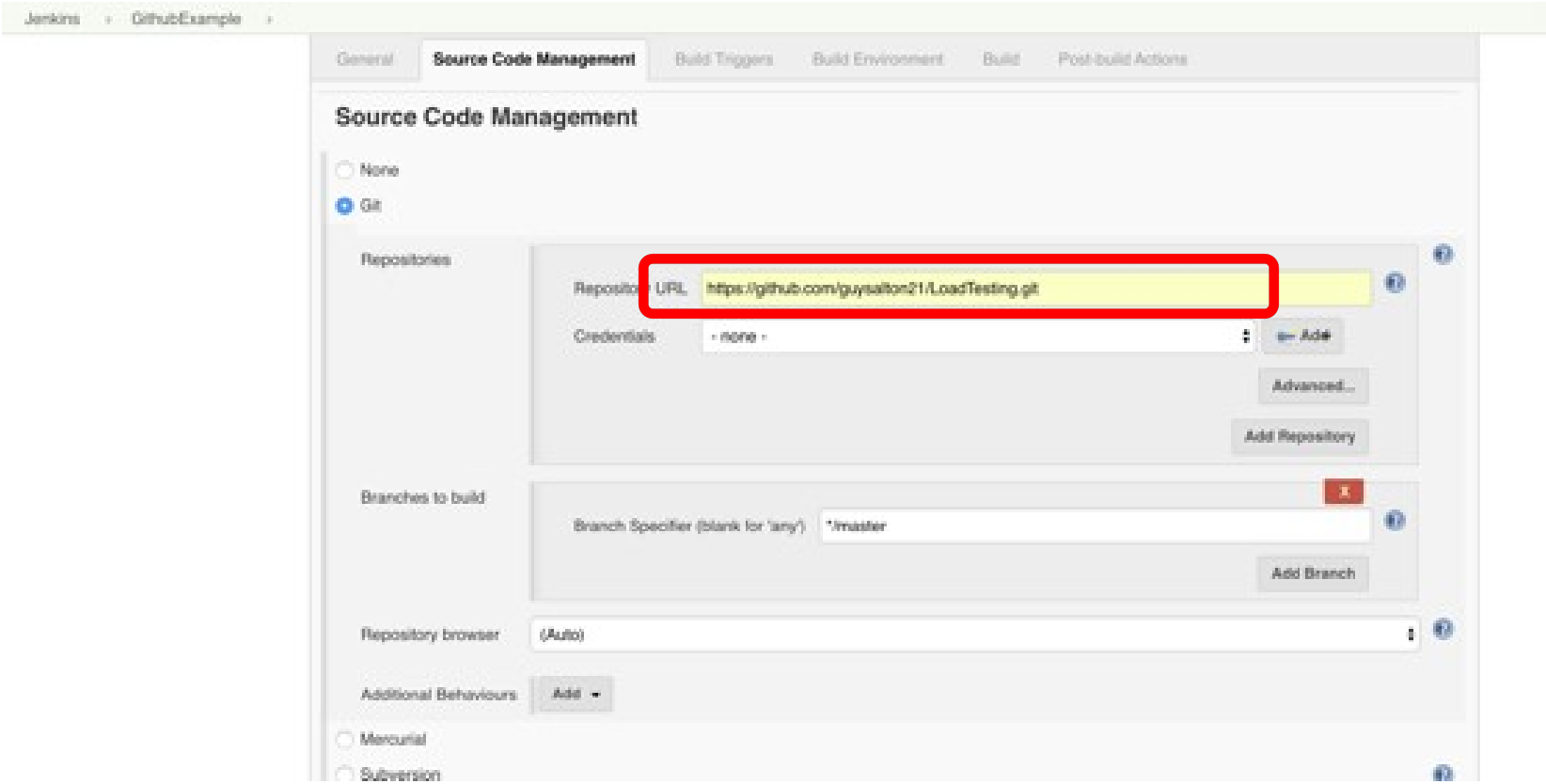
Configuring Jenkins

- Step 7: Click on the 'Source Code Management' tab.



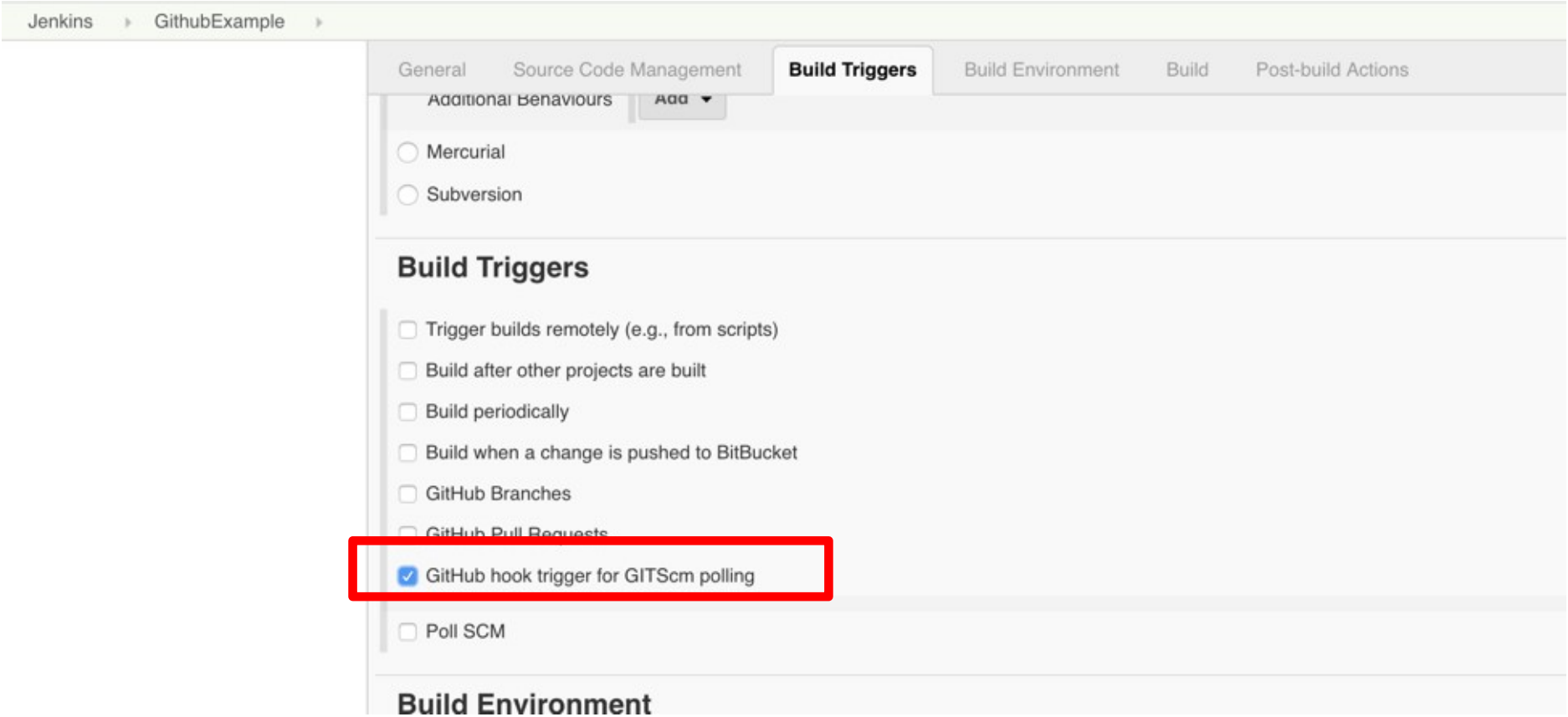
Configuring Jenkins

- Step 8: Click on Git and paste your forked GitHub repository URL in the 'Repository URL' field.



Configuring Jenkins

- Step 9: Click on the 'Build Triggers' tab and then on the 'GitHub hook trigger for GITScm polling'. Or, choose the trigger of your choice.



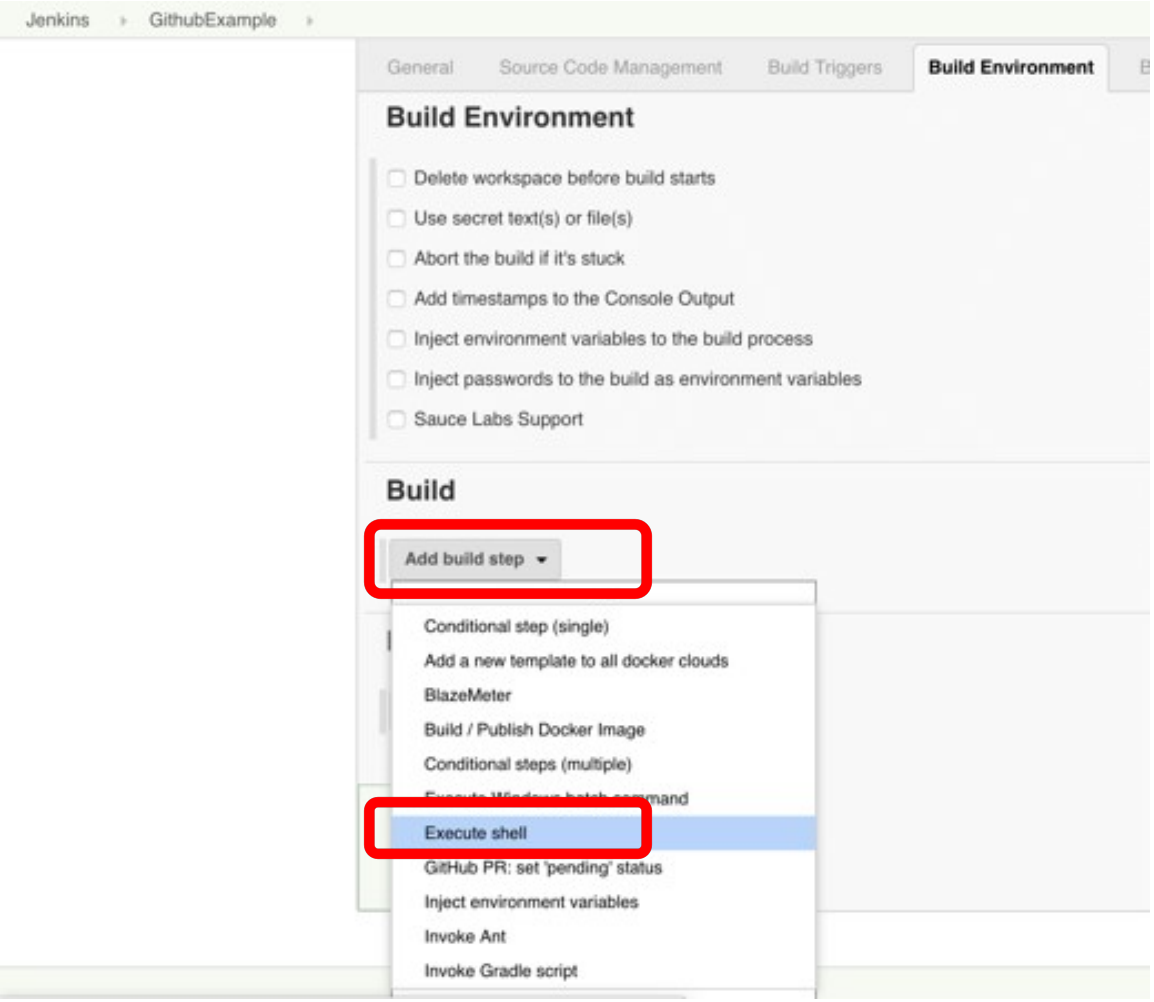
Configuring Jenkins

- Your GitHub repository is integrated with your Jenkins project.
- You can now use any of the files found in the GitHub repository and trigger the Jenkins job to run with every code commit.

Triggering the Jenkins Job to Run with Every Code Commit

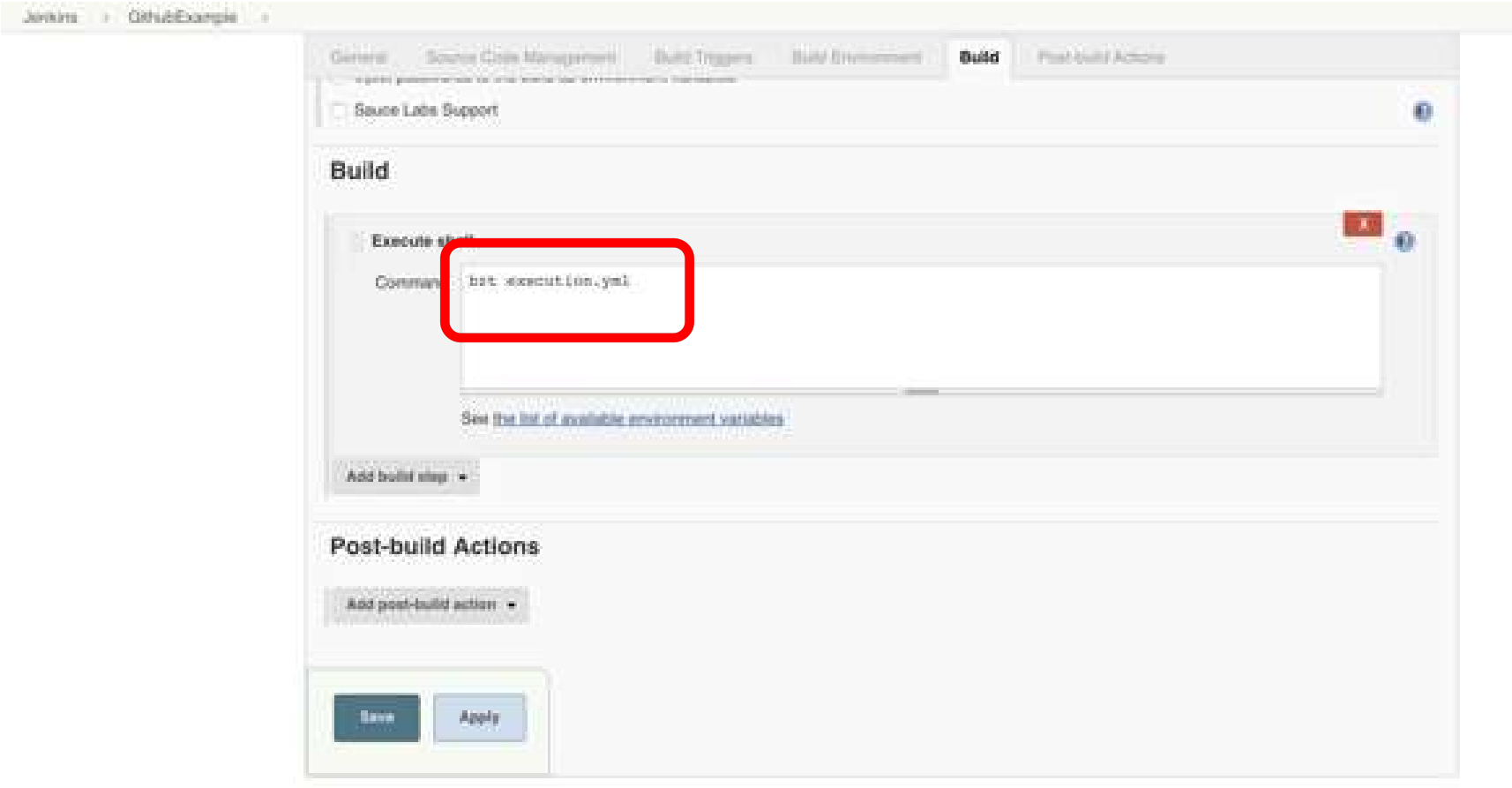
Triggering the Jenkins Job to Run

- Step 10: Click on the 'Build' tab,
- Then click on 'Add build step' and
- Choose 'Execute shell'.



Triggering the Jenkins Job to Run

- Step 11: To run sample commands - echo "Building Project"; echo "$(pwd)"

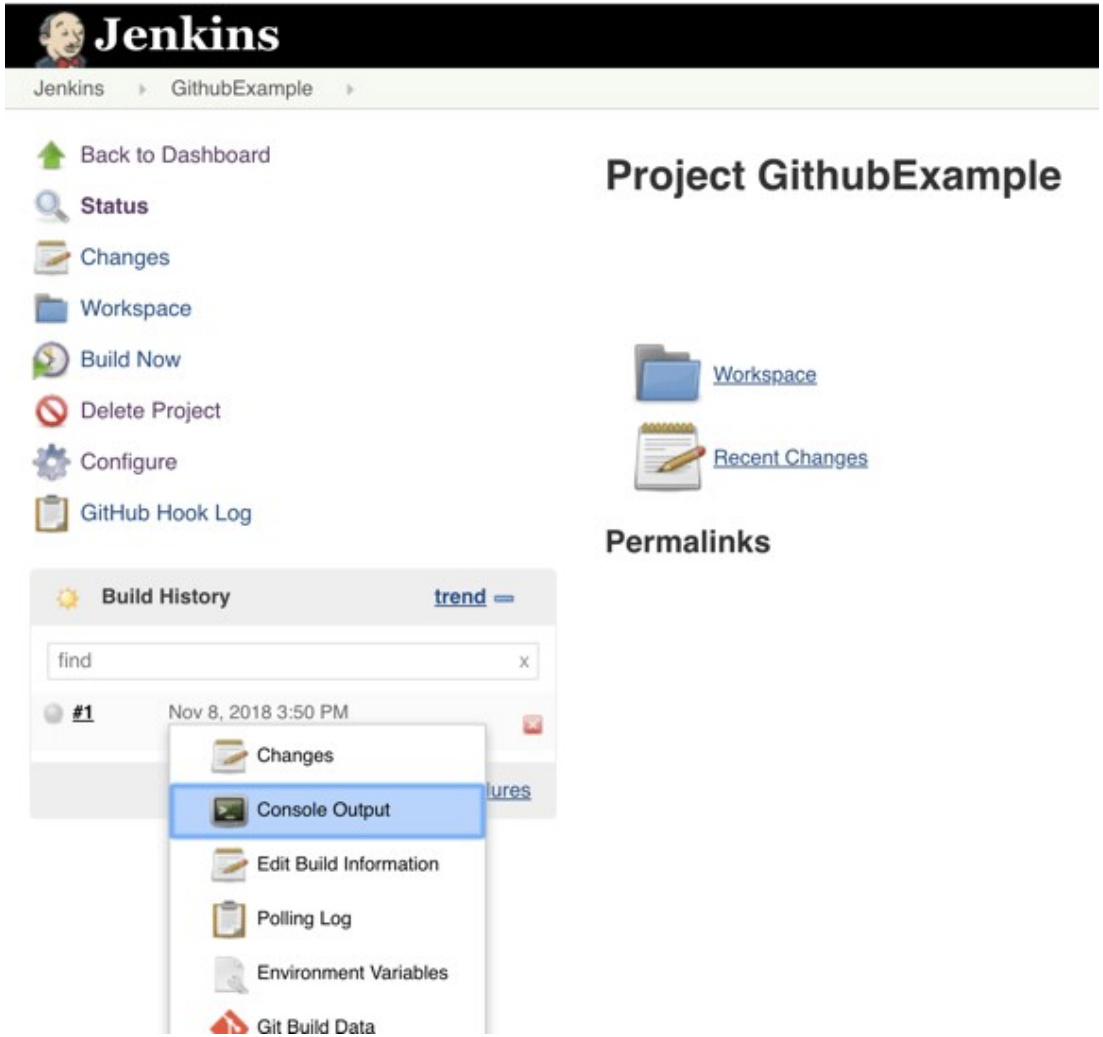


Triggering the Jenkins Job to Run

- Step 12: Go back to your GitHub repository, edit the code and commit the changes.
  - We will now see how Jenkins ran the script after the commit.

Triggering the Jenkins Job to Run

- Step 13: Go back to your Jenkins project and you'll see that a new job was triggered automatically from the commit we made at the previous step.
- Click on the little arrow next to the job and choose 'Console Output'.



Triggering the Jenkins Job to Run

- Step 14: You can see that Jenkins was able to pull the latest code and run it!

- Every time you publish your changes to Github, GitHub will trigger your new Jenkins job.

Code Packaging automation

Automation Maven test, Compile and Package

Continuous Delivery Pipeline Using Jenkins

- Fetching the code from GitHub
- Compiling the source code
- Unit testing and generating the JUnit test reports
- Packaging the application into a WAR file and deploying it on the Tomcat server

Source Code on Github

- https://github.com/atingupta2005/java-servlet-hello

- Clone
  - git clone https://github.com/atingupta2005/java-servlet-hello
  - cd java-servlet-hello

- Compile app
  - mvn clean install

- Package App
  - mvn clean package

Step 1 — Compiling the Source Code

- Let's begin by first creating a Freestyle project in Jenkins
- Use Project Name – “Compile”
- When you scroll down you will find an option to add source code repository, select "git" and add the repository URL
- In that repository, there is a pom.xml fine which we will use to build our project
- Consider the below screenshot:

Step 1 — Compiling the Source Code

General | **Source Code Management** | Build Triggers | Build Environment | Build | Post-build Actions

Source Code Management

- None
- Git

Repositories

Repository URL https://github.com/saurabh0010/game-of-life.git

Credentials - none - Add

Advanced...

Add Repository

Branches to build

X

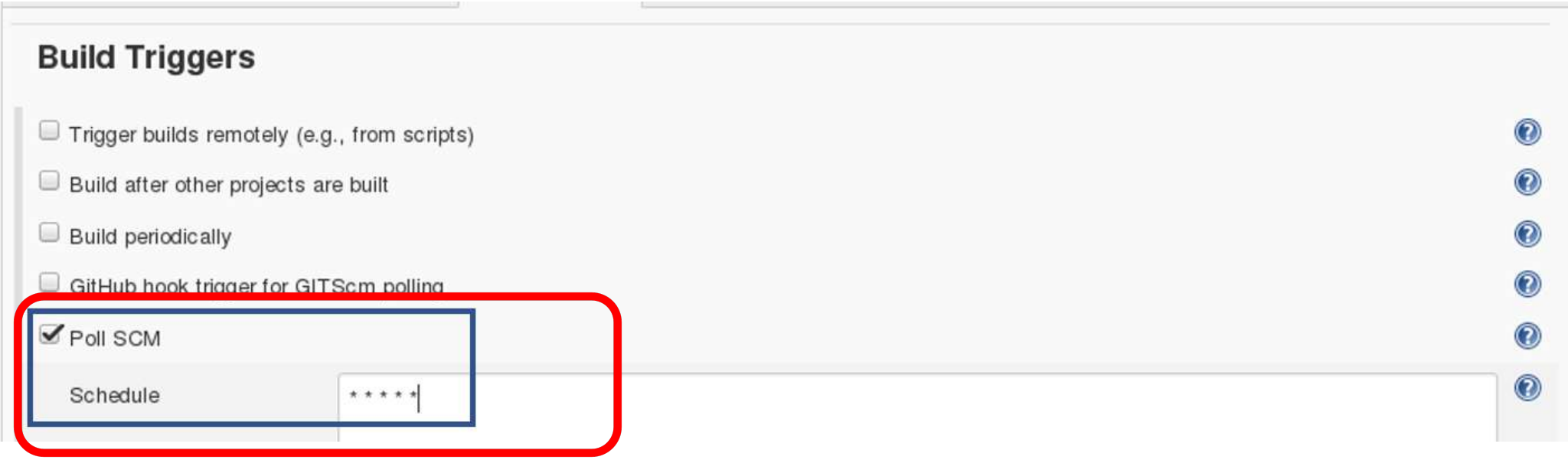
Branch Specifier (blank for 'any') */master

Add Branch

Save Apply

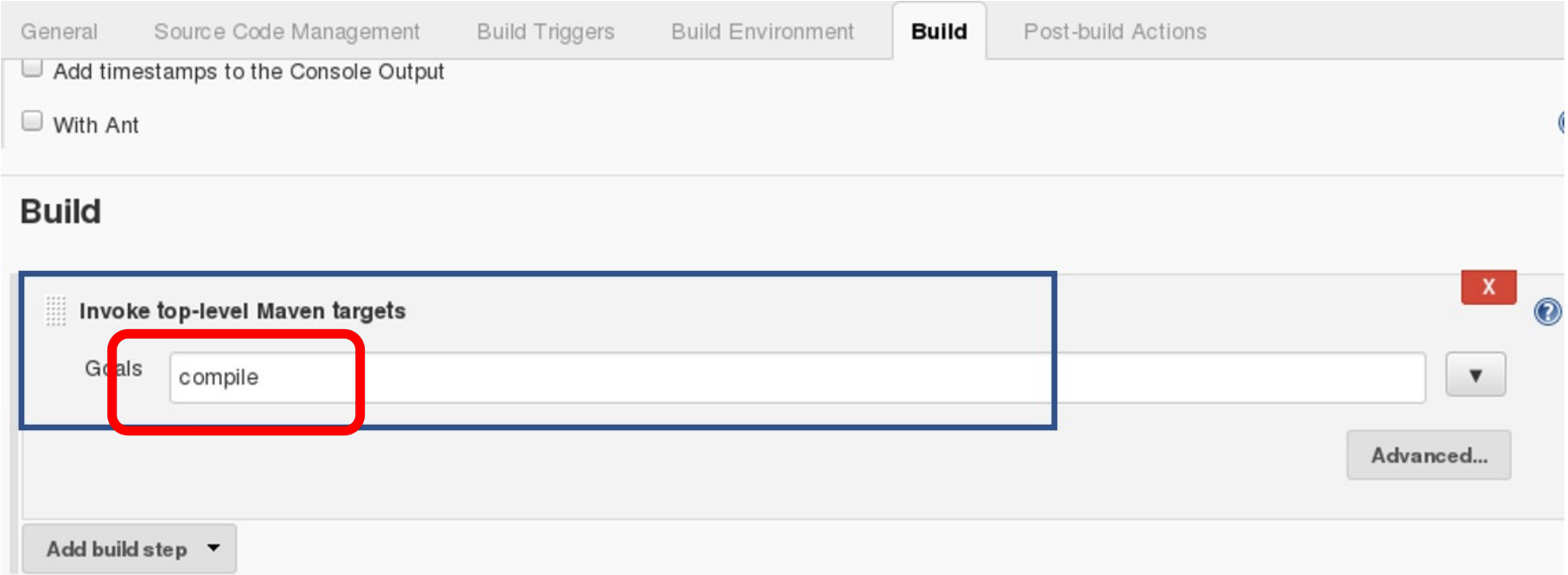
Step 1 — Compiling the Source Code

- Now we will add a Build Trigger
- Pick the poll SCM option
  - Basically, we will configure Jenkins to poll the GitHub repository after every 5 minutes for changes in the code
- Consider the below screenshot:



Step 1 — Compiling the Source Code

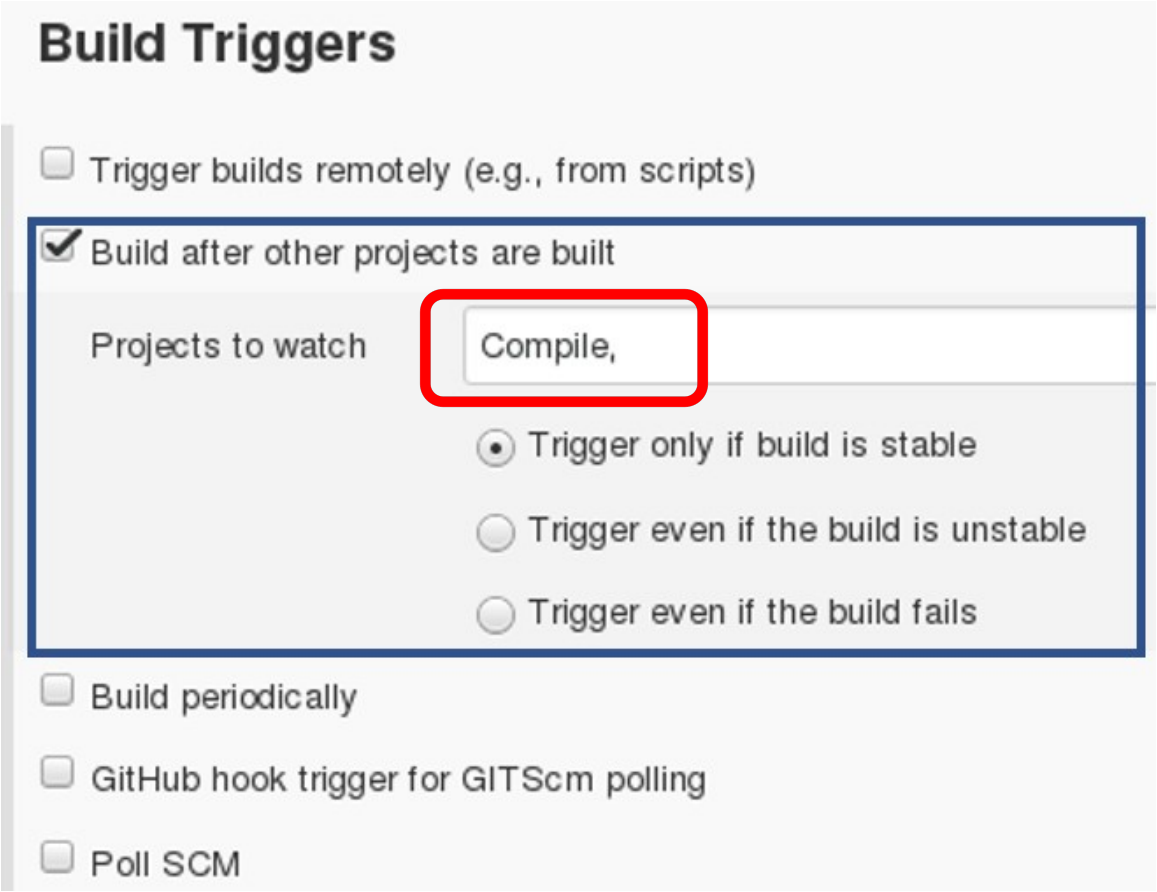
- In the build tab, click on invoke top level maven targets and type the below command:
  - compile



- This will pull source code from the GitHub repository and will also compile it.
- Click on Save and run the project.
- Now, click on the console output to see the result.

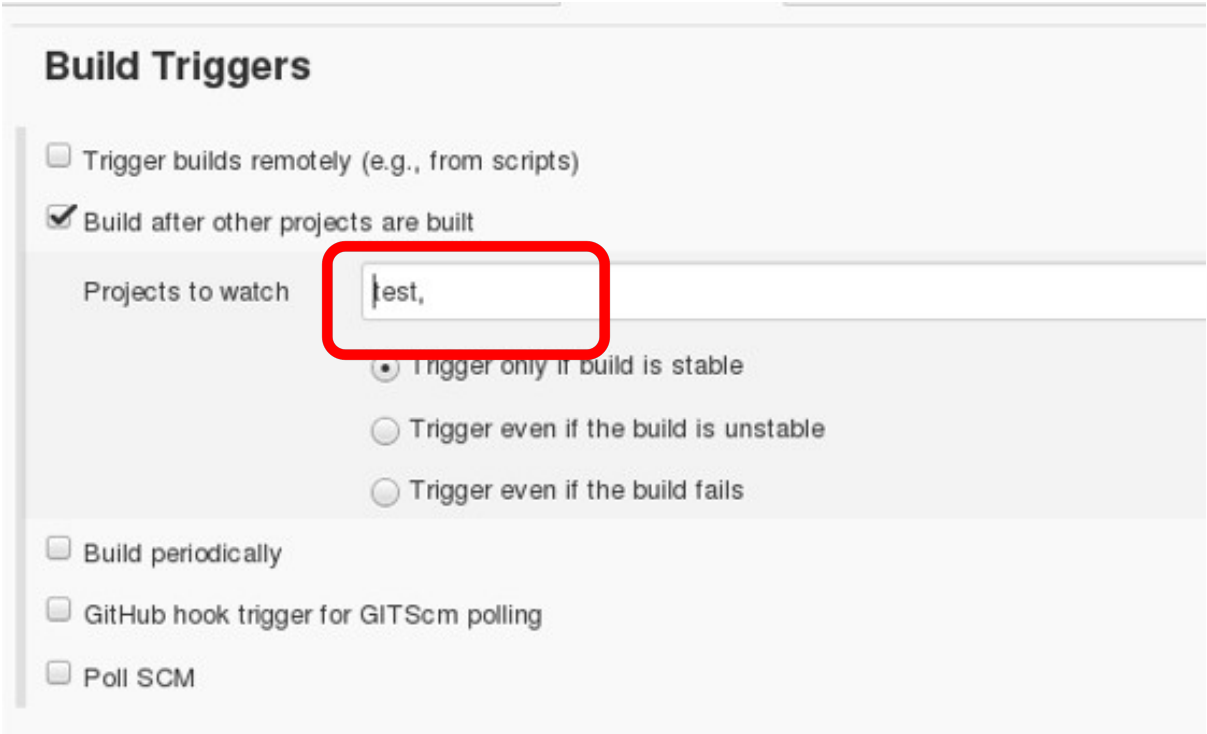
Step 2 — Test the Source Code

- Now we will create one more Freestyle Project for unit testing.
- Project Name - Test
- Add the same repository URL in the source code management tab, like we did in the previous job.
- Now, in the "Build Trigger" tab click on the
  - "build after other projects are built".
- In the Build tab, click on invoke top level maven targets and use the below command:
  - test



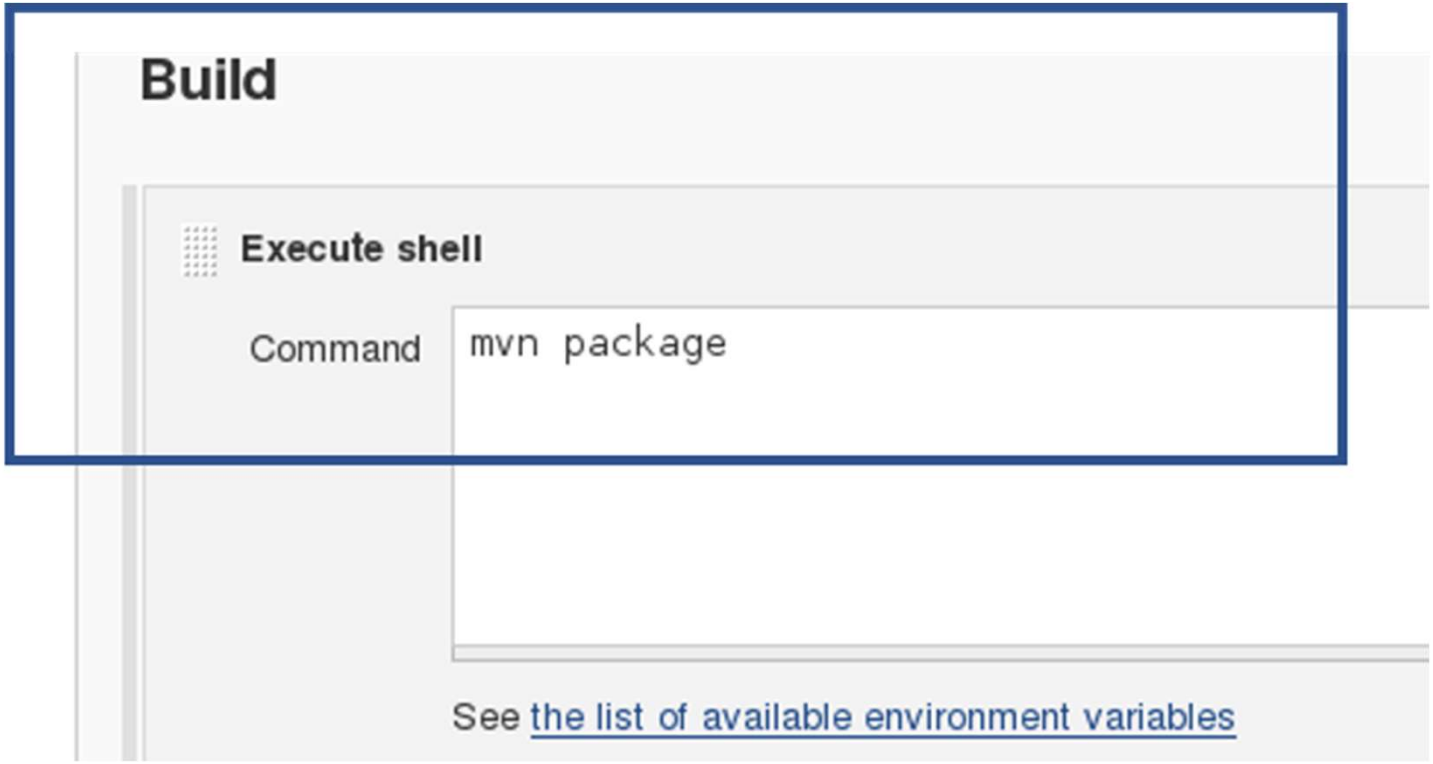
Step 3 — Creating a JAR File and Deploying

- Create one more freestyle project and add the source code repository URL.
- Then in the build trigger tab, select build when other projects are built, consider the below screenshot:
- Project Name – "Create Jar"



Step 3 — Creating a JAR File and Deploying

- In the build tab, select shell script. Type the below command to package the application:
  - mvn package



Important URLs

- GitHub projects:
  - https://github.com/atingupta2005/hello-world-maven
    - Console Based – To build jar file
  - https://github.com/atingupta2005/java-servlet-hello
    - Web Based to build war file

Thanks