Software Testing & Integration

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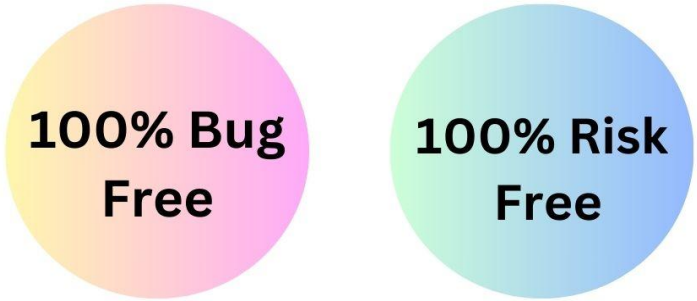
Session 1

- Introduction to software testing
- Why testing code is important
- Verification and validation
- Quality Assurance vs Quality Control vs Testing
- Principles of software testing

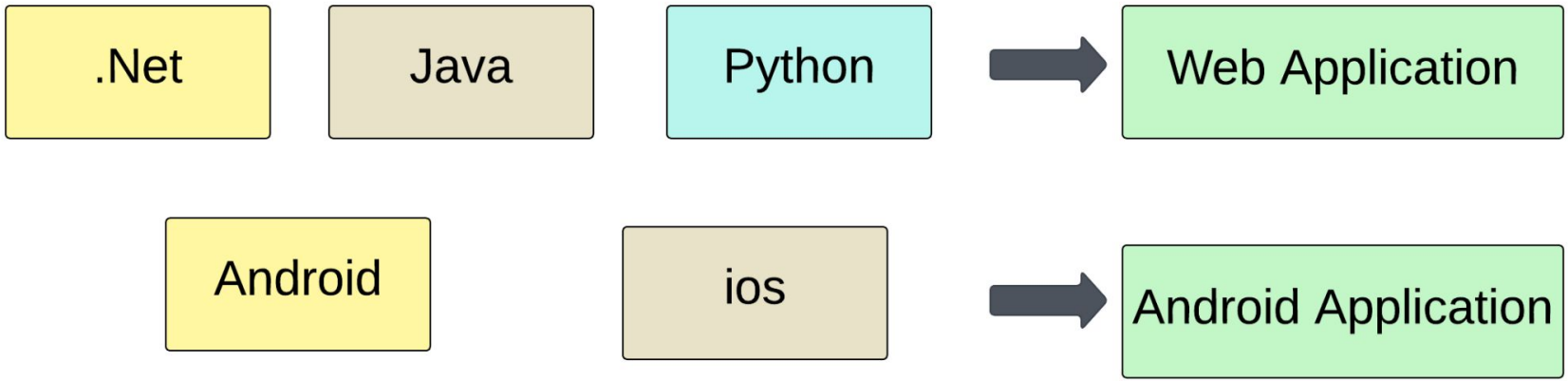
Introduction to software testing

What is Software Testing?

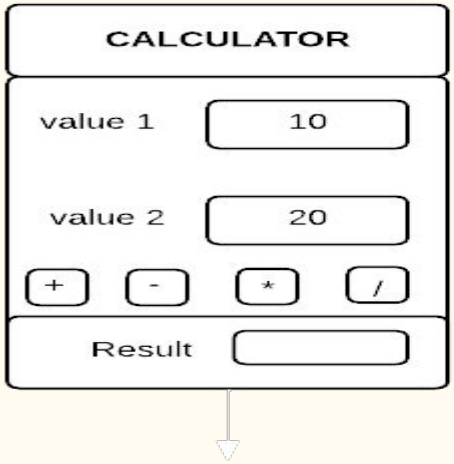
- It is the process of validating and checking of the developed software, whether its meeting the end-user customer requirement or not.
- It is the process of Identifying bugs in software.
- It involves running a program or system to identify and fix any errors or bugs



- Every application need to be tested irrespective of Technology and Business Domain needed to built up

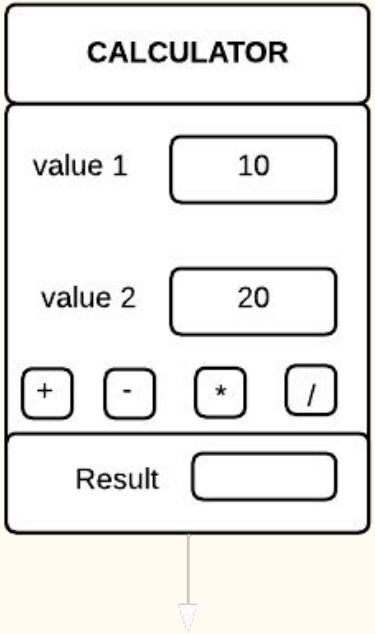


- **Error** - Any incorrect human action that produces a problem or wrong output in System
- **Defect/Bug** - Deviation of Actual result from the expected result
- **Failure -** Incorrect/Unexpected behaviour or output of an application



Sum Program

```
int a,b,c,result;
  a = value1;
  b = value2;
   c = a*b;
 result = c;
```



SUM **Program**

```
int a,b,c,result;
  a = value1;
  b = value2;
  c = a * b;
  result = c;
```

Error

Expected = 30
Actual = 200

Defect

Defects

Major Defects

- Wrong Requirements by Business Analyst
- Wrong Design by Architect
- Wrong Coding by Developer

➢ **Then What's Better Testing Approach?**

The Better Approach is to Test at every stage of Development

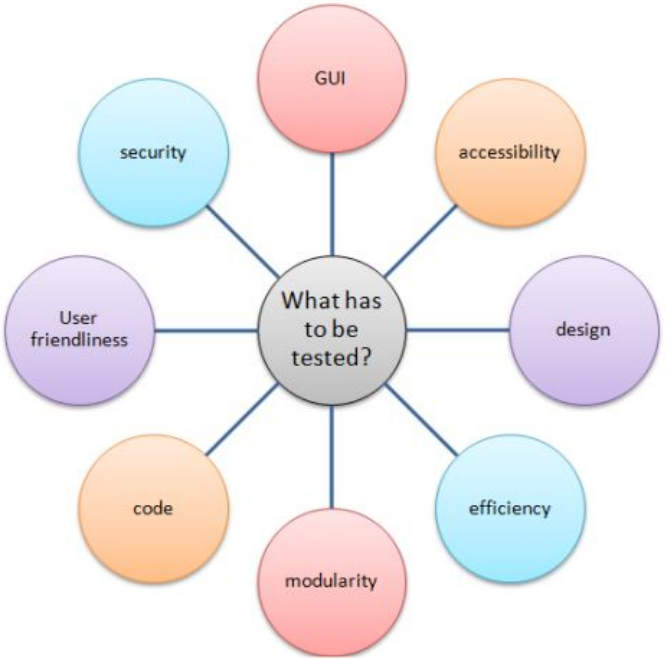
Why testing code is important?

- To find out defects and bugs at early stage of development
- Ensure Correctness and Quality
- Uncover security vulnerabilities
- To meet the compliance standards
- Consistent and Efficient user experience
- Immediate feedback addresses the issues and improve developers code

Why Software Application have Defects?

- Complexity of Software
- Changing Requirements
- Human Error
- Environment Differences
- Insufficient Testing
- Integration Issues
- Poor Documentation and Communication
- Performance Issues
- Inadequate Requirements

What to Test?



What testing achieves?

- It ensures that the software is robust, secure, and user-friendly

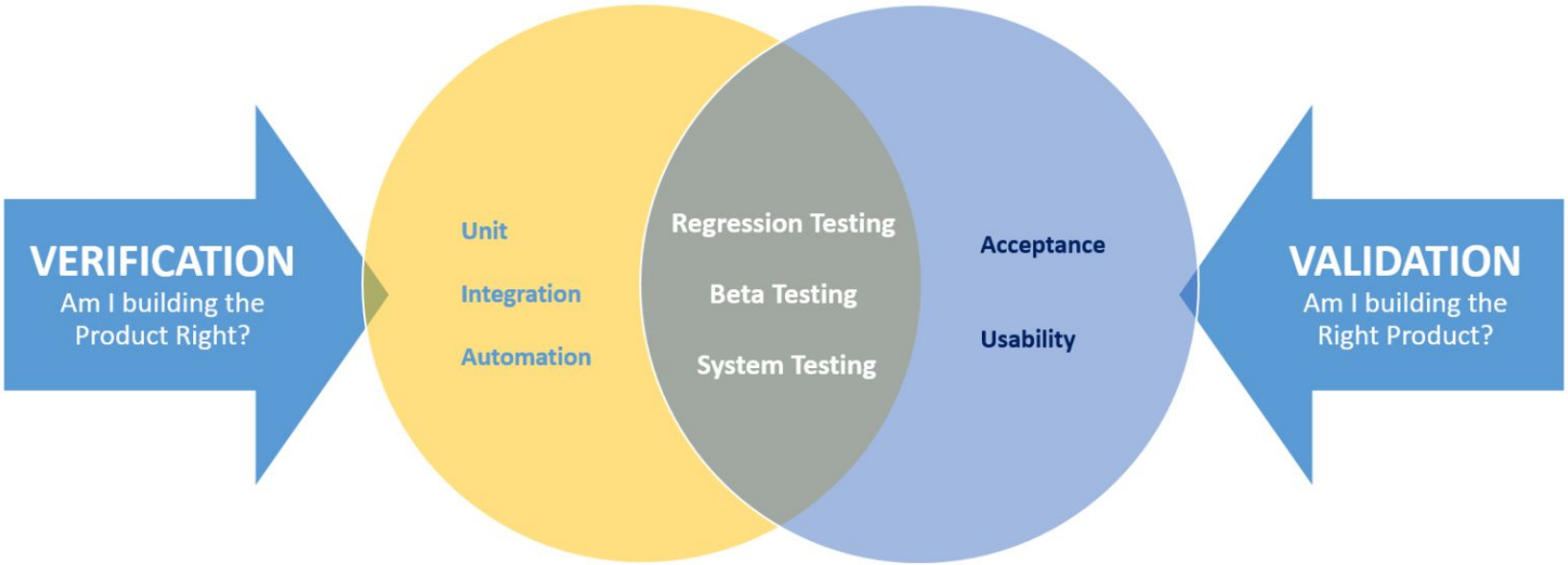
Verification and Validation:

Verification: It involves a static analysis method (review) done without executing code.

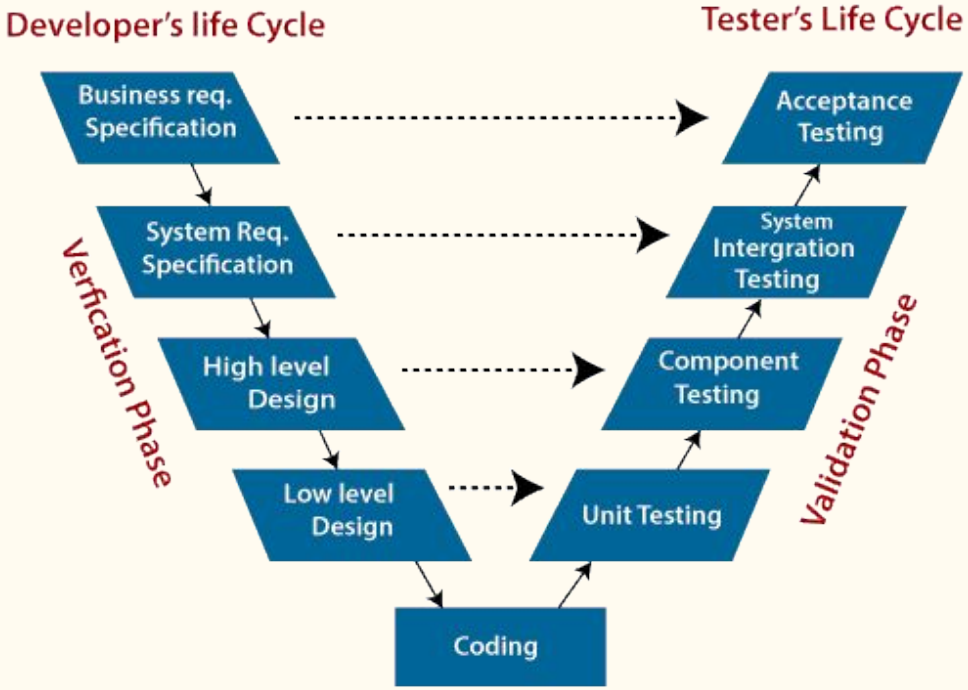
It is the process of evaluation of the product development process to find whether specified requirements meet.

Validation: It involves dynamic analysis method (functional, non-functional), testing is done by executing code.

It is the process to classify the software after the completion of the development process to determine whether the software meets the customer expectations and requirements.


VERIFICATION
Am I building the Product Right?
Unit
Integration
Automation
Regression Testing
Beta Testing
System Testing
Acceptance
Usability
VALIDATION
Am I building the Right Product?

V- Model


Developer's life Cycle
Tester's Life Cycle
Business req. Specification
Acceptance Testing
System Req. Specification
System Intergration Testing
High level Design
Component Testing
Low level Design
Unit Testing
Coding
Verfication Phase
Validation Phase

Quality Assurance vs Quality Control vs Testing

Aspect	Quality Assurance (QA)	Quality Control (QC)	Testing
Definition	Proactive process focused on improving processes to prevent defects.	Reactive process focused on detecting and fixing defects in the product.	The act of executing tests to find defects in the software.
Focus	Process and methodology improvement to ensure quality through audits, continuous improvement.	Identifying defects in the finished product through Inspections, reviews, defect management, testing	Detecting bugs through test cases through Manual and automated testing, performance testing, security testing

Quality Assurance vs Quality Control vs Testing

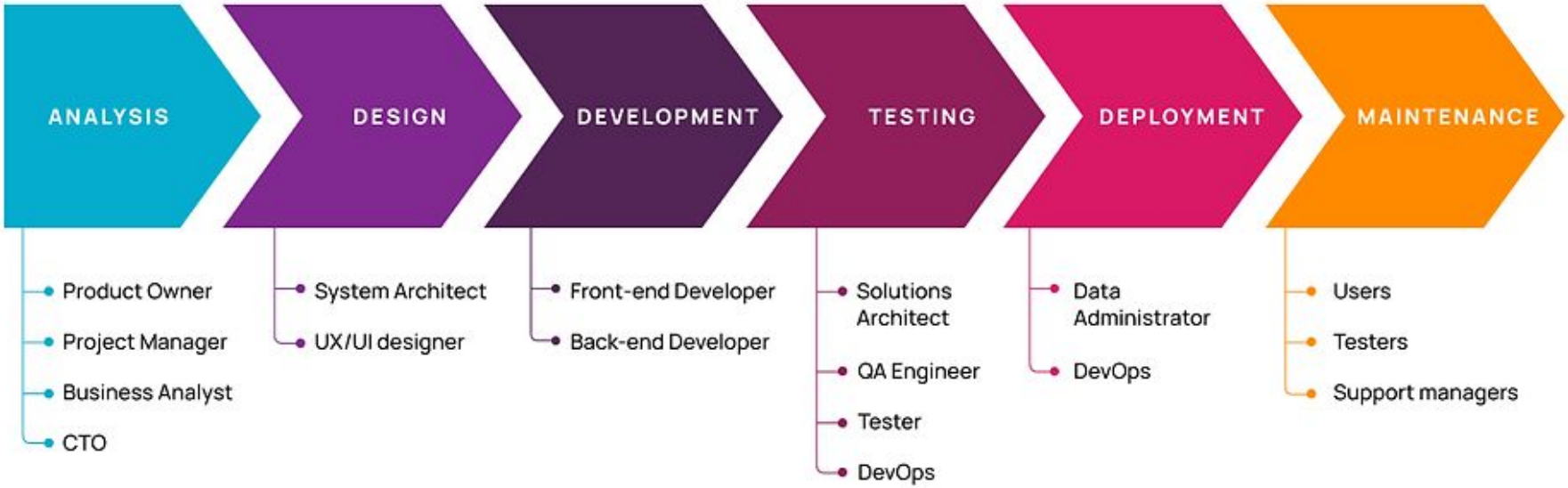
Aspect	Quality Assurance (QA)	Quality Control (QC)	Testing
Activities	Process reviews, audits, creating standards, defining practices, training.	Product inspections, defect tracking, validating compliance.	Writing test cases, executing test scripts, reporting bugs.
Goal	Preventing defects by optimizing processes and standards.	Identifying and fixing defects in the product.	Verifying the correctness and functionality of the software.
Timing	Happens throughout the development lifecycle.	Occurs after the product has been built, before release.	Occurs during the development cycle, often after coding.

7 Principles of Software Testing

Session 2

- Introduction to STLC and V Model
- Types of testing: manual and automation
- Tools used for automation testing
- Introduction to testing methods: white-box, black-box and grey-box
- Introduction to functional testing
- Introduction to non-functional testing

6 Phases of the Software Development Life Cycle



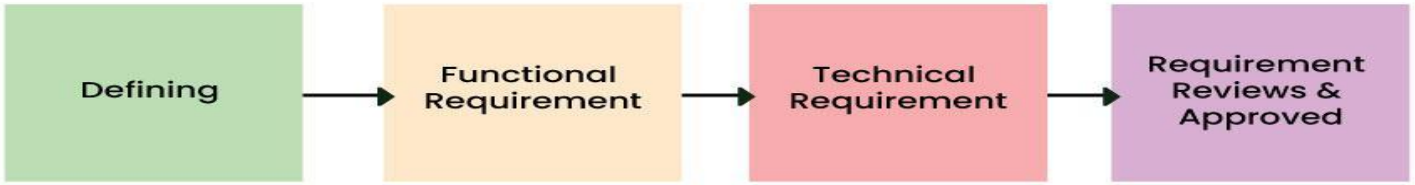
Phase-1: Requirement and Planning Analysis

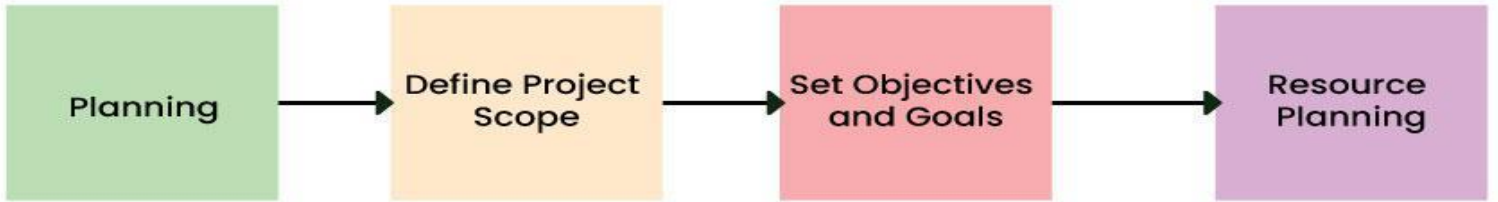
- This is the initial phase which defines project's scope, objectives and requirements
- Conduct interviews, surveys, and workshops to gather requirements.
- Understand and document the software requirements from stakeholders.

Key activities:

- ➢ Requirement gathering
- ➢ Feasibility analysis
- ➢ Setting project timelines and budget
- ➢ Risk assessment

Requirements and Planning Analysis





Phase-2: Design

- This phase involves creating the system architecture, technical specifications and design documents based on the requirements gathered.

Key activities:

- ➢ High-level system design (overall architecture)
- ➢ Low-level design (detailed design of modules, database schema, etc.)
- ➢ Design validation and reviews

Design

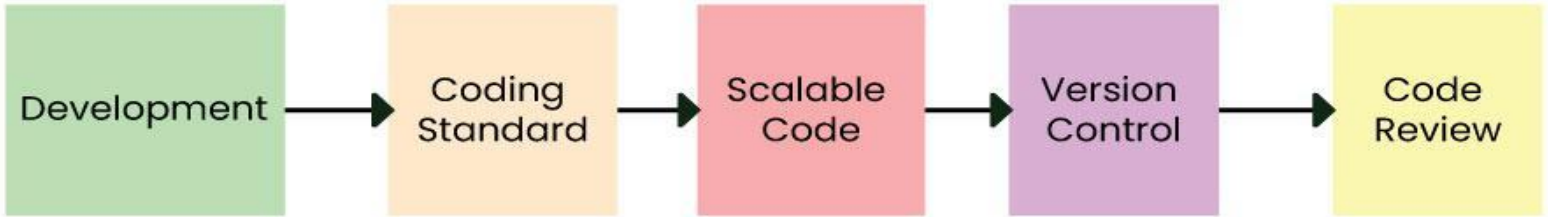
Phase-3: Development

- During this phase, the actual code is written according to the design documents.
- It involves developers writing the source code and unit testing the individual components.

Key activities:

- ➢ Coding according to design specifications
- ➢ Unit testing
- ➢ Integration with other modules

Development



Phase-4: Testing

- In this phase, the software is rigorously tested to identify and fix any bugs, errors, or issues.

Key activities:

- ➢ Functional testing (does it meet the requirements?)
- ➢ Performance testing (how does it perform under stress?)
- ➢ Security testing
- ➢ User acceptance testing (UAT)
- ➢ Bug fixing and quality assurance

Testing

Phase-5: Deployment

- After testing is complete and the software is validated, it is deployed to the production environment where it will be available to users.

Key activities:

- ➢ Installing the software on the production servers
- ➢ Ensuring that everything works as expected in the live environment

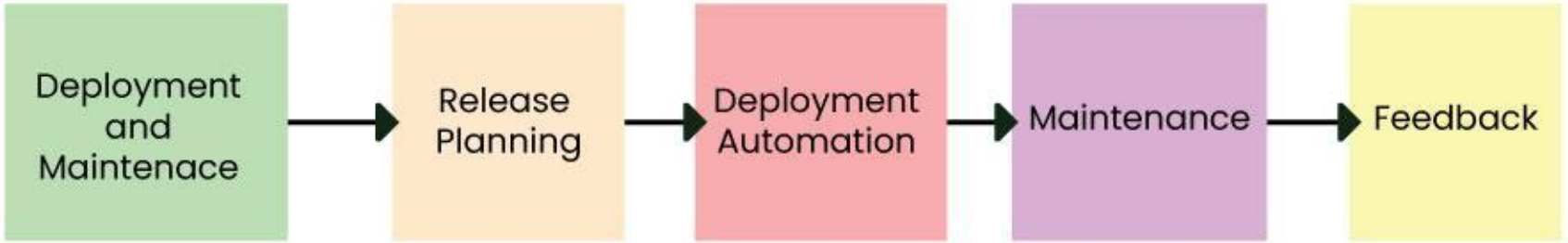
Phase-6: Maintenance

- This phase involves ongoing support, updates, and modifications to the software post-deployment. Maintenance ensures the system remains functional and relevant over time.

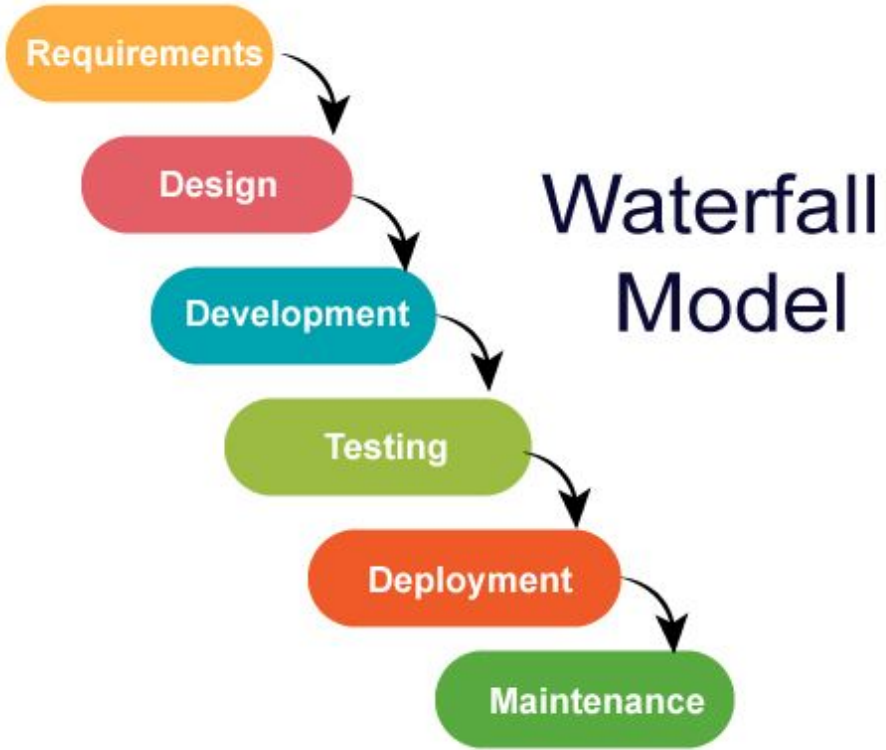
Key activities:

- ➢ Bug fixes
- ➢ Regular updates
- ➢ Performance monitoring
- ➢ Handling user feedback and issues

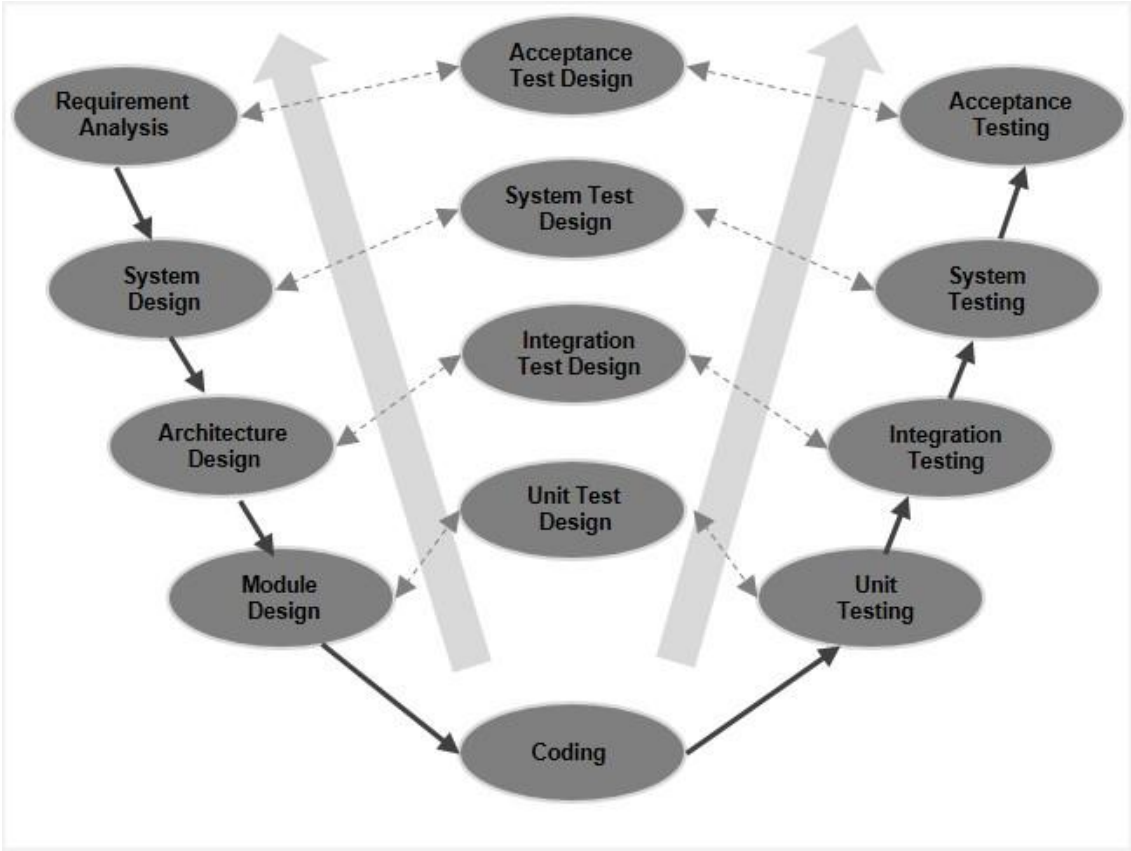
Deployment and Maintenance



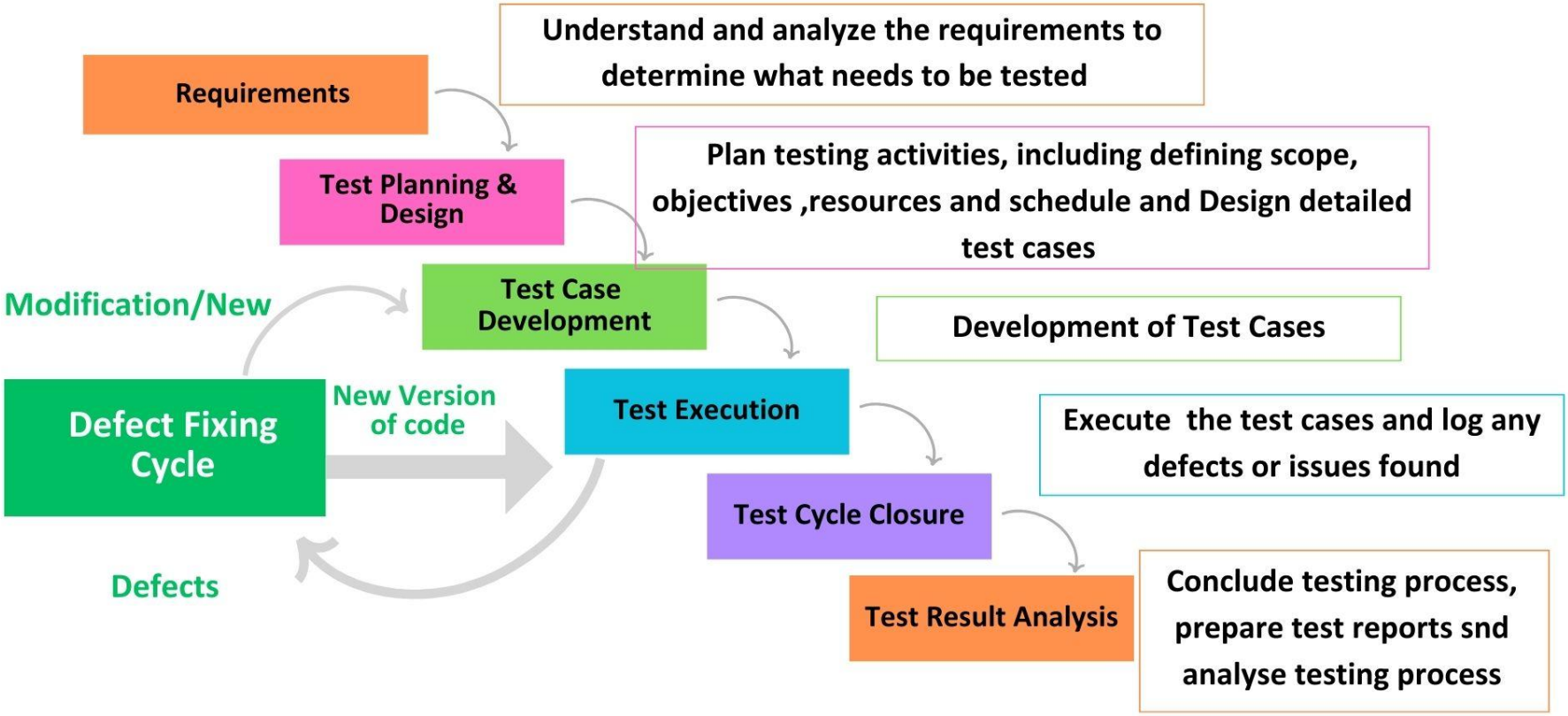
Software Development Life Cycle (SDLC) Model

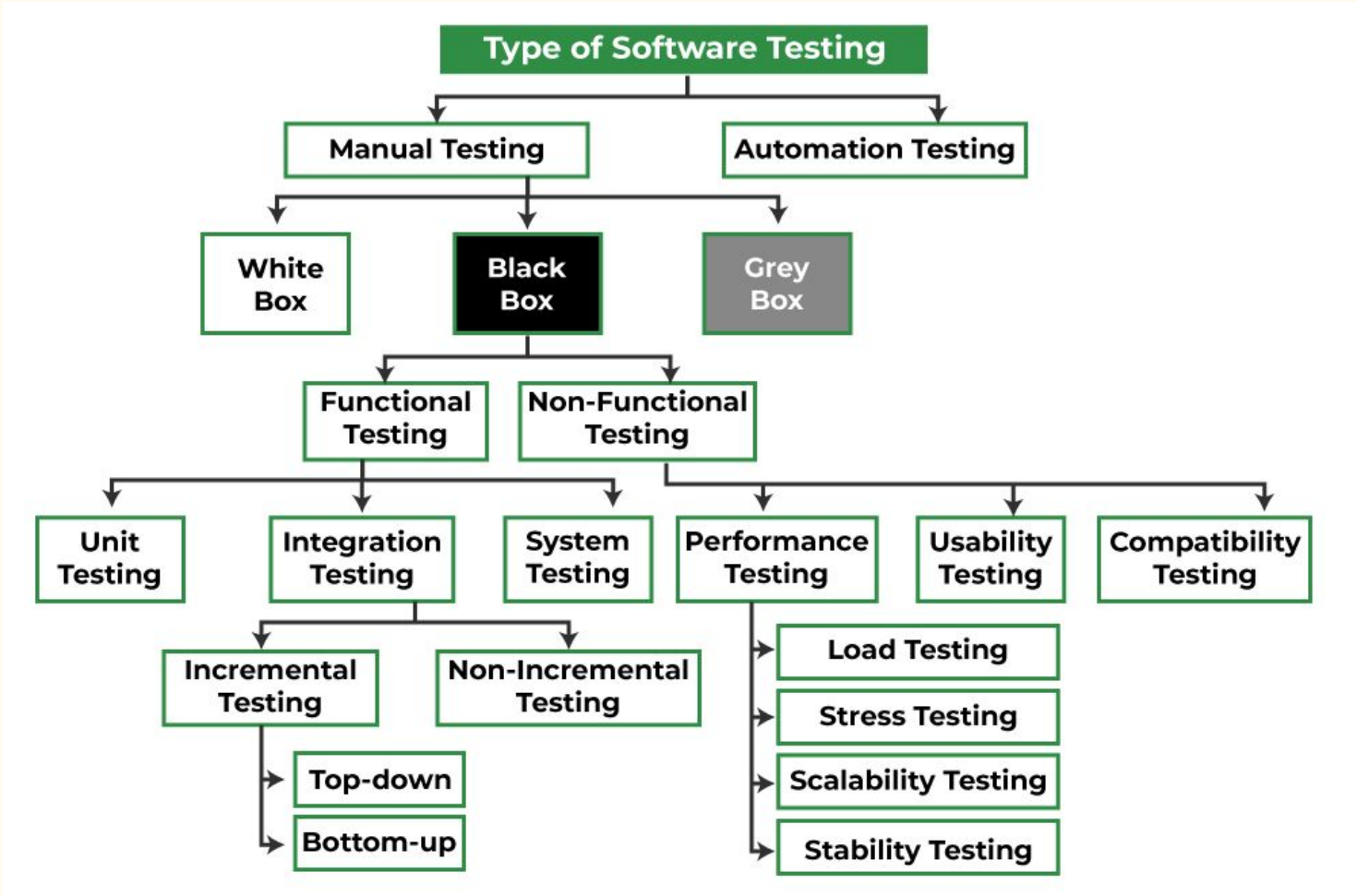


Software Development Life Cycle (SDLC) V Model



Software Testing Life Cycle




Type of Software Testing
Manual Testing
Automation Testing
White Box
Black Box
Grey Box
Functional Testing
Non-Functional Testing
Unit Testing
Integration Testing
System Testing
Performance Testing
Usability Testing
Compatibility Testing
Incremental Testing
Non-Incremental Testing
Top-down
Bottom-up
Load Testing
Stress Testing
Scalability Testing
Stability Testing

Types of Testing: manual and automation

- **Manual testing** is the process of testing software applications manually and executing test cases without the use of automation tools.
- Testers perform test cases, identify bugs, and ensure that the software works as expected by following a manual, step-by-step process.

Tools used for Manual Testing:

Test Link, Bugzilla, Jira ,LoadRunner, Apache J Meter, RedMine, FogBugz

Disadvantages of Manual Testing

- Time consuming
- High changes of human error
- Less accuracy

Advantages of Manual Testing

- No need for programming language
- Less Expensive

Different Types of manual testing

Black Box Testing

- Evaluate the performance and behaviour of software from user’s point of view.
- Tester only has visibility into the inputs and outputs, not the internal code
- Also known as functional testing
- Includes System Testing,User Acceptance Testing

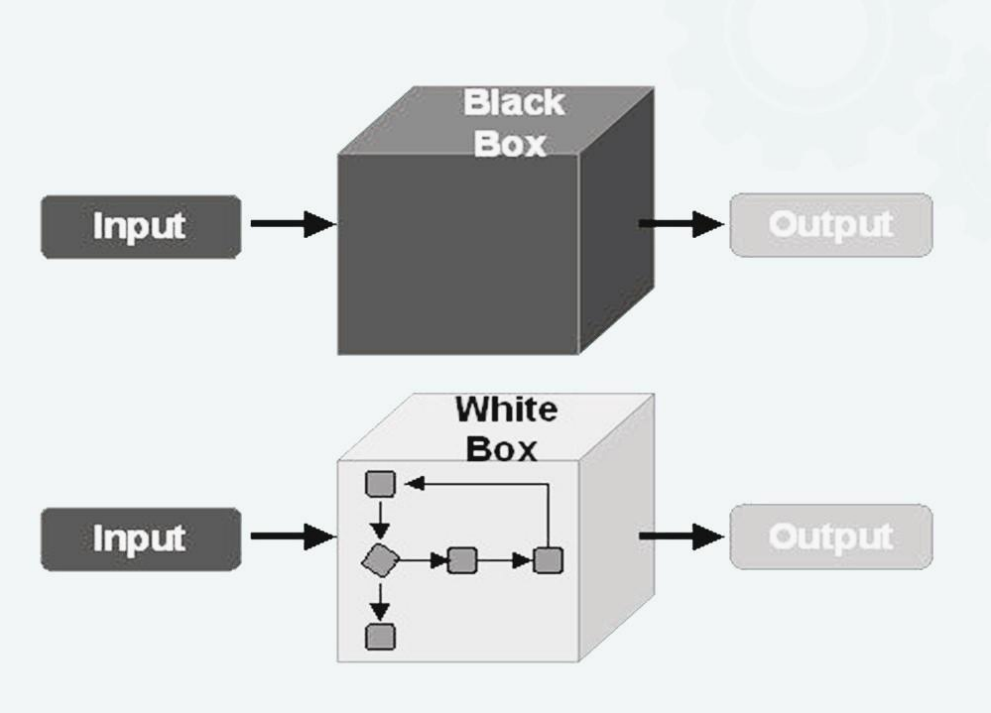
Different Types of manual testing

White Box Testing

- Evaluate the security and functionality of the product in more detail.
- This is performed by a developer or QA professional with an understanding of the internal code behind the software.
- Also known as structural testing or clear-box testing
- Includes Unit Testing, Integration Testing

Introduction to testing methods: white-box, black-box and grey-box

- Tester provides input to the system and observes whether the output matches the expected results.
- Test cases are derived from the requirements and use cases, ensuring that the software meets the functional requirements



Introduction to testing methods: white-box, black-box and grey-box

Black Box Testing Coverage:

- **Equivalence Partitioning**: This technique divides the input data into partitions (or equivalence classes) where test cases are selected from each partition. The idea is that all values within a partition will be treated similarly by the system, so testing one value from each partition is sufficient.

- **Boundary Value Analysis**: Focuses on testing values at the boundaries of input ranges.

  For example, if an input field accepts values between 1 and 10, boundary values would include 1, 10, and values just above or below these limits (e.g., 0 and 11).

Introduction to testing methods: white-box, black-box and grey-box

White Box Testing Coverage:

- **Statement Coverage**: Ensures that every line of code in the program is executed at least once during testing.
- **Branch Coverage**: Tests all possible branches (e.g., if and else conditions) of the code, ensuring that both true and false branches are executed.
- **Path Coverage**: Focuses on testing all possible paths that can be taken in the code, which can be significantly more complex than branch or statement coverage, especially in large programs.

Introduction to testing methods: white-box, black-box and grey-box

White Box Testing Coverage:

- **Condition Coverage**: Ensures that every boolean expression in the program is tested for both true and false values.
- **Function Coverage**: Ensures that every function in the program is called at least once during testing.
- **Loop Coverage**: Ensures that loops are tested for different scenarios, such as zero iterations, one iteration, and multiple iterations.

Introduction to testing methods: white-box, black-box and grey-box

Advantages of Black Box Testing:

- **Non-technical Focus**: Testers do not need to have programming knowledge, making it accessible for non-technical personnel or end-users to conduct testing.
- **User Perspective**: Since the testing is based on the system's functionality and user requirements, it simulates how real users will interact with the system.
- **Effective for Large Systems**: Black box testing is particularly useful for large applications, as it allows testing of complex systems without requiring knowledge of the intricate details of the code.

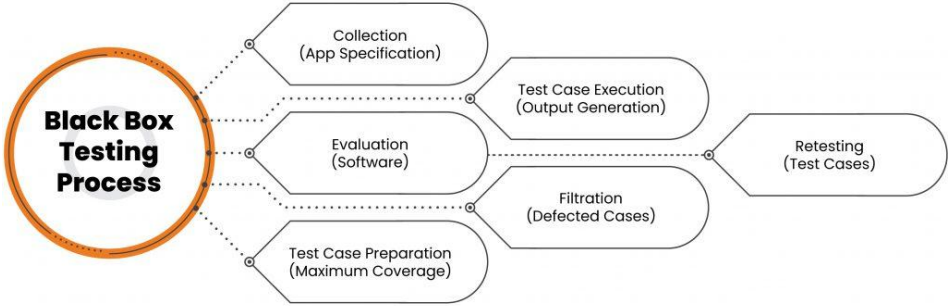
Introduction to testing methods: white-box, black-box and grey-box

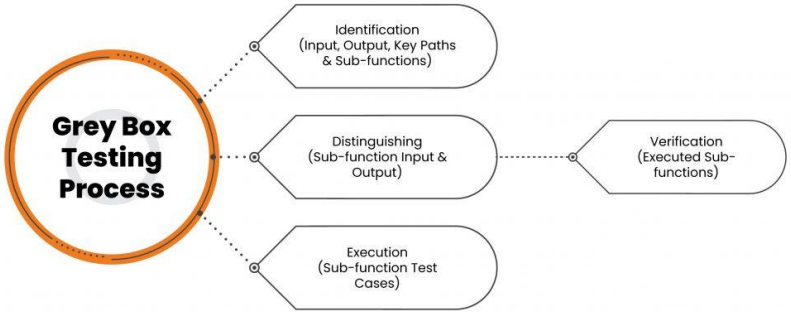
Disadvantages of Black Box Testing:

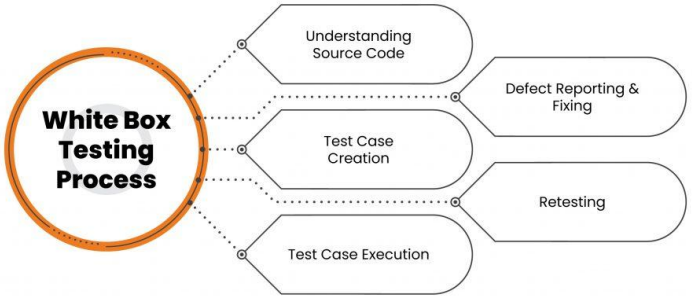
- **Limited Code Coverage**: Black box testing does not guarantee that all code paths are covered. It may miss issues related to internal system logic, unused code, or paths that are not exercised by the inputs.
- **Redundancy**: There may be overlapping or redundant test cases, especially when multiple test cases produce similar outputs for different inputs.
- **Dependence on Requirements**: The quality of testing depends heavily on the completeness and clarity of the functional requirements. If the requirements are incomplete or unclear, the tests may not be comprehensive.

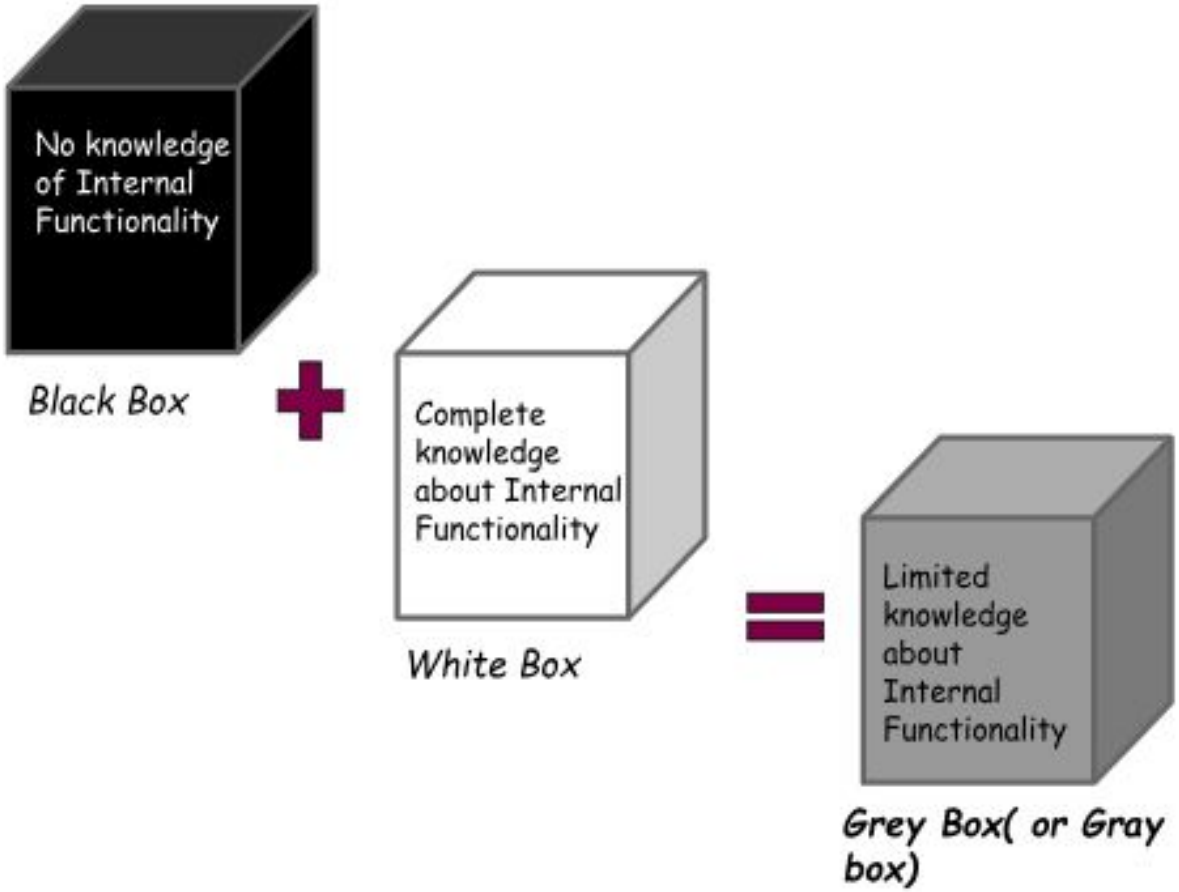
Testing levels

- **Unit Testing**: Testing individual components or units of code to ensure that they function correctly. Typically done by developers.
- **Integration Testing**: Checking the interaction between multiple units or systems to ensure they work together as expected.
- **System Testing**: Testing the entire system as a whole to validate its functionality against the requirements.
- **User Acceptance Testing**: Ensuring that the software meets the acceptance criteria or business requirements, often performed by end users or clients.
- **Regression Testing**: Automating tests to verify that new code changes haven't broken existing functionality.


Black Box Testing Process
Collection (App Specification)
Test Case Execution (Output Generation)
Evaluation (Software)
Retesting (Test Cases)
Filtration (Defected Cases)
Test Case Preparation (Maximum Coverage)


Grey Box Testing Process
Identification (Input, Output, Key Paths & Sub-functions)
Distinguishing (Sub-function Input & Output)
Verification (Executed Sub-functions)
Execution (Sub-function Test Cases)


White Box Testing Process
Understanding Source Code
Defect Reporting & Fixing
Test Case Creation
Retesting
Test Case Execution


No knowledge of Internal Functionality
Black Box
Complete knowledge about Internal Functionality
White Box
Limited knowledge about Internal Functionality
Grey Box(or Gray box)

Functional Testing

- Functional testing is a type of software testing that validates the software system against the functional requirements or specifications.
- They are performed both manually and using automation tools

Types of functional testing

Unit Testing

- To Test individual components or units of the software to ensure they work as intended
- It is performed by developers or QA professionals
- **Ex** - Testing a function in a payment processing system to ensure it calculates correct total amount
- **Tools** : JUnit nunit TestNG

Types of Functional Testing

Integration Testing

- Tests the interactions between integrated units/modules to ensure they function together correctly.

Types

- ➢ **Big Bang :** All modules are integrated and tested at once
- ➢ **Top-Down :** All modules are integrated from top to bottom
- ➢ **Bottom-Up :** Modules are integrated from bottom to top

Ex - Testing the interaction between the login module and the user dashboard in a web application

- **Tools** JUnit nunit TestNG

Types of Functional Testing

System Testing

- Tests the complete and integrated software system to verify that it meets the specified requirements.

Ex - Testing the entire online banking system to ensure all modules (login,fund transfer)

Tools:

Types of Functional Testing

Acceptance Testing

- Validates the software against user requirements and checks if it is ready for deployment.
- This is done right before deploying the product

Types:

Alpha Testing - Conducted by the developers at the development site

Beta Testing - Conducted by end-users at the client site

Types of Functional Testing

Acceptance Testing

User Acceptance Testing (UAT)

- Customer performs test randomly and accepts/rejects the product

Reliability Testing

- The behaviour of the application is tested under abnormal conditions such as “How does the system behave when system is switched off?”

Ex - Testing a new feature in a mobile app by end-users before releasing to the public

Tools : Load Runner QTP

Types of Functional Testing

Smoke Testing

- To verify the most critical functions of the software work properly

Ex - Performing a quick check on a new build of a mobile app to ensure it launches and the main features are accessible

Tools: 

Types of Functional Testing

Sanity Testing

- To verify that new functionality or bug fixes work as expected

Ex - Testing a recently fixed bug in a customer service application to ensure the issue is resolved

Tools:

Functional Testing - E-Commerce Website

Unit Testing : Testing the function that calculates discounts on products.

Integration Testing : verifying the interaction between the shopping cart and payment gateway modules.

System Testing : Ensuring that the entire checkout process works correctly.

Acceptance testing : validating the new search feature with end-users before deployment.

Regression Testing : Checking that existing payment methods still function after adding a new payment option

Non-functional Testing

- It is the testing of non-functional aspects of an application such as performance , reliability,usability,security and so on
- Generally , tests are executed using tools
- They are performed after performing functional tests
- It Improves the quality of the software
- It allows you to polish the software

Types of Non-functional testing

Performance Testing - Ensure the software performs well under expected workloads

- **Load Testing** - Evaluate the software's behaviour under expected load conditions

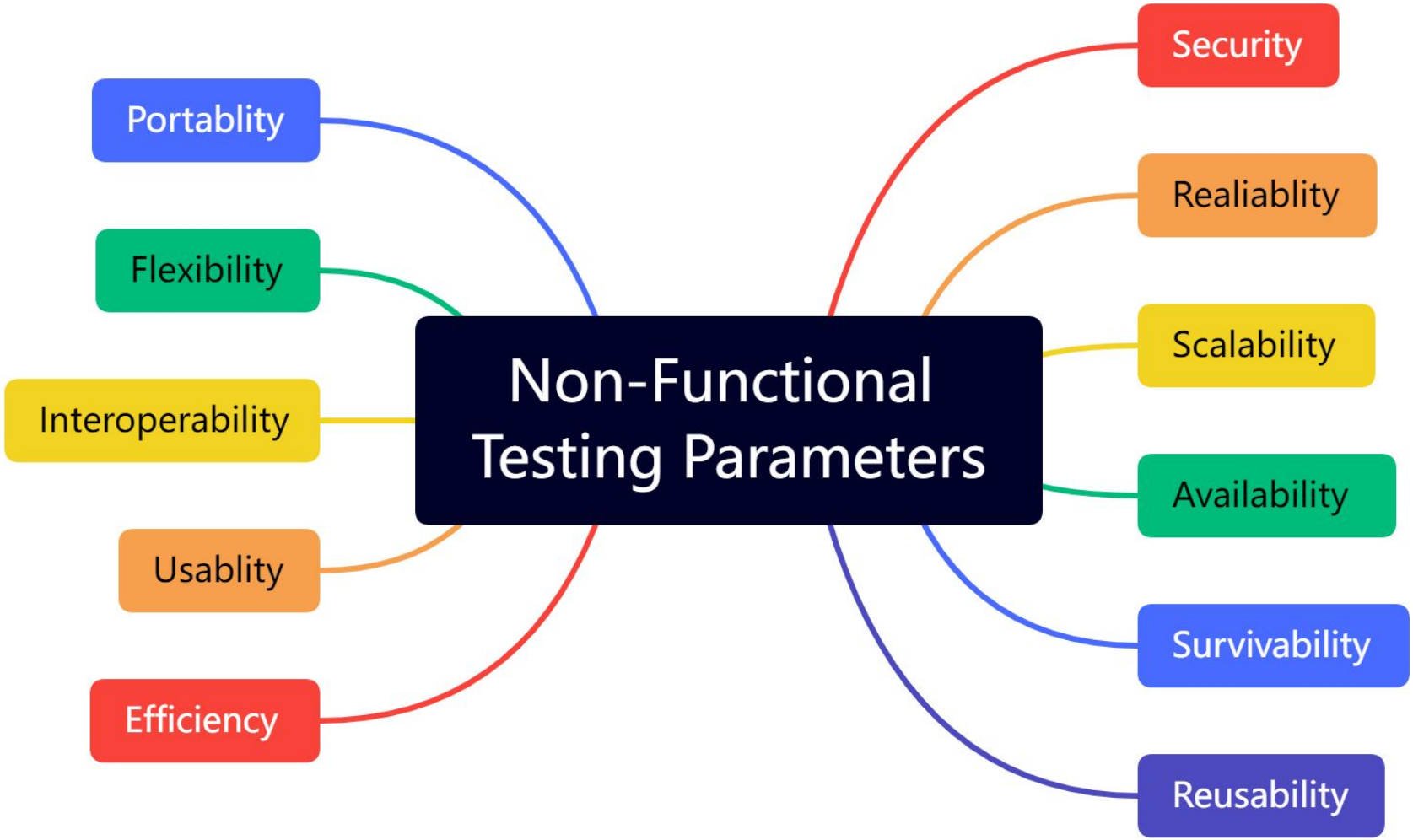
  Ex - Testing an ecommerce website response time when 1000 users browse products simultaneously

- **Stress Testing** - Determines the software's stability under extreme conditions beyond normal operational capacity

  Ex - Testing a banking application to see how it handles 10000 simultaneous transactions

Types of Non-functional testing

- **Security Testing** - To identify vulnerabilities and ensure the software is protected against attacks
- **Usability Testing** - To ensure the software is user-friendly and provides a good user experience
- **Reliability Testing** - To ensure the software performs consistently under specific conditions
- **Compatibility Testing** - To ensure the software works well across different environments
- **Scalability Testing** - To determine the software's ability to scale up or down based on the demand


Non-Functional Testing Parameters
Portablity
Flexibility
Interoperability
Usablity
Efficiency
Security
Realiablity
Scalability
Availability
Survivability
Reusability

Non Functional Testing - E-Commerce Website

Performance Testing : Assessing the website’s response time during Sale Season

Security Testing : Conducting penetration tests to identify vulnerabilities in payment processing

Usability Testing : Ensuring the checkout process is quick for users

Automation

Automated testing involves the use of specialized software tools to run test cases, which can significantly speed up the testing process and improve the accuracy and consistency of tests.

Types of Automated Testing

- **Unit Testing**: Automation of unit tests to check individual code components.
- **Regression Testing**: Automating tests to verify that new code changes haven't broken existing functionality.
- **Load Testing**: Simulating a large number of users to check how the application behaves under stress or heavy load.
- **Functional Testing**: Ensuring that specific features of the application function correctly, based on pre-defined inputs and outputs.

Automation Tools :

Lambda test, TestProject,Katalon Studio, Test IM, Ranorex Studio,Rapise,Squish

Aspect	Manual Testing	Automation Testing
Execution approach	Testers execute test cases manually.	Test cases are executed using automated tools.
Human involvement	Requires human intervention for each step.	Minimal human intervention once scripts are set up.
Test case creation	Test cases are created manually.	Test cases are scripted and automated.
Speed and efficiency	Relatively slower due to manual execution.	Faster and more efficient, especially for repetitive tests.
Test data handling	Test data is entered manually by testers.	Test data can be generated and managed automatically.
Test coverage	Subject to human bias and limitations.	Can achieve extensive test coverage with consistent precision.
Scalability	Less scalable for large-scale projects.	Highly scalable for large and complex projects.
Human observation	Enables human intuition and exploratory testing.	Lacks human intuition but excels in repetitive tasks.
Suitable scenarios	Exploratory testing, usability testing, ad-hoc testing.	Regression testing, load testing and data-driven testing.
Initial investment	Lower initial investment, minimal tool requirement.	Higher initial investment for selecting and setting up tools.
Maintenance effort	Moderate maintenance effort for test case updates.	Regular maintenance needed for test script updates.

Test Case

- A test case is standard format adhered to in testing to check if the software is working as per the requirements.
- It comprises a collection of conditions that are required to be verified to validate if the actual outcomes on the software are matching with the expected ones.

The various sections of a test case are listed below −

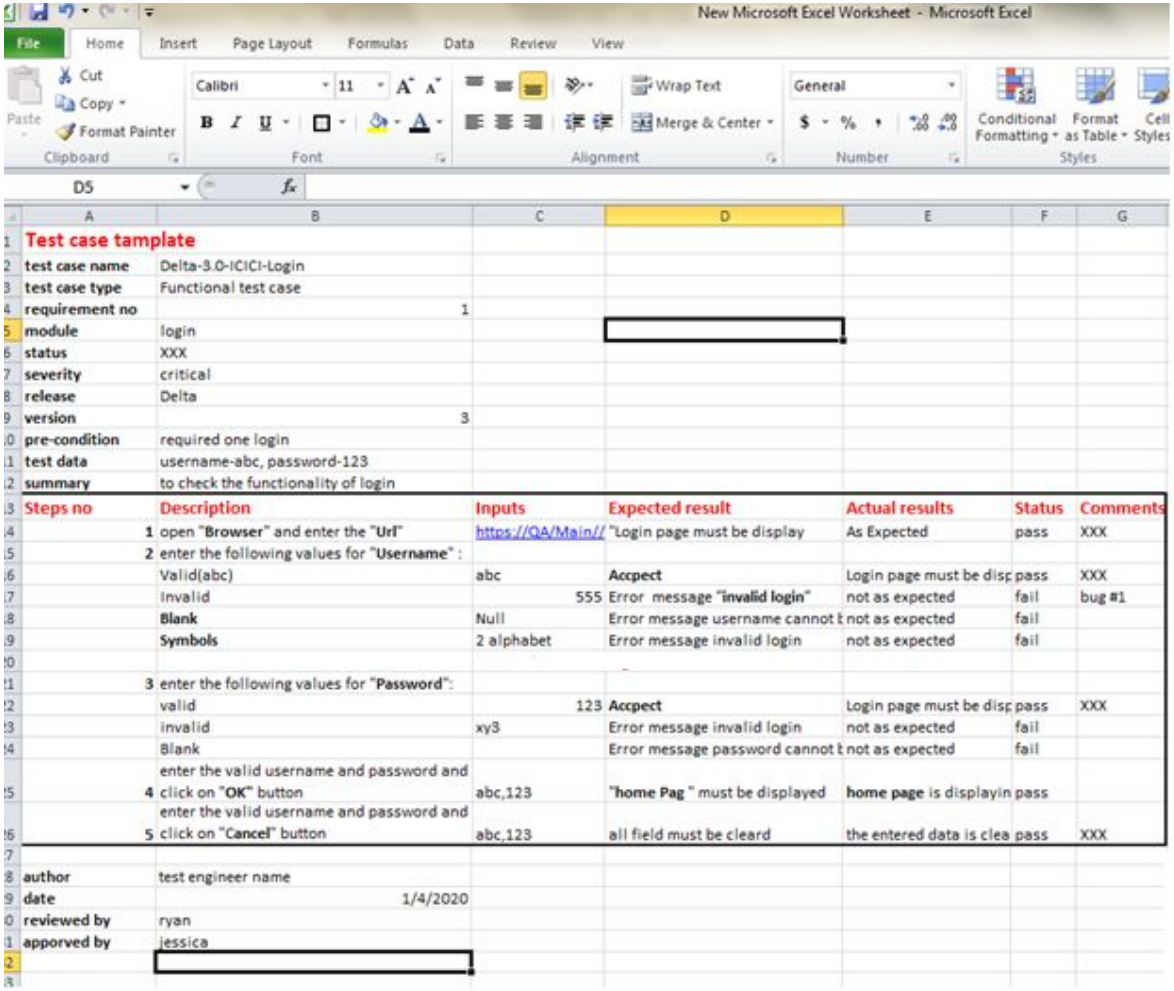
- **Functionality Name −** It points to the functionality which is verified.
- **Test Case Identifier −** It points to a unique id assigned to each test case.
- **Name of Tester −** The name of the tester who will carry out the testing.
- **Test Scenario Name −** The name of the scenario which will be converted into a test case.

Test Case

- **Test Case Description** − The requirement or the criteria which is going to be verified in the test case.
- **Test Steps** − The actions to be performed on the software to verify the test conditions.
- **Preconditions** − The prerequisites that need to be satisfied before starting with the test steps.
- **Test Priority** − The test priority is assigned to the test case to decide the order in which it needs to be executed.
- **Test Data** − The inputs and data which are needed to complete the test.
- **Expected Outcome** − The expected results as per the requirements.

Test Case

- **Test Settings** − The settings and parameters that are needed to be set before running the test.
- **Actual Outcome** − The actual result produced on the software.
- **Environment** − The configuration of the environment on which the test is to be performed including the operating system, configurations, security etc.
- **Test Status** − The status of the test should reflect as pass, fail, not executed and blocked.
- **Comments** − The comments added against each test case.



New Microsoft Excel Worksheet - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View

Cut Copy Format Painter Paste Clipboard

Calibri 11 Font

Wrap Text Merge & Center Alignment

General Number

Conditional Formatting Format as Table Cell Styles Styles

D5

	A	B	C	D	E	F	G
1	**Test case tamplate**						
2	**test case name**	Delta-3.0-ICICI-Login					
3	**test case type**	Functional test case					
4	**requirement no**	1					
5	**module**	login					
6	**status**	XXX					
7	**severity**	critical					
8	**release**	Delta					
9	**version**	3					
10	**pre-condition**	required one login					
11	**test data**	username-abc, password-123					
12	**summary**	to check the functionality of login					
13	**Steps no**	**Description**	**Inputs**	**Expected result**	**Actual results**	**Status**	**Comments**
14	1	open "**Browser**" and enter the "**Url**"	https://QA/Main//	"Login page must be display	As Expected	pass	XXX
15	2	enter the following values for "**Username**" :					
16		Valid(abc)	abc	**Accpect**	Login page must be disp	pass	XXX
17		Invalid	555	Error message "**invalid login**"	not as expected	fail	bug #1
18		**Blank**	Null	Error message username cannot b	not as expected	fail	
19		**Symbols**	2 alphabet	Error message invalid login	not as expected	fail	
20							
21	3	enter the following values for "**Password**":					
22		valid	123	**Accpect**	Login page must be disp	pass	XXX
23		invalid	xy3	Error message invalid login	not as expected	fail	
24		Blank		Error message password cannot b	not as expected	fail	
25	4	enter the valid username and password and click on "**OK**" button	abc,123	"**home Pag** " must be displayed	**home page** is displayin	pass	
26	5	enter the valid username and password and click on "**Cancel**" button	abc,123	all field must be cleard	the entered data is clea	pass	XXX
27							
28	**author**	test engineer name					
29	**date**	1/4/2020					
30	**reviewed by**	ryan					
31	**apporved by**	jessica					
32							

Session 3

- **Introduction to Selenium (use Eclipse IDE)**
- **Load web driver**
- **Create selense commands: locators: by ID, name, class, tag name, XPath**
- **Add interactions: text box, radio button selection, check box selection, drop down item selection, keyboard actions, mouse actions, multi select**

Introduction to Selenium (use Eclipse IDE)

- Selenium is a popular open-source web-based functional automation tool
- Provides a single interface that lets you to write test scripts in programming languages like Ruby,java,Nodejs,C# and others
- Using Selenium framework, testers are able to deliver test cycles faster by automating reported test cases
- Selenium Webdriver allows you to directly interact with the browsers through automation test scripts
- Selenium Webdriver supports operating systems- Windows, Mac OS,iOS and Solaris
- Selenium Webdriver also known as Selenium 2

Getting Started

Selenium WebDriver

If you want to create robust, browser-based regression automation suites and tests, scale and distribute scripts across many environments, then you want to use Selenium WebDriver, a collection of language specific bindings to drive a browser - the way it is meant to be driven.

READ MORE

Selenium IDE

If you want to create quick bug reproduction scripts, create scripts to aid in automation-aided exploratory testing, then you want to use Selenium IDE; a Chrome, Firefox and Edge add-on that will do simple record-and-playback of interactions with the browser.

READ MORE

Selenium Grid

If you want to scale by distributing and running tests on several machines and manage multiple environments from a central point, making it easy to run the tests against a vast combination of browsers/OS, then you want to use Selenium Grid.

READ MORE

Selenium Architecture

There are four components of Selenium Architecture:

Selenium Client Library

- Selenium supports multiple libraries such as Java, Ruby, Python, etc.,
- Selenium Developers have developed language bindings to allow Selenium to support multiple languages.

JSON Wire Protocol over HTTP

- JSON is used to transfer data between a server and a client on the web.
- JSON Wire Protocol is a REST API that transfers the information between HTTP server.
- Each BrowserDriver (such as FirefoxDriver, ChromeDriver etc.,) has its own HTTP server.

Selenium Architecture

Browser Drivers -

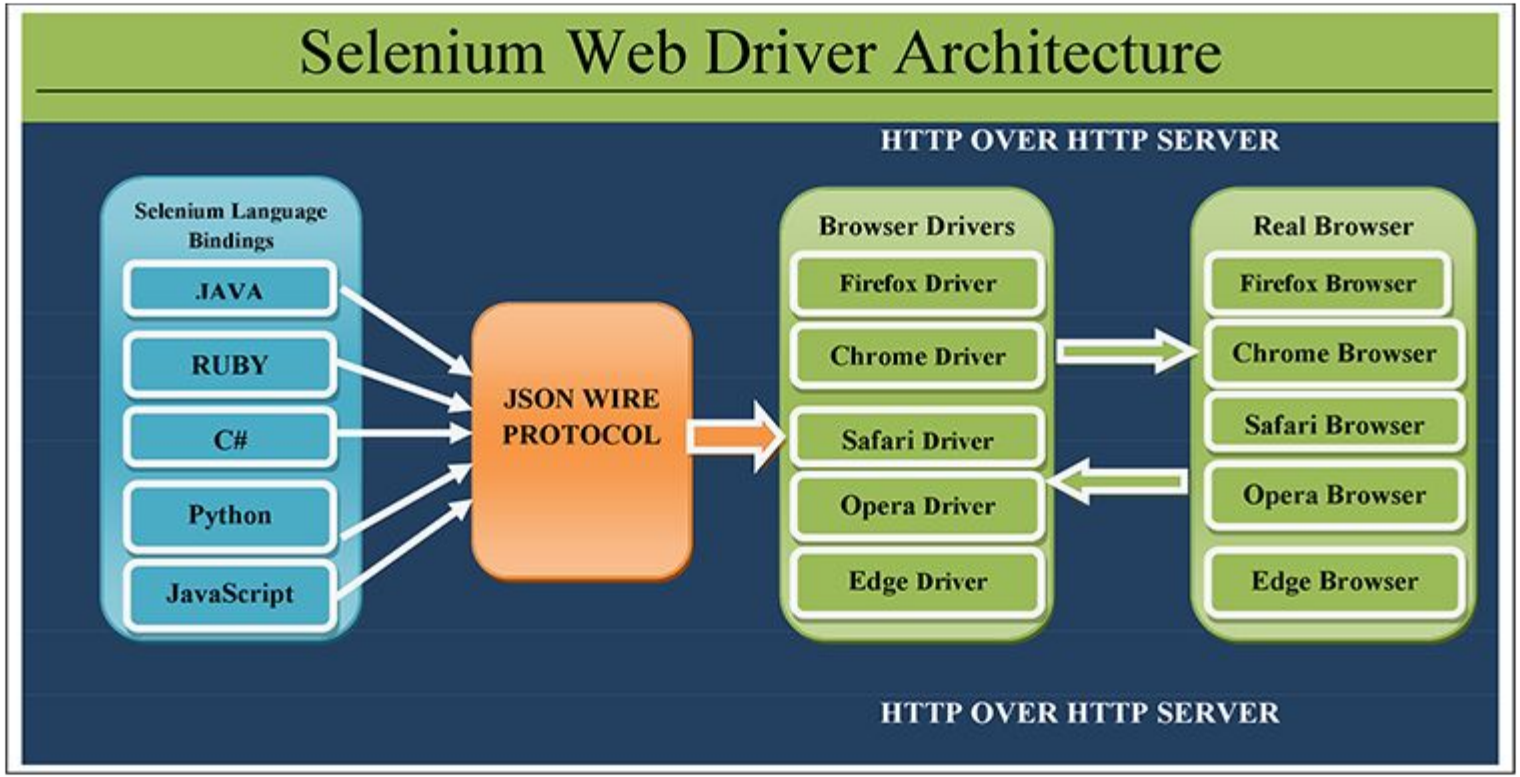
- Each browser contains separate browser driver. Browser drivers communicate with respective browser without revealing the internal logic of browser's functionality.
- When a browser driver is received any command then that command will be executed on the respective browser and the response will go back in the form of HTTP response.

Browsers

- Selenium supports multiple browsers such as Firefox, Chrome, IE, Safari etc.,

Example:

```
WebDriver driver  = new FirefoxDriver();
driver.get(https://www.google.com)
```


Selenium Web Driver Architecture
HTTP OVER HTTP SERVER
Selenium Language Bindings
JAVA
RUBY
C#
Python
JavaScript
JSON WIRE PROTOCOL
Browser Drivers
Firefox Driver
Chrome Driver
Safari Driver
Opera Driver
Edge Driver
Real Browser
Firefox Browser
Chrome Browser
Safari Browser
Opera Browser
Edge Browser
HTTP OVER HTTP SERVER

Selenium Setup Steps

1) Install Java - https://www.oracle.com/in/java/technologies/downloads/
2) Install Eclipse IDE - https://www.eclipse.org/downloads/
3) Any supported browser and install drivers
4) Associate Selenium to your java project

   https://www.selenium.dev/downloads/

Advantages of Selenium

- Free and Open Source
- Supports multiple languages
- Supports multiple browsers
- Supports almost every OS
- Integrated with CI/CD
- Run Tests Concurrently

Disadvantages of Selenium

- We can't perform regression testing and Re-testing
- Static actions like GUI testing and availability of fields is not possible
- Selenium has limited support for desktop applications, making it more suitable for web application testing.
- Maintenance efforts are required to update test scripts as web applications evolve and change.
- Dependency on browser updates can cause compatibility issues and require regular updates of Selenium drivers to ensure compatibility with the latest browser versions.
- It is not providing detailed test report to analyse bugs

Selenium

About Downloads Documentation Projects Support Blog English

+ − Browsers

Firefox

GeckoDriver is implemented and supported by Mozilla, refer to their documentation for supported versions.

Internet Explorer

Only version 11 is supported, and it requires additional configuration.

Safari

SafariDriver is supported directly by Apple, for more information, check their documentation

Opera

OperaDriver is supported by Opera Software, refer to their documentation for supported versions.

Chrome

ChromeDriver is supported by the Chromium project, please refer to their documentation for any compatibility information.

Edge

Microsoft is implementing and maintaining the Microsoft Edge WebDriver, please refer to their documentation for any compatibility information.

Selenium

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WebDriver scripts, you need to make use of language-specific client drivers.

While language bindings for other languages exist, these are the core ones that are supported by the main project hosted on GitHub.

.NET/C#

Stable: 4.27.0 (November 25, 2024)

Changelog

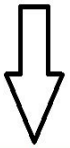
API Docs

Ruby

Stable: 4.27.0 (November 25, 2024)

Changelog

API Docs



Java

Stable: 4.27.0 (November 25, 2024)

Changelog

API Docs

Load web driver

- Meaning of driver is page where driver focus is available during runtime
- Selenium provided
  - firefox driver
  - chrome driver
  - safari driver
- All these classes are the implementation of interface/super class i.e.,web driver
- This web driver interface provided the common operations such as accessing web URL,navigating the browser, closing the browser and so on

```
// Set the path for the ChromeDriver

System.setProperty("webdriver.chrome.driver", "path/to/chromedriver");


// Create a new instance of the Chrome driver

WebDriver driver = new ChromeDriver();
```

Create selense commands: locators: by ID, name, class, tag name, XPath

Locator by ID

- This locator is used to locate an element by its **id** attribute
- The id is **unique** for each element on a webpage

Syntax - WebElement elementById = driver.findElement(By.id("elementId"));

Locator by Name

- This locator is used to find an element by its **name** attribute
- The name attribute can be shared by multiple elements, but it's often used for form fields

Syntax - WebElement elementByName = driver.findElement(By.id("elementName"));

Create selense commands: locators: by ID, name, class, tag name, XPath

Locator by Class Name

- This locator is used to find elements by their **class** attribute
- This can be useful when you want to select elements with a specific class, but be aware that multiple elements can share the same class.

Syntax - WebElement elementByClassName = driver.findElement(By.className("elementClass"));

Create selense commands: locators: by ID, name, class, tag name, XPath

Locator by Tag Name

- This locator is used to locate an element by its **tag** name (such as , <button>, <input>, etc.)

Syntax

WebElement elementByTagName = driver.findElement(By.tagName("div"));

Create selense commands: locators: by ID, name, class, tag name, XPath

Locator by XPath

- The locator is used to locate an element using an **XPath** expression.
- XPath allows for complex queries and is very flexible, but may be slower compared to other locators if not written optimally.
- This is faster in identifying element since we can use any property of element in xpath to make selenium to identify any element even without class, name or id attributes.

Syntax - WebElement elementByXPath = driver.findElement(By.xpath("//div[@class='example']"));

HTML Code Example

Html

```html
<!DOCTYPE html>
<html>
<head>
    <title>Sample Page</title>
</head>
<body>
    <h1 id="header">Welcome to My Page</h1>
    <input type="text" name="username" class="input-field" />
    <button class="btn-submit">Submit</button>
    <div class="container">
        <p>Sample Text</p>
        <a href="#" id="link">Click Me</a>
    </div>
</body>
</html>
```

```
import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.chrome.ChromeDriver;
public class SeleniumLocatorsExample{
        public static void main(String[] args) {
                        // Set the path for the ChromeDriver
                        System.setProperty("webdriver.chrome.driver", "path/to/chromedriver");

                        // Create a new instance of the Chrome driver
                        WebDriver driver = new ChromeDriver();

                        // Launch the URL of the HTML file
                        driver.get("path/to/your/htmlfile.html");

                        // Locate elements using different strategies
                        WebElement header = driver.findElement(By.id("header"));
                        WebElement username = driver.findElement(By.name("username"));
                        WebElement inputField = driver.findElement(By.className("input-field"));
                        WebElement button = driver.findElement(By.tagName("button"));
                        WebElement link = driver.findElement(By.xpath("//a[@id='link']"));

                        // Perform actions on the located elements (e.g., click, send keys, etc.)
                        username.sendKeys("myusername");
                        button.click();

                        // Close the browser
                        driver.quit();
                    }
                }
```

Add interactions: text box, radio button selection, check box selection, drop down item selection, keyboard actions, mouse actions, multi select

Text Box Interaction (Entering Text)

- You can send text to a text box using the sendKeys() method.

  ```
  WebElement textBox = driver.findElement(By.id("text-box-id"));
  textBox.sendKeys("Hello, Selenium!");
  ```

Radio Button Selection

- To select a radio button, find the radio button using a locator and click it.

  ```
  WebElement radioButton = driver.findElement(By.id("radio-button-id"));
  radioButton.click();
  ```

Add interactions: text box, radio button selection, check box selection, drop down item selection, keyboard actions, mouse actions, multi select

Checkbox Selection

- Similarly to radio buttons, checkboxes can be clicked to select or unselect.

  WebElement checkBox = driver.findElement(By.id("checkbox-id"));

  checkBox.click();

- If you need to check whether a checkbox is already selected, you can use the isSelected() method.

Usage of isSelected()

```
if (!checkBox.isSelected()) {
    checkBox.click();  // Click to select it
}
if (!checkBox.isSelected()) {
    checkBox.click();  // Click to select it
}
```

Add interactions: text box, radio button selection, check box selection, drop down item selection, keyboard actions, mouse actions, multi select

Dropdown Item Selection

- For dropdowns, you typically use the Select class provided by Selenium, which allows you to select options based on visible text, value, or index.

```
import org.openqa.selenium.support.ui.Select;

import org.openqa.selenium.WebElement;

WebElement dropdown = driver.findElement(By.id("dropdown-id"));

Select select = new Select(dropdown);

// Select by visible text

select.selectByVisibleText("Option 1");

// Select by value

select.selectByValue("option1");

// Select by index

select.selectByIndex(1);
```

Add interactions: text box, radio button selection, check box selection, drop down item selection, keyboard actions, mouse actions, multi select

Keyboard Actions

- Selenium provides the Actions class and the Keys class for keyboard-related interactions, such as pressing keys or performing key combinations.

  Pressing a Single Key:

  ```
  import org.openqa.selenium.Keys;

  import org.openqa.selenium.interactions.Actions;

  Actions actions = new Actions(driver);

  actions.sendKeys(Keys.ENTER).perform();
  ```

Add interactions: text box, radio button selection, check box selection, drop down item selection, keyboard actions, mouse actions, multi select

Keyboard Actions

- **Typing Text (Simulating a KeyPress):**

  WebElement inputField = driver.findElement(By.id("input-field-id"));

  inputField.sendKeys("Some text to type" + Keys.ENTER);

- **Pressing a Combination of Keys (e.g., Ctrl+C for Copy):**

actions.keyDown(Keys.CONTROL).sendKeys("c").keyUp(Keys.CONTROL).perform();

Add interactions: text box, radio button selection, check box selection, drop down item selection, keyboard actions, mouse actions, multi select

Mouse Actions (Click, Move, Hover, Drag & Drop)

- Selenium's Actions class provides methods for mouse actions like click, move, hover, and drag-and-drop.

Click on an Element:

```
WebElement element = driver.findElement(By.id("button-id"));

Actions actions = new Actions(driver);

actions.click(element).perform();
```

Mouse Actions (Click, Move, Hover, Drag & Drop)

Hover over an Element (Mouseover):

```
WebElement element = driver.findElement(By.id("hover-element-id"));

Actions actions = new Actions(driver);

actions.moveToElement(element).perform();
```

Drag and Drop:

```
WebElement source = driver.findElement(By.id("source-id"));

WebElement target = driver.findElement(By.id("target-id"));

Actions actions = new Actions(driver);

actions.dragAndDrop(source, target).perform();
```

Mouse Actions (Click, Move, Hover, Drag & Drop)

Multi-Select Dropdown (Handling Multiple Selections)

For multi-select dropdowns, you can use the Select class to select multiple options.

```
WebElement multiSelectDropdown =
driver.findElement(By.id("multi-select-dropdown-id"));

Select select = new Select(multiSelectDropdown);

// Check if it supports multiple selections

if (select.isMultiple()) {

    select.selectByIndex(0);

    select.selectByVisibleText("Option 2");

    select.selectByValue("option3"); }
```

```
import org.openqa.selenium.*;
import org.openqa.selenium.support.ui.*;
import org.openqa.selenium.interactions.Actions;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.chrome.ChromeDriver;

public class SeleniumInteractions {
    public static void main(String[] args) {
        WebDriver driver = new ChromeDriver();

        driver.get("http://example.com");

        // Text Box Interaction
        WebElement textBox = driver.findElement(By.id("text-box-id"));
        textBox.sendKeys("Hello, Selenium!");

        // Radio Button Interaction
        WebElement radioButton = driver.findElement(By.id("radio-button-id"));
        radioButton.click();

        // Checkbox Interaction
        WebElement checkBox = driver.findElement(By.id("checkbox-id"));
        if (!checkBox.isSelected()) {
            checkBox.click();
        }

        // Dropdown Interaction
        WebElement dropdown = driver.findElement(By.id("dropdown-id"));
        Select select = new Select(dropdown);
        select.selectByVisibleText("Option 1");

        // Keyboard Action (e.g., Enter key)
        WebElement inputField = driver.findElement(By.id("input-field-id"));
        inputField.sendKeys("Some text" + Keys.ENTER);

        // Mouse Hover Action
        WebElement hoverElement = driver.findElement(By.id("hover-element-id"));
        Actions actions = new Actions(driver);
        actions.moveToElement(hoverElement).perform();

        // Multi-select Dropdown Interaction
        WebElement multiSelectDropdown = driver.findElement(By.id("multi-select-dropdown-id"));
        Select multiSelect = new Select(multiSelectDropdown);
        if (multiSelect.isMultiple()) {
            multiSelect.selectByIndex(1);
            multiSelect.selectByValue("option2");
        }

        driver.quit();
    }
}
```

Summary of the Methods:

- **Text Box:** sendKeys()
- **Radio Button:** click()
- **Checkbox:** click() and isSelected()
- **Dropdown:** Select class (with methods like selectByVisibleText(), selectByIndex(), etc.)
- **Keyboard:** sendKeys() and Actions class (keyDown(), keyUp(), sendKeys() with Keys)
- **Mouse Actions:** Actions class (click(), moveToElement(), dragAndDrop())
- **Multi-select Dropdown:** Select class with isMultiple() and selectBy*() methods

Session 3

- Introduction to delivery pipeline
- Introduction to Jenkins
- Jenkins management
- Adding slave node to Jenkins
- Building a delivery pipeline
- Selenium integration with Jenkins

Introduction to Jenkins

- Jenkins is an open source automation server which enables developers around the world to reliably build, test, and deploy their software.
- Jenkins can be installed through native system packages, Docker, or even run standalone by any machine with a Java Runtime Environment (JRE) installed.
- It provides a streamlined, efficient, and consistent way to deliver software from development to production, ensuring higher quality, faster delivery, and easier collaboration among teams.

Introduction to Jenkins

- It run test and build like JAR, Trigger the job automatically
- Its primary focus is to keep track of the version control system and initiate and monitor a build system if there are any changes

Example - If your team is developing a project, Jenkins will continuously test your project builds and show you the errors in early stages of your development

Advantages of Jenkins

Continuous Integration and Continuous Delivery

As an extensible automation server, Jenkins can be used as a simple CI server or turned into the continuous delivery hub for any project.

Easy installation

Jenkins is a self-contained Java-based program, ready to run out-of-the-box, with packages for Windows, Linux, macOS and other Unix-like operating systems.

Advantages of Jenkins

Easy configuration

Jenkins can be easily set up and configured via its web interface, which includes on-the-fly error checks and built-in help

Plugins

With hundreds of plugins in the Update Center, Jenkins integrates with practically every tool in the continuous integration and continuous delivery toolchain.

Advantages of Jenkins

Extensible

Jenkins can be extended via its plugin architecture, providing nearly infinite possibilities for what Jenkins can do.

Distributed

Jenkins can easily distribute work across multiple machines, helping drive builds, tests and deployments across multiple platforms faster.

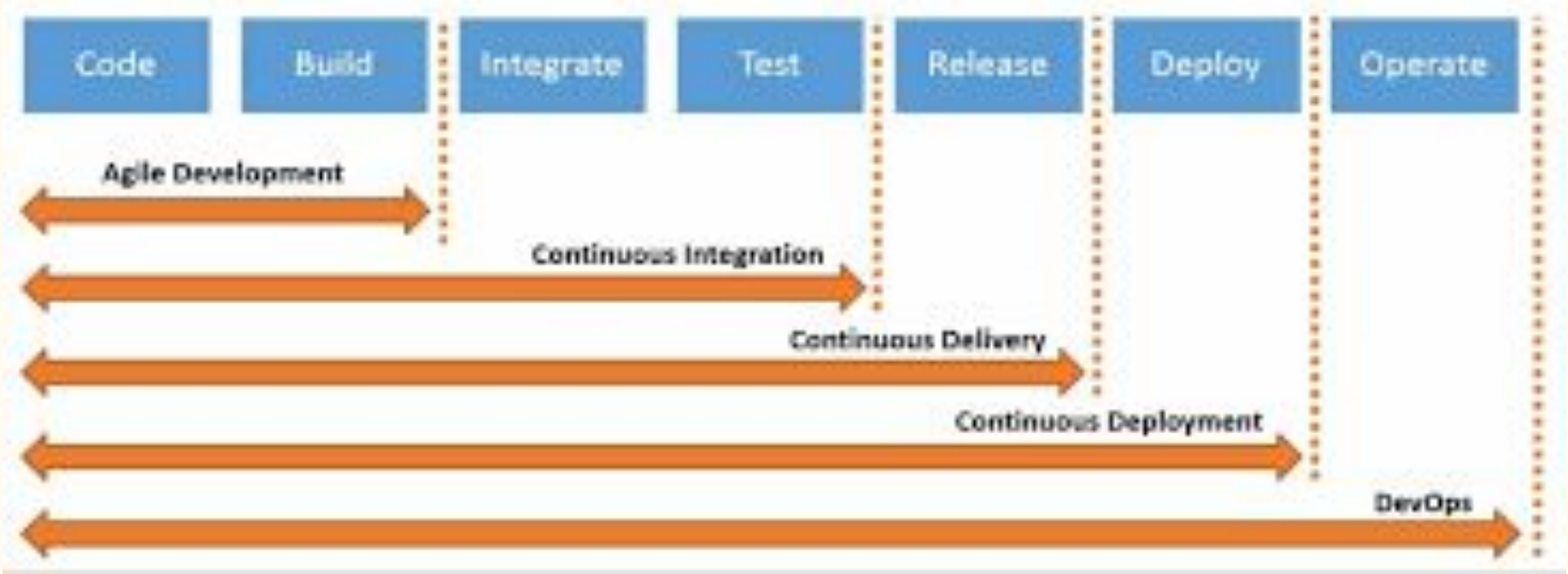
Introduction to delivery pipeline

- A delivery pipeline is a key component of **Continuous Integration (CI)** and **Continuous Delivery (CD)**, which are practices within the **DevOps** culture aimed at automating software delivery and improving operational efficiency
- This process involves building the software in a reliable and repeatable manner, as well as progressing the built software (called a "build") through multiple stages of testing and deployment.
- **Jenkins Pipeline** (or simply "Pipeline" with a capital "P") is a suite of plugins which supports implementing and integrating continuous delivery pipelines into Jenkins.
- **Tools** - Bamboo, TeamCity

Features of Pipeline:

- **Code**: Pipelines are implemented in code and typically checked into source control, giving teams the ability to edit, review, and iterate upon their delivery pipeline.
- **Durable**: Pipelines can survive both planned and unplanned restarts of the Jenkins controller.
- **Pausable**: Pipelines can optionally stop and wait for human input or approval before continuing the Pipeline run.
- **Versatile**: Pipelines support complex real-world CD requirements, including the ability to fork/join, loop, and perform work in parallel.
- **Extensible**: The Pipeline plugin supports custom extensions to its DSL [1] and multiple options for integration with other plugins.

Introduction to delivery pipeline



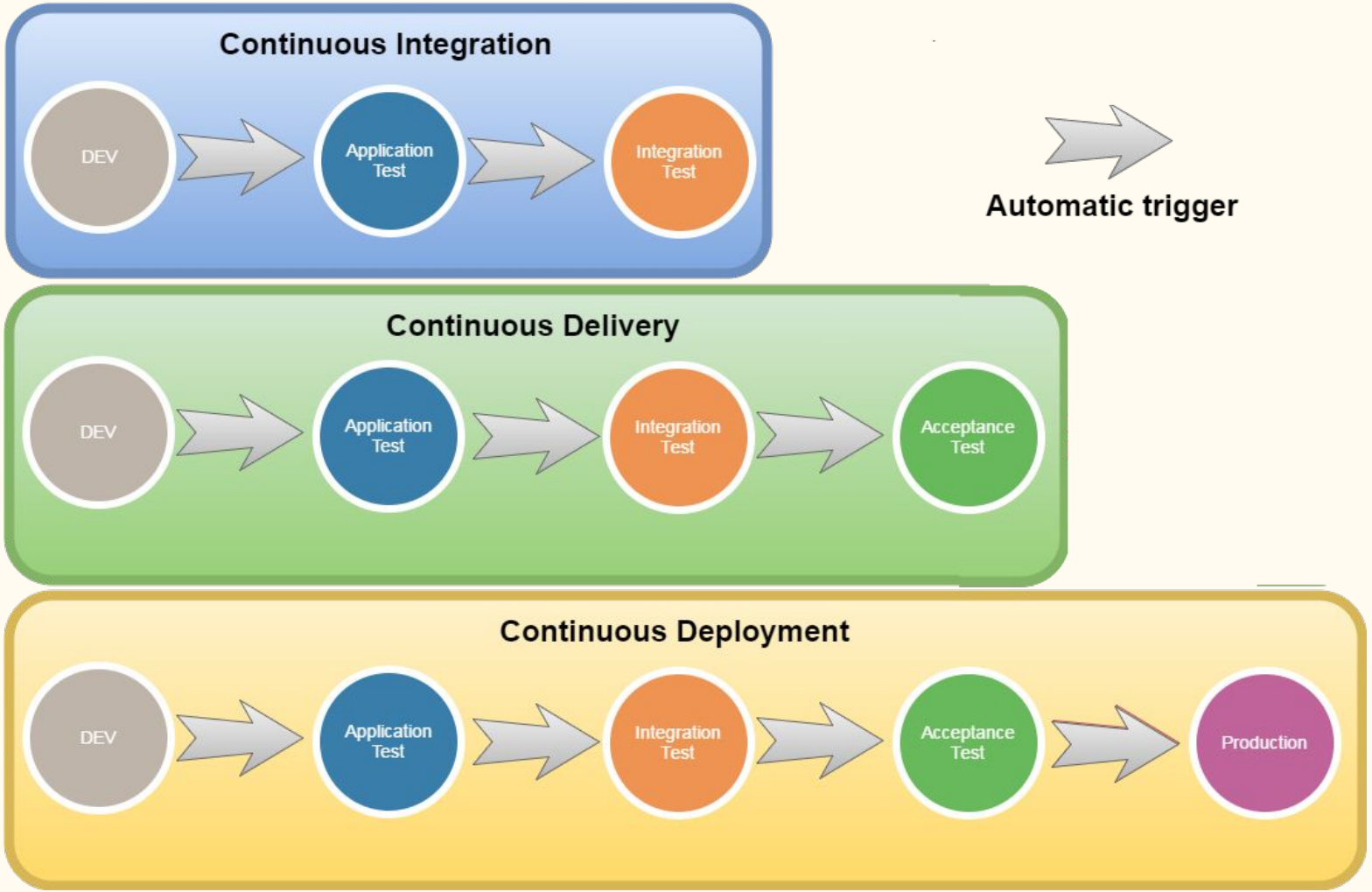
Continuous Integration (CI) and Continuous Deployment

Continuous Integration

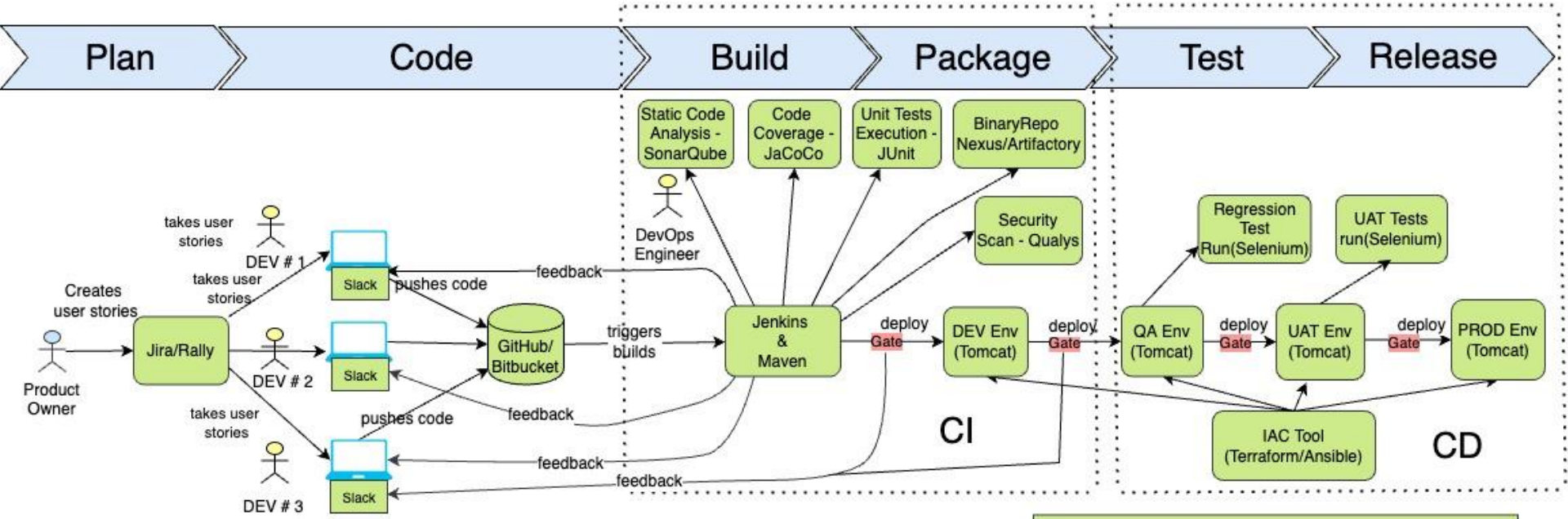
- Continuous Integration is about how developers integrate code using a shared repository multiple times a day with the help of automation.

Continuous Delivery

- It is about automatically releasing software to the test or produce environment


Continuous Integration
DEV
Application Test
Integration Test
Automatic trigger
Continuous Delivery
DEV
Application Test
Integration Test
Acceptance Test
Continuous Deployment
DEV
Application Test
Integration Test
Acceptance Test
Production

Agile Development with DevOps - CICD Process Flow Diagram



Continuous integration?

1. Continuously integrate and merge code changes frequently
2. Find out bugs early in software development stages
3. Make frequent releases possible
4. Make Continuous testing possible
5. Encourage good coding practices

Sample Gating Criteria for DEV/QA/UAT/PROD deployment

1. 100% unit test executions pass
2. At least 80% code coverage
3. No critical defects/vulnerabilities in code

Milestones:

1. Automated builds
2. Automated unit tests execution
3. Automated code quality checks
4. Automated code coverage checks
5. Automated security scanning
6. Automated deployments with gating
7. Automated feedback to prod teams
8. Automated Binary storage into Repo manager
9. Automated Infrastructure setup

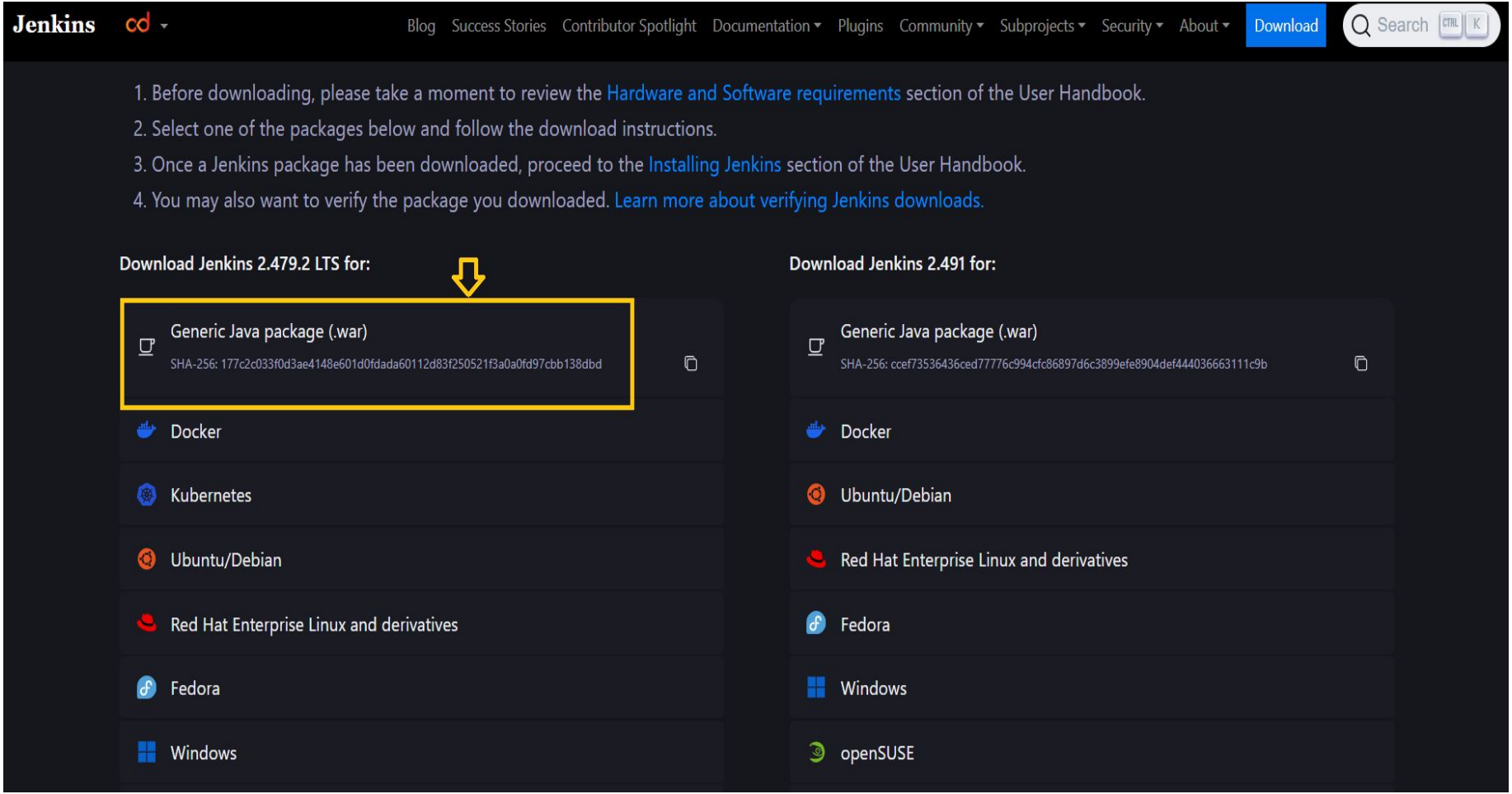
Installation of Jenkins

Java - https://www.oracle.com/in/java/technologies/downloads/

Jenkins - https://www.jenkins.io/download/

https://www.jenkins.io/doc/pipeline/tour/hello-world/

https://www.javatpoint.com/installing-jenkins-on-windows

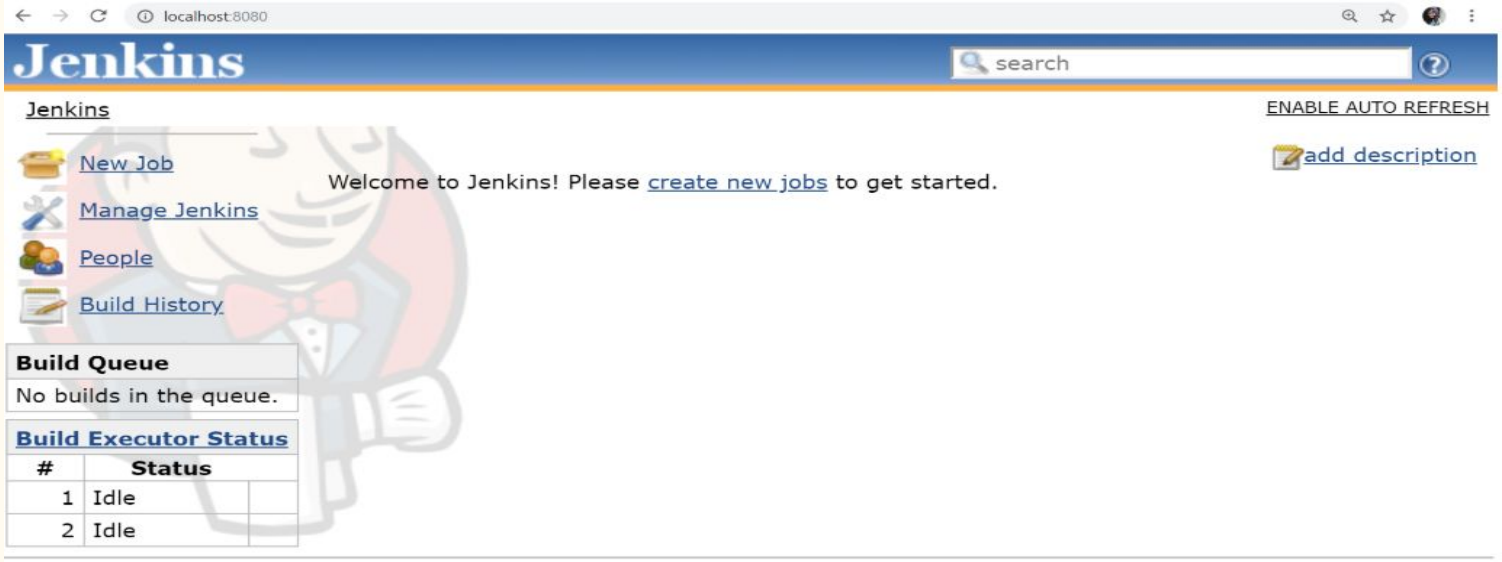

Jenkins
Blog
Success Stories
Contributor Spotlight
Documentation
Plugins
Community
Subprojects
Security
About
Download
Search
1. Before downloading, please take a moment to review the Hardware and Software requirements section of the User Handbook.
2. Select one of the packages below and follow the download instructions.
3. Once a Jenkins package has been downloaded, proceed to the Installing Jenkins section of the User Handbook.
4. You may also want to verify the package you downloaded. Learn more about verifying Jenkins downloads.
Download Jenkins 2.479.2 LTS for:
Generic Java package (.war)
SHA-256: 177c2c033f0d3ae4148e601d0fdada60112d83f250521f3a0a0fd97cbb138dbd
Docker
Kubernetes
Ubuntu/Debian
Red Hat Enterprise Linux and derivatives
Fedora
Windows
Download Jenkins 2.491 for:
Generic Java package (.war)
SHA-256: ccef73536436ced77776c994cfc86897d6c3899efe8904def444036663111c9b
Docker
Ubuntu/Debian
Red Hat Enterprise Linux and derivatives
Fedora
Windows
openSUSE

Starting Jenkins

Open the command prompt and go to the directory where the Jenkins.war file is located. And then run the following command:

C:/Java -jar Jenkins.war

When you run this command, various tasks will run, one of which is the extraction of the war file which is done by an embedded webserver called winstone.



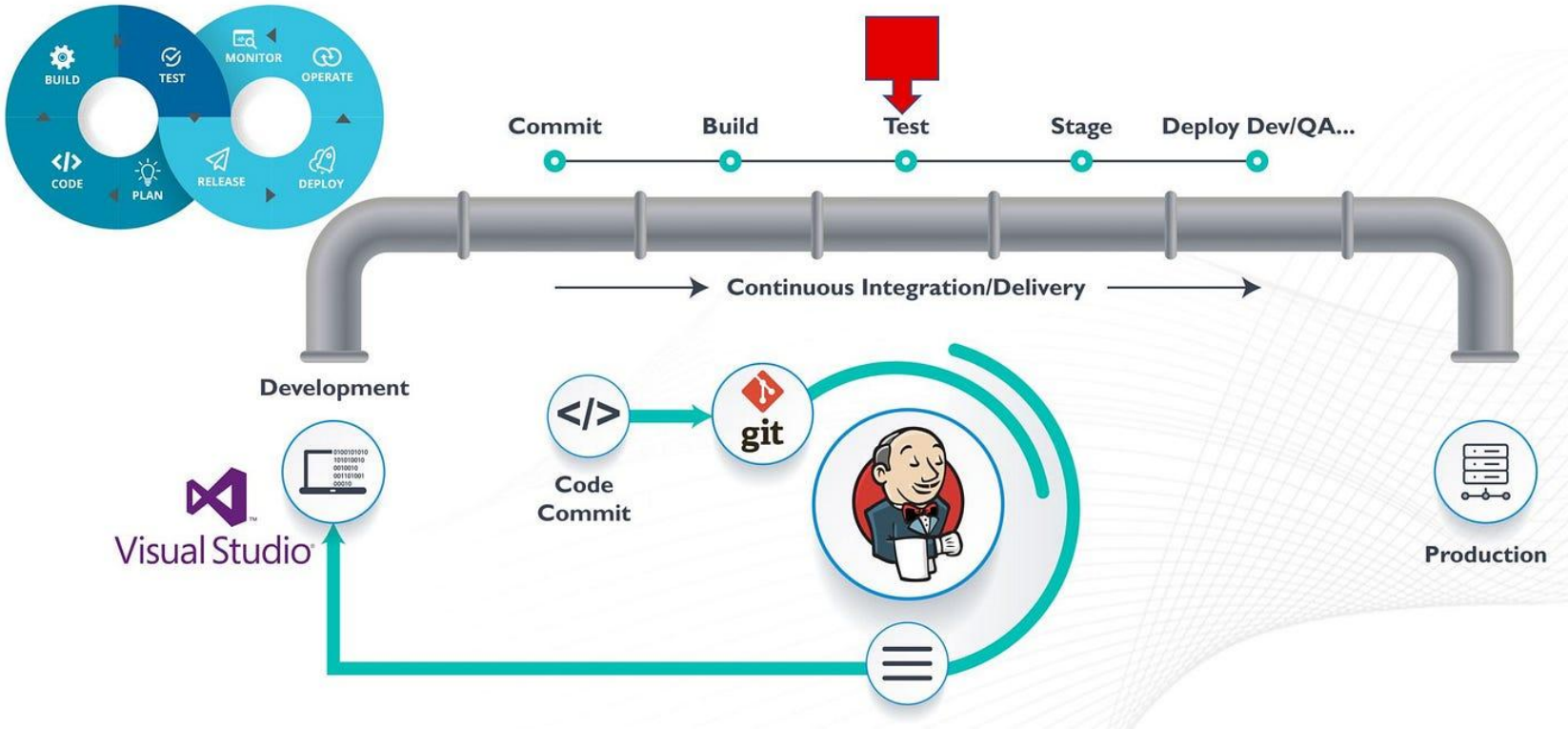
Now you can access the Jenkins. Open your browser and type the following url on your browser:

http://localhost:8080

How does Jenkins work?

Jenkins Continuous Integration Pipeline is a powerful instrument that consists of a set of tools designed to **host**, **monitor**, **compile** and **test** code, or code changes, like:

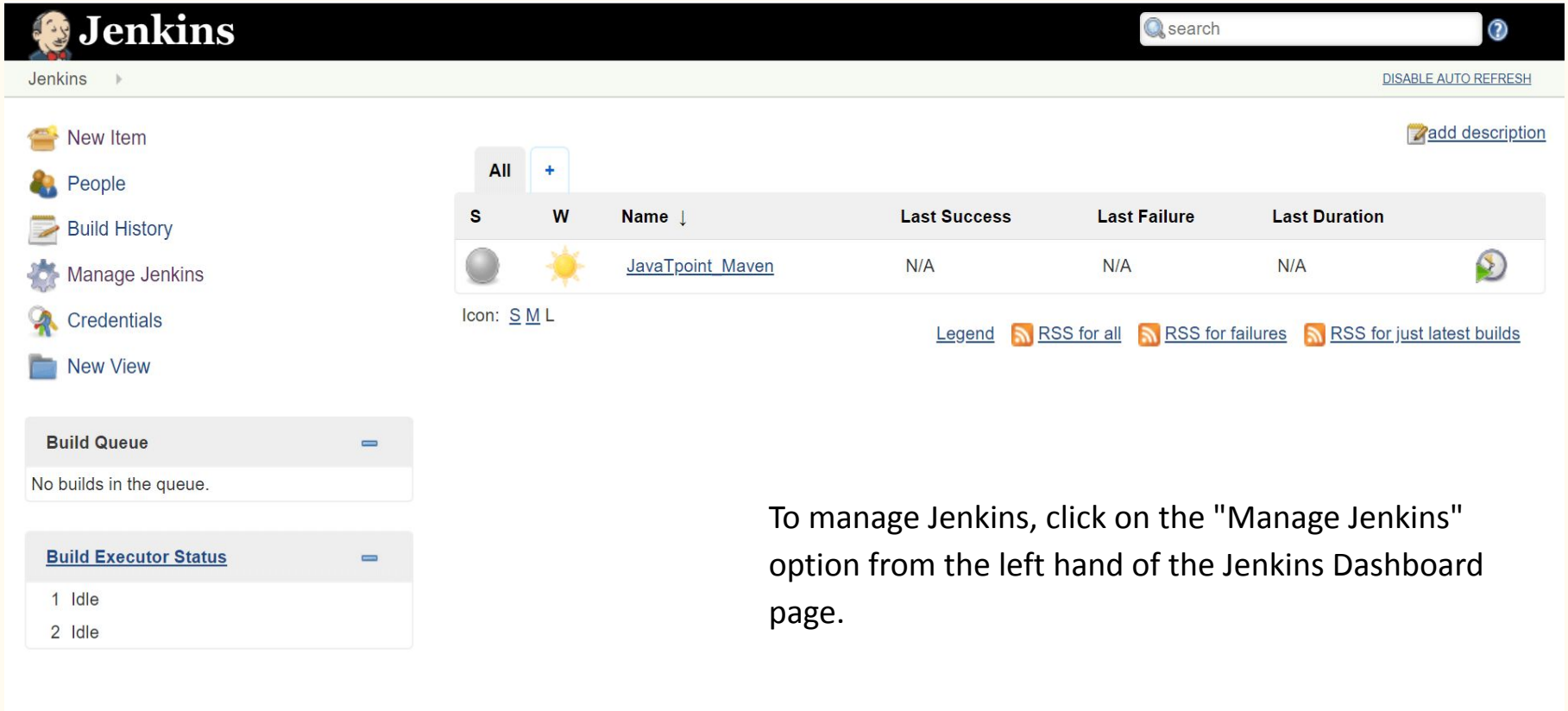
- **Continuous Integration Server** (Jenkins, Bamboo, CruiseControl, TeamCity, and others)
- **Source Control Tool** (e.g., CVS, SVN, GIT, Mercurial, Perforce, ClearCase and others)
- **Build tool** (Make, ANT, Maven, Ivy, Gradle, and others)
- **Automation testing framework** (Selenium, Appium, TestComplete, UFT, and others)


BUILD
TEST
MONITOR
OPERATE
CODE
PLAN
RELEASE
DEPLOY
Commit
Build
Test
Stage
Deploy Dev/QA...
Continuous Integration/Delivery
Development
Visual Studio
Code
Commit
git
Production

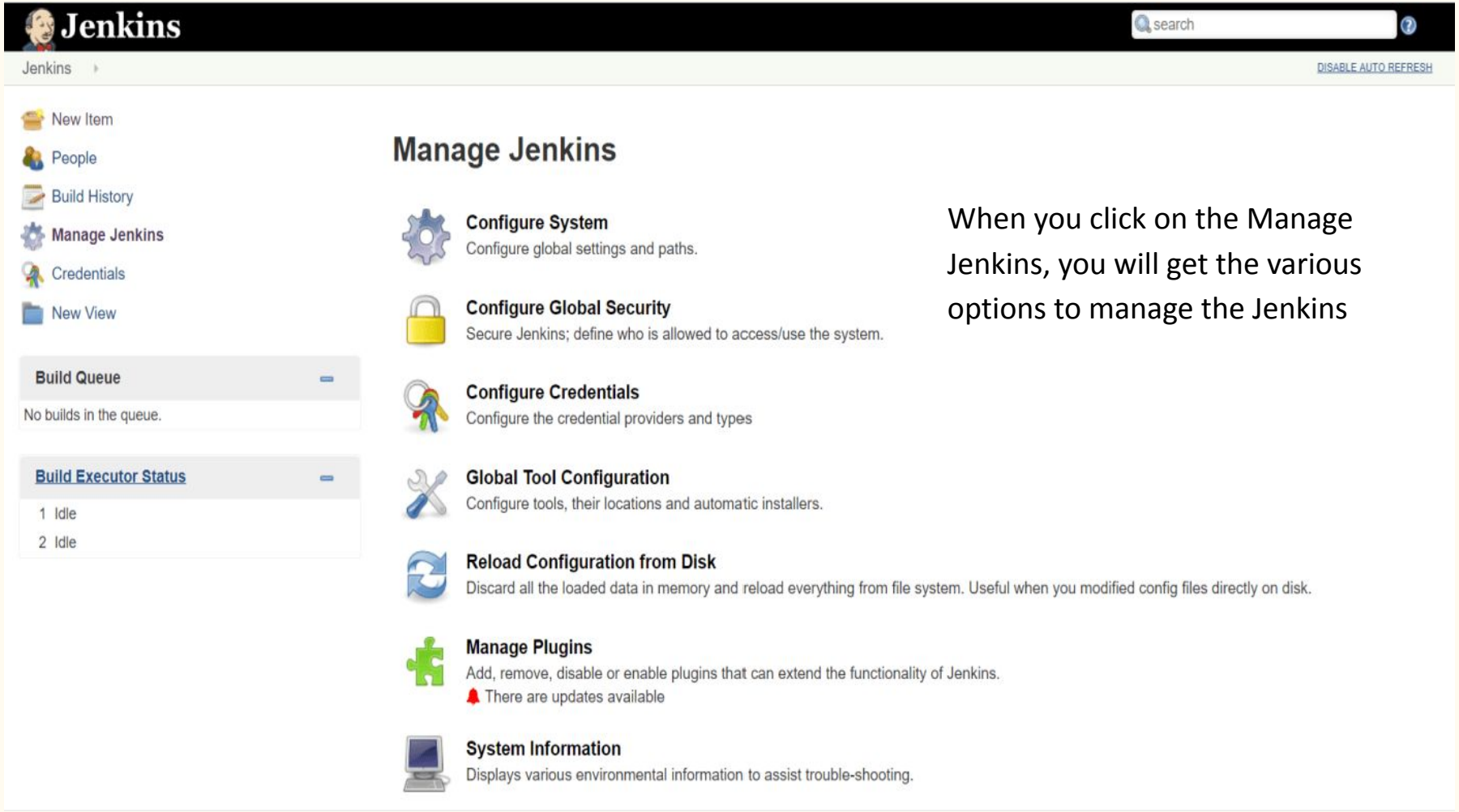
Jenkins Plugins

- By default, Jenkins comes with a limited set of features.
- If you want to integrate your Jenkins installation with version control tools like Git, then you need to install plugins related to Git.
- In fact, for integration with tools like Maven, Amazon EC2, you need to install respective plugins in your Jenkins.

Jenkins Management



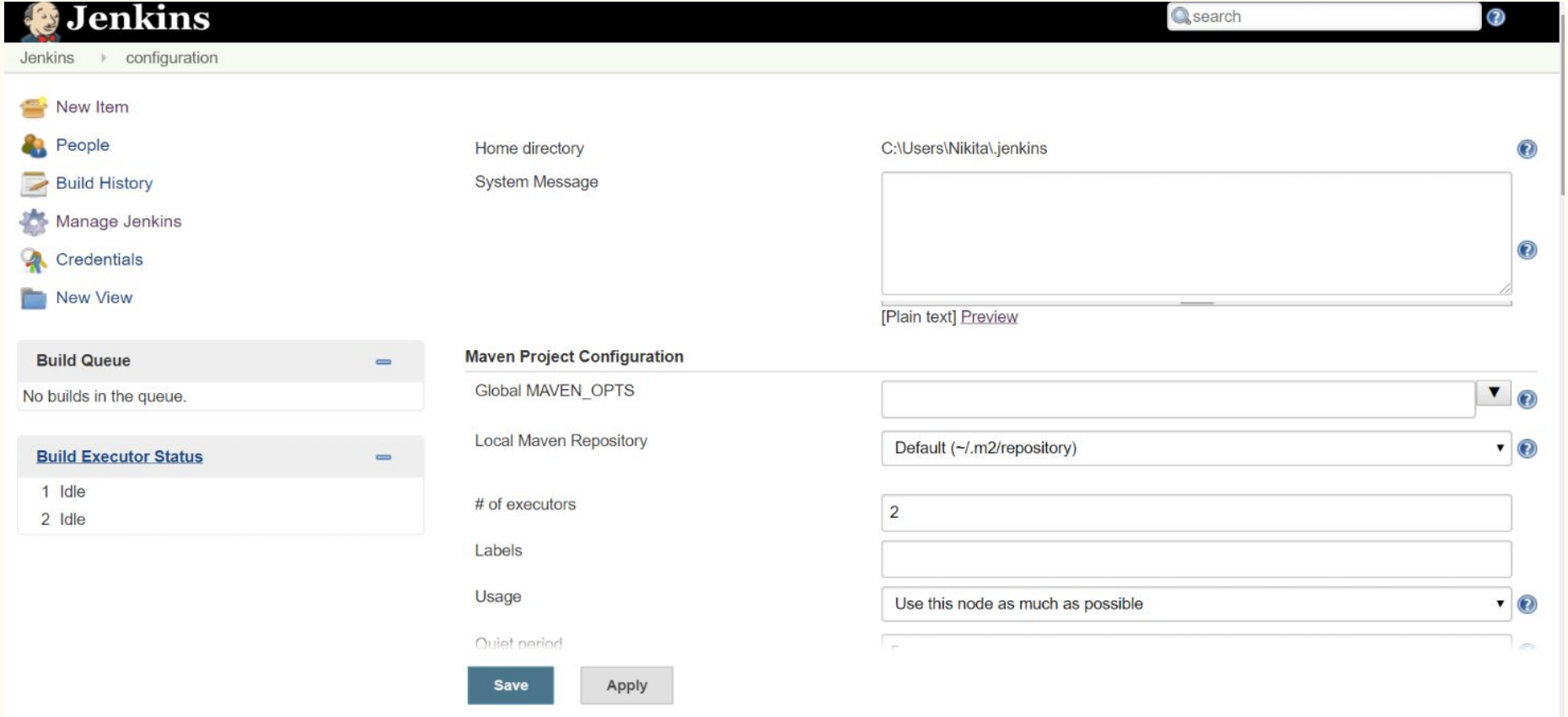
To manage Jenkins, click on the "Manage Jenkins" option from the left hand of the Jenkins Dashboard page.



When you click on the Manage Jenkins, you will get the various options to manage the Jenkins

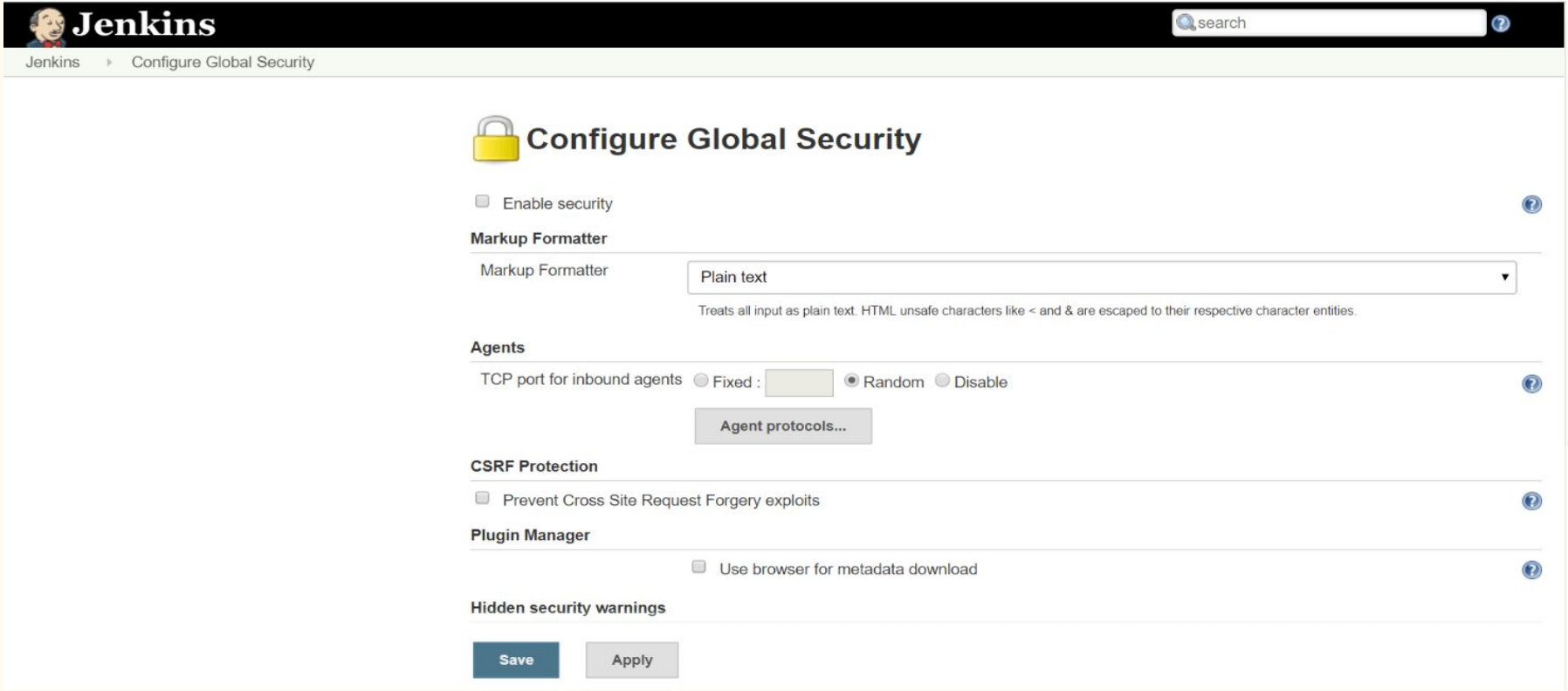
Configure System

In this, we can manage paths to the various tools to use in builds, such as the versions of Ant and Maven, as well as security options, email servers, and other system-wide configuration details. Jenkins will add the required configuration fields dynamically when new plugins are installed.



Configure Global Security

Configure Global Security option provides the ability to set up users and their relevant permissions on the Jenkins instance. By default, you will not want everyone to be able to define builds or other administrative tasks in Jenkins. So Jenkins provides the ability to have a security configuration in place.

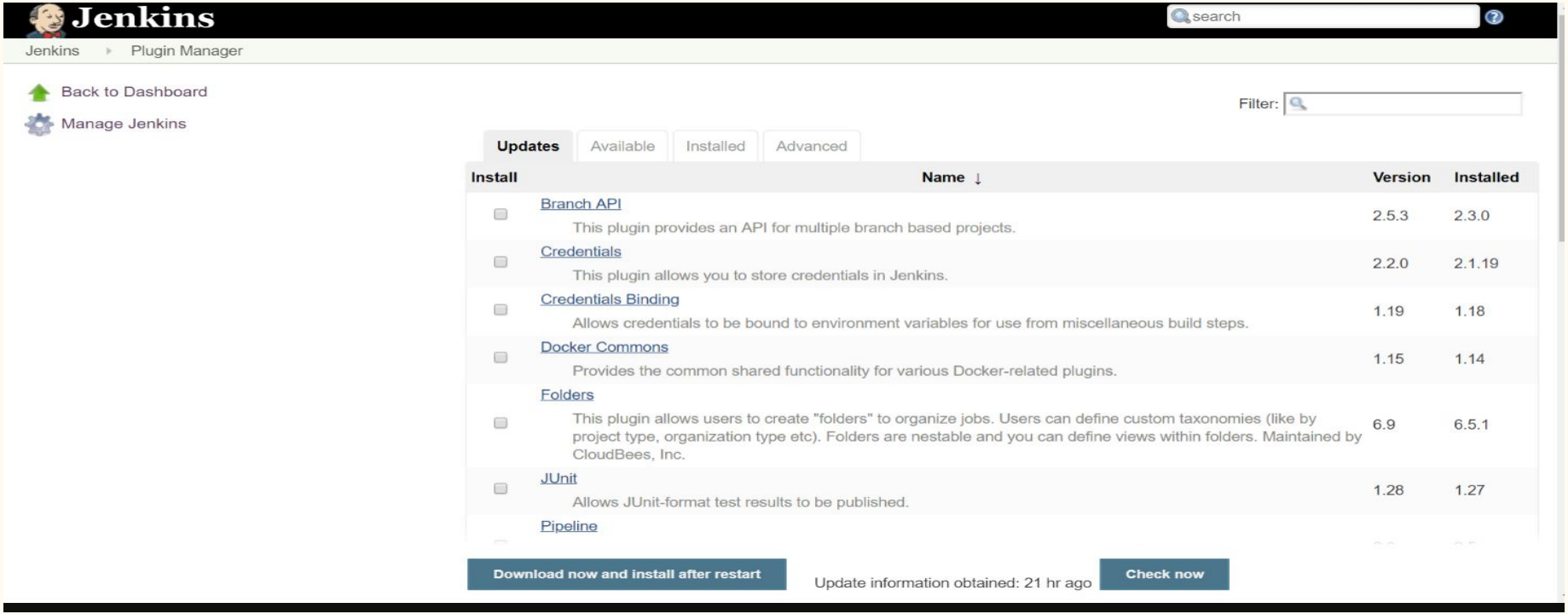


Reload Configuration from Disk

- Jenkins stores all its system and job configuration details as XML files and all XML files are stored in the Jenkins home directory.
- Jenkins also stores all of the build histories.
- If you are moving build jobs from one Jenkins instance to another or archiving old build jobs, you will have to insert or remove the corresponding build job directories to Jenkins's builds directory.
- You do not have to take Jenkins offline to do this?you can simply use the "Reload Configuration from Disk" option to reload the Jenkins system and build job configurations directly.

Manage Plugin

Here you can install a wide or different variety of third-party plugins from different Source code management tools such as Git, ClearCase or Mercurial, to code quality and code coverage metrics reporting. We can download, install, update, or remove the plugins from the Manage Plugins screen.



System Information

This option displays a list of all the current Java system properties and system environment variables. Here you can check what version of Java is currently running in, what user it is running under, and so forth.

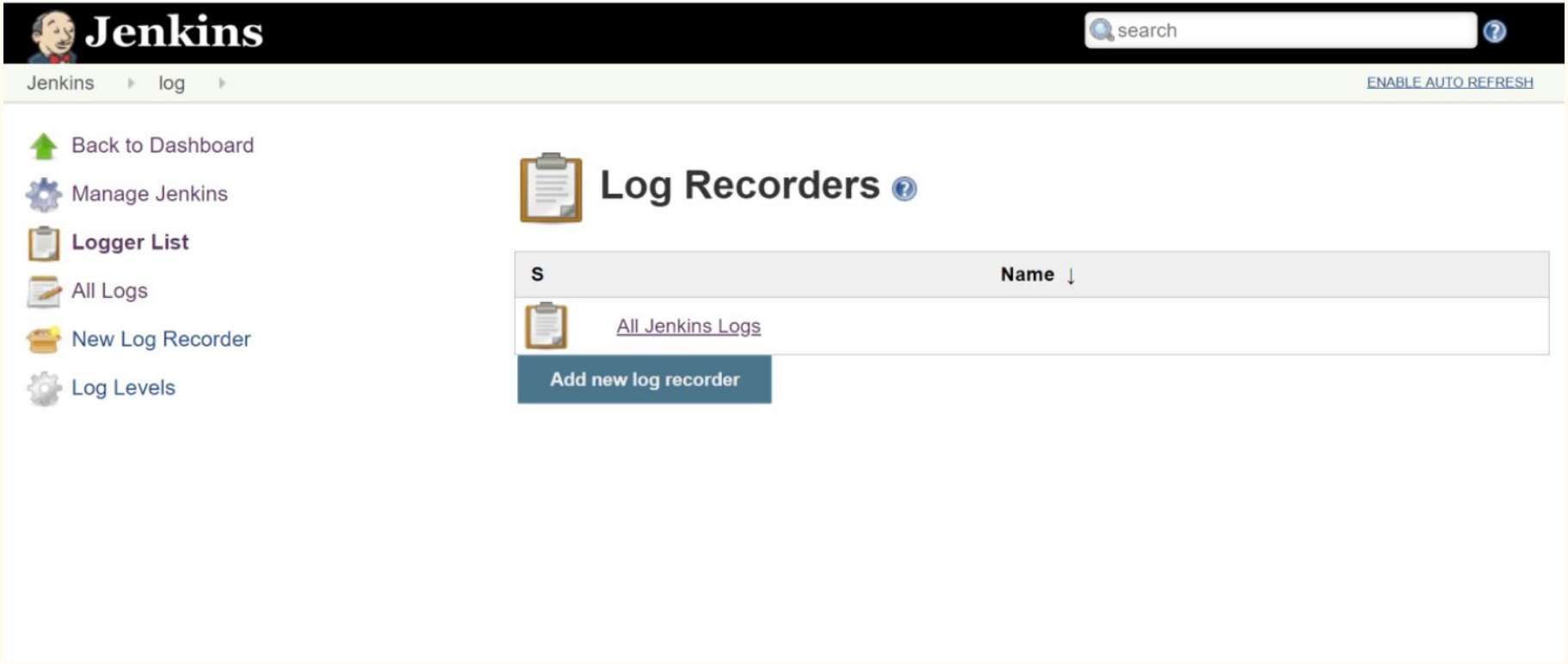
ENABLE AUTO REFRESH

System Properties

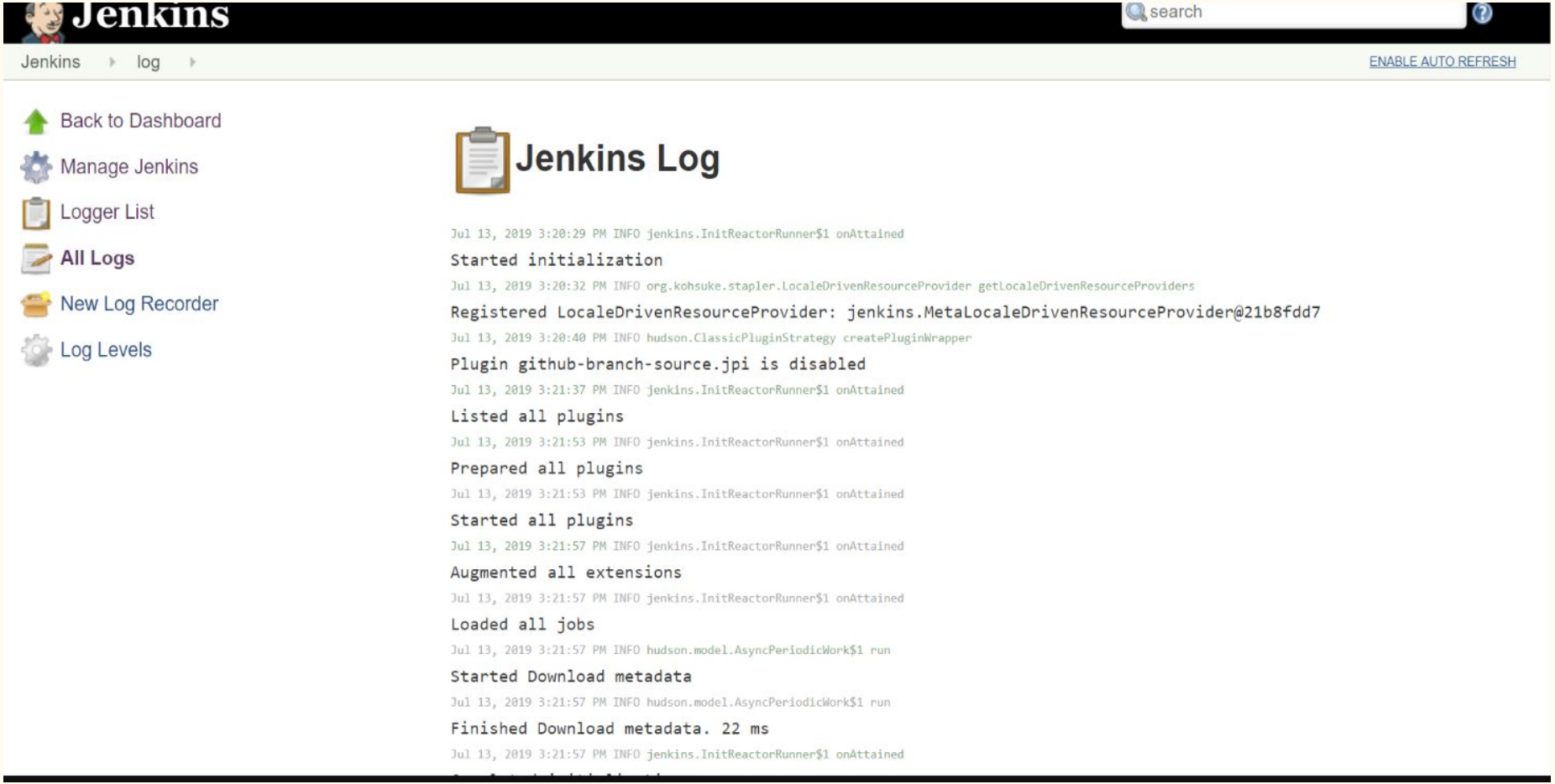
Name ↓	Value
awt.toolkit	sun.awt.windows.WToolkit
catalina.base	C:\apache-tomcat-9.0.21
catalina.home	C:\apache-tomcat-9.0.21
catalina.useNaming	true
common.loader	"${catalina.base}/lib","${catalina.base}/lib/*.jar","${catalina.home}/lib","${catalina.home}/lib/*.jar"
file.encoding	Cp1252
file.encoding.pkg	sun.io
file.separator	\
ignore.endorsed.dirs	
java.awt.graphicsenv	sun.awt.Win32GraphicsEnvironment
java.awt.printerjob	sun.awt.windows.WPrinterJob
java.class.path	c:\apache-tomcat-9.0.21\bin\bootstrap.jar;c:\apache-tomcat-9.0.21\bin\tomcat-juli.jar

System Log

The System Log option is used to view the Jenkins log files in real time. As well as, the main use of this option is for troubleshooting.

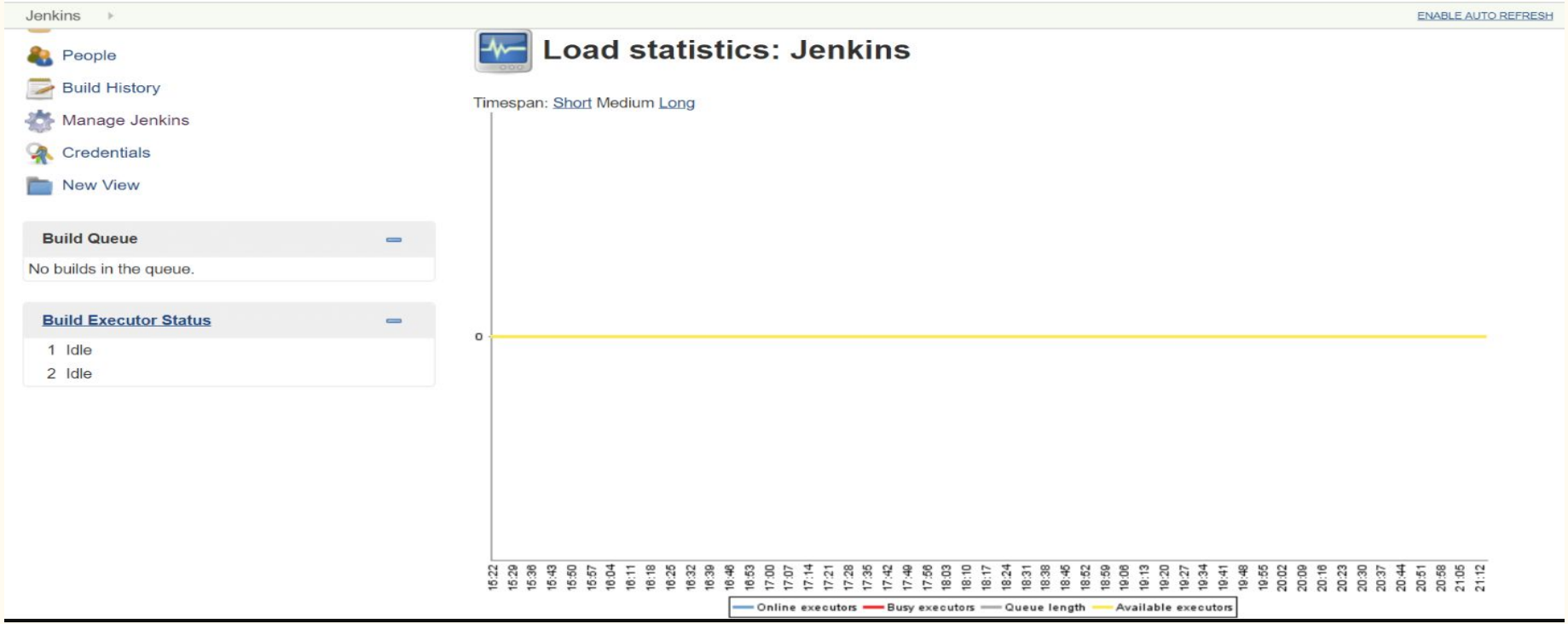


To see the logs click on the 'All Jenkins Logs'.



Load Statistics

This option is used to see the graphical data on how busy the Jenkins instance is in terms of the number of concurrent builds and the length of the build queue which provides an idea of how long your builds need to wait before being executed. These statistics can show you a good idea of whether extra capacity or extra build nodes are required from an infrastructure perspective.

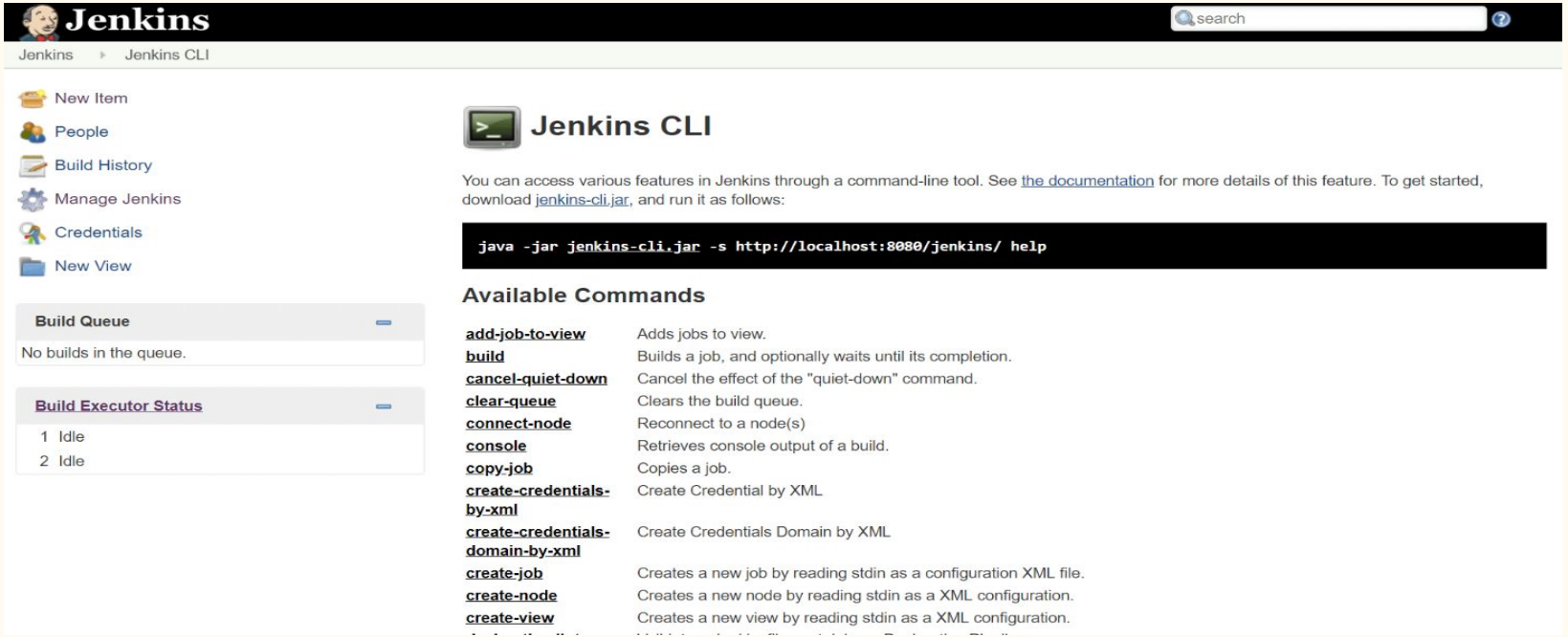


Jenkins CLI

Using this option, you can access various features in Jenkins through a command-line. To run the Jenkins through cli, first you have to download the Jenkins-cli.jar file and run it on your command prompt as follows:

java -jar jenkins-cli.jar -s *http://localhost:8080/jenkins/*

This page gives the list of available commands with their description.

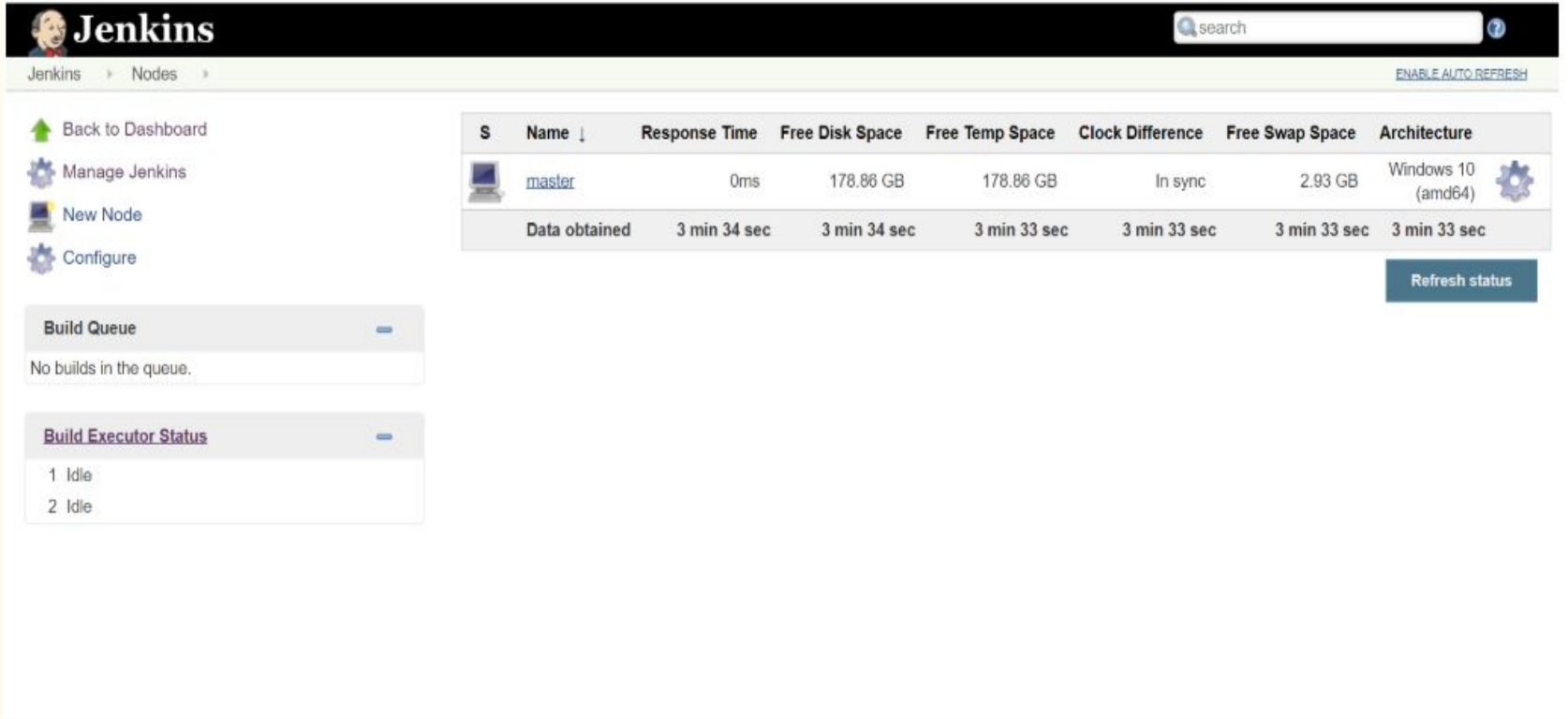


Script Console

This option allows you to run Groovy scripts on the server. This option is very useful for advanced troubleshooting since it requires a strong knowledge of the internal Jenkins architecture.

Manage nodes

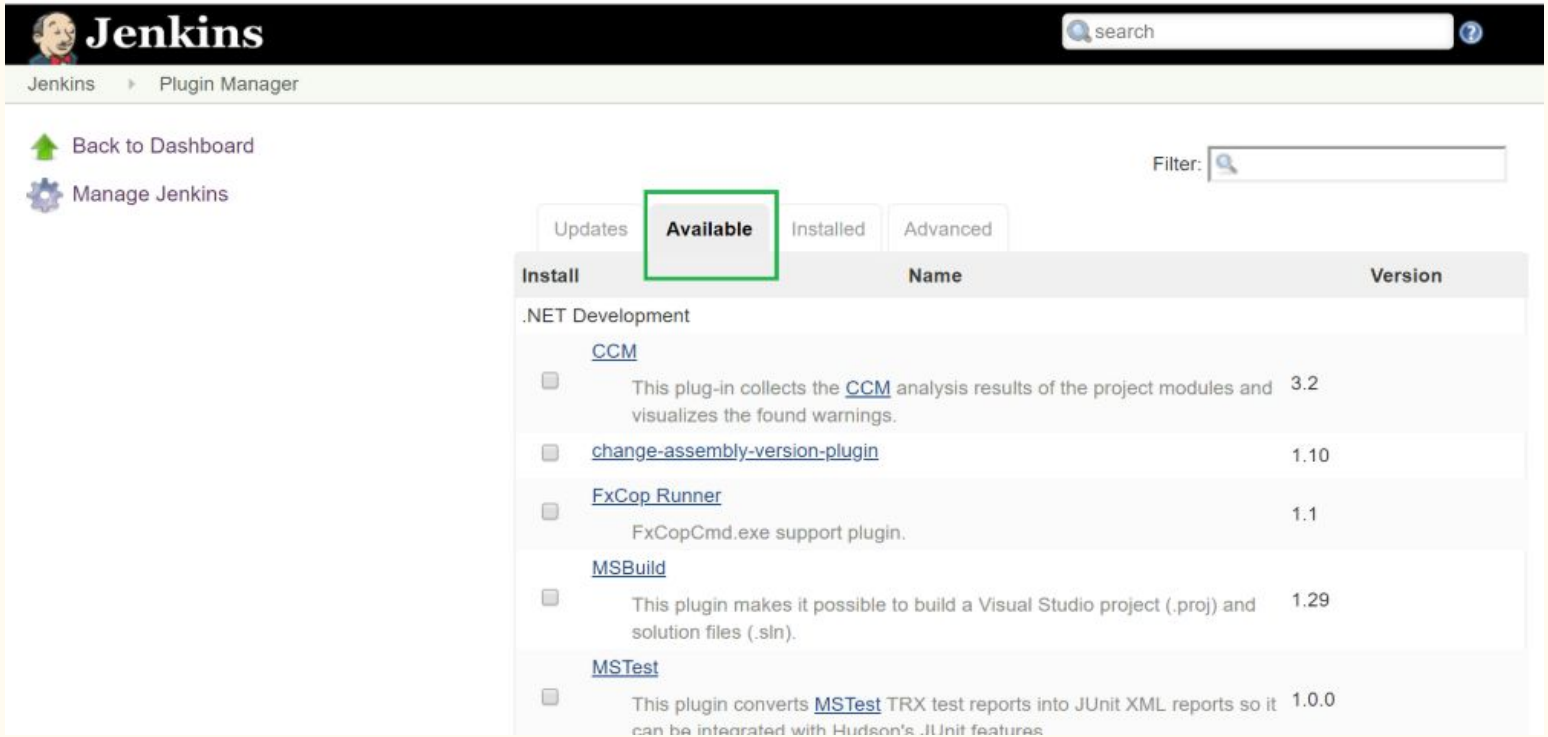
Jenkins can handle parallel and distributed builds. In this page, you can configure how many builds you want. Jenkins runs concurrently, and, if you are using distributed builds, set up builds nodes. A build node (slave) is another machine that Jenkins can use to execute its builds.



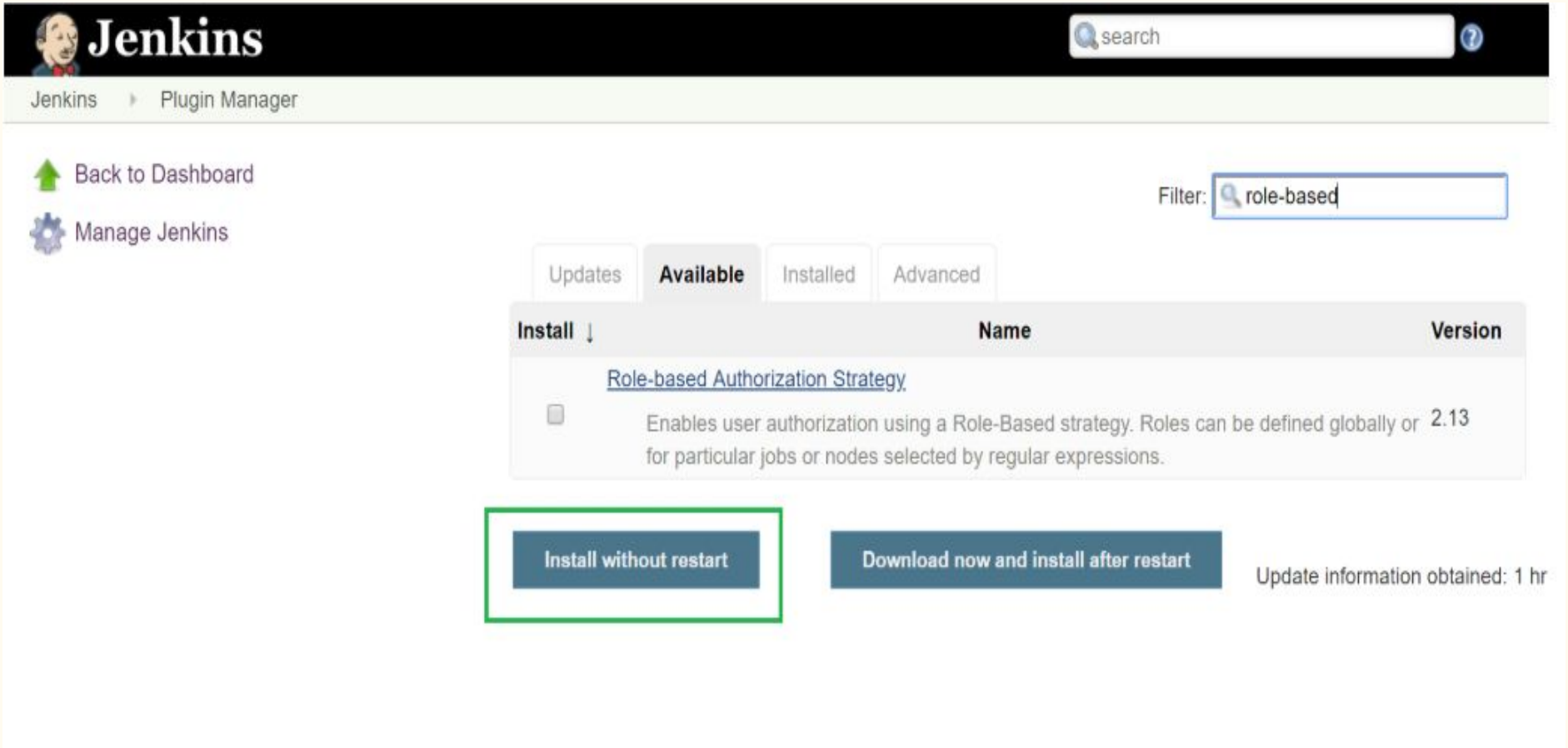
Create and Manage Users in Jenkins

Step 1: Open your Jenkins dashboard by visiting http://localhost:8080/jenkins

Step 2: Click on 'Manage Jenkins' and select the 'Available' tab.



Step 3: On the filter option, type "role-based" and press Enter.

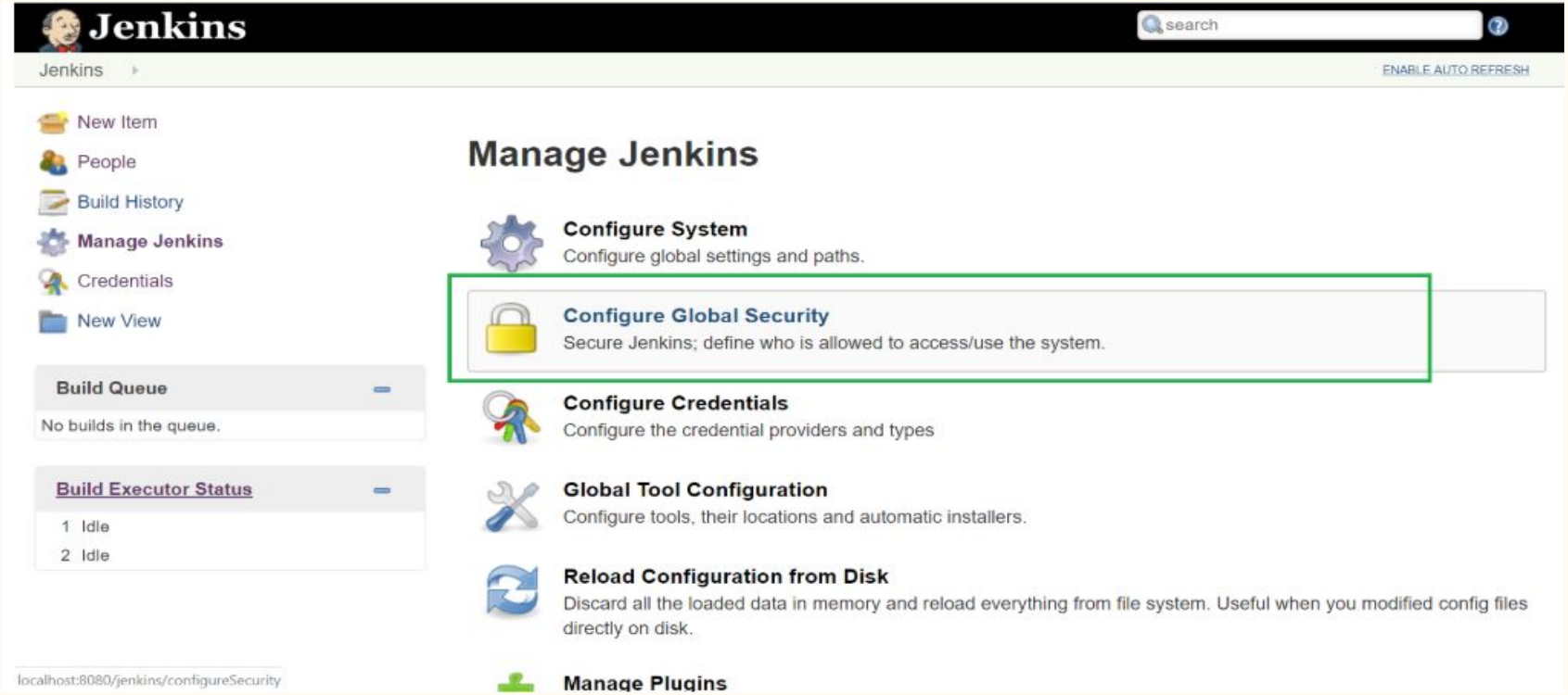


Step 4: Now, select the plugin and click on 'Install without restart' button.

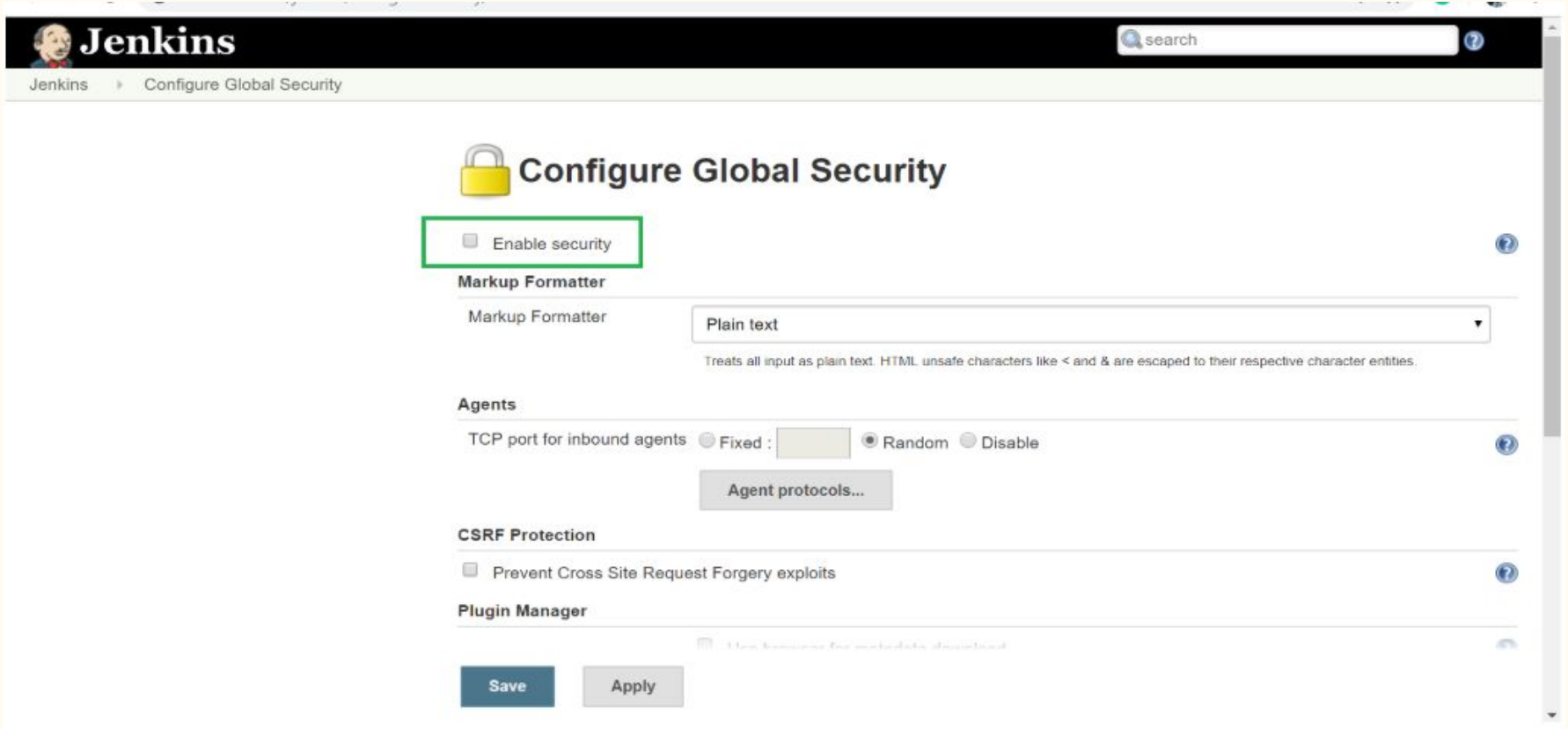
Step 5: Click on 'Go back to the top page'.

Enable Role-Based Strategy on Jenkins

Step 1: After Plugin installation, go to the 'Manage Jenkins' and then click on 'Configure Global Security'.



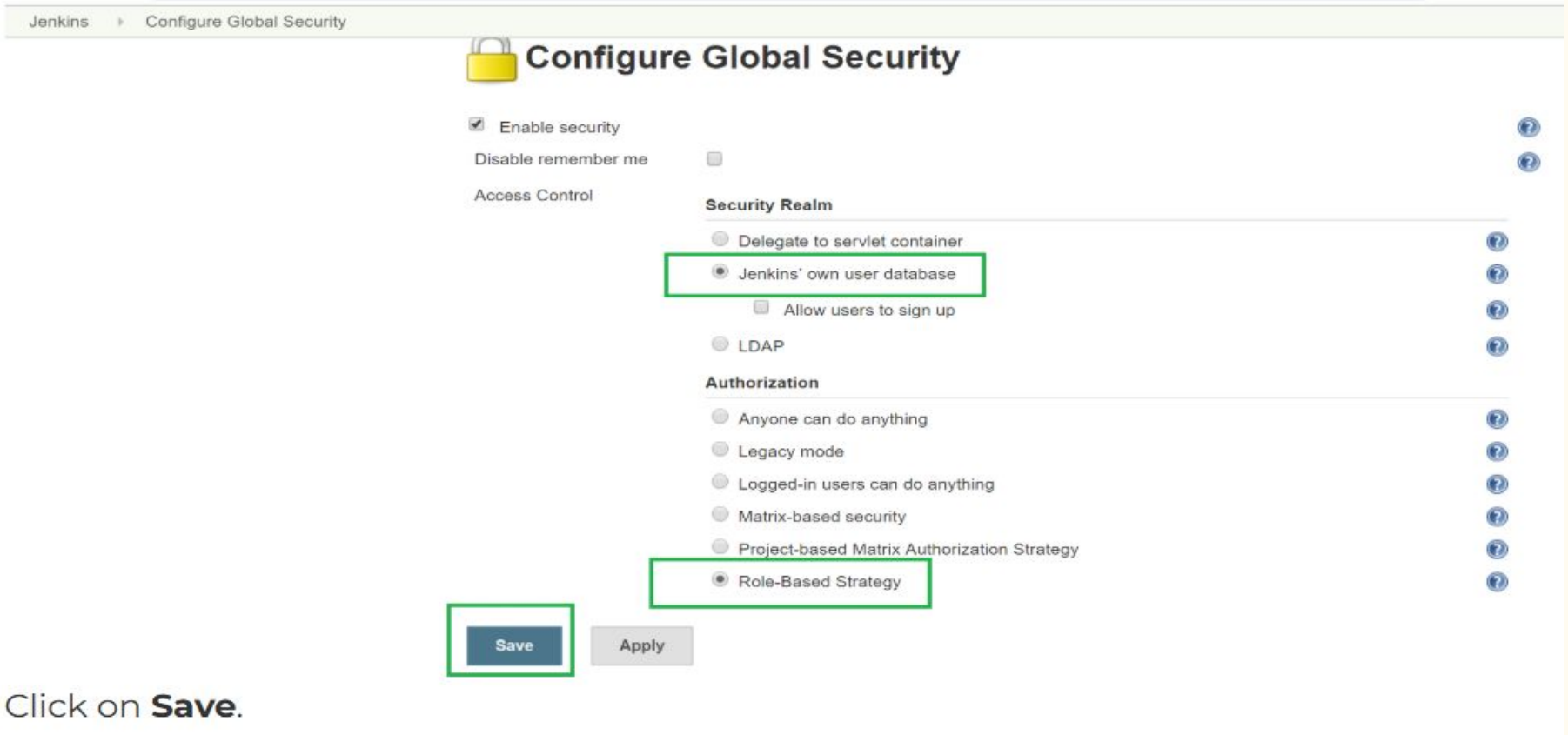
When you click the Configure Global Security option then you will see the following page:



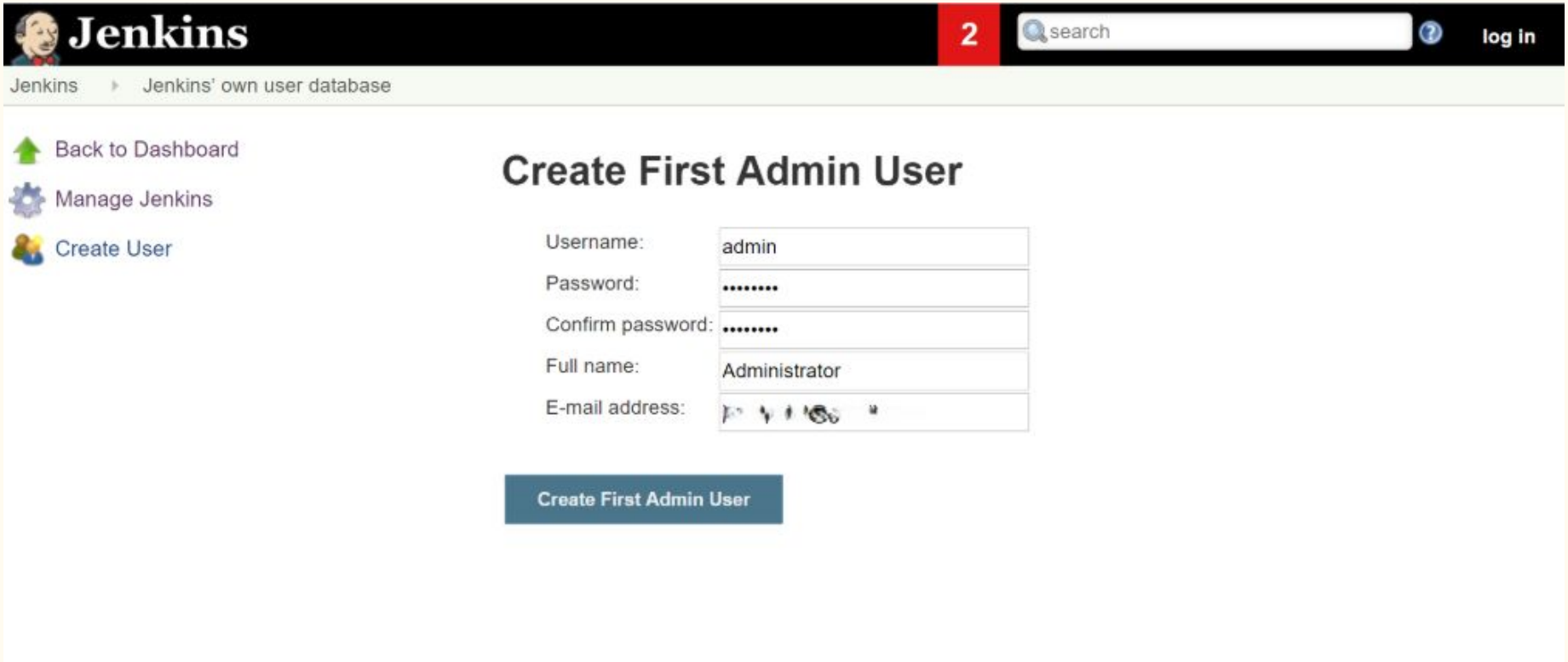
Check on Enable security option.

Step 2: On the Security Realm section, select 'jenkins' own user database'.

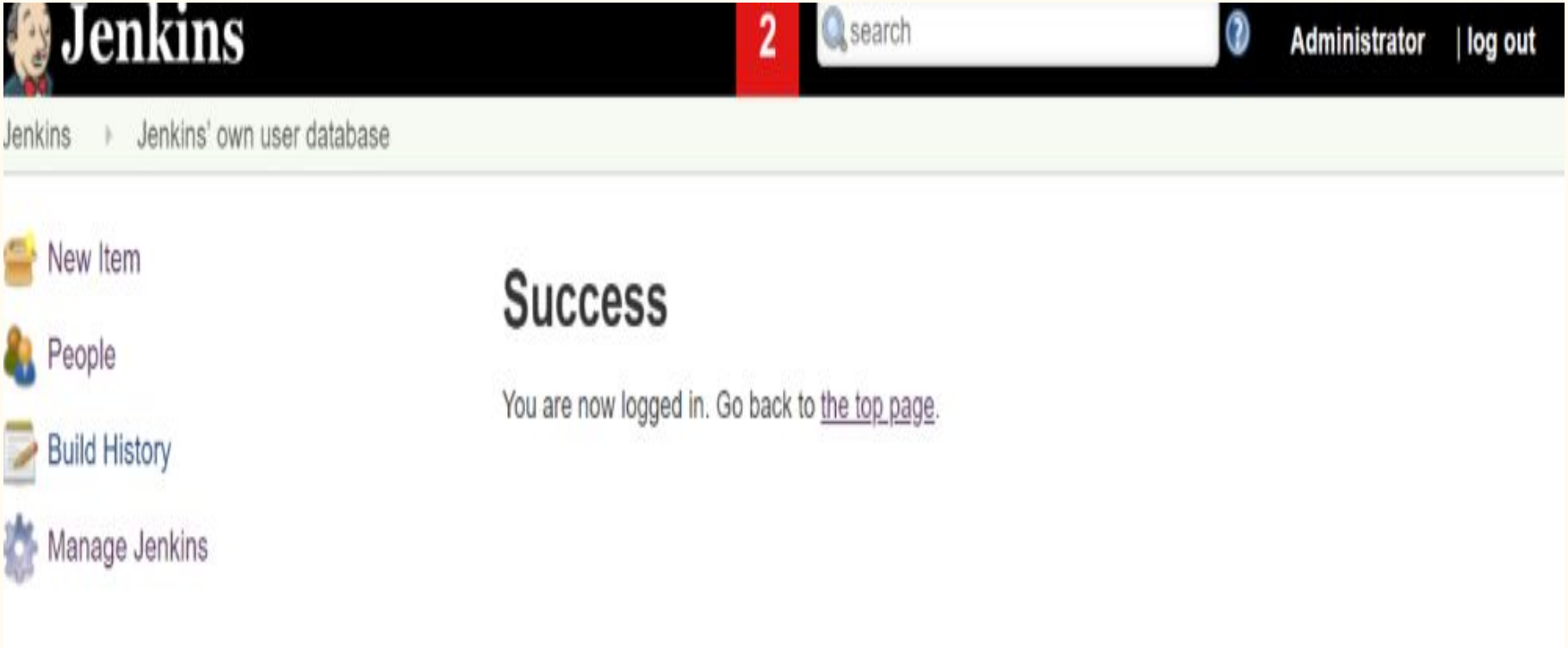
On Authorization section, select 'Role-Based Strategy'.



Step 3: You will be prompted to add your first user. Here, we are setting up an admin user for the system.

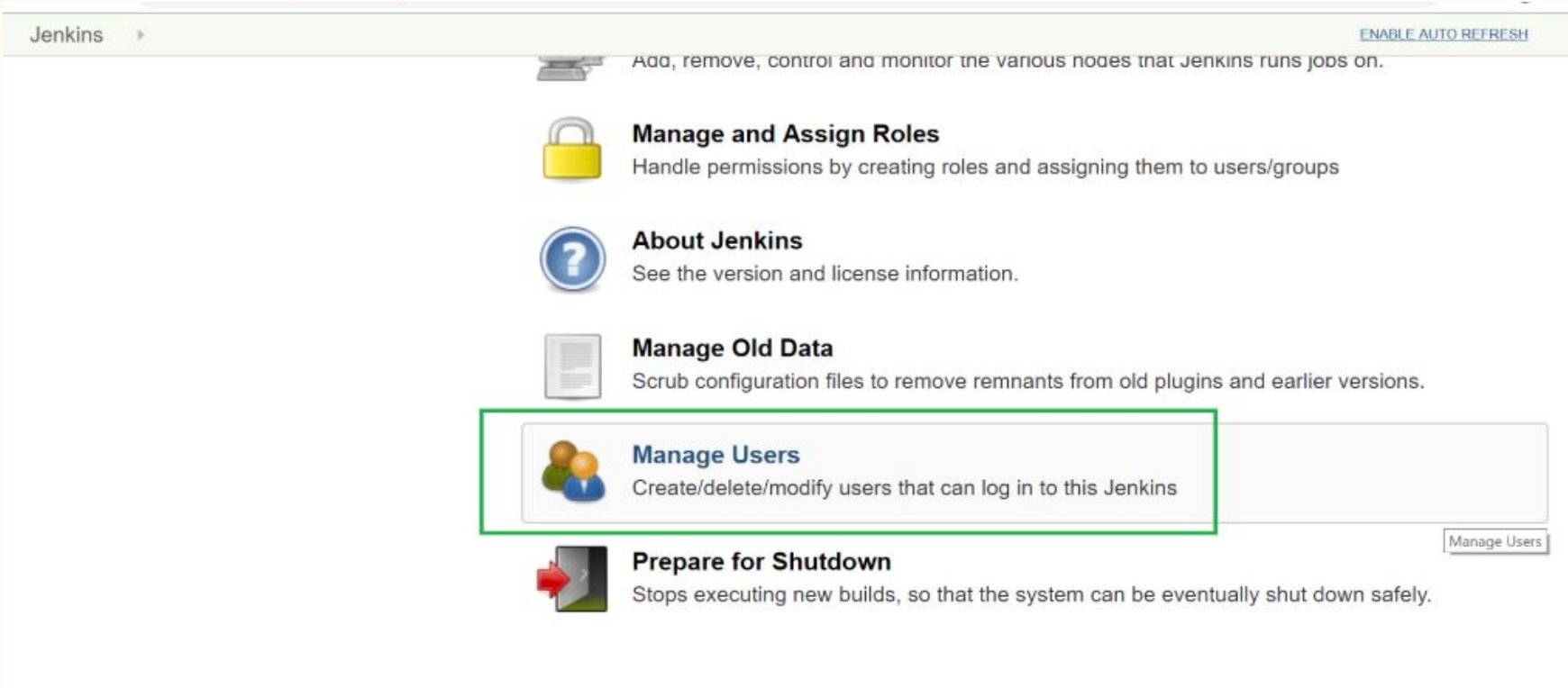


Click on Create First Admin User.



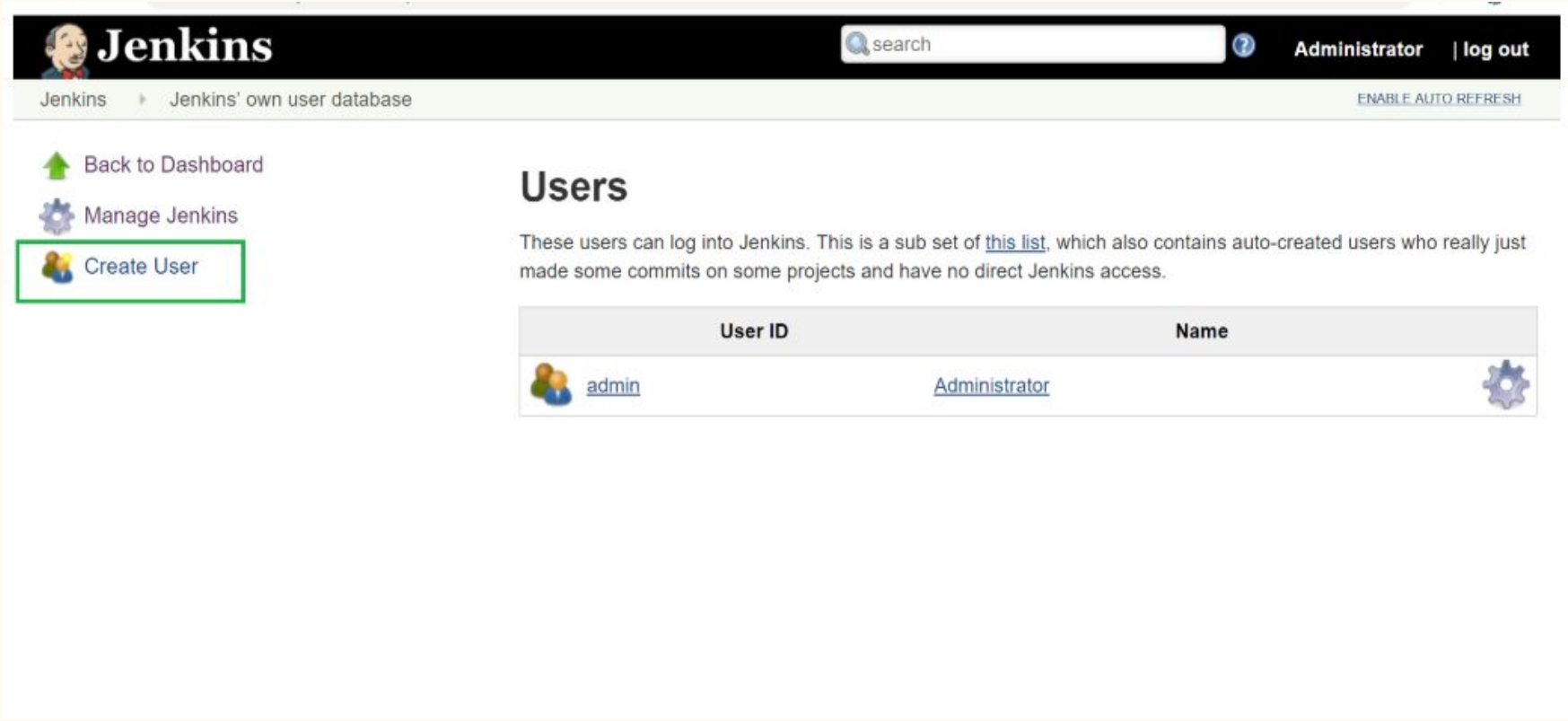
Creating User on Jenkins

Step 1: Now it's time to setup your users in the system. When you go to manage Jenkins and scroll down, you will see the 'Manage Users' option. Click on this option.

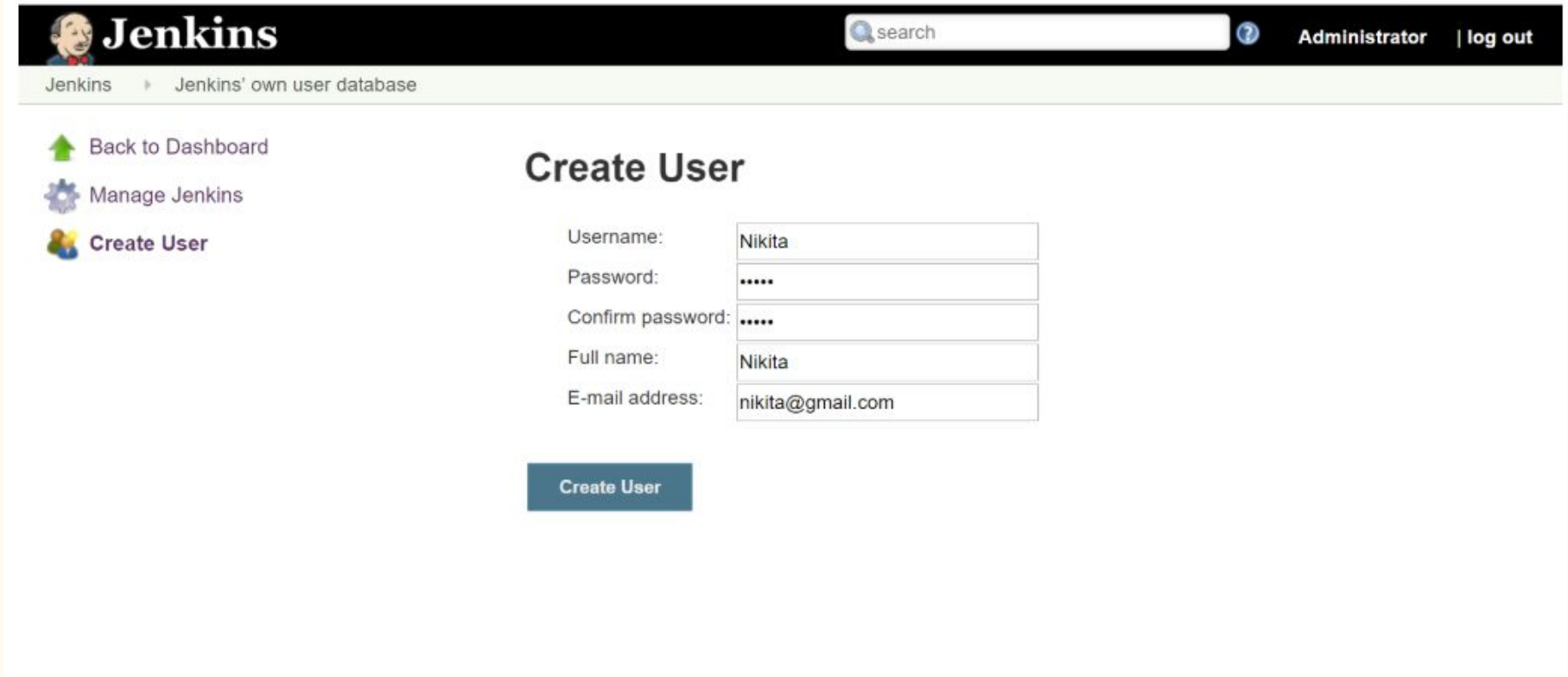


Step 2: Just Like, you defined the admin user, and start creating other users for the system. Let's create another user:

- To create another user click on 'Create User' option on the left hand side of the Manage Users page.



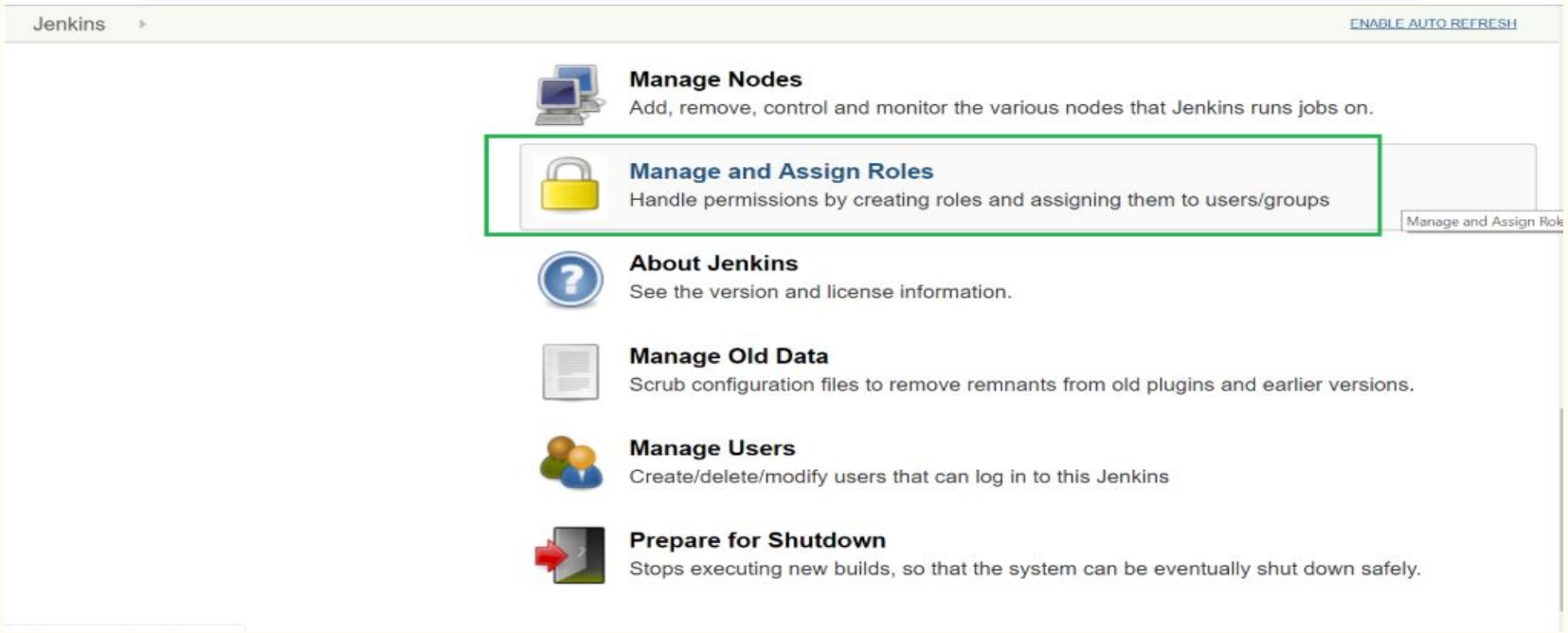
Click on Create User button.



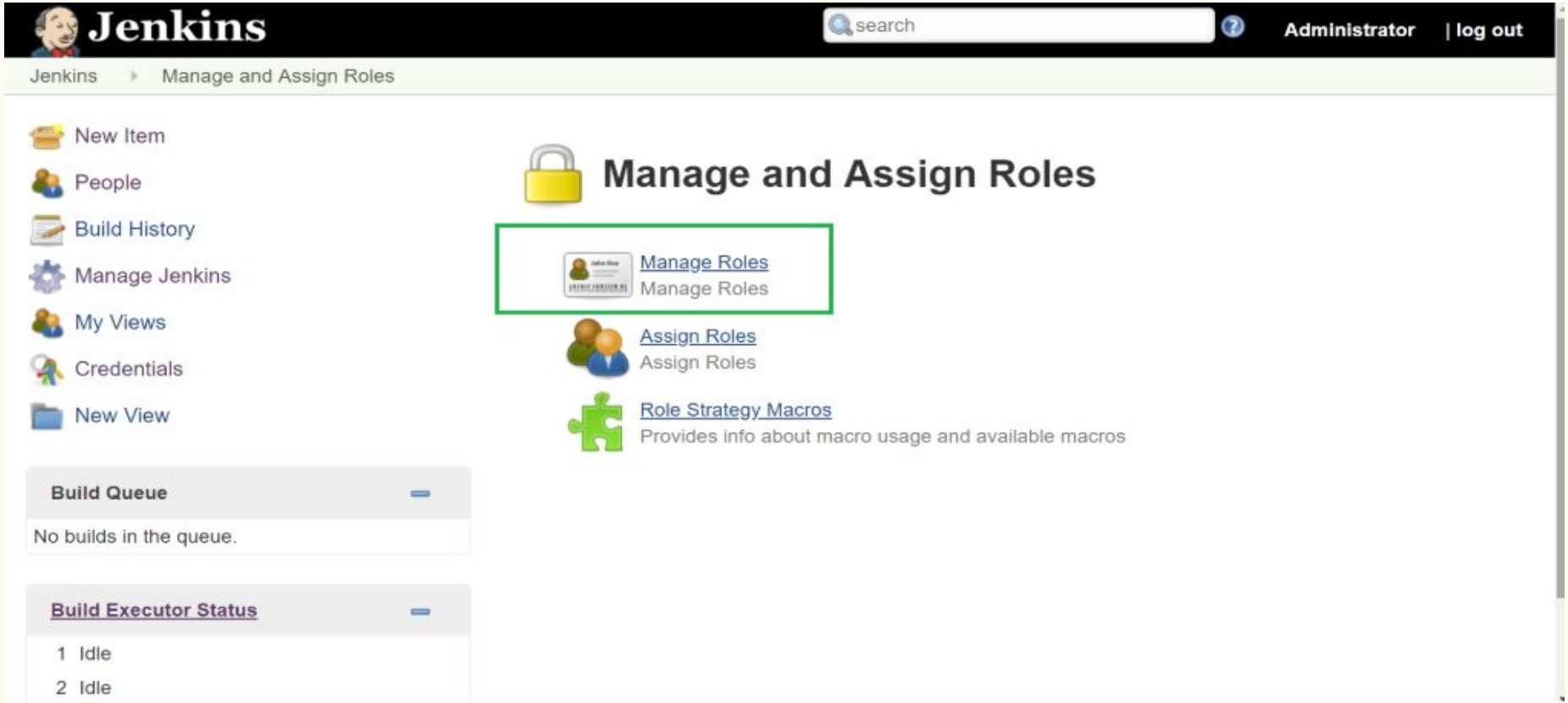
Managing User Roles on Jenkins

Step 1:

- Click on Manage Jenkins.
- Select Manage and Assign Roles. Note that, Manage and Assign Role will only be visible if you have installed the Role strategy plugin.

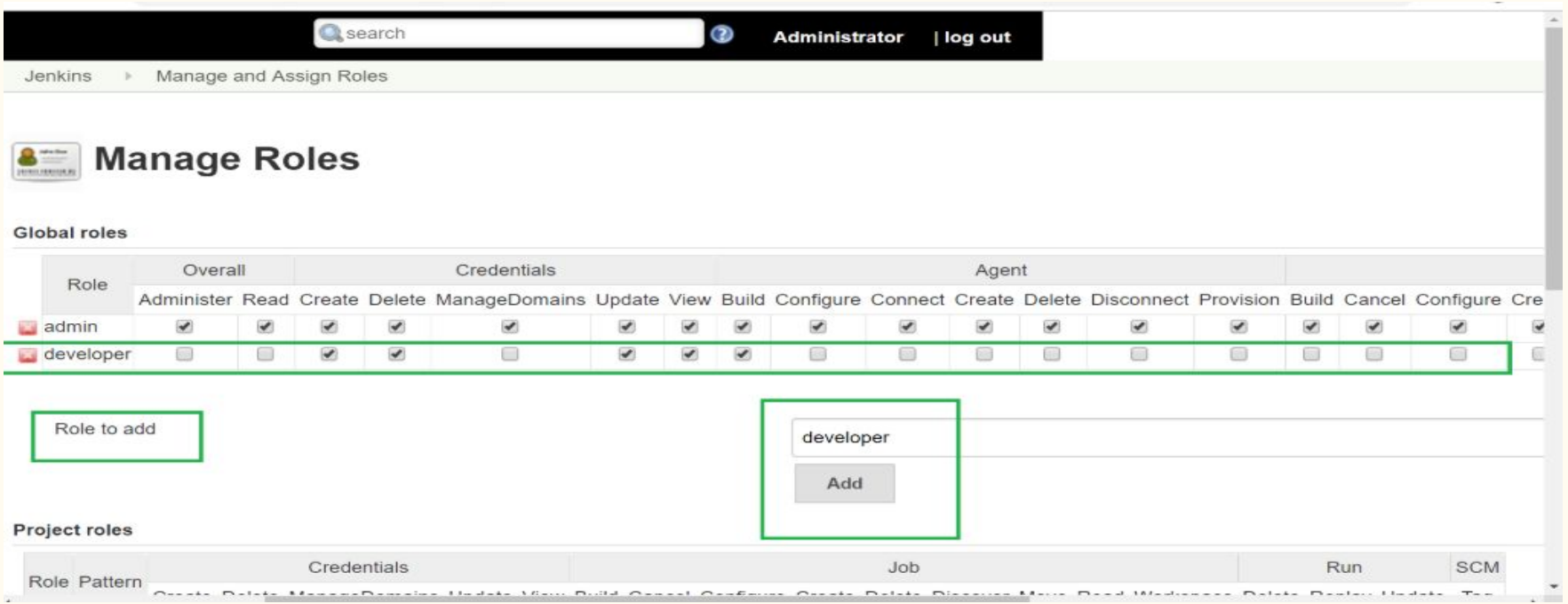


Step 2: Click on Manage Roles option to add new roles.



Step 2: To create a new role called "developer".

- Type "developer" in the Role to add option.
- Click on Add to create a new role.
- Now, select the appropriate permissions that you want to assign to the developer role.
- Then Click on Save button.



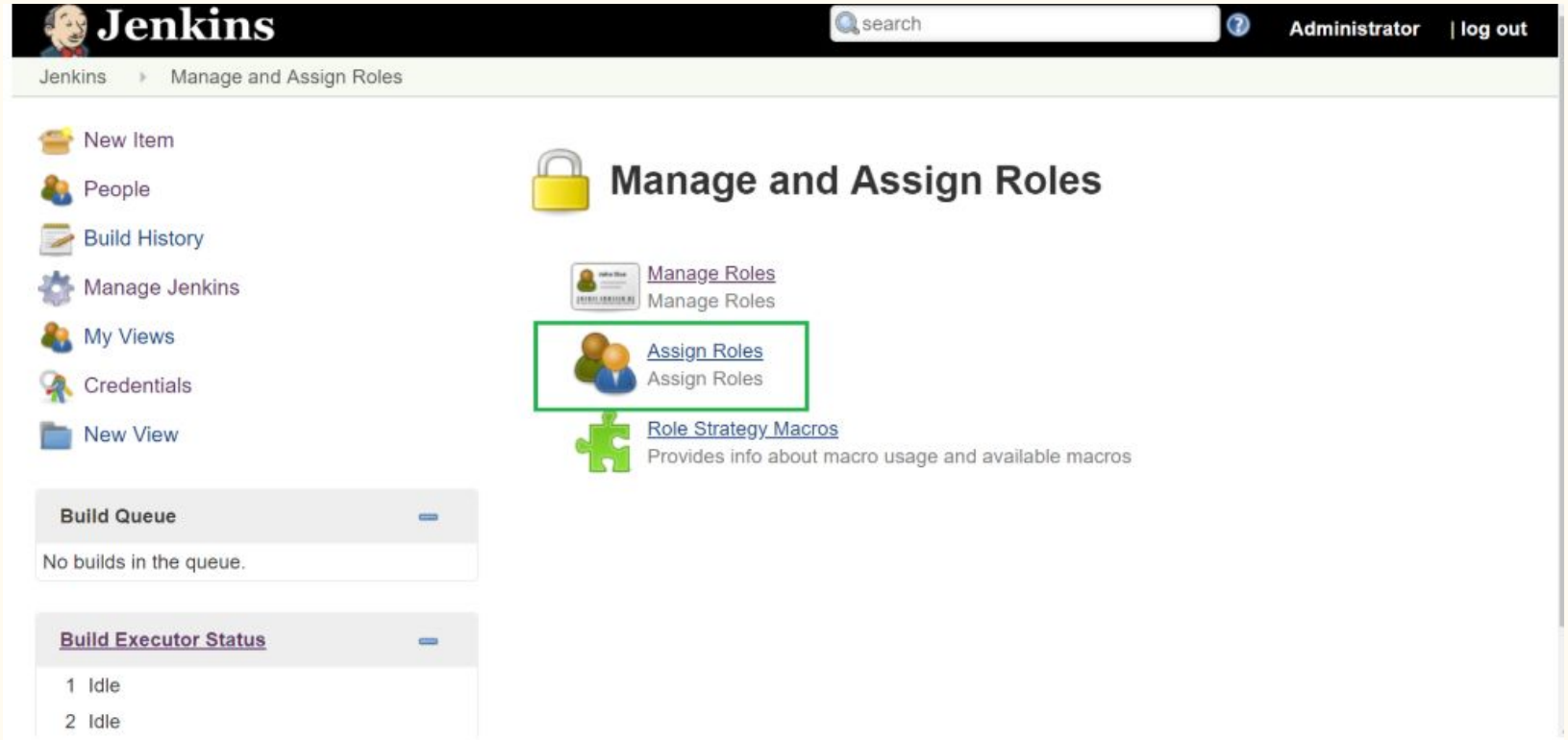
Assigning User Roles on Jenkins

Step 1: Now, you have created roles, let's assign them to specific users.

Click on Manage Jenkins.

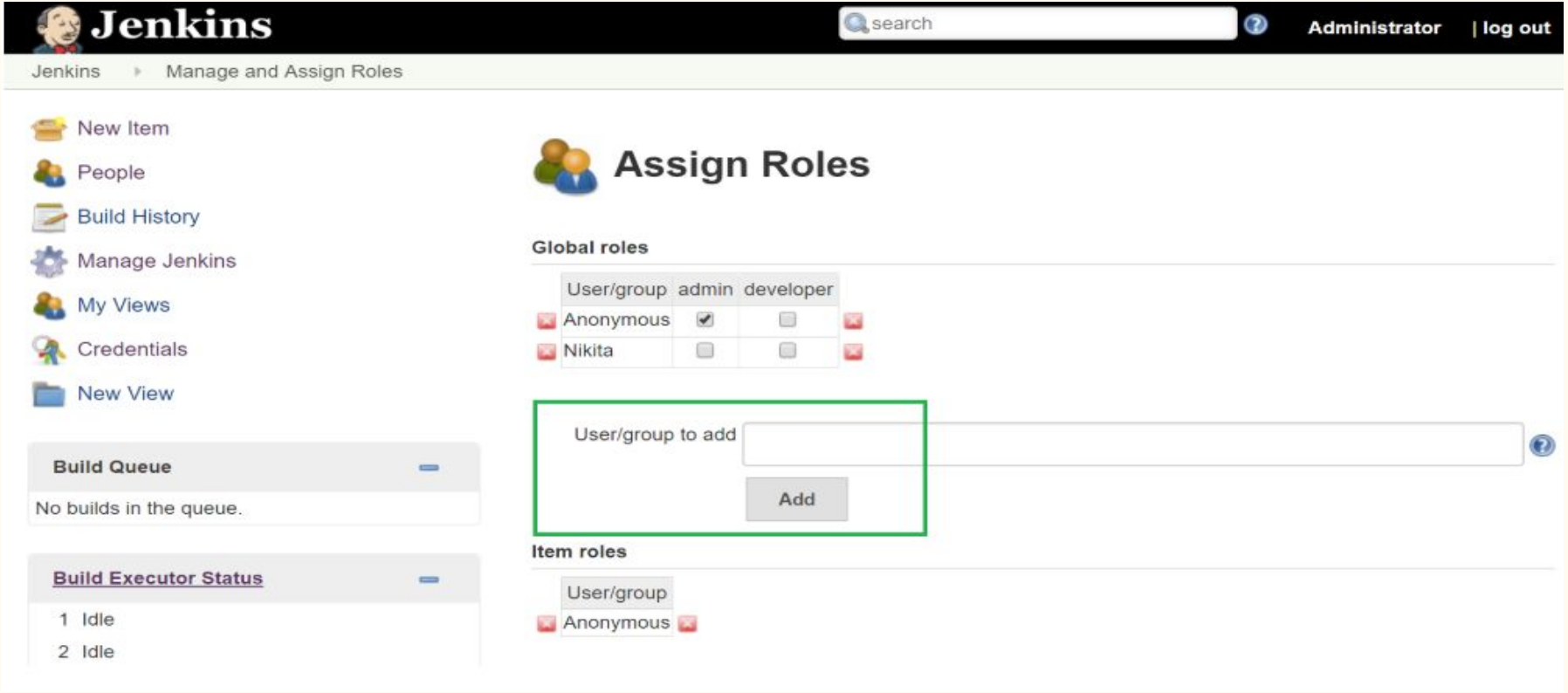
Then select Manage and Assign Roles.

Click on Assign Roles.

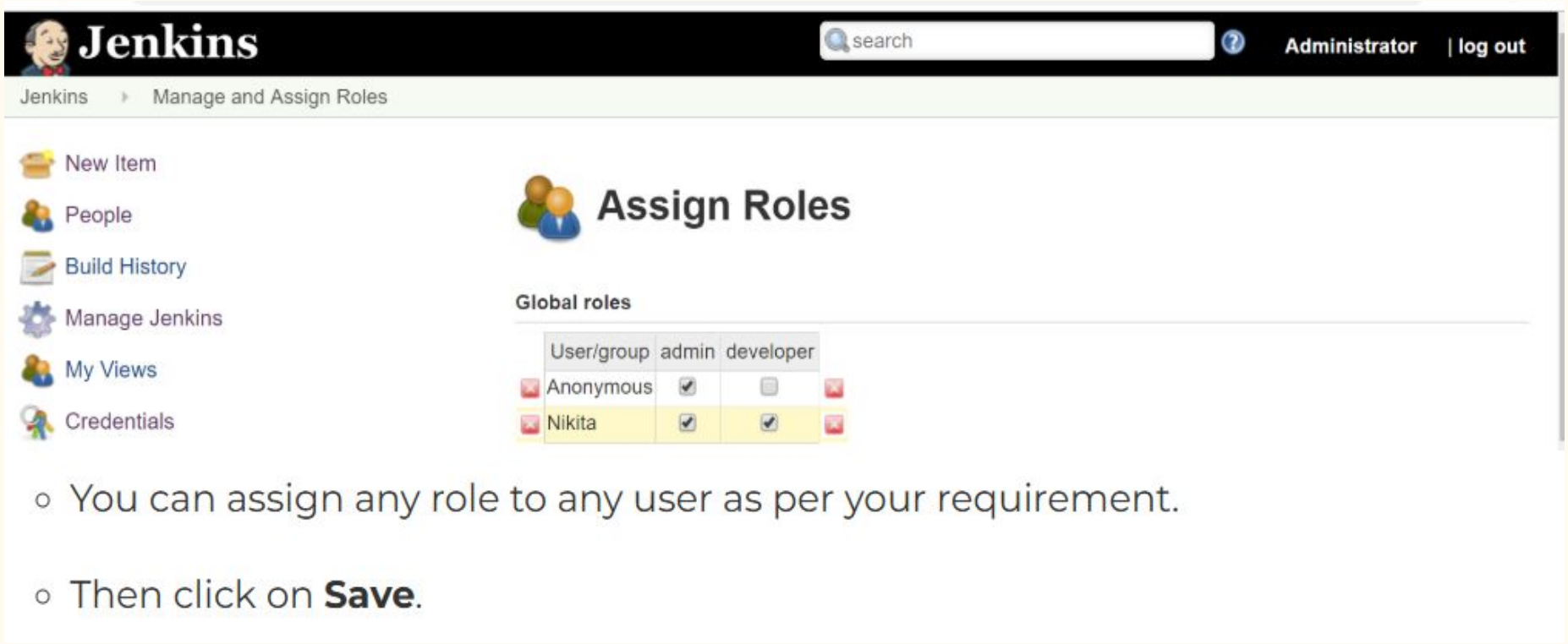


Step 2: Let's add new role "developer" to user.

- Add the User name on User/group to add option.
- Click on Add button.



Select "developer" role check box.



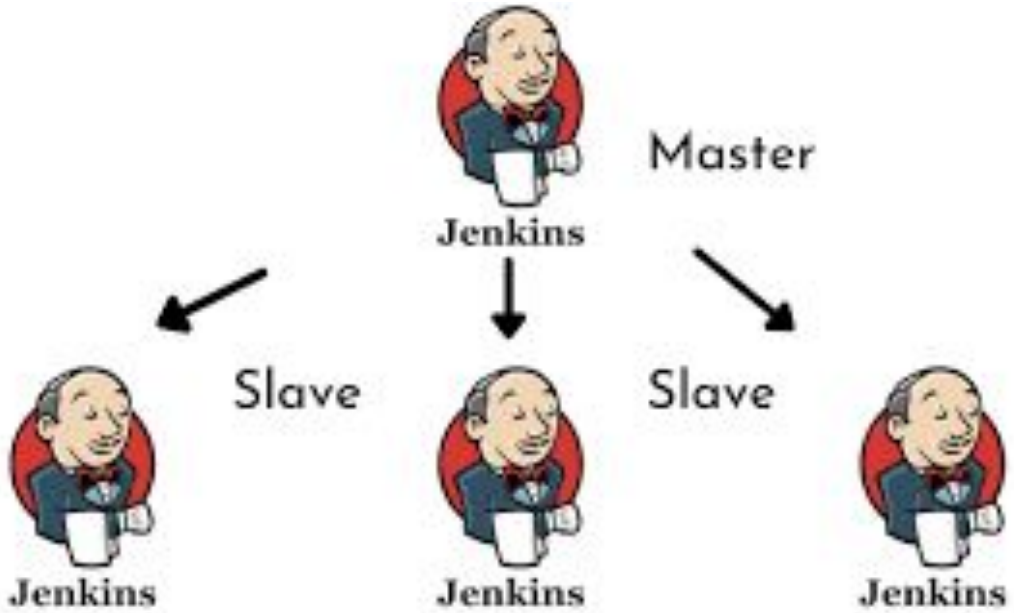
Adding slave node to Jenkins

- Jenkins master can allocate slave nodes, schedule jobs, and distribute builds to multiple slaves for execution.
- Additionally, it can monitor the slave node's state, get build results from slave nodes and aid in the parallel execution on multiple nodes.

Steps to be performed on slave node(agent) system:

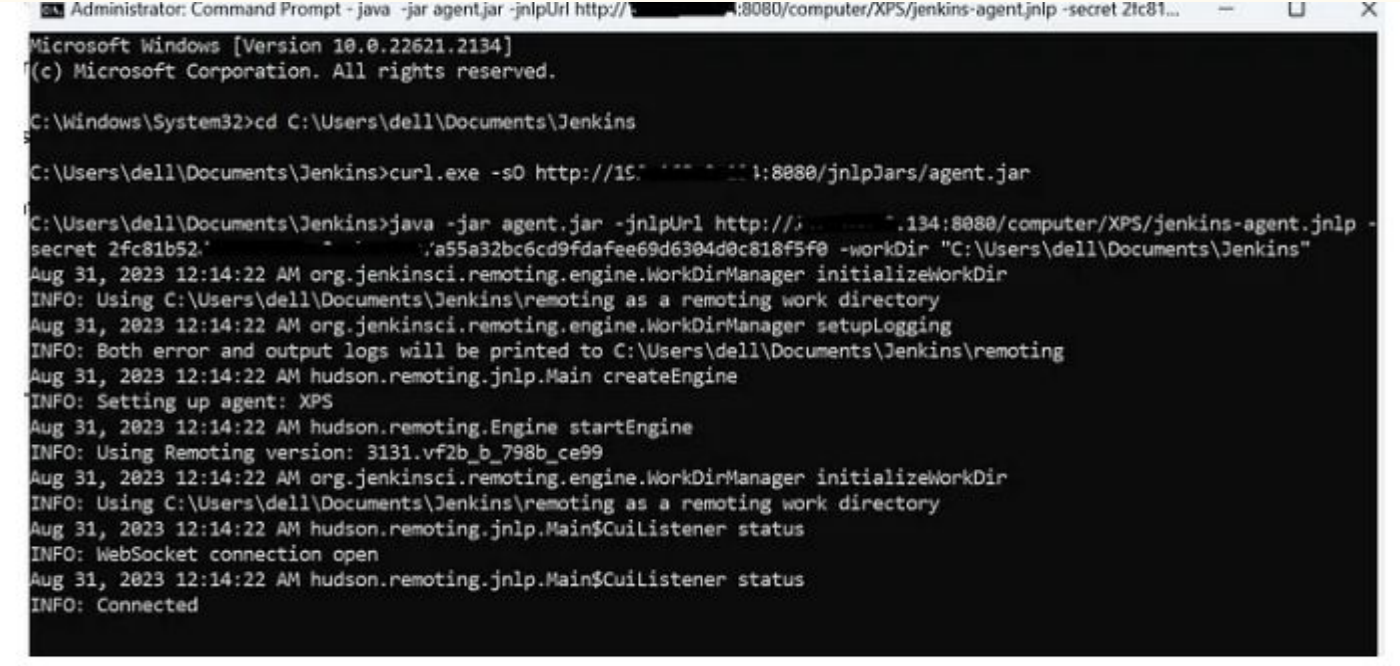
- Open the URL localhost:8080 in browser and log in to Jenkins.
- In the Dashboard, click on System under System Configuration. Under the Jenkins URL tab, replace localhost by the IP address of the master system. Save the changes.

Adding slave node to Jenkins



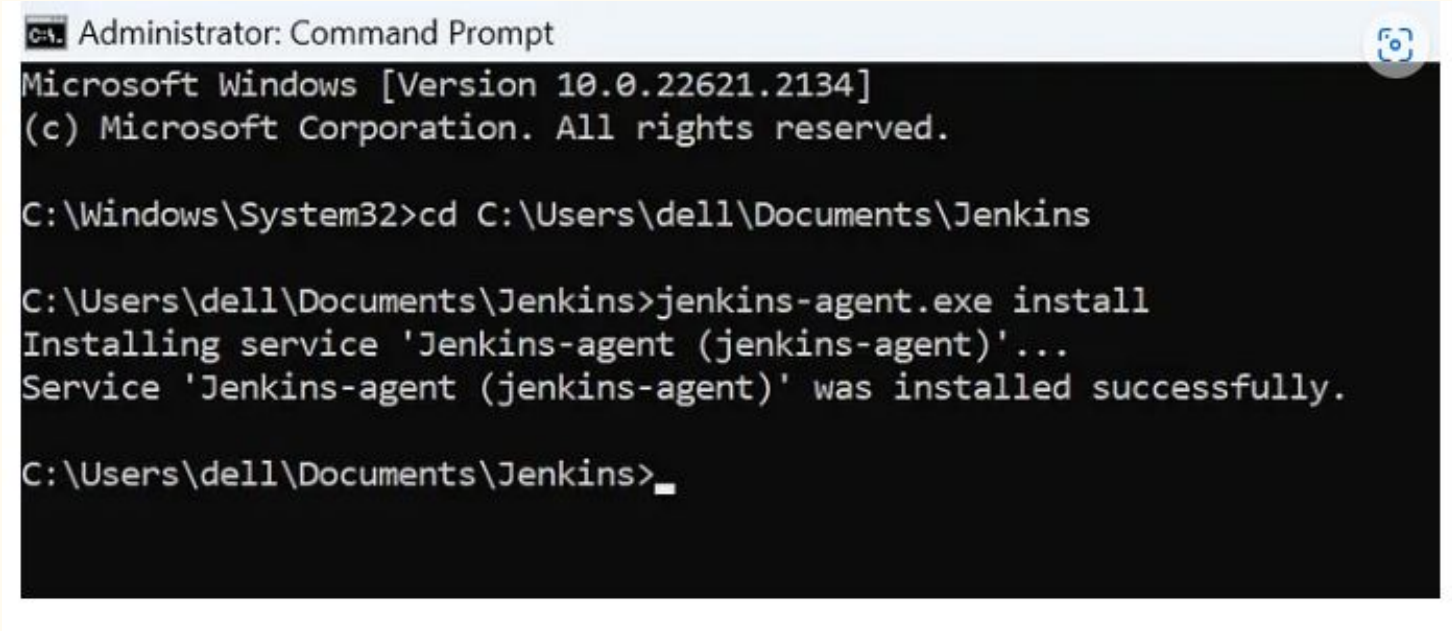
- Open the Jenkins dashboard in the browser using the above configured IP address (Ex:<IP of master>:8080).
- In the Dashboard, click on Nodes under System Configuration and click on New Node.
- Enter the name for the node and select the type as permanent agent.
- Click on Create. Add the description if required.
- Now on your slave machine, create an empty folder in any desired location (Ex: C:\Users\dell\Documents\Jenkins).
- Enter the path of this newly created directory in the remote root directory field.
- Enter the label if required. This is useful if you want to execute the job on multiple nodes without changing the configuration.
- In the Launch method, select the option ‘Launch agent by connecting it to controller’.
- Copy the same path entered in the ‘Remote root directory field’ above into the ‘Custom WorkDir path’ field. Select the option ‘Use WebSocket’ checkbox.
- In the availability section, choose the option ‘Keep this agent online as much as possible’ and save the changes.
- The newly created agent shows a red cross mark indicating that the agent is offline. Click on this node. There are 2 commands displayed under this section ‘Run from agent command line: (Windows)’

- Open command prompt as an admin and cd to the path that was entered previously in the ‘remote root directory field’ while creating the node.
- Copy paste both these commands in the cmd prompt and they should execute without any error. Once this is successful, your previously empty Jenkins folder will have a remoting folder and an agent.jar file.

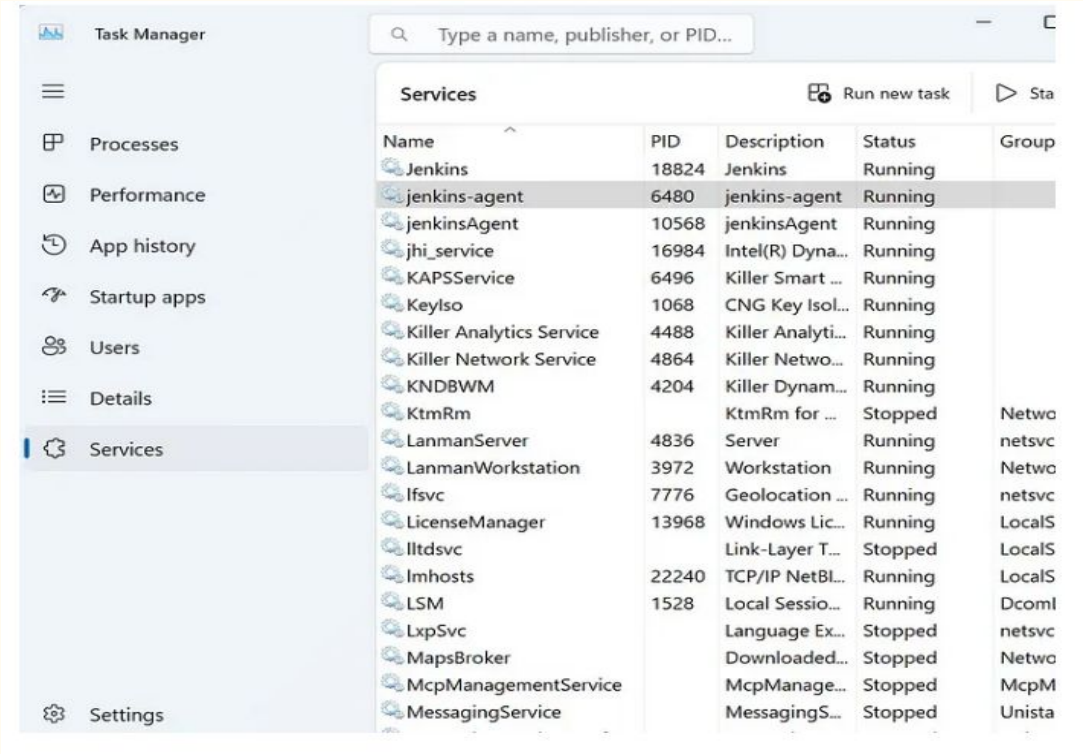


- Now when you refresh your Jenkins UI, it shows that the node is connected and online. But the limitation is that this node gets disconnected as soon as this command prompt window is closed.
- In order to keep the slave node online as much as possible, we will have to set it up as a service.
- For this purpose, we will be using the Windows Service Wrapper(winsw).
- Download the latest WinSW.exe from Releases · winsw/winsw
- Next, download the jenkins.xml file
- Note that the name of the exe and xml file should be the same.
- Now open the jenkins-agent.xml in edit mode. Change the value of id and name tag to jenkins-agent. Delete the value of arguments tag and replace the it with the command that is displayed in your node page,just remove the first word java and paste everything else as it is)

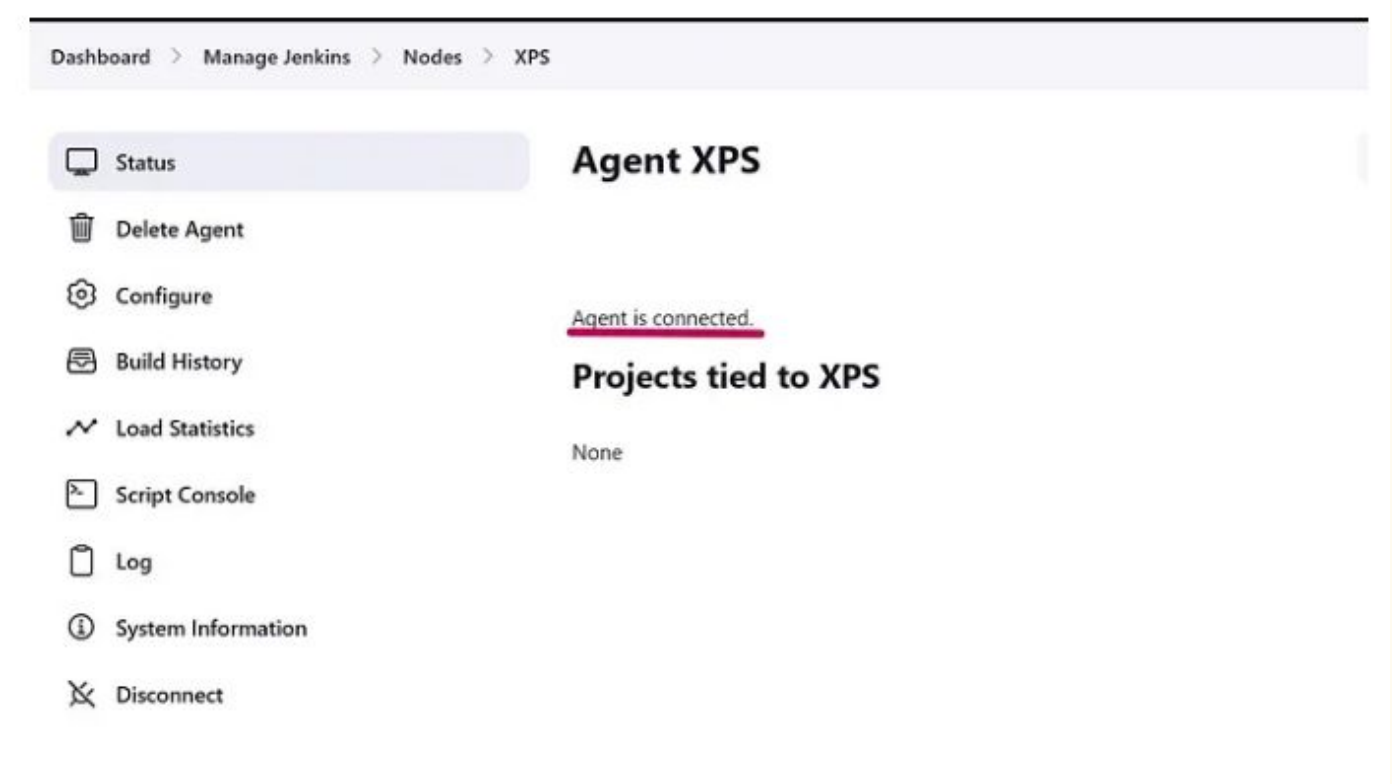
Now open cmd prompt as an admin, cd to your Jenkins folder path and enter the command: jenkins-agent.exe install. Now the Jenkins-agent is installed as a service successfully.



- Now if you open the Jenkins UI, it’s seen the agent is still not connected. This is because the agent service is not yet started.
- Open services tab in task manager, search for the jenkins-agent service, right click on it and click start.



Once this agent is up and running, you can refresh the Jenkins UI and tadaaaaaa! the slave is connected.



You can now create multiple slave nodes in this way and assign builds to all the slave nodes from the master node and perform parallel execution.

Selenium integration with Jenkins

Step 1: Install Jenkins Plugins

The functionalities of Jenkins are enhanced using numerous plugins. To work with Selenium, you'll need to install a couple of plugins:

Selenium Plugin: Go to Jenkins Plugin Manager and install "Selenium Plugin". Use this plugin for running Selenium tests on a Jenkins pipeline.

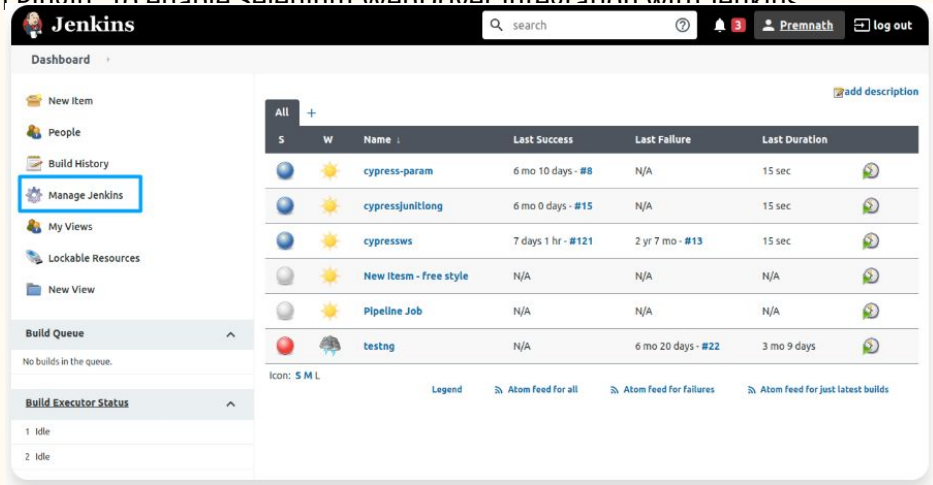
WebDriver Automation Plugin: Install the "WebDriver Automation Plugin" to enable Selenium WebDriver integration with Jenkins.

Step 2: Configure Jenkins

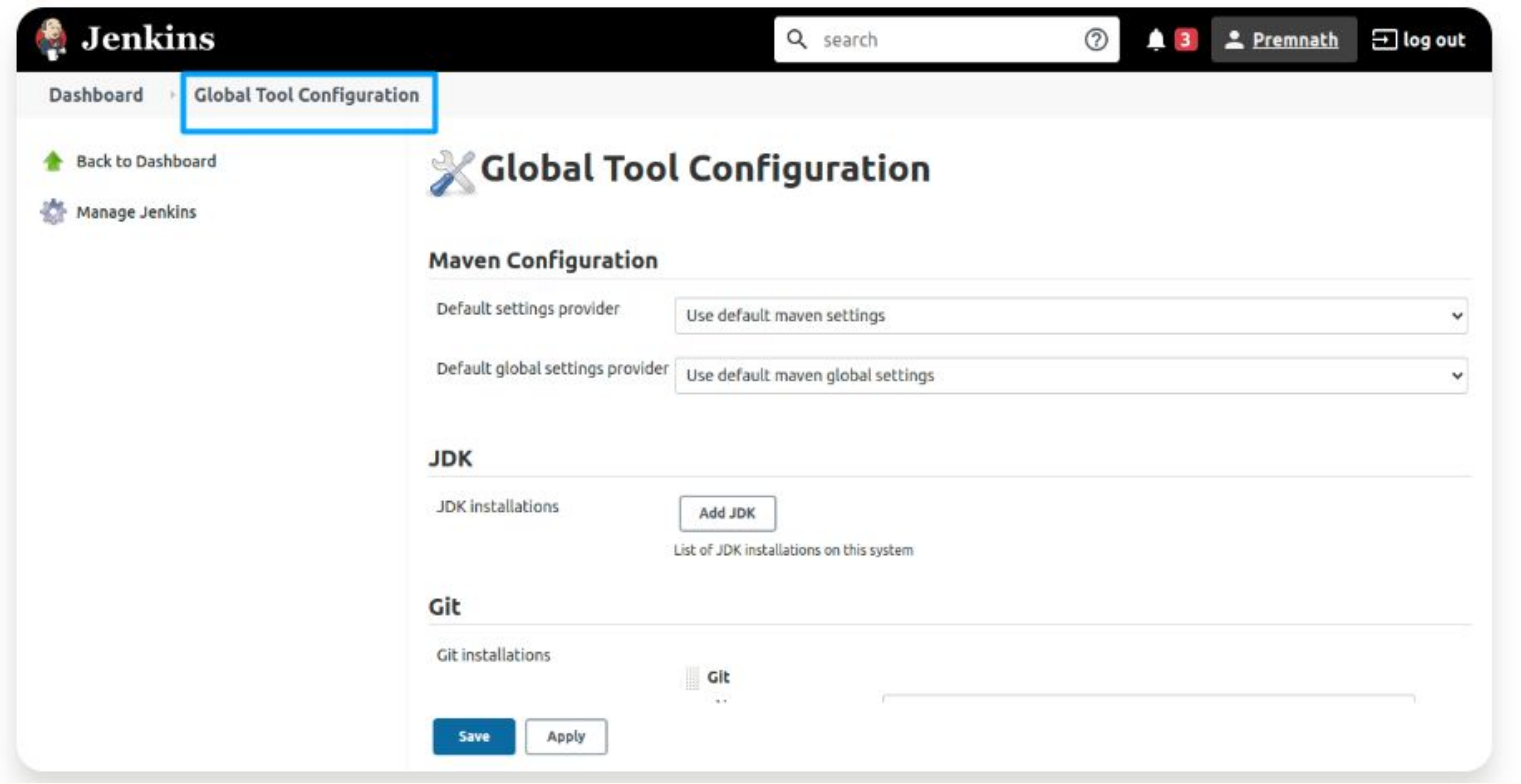
Once the plugins are installed, you need to configure Jenkins:

Open Jenkins in your web browser.

On the left sidebar, click "Manage Jenkins".



Navigate to “Global Tool Configuration.”



Under “Selenium WebDriver,” add the path to your Selenium WebDriver executable.

Save the configuration.

Step 3: Create a Jenkins Job

To automate Selenium tests using Jenkins, you need to create a Jenkins job:

Navigate to the ‘New Item’ option on the Jenkins dashboard.

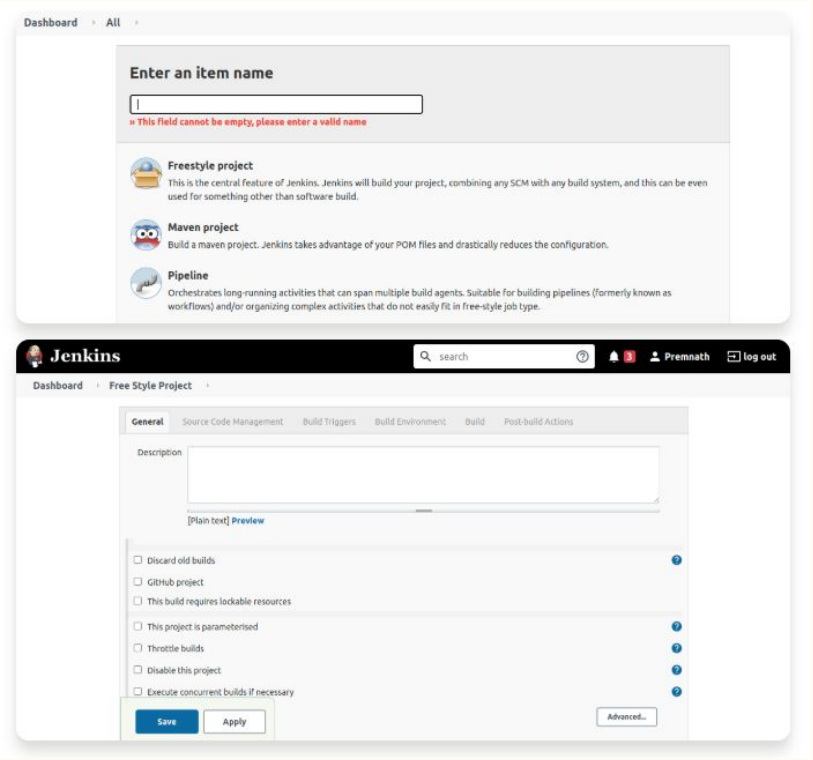
Give your job a name and select “Freestyle project.”

Under the “Build” section, click on “Add build step” and select “SeleniumHQ htmlSuite Run.“

Configure your Selenium tests by providing the path to your test suite, browser settings,

and other relevant details.

Save the job configuration.



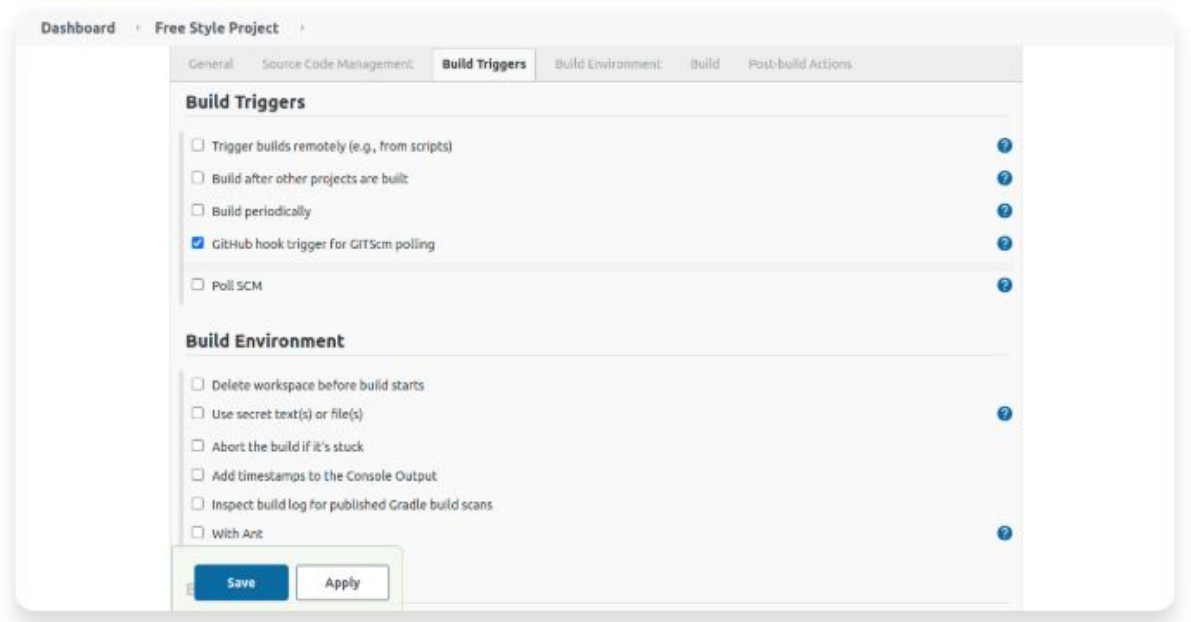
Step 4: Configure Jenkins Build Triggers

To trigger your Selenium tests automatically, you can set up build triggers. The most common trigger is to run the tests when code is pushed to a specific branch in your version control system (e.g., GitHub). To set up GitHub webhook triggers:

In your Jenkins job configuration, go to the “Build Triggers” section.

Check the option “GitHub hook trigger for GITScm polling.”

Save your job configuration.



Step 5: Build and Test

With everything set up, you can now build and test your Selenium integration with Jenkins:

Click on your Jenkins job from the dashboard.

Click “Build Now” to start a manual build, or wait for automatic triggers to initiate the tests.

Jenkins will execute your Selenium tests and display the results in the job console output.