Experiment No: 1 Git installation and basic Git Commands

What is version control?

Version control is a system that tracks and manages changes to files or a set of files over time. It allows developers to collaborate on a project by keeping track of changes made by different contributors, making it easy to revert to previous versions if necessary.

What is the staging area?

The staging area is a space in Git where changes to files are marked as ready to be committed to the repository. It allows developers to selectively add changes and review them before committing to the repository.

What do you mean by a repository?

A repository is a central location in Git where all the files and the complete history of the project are stored. It contains all the files and directories, as well as the metadata associated with each commit.

What care is to be taken when merging two branches?

When merging two branches, it is important to ensure that both branches are up to date with the latest changes, and that there are no conflicts between the two branches. It is also important to test the merged code thoroughly before committing it to the repository, to ensure that there are no bugs or issues that may cause problems down the line.

Experiment No: 2 Create and fork repositories in GitHub.

What is the difference between Git and GitHub?

Git is a version control system that is used to track changes to files over time, while GitHub is a web-based platform that provides hosting for Git repositories and allows developers to collaborate on projects.

How do you push your project into a remote repository?

To push your project to a remote repository, you need to first create a repository on the remote server, and then add the remote URL to your local Git repository. You can then use the 'git push' command to push your changes to the remote repository.

Is it possible to revert changes after commit? If so, how?

Yes, it is possible to revert changes after a commit by using the 'git revert' command. This creates a new commit that undoes the changes made in the previous commit, effectively rolling back the code to its previous state.

Experiment No: 3 Installation of Jenkins

What is Continuous Integration?

Continuous Integration is a software development practice where developers regularly merge their code changes into a central repository, which is then automatically built and tested. This helps to catch bugs and issues early in the development cycle and ensures that the code is always in a releasable state.

What is CI/CD?

CI/CD stands for Continuous Integration/Continuous Delivery or Continuous Deployment. It is a software development practice where code changes are automatically built, tested, and deployed to production as quickly and efficiently as possible.

Which tools can be plugged with Jenkins?

Jenkins can be integrated with a wide variety of tools and plugins, including source control systems like Git and SVN, build tools like Maven and Gradle, testing frameworks like JUnit and Selenium, and deployment tools like Docker and Kubernetes.

Experiment No: 4 To build the pipeline of jobs in Jenkins, create a pipeline script to deploy an application over Server.

What is a pipeline?

In Jenkins, a pipeline is a series of steps or jobs that are executed in a specific order to perform a particular task, such as building and deploying an application.

What is a declarative pipeline?

A declarative pipeline is a Jenkins pipeline that is defined using a specific syntax that allows for better readability and easier management of complex pipelines. It uses a series of predefined stages and steps to build, test, and deploy code.

What is a scripted pipeline?

A scripted pipeline is a Jenkins pipeline that is defined using a script written in Groovy, a programming language that is similar to Java. It allows for more flexibility and fine-grained control over the pipeline and can be used to define more complex workflows and custom logic.

Experiment No: 5 To install Tomcat server on windows and run Jenkins over Tomcat server.

What is Tomcat server?

Tomcat is an open-source web server that is used to serve Java web applications. It can also be used as a Servlet container for serving dynamic content and supporting Java Server Pages (JSP).

What is a web server?

A web server is a software program that delivers web content, such as HTML pages, images, and other multimedia files, to clients over the internet. It listens for incoming requests from clients and responds with the appropriate content.

What are the other web servers available for deployment?

Some other popular web servers that are commonly used for deployment include Apache HTTP Server, Nginx, and Microsoft IIS (Internet Information Services). Each of these servers has its own strengths and weaknesses and may be more suitable for certain types of applications or environments.

Experiment No.: 6 Test Software Applications: To Setup and Run Selenium Tests in Jenkins Using Maven

What is Selenium?

Selenium is an open-source testing tool that automates web browsers to test web applications. It supports various programming languages such as Java, Python, Ruby, and C#.

What is Jenkins and what is its role in software development?

Jenkins is a popular open-source continuous integration and continuous delivery (CI/CD) tool that helps automate the building, testing, and deployment of software. It allows developers to automate repetitive tasks such as compiling code, running tests, and deploying applications, which helps in increasing productivity and reducing errors.

What is Maven and how does it help in software development?

Maven is a build automation tool used for building and managing Java projects. It helps in managing project dependencies, building and testing projects, and generating reports on the project's status. It provides a standard way of building projects, making it easier to maintain and manage software projects.

How do you install and configure Jenkins on your machine?

Jenkins can be downloaded from its official website and installed on any machine that supports Java. Once installed, Jenkins can be accessed through a web browser by visiting the URL http://localhost:8080. Configuration can be done through the web-based interface.

How do you create a Maven project in Eclipse?

To create a Maven project in Eclipse, go to File > New > Maven Project. Select the desired archetype, and fill in the project details such as Group Id, Artifact Id, and Version. Click Finish to create the project.

How do you add Selenium dependencies to your Maven project?

Selenium dependencies can be added to a Maven project by adding the necessary dependencies in the pom.xml file of the project. The dependencies can be added by specifying the group Id, artifact Id, and version number of the required Selenium libraries.

How do you write a Selenium test script in Java?

A Selenium test script in Java can be written by using the WebDriver API. First, create an instance of the WebDriver and navigate to the required URL. Then, locate the web elements using locators such as id, name, class, etc. and perform the desired actions such as clicking a button, entering text in a field, etc.

How do you run your Selenium tests in Jenkins?

Selenium tests can be run in Jenkins by configuring a build job that executes the tests. The build job should be configured to run the Maven command that executes the tests. Jenkins can be configured to generate reports on the test results.

How do you view the results of your Selenium tests in Jenkins?

The results of Selenium tests can be viewed in Jenkins by accessing the build job and clicking on the test result link. Jenkins generates reports on the test results, which can be viewed in the web-based interface.

How do you integrate Selenium tests with other tools in the software development lifecycle, such as Git or JIRA?

Selenium tests can be integrated with other tools in the software development lifecycle by using plugins. For example, the Jenkins Git plugin can be used to fetch code from a Git repository, and the Jenkins JIRA plugin can be used to log issues in JIRA. The test results can be linked to the corresponding issues in JIRA for tracking purposes.

Experiment No.: 7 To understand Docker Architecture, install docker desktop and execute docker commands to manage and interact with containers.

What is a Container?

A container is a lightweight and standalone executable package that contains all the dependencies, libraries, and configuration files needed to run an application. Containers are isolated from the host system and other containers running on the same host, making them portable and easy to deploy.

Why Learn Docker?

Docker is a popular platform for containerization that simplifies the process of building, deploying, and managing applications. By learning Docker, developers and IT professionals can create and manage containerized applications, which are easier to deploy and more scalable than traditional applications.

What are Docker images?

Docker images are read-only templates that contain all the necessary files and dependencies needed to create a container. An image can be thought of as a snapshot of an application and its environment. Images are created using a Dockerfile, which is a script that contains instructions for building an image.

Experiment No.: 8 To learn Dockerfile instructions, build an image for sample web application on Docker Engine.

What is a Dockerfile?

A Dockerfile is a script that contains a set of instructions for building a Docker image. It specifies the base image, dependencies, environment variables, and other configuration settings needed to build and run an application in a container.

What is Docker Hub?

Docker Hub is a cloud-based registry that allows developers to store and share Docker images with others. It provides a central repository for Docker images and makes it easy to search and download images for use in building and deploying containerized applications.

How do you create a Docker container from an image?

To create a Docker container from an image, you can use the docker run command, followed by the name of the image. For example, to run a container from the nginx image, you can use the command docker run nginx. This will download the latest version of the nginx image from Docker Hub and start a container from it.

Experiment No.: 9 To install and configure software configuration management and provisioning tool using Ansible.

What is configuration management?

Configuration management is the process of managing and maintaining the state of an IT system's infrastructure and software applications. It involves tracking changes to the system, controlling and automating those changes, and ensuring that the system remains stable and secure.

Why do we need configuration management?

Configuration management is necessary to ensure that IT systems are reliable, consistent, and secure. It helps IT teams to manage and automate the deployment and configuration of applications and infrastructure, reducing the risk of errors and downtime.

What are other tools for configuration management?

Other tools for configuration management include Chef, Puppet, SaltStack, and Terraform. These tools automate the deployment and management of IT systems and applications, enabling IT teams to scale their infrastructure and reduce the time and effort needed to maintain it.

Experiment No.: 10 Case Study: Comparative study of Software Development Life Cycle – Waterfall Cycle vs Agile vs DevOps.

What is the Waterfall Model?

The Waterfall Model is a linear sequential approach to software development that follows a strict top-down approach, where each phase of the software development process must be completed before moving on to the next phase.

What are the advantages of using the Waterfall Model?

The advantages of using the Waterfall Model are that it provides a clear understanding of the requirements, deliverables, and deadlines for each phase of the development process. It also ensures that each phase is thoroughly completed before moving on to the next one, reducing the risk of errors.

What are the disadvantages of using the Waterfall Model?

The disadvantages of using the Waterfall Model are that it is not flexible to changing requirements or feedback during the development process. It also does not allow for testing until the end of the development process, which can result in high costs for fixing errors.

What is Agile Software Development?

Agile Software Development is an iterative approach to software development that emphasizes collaboration, flexibility, and adaptability. It involves breaking down the development process into smaller, manageable iterations that are delivered frequently.

What are the advantages of using Agile Software Development?

The advantages of using Agile Software Development are that it allows for flexibility and adaptability to changing requirements, feedback, and

priorities. It also promotes collaboration, transparency, and customer satisfaction.

What are the disadvantages of using Agile Software Development?

The disadvantages of using Agile Software Development are that it can be challenging to manage and coordinate multiple iterations simultaneously. It can also be difficult to estimate the time and resources needed for each iteration accurately.

What is DevOps?

DevOps is a software development methodology that combines software development and IT operations to improve the efficiency and speed of software delivery. It emphasizes collaboration, communication, automation, and monitoring throughout the software development lifecycle.

What are the advantages of using DevOps?

The advantages of using DevOps are that it promotes collaboration and communication between development and operations teams, resulting in faster and more efficient software delivery. It also emphasizes automation, reducing the risk of human error.

What are the disadvantages of using DevOps?

The disadvantages of using DevOps are that it requires a significant cultural shift and changes in the way teams work. It can also be challenging to implement and maintain DevOps practices in large and complex organizations.

What are the key differences between Waterfall, Agile, and DevOps?

Waterfall is a linear sequential approach that emphasizes planning and control, Agile is an iterative approach that emphasizes collaboration and flexibility, and DevOps is a methodology that combines software

development and IT operations to improve efficiency and speed. Waterfall focuses on delivering the final product, Agile focuses on delivering small increments of the product, and DevOps focuses on continuously delivering value to customers.