KESHAV MEMORIAL INSTITUTE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION)

Accredited by NBA & NAAC, Approved by AICTE, Affiliated to JNTUH,
Narayanguda, Hyderabad – 500029

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

((Artificial Intelligence and Machine Learning)

LAB RECORD

SOFTWARE ENGINEERING LAB

B.Tech. III YEAR I SEM (RKR21)

ACADEMIC YEAR 2024-25

KESHAV MEMORIAL INSTITUTE OF TECHNOLOGY

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Certificate

This is to certify that following is a Bonafide Record of the workbook task done by

_____bearing Roll No_____ of _____

Branch of _____ year B. Tech Course in the_____

Subject during the Academic year _____ & _____ under our supervision.

Number of week tasks completed: _____

Signature of Staff Member Incharge

Signature of Head of the Dept.

Signature of Internal Examiner

Signature of External Examiner

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Daily Laboratory Assessment Sheet

Name of the Lab: Name of the Student:

Class: HT. No:

S.No.	Name of the Experiment	Date	Observation Marks (3M)	Record Marks (4M)	Viva Voice Marks (3M)	Total Marks (10M)	Signature of Faculty

S.No.	Name of the Experiment	Date	Observation Marks (3M)	Record Marks (4M)	Viva Voice Marks (3M)	Total Marks (10M)	Signature of Faculty
	TOTAL						

INDEX

Vision of the Institution:

To be the fountain head of latest technologies, producing highly skilled, globally competent engineers.

Mission of the Institution:

- To provide a learning environment that inculcates problem solving skills, professional, ethical responsibilities, lifelong learning through multi modal platforms and prepare students to become successful professionals.
- To establish Industry Institute Interaction to make students ready for the industry.
- To provide exposure to students on latest hardware and software tools.
- To promote research-based projects/activities in the emerging areas of technology convergence.
- To encourage and enable students to not merely seek jobs from the industry but also to create new enterprises
- To induce a spirit of nationalism which will enable the student to develop, understand India's challenges and to encourage them to develop effective solutions.
- To support the faculty to accelerate their learning curve to deliver excellent service to students

Department of Computer Science & Engineering (AI & ML)

Vision of the Department:

To be among the region's premier teaching and research Computer Science and Engineering departments producing globally competent and socially responsible graduates in the most conducive academic environment

Mission of the Department:

- To provide faculty with state-of-the-art facilities for continuous professional development and research, both in foundational aspects and of relevance to emerging computing trends.
- To impart skills that transform students to develop technical solutions for societal needs and inculcate entrepreneurial talents.
- To inculcate an ability in students to pursue the advancement of knowledge in various specializations of Computer Science and Engineering and make them industry-ready.
- To engage in collaborative research with academia and industry and generate adequate resources for research activities for seamless transfer of knowledge resulting in sponsored projects and consultancy.
- To cultivate responsibility through sharing of knowledge and innovative computing solutions that benefit the society-at-large.
- To collaborate with academia, industry and community to set high standards in academic excellence and in fulfilling societal responsibilities

PROGRAM OUTCOMES (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and Team Work: Function effectively as an individual, and as a member or

leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: An ability to analyze the common business functions to design and develop appropriate Computer Science solutions for social upliftment.

PSO2: Shall have expertise on the evolving technologies like Python, Machine Learning, Deep Learning, Internet of Things (IOT), Data Science, Full stack development, Social Networks, Cyber Security, Big Data, Mobile Apps, CRM, ERP etc.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Graduates will endeavor to excel in their chosen careers as professionals, researchers and entrepreneurs on a global platform.

PEO2: Graduates will demonstrate the ability to solve challenges in the fields of Engineering and Technology simultaneously catering to societal needs.

PEO3: Graduates will strive to improve their learning curve by practicing Continuing Professional Development (CPD).

PEO4: Graduates will, at all times, adopt a professional demeanor by communicating effectively, working collaboratively, and maintaining the ethics & core values as befitting their education in interdisciplinary and emerging fields.

B. Tech. in COMPUTER SCIENCE AND ENGINEERING
III Year I Semester Syllabus (RKR21)
SOFTWARE ENGINEERING LAB (21CC505PC)
Common to CSE, IT, CSE (AI&ML) and CSE (DS)

L	T	P	C
0	0	3	1.5

Pre-requisites/ Co-requisites:

1. 21CC502PC – Software Engineering Course
2. 21CS401PC- Java Programming Course

Course Objectives: The course will help to

1. Formulate problem statements and Software Requirement Specifications by comprehensively grasping project requirements.
2. Demonstrate proficiency in designing, developing, and testing diverse project modules.
3. Utilize Git Framework and GitHub while implementing Continuous Integration/Continuous Deployment (CI/CD) pipelines through Jenkins.
4. Implement project deployment using Docker and Kubernetes.
5. Acquire knowledge in AWS cloud infrastructure.

Course Outcomes: After learning the concepts of this course, the student is able to

1. Transform end-user needs into system and software requirements through a structured process.
2. Depict the system's high-level design using CASE tools based on the software requirements.
3. Employ Jenkins CI/CD for project building purposes.
4. Implement project deployment utilizing Docker and Kubernetes.
5. Create a project within the AWS Cloud environment.

Software to be used: The students must use JDK 11/17/21 Version, STAR UML, GIT Bash, Jenkins, Dockers Desktop, Mini KUBE, Eclipse, Tomcat, and Visual Studio Editor.

List of Experiments:
Do the following exercises for any one project given in the list of sample projects or any other projects?

1. Development of problem statement.
2. Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents.
3. Study and usage of any Design phase CASE tool
4. Creating the project and committing using Git and GitHub
5. Creating Maven Java and Maven Web project using Eclipse and Push them to GitHub.
6. Building the CI/CD pipeline using Jenkins for the project in the previous experiment.
7. Local Deployment of project using Docker, Kubernetes and Monitoring using Nagios tool.
8. Cloud Deployment of a project in the AWS Cloud using EC2 instance.

Sample Projects:

1. Book Bank
2. Online course reservation system
3. E-ticketing
4. Recruitment system
5. Hospital Management system
6. Online Banking System

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition, 2015.
2. Software Engineering- Sommerville, 7th edition, Pearson Education, 2017.
3. The unified modeling language user guide Grady Brooch, James Rumbaugh, Ivar Jacobson, Pearson Education, 2016.
4. The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations, 2015.

REFERENCE BOOKS:

1. https://kubernetes.io/docs/tutorials/hello-minikube/
2. https://minikube.sigs.k8s.io/docs/start/
3. https://www.jenkins.io/doc/
4. https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/concepts.html
5. Introducing Maven by, Balaji Varanasi and Sudha Belida, APRESS publications.

Course Outcomes and CO-PO-PSO Mapping

Course Outcomes:

After learning the contents of this course, the student is able to

CO1	Transform end-user needs into system and software requirements through a structured process.
CO2	Depict the system's high-level design using CASE tools based on the software requirements.
CO3	Employ Jenkins CI/CD for project building purposes.
CO4	Implement project deployment utilizing Docker and Kubernetes.
CO5	Create a project within the AWS Cloud environment.

CO-PO-PSO MAPPING:

	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
Software Engineering Lab	**CO1**	3	3	3	2						2			2	1
	CO2	2	3	3	3	3					2			2	1
	CO3					3				2	2	2		1	2
	CO4				3	3	2	2		2	2	2	2	2	3
	CO5	3				3	2	2				3	3	3	3

Software and Hardware Requirements

1. Software Tools

a. Star UML
b. Java 11/17/21 Version
c. Apache Tomcat 9
d. Eclipse IDE
e. Visual Studio
f. Jenkins
g. Git Bash for Windows
h. Windows Docker Desktop
i. AWS Cloud account (Basic Plan)

3. Hardware Requirements

a. Windows 10 Pro
b. 8 GB RAM (64-bit Processor)
c. 512 GB HDD
d. i5 Core Processor
e. BIOS-level hardware virtualization support is enabled in the BIOS settings.

Experiment 1: Installation of StarUML, Git Bash and GitHub Account Creation

AIM: To experience the **UML diagrams, version control system**, Tracking code changes and code collaboration.

Introduction:

- **Star UML:**
  - StarUML is a powerful software modeling tool used for creating Unified Modeling Language (UML) diagrams.
  - It is widely adopted by developers and designers to visualize and document the architecture of software systems.
  - **Features of StarUML**
    - Supports various **UML diagrams** for analysis and design.
    - Offers **code generation** for languages like Java, C++, and Python.
    - Allows **collaboration** with team members via plugins.
    - Compatible with industry-standard modeling notations like **UML 2.x.**

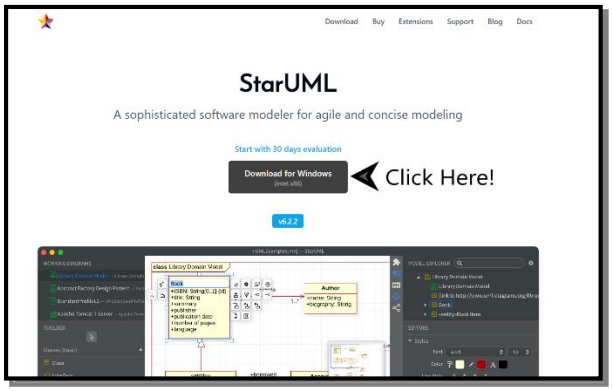
- **UML diagrams:**
  - UML (Unified Modeling Language) diagrams are standardized visual representations of a software system's structure and behavior. They help developers and stakeholders understand and communicate system requirements. developers or teams
  - **Types of UML Diagrams**
    - **Structural Diagrams**: Focus on the system's static aspects.
      - Class Diagram
      - Component Diagram
      - Object Diagram
      - Deployment Diagram
    - **Behavioral Diagrams**: Represent the system's dynamic aspects.
      - Use Case Diagram
      - Sequence Diagram
      - Activity Diagram
      - State Diagram

- **Git Bash and GitHub:**
  - Git is a popular version control system. It was created by Linus Torvalds in 2005.
  - It is designed to make it easier to have multiple versions of a code base, sometimes across multiple developers or teams
  - **Functions of Git**
    - Manage projects with Repositories
    - Clone a project to work on a local copy
    - Control and track changes with Staging and Committing
    - Branch and Merge to allow for work on different parts and versions of a project
    - Pull the latest version of the project to a local copy
    - Push local updates to the main project

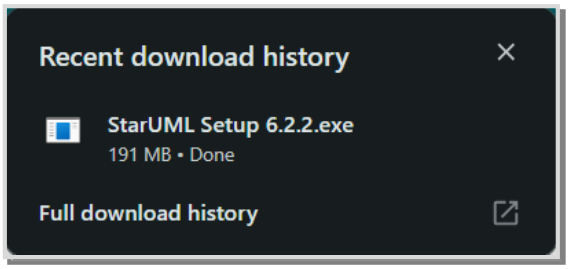
Procedure

STARUML Installations

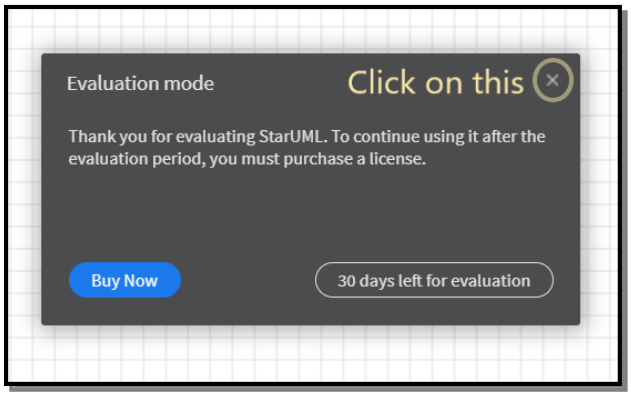
STEP 1 : Visit **staruml.io**



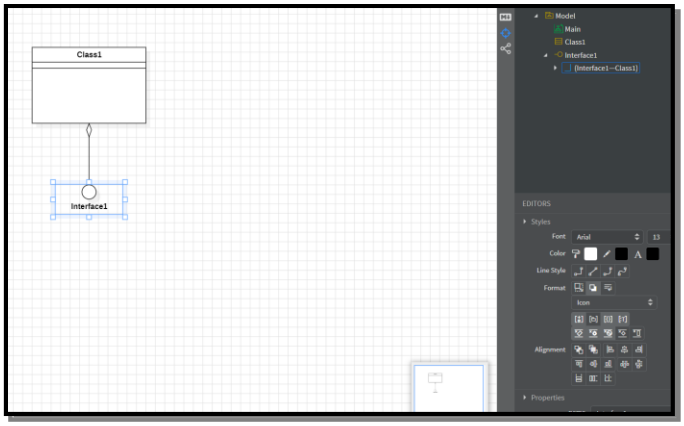
STEP 2 : Click on **Download** and run the **.exe** file



STEP 3: When you get the **evaluation mode** screen

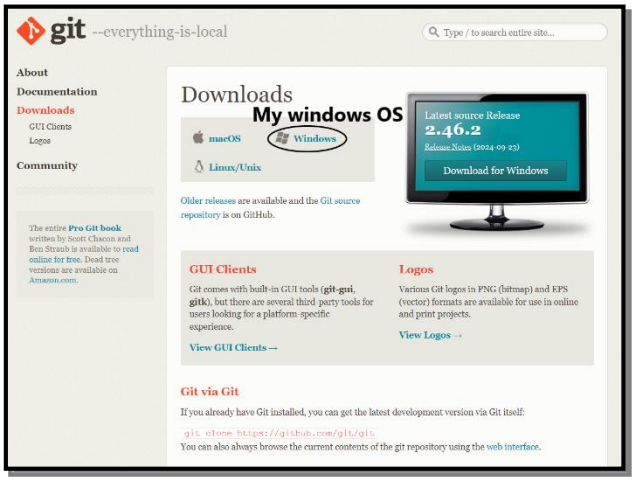


STEP 4: Click on **x** / **cross** and enjoy your UML

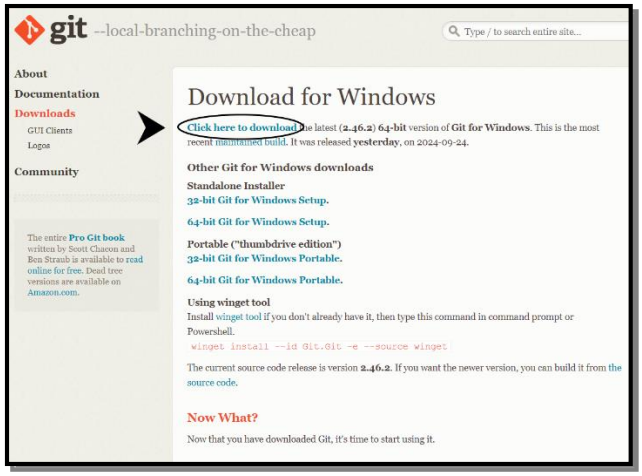


GITBASH Installations

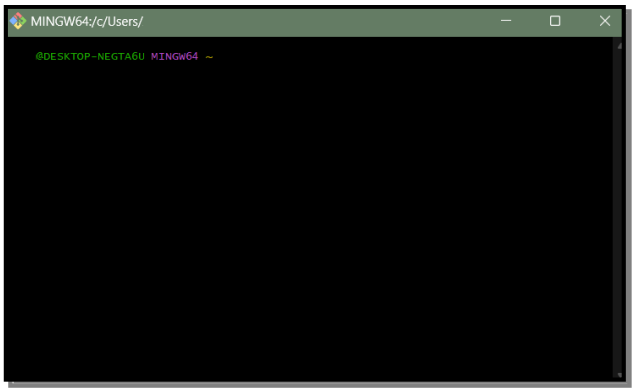
STEP 1 : Visit **git-scm.com/downloads**



STEP 2: Click on your **OS hyperlink** under **Download** and click on **Download**

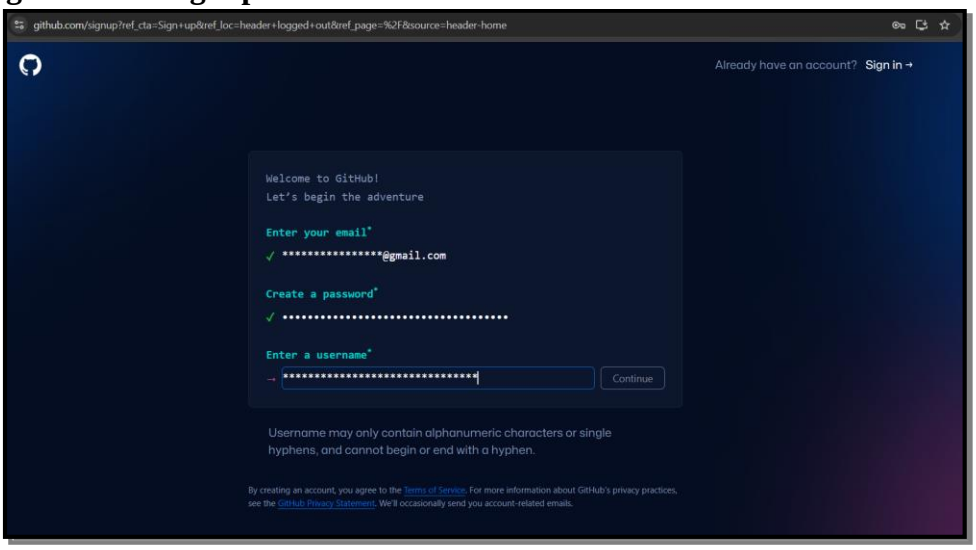


STEP 3: After Download completes **run** the exe file and enjoy **GitBash**

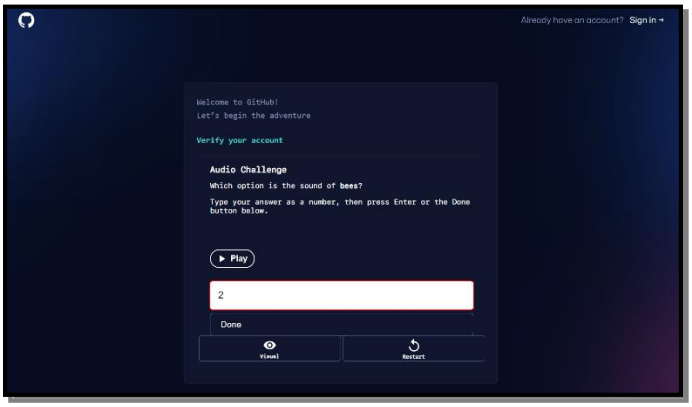


Creating GitHub Account

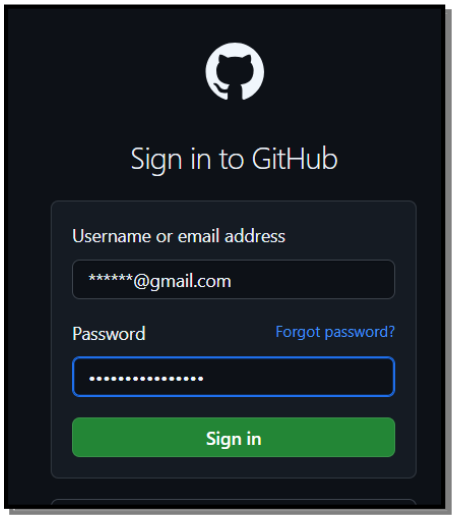
STEP 1 : Visit **github.com/signup**



STEP 2 : Enter your **Email, Password and Username** and **Verify** your account



STEP 3 : Login into your account



Conclusion : Thus we have installed **StarUML, GitBash** and created a **GitHub account.**

Experiment 2: IEEE – SRS (SOFTWARE REQUIREMENTS SPECIFICATION) WITH UML DIAGRAMS

AIM: To develop a project on a **E-Ticketing system** using **StarUML**

SRS:

Problem Statement:

In the rapidly digitizing E-ticketing industry, users increasingly demand a seamless and efficient experience when booking tickets for events such as concerts and marriages. However, the current fragmented experience across different platforms often results in frustration due to inconsistent ticket tracking, missing payment receipts, and lack of real-time status updates. Our E-Ticketing application, accessible via a server and a webpage, is designed to address these challenges by offering a unified platform that enables users to book tickets effortlessly.

The application aims to provide a cohesive and secure experience for users, allowing them to browse and book tickets for events, make payments through an integrated payment gateway, and receive receipts immediately, which they can download and store for future reference. Additionally, users will be able to track the status of their tickets in real-time, ensuring they remain informed and updated throughout the booking process. Notifications regarding event status, such as confirmations or cancellations, will further enhance user satisfaction.

By simplifying the interface and focusing on key functionalities, the E-ticketing system ensures a streamlined, user-friendly experience, transforming the ticketing process into a hassle-free and enjoyable journey for all users.

Members:

1. Chodavarapu Srinidhi - 22BD1A6712
2. Darsh Agrawal - 22BD1A6714
3. Mohammed Areeb Akhter - 22BD1A6737
4. Pasham Ayush Reddy - 22BD1A6744

Software Requirement Specification

For

E-Ticketing System

Version 3.0

Prepared by:

1. Chodavarapu Srinidhi - 22BD1A6712

2. Darsh Agrawal - 22BD1A6714

3. Mohammed Areeb Akhter - 22BD1A6737

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Keshav Memorial Institute of Technology

25-10-2024

Table of Contents

Revision History

Name	Date	Reason for changes	Version
Week-1	26-09-24	SRS Draft Template	1.0
Week-2	19-10-24	SRS Documentation - Use case, Class Diagram	2.0
Week-3	25-10-24	SRS Final Document – Component, Sequence Diagram	3.0

1. Introduction

The Software Requirement Specification is designed to document and describe the agreement between the customer and developer regarding the specification of the software product requested. This documentation is done to provide a clear idea of customer requirements. This document can be used as reference in further development of the software system.

1.1 Purpose

The purpose of this document is to specify the software requirements for an E-ticketing system that enables users to browse and book tickets for events like concerts and marriages. It describes the system's functionality, expected behaviour, and constraints, providing a reference for developers, testers, and stakeholders involved in the project.

1.2 Document Convention

Heading:

Font-Size: 16, Font-Style: Bold, Font: Times New Roman

Subheading:

Font-Size: 14, Font-Style: Bold, Font: Times New Roman

Content:

Font-Size: 12, Font: Times New Roman.

1.3 Intended Audience and Reading Suggestions

This document is intended for developers responsible for system implementation, providing them with clear specifications for building the E-Ticketing platform. It is also designed for testers who will validate the functionalities outlines in the requirements, ensuring that the system performs as expected. Managers can use this document for project tracking, helping them monitor progress and ensure that the system is developed according to plan. Additionally, it serves event organizers using the platform, allowing them to understand the system’s capabilities for managing events, ticketing, and user interactions.

1.4 Product Scope

The E-ticketing system focuses on creating a unified platform for users to browse, book, and manage tickets for events like concerts and marriages. The system will operate on a server and be accessible through a webpage. It will support an integrated payment system and real-time status updates. Users can track the event status and download tickets and receipts via the website.

1.5 References

https://www.studocu.com/in/document/university-college-of-engineering/software-engineering/e-ticketting-software-engineering-projects/65486732

https://www.studocu.com/in/document/university-college-of-engineering/software-engineering/e-ticketting-software-engineering-projects/65486732

2. Overall Description

2.1 Product Perspective

The E-ticketing system will function as a single-server platform, accessible via a webpage. It will provide a seamless ticketing experience for events like concerts and marriages, offering an efficient booking system with real-time tracking, secure payment, and receipt generation.

2.2 Product functions

2.2.1 Recruiter Portal

- **Job Posting Management**: Recruiters can post event tickets for concerts and marriages, update event details, and specify ticketing requirements.
- **Ticket Management**: Recruiters can manage ticket sales, view bookings, and update available slots based on event capacity.
- **Notification and Alerts**: Recruiters will receive real-time notifications when a user books a ticket, or when an event update occurs.
- **Attendee Database**: Recruiters can access a searchable database of attendees, categorized by booking details and ticket type.

2.2.2 Attendee Portal

- **Profile Management**: Attendees can create and update their profiles, including adding personal details and past event bookings. Filter and search for specific events
- **Event Search and Booking**: Attendees can search for concerts or marriage events based on various filters like location, date, and event type, and book tickets directly from the platform.
- **Booking Tracking**: Attendees can track the status of their ticket bookings in real time, including confirmations or cancellations.
- **Event Recommendations**: The system will suggest upcoming events based on the attendee's profile and booking history.

2.3 Operating Environment

- Web browsers (Chrome, Firefox, Safari, Edge) This E - Ticketing server shall operate in all famous browsers, for a model we are taking ,Internet Explorer Versions 7.0,8.0 and 9.0,with flash player 9 and JavaScript.
- This e-commerce website shall operate in all famous browsers, for a model we are taking, Internet Explorer Versions 7.0, 8.0 and 9.0, with flash player 9 and JavaScript.

2.4 User Characteristics

2.4.1 Event Attendees:

- The primary users who will use the system to browse and book tickets for concerts and marriages.
- Must have basic computer literacy, including the ability to navigate websites and complete online payments.
- Will access the system through web browsers on PCs or laptops with a stable internet connection.
- Responsibilities include searching for events, booking tickets, and managing bookings (e.g., checking event updates, downloading receipts).

2.4.2 Event Organizers:

- The primary users who will use the system to browse and book tickets for concerts and marriages.
- Must have basic computer literacy, including the ability to navigate websites and complete online payments.
- Will access the system via web browsers on PCs or laptops with a stable internet connection.
- Responsibilities include creating and managing event listings, tracking ticket sales and attendees, updating event details, and handling booking inquiries.

2.5 Design and Implementation Constraints:

- The system will be hosted on a server and accessed via modern web browsers, supporting devise like PCs and laptops with a stable internet connection.

- All transactions should be secured using SSL encryption.

2.6 Assumptions and Dependencies

- MERN stack (MongoDB, Express, React, Node.js) for the web application development.
- Python Django for server-side processing and APIs.
- JSON for data exchange between the server rand the client – side interface.
- Reliable internet access for both event organizers and attendees.
- Users being comfortable with basic web navigation and online payments.

3. External Requirements

3.1 User Interfaces:

- The system will provide a **web-based interface** accessible via modern web browsers such as Chrome, Firefox, and Edge.
- The user interface will be intuitive and responsive, allowing both event attendees and event organizers to navigate easily.
- Attendees will access event listings, booking forms, and payment processing through a simple, mobile - friendly layout.
- Organizers will have access to an administrative dashboard where they can manage event details, track bookings, and view attendee information.

3.2 Hardware Interfaces:

- The system does not require specific hardware interfaces; it will be accessed via **standard PCs or laptops** with stable internet connections.
- The server hosting the system will require standard hardware to support the **MERN stack** and **Python Django** server, ensuring optimal performance under expected traffic loads.
- The system may also be optimized for **mobile-friendly access** but does not require specialized mobile hardware.

3.3 Software Interfaces:

- The system will integrate with **MongoDB** for data management and storage
- It will use **third-party payment gateways** for processing online transactions securely.
- **API** integration will allow external systems (e.g., notifications, mailing services) to connect for additional functionalities.
- **React** will be used for building the client-side web application, while **Express.js** and **Node.js** will handle server-side operations.

3.4 Communications Interfaces:

- The system will use **HTTP/HTTPS** protocols for secure communication between users' browsers and the server.
- All communication between the client and server, including login, event browsing, and payment, will be encrypted using **SSL/TLS.**
- The system will support **real-time notifications** and updates via **Web Sockets** or similar technology for delivering booking confirmations and event status changes to users

4. System Features:

These requirements include the development of search tools, sorting, filtering, navigation, and visual components of the platform, which can be maintained by event organizers.

4.1 Event Organizer/Management Staff:

Requirement ID : RI.01.01
Title : Event Management
Description : Control the entire database containing records of events, bookings, and attendee details. Any issues related to accessing or updating the database should be resolved as quickly as possible.
Priority : 1

Requirement ID : RI.01.02
Title : Event Created and Update
Description : Event organizers can create new event listings (concerts and marriages), update event details (date, time, venue), and set ticket availability.
Priority : 1

Requirement ID : RI.01.03
Title : View all bookings
Description : Event organizers must be able to view all ticket bookings, track attendee details, and manage ticket availability in real time.
Priority : 1

Requirement ID : RI.01.04
Title : Event Notifications
Description : Organizers can send notifications (event updates, cancellations) to attendees based on their bookings.
Priority : 2

4.2 Event Attendee:

Requirement ID : R1.02.01
Title : Attendee Registration
Description : New attendees should sign up by creating an account with valid login credentials to access the platform.
Priority : 1

Requirement ID : R1.02.02
Title : Attendee Login
Description : Attendees must use their registered credentials to log into the system and access available events.
Priority : 1

Requirement ID : R1.02.03
Title : View and Edit Personal Details
Description : Attendees must be able to view and edit their personal details (e.g., name, contact information) in their profile.
Priority : 2

Requirement ID : R1.02.04
Title : Browse and Book Events
Description : Attendees must be able to browse available concerts and marriages, apply filters, and book tickets directly through the platform.
Priority : 2

5. Other Non-Functional Requirements

5.1 Performance Requirements

- **Response Time:** Transactions such as loading applications, allotting interview and must complete within 2-5 seconds. Account details and applications should load within 1 second under normal load conditions.
- **Concurrent Users**: The system must handle up to 5000 concurrent users wit without significant degradation in performance. The system should scale to accommodate peak traffic, especially during working hours and end-of-month transactions.
- **Database Transactions:** Each transaction should commit to the database within 1 second, ensuring data consistency and atomicity (ACID compliance) to avoid transactional errors.
- **Backup Speed:** Automated backups of sensitive data should occur within off-peak hours and must not impact system availability. The system must recover within 15 minutes in the event of failure.

5.2 System Requirements

- **Data Loss Prevention**: In case of a system crash or unexpected shutdown, all pending transactions must be either rolled back or stored securely to prevent any loss. The system must log any discrepancies and alert the administrators immediately.
- **Physical Safety**: The system must ensure that physical access to critical server components is restricted to authorized personnel only. No sensitive operations should be allowed unless the user has the correct level of access.
- **Transaction Safety:** To prevent incorrect transactions, the system must perform thorough checks, including balance verification and approval workflows for high-value transactions. Any failed transaction should trigger automated rollback mechanisms and alert the customer.
- **Fraud Detection:** The system should have a built-in fraud detection mechanism to alert and block suspicious or unauthorized activities based on user behaviour analysis and transaction patterns.

5.3 Security Requirements

- **User Authentication**: All users, whether customer, bank staff, or admins, must authenticate via a secure two-factor authentication (2FA) system before accessing the platform. Passwords should adhere to the latest encryption standards and be stored using cryptographic hashing (e.g., SHA-256).

- **Data Encryption**: Sensitive data like passwords, transaction details, and personal information must be encrypted in transit and at rest using at least 256-bit AES encryption.
- **Access Control**: Different levels of access should be enforced:
    - **User**: Can only access personal details, applications and search for events.
    - **Organiser**: Can only put forward a request to add an event to the admin.
    - **Admin**: Can modify system-wide configurations, grant permissions, access logs.

5.4 Software Quality Attributes

- **Availability**: The system must be available 99.99% of the time, ensuring minimal downtime, particularly during critical financial operations like payroll processing.
- **Reliability**: Transactions must be processed reliably, without any duplication or data loss. Fail-safe mechanisms should prevent incomplete transactions.
- **Scalability**: The system must be able to scale horizontally, supporting additional users and accounts without performance degradation as the number of customers grows.
- **Maintainability**: The code base should be modular and easy to maintain, allowing for quick fixes and updates. Routine maintenance must be conducted without affecting system availability.
- **Portability**: The system should support deployment across various platforms and cloud services to allow for distributed operations and disaster recovery.
- **Interoperability**: The system must be able to integrate with third-party services like payment gateways (UPI, credit cards, internet banking) and notification services (SMS, email).
- **Usability**: The user interface must be intuitive and easy to use, ensuring a smooth banking experience for all customer demographics.
- **Testability**: All features must be easily testable with automated scripts, especially for security vulnerabilities, performance benchmarks, and functional testing.

5.5 Business Rules

- **Applicant Permissions**: Applicants can only access their own account details, manage their application, and apply for jobs. No applicant can access another applicant's account details.

- **Recruiter Permissions**: Recruiter can approve or reject applications, allot interview slots, and oversee all the applications. Permissions are role-specific.

- **Administrator Permissions**: Admins can override any system settings, including enabling or disabling recruitment services, modifying job details, and managing staff permissions.

- **Alerts & notifications**: The applicant must receive alerts as soon as the recruiter allots an interview slot and as well as the status of his application.

6. Other Requirements

Appendix A: Glossary

- **Attendee**: An individual looking to book tickets for events such as concerts and marriages via the E-ticketing platform. They can browse events, book tickets, and manage their bookings.
- **Event Organizer**: A person or organization using the E-ticketing system to create and manage event listings, track ticket sales, and send notifications to attendees.
- **Booking System**: The feature that allows attendees to search for events, select tickets, make payments, and receive confirmation receipts.
- **Ticket**: A digital entry pass purchased by an attendee for an event. The system generates tickets after successful booking and payment.
- **Event Management**: A process managed by event organizers to create, update, and oversee event details such as time, location, and ticket availability.
- **Encryption**: The method of securing sensitive data, such as user credentials and payment information, ensuring that all data transmitted and stored is encrypted to maintain security and privacy.
- **Payment Gateway**: A third-party service integrated into the platform to process payments securely and generate receipts for successful ticket purchases.
- **Real-Time Updates**: Instant updates provided by the system regarding event status, booking confirmations, or cancellations, ensuring that users receive timely notifications.
- **Responsive User Interface (UI)**: A design feature that adjusts the layout of the platform to various device screen sizes, providing a smooth user experience on both desktop and mobile browsers.
- **MongoDB**: A NoSQL database used to store and manage event and user data in the E-ticketing system.
- **User Interface (UI)**: The visual part of the platform through which attendees and organizers interact with the system, including navigation menus, event listings, and booking forms.
- **Availability**: The system's capability to be accessible at all times, allowing users to browse events, book tickets, or manage events 24/7.

- **Cross-Platform**: A feature ensuring the E-ticketing system operates smoothly across multiple devices, such as desktops, tablets, and smartphones, through web browsers.
- **Event Notifications**: Alerts provided to attendees by organizers about event changes, confirmations, or cancellations.
- **Scheduled Maintenance**: Periodic downtime planned for system updates and improvements to ensure the platform remains secure and performs optimally.
- **User Assistance**: An integrated help system or FAQ section that guides attendees and organizers through using the platform efficiently, ensuring ease of use.

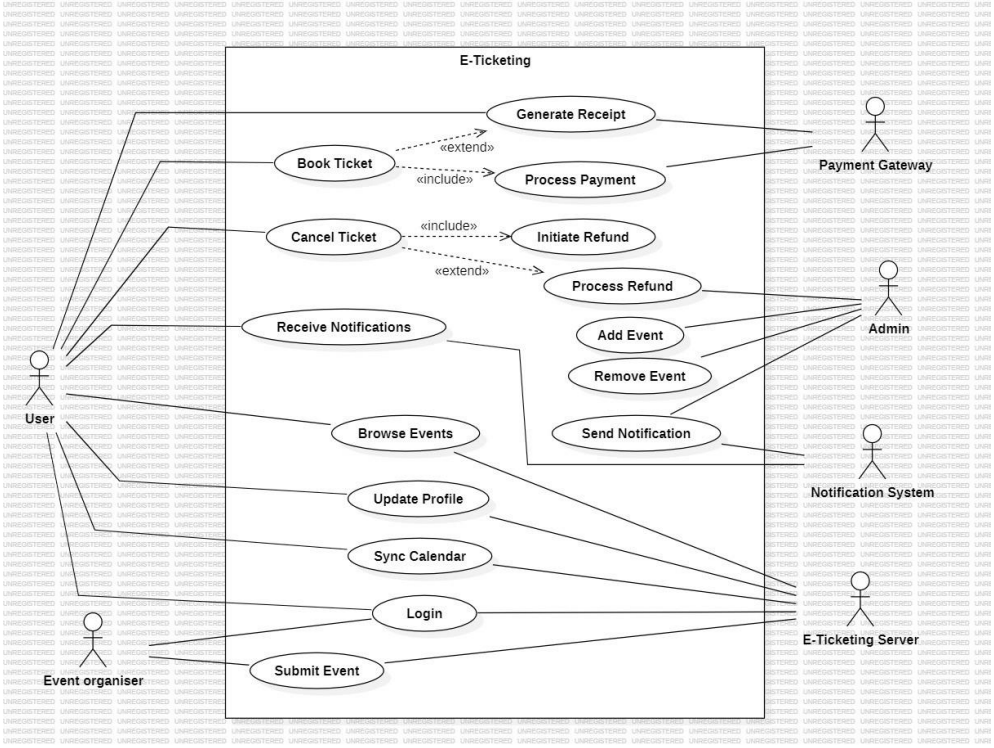
• Appendix B: Analysis Models

• Use Case Template:

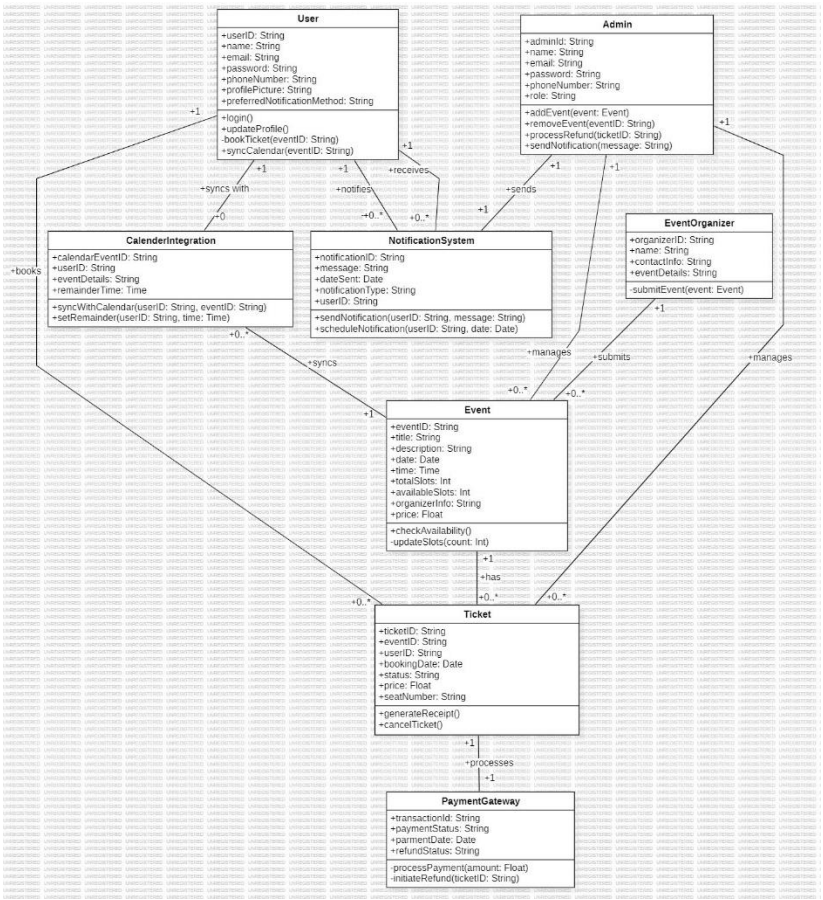
<table>
<tr><td colspan="2">Use Case ID:</td><td colspan="2">1234322</td></tr>
<tr><td colspan="2">Use Case Name:</td><td colspan="2">E-Ticketing</td></tr>
<tr><td colspan="2">End Objective:</td><td colspan="2">Make a E-ticketing platform for events</td></tr>
<tr><td rowspan="4">Created By:</td><td>1. Chodavarapu Srinidhi</td><td rowspan="4">On (date):</td><td rowspan="4">October 18, 2024</td></tr>
<tr><td>2. Darsh Agrawal</td></tr>
<tr><td>3. Areeb Akhtar</td></tr>
<tr><td>4. Pasham Ayush Reddy</td></tr>
<tr><td colspan="2">User / Actor</td><td colspan="2">User, Admin, Event organizer</td></tr>
<tr><td colspan="2">Trigger:</td><td colspan="2">User logging in the site to buy tickets for events</td></tr>
<tr><td colspan="4">Basic/Normal flows</td></tr>
<tr><td colspan="2">User Actions</td><td colspan="2">System Actions</td></tr>
<tr><td colspan="2">The user login to the site by entering details.</td><td colspan="2">Login page requests the user to provide a proper username and password.</td></tr>
</table>

User views events present on the site.	The home page suggests to the user some events or the user can search for the required event.
Users make purchases of the tickets of the event with appropriate purchase options.	Site will provide users with COD or other online payment methods.
User wants to view and edit his/her own details.	Site will provide the user to edit the changes
User completes the purchase and checkout.	Site processes the purchase and gives tickets.
Users can sync their calendar with the site.	Site syncs his calendar.
Users can receive notifications about the latest events.	Site notifies users with the latest events.
Users can cancel their tickets.	Admin processes the refund of the tickets
Exception Flows	
User Actions	**System Actions**
The user tries to login but doesn't have an account on the website.	The page requests the user to register an account in the registration page before committing the login.
The user tries to login by entering details.	The details entered are incorrect. Error message is displayed and the user needs to enter the correct details.
User tries to book tickets for a sold out event.	A “Sold out” message is displayed.
Payment by user fails.	A payment failed message is displayed.

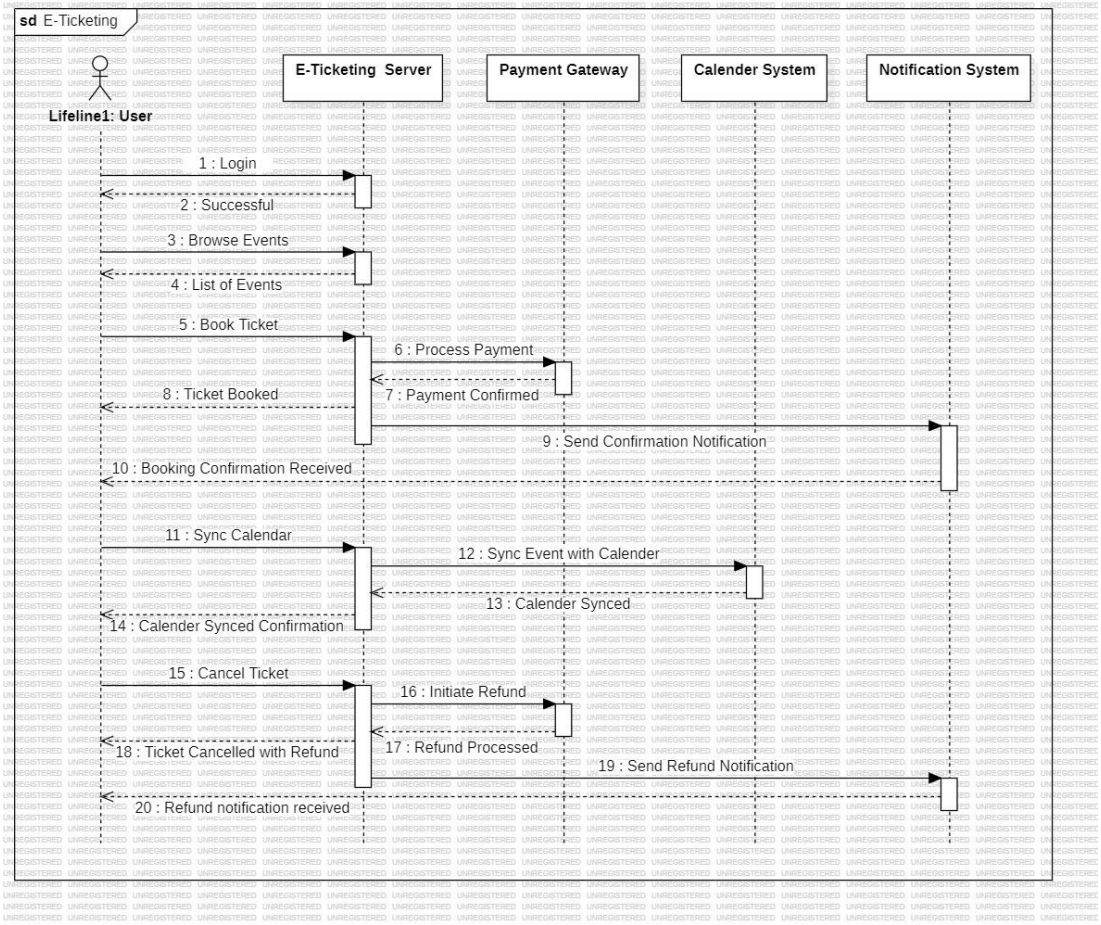
Use-Case Diagram:



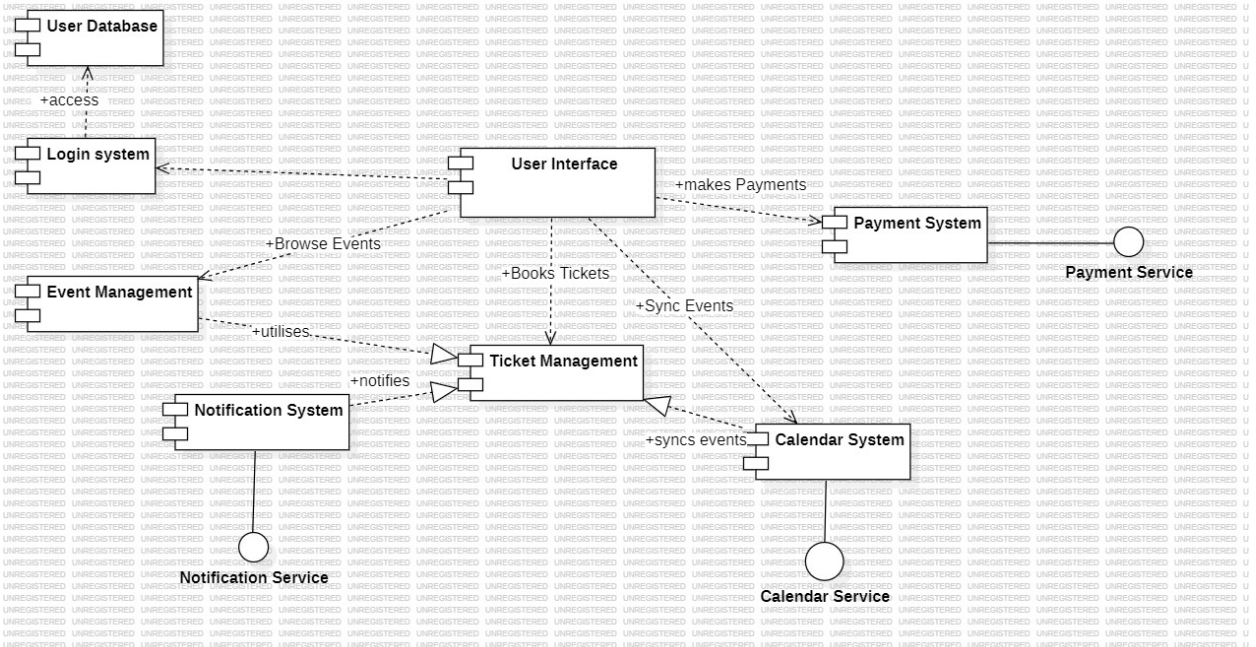
Class Diagram:



Sequence Diagram:



Component Diagram:



Appendix C: To Be Determined (TBD) List

This appendix lists items that need further clarification or finalization during the project's development. These items will be addressed as the project evolves, and final decisions will be made during subsequent stages.

- **Third-Party Payment Systems:** The exact payment gateways (e.g., PayPal, Stripe, Google Pay) to be integrated for processing payments securely and efficiently are still under evaluation.
- **Finalized User Roles and Permissions**: User roles and permission levels, especially for the **Admin** class, need further definition. This will include detailed permissions (e.g., VIP, standard, student discounts, managing users, and generating reports) and access control for sensitive actions.
- **Tickets Types and Categories**: Finalization of the specific ticket types (e.g., VIP, standard, student discounts) and categories (e.g., transportation, event types) the system will support.

Conclusion : Thus we created SRS document for E-Ticketing System.

Experiment 3: INSTALLATION OF ECLIPSE, MAVEN, JDK, TOMCAT, CONFIGURING TOMCAT TO ECLIPSE

AIM: To experience the Eclipse IDE, Maven software, JDK and Tomcat Server Configuration.

Introduction:

- **Eclipse IDE**
  - Eclipse IDE is a popular, open-source integrated development environment (IDE) primarily used for Java programming. It provides tools for coding, debugging, and testing applications, supporting multiple programming languages through plugins.
  - **Features of StarUML:**
    - **Code Editing** with syntax highlighting and auto-completion.
    - **Debugging Tools** for error tracking.
    - **Integration** with version control systems like Git.
    - **Plugin Support** for languages like Python, C++, and more.

- **Maven Software**
  - Apache Maven is a build automation and project management tool designed for Java projects. It uses a POM (Project Object Model) file to manage project dependencies and configurations.
  - **Key Features of Maven:**
    - Dependency Management: Automatically downloads required libraries.
    - Build Automation: Simplifies compiling, testing, and packaging applications.
    - Project Standardization: Follows a structured directory format.

- **JDK (Java Development Kit)**
  - The JDK is a software development environment used for developing Java applications. It includes tools like the Java compiler, libraries, and the Java Virtual Machine (JVM).
  - **JDK Installation and Configuration:**
    - Download the latest JDK from the Oracle website.
    - Install and set the JAVA_HOME environment variable.
    - Add the bin folder to the Path environment variable for global access to Java commands.

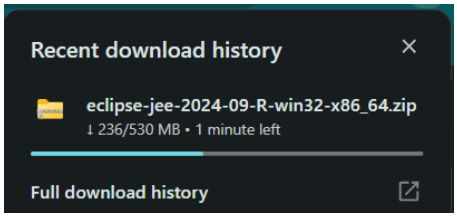
- **Tomcat Server Configuration**
  - Apache Tomcat is a web server and servlet container used to deploy and run Java-based web applications.
  - **Steps to configure Tomcat:**
    - Download the Tomcat server from the official website.
    - Extract the archive and set the CATALINA_HOME environment variable to the Tomcat directory.
    - Add the bin folder to the Path environment variable.
    - Deploy web applications in the webapps folder.
    - Start the server using the startup.bat (Windows) or startup.sh (Linux) script.
    - Access the server at http://localhost:8080

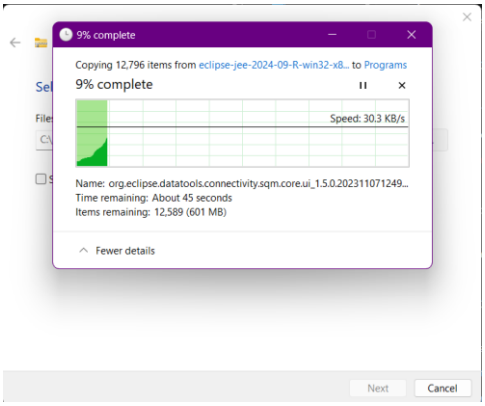
Procedure

ECLIPSE IDE Installations

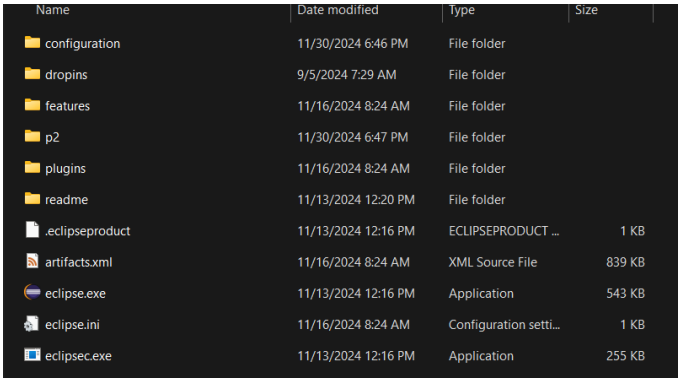
STEP 1 : Visit **https://www.eclipse.org/downloads/packages/** and go to **Java And Web Developers**

STEP 2 : After the download completes extract the zip file



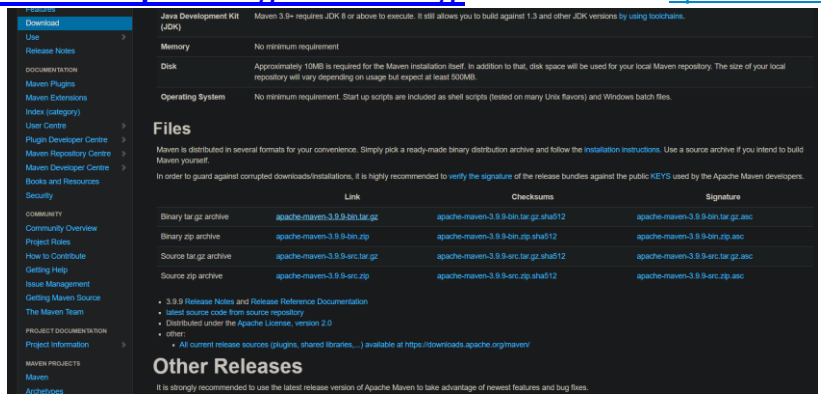


STEP 3 : After extraction you have the eclipse set up and ready to run

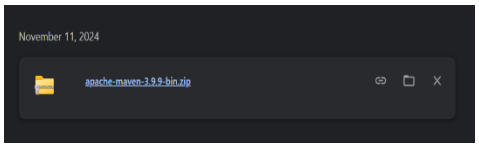


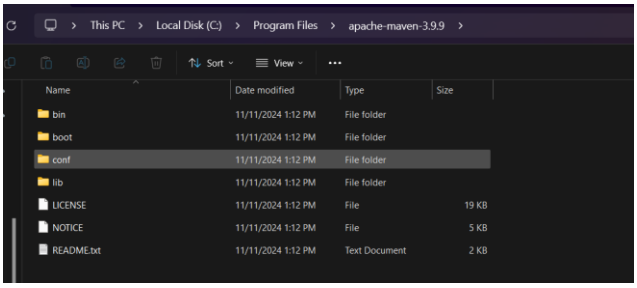
MAVEN Installations

STEP 1 : Visit **https://maven.apache.org/download.cgi** and download apache-maven-3.9.9-bin.zip

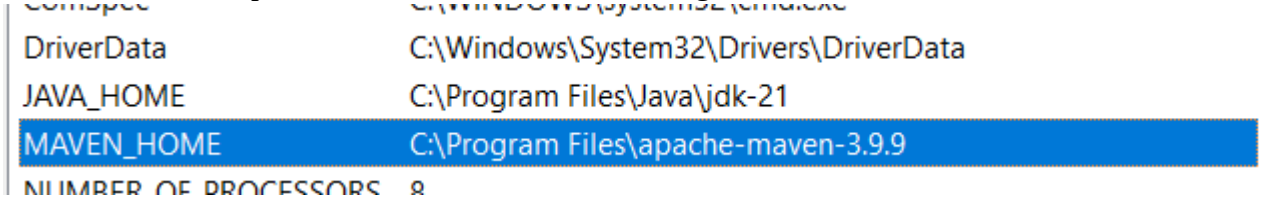


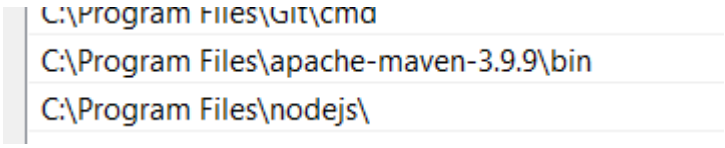
STEP 2 : Visit After Download of the zip file extract it





STEP 3 : Add this path to environment variables along with **MAVEN_HOME** variable



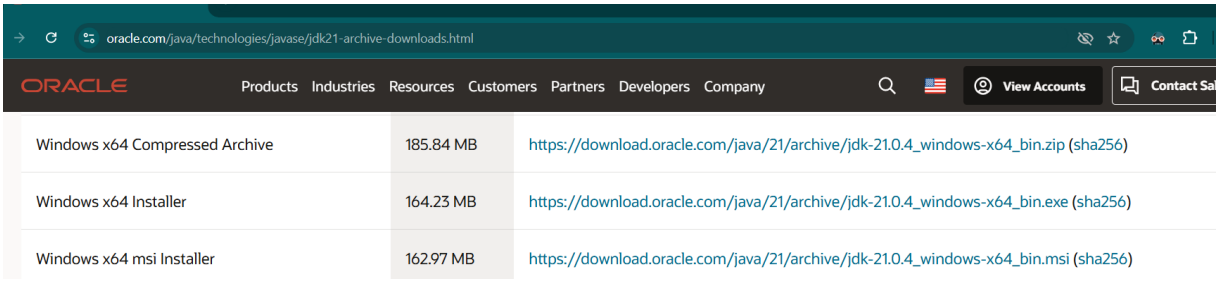


STEP 4 : Verify using **mvn --version** command

```
C:\Users\Ayush>mvn --version
Apache Maven 3.9.9 (8e8579a9e76f7d015ee5ec7bfcdc97d260186937)
Maven home: C:\Program Files\apache-maven-3.9.9
Java version: 21.0.4, vendor: Oracle Corporation, runtime: C:\Program Files\Java\jdk-21
Default locale: en_US, platform encoding: UTF-8
OS name: "windows 11", version: "10.0", arch: "amd64", family: "windows"
```

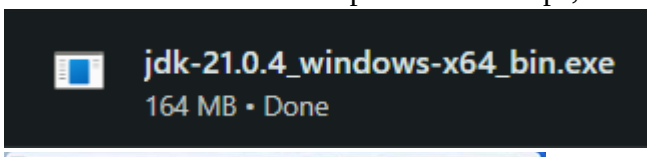
JDK Installations

STEP 1 : Visit https://www.oracle.com/java/technologies/javase/jdk21-archive-downloads.html and download Windows x64 Installer

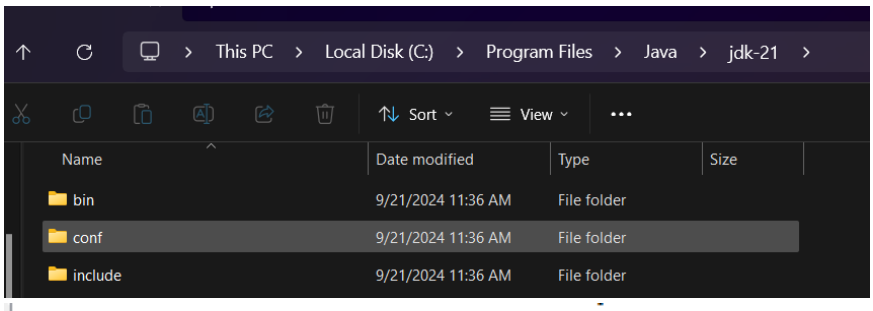


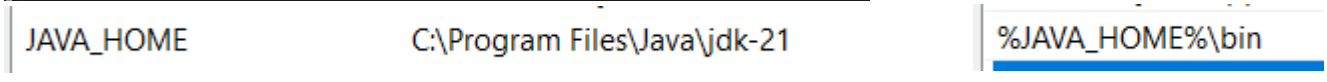
Windows x64 Compressed Archive	185.84 MB	https://download.oracle.com/java/21/archive/jdk-21.0.4_windows-x64_bin.zip (sha256)
Windows x64 Installer	164.23 MB	https://download.oracle.com/java/21/archive/jdk-21.0.4_windows-x64_bin.exe (sha256)
Windows x64 msi Installer	162.97 MB	https://download.oracle.com/java/21/archive/jdk-21.0.4_windows-x64_bin.msi (sha256)

STEP 2 : Run the exe and perform the steps, and change install path if needed



STEP 3 : Add this path to environment variables along with **JAVA_HOME** variable



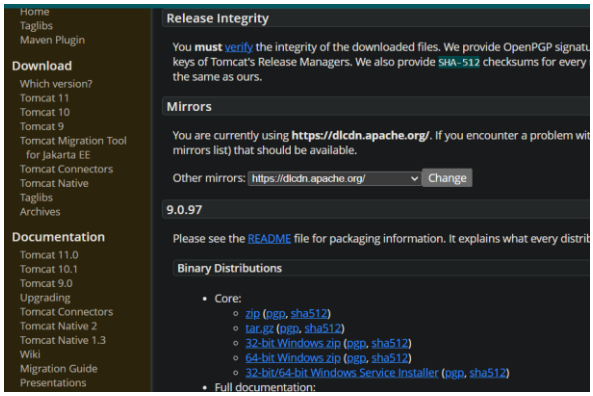


STEP 4 : Verify using **java --version** command

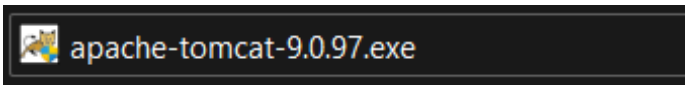
```
C:\Users\Ayush>java -version
java version "21.0.4" 2024-07-16 LTS
Java(TM) SE Runtime Environment (build 21.0.4+8-LTS-274)
Java HotSpot(TM) 64-Bit Server VM (build 21.0.4+8-LTS-274, mixed mode, sharing)
```

Tomcat Installations

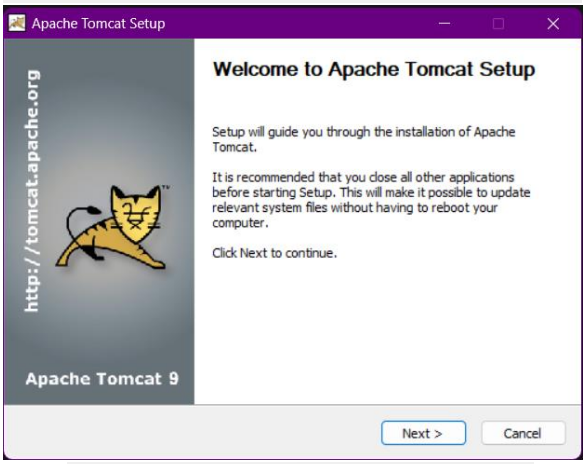
STEP 1 : Visit https://tomcat.apache.org/download-90.cgi and download **Windows service Installer**

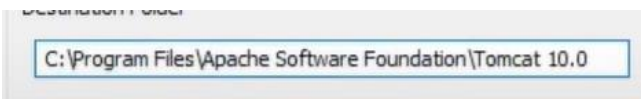


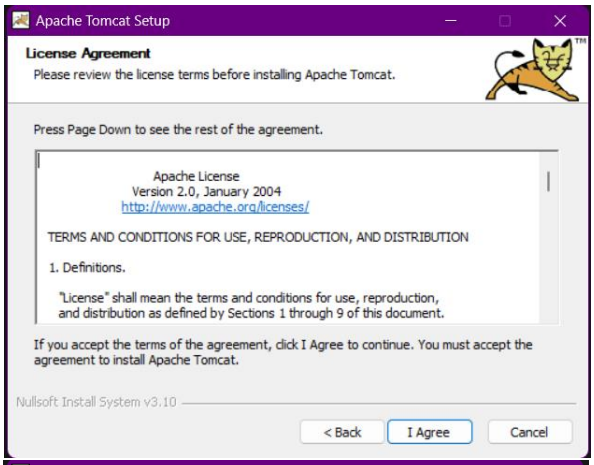
STEP 2 : Run the exe and perform the steps

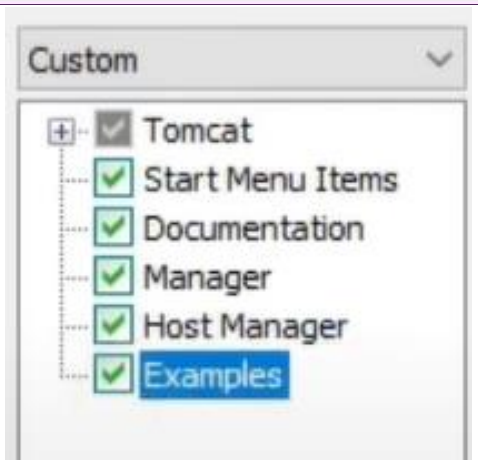


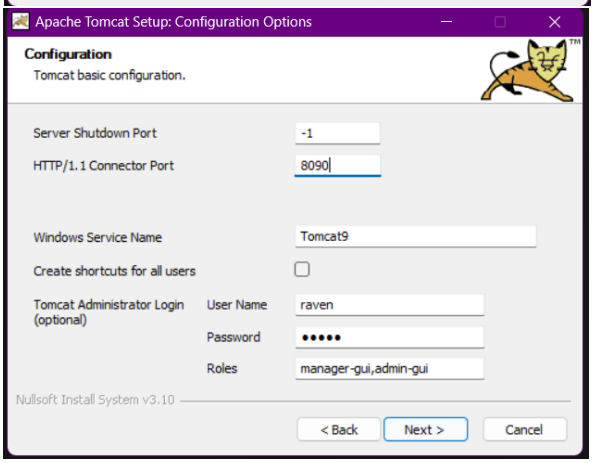
- Click on **Next** and **I Agree**
- Tick all options
- Set up **Port** ,**Username** and **Password**
- Click on **Next>**
- Select **JDK** path & **Destination** path and click **Finish**



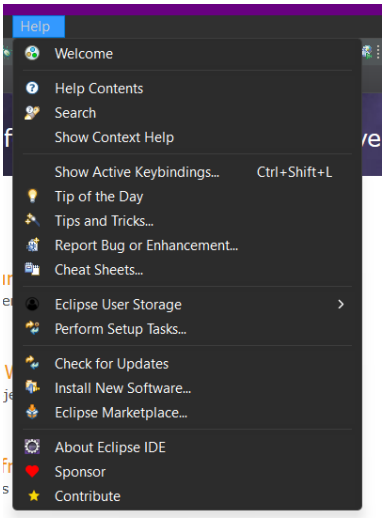






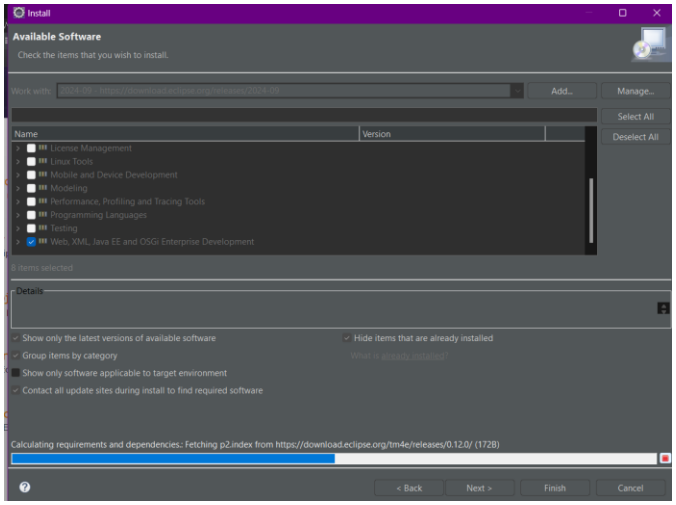


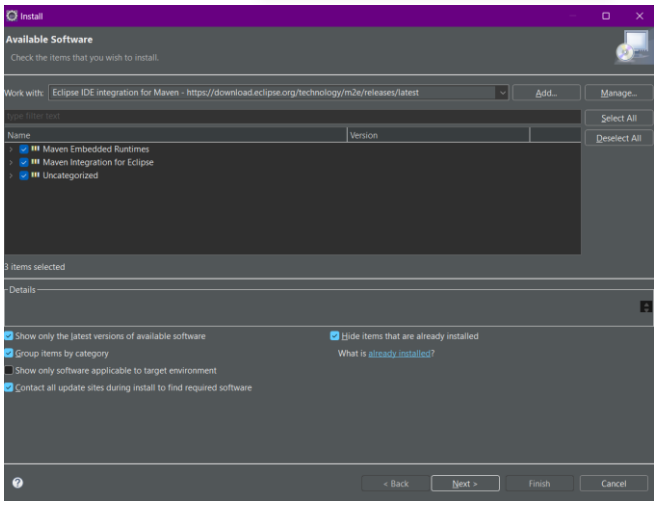
Tomcat SET-UP



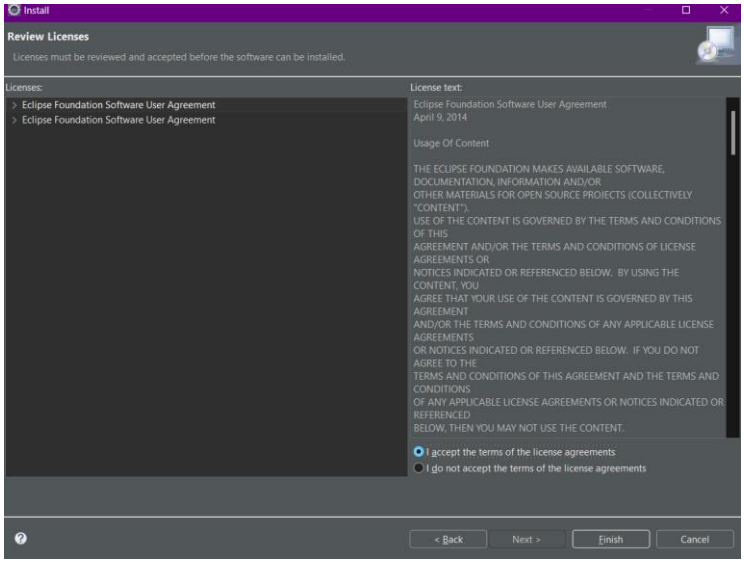
STEP 1 : Click on **Help** in **Eclipse IDE** and click on **Install New Software…**

STEP 2 : Download **Web XML, Java EE & OSGi Enterprises** and **Maven dependencies**

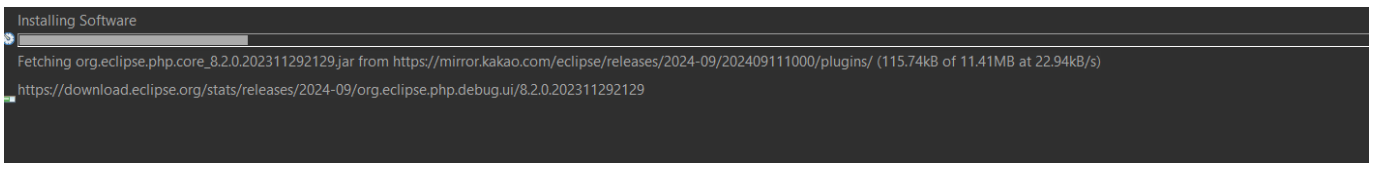




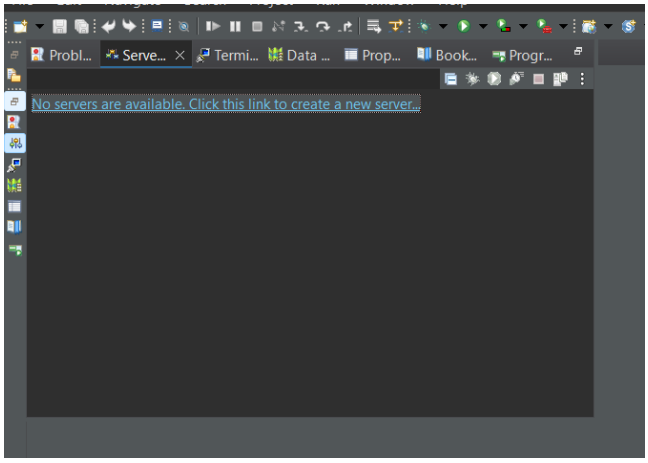
STEP 3 : Click on **I agree**



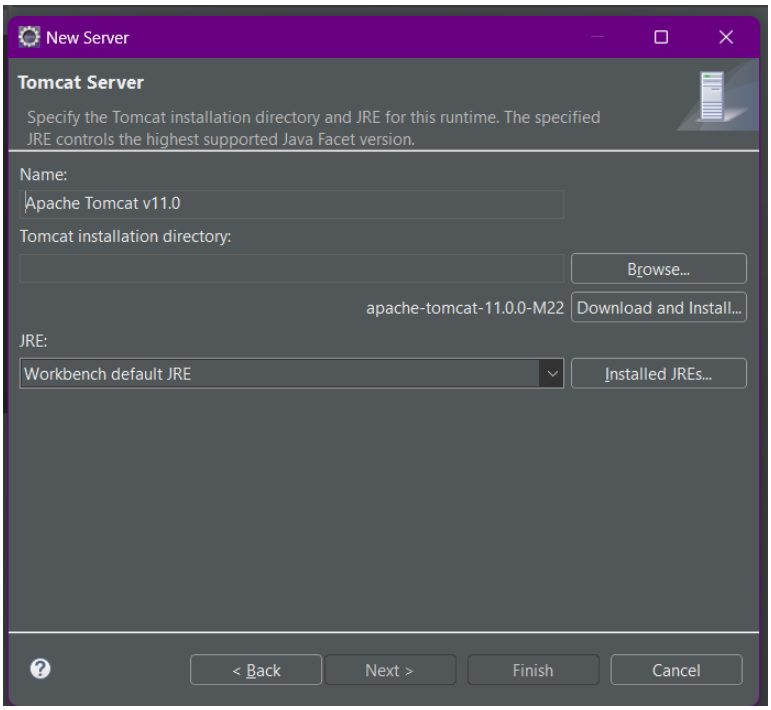
STEP 4 : Wait for downloads



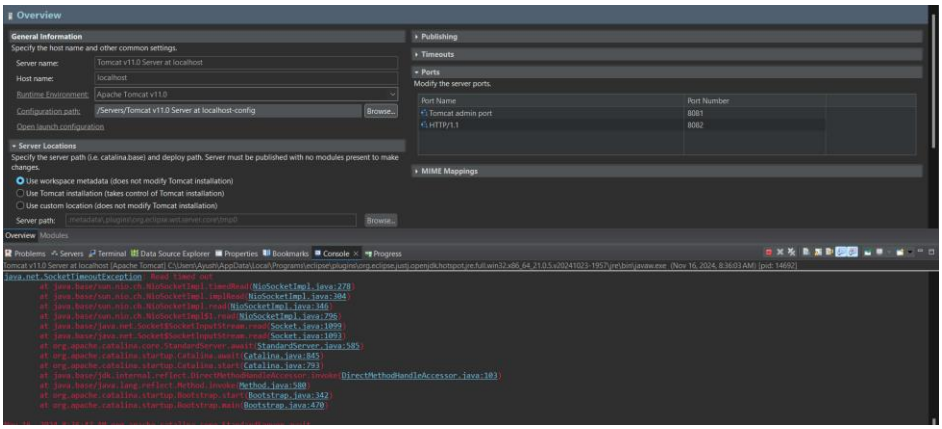
STEP 5 : Click on **Servers** option



STEP 6 : Select appropriate **Tomcat version** and click on **Finish**



STEP 7 : Click Edit the ports as **8081** & **8082**



Conclusion : Thus we setup **Tomcat Server** and other software to launch our pages.

Experiment 4: GIT COMMANDS

AIM: To experience the GIT commands and GITHUB repository warehouse.

Introduction:

- **GIT Bash and GitHub**
  - Git is a popular version control system. It was created by Linus Torvalds in 2005.
  - It is designed to make it easier to have multiple versions of a code base, sometimes across multiple developers or teams
  - **Functions of Git**
    - Manage projects with Repositories
    - Clone a project to work on a local copy
    - Control and track changes with Staging and Committing
    - Branch and Merge to allow for work on different parts and versions of a project
    - Pull the latest version of the project to a local copy
    - Push local updates to the main project

- **GitHub Repositories**
  - A **GitHub repository** is a storage space in GitHub where developers host and manage their project files, code, and documentation. Repositories are essential for collaboration, version control, and sharing projects with others.
  - **Functions of GitHub Repos**
    - **Code Storage**: Store and organize project files.
    - **Version Control**: Track changes to files using Git.
    - **Collaboration**: Multiple contributors can work on the same project.
    - **Issue Tracking**: Report and manage bugs or feature requests.
    - **Branching**: Create separate branches for different features or fixes.

Procedure

Basic GIT Commands

cmd-1 : git version

```
C:\Users\Ayush\OneDrive\Desktop\newRepo>git version
git version 2.46.2.windows.1
```

cmd-2 : git init

```
C:\Users\Ayush\OneDrive\Desktop\newRepo>git init
Initialized empty Git repository in C:/Users/Ayush/OneDrive/Desktop/newRepo/.git/
```

cmd-3 : git config

```
C:\Users\Ayush\OneDrive\Desktop\newRepo>git config user.name
RahZero0

C:\Users\Ayush\OneDrive\Desktop\newRepo>git config user.email
ayushpasham@gmail.com
```

cmd-4 : git status

```
C:\Users\Ayush\OneDrive\Desktop\newRepo>git status
On branch master

No commits yet

nothing to commit (create/copy files and use "git add" to track)
```

cmd-5 : git add

```
git add .
```

cmd-6 : git commit

```
PS C:\Users\Ayush\OneDrive\Desktop\newRepo> git commit -m "Added Hello World!"
[master (root-commit) f198458] Added Hello World!
 1 file changed, 1 insertion(+)
 create mode 100644 a.txt
```

cmd-7 : git diff

```
PS C:\Users\Ayush\OneDrive\Desktop\newRepo> git diff
diff --git a/a.txt b/a.txt
index bc7774a..f2c8a5d 100644
--- a/a.txt
+++ b/a.txt
@@ -1 +1,2 @@
-hello world!
\ No newline at end of file
+hello world!
+My world
\ No newline at end of file
```

cmd-8 : git reset

```
PS C:\Users\Ayush\OneDrive\Desktop\newRepo> git reset
Unstaged changes after reset:
M       a.txt
```

cmd-9 : Branch Operations

```
PS C:\Users\Ayush\OneDrive\Desktop\newRepo> git branch work
PS C:\Users\Ayush\OneDrive\Desktop\newRepo> git branch -a
* master
  work
PS C:\Users\Ayush\OneDrive\Desktop\newRepo> git checkout work
M       a.txt
Switched to branch 'work'
PS C:\Users\Ayush\OneDrive\Desktop\newRepo> git checkout -b new
Switched to a new branch 'new'
PS C:\Users\Ayush\OneDrive\Desktop\newRepo> git checkout -d new
M       a.txt
HEAD is now at f198458 Added Hello World!
PS C:\Users\Ayush\OneDrive\Desktop\newRepo> git branch -d new
Deleted branch new (was f198458).
PS C:\Users\Ayush\OneDrive\Desktop\newRepo> git checkout master
M       a.txt
Switched to branch 'master'
```

cmd-10 : Logs

```
PS C:\Users\Ayush\OneDrive\Desktop\newRepo> git log
commit f1984586e94921b842de432ffe21d6f883f611b6 (HEAD -> master, work)
Author: RahZero0 <ayushpasham@gmail.com>
Date:   Sat Nov 16 12:33:00 2024 +0530

    Added Hello World!
PS C:\Users\Ayush\OneDrive\Desktop\newRepo> git log --oneline
f198458 (HEAD -> master, work) Added Hello World!
```

cmd-11 : git revert

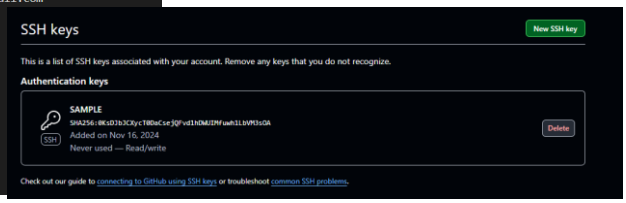
```
PS C:\Users\Ayush\OneDrive\Desktop\newRepo> git revert f1984586e94921b842de432ffe21d6f883f611b6
error: Your local changes to the following files would be overwritten by merge:
        a.txt
Please commit your changes or stash them before you merge.
Aborting
fatal: revert failed
```

cmd-12 : Pushing

```
PS C:\Users\Ayush\OneDrive\Desktop\newRepo> git branch -M main
>> git remote add origin https://github.com/RahZero0/SE.git
PS C:\Users\Ayush\OneDrive\Desktop\newRepo> git push -u origin main
Enumerating objects: 3, done.
Counting objects: 100% (3/3), done.
Writing objects: 100% (3/3), 229 bytes | 38.00 KiB/s, done.
Total 3 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)
To https://github.com/RahZero0/SE.git
 * [new branch]      main -> main
branch 'main' set up to track 'origin/main'.
```

cmd-13 : SSH Key

```
PS C:\Users\Ayush\OneDrive\Desktop\newRepo> ssh-keygen -t rsa -C "ayushpasham@gmail.com"
Generating public/private rsa key pair.
Enter file in which to save the key (C:\Users\Ayush/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in C:\Users\Ayush/.ssh/id_rsa
Your public key has been saved in C:\Users\Ayush/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:0KsDJbJCXycT0DaCsejQFvd1hDWUIMfuwh1LbVM3sOA ayushpasham@gmail.com
The key's randomart image is:
+---[RSA 3072]----+
| .+.+...+*B...   |
|.o.+ =.=oo.o..o  |
|oo+ ++=o..E... . |
|+..o.o+.+.+      |
|..... +S+ .      |
| .   .o.+        |
|      o.         |
|       .         |
|                 |
+----[SHA256]-----+
```



cmd-14 : git clone

```
PS C:\Users\Ayush\OneDrive\Desktop\newRepo> git clone https://github.com/RahZero0/SE.git
Cloning into 'SE'...
remote: Enumerating objects: 3, done.
remote: Counting objects: 100% (3/3), done.
remote: Total 3 (delta 0), reused 3 (delta 0), pack-reused 0 (from 0)
Receiving objects: 100% (3/3), done.
```

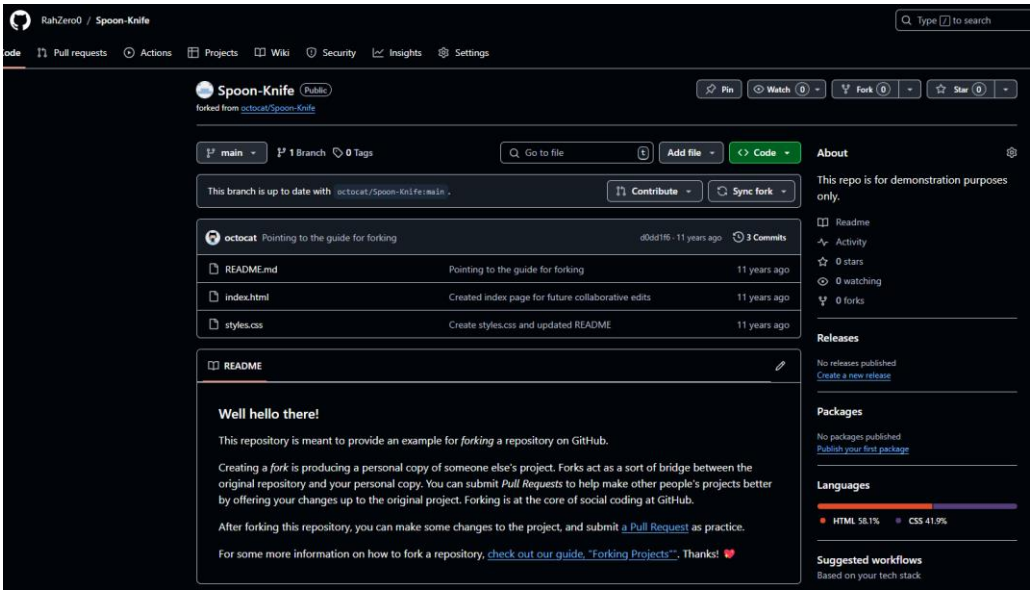
cmd-15 : git fetch

```
PS C:\Users\Ayush\OneDrive\Desktop\newRepo> git fetch https://github.com/RahZero0/SE.git
From https://github.com/RahZero0/SE
 * branch            HEAD       -> FETCH_HEAD
```

cmd-16 : git pull

```
PS C:\Users\Ayush\OneDrive\Desktop\newRepo> git pull origin
Already up to date.
```

cmd-17 : Forking



cmd-17.a : Adding Branch

```
PS C:\Users\Ayush\OneDrive\Desktop\newRepo> git clone https://github.com/RahZero0/Spoon-Knife.git
Cloning into 'Spoon-Knife'...
remote: Enumerating objects: 10, done.
remote: Total 10 (delta 0), reused 0 (delta 0), pack-reused 10 (from 1)
Receiving objects: 100% (10/10), done.
Resolving deltas: 100% (1/1), done.
PS C:\Users\Ayush\OneDrive\Desktop\newRepo> cd .\Spoon-Knife\
PS C:\Users\Ayush\OneDrive\Desktop\newRepo\Spoon-Knife> code .
PS C:\Users\Ayush\OneDrive\Desktop\newRepo\Spoon-Knife> git checkout -b 22BD1A6744
Switched to a new branch '22BD1A6744'
PS C:\Users\Ayush\OneDrive\Desktop\newRepo\Spoon-Knife> code .
PS C:\Users\Ayush\OneDrive\Desktop\newRepo\Spoon-Knife> git add .
PS C:\Users\Ayush\OneDrive\Desktop\newRepo\Spoon-Knife>
```

cmd-17.b : Pushing changes back to forked repository

```
PS C:\Users\Ayush\OneDrive\Desktop\newRepo\Spoon-Knife> git commit -m "I added changes."
[22BD1A6744 00280eb] I added changes.
 1 file changed, 1 insertion(+)
 create mode 100644 22BD1A6744.txt
PS C:\Users\Ayush\OneDrive\Desktop\newRepo\Spoon-Knife> git push origin 22BD1A6744
Enumerating objects: 4, done.
Counting objects: 100% (4/4), done.
Delta compression using up to 8 threads
Compressing objects: 100% (2/2), done.
Writing objects: 100% (3/3), 382 bytes | 127.00 KiB/s, done.
Total 3 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)
remote:
remote: Create a pull request for '22BD1A6744' on GitHub by visiting:
remote:      https://github.com/RahZero0/Spoon-Knife/pull/new/22BD1A6744
remote:
To https://github.com/RahZero0/Spoon-Knife.git
 * [new branch]      22BD1A6744 -> 22BD1A6744
```

cmd-18 : Pull from upstream repository

```
PS C:\Users\Ayush\OneDrive\Desktop\newRepo\Spoon-Knife> git remote add upstream git@github.com:octocat/Spoon-Knife.git
PS C:\Users\Ayush\OneDrive\Desktop\newRepo\Spoon-Knife> git fetch upstream
The authenticity of host 'github.com (20.207.73.82)' can't be established.
ED25519 key fingerprint is SHA256:+DiY3wvvV6TuJJhbpZisF/zLDA0zPMSvHdkr4UvCOqU.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'github.com' (ED25519) to the list of known hosts.
remote: Enumerating objects: 8, done.
remote: Counting objects: 100% (8/8), done.
remote: Compressing objects: 100% (3/3), done.
remote: Total 6 (delta 2), reused 6 (delta 2), pack-reused 0 (from 0)
Unpacking objects: 100% (6/6), 597 bytes | 12.00 KiB/s, done.
From github.com:octocat/Spoon-Knife
 * [new branch]      change-the-title -> upstream/change-the-title
 * [new branch]      main             -> upstream/main
 * [new branch]      test-branch      -> upstream/test-branch
```

```
PS C:\Users\Ayush\OneDrive\Desktop\newRepo\Spoon-Knife> git remote add upstream git@github.com:octocat/Spoon-Knife.git
PS C:\Users\Ayush\OneDrive\Desktop\newRepo\Spoon-Knife> git fetch upstream
The authenticity of host 'github.com (20.207.73.82)' can't be established.
ED25519 key fingerprint is SHA256:+DiY3wvvV6TuJJhbpZisF/zLDA0zPMSvHdkr4UvCOqU.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'github.com' (ED25519) to the list of known hosts.
remote: Enumerating objects: 8, done.
remote: Counting objects: 100% (8/8), done.
remote: Compressing objects: 100% (3/3), done.
remote: Total 6 (delta 2), reused 6 (delta 2), pack-reused 0 (from 0)
Unpacking objects: 100% (6/6), 597 bytes | 12.00 KiB/s, done.
From github.com:octocat/Spoon-Knife
 * [new branch]      change-the-title -> upstream/change-the-title
 * [new branch]      main             -> upstream/main
 * [new branch]      test-branch      -> upstream/test-branch
PS C:\Users\Ayush\OneDrive\Desktop\newRepo\Spoon-Knife> git push origin 22BD1A6744
Everything up-to-date
```

Conclusion : Thus we were able to understand and perform GIT commands.

Experiment 5: CREAITNG MAVEN JAVA AND MAVEN WEB PROJECT USING ECLIPSE AND PUSH THEM TO GITHUB + JENKINS INSTALLATIONS

AIM: To create **Maven JAVA** and **Maven WEB** projects using **Eclipse** and push them to **GitHub**

Introduction:

- **MAVEN**
  - Apache Maven is a powerful **build automation and dependency management tool** for Java-based projects. It simplifies project setup, management, and deployment using a standard directory structure and configuration file called pom.xml.
  - **Functions of Maven**
    - **Project Management with POM**: Centralized configuration using the pom.xml file.
    - **Dependency Management**: Automatically downloads and resolves project dependencies.
    - **Build Automation**: Compiles, tests, and packages projects efficiently.
    - **Plugin Support**: Extends functionality through a wide range of plugins.
    - **Standard Project Structure**: Provides a consistent and organized directory layout.
    - **Integration with Tools**: Works seamlessly with IDEs, version control systems, and CI/CD tools.

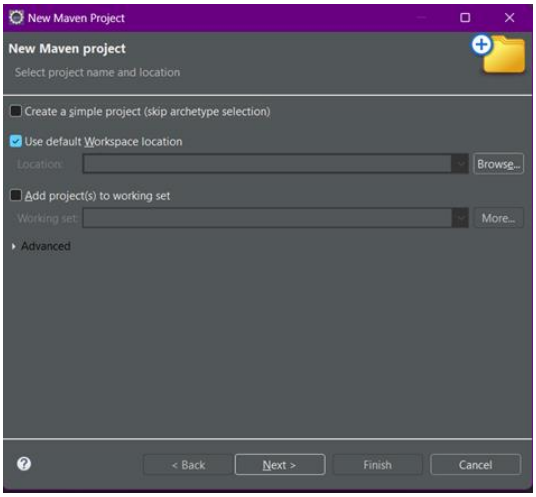
- **ECLIPSE IDE**
  - Eclipse IDE is a widely used **integrated development environment (IDE)** designed primarily for Java development. It supports other programming languages through plugins and provides tools for coding, debugging, and testing applications efficiently.
  - **Functions of Eclipse IDE**
    - **Code Editing**: Offers syntax highlighting, code completion, and real-time error detection.
    - **Project Management**: Organizes files and resources for single or multi-module projects.
    - **Debugging Tools**: Allows developers to set breakpoints, inspect variables, and debug code.
    - **Plugin Support**: Extends functionality for languages like Python, C++, and web development.
    - **Version Control Integration**: Works seamlessly with Git and other version control systems.
    - **Build Automation**: Supports tools like Maven and Gradle for building projects.

- **JENKINS**
  - Jenkins is an open-source **automation server** used for building, testing, and deploying software projects. It supports **Continuous Integration (CI)** and **Continuous Delivery (CD)**, helping developers integrate changes and deliver updates efficiently.
  - **Functions of Jenkins**
    - **Continuous Integration**: Automatically builds and tests code whenever changes are committed.
    - **Integration**: Automatically builds and tests code whenever changes are committed.
    - **Pipeline Automation**: Manages complex build and deployment workflows using Jenkins Pipelines.
    - **Plugin Support**: Extends functionality with a vast library of plugins for tools like Git, Maven, and Docker.
    - **Build Scheduling**: Allows builds to be triggered manually, on a schedule, or based on code changes.
    - **Integration with Tools**: Works with version control systems, testing frameworks, and deployment platforms.
    - **Monitoring and Reporting**: Provides detailed build logs, test reports, and error tracking.

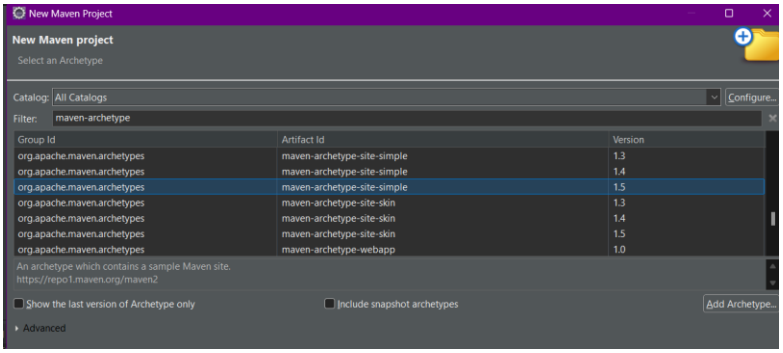
Procedure

MAVEN JAVA

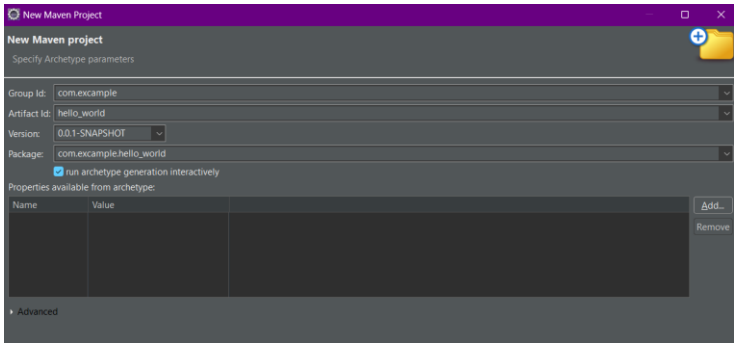
STEP 1 : Open Eclipse IDE and create new **Maven Project**.



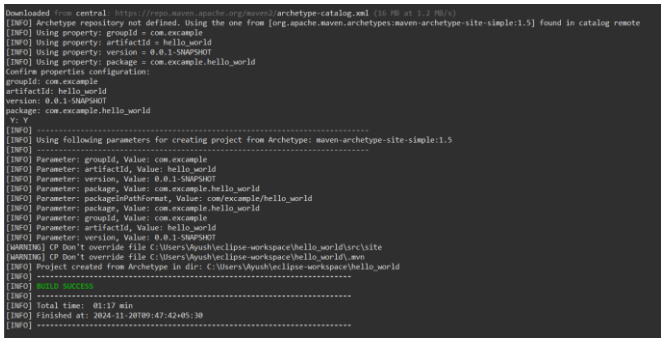
STEP 2 : Select **org.apache.maven.archetypes -> maven-archetype-quickstart 1.5** as Maven Architect Type and click on **Next**



STEP 3 : Define Project **MetaData** and click **FINISH**



STEP 4 : In the **Console All the Artifacts** have been grouped

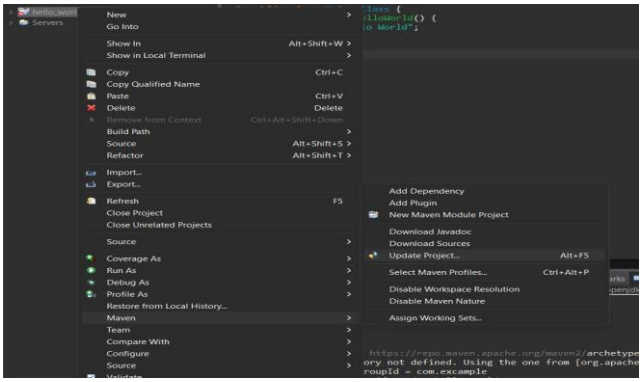


STEP 5 : Maven Project has been successfully created

└── Includes:
└── src/main/java (for Java code)
└── src/test/java (for test code)
└── pom.xml (Maven config file)

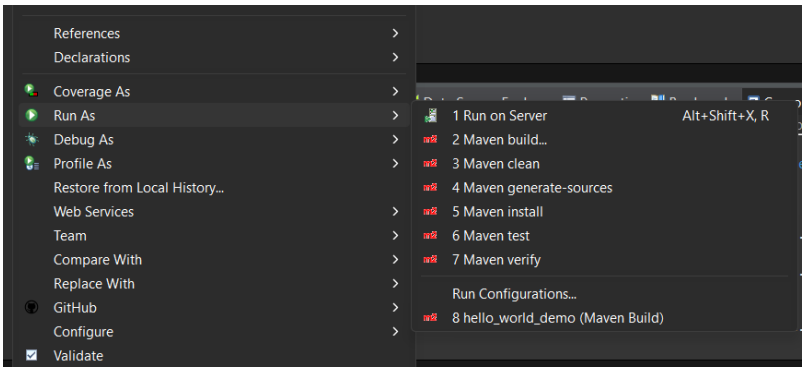
```java
package hello_world_demo;

public class WelcomClass {
    public String HelloWorld() {
        return "Hello World";
    }
}
```

STEP 6 : Update Project Settings to ensure the dependencies are up to date

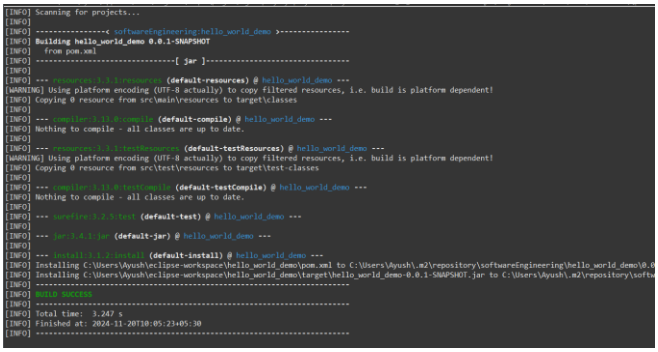


STEP 7 : Build and Run Maven Project

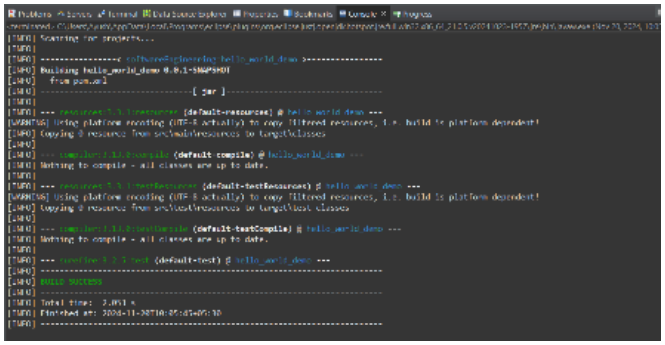
└── Right-click on App.java -> Run As -> Maven Clean
└── Right-click on App.java -> Run As -> Maven Install
└── Right-click on App.java -> Run As -> Maven Test
└── Right-click on App.java -> Run As -> Maven Build



MAVEN INSTALL



MAVEN TEST



STEP 8 : Output

```java
public class WelcomClass {
    public static void main(String[] args) {
        System.out.println(HelloWorld());
    }
    public static String HelloWorld() {
        return "This is student Ayush Reddy, 22BD1A6744";
    }
}
```

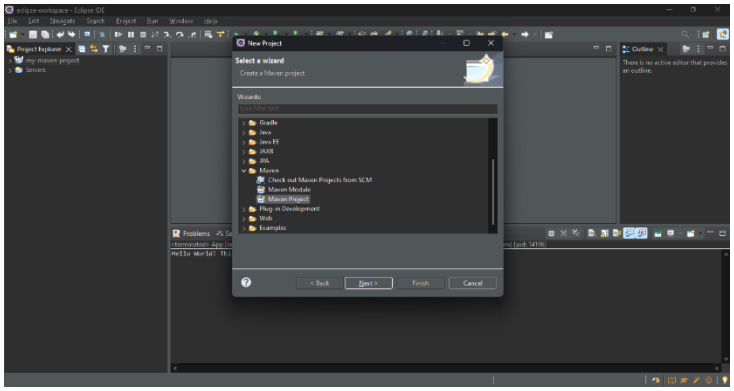
Problems Servers Terminal Data Source Explorer Properties Bookmarks Console

<terminated> WelcomClass [Java Application] C:\Users\Ayush\AppData\Local\Programs\eclipse\plugins\org.eclips

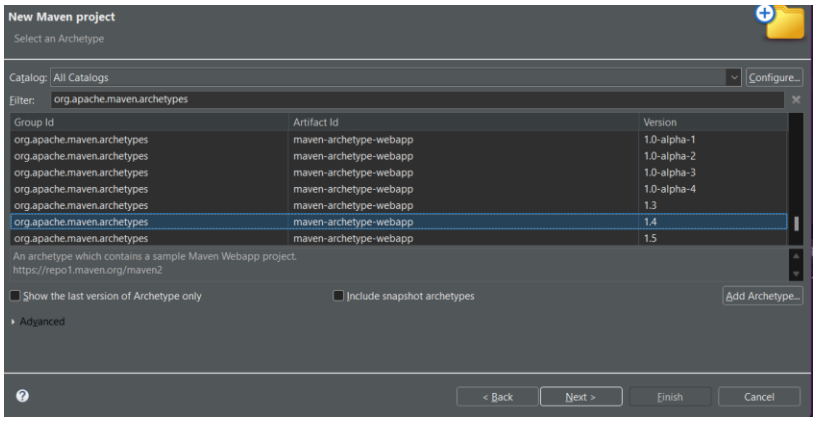
This is student Ayush Reddy, 22BD1A6744

MAVEN WEB

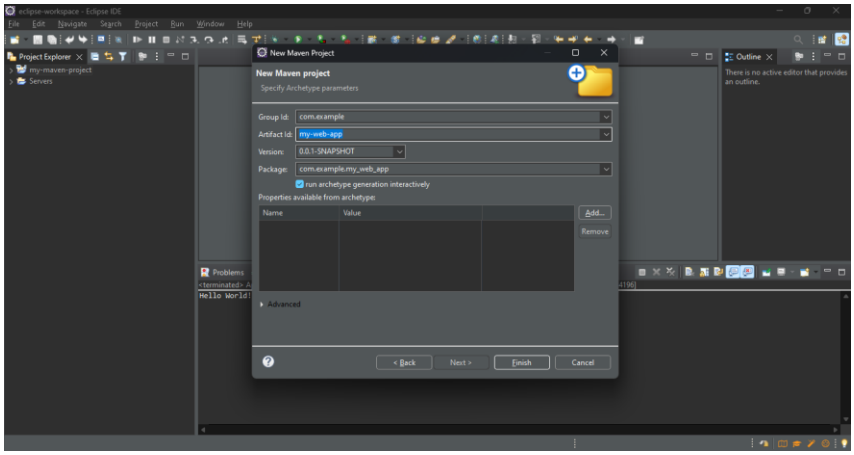
STEP 1 : Open Eclipse IDE and create new **Maven Project**.



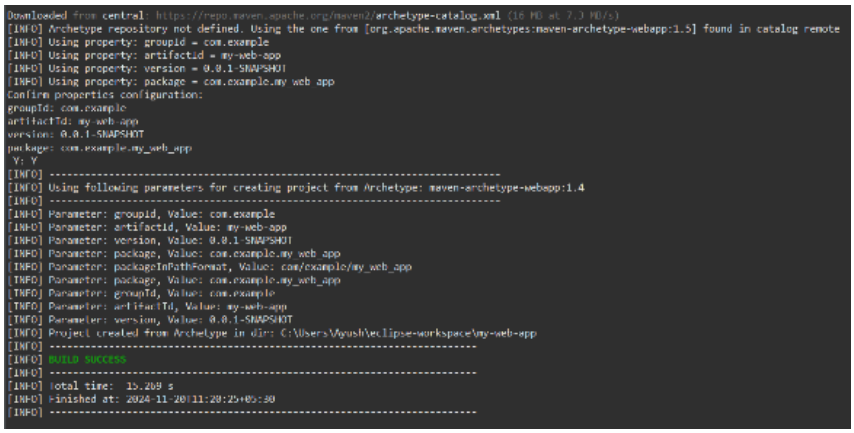
STEP 2 : Select an archetype **org.apache.maven.archetypes -> maven-archetype-webapp 1.4**



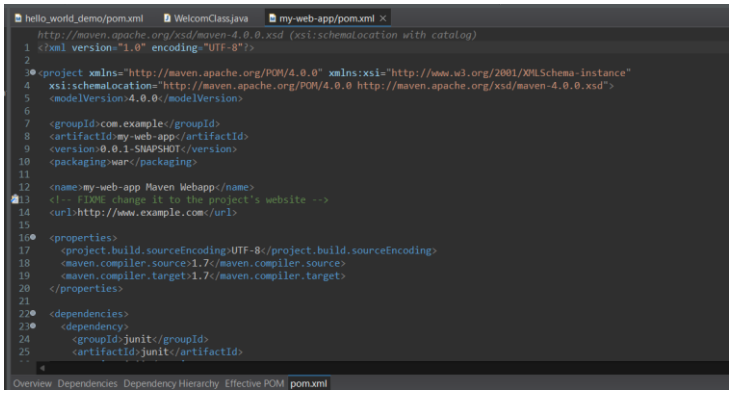
STEP 3 : Define Project **MetaData** and click **FINISH**



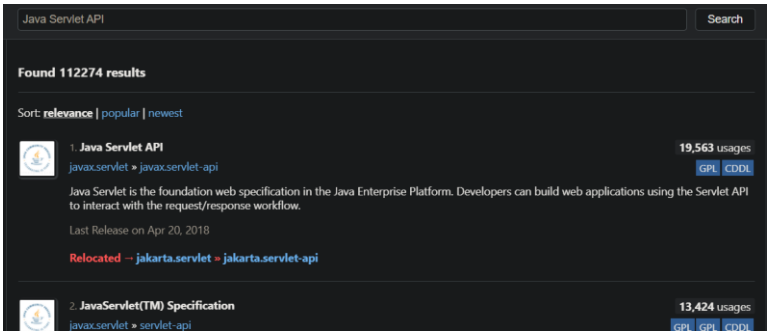
STEP 4 : Open Enter **Y** in **Console.**



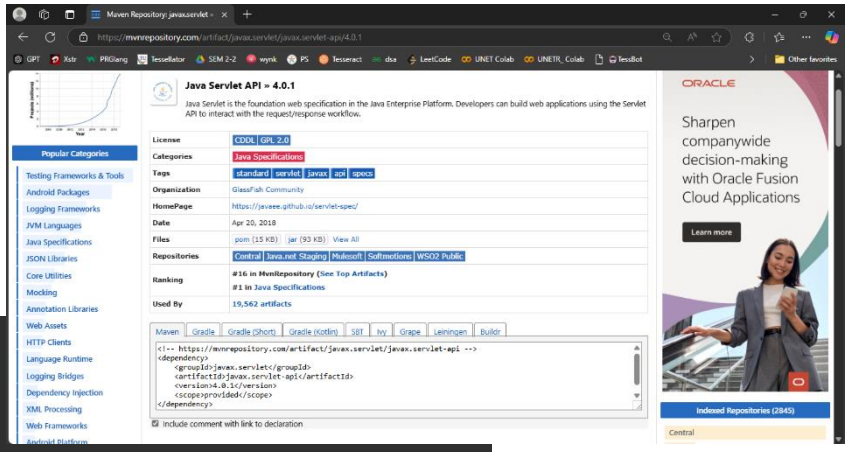
STEP 5 : Add necessary dependencies in **pom.xml**



STEP 6 : Go to **mvnrepository.com** and Search **Java Servlet API**



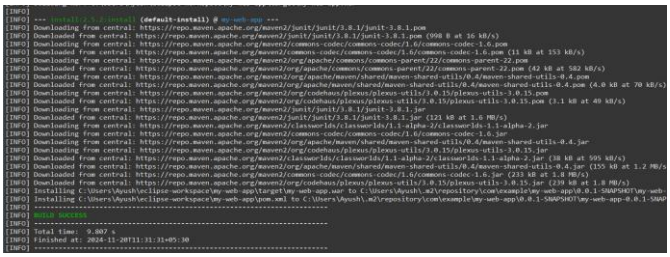
STEP 7 : Click on it and Select **Latest Version** and Copy the dependency Code and paste it in **MavenWeb's pom.xml**

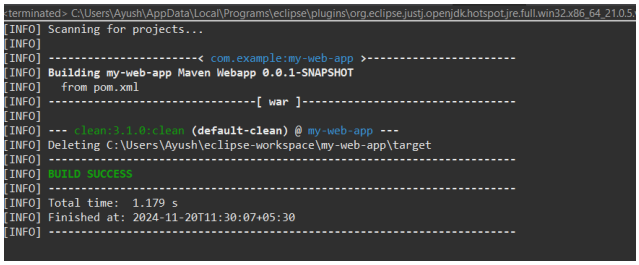



```
<dependencies>
  <dependency>
    <groupId>junit</groupId>
    <artifactId>junit</artifactId>
    <version>4.11</version>
    <scope>test</scope>
  </dependency>
  <!-- https://mvnrepository.com/artifact/javax.servlet/javax.servlet-api -->
  <dependency>
      <groupId>javax.servlet</groupId>
      <artifactId>javax.servlet-api</artifactId>
      <version>4.0.1</version>
      <scope>provided</scope>
  </dependency>
</dependencies>

<build>
  <finalName>my-web-app</finalName>
```

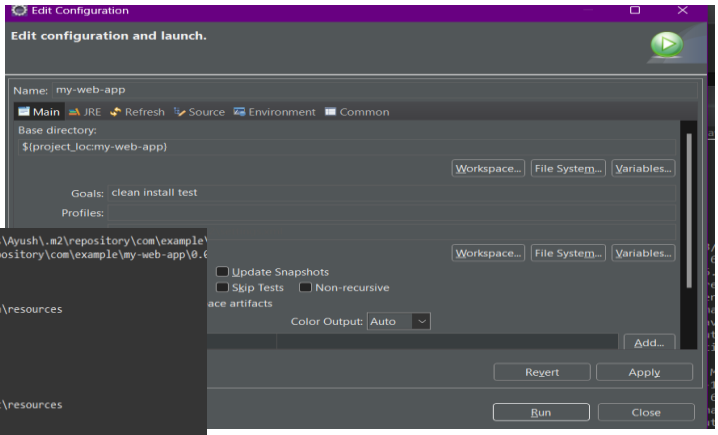
STEP 8 : Perform **MAVEN CLEAN:**

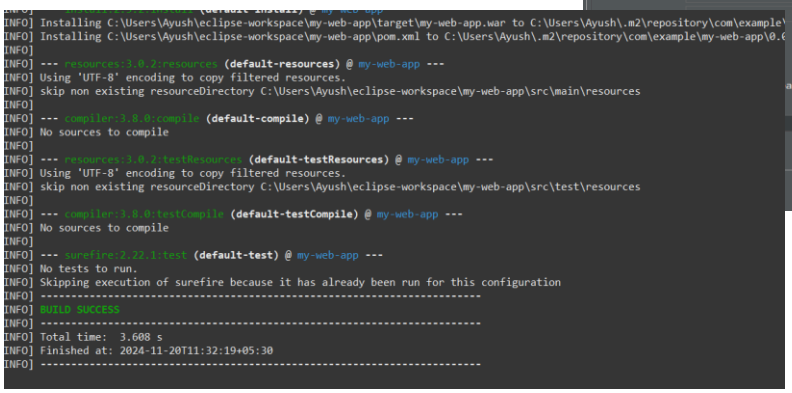
MAVEN INSTALL:



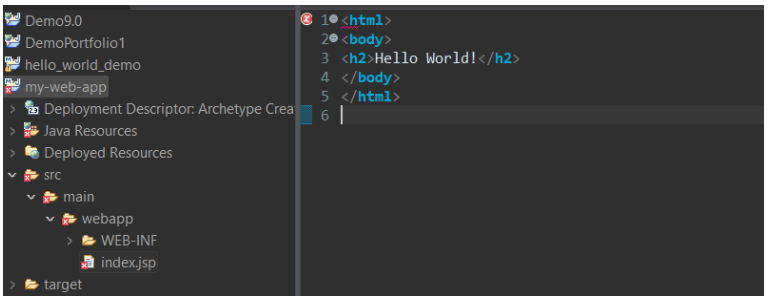


STEP 9 : Do **Maven Build** and Give **clean install test** in Goals

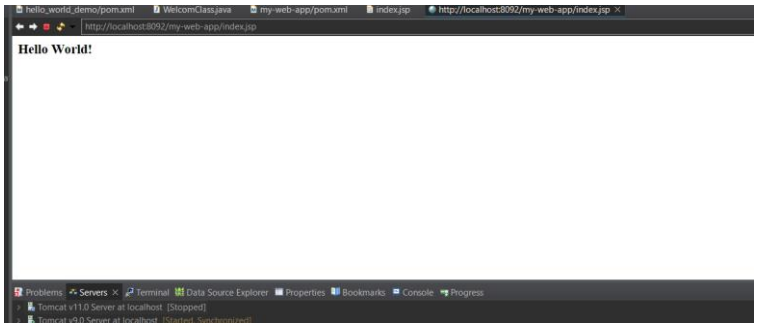




STEP 10 : Start the Web App Right Click on index.jsp and Run on Server

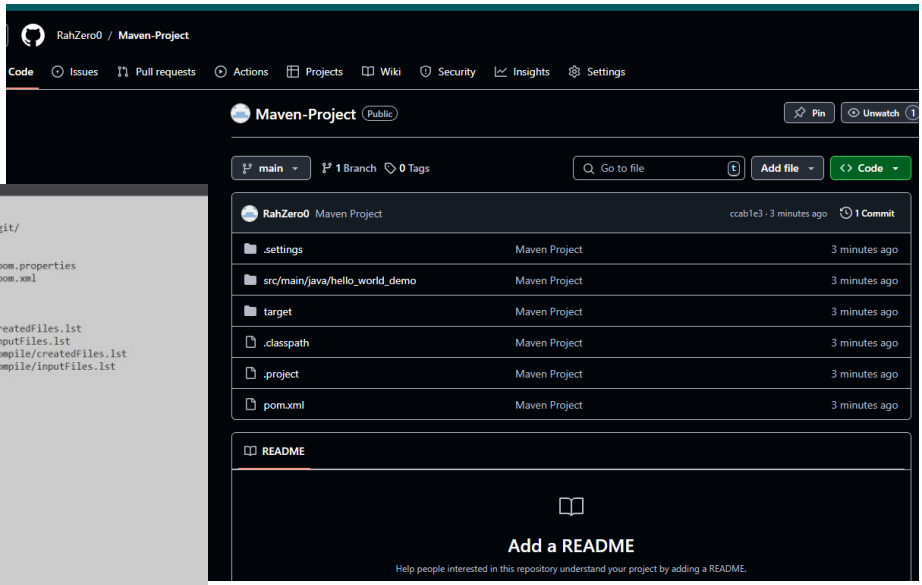


STEP 11 : Output



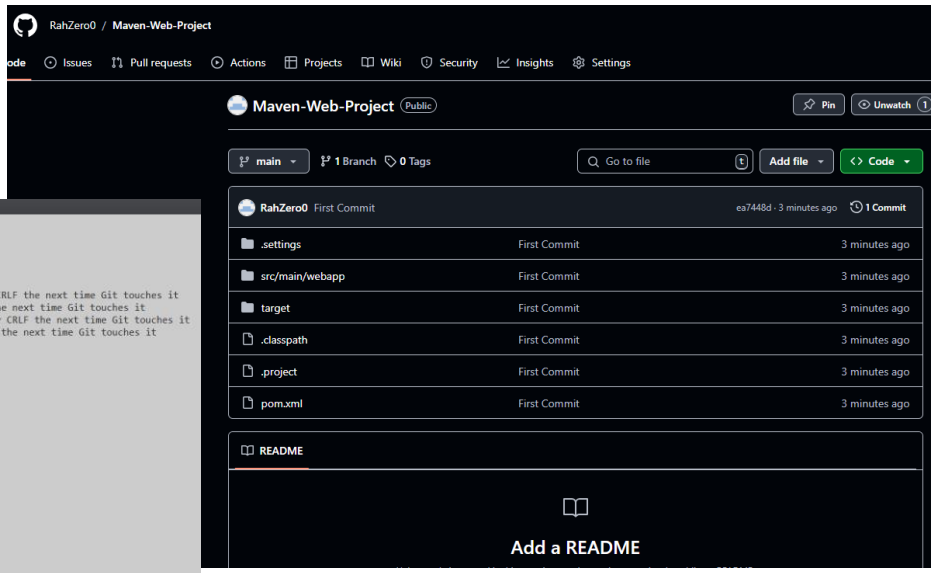
PUSHING TO GITHUB

STEP 1 :
Pushing **Maven Project**




```
MINGW64:/c/Users/Ayush/eclipse-workspace/hello_world_demo
Ayush@DESKTOP-NEGTA6U MINGW64 ~/eclipse-workspace/hello_world_demo (master)
$ git init
Initialized empty Git repository in C:/Users/Ayush/eclipse-workspace/hello_world_demo/.git/

Ayush@DESKTOP-NEGTA6U MINGW64 ~/eclipse-workspace/hello_world_demo (master)
 create mode 100644 target/classes/META-INF/maven/softwareEngineering/hello_world_demo/pom.properties
 create mode 100644 target/classes/META-INF/maven/softwareEngineering/hello_world_demo/pom.xml
 create mode 100644 target/classes/hello_world_demo/WelcomClass.class
 create mode 100644 target/hello_world_demo-0.0.1-SNAPSHOT.jar
 create mode 100644 target/maven-archiver/pom.properties
 create mode 100644 target/maven-status/maven-compiler-plugin/compile/default-compile/createdFiles.lst
 create mode 100644 target/maven-status/maven-compiler-plugin/compile/default-compile/inputFiles.lst
 create mode 100644 target/maven-status/maven-compiler-plugin/testCompile/default-testCompile/createdFiles.lst
 create mode 100644 target/maven-status/maven-compiler-plugin/testCompile/default-testCompile/inputFiles.lst

Ayush@DESKTOP-NEGTA6U MINGW64 ~/eclipse-workspace/hello_world_demo (master)
$ git branch -M main

Ayush@DESKTOP-NEGTA6U MINGW64 ~/eclipse-workspace/hello_world_demo (main)
$ git remote add origin https://github.com/RahZero0/Maven-Project.git

Ayush@DESKTOP-NEGTA6U MINGW64 ~/eclipse-workspace/hello_world_demo (main)
$ git push -u origin main
Enumerating objects: 35, done.
Counting objects: 100% (35/35), done.
Delta compression using up to 8 threads
Compressing objects: 100% (22/22), done.
Writing objects: 100% (35/35), 4.80 KiB | 144.00 KiB/s, done.
Total 35 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)
To https://github.com/RahZero0/Maven-Project.git
 * [new branch]      main -> main
branch 'main' set up to track 'origin/main'.

Ayush@DESKTOP-NEGTA6U MINGW64 ~/eclipse-workspace/hello_world_demo (main)
```

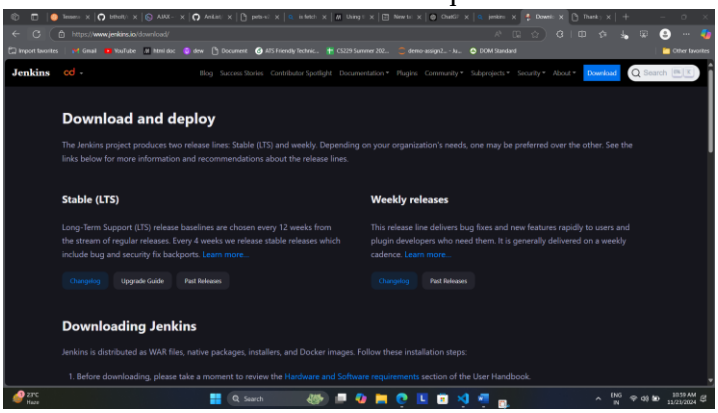
STEP 2 :
Pushing **Maven Web Project**

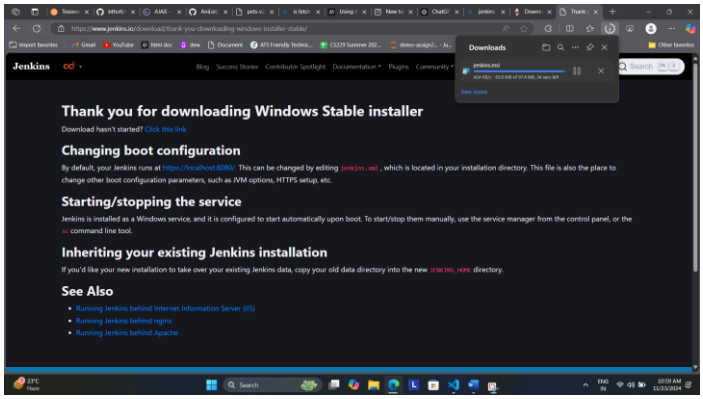



```
MINGW64:/c/Users/Ayush/eclipse-workspace/my-web-app
Ayush@DESKTOP-NEGTA6U MINGW64 ~/eclipse-workspace/my-web-app (master)
$ git init
Initialized empty Git repository in C:/Users/Ayush/eclipse-workspace/my-web-app/.git/

Ayush@DESKTOP-NEGTA6U MINGW64 ~/eclipse-workspace/my-web-app (master)
$ git add .
warning: in the working copy of 'src/main/webapp/WEB-INF/web.xml', LF will be replaced by CRLF the next time Git touches it
warning: in the working copy of 'src/main/webapp/index.jsp', LF will be replaced by CRLF the next time Git touches it
warning: in the working copy of 'target/my-web-app/WEB-INF/web.xml', LF will be replaced by CRLF the next time Git touches it
warning: in the working copy of 'target/my-web-app/index.jsp', LF will be replaced by CRLF the next time Git touches it

Ayush@DESKTOP-NEGTA6U MINGW64 ~/eclipse-workspace/my-web-app (master)
$ git commit -m "First Commit"
[master (root-commit) ea7448d] First Commit
 21 files changed, 314 insertions(+)
 create mode 100644 .classpath
 create mode 100644 .project
 create mode 100644 .settings/.jsdtscope
 create mode 100644 .settings/org.eclipse.core.resources.prefs
 create mode 100644 .settings/org.eclipse.jdt.core.prefs
Ayush@DESKTOP-NEGTA6U MINGW64 ~/eclipse-workspace/my-web-app (master)
$ git branch -M main

Ayush@DESKTOP-NEGTA6U MINGW64 ~/eclipse-workspace/my-web-app (main)
$ git remote add origin https://github.com/RahZero0/Maven-Web-Project.git

Ayush@DESKTOP-NEGTA6U MINGW64 ~/eclipse-workspace/my-web-app (main)
$ git push -u origin main
Enumerating objects: 33, done.
Counting objects: 100% (33/33), done.
Delta compression using up to 8 threads
Compressing objects: 100% (22/22), done.
Writing objects: 100% (33/33), 6.06 KiB | 194.00 KiB/s, done.
Total 33 (delta 1), reused 0 (delta 0), pack-reused 0 (from 0)
remote: Resolving deltas: 100% (1/1), done.
To https://github.com/RahZero0/Maven-Web-Project.git
 * [new branch]      main -> main
branch 'main' set up to track 'origin/main'.
```

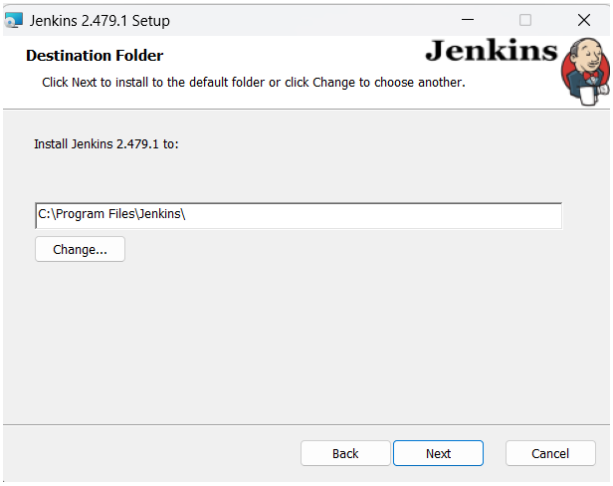
JENKINS INSTALLATION

STEP 1 : Download the required installation file from the official **Jenkins website**

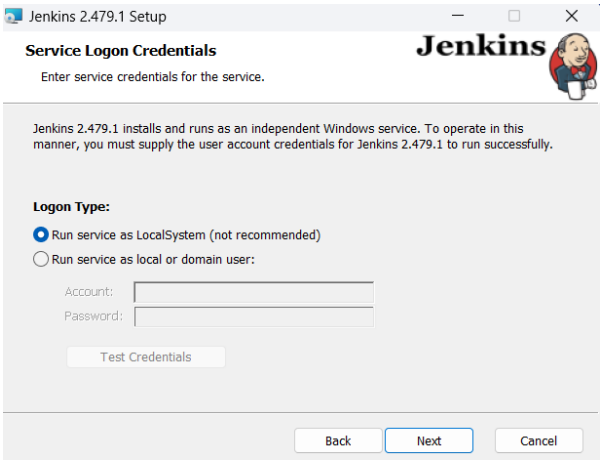


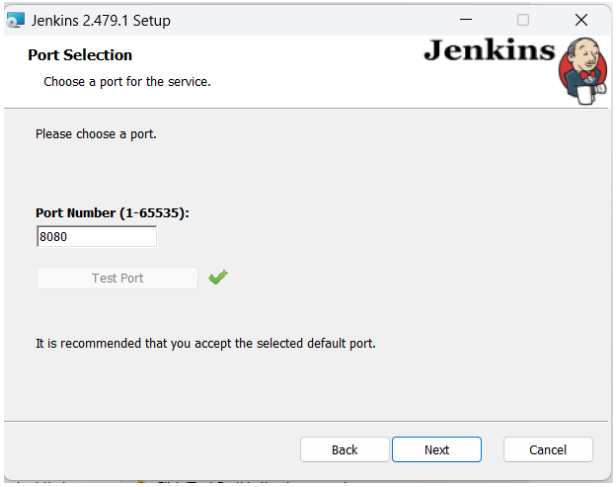


STEP 2 : Setting up Jenkins using the **downloaded exe**

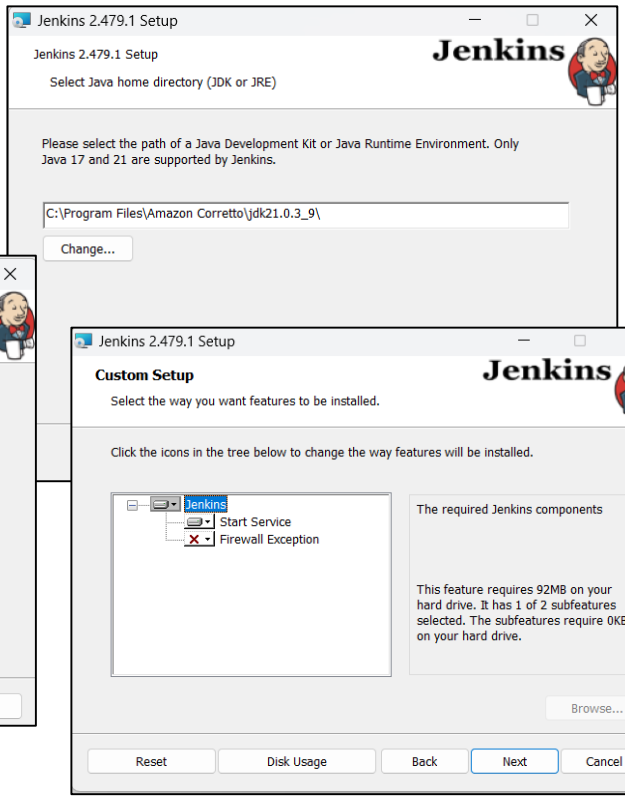


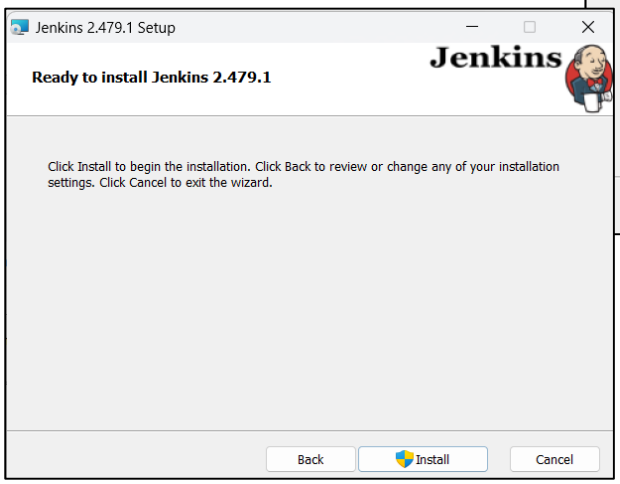
STEP 3 : Select **Local System** and check for **active ports**



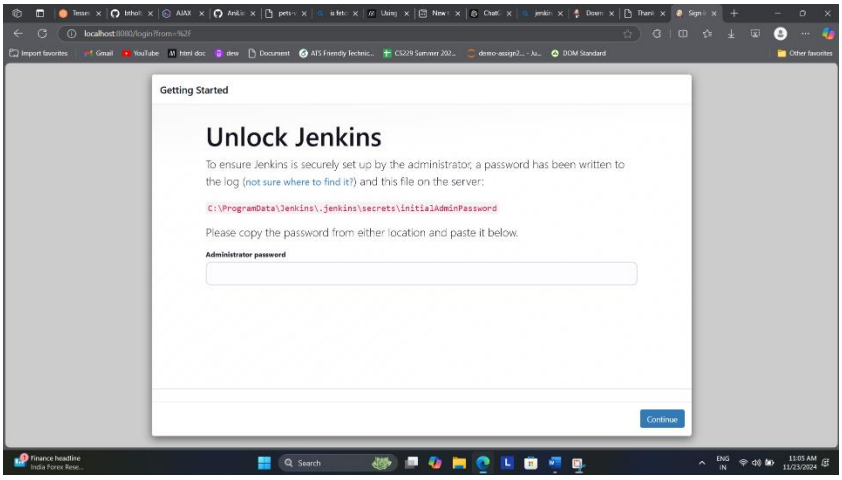


STEP 4 : Java path will automatically be filled

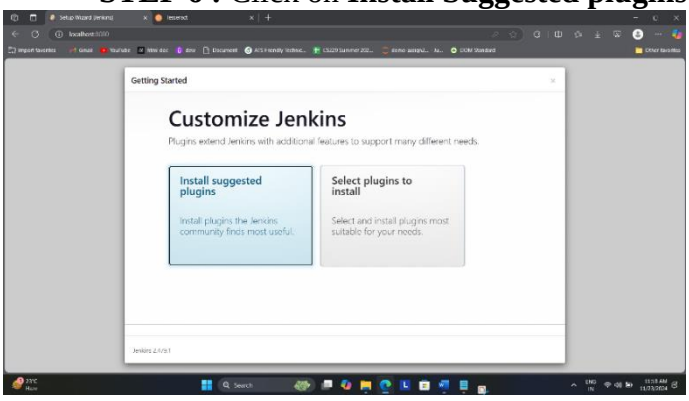


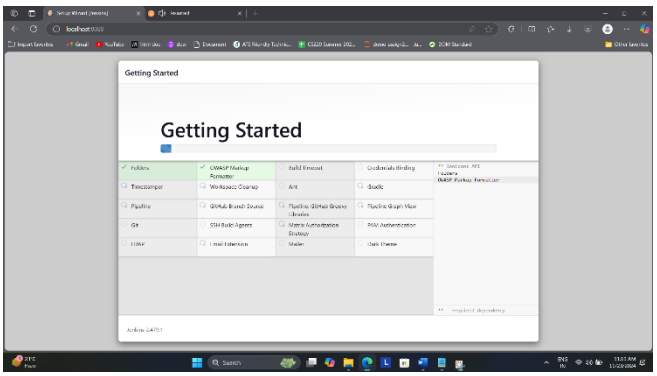


STEP 5 : Open **LocalHost 8080** and enter the **administrative password** which is in mentioned file location

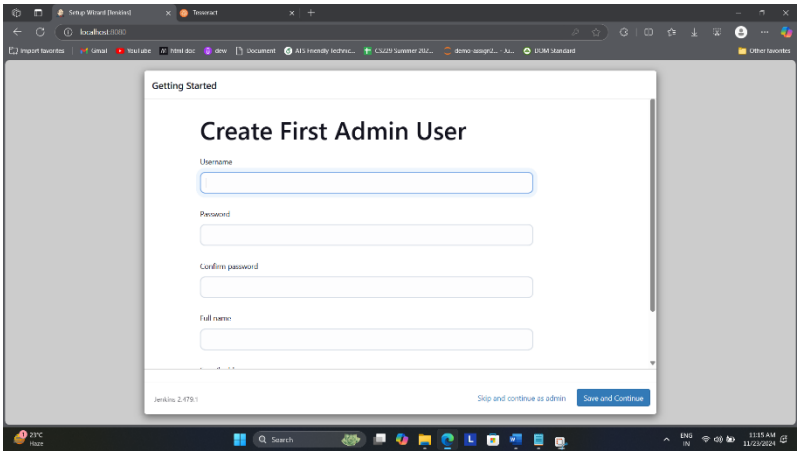


STEP 6 : Click on **Install Suggested plugins**

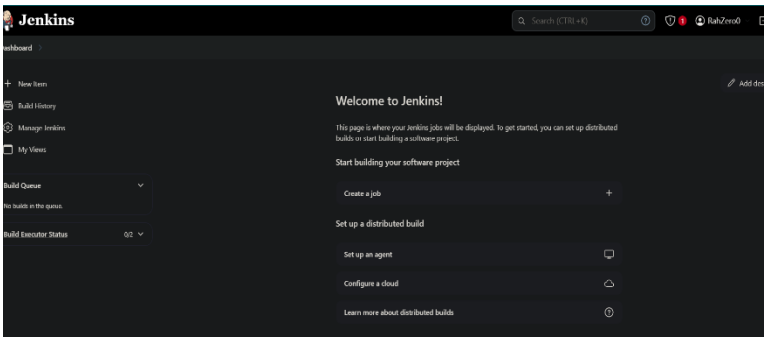




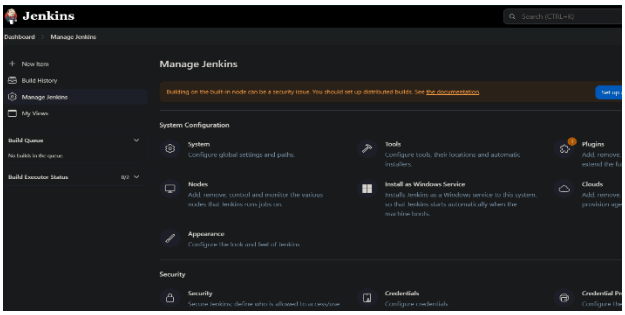
STEP 7 : Enter **credentials** and **enter**



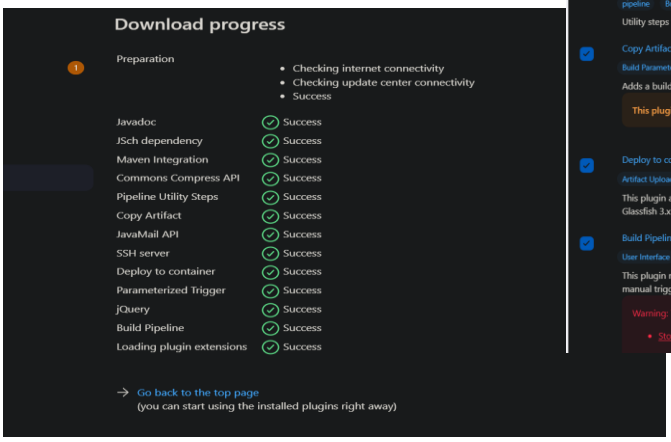
STEP 8 : Your Jenkins Server has been installed , click on **Manage Jenkins**

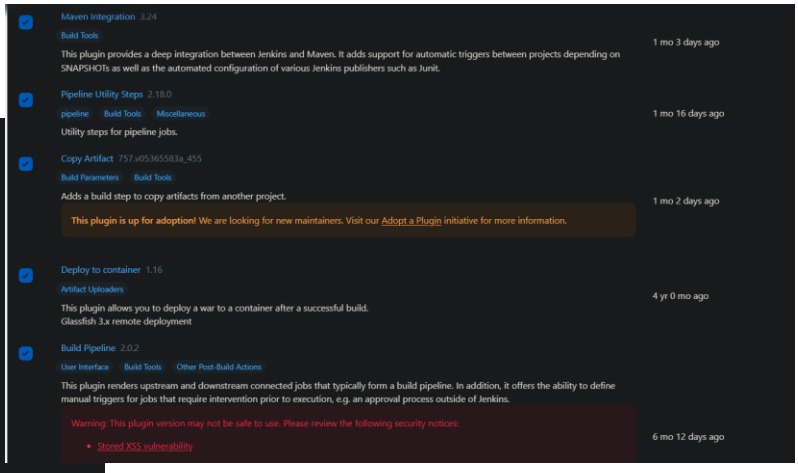


STEP 9 : Click on System

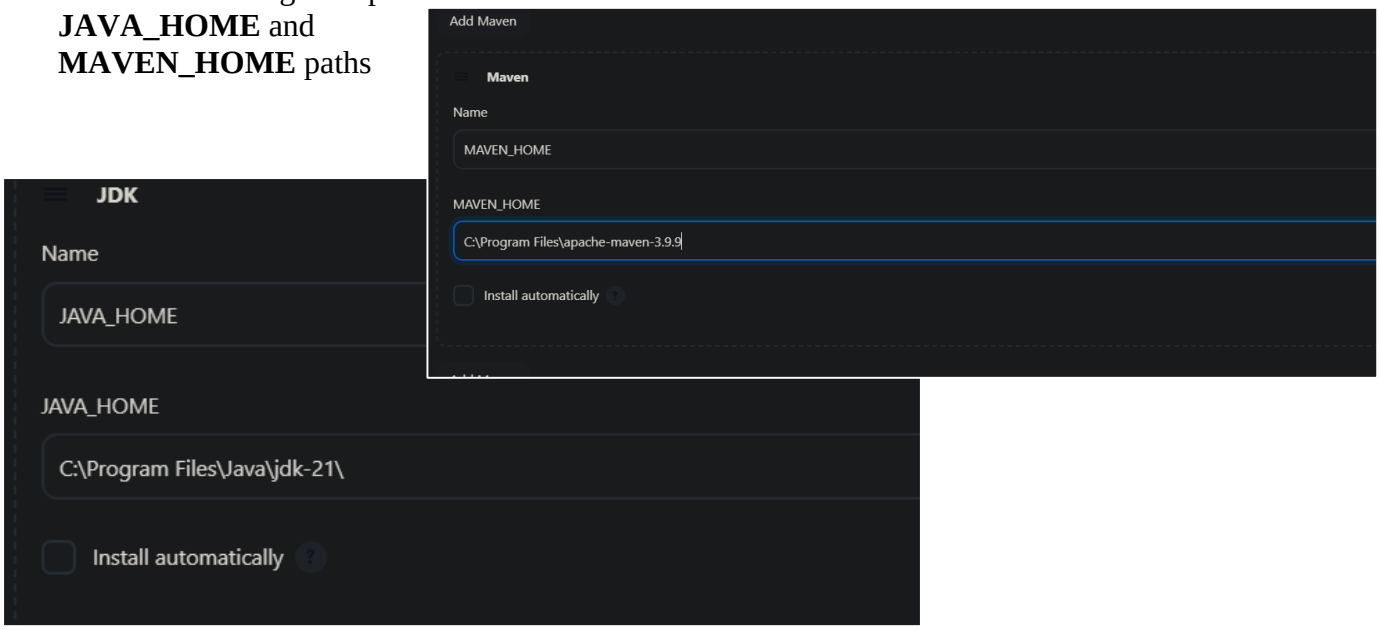


STEP 10 : Install given plugins





STEP 11 : Setting Set up **JAVA_HOME** and **MAVEN_HOME** paths



Conclusion : Thus we were able to create a **MAVEN JAVA** & **MAVEN WEB** project and push it to **GITHUB** and successfully installed **JENKINS**.

Experiment 6: Building the CI/CD pipeline using Jenkins for the project in the previous experiment

AIM: To create **CI/CD pipeline using Jenkins** for **Maven JAVA** and **Maven WEB** projects.

Introduction:

- **MAVEN**
  - Apache Maven is a powerful **build automation and dependency management tool** for Java-based projects. It simplifies project setup, management, and deployment using a standard directory structure and configuration file called pom.xml.
  - **Functions of Maven**
    - **Project Management with POM**: Centralized configuration using the pom.xml file.
    - **Build Automation**: Compiles, tests, and packages projects efficiently.
    - **Plugin Support**: Extends functionality through a wide range of plugins.

- **CI/CD PIPELINE**
  - A **CI/CD pipeline** is a series of automated processes used to build, test, and deploy software applications. It enables **Continuous Integration (CI)** and **Continuous Delivery (CD)**, streamlining the development workflow and ensuring faster, reliable delivery of code changes.
  - **Functions of CI/CD Pipeline**
    - **Code Integration**: Automatically integrates and validates code changes from multiple developers.
    - **Automated Testing**: Runs unit, integration, and end-to-end tests to ensure code quality.
    - **Build Automation**: Compiles the application and packages it for deployment.
    - **Deployment Automation**: Deploys the application to staging, production, or other environments.
  - **Key Stages in CI/CD Pipeline**
    - **Source Control**: Triggered when code changes are pushed to a version control system like Git.
    - **Build**: The application is compiled, and dependencies are resolved.
    - **Test**: Automated tests are executed to validate functionality.
    - **Deploy**: The application is deployed to staging or production environments.

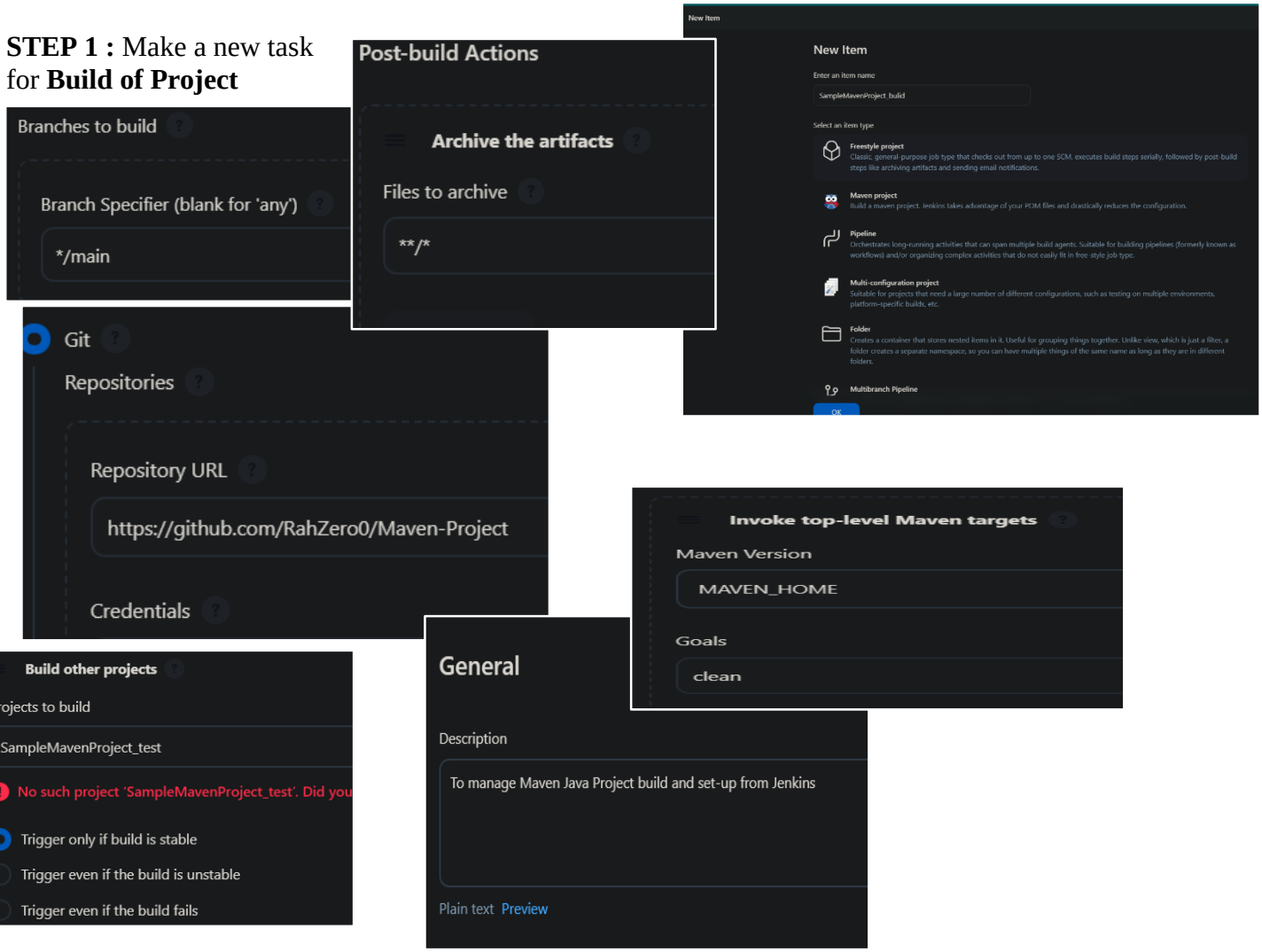
- **JENKINS**

  - Jenkins is an open-source **automation server** used for building, testing, and deploying software projects. It supports **Continuous Integration (CI)** and **Continuous Delivery (CD)**, helping developers integrate changes and deliver updates efficiently.
  - **Functions of Jenkins**
    - **Continuous Integration**: Automatically builds and tests code whenever changes are committed.
    - **Integration**: Automatically builds and tests code whenever changes are committed.
    - **Pipeline Automation**: Manages complex build and deployment workflows using Jenkins Pipelines.
    - **Plugin Support**: Extends functionality with a vast library of plugins for tools like Git, Maven, and Docker.
    - **Build Scheduling**: Allows builds to be triggered manually, on a schedule, or based on code changes.
    - **Monitoring and Reporting**: Provides detailed build logs, test reports, and error tracking.

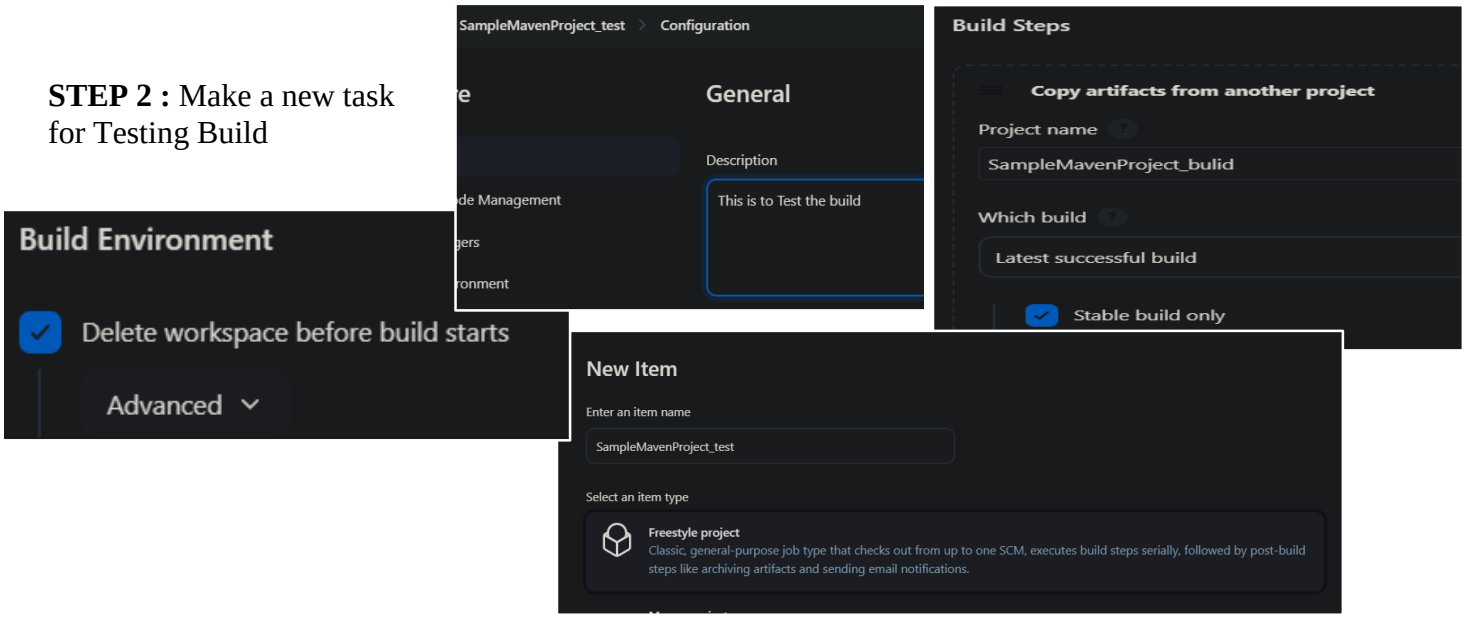
Procedure

FREESTYLE MAVEN JAVA

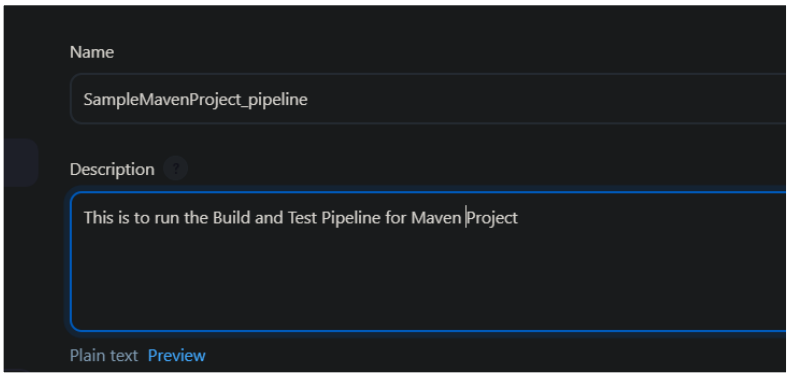
STEP 1 : Make a new task for **Build of Project**

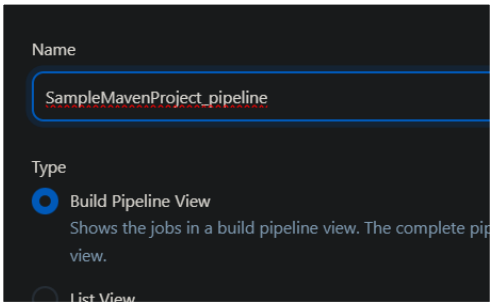


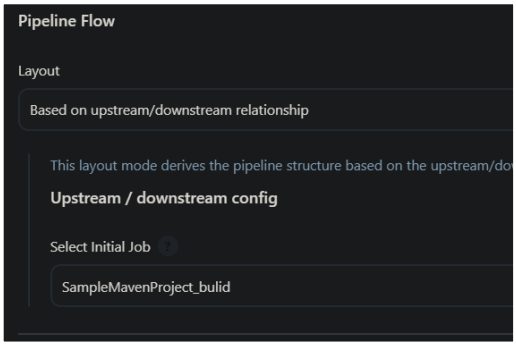
STEP 2 : Make a new task for Testing Build

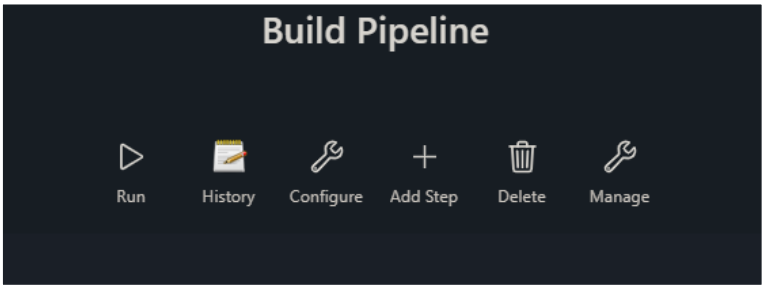


STEP 3 : Create a Pipeline

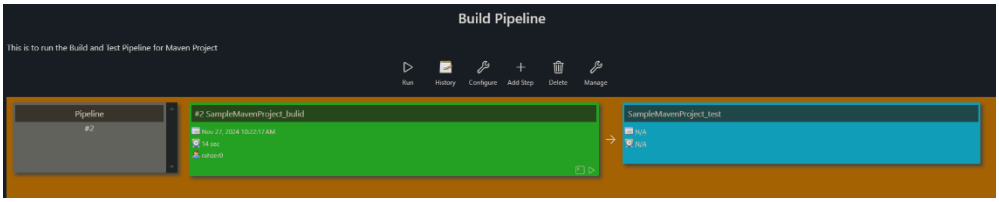




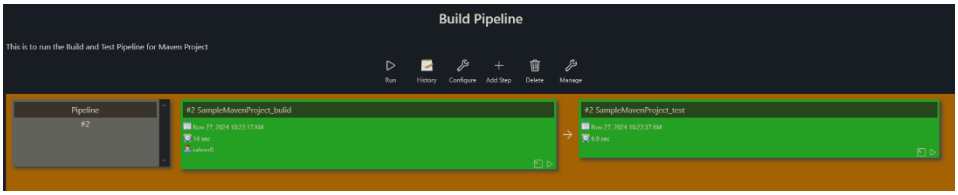




STEP 4 : Build Successfully

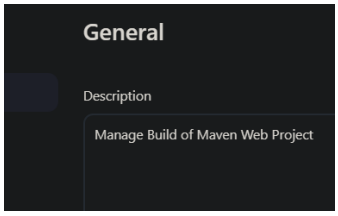


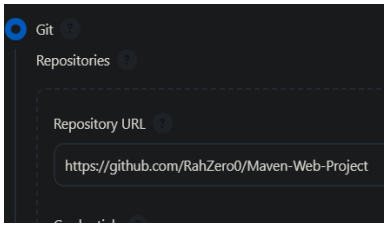
STEP 5 : Test Successfully

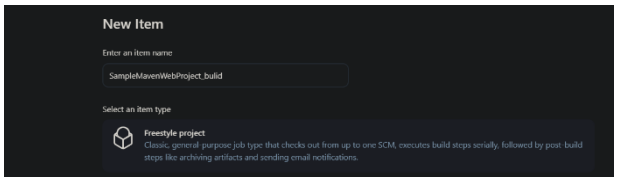


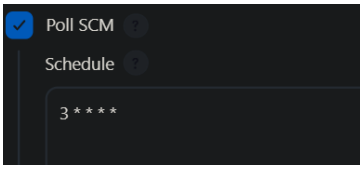
FREESTYLE MAVEN WEB

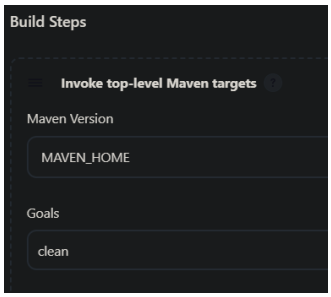
STEP 1 : Make a new task for Build of Project

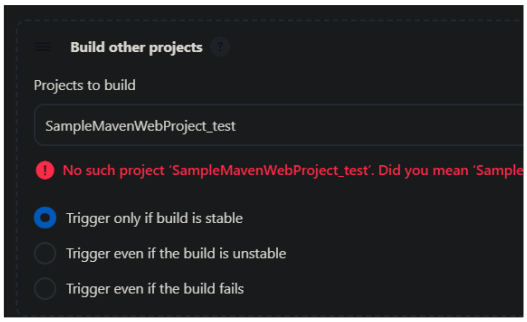




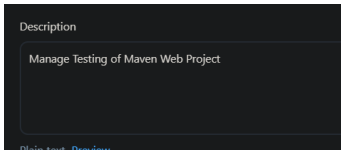


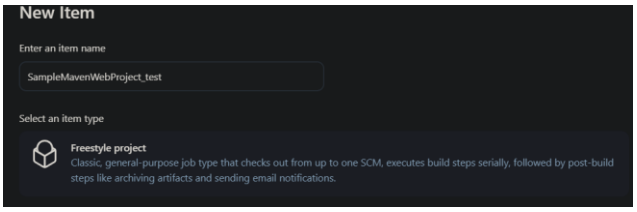


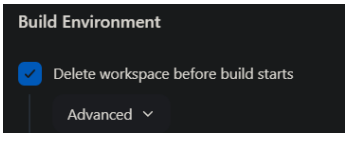


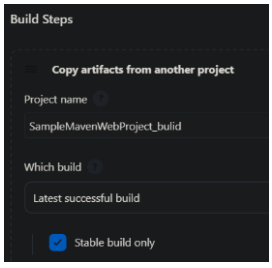


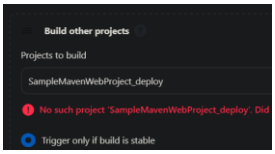
STEP 2 : Make a new task for Testing Build

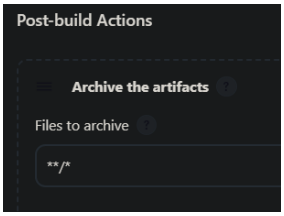




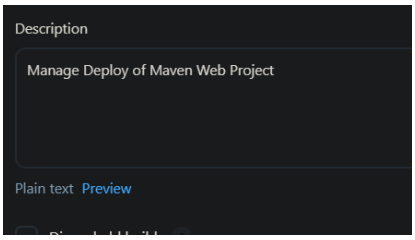


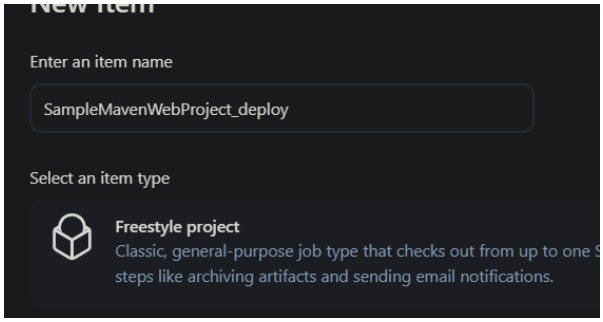


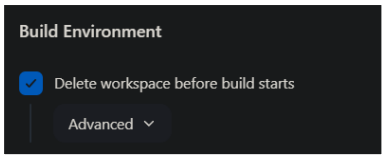


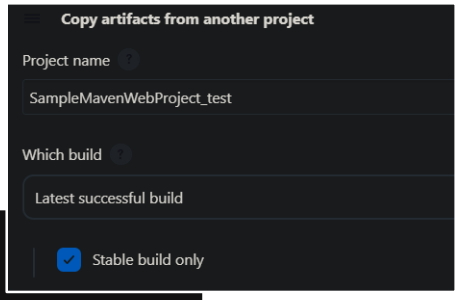


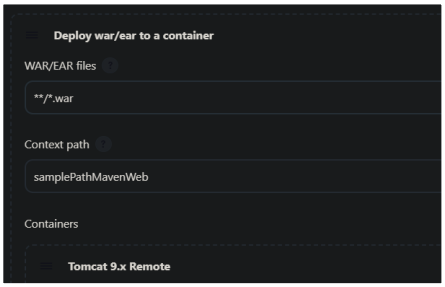
STEP 3 : Make a new task for Deploying Build

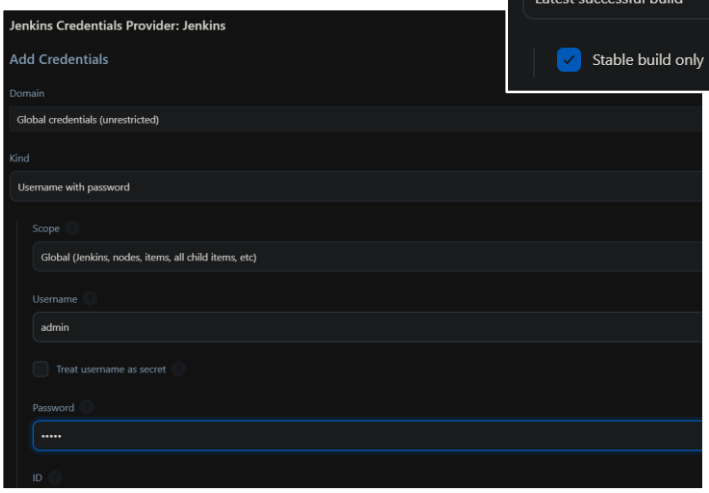


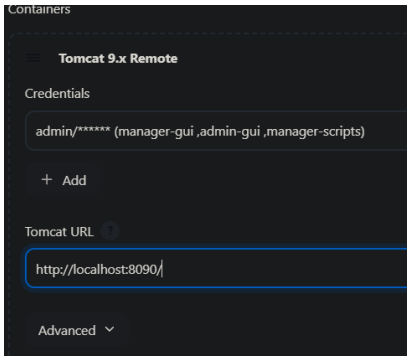




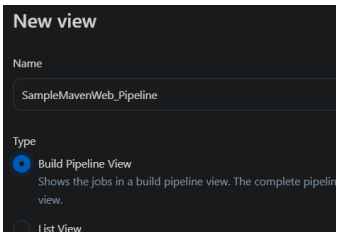


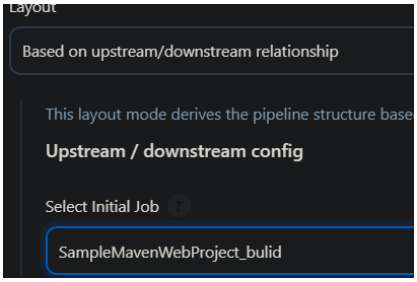


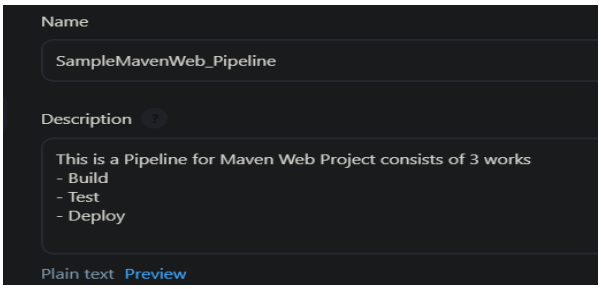




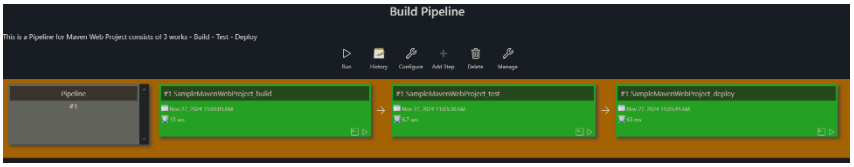
STEP 4 : Create a Pipeline







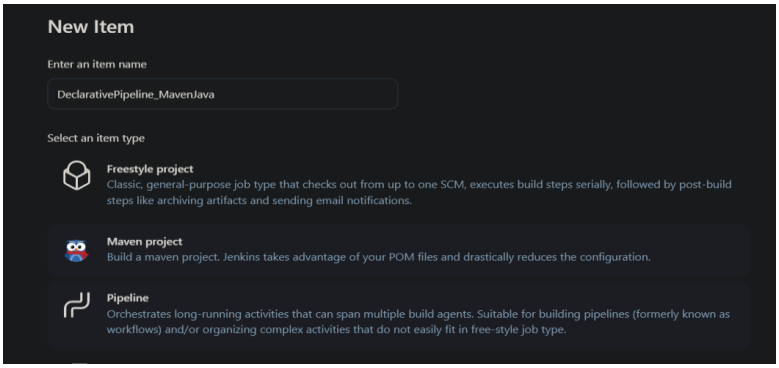
STEP 5 : Build the Pipeline



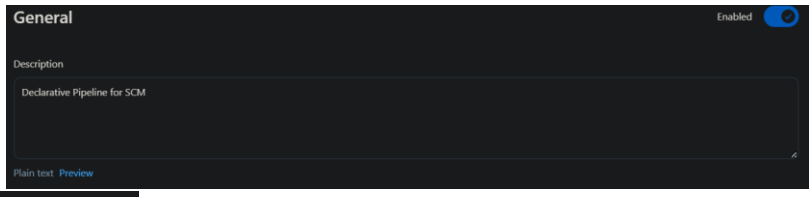
/samplePathMavenWeb	*None specified*	Archetype Created Web Application	true

SCRIPTED PIPELINE USING JENKINS

STEP 1 : Make a new task for Build of Project



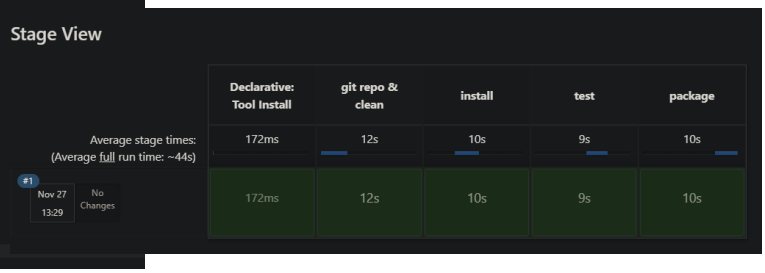
STEP 2: Description of Declarative Pipeline



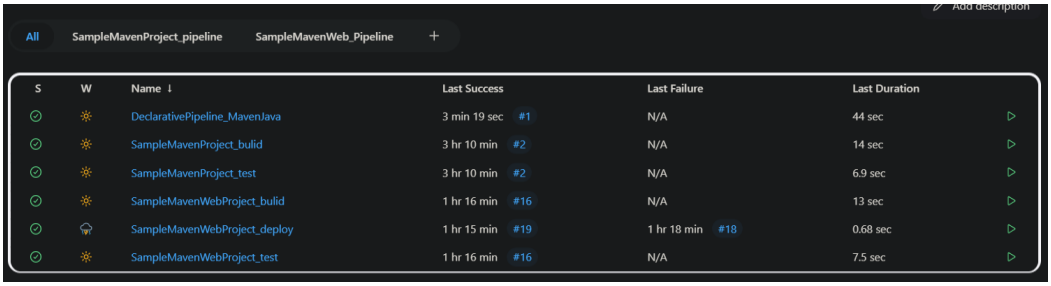
STEP 3: The script for the pipeline

```
pipeline {
    agent any
    tools {
        maven 'MAVEN_HOME'
    }
    stages {
        stage('git repo & clean') {
            steps {
                bat "rmdir /s /q Maven-Web-Project"
                bat "git clone https://github.com/RahZero0/Maven-Web-Project.git"
                bat "mvn clean -f Maven-Web-Project"
            }
        }
        stage('install') {
            steps {
                bat "mvn install -f Maven-Web-Project"
            }
        }
        stage('test') {
            steps {
                bat "mvn test -f Maven-Web-Project"
            }
        }
        stage('package') {
            steps {
                bat "mvn package -f Maven-Web-Project"
            }
        }
    }
}
```

STEP 4: Build the pipeline



Total Pipelines [JENKIN]:



Conclusion : Thus we were able to create pipelines for **MAVEN JAVA** & **MAVEN WEB** projects using **JENKINS** and test the build process.

Experiment 7: Local Deployment of project using Docker, Kubernetes and Monitoring using Nagios tool

AIM: To use various **DevOps Tools** and learn their workings in many projects.

Introduction:

❖ DOCKER & CONTAINERS

- Docker is a platform for developing, shipping, and running applications using containerization.
- It allows applications to run in isolated environments called **containers**, ensuring consistency across different environments.
- **Functions of Docker**
  - **Build** lightweight, portable containers for applications.
  - **Run** containers anywhere (local machines, cloud, or servers).
  - **Package** dependencies with the application, ensuring compatibility.
  - **Manage** containerized applications efficiently using Docker commands.
  - **Scale** applications with Docker Compose and Swarm for multi-container deployments.

❖ MINIKUBE

- Minikube is a lightweight tool that allows developers to **run Kubernetes clusters locally** on their machines.
- It is designed for testing, development, and learning purposes, making it easier to experiment with Kubernetes without needing a full-scale cloud environment.
- **Functions of Minikube**
  - **Local Kubernetes Cluster**: Sets up a single-node Kubernetes cluster on your local machine.
  - **Cluster Management**: Provides commands to start, stop, and delete local clusters.
  - **Resource Testing**: Allows testing of Kubernetes configurations, deployments, and services.
  - **Multi-platform Support**: Works on Windows, macOS, and Linux.
  - **Add-ons**: Supports Kubernetes features like Ingress, Dashboard, and Metrics Server.
  - **Compatibility**: Works with kubectl and integrates seamlessly with CI/CD pipelines.

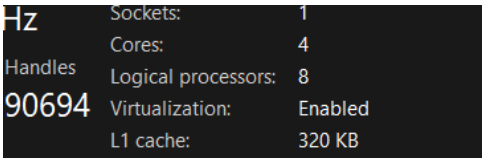
❖ NAGIOS

- Nagios is an open-source **monitoring system** used for tracking the performance and availability of IT infrastructure, including servers, networks, applications, and services.
- **Functions of Nagios**
  - **Infrastructure Monitoring**: Tracks the health of servers, network devices, and applications.
  - **Alerting**: Sends notifications via email, SMS, or other channels when issues are detected.
  - **Log Management**: Monitors logs for errors or unusual activity.
  - **Performance Metrics**: Measures system performance and generates reports.
  - **Custom Plugins**: Allows users to create custom checks for specific monitoring needs.
  - **Scalability**: Supports distributed monitoring for large infrastructures.

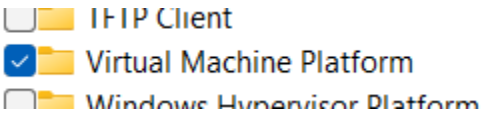
Procedure

INSTALLATIONS OF DOCKER & DOCKERHUB ACCOUNT

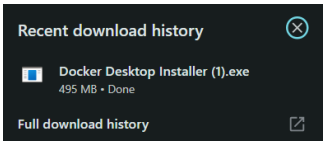
STEP 1 : Check if Virtualization is enabled in device
└── Open Task Manager:
└── Click on CPU



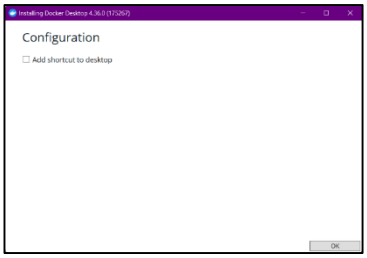
STEP 2 : Check Windows Features on and off

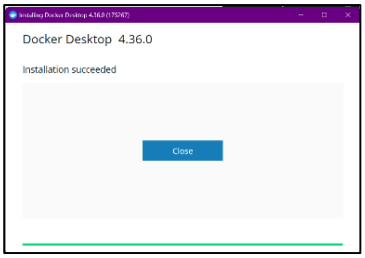


STEP 3 : Go to
https://docs.docker.com/desktop/setup/install/windows-install/
click on download



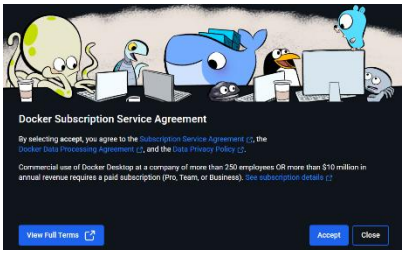
STEP 4 : Go to
https://docs.docker.com/desktop/setup/install/windows-install/
click on download





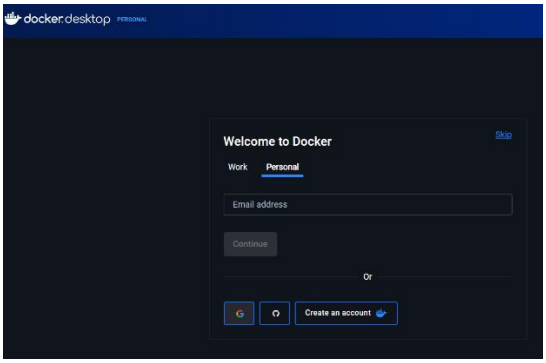
STEP 5 : Go to https://hub.docker.com/
and make an account

STEP 6 : Accept Agreement

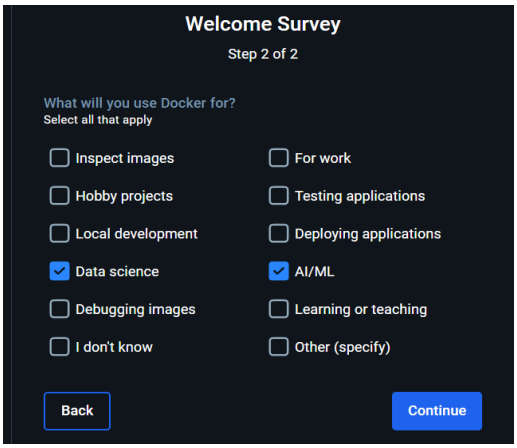


STEP 7 : Do recommended Settings

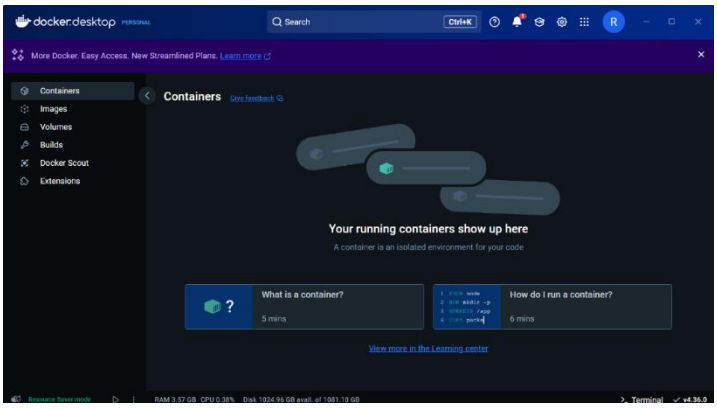
STEP 8 : Login with Docker hub account



STEP 9 : Click on Surveys

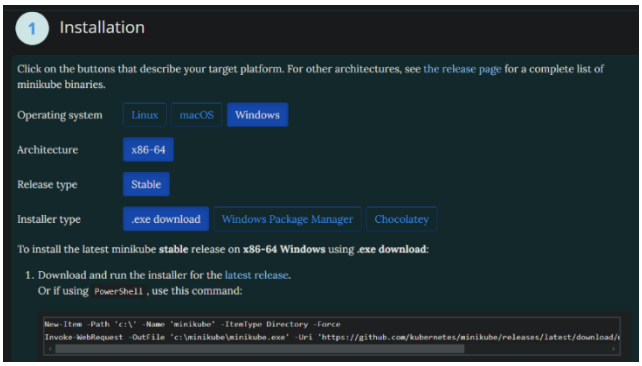


STEP 10 : Welcome to Docker Desktop

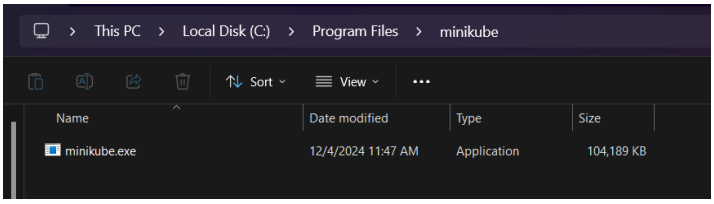


MINIKUBE INSTALLATION

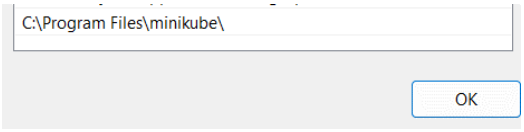
STEP 1 : Go to https://minikube.download/



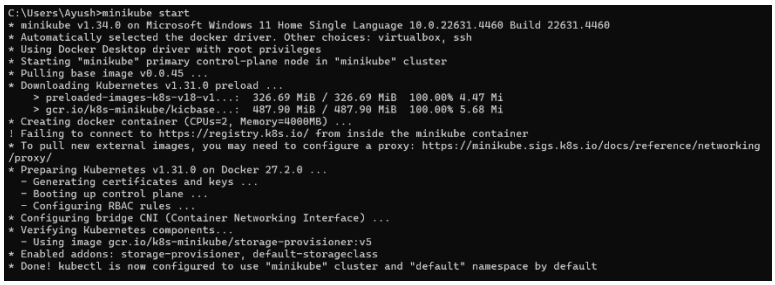
STEP 2 : Create a folder in Program Files and copy the exe there and rename it minikube.exe



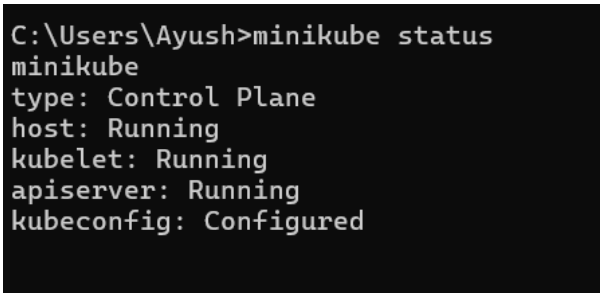
STEP 3 : Add to environment variables



STEP 4 : Type minikube start



STEP 5 : Type minikube status



DOCKER CLI COMMANDS

STEP 1 : Docker version

```
C:\Users\Ayush>docker --version
Docker version 27.3.1, build ce12230
```

STEP 2 : Docker pulling hello-world

```
C:\Users\Ayush>docker pull hello-world
Using default tag: latest
latest: Pulling from library/hello-world
c1ec31eb5944: Pull complete
Digest: sha256:305243c734571da2d100c8c8b3c3167a098cab6049c9a5b066b6021a60fcb966
Status: Downloaded newer image for hello-world:latest
docker.io/library/hello-world:latest
```

STEP 3 : All Docker Images

```
C:\Users\Ayush>docker images
REPOSITORY                    TAG       IMAGE ID       CREATED          SIZE
gcr.io/k8s-minikube/kicbase   v0.0.45   aeed0e1d4642   3 months ago     1.28GB
hello-world                   latest    d2c94e258dcb   19 months ago    13.3kB
```

STEP 4 : Docker Run hello-world

```
C:\Users\Ayush>docker run hello-world

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
 1. The Docker client contacted the Docker daemon.
 2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
    (amd64)
 3. The Docker daemon created a new container from that image which runs the
    executable that produces the output you are currently reading.
 4. The Docker daemon streamed that output to the Docker client, which sent it
    to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
 $ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:
 https://hub.docker.com/

For more examples and ideas, visit:
 https://docs.docker.com/get-started/
```

STEP 5 : docker ps –a

```
C:\Users\Ayush>docker ps -a
CONTAINER ID   IMAGE                                COMMAND                  CREATED         STATUS                          PORTS     NAMES
631317eb0223   hello-world                          "/hello"                 2 minutes ago   Exited (0) 2 minutes ago                  crazy_thompson
1004f93b3bc8   gcr.io/k8s-minikube/kicbase:v0.0.45   "/usr/local/bin/entr…"   5 days ago      Exited (137) 2 days ago                   minikube
```

STEP 6 : docker rm CONTAINER ID

```
C:\Users\Ayush>docker rm 631317eb0223
631317eb0223
```

STEP 7 : docker ps –a (checking if it is there)

```
C:\Users\Ayush>docker ps -a
CONTAINER ID   IMAGE                                COMMAND                  CREATED      STATUS                      PORTS     NAMES
1004f93b3bc8   gcr.io/k8s-minikube/kicbase:v0.0.45   "/usr/local/bin/entr…"   5 days ago   Exited (137) 2 days ago             minikube
```

STEP 8 : docker rmi hello-world

```
C:\Users\Ayush>docker rmi hello-world
Untagged: hello-world:latest
Untagged: hello-world@sha256:305243c734571da2d100c8c8b3c3167a098cab6049c9a5b066b6021a60fcb966
Deleted: sha256:d2c94e258dcb3c5ac2798d32e1249e42ef01cba4841c2234249495f87264ac5a
Deleted: sha256:ac28800ec8bb38d5c35b49d45a6ac4777544941199075dff8c4eb63e093aa81e
```

STEP 9 : docker pull redis

```
C:\Users\Ayush>docker pull redis
Using default tag: latest
latest: Pulling from library/redis
bc0965b23a04: Pull complete
9501a6ec095f: Pull complete
98e7597530ef: Pull complete
75dffa679c9b: Pull complete
8912a88e73c8: Pull complete
141f00d6fee8: Pull complete
4f4fb700ef54: Pull complete
8242f9d5b464: Pull complete
Digest: sha256:ea96c435dc17b011f54c6a883c3c45e7726242b075de61c6fe40a10ae6ae0f83
Status: Downloaded newer image for redis:latest
docker.io/library/redis:latest
```

STEP 10 : docker run --name redis1 -d redis

```
C:\Users\Ayush>docker run --name redis1 -d redis
c09baf1d1b7fa145da9f3a62ece80de2c77dd0f43fba98a2a94d81f43c60e4d8
```

STEP 11 : docker ps –a

```
C:\Users\Ayush>docker ps -a
CONTAINER ID   IMAGE                                COMMAND                  CREATED             STATUS                      PORTS      NAMES
c09baf1d1b7f   redis                                "docker-entrypoint.s…"   About a minute ago  Up About a minute           6379/tcp   redis1
1004f93b3bc8   gcr.io/k8s-minikube/kicbase:v0.0.45   "/usr/local/bin/entr…"   9 days ago          Exited (137) 6 days ago                minikube
```

STEP 12 : docker ps

```
C:\Users\Ayush>docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED         STATUS         PORTS      NAMES
c09baf1d1b7f   redis     "docker-entrypoint.s…"   8 minutes ago   Up 8 minutes   6379/tcp   redis1
```

STEP 13 : docker exec –it redis1 redis-cli

```
C:\Users\Ayush>docker exec -it redis1 redis-cli
127.0.0.1:6379> SET name "Abcdefg"
OK
127.0.0.1:6379> GET name
"Abcdefg"
127.0.0.1:6379>
```

STEP 14 : docker stop <redis-code>

```
C:\Users\Ayush>docker stop c09baf1d1b7f
c09baf1d1b7f
```

```
C:\Users\Ayush>docker rm c09baf1d1b7f
c09baf1d1b7f
```

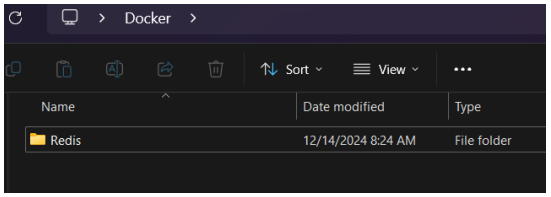
STEP 15 : docker ps –a

```
C:\Users\Ayush>docker ps -a
CONTAINER ID   IMAGE                                COMMAND                  CREATED      STATUS                      PORTS     NAMES
1004f93b3bc8   gcr.io/k8s-minikube/kicbase:v0.0.45   "/usr/local/bin/entr…"   9 days ago   Exited (137) 6 days ago             minikube
```

STEP 16 : docker rmi redis

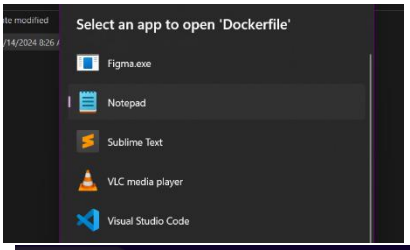
```
C:\Users\Ayush>docker rmi redis
Untagged: redis:latest
Untagged: redis@sha256:ea96c435dc17b011f54c6a883c3c45e7726242b075de61c6fe40a10ae6ae0f83
Deleted: sha256:b5e874b32a794f96b6119e5478f93165d4110cdd8c056d470b3d48b27114f716
Deleted: sha256:b29f5016befac03b5cde2788c31508900647ab8d456136768cb4743862739d1b
Deleted: sha256:6ae211a59cc93f2ff8a2d23914420f49632b93256cb925143a4b99ed07b8a1e6
Deleted: sha256:9138b812320895356a59879ae78ba94089af1f32ad80177967363bde5cac10d1
Deleted: sha256:36c5c6a38ba8a8cf7c71b8035ab30704bb905d54980a2528025dcb90d8513543
Deleted: sha256:aea9e1fe4e796252e3fa7c8f6400b11717c601c8b23061aa702bcc0d61ad8108
Deleted: sha256:75850a6af24741b7465394e4b26811475e867fc793aa9cfb5cca7c27e1ed788a
Deleted: sha256:d734075709827a4cbe434847a33d25f14642a8b9f5589d80aa9b38ed82f3126f
Deleted: sha256:c0f1022b22a9b36851b358f44e5475e39d166e71a8073cf53c894a299239b1c5
```

STEP 17 : Create a new folder at any location and name it Redis

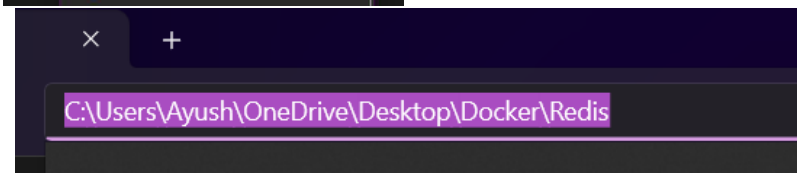


STEP 18 : Name a new file as `**Dockerfile**`

STEP 19 : Open the file with `**Notepad**` and add the content



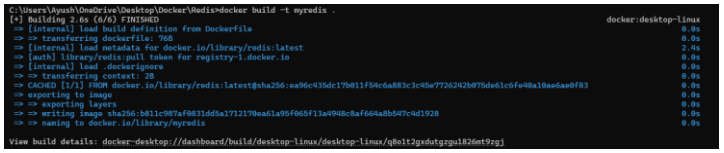
STEP 20 : Copy this path



STEP 21 : Change directory into this location

```
Users\Ayush\OneDrive\Desktop\Docker\Redis>dir
lume in drive C has no label.
lume Serial Number is 5082-C6BF

rectory of C:\Users\Ayush\OneDrive\Desktop\Docker\Redis

14/2024  08:26 AM    <DIR>          .
14/2024  08:24 AM    <DIR>          ..
14/2024  08:28 AM                39 Dockerfile
               1 File(s)             39 bytes
               2 Dir(s)  15,118,471,168 bytes free
```

STEP 22 : docker build -t myredis .



STEP 23 : docker images

```
C:\Users\Ayush\OneDrive\Desktop\Docker\Redis>docker images
REPOSITORY                    TAG       IMAGE ID       CREATED        SIZE
ubuntu                        latest    b1d9df8ab815   3 weeks ago    78.1MB
myredis                       latest    b811c987af08   2 months ago   117MB
gcr.io/k8s-minikube/kicbase   v0.0.45   aeed0e1d4642   3 months ago   1.28GB
```

STEP 24 : docker run –name newmyredis –d myredis

```
C:\Users\Ayush\OneDrive\Desktop\Docker\Redis>docker run --name newmyredis -d myredis
ced8a89a6b5a7fe016e779703591d8563d291a3b0493693229ff29ddd3248b26
```

STEP 25 : docker ps

```
C:\Users\Ayush\OneDrive\Desktop\Docker\Redis>docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED              STATUS              PORTS      NAMES
ced8a89a6b5a   myredis   "docker-entrypoint.s…"   About a minute ago   Up About a minute   6379/tcp   newmyredis
```

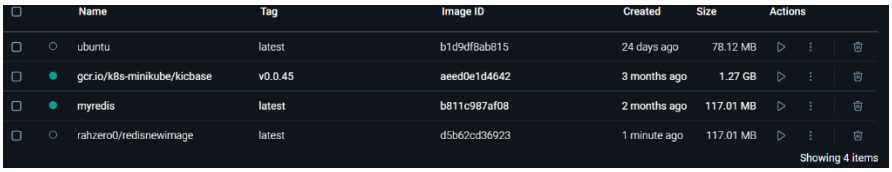
STEP 26 : docker stop <container-id>

```
C:\Users\Ayush\OneDrive\Desktop\Docker\Redis>docker stop ced8a89a6b5a
ced8a89a6b5a
```

STEP 27 : docker commit <container-id> rahzero0/redisnewimage

```
C:\Users\Ayush\OneDrive\Desktop\Docker\Redis>docker commit ced8a89a6b5a rahzero0/redisnewimage
sha256:d5b62cd36923d60a2a0bfbdcf472b81f019e7044cd0dacc586691576f8eac1c0
```

STEP 28 : Open docker images



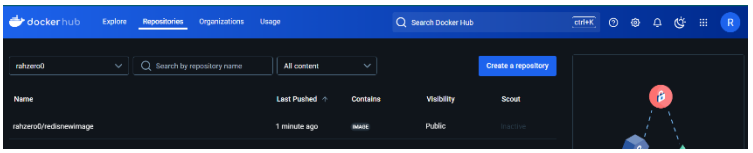
STEP 29 : docker login

```
C:\Users\Ayush\OneDrive\Desktop\Docker\Redis>docker login
Authenticating with existing credentials...
Login Succeeded
```

STEP 30 : docker push rahzero0/redisnewimage

```
C:\Users\Ayush\OneDrive\Desktop\Docker\Redis>docker push rahzero0/redisnewimage
Using default tag: latest
The push refers to repository [docker.io/rahzero0/redisnewimage]
4c3a66986d54: Mounted from library/redis
5f70bf18a086: Mounted from library/redis
59858d305cb4: Mounted from library/redis
3c008636f68d: Mounted from library/redis
d3ce9d926f3b: Mounted from library/redis
d575106a8e12: Mounted from library/redis
74264edca52d: Mounted from library/redis
c0f1022b22a9: Mounted from library/redis
latest: digest: sha256:fcc3e59c4d1bf0bbd8f05a425d418a37a502ac98ead01e8a60e08267dd1870cf size: 1986
```

STEP 31 : Go to docker hub to check commit of image



STEP 32 : docker rm <container-id>

```
C:\Users\Ayush\OneDrive\Desktop\Docker\Redis>docker rm ced8a89a6b5a
ced8a89a6b5a
```

STEP 33 : docker rmi rahzero0/redisnewimage

```
C:\Users\Ayush\OneDrive\Desktop\Docker\Redis>docker rmi  rahzero0/redisnewimage
Untagged: rahzero0/redisnewimage:latest
Untagged: rahzero0/redisnewimage@sha256:fcc3e59c4d1bf0bbd8f05a425d418a37a502ac98ead01e8a60e08267dd1870cf
Deleted: sha256:d5b62cd36923d60a2a0bfbdcf472b81f019e7044cd0dacc586691576f8eac1c0
```

STEP 34 : docker ps

```
C:\Users\Ayush\OneDrive\Desktop\Docker\Redis>docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS     NAMES
```

STEP 35 : docker pull

```
C:\Users\Ayush\OneDrive\Desktop\Docker\Redis>docker pull  rahzero0/redisnewimage
Using default tag: latest
latest: Pulling from rahzero0/redisnewimage
bc0965b23a04: Already exists
9501a6ec095f: Already exists
98e7597530ef: Already exists
75dffa679c9b: Already exists
8912a88e73c8: Already exists
141f00d6fee8: Already exists
4f4fb700ef54: Already exists
8242f9d5b464: Already exists
Digest: sha256:fcc3e59c4d1bf0bbd8f05a425d418a37a502ac98ead01e8a60e08267dd1870cf
Status: Downloaded newer image for rahzero0/redisnewimage:latest
docker.io/rahzero0/redisnewimage:latest
```

STEP 36 : docker run --name newmyredis -d rahzero0/redisnewimage

```
C:\Users\Ayush\OneDrive\Desktop\Docker\Redis>docker run --name newmyredis -d  rahzero0/redisnewimage
29d055e4b8f941b0929453f36108e536bf24728cf6a809a57674ae46e1f417ec
```

STEP 37 : docker exec -it newmyredis redis-cli

```
C:\Users\Ayush\OneDrive\Desktop\Docker\Redis>docker exec -it newmyredis redis-cli
127.0.0.1:6379>
```

MODIFY & PUSH DOCKER IMAGE

STEP 1 : docker pull ubuntu

```
C:\Users\Ayush>docker pull ubuntu
Using default tag: latest
latest: Pulling from library/ubuntu
de44b265507a: Pull complete
Digest: sha256:80dd3c3b9c6cecb9f1667e9290b3bc61b78c2678c02cbdae5f0fea92cc6734ab
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest
```

STEP 2 : docker run -it --name newubuntu -d ubuntu

```
C:\Users\Ayush>docker run -it --name newubuntu -d ubuntu
2130a2098e2c07bf8ac9014957f54f579cff2de715c3dc4e88ab0f83d6139e4d
```

STEP 3 : docker ps

```
C:\Users\Ayush>docker ps
CONTAINER ID   IMAGE     COMMAND       CREATED              STATUS              PORTS     NAMES
2130a2098e2c   ubuntu    "/bin/bash"   About a minute ago   Up About a minute             newubuntu
```

STEP 4 : docker exec -it <container_id> bash

```
C:\Users\Ayush>docker exec -it 2130a2098e2c bash
root@2130a2098e2c:/#
```

STEP 5 : Check git version

```
C:\Users\Ayush>docker exec -it 2130a2098e2c bash
root@2130a2098e2c:/# git --version
bash: git: command not found
root@2130a2098e2c:/# apt update
Get:1 http://security.ubuntu.com/ubuntu noble-security InRelease [126 kB]
Get:2 http://archive.ubuntu.com/ubuntu noble InRelease [256 kB]
Get:3 http://security.ubuntu.com/ubuntu noble-security/universe amd64 Packages [979 kB]
Get:4 http://archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]
Get:5 http://archive.ubuntu.com/ubuntu noble-backports InRelease [126 kB]
Get:6 http://archive.ubuntu.com/ubuntu noble/restricted amd64 Packages [117 kB]
Get:7 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 Packages [15.3 kB]
Get:8 http://security.ubuntu.com/ubuntu noble-security/main amd64 Packages [677 kB]
Get:9 http://archive.ubuntu.com/ubuntu noble/main amd64 Packages [1808 kB]
Get:10 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 Packages [663 kB]
Get:11 http://archive.ubuntu.com/ubuntu noble/universe amd64 Packages [19.3 MB]
Get:12 http://archive.ubuntu.com/ubuntu noble/multiverse amd64 Packages [331 kB]
Get:13 http://archive.ubuntu.com/ubuntu noble-updates/universe amd64 Packages [1205 kB]
Get:14 http://archive.ubuntu.com/ubuntu noble-updates/multiverse amd64 Packages [19.7 kB]
Get:15 http://archive.ubuntu.com/ubuntu noble-updates/restricted amd64 Packages [679 kB]
Get:16 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 Packages [922 kB]
Get:17 http://archive.ubuntu.com/ubuntu noble-backports/universe amd64 Packages [11.9 kB]
Fetched 27.4 MB in 21s (1294 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
All packages are up to date.
```

STEP 6 : apt install git -y

```
root@2130a2098e2c:/# apt install git -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  adduser ca-certificates git-man krb5-locales less libbrotli1 libbsd0 libcbor0.10 libcurl3t64-gnutls libedit2
  liberror-perl libexpat1 libfido2-1 libgdbm-compat4t64 libgdbm6t64 libgssapi-krb5-2 libk5crypto3 libkeyutils1
  libkrb5-3 libkrb5support0 libldap-common libldap2 libnghttp2-14 libperl5.38t64 libpsl5t64 librtmp1 libsasl2-2
  libsasl2-modules libsasl2-modules-db libssh-4 libx11-6 libx11-data libxau6 libxcb1 libxdmcp6 libxext6 libxmuu1
  netbase openssh-client openssl patch perl perl-modules-5.38 publicsuffix xauth
Suggested packages:
  liblocale-gettext-perl cron quota ecryptfs-utils gettext-base git-daemon-run | git-daemon-sysvinit git-doc git-email
  git-gui gitk gitweb git-cvs git-mediawiki git-svn gdbm-l10n krb5-doc krb5-user libsasl2-modules-gssapi-mit
  | libsasl2-modules-gssapi-heimdal libsasl2-modules-ldap libsasl2-modules-otp libsasl2-modules-sql keychain
  libpam-ssh monkeysphere ssh-askpass ed diffutils-doc perl-doc libterm-readline-gnu-perl | libterm-readline-perl-perl
  make libtap-harness-archive-perl
The following NEW packages will be installed:
  adduser ca-certificates git git-man krb5-locales less libbrotli1 libbsd0 libcbor0.10 libcurl3t64-gnutls libedit2
  liberror-perl libexpat1 libfido2-1 libgdbm-compat4t64 libgdbm6t64 libgssapi-krb5-2 libk5crypto3 libkeyutils1
  libkrb5-3 libkrb5support0 libldap-common libldap2 libnghttp2-14 libperl5.38t64 libpsl5t64 librtmp1 libsasl2-2
  libsasl2-modules libsasl2-modules-db libssh-4 libx11-6 libx11-data libxau6 libxcb1 libxdmcp6 libxext6 libxmuu1
  netbase openssh-client openssl patch perl perl-modules-5.38 publicsuffix xauth
0 upgraded, 46 newly installed, 0 to remove and 0 not upgraded.
Need to get 18.9 MB of archives.
After this operation, 92.7 MB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu noble/main amd64 perl-modules-5.38 all 5.38.2-3.2build2 [3110 kB]
Get:2 http://archive.ubuntu.com/ubuntu noble/main amd64 libgdbm6t64 amd64 1.23-5.1build1 [34.4 kB]
Get:3 http://archive.ubuntu.com/ubuntu noble/main amd64 libgdbm-compat4t64 amd64 1.23-5.1build1 [6710 B]
```

STEP 7 : git –version

```
root@2130a2098e2c:/# git --version
git version 2.43.0
root@2130a2098e2c:/#
```

STEP 8 : docker stop <container_id>

```
C:\Users\Ayush>docker stop 2130a2098e2c
2130a2098e2c
```

STEP 9 : docker commit 2130a2098e2c rahZero0/newubuntu2024

```
C:\Users\Ayush>docker commit 2130a2098e2c rahzero0/rahzero0:newubuntu
sha256:e18ca963812ca75a566a6d77264588ba9d405de8c998ac4467b788147a4fd96f
```

STEP 10 : docker login

```
C:\Users\Ayush>docker login
Authenticating with existing credentials...
Login Succeeded
```

STEP 11 : docker push rahZero0/newubuntu2024

```
C:\Users\Ayush>docker push rahzero0/rahzero0:newubuntu
The push refers to repository [docker.io/rahzero0/rahzero0]
95f0b41eac12: Pushed
687d50f2f6a6: Mounted from library/ubuntu
newubuntu: digest: sha256:9f89291f1648c554c3e520eedfeb1b245140fa1d4fadd0cacc8cc0db775bfac5 size: 741
```

STEP 12 : docker rm <container_id>

```
C:\Users\Ayush>docker rm 2130a2098e2c
2130a2098e2c
```

STEP 13 : docker rmi rahZero0/newubuntu2024

```
C:\Users\Ayush>docker rmi rahzero0/rahzero0:newubuntu
Untagged: rahzero0/rahzero0:newubuntu
Untagged: rahzero0/rahzero0@sha256:9f89291f1648c554c3e520eedfeb1b245140fa1d4fadd0cacc8cc0db775bfac5
Deleted: sha256:e18ca963812ca75a566a6d77264588ba9d405de8c998ac4467b788147a4fd96f
Deleted: sha256:a25ac9206412f16355bf35afc4caacfd7a0b33bf5c32ad9eef3d9c458e9c7175
```

STEP 14 : docker logout

```
C:\Users\Ayush>docker logout
Removing login credentials for https://index.docker.io/v1/
```

STEP 15 : docker pull rahzero0/rahzero0:newubuntu

```
C:\Users\Ayush>docker pull rahzero0/rahzero0:newubuntu
newubuntu: Pulling from rahzero0/rahzero0
de44b265507a: Already exists
d26b54e74d0e: Pull complete
Digest: sha256:9f89291f1648c554c3e520eedfeb1b245140fa1d4fadd0cacc8cc0db775bfac5
Status: Downloaded newer image for rahzero0/rahzero0:newubuntu
docker.io/rahzero0/rahzero0:newubuntu
```

STEP 16 : docker running the pulled container

```
C:\Users\Ayush>docker run --name newubuntu -it rahzero0/rahzero0:newubuntu
root@0b96eb780e2f:/# git --version
git version 2.43.0
root@0b96eb780e2f:/# exit
exit
```

STEP 17 : docker ps –a

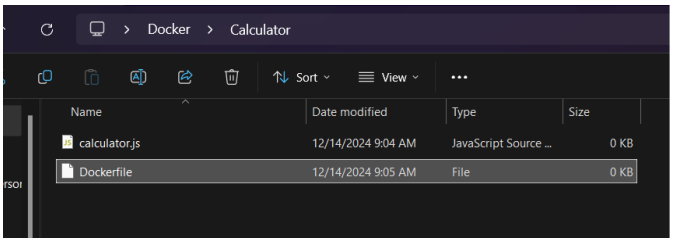
```
C:\Users\Ayush>docker ps -a
CONTAINER ID   IMAGE                                COMMAND                  CREATED              STATUS                      PORTS     NAMES
0b96eb780e2f   rahzero0/rahzero0:newubuntu          "/bin/bash"              About a minute ago   Exited (0) 33 seconds ago             newubuntu
1004f93b3bc8   gcr.io/k8s-minikube/kicbase:v0.0.45   "/usr/local/bin/entr…"   9 days ago           Exited (137) 6 days ago               minikube
```

STEP 18 : Cleaning up

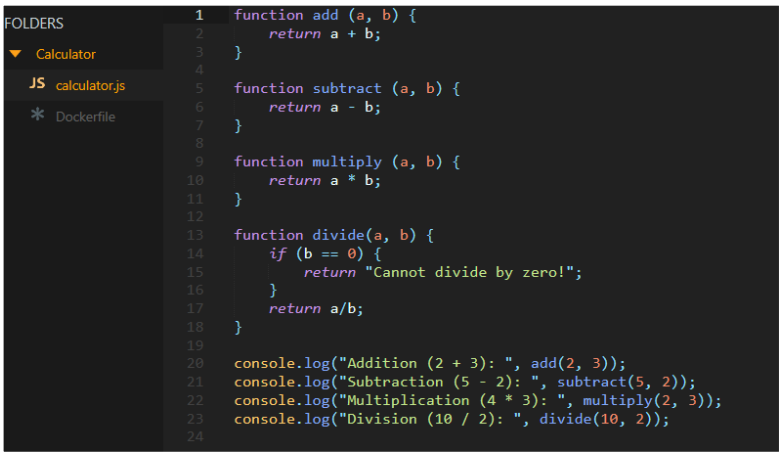
```
C:\Users\Ayush>docker rm 0b96eb780e2f
0b96eb780e2f

C:\Users\Ayush>docker rmi rahzero0/rahzero0:newubuntu
Untagged: rahzero0/rahzero0:newubuntu
Untagged: rahzero0/rahzero0@sha256:9f89291f1648c554c3e520eedfeb1b245140fa1d4fadd0cacc8cc0db775bfac5
Deleted: sha256:e18ca963812ca75a566a6d77264588ba9d405de8c998ac4467b788147a4fd96f
Deleted: sha256:a25ac9206412f16355bf35afc4caacfd7a0b33bf5c32ad9eef3d9c458e9c7175
```

CREATE & PUSH DOCKER FILE IMAGE

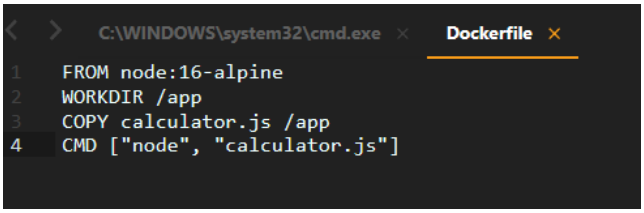
STEP 1 : Create a new folder, name it Calculator and have files calculator.js and Dockerfile



STEP 2 : Write this content in calculator.js

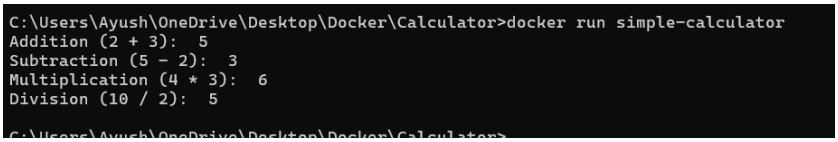


STEP 3 : Write this content in Dockerfile

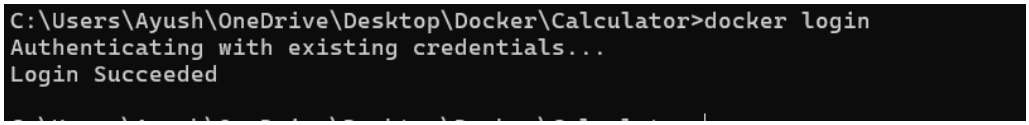


STEP 4 : docker build -t simple-calculator .

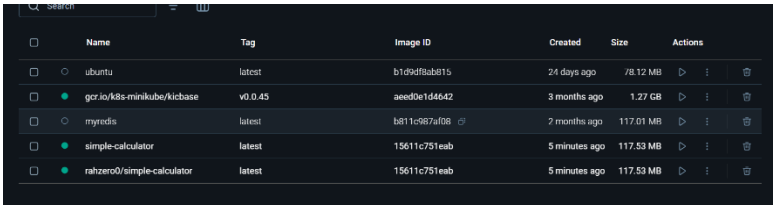
STEP 5 :docker run simple-calculator



STEP 6 : docker login

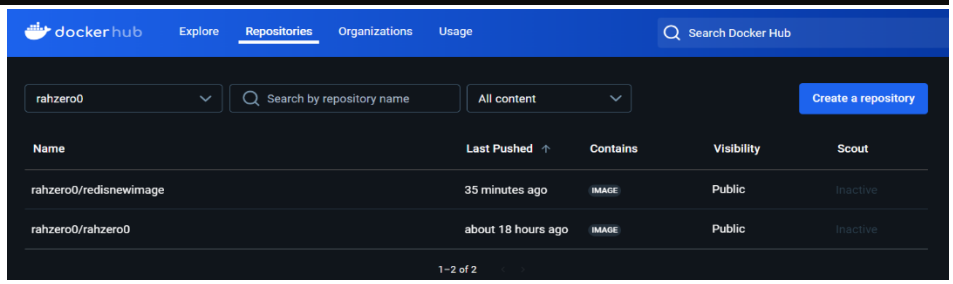


STEP 7 : docker tag simple-calculator rahzero0/simple-calculator



STEP 8 : docker push rahzero0/simple-calculator

```
C:\Users\Ayush\OneDrive\Desktop\Docker\Calculator>docker push rahzero0/simple-calculator
Using default tag: latest
The push refers to repository [docker.io/rahzero0/simple-calculator]
6afeaab59eb8: Pushed
4efa8beb928e: Pushed
365ccd918307: Mounted from library/node
1bba629c69e9: Mounted from library/node
139c1270acf1: Mounted from library/node
4693057ce236: Mounted from library/node
latest: digest: sha256:61bb3e40417002724bc0d6261d1649f742b4ca885dfffa415291e337c956a951 size: 1571
```



STEP 9 : Remove image from local system

```
C:\Users\Ayush\OneDrive\Desktop\Docker\Calculator>docker rm 56148960201f
56148960201f

C:\Users\Ayush\OneDrive\Desktop\Docker\Calculator>docker rmi rahzero0/simple-calculator

Untagged: rahzero0/simple-calculator:latest
Untagged: rahzero0/simple-calculator@sha256:61bb3e40417002724bc0d6261d1649f742b4ca885dfffa415291e337c956a951
```

STEP 10 : docker pull rahzero0/simple-calculator

```
C:\Users\Ayush\OneDrive\Desktop\Docker\Calculator>docker pull rahzero0/simple-calculator
Using default tag: latest
latest: Pulling from rahzero0/simple-calculator
Digest: sha256:61bb3e40417002724bc0d6261d1649f742b4ca885dfffa415291e337c956a951
Status: Downloaded newer image for rahzero0/simple-calculator:latest
docker.io/rahzero0/simple-calculator:latest
```

STEP 11 : docker run rahzero0/simple-calculator

```
C:\Users\Ayush\OneDrive\Desktop\Docker\Calculator>docker run rahzero0/simple-calculator
Addition (2 + 3):  5
Subtraction (5 - 2):  3
Multiplication (4 * 3):  6
Division (10 / 2):  5
```

STEP 12 : Cleaning up

```
C:\Users\Ayush\OneDrive\Desktop\Docker\Calculator>docker rm a2728d423e5b
a2728d423e5b

C:\Users\Ayush\OneDrive\Desktop\Docker\Calculator>docker rmi rahzero0/simple-calculator
Untagged: rahzero0/simple-calculator:latest
Untagged: rahzero0/simple-calculator@sha256:61bb3e40417002724bc0d6261d1649f742b4ca885dfffa415291e337c956a951
```

RUNNING MULTIPLE CONTAINERS USING DOCKER COMPOSE

STEP 1 : Create a compose folder where we write docker-compose(.yaml / .yml)

docker-compose.yaml

```yaml
version: '3'

services:
  # Database
  db:
    image: mysql:5.7
    volumes:
      - db_data:/var/lib/mysql
    restart: always
    environment:
      MYSQL_ROOT_PASSWORD: password
      MYSQL_DATABASE: wordpress
      MYSQL_USER: wordpress
      MYSQL_PASSWORD: wordpress
    networks:
      - wpsite
    # Wordpress
  wordpress:
    depends_on:
      - db
    image: wordpress:latest
    ports:
      - '8000:80'
    restart: always
    volumes: ['./:/var/www/html']
    environment:
      WORDPRESS_DB_HOST: db:3306
      WORDPRESS_DB_USER: wordpress
      WORDPRESS_DB_PASSWORD: wordpress
    networks:
      - wpsite
networks:
  wpsite:
volumes:
  db_data:
```

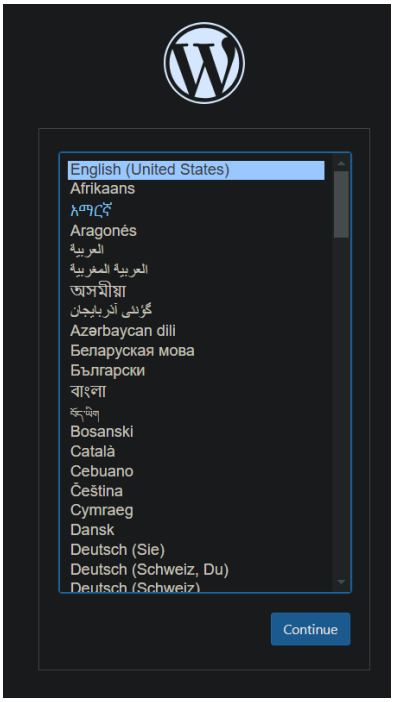
STEP 2 : Move to the location of above file , type docker-compose up –d

```
C:\Users\Ayush\OneDrive\Desktop\Docker\compose>docker-compose up -d
time="2024-12-15T14:22:31+05:30" level=warning msg="C:\\Users\\Ayush\\OneDrive\\Desktop\\Docker\\compose\\docker-compose
.yaml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion"
[+] Running 26/24
 - db [                ] Pulling                                                    320.5s
 - wordpress [##                  ] Pulling                                        320.5s
```

```
[+] Running 35/15                                                                  ] Pulling
                                                                                          3
 ✔db Pulled                                                                       530.1s
 ✔wordpress Pulled                                                                531.3s
```

```
[+] Running 4/4
 ✔Network compose_wpsite          Created                                          0.1s
 ✔Volume "compose_db_data"        Created                                          0.0s
 ✔Container compose-db-1          Started                                          2.7s
 ✔Container compose-wordpress-1   Started                                          1.8s
```

STEP 3 : Go to localhost:8000



STEP 4 : docker ps

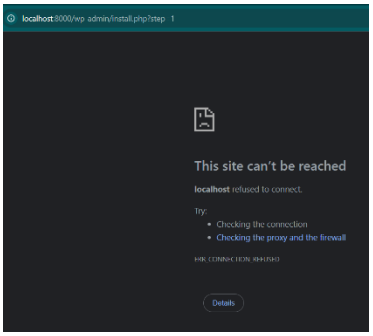
```
C:\Users\Ayush\OneDrive\Desktop\Docker\compose>docker ps
CONTAINER ID   IMAGE              COMMAND                  CREATED         STATUS         PORTS                    NAMES
ba125cace4dd   wordpress:latest   "docker-entrypoint.s…"   4 minutes ago   Up 4 minutes   0.0.0.0:8000->80/tcp     compose-wordpress-1
020c289db376   mysql:5.7          "docker-entrypoint.s…"   4 minutes ago   Up 4 minutes   3306/tcp, 33060/tcp      compose-db-1
```

STEP 5 :
We can create
username and password

STEP 6 : docker-compose stop

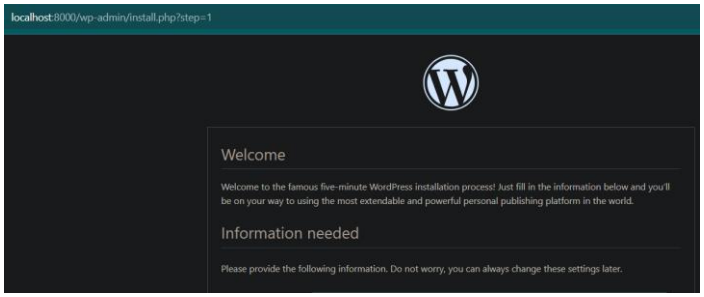
```
C:\Users\Ayush\OneDrive\Desktop\Docker\compose>docker-compose stop
[+] Stopping 2/0
 ✔Container compose-wordpress-1  Stopped                                           0.0s
 ✔Container compose-db-1         Stopped                                           0.0s
```

```
C:\Users\Ayush\OneDrive\Desktop\Docker\compose>docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS     NAMES
```



STEP 7 : docker-compose start

```
C:\Users\Ayush\OneDrive\Desktop\Docker\compose>docker-compose start
[+] Running 2/2
 ✔Container compose-db-1         Started
 ✔Container compose-wordpress-1  Started
```




```
C:\Users\Ayush\OneDrive\Desktop\Docker\compose>docker ps
CONTAINER ID   IMAGE              COMMAND                  CREATED          STATUS          PORTS                  NAMES
ba125cace4dd   wordpress:latest   "docker-entrypoint.s…"   9 minutes ago    Up 39 seconds   0.0.0.0:8000->80/tcp   compose-wordpress-1
020c289db376   mysql:5.7          "docker-entrypoint.s…"   10 minutes ago   Up 39 seconds   3306/tcp, 33060/tcp    compose-db-1
```

STEP 8 : To delete everything

- ➔ docker-compose stop
- ➔ docker-compose down

```
C:\Users\Ayush\OneDrive\Desktop\Docker\compose>docker-compose stop
[+] Stopping 2/2
 ✔Container compose-wordpress-1  Stopped                                                                    1.4s
 ✔Container compose-db-1         Stopped                                                                    2.1s

C:\Users\Ayush\OneDrive\Desktop\Docker\compose>docker-compose down
[+] Running 3/3
 ✔Container compose-wordpress-1  Removed                                                                    0.0s
 ✔Container compose-db-1         Removed                                                                    0.0s
 ✔Network compose_wpsite         Removed                                                                    0.2s

C:\Users\Ayush\OneDrive\Desktop\Docker\compose>
```

DEPLOYING AND SCALING APPLICATIONS USING MINIKUBE

STEP 1 : minikube start

```
C:\Users\Ayush\OneDrive\Desktop\Docker\compose>minikube start
* minikube v1.34.0 on Microsoft Windows 11 Home Single Language 10.0.22631.4602 Build 22631.4602
* Using the docker driver based on existing profile
* Starting "minikube" primary control-plane node in "minikube" cluster
* Pulling base image v0.0.45 ...
* Restarting existing docker container for "minikube" ...
! Failing to connect to https://registry.k8s.io/ from inside the minikube container
* To pull new external images, you may need to configure a proxy: https://minikube.sigs.k8s.io/docs/reference/networking/proxy/
* Preparing Kubernetes v1.31.0 on Docker 27.2.0 ...
* Verifying Kubernetes components...
  - Using image gcr.io/k8s-minikube/storage-provisioner:v5
* Enabled addons: storage-provisioner, default-storageclass
* Done! kubectl is now configured to use "minikube" cluster and "default" namespace by default
```

STEP 2 : kubectl create deployment mynginx --image=nginx

```
C:\Users\Ayush\OneDrive\Desktop\Docker\compose>kubectl create deployment mynginx --image=nginx
deployment.apps/mynginx created
```

STEP 3 : kubectl get deployments

```
C:\Users\Ayush\OneDrive\Desktop\Docker\compose>kubectl get deployments
NAME      READY   UP-TO-DATE   AVAILABLE   AGE
mynginx   0/1     1            0           31s
```

STEP 4 : kubectl expose deployment mynginx --type=NodePort --port=80 --target-port=80

```
C:\Users\Ayush\OneDrive\Desktop\Docker\compose>kubectl expose deployment mynginx --type=NodePort --port=80 --target-port=80
service/mynginx exposed
```

STEP 5 : kubectl scale deployment mynginx --replicas=4

```
C:\Users\Ayush\OneDrive\Desktop\Docker\compose>kubectl scale deployment mynginx --replicas=4
deployment.apps/mynginx scaled
```

STEP 6 : Checking deployments / kubectl get deployments

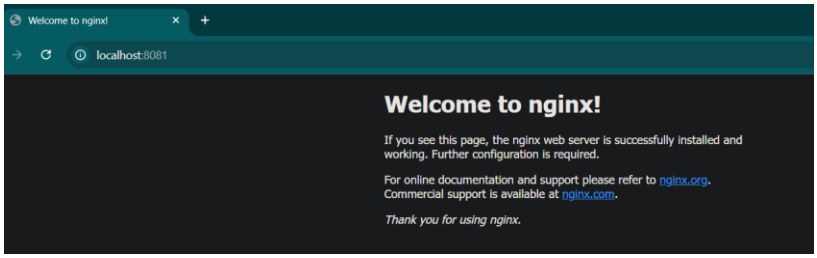
```
C:\Users\Ayush\OneDrive\Desktop\Docker\compose>kubectl get deployments
NAME      READY   UP-TO-DATE   AVAILABLE   AGE
mynginx   4/4     4            4           4m22s
```

STEP 7 : kubectl get pods

```
C:\Users\Ayush\OneDrive\Desktop\Docker\compose>kubectl get pods
NAME                       READY   STATUS    RESTARTS   AGE
mynginx-79bb8756c7-8pgd2   1/1     Running   0          62s
mynginx-79bb8756c7-h6cbx   1/1     Running   0          62s
mynginx-79bb8756c7-sn5gq   1/1     Running   0          62s
mynginx-79bb8756c7-x2fx4   1/1     Running   0          4m55s
```

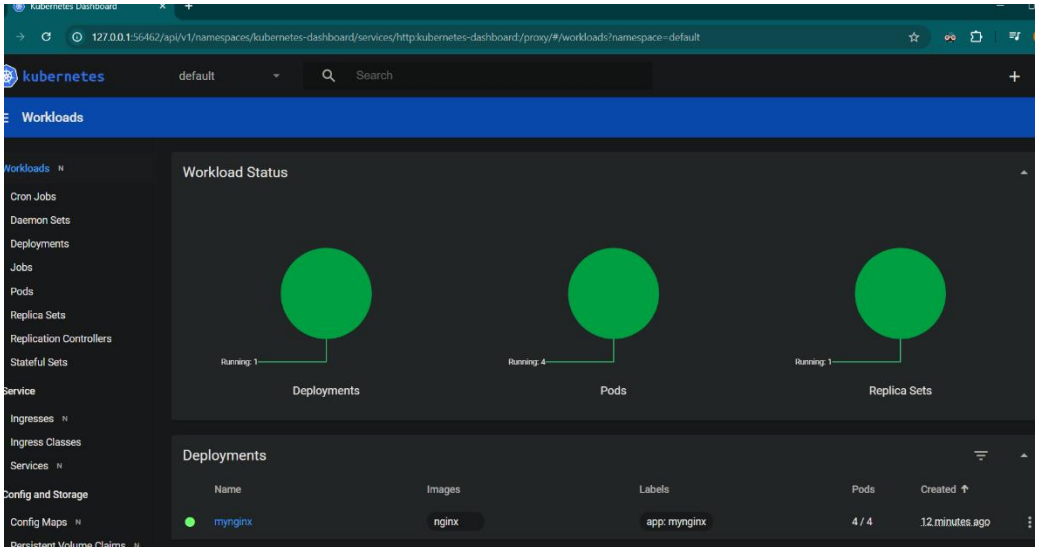
STEP 8 : kubectl port-forward svc/mynginx 8081:80

```
C:\Users\Ayush\OneDrive\Desktop\Docker\compose>kubectl port-forward svc/mynginx 8081:80
Forwarding from 127.0.0.1:8081 -> 80
Forwarding from [::1]:8081 -> 80
```



STEP 9 : minikube dashboard

```
C:\Users\Ayush>minikube dashboard
* Enabling dashboard ...
  - Using image docker.io/kubernetesui/dashboard:v2.7.0
  - Using image docker.io/kubernetesui/metrics-scraper:v1.0.8
* Some dashboard features require the metrics-server addon. To enable all features please run:

        minikube addons enable metrics-server

* Verifying dashboard health ...
* Launching proxy ...
* Verifying proxy health ...
* Opening http://127.0.0.1:56462/api/v1/namespaces/kubernetes-dashboard/services/http:kubernetes-dashboard:/proxy/ in your default browser...
```



STEP 10 : kubectl delete deployments mynginx

```
C:\Users\Ayush\OneDrive\Desktop\Docker\compose>kubectl delete deployments mynginx
deployment.apps "mynginx" deleted
```

STEP 11 : kubectl delete service mynginx

```
C:\Users\Ayush\OneDrive\Desktop\Docker\compose>kubectl delete service mynginx
service "mynginx" deleted
```

STEP 12 : minikube stop

```
C:\Users\Ayush\OneDrive\Desktop\Docker\compose>minikube stop
* Stopping node "minikube"  ...
* Powering off "minikube" via SSH ...
* 1 node stopped.
```

DEPLOYING AND MANAGING MONITORING SYSTEMS USING NAGIOS IN DOCKER

STEP 1 : docker pull jasonrivers/nagios:latest

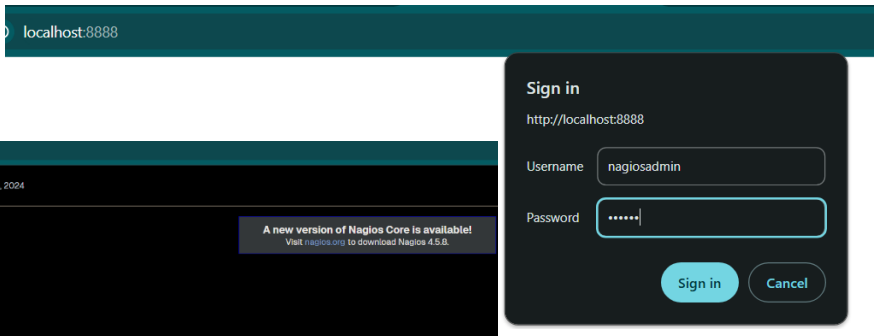
```
C:\Users\Ayush\OneDrive\Desktop\Docker\compose>docker pull jasonrivers/nagios:latest
latest: Pulling from jasonrivers/nagios
ff65daf9395b: Pull complete
785b9873bdf4: Pull complete
0ef9446ba5cc: Pull complete
53aff88babc4: Pull complete
d72f92e29533: Pull complete
706ed7d4ce0a: Pull complete
d3245570f968: Pull complete
eeb77e6dde3e: Pull complete
0bd0f5795eeb: Pull complete
71bfb386f8cb: Pull complete
738fc7520889: Pull complete
fe8a6b2cf4e3: Pull complete
e6f8fab512d1: Pull complete
15f36d0b0439: Pull complete
a2fc4187e3b4: Pull complete
3d5785144815: Pull complete
566cdc02555d: Pull complete
c700be87d617: Pull complete
4f4fb700ef54: Pull complete
b69c76bd2b6b: Pull complete
d5aa2a3a6539: Pull complete
8fb30af17153: Pull complete
9ffe54c5c139: Pull complete
279b28aefa10: Pull complete
a900dfcceb38: Pull complete
9a906a45e352c: Pull complete
8e911c59da28: Pull complete
c219d58cc3f9: Pull complete
b0e280e9aa8c: Pull complete
8c389e58e867: Pull complete
Digest: sha256:2a7c2b20d118baf92b47b69a3901e68dd7664617801b94e560bc4d6564d6ae54
Status: Downloaded newer image for jasonrivers/nagios:latest
docker.io/jasonrivers/nagios:latest
```

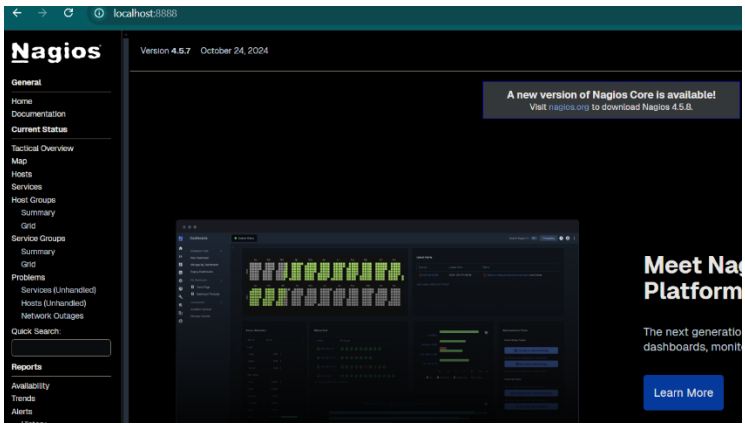
STEP 2 : docker run --name nagiosdemo -p 8888:80 jasonrivers/nagios:latest

```
C:\Users\Ayush\OneDrive\Desktop\Docker\compose>docker run --name nagiosdemo -p 8888:80 jasonrivers/nagios:la
Adding password for user nagiosadmin
chown: warning: '.' should be ':': 'nagios.nagios'
Started runsvdir, PID is 13
checking permissions for nagios & nagiosgraph
rsyslogd: [origin software="rsyslogd" swVersion="8.2312.0" x-pid="21" x-info="https://www.rsyslog.com"] star
nsca[24]: Starting up daemon

Nagios Core 4.5.7
Copyright (c) 2009-present Nagios Core Development Team and Community Contributors
Copyright (c) 1999-2009 Ethan Galstad
Last Modified: 2024-10-24
License: GPL

Website: https://www.nagios.org
Nagios 4.5.7 starting... (PID=23)
Local time is Sun Dec 15 09:54:17 UTC 2024
nagios: Nagios 4.5.7 starting... (PID=23)
nagios: Local time is Sun Dec 15 09:54:17 UTC 2024
nagios: LOG VERSION: 2.0
nagios: qh: Socket '/opt/nagios/var/rw/nagios.qh' successfully initialized
nagios: qh: core query handler registered
nagios: qh: echo service query handler registered
nagios: qh: help for the query handler registered
wproc: Successfully registered manager as @wproc with query handler
nagios: wproc: Successfully registered manager as @wproc with query handler
wproc: Registry request: name=Core Worker 42;pid=42nagios: wproc: Registry request: name=Core Worker 42;pid=

wproc: Registry request: name=Core Worker 44;pid=44
wproc: Registry request: name=Core Worker 43;pid=43
wproc: Registry request: name=Core Worker 45;pid=45
nagios: wproc: Registry request: name=Core Worker 44;pid=44
wproc: Registry request: name=Core Worker 46;pid=46
wproc: Registry request: name=Core Worker 50;pid=50nagios: wproc: Registry request: name=Core Worker 43;pid=

nagios: wproc: Registry request: name=Core Worker 45;pid=45
nagios: wproc: Registry request: name=Core Worker 46;pid=46
wproc: Registry request: name=Core Worker 51;pid=51
nagios: wproc: Registry request: name=Core Worker 50;pid=50
wproc: Registry request: name=Core Worker 53;pid=53
wproc: Registry request: name=Core Worker 47;pid=47
```

STEP 3 : Go to localhost:8888

- ➔ Username: nagiosadmin
- ➔ Password: nagios





STEP 4 :
docker ps

```
C:\Users\Ayush>docker ps
CONTAINER ID   IMAGE                      COMMAND                  CREATED         STATUS         PORTS                              NAMES
2930c2d3d928   jasonrivers/nagios:latest   "/usr/local/bin/star…"   4 minutes ago   Up 4 minutes   5667/tcp, 0.0.0.0:8888->80/tcp   nagiosdemo
```

STEP 5 : docker stop nagios

```
C:\Users\Ayush>docker stop nagiosdemo
nagiosdemo
```

```
Response time
Shutting Down
Caught SIGTERM, shutting down...nagios: Caught SIGTERM, shutting down...

nsca[24]: Caught SIGTERM - shutting down...
nsca[24]: Cannot remove pidfile '/var/run/nsca.pid' - check your privileges.
nsca[24]: Daemon shutdown
postfix/master[25]: fatal: master_sigdeath: kill process group: No such process
ok: down: svlogd: 0s, normally up, want up
Successfully shutdown... (PID=23)
ok: down: apache: 1s, normally up
ok: down: nagios: 1s, normally up
ok: down: nsca: 1s, normally up
ok: down: rsyslog: 1s, normally up
ok: down: postfix: 0s, normally up
```

STEP 6 : docker rm nagiosdemo

```
C:\Users\Ayush>docker rm nagiosdemo
nagiosdemo
```

STEP 7 : Deleting image

- ➔ docker images
- ➔ docker rmi jasonrivers/nagios

```
C:\Users\Ayush>docker images
REPOSITORY                    TAG       IMAGE ID       CREATED         SIZE
rahzero0/simple-calculator    latest    15611c751eab   30 hours ago    118MB
simple-calculator             latest    15611c751eab   30 hours ago    118MB
wordpress                     latest    c89b40a25cd1   3 weeks ago     700MB
ubuntu                        latest    b1d9df8ab815   3 weeks ago     78.1MB
jasonrivers/nagios            latest    2ab73fb5d162   5 weeks ago     960MB
myredis                       latest    b811c987af08   2 months ago    117MB
gcr.io/k8s-minikube/kicbase   v0.0.45   aeed0e1d4642   3 months ago    1.28GB
mysql                         5.7       5107333e08a8   12 months ago   501MB

C:\Users\Ayush>docker rmi jasonrivers/nagios
Untagged: jasonrivers/nagios:latest
Untagged: jasonrivers/nagios@sha256:2a7c2b20d118baf92b47b69a3901e68dd7664617801b94e560bc4d6564d6ae54
Deleted: sha256:2ab73fb5d162ad0be4ef495fb62e17772120b32721a6c3eb9091fcc800d2909b
Deleted: sha256:631ab139f760d68457a4186da4a60f5e5f11e65aa3b26864b5df237ef75b1311
Deleted: sha256:b10e2a7f4de8bcf15a69232335422c9a736c4a4a93ca288592a2fb53a2de6f45
Deleted: sha256:3a5a34bf7e5ab76f1a3054c5854a9bc7227fd5a0dec73d4a4673456f69cec753
Deleted: sha256:0603355dfe22b531eff49627391c7a8bb944163a735d9142cfcf02529e3c8ffd
Deleted: sha256:2cdfed24d1997cb2951dc561b1c4fbc1947069e22801aab9103cf0f0c1e8c532
Deleted: sha256:5d2ae66d21d91026745748ae98d112256472f76f72deaa904a368b9dd41ca987
Deleted: sha256:b9759ebfa6418db67d02fd861af913fd571bd06c6d3ccddfe760d637e49f15f2
Deleted: sha256:62b02d2bded253673e8e75637dda61e85ad0fbe2e2eaa48bcfda314197add5f4
Deleted: sha256:c8bf237c41fd124329567e29514d381ae822f6d202565e013df75bb47811c94d
Deleted: sha256:5e918b338fe317b5f88044bfc83c21c5bca1f8570092859d4a0c05a8e2e036ce
Deleted: sha256:24ce75f6abff9acee33a572c2adb3cccf1a57d995ba1eaad9bf68b9a50d5bfab
Deleted: sha256:bc291db0b02d187622e2bb6f1c85dcb5baa3a37ce557e5357a628b3befbb0df3
```

Conclusion : Thus we were able to use **Docker** containers and images and learn about **Nagios**.

Experiment 8: CLOUD DEPLOYMENT OF A PROJECT IN THE AWS CLOUD USING EC2 INSTANCE

AIM: To use **AWS** services and implement its **EC2 instance** in our projects.

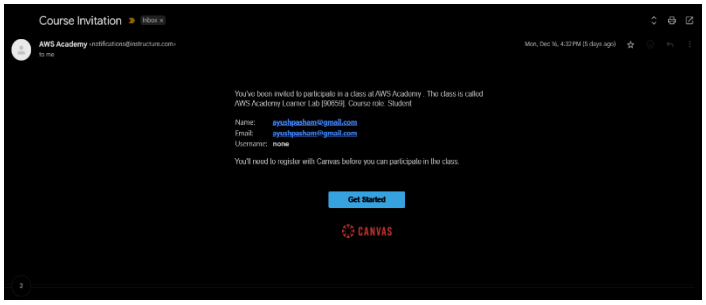
Introduction:

- **AWS (Amazon Web Services)**
  - AWS is a comprehensive **cloud computing platform** provided by Amazon. It offers a wide range of services, including computing power, storage, databases, networking, and machine learning, to help businesses build and scale applications without managing physical hardware.
  - **Functions of AWS**
    - **Compute Services**: Provides scalable computing power through services like EC2 (Elastic Compute Cloud) and Lambda (server less computing).
    - **Storage Solutions**: Offers reliable storage options like S3 (Simple Storage Service) and EBS (Elastic Block Store).
    - **Database Management**: Includes managed database services like RDS (Relational Database Service) and Dynamo DB (NoSQL).
    - **Networking**: Enables secure networking with services like VPC (Virtual Private Cloud) and Route 53 (DNS).
    - **AI and Machine Learning**: Provides AI tools like Sage Maker for training and deploying machine learning models.
    - **Deployment and Monitoring**: Facilitates application deployment and monitoring with services like Elastic Beanstalk and Cloud Watch.
    - **Security and Identity**: Ensures secure access using services like IAM (Identity and Access Management).

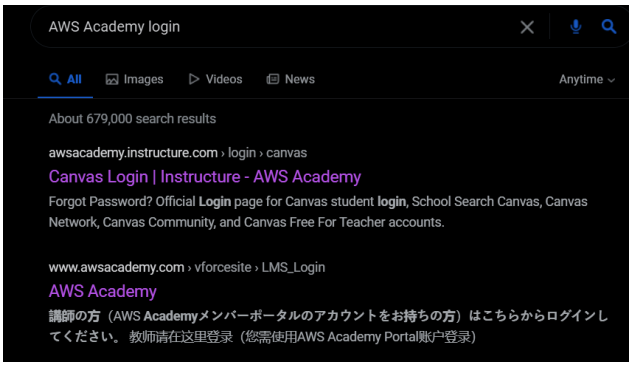
- **EC2 INSTANCE**
  - An **EC2 (Elastic Compute Cloud) instance** is a virtual server provided by AWS for running applications. It allows users to launch, configure, and manage virtual machines with customizable operating systems, CPU, memory, and storage options.
  - **Functions of EC2 Instance**
    - **On-demand Computing Power**: Provides scalable virtual servers to meet varying workloads.
    - **Customizable Configuration**: Supports different instance types optimized for compute, memory, or storage needs.
    - **Operating System Choices**: Allows the use of Linux, Windows, or custom OS images.
    - **Auto Scaling**: Dynamically adjusts the number of instances based on demand.
    - **Elasticity**: Start, stop, or resize instances as needed.
    - **Integration with AWS Services**: Works seamlessly with S3, RDS, and other AWS services.
    - **Secure Access**: Uses key pairs and security groups to control access to instances.

AWS ACADEMY LEARNING ACOUNT CREATION

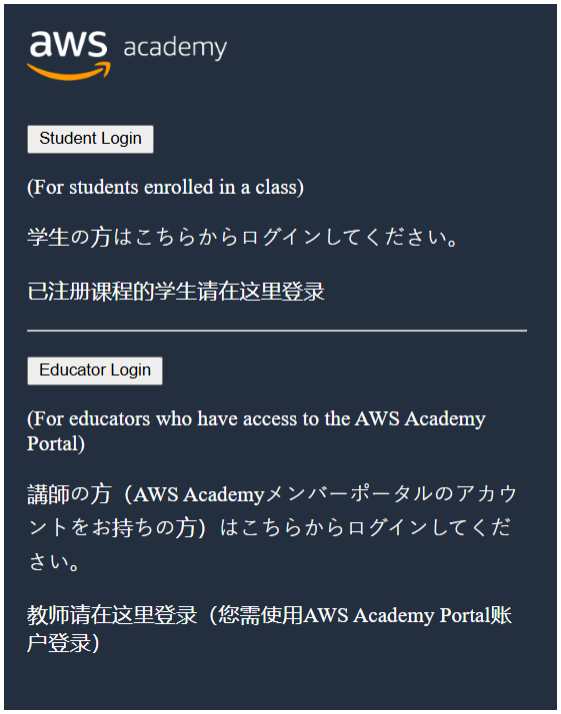
STEP 1 : Open your mail and click on **Get Started**



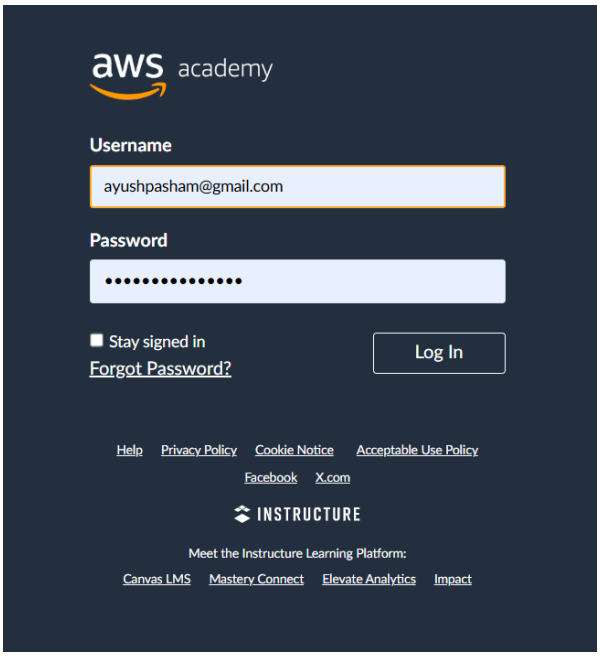
STEP 2 : Open Google and type **AWS Academy Login**



STEP 3 : Open this page and click on **Student Loign**



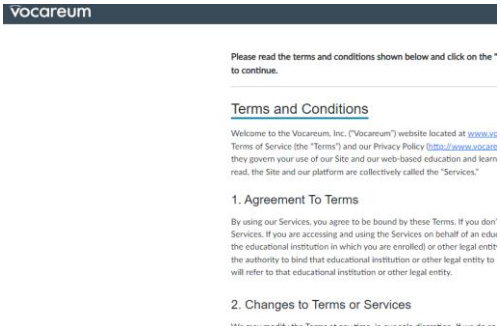
STEP 4 : Open Enter your credentials



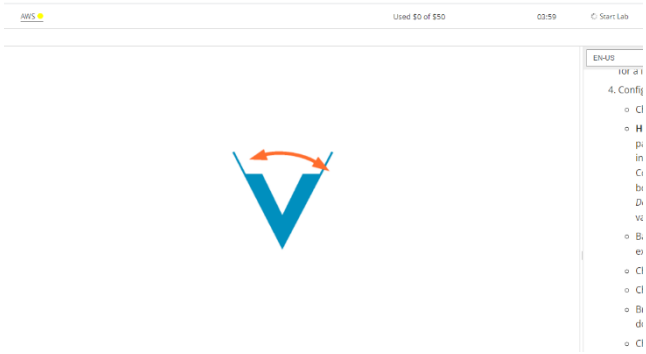
STEP 5 : Open Click on Modules in this Learner Lab

STEP 6 : Click on this option **Launch AWS Academy Learner Lab**

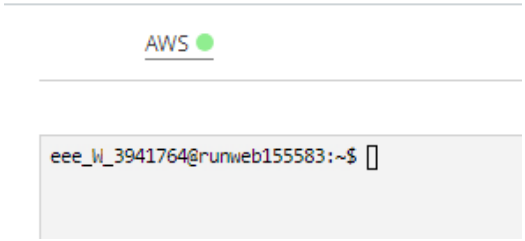
STEP 7 : Accept Terms and Conditions



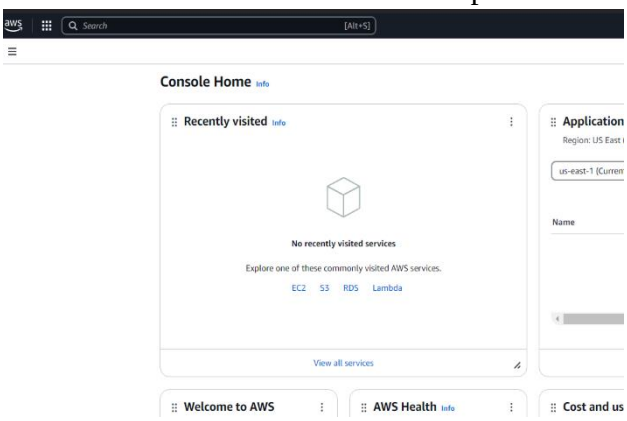
STEP 8 : Start Lab by clicking on Start Lab button



STEP 9 : After successfully starting the lab click on **AWS**

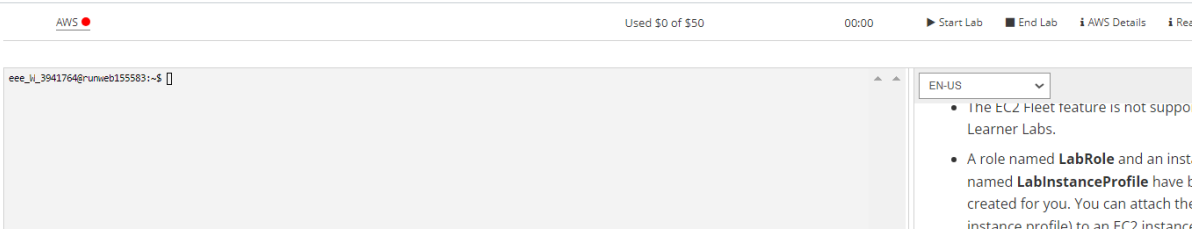


STEP 10 : This interface will be opened



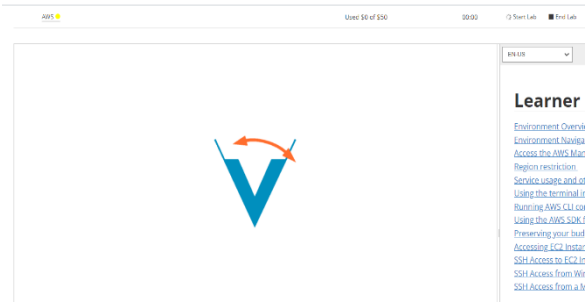
STEP 11 : Close the lab by clicking on close lab and then **Yes**

STEP 12 : Verify that the lab is closed by getting the red dot

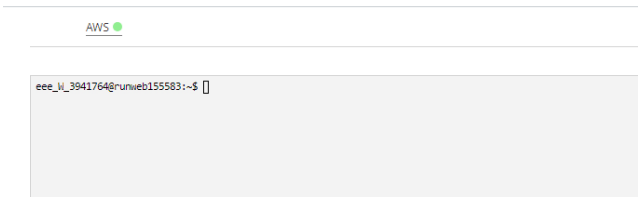


PROJECT DEPLOYMENT IN THE AWS CLOUD USING EC2 INSTANCE

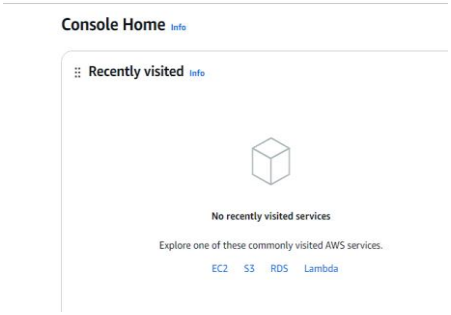
STEP 1 : Start the lab and wait for the button to turn green

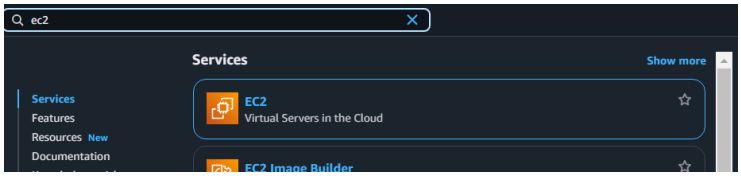


STEP 2 : As soon as it turns green click on **AWS**

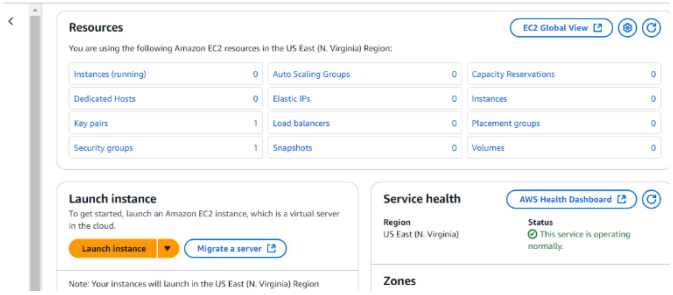


STEP 3 : As you enter the lab search for **EC2** instance

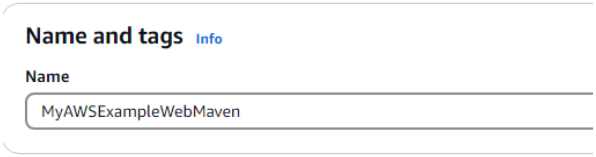




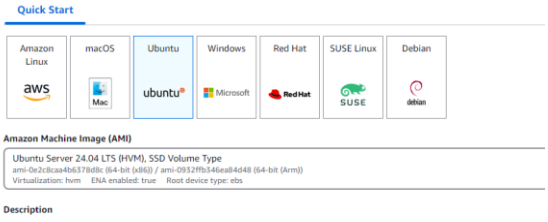
STEP 4 : Wait for the screen to load and then click on **Launch Instance**



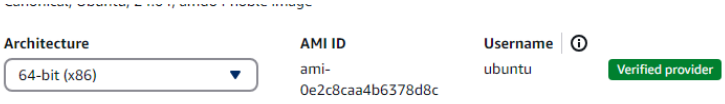
STEP 5 : Type an appropriate name



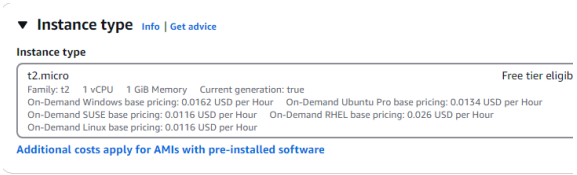
STEP 6 : Select Ubuntu Free Tier



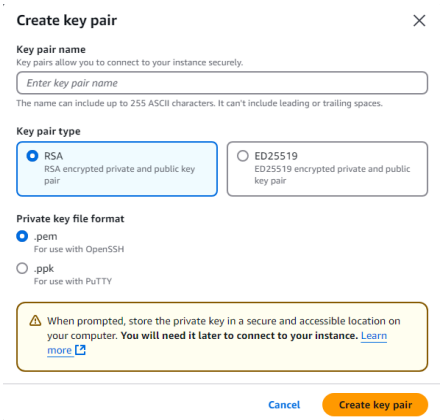
STEP 7 : Select 64 bit architecture



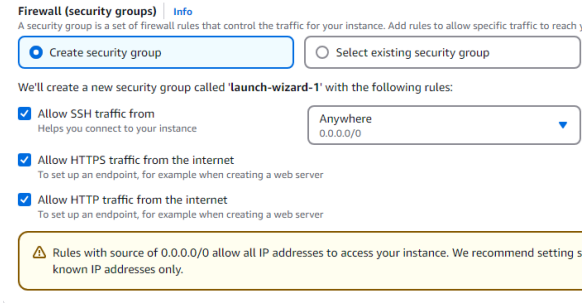
STEP 8 : Select t2 free instance type



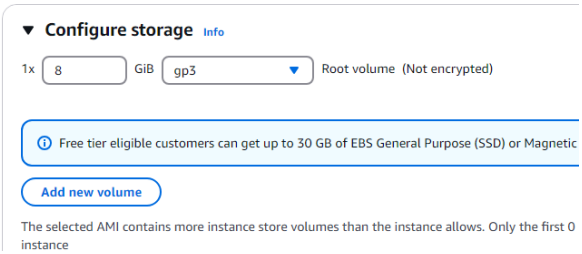
STEP 9 : Create your key by clicking **RSA**



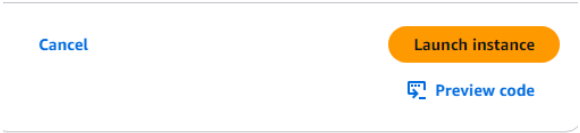
STEP 10 : In network settings allow both **HTTP – HTTPS** traffic



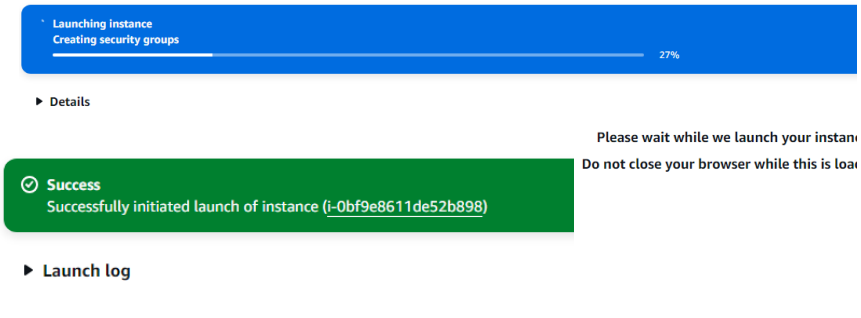
STEP 11 : In storage settings select either **8GB | 10GB** which is still free tier



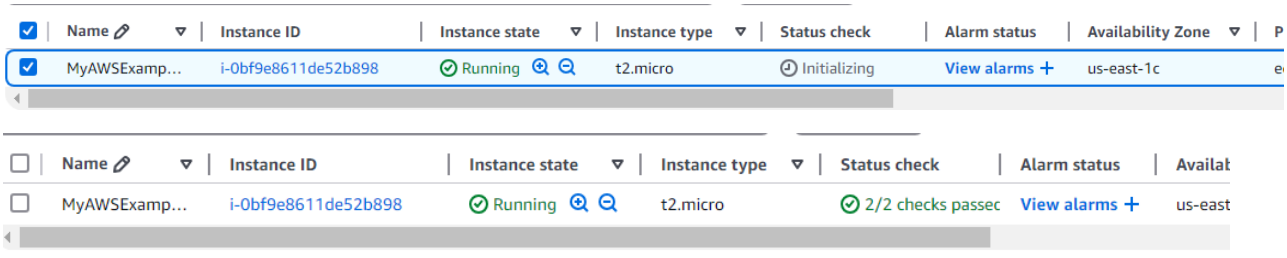
STEP 12 : Click on **Launch Instance**



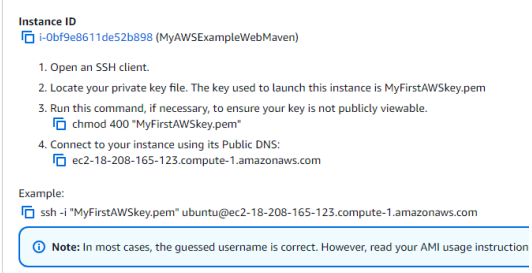
STEP 13 : Verify instance has launched



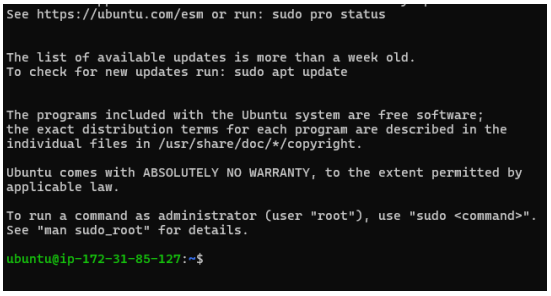
STEP 14 : Wait for the instance to load



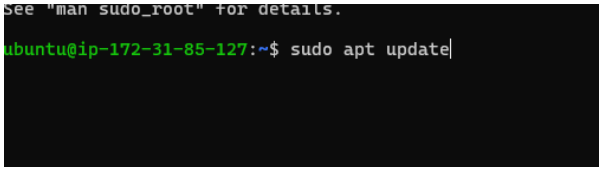
STEP 15 : SSH Connect to the instance



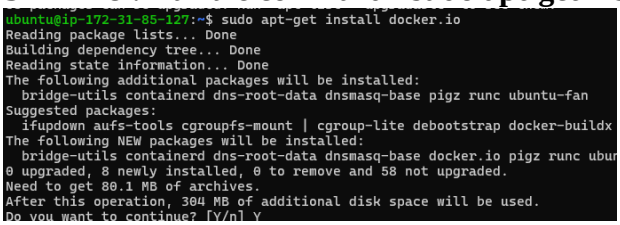
STEP 16 : Copy and paste the ssh line in the terminal



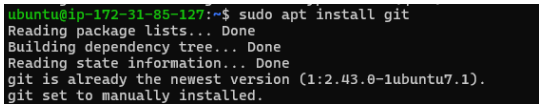
STEP 17 : Run the command `**sudo apt update**`



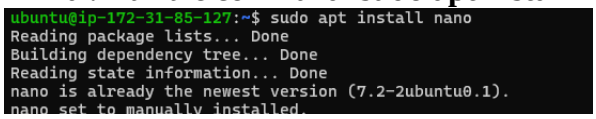
STEP 18 : Run the command `**sudo apt-get install docker.io**`



STEP 19 : Run the command `**sudo apt install git**`

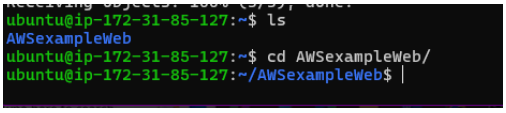


STEP 20 : Run the command `**sudo apt install nano**`

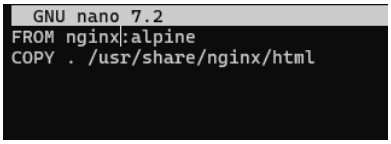


STEP 21 : Run the command `**git clone https://github.com/RahZero0/AWSexampleWeb.git**`

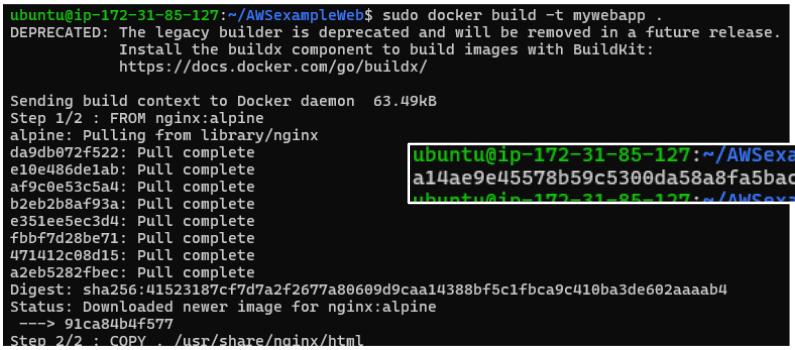
STEP 22 : Move to the loaded directory



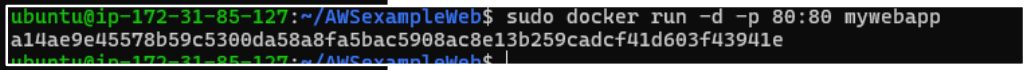
STEP 23 : Create the **Dockerfile** and write the below



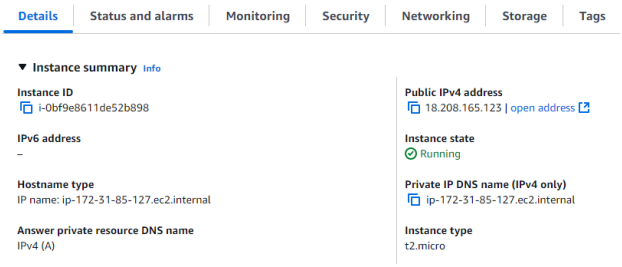
STEP 24 : Run the command `**sudo docker build -t mywebapp .**`



STEP 25 : Run the command `**sudo docker run -d -p 80:80 mywebapp**`



STEP 26 : Copy the public **IP** address



STEP 27 : Go to the IP address

STEP 28 : Run the command `sudo docker ps`

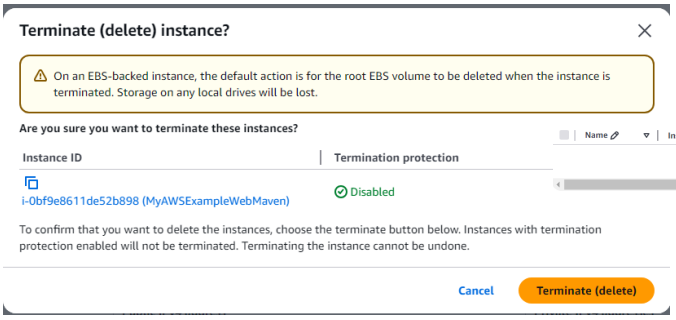
```
ubuntu@ip-172-31-85-127:~/AWSexampleWeb$ sudo docker ps
CONTAINER ID   IMAGE      COMMAND                  CREATED         STATUS         PORTS                                   NAMES
a14ae9e45578   mywebapp   "/docker-entrypoint.…"   2 minutes ago   Up 2 minutes   0.0.0.0:80->80/tcp, :::80->80/tcp       pensive_allen
ubuntu@ip-172-31-85-127:~/AWSexampleWeb$
```

STEP 29 : Run the command `sudo docker stop <container_id>`

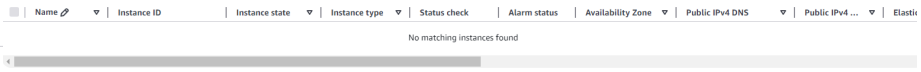
```
ubuntu@ip-172-31-85-127:~/AWSexampleWeb$ sudo docker stop a14ae9e45578
a14ae9e45578
ubuntu@ip-172-31-85-127:~/AWSexampleWeb$
```

```
ubuntu@ip-172-31-85-127:~/AWSexampleWeb$ sudo docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS     NAMES
ubuntu@ip-172-31-85-127:~/AWSexampleWeb$
```

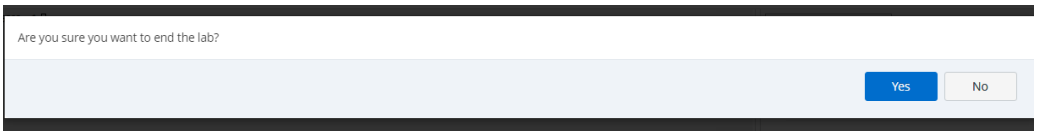
STEP 30 : Terminate the instance



STEP 31 : Refresh the page to see if instance is **terminated**



STEP 32 : Close the lab

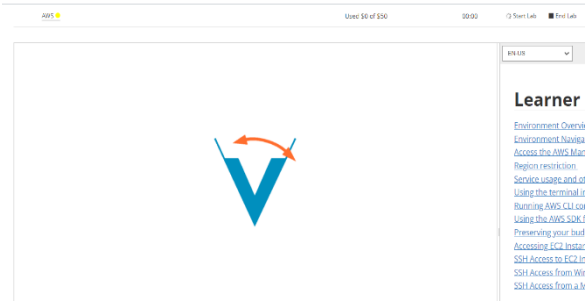


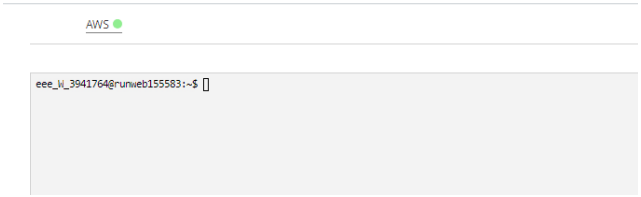
STEP 33 : Check for red dot

DEPLOYING MAVEN WEB PROJECT DEPLOYMENT IN THE AWS CLOUD USING EC2 INSTANCE

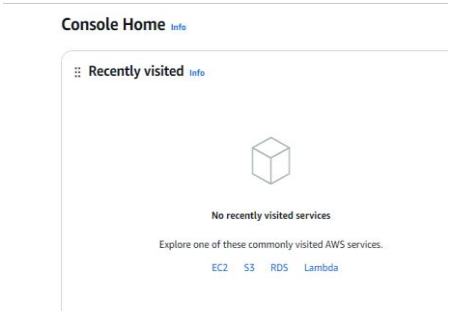
STEP 1 : Start the lab and wait for the button to turn green

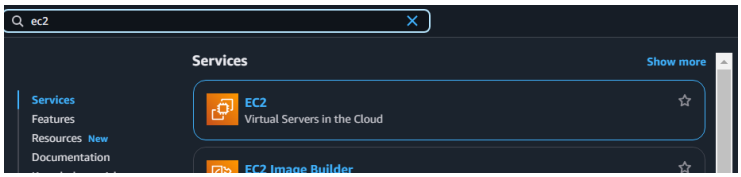
STEP 2 : As soon as it turns green click on **AWS**



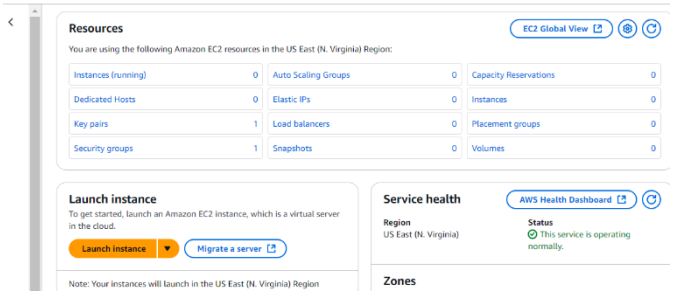


STEP 3 : As you enter the lab search for **EC2** instance

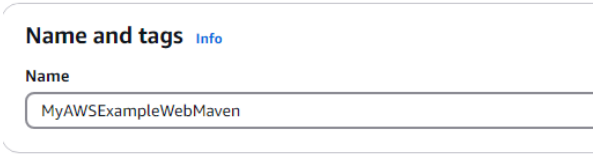




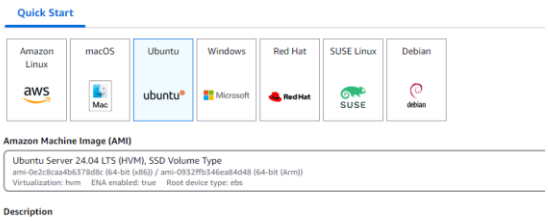
STEP 4 : Wait for the screen to load and then click on **Launch Instance**



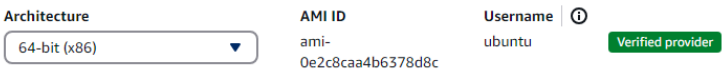
STEP 5 : Type an appropriate name



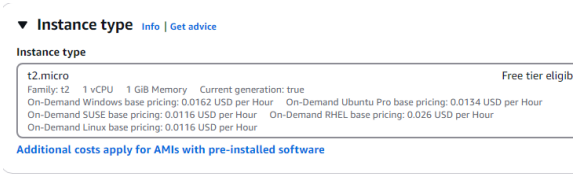
STEP 6 : Select Ubuntu Free Tier



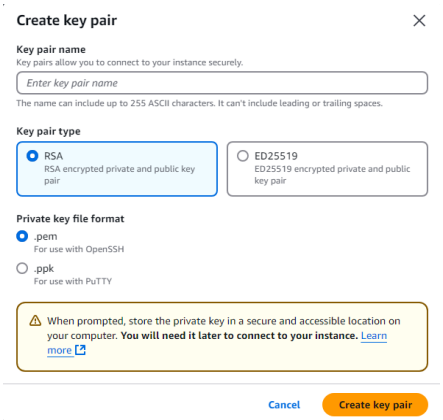
STEP 7 : Select 64 bit architecture



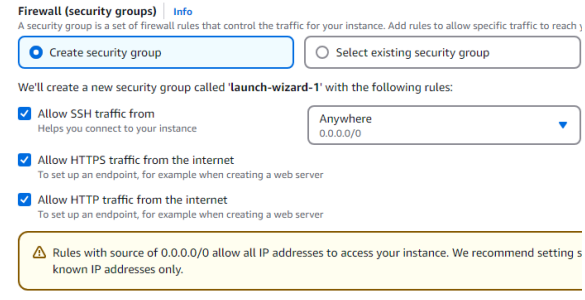
STEP 8 : Select t2 free instance type



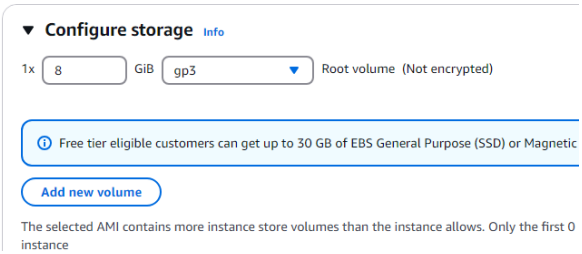
STEP 9 : Create your key by clicking **RSA**



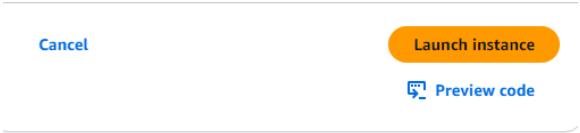
STEP 10 : In network settings allow both **HTTP – HTTPS** traffic



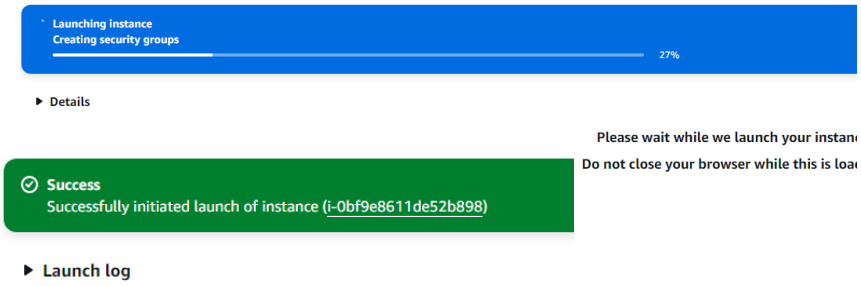
STEP 11 : In storage settings select either **8GB | 10GB** which is still free tier



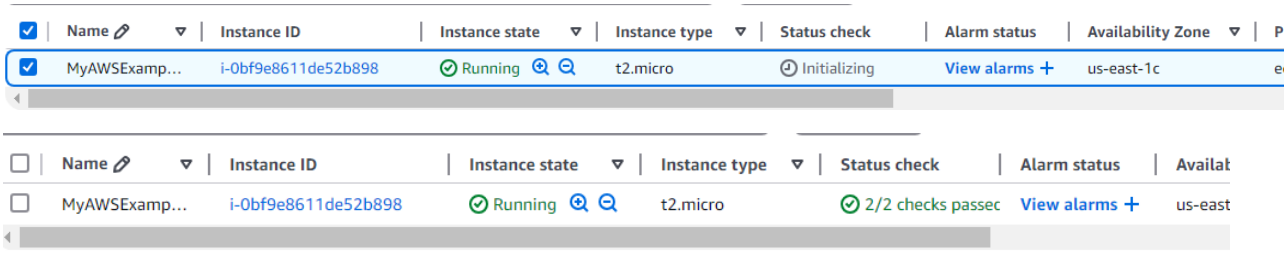
STEP 12 : Click on **Launch Instance**



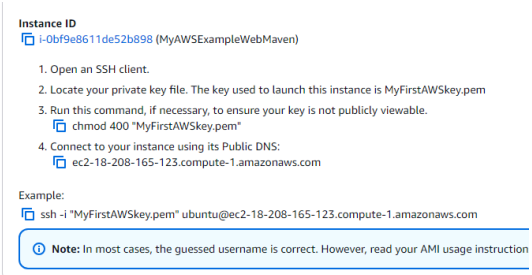
STEP 13 : Verify instance has launched



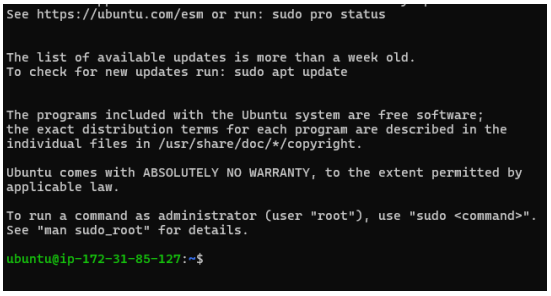
STEP 14 : Wait for the instance to load



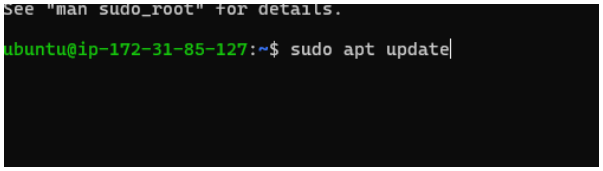
STEP 15 : SSH Connect to the instance



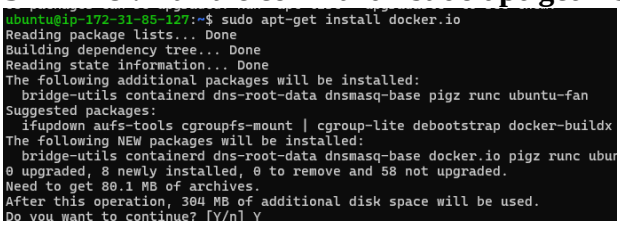
STEP 16 : Copy and paste the ssh line in the terminal



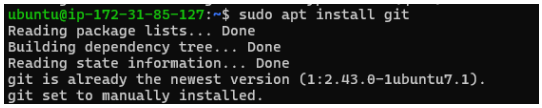
STEP 17 : Run the command `**sudo apt update**`



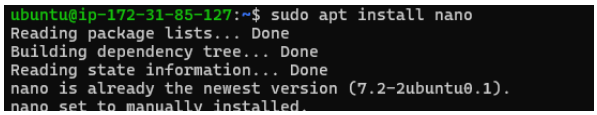
STEP 18 : Run the command `**sudo apt-get install docker.io**`



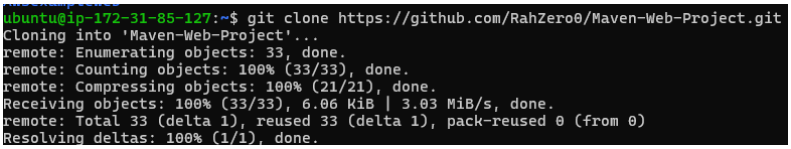
STEP 19 : Run the command `**sudo apt install git**`



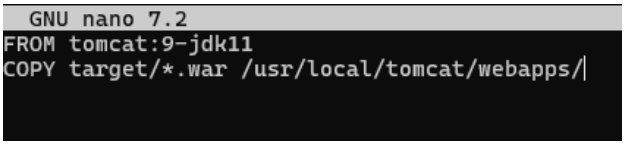
STEP 20 : Run the command `**sudo apt install nano**`



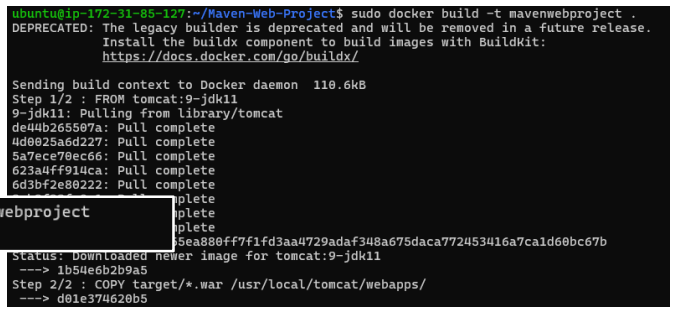
STEP 21 : Run the command `**git clone https://github.com/RahZero0/Maven-Web-Project.git**`



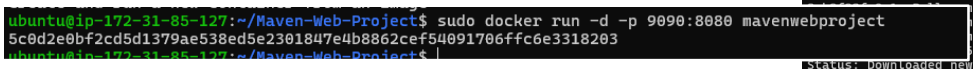
STEP 22 : Create a Dockerfile and write the contents



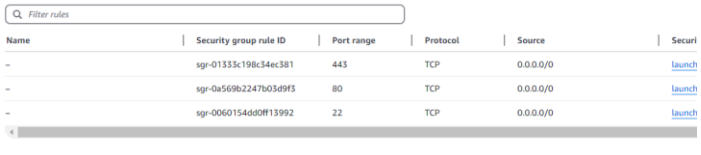
STEP 23 : Run the command `**sudo docker build -t mavenwebproject .**`



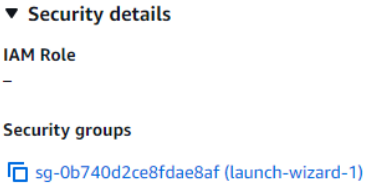
STEP 24 : Run the command `**sudo docker run -d -p 9090:8080 mavenwebproject**`



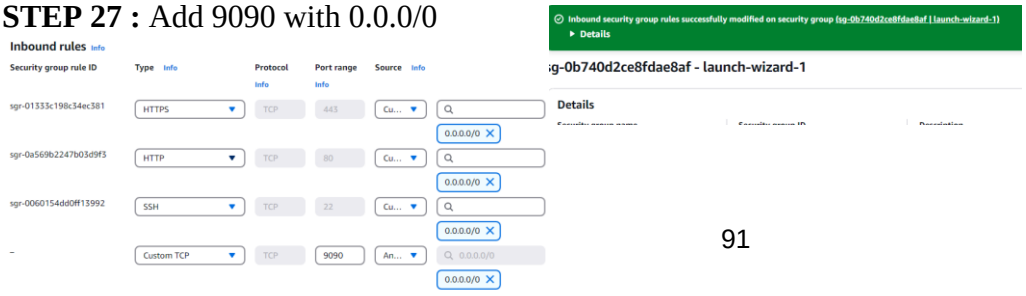
STEP 25 : Check if 9090 is in the security ports



STEP 26 : Click on security groups



STEP 27 : Add 9090 with 0.0.0/0



STEP 28 : Check the url for the **MavenWebProject**

STEP 29 : Run the command `**sudo docker ps**`

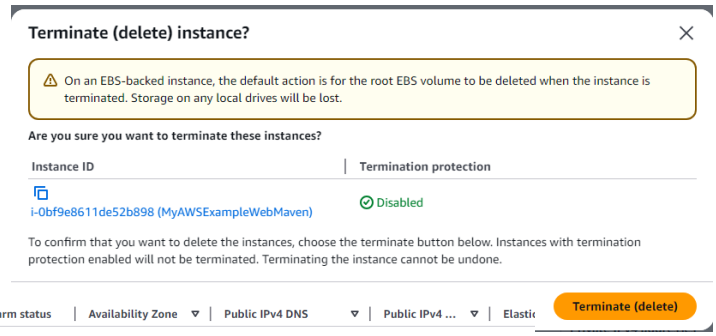
```
ubuntu@ip-172-31-85-127:~/Maven-Web-Project$ sudo docker ps
CONTAINER ID   IMAGE            COMMAND             CREATED         STATUS         PORTS                                              NAMES
5c0d2e0bf2cd   mavenwebproject   "catalina.sh run"   7 minutes ago   Up 7 minutes   0.0.0.0:9090->8080/tcp, :::9090->8080/tcp   gifted_carver
ubuntu@ip-172-31-85-127:~/Maven-Web-Project$
```

STEP 30 : Open

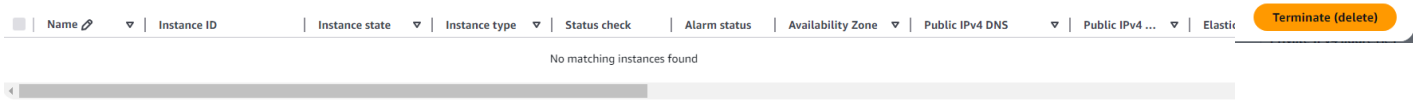
```
ubuntu@ip-172-31-85-127:~/Maven-Web-Project$ sudo docker stop 5c0d2e0bf2cd
5c0d2e0bf2cd
ubuntu@ip-172-31-85-127:~/Maven-Web-Project$
```

```
ubuntu@ip-172-31-85-127:~/Maven-Web-Project$ exit
logout
Connection to ec2-18-208-165-123.compute-1.amazonaws.com closed.
```

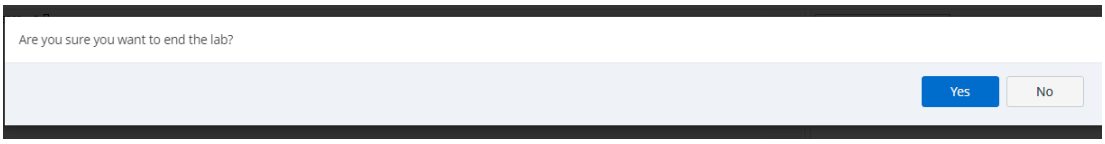
STEP 31 : Terminate the instance



STEP 32 : Refresh the page to see if instance is **terminated**



STEP 33 : Close the lab



STEP 34 : Check for red dot

Conclusion : Thus we were able to use **AWS services** and learn more about **EC2** and do projects in them.