Online Auction

Technical Manual

**Slippery Rock University of Pennsylvania**

Contributions by:

**Fall 2023**

Timothy Holtz – tth1003@sru.edu

Douglas Maxwell – dsm1015@sru.edu

Luke McElligott – lpm1006@sru.edu

Table of Contents

[Docker 4](#_Toc152009763)

[Prerequisites for Docker 4](#_Toc152009764)

[Dockerfile Explanation 4](#_Toc152009765)

[Base Image 4](#_Toc152009766)

[Working Directory 4](#_Toc152009767)

[Copying Project Files 4](#_Toc152009768)

[Build Project 5](#_Toc152009769)

[Expose Port 5](#_Toc152009770)

[Run Command 5](#_Toc152009771)

[Docker Compose Explanation 5](#_Toc152009772)

[Services 5](#_Toc152009773)

[Volumes 5](#_Toc152009774)

[Compose 6](#_Toc152009775)

[Dynamic SQL Import in SpringBoot 6](#_Toc152009776)

[Steps to Use Dynamic SQL Import 6](#_Toc152009777)

[1. Create import.sql 6](#_Toc152009778)

[2. Confirm SQL Statements 6](#_Toc152009779)

[3. Handle Foreign Key Constraints 6](#_Toc152009780)

[4. Configuration 7](#_Toc152009781)

[Category Tree & Attribute Recommendation System 7](#_Toc152009782)

[Category Tree 7](#_Toc152009783)

[Tree Structure 7](#_Toc152009784)

[Tree Features 7](#_Toc152009785)

[Data 8](#_Toc152009786)

[Attribute Recommendation System 8](#_Toc152009787)

[Recommendation Structure 8](#_Toc152009788)

[Recommendation Features 8](#_Toc152009789)

[Integration 8](#_Toc152009790)

[Session-based User Information Retrieval 8](#_Toc152009791)

[Overview: 8](#_Toc152009792)

[Key Concepts: 9](#_Toc152009793)

[Principal: 9](#_Toc152009794)

[Custom Exception for Unauthenticated Users: 9](#_Toc152009795)

[Global Exception Handling: 9](#_Toc152009796)

[Usage in Controller: 9](#_Toc152009797)

[Takeaway: 9](#_Toc152009798)

[Shipment Tracking with Shippo 9](#_Toc152009799)

[Prerequisites 9](#_Toc152009800)

[Integration Steps 10](#_Toc152009801)

[1. API Key Configuration 10](#_Toc152009802)

[2. Creating Shipment Tracking Service 10](#_Toc152009803)

[3. Handling Exceptions 10](#_Toc152009804)

[4. Mapping Shippo Responses to DTOs 10](#_Toc152009805)

[5. Creating a Controller 10](#_Toc152009806)

[6. Fetching and Displaying Tracking Information 11](#_Toc152009807)

[Spring Profiles 11](#_Toc152009808)

[Configuration Setup: 11](#_Toc152009809)

[Default Profile Setting 11](#_Toc152009810)

[Profile-Specific Configuration Files: 11](#_Toc152009811)

[Profile Configuration Example: 11](#_Toc152009812)

[Profile Activation and Usage: 11](#_Toc152009813)

[Profile Activation: 11](#_Toc152009814)

[Configuration Loading: 12](#_Toc152009815)

[Database Configuration: 12](#_Toc152009816)

[Diagrams 12](#_Toc152009817)

[Use Case: 12](#_Toc152009818)

[Diagram Images: 12](#_Toc152009819)

[Class: 16](#_Toc152009820)

[Diagram Images: 16](#_Toc152009821)

[Activity: 24](#_Toc152009822)

[Diagram Images: 25](#_Toc152009823)

[Synopsis 33](#_Toc152009824)

# Docker

Docker is a platform used to develop, ship, and run applications inside containers. A container is a lightweight, standalone, and executable software package that includes everything needed to run a piece of software, including the code, runtime, system tools, libraries, and settings. Containers are isolated from each other and the host system.

In the context of the Online Auction project, Docker is used to ensure that the application and its dependencies are packaged together and can be consistently deployed across various environments.

## Prerequisites for Docker

1. Ensure you have Docker installed on your machine. Please refer to the install manual for instructions.
2. Ensure Docker Engine is running (start the Docker Desktop app).
3. Have the Project cloned to your machine from GitHub

## Dockerfile Explanation

The Dockerfile is a script used by Docker to automate the building of container images. Here's a breakdown of the provided Dockerfile:

### Base Image

FROM maven:3.8.4-openjdk-17

This line specifies that the base image for this container will be the official Maven image with Java 17. This means that the container will have both Maven and Java pre-installed.

### Working Directory

WORKDIR /OnlineAuction

This sets the working directory inside the container to /OnlineAuction.

### Copying Project Files

COPY pom.xml .

COPY src ./src

These lines copy the pom.xml (Maven project file) and the src directory (source code) into the container's working directory.

### Build Project

RUN mvn clean install -DskipTests

This runs the Maven command to clean any previous builds, install the project dependencies, and compile the source code. Tests are skipped in this process.

### Expose Port

EXPOSE 8080

This exposes port 8080 from the container, which is the default port for Spring Boot applications.

### Run Command

EXPOSE 8080

This is the command that will be executed when the container starts. It runs the Spring Boot application.

## Docker Compose Explanation

Docker Compose is a tool for defining and running multi-container Docker applications. The provided docker-compose.yml file defines the services, networks, and volumes for the Online Auction project.

### Services

#### app

This service represents the main application. It depends on the mysql service, builds the image using the provided Dockerfile, maps port 6868 on the host to port 8080 on the container, and sets various environment variables for Spring Boot configuration.

The volumes directive is used to mount the Maven local repository from the host to the container, ensuring that dependencies are cached and reused between builds.

The stdin\_open and tty options are set to true, allowing you to interact with the app service as if it were running in the foreground.

#### mysql

This service uses the official MySQL 8.0 image. It sets the root password and initializes a database named online-auction. The import.sql file from the project is copied to the container's initialization directory, ensuring that the database schema and initial data are loaded when the container starts.

The volumes directive is used to persist the MySQL data on the host machine, ensuring that data is not lost when the container is stopped or removed.

### Volumes

volumes:

online-auction-db:

This defines a named volume online-auction-db which is used to persist the MySQL database data.

### Compose

To build and start the services defined in the docker-compose.yml file, use the following command:

docker-compose up --build

Once the services are up and running, you can access the Online Auction application by navigating to:

http://localhost:6868

To stop the running services, press CTRL+C in the terminal where docker-compose up is running. Alternatively, you can run the following command in another terminal:

docker-compose down

# Dynamic SQL Import in SpringBoot

Spring Boot offers a simple way to initialize your database on startup through the import.sql file. By placing an import.sql file in the src/main/resources directory, Spring Boot will execute it on startup if Hibernate is used as the JPA implementation.

## Steps to Use Dynamic SQL Import

### 1. Create import.sql

Firstly, we the place import.sql file inside the src/main/resources directory of our Spring Boot application. The import.sql is generated by exporting the current database using MySQL Workbench.

### 2. Confirm SQL Statements

### 3. Handle Foreign Key Constraints

When working with relational databases, especially those having foreign key relationships, the order of insertion matters. If you are certain about the integrity of the data being imported, you can temporarily disable foreign key checks to ease the import process. There are free reasons we do this:

* Bulk Insertion Order: By disabling checks, you are free to order your inserts in any way without worrying about reference integrity.
* Performance: Bulk insertions can be faster without the overhead of checking foreign key constraints.
* Data Integrity Assurance: If you're sure of the integrity of your data, i.e., the data being imported maintains referential integrity by itself, then disabling checks will not lead to integrity problems.

To disable/enable foreign key checks in MySQL:

SET foreign\_key\_checks = 0;

-- Your SQL INSERT statements go here

SET foreign\_key\_checks = 1;

### 4. Configuration

Spring Boot with Hibernate will pick up and execute import.sql on startup. However, we need to specify the property of Hibernate to create.

spring.jpa.hibernate.ddl-auto=create

Using these steps allows use to import the initial requirements of our database upon starting up the application.

# Category Tree & Attribute Recommendation System

## Category Tree

The Category Tree is a hierarchical representation of product or item classifications, where each category can have multiple subcategories. These categories help organize products or items in a structured manner, making it easier for users to navigate and locate specific items.

A screenshot of a computer screen

Description automatically generated

### Tree Structure

* *Root Category*: The top-level category that forms the base of the tree. This category doesn't have a parent.
* *Subcategory*: Categories that fall under the root or another subcategory. Each subcategory has a parent category to which it is directly associated.
* *Further Subdivisions*: Subcategories can further be divided into more granular categories, creating multiple layers in the hierarchy.
* *Category Stack*: This represents the breadcrumb trail of categories for a given subcategory or item. For example, for an item in the "SS111" sub-subcategory, its category stack might be "SS111 > S11 > R1", indicating it falls under "SS111", which is under "S11", which in turn is under the root "R1".

### Tree Features

* *Self-Join*: Categories have a parent-child relationship with themselves, allowing the creation of an n-level hierarchy.
* *Flexibility*: The tree can grow dynamically. As the inventory expands, more categories or subcategories can be added seamlessly.

### Data

* For this application, basic ecommerce data was downloaded from Google to populate our database with categories.
* Link: <https://support.google.com/merchants/answer/6324436?hl=en-GB>

## Attribute Recommendation System

In addition to the Category Tree, the platform also incorporates an Attribute Recommendation System. This system suggests attributes that are pertinent to specific categories, helping users define and refine their product descriptions.

### Recommendation Structure

* *Attribute*: Represents a specific characteristic or property of an item. For instance, the attribute could be "Color" for clothing, or "Storage Capacity" for electronic devices.
* *Attribute Recommendation*: Associates an attribute with a category. Each association also carries a recommendation level, indicating its relevance or importance.

### Recommendation Features

* *Relevance Score*: Each attribute associated with a category has a recommendation level. The higher the score, the more relevant the attribute is deemed to be for that category.
* *Dynamic Recommendations*: As products are added or removed, and as the market evolves, the recommendation levels for attributes can change, ensuring the system remains relevant and timely. Whenever a user uses a recommendation, the score associated with that attribute increases. Whenever they remove and attribute that was recommended, the score decreases.
* *Top Recommendations*: For any category, it's possible to retrieve the most recommended attributes, allowing users to quickly see the most relevant characteristics for products within that category. These recommendations can also be fetched from higher up the Category Stack.

## Integration

The Category Tree and Attribute Recommendation System work hand in hand. When a product is classified under a category, the Attribute Recommendation System can provide the most relevant attributes for that category, guiding the user in detailing the product specifications efficiently.

# Session-based User Information Retrieval

## Overview:

In Spring-based applications, the Principal interface represents the current authenticated user. It provides a mechanism to verify authentication and access user-specific details.

A screenshot of a computer program

Description automatically generated

## Key Concepts:

### Principal:

* Represents the authenticated user in Spring.
* Used to check if a user is authenticated and fetch their details, e.g., principal.getName().

### Custom Exception for Unauthenticated Users:

* UnauthenticatedUserException is thrown when principal is null, indicating a lack of authentication.

### Global Exception Handling:

* PrincipalControllerAdvice uses @ControllerAdvice to handle exceptions globally.
* The method handleUnauthenticated redirects unauthenticated users to the login page when the custom exception is thrown.

### Usage in Controller:

* Within controllers in the project, Principal checks user authentication. If null, the custom exception is thrown.
* If authenticated, the user's details are retrieved using principal.getName().

## Takeaway:

Principal is a crucial tool in Spring for verifying user authentication and accessing user data. Proper handling, such as redirecting unauthenticated users, ensures secure and effective application functionality.

# Shipment Tracking with Shippo

Integrating Shippo into the system significantly enhanced shipment tracking capabilities. Shippo provides a seamless API that can be utilized to fetch real-time tracking information from various carriers. This integration provides users with accurate and timely updates regarding their shipments.

## Prerequisites

* A valid Shippo API key
* Shippo API dependency in pom.xml file:

<dependency>

<groupId>com.goshippo</groupId>

<artifactId>shippo-java-client</artifactId>

<version>3.2.0</version> <!-- Use the latest version -->

</dependency>

## Integration Steps

### 1. API Key Configuration

A Shippo API key is obtained and configured within the system, stored as a variable in application.properties.

shippo.api.key=shippo\_live\_key\_1234

### 2. Creating Shipment Tracking Service

A service class named ShippoTrackingService is established to manage interactions with the Shippo API. Within this class, the getTrackingInformation method is crafted to fetch tracking information.

@Service

public class ShippoTrackingService {

public TrackDTO getTrackInformation(String carrier, String trackingNum){

Shippo.setApiKey(shippoApiKey);

// ... rest of the code

}

// ... rest of the code

}

### 3. Handling Exceptions

Exception handling is implemented to catch and manage any ShippoException that may arise during interactions with the Shippo API. Encountered ShippoException is wrapped in a RuntimeException.

catch (ShippoException e) {

throw new RuntimeException("Failed to get tracking information", e);

}

### 4. Mapping Shippo Responses to DTOs

The response obtained from Shippo is mapped to Data Transfer Objects (DTOs) to facilitate its utilization within the application. Methods are created to map Track, Track.Address, and Track.TrackingEvent objects to their corresponding DTOs.

private TrackDTO mapTrackToTrackDTO(Track track) {

// ... code to map track to TrackDTO

}

// ... rest of the mapping methods

### 5. Creating a Controller

A controller class named TrackingController is created to handle HTTP requests for tracking information. The ShippoTrackingService is utilized to fetch and return tracking information based on a transaction ID.

@RestController

@RequestMapping("/api/tracking")

public class TrackingController {

@Autowired

private ShippoTrackingService shippoTrackingService;

// ... rest of the code

}

### 6. Fetching and Displaying Tracking Information

The /api/tracking/{transId} endpoint is devised to fetch and display tracking information for a particular transaction. It's ensured that the transaction exists and possesses valid tracking information before proceeding.

@GetMapping("/{transId}")

@ResponseBody

public TrackDTO getTrackingInformation(@PathVariable("transId") long transId) {

// ... rest of the code

}

### 7. Testing Shippo with Synthetic Tracking Information

The Shippo API can be tested with synthetic data. This will return a fake tracking status and updates that you can work with.

**Synthetic Tracking Data:**

* Tracking Number: SHIPPO\_TRANSIT
* carrier: shippo

**Upload tracking UI:**  
A screenshot of a shipping box

Description automatically generated

**Synthetic return data:**

A screenshot of a computer

Description automatically generated

# Spring Profiles

The system is configured to utilize Spring Profiles to manage environment-specific configurations seamlessly. By leveraging Spring Profiles, the project can easily switch between different configurations based on the environment it is running in, namely development (dev) or production (prod).

# Set profile to dev or prod

spring.profiles.active=dev

## Configuration Setup:

### Default Profile Setting

Within the resources folder, the application.properties file is configured to allow users to define a default active Spring profile.

### Profile-Specific Configuration Files:

Under the profiles folder, two properties files are created for each environment: application-dev.properties for development and application-prod.properties for production.

### Profile Configuration Example:

Here's an example of what the application-prod.properties file looks like:

spring.datasource.data=classpath:prod-data.sql

spring.jpa.hibernate.ddl-auto=update

## Profile Activation and Usage:

### Profile Activation:

The active profile is determined by the spring.profiles.active property set in the application.properties file. Setting this property to dev or prod activates the corresponding profile and loads the settings from application-dev.properties or application-prod.properties respectively.

### Configuration Loading:

When the system starts up, it reads the spring.profiles.active property to determine the active profile. It then loads the configurations from the corresponding profile-specific properties file located in the profiles folder.

### Database Configuration:

In the provided example for prod, the spring.datasource.data property is set to point to a SQL script file (prod-data.sql) which contains the data to be loaded into the database. Additionally, the spring.jpa.hibernate.ddl-auto property is configured to update, allowing Hibernate to update the database schema whenever necessary.

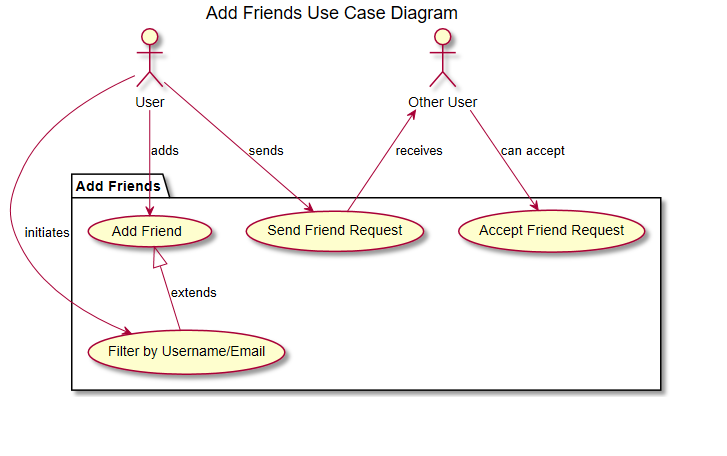
# Diagrams

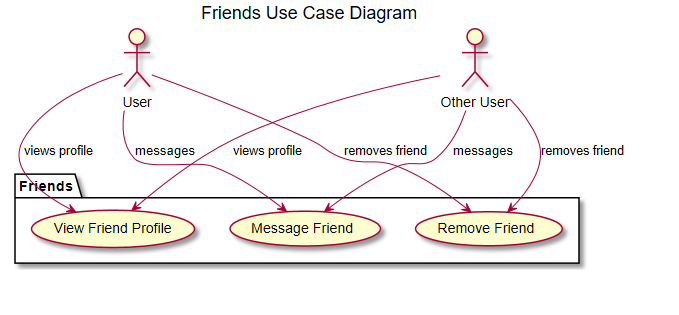
In this section, we delve into the pivotal role of diagrams in software engineering. Diagrams are not just mere representations but powerful tools that encapsulate complex concepts, processes, and structures within a software system. They serve as a universal language, bridging the gap between technical and non-technical stakeholders, and are essential for effective planning, design, and communication in software development.

## Use Case:

Use case diagrams are instrumental in illustrating the interactions between users (actors) and systems. They capture the functional requirements of a system, highlighting the various ways different users interact with it. These diagrams are crucial in understanding and communicating the intended functionality of the system to clients, developers, and other stakeholders.

### Diagram Images:



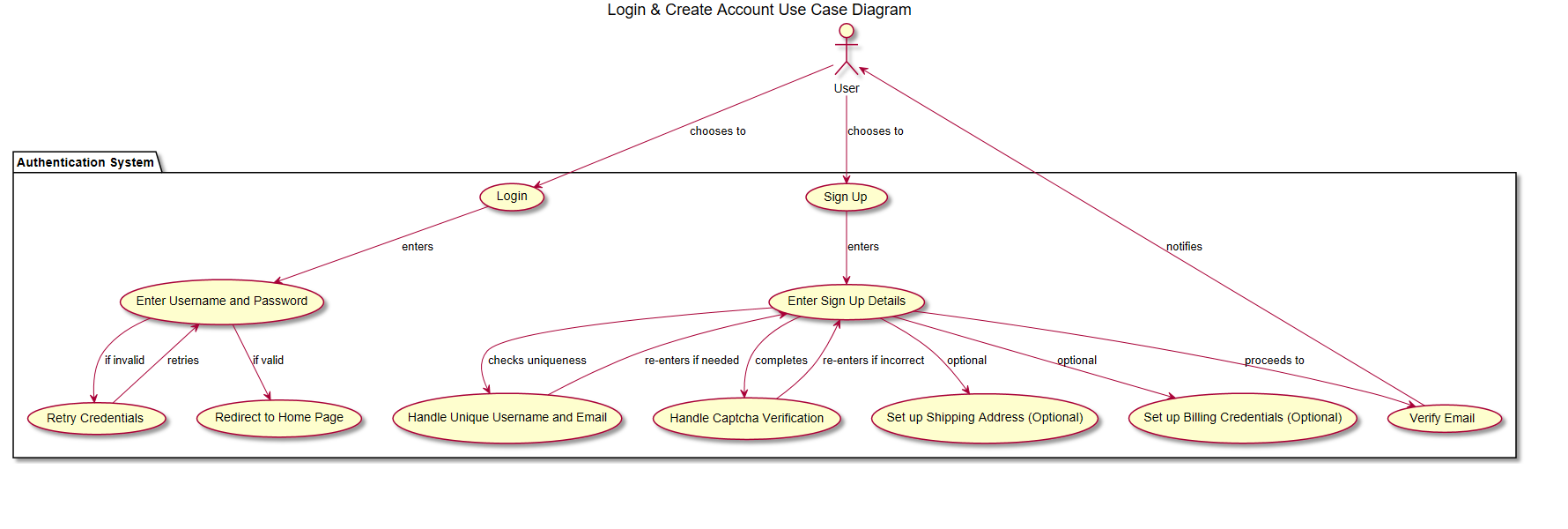


A diagram of a process

Description automatically generated

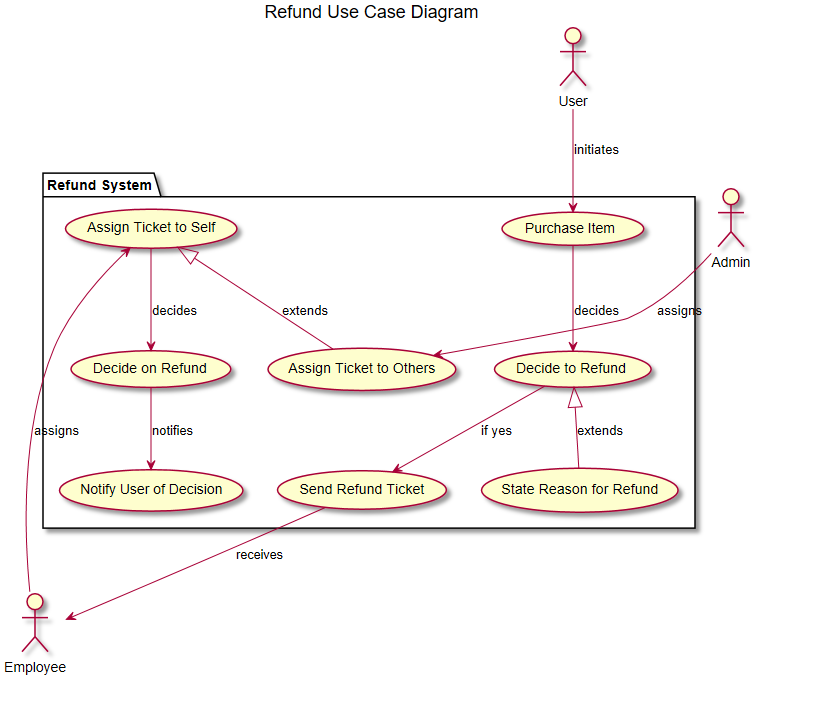
A diagram of a diagram

Description automatically generated



A close-up of a white background

Description automatically generated



A diagram of a diagram

Description automatically generated

A diagram of a view legs use case diagram

Description automatically generated

A close-up of a diagram

Description automatically generated

## Class:

Class diagrams are a staple in object-oriented modeling, offering a static view of the system. They depict the structure of the system by showing classes, their attributes, operations (methods), and the relationships among them. Class diagrams are fundamental for software architects and developers in designing and understanding the system's architecture.

### Diagram Images:

A screenshot of a computer

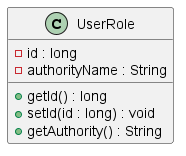
Description automatically generated

A screenshot of a computer

Description automatically generated

A screenshot of a computer

Description automatically generated



A screenshot of a computer

Description automatically generated

A screenshot of a message

Description automatically generated

A screenshot of a computer

Description automatically generated

A screenshot of a computer

Description automatically generated

**A screenshot of a computer

Description automatically generated**

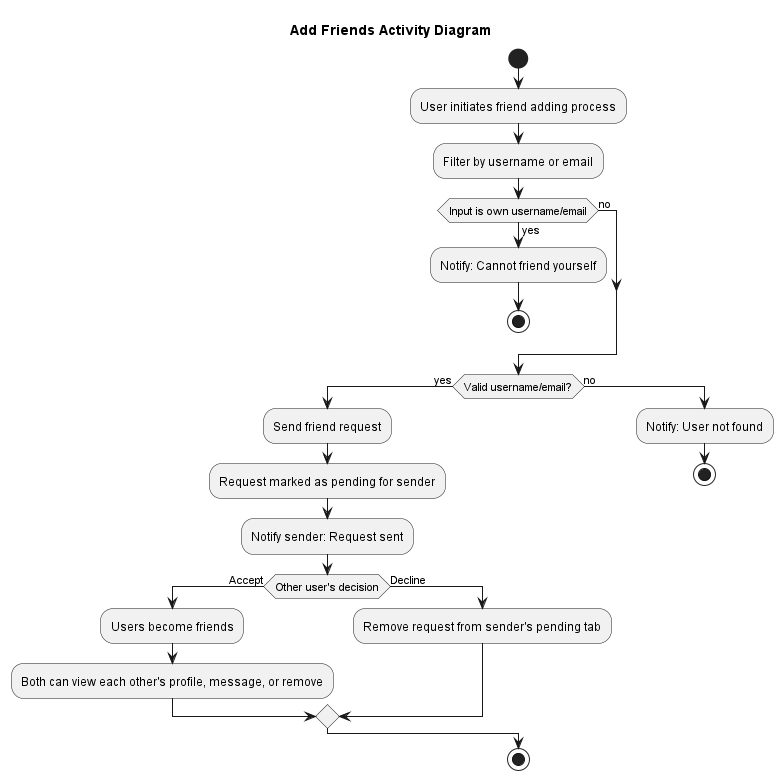
**A screenshot of a computer

Description automatically generated**

## Activity:

Activity diagrams are dynamic modeling tools used to depict workflows and processes in a system. They illustrate the sequence of activities and the flow of control from one activity to another, making them invaluable for understanding and designing complex business processes and system functions.

### Diagram Images:

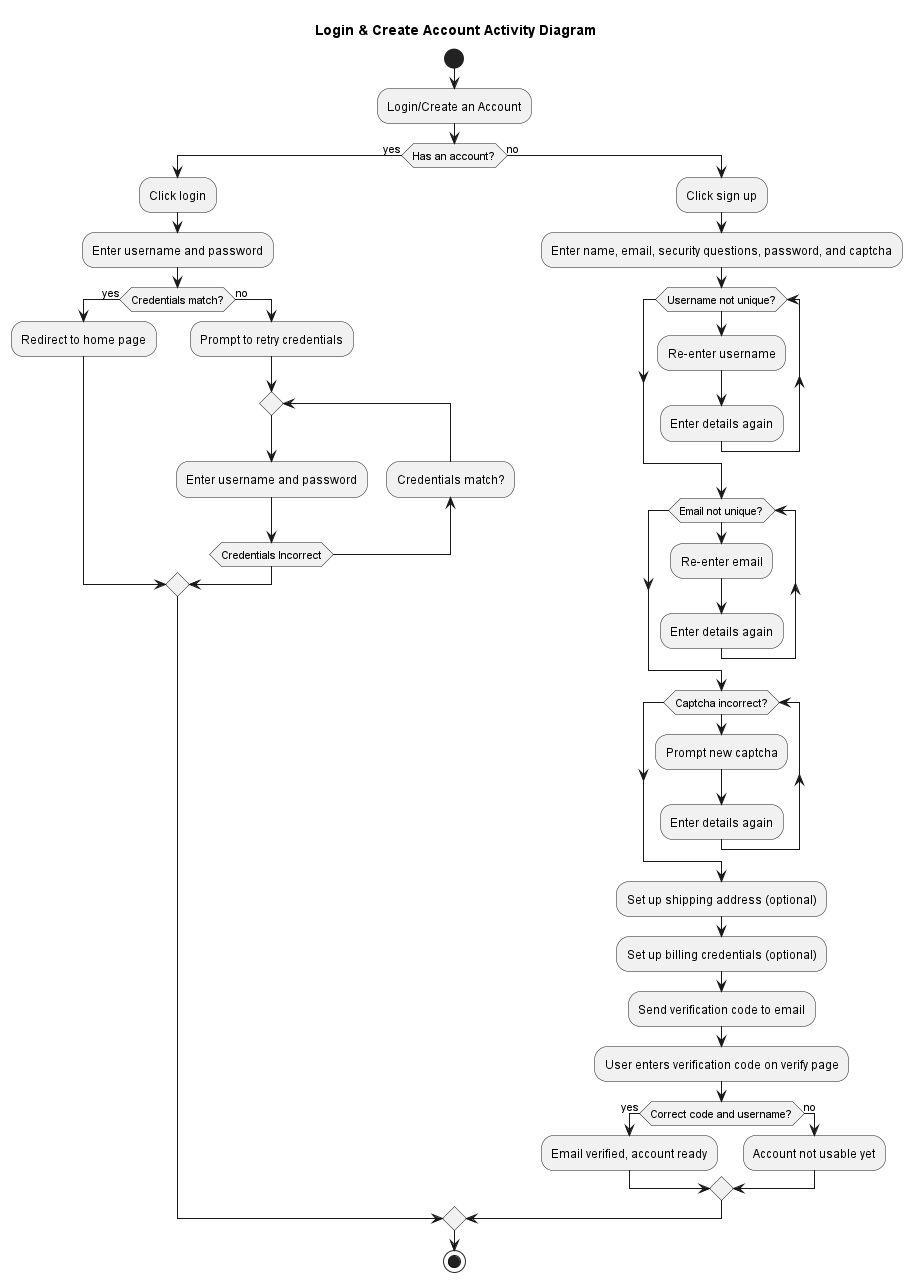


A diagram of a bid

Description automatically generated

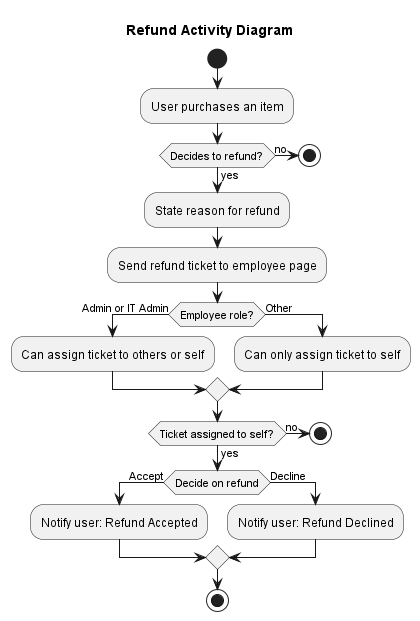
A diagram of a software process

Description automatically generated with medium confidence



A diagram of a process

Description automatically generated



A diagram of a process

Description automatically generated

A diagram of a process

Description automatically generated

A diagram of a watchlist activity

Description automatically generated

# Synopsis

**Requirements to Operate Software:**

Eclipse IDE for Enterprise Java and Web Developers – 2023 – 06.

MySQL Server – 8.0 or above.

MySQL Workbench – 8.0 or above.

MySQL Shell - 8.0 or above.

Operating System capable of running software above.

\*Reference the ‘Updated Install Manual’ within Program Documents for more details on the process of installing each product and the steps for first time setup.

After setup, the program can be run by right clicking the ‘sellingwidgets’ folder within eclipse and selecting RunAs -> Springboot Application.

Upon initialization of the program, the user is brought to the index page where there are a variety of options including ‘login,’ ‘signup,’ ‘browse,’ ‘motto,’ ‘FAQ,’ and ‘contact us.’

The software contains to accounts in which are utilized for testing, they include:

**Regular User Account:**

Username: userName

Password: testPass

**Administrative User Account:**

Username: useradminwidget

Password: useradmin

\*Each of the functions within the program are described in detail as well as the operations in which they can perform. Reference the ‘User Manual’ within Program Documents.