

**SINGAPORE POLYTECHNIC
SCHOOL OF ELECTRICAL & ELECTRONIC
ENGINEERING**

(ET0706) Object Oriented Programming

Project Title: Seamless Logistic Transport

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Project Overview

This Project endeavors to develop a JavaFX Application tailored to the needs of a logistics transportation company, mainly focused on land transportation companies.

The application establishes a user-friendly interface for administrative work and simple tasks related to their role in the company.

By incorporating a robust database system, data and information is seamlessly stored and facilitates execution of CRUD (Create Read Update Delete) operations.

Additionally, through the incorporation of an API, the program furnishes comprehensive travel details such as distance, duration, fuel consumption and fuel combustion.

System Requirements

The application is set up in IntelliJ IDEA 2022.3.2 (Community Edition).

It preferably requires:

- OpenJDK version 19.0.2
- JFoenix version 8.0.10
- MongoDB version 4.10.0 (Also requires connection to authorized wifi)
- JSON version 20210307
- API key from Google Cloud Services (Place Auto Fill & Distance Matrix)

Key Features

Streamlined Parcel Management System

This application provides a user-friendly interface for coordinators to effortlessly input parcel details and assign tasks to haulers. This efficient process ensures smooth logistics management within the delivery company.

Hassle-Free Employee Management

Administrators can conveniently add new employees to the system, facilitating seamless onboarding and maintaining an up-to-date employee database.

Integrated Database Functionality

Incorporates a robust database system, ensuring secure storage and retrieval of critical information related to parcels, employees, and task assignments.

Integration with Google API

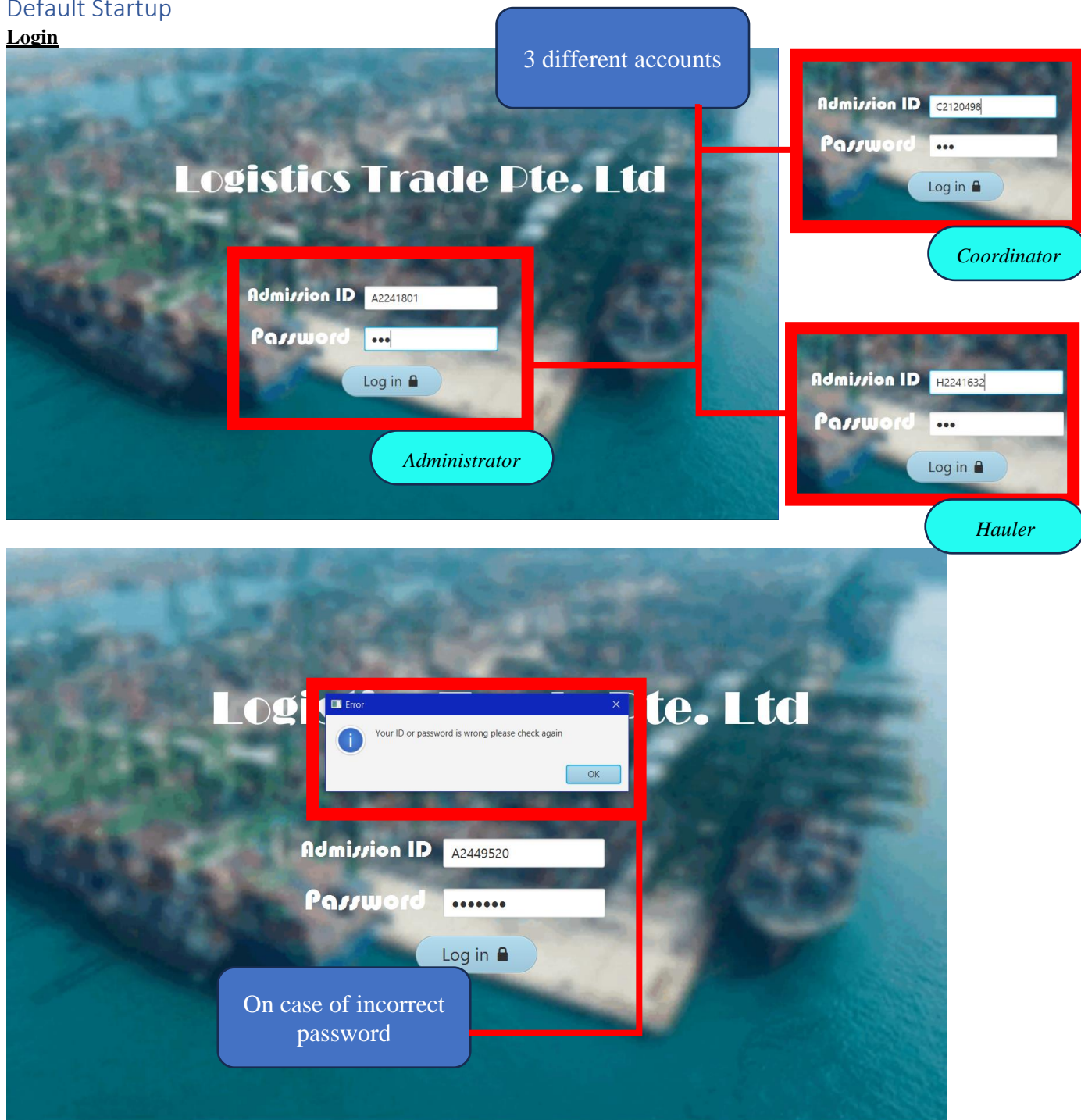
By utilizing a Google API key, the application enables automated address autofill and provides accurate duration calculations for specific locations enhancing efficiency and accuracy in delivery planning.

Together, these compelling features make the JavaFX application an indispensable tool for the logistic delivery company, streamlining operations, enhancing communication, and optimizing overall efficiency.

Front-End User Interface Design

Default Startup

Login



Home


Home

Manage Employees

View Employees

View Logistics

Log Out



Administrator
Abby Bisket


Home

Manage Trades

Assign Tasks

View Logistics

Log Out




Coordinator
Ashi Mathy

Home

My Tasks

Distance Calculator

Log Out



Hauler
Teelooran Lawi

Manage Employees

View Employees

View Logistics

Please click on the stars to
navigate to respective pages

Manage Trades

Assign Tasks

View Logistics

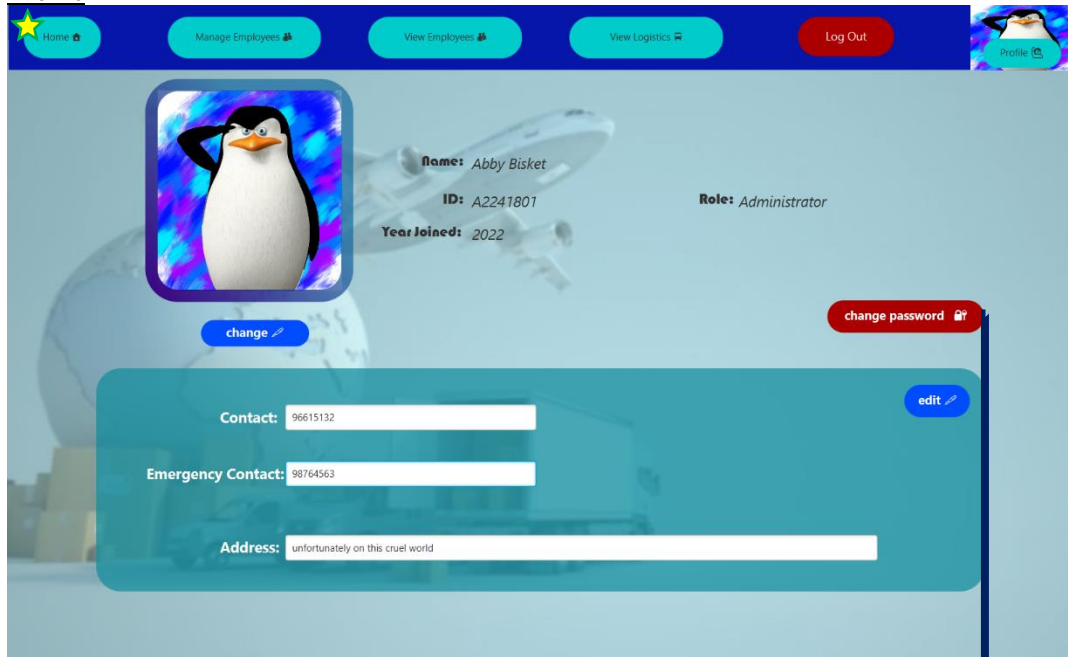
Please click on the stars to
navigate to respective pages

My Tasks

Distance Calculator

Please click on the stars to
navigate to respective pages

Profile



The profile page features a dark blue navigation bar with buttons for Home, Manage Employees, View Employees, View Logistics, and Log Out. A user profile card on the left shows a penguin avatar, name (Abby Bisket), ID (A2241801), role (Administrator), and year joined (2022). A 'change' button is below the card. A red 'change password' button with a lock icon is on the right. Below these is a teal form with fields for Contact (96615132), Emergency Contact (98764563), and Address (unfortunately on this cruel world), each with an 'edit' button.

Home Manage Employees View Employees View Logistics Log Out Profile

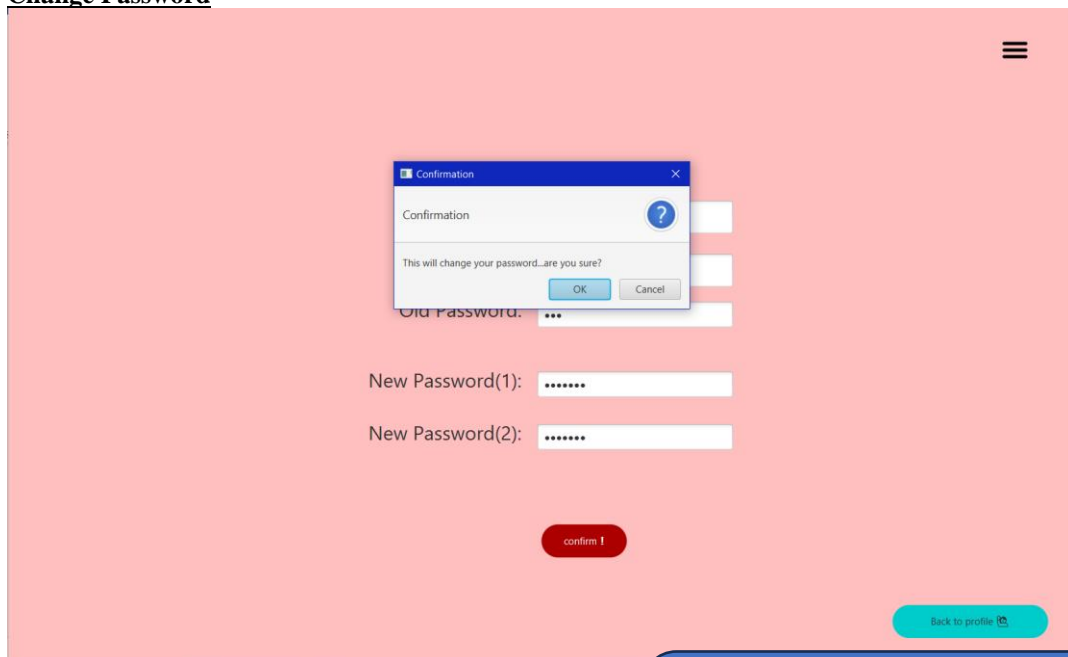
Name: Abby Bisket
ID: A2241801
Role: Administrator
Year joined: 2022

change

change password

Contact: 96615132 edit
Emergency Contact: 98764563
Address: unfortunately on this cruel world edit

Change Password



The change password page has a pink background and a hamburger menu icon in the top right. It contains a 'Confirmation' dialog box asking for confirmation to change the password. Below the dialog are input fields for Old Password, New Password(1), and New Password(2), all masked with dots. A red 'confirm !' button and a teal 'Back to profile' button are at the bottom.

Confirmation

Confirmation

This will change your password...are you sure?

OK Cancel

Old Password: ...

New Password(1):
New Password(2):

confirm !

Back to profile

Before allowing user to enter password...

- there'll be credentials check,
- ensures password is correctly typed
- asks user for confirmation before officially changing

Administrator Site

Manage Employees

Home Manage Employees View Employees Log Out Profile

Arrange by Name Arrange by ID

To view the list in alphabetical order or by ID

ID	Name	Role	Year	Tel
A2241801	Abby Bisket	Administrator	2022	96615132
C2120498	Ashi Matthy	Coordinator	2021	93836659
H2146720	Cornel Jackson	Haulier	2021	98762354
C2271772	Hailey Joseph	Coordinator	2022	90456732
C2230516	Howard Theory	Coordinator	2022	97824561
H2138274	Jake Minestone	Haulier	2021	87563402
H2012503	Lobel Petrez	Haulier	2020	87654903
H2220196	Lucas Dumphy	Haulier	2022	90234965
C2092142	Ming Yee	Coordinator	2020	98761032
H2241632	Teelooran Lawi	Haulier	2022	92950473

Employee Registration Page

Year: 20-- role: --

Name: Name clear

Phone No: tel

Add update delete

Create Read Update Delete (CRUD)

As admin adds an employee, it gets updated in the list. When admin clicks on an employee in the list, the information gets filled in the text fields. The admin can later update information or delete information

View Employees

Home Manage Employees View Employees View Logistics Log Out Profile

Employee ID: H2012503

Name: Lobel Petrez

Role: Haulier

Year Joined: 2020

Contact: 87654903

Emergency Contact: not stated

Address: not stated

To check for an employee, admin can search for them through their ID. Their profile picture and personal details will be displayed.

View Logistics

Home Manage Employees View Employees View Logistics Log Out Profile

Logistics Monitoring

Haulier ID	Pick Up	Drop Off	message	Status
H2241632	Yishun Avenue 2, Yishun MRT Station (NS13), Singapore	Jurong West Central 2, JurPoint Mediscare, Singapore		Not Done
	Woodlands Avenue 3, Marsiling MRT Station (NS8), Singapore	Bayfront Avenue, Marina Bay Sands Singapore, Singapore		Not Done
	Yishun Avenue 11, Yishun Park Hawker Centre, Singapore	Dover Road, Singapore		Not Done
H2241632	Geylang East Avenue 1, Geylang East Public Library, Singapore	Kuala Lumpur, Federal Territory of Kuala Lumpur, Malaysia		Not Done
H2012503	Ang Mo Kio Avenue 8, Ang Mo Kio MRT Station (NS16), Singapore	PSA Terminal 2, Singapore		Not Done
	Faridabad, Haryana, India	Pörschach am Wörthersee, Austria		Not Done
	Texas A&M University, Bizzell Street, College Station, TX, USA	Malang, Malang City, East Java, Indonesia		Not Done
	Switzer Falls Trail, Angeles Crest Highway, Tujunga, CA, USA	Dubai - United Arab Emirates		Not Done

This page is displayed to both Admin and Coordinators. This is an overview of all logistics.

Coordinator Site

Manage Trades

Implementation of API

CRUD operation is used here. The text fields have auto fill features so the user doesn't have to manually type all the locations

Assign Tasks

When the coordinator clicks on a trade on the right, it fills up the label as shown. The user can later select a hauler (in the dropdown list) to take on the task.

If the user wants to remove any, or update any, they are able to do so. This action will update both tasks accordingly

View Logistics

This page is displayed to both Admin and Coordinators. This is an overview of all logistics.

My Tasks

[illegible]

The hauler can view their tasks for the day. They are able to set the status of their task to let the coordinators updated of their progress.

Distance Calculator

Implementation of API

The hauler is able to check the distance and duration between 2 locations.

There is calculations done to provide approximate fuel used and fuel combustion for the respective trip

Back-End

The application has 2 super classes, 2 domain classes and 12 controller classes.

The super classes are:

- 1) Application

It incorporates functions to create a new pages, convert base64 strings to image formats, and pop open alert boxes. This class is integrated so that the features mentioned could be executed in a single line, enhancing code flow for the programmer.

- 2) ConnectionToMongoDB

This class is integrated so that connection to database is only needed to be done once. The class also has functions such as to read from specific column, add data and update data in certain collections. These functions are added so that executing these features can be done in a single line in the controller classes.

The domain classes are:

- 1) Employees

This domain class is accessed by 'EmployeesController' where an observable list of instances of this class is created. This domain class encapsulates variables that store employee information, facilitating not only additions on but also updates or deletions.

- 2) Trades

This domain class is accessed by 'Trades Controller', 'AssignTasksController' and 'ViewTradesOnlyController' and '*HaulerViewTasks*'. This domain class encapsulates information of logistic trades such as the '*haulerID*', '*pickUp*', '*dropOff*', '*message*' and lastly '*status*'. The 4 controller classes create an observable list of instances of this domain class.

The controller classes are:

- 1) EmployeesController
- 2) TradesController
- 3) AssignTasksController
- 4) ViewTradesOnlyController
- 5) HaulerViewTasks
- 6) DistanceCalculatorController

This controller accesses the place auto-fill API to ease typing in the text field by auto completing user sentences and the distance matrix API to provide distance and duration details.

- 7) LoginPageController

This class accesses the database to ensure if the user id and password typed by the user is correct to allow access to assigned page.

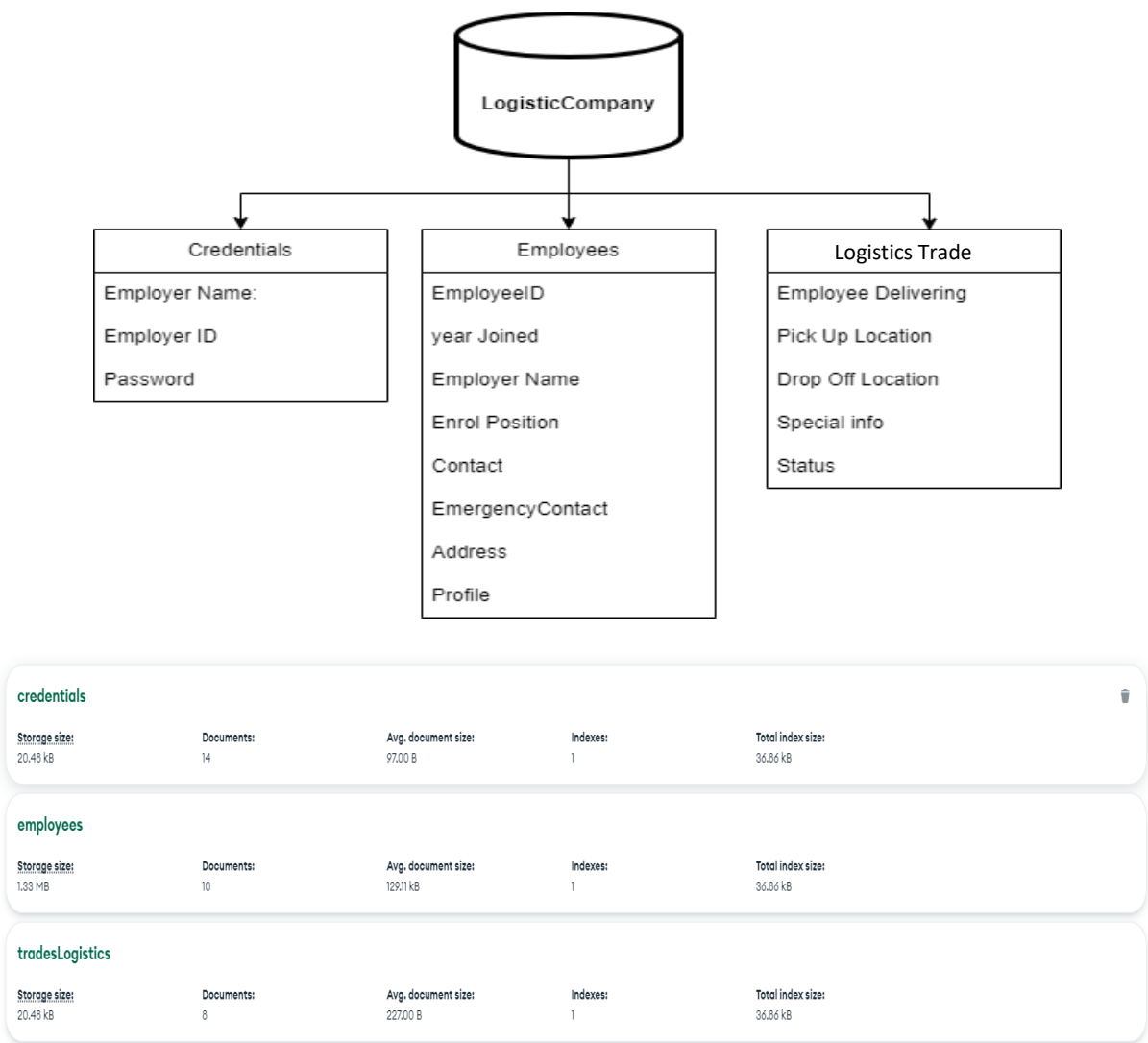
- 8) NavController

This class arranges the navigation bar according to the user. Options displayed and actions taken varies depending on the user. Hence this controller takes charge of these features.

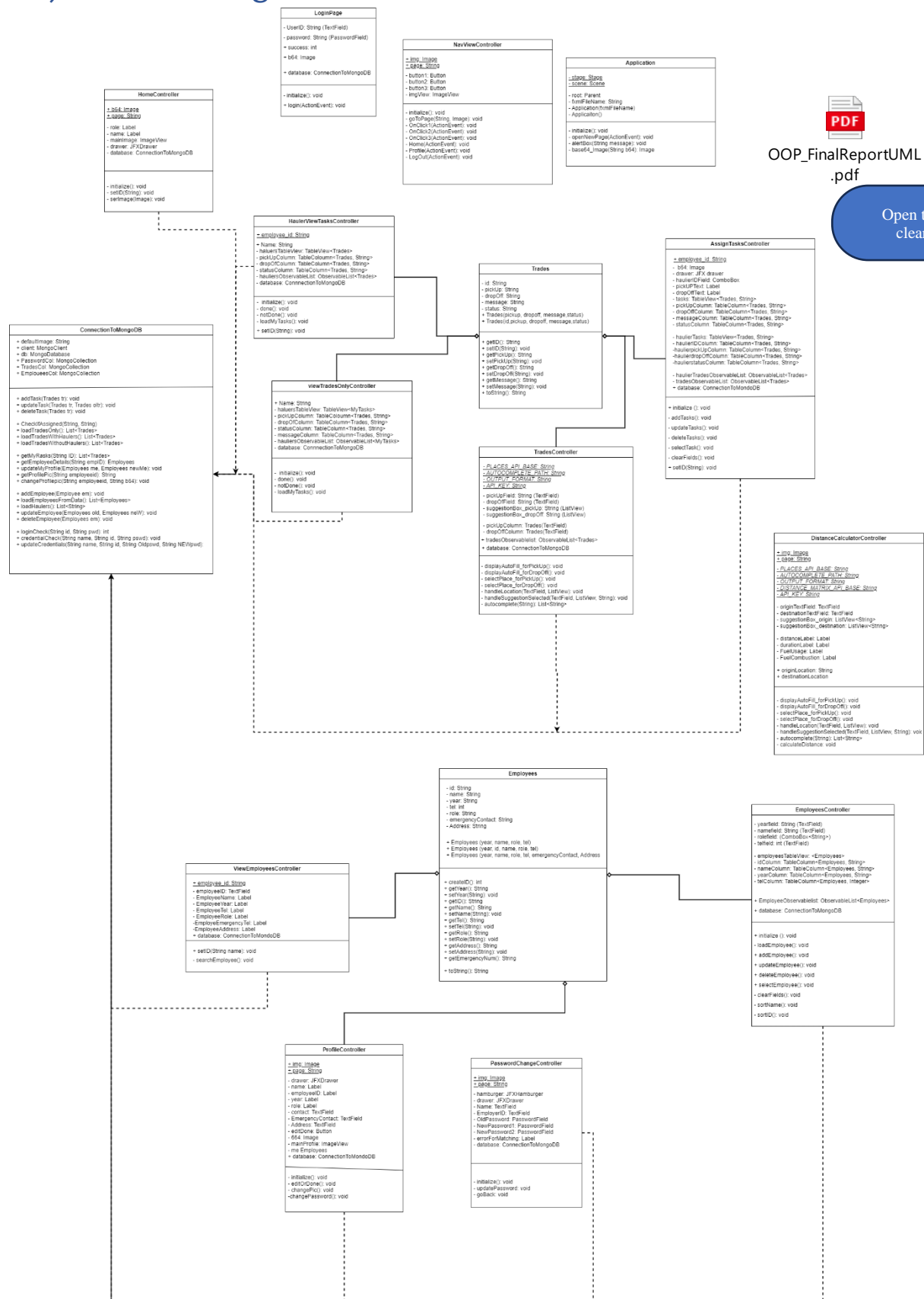
- 9) ProfileController

This class access the database to display personal information of the user. These information could also be edited.

Database architecture



Object Class Design



Conclusion

I was pleased to realize I managed to create all the features I mentioned in the concept paper and was also able to add additional features on the final project. Embarking on this project has been a profound learning experience that vividly demonstrated Object-Oriented Programming (OOP) concepts. By integrating a database and effectively implementing CRUD operations, I gained valuable insights into data management and persistence. Adding and understanding the distance matrix API and the Place auto-fill API not only showcased the power of API utilization but also enriched my experience. Creating this application honed my skills in creating a well organized and maintainable code. Overall, this endeavor underscored the significance of structured programming, efficient data handling, and strategic API integration, enhancing my proficiency as a developer and problem solver.

Resource

- Flowchart and Object Class Diagram
 - <https://app.diagrams.net/>
 - <https://www.youtube.com/watch?v=UI6lqHOVHic>
- MongoDB database
 - <https://www.baeldung.com/java-mongodb>
 - https://www.tutorialspoint.com/mongodb/mongodb_java.htm
- Google Distance Matrix API & Google Place Auto Fill API
 - <https://developers.google.com/maps/documentation/places/android-sdk/autocomplete-tutorial>
 - <https://console.cloud.google.com>
 - <https://youtu.be/dFhKVJcmADo>
- Basics of JavaFX
 - https://youtu.be/9XJicRt_FaI
- CSS
 - <https://youtu.be/o-lAsVuskKI>