

Final Report

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CEN 4.S1B

1 Role and objectives of the application. Application requirements.

The main role of the application is to manage the activity for a rail-transport company, both for the administrators and customers. The application has separate roles for administrators and customers with different features for each of them. The main objective of this application is to make it easier for the users to interact with the possible actions such as adding, deleting or editing a route or a train type (in case of administrators) or searching and buying a train ticket (in case of the customer) and overall to facilitate the selling of train tickets.

The functional requirements were presented in the last report and below I will give more details about the design of the application with the help of UML diagrams: activity diagrams and class diagrams. After that I gave a short description about the system architecture and database design that is followed by the presentation of the implemented functionalities with screen-shots of the app in progress, as it is not done yet.

As I chose to make everything as simple as possible, the app is very likely to be used by any kind of computer user. It is accessible to everyone, but you can only see the offers after creating an account. Even if it may seem to be an inconvenient, it is very simple to make one, so this may not be a problem for most of the possible users.

1.1 Functional Requirements

1.1.1 Client User:

1.1.1.1 Client User Registration

Description: Each user has to register before he is able to log-in and use the application.

Dependencies: None

1.1.1.2 Client User Log-in

Description: After the registration, the user is now able to log in into his account

Dependencies: Client User Registration

1.1.1.3 Client User Search

Description: After the log in the user is able to search for a ticket on the search page

Dependencies: Client User Log-in

1.1.1.4 Client User Buy

Description: After the client has searched for the ticket, he can buy the ticket buy click-ing on “buy” button. The client can buy a ticket for anyone as long as he completes the data needed.

Dependencies: Client User Search

1.1.1.5 Client User See Reservations

Description: After the log in, the client can go to see his reservations from the menu.

Dependencies: Client User Log-in

1.1.1.6 Client User Edit/Delete Account

Description: After the log in, the client can go on “Edit Account” page to change or delete his account.

Dependencies: Client User Log-in

1.1.1.7 Client User Log-out

Description: After the log-in, the user can log-out by click-ing on the “Log-out” button.

Dependencies: Client User Log-in.

1.1.2 Administrator User:

1.1.2.1 Administrator User Registration

Description: Each user has to register before he is able to log-in and use the application.

Dependencies: None

1.1.2.2 Administrator User Log-in

Description: After the registration, the user is now able to log in into his account.

Dependencies: Administrator User Registration

1.1.2.3 Administrator User Search

Description: The administrator user search is used to search for a specific route that needs to be edited or deleted, so that the administrator can find the route faster.

Dependencies: Administrator User Log-in

1.1.2.4 Administrator User Add Train Type

Description: After the log in, the user can add a train type by selecting this option from the menu.

Dependencies: Administrator User Log-in

1.1.2.5 Administrator User Add Train Route

Description: After the log in, the user can add a train route by selecting this option from the menu.

Dependencies: Administrator User Log-in

1.1.2.6 Administrator User See Existing Train Types

Description: After the log in, the user can see all train types by selecting this option from the menu.

Dependencies: Administrator User Log-in

1.1.2.7 Administrator User See Existing Train Routes

Description: After the log in, the user can see all train routes by selecting this option from the menu.

Dependencies: Administrator User Log-in

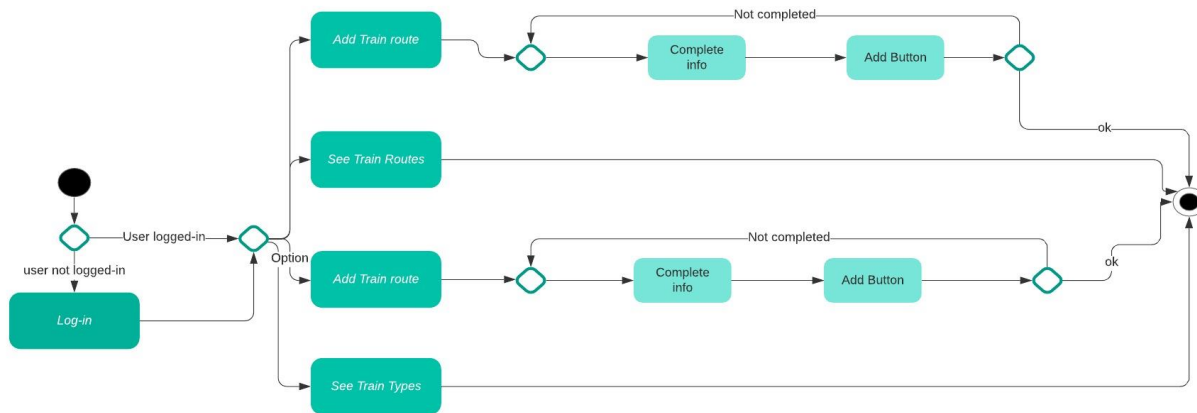
1.1.2.8 Administrator User Log-out

Description: After the log in, the user can log-out by click-ing on the “Log-out” button.

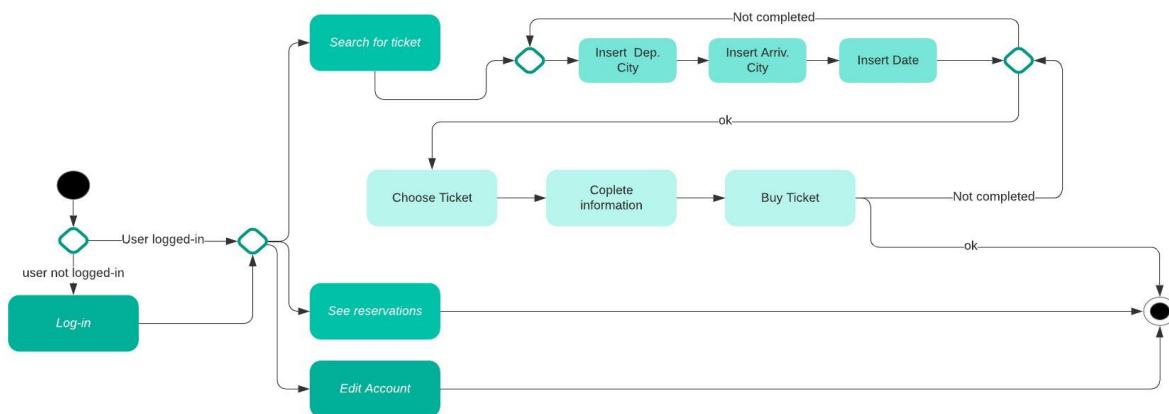
Dependencies: Administrator User Log-in

2 UML diagrams

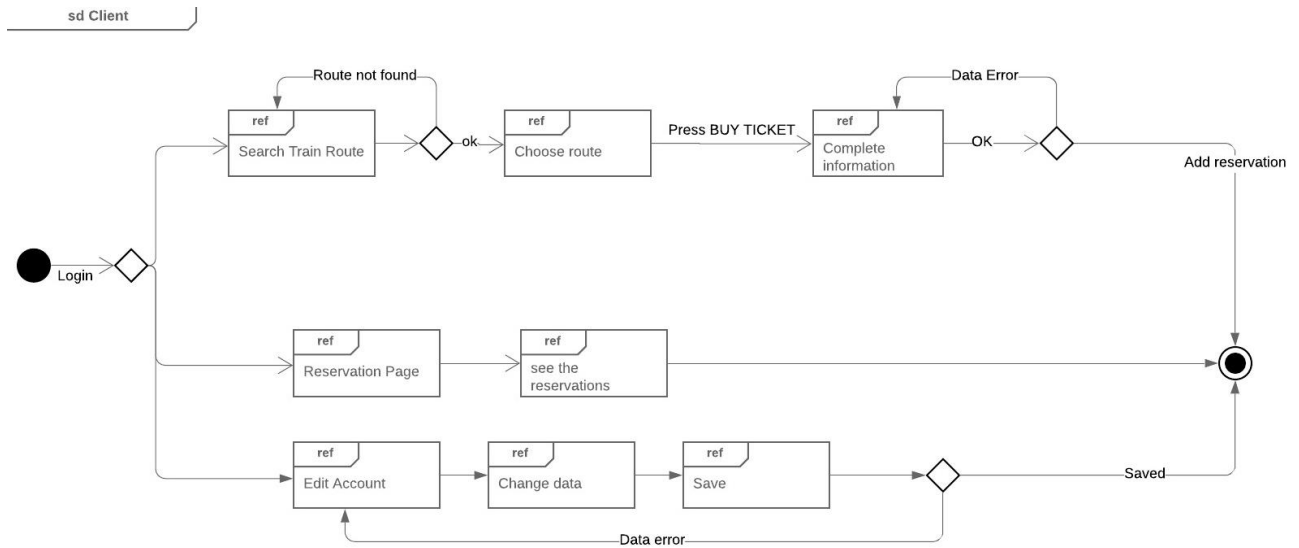
2.1 Activity



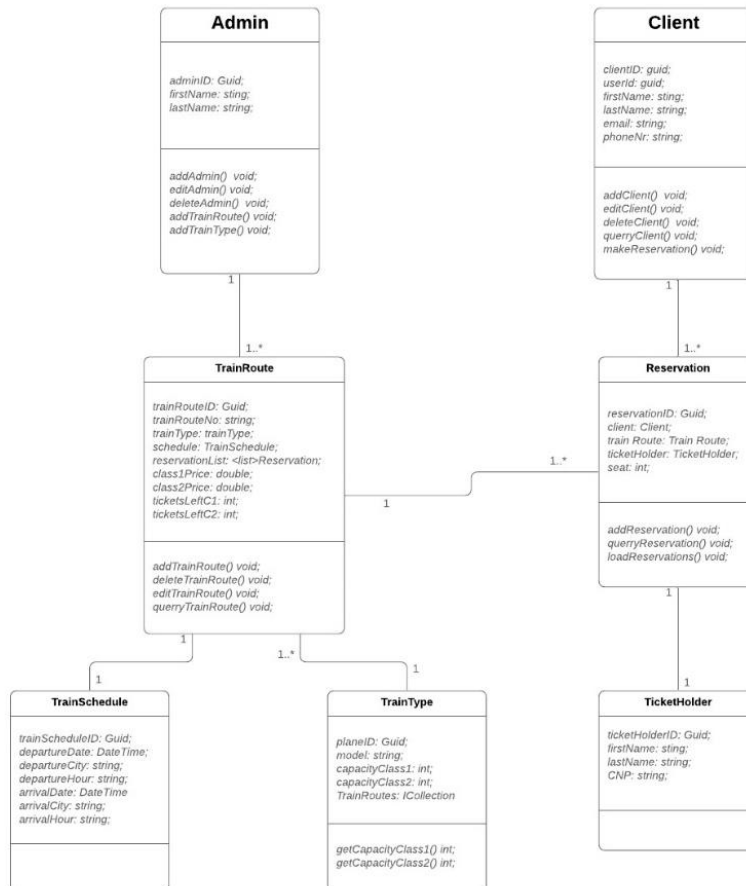
Activity diagram - Buy ticket process



2.2 Interaction Overview



2.3 Class diagram



3 System architecture and database

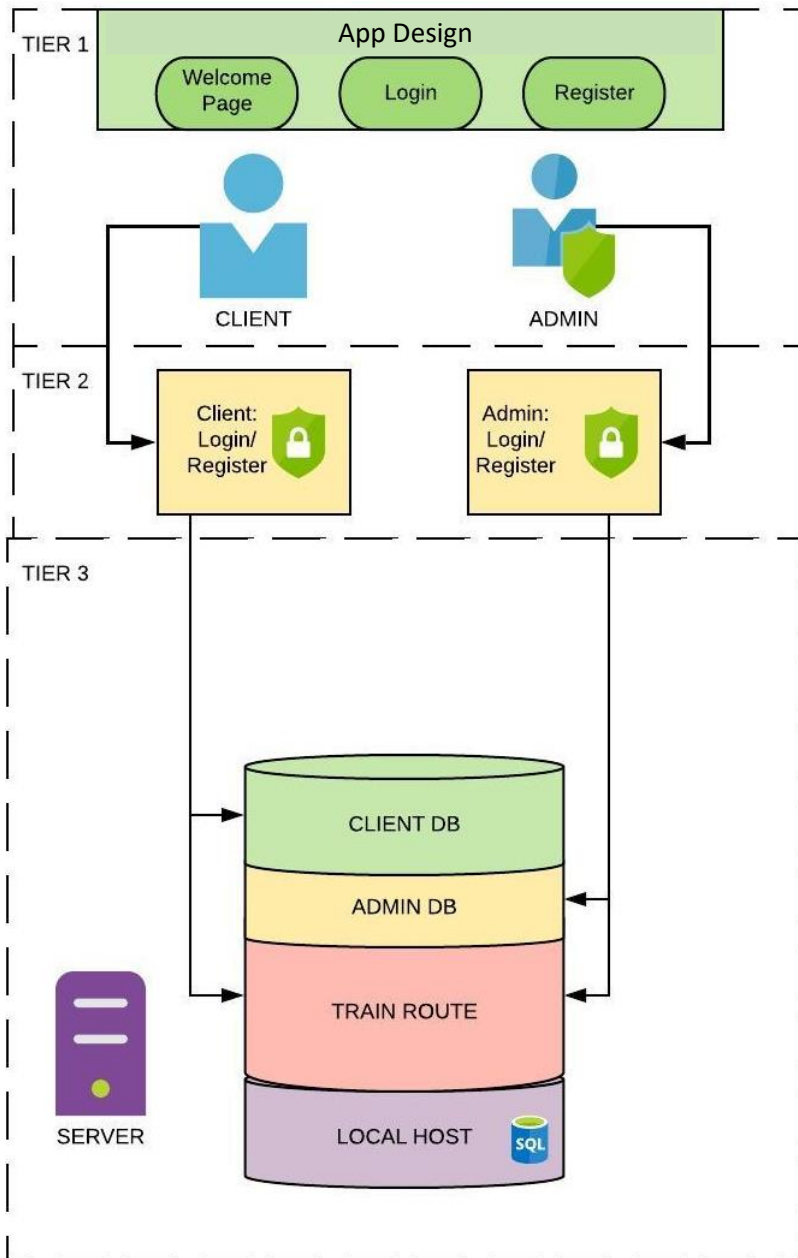
I have used for developing my application the MVC design pattern and repository pattern.

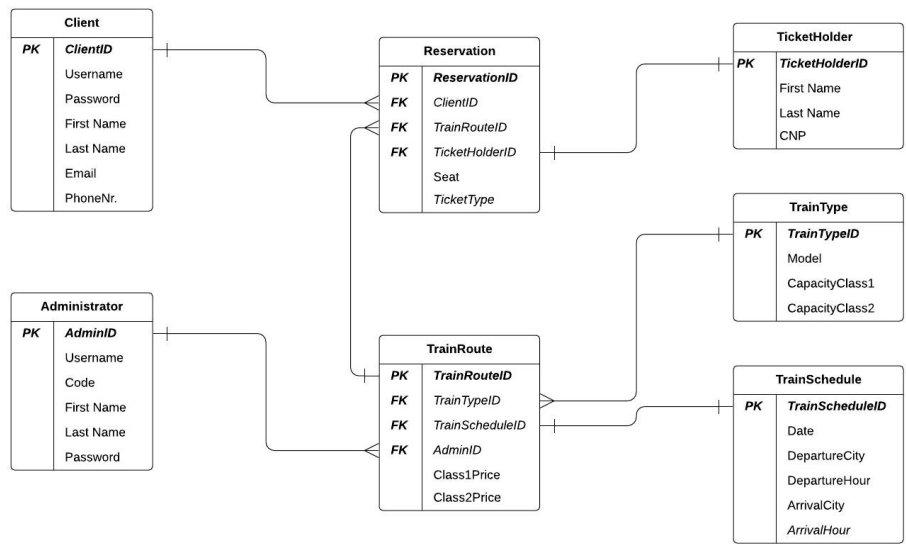
MVC is an architectural pattern that has 3 main components, model, view and controller. Each of these has a specific purpose in developing the app and their main purpose is to separate the business logic from the interface. This was done in an easier way by using entity framework, it also helped in linking the database to the app and managing the controllers. The business logic is found in services and in order to link it to the app I have used repository pattern, so that everything is well separated and does not affect other parts of the code.

The 3 main layers of the application are the interface, which makes it easier for the user to access the app and enjoy it, the business logic that uses the information received from the users through the interface and the server or database layer, linked to the business logic through repositories.

The database is updated or changed with the information received by the services through the interface, so it does not have direct link with the interface, only through services.

In the images below are the diagrams of the system architecture and the database with the needed links. For the minimal implementation I have used SQL server for the database and bootstrap with css and html for the interface.





4 Functionalities of the application

4.1 Welcome page

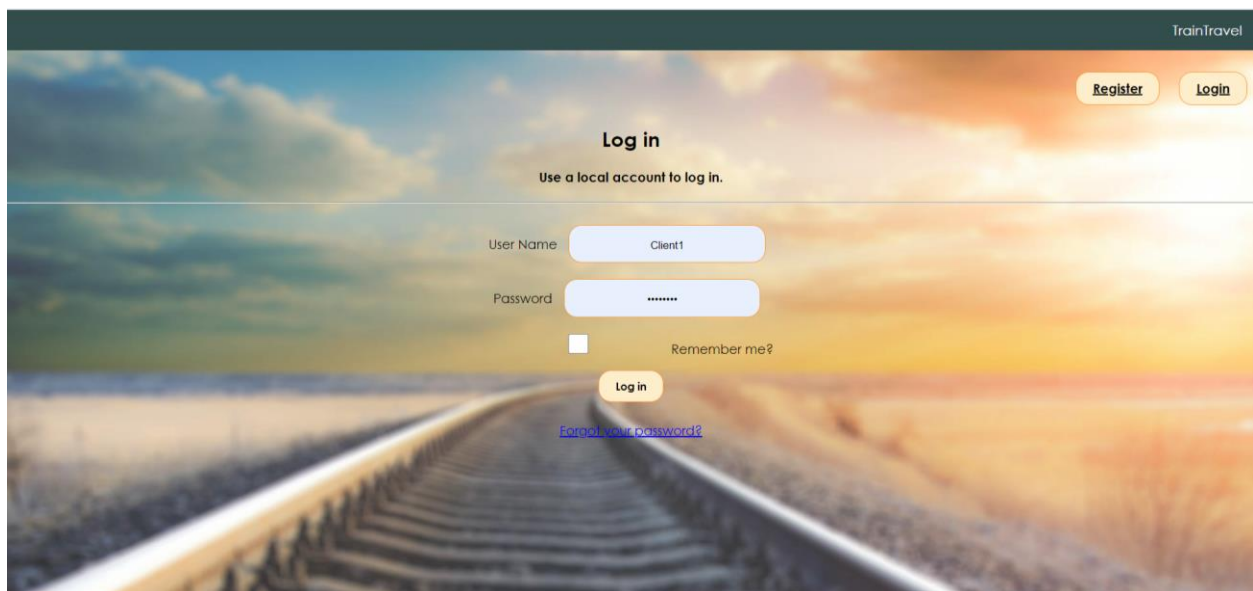
The first thing to be seen when accessing the website is the welcome page, from where you can log -in or register depending on your status. A brief introduction of the company and standards may be put here, as well as a logo or a picture of something linked to the company.



4.2 Login

The log-in page contains only the essentials, such as the username, password, remember me check-box, log-in button and a link in case you have forgotten your password. From this page you can also access the register button in case you want a new account.

After completing the fields, the user can press the login button to enter his account.

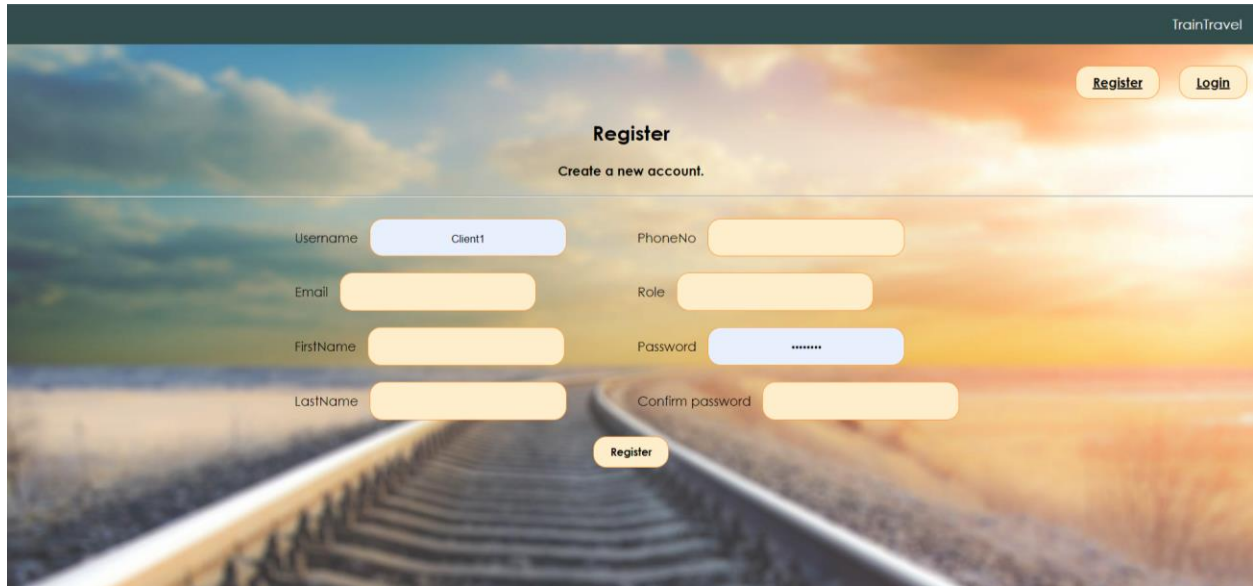


The screenshot shows the login interface for 'TrainTravel'. The page has a dark green header with the brand name 'TrainTravel' in the top right corner. Below the header is a large background image of train tracks receding into the distance under a sunset sky. In the top right corner of the main content area, there are two orange buttons: 'Register' and 'Login'. The main heading is 'Log in' in bold black text, followed by the instruction 'Use a local account to log in.' in a smaller font. Below this, there are two input fields: 'User Name' with the value 'Client1' and 'Password' with masked characters '*****'. To the right of the password field is a 'Remember me?' checkbox, which is currently unchecked. Below the input fields is an orange 'Log in' button. At the bottom of the form, there is a blue hyperlink that reads 'Forgot your password?'. The entire form is centered on the page.

4.3 Register

The register page contains the fields for the necessary information needed to create an account and also a choose file button for the profile picture and a field to select the role you want for your account.

From here you can also access the login page in case you remembered that you have an account.

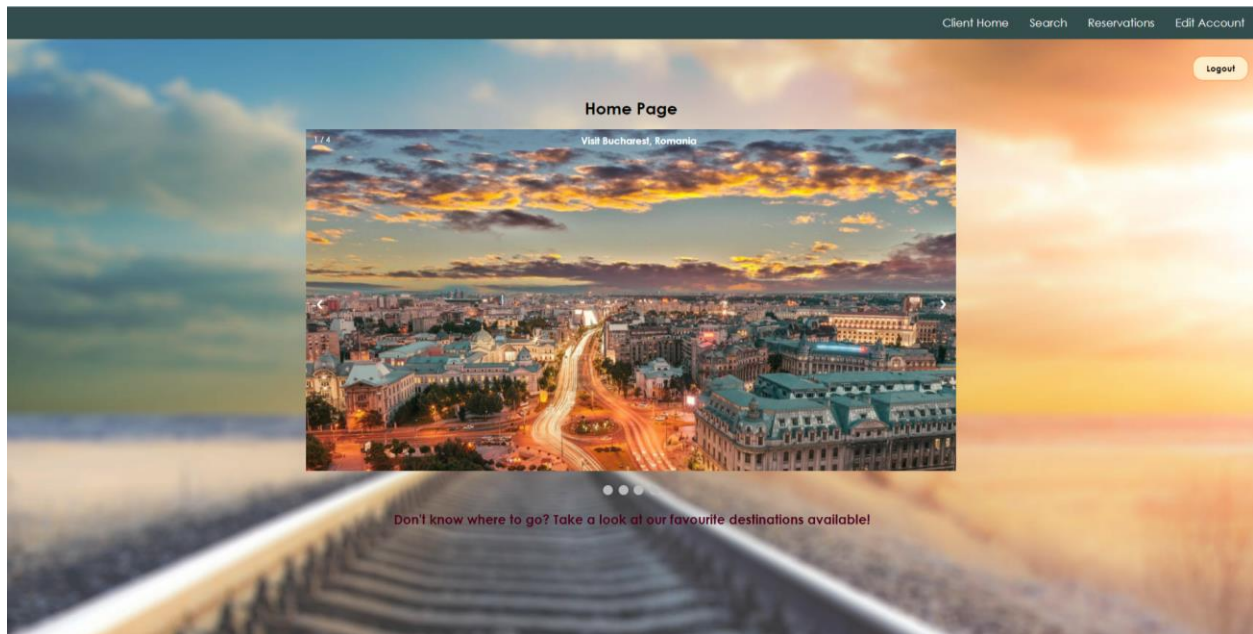


The screenshot shows the 'Register' page of the 'TrainTravel' application. The page has a dark green header with the 'TrainTravel' logo on the right. Below the header, there are two buttons: 'Register' and 'Login'. The main heading is 'Register' with the subtext 'Create a new account.' The form contains the following fields: 'Username' (with the value 'Client1'), 'PhoneNo', 'Email', 'Role', 'FirstName', 'Password' (with masked characters '*****'), 'LastName', and 'Confirm password'. A 'Register' button is located at the bottom of the form. The background of the page is a scenic image of train tracks stretching into the distance under a sunset sky.

4.4 Client Home Page

The client Home page shows a slide-carousel with images from some of the destination cities that are available.

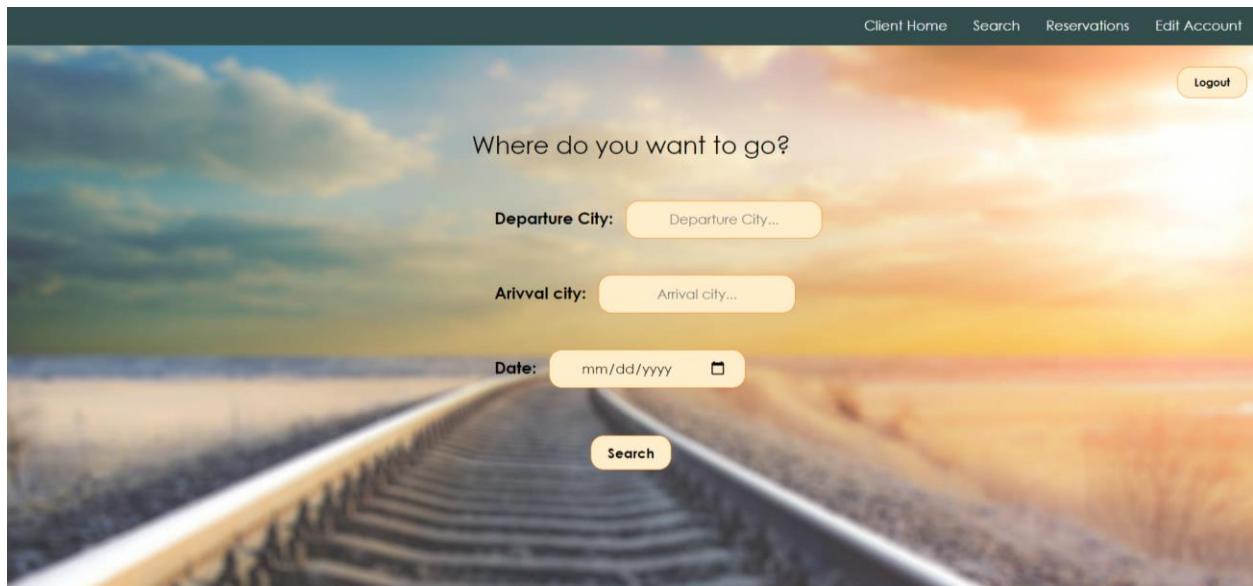
In this way, the client can be inspired and helped by the images presented and he may be tempted to plan another trip.



4.5 Client – Search

As the above pages, the search page is also very simple to use and intuitive, it only has 3 fields, for the information needed to search for a specific train route. After he completes the details, the client can press the Search button and he will be redirected to the search result page in case the search is correct, otherwise, he will be returned to the search page.

Also, here we can see the menu for the client with the options for search, reservation and edit account. Client Home is the welcome page. The client can navigate through the menu on every page and can also return back. Last thing to be said, at any point the user is able to logout from his account.

The image shows a web application interface for a client search. At the top, there is a dark green navigation bar with links: "Client Home", "Search", "Reservations", and "Edit Account". In the top right corner, there is a "Logout" button. The main content area has a background image of train tracks receding into the distance under a sunset sky. The text "Where do you want to go?" is centered. Below it are three input fields: "Departure City:" with a placeholder "Departure City...", "Arrival city:" with a placeholder "Arrival city...", and "Date:" with a placeholder "mm/dd/yyyy" and a calendar icon. A "Search" button is positioned below the date field.

4.6 Client – Search Results

After the client has searched for the needed route, the search result page appears with all the existing train routes from that specific day having the searched departure and arrival city.

The page contains a table with all the information needed for the client to be able to choose the best route for him, such as price, hour, seats and so on.

After the client decides which route he wants to take, he can simply press the buy ticket button from the table and he will be redirected to the buy ticket page.

Train Route No	TicketsLeftC1	TicketsLeftC2	Class1 Price	Class2 Price	Departure Date	Departure City	Departure Hour	Arrival Date	Arrival City	Arrival Hour	Buy Ticket
1234	120	40	30,00	20,00	17.01.2021 00:00:00	Bucuresti	20:20	18.01.2021 00:00:00	Craiova	00:20	Buy Ticket

4.7 Client – Buy Ticket

The buy ticket page contains in the first place the information of the selected train route, and below the table it contains the fields for the needed data. The client can buy a ticket for any person, not only for himself by completing the fields with the needed information.

Also, here he has to complete that payment details so that his reservation may be done. At the end all he needs to do is to press the buy button.

[Client Home](#) [Search](#) [Reservations](#) [Edit Account](#) [Logout](#)

Buy Ticket

FlightNo	Class1 Price	Class2 Price	Departure Date	Departure City	Departure Hour	Arrival Date	Arrival City	Arrival Date
1234	30,00	20,00	17.01.2021 00:00:00	Bucuresti	20:20	18.01.2021 00:00:00	Craiova	00:20

Buy Ticket

First Name:

FirstName...

Last Name:

LastName...

TicketCategory :

Category 1

Ticket Type:

Normal

DiscountCode:

DiscountCode...

Card Number:

CardNumber...

Payment Method:

Visa

CardHolder Name:

CardHolderName...

Expiration Date:

mm/dd/yyyy

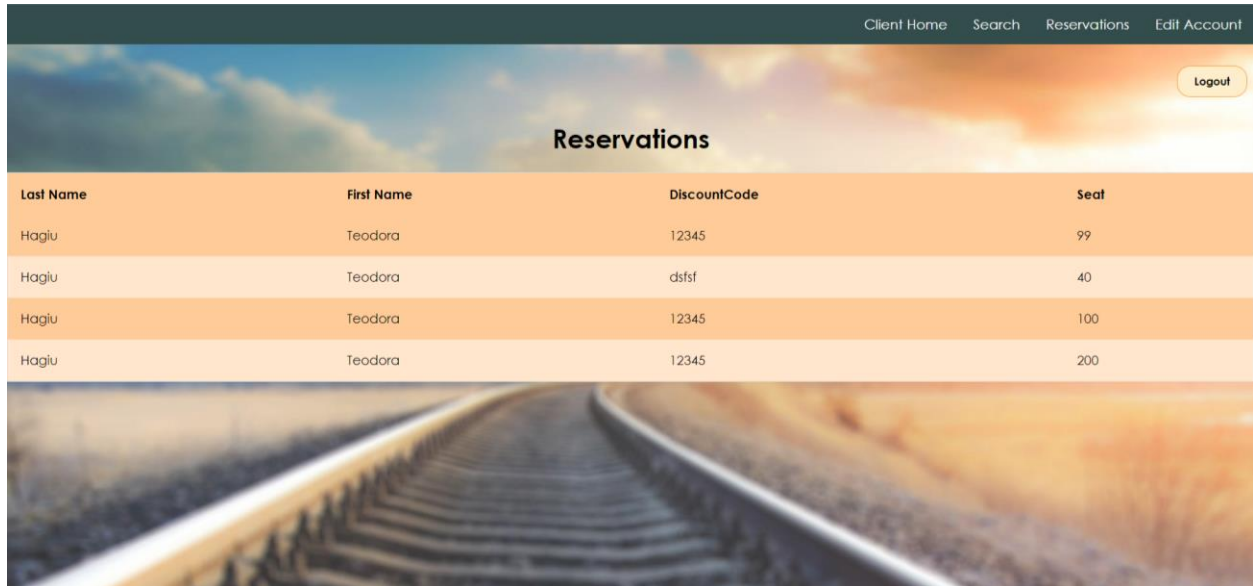
CVV:

CVV...

Buy Ticket

4.8 Client – Reservations

The reservations page contains a table with all the reservations that had been done, with the names, seat and discount codes.

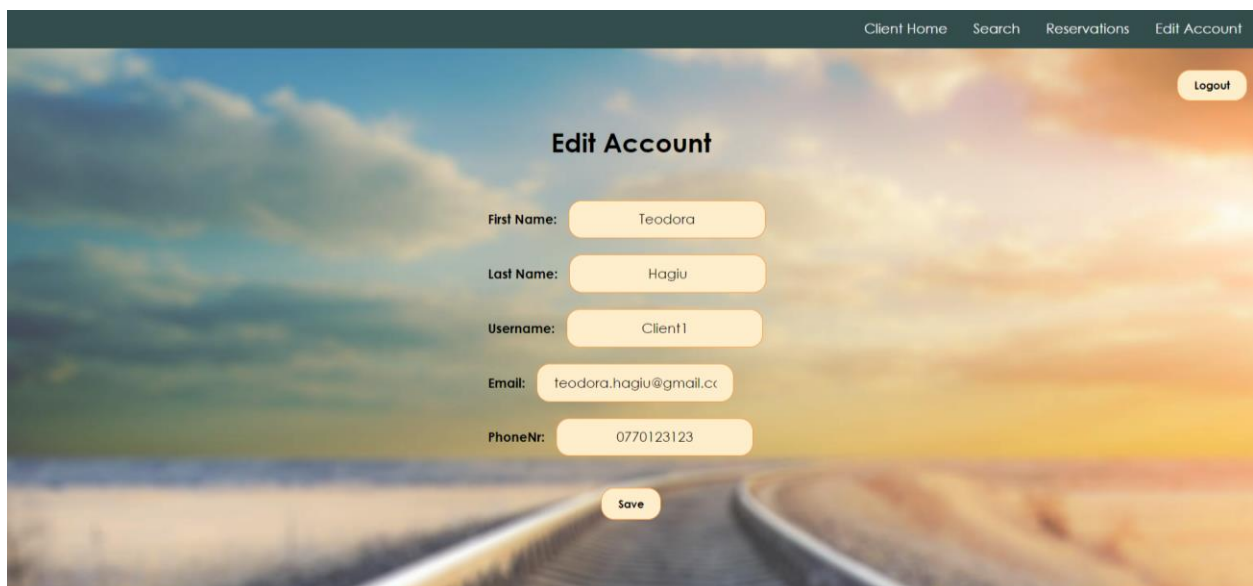


The screenshot shows the 'Reservations' page of a client interface. At the top, there is a dark navigation bar with links for 'Client Home', 'Search', 'Reservations', and 'Edit Account'. A 'Logout' button is located in the top right corner. The main content area has a background image of a sunset over a body of water. In the center, the title 'Reservations' is displayed. Below the title is a table with four columns: 'Last Name', 'First Name', 'DiscountCode', and 'Seat'. The table contains four rows of reservation data.

Last Name	First Name	DiscountCode	Seat
Hagiu	Teodora	12345	99
Hagiu	Teodora	dsfsf	40
Hagiu	Teodora	12345	100
Hagiu	Teodora	12345	200

4.9 Client – Edit Account

On this page the client can edit or update his data, such as names, username, email or phone number and save the changes by clicking on save button.



The screenshot shows the 'Edit Account' page of a client interface. It features the same navigation bar and background image as the previous page. The title 'Edit Account' is centered. Below the title, there are five form fields for editing user data: 'First Name' (Teodora), 'Last Name' (Hagiu), 'Username' (Client1), 'Email' (teodora.hagiu@gmail.co), and 'PhoneNr' (0770123123). Each field is a light yellow rounded rectangle. At the bottom center, there is a 'Save' button, also a light yellow rounded rectangle.

Edit Account

First Name: Teodora

Last Name: Hagiu

Username: Client1

Email: teodora.hagiu@gmail.co

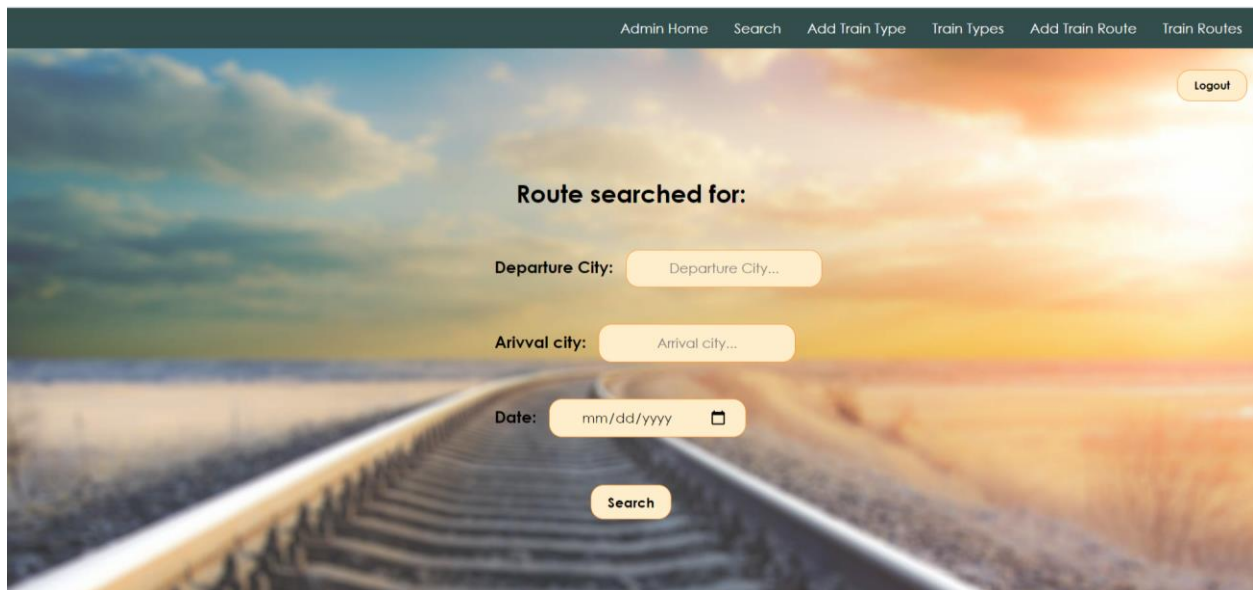
PhoneNr: 0770123123

Save

4.10 Admin – Search

As the above pages, the search page is also very simple to use and intuitive, it only has 3 fields, for the information needed to search for a specific train route. After he completes the details, the admin can press the Search button and he will be redirected to the search result page in case the search is correct, otherwise, he will be returned to the search page.

Also, here we can see the menu for the admin with the options for search, add train route, train routes, add train type and train types. Admin Home is the welcome page. The admin can navigate through the menu on every page and can also return back. Last thing to be said, at any point the user is able to logout from his account.

The screenshot shows the 'Admin Search' page of a web application. At the top, there is a dark green navigation bar with white text links: 'Admin Home', 'Search', 'Add Train Type', 'Train Types', 'Add Train Route', and 'Train Routes'. In the top right corner of the page, there is a yellow 'Logout' button. The main content area has a background image of train tracks receding into the distance under a sunset sky. Centered on the page is the heading 'Route searched for:'. Below this heading are three input fields: 'Departure City:' with a placeholder 'Departure City...', 'Arrival city:' with a placeholder 'Arrival city...', and 'Date:' with a placeholder 'mm/dd/yyyy' and a calendar icon. At the bottom of these fields is a yellow 'Search' button.

4.11 Admin – Search Results

After the admin has searched for the needed route, the search result page appears with all the existing train routes from that specific day having the searched departure and arrival city.

The page contains a table with all the information needed for the admin to be able to find the needed route to be edited or deleted.

After the admin finds which route he wants to edit/delete, he can simply press the edit or the delete button from the table and he will be redirected to the edit route page.

Admin Home

Search

Add Train Type

Train Types

Add Train Route

Train Routes

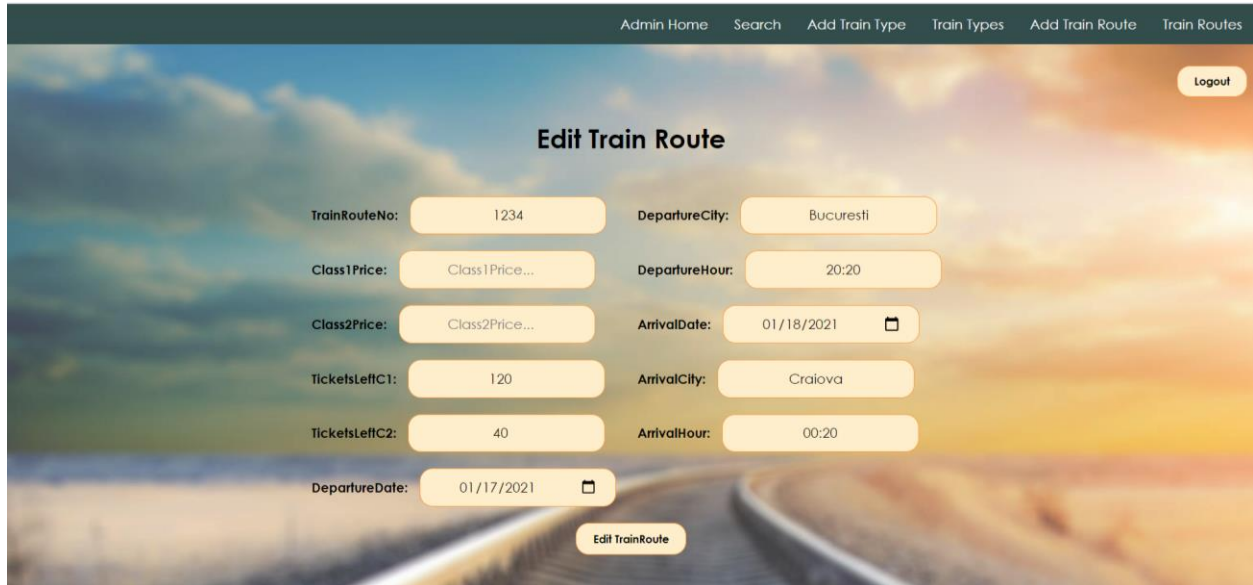
Logout

Search Result

Train Route No	TicketsLeftC1	TicketsLeftC2	Class1 Price	Class2 Price	Departure Date	Departure City	Departure Hour	Arrival Date	Arrival City	Arrival Hour	Edit	Delete
1234	120	40	30.00	20.00	17.01.2021 00:00:00	Bucuresti	20:20	18.01.2021 00:00:00	Craiova	00:20	Edit	Delete
34567	100	200	65.00	35.00	06.12.2020 00:00:00	Bucuresti	20:20	07.12.2020 00:00:00	Craiova	23:23	Edit	Delete
123	100	200	23.00	12.00	01.01.0001 00:00:00	Bucuresti	20:20	01.01.0001 00:00:00	Craiova	23:23	Edit	Delete

4.12 Admin – Edit Train Route

If the admin chose to edit the route, he can change the details of the train route, exactly as in the add route page. At the end he needs to press edit train route button in order to save the changed information.



The screenshot shows a web application interface for editing a train route. The background is a scenic image of a train track curving through a landscape under a sunset sky. The interface includes a dark green navigation bar at the top with links: Admin Home, Search, Add Train Type, Train Types, Add Train Route, and Train Routes. A 'Logout' button is in the top right corner. The main heading is 'Edit Train Route'. The form contains the following fields:

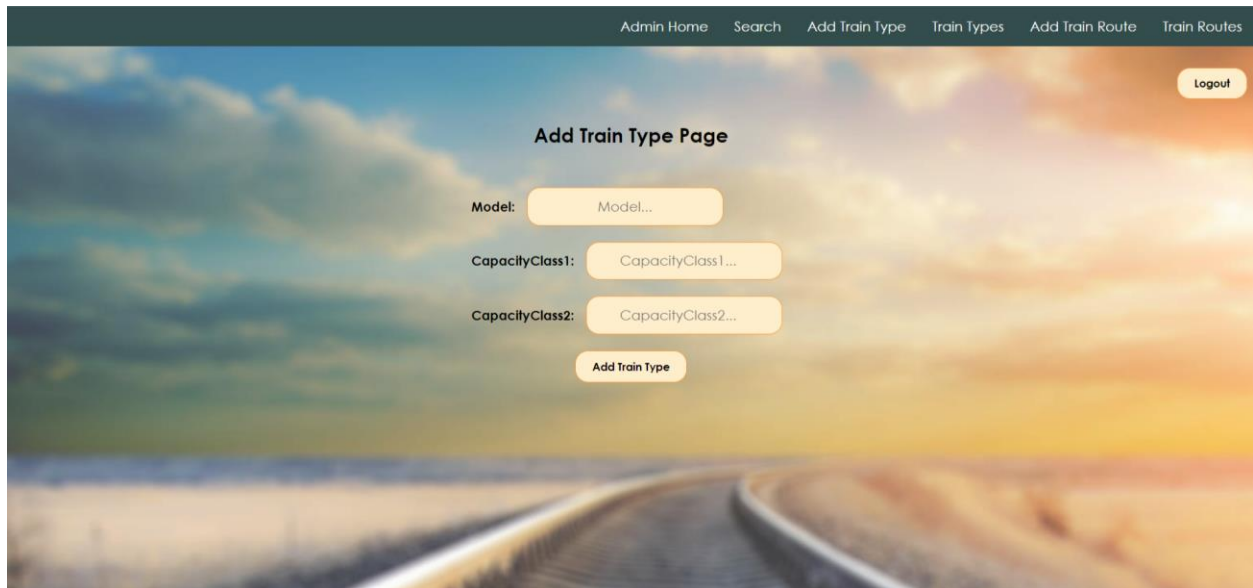
Field Label	Value
TrainRouteNo:	1234
Class1Price:	Class1 Price...
Class2Price:	Class2 Price...
TicketsLeftC1:	120
TicketsLeftC2:	40
DepartureDate:	01/17/2021
DepartureCity:	Bucuresti
DepartureHour:	20:20
ArrivalDate:	01/18/2021
ArrivalCity:	Craiova
ArrivalHour:	00:20

At the bottom center, there is a button labeled 'Edit TrainRoute'.

4.13 Admin – Add Train Type

The add train page is as simple as the others to use, it contains the needed fields for the information to be completed and at the end the add train type button used to add and save the type in the database.

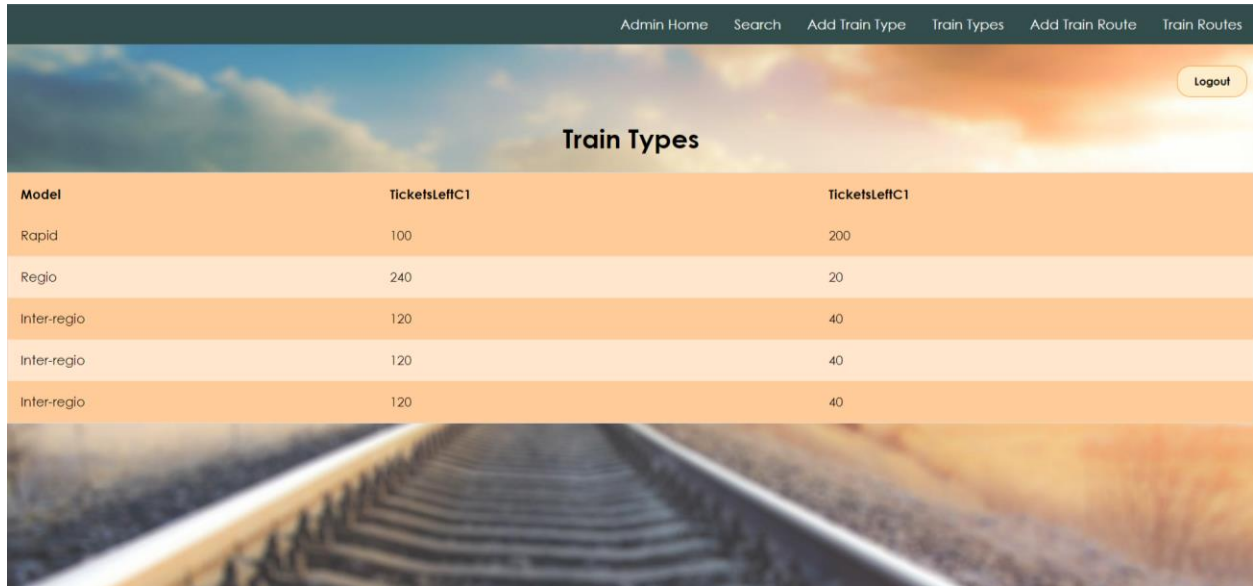
All the fields are restricted to be required, so that the admin will not forget to fill any of them.



The screenshot shows the 'Add Train Type Page' within an admin dashboard. The page has a dark blue header with navigation links: 'Admin Home', 'Search', 'Add Train Type', 'Train Types', 'Add Train Route', and 'Train Routes'. A 'Logout' button is in the top right corner. The main content area has a background image of a train track curving into the distance under a sunset sky. The title 'Add Train Type Page' is centered. Below it, there are three required input fields: 'Model:' with a placeholder 'Model...', 'CapacityClass1:' with a placeholder 'CapacityClass1...', and 'CapacityClass2:' with a placeholder 'CapacityClass2...'. At the bottom, there is a yellow 'Add Train Type' button.

4.14 Admin – Train Types

The train types page shows a table containing all the train types that exist in the database so that the admin knows which types of trains he has to choose.



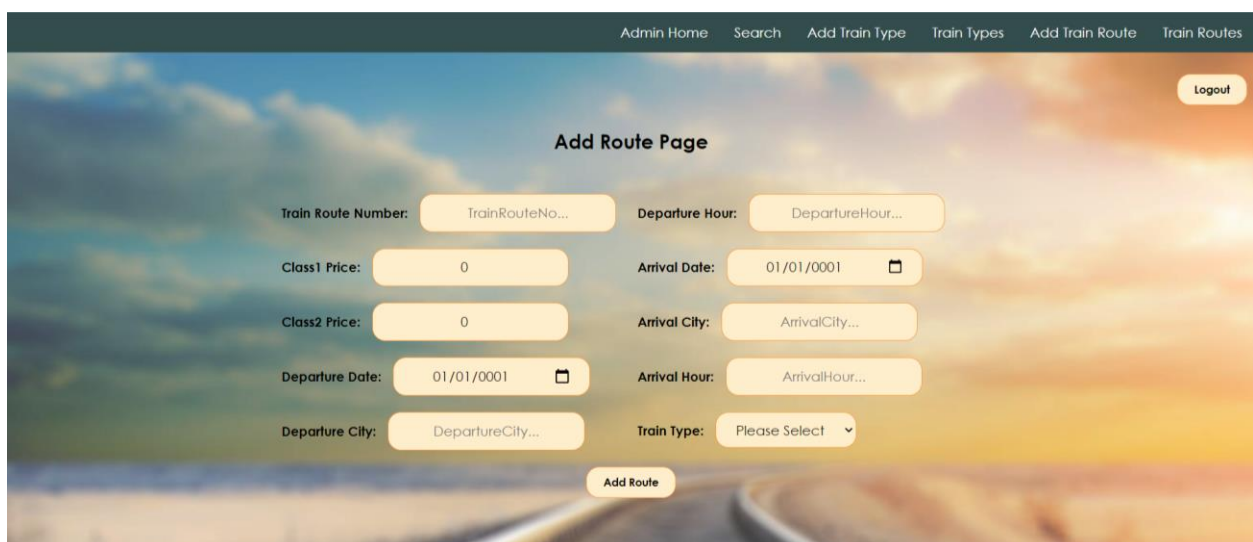
The screenshot shows the 'Train Types' page in an admin interface. At the top, there is a navigation bar with links: 'Admin Home', 'Search', 'Add Train Type', 'Train Types' (active), 'Add Train Route', and 'Train Routes'. A 'Logout' button is in the top right. The main heading is 'Train Types'. Below it is a table with three columns: 'Model', 'TicketsLeftC1', and 'TicketsLeftC1'. The table contains five rows of data. The background of the page features a sunset over a body of water.

Model	TicketsLeftC1	TicketsLeftC1
Rapid	100	200
Regio	240	20
Inter-regio	120	40
Inter-regio	120	40
Inter-regio	120	40

4.15 Admin – Add Train Route

The add train page is as simple as the others to use, it contains the needed fields for the information to be completed and at the end the add train route button used to add and save the route in the database.

All the fields are restricted to be required, so that the admin will not forget to fill any of them.




The screenshot shows the 'Add Route Page' in an admin interface. At the top, there is a navigation bar with links: 'Admin Home', 'Search', 'Add Train Type', 'Train Types', 'Add Train Route' (active), and 'Train Routes'. A 'Logout' button is in the top right. The main heading is 'Add Route Page'. Below it are several form fields arranged in two columns. The first column contains: 'Train Route Number:' with a text input 'TrainRouteNo...', 'Class1 Price:' with a text input '0', 'Class2 Price:' with a text input '0', 'Departure Date:' with a date input '01/01/0001' and a calendar icon, and 'Departure City:' with a text input 'DepartureCity...'. The second column contains: 'Departure Hour:' with a text input 'DepartureHour...', 'Arrival Date:' with a date input '01/01/0001' and a calendar icon, 'Arrival City:' with a text input 'ArrivalCity...', 'Arrival Hour:' with a text input 'ArrivalHour...', and 'Train Type:' with a dropdown menu 'Please Select'. At the bottom center is an 'Add Route' button. The background of the page features a sunset over a body of water.

Train Route Number:


Departure Hour:

Class1 Price:

Arrival Date: 

Class2 Price:

Arrival City:

Departure Date: 

Arrival Hour:

Departure City:

Train Type:

4.16 Admin – Train Routes

The train routes page shows a table containing all the train routes that exist in the database so that the admin knows which routes of trains can be edited

Admin Home Search Add Train Type Train Types Add Train Route Train Routes												
Train Routes												
Train Route No	TicketsLeftC1	TicketsLeftC2	Class1 Price	Class2 Price	Departure Date	Departure City	Departure Hour	Arrival Date	Arrival City	Arrival Hour	Edit	Delete
1234	120	40	30,00	20,00	17.01.2021 00:00:00	Bucuresti	20:20	18.01.2021 00:00:00	Calova	00:20	Edit	Delete
1234	19	20	502,00	4501,00	22.11.2020 00:00:00	Calova	19:55	22.11.2020 00:00:00	Bucuresti	23:22	Edit	Delete
5976	0	0	3499,00	11999,00	30.11.2020 00:00:00	Calova	19:55	30.11.2020 00:00:00	Bucuresti	23:22	Edit	Delete
5767	98	199	25,00	50,00	22.11.2020 00:00:00	Calova	19:55	22.11.2020 00:00:00	Bucuresti	21:22	Edit	Delete
0310	120	39	45,00	70,00	22.12.2020 00:00:00	Calova	12:30	22.12.2020 00:00:00	Bucuresti	15:30	Edit	Delete
34567	100	200	65,00	35,00	06.12.2020 00:00:00	Bucuresti	20:20	07.12.2020 00:00:00	Calova	23:23	Edit	Delete

5 Promoting plan

The main reason for choosing a railway transfer app for my project was that I believe this is the future of an ECO travelling. Looking at the world around us, it is very clear that we need to find a solution for travel transport that is not only eco-friendly, but also fast and, considering that, trains can achieve both of them at a considerable level.

That being said, I would like to base my promoting campaign on the advantages of railway transport, the fact that it can be very relaxing, enjoyable and also a way to see the landscapes around.

Based on this, I consider that joining campaigns that encourage eco-lifestyle and eco-traveling is a very good way to promote my app and the company.

Another way is through advertising on all kinds of websites, especially booking websites and travel agencies, as well as on different social media websites and apps.

We can also implement a strategy in the beginning like offering discount codes to those that invite their friends to make an account on the app and buy a train ticket.

Last, but not least, having panels and posters in the railway stations and in the nearby area is also a good way of promoting an app, as most people in that area are already interested and are already using this kind of transportation.

6 Usability and accessibility issues

As I chose to make everything as simple as possible, the app is very likely to be used by any kind of computer user. It is accessible to everyone, but you can only see the offers after creating an account. Even if it may seem to be an inconvenient, it is very simple to make one, so this may not be a problem for most of the possible users. Even if it is only accessible from the browser at this moment, it can also be opened from the mobile phone, so having a laptop or a computer is not a must, but having a dedicated mobile app would make it a lot easier to access and use.

For now, the usability is restricted to only buy a ticket for the current company, but it can be easily extended to an app where you can find tickets and details at any company, and that would make the life of customers a lot easier.