San José State
UNIVERSITY

Computer Engineering Department
CMPE-275 | Enterprise Application Development
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Final Project Report

California Ultra-Speed Rail (CUSR)

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1. Motivation and introduction

The main moto of the project is to develop a train reservation and management system for California Ultra Speed Rail. Which mainly includes 26 stations named from A-Z. Where trains travelling from A-Z are south bound and trains travelling from Z-A are north bound and they both have their own rails.

- User registration -

Every passenger have to register to the CUSR system using there email address or through Google or through Facebook. There are mainly two kinds of users, Admin and normal user. Admin has the privilege to cancel the train and resize the train capacity. Normal user can only use the CUSR reservation system.

- Station and train type -

There are 26 stations named from A-Z, where A is northmost station and Z is southmost station. There are mainly two types of trains express and regular. Regular train stops at every station and the express train stops at every 5th station i.e., A, F, K, P, U and Z.

- Train capacity and schedules -

Train capacity may range from 5 to 1000 passengers and can be rest by the administrator. Regular trains start from station A and Z every 15 minutes and Express trains start from station A and Z every 1 hour and the express trains stops at every 5th station. The south bound trains are numbered from SB0600, SB0615 to SB2100 and the north bound trains are numbered from NB0600 through NB2100.

- Ticket booking and pricing -

Each user can book up to 5 tickets through there account and the ticket cost depends on the type of train they choose where, normal train ticket costs 1$ and a 1$ booking fees. The cost of booking express train ticket costs 2$ and a 1$ booking fees.

- Ticket cancellation -

Ticket can be only cancelled before one hour of boarding time. All the tickets purchased by a user will be cancelled, if the purchase is made in the same transaction.

- Booking notification and cancellation notification -

Once the user books a ticket, a email notification will be sent to the user. The email includes the ticket and all the information regarding the booking. If a user cancels a trip, a cancellation notification will be sent to the user email.

2. High level and component level design

Below are the diagrams for Component design and Module design for our system.

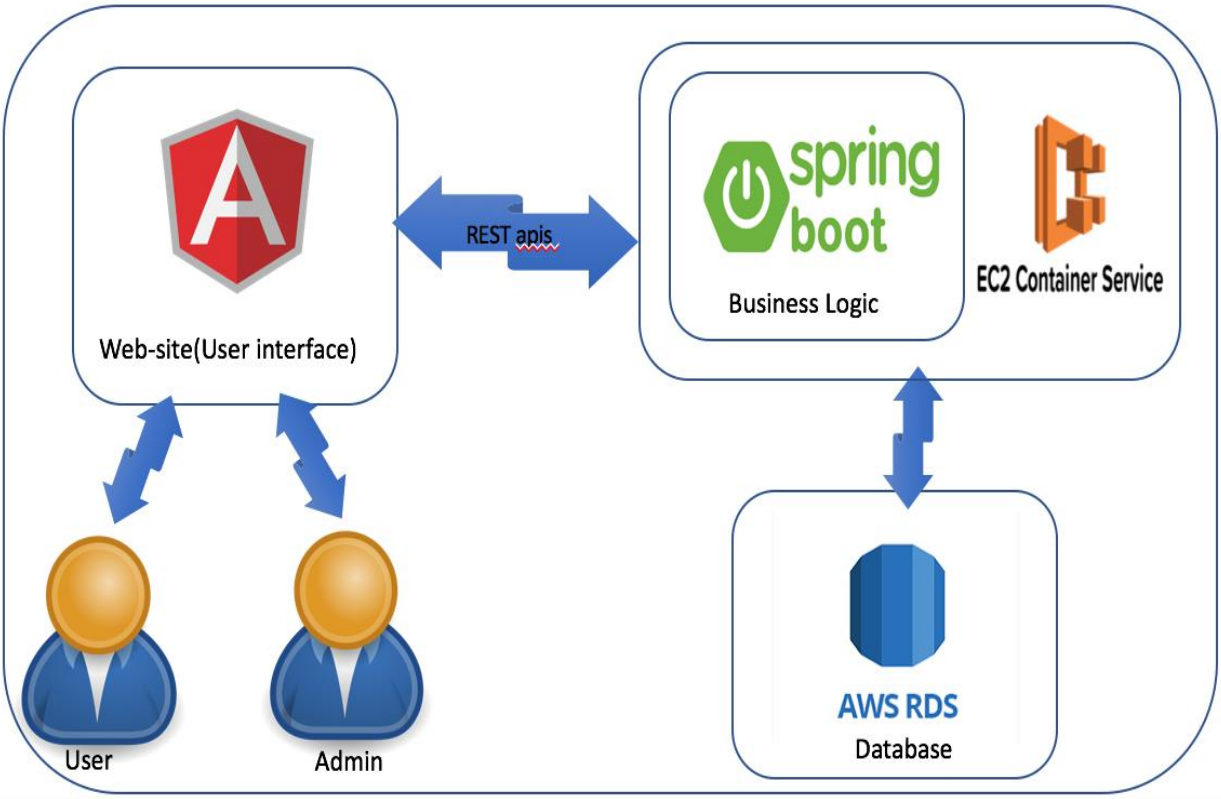

Figure 1 Component Design

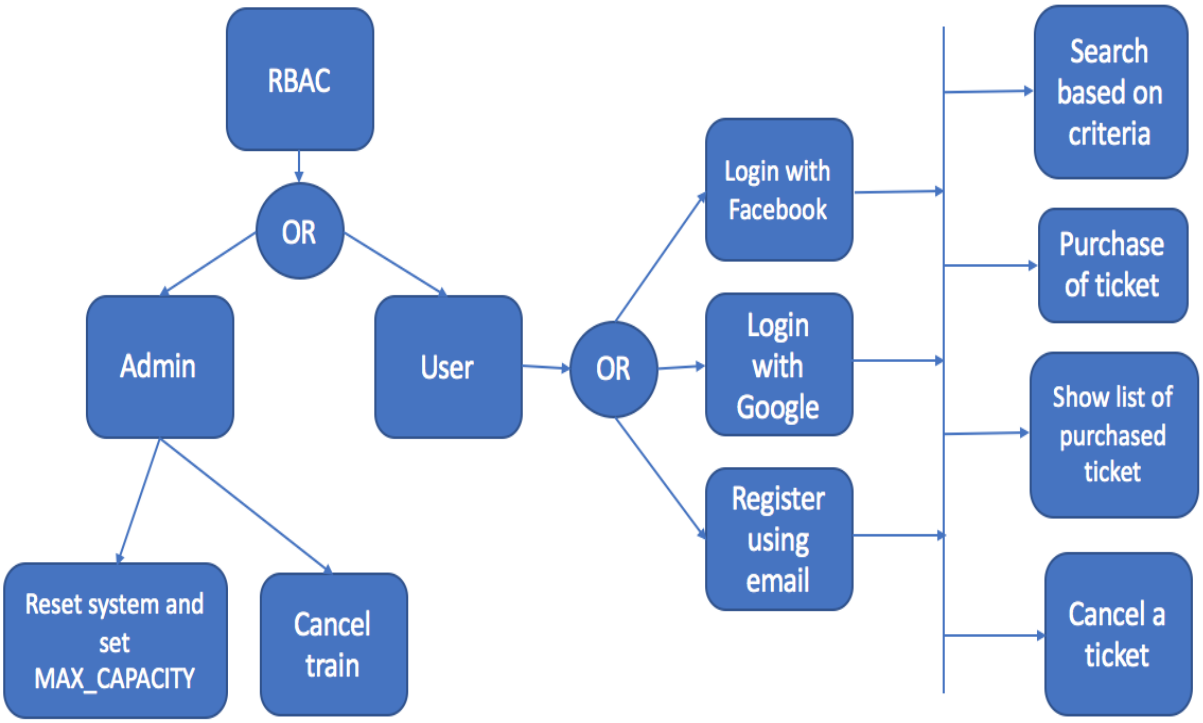

Figure 2 Modular Design

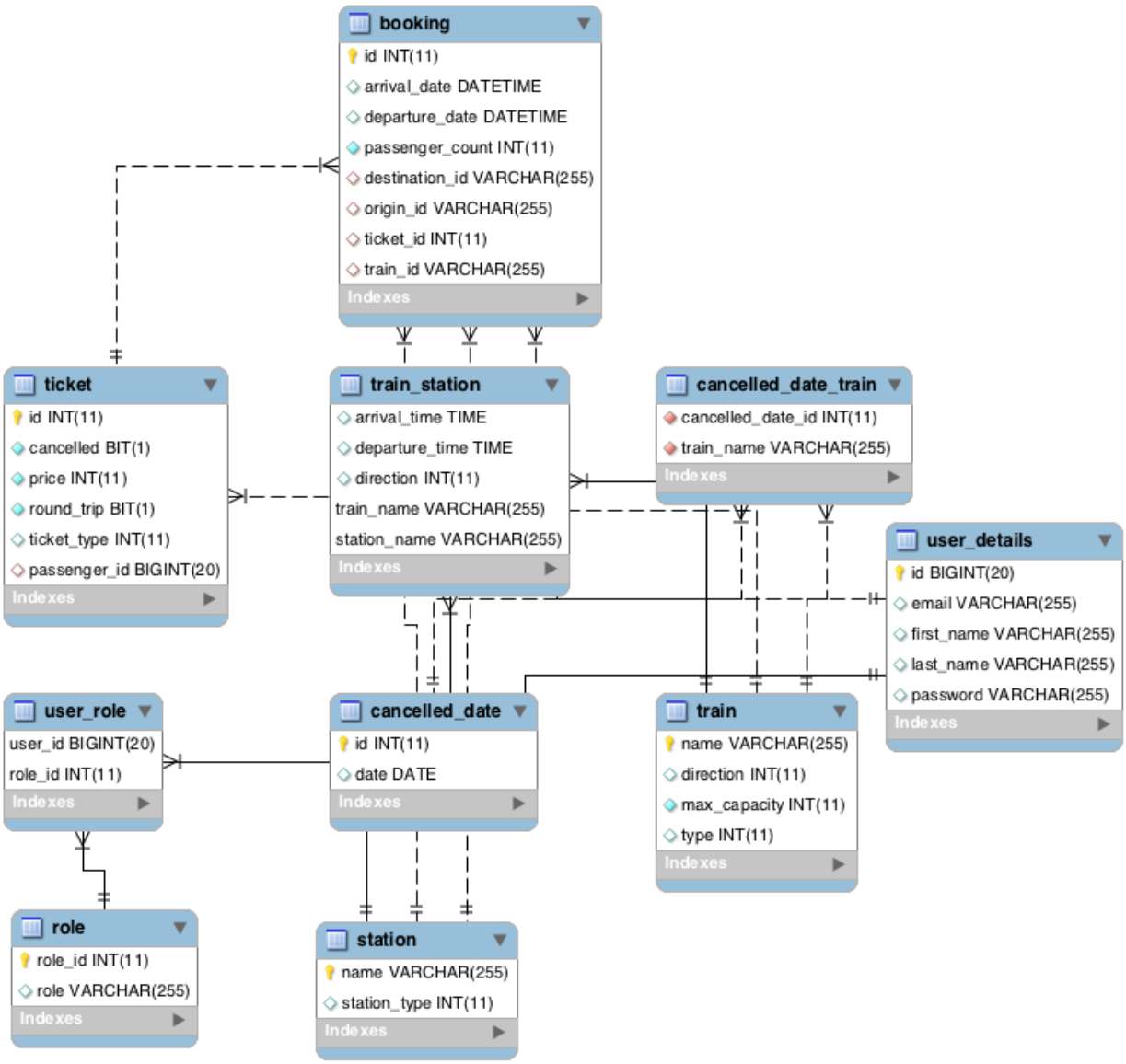

Figure 3 ER diagram

3. Technology choices

Front End: Angular.js
Backend Server: Spring Boot, Hibernate, ORM
Database: AWS RDS
Primary Language: Java
Cloud Hosting Platform: AWS ECS

Hosted app url: http://ec2-13-56-156-165.us-west-1.compute.amazonaws.com:3000/
GitHub link: https://github.com/parthp17/CMPE275TermProject

4. Description of features with final screenshots

Reset System – This project has the capability to reset the whole system. Whenever there is a reset request, all bookings and ticket history is deleted. Only admin is authorized to reset the system. Also, admin can set the MAX_CAPACITY of the system while resetting.

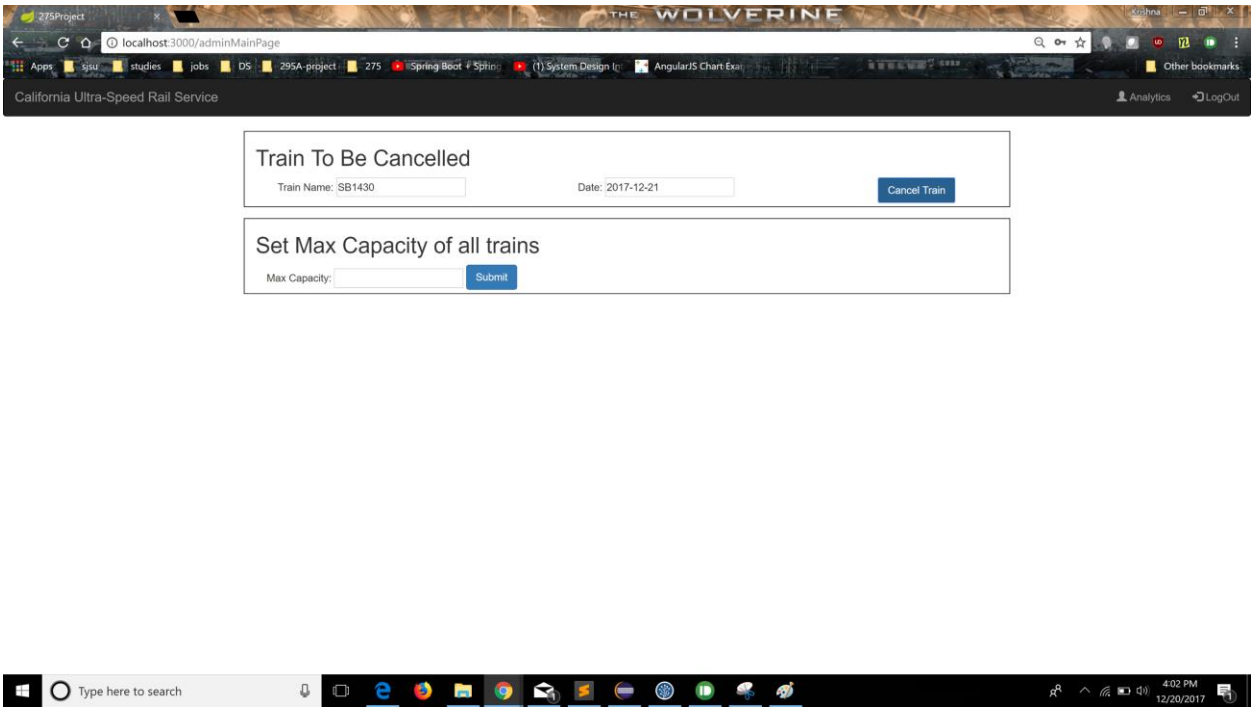

Figure 4 Reset system and set capacity

Train cancellation – Only admin is authorized to cancel a train for a particular date.

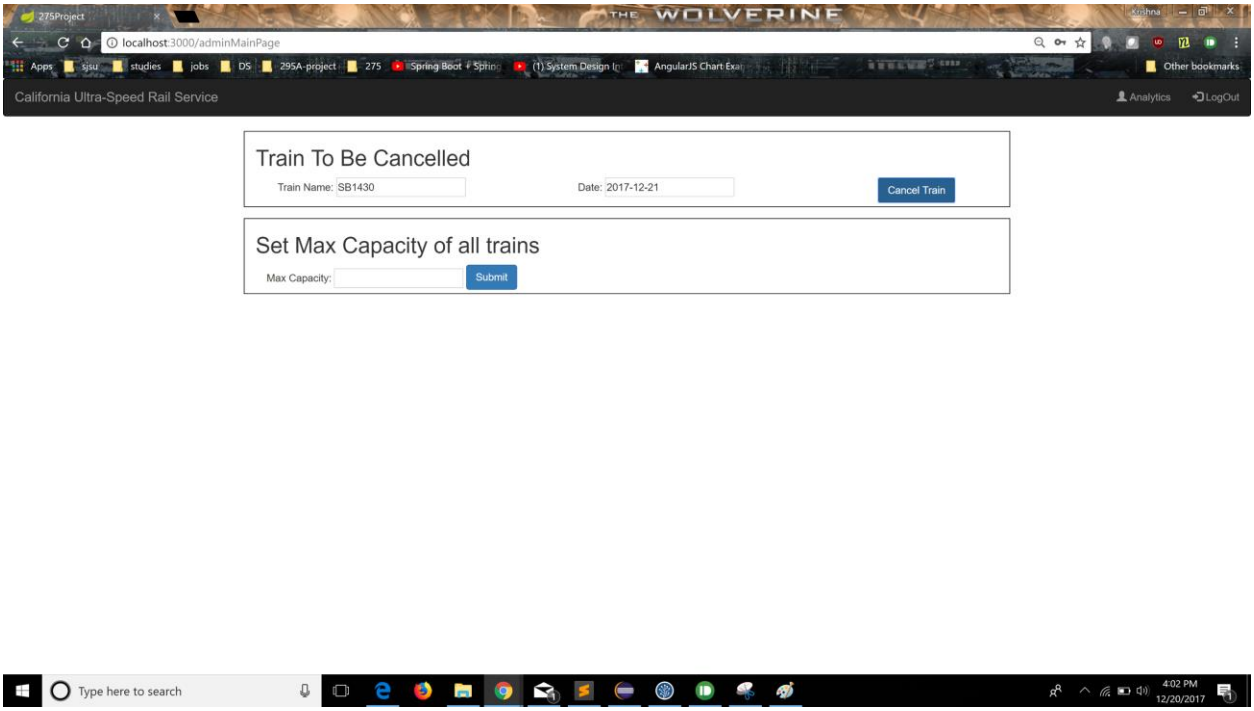

Figure 5 Train cancellation

Registration – User can register by providing email and password in the system.

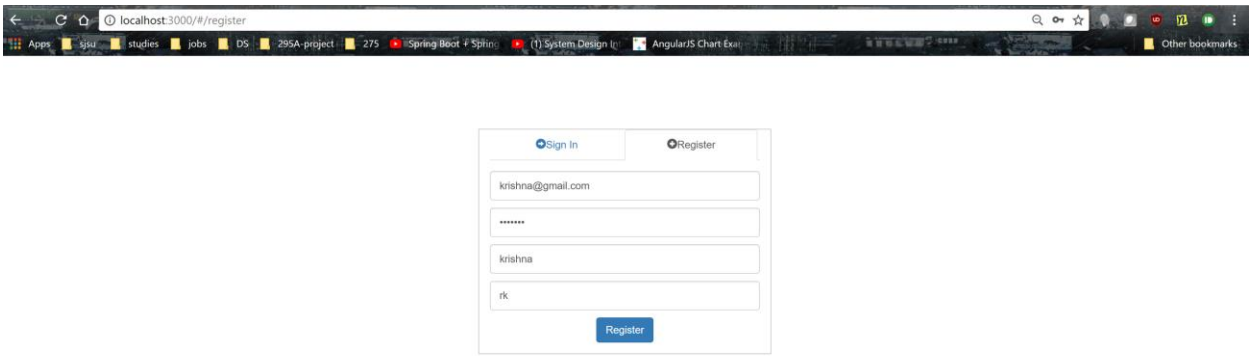

Figure 6 Registration

Login – It is necessary for the user to be authenticated to access all the features of the system. There are options available for the user to choose between login by Facebook and login by Google as well.

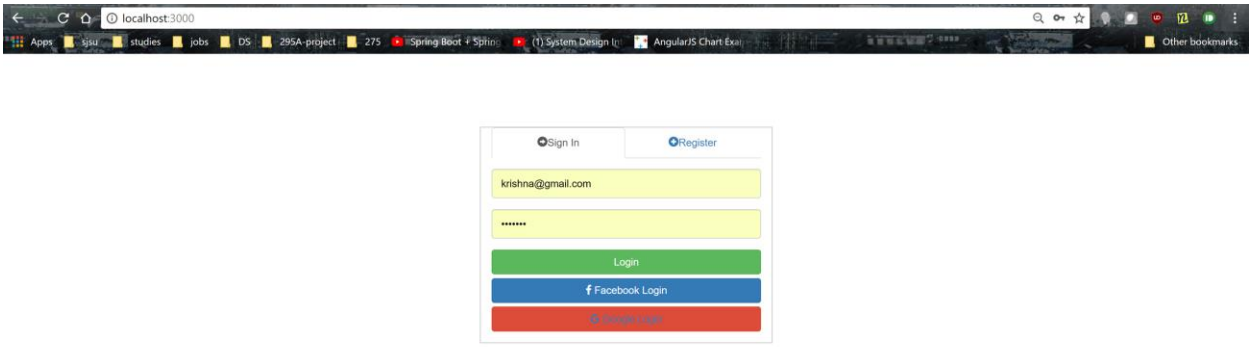

Figure 7 Login

Search Train – This feature allows user to search for particular train based on provided criteria. There are different options available for the user to choose from. User is provided with top 5 trains arriving at the destination the earliest.

These screenshot shows the functionality of one way trip.

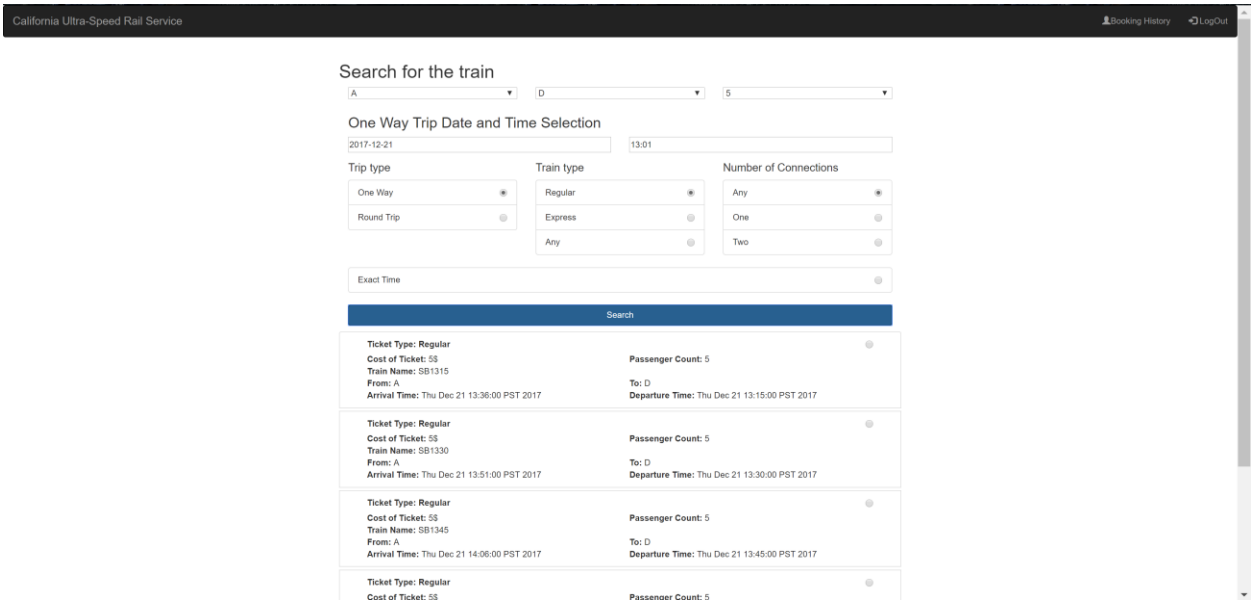

Figure 8 Search for one way trip

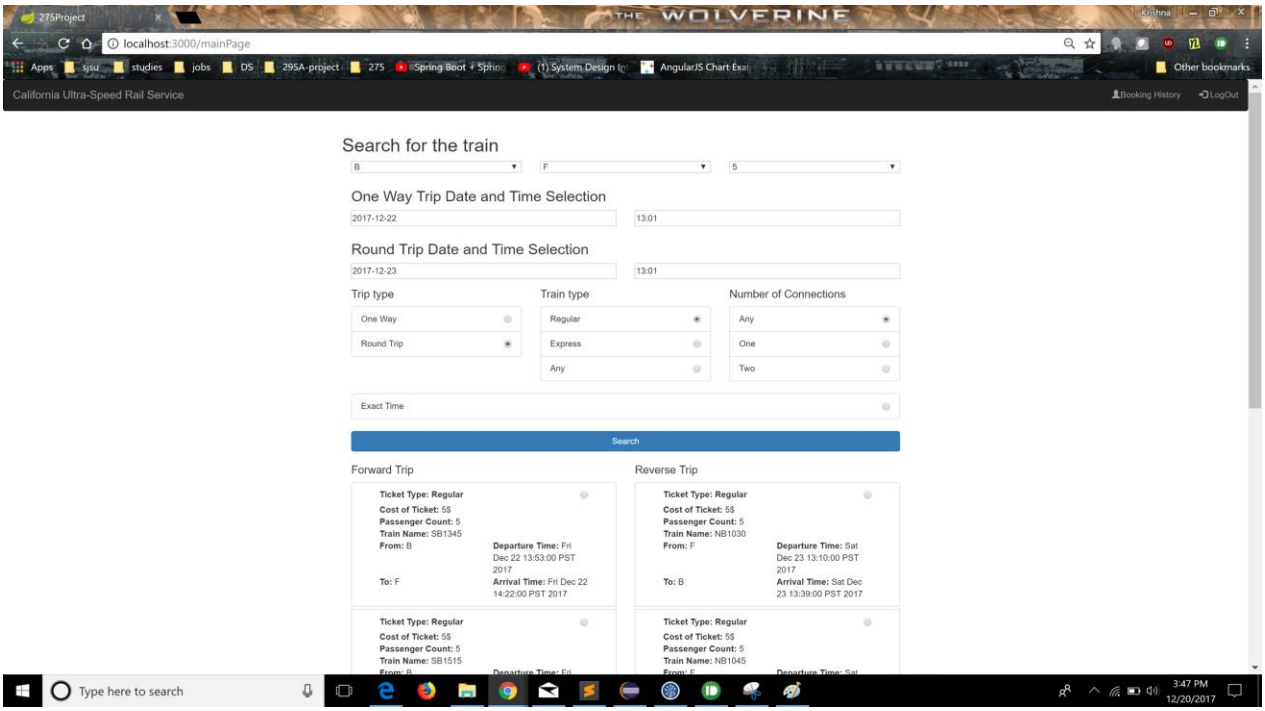

Figure 9 Search for round trip

Purchase Ticket – User can choose a particular train-option resulted from the search module. There is a transaction fee of $1 applied whenever user tries to purchase a ticket.

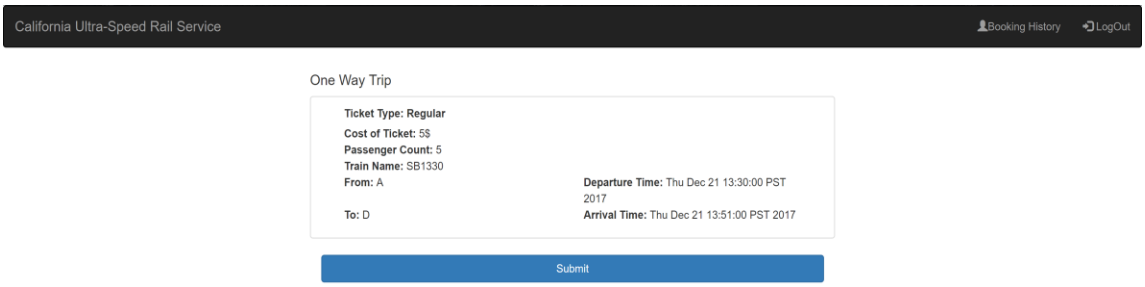

Figure 10 Purchase of one way ticket

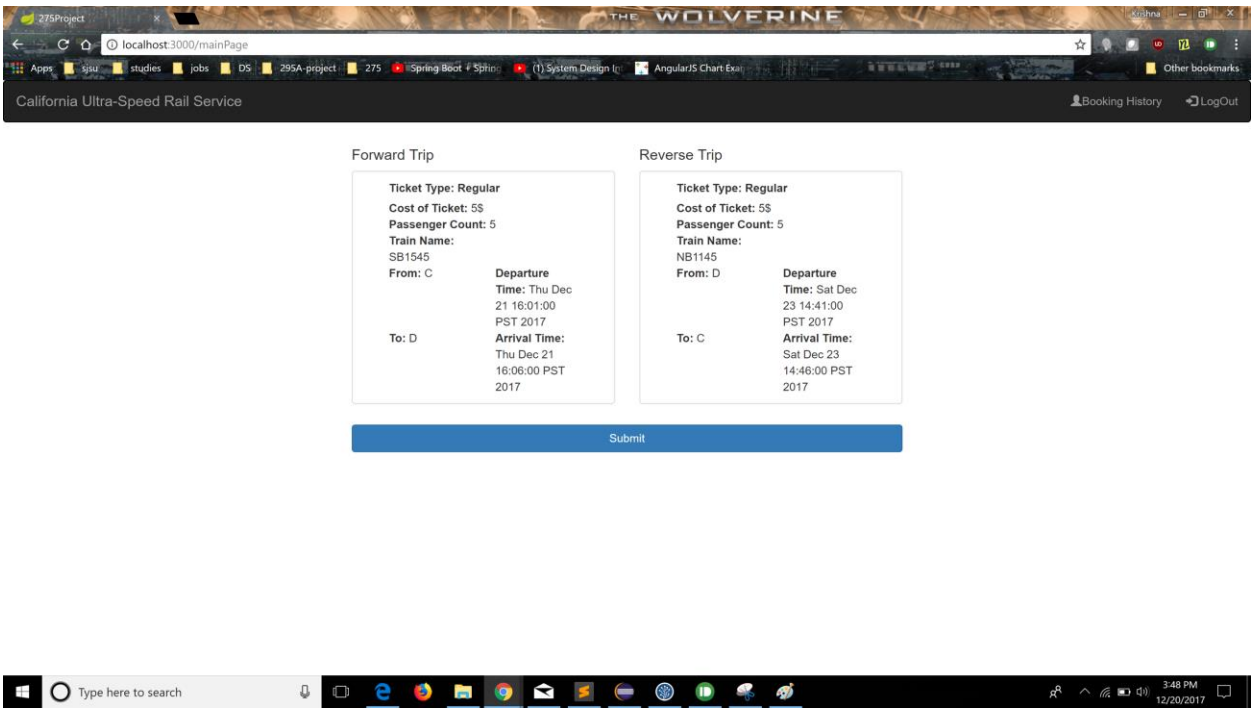

Figure 11 Purchase of round trip ticket

Show all trips(Booking History) – User can see all trips by accessing his account. List of ticket is provided with all related information.

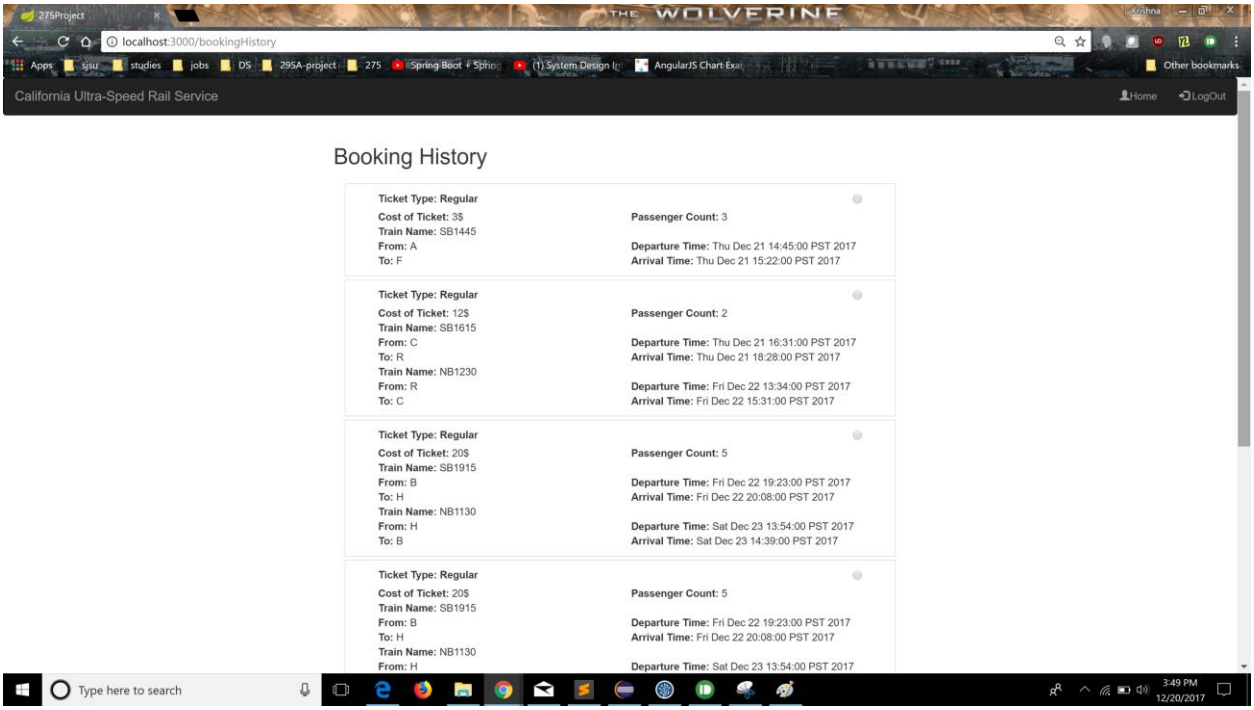

Figure 12 Show all bookings

Ticket cancellation – User can cancel the ticket any time before an hour of its boarding time. There is an option provided in the system for ticket cancellation.

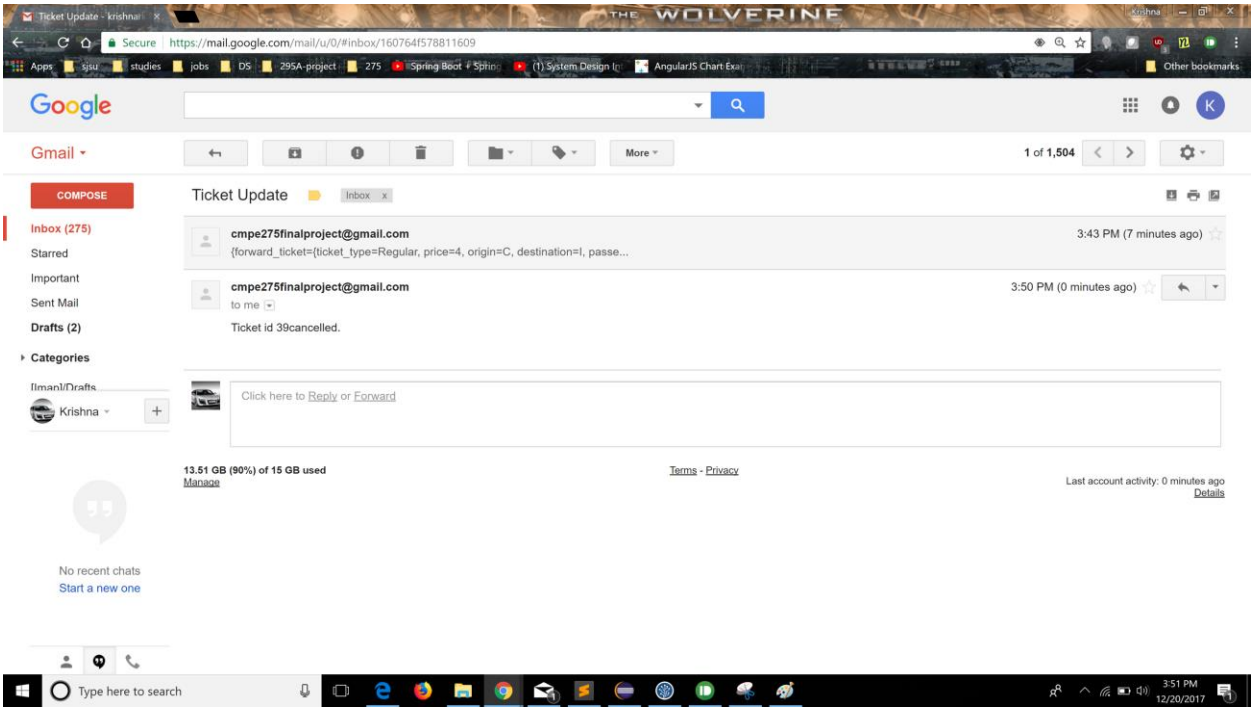

Figure 13 Email notification on Ticket Cancellation

Email notifications – Aspects are defined to send email notification to users whenever there is a ticket purchase, ticket cancellation or train cancellation.

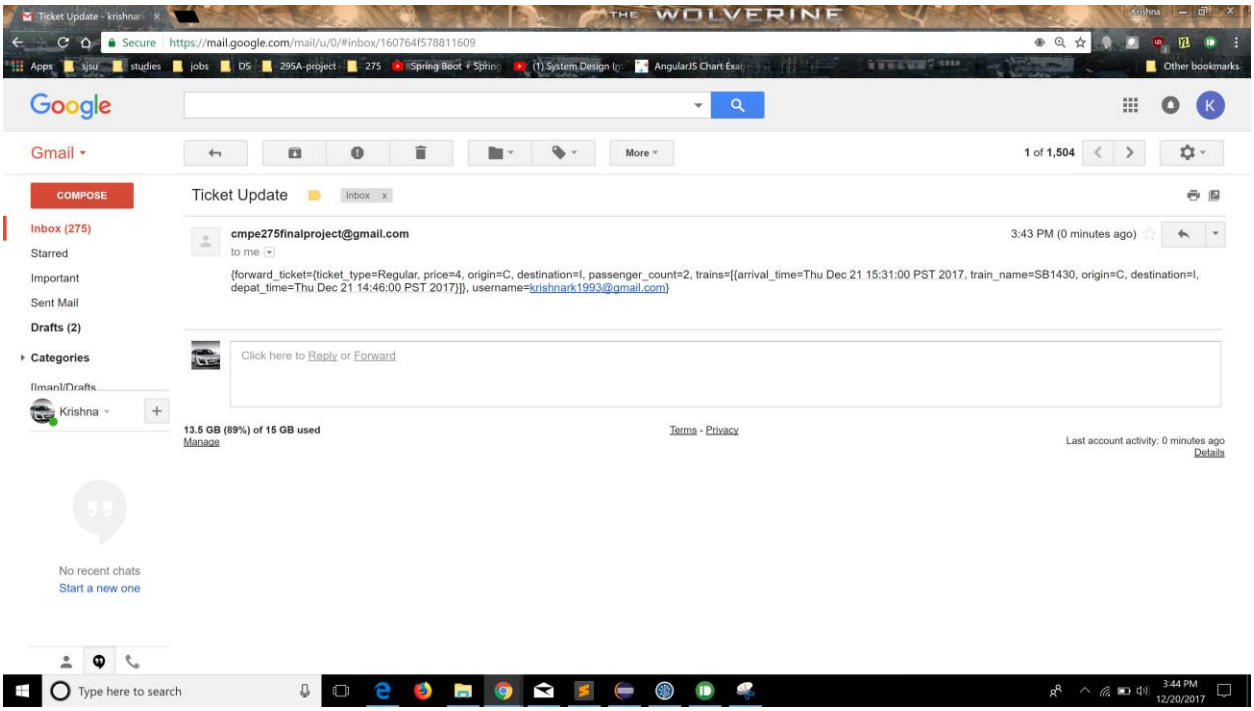

Figure 14 Email notification on ticket purchase

System report – This feature shows detailed report in form of line graph for Per Train Reservation Rate, Daily System Reservation Rate.

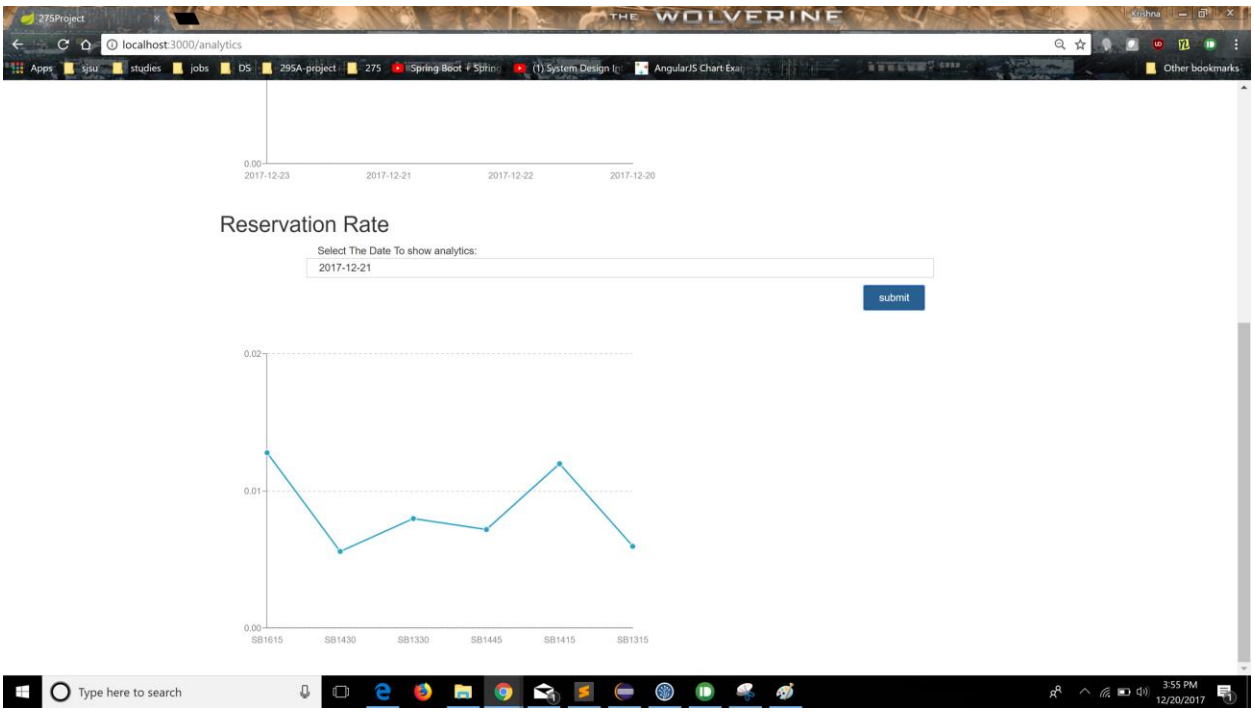

Figure 15 Per Train Reservation Rate

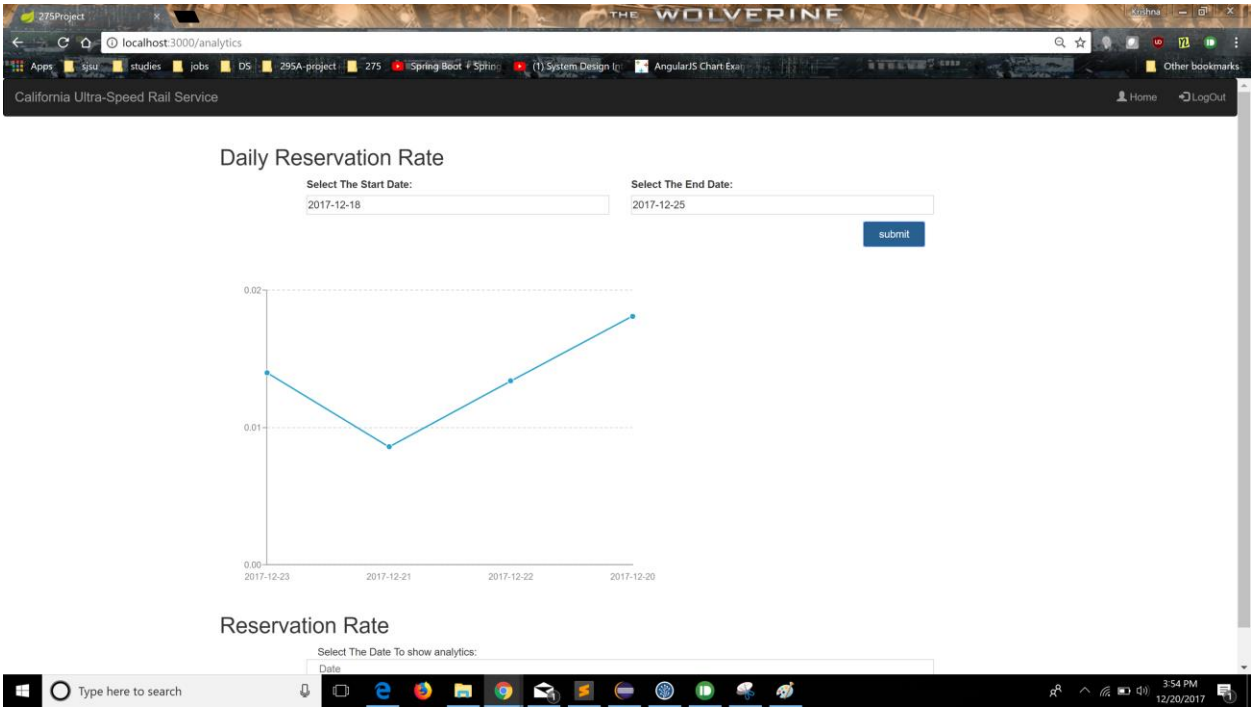

Figure 16 Daily System Reservation Rate

5. Testing plan executed and results

- To test the system, we came up with testing plan and different test cases. We performed test cases on each unit of the manually.
- Each function is tested for its correctness. We created a list of number and type of input parameters as well as output parameters for all functions. System behavior is checked against the parameters from that list.
- Proper use of closable interface and exception handling made the system robust to any input. Different validations are applied to each functionality of the system.
- We also performed database testing to ensure the connectivity.
- Important functionalities like purchase of ticket are made transactional to provide atomicity to the system and rollback in such cases.
- We have used Postman to test all REST apis of the system.
- We also performed integration testing to test the whole flow of the request from frontend to backend.

6. Lessons learned and possible future work

Through this project, we got to learn different spring features like Object Relational Mapping, Spring Security, Aspect Oriented Programming. We also learned about Role based Access Control(RBAC) for assigning different authorities to normal user and admin of the system. We can implement cache feature for this system for better performance in future.