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## Single Page Application Implemented in Train Ticket Booking

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### ABSTRACT

*The railway reservation system facilitates the passengers to enquiry about the trains available on the basis of source and destination, booking and cancellation of tickets, enquiry about the status of the booked ticket, etc. The aim of the application is to design and develop a web page to maintain record of train status, passenger details by rendering it has a component in our application. The application is designed in such a way that, it should provide security to user credentials by using SHA-256 Hashing algorithm When it works out manually numbers of employees were needed. But through this system, we could overcome the above-mentioned problems. Some of the main features of our project, Single Page Component Rendering, security updates like hashing SHA-256 algorithm are used to secure password of the user. If any person enters to book the tickets, they could view the details of all the persons who have booked tickets until and also about what are all the places already booked. Presently available seats also shown. According to the passengers wish they could reserve the tickets. All the booking details and cost of tickets for reservation will be displayed. This is less time consuming and also reduces the overhead of railway employees.*

**Keywords**— SHA-256 algorithm, Indian Railways, Passengers tickets

### 1. INTRODUCTION

#### 1.1 OVERVIEW

Indian Railways is an Indian state-owned enterprise, owned and operated by the Government of Indian through the Ministry of Railways. It is one of the world's largest railways networks comprising 115,000 km of track over a route of 65,000 km and 75,000 stations. As of December 2012, it transported over 25 million passengers daily (over 9 billion on an annual basis). In 2011, IR carried over 8,900 million passengers annually or more than 24 million passengers daily. Indian Railway had revenues of Rs.1119848.9 million which consists of Rs.286455.2 million

from passengers tickets. Railways were first introduced to Indian 1853 from Bombay to Thane. In 1951 the systems were nationalized as one unit, the Indian Railways, becoming one of the largest networks in the world. IR operates both long distance and suburban rail systems on a multi-gauge network of broad, metre and narrow gauges. It also owns locomotive and coach production facilities at several places in India and are assigned codes identifying their gauge, kind of power and type of operation. Its operations cover twenty-eight states and seven union territories and also provide limited international services to Nepal, Bangladesh and Pakistan. The advance booking for Indian train ticket opens 120 days before the date of journey. Tickets can be booked both offline at Passenger Reservation System (PRS) or online using IRCTC website. Ticket booked online can be an e-ticket (which is a print-out/SMS) or an i-ticket wherein the PRS ticket is couriered to the passenger. All the tickets issued have a unique 10-digit PNR (Passenger Name Record) which you should quote for any correspondence regarding your ticket / journey. The ticket also contains all the other journey details like train number, journey date, travel class, origin, destination, ticket status, berth details for confirmed tickets, passenger details etc. Maximum of six passengers can travel through one ticket. But just having a ticket does not guarantee that your journey is confirmed. It all depends on the ticket status. All the passengers in a ticket are assigned a ticket status which can be waiting (WL), RAC (a half berth), or confirmed (full berth).

#### 1.2 Objective

The main objectives of the application is provide, a good user-friendly environment for the user to book the seats and payment in easy going way. Another aspect of our application, is to provide credential security to the user.

#### 1.3 Literature Survey

[1] B. T. S. Sakthi, J. J. Leo, R. Monisha and S. M. Ramesh, "Advanced train reservation and passenger

intimation with safety system", **International Conference on Information Communication and Embedded Systems (ICICES2018), 2018 pp. 1-5.** Indian Railway will continue to play a Crucial role in the economy of the country in the many years to come. The need of the hour is to have an exclusive advanced reservation system, PNR status checking system, location identification through effective communication system, fire sensing system and catering services in place that would Fulfil the requirements of the whole spectrum of passengers.

2]Ganesh K and Joy Kuri (2017), **International journal on Engineering science and management "Implementation Of A Real Time Passenger Information System", Vol. II Issue II .** In present system, there is no passenger intimation in a train that is persons who are travelling during night time are unaware of the exact place now they are in and no prior intimation of when they reach their respective stations. The information about arrival of the respective station can be checked using live status option in application.

3]Ci SONG and Weimin (2019), **International Conference on Automation and Logistics, Zhengzhou "WU Petri Net Modeling of Information Flow in the Online Train Ticket Booking System", Vol I pp 1-7.** IPMIS model is an inevitable trend, which means a common platform for mobile booking and reservation has become a priority. More also, people have no patience to spend time in queue waiting, and therefore IPMIS is to relieve the pressure of queue congestion due to the contradictions of supply and demand between people and social resources as well as achieving well-ordered management of social resources.

## 2. SYSTEM ANALYSIS

The system study is to provide the description about the existing system, its limitation and proposed system, its advantages of the project.

### 2.1 Existing System

Lakh of passenger book train ticket in online. Where most of the tickets are booked by agents. In existing system we can login the railway reservation only those who are created by giving their own detail to railway serves. And it also have multistage redirection.

#### 2.1.1 Disadvantages

- Passengers can't login to railway reservation system easily.
- Passenger can't see a visual representation of the seating arrangement of their own seats.
- Unsatisfactory security measures.

### 2.2 Proposed System

In order to solve the problem of railway reservation, we are giving a Web App that can give passenger a user-friendly platform to reserve seats in the train. We are given our application in single page application using hashing algorithm.

#### 2.2.1 Advantages

- Reservation can be done very easily.
- This project also provides a complete set of solution for some common and specific areas of work in the railways.
- Passengers can login using Google account or Facebook account.

## 3. SYSTEM REQUIREMENTS

The requirements specification is a technical specification of requirements for the software products. It is the first step in the

requirements analysis process; it lists the requirements of a software system including functional, performance and security requirements. The requirements also provide usage scenarios from a user, an operational and an administrative perspective. The purpose of software requirements specification is to provide a detailed overview of the software project, its parameter and goals. This describes the projects target audience and its user interface, hardware and software requirements.

### 3.1 Hardware Requirements

Processor: 1.9 gigahertz (GHz) x86 or x64-bit dual core processor with SSE2 instruction set. RAM: 2-RAM. Hard Disk: Super VGA with resolution of 1024 x 798

### 3.2 Network Requirements

- Bandwidth greater than 50 Kbps.
- Latency under 150ms.

### 3.3 Software Requirements

FRONT-END: React-JS

BACK-END: MONGO DB

TECHNOLOGIES: JAVASCRIPT, HTML 5, NODE JS, CSS6

### 3.4 Software Description

Software Description is a technical specification of requirement of software product. This specifies the environment for development, operation and maintenance of the product.

#### 3.4.1 HTML

HTML is used for layout of the project using Tags. It is also used to design a skeleton for our project.

#### 3.4.2 CSS

CSS stands for Cascading Style Sheets with an emphasis placed on "Style." While HTML is used to structure a web document (defining things like headlines and paragraphs, and allowing you to embed images, video, and other media), CSS comes through and specifies your document's style—page layouts, colors, and fonts are all determined with CSS.

#### 3.4.3 JAVA SCRIPT

In the application, we use one of a Javascript frame work as JSX. JSX allows us to use customized element to perform a dynamic function in our application. Using Javascript, we can also handle event triggered by the component. It can also be used to mapping our user object and delivering it to the component to render it has a attribute.

#### 3.4.4 NODE JS

It is used for handling back-end process

#### 3.4.5 MONGO DB

MongoDB is a document database, which means it stores data in JSON - like documents. We believe this is the most natural way to think about data, and is much more expressive and powerful than the traditional row/column model.

#### 3.4.6 REACT JS

React (also known as React.js or React-JS) is an open-source front-end JavaScript library for building user interfaces or UI components. It is maintained by Facebook and a community of individual developers and companies. React can be used as a base in the development of single-page or mobile applications. However, React is only concerned with state management and rendering that state to the DOM, so creating React applications usually requires the use of additional libraries for routing, as well as certain client-side functionality.

#### 4. SYSTEM DESIGN

System design is the process of planning a new system or to replace the existing system. Simply, system design is like the blueprint for building, it specifies all the features that are to be in the finished product.

##### 4.1 System Architecture

System architecture is the conceptual model that defines the structure, behavior and more views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behavior of the system.

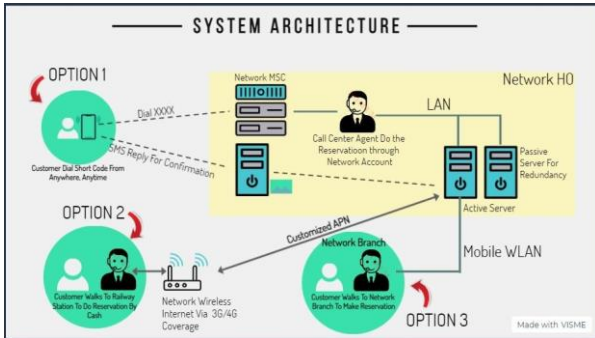


Figure 4.1 Architecture diagram for Single Page application Implemented in Train Ticket Booking.

#### 4.2 UML Diagram

##### 4.2.1 Usecase Diagram

Use Cases are typically used to describe the typically visible interactions that the system will have with users and external systems. In this use case diagram, we approach with two main user action as Issuer, one is passenger and database. Registered user can book ticket and get train details and seats available in a coach and cancel a ticket. In database, train details are updated according to there available train coach.

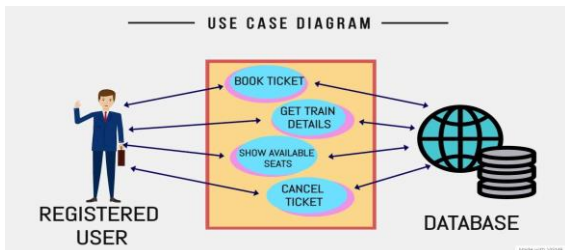


Figure 4.2 Usecase diagram for Single Page Application Implemented in Train Ticket Booking

##### 4.2.2 Class Diagram

A class diagram in the Unified Modelling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among, objects. In passenger class we can upload passenger name, age, address functions of passenger, Issuer and organization.

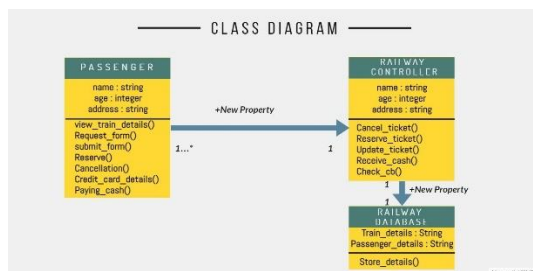


Figure 4.3 Class diagram for Single Page Application Implemented in Train Ticket Booking.

##### 4.2.3 Activity Diagram

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency.

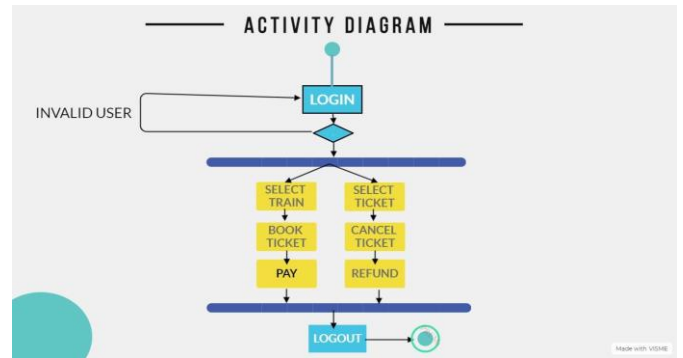


Figure 4.4 Activity diagram for Single Page Application Implemented In Train Ticket Booking.

##### 4.2.4 Sequence Diagram

A Sequence diagram is an interaction diagram that shows how objects operate with one another and in what order. It is a construct of a message sequence chart.

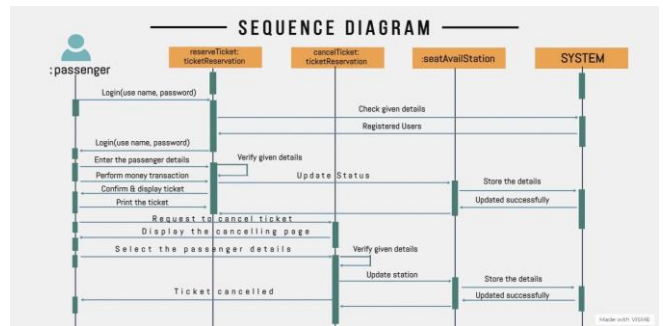


Figure 4.5 Sequence diagram for Single Page Application Implemented In Train Ticket Booking.

##### 4.2.5 Collaboration Diagram

Another type of interaction diagram is the collaboration diagram. A collaboration diagram represents a collaboration, which is a set of objects related in a particular context, and interaction, which is a set of messages exchange among the objects within the collaboration to achieve a desired outcome.

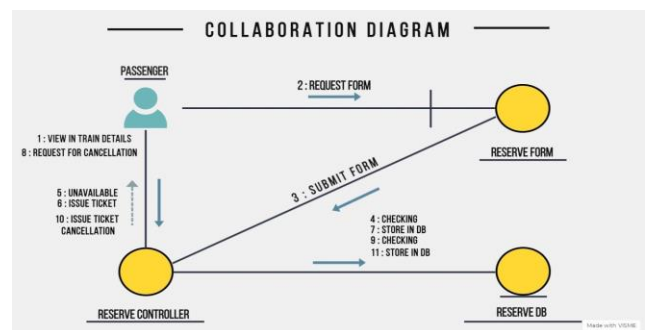


Figure 4.6 Collaboration diagram for Single Page Application Implemented In Train Ticket Booking.

#### 5. SYSTEM IMPLEMENTATION

##### 5.1 List of Modules

- Passenger Data Validation.
- Secure User Data transmission.
- UI in React JS.

##### 5.2 Module Description

The first page of the web application consists of the login page,

where the user is allowed to enter his/her credentials based on verification. The Credentials consist of E-mail and their respective passwords. These entered credentials are checked out in the database of its existence, If not, the user is made to register as a new user by entering his/her credentials which will be soon stored into the database. If the credentials exist in the database, the website redirects them to the next page of the application (homepage) where the user is allowed to enter the type of train they tend to travel. The website soon checks out, whether the availability of the respective train, if it is present the website will be redirecting the user, to the page where the seat arrangements are displayed. The UI displays the seat arrangements in 3 colors, they will be.

- 1.) RED - the seat is unavailable / occupied.
- 2.) GREEN - The seat is available to be booked.
- 3.) YELLOW - The seat is under wait.

When the user selects the seats (indicated in green), the website redirects the user to the next page where the following details should be filled.

- 1.) NAME.
- 2.) GENDER.
- 3.) MAIL.15

after the above process is complete, the user is then moved to the payment page where the user is allowed the pay the total amount calculated from the selected number of seats. the user can pay the money using these payment options.

- 1.) UPI (Unified Payment Interface).
- 2.) Net banking.
- 3.) Credit card / Debit Card.
- 4.) E-Wallet.

After the payment, the user is mailed with a ticket along with a payment receipt.

**5.2.1 Passenger Data Validation**

We prefer MongoDB for our project rather than MySQL because MongoDB is faster than MySQL due to its ability to handle large amounts of unstructured data when it comes to speed. It uses slave replication, master replication to process vast amounts of unstructured data and offers the freedom to use multiple data types that are better than the rigidity of MySQL. In MongoDB, the entered user credentials are stored as documents. These documents are stored in MongoDB in JSON (JavaScript Object Notation) format. JSON documents support embedded fields, so related data and lists of data can be stored with the document instead of an external table. JSON is formatted as name/value pairs.

**5.2.2 Secure User Data Transmission**

We prefer HTTPS protocol for the secure transmission of data that is carried out between the user and our web application such as important details of the user's banking details and passwords. HTTPS is often used to protect highly confidential online transactions.

**5.2.3 UI in React JS**

React js is right now the top trending open source frontend framework as React also allows us to create reusable UI components. we prefer ReactJs among other frameworks like angularJs and VueJs because of its superior Virtual DOM capabilities, its Train community support, a rich documentation, its lightweight attributes, manageable learning curve, and its flexibility to allow mobile functionality with React Natives.

**6. TESTING**

Testing is the process of executing a program or application with the intent of finding software bugs, and to verify that the software product is fit for use.

**6.1 Unit Testing**

Unit testing is a software testing method by which individual units of source code, sets of one or more computer program modules together with associated control data, usage procedures, and operating procedures, are tested to determine whether they are fit for use. In this project, all statements are executed properly. All units of program programs are tested in different computer. And the result of the project is same in all system.

**6.1.1 Test Objectives**

- Collection of required information of train.
- Validation of train details.
- Collection of required information of passenger.
- Validation of passenger details.
- To analyze that UI comfort the User.

**6.1.2 Test case of single page application implemented in train ticket booking**

ID	Test cases	Pre-Condition	Expected Results	Actual Results	Pass/Fail
TC001	Account Registration	User Details	Successful account for user.	Successful Account creation for issuer.	PASS
TC002	Initial Station	Select the station	Successfully Selected the station	Successfully selected the station	PASS
TC003	Select the Station	Select the station	Successfully selected the station	Successfully selected the station	PASS
TC004	Select the date	Select the date	Successfully selected the date	Successfully selected the date	PASS
TC005	Select the train	Select the train	Successfully selected the train	Successfully selected the train	PASS
TC006	Seat Allocation	Select the seat Allocation	Successfully selected the passenger gender	Successfully selected the passenger gender	PASS
TC007	Adding passenger Gender	Enter the passenger name	Successfully selected the passenger gender	Successfully selected the passenger gender	PASS
TC007	Adding passenger Gender	Enter the passenger name	Successfully selected the passenger gender	Successfully selected the passenger gender	PASS
TC008	Adding passenger Gender	Click the passenger gender	Successfully selected the passenger gender	Successfully selected the passenger gender	PASS

**6.2 Integration Testing**

Integration testing (sometimes called integration and testing, abbreviated I&T) is the phase in software testing in which individual software modules are combined and tested as a group. It occurs after unit testing and before verification testing. Integration testing takes as its input modules that have been unit tested, groups them in larger aggregates, applies tests

defined in an integration test plan to those aggregates, and delivers as its output the integrated system ready for system testing.

**6.3 System Testing**

The listed tests were conducted in the software at the various development stages. Unit testing was conducted. The errors were debugged was performed. The integration testing will be performed once the system is integrated with other related systems like Inventory, Budget etc. The results were analyzed, and the appropriate alterations were made. The test results proved to be positive and henceforth the application is feasible, and test approved.

**7. RESULTS AND DISCUSSION**

**7.1 Results**

The main scope of the project is to visualize the seats in train ticket for the better view for the passenger where most of them have an interest in selecting the seats. In this way they need not worry for the experience of train journey where they stay.

**7.2 Discussion**

We have implemented the project on Web development Application so it is well secured, and no personal details can be viewed by third-party without the user knowledge. Anyone can access the file uploaded no intermediate is needed because Web development Application are decentralized and they can be communicated directly without any interfaces.

**8. CONCLUSION AND FUTURE ENHANCEMENT**

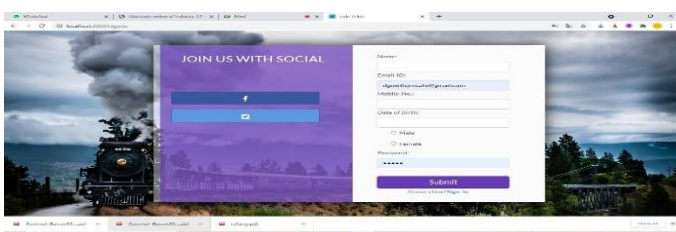
**8.1 Conclusion**

The application is developed in perspective of user convenience and the friendly user interface of application which helps users without any complicated searching process and other software requirements are data security and maintainability as anyone can access with their own login so the data will be secured and the maintenance of the software will be done by the developers who will be maintain the app and so in this application with booking of ticket it also includes cancellation of ticket, pnr status of ticket, live status of train and live station info all these features will be included in this application and the additional feature which is being added to the application is the shortest time is calculated for all trains between two stations and it will suggest the train which will travel in shortest time to our destination and therefore these features will help users and user interface is also simplified such that anyone can easily use it.

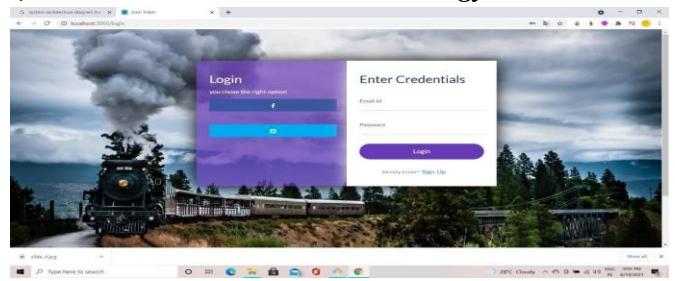
**8.2 Future Enhancement**

Many of tickets will be canceled before few of the passenger journey those tickets must be given to the people who are in waiting list and so the information must be sent to TTE regarding cancellation through an electronic device which must be regularly updated with API's and another major problem which passengers will go through it is with cleanliness and lack of other mandatory facilities which must be done daily but in most of trains these will not function properly

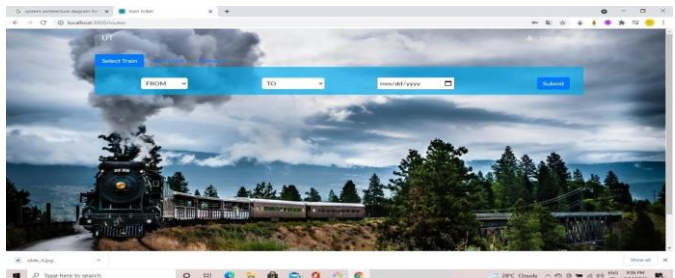
**9. OUTPUT SCREEN SHOTS**



**Creating the new account for Passenger**



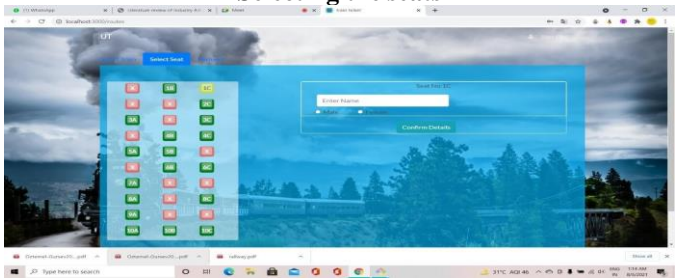
**Login page for passenger**



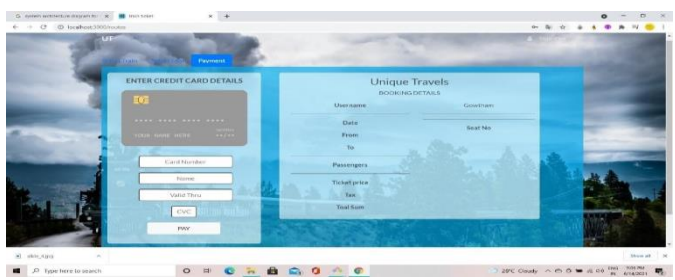
**Selecting the route**



**Selecting the seats**



**Enter the Passenger data**



**Payment of seat**

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