

Abstract

SAJA Bus Ticket Reservation System is a Web based application that works within a centralized network. This project presents a review on the software program "Online Bus Ticket Reservation System" as should be used in a bus transportation system, a facility which is used to reserve seats, cancellation of reservation and different types of route enquiries used on securing quick reservations. The system is a web – based application that allows visitors to check bus availability, buy and pay bus ticket online. In this paper, the proposed bus reservation system was developed using Hypertext Markup Language (HTML), PHP Hypertext Preprocessor (PHP), visual studio code (VS code), Xampp, and Cascading Style Sheet (CSS).

Acknowledgement

A project like this takes quite a lot of time to do properly. As is often the case, this project owns its existence is quality to a number of people, whose name does not appear on the cover.

We thank to **our supervisor Er. Kalpana Karki** who deserves credit for helping us done project and taking care of all details that most programmers really don't think about. Errors and confusions are our responsibility, but the quality of the project is to their credit and we can only thank them.

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List of Abbreviations

SDLC – SOFTWARE DEVELOPMENT LIFE CYCLE

ER Diagram – ENTITY RELATIONSHIP Diagram

DFD – DATA FLOW DIAGRAM

HTML – HYPER TEXT MARKUP LANGUAGE

PHP – PHP HYPERTEXT PREPROCESSOR

XML – EXTREMEMARKUP LANGUAGE

CSS – CASCADING STYLE SHEET

VS Code – VISUAL STUDIO Code

RAM – RANDOM ACCESS MEMORY

QA – QUALITY ASSURANCE

Chapter 1: Introduction

SAJA Bus Reservation System is a system where bus users can reserve their seats using a web-based application. It is made for the ease of access for both the bus trip administrators and the bus users. SAJA Bus Reservation System helps you schedule bus routes and tours with ease. The system allows you to plan, schedule and manage unlimited routes with start, end stop destinations, create a route timetable, print bus schedules, bus and passenger lists.

1.1. Background

SAJA Bus Reservation System is a system where bus users can reserve their seats using a web-based application. It is made for the ease of access for both the bus trip administrators and the bus users. Bus reservation system helps you schedule bus routes and tours with ease. The system allows you to plan, schedule and manage unlimited routes with start, end stop destinations, create a route timetable, print bus schedules, seat and passenger lists.

Currently, staff at the bus ticket counter is using an internal system to sell tickets at the counter and customers who are unable to buy bus ticket online at this moment to queue up a long queue to buy bus ticket and ask for information.

A lot of inconveniences to customers. However, SAJA Bus Reservation System enables the passengers to buy bus ticket, make payment, and ask for information online easily. Furthermore, staff can sell bus ticket using SAJA Bus Ticket Reservation System after checking the bus ticket availability for the passengers and print the bus ticket to the passengers.

Currently, staff at the bus ticket counter is using an internal system to sell tickets at the counter and customers who are unable to buy bus ticket online at this moment to queue up a long queue to buy bus ticket and ask for information.

1.2. Objectives

There are two types of objectives which are enlisted below:

1.1.1. General objective

1.1.2. Specific objective

1.2.1. General objective:

- To solve the existing problem of bus reservation system.

1.2.2. *Specific objective:*

- To reserve the bus by seating on the home.
- To save money and time by reserving ticket without moving here and there.
- To track information of booking by admin.
- To add, delete, update, and edit the records of Bus Schedule, Bus Routes, and Customer.
- To manage the information of Bus, Bus route, Booking etc.

1.3. Scope:

This application can be used by any bus operator to book the tickets. So throughout the country this application is use full for all the Bus operators.

Mainly SAJA Bus Reservation System is used by Travel agency, Tours Company to manage the tourist. This application is used in many sectors for traveling, issue the ticket to the customers. Apart from customer will able to check the timings and schedule of the buses.

This application provide automation of reservation and billing system to passenger and bus booking facility using bus operators.

Chapter2: Literature Review

2.1. Why you select this topic?

The use of bus travelling is a large growing business in Nepal and other countries; hence this system deals with maintenance of records of each passenger who had reserved a seat for a journey. Also, we got to know that there are many operations, which they have to do manually. It takes a lot of time and causes many errors. Due to this, sometimes a lot of problems occur and they are facing many disputes within passengers. To solve the above problem, and further maintaining records of passengers, ticket booking for passengers, check availability of bus , bill generation we are offering this system. Therefore, we use this system to make bus booking system more efficient.

2.2. Study of existing system:

In existing system, there are various problems related to keeping records of passenger and bus - list, online ticket booking for passengers, check availability of bus and fixing bill generation. Finding out details regarding any information is very difficult, as the travellers has to go through all the books manually, major problems was lack of security. In the current SAJA Bus Ticket Reservation System, traveller hsas to create first an account so that they can book and print the ticket using machine and it is keep secure by the admin who also should have an account which can solve the security issues.

Currently, the type of system being used at the counter is an internal system which is manually used in selling the bus tickets.

2.3. Previous system:

We have visited online reservation system of research gate and we find many problem using that system. The problems facing the company are that customers have to go to the counter to buy bus ticket or ask for bus schedule, customers will also have to queue up for a long time in order to secure a bus ticket and company also need to pay cash when passenger buy the bus ticket. The system is ineffective as not maintained properly. [1]

Chapter 3: Project requirements

3.1. Software requirements:

Some of the software implemented during the project preparations:

- Windows OS : Windows 10 :Linux
- Browser link (Google Chrome and Mozilla Firefox)
- Microsoft Word, Excel and Power Points
- Lucid Chart etc.

- PHP (Hypertext Preprocessor)

An extremely popular scripting language that is used to create dynamic Web pages. Combining syntax from the C, Java and Perl languages, PHP code is embedded within HTML pages for server side execution.

- **Uses:**
 - a. A general-purpose scripting language that can be used to develop dynamic and interactive websites. It is used to manage dynamic content, databases, session tracking, even build entire e-commerce sites
- **Benefits:**
 - a. Open Source and Free of Cost
 - b. Platform Independence
 - c. User-friendly
 - d. Database connection

- VS code (visual studio code)

Visual Studio Code is a source-code editor that can be used with a variety of programming languages, including Java, JavaScript, Go, Node.js, Python and C++. It is based on the Electron framework, which is used to develop Node.js Web applications that run on the Blink layout engine.

- **Uses:**
 - a. VS Code helps you be instantly productive with syntax highlighting, bracket-matching, auto-indentation, box-selection, snippets, and more.

- **Benefits:**
 - a. Cross-platform support
 - b. Light-weight.
 - c. Robust Architecture.
 - d. Intelli-Sense

- HTML (Hypertext Markup Language)

Hypertext Markup Language is the standard markup language for document designed to be displayed in a web browser. It determines the structure of web pages. This structure alone is not enough to make a web page look good and interactive.

- **Uses:**
 - a. Web Pages Development.
 - b. Web Document Creation
 - c. To render pages on the world wide web
 - d. Responsive images on web pages

- **Benefits:**
 - a. Easy to Learn and Use
 - b. Free
 - c. Supported by all Browsers
 - d. Most Friendly Search Engine

- CSS (Cascading Style Sheets)

CSS is a computer language for laying out and structuring web pages (HTML or XML). This language contains coding elements and is composed of these “cascading style sheets” which are equally called CSS files .

- **Uses:**
 - a. Describing the presentation of Web pages, including colors, layout, and fonts.
 - b. To style and layout web pages
 - c. Used with JavaScript and HTML in most of the websites to develop user interfaces.

- **Benefits:**
 - a. Easier to maintain and update.
 - b. Greater consistency in design.
 - c. More formatting options.
 - d. Lightweight code.
 - e. Faster download times.

3.2. Hardware requirements

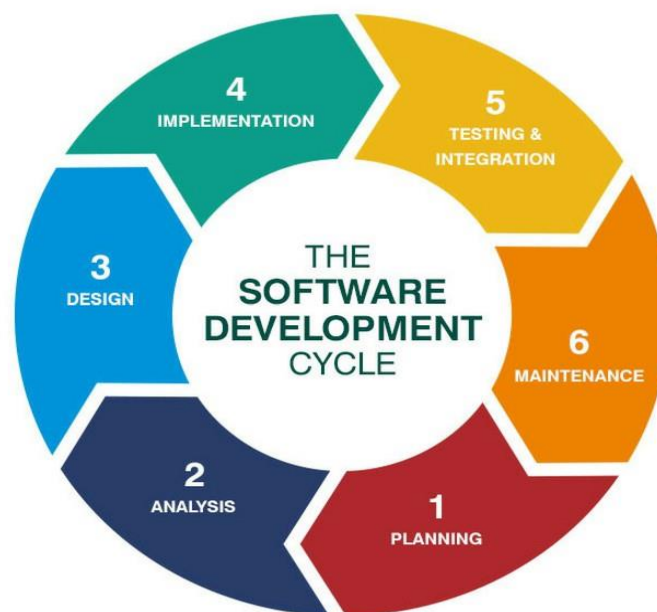
Some of the Hardware's implemented during the project preparations:

- Processor
- External Hard Disk
- RAM
- Mouse
- Keyboard etc.

Chapter 4: System Design

4.1. SDLC (Software Development Lifecycle)

SDLC stands for software development lifecycle which is used to develop software. It is step by step procedure need to be followed by organization to design and develop a good quality product/software. It gives a complete idea about developing, and maintaining a software product by ensuring all the functionalities along with user requirements, objectives, and the end goals are addressed. This model is a conceptual framework describing all activities in a software development project from planning to maintenance.



Synotive

Source: Image from synotive.com

Fig 1: SDLC

The various phases of SDLC model are as follows:

1. Planning:

- Define the problem and scope of existing system.
- Overview the new system and determine its objectives.
- Confirm project feasibility and produce the project Schedule.

2. Analysis:

- Gather, analyze, and validate the information.
- Define the requirements and prototypes for new system.
- Evaluate the alternatives and prioritize the Requirements.

3. Design:

- Includes the design of application, network, databases, user Interfaces, and system interfaces.
- Transform the SRS document into logical structure, which contains detailed and complete set of specifications that can be
- Implemented in a programming language.
- Create a contingency, training, maintenance, and operation plan.
- Finally, prepare a design document which will be used during Next phases.

4. Implementation:

- Implement the design into source code through coding.
- Combine all the modules together into training
- Environment that detects errors and defects.
- A test report which contains errors is prepared through test plan that includes test related tasks such as test case
- Generation, testing criteria, and resource allocation for testing.

5. Maintenance:

- The application is done and being used in the field.
- The Operation and Maintenance phase is still important, though.
- In this phase, users discover bugs that weren't found during testing.
- Maintenance may be needed for a longer time for large systems and for a short time for smaller systems.

6. Testing:

- Once the developers build the software, then it is deployed in the testing environment.
- The testing team tests the functionality of the entire system.
- The testing is done to ensure that the entire application works according to the customer requirements.
- After testing, the QA and testing team might find some bugs or defects and communicate the same with the developers.

There are many types of models in SDLC. In comparison to other models, we used Iterative methods for project.

4.2. Iterative Model:

In this model, iterative process starts with a simple implementation of a small set of software requirements and iteratively enhances the evolving versions until the complete system is implemented and ready to be deployed. It is also called an incremental model which primarily focuses on preliminary growth and design, one of easiest to implemented SDLC models.

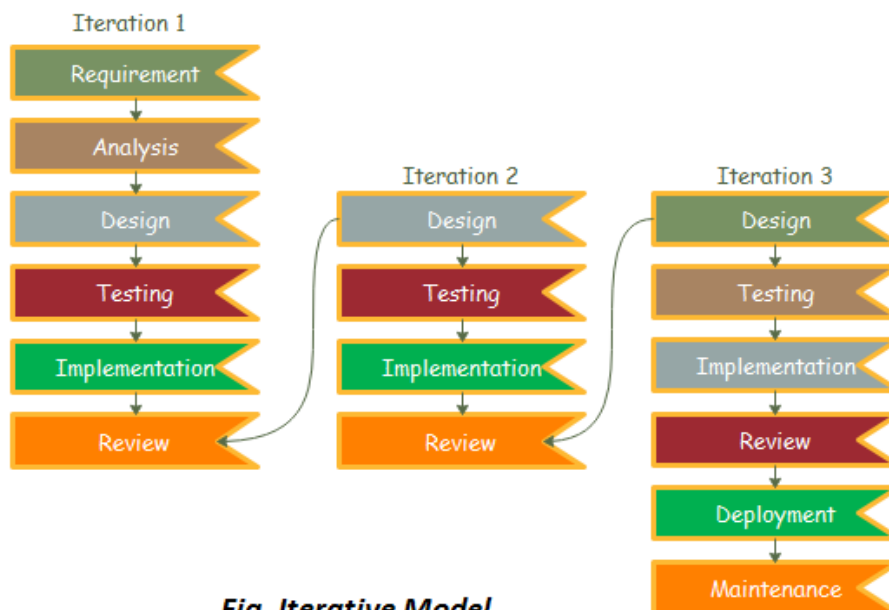


Fig. Iterative Model

Source: javapoint

Fig 2: Iterative model

The various phases of Iterative model are as follows:

1. Requirement gathering & analysis:

- In this phase, requirements are gathered from customers and check by an analyst whether requirements will fulfil or not.
- The collected requirements are then planned accordingly for developing the system.

2. Design:

- In the design phase, team design the software by the different diagrams like Data Flow diagram, activity diagram, class diagram, state transition diagram, etc.
- The software solution is prepared to meet the necessities for the design.

3. Implementation and Test:

- Implement the design into source code through coding.
- Combine all the modules together into training.
- Environment that detects errors and defects.
- A test report which contains errors is prepared through test plan that includes test related tasks such as test case
- Generation, testing criteria, and resource allocation for testing.

4. Deployment:

- After completing all the phases, software is deployed to its work environment.

5. Review:

- In this phase, after the product deployment, review phase is performed to check the behavior and validity of the developed product.

6. Maintenance:

- In the maintenance phase, after deployment of the software in the working environment there may be some bugs, some errors or new updates are required.
- Maintenance involves debugging and new addition options.

4.2.1 Why this model?

Because this model generates working software quickly and early during the software life cycle. It produces a working prototype early on in the project. As it is being reviewed and discussed, it's possible to isolate flaws in functions or design. Finding these issues at an early stage may help to address them quickly within a tight budget. The key to a successful use of an iterative software development lifecycle is rigorous.i.e. (Very strict) Validation of requirements, and verification & testing of each version of the software against those requirements within each cycle of the model.

4.2.2 Reason behind selecting this model:

- More flexible.
- Less costly to change scopes and requirement.
- Easier to test and debug during a small iteration.
- Easier to manage risk because risky pieces are identified and handled during its iteration.
- Produced working system rapidly and before time throughout the SDLC.
- Easy adoptable to the ever-changing needs of project as well as the client.
- Parallel development can be planed,
- Less time is spent on documenting and more time is given for designing.
- Regular release of new version.
- Efficient feedback.
- Higher quality.

4.3 ER-Diagram

An entity relationship diagram (ERD), also known as an entity relationship model, is a graphical representation that depicts relationships among people, objects, places, concepts or events within an information technology (IT) system.

4.3.1 Why you use ER-diagram?

We use ER-diagram to analyze existing databases to find and resolve problems in logic or deployment. It is essential for modeling the data stored in a database. ER diagrams are used to analyze existing databases to find and resolve problems in logic or deployment. The diagrams are used to design or analyze relational databases used in business processes. Databases are today's method of storing relational information for educational purposes and later retrieval, so ER Diagrams can be valuable in planning those data structures. Since so much research focuses on structured data, ER diagrams can play a key role in setting up useful databases to analyze the data.

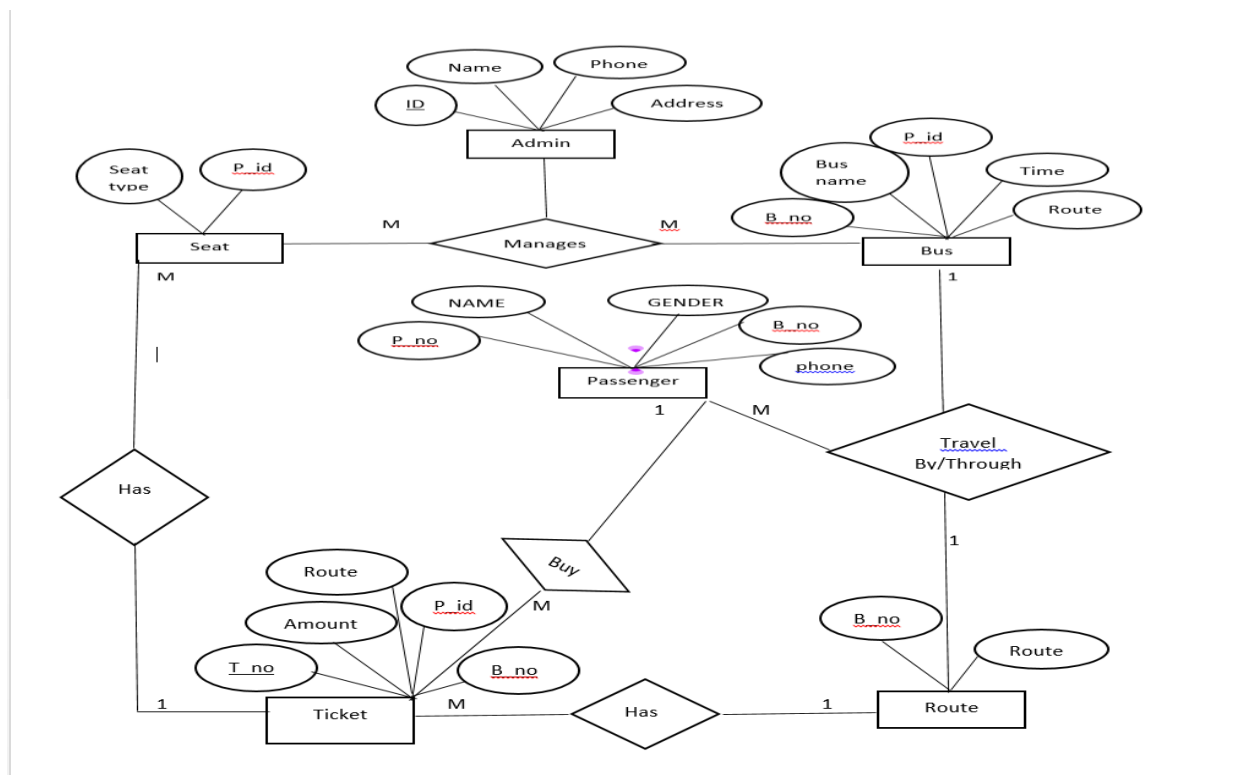


Fig 3: ER Diagram of SAJA bus reservation system.

In the above figure, there are so many entities, attributes and relations. There are 6 entities in above figure:

1. admin
2. passenger
3. bus
4. seat
5. ticket
6. routes

Here, there are the attributes of these entities. The admin of attributes includes id, name, phone and address where admin id is primary key. The passenger of attributes includes P_no, name, phone, gender ,b_no where passenger P_no is primary key. The bus of attributes include route, time, Bus B_no, Bus name,passenger P_no, where passenger P_no is foreign and bus B_no is primary key. The route of attributes include route , bus B_no where route is primary and bus B_no is foreign key. The ticket of attributes include T_no, amount, Route, P_no, B_no where ticket T_no is primary, passenger P_no is foreign, and bus B_no is foreign key.

There are many types of relationship which is included in above figure. Like one to one, one to many, many to one, many to many. So let's describe relations among entities. One admin manages multiple number of seat, passenger, and buses. One or multiple bus manage multiple number of seat. One or many passenger travel in one or multiple bus. One or many passenger buy one or multiple ticket. One ticket has multiple number of seat. Multiple ticket has one route and multiple bus travel through one or multiple routes.

4.4. Context Diagram

A context diagram, sometimes called a level 0 data-flow diagram, is drawn in order to define and clarify the boundaries of the software system. It identifies the flows of information between the system and external entities. The entire software system is shown as a single process.

In the figure below, passenger and admin register and login the system to gain its access.

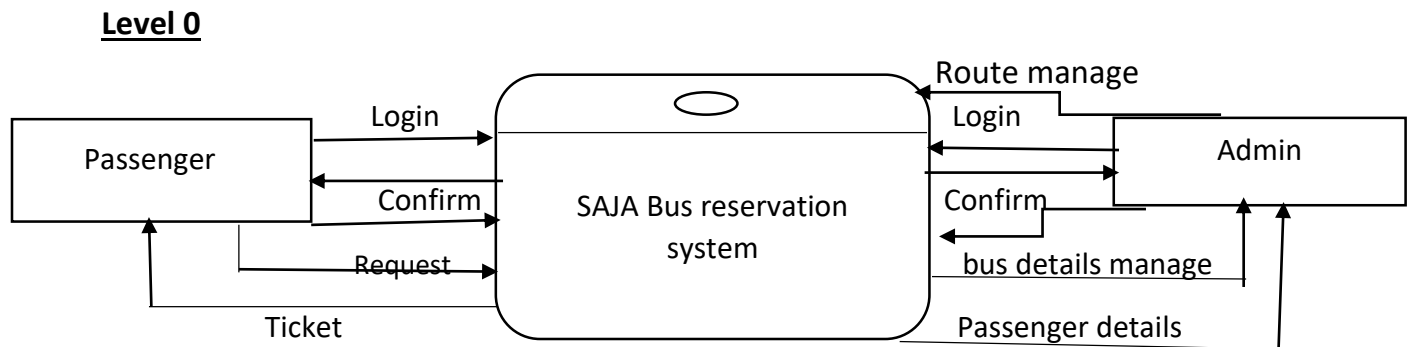


Fig 4: context diagram of SAJA bus reservation system

4.5 Data flow Diagram (DFD)

A data flow diagram (DFD) is a graphical representation of the "flow" of data through an information system, modeling its process aspects. A DFD shows what kind of information will be input to and output from the system, where the data will come from and go to, and where the data will be stored.

The development of DFD'S is done in several levels. Each process in lower level diagrams can be broken down into a more detailed DFD in the next level. The Top-level diagram is often called context diagram. It consist a single process bit, which plays vital role in studying the current system. The process in the context level diagram is exploded into other process at the first level DFD.

In the figure below, passenger login /register their respective personal info and request for bus details and after receiving response they can further preceed for ticket booking whereas admin login /register their respective personal info and get access to admin panel where they can manage buses and passengers information ,available routes and billing details.

LEVEL 1

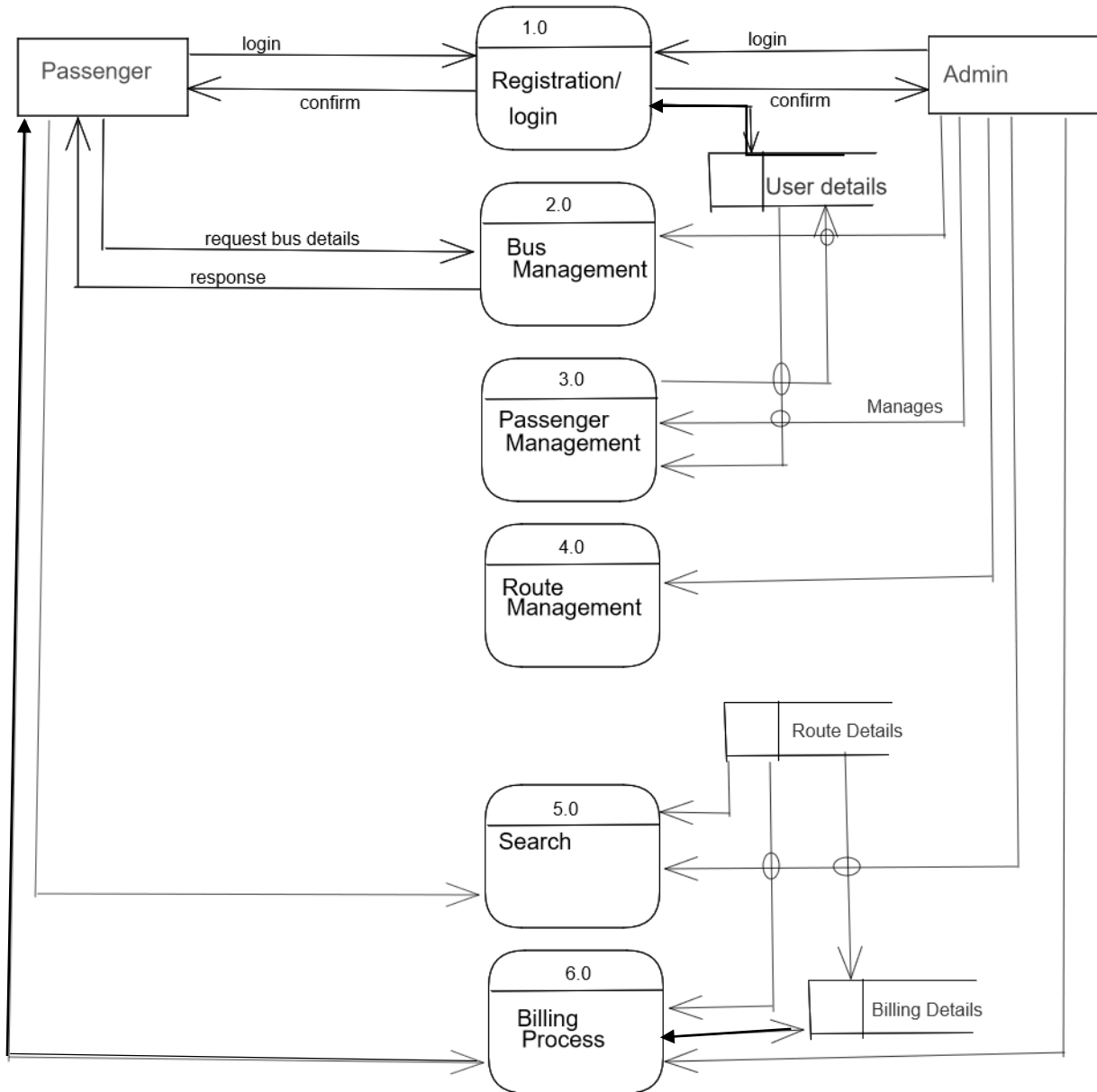


Fig 5: data flow diagram of SAJA bus reservation system

4.6. Use Case Diagram

A **use case diagram** is a graphical depiction of a user's possible interactions with a system. A use case diagram shows various use cases and different types of users the system has and will often be accompanied by other types of diagrams as well. The use cases are represented by either circles or ellipses. The actors are often shown as stick figures.

In our bus reservation system, actors include:

1. Admin
2. Passenger

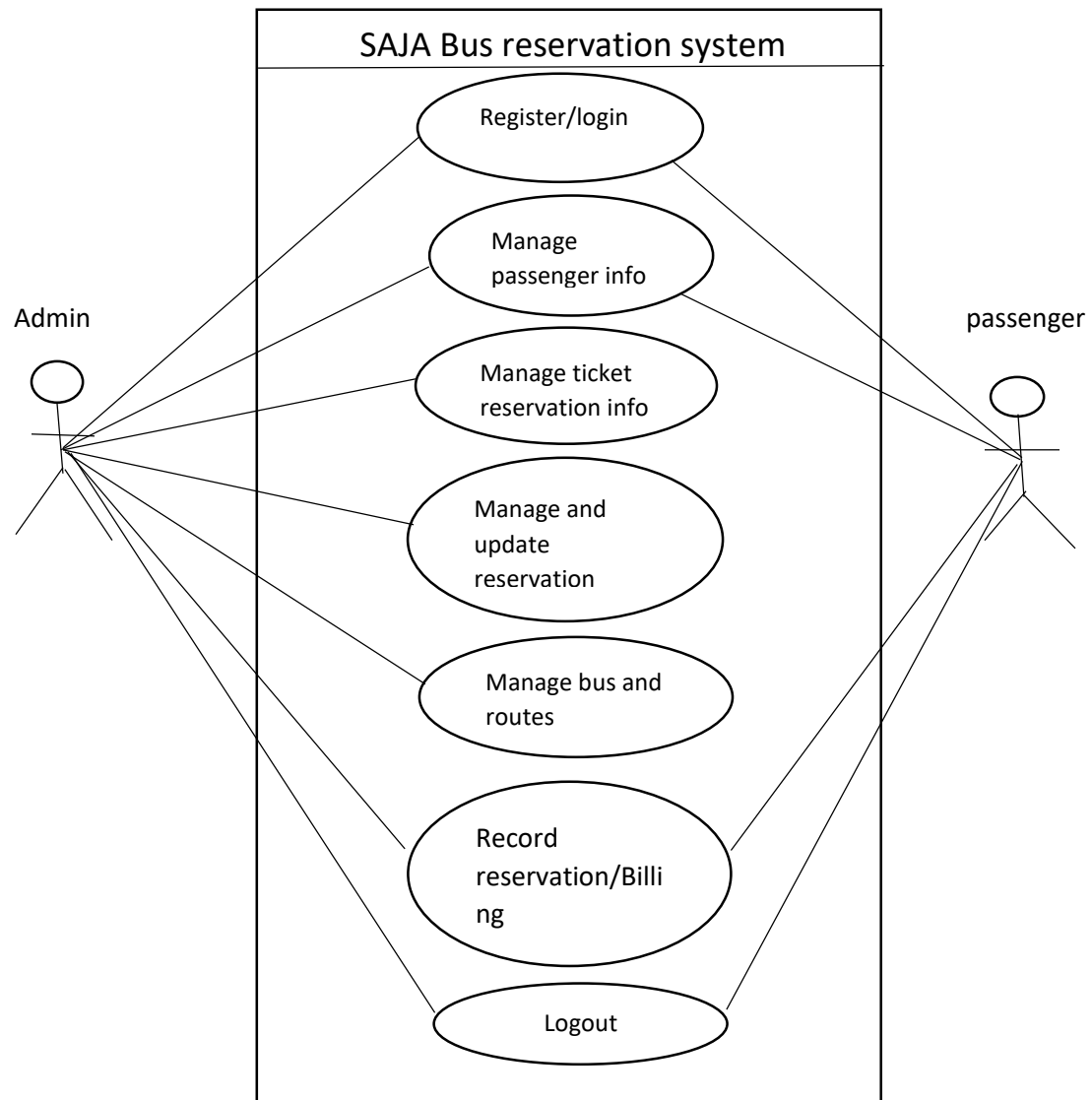


Fig 6: use case diagram of SAJA bus reservation system

In the figure above, passenger login /register their respective personal info and after receiving response they can further precede for ticket booking and logout from the page whereas admin login /register their respective personal info and get access to admin panel where they can manage buses and passengers information ,available routes and billing details and logout from the page.

4.7. Gantt chart

A Gantt chart is a project management tool assisting in the planning and scheduling of projects of all sizes, although they are particularly useful for simplifying complex projects. Project management timelines and tasks are converted into a horizontal bar chart, showing start and end dates, as well as dependencies, scheduling and deadlines, including how much of the task is completed per stage and who is the task owner. This is useful to keep tasks on track when there is a large team and multiple stakeholders when the scope changes.

As it's in a bar chart format it is possible to check on progress with a quick glance. You can easily see:

- a visual display of the whole project,
- timelines and deadlines of all tasks,
- relationships and dependencies between the various activities,
- project phases

Project management solutions that integrate Gantt charts give managers visibility into team workloads, as well as current and future availability, which allows for more accurate scheduling. Gantt charts have been around for nearly a century, having been invented by Henry Gantt, an American mechanical engineer, around 1910.

4.7.1. History of the Gantt chart

It is difficult to envisage how a modern project would be managed without at some point creating a chart of tasks to be done in delivering the project's declared benefits. One of the most enduring types of chart is the Gantt chart.

4.7.2. How to use a Gantt chart

The underlying concept of a Gantt chart is to map out which tasks can be done in parallel and which need to be done sequentially. If we combine this with the project resources we can explore the trade-off between the scope (doing more or less work), cost (using more or less resources) and the time scales for the project. By adding more resources or reducing the scope the project manager can see the effect on the end date.

To create a chart you need to know all of the individual tasks required to complete the project, an estimate of how long each task will take and which tasks are dependent on others. The very process of pulling this information together helps a project manager focus on the essential parts of the project and begin to establish a realistic timeframe for completion.

A Gantt chart is used for the following activities:

- Establish the initial project schedule - who is going to do what, when and how long will it take.
- Allocate resources - ensure everyone knows who is responsible for what.
- Make project adjustments - the initial plan will need many adjustments.
- Monitor and report progress - helps you stay on schedule.
- Control and communicate the schedule - clear visuals for stakeholders and participants.
- Display milestones - shows key events. Identify and report problems - As everything is depicted visually you can immediately see what should have been achieved by a certain date and, if the project is behind schedule, you can take action to bring it back on course.

Start date: Chaitra, 2078

End date: Jestha, 2079

SDLC PHASE	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
WEEK								
Requirement Analysis								
Designing								
Coding								
Testing								
Implementation And Maintenance								
Documentation								

Fig 7: data flow diagram of SAJA bus reservation system

Chapter 5: System Testing

1. Unit testing:

- It is a software development process in which the smallest testable parts of an application, called units.
- Individually and independently scrutinized for proper operation.
- It is done during the coding phase by the developers.
- To perform unit testing, a developer writes a piece of code (unit tests) to verify the code to be tested (unit) is correct.

2. Integration testing:

- Process of testing the interface between two software units or module.
- Focus on determining the correctness of the interface and to expose faults in the interaction between integrated units.
- Integration testing is performed using the black box method.
- This method implies that a testing team interacts with an app and its units via the user interface – by clicking on buttons and links, scrolling, swiping, etc.

3. Black box testing:

- Involves testing a system with no prior knowledge of its internal workings.
- Also known as behavioral testing.

4. White box testing:

- An approach that allows testers to inspect and verify the inner workings of a software system.
- Also known as clear box testing, glass box testing, transparent box testing, and structural testing.

5. System testing:

- System testing is defined as testing of a complete and fully integrated software product.
- Falls in black-box testing wherein knowledge of the inner design of the code is not a pre-requisite and is done by the testing team.
- The level of software testing performed before Acceptance Testing and after Integration Testing.
- It comes under Black Box testing, i.e., only external working features of the software evaluated during this testing.

Chapter 6: Conclusion

SAJA bus reservation system is an application where the customer can book a ticket online and 24 hours a day from anyplace in the world. Customers can also interact with the ticket booking website to know any other details they want. Online ticket booking system has been developed successfully. System performance is also found to be satisfactory. This is a user-friendly application. Through this application, the cost can be reduced and efficiency is increased. There are several procedures that can be selected by customers. This system is friendly and accurate. With the help of online ticket booking system records are maintained and the database is updated with time to time. Through Online ticket booking system, technologies and features have been introduced.

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PAGES

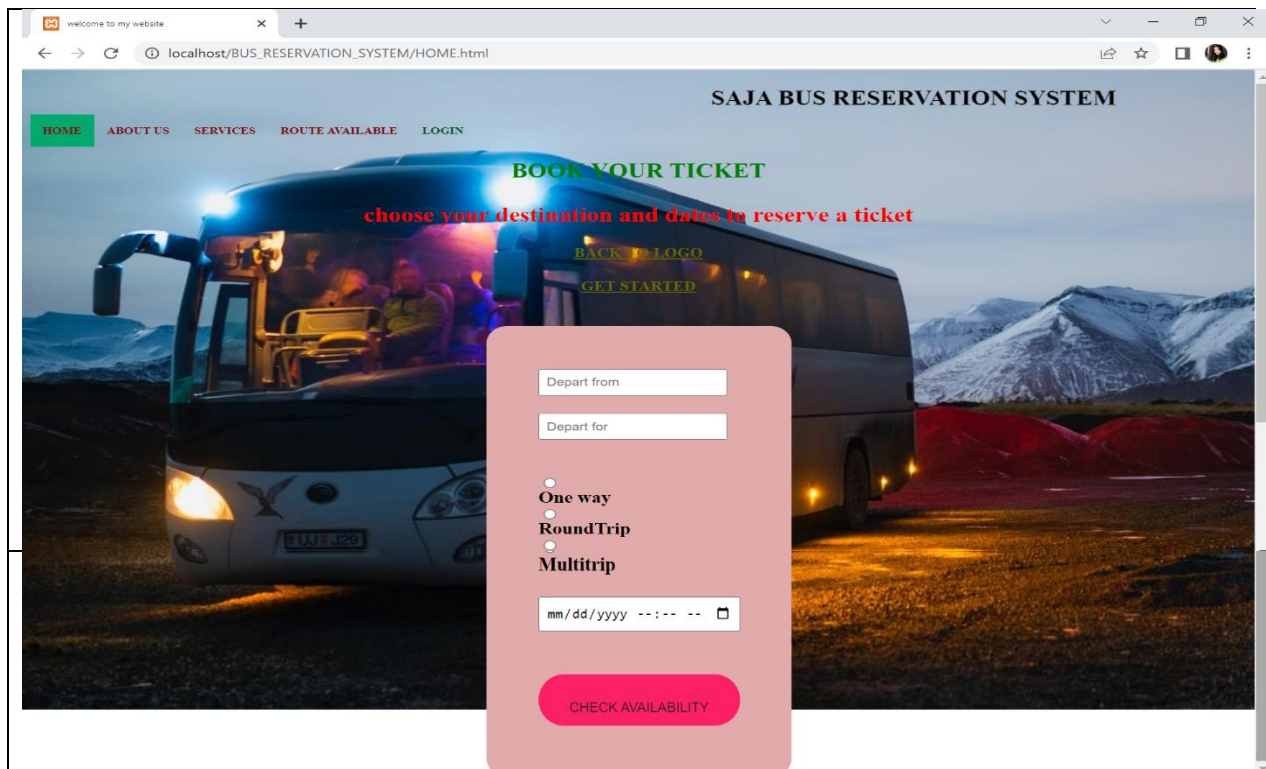


Fig 8 : Home page of SAJA bus reservation system

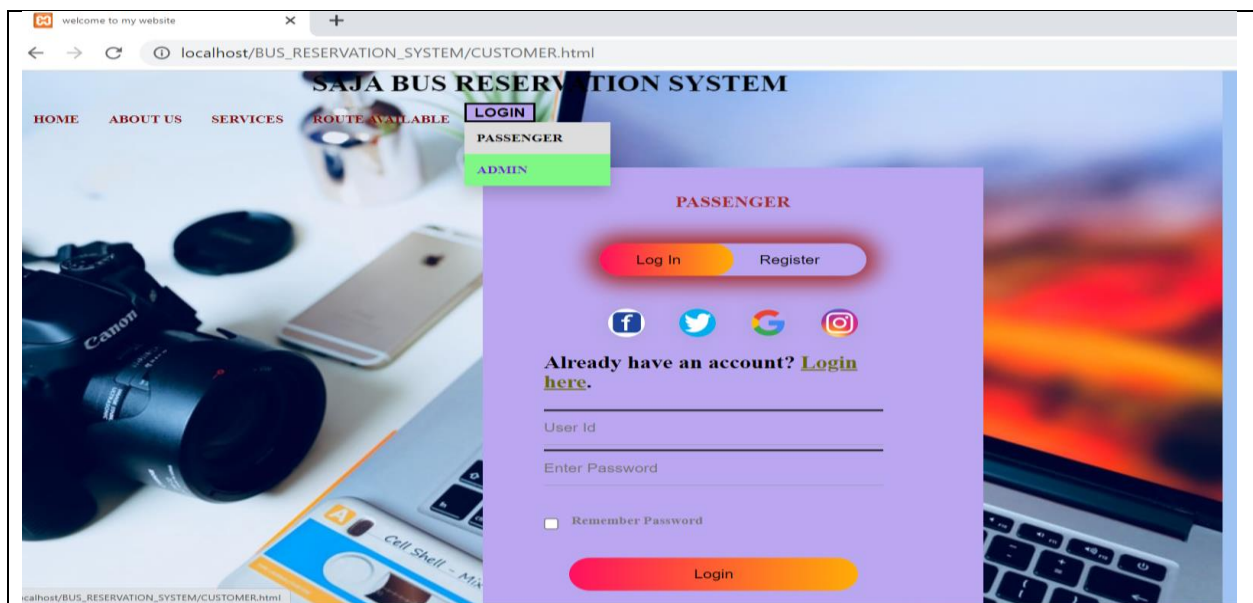


Fig 9 : Customer page of SAJA bus reservation system

Saja Bus Reserve Bus Ticket

Please insert each information wisely and correct....

Passenger Info :

Name Enter your name

E-mail Enter your email

Phone no.: Enter your phone number

Number of Passenger :

Adult Enter number

Children Enter number

Booking Details :

Date mm/dd/yyyy --:--:--

Location Enter your location

Destination Enter your destination

Select seat Preference Choose a Seat from the List

Others

Anything Else? Tell us anything else that might be

[Note :After confirmed if you need to cancelled the ticket, inform to the member from OUR DETAILS.]

[Click here to confirmation](#)

Fig 10 : Booking page of SAJA bus reservation system

Saja Bus Reserve Bus Ticket

Passenger Info :

Name Aakansha Xetri

Phone 9861757075

Number of Passenger

Adult 1

Children 0

Booking Details :

Date 2022-06-10 08:20:00.0000

Location kathmandu

Destination sarlahi

Select seat Preference B3

[Note : Bus fare as fixed by the Government Of Nepal.]

Thank You For choosing us!!

Please keep it safe since needed while travel...

Have a safe and comfort journey..

Fig 11 : Print page of SAJA bus reservation system

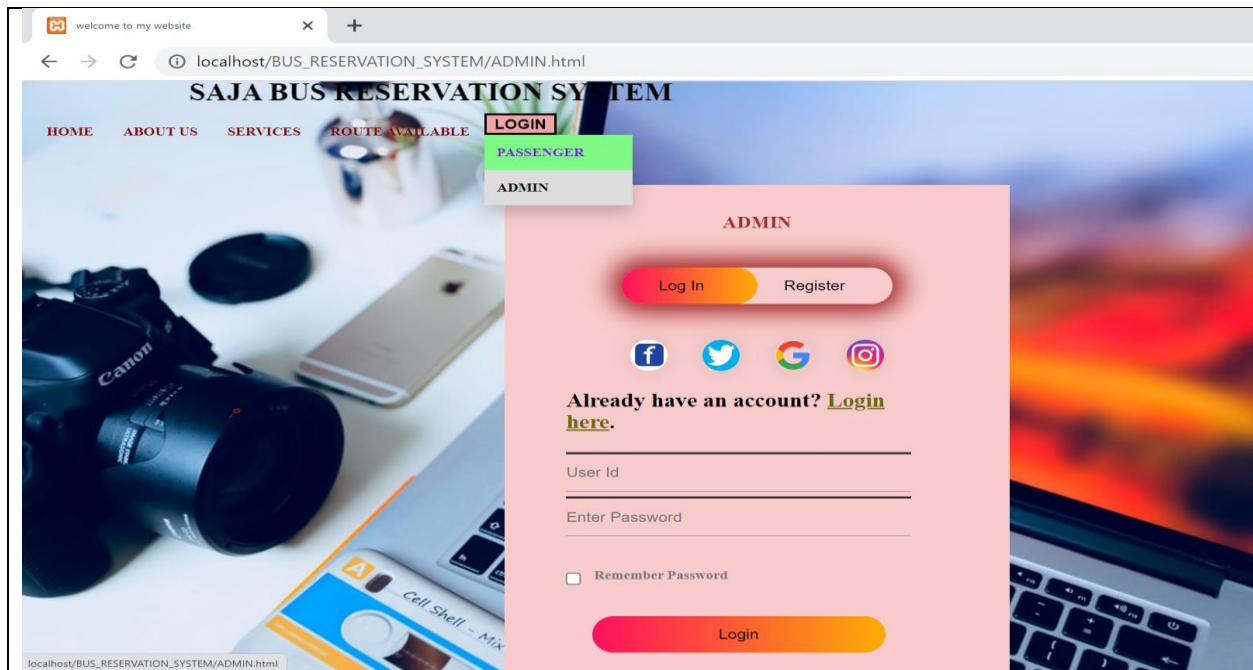


Fig 12 : Admin page of SAJA bus reservation system

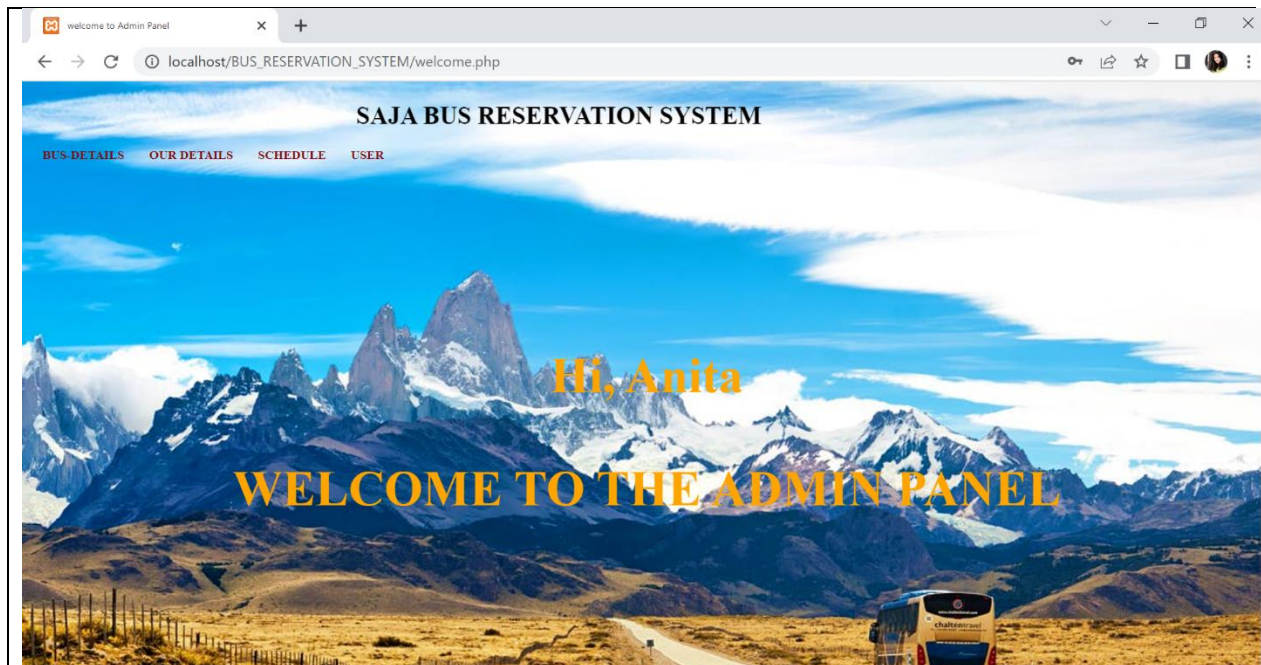


Fig 13 : Welcome page of SAJA bus reservation system



Fig 14 : BUSLIST page of SAJA bus reservation system

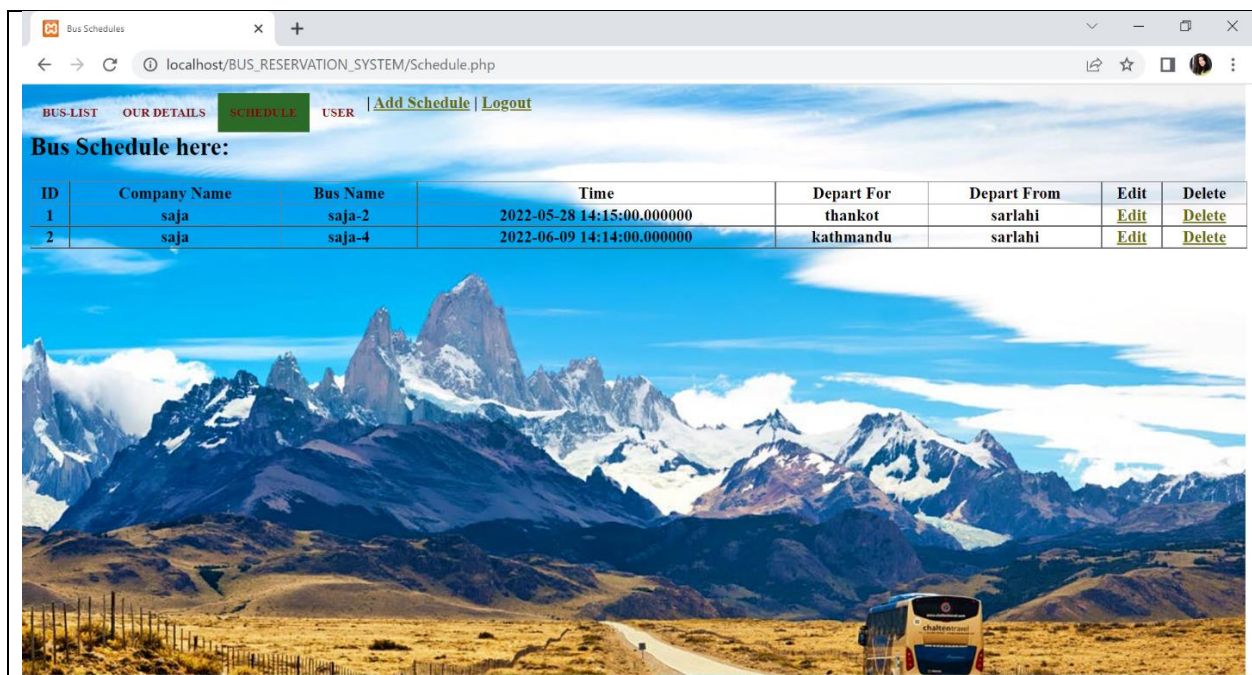


Fig 15 : Bus Schedule page of SAJA bus reservation system

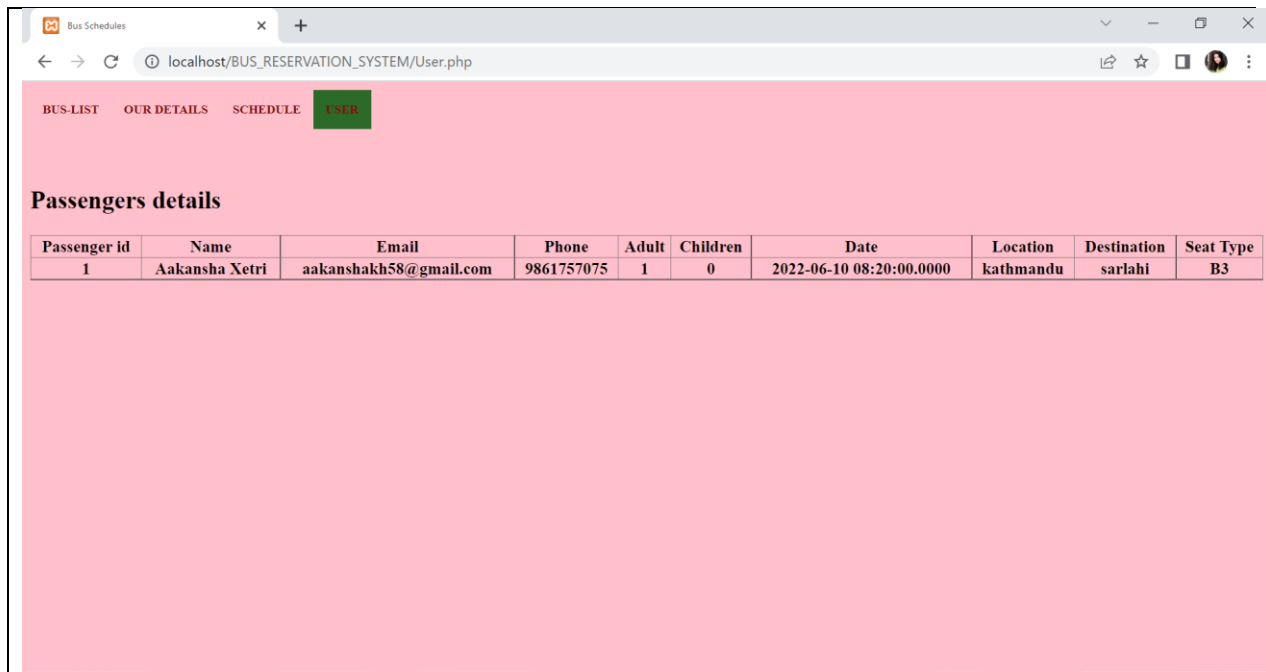


Fig 16 : User page of SAJA bus reservation system