



NEW IMPLEMENTATION OF BUS TICKETING SYSTEM IN JAVA WITH EXTREME PROGRAMMING METHODOLOGY USING UNIFIED MODELLING LANGUAGE

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ABSTRACT

In today's tech era, IOT (Internet of things) has become much popular around the world. Almost all the devices, which are known as smart device, can connect to the internet and access data from any corner of the world. There was a time when people used to waste their valuable times just to get a piece of information. Now the technology is more advance then compare to any previous times. One of the blessings of technology is web application. It allows users to interact with the system from anywhere as long as they are connected to the internet. Here the system proposed going to discuss is "Bus Ticketing System" which is completely a web application. As already discussed above that internet has made the user's interaction through the system easier, so this web application can connect to respective servers for accessing data which will surely help users to purchase the bus ticket or reserve their seats online without waiting on queue. Moreover, in recent decays peoples are like to travel to get some relief from their monotonous life. So, travelers want to travel without any hesitations. In this modern tech era they want a system that will enhance the portability, accessibility as well as user friendly. Hence the implemented web system having all the features that will make it more user friendly and accessible.

Keywords: *Analysis, Class diagram, Extreme programming, Use case diagram,*

I. INTRODUCTION

EZB SDN BHD is a bus service company located in the heart of Malaysia, Kuala Lumpur. Usually they do paper works for keep their customer's details and booking reservation records. If any customer need to reserve seat he or she need to call them or walk in to their counter which is consider as wasting their valuable times. Sometimes the phone line also keep busy and customers unable to reserve seats for them. Besides, EZB need to keep records of the payments made by customers in papers and quite impossible for them to keep track on payment issues. Currently EZB is planning to replace their old booking system with new system which is online based. So they want to implement an online web based bus ticketing system which will be easier for customers to book from home and abroad as well as for them to manage their overall business smoothly.



2.1 Users List

A. User: Customer

Here customers can purchase the ticket or reserve their seats by accessing the system as a guest or as a member. With every purchasing or reservation the system will generate a reservation id or purchased id for both guest and members at a time. Once the payment is done customers won't be able to send the request through the system to refund the payment if they want to cancel their purchase. Customers can update their account details as for example: contact number, email address, mail address etc. If the customers is not registered members then the system will not have any account for the guest to update at any time they want. So the information as for example name, address, contact, and email they will provide while reservation need to make sure they don't change for any reasons. Registered Customers are able to cancel their booking although there will be no refund.

B. User: Staff

Employee is another user of this system. They will access the system for reservation and booking purposes. Every employee can login to the system by entering their individual username and password. Depending on customers preferences they will purchase the ticket on behalf of them or reserve the seats and send them an email as a confirmation or notification.

C. User: Manager

Manager will be able to access the system to check the reports of booking or purchasing details of individual customers. He can cancel the booking on request. He will also check the employees working hours completed. Manager will also be able to generate the sales report depending on months or years. He can also update the bus schedule.

D. User: Admin

Admin is the key users of this entire web system. He will register new staff, new manager and even new admin (if necessary) by entering their details into the system. He will also be able to manage the booking of the registered customers. Again, changing the user's credentials like username and password is another important function that only an admin will be allowed to do that. In a nutshell admin will be able to access each and every functionalities of the system. Besides admin can also delete users account

III. ASSUMPTION

Here author going to illustrate some of the assumption regarding the systems functionalities. Author will discuss some of the advantages, disadvantages of the system itself. Author will also show how the design or modelling the system using UML (Uniform Modelling Language) for examples: Use Case, Activity (Swim Lane) and Class Diagram (Draft). For further description in details author will proceed step by step so that it will help people to understand the overall development process.

Some of the advantages and disadvantages regarding the system functionalities.

3.1 Advantages

- The system having online payment functions. So that it will be easier for customers to pay online rather than going to the counter and pay by cash.

- The system will generate a voucher code for registered customers every 15 days. So, using this voucher customers will have some discount while purchasing ticket online.

- Customers will be able to see the available bus depending on the schedule they select along with the price.

To make the seat reservation clearer the system having the picture of available and reserved bus seats so that customers will know which seats they can reserve before they go for purchasing tickets. Below is a sample of a bus reservation seats GUI [1].

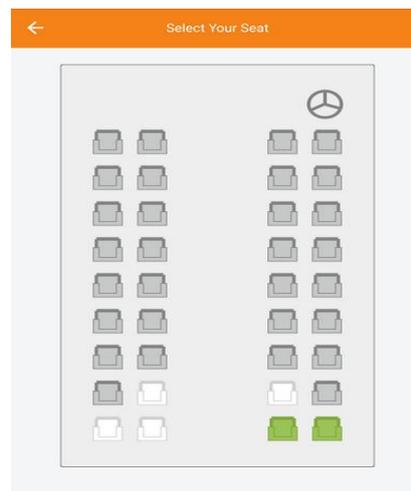


Figure.1 Sample bus seats reservation

Above “Fig.1” is a sample of bus seats reservation UI which shows the available and booked or purchased seats by color.

- If there is any upcoming or ongoing promotion then the system will show it for customers whoever accessing.
- As the system having online transaction it will not save the customer’s credit or debit details like card numbers, expiry dates and cvv code for security issues while purchasing or reserving the seats.
- If the registered customers want to add their credit or debit card as a default payment methods then the system will have the sanction where it will encrypt the card details and allow them to use it while purchasing without entering any card details.
- If the users forget their password the system will have the panel where they can apply for the new password for logging in to the system thus the new password will be send to their registered email address promptly.
- In case of emergency, the system will ask users to add their secondary email address for password recovery. It is also an extra advantages the system will provide as a better security for users.
- For enhancing the security while online transaction the system will be secured by SSL (Secured Socket Layer) having certification from Veri Sign & MacAfee.
- For the last not for least, every data provide by the users will be encrypted by 128 bits.

IV. SOFTWARE DEVELOPMENT MODEL

A software development model or system development methodology in software engineering is a framework that is used to structure, plan as well as control the process of developing an information system. There are few software development models which we usually follows. They are:



- Agile Software Development
- Extreme Programming
- JAD (Joint Application Development) Waterfall
- WSDM (Web Semantic Design Method)
- Design Improvement
- Small Releases

Changes in software requirements is a common in every software development. As a developer we need to make sure that whatever the changes take place our system should meet the overall requirements of the stakeholders. Here I am going to choose XP (Extreme Programming) methodology to develop this system.

4.1 Extreme Programming

Extreme Programming is one of the agile methodology for system development. Here changes in requirements while iteration is possible compare to others like (Scrum, RAD etc.). It improves the quality and responsiveness of system application shown in “Fig.2”.

There are 5 phases in this agile methodology. They are:

- Planning
- Designing
- Coding
- Testing
- Listening

4.1.1 Planning

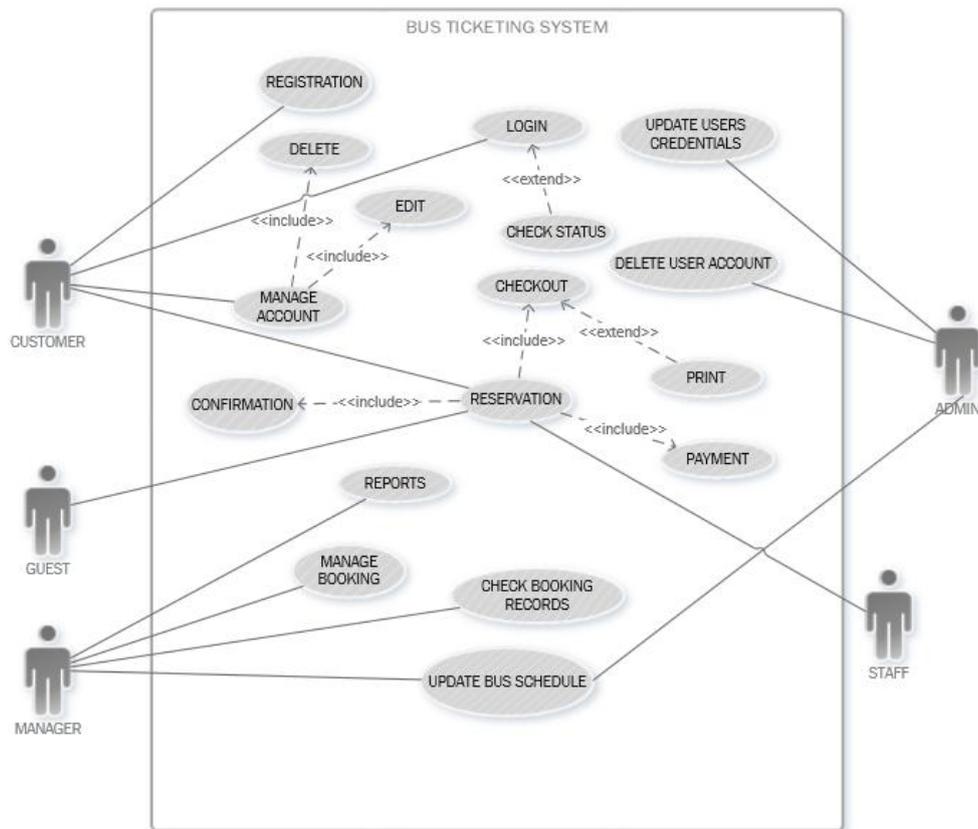
The first step we are going to take is planning. Here we the development team will involve customers or users to create the system requirements or user stories. Here the users of our system are Admin, Staff, Manager and the registered customers. We will convert their requirements into the iteration which is usually a small parts of the system functionalities. We will focus on dead line of the iteration so that we will be able to complete the requirements on time.

4.1.2 Design

After the planning we will start designing the overall system. Here we will include object oriented design models (UML) to illustrate the overall functionalities of the system. This design models will show the active users of the system and their involvement in every process. As for examples: registered customers login, customer registration, payment, reservation, booking updates and so on.

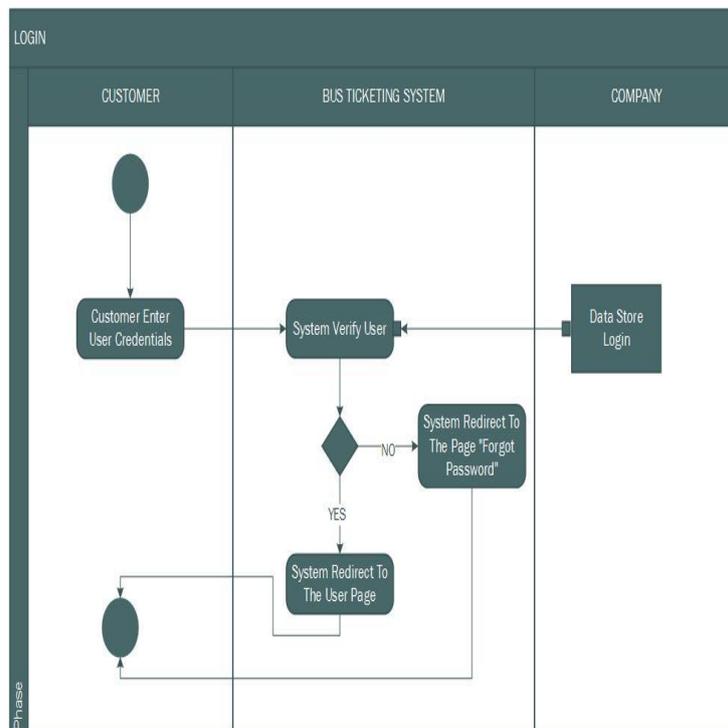
4.1.3 Coding

This is the most important phases we will take into account while developing the system. Here we will do pair coding for developing the system using one machine so that at the end we will be able to produce high quality code and at the same time reduce the overall cost. It will also help us to reduce the conflict and optimize the functionalities of the system.

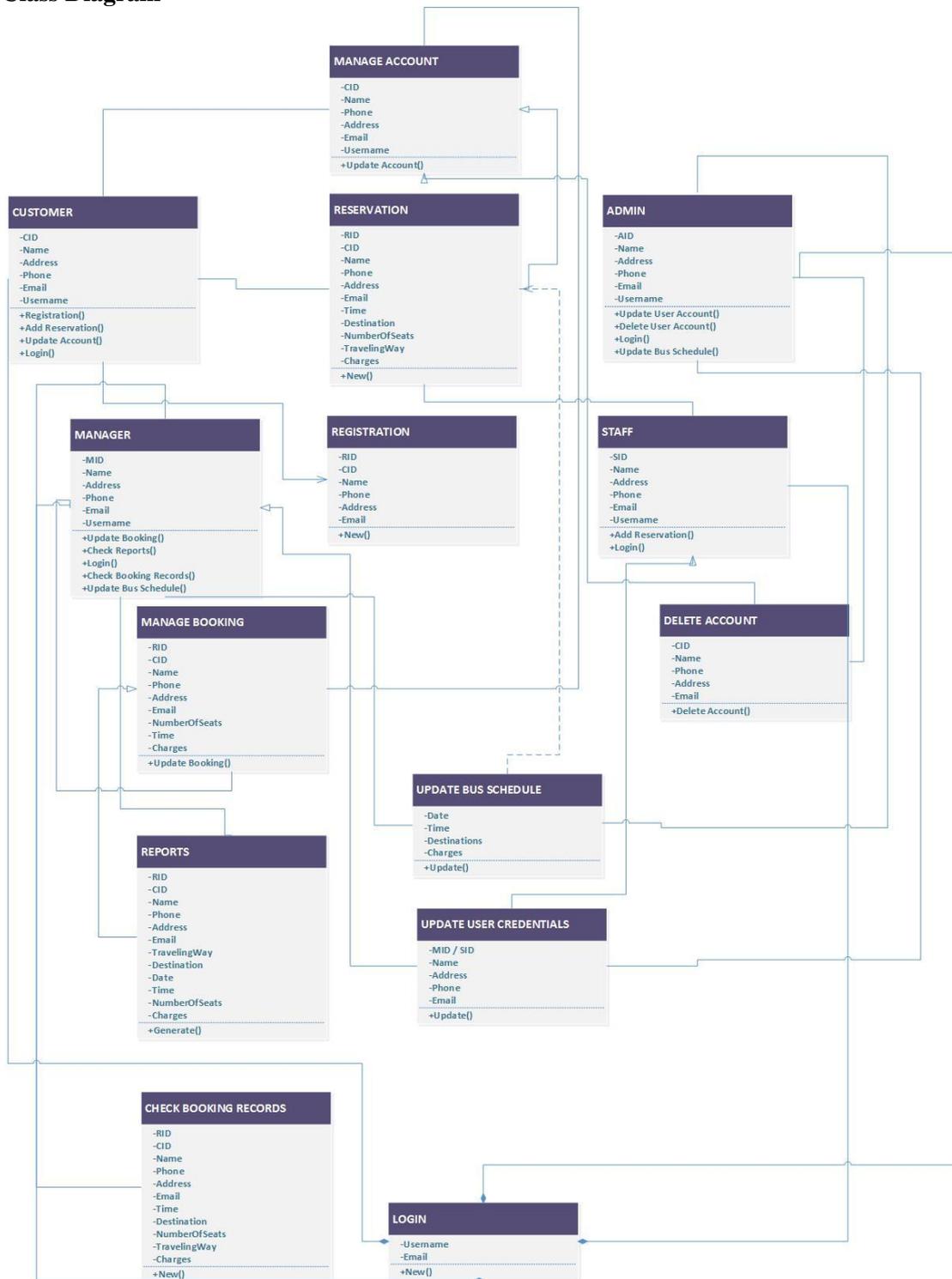


5.3 ACTIVITY DIAGRAM (SWIMLANE)

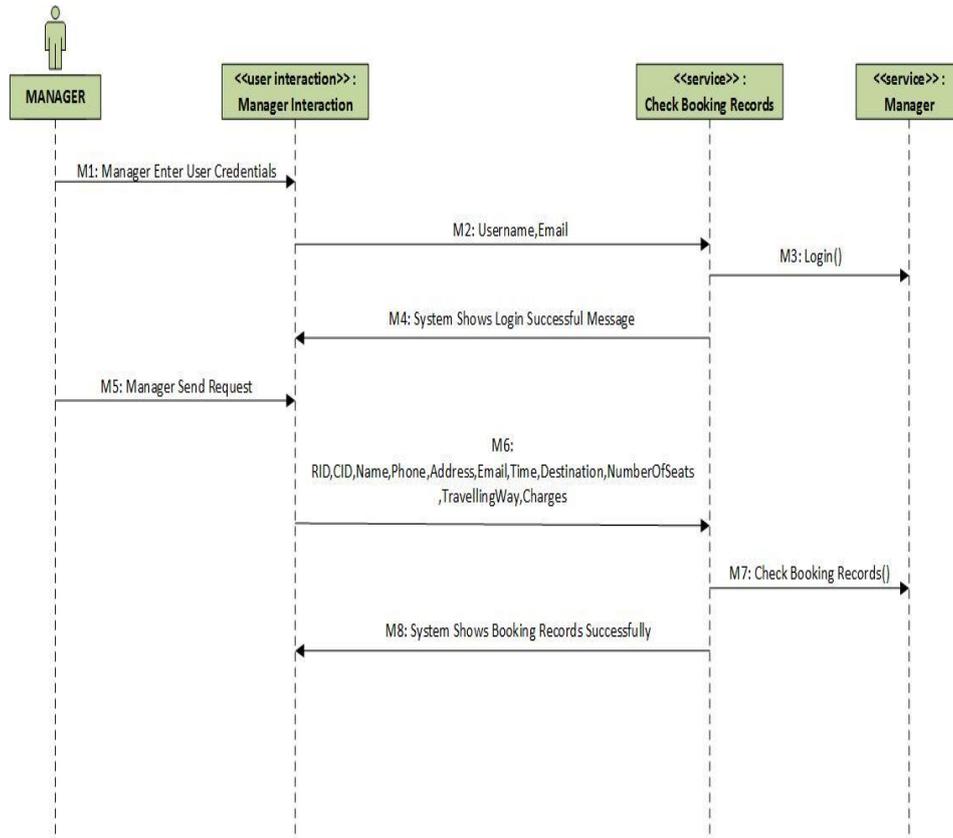
A) LOGIN



5.4 Class Diagram

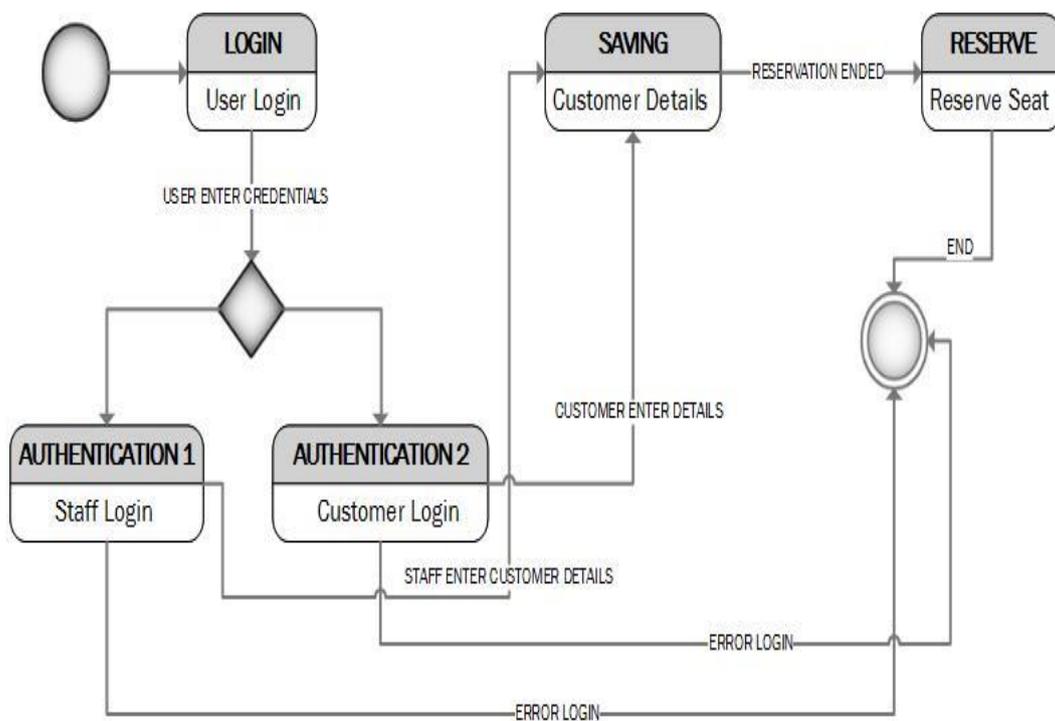


5.5 Sequence Diagram for Check Booking Records



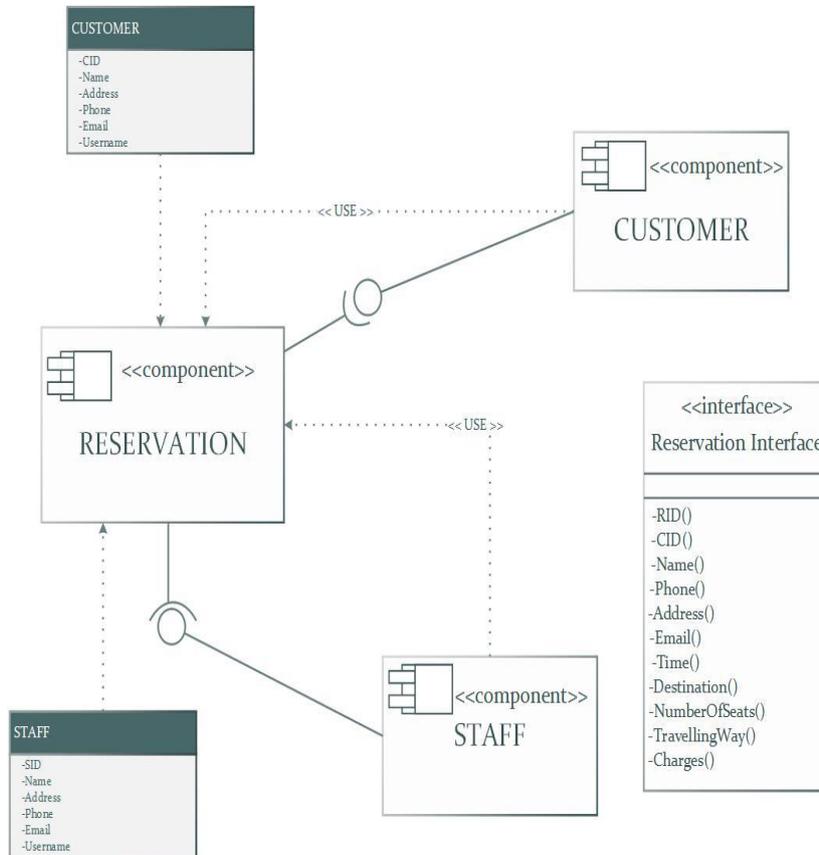
VI. STATE MACHINE DIAGRAM

A) RESERVATION



6.4 Component Diagram

A) Reservation



VII. SAMPLE CODES

```

#include<iostream>
#include<string.h>
using namespace std;

class Customer{
public:
    void setID(string id){
        CID = id;
    }

    string getID(){
        return CID;
    }

public:
    void setName(string name){
        Name = name;
    }

    string getName(){
        return Name;
    }
}
    
```

Although the overall system will bring some advantages for EZB, some of the facts needed to be considered. As author said earlier the system is not going to available for 24*7 and there will be a limited operation hours, EZB may lose some customers in future due to the booking time restriction. If the internet connection become down then the system will halt and no offline data can be accessed through it. Changing customers mind wont effect the system as there will be no refund after booking. The pros of the system we can consider here is like EZB can run the business smoothly as there will be no hustle regarding managing customers details, booking details, payments and so on. This system will increase the productivity of their business as well. For the future enhancement, there will be a scope for international customers also to book from home and abroad which will boost up their business profit and also make them renown worldwide. Besides, they also need to provide hands on training to their staffs so that they will become more familiar to the system and also make it easy for them to book seats on behalf of customers. Restriction in PayPal money transfer is also an issue. So customers from abroad will face some difficulties on payment. Auto backup will be implemented in future as currently we designed the backup system manually. If the system crash then all the data will be erased so staff should take care for keeping the data safe by saving it every day after office hours. From the above discussion we can say that although the system will have some cons, somehow it will have some positive impact of EZB business process. Comparing to current system which is just a manual book keeping, this online web system will automate their day to day business process.

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