

## Developing A Bus Ticket Reservation Web Application At PT. Setia Jiwana Sakti

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### Abstract

*This paper describes the development of an online ticket reservation application that integrates and automates current business processes throughout multiple branches of a bus transportation service provider operating across the border of neighboring countries. Utilizing the versatility of the current web technology, the application also adds new values to the company's business process; enabling it to provide customers with services that is not limited to physical boundaries such as location and time. The web application is developed using PHP and utilizes MySQL.*

### 1. Introduction

PT Setia Jiwana Sakti (SJS) is a bus transportation service provider that operates routes between the neighboring countries of Indonesia, Malaysia and Brunei. It has multiple branches in several cities in Indonesia, enabling customers to make reservations at the nearest branch.

However, since the current reservation system is still conducted manually and separately at each branch, contact must be made by each branch's front-officer to the head office for each customer's enquiry in order to get the latest update on schedule, seat availability and other reservation-related information; as well as to avoid duplicate bookings or over-capacity. There is also a physical limit to the reservation availability as each branch only operates during certain hours and reservations can only be made on-the-spot or via telephone. Travelers from Malaysia who would like to use the bus service to travel to Indonesia must be willing to make an international call to one of the branches to be able to get information and reserve a seat.

These limitations are not the only issues the company is currently facing. Other factors that create problems include human errors (e.g. miscalculations in ticket price, mistakes in noting passenger data, etc.), the fluctuation of passengers during certain periods of time that causes a bottleneck in the check-in process because

of the inability of the front-officer to multitask and the lack of overview or report of the on-going business; making it difficult for the company to judge past/current performance or plan future improvements.

Looking at these problems and limitations, it is clear that both the company and the customers require an integrated reservation system that is more efficient in information update and reservation handling and also easy to use.

### 2. Analysis and Design

The application is developed using the prototyping method and utilizes UML (Unified Modeling Language) as the modeling language [1].

#### 2.1. Requirements Determination

The application will be used by different types of user with different levels of access. Identified major user groups are owner (who will function as the administrator of the system and thus gain full access to the whole application), employees (supervisor, front-officer/ticketing and cashier: each role is given different access levels according to their tasks) and customers (who will use the application to create and manage their reservation).

Requirements for the web application that are gathered through interview and observations of the current system include:

#### 1) **Access Levels: permissions and privileges**

*Administrator (owner)* has full access to the system including user management, report generation and viewing user log.

*Supervisor* has the ability to edit bus and employee status, create bus schedules and manage bus leasing.

*Front-officer/ticketing* is given access to reservation management activities i.e. create, edit and cancel reservation and/or activated tickets (i.e. payment has been made), view reservation data, print tickets and conduct check-in.

Customers can create and manage reservation, check-in (after login). All visitors to the website can view bus schedules, tour information and send enquiry for bus leasing.

## 2) **Reservation**

*Create new reservation* starts with searching and displaying available schedule based on user input, i.e. city name (to and from), dates (departure and return date for two-way ticket reservation) and number of passengers. The system will also display the capacity status of the busses in the search result, disabling selection of fully-booked busses. Customers can also manage (edit or cancel) their reservation through this system.

*Seat availability* is displayed, enabling passengers to select seats according to their preference and to prevent multiple seat bookings.

*Passenger data* including full name, nationality, and passport number are stored in the system.

*Reservation and ticket status* will be updated accordingly. By default, once a reservation is made it will be regarded as *pending*. After payment has been made and confirmed, the cashier will update the reservation status to *active*. Cancellations can be made either to the entire reservation or just the tickets (e.g. cancelling the return trip in a two-way reservation). The system will automatically cancel all pending reservations that surpass their payment due dates. Should a passenger wishes to reschedule a trip to a yet-to-be-decided date, the ticket status can be updated to *extend*, giving the passenger three months to decide on a travel date before automatically setting the ticket status to *cancelled*. Note that ticket management can only be done by the ticketing officer and not by the passengers.

## 3) **Ticket Activation**

*Status update* for all paid reservations will be done by the cashier.

*Automatic ticket number generation* by the system will be followed by sending the ticket through email to the user and the ability to view and print the ticket online by entering the reservation or ticket number.

## 4) **Check-in**

*Self check-in* is available for users before departure by logging in to the system and entering their reservation number on the day of

departure. The ticketing officer is given access to view the number of checked-in passengers.

## 5) **Route Management and Scheduling of Busses, Drivers and Co-Drivers**

*Create and manage routes* are accessible only for the administrator. Route management also includes assigning available busses with proper capacity besides the default required information such as cities, date and time, and ticket price.

Managing available busses, drivers and co-drivers can be done by both administrator and supervisor. Busses, drivers and co-drivers that are unavailable (e.g. bus is undergoing repairs or maintenance, sick drivers, etc.) will not be available for scheduling. Should the administrator/supervisor change the status of a scheduled bus/driver/co-driver to unavailable, the system will alert the administrator or supervisor of this matter.

## 6) **Leasing and Tourist Information**

The system enables the company to add new services for customers such as the ability to lease busses based on online enquiries sent by customers and the ability to provide information about the destination cities including tourist spots and hotels.

Non-functional requirements of the system include Windows platform operability and multiple browsers compatibility, authentication, encryption and 24/7 system availability.

A notable change in the business process is the division of front officer tasks into the new roles of Cashier and Ticketing Officer.

## 2.2. Functional Modeling

The use case diagram in figure 1 depicts the interaction between users and the system while figure 2 shows the activity diagram of making new reservations. Figure 3 depicts the flow of activity to manage (edit or cancel) reservations while figure 4 shows the flow of activity to manage (edit or cancel) ticket(s) within a reservation. The flow of activity to conduct self check-in by passengers is depicted in figure 5 below.

## 2.3. Interface Design

In order to create an application that is not only functional but also easy to use, i.e. has a user-friendly interface, the following principles of website design are taken into account [3]:

- 1) **Designing for the computer medium.** Making sure that users are comfortable with the look-and-feel and are able to load the website on various browsers and with non-broadband internet connection.

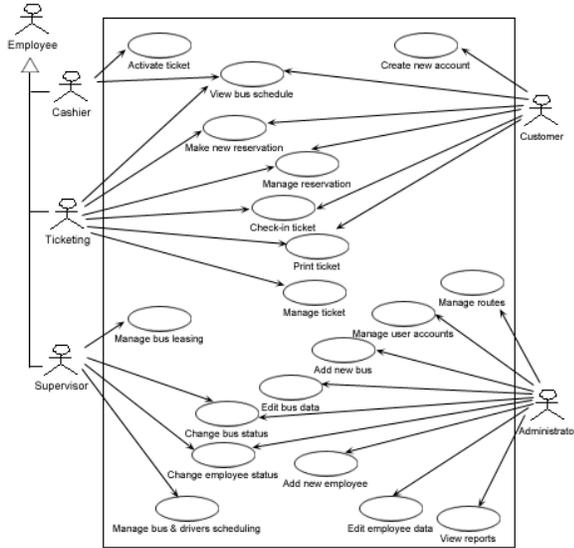


Figure 1. Use case diagram of web application.

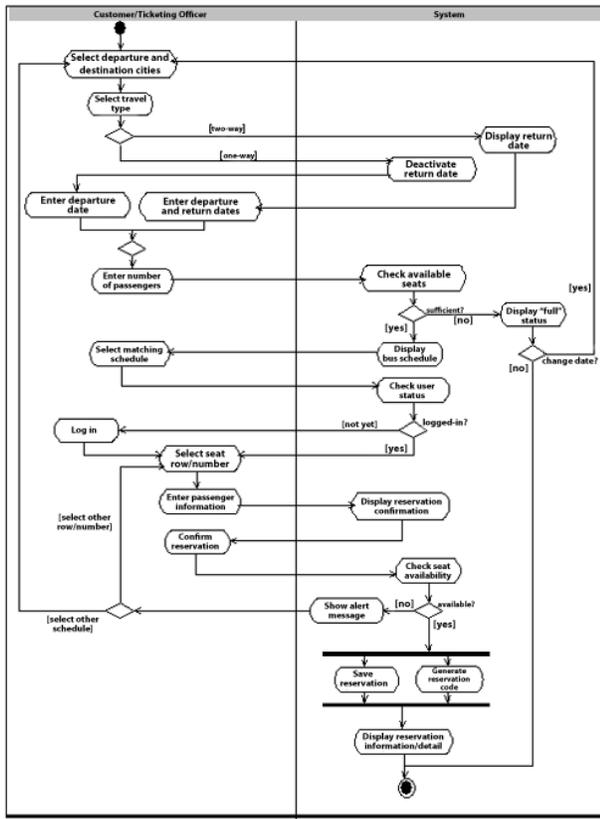


Figure 2. Activity diagram of making new reservation.

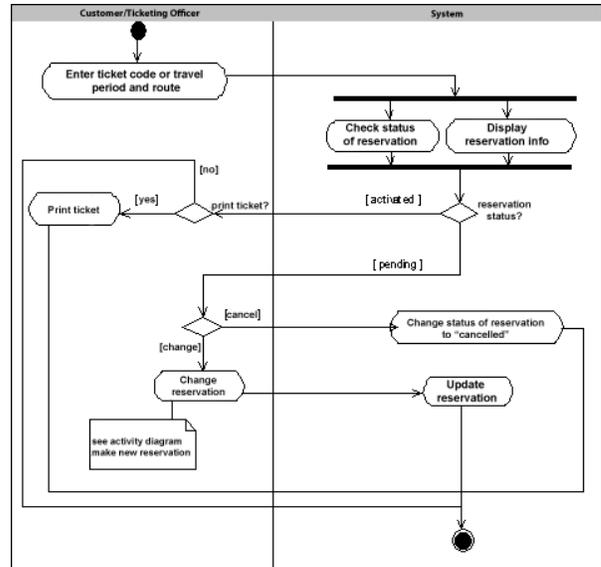


Figure 3. Activity diagram of managing reservation.

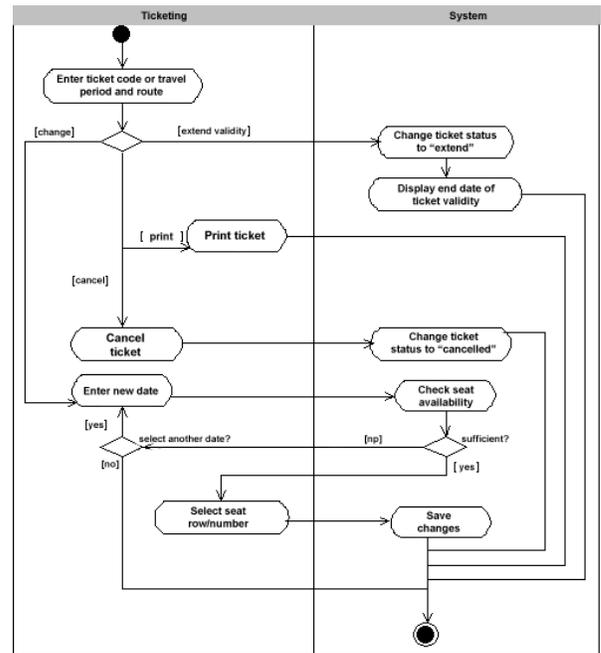


Figure 4. Activity diagram of managing ticket.

- 2) **Creating a unified site design.** To avoid user confusion, the wholeness of the website is made apparent through its unified design theme.
- 3) **Putting the user first: designing for the user.** Making sure that users' attention is guided to the information they are looking for by proper placement based on importance and by keeping a flat hierarchy in the content structure: reducing user clicks as much as possible. The information must also be designed for screen

reading since reading text on screen is different than on paper and may take a toll on users.

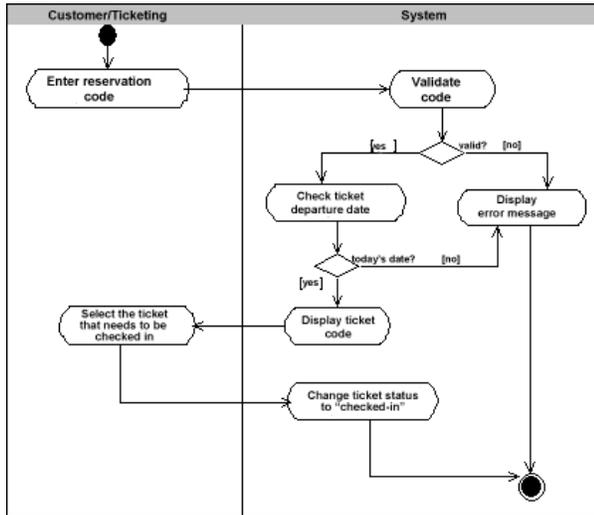


Figure 5. Activity diagram of customer self check-in.

The result is the main page of the website as shown in figure 6 below.

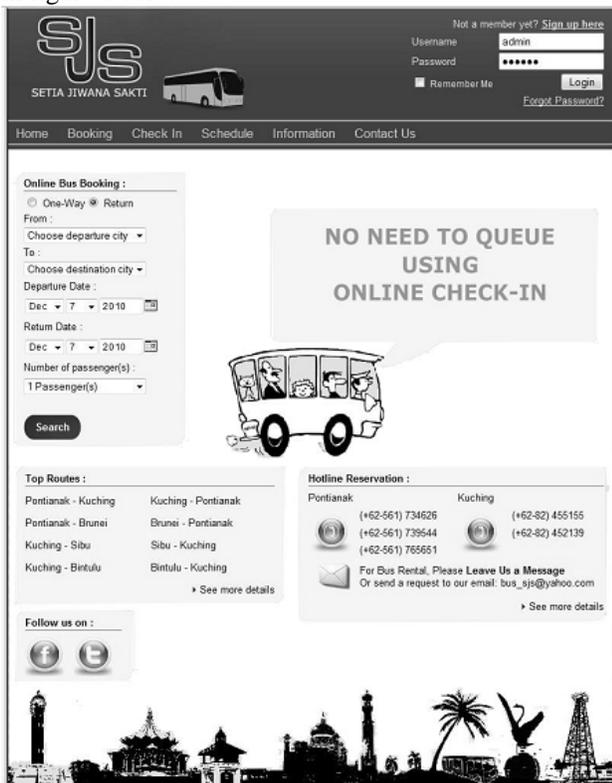


Figure 6. Interface of the website (main page).

### 3. Prototype Development

Development of the web application prototype utilizes PHP and MySQL. The booking process flow can

be seen below in figures 7 to 11. After entering the selected travel date(s) and destination plus the number of passengers, the customers will be presented with a search result of the available schedules as shown in figure 7. The system will check the travel dates validity, preventing conditions such as departure date that is later than return date and travel dates that are less than one day away from today's date.

The application displays how many steps there are in the booking process and which step the customer is currently at besides the main menus that are always displayed on top (in the header) to ease access.

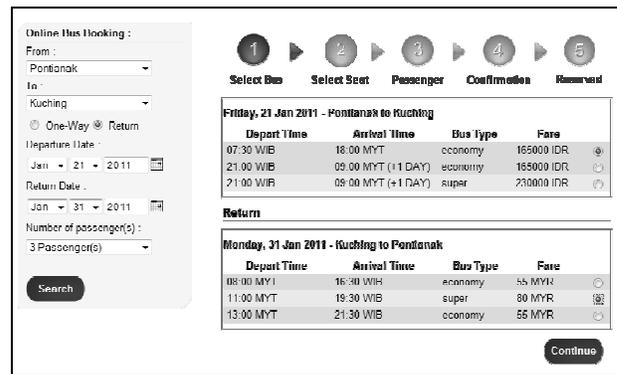


Figure 7. Selecting from available schedules.

When the preferred schedules have been chosen, the next step in the booking process is selecting seats for the entered number of passengers (figure 8) by simply clicking the rows and seat numbers accordingly. Should the number of chosen seats total less than the given number of passengers, the system will alert the customers of this condition.

The next step is the completion of personal information for each passenger as shown in figure 9 below. The system will again check whether the data for each given passenger has been provided completely and alert the user should there be any lack of required information. After all data have been entered, the customer will be provided with a final overview of the booking details before confirming the reservation (figure 10). A successful reservation will be indicated with the generation and display of the booking number, payment procedure and other ticket activation related information (figure 11). Self check-in can be done by entering the booking code after user login. The system will display all tickets related to that booking and the user can choose which ticket to check-in (figure 12). Another way to book tickets is to first view and search available schedules based on day of departure or destination city and choose the preferred schedule as shown in figure 13 below.

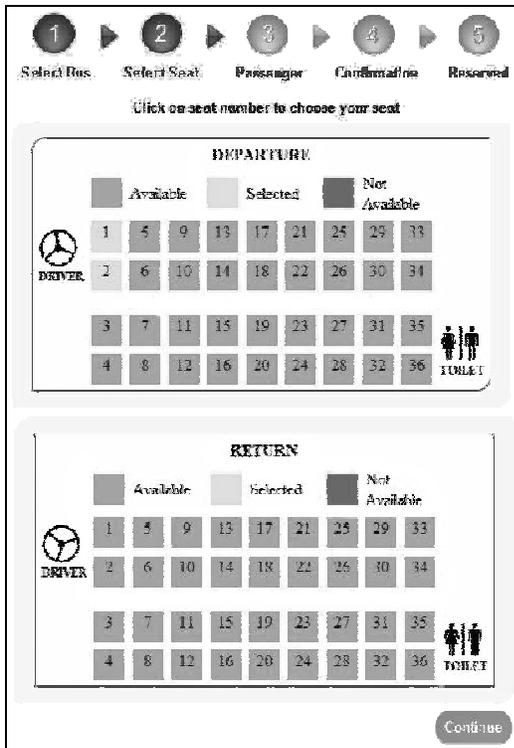


Figure 8. Select seats.

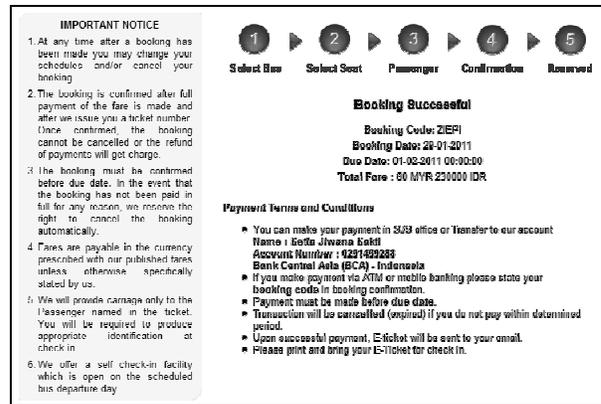


Figure 11. Successful booking notification page.



Figure 12. Self check-in form.

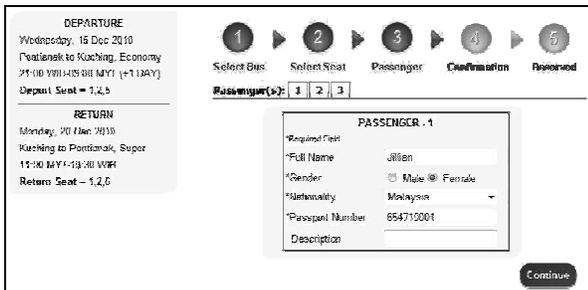


Figure 9. Enter all passengers' personal information.

BUS SCHEDULE						
From	To	Depart Time	Arrival Time	Fare	Schedule	
Pontianak	Sintang	19:00 WIB	05:00 WIB (+1 DAY)	100000 IDR	Everyday	<a href="#">Book Now</a>
Sintang	Pontianak	19:00 WIB	05:00 WIB (+1 DAY)	100000 IDR	Everyday	<a href="#">Book Now</a>
Pontianak	Kuching	07:30 WIB	18:00 MYT	165000 IDR	Everyday	<a href="#">Book Now</a>
Pontianak	Kuching	21:00 WIB	09:00 MYT (+1 DAY)	165000 IDR	Everyday	<a href="#">Book Now</a>
Pontianak	Kuching	21:00 WIB	09:00 MYT (+1 DAY)	230000 IDR	Everyday	<a href="#">Book Now</a>
Kuching	Pontianak	08:00 MYT	16:30 WIB	55 MYR	Everyday	<a href="#">Book Now</a>
Kuching	Pontianak	11:00 MYT	19:30 WIB	80 MYR	Everyday	<a href="#">Book Now</a>
Kuching	Pontianak	13:00 MYT	21:30 WIB	55 MYR	Everyday	<a href="#">Book Now</a>
Pontianak	Brunei Darussalam	08:00 WIB	12:00 BNT (+1 DAY)	550000 IDR	Monday Wednesday Saturday	<a href="#">Book Now</a>
Brunei Darussalam	Pontianak	14:30 BNT	15:00 WIB (+1 DAY)	80 BND	Tuesday Thursday Sunday	<a href="#">Book Now</a>
Kuching	Sibu	06:30 MYT	14:30 MYT	40 MYR	Everyday	<a href="#">Book Now</a>

Figure 13. View available bus schedules.

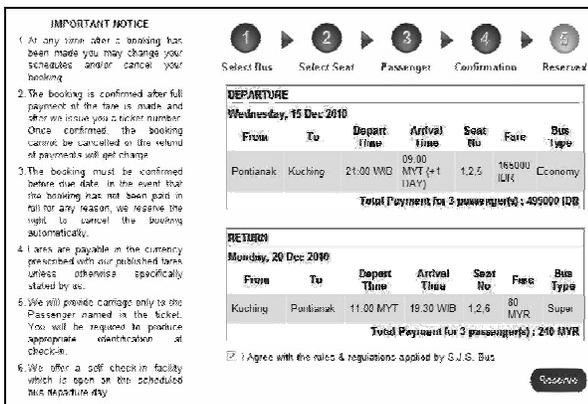


Figure 10. Confirm reservation.

Features for administrator employees such as managing (adding and editing) bus and route data or assigning bus, drivers and co-drivers to scheduled routes are depicted in figures 14 to 17 below.

Regarding security of this application, user passwords are encrypted and even administrators will not have access to view or alter this password. When

customers or users forget their password, their passwords will be reset and the new automatically and randomly generated password will be sent to user's email.

Bus Code	Plat Number	Capacity	Type	Status
BE01	KB 7645 C	36	economy	ready
BE02	KB 7616 C	36	economy	ready
BE03	KD 7647 C	36	economy	ready
BE04	KB 7648 C	36	economy	ready
BE05	KB 7649 C	36	economy	ready
BE06	KH 7726 AP	36	economy	ready
BE07	KS 7727 AP	36	economy	ready
DE00	KD 7728 AP	36	economy	ready
BE11	KB 7716 AP	36	economy	ready
BE12	KB 7716 AP	36	economy	ready
BE13	KH 7717 AP	36	economy	ready
BE14	KB 7718 AP	36	economy	ready
DS11	KQ 7771 AC	36	economy	ready

Figure 14. Manage bus data.

Route Code	From	To	Depart Time	Arrival Time	Price	Schedule
R001	Pontianak	Sintang	18:00 WIB	05:00 WIB (+1 DAY)	100000 IDR	Everyday
R002	Sintang	Pontianak	19:00 WIB	06:00 WIB (+1 DAY)	100000 IDR	Everyday
R003	Pontianak	Kuching	07:30 WIB	16:00 MYT	165000 IDR	Everyday
R004	Pontianak	Kuching	21:00 WID	09:30 MYT (+1 DAY)	160000 IDR	Everyday
R005	Pontianak	Kuching	21:00 WIB	09:00 MYT (+1 DAY)	230000 IDR	Everyday
R006	Kuching	Pontianak	08:00 MYT	16:30 WIB	55 MYR	Everyday
R007	Kuching	Pontianak	11:00 MYT	19:30 WIB	60 MYR	Everyday
R008	Kuching	Pontianak	13:00 MYT	21:30 WIB	55 MYR	Everyday
R024	Singkawang	Pontianak	12:00 WIB	17:00 WIB	50000 IDR	Everyday

Figure 15. Manage route.

Figure 16. Generate ticket sales report form.

4. Conclusion

By using this application, the company can provide reservation services and information to their customers without the limitation of office hours or manpower. Not only does it let customers book trips around the clock from any location with an internet connection but it is also designed for use by the company to internally manage their business processes; minimizing human errors and overcoming difficulties and problems that arose in the previous system.

Figure 17. Assigning bus, drivers and co-drivers to a scheduled trip.

SETIA JIWANA SAKTI  
ELECTRONIC TICKET

BOOKING CODE: VR2NIV  
Thank You For Using SJS Electronic Ticket Service  
This is your travel itinerary and receipt. The name of the identity card must match the name of passenger shown below.

DEPARTURE TRIP TICKET NUMBER  
-42PAKIS → Susan Gouw (Malaysia, 877090011)  
-83WDHS → Hengyu Gouw (Malaysia, 1628912717)  
RETURN TRIP TICKET NUMBER  
-6FCQK44T → Susan Gouw (Malaysia, 877090011)  
-SIS3COUQ → Hengyu Gouw (Malaysia, 1628912717)

Journey	Date	From	Depart Time	To	Arrival Time	Type
Departure	Sunday, 16 Jan 2011	Pontianak	21:00 WIB	Kuching	09:00 MYT (+1 DAY)	economy
Return	Monday, 24 Jan 2011	Kuching	11:00 MYT	Pontianak	19:30 WIB	super

Total Fare: 330000 IDR 160 MYR

Notice:  
- Fares are issued subject to conditions apply  
- You should be need to show this electronic ticket and identity card at check-in counter  
- We offer a self check-in facility which is open on the scheduled bus departure day  
- Please be at the bus station at least 30 minutes before your departure or we will leave without you to avoid unnecessary delays

Issued Date: Wednesday, 22-10-2010

Figure 18. The issued electronic ticket (to print out).

In the future, should the e-commerce payment system and policies in the countries of operations improve; the system can be integrated with an online payment system to further assist the customer in completing reservations. Also, additional security features such as digital signature and/or digital certificate will be reinforced during deployment of the system to ascertain the authenticity of the website and secure data communications.

References

- [1] A. Dennis, B. H. Wixom, & D. Tegarden, *System Analysis and Design with UML Version 2.0*, John Wiley & Sons, Inc., 2005.
- [2] R. S. Pressman & D. Lowe, *Web Engineering: A Practitioner's Approach*, McGraw-Hill, 2009.
- [3] J. Sklar, *Principles of Web Design (4th ed.)*, Cengage Learning, 2009.
- [4] G. R. Stair, *Principles of Information Systems (7th ed.)*, Thomson Course Technology, 2006