Bus Tap

Project Documentation
Submitted to the Faculty of
School of Computing and Information Technologies of
Asia Pacific College

In Partial Fulfillment of the Requirements for the Course
Applied Projects 2

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ASIA PACIFIC COLLEGE
Approval Sheet

BUS TAP

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In Partial Fulfilment of the Requirements for the Degree of

Bachelor of Science in

Examined and Recommended for Acceptance and Approval for Research/Capstone Presentation

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Executive Director
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Executive Summary

Passengers of the Bonifacio Global City (BGC) Bus have complained about the service of the BGC Bus company, mostly about how long buses take to arrive at the bus stop. When implementing a bus passenger information system, passengers perceive deduced waiting time and better service from the company. With passenger information systems, passengers are informed about the services of the company and about the arrival time of the buses.

The group created a mobile application as front-end and a web application as back-end for the Bus Tap, a passenger information system, that aims to connect the BGC Bus company to its passengers. Through the Bus Tap, the BGC Bus company can provide its passengers with the latest information regarding their services, and passengers can access up-to-date information regarding BGC Bus. Passengers can also contact the BGC Bus company through the mobile application, and provide rating, feedback, suggestions, or send inquiries, and receive replies.

With the Bus Tap reservation feature, passengers no longer have to wait long to be able to ride the bus, having been able to reserve a spot on their desired schedule ahead of time, minimizing the waiting time they experience when taking the BGC Bus.

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I. Introduction

1.1 Project Context

The Bus Tap is a passenger information system that will provide passengers of the BGC (Bonifacio Global City) Bus with information (e.g. news and announcements, bus routes, bus stops, operating schedule, bus schedules, and location of the buses) regarding the BGC Bus.

Using the mobile application of Bus Tap, BGC Bus passengers can view the latest news and announcements from the BGC Bus company. Passengers can view information on all the bus routes (e.g. route map, operating schedule, bus fare, and stops), bus stops (e.g. location, beep card loading availability, bus ticket availability, and routes), and bus schedules (e.g. bus number, arrival time, and departure time). Passengers will also be able to check the passenger congestion of the bus, and even reserve spots on the bus arriving closest to their selected bus schedule. Passengers can also send their rating and feedback, or inquiries regarding the BGC Bus.

Using the web application of the Bus Tap, employees of the BGC Bus company can post news and announcements to the passengers. Employees can add, view, update, and delete information regarding the bus routes, bus stops, buses, and bus schedules. Using the Bus Tap web application, the company will be able to receive reservations, rating and feedback, and inquiries sent by the passengers.

1.2 Purpose and Description

Bonifacio Global City (BGC) is one of Manila's Central Business Districts. Companies, especially business process outsourcing (BPO) firms, have made BGC the base of their operations in the country. With its strategic location near EDSA (Epifanio de los Santos Avenue), C-5, and SLEX (South Luzon Expressway), BGC is accessible from all points of the Metro.

To travel from, to, and within BGC, the majority relies on mass transport, mostly, the BGC Bus. The BGC bus caters to 44,000 passengers daily on weekdays, and 20,000 passengers daily on weekends (Obias, 2017). The BGC Bus has a fleet composed of 51 buses with seating capacity of 37 passengers and additional 38 standing passengers (Obias, 2017). These buses are deployed to 12 routes to help commuters navigate their way around BGC: North, North Express, East Express, Upper West Express, Lower West Express, Central, Night, East, West, Ayala Express, ARCA South Express, and Nuvali Express.

With 44,000 daily passengers, the BGC Bus company has received complaints from the passengers regarding the long queue of passengers and long waiting time during peak hours (Obias, 2017). The group conducted their own observation regarding the waiting time during peak hours. From the data gathered, the longest waiting time was about 30 minutes and 44 seconds. From the interview conducted by the group with the BGC Bus company, the company has stated that it aims to achieve a standard waiting time of 10 minutes.

The Bus Tap aims to help the BGC Bus company to achieve the standard waiting time of 10 minutes. The Bus Tap has a mobile application front-end (for the passengers) and web application back-end (for the BGC Bus company). The Bus Tap aims to build a two-way mode of communication for the company bus and its passengers.

1.3 Objectives

The Bus Tap aims to be able to:

- build a two-way mode of communication for the bus company and its passengers; and
- decrease the waiting time of BGC Bus passengers to 10 minutes.

The Bus Tap aims to provide the passengers with information from the BGC Bus company such as the latest news and announcements from the BGC Bus company, list of bus routes and bus stops, route maps, location of the bus stops, operating schedule of each bus route, bus fare, and trip schedules. The Bus Tap also aims to allow the passengers to send their rating, feedback, and inquiries to the BGC Bus company, who can then send their replies.

The Bus Tap also aims to decrease the waiting time of passengers riding the BGC Bus to 10 minutes, as is the goal of the BGC Bus company. With the reservation feature of the Bus Tap, passengers will be able to reserve a spot ahead of time on the bus arriving at their selected bus stop on their selected time, and would only need to arrive at the bus stop at least 3 minutes before the bus arrives. Reserving a spot on the bus will allow the passengers to skip the long queues and will minimize their waiting time.

1.4 Scope and Limitations

The Bus Tap will be available a mobile-based application for the passengers of the BGC Bus; however, the app will only be available to Android devices. The app will also be limited to the BGC Bus. As such, locations that will be included in the app will be limited to within BGC and some areas of Makati, Taguig, and Sta. Rosa, Laguna.

II. Review of Related Systems

2.1 BGC Bus

The BGC Bus has a fleet composed of 51 buses with seating capacity of 37 passengers, but can fit a total of 75 passengers (Obias, 2017). These buses are deployed to 12 routes to help commuters navigate their way around BGC: North, North Express, East Express, Upper West Express, Lower West Express, Central, Night, East, West, Ayala Express, ARCA South Express, and Nuvali Express.

The North Route, North Express Route, East Express Route, Upper West Express Route, Lower West Express Route, Central Route, Night Route, East Route, and West Route only travel within BGC. The North Route operates from Mondays to Fridays only, from 6:30AM to 10:00AM and from 4:30PM to 8:30 PM. The North Express Route, East Express Route, Upper West Express Route, and Lower West Express Route also operates from Mondays to Fridays only, but from 6:00AM to 10:00PM. The Central Route operates every day from 6:00AM to 10:00PM, while the Night Route also operates every day from 10:00PM to 6:00AM. The West Route and the East Route operate on Saturdays, Sundays, and holidays, from 6:00AM to 10:00PM.

The extension routes, Ayala Express Route, Arca South Express Route, and Nuvali Express Route travel to Makati City, Taguig City, and Sta. Rosa, Laguna, respectively. These routes operate from Mondays to Fridays only during peak hours. Peak hours of the BGC Bus are from 6:00AM to 10:00AM and from 4:00PM to 10:00PM (Obias, 2017). The Arca South Express Route operates from 6:10AM to 9:00AM and from 4:00PM to 8:00PM. The Ayala Express Route operates only on mornings from 7:00AM to 10:00AM. The Nuvali Express Route only has one morning trip at 6:30AM, and two evening trips at 6:30PM and 7:15PM. Table 1 shows the routes and schedules of the BGC Bus:

Table 1. Routes and Schedules of the BGC Bus

Routes	Day	Time	Stops
North	Weekdays	6:30AM to 10:00AM and 4:30PM to 8:30 PM	North Station Uptown Park Suites Park Triangle BGC Turf The Globe Tower RCBC Net One Bonifacio Stopover Crescent Park West Nutriasia Uptown Mall Uptown Parade
North Express	Weekdays	6:00AM to 10:00PM	Edsa Ayala HSBC The Globe Tower Nutriasia BGC Turf
East Express	Weekdays	6:00AM to 10:00PM	EDSA Ayala Market! Market!
Central	Everyday	6:00AM to 10:00PM	Market! Market! One Parkade RCBC

			Net One Bonifacio Stopover Crescent Park West HSBC The Globe Tower Nutriasia University Parkway
Upper West Express	Weekdays	6:00AM to 10:00PM	EDSA Ayala Bonifacio Stopover Crescent Park West
Lower West Express	Weekdays	6:00AM to 10:00PM	EDSA Ayala RCBC Net One Fort Victoria
Night	Everyday	10:00PM to 6:00 AM	EDSA Ayala McKinley Parkway RCBC Net One Bonifacio Stopover Crescent Park West HSBC The Globe Tower Nutriasia University Parkway Market! Market! One Parkade RCBC Net One Bonifacio Stopover Crescent Park West Fort Victoria
East	Weekends	6:00AM to 10:00PM	EDSA Ayala HSBC The Globe Tower Nutriasia University Parkway Market! Market!
West	Weekends	6:00AM to 10:00PM	EDSA Ayala McKinley Parkway RCBC Net One Bonifacio Stopover Crescent Park West

			Fort Victoria
Ayala Express	Weekdays	7:00AM to 10:00AM	EDSA Ayala Ritz Tower MSE PBCOM RCBC Plaza The Columns City Gate Security Bank SGV Building Glorietta 5
Arca South Express	Weekdays	6:10AM to 9:00AM and 4:00PM to 8:00PM	Arca South Market! Market! RCBC Net One Bonifacio Stopover Crescent Park West Nutriasia Market! Market!
Nuvali Express	Weekdays	6:30AM, 6:30PM, and 7:15PM	Nuvali Market! Market!

Fare for each trip is Php 12.00 for all routes, except for Arca South Express Route and Nuvali Express Route; fare for the Arca South Express Route is Php 24.00. Tickets are not sold on board a BGC Bus. When taking the BGC Bus, passengers can either buy single-journey tickets or pay using their tap-and-go beep™ cards. Tickets are sold at cashier counters at BGC Bus terminals (e.g. Ayala, Market! Market!, and Bonifacio One Technology Tower) or from ticket sellers at selected bus stops (e.g. Bonifacio Stopover, RCBC, and Nutriasia).

2.2 Bus Passenger Information System

A bus passenger information system allows a bus company to communicate with the bus riders (Trapeze Group). Through the passenger information system, bus companies can provide announcements, status updates, and bus schedules. With the passenger information system, passengers will know when the buses will arrive at the bus stops.

From a study of the Department for Transport of the United Kingdom, one of the benefits of implementing a passenger information system are reduced perceived waiting time (Trapeze Group). Because the passenger information system provides the schedule of the buses, passengers know when their bus will arrive.

Information can be passed to the passengers through the passenger information system in different methods: (1) wayside and transfer station signs, (2) website, (3) mobile website, (4) real-time SMS, (4) mobile applications, and (5) web services.

The Bus Tap is a passenger information system that passes information to the passengers through a mobile application. The mobile application can make the BGC Bus more accessible for new passengers, and can encourage more people to use the BGC Bus. The list of the bus routes and bus stops, map of the routes, location of the bus stop, operating schedule of the BGC Bus, bus fare, and trip schedules provided by the mobile application give new passengers all the information they need to ride the bus.

The mobile application is also a great way to connect and engage the riders. Through the mobile application, passengers can send their feedback, suggestions, and inquiries to the bus company. Through the website, the company can view the passengers' feedbacks, suggestions, and inquiries, and be able to reply to each.

Through the Bus Tap, the company can release and update their information, and the public always has the most current information regarding their service.

III. Technical Background

3.1 Android

The mobile application of the Bus Tap is only available for Android users. The Android operating system is one of the most common operating system that is being used in the market. This type of OS can be found and is most compatible on modern devices, smartphones being the most popular. It can also be used on Smart TVs, tablets, Smart Watches, computers, and other portable gadgets.

The Android OS is a system software that manages every hardware and software running resources. The primary work of Android OS is to provide services to its host computer. It controls all application running in the gadget. Moreover, it gives access to apps especially on applications made by Google. Because of the Android OS, mobile users can play games, check the weather, check the user's current location, play music, etc. This type of OS has its advantages over other operating system since it is easy to customize.

The Android OS is made customizable so that the phone settings would perfectly fit the taste of the user. The user can change the wallpaper, themes and launchers, unlike some operating system like IOS which make the default system private. Furthermore, a ton of application is more compatible on android compared to others.

3.2 Laravel

The web application of the Bus Tap created using the PHP web application framework, Laravel. Laravel supports the Model View Controller (MVC) architecture. The MVC architecture separates an application into three components: the model, the view, and the controller.

The Model component corresponds to all the data-related logic that the user works with. This can represent either the data that is being transferred between the View and Controller components or any other data in the database. The View component is used for all the UI logic of the application. Controllers act as an interface between Model and View components to process all the business logic and incoming requests, manipulate data using the Model component and interact with the Views to render the final output.

IV. Design and Methodology

4.1 Requirements Analysis

The group conducted an interview with the Assistant Operations Manager of the Bonifacio Transport Corporation to gather information regarding the BGC Bus (refer to Appendices for the Interview Transcript). From the interview, information regarding the BGC Bus such as available bus routes and bus stops, operating schedule, bus fare, number of buses in the fleet, passenger capacity of each bus, number of daily passengers, peak hours, peak seasons, bus route with the highest number of passengers, and passenger complaints were gathered.

The group conducted a survey amongst passengers of the BGC Bus (refer to Appendices for the Survey Questionnaire). The passengers were asked about problems encountered when riding the BGC Bus (e.g. long queue when buying bus ticket or loading beep™ card, long queue when waiting for the bus, inaccurate bus schedules, congestion of passengers inside the bus). Table 2 shows the results of the survey about the problems passengers encounter when riding the BGC Bus.

Table 2. Problems encountered by BGC Bus passengers

Problems encountered when riding the BGC Bus	Passengers who encountered the problem	Percentage (%) out of 60 passengers
long queue when buying bus ticket or loading beep™ card	5	8%
long queue when waiting for the bus	45	75%
inaccurate bus schedules	35	58%
congestion of passengers inside the bus	15	25%

From the results of the survey, most of the passengers do not encounter problems regarding long queue when buying bus ticket or loading beep™ card. Most of the passengers only take 1-2 minutes to buy ticket or load beep™ cards at the teller booths.

Most of the passengers also do not encounter problems regarding congestion of passengers inside the bus. Buses of the BGC Bus can accommodate 75 passengers, having a

seating capacity of 37 passengers and can accommodate additional 38 standing passengers (Obias, 2017).

Passengers were also asked about the average number of minutes they usually wait for the BGC Bus. Table 3 shows the results of the survey about the average waiting time of the passengers for the BGC Bus.

Table 3. Average waiting time

Average waiting time before boarding the BGC Bus	Number of passengers
1-5 minutes	6
6-10 minutes	5
11-15 minutes	24
16-20 minutes	15
21-25 minutes	0
25-30 minutes	5
more than 30 minutes	5

The goal of the BGC Bus company was to achieve a standard waiting time of 10 minutes. From the survey conducted by the group, more than half of the passengers of the BGC Bus have encountered problems regarding the long queue when waiting for the bus, with 40% having to wait for 11-15 minutes, 25% having to wait for 16-20 minutes, 8% having to wait for 25-30 minutes, and another 8% having to wait for more than 30 minutes. Out of 60 BGC Bus passengers surveyed, 81% or 49 passengers answered having to wait for the bus for longer than 10 minutes.

BGC Bus passengers were also asked if an app for the BGC Bus would be useful and which features the passengers would like the app to have. Fifty passengers or 83% answered that the passengers of the BGC Bus would find an app useful.

From the survey, passengers regard the long waiting time as the problem of the BGC Bus. The Bus Tap aims to prevent or minimize the problems encountered by the passengers of the BGC Bus. With the reservation feature provided by the Bus Tap, passengers can reserve spots to the bus ahead of time, and skip the long queues, minimizing the amount of time spent waiting for the bus.

The group observed the operations of the BGC Bus. The group bought a beep card and bus tickets to pay for the bus fare. During the group's observation, even during rush hours, loading the beep card at the BGC Bus terminals or buying tickets at the terminals and stops do not take more than a minute. Passengers wait in line at the stops or terminals to wait for the bus to arrive. During the group's observation, the waiting time varies. The longest waiting time the group experienced is 30 minutes and 44 seconds at the Crescent Park West stop for the bus going

back to the BGC Bus Ayala Terminal. When the bus arrives, passengers ride the bus in a first-come-first-serve basis. When the bus seats are all occupied, passengers can either choose to stand inside the bus or take the next bus. The bus then takes the route it was assigned, stopping at all the stops in the route.

4.2 Requirements Documentation

The Bus Tap must have a front-end and a back-end. The front-end of the Bus Tap must be a mobile application, accessible by the public, running using the Android operating system; thus, the mobile application must be available to Android users. The back-end of the Bus Tap must be a web application, accessible only to the employees of the BGC Bus company.

Users for both the mobile and web application must be able to sign up, sign in, and sign out of their accounts. Users must also be able to request for a change of password

Users of the mobile application (passengers) must be able to view the latest news updates from the BGC Bus company, view the map of BGC with the location of all the bus stops and several points of interest within BGC, view information regarding the bus routes and bus stops, view the bus schedules, view the passenger congestion, reserve a spot in the bus arriving closest to their selected trip, provide rating, feedback, suggestions, and inquiries to the company, and receive replies from the company.

Users of the web application (employees) must be able to add, view, update, and delete information regarding bus routes, bus stops, buses, bus schedules, news updates, and passenger congestion. Employees must also receive the reservations made by the passengers. The company must also be able to view the passengers' ratings, feedbacks, suggestions, and inquiries, and be able to reply.

4.3 Gap Analysis

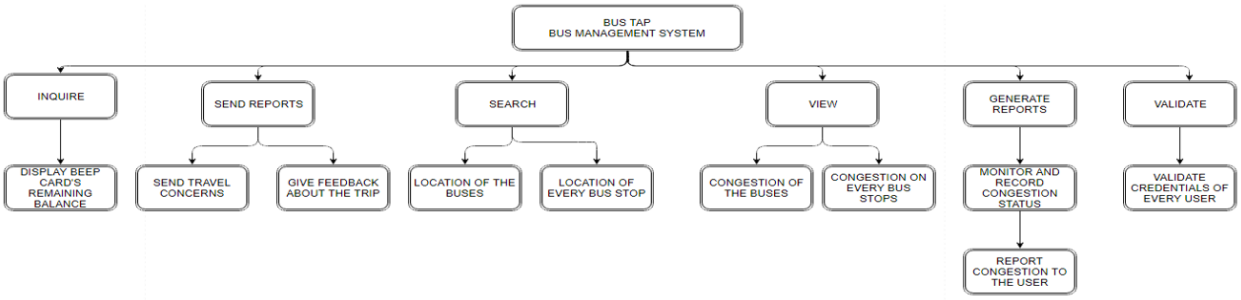
Table 4. Current System vs. Proposed System

User Requirements	Current System	Proposed Changes	Remarks/Impact
The system must be able to show accurate BGC Bus trip schedule like minutes to wait, estimated time of	BGC Bus company has inaccurate trip schedule that resulted to increased waiting time for all BGC Bus passengers.	Provide a more accurate system in terms of showing data regarding arrival and departure times. Improve overall waiting time.	Improved average waiting time by less than 10 minutes.

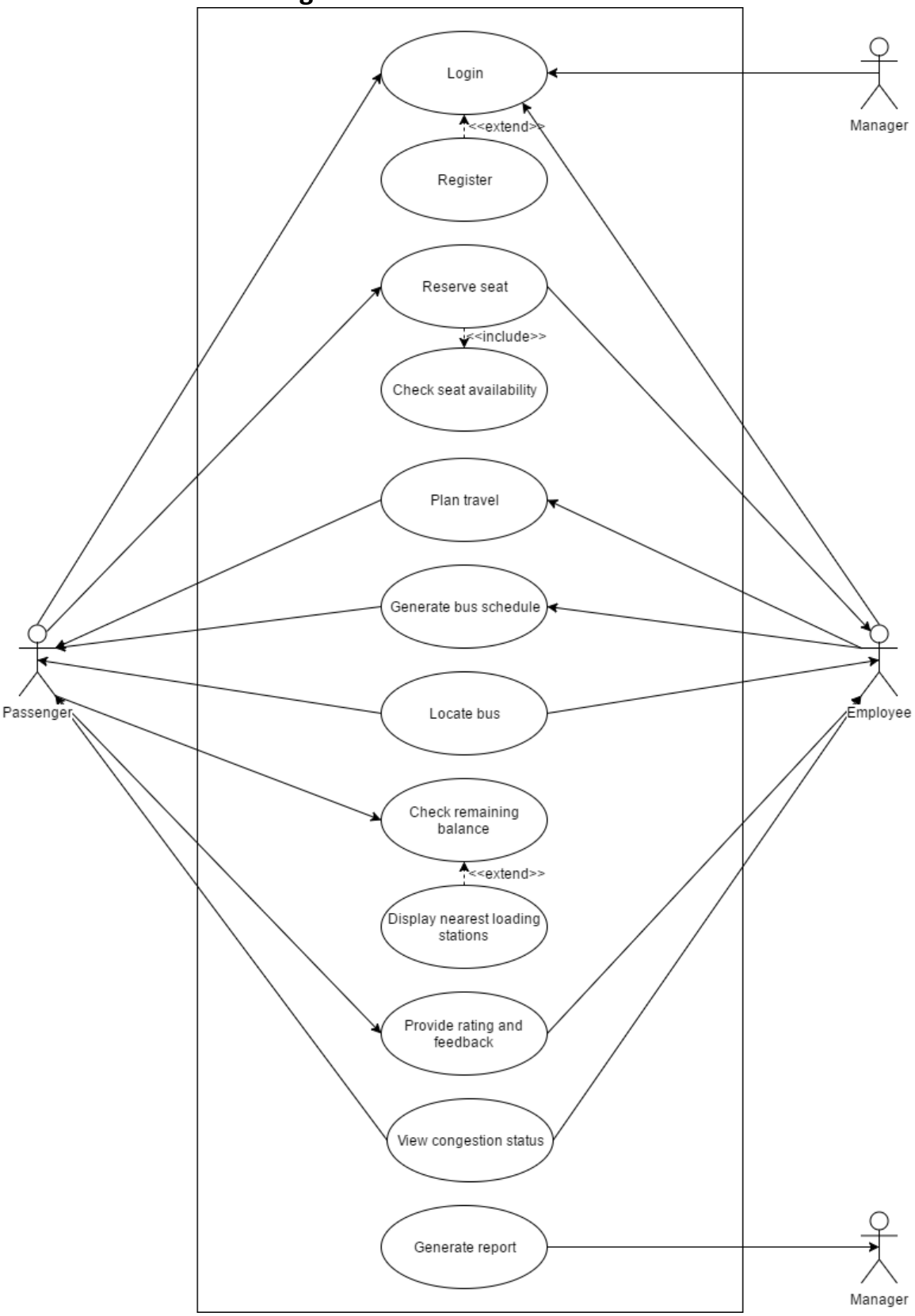
arrival and departure times.			
The system must be able to show all nearest bus stops based on user's location.	The functionality is not currently available now.	Show all nearest bus stop based on user's location and view information regarding the preferred bus stop.	Users will be more knowledgeable regarding their current location and be guided by all bus stops available.
The system must have a news feature that would allow users to be well informed about the current situation.	The news feature of the current system is not real time, making the spreading of news late and slow.	Provide a real-time news feature that would allow all users about the current happenings and current problems at the most present time.	BGC Bus passengers will become well informed about the current situation. Moreover, transparency between the company and the passengers will become more evident.
The system must have a report issue/concern feature.	Reporting concerns and sending issues are available but can only be accessed through SMS or via phone call.	Produce a more reliable functionality that would make use of internet connection instead of SMS.	Viewing reports and issues from the passengers will be available since user concerns and reports will be stored in a database.
Forecast the number of passengers per bus stop.	Congestion Forecast cannot be viewed by the BGC Bus passenger.	Produce a forecast that is readily available for the passengers. This would allow passengers to choose their preferred less congested stop or take an alternate route.	Knowledgeable about the current situation in a specific bus stop.
The system must have a reservation feature.	This is not available for the current system.	Make a reservation feature that would allow passengers to reserve a spot in a specific bus.	This would be a solution for controlling long queue lines in bus stops.

4.4 Design of Software, Systems, Product, and/or Processes

4.4.1 Functional Description Diagram



4.4.2 Use Case Diagram



4.4.3 Full Use Case Description

Use Case Name:	**Login (Passenger)**	
Scenario:	**Passenger logs in to their Bus Tap account.**	
Triggering Event:	**Passenger entered their login details on the login page of the app.**	
Brief Description:	**When passenger logs in to their account, the system validates that the login details entered by the passenger matches the login details of an existing Bus Tap account.**	
Actors:	**Passenger**	
Related Use Case:	**Login (Employee), Login (Manager)**	
Stakeholders:	**Passenger – provides the login details**	
Preconditions:	**Passenger must have an existing Bus Tap account**	
Postconditions:	**Passenger is logged in.**	
Flow of Activities:	Actor	System
	1. Passenger requests the login page of the app. **2. Passenger enters the registered email address and corresponding password.**	**1.1 System displays the login page.** **2.1 Validate data input** **2.2 Match email address and password to an existing account** **2.3 Log in passenger** **2.4 Display passenger information**
Exception Conditions:	**1. If email address entered does not match any existing accounts, redirect to sign-up interface or forgot username interface.** **2. If password entered does not match the email address, redirect to forgot password interface.** **3. Users are only given 10 chances to enter their correct login details at a time.**	

Use Case Name:	**Reserve seat**	
Scenario:	**Passenger reserves a spot on a BGC Bus.**	
Triggering Event:	**Passenger entered travel details on the seat reservation page of the app.**	
Brief Description:	**When passenger wants to reserve a spot on the BGC Bus, the system displays the bus schedules, and the passenger can reserve a spot.**	
Actors:	**Passenger** **Driver**	
Related Use Case:		
Stakeholders:	**Passenger – provides date and time of travel, bus stop; selects the bus schedule;** **Driver – reserves the bus seat**	
Preconditions:	**Passenger must be logged in to their Bus Tap account.**	
Postconditions:	**A seat is reserved for the passenger.**	
Flow of Activities:	Actor	System
	1. Passenger requests the seat reservation page of the app. **2. Passenger enters the date, time, and the bus stop.** **3. Passenger selects the bus schedule.**	**1.1 System displays the seat reservation page of the app.** **1.1 System displays the available schedules closest to the travel details entered by the passenger.** **3.1 System reserves a spot on the bus arriving closest to the schedule.**

Use Case Name:	**Generate bus schedules**	
Scenario:	**Manager should be able to generate bus schedule so that user would be able to view all bus schedules**	
Triggering Event:	**Viewing of travel details**	
Brief Description:	**The passenger should be able to view the bus schedule generated by the manager**	
Actors:	**Logged in Passenger** **Manager**	
Related Use Case:	**Logging of accounts**	
Stakeholders:	**Manager – the one who will update the bus schedules** **Logged passengers – the one who will view the schedules**	
Preconditions:	**Bus schedule data should be available** **Passenger should be logged in to view the details**	
Postconditions:	**The logged in passenger should be able to view all details regarding bus schedules**	
Flow of Activities:	Actor	System
	1. User requests to view the bus schedules of the bus	**1.1 The system should be able to validate the credentials of the user before giving the schedules** **1.2 The system should be able to display all the bus schedule**
Exception Conditions:	**1. Bus schedule should be available, if not, the manager or administrator should provide**	

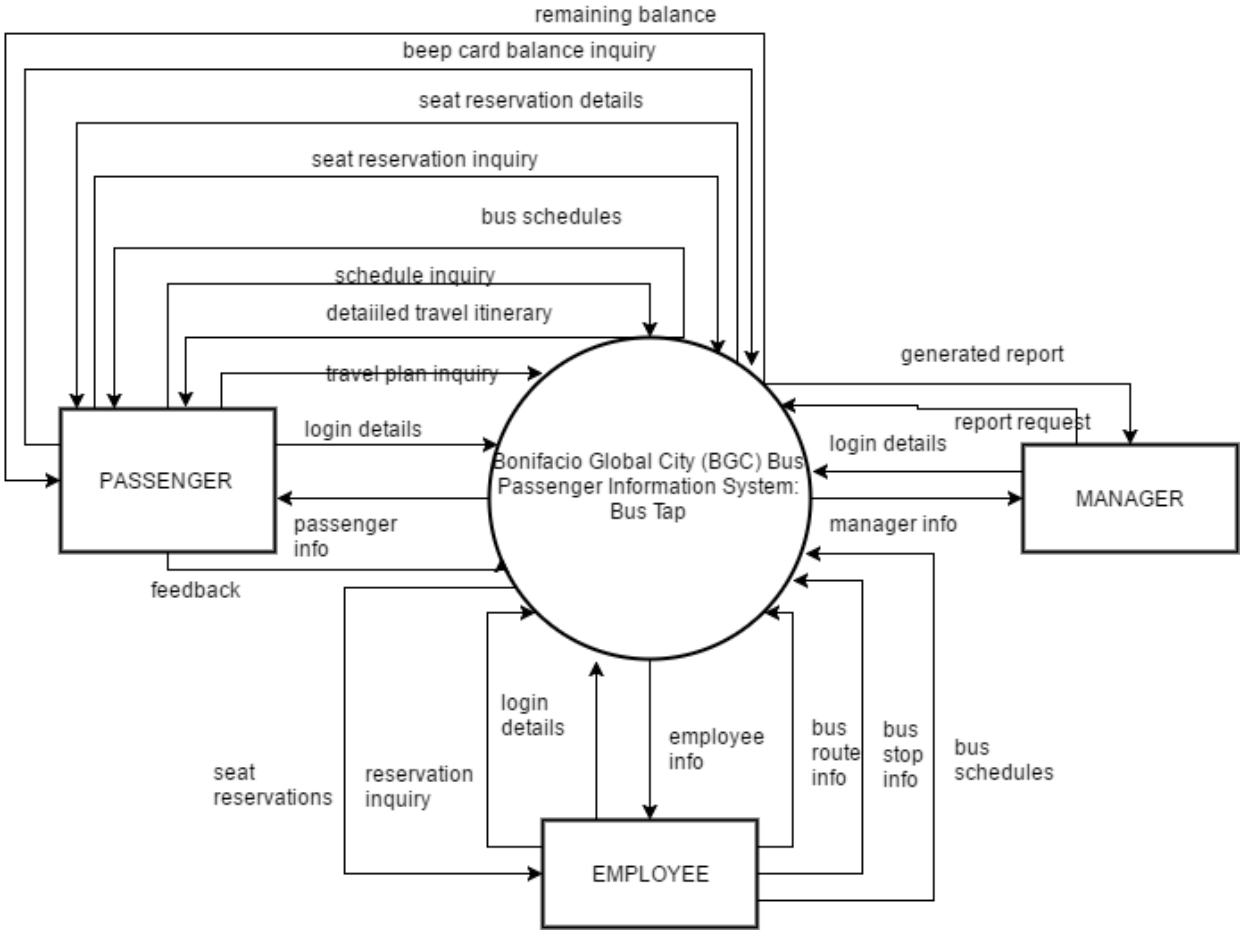
Use Case Name:	**Rate and provide feedback**	
Scenario:	**The passenger wants to give feedback regarding the user's trip**	
Triggering Event:	**User feedback**	
Brief Description:	**The passenger should be able to give feedback and rate regarding his/her trip**	
Actors:	**Logged in Passenger**	
Related Use Case:	**Log in**	
Stakeholders:	**Logged in passenger – the one who will give feedback**	
Preconditions:	**Users must be successfully logged in to their accounts**	
Postconditions:	**The rate and feedbacks should be able to go to the database**	
Flow of Activities:	Actor	System
	1. User will rate the driver and his/her overall trip **2. User will give feedbacks**	**1.1 Validate the credentials of the user** **1.1 Rating page would show up** **1.3 Allow the user to rate his/her travel** **1.4 Save it to the system's database** **2.1 Validate the credentials of the user** **2.2 Feedback page should show up** **2.3 Allow the user to give feedback** **2.4 Save the feedback of the user**
Exception Conditions:	**The user should be registered, if not, redirect to create account and log in page.**	

4.4.4 Event Table

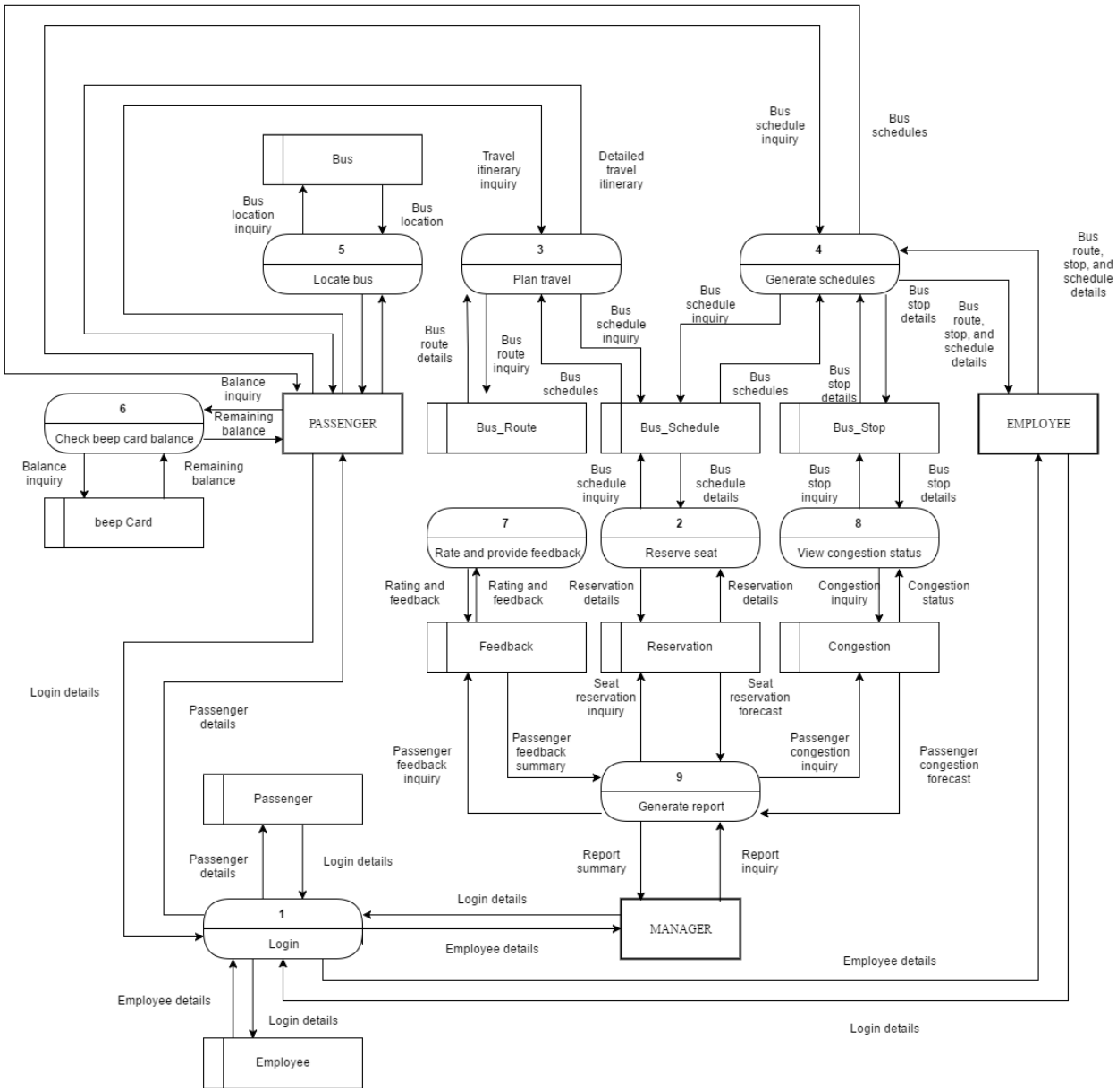
EVENT	TRIGGER	SOURCE	USE CASE	RESPONSE	DESTINATION
Passenger logged in to Bus Tap account	Login details	Passenger	Login	Passenger information	Manager
Passenger wants to reserve a spot on a BGC Bus	Reservation request	Passenger	Reserve	Reservation details	Passenger
Passenger wants to know the available bus schedules	Travel details	Passenger	Generate bus schedules	Bus schedules	Passenger
Passenger wants to rate the facilities and services of the BGC Bus and provide a feedback	Travel details, rating, feedback	Passenger	Rate and provide feedback	Rating and feedback	Employee
Manager wants to generate a report about the BGC Bus.	Report request	Manager	Generate report	Report	Manager

4.4.5 Data Flow Diagram

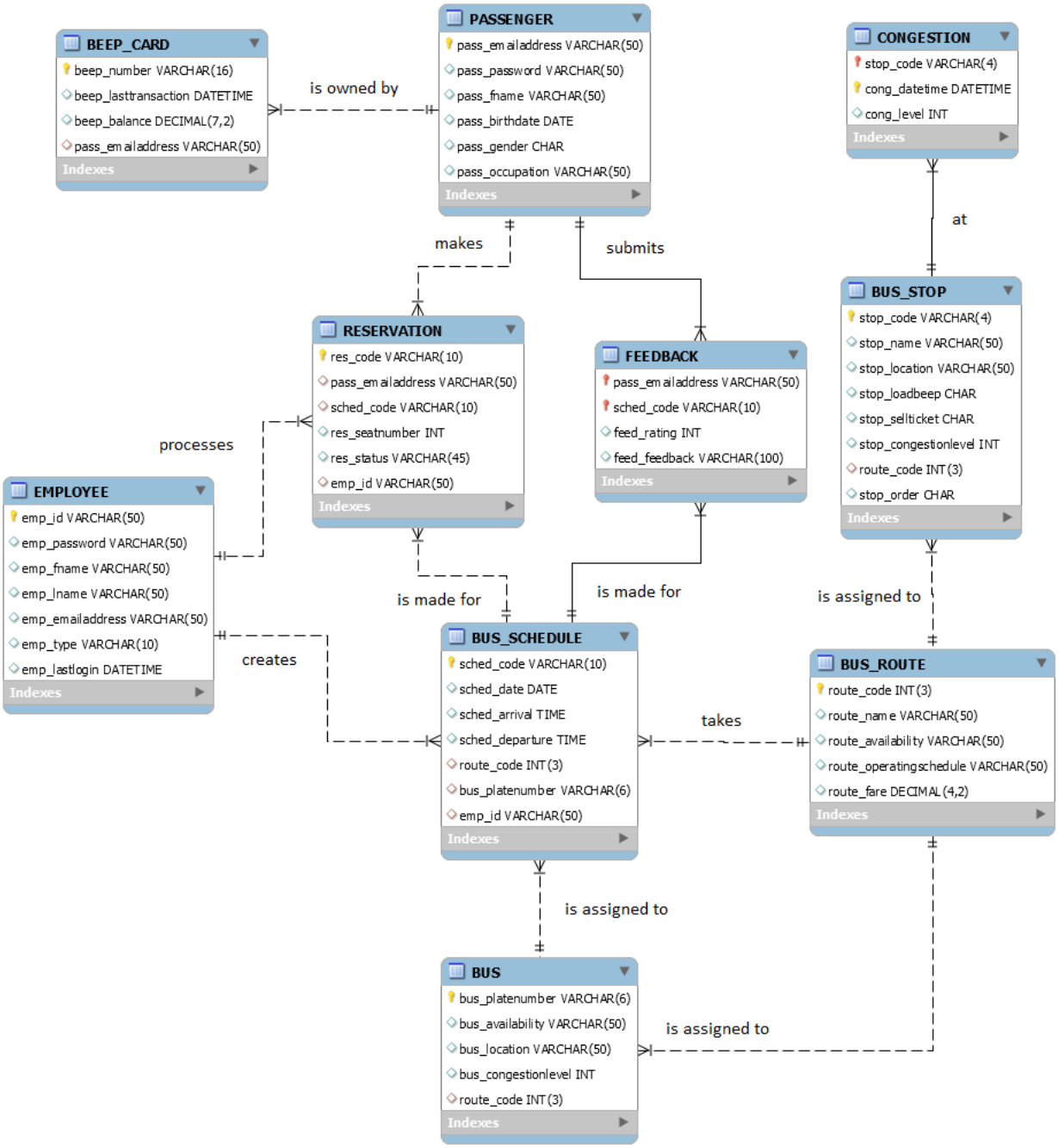
Data Flow Diagram Context Diagram



Data Flow Diagram Level 1



4.4.6 Entity Relationship Diagram



4.4.7 Data Dictionary

ENTITY: BEEP_CARD	
Attribute Name	**Data Type**
beep_number	VARCHAR(16)
beep_lasttransaction	DATETIME
beep_balance	DECIMAL(7,2)
pass_mobilenumber	VARCHAR(11)

ENTITY: PASSENGER	
Attribute Name	**Data Type**
pass_emailaddress	VARCHAR(50)
pass_password	VARCHAR(50)
pass_fname	VARCHAR(50)
pass_lname	VARCHAR(50)
pass_birthdate	DATE
pass_gender	CHAR
pass_occupation	VARCHAR(50)

ENTITY: RESERVATION	
Attribute Name	**Data Type**
res_code	VARCHAR(10)
pass_emailaddress	VARCHAR(50)
sched_code	VARCHAR(10)
res_seatnumber	INT
res_status	VARCHAR(45)
emp_id	VARCHAR(50)

ENTITY: FEEDBACK	
Attribute Name	**Data Type**
pass_emailaddress	VARCHAR(50)
sched_code	VARCHAR(10)
feed_rating	INT
feed_feedback	VARCHAR(100)

ENTITY: BUS	
Attribute Name	**Data Type**

bus_platenumber	VARCHAR(6)
bus_availability	VARCHAR(50)
bus_location	VARCHAR(50)
bus_congestionlevel	INT
route_code	INT(3)

ENTITY: BUS_SCHEDULE	
Attribute Name	**Data Type**
sched_code	VARCHAR(10)
sched_date	DATE
bus_platenumber	VARCHAR(6)
route_code	INT(3)
sched_arrival	TIME
sched_departure	TIME
emp_id	VARCHAR(50)

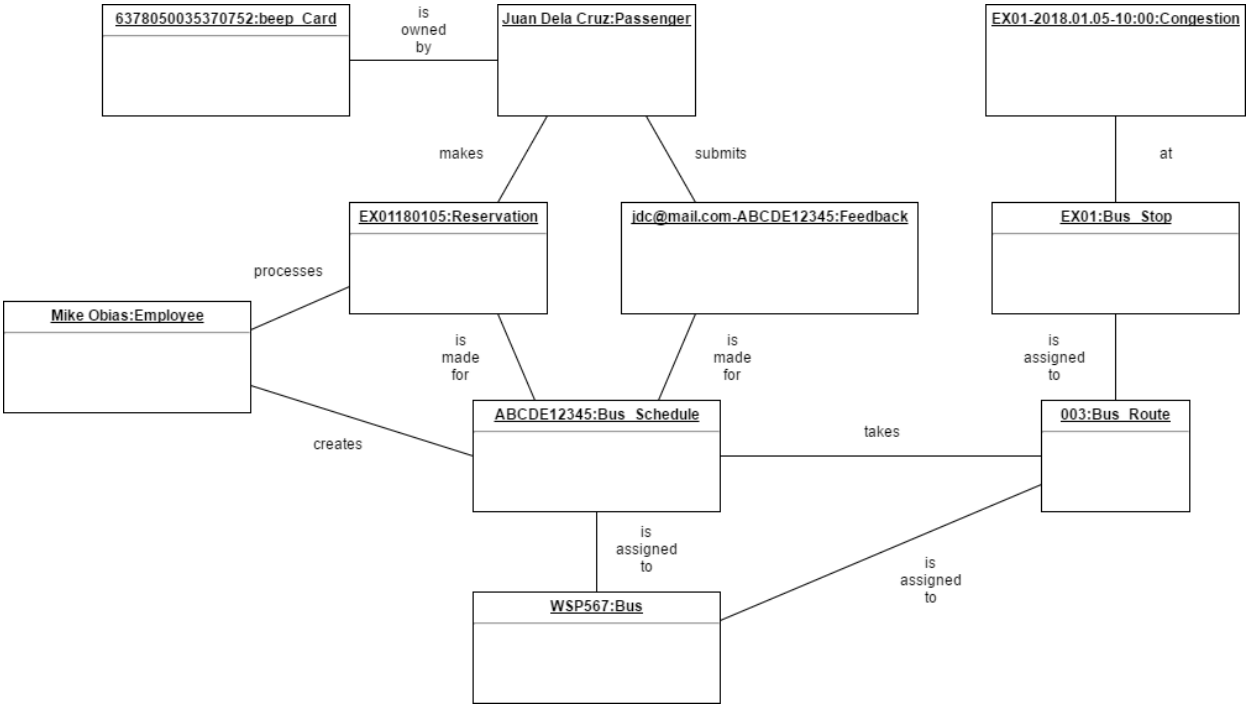
ENTITY: EMPLOYEE	
Attribute Name	**Data Type**
emp_id	VARCHAR(50)
emp_password	VARCHAR(50)
emp_fname	VARCHAR(50)
emp_lname	VARCHAR(50)
emp_emailaddress	VARCHAR(50)
emp_type	VARCHAR(10)
emp_lastlogin	DATETIME

ENTITY: BUS_ROUTE	
Attribute Name	**Data Type**
route_code	INT(3)
route_name	VARCHAR(50)
route_availability	VARCHAR(50)
route_operatingschedule	VARCHAR(50)
route_fare	DECIMAL(4,2)
ENTITY: BUS_STOP	
Attribute Name	**Data Type**
stop_code	VARCHAR(4)
stop_name	VARCHAR(50)

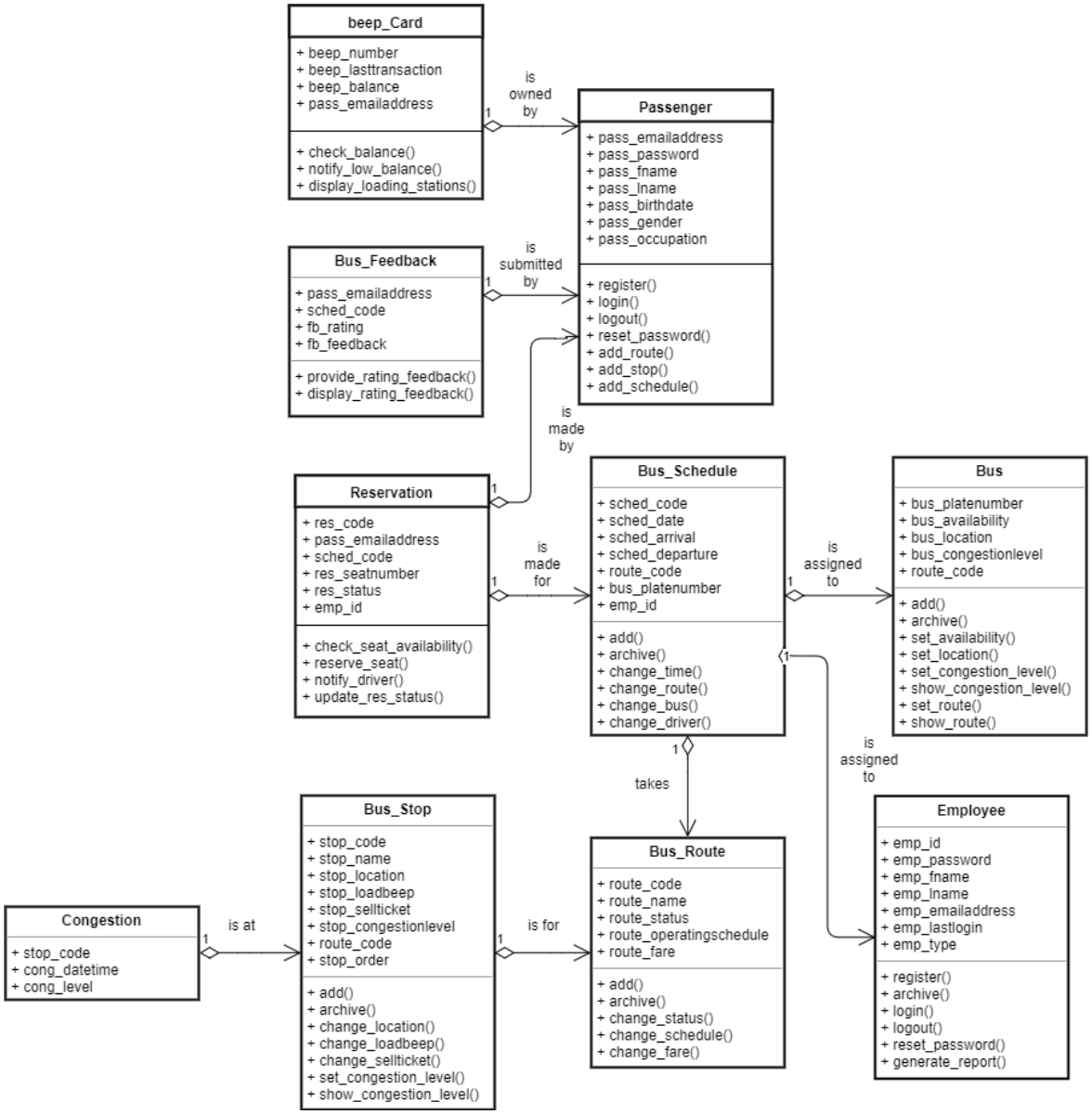
stop_location	VARCHAR(50)
stop_loadbeep	CHAR
stop_sellticket	CHAR
stop_congestionlevel	INT
route_code	INT(3)
stop_order	INT

ENTITY: CONGESTION	
Attribute Name	**Data Type**
stop_code	VARCHAR(4)
cong_datetime	DATETIME
cong_level	VARCHAR(10)

4.4.8 Object Diagram

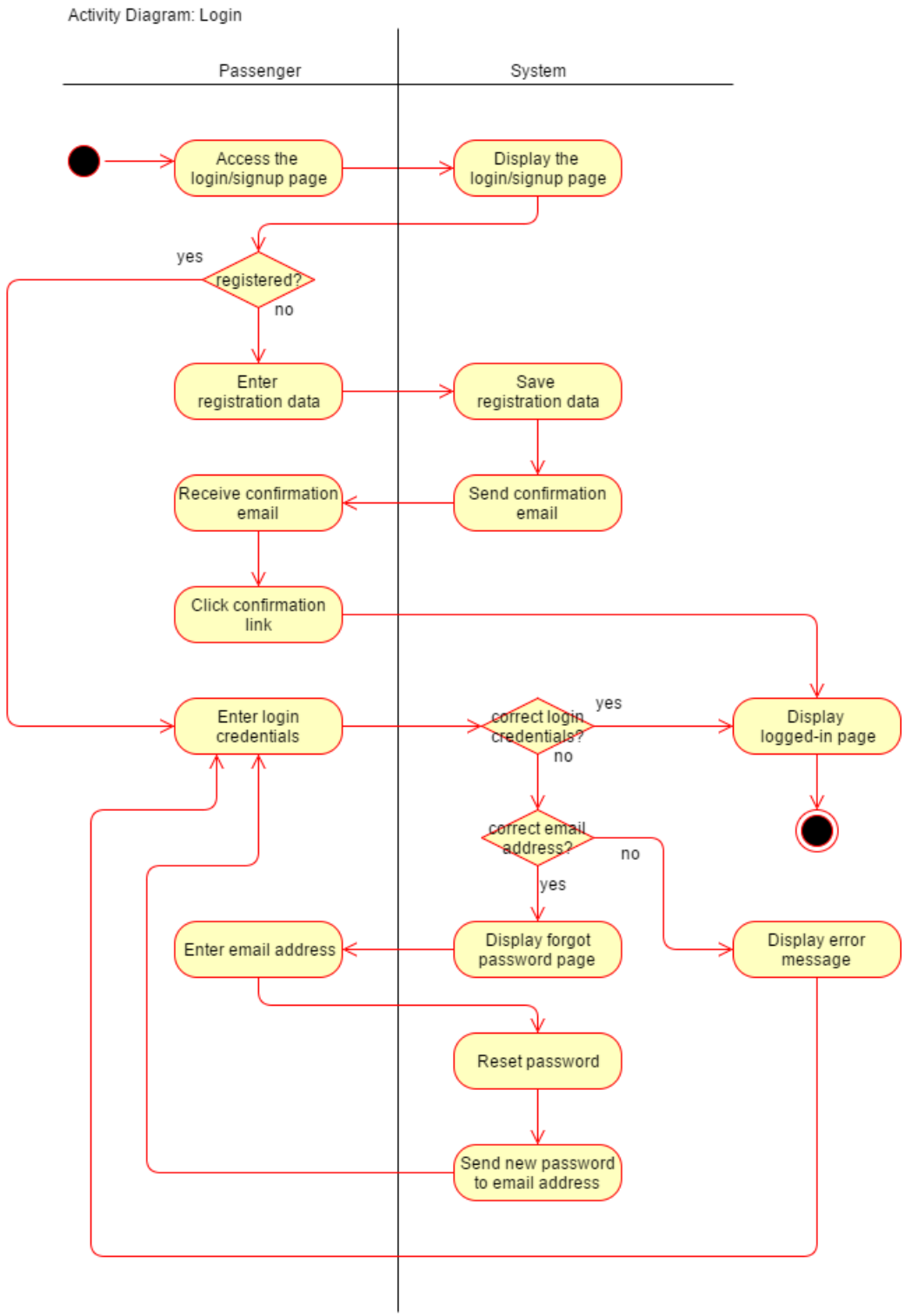


4.4.9 Class Diagram

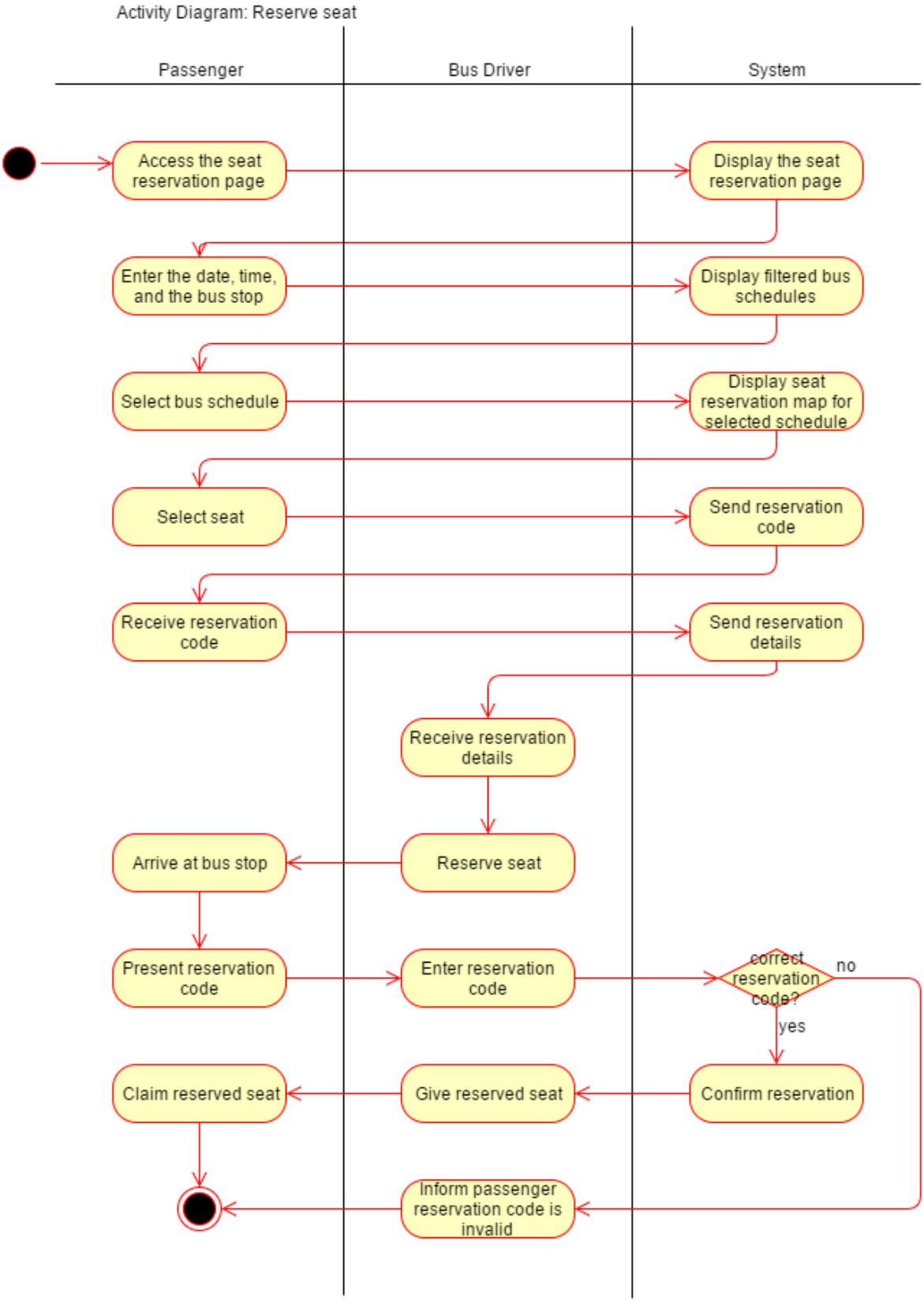


4.4.10 Activity Diagram

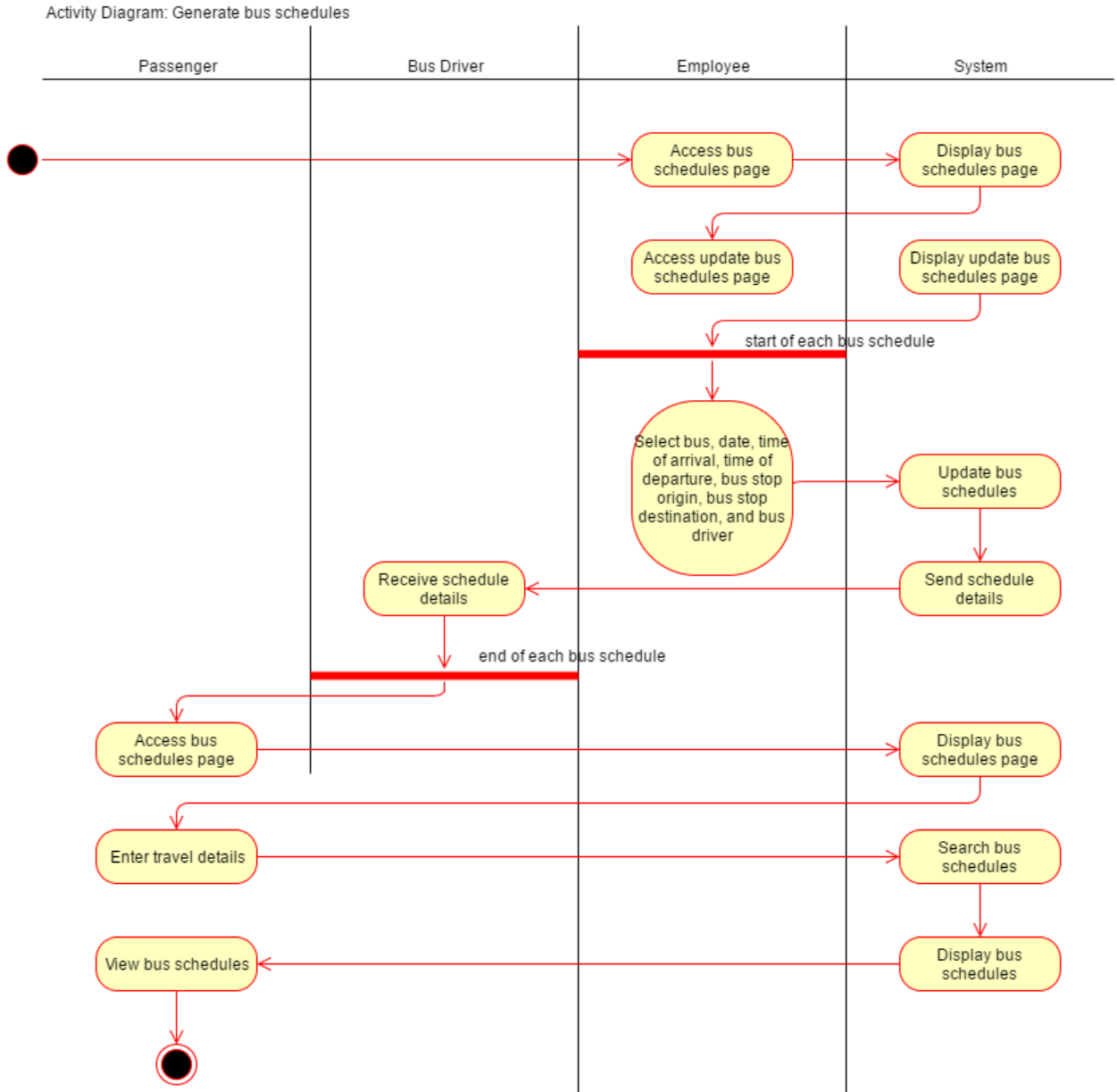
Activity diagram for Use Case: Login



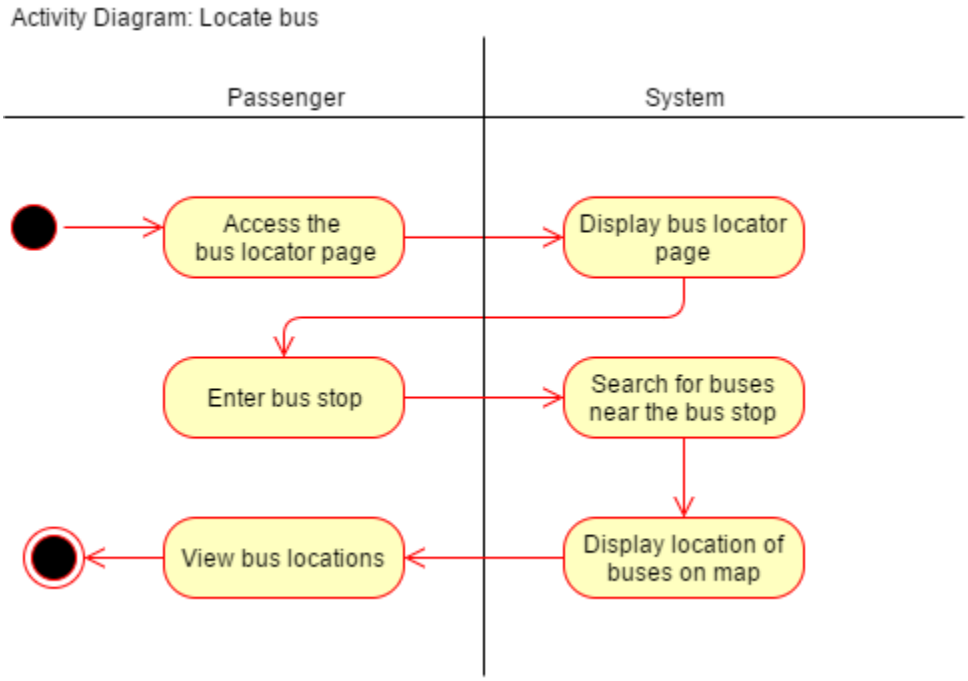
Activity diagram for Use Case: Reserve seat



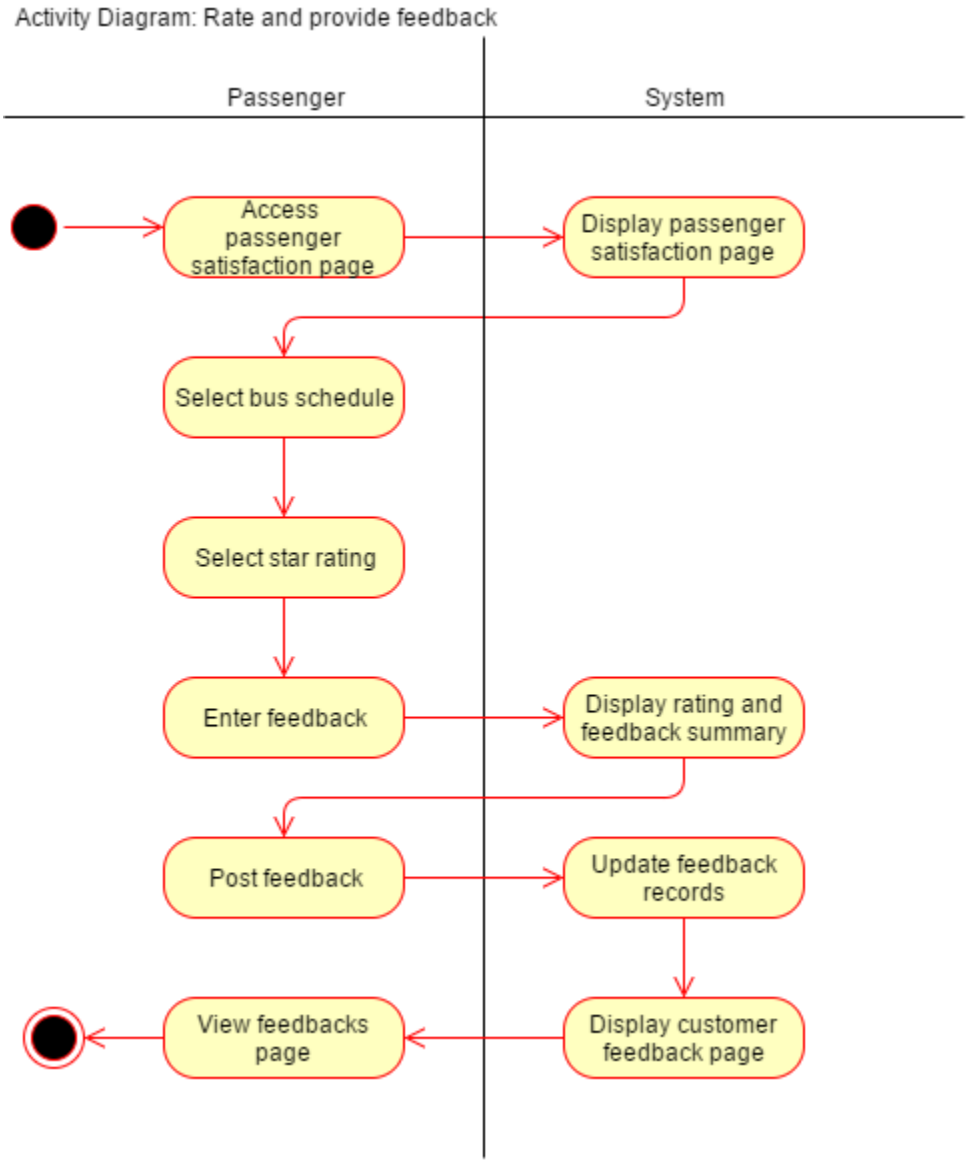
Activity diagram for Use Case: Generate bus schedules



Activity diagram for Use Case: Locate bus

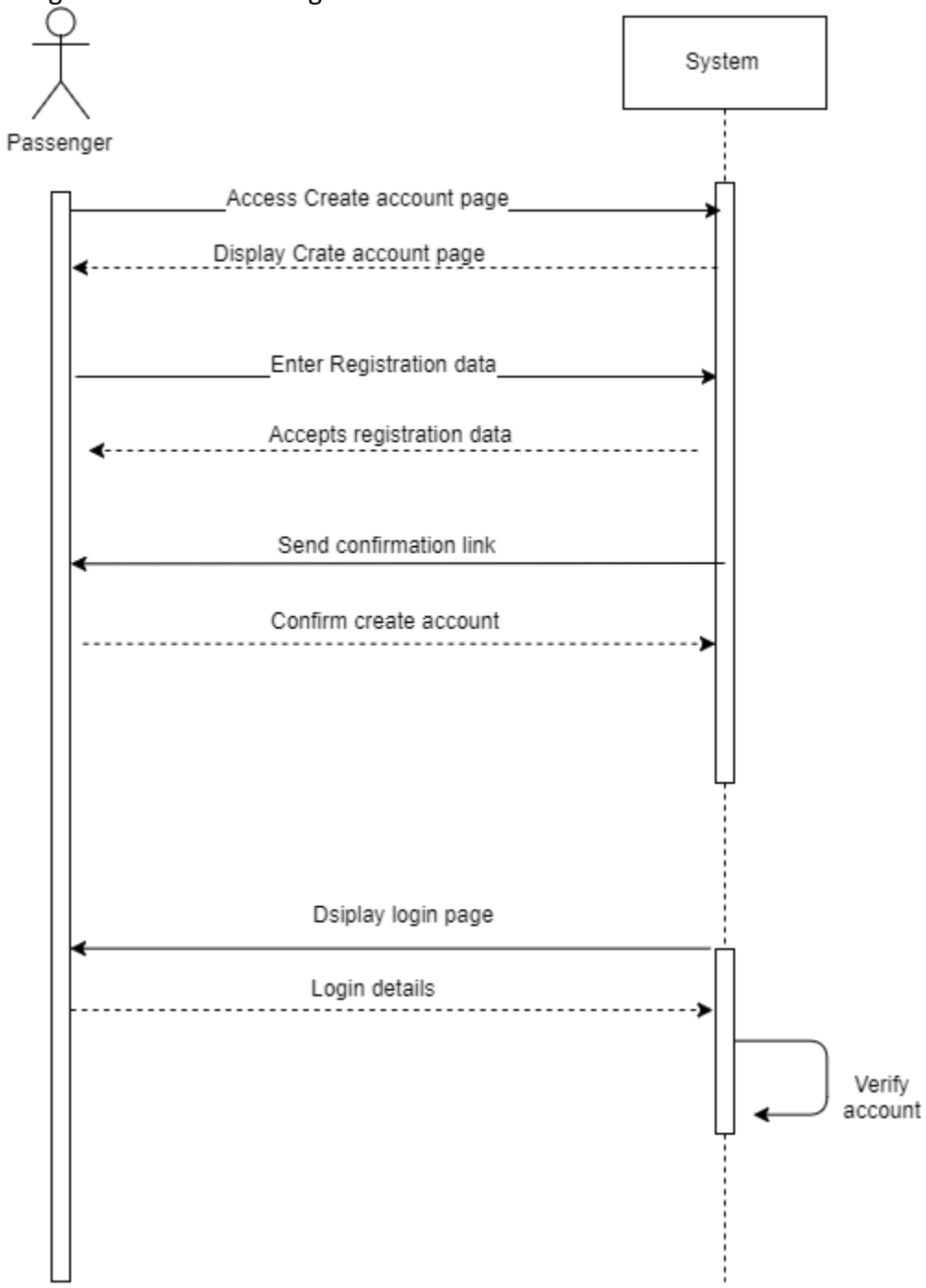


Activity diagram for Use Case: Rate and provide feedback

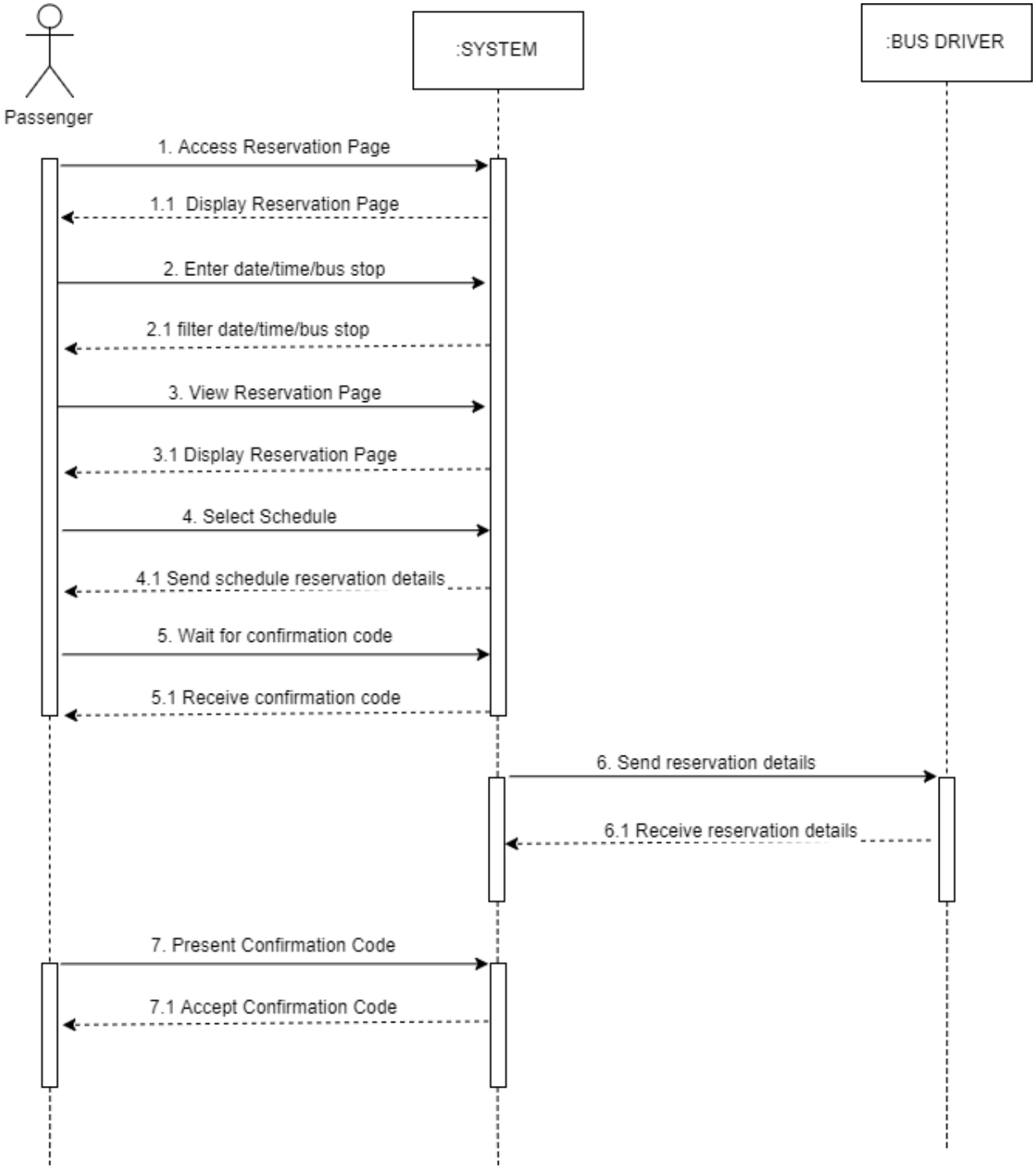


4.4.11 Sequence Diagram

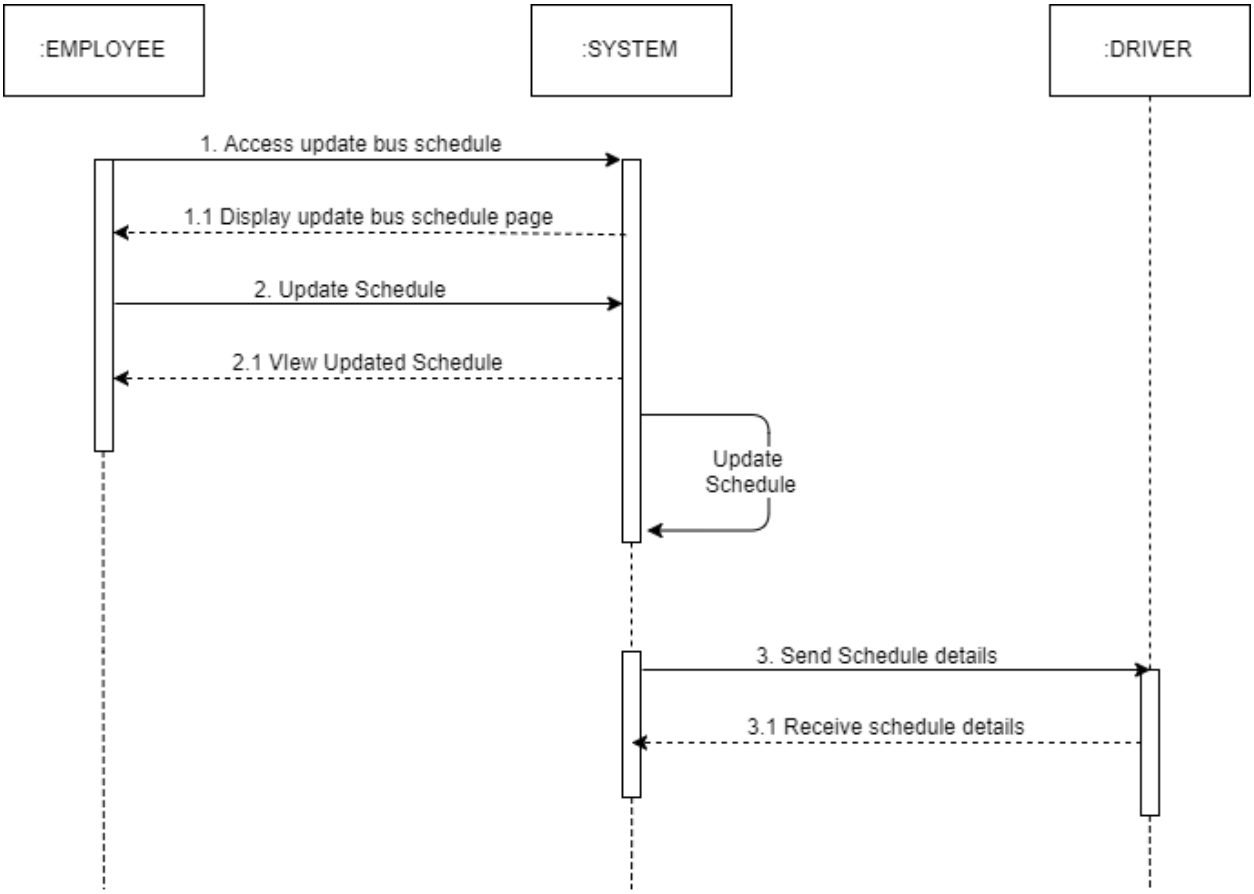
Sequence diagram for Use Case: Login



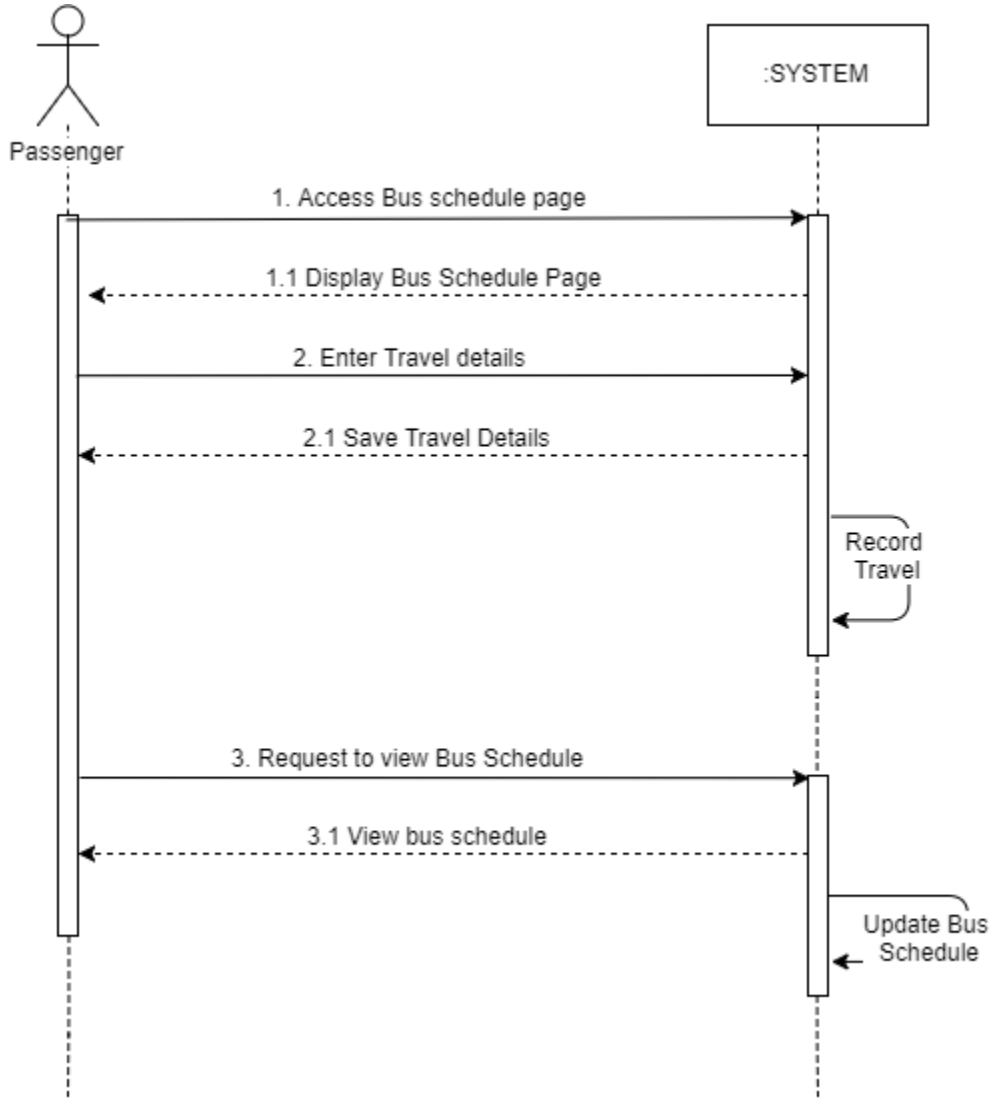
Sequence diagram for Use Case: Reserve seat



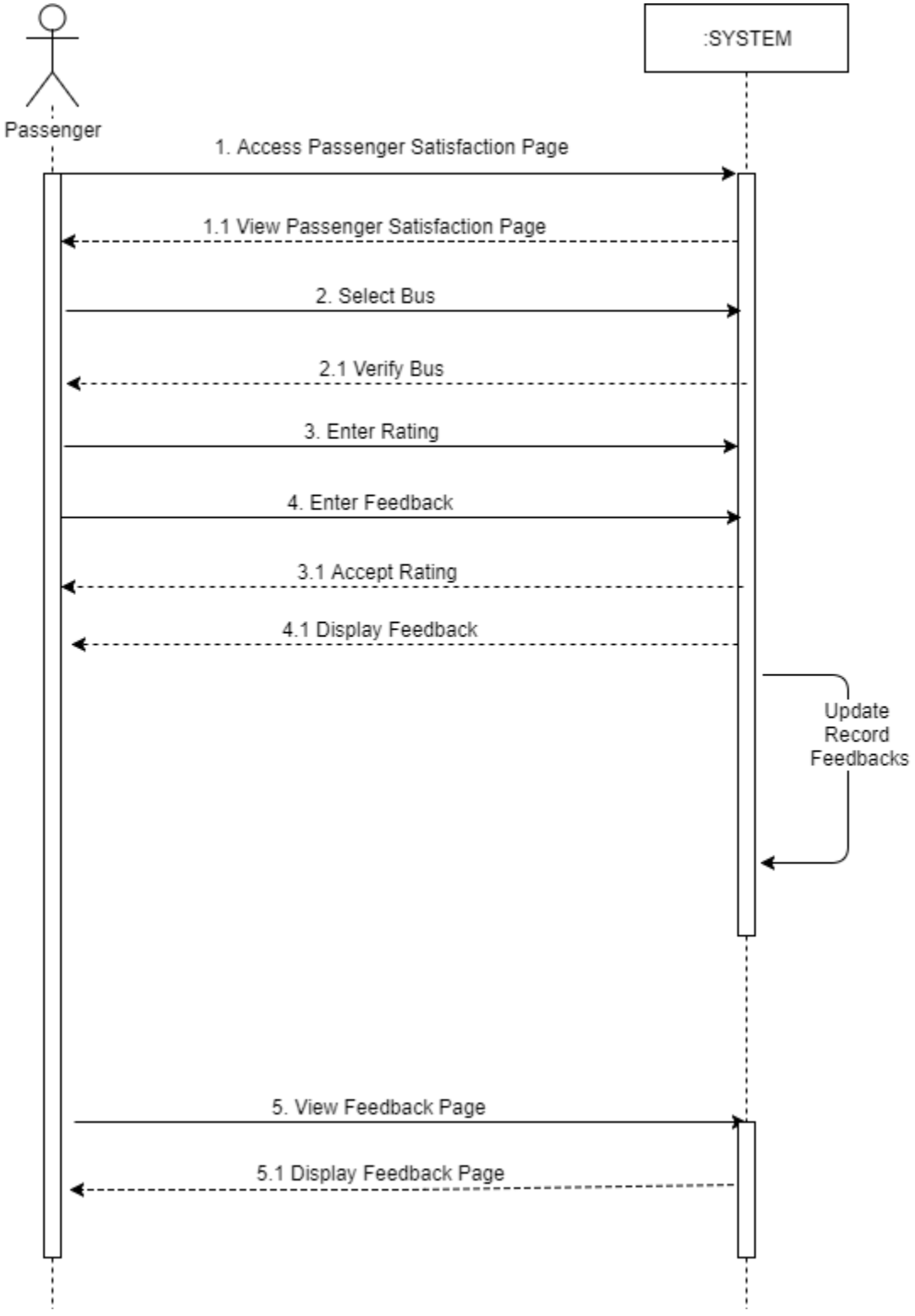
Sequence diagram for Use Case: Generate bus schedules (employee)



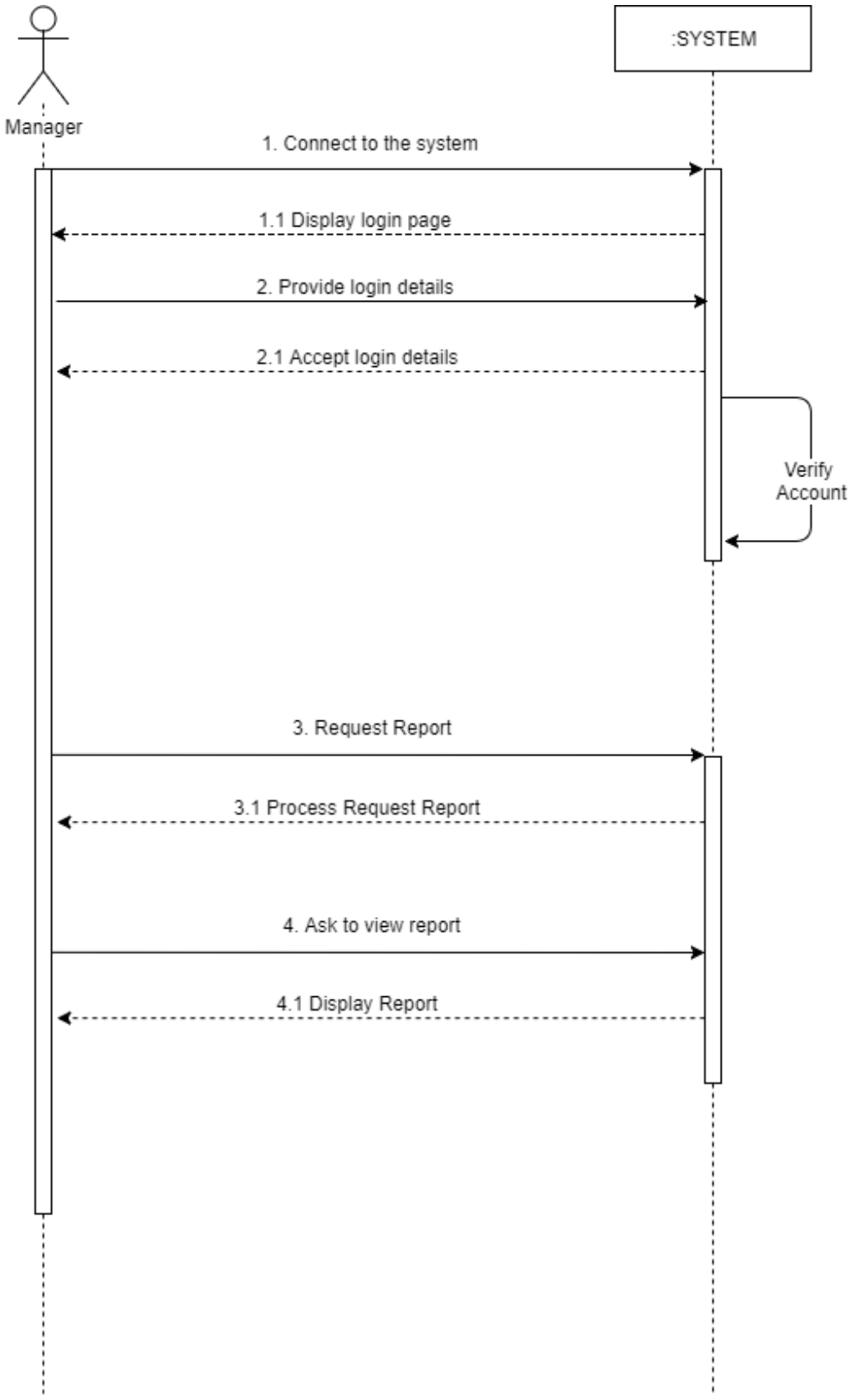
Sequence diagram for Use Case: Generate bus schedules (passenger)



Sequence diagram for Use Case: Rate and provide feedback

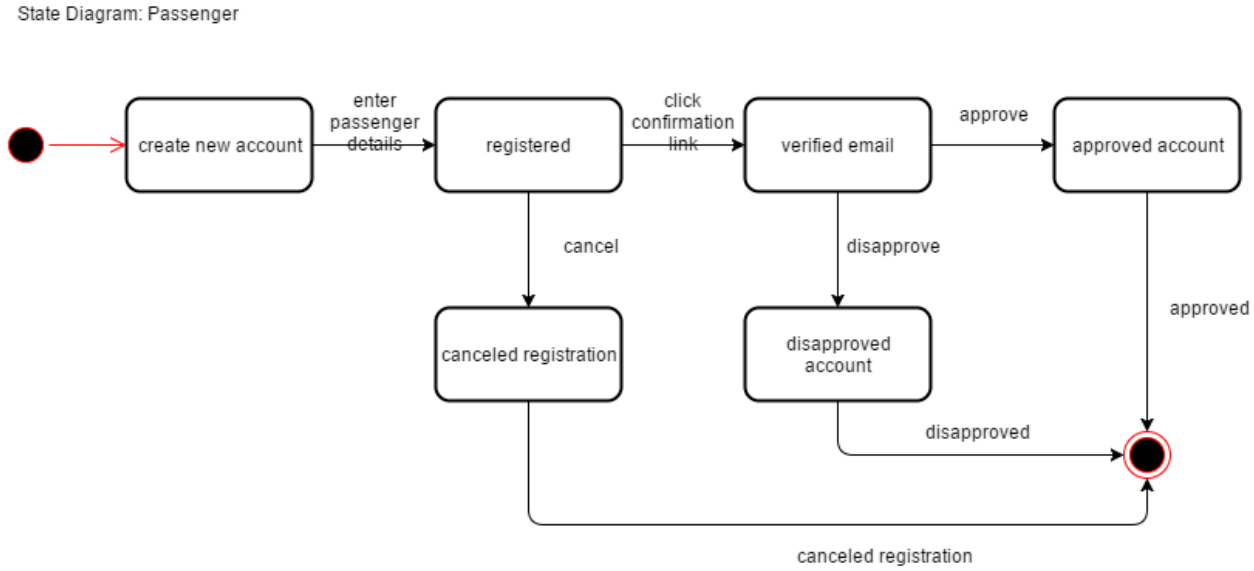


Sequence diagram for Use Case: Generate report

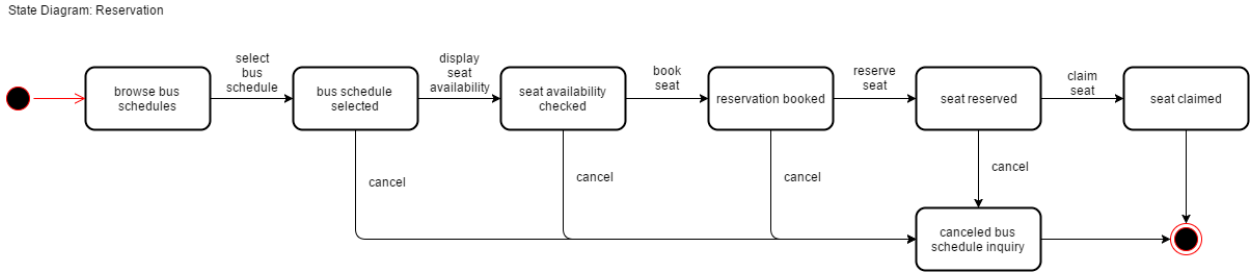


4.4.12 State Machine Diagram

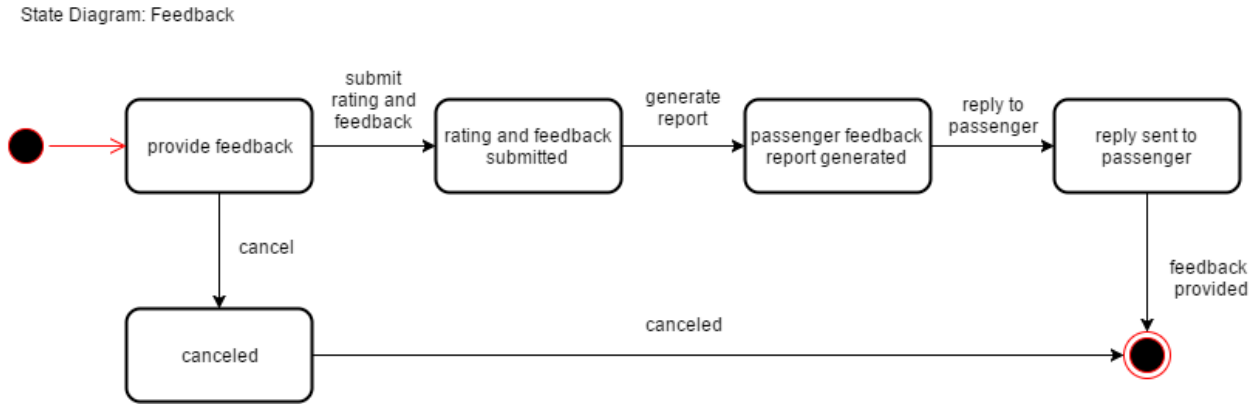
State Machine diagram for Object: Passenger



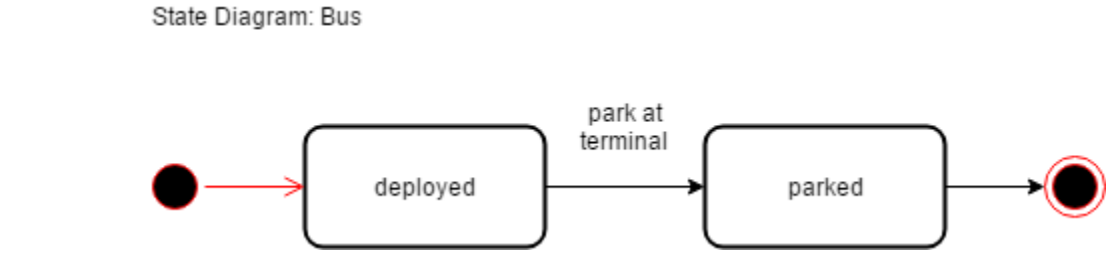
State Machine diagram for Object: Reservation



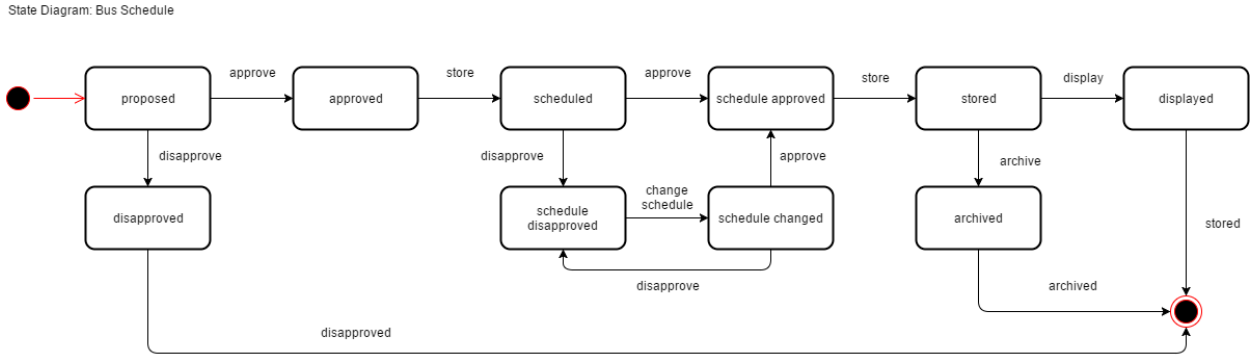
State Machine diagram for Object: Feedback



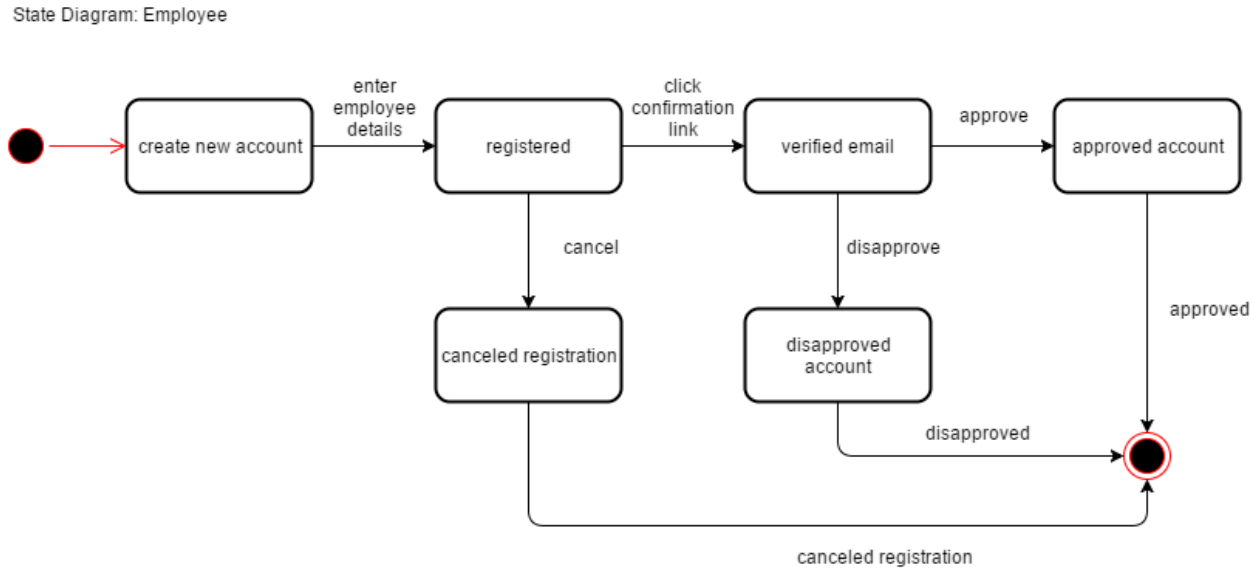
State Machine diagram for Object: Bus



State Machine diagram for Object: Bus Schedule

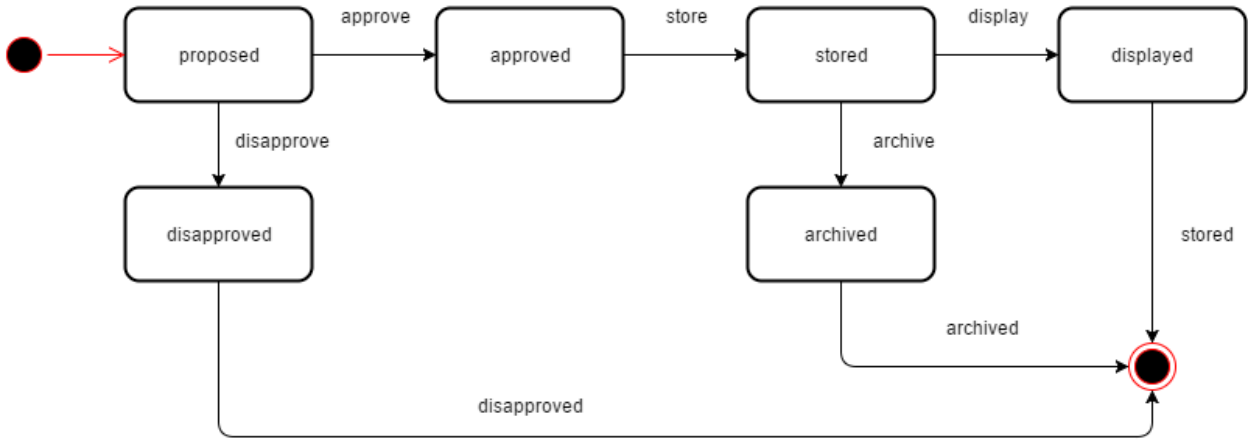


State Machine diagram for Object: Employee



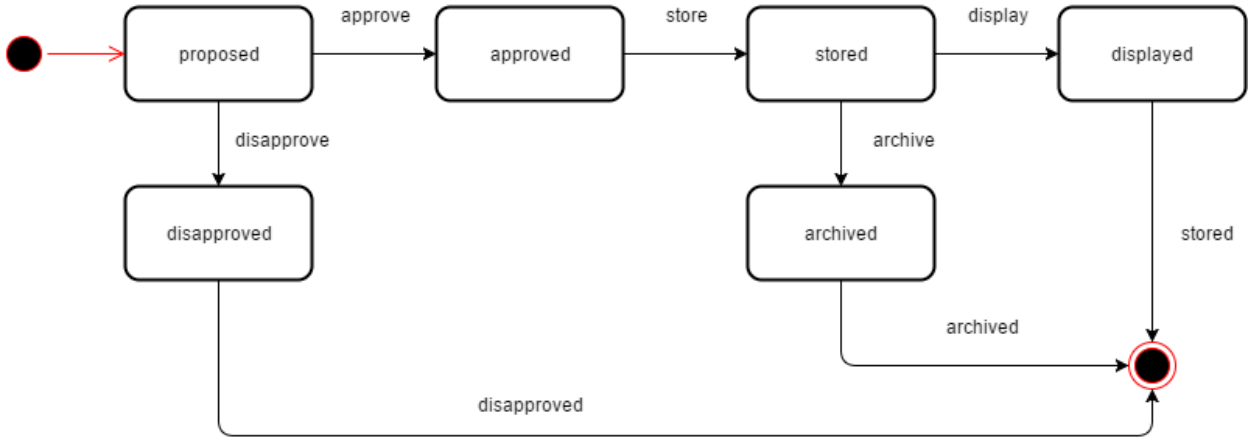
State Machine diagram for Object: Bus Route

State Diagram: Bus Route



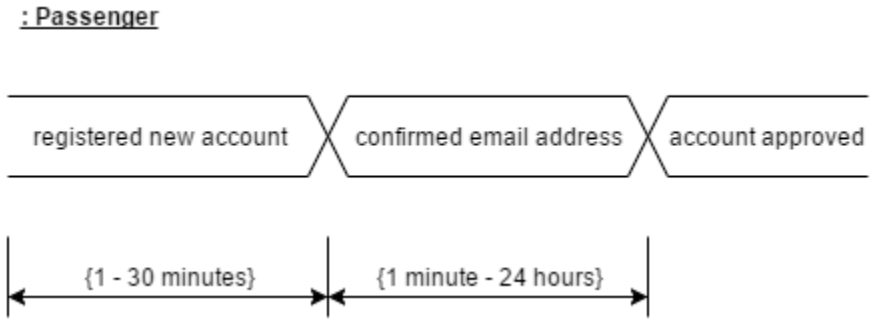
State Machine diagram for Object: Bus Stop

State Diagram: Bus Stop

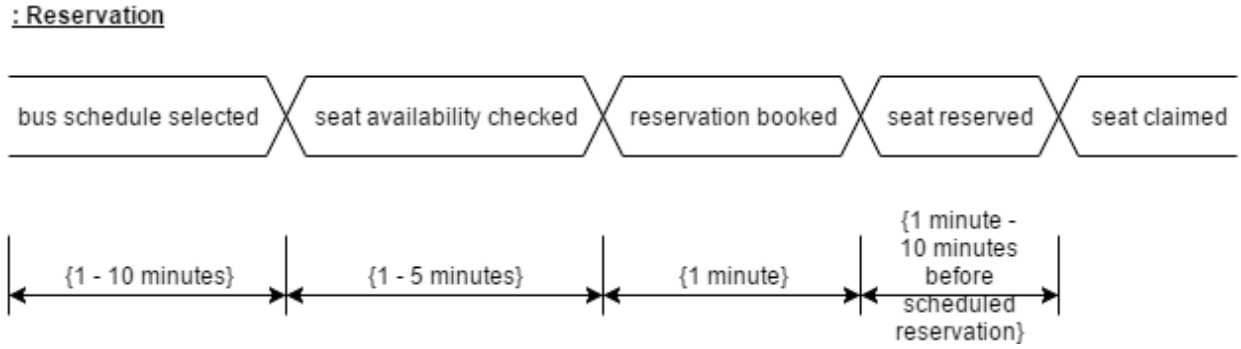


4.4.13 Timing Diagram

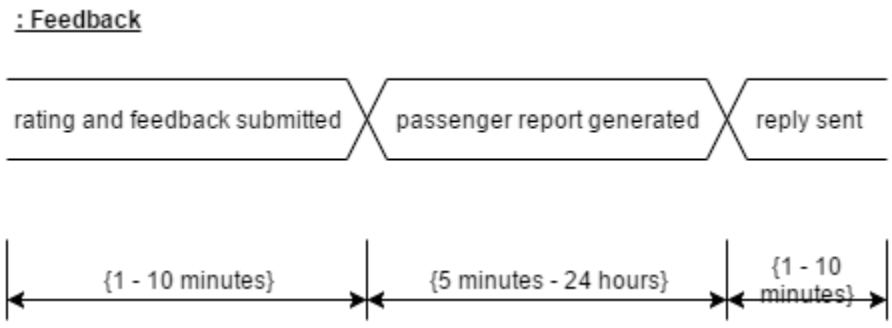
Timing diagram for Object: Passenger



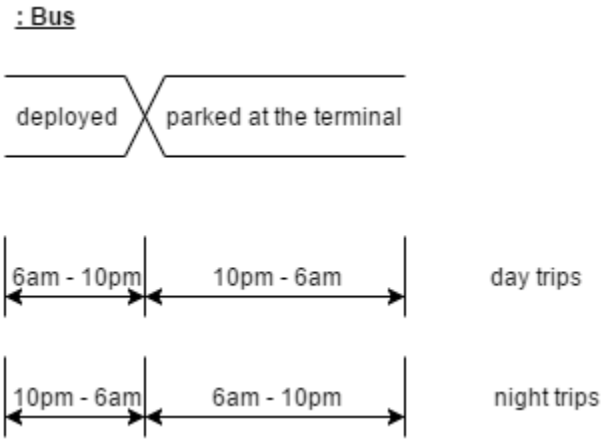
Timing diagram for Object: Reservation



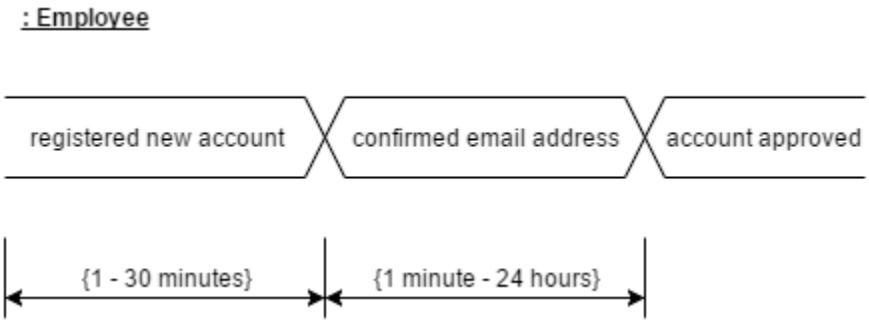
Timing diagram for Object: Feedback



Timing diagram for Object: Bus

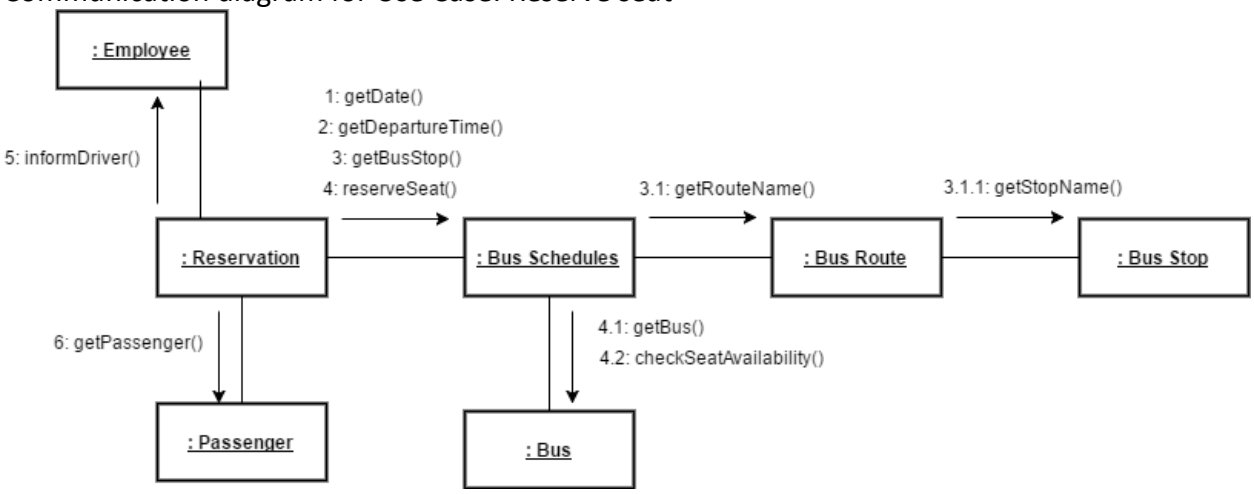


Timing diagram for Object: Employee

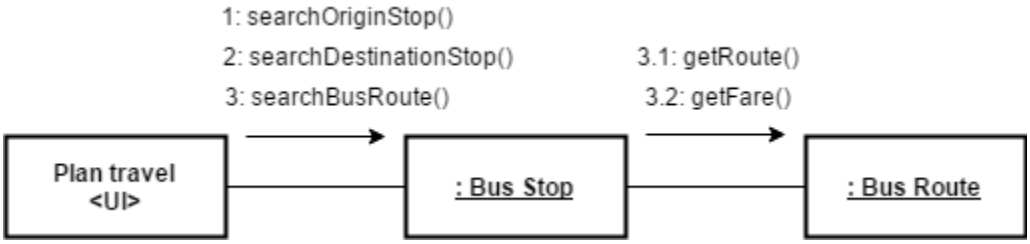


4.4.14 Communication Diagram

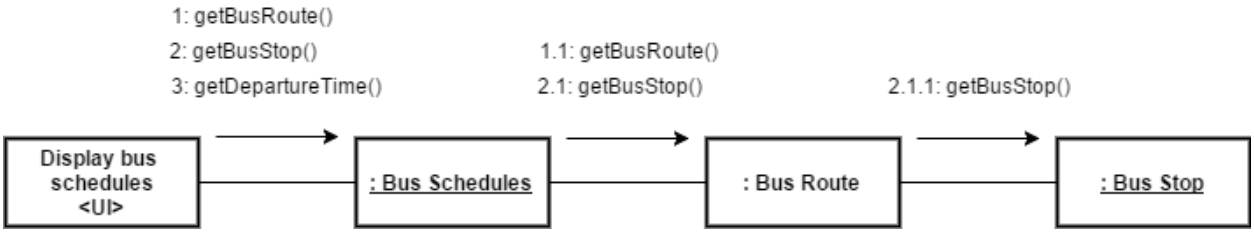
Communication diagram for Use Case: Reserve seat



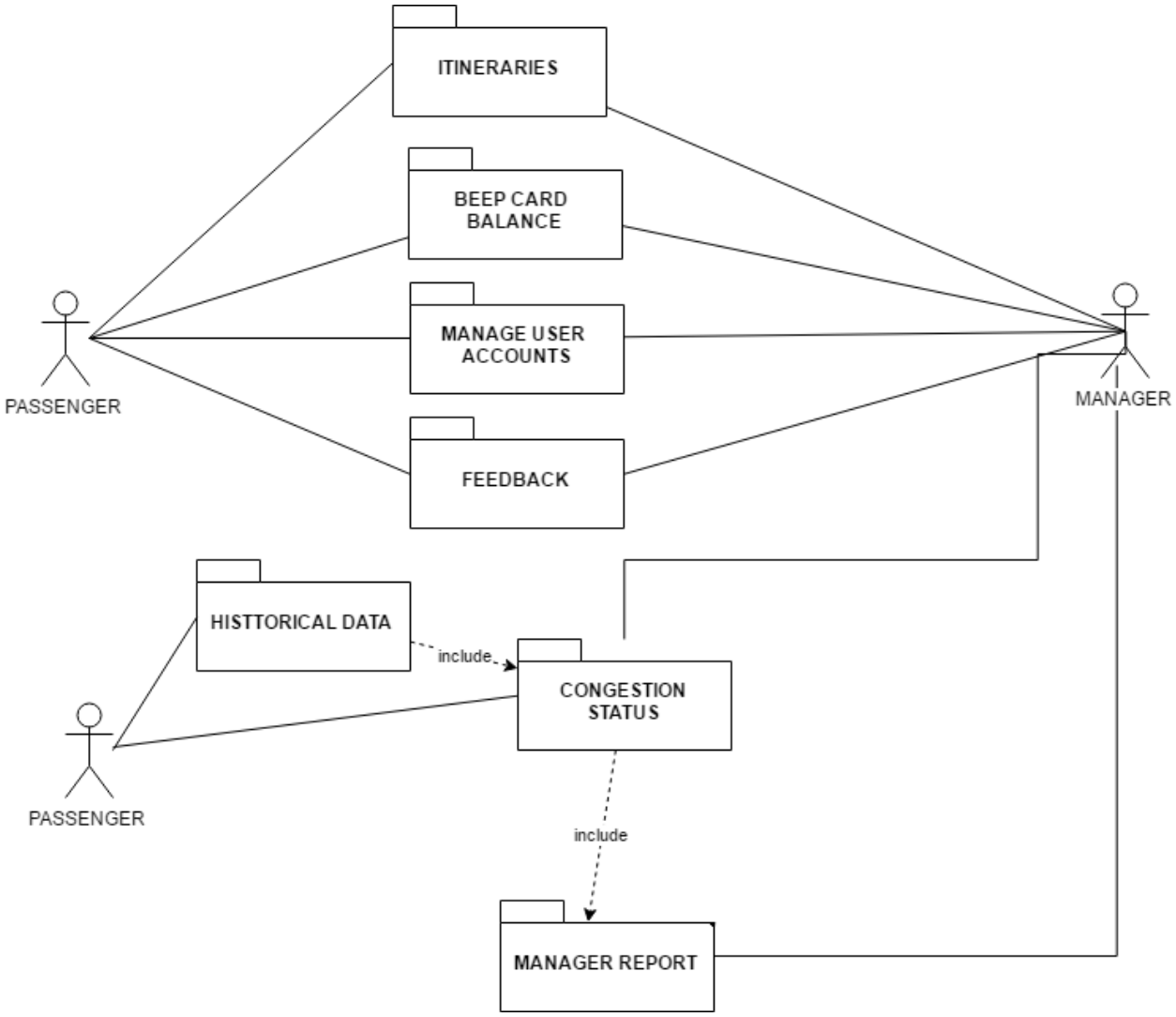
Communication diagram for Use Case: Plan travel



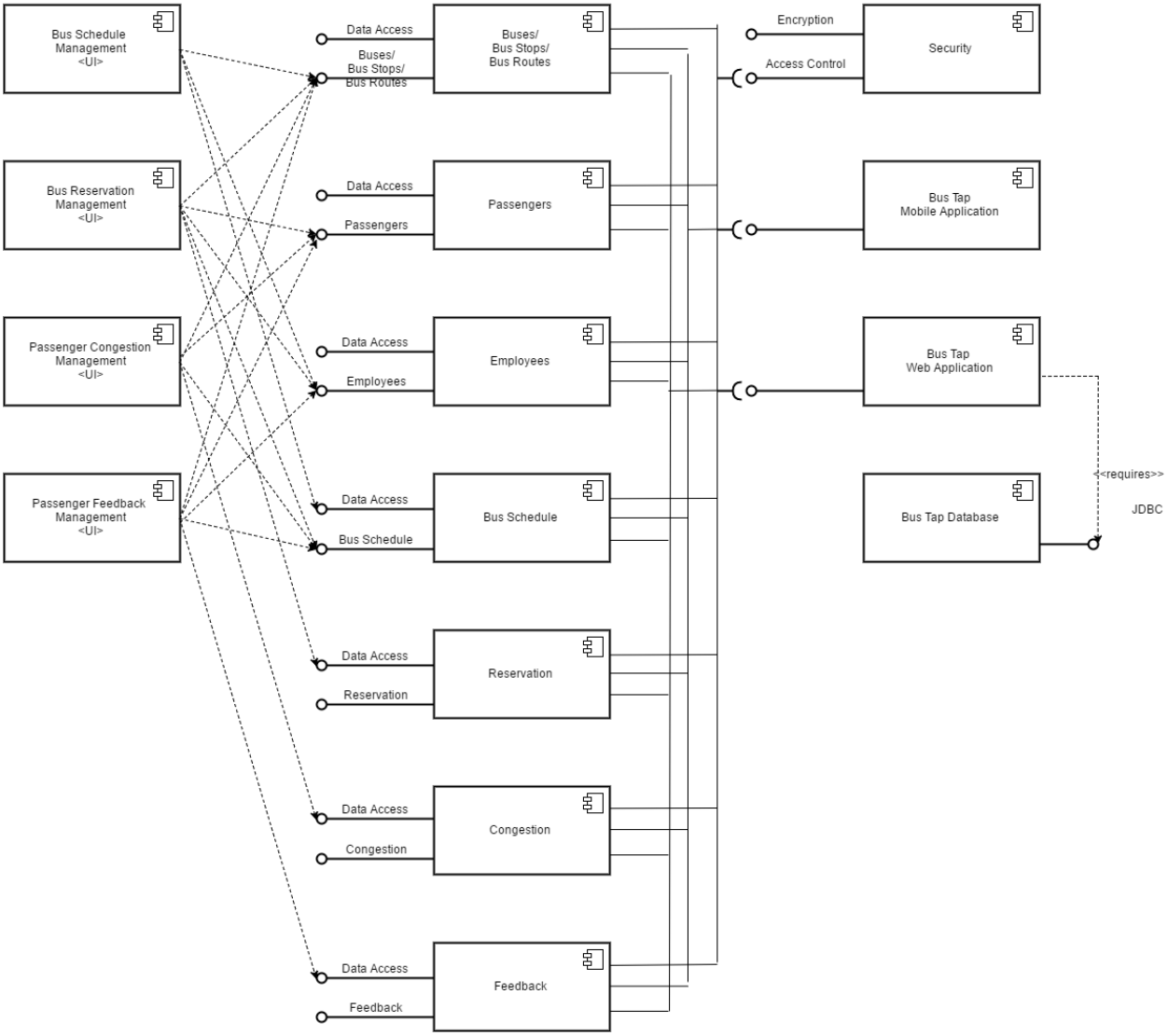
Communication diagram for Use Case**: Display bus schedules**



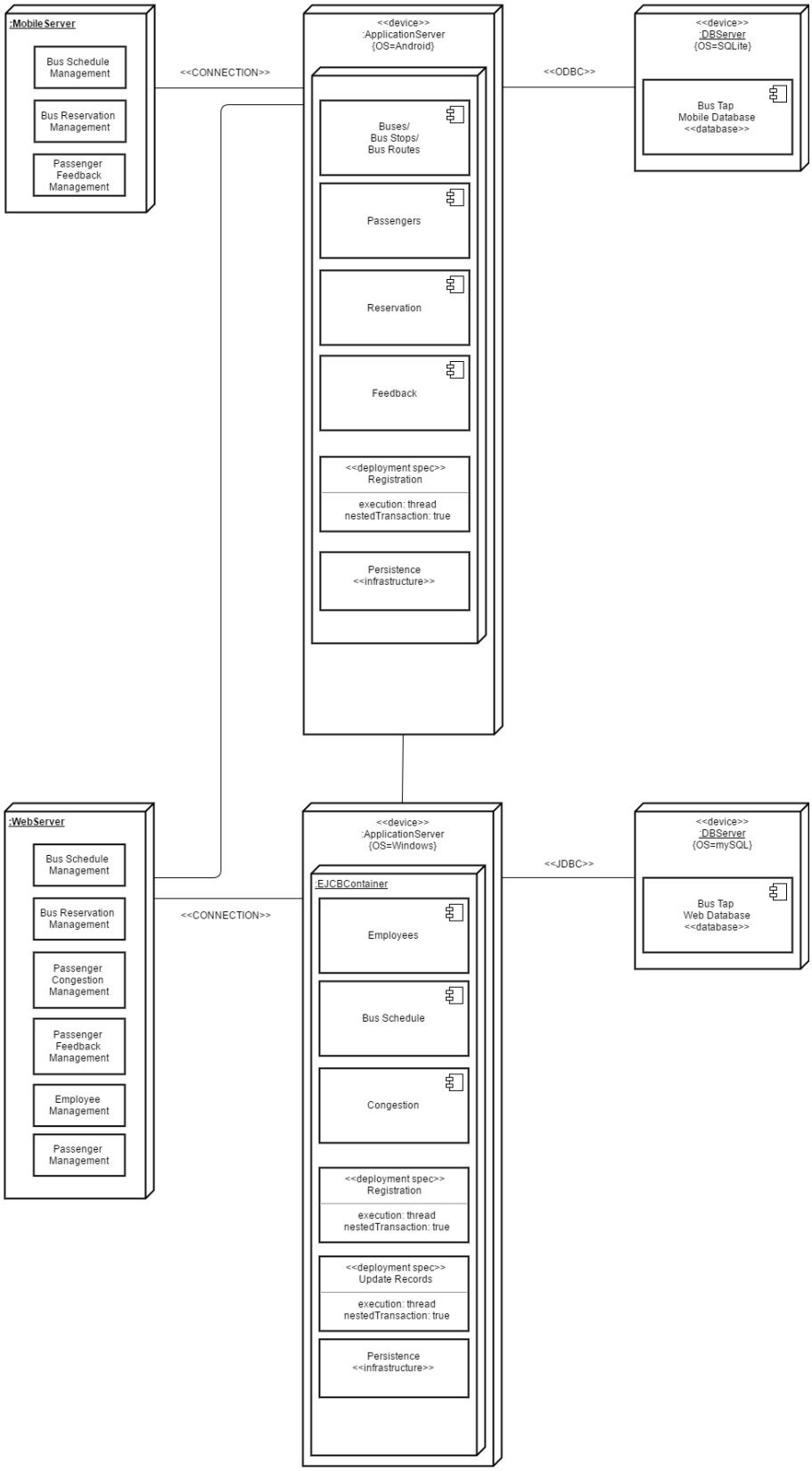
4.4.15 Package Diagram



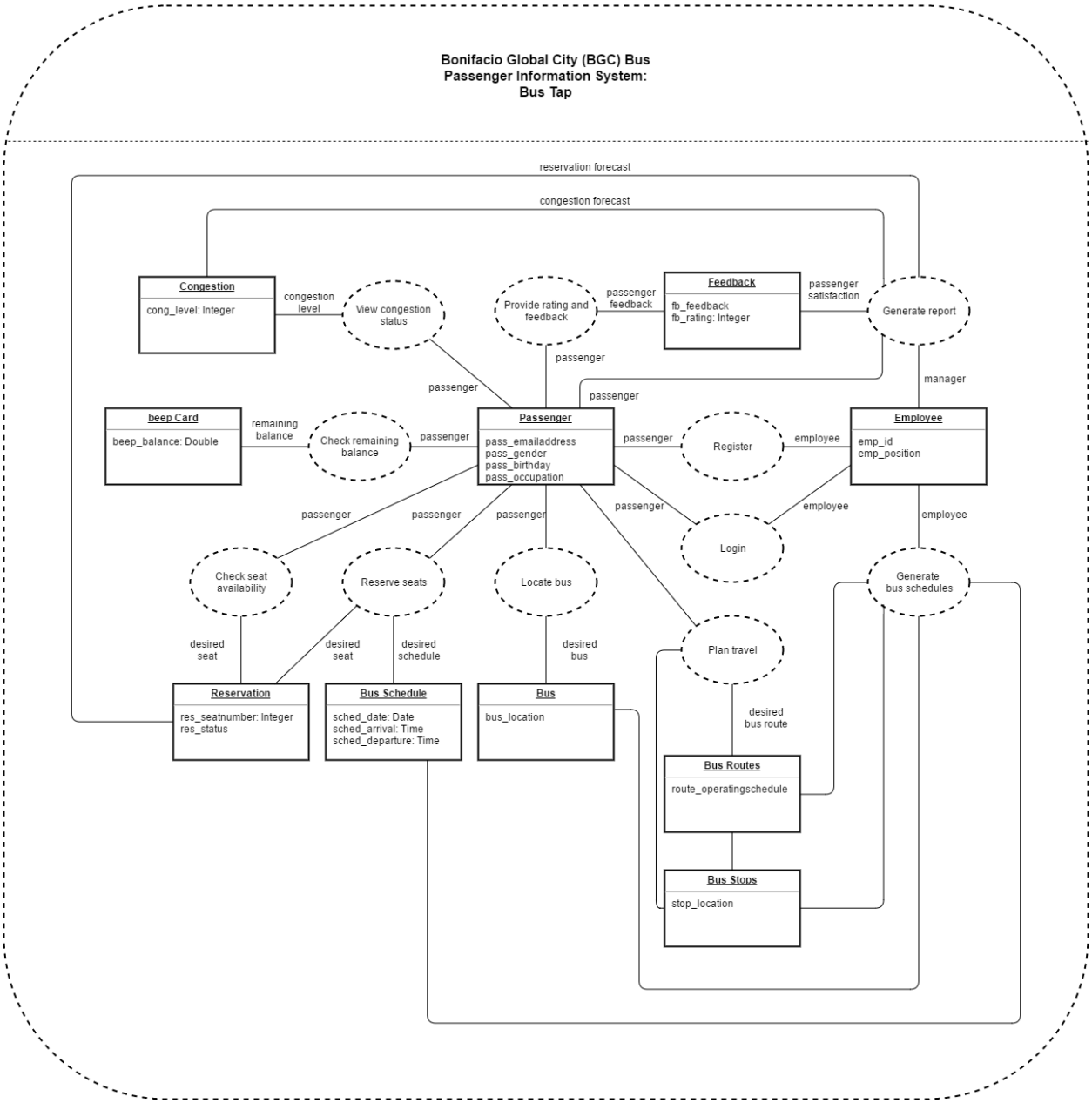
4.4.16 Component Diagram



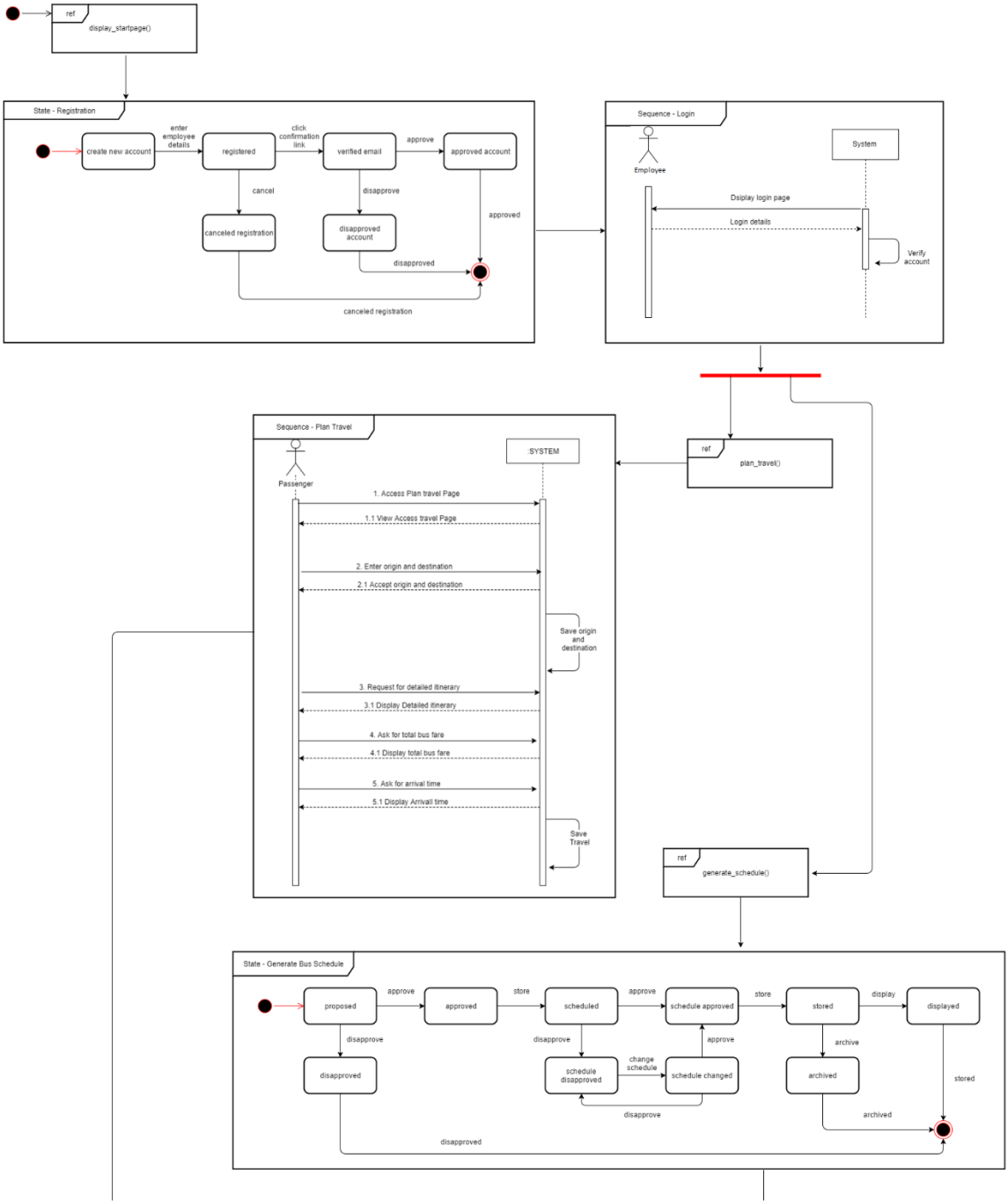
4.4.17 Deployment Diagram

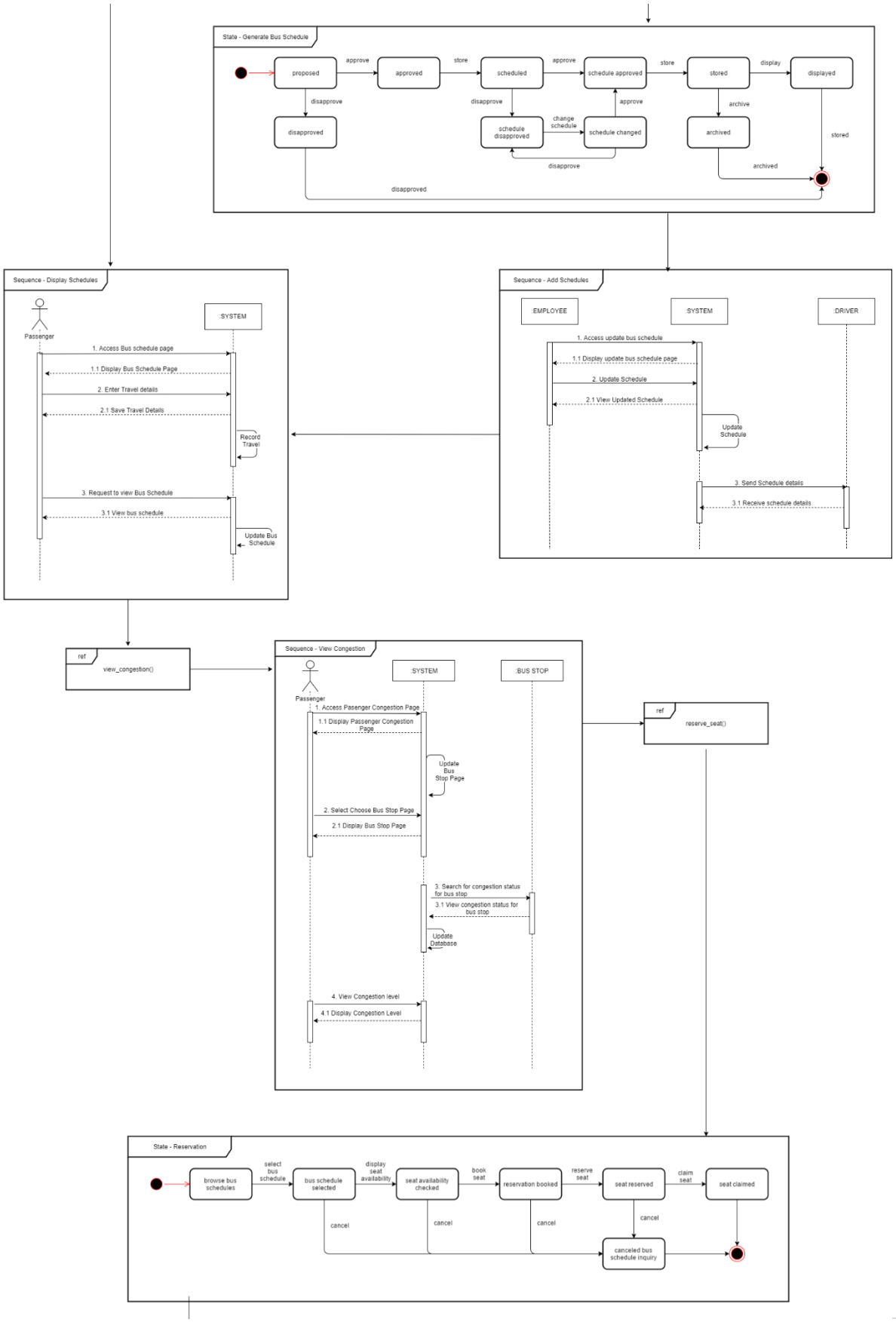


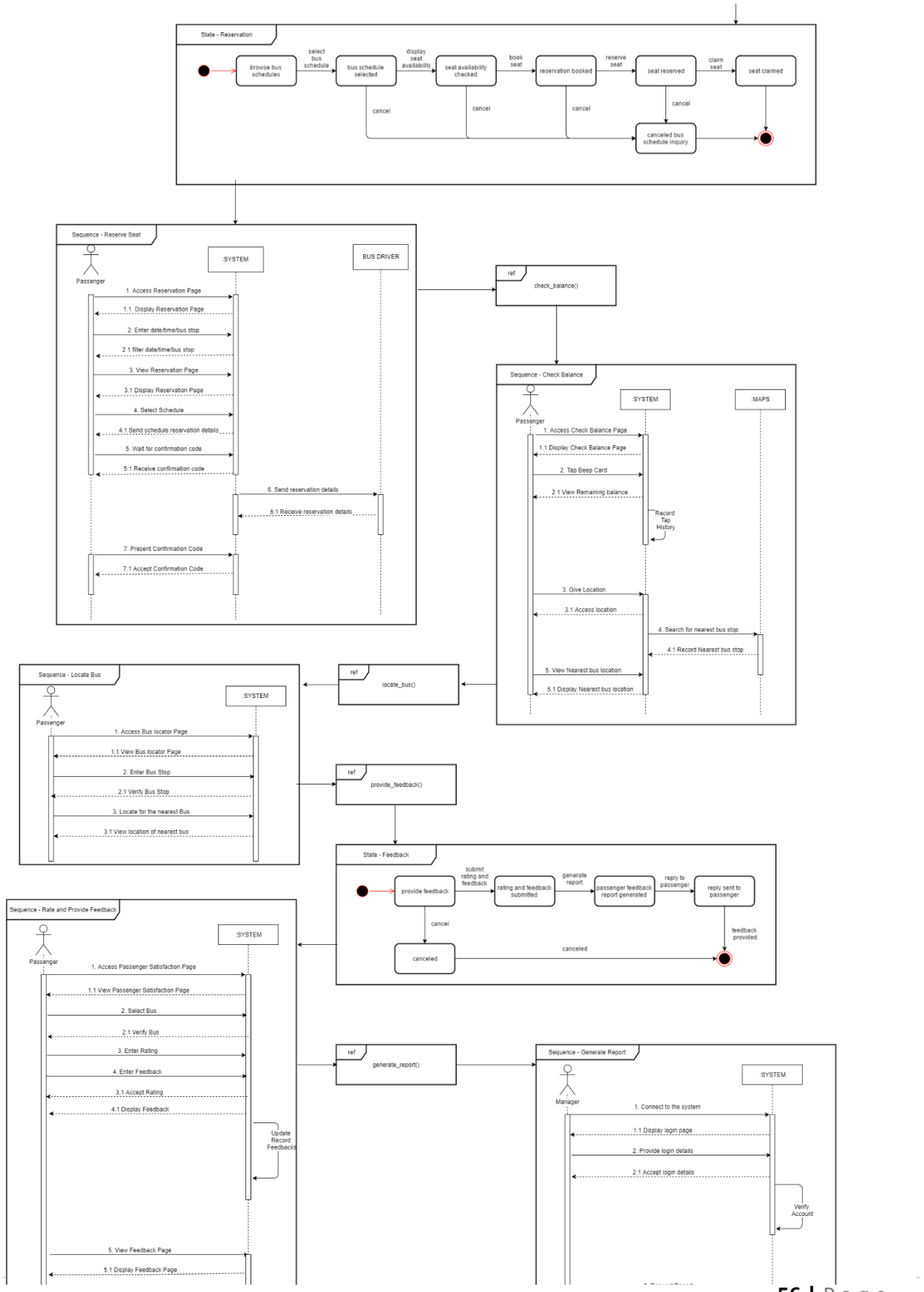
4.4.18 Composite Structure Diagram

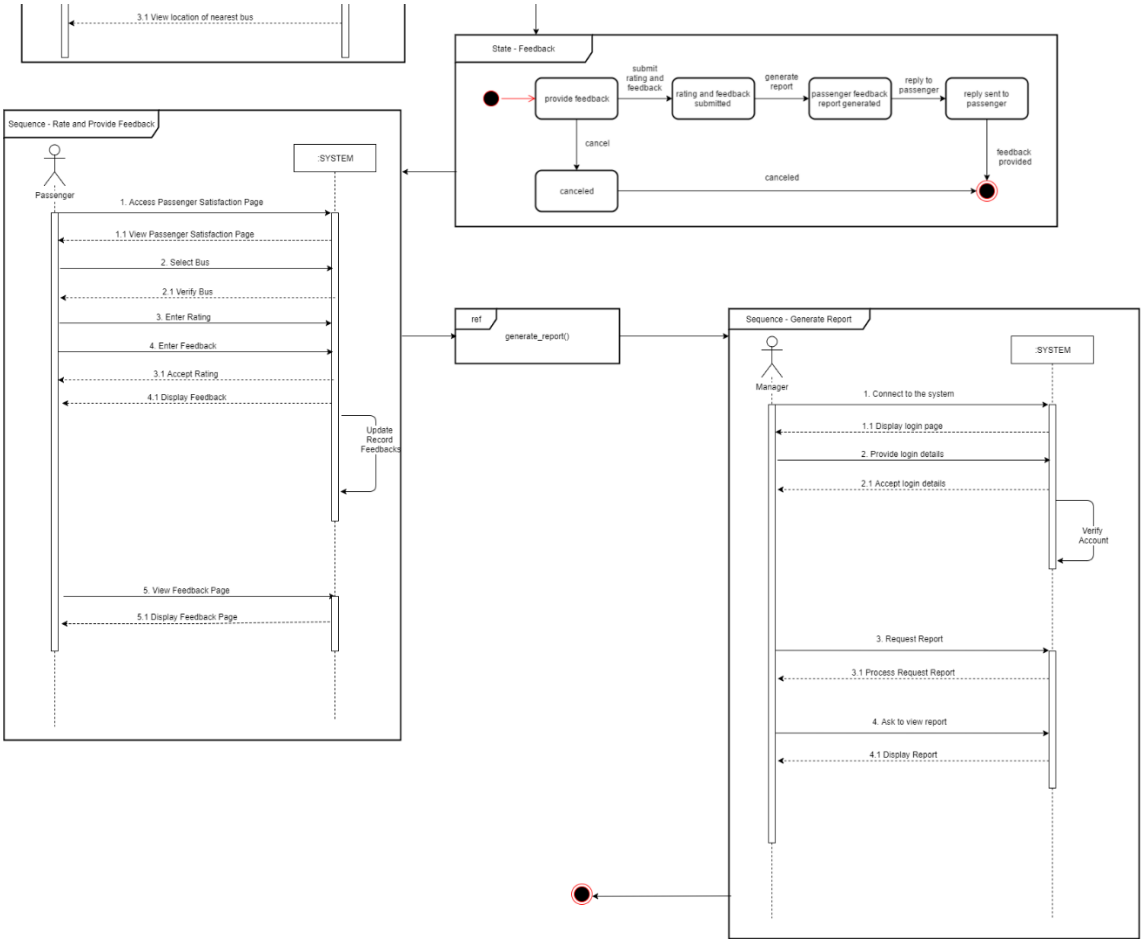


4.4.19 Interaction Overview Diagram




State - Generate Bus Schedule
proposed
approve
approved
store
scheduled
approve
schedule approved
store
stored
display
displayed
disapprove
disapproved
disapprove
schedule disapproved
change schedule
schedule changed
approve
disapprove
archive
archived
stored
archived
disapproved
Sequence - Display Schedules
Passenger
:SYSTEM
1. Access Bus schedule page
1.1 Display Bus Schedule Page
2. Enter Travel details
2.1 Save Travel Details
Record Travel
3. Request to view Bus Schedule
3.1 View bus schedule
Update Bus Schedule
Sequence - Add Schedules
:EMPLOYEE
:SYSTEM
:DRIVER
1. Access update bus schedule
1.1 Display update bus schedule page
2. Update Schedule
2.1 View Updated Schedule
Update Schedule
3. Send Schedule details
3.1 Receive schedule details
ref
view_congestion()
Sequence - View Congestion
Passenger
:SYSTEM
:BUS STOP
1. Access Pasenger Congestion Page
1.1 Display Passenger Congestion Page
Update Bus Stop Page
2. Select Choose Bus Stop Page
2.1 Display Bus Stop Page
3. Search for congestion status for bus stop
3.1 View congestion status for bus stop
Update Database
4. View Congestion level
4.1 Display Congestion Level
ref
reserve_seat()
State - Reservation
browse bus schedules
select bus schedule
bus schedule selected
display seat availability
seat availability checked
book seat
reservation booked
reserve seat
seat reserved
claim seat
seat claimed
cancel
cancel
cancel
cancel
canceled bus schedule inquiry


State - Reservation
browse bus schedules
select bus schedule
bus schedule selected
display seat availability
seat availability checked
book seat
reservation booked
reserve seat
seat reserved
claim seat
seat claimed
cancel
cancel
cancel
cancel
canceled bus schedule inquiry
Sequence - Reserve Seat
Passenger
:SYSTEM
:BUS DRIVER
1. Access Reservation Page
1.1. Display Reservation Page
2. Enter date/time/bus stop
2.1 filter date/time/bus stop
3. View Reservation Page
3.1 Display Reservation Page
4. Select Schedule
4.1 Send schedule reservation details
5. Wait for confirmation code
5.1 Receive confirmation code
6. Send reservation details
6.1 Receive reservation details
7. Present Confirmation Code
7.1 Accept Confirmation Code
ref
check_balance()
Sequence - Check Balance
Passenger
:SYSTEM
:MAPS
1. Access Check Balance Page
1.1 Display Check Balance Page
2. Tap Beep Card
2.1 View Remaining balance
Record Tap History
3. Give Location
3.1 Access location
4. Search for nearest bus stop
4.1 Record Nearest bus stop
5. View Nearest bus location
5.1 Display Nearest bus location
Sequence - Locate Bus
Passenger
:SYSTEM
1. Access Bus locator Page
1.1 View Bus locator Page
2. Enter Bus Stop
2.1 Verify Bus Stop
3. Locate for the nearest Bus
3.1 View location of nearest bus
ref
locate_bus()
ref
provide_feedback()
State - Feedback
provide feedback
submit rating and feedback
rating and feedback submitted
generate report
passenger feedback report generated
reply to passenger
reply sent to passenger
cancel
canceled
canceled
feedback provided
Sequence - Rate and Provide Feedback
Passenger
:SYSTEM
1. Access Passenger Satisfaction Page
1.1 View Passenger Satisfaction Page
2. Select Bus
2.1 Verify Bus
3. Enter Rating
4. Enter Feedback
3.1 Accept Rating
4.1 Display Feedback
Update Record Feedbacks
5. View Feedback Page
5.1 Display Feedback Page
ref
generate_report()
Sequence - Generate Report
Manager
:SYSTEM
1. Connect to the system
1.1 Display login page
2. Provide login details
2.1 Accept login details
Verify Account


3.1 View location of nearest bus
State - Feedback
provide feedback
submit rating and feedback
rating and feedback submitted
generate report
passenger feedback report generated
reply to passenger
reply sent to passenger
cancel
canceled
canceled
feedback provided
Sequence - Rate and Provide Feedback
Passenger
:SYSTEM
1. Access Passenger Satisfaction Page
1.1 View Passenger Satisfaction Page
2. Select Bus
2.1 Verify Bus
3. Enter Rating
4. Enter Feedback
3.1 Accept Rating
4.1 Display Feedback
Update Record Feedbacks
5. View Feedback Page
5.1 Display Feedback Page
ref
generate_report()
Sequence - Generate Report
Manager
:SYSTEM
1. Connect to the system
1.1 Display login page
2. Provide login details
2.1 Accept login details
Verify Account
3. Request Report
3.1 Process Request Report
4. Ask to view report
4.1 Display Report

4.5 Development and Testing

The mobile application was developed using the Android Studio IDE. The web application was developed using the Visual Studio Code IDE. The web application runs via localhost of the computer. Database of the website also runs via localhost of the computer.

4.6 Description of the Prototype

The mobile application of the Bus Tap consists of the

- Welcome Page,
- Sign In Page,
- Sign Up Page,
- Forgot Password Page,
- Menu Page,
- News Page,
- Maps Page,
- Routes Page,
- Feedback Page, and
- Reservation Page.

The web application of the Bus Tap consists of the

- Sign In Page,
- Sign Up Page,
- Reset Password Request Page,
- Reset Password Page,
- Home Page
- Bus Routes Page (View All, Add, Update, and View One)
- Bus Stops Page (View All, Add, Update, and View One)
- Buses Page (View All, Add, Update, and View One)
- Bus Schedules Page (View All, Add, Update, and View One)
- News Page (View All, Add, Update, and View One)
- View Rating and Feedback Page

The Sign Up Page, Sign In Page, Reset Password Page, and Reset Password Request Page allows of the mobile and web application allows the users to create an account and to access them. The Menu Page of the mobile application and the Home Page of the web application allows users to access the different pages upon signing in. The News Page, Routes Page, Bus Stops Page, Buses Page, and Bus Schedules Page allows the employee to post news, route information, stop information, bus information, and trip information and the passengers to view the posts. The Feedback Page allows the passengers to provide rating and feedback, which can be seen by the company. The Reservation Page allows the passengers to make a reservation and for the company to receive the reservation.

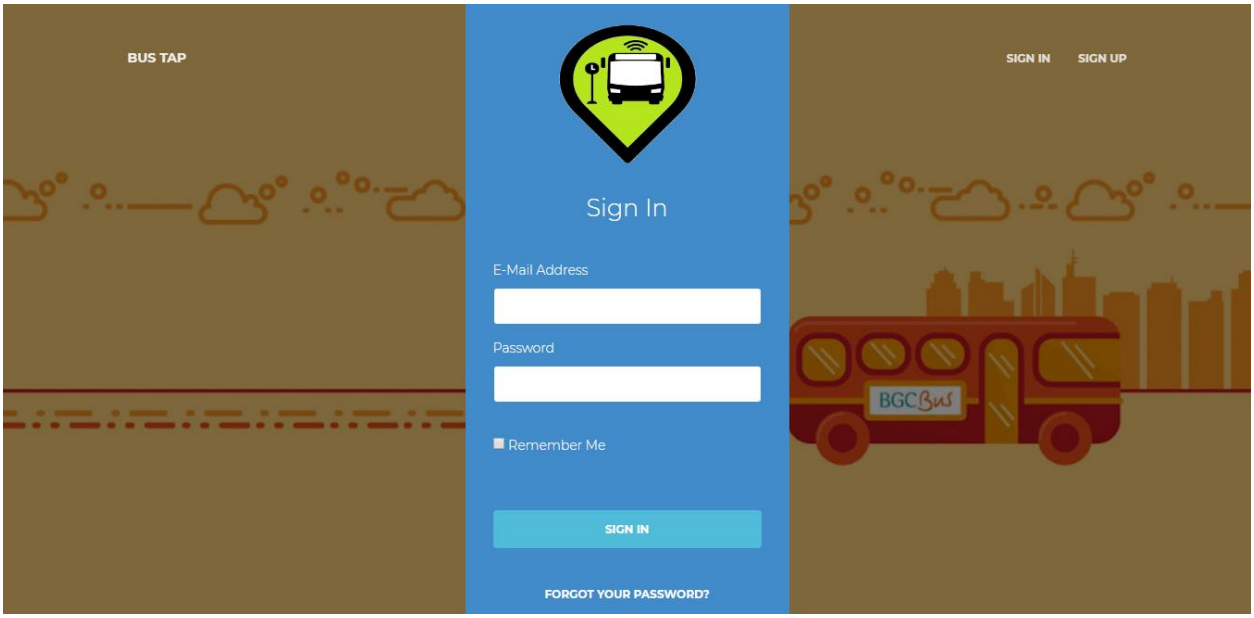


Figure 1. Screenshot of the Sign In Page of the Web Application

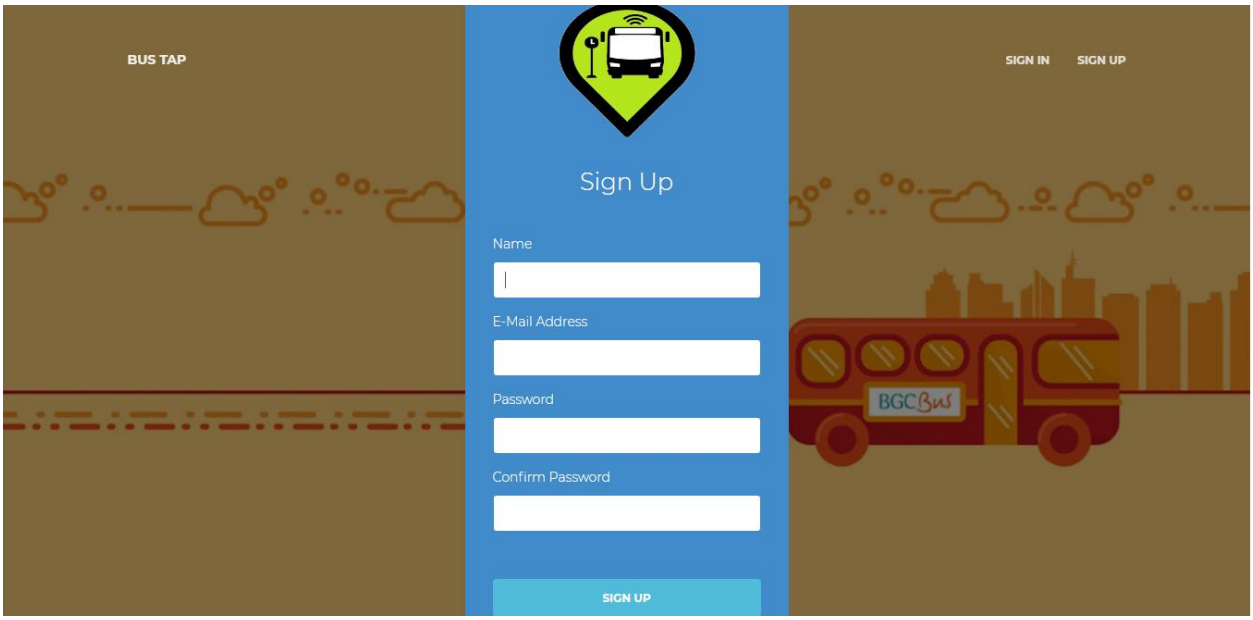


Figure 2. Screenshot of the SignUp Page of the Web Application

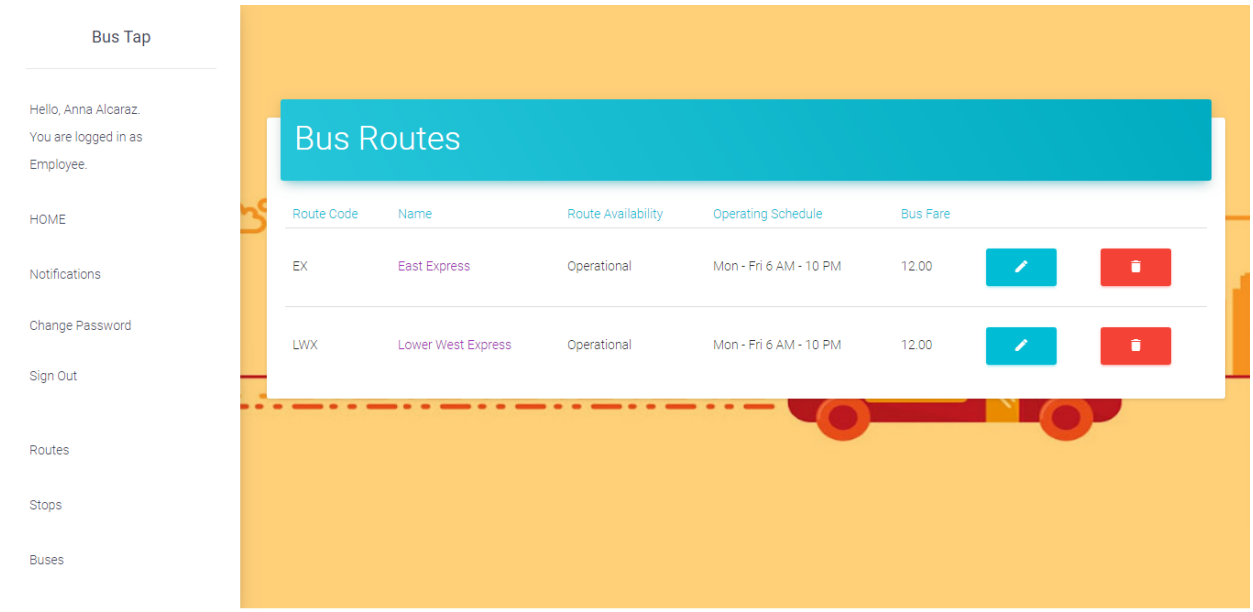


Figure 3. Screenshot of the View Routes Page of the Web Application

V. Conclusions and Recommendations

The group created a mobile application as front-end and a web application as back-end for the Bus Tap, a passenger information system, that aims to connect the BGC Bus company to its passengers. Through the Bus Tap, the BGC Bus company can provide its passengers with the latest information regarding their services, and passengers can access up-to-date information regarding BGC Bus. Passengers can also contact the BGC Bus company through the mobile application, and provide rating, feedback, suggestions, or send inquiries, and receive replies.

With the Bus Tap reservation feature, passengers no longer have to wait long to be able to ride the bus, having been able to reserve a spot on their desired schedule ahead of time, minimizing the waiting time they experience when taking the BGC Bus.

VI. References

Obias, M. (2017, August 9). BGC Bus. (A. C. Alcaraz, S. M. Angot, J. V. Besmano, & J. G. Brioso, Interviewers)

Todd, A., & Barraclough, C. (2017, June 28). *What is Android OS*. Retrieved from recombu.com: https://recombu.com/mobile/article/what-is-android-and-what-is-an-android-phone_M12615.html#

Trapeze Group. (n.d.). *Passenger Information Systems: What Transit Agencies Need To Know.* Retrieved from Trapeze Group Web site: http://www.trapezegroup.com/uploads/resources/Trapeze_WP_Passenger_Info_FIN.pdf

VII. Appendices

7.1 Data Gathering

Letter of Request for Interview to the management of the BGC Bus

3 August 2017

MR. JAIME FRANCISCO T. GALVEZ, JR.

General Manager

Bonifacio Transport Corporation

Utility Area 31st Street

Crescent Park West Bonifacio Global City

DEAR MR. GALVEZ:

Greetings!

We are 3rd year students of Asia Pacific College, under the BS Computer Science program, specializing in Systems Software. We are currently enrolled in an Introduction to Systems Analysis and Design (INTSDEV) course that requires students to complete an industry-based project of developing systems or applications for a company, government agency, or institution.

Public transportation, particularly the BGC Bus, has been the interest of our group. We aim to learn more about the business process of the BGC Bus, and to identify issues and problems encountered by the management and the passengers of the BGC Bus, to be able to propose a suitable system or application that will help not only the management of the BGC Bus, but also its passengers.

In this light, we would like to request for an interview with you or your representative on August 9, 2017 between 2:00-5:00PM in your office. We have at least 20 questions and might take about 45 minutes of the interviewer's time. Attached herewith is the list of interview questions.

If you have some inquiries or clarifications, or if you would like to set the interview on a different date and time, please feel free to get in touch with our project manager, Anna Lynn Alcaraz, at 09998845654, or through e-mail at acalcaraz@student.apc.edu.ph.

Thank you in advance.

Sincerely,

ANNA LYNN C. ALCARAZ	SAMMY BOY M. ANGOT	JUSTIN V. BESMANO	JOB G. BRIOSO
Project Manager	Team Member	Team Member	Team Member

Noted by:

MS. RHEA-LUZ VALBUENA	MR. JUSTIN DAVID PINEDA
Course Instructor	Project Adviser

Questions for the Interview with the management of the BGC Bus

Interview Questions: Bonifacio Transport Corporation

1. What is the daily average total number of passengers of the BGC Bus?
2. How many passengers ride the BGC Bus in every month? If possible, please specify for each month of the year.
3. What are the different bus routes of the BGC Bus?
4. Which route caters to the most number of passengers? Which route caters to the least number of passengers?
5. For each bus route, what are the operating hours?
6. What are the peak hours and off-peak hours? If peak hours and off-peak hours vary for each bus route, please specify.
7. For each bus route, how many buses are deployed during peak hours, and during off-peak hours?
8. Are the buses of the BGC Bus equipped with GPS? If yes, may the group be allowed to use the GPS for our app or system?
9. Are the buses of the BGC Bus equipped with CCTV? If yes, may the group be allowed to use the CCTV for our app or system?
10. Is there a fixed schedule for bus arrival and bus departure?
11. Between each bus, what is the time interval during peak hours, and during off-peak hours?
12. What is the average waiting time of passengers during peak hours, and during off-peak hours?
13. How much is the bus fare for each bus route?
14. Which bus stops or terminals have loading stations and/or ticket booths?
15. Are the bus stops or terminals equipped with CCTV? If yes, may the group be allowed to use the CCTV for our app or system?
16. Can a new mode of payment, other than the beep™ card, be allowed?
17. What are the problems or difficulties encountered by the BGC Bus?
18. What are the strategies employed to accommodate additional passengers during peak hours?
19. How are announcements regarding the operations of the BGC Bus posted to the public?
20. What technology is used by the BGC Bus to predict the number of minutes until the arrival of the next bus?

Interview Transcript

Interviewer: Anna Lynn C. Alcaraz, Sammy Boy M. Angot, Justin V. Besmano, Job G. Brioso

Interviewee: Mr. Mike Obias, Assistant Operation Manager, BGC Bus

Date: August 9, 2017

Time: 4:00 PM

Venue: Bonifacio Transport Corporation
Utility Area 31st Street
Crescent Park West, Bonifacio Global City

(start of interview)

Interviewer: What is the daily average total number of passengers of the BGC Bus? How many passengers ride the BGC Bus in every month?

Interviewee: Right now, we have 44,000 passengers on weekdays, and half of that on weekends. So, during Saturdays and Sundays, 20,000. In a month, we have almost 1,000,000 passengers.

Interviewer: Which months have the highest number of passengers, and which months have the lowest number of passengers?

Interviewee: Before, during March to June, we have less passengers, compared to the other months because those months are usually the students' summer vacation; however, because some universities moved the start of their academic calendar, we noticed a decrease in passengers during July to September. But the month with the lowest ridership is March because it has lots of holidays, like Holy Week. Whenever there is a long holiday, we always have the lowest ridership.

Interviewer: What are the different bus routes of the BGC Bus?

Interviewee: Just last Monday, August 7, we recently implemented improved bus routes for the BGC Bus. We have 7 new regular routes that run from 6AM to 10PM. Then, we also have the augmentation, or what we call the extension routes. These extension routes travel to places outside BGC, like Ayala, we call it Ayala Route or Ayala Express. The second one is Arca South. It travels from here to Arca. Then the third one is the North Route, though the North Route still travels within BGC, but the North is handled by Megaworld, unlike BGC, which is handled by FBDC Ayala.

Interviewer: Which route caters to the most number of passengers? Which route caters to the least number of passengers?

Interviewee: So far, the route with the highest recorded number of passengers is the West Route. It is the combination of the Upper West and Lower West. Before it was just the West Route, but we split it into Upper and Lower. The West side of BGC Bus is here, where the office of the BGC Bus is located, and the East part is Market!

Market! The route with the least number of passengers is the route going to Kalayaan. We recently implanted this route, just two months ago. It only runs for 4 hours in the morning on weekdays. Right now, it only has 100 pax.

Interviewer: For each bus route, how many buses are deployed for each route?

Interviewee: The amount of buses deployed to each route depends on the availability. But right now, our fleet is composed of 51 buses. The route with the most buses being deployed to is the one with the highest ridership, the West, followed by the East, then the other routes.

Interviewer: What is the capacity of the bus?

Interviewee: The buses have perimeter seating. In has a seating capacity of 37 passengers, but the bus can accommodate 75 passengers comfortably. The maximum capacity of the bus is 90 passengers.

Interviewer: What are the peak hours and off-peak hours?

Interviewee: Peak hours apply to all the routes. Peak hours are 6AM to 10AM and 4PM to 8PM.

Interviewer: Are the buses of the BGC Bus equipped with GPS? If yes, may the group be allowed to use the GPS for our app or system?

Interviewee: All buses are equipped with GPS.

Interviewer: Are the buses of the BGC Bus equipped with CCTV? If yes, may the group be allowed to use the CCTV for our app or system?

Interviewee: The buses are not yet equipped with CCTV, but we are planning to equip them. The challenge is for real-time streaming. The plan is to equip each bus with 4 CCTVs. But the challenge is with the bandwidth.

Interviewer: Are the bus stops or terminals equipped with CCTV? If yes, may the group be allowed to use the CCTV for our app or system?

Interviewee: The terminals are equipped with CCTVs but some of the stops don't. But aside from the CCTV of the BGC Bus, we also have the city CCTVs. These stops are within range of the city CCTVS.

Interviewer: Is there a fixed schedule for bus arrival and bus departure?

Interviewee: We have a fixed schedule.

Interviewer: Between each bus, what is the time interval during peak hours, and during off-peak hours? What is the average waiting time of passengers during peak hours, and during off-peak hours?

Interview: The standard waiting time is 10 minutes. Every passenger should only wait, at most, for 10 minutes. That's our goal here. For the actual, it varies depending on the traffic, the speed of the bus.

Interviewer: How much is the bus fare for each bus route?

Interviewee: We have a fixed fare price of P12 for all routes, except for Arca South and Nuvali, but that's because they're extension routes.

Interviewer: Which bus stops or terminals have loading stations and/or ticket booths?

Interviewee: Only selected stops have ticket booths. We encourage the passengers to use the beep™ cards. However, for stops near government offices, we have to deploy ticket sellers. These government offices have visitors that do not regularly travel within BGC. We cannot insist they buy their own beep™ cards. Stops with ticket sellers are Bonifacio Stopover, RCBC, Nutriasia, BGC Bus Bonifacio One Technology Tower terminal, BGC Bus Ayala terminal, and BGC Bus Market! Market! terminal. beep™ cards can be reloaded at the terminals.

Interviewer: What are the problems or difficulties encountered by the BGC Bus?

Interview: Passenger complaints.

Interviewer: Can you cite examples of complaints the BGC Bus has received from the passengers?

Interview: Mostly, passengers complain about the long line of passengers during rush hours, about having to wait long for the buses to arrive, and about how few the buses going around are.

(end of interview)

Survey Questionnaire

Good day!

We are 3rd year students of Asia Pacific College, under the BS Computer Science program, specializing in Systems Software. For our Introduction to Systems Analysis and Design (INTSDEV) course this term, our group has to conduct a survey on passengers of the BGC Bus, as part of our data gathering for our project.

We would like to ask you to answer the following questions.

Thank you for your cooperation.

Survey Questions:
Why do you ride the BGC Bus? (check all that apply)
☐ to go to school
☐ to go to work
☐ to go home
☐ to go to the mall
☐ others, please specify: _____

How often do you ride the BGC Bus in a week? (check one only)
◯ I don't regularly ride the BGC Bus
◯ 1-5 times a week
◯ 6-10 times a week
◯ 11-15 times a week
◯ more than 15 times a week

What are the problems you encounter when riding the BGC Bus? (check all that apply)
☐ long queue when buying bus ticket or loading beep™ card
☐ long queue when waiting for the bus
☐ inaccurate bus schedules
☐ congestion of passengers inside the bus
☐ others, please specify: _____

How do you pay for the BGC Bus fare? (check all that apply)
☐ bus ticket
☐ beep™ card

If you buy tickets, how many minutes do you usually take to buy bus tickets? (check one only)
◯ less than a minute

◯ 1-2 minutes
◯ 3-4 minutes
◯ 5 minutes or more

If you use the beep™ card, where do you load your beep™ card? (check all that apply)
☐ LRT stations
☐ MRT stations
☐ BGC Bus Ayala terminal
☐ BGC Bus Market! Market! terminal
☐ BGC Bus Bonifacio One Technology Tower terminal
☐ FamilyMart
☐ Circle K
☐ SM malls

How many minutes do you usually have to wait before boarding the bus? (check one only)
◯ 1-5 minutes
◯ 6-10 minutes
◯ 11-15 minutes
◯ 16-20 minutes
◯ 21-25 minutes
◯ 25-30 minutes
◯ more than 30 minutes

Will an app for the BGC Bus be useful to you? (check one only)
◯ yes
◯ no

What features of a BGC Bus app will be useful to you? (check all that apply)
☐ the app can give users step-by-step directions from origin to direction, with estimated travel time and fare
☐ the app can display a map indicating all bus routes, including stops and nearby landmarks for each bus route
☐ the app can display nearby locations of beep™ card loading stations on the map
☐ the app can display bus arrival times and departure times
☐ the app can display how many minutes until the next bus arrives at the bus stop
☐ the app can show the real-time location of the buses on the map
☐ users can check how long the lines are at each bus stop
☐ users can check the remaining balance on their beep™ card
☐ users can use their cellphone load to pay for the bus far

Intern Résumé

Name:	**ANNA LYNN C. ALCARAZ**
Complete Address:	37 Circle Drive, Cubic Homes
	Merville, Parañaque
Contact Number/s:	Landline: 8220429
	Mobile No.: (0999) 884-5654
Email Address:	acalcaraz@student.apc.edu.ph annalynn.alcaraz@gmail.com
Website:	https://www.linkedin.com/in/anna-lynn-alcaraz/

2x2
CORPORATE
photo
Must fit in this box.
Strictly corporate attire.

Personal Statement	Currently the Project Manager of Bus Tap, Web Developer of TaraNaSaPinas, and SQA Team Project Manager of Guru-App Knowledgeable in C++, Java, Python, Ruby, HTML, CSS, and PHP
Education	**Asia Pacific College**, Magallanes, Makati City **B.S. Computer Science Major in Systems Software** January 2015-present
Work-Related Courses	• Database Management • Web Development • Systems Analysis and Design • Software Development • Project Management
Academic Projects	**Bus Tap** • Passenger information system for the Bonifacio Global City (BGC) Bus • June 2017 – April 2018 • Project Manager **TaraNaSaPinas** • Mobile and web application where travel agencies can post travel deals and travellers can book travel deals • January 2018 – April 2018 • Web Developer **Guru App** • Web application where School HR can post jobs and where full-time/part-time teachers can search for job positions

	• January 2018 – April 2018 • SQA Team Project Manager
Technical Skills	• Knowledgeable in Database Administration, Systems Analysis and Design, Software Development, Project Management
Awards & Recognitions	• Dean's Lister, AY 2017-2018

Intern Résumé

Name:	**SAMMY BOY M. ANGOT**
Complete Address:	52 Ranger Street, South Signal Village,
	Taguig City
Contact Number/s:	Landline: 837-7418
	Mobile No.: (0916) 697-8145
Email Address:	smangot@student.apc.edu.ph angot.sammy@gmail.com
Website:	https://sg.linkedin.com/in/sammy-angot-284a7515b

Personal Statement	Currently the Logistics Team Assistant Head of the APC Microsoft Community who is eager to accomplish work with compliance to a minimum time allotted and ensures what needs to be done. Humble and flexible to any teams that to be assigned. Skilled in using Adobe Photoshop, Adobe Illustrator, Adobe Aftereffect, Adobe Dreamweaver, Android Studio and Vegas Pro, specializing for work presentations, system production and debugging maintenance, and multimedia creation for outsourcing clients.
Education	**Asia Pacific College**, Magallanes, Makati City **B.S. Computer Science Major in Systems Software** June 2015-present
Work-Related Courses	• Web Development • Mobile Development • Business Analysis
Academic Projects	**McShield** • Anti-Malware Software, June. 2012 • Introduced to APC to be the standard anti-malware software • Documentation Head • Used as the standard by the APC School of Computing and Information Technologies, June 2016 **Smart Trash Can** • Arduino-based microcontrollers and sensors

	• Functional prototype to send SMS to waste management authorities if trash bins are full • Prototype Assembly **Bonifacio Global City (BGC) Bus Passenger Information System: Bus Tap** • Mobile application that helps commuters riding the BGC Bus. • June 2017 – April 2018 • Project Analyst • Chosen to Exhibit Project in Merge 2.0, April 2018
Technical Skills	• Highly skilled in Software Development and Multimedia • Intermediate skills in Programming and Video Production • Proficient in MS Office: Word, Excel, PowerPoint • Sufficient knowledge in System Design
Certifications	• N/A
Awards & Recognitions	• N/A
Seminars & Trainings Attended	• Xamarin Workshop, Asia Pacific College, July 2016 • Internet of Things Seminar, Asia Pacific College, July 2017 • Xamarin Workshop, Asia Pacific College, July 2017 • Introduction to Azure Seminar, Asia Pacific College, July 2017 • How to be successful in Pitching Idea Seminar, July 2017 • Cognitive Services and Internet of Things Seminar, Asia Pacific College, July 2017 • Imagine Cup Seminar, Asia Pacific College, July 2017
Extra-Curricular Activities	• Gaming Genesis, Member, SY 2015-2016 • Junior Philippine Computer Society, Member, SY 2015-2017 • APC Microsoft Community, Logistics Team Assistant Head, SY 2017-present

Intern Résumé

Name:	**Justin V. Besmano**
Complete Address:	676 E. Rodriguez Street, Malibay,
	Pasay City
Contact Number/s:	Landline: N/A
	Mobile No.: (0917) 333-9604
Email Address:	jvbesmano@student.apc.edu.ph jvbesmano@gmail.com
Website:	www.linkedin.com/in/justin-besmano/

Personal Statement	A recent student of Asia Pacific College, achieving good grades in math and science related courses, who is looking to have a career as a system software analyst and/or developer to use and further develop my analytical and critical thinking ability. A highly motivated individual who is into Project Management and Software development, has a good work ethic and an enthusiastic person who enjoys challenges in achieving personal and team goals. Highly Skilled in web and mobile programming, especially android development for mobile and frameworks for web, proficient in web design, with proficient knowledge in JavaScript and CSS
Education	**Asia Pacific College**, Magallanes, Makati City **BS Computer Science Major in Systems Software** June 2015-present
Work-Related Courses	• Programming • Research • Software development • System Analysis

Academic Projects	**BGC Bus: Passenger Bus Information System** • Bus Tap, April 2018 • Mobile Application • Lead Mobile Developer • Included in APC's Merge 2.0 exhibit **Eat-ToDo-Mo: Carinderia Finder** • Carinderia Finder Application • January – April 2018 • Lead Developer **Community Portal Application** • Community portal web application • September – January 2018 • Project Manager
Technical Skills	• Highly skilled in Java Programming • Proficient in MS Office: Word, Excel, PowerPoint • Proficient in python, ruby programming language • Proficient in Web and Mobile Design
Certifications	
Awards & Recognitions	• 4th Place, ORSP National Congress Quiz Bee, March 2017 • Dean's List, Academic Year 2016-2017 • Dean's List, Academic Year 2017-2018
Seminars & Trainings Attended	• Operations Research Society of the Philippines National Congress, March 2017
Extra-Curricular Activities	• Microsoft Community, Member, SY 2017-present • Junior Philippine Computer Society, Member, SY 2016-2017

Intern Résumé

Name:	**Job G. Brioso**
Complete Address:	MB 14 Unit 506 BCDA Diego Silang Village
	Taguig City
Contact Number/s:	Landline: N/A
	Mobile No.: (0956) 432 0167
Email Address:	jgbrioso@student.apc.edu.ph briosojob@gmail.com
Website:	N/A

Personal Statement	Presently a student of Asia Pacific College and is preparing to have a career in Systems development to enhance the knowledge that I have learn during my college years. A team player and result oriented, ensuring that every task given is executed properly and efficiently. Knowledgeable in information technology and software development proficient in web design, with experience knowledge in JavaScript and CSS. Hoping to pursue a fruitful career in the above mentioned proficiencies and subjects to be recognized as a proficient programmer from the reputed Asia Pacific College.
Education	**Asia Pacific College**, Magallanes, Makati City **BS Computer Science Major in Systems Software** June 2015-present
Work-Related Courses	• Programming • Research • Software development • System Analysis

Academic Projects	**BGC Bus: Passenger Bus Information System** • Bus Tap, April 2018 • Included in APC's Merge 2.0 exhibit
Technical Skills	• Highly skilled in Java Programming • Proficient in MS Office: Word, Excel, PowerPoint
Certifications	N/A
Awards & Recognitions	N/A
Seminars & Trainings Attended	N/A
Extra-Curricular Activities	• Junior Philippine Computer Society, Member, SY 2016-2017