

Ticket Purchasing System Enhancements

Phase II

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I. PROJECT INTRODUCTION

My name is Anna Dubé. I am a project manager at ABC Company. In response to a project request, my company has prepared the following proposal. Throughout this proposal my company will be referred to as the “contractor” or “we,” and the company requesting proposals will be referred to as the “company” or “they.” The company’s website appears outdated and should be upgraded to include the benefits of the latest standards. For examples, the company’s website currently has a pdf map showing the different routes, and when a customer purchases tickets, they have to print their tickets. The contractor will enhance the ticket purchasing system to replace the pdf stops map with Leaflet GIS mapping and the paper tickets with email tickets. The GIS mapping will make the website look more professional and give the user more information. Currently customers have to print their tickets. We propose that customers be given the choice of printing tickets or receiving an email with a barcode. If the emailing option is chosen, then on the day of departure, customers will access the email to get the barcode scanned. This will make it easier for customers to get tickets. We will also provide analytical and graphing capabilities to help the company managers make operational decisions.

II. PROJECT CHARTER

Project Name: Ticket Purchasing System Enhancements

Project Overview:

The purpose of this project is to modernize the website to improve the user experience (UX) by upgrading to HTML5, CSS3 and JavaScript6. This project will add GIS capability to replace the travel stops pdf map and provide digital barcode capability in addition to the printed ticket. The project will also provide analytical and graphing capabilities for the company managers.

Project Objectives:

- Update the technical specifications
- Improve the user experience
- Provide data visibility for management

Key Assumptions:

- Potential revenue is being lost
- Improvements can be made to modernize the website

III. BASELINE PROJECT PLAN REPORT

1.0 Introduction

A. Project Overview

Table 1 Project Scope

Project Information: Project Name: Ticket Purchasing System Enhancements Project Manager: Anna Dubé
Opportunity Statement:

The company's website appears outdated and they have an opportunity to enhance it.
Objectives: To modernize the company's website to provide more options and features for customers. This project will also provide managers with easier access to data.
Description: A few enhancements will be made to the company's website. The pdf map will be replaced with a GIS map. Customers will have two options when purchasing tickets. They can print the tickets or have the tickets sent to their email. A new system will also provide managers with graphing capabilities.
Benefits: Better management planning Increased customer satisfaction Cost reduction Increase in sales Improved asset usage More timely information
Deliverables: System analysis and design Documentation Software
Estimated Duration of Project: The project is estimated to take about six months.

This project will modernize the company's website and make company operations more efficient. The project has been divided into six tasks and will take about six months to complete. This is a small project, so there are only two members on the team, the project manager and the programmer. A new cloud hosting contract may also be required for this project. The system will be implemented on a server at the cloud hosting company that the company has a contract with. There are some technical problems that could arise after the changes are implemented, but it is unlikely. There is one contractual issue with this project. A new communications contract may be needed because of the increase in emailing. However, this is a small project with a relatively low risk. The data shows the benefits will be greater than the costs about two years after implementation. Within five years, it is estimated that the company's benefits will be greater than \$140,000 and their costs will be less than \$100,000.

B. Recommendation

The contractor recommends that the company reevaluates their website every five years. When we discovered that the company's website was outdated, we researched ways to improve it. We discovered that Leaflet's free JavaScript library had GIS mapping capability. Also during the planning process, we discovered there was going to be a contractual issue, so we reconsidered the alternatives. We compared the benefits and drawbacks of all the choices and learned that the planned method was still the best choice.

2.0 System Description

A. Alternatives

There are a few alternatives that can be considered to replace the travel routes map, but they are more costly whereas Leaflet GIS mapping is a free JavaScript library that can be used by anyone. One of these alternatives is Google maps. To insert a Google map in the company's website, the company would have to pay a fee. Leaflet GIS mapping is the best choice because it comes with no fee and is high quality.

With the barcodes, we can change it so that customers have the option of printing their tickets or getting an email with a barcode to be scanned when boarding a bus. There is an alternative. Every customer will have to have an account. They would log on to their account to see their tickets and have them scanned at the bus. The drawback

of this method is every customer may not want to have an account. We can also just leave the system how it is; all customers will have to continue printing their tickets.

The last change that will be addressed in this project has no reasonable alternative. We can either leave the old system in place or change it to something better. All analytical data is recorded manually, but we can develop a system that will take the data from customer purchases and organize it into data charts for managers.

B. System Description

The Leaflet GIS map will show all of the bus routes and stops. It will allow customers to zoom in and out and to move the map around to look at the surrounding area. There will be a new option added to the print tickets tab. After customers purchase their tickets, they will have the choice of printing their tickets or receiving an email with their tickets. The new graphing system will take data entered by customers and organize it into data charts for the managers. There will be several options for managers to choose from. They will be able to view data in pie charts, bar graphs, and line graphs.

3.0 Feasibility Assessment

A. Economic Analysis

Table 2 Benefits

Better management planning	\$15,500
Increase in sales	\$17,500
Cost reduction	\$7,000
Total	\$40,000

The company's data will be more easily accessible. This will reduce costs and improve management planning. The pay rate for the data analyst is \$42,000 a year. The analyst's job will be less time consuming. About one sixth of the analyst's time is spent making data charts for the managers. With the new system, costs will be reduced by \$7,000. Also management planning will be more efficient. Managers will have easier access to data. It is predicted that this will save the company about an additional \$15,000 each year. It is also predicted that the modernized website will attract about 350 additional customers each year. With each ticket averaging around \$50, sales will increase by about \$17,500. The project is estimated to have a yearly benefit of about \$40,000.

Table 3 One-Time Costs

Development	45,000
User training	5,000
Total	\$50,000

This is the estimated cost of development that the company will incur. It was estimated by calculating the programmer's pay rate.

Table 4 Recurring Costs

Maintenance	\$7,000
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Communications	\$3,000
Total	\$10,000

Maintenance will cost about \$7,000 each year. It is estimated that the programmer will spend about three to four weeks throughout the year maintaining the system. The company may also need to spend an additional \$3,000 on email services each year if the new email volume puts them in the next service tier.

There will also be intangible benefits and costs resulting from this project. This project is essential to competition. It will modernize the company's website which will attract more customers. By giving customers the choice of printing tickets or receiving an email with a barcode, the company will have increased customer satisfaction. The new generated data charts will improve asset usage and provide more timely information.

Some intangible costs may occur. There may be some technical problems that arise with these changes resulting in operational complications and possible loss of potential revenue.

According to the following diagram, the project will break-even just after one and a half years. The costs incurred will most likely never exceed \$100,000 and the benefits are projected to be over \$140,000 in the next five years.

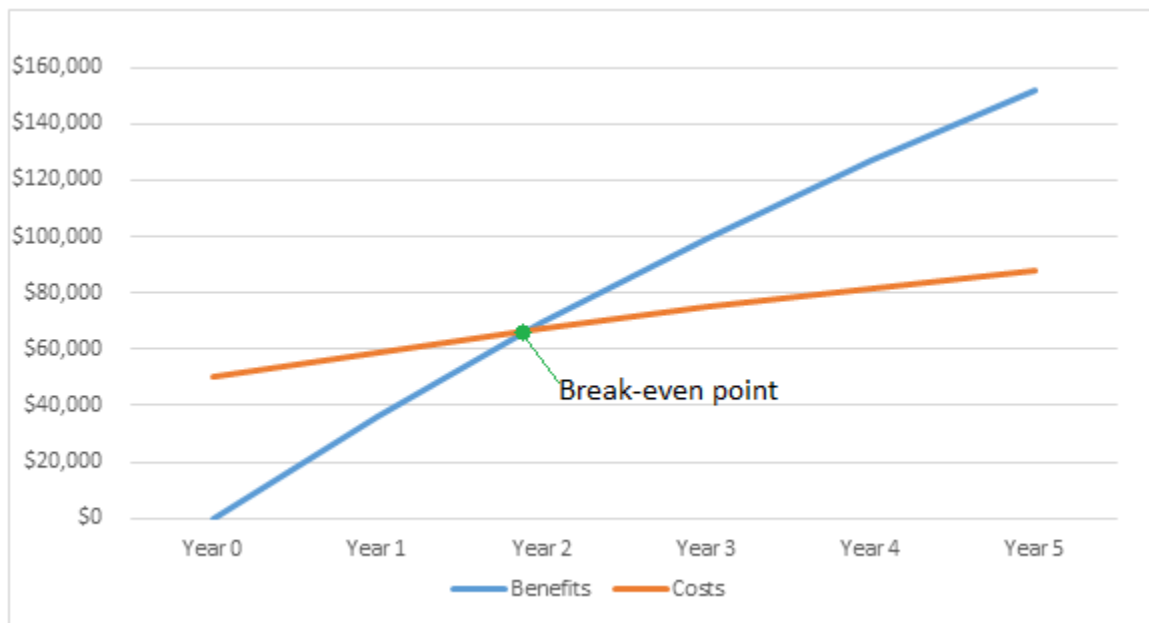


Figure 1 Benefit-Cost Analysis

B. Technical Analysis

This is a small project, so there is an overall low risk level. There may be some technical problems when we upgrade to HTML5, but this is unlikely because many people around the world have been using HTML5 for several years now. For example, when Leaflet's server experiences software changes, the server will be down and the map will not show up on the company's webpage. When there are problems with the GIS map, we can default to the pdf map. Also this project proposes that we give customers the options of either printing tickets or getting a barcode sent to their email. We need to make sure that the company's email service contract with the cloud hosting company will allow this increase in emails being sent.

C. Operational Analysis

The company should experience fewer customer support calls because of the detailed mapping versus the vague rudimentary pdf map. Data will be more easily accessible to management for fine tuning routes and stops. Managers will easily be able to sort the customer ticket data, the actual trip data, and the survey data.

D. Legal and Contractual Analysis

The current email portion of the cloud hosting company contract may not allow the company to increase the volume of emails. The company may have to purchase a new contract. This all depends on the number of customers who will choose the ticket emailing option.

E. Schedules, Time Line, and Resource Analysis

This project will take about six months to complete. The start date is currently set for October, 12 2020. The expected completion date is April 16, 2021. The project has been divided into six tasks. Some of these tasks will last for several months, but the actual time spent on these tasks will only be a few weeks.

Table 5 Project Schedule

Task Name	Duration	Start	Finish
Gather Requirements	3 WKS	Mon 10/12/20	Fri 02/05/21
Report Design	2 WKS	Mon 10/26/20	Fri 12/04/20
Programming	9 WKS	Mon 11/01/20	Fri 03/12/21
Documentation	5 WKS	Mon 02/01/21	Fri 04/02/21
User Testing	5 WKS	Mon 03/01/21	Fri 04/02/21
Installation	1 WK	Mon 04/12/21	Fri 04/16/21

4.0 Management Issues

A. Team Configuration and Management

Since this is a small project, there are only two members on the team. Responsibilities have been divided between the team members, but each member will work together on all tasks.

Table 6 Team Configuration

Project: Ticket Purchasing System Enhancements		Prepared by: Anna Dubé		P – primary S - support
Manager: Anna Dubé		Responsibilities		
Task ID	Task	Anna	John	
1	Gather Requirements	P	S	
2	Report Design	S	P	
3	Programming	S	P	

4	Documentation	P	S
5	User Testing	P	S
6	Installation	S	P

B. Communication Plan

We will conduct weekly meetings to go over the progress of the project and to work on any problems that arise. This will allow the users to see the progress and request changes if needed. Below is the communication plan. All stakeholders will communicate through email.

Table 7 Communication

Stakeholder	Document	Format	Team Contact	Due Date
Programmer	Software Specifics	E-mail	John	Last Friday of Month
Management	Status Report	E-mail	Anna	Last Friday of Month
Users	Status Report	E-mail	John and Anna	Last Friday of Month

C. Project Standards and Procedures

During the weekly meetings, project progress will be discussed and users will be able to see the new software in development. Users will also be able to submit change requests. To do this, they will need to contact the project manager. During the weekly meeting, change requests will be discussed and a decision will be made regarding each request.

IV. FINANCIAL ASSESSMENT

Economic Feasibility Analysis							
Ticket Purchasing System Enhancements							
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Totals
Net Economic Benefit	\$0	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	
Discount Rate 10%	1	0.9091	0.8264	0.7513	0.683	0.6192	
PV of Benefits	\$0	\$36,364	\$33,056	\$30,052	\$27,320	\$24,768	
NPV of all Benefits	\$0	\$36,364	\$69,420	\$99,472	\$126,792	\$151,560	\$151,560
One-time Costs	(\$50,000)						
Recurring Costs	\$0	(\$10,000)	(\$10,000)	(\$10,000)	(\$10,000)	(\$10,000)	
Discount Rate 10%	1	0.9091	0.8264	0.7513	0.683	0.6192	
PV of Recurring Costs	\$0	(\$9,091.00)	(\$8,264)	(\$7,513.00)	(\$6,830)	(\$6,192)	
NPV of all Costs	(\$50,000)	(\$59,091.00)	(\$67,355.00)	(\$74,868)	(\$81,698)	(\$87,890)	(\$87,890)
Overall NPV							\$63,670
Overall ROI							0.72
Break-Even Analysis							
Yearly NPV Cash Flow	(\$50,000)	\$27,273	\$24,792	\$22,539.00	\$20,490	\$18,576	
Overall NPV Cash Flow	(\$50,000)	(\$22,727.00)	\$2,065.00	\$24,604	\$45,094	\$63,670	
The project will break even between year 1 and 2.							
break-even fraction: 0.917							
Break-Even will occur at 1.92 years.							

Figure 2 Economic Feasibility

The project is estimated to have a yearly benefit of about \$40,000. There will be a one-time cost of about \$50,000 for the project development, and a yearly recurring cost of about \$10,000 for maintenance and communication costs.

PV refers to the present value of benefits or costs for a given year and NPV refers to the accumulated net present value of benefits or costs over a given number of years. Following are the steps used to calculate the present value (PV) and the net present value (NPV) of benefits and costs. To get the PV of benefits for each year, the discount rate is multiplied by the yearly economic benefit. To get the PV of costs for each year, the discount rate is multiplied by the yearly recurring cost. The PV of benefits and costs are calculated using (1).

$$(1) PV_n = Y \times [1 \div (1 + i)^n]$$

Y is the total benefits or costs for a specific year, n is the year, and i is the discount factor. These yearly calculations for economic benefits are then added together to get the NPV of all the benefits. In five years the NPV of benefits will be about \$151,560. The PV of costs for each year are then added together to get the NPV of all costs. In five years the NPV of costs will be about \$87,890. The costs are then subtracted from the benefits to get the overall NPV or the actual economic benefit which will be about \$63,670. The return on investment (ROI) is calculated by dividing the overall NPV by the NPV of all costs.

To estimate when the project will break even, the yearly NPV and overall NPV cash flows need to be calculated. These cash flows show the relationship between benefits and costs for each year. The yearly NPV cash flow is calculated by subtracting the PV of recurring costs from the PV of benefits for each year. The overall NPV cash flow is calculated by subtracting the NPV of all costs from the NPV of all benefits for each year. By analyzing this data in Figure 2, it is evident that the benefits exceed the costs during year one. This calculation is shown in (2).

$$(2) \text{ Break-Even} = \frac{\text{Yearly NPV Cash Flow} - \text{Overall NPV Cash Flow}}{\text{Yearly NPV Cash Flow}}$$

This estimates that the project will break even in 1.92 years.

V. DATA FLOW

Table 8 Data Flow

Data Flow	Description
Customer	
Barcode	Barcode tickets will be sent by email.
Purchase	
Schedule File	The schedule file will now be accessed by managers.
Purchase File	The purchase file will now be accessed by managers.
Manager	
Data Charts	Data will be taken from purchases and various charts will be generated using the data. Data will now flow from the database to managers.
Equipment	
Equipment File	The equipment file will now be accessed by managers.
User/System Messages	
Email Option	A customer has requested an email ticket.

VI. CONTEXT DIAGRAM

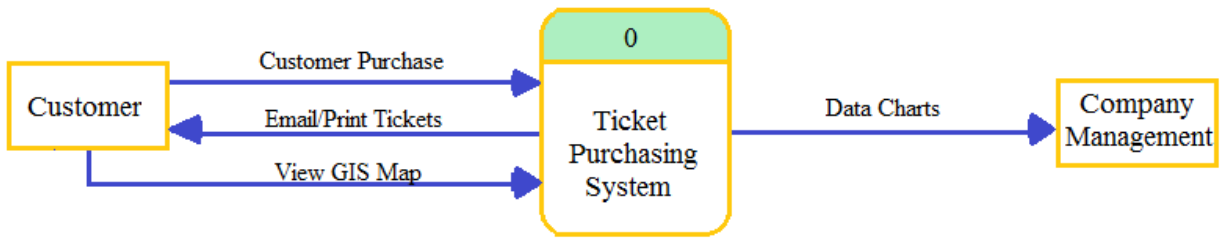


Figure 3 Ticket Purchasing System Context Diagram

Figure 3 Ticket Purchasing System Context Diagram shows that a customer can purchase a ticket and either print it or have it emailed to them. In the current system, there is only the option of printing tickets. Customers will also be able to view a newer map that will replace the pdf map. The data from customer purchases will be organized into various data charts for the company managers.

VII. LEVEL-0 DIAGRAM

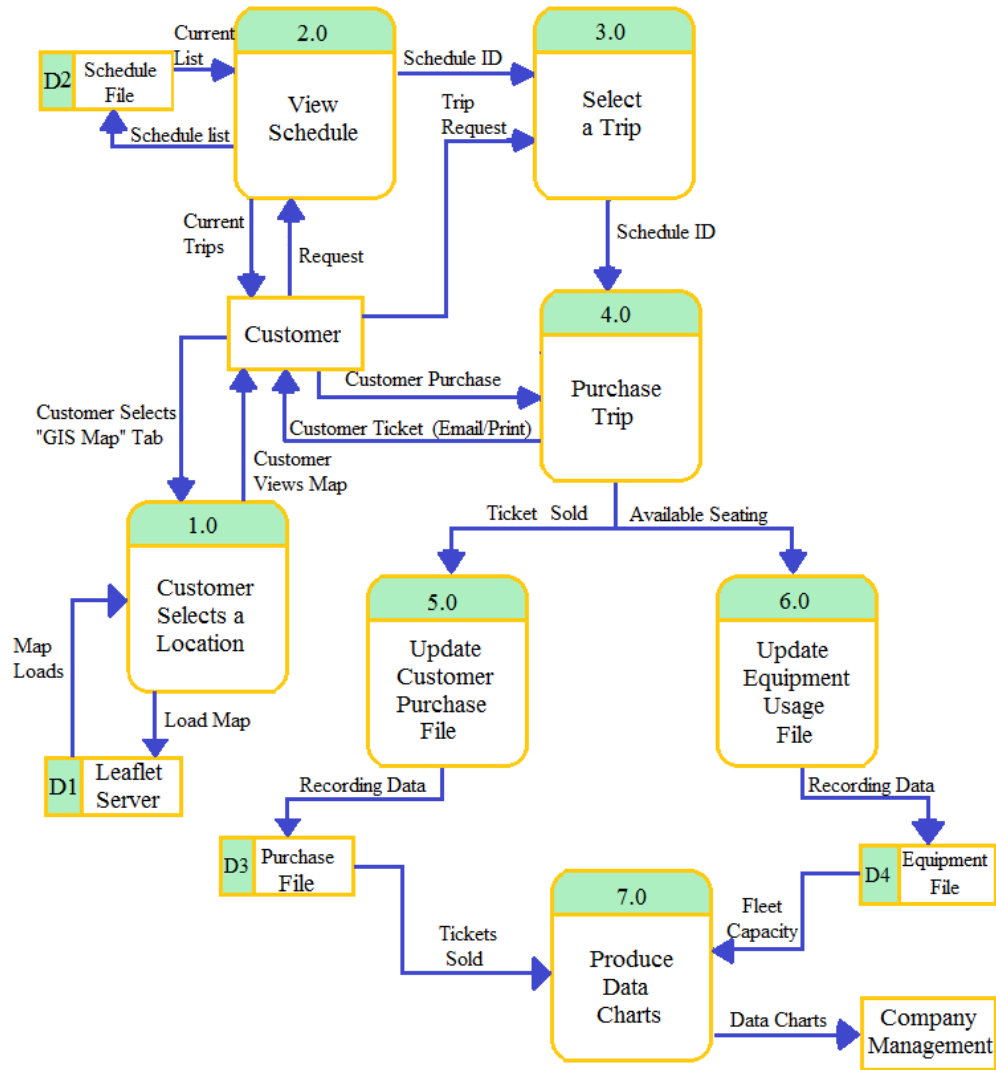


Figure 4 Level-0 Diagram for Ticket Purchasing System

Figure 4 Level-0 Diagram for Ticket Purchasing System shows the processes of purchasing tickets and recording data. The first process shows a customer viewing the GIS map which is pulled from Leaflet's server. In the second process, a customer views the trip schedule, and then in process three, the customer selects a trip. In process four, a customer purchases a ticket and then receives the ticket through email or by printing it. Then, in the fifth and sixth processes, the sale is recorded and the available seating is updated. This information will then be used to generate data charts for managers which is shown in process seven.

VIII. LEVEL-1 DIAGRAM

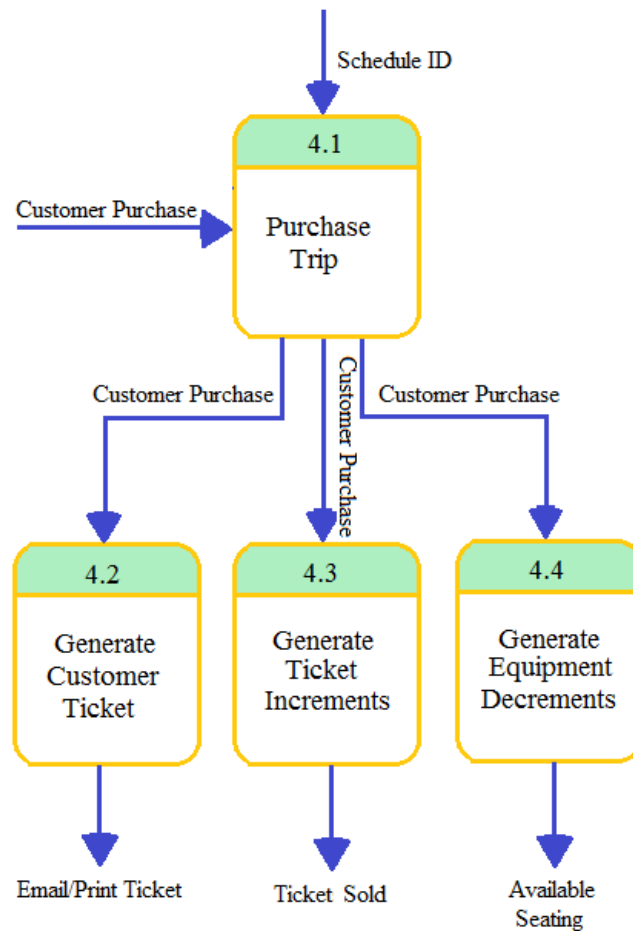


Figure 5 Level-1 Diagram

Figure 5 Level-1 Diagram expands the fourth process in the level-0 diagram. When a purchase is made, customers are given two options for receiving their ticket. Data, including number of tickets sold and available seating, is also updated. The data will be recorded in process five and six and will be made available to managers in process seven of the level-0 diagram.

IX. USER CASE

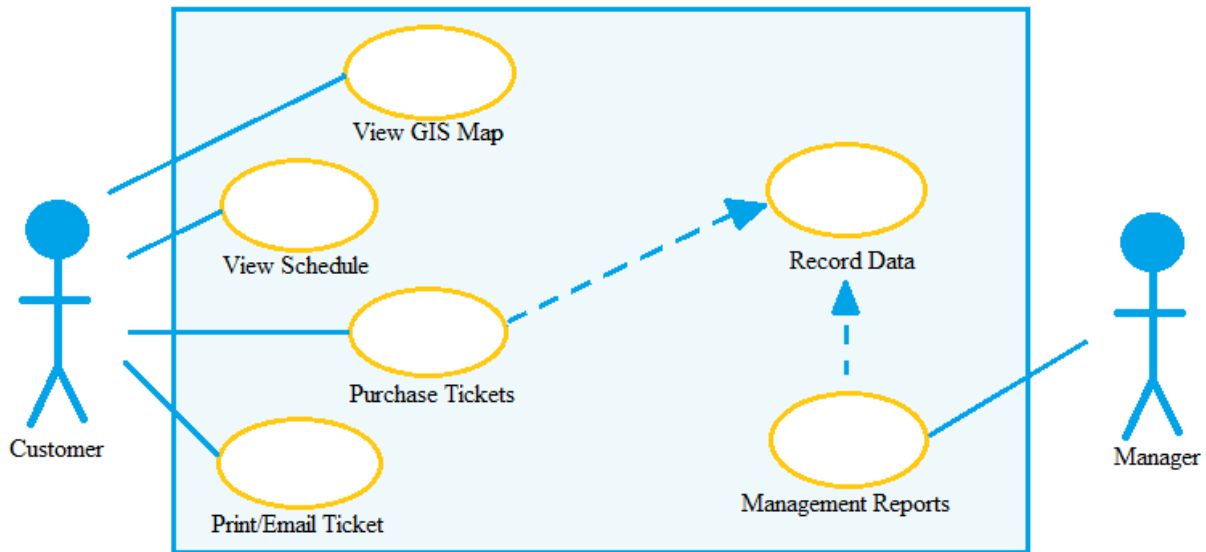


Figure 6 User Case Diagram

Figure 6, User-Case Diagram, shows that only two groups of users, managers and customers, will be affected by the changes. Currently customers are able to view a pdf map and a trip schedule. Two new features will affect customers. Customers will be able to view a GIS routes map, and they will be given two options for receiving tickets after a purchase has been made. There will also be a new website for the company managers. This will give them easier access to the company data.

Table 9 Written User Case

Use Case Title: Ticket Options/GIS Map
Primary Actor: Customer
Level: Kite
Stakeholders: Users, managers, customers
Precondition: A customer visits the website.
Minimal Guarantee: If there are any problems with the changes, the system can be roll backed.
Success Guarantee: A customer purchases a ticket and either prints their ticket or receives an email with their ticket. A customer is able to view the GIS map.
Trigger: A customer clicks on the GIS routes map tab on the homepage, or they select the Plan a Trip tab.
Main Success Scenario: <ol style="list-style-type: none"> 1. A customer selects the GIS routes map tab. 2. A customer is able to view the map. 3. A customer selects Plan a Trip. 4. A customer proceeds to payment. 5. A customer selects either the email or print tickets option. 6. If the email option is selected, the customer receives an email with their ticket soon after purchase.

Extensions:
<ol style="list-style-type: none"> 1. Leaflets server is down and the GIS map is not functioning. <ol style="list-style-type: none"> a. The old pdf map will be displayed if this occurs. b. The customer may use another resource, like google maps. 2. The email option is not functioning due to technical problems with the email server. <ol style="list-style-type: none"> a. The customer uses the print option.

Table 10 Written User Case 2

Use Case Title: Data Charts
Primary Actor: Manager
Level: Kite
Stakeholders: Users, managers
Precondition: Data from purchases needs to be recorded.
Minimal Guarantee: If the managers cannot access the data, they can still get data from the data analyst.
Success Guarantee: Managers will have easier access to data.
Trigger: A manager signs in on the website.
Main Success Scenario: <ol style="list-style-type: none"> 1. A manager enters their credentials. 2. Login is successful. 3. Data charts load and display current data.
Extensions: <ol style="list-style-type: none"> 1. Manager login fails with correct credentials. <ol style="list-style-type: none"> a. The manger gets data charts from data analyst. b. The manager reports the problem. 2. The data charts are not functioning correctly. <ol style="list-style-type: none"> a. Managers get data from data analyst. b. The problem is reported.

X. SEQUENCE DIAGRAM

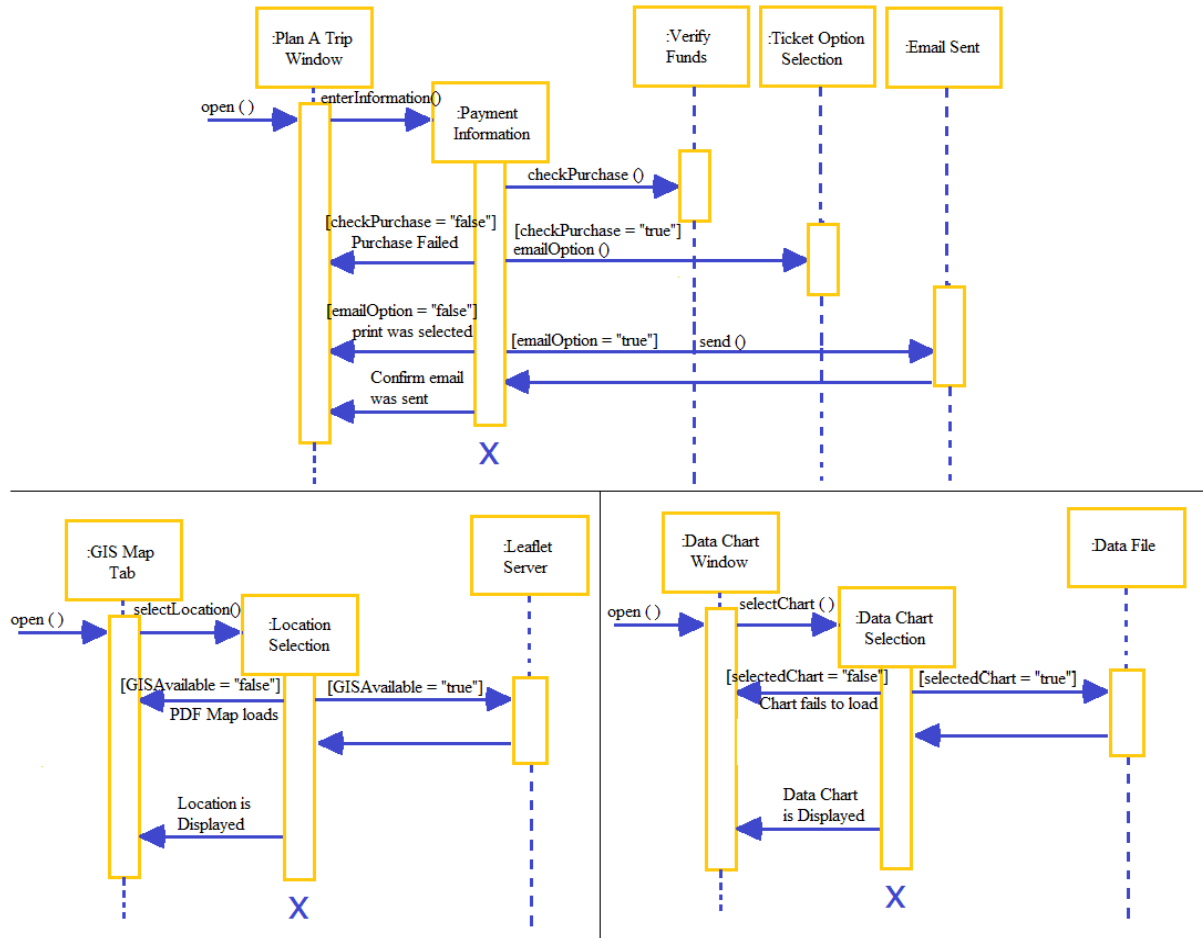


Figure 7 Sequence Diagram for Ticket Purchasing System

Figure 7 Sequence Diagram for Ticket Purchasing System shows how the new website for managers and the changes to the company website will function. When a customer selects the Plan a Trip tab, they are prompted to choose a trip and then enter their payment information. After a purchase is successfully made, a customer is then taken to the Ticket Options tab where the customer is given two choices: print or email tickets. If the email option is selected, an email will be sent to the customer and a message will appear on the webpage confirming whether an email was sent. When the GIS Map tab is opened, the map will appear and customers will be able to select a location. If the map has loaded, the location will be displayed. If the map fails to load, the pdf map will be displayed. When managers login to the website, they will be able to select a data chart to view.

XI. ACTIVITY DIAGRAM

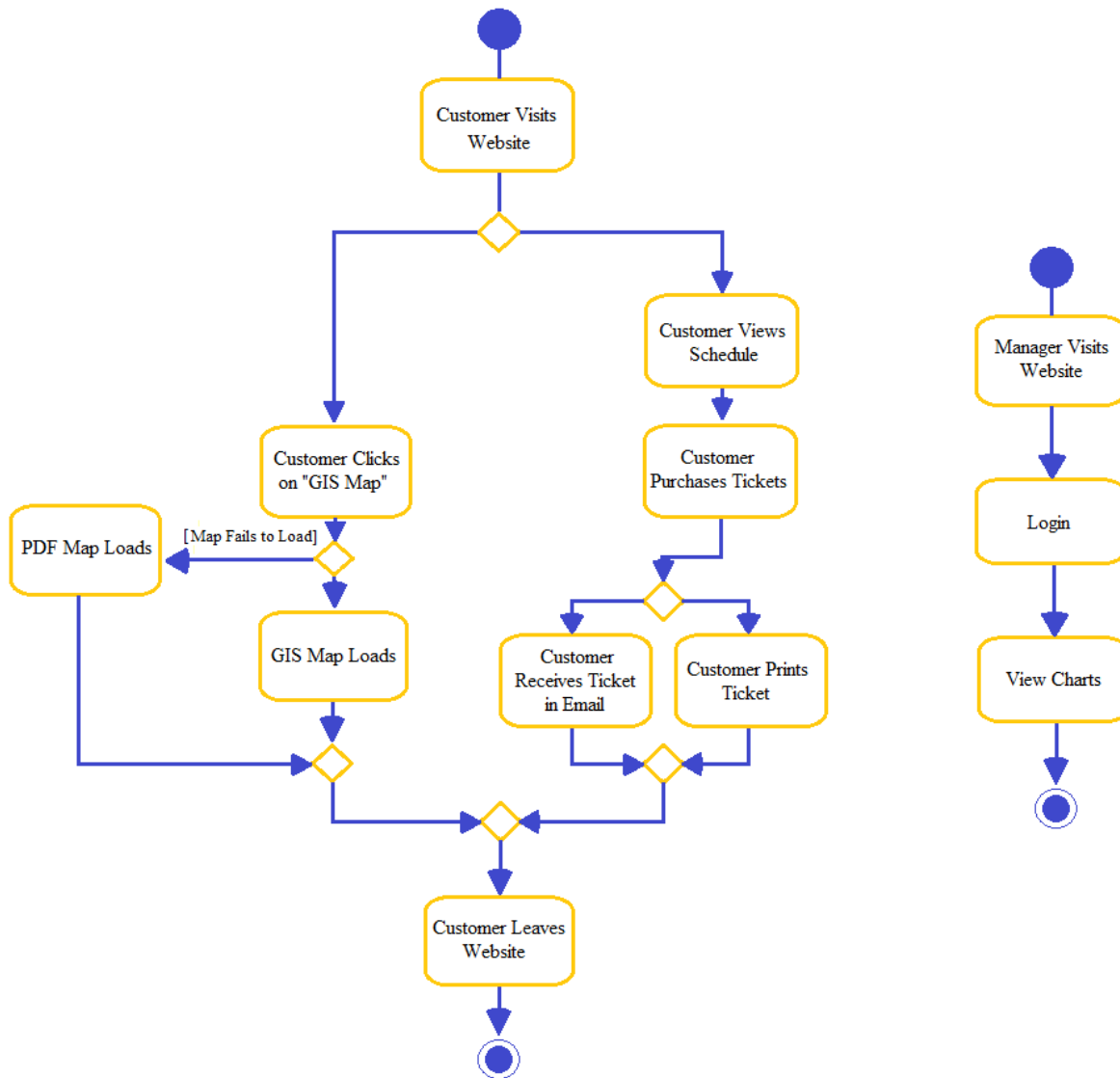


Figure 8 Activity Diagram for Ticket Purchasing System

Figure 8 Activity Diagram for Ticket Purchasing System shows the new customer and manager activities that will result from this project. Customers will be able to view a new GIS map. When the map fails to load, the old pdf map will load instead. Also customers will now have two options when printing tickets. Managers will be able to login to a website and view data charts.

XII. ERD

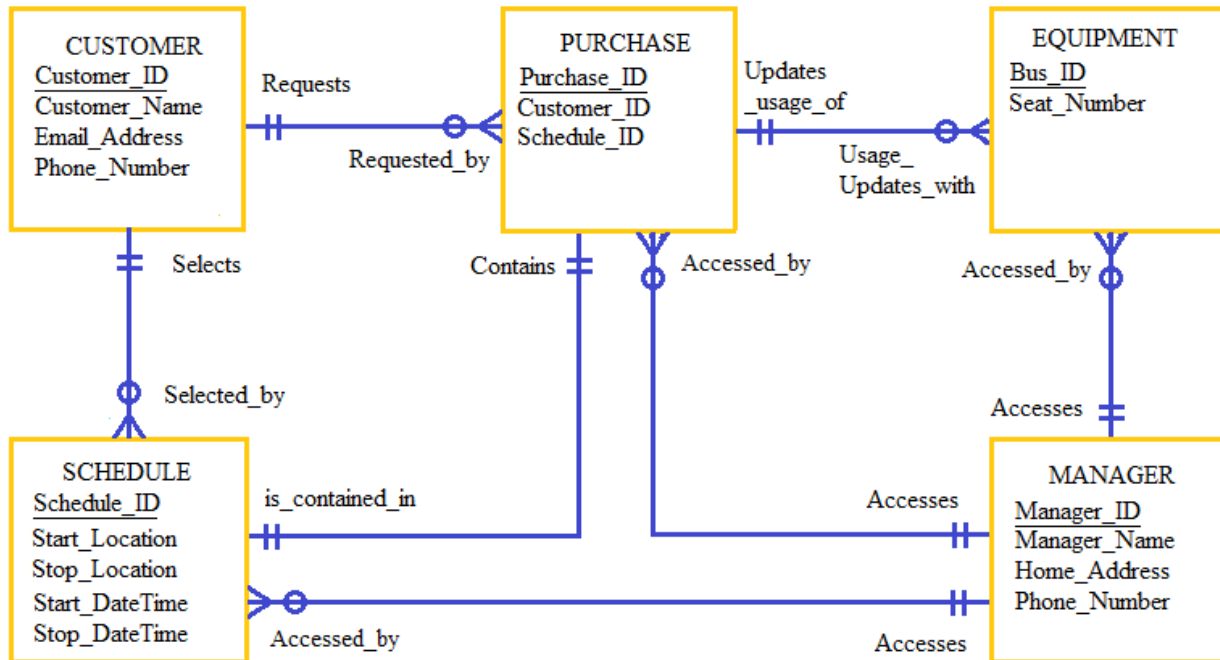


Figure 9 ERD for Ticket Purchasing System

Figure 9 ERD for Ticket Purchasing System shows the relationships between customer purchases and data recorded for managers. A customer can select multiple trips and each seat on a scheduled trip can only be selected by a single customer. A customer then requests a purchase and each purchase is requested by a single customer. The schedule information is contained in the purchase. The customer enters their purchase information which updates the company purchase and equipment usage data. Equipment usage is updated with each purchase. Purchase and Equipment data can be accessed by the company managers. A manager has access to all accumulated data.

XIII. SUMMARY

This project proposes enhancements for the website and a new system for managers. The pdf map will be upgraded to a GIS map, the customers will be given the choice of printing tickets or receiving tickets in an email, and the managers will be provided with data charts generated from the customer data. These enhancements will modernize the company's website and provide more timely information for managers. There are other alternatives, but these proposed changes are the best choice based on the research. The economic benefit of this project is estimated to be about \$151,560. The costs incurred are estimated to be about \$87,890. The overall economic benefit will be about \$63,670 after costs. This is a small project, so there will not be many new processes or data flows resulting from this project. These enhancements are necessary to improve the website. Customer satisfaction will increase with the new ticket option and the higher quality map, and business processes will be more efficient.