Airport Luggage Retrieval System

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An Information System Project proposal submitted to Strathmore University in partial fulfilment of the requirements for the award of the Bachelor of Business Information Technology Strathmore University

School of Computing and Engineering Sciences
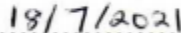
Strathmore University

Nairobi, Kenya

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Declaration

We declare that this work has not been previously submitted and approved for the award of a Bachelor's degree by this or any other University. To the best of my knowledge and belief, the proposal contains no material previously published or written by another person except where due references is made in the proposal itself.
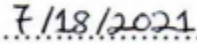
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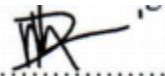
Approval

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Abstract

Due to the amount of luggage that happens to pass through an airport, a passenger's luggage tends to be mishandled. When the passenger's luggage goes missing, they have to fill in a form to describe their luggage in order to try and recover it which can be difficult for the passenger to accurately describe their bag and if they have a name tag on the bag, it also puts them in danger because their information will be out in the world. The solution is a web-based application that uses a tag with a reference number that will be attached to the bag. If the bag gets lost, the passenger will input their reference number into the website to notify the staff that their bag is lost. The system then looks for the reference number in the section for lost bags that have been found. When located, the passenger gets an email notifying them and the airport staff delivers the bags to the passenger. The solution is a web-based application that allows a passenger to track their luggage through a reference number that is attached to their bag. Once the luggage is found by the airport staff, the passenger gets an email and the airport arranges for how to deliver the luggage to the passenger. The methodology of choice for building this project is the Scrum Methodology. This will help the project take a flexible approach throughout its development. New ideas can be tested and implemented into the system and any changes can easily be made during the stage of its development, even after its completion.

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Chapter 1: Introduction

1.1   Background

According to Muuthia (2013), a report by SITA was made that claimed that around 25 million pieces of passenger luggage was lost in 2009. However, it should be noted that from the missing luggage, around 96.6% of it was found and returned to their respective passengers. It should also be noted that there have been developments in technology. Soley (2017), there have been developments in technology that have strived to try and improve the problem that is handling passenger luggage. They have done this using the Internet of Things (IOT). The IOT provides solutions that have been in use for years. An example would be Radio Frequency Identification (RFID) Technology.

Soley (2017) also went into extensive detail explaining how Airlines such as Delta and Air France use IOT to try and combat cases of mishandled luggage. Airlines such as Delta have experimented with this technology which gives the passenger the ability to track their luggage with an application across their stations. The only downside of these tags is that they have a limited range. This led to airlines such as Air France using a different system where they track luggage using eTags, permanent tags that connect to the Internet, which allows people to track their bags more efficiently even if they happen to be across the world. Despite these developments their remains an issue which is not all airports that use RFIDs can understand each other's RFIDs and not all airports use RFIDs as is the case with airports such as Air France. Therefore even though it can be said that there have been large improvements that have been made in luggage handling, luggage will still be mishandled and the passenger will be unable to track it due to a minor inconvenience such as the luggage ending up in an area where the airport does not support the IOT technology that has been put in place by the airport. The passenger then has to go through the process of trying to report their missing luggage to their airport staff and according to Smarter Travel(2019), even though there have been developments in technology, what you do when an airline mishandles your luggage remains about the same as it did in the 1990s. The passenger would be required to fill a passenger irregularity form and accurately describe how their luggage looks. They would then be given a reference number for their complaint and if the luggage is not found, it is considered permanently lost. Technology can help improve this by making the whole process a bit more

automated. It will help provide both the airport and the passenger and their airport staff with the necessary tools and information to make the baggage retrieval process a lot smoother and less stressful as compared to the old system.

The proposed airport luggage retrieval system hopes to achieve this by adding an online element to this solution to help both the passenger and the airport staff to better communicate during the process of retrieving the lost luggage.

1.2   Problem Statement

Although the number of lost luggage has decreased significantly and there have been developments in technology, there remains a significant number of passengers who still end up losing their luggage. This issue remains because there are so many flights and many passengers going through an airport in a single day. It is extremely tricky for airports to handle all this luggage and even trickier to handle missing luggage complaints from passengers. It is also just as difficult for passengers to file the complaints in the first place. When their luggage is lost, they are required to reach out to the airline and file a passenger irregularity report. This ends up being an issue because the report relies on the fact that the passenger will be able to accurately describe their luggage and that the description will be enough for the airline staff to find it. Another issue is that the passenger irregularity report may get lost. If the report is lost, it would require the passenger to resubmit it again which is repetitive and tiresome for the passenger.

1.3   General Objectives

To develop a web-based solution that helps people claim their luggage when it gets lost as well as try to reach out to users.

1.3.1   Specific Objectives

  i.   To investigate existing airport luggage retrieval systems
 ii.   To find challenges faced by passengers when it comes to claiming lost luggage.
iii.   To design a system that helps passengers claim their lost luggage.
 iv.   To develop a functioning system that helps passenger claim their lost luggage.
  v.   To test the system and make sure it works as intended.

1.4   Justification

The system helps keep user information confidential since only the reference number will be attached to their bag. The system also helps make claiming lost luggage a smoother process by reducing confusion between the parties involved. Most systems set in place require you to either fill out forms where you provide your information and describe your luggage. This is inefficient because it relies on the fact that the passenger will be able to accurately describe the luggage that they are missing. Keeping track of forms can also prove to be difficult and they may get lost as well.

1.5   Scope and Limitations

The system makes tracking of lost luggage easier since the passenger just inputs the reference number of their luggage and if the luggage was recorded in the system, the passenger is notified that their luggage was found, and arrangements are made when they can claim it.

The downside to the system is that there is no active tracking system so the passenger cannot actively see where their luggage is. They can only claim it if the luggage is recorded as missing in the luggage retrieval system by the airport staff.

Chapter 2: Literature Review

2.1 Introduction

This chapter reviews the current technological solutions for luggage retrieval systems, luggage retrieval and the whole importance of it, as well as some of the problems faced by the current luggage retrieval solutions that have been created.

2.2 Airport Luggage Retrieval Systems

According to the Inernational Civil Aviation Organization [ICA] (2018), the total number of passengers that carried on scheduled services was 4.3 billion while the number of departures was 37.8 billion in the year 2018.

These numbers help put into perspective the weight of the reponsibility placed on airports. Just the number of passengers alone is daunting when it comes to how they have to handle the booking of flights. It should also be taken into consideration that these numbers do not represent the luggage that is carried by the passengers because the passengers are bound to have two or more bags with them. Even with developments in technology when it comes to how luggage is handled, due to the large number of luggage that passes through an airport luggage is bound to go missing. Accorfing to the Nationwide Mutual Insurance Company and Affiliated Companies (2015), 2 milllion mishandled luggage reports are filed each year.

It can therefore be concluded that there still remains a huge issue when it comes to how luggage is handled in an airport which probably last for a very long time despite the developments in technology.

2.3 Challenges Experienced in Retrieving Lost Luggage

Parties involved in retrieval of luggage (airport and airline staff), must deal with the task of handling a lot of baggage at the airports and as a result they are unable to respond to missing luggage claims thus slowing down the entire process of luggage retrieval. Lack of a proper system to file the missing luggage reports plays a big role in making the retrieval process much harder.

2.3.1 Challenges Faced by Airport and Airline Staff.

At times staff may end up getting overwhelmed by luggage moving in and out of the airports at different times and it is during this period which it is likely for luggage to go missing. Also, as a

result of being overwhelmed by their duties, it is possible for them to take much longer to retrieve and return lost luggage to the rightful owners.

2.3.2   Challenges Faced by Passengers.

In an event where a passenger has misplaced their luggage or it went missing, they will have to physically fill an irregularity report to the airline in order to begin the process of retrieving their luggage which tends to be tedious.

2.4   Related Works

The following is a list of works that have been provided to the public to help with the problems facing luggage retrieval. The systems include:

2.4.1   HomingPIN

Garnett (2021) states that HomingPIN is a system that use permanent bag tags, loops, key-ring tags or asset labels with a pin number specific to each HomingPin customer . These pins correspond to a Unique Identifier Service that is tagged to the customer's email address and phone numbers. This reduces identity theft that users would normally fall to when putting their name tags. When the bag is lost, the finder simply enters the pin code found on the luggage tag on the HomingPin website and the owner is notified that there bags have been found and they arrange how to get back their bags.

Figure 2.1 shows the homepage for HomingPIN.
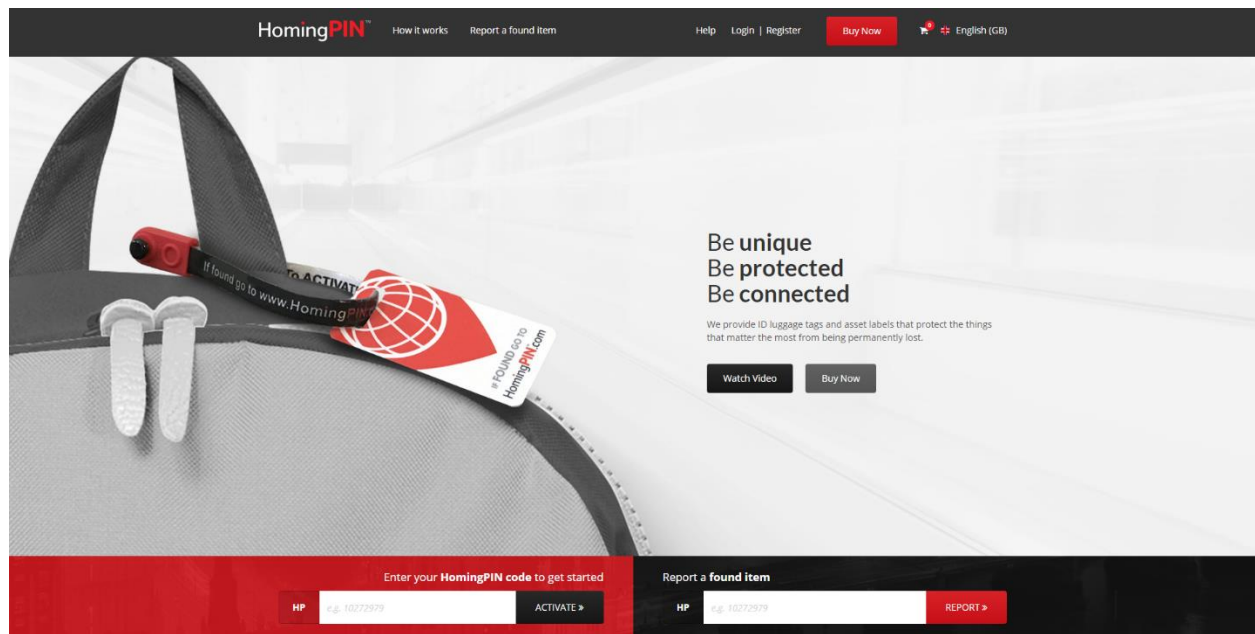
Figure 2.1 HomingPIN Webpage *(HomingPIN, 2021)*

2.4.2 LugLoc

According LugLoc (2021), they offer a geo-tracking solution that helps you track your luggage at vitually any airport in the world. They do this by using a device that you can pack into any of your luggage and if your luggage gets lost, you simply track your device using their application which is connected to the lugloc device.

Figure 2.2 shows the application homepage for the Lugloc application.
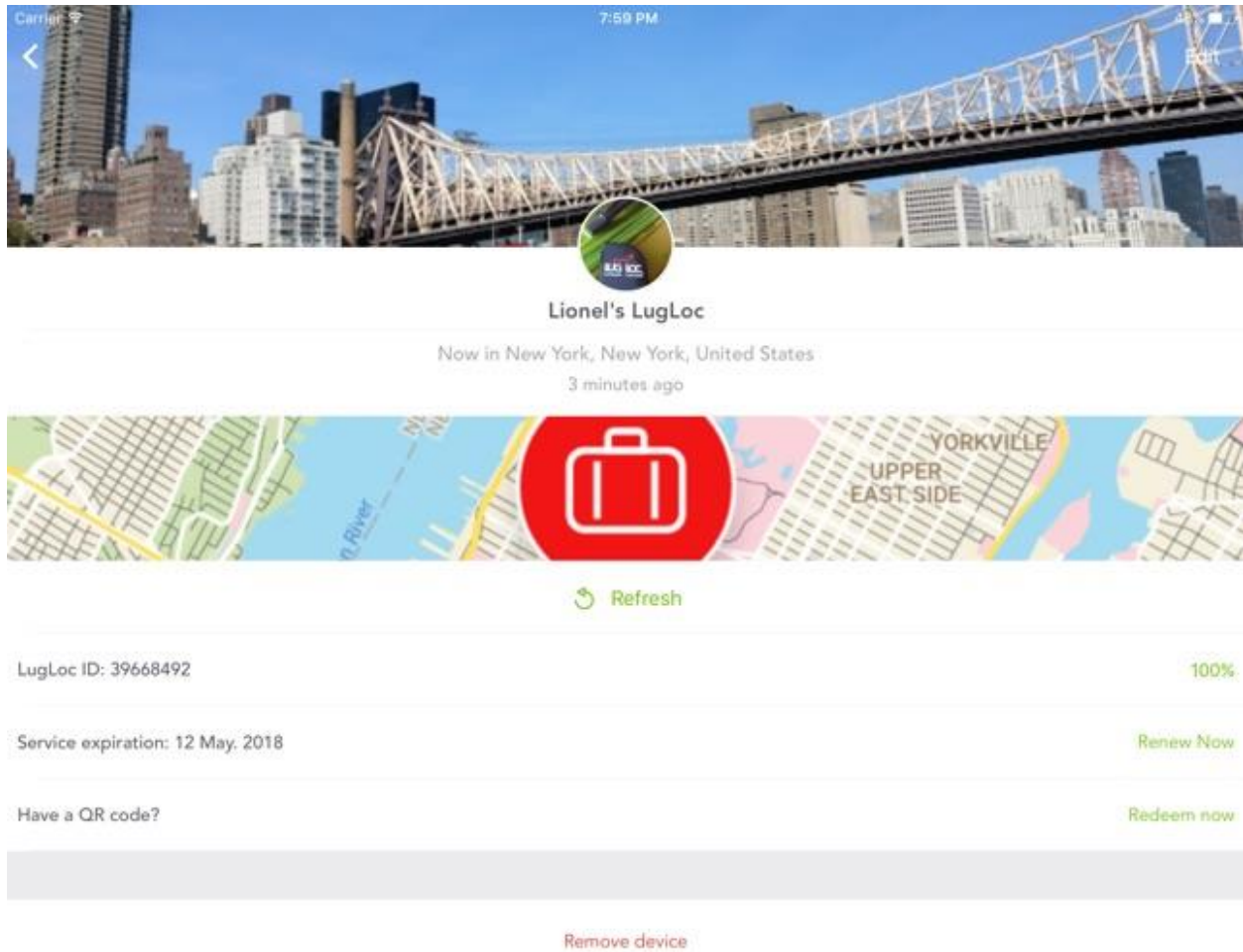
Figure 2.2 Lugloc Homepage *(LugLoc Company, 2021)*

2.4.3 American Airlines Delayed Luggage Search

American Airlines have a system set in place that helps passengers file a complaint in case their luggage is lost. If your bags are lost, you are required to see an agent at the airport. When you reach the agent, you are given a 13-character file reference number while filing your claim. After that, you will use your name and the reference number to check the status of your bags.

Figure 2.3 shows the website section that handles lost luggage claims.

Figure 2.3 American Airlines Delayed Luggage Search Homepage *(Ewen, 2020)*

2.5 Gaps of Existing Systems

HomingPIN is a separate service that is not provided by the airport. When the passenger's luggage is found, it requires that the passenger meet up with the person who found their luggage. This is dangerous because not all people have good intentions and could lead to the passenger being put in unnecessary danger.

Luglocs is device that is placed in the passenger's luggage in order to enable them to track it. The main issue with this is that if the device is taken out of the luggage, the passenger will end up tracking the device but not their luggage.

The main issue with the American Airlines Delayed Luggage Search system is that it requires the passenger to fill in a claim form. So in the event that the claim is lost or misplaced, they would have to fill it again. They would also have to do this within a time period because after 21 days, American Airlines considers the luggage lost.

2.6 Conceptual Framework

Figure 2.4 demonstrates how the airport luggage retrieval system works. The passenger inputs their reference number into the system. On the airport staff's side, they input the reference numbers of the luggage that they have found. The system then cross references the reference numbers provided by the passengers with those provided by the airport staff. Once a match is made, they system notifies both the passenger and the airport staff that the bag has been found. The airport staff then delivers the passenger's luggage to them.

Airport Luggage Retrieval System

Passenger

Inputs their reference number

System checks the reference number provided by passenger with the one provided by staff

Notifies the passenger that their luggage has been found

Delivers the luggage to the passenger

Updates missing luggage reference numbers

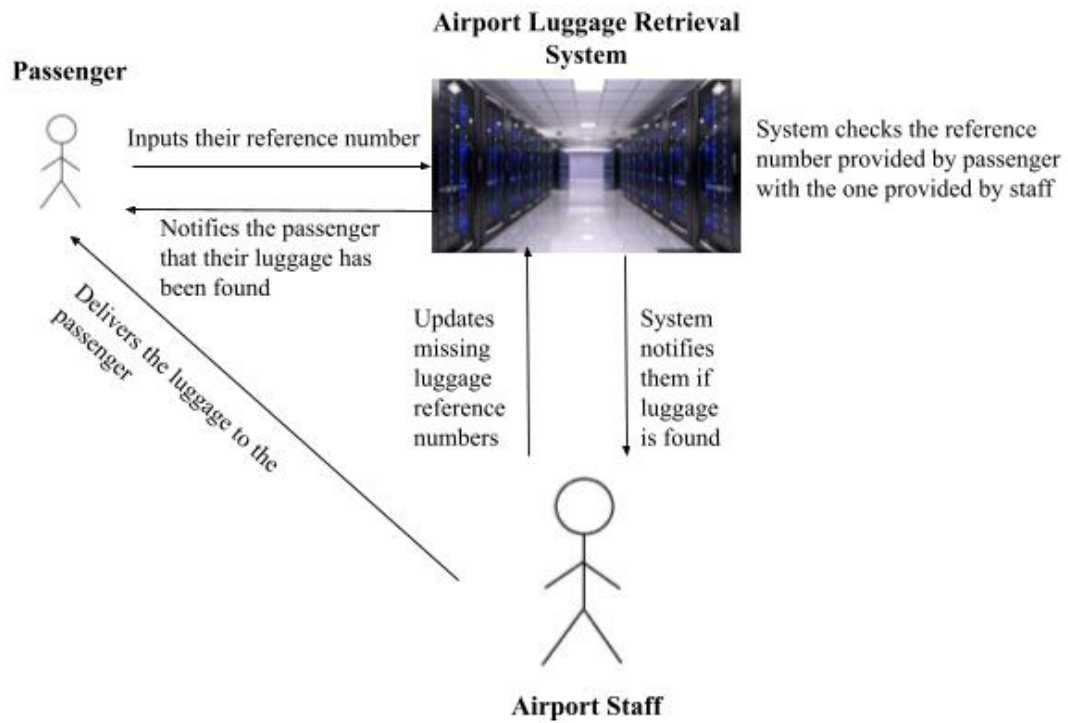System notifies them if luggage is found

Airport Staff

Figure 2.4 Conceptual Framework of the Airport Lost Luggage Retrieval System

Chapter 3: Methodology

3.1   Introduction

This chapter highlights the methodology that will be used in the development of this system. The requirements of the system are also addressed in this chapter. The methodology used is the Object-Oriented Analysis and Design. It is a technical method of analyzing and designing a system that focuses on iterations and increments thus allowing changes to easily be made. Object-Oriented Analysis and design focuses on the objects (Powell-Morse, 2017).

3.2   System Development Methodology

The system will be developed using the Scrum Methodology. Scrum is an agile methodology that focuses on delivering the business value in the shortest time possible through rapidly and repeatedly inspecting actual working software (Agile Vs Scrum: Know the Difference, n.d.). Even though the scrum methodology is intended for big, collaborative projects, there are a lot of elements of the scrum methodology that can be adapted to individual productivity (Wax, n.d.) The same can be said for other agile methodologies that are commonly used by teams.

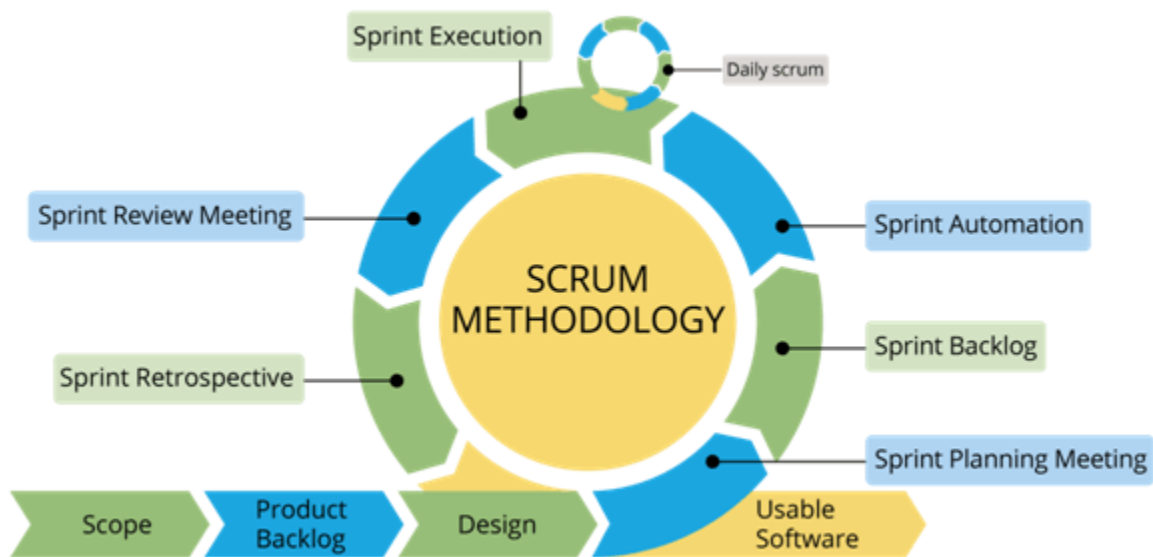Figure 3.1 shows the stages involved

Figure 3.1 Scrum methodology

3.2.1 Product Backlog

At this stage, a list of all the tasks that must be completed at the end of the project is generated which makes it easy to see what is left to do (Lucid Software Inc., 2020).

3.2.2 Sprint Backlog

This is a list of the tasks that are to be completed during the scrum sprint (Mountain Goat Software, n.d.). This ensures that during each sprint, a task is completed in time and focus is not taken away from that task.

3.2.3 Sprint Planning

At this stage of the scrum framework, the product backlog items are reviewed and a few of the product backlog items are picked and worked on during that sprint (Agile Alliance, n.d.). This helps set clear goals to be completed and avoid unnecessary distractions.

3.2.4 Sprint

Greene states that a sprint is a specific timeframe that the developers plan to complete a certain amount of work (2018). Sprints are helpful because they help the team remain focused. During the sprint, the team only focuses on the tasks and only the tasks they had agreed to work on in the sprint planning process. This helps better organize the project and ensure that tasks are completed in time and within a certain time period.

3.2.5 Sprint Retrospective

This takes place after a sprint has been completed. At this stage, the sprint process is reflected on. This helps better understand how far the project is coming along and what changes need to be made (Agile Vs Scrum: Know the Difference, n.d.). This stage helps in determining how fast the project is moving and what needs to be done in case the project is not moving fast enough.

3.3 System Analysis

For Object Oriented Analysis and Design, System analysis is the process of modelling the functional requirements and considering the implementation requirements (Powell-Morse, 2017). The following is used in the system analysis phase.

3.3.1 Use Case Diagram

This is a diagram that demonstrates how activities performed produce a certain output result and describes how an external user triggers an event to occur within the system (Dennis, 2012).

3.3.2 Sequence Diagram

This is a diagram that illustrates how the objects within a use case share messages with each other over time (Dennis, 2012).

3.4 System Design

For Object Oriented Analysis and Design, the process of system design is described as the process of determining how the system is created and how it should appear. At this stage, considerations such as the software to be used and performance requirements are taken into consideration (Powell-Morse, 2017). The following diagrams were used in the system design phase.

3.4.1 ERD Diagram

This is a diagram that shows the information that is created, stored and used by a business system and how the data relates with other data within the system (Dennis, 2012).

3.4.2 Database Schema

This is a diagram that helps show the logical configuration of a relational database such as MySQL (Lucid Software Inc., n.d.).

3.4.3 Class Diagram

This is a diagram that describes the structure of a system by showing the system's classes, their attributes, operations and the relationship among the objects (Visual Paradigm, n.d.)

3.5 Tools

This is a list of the tools that were used for the development of the system.

3.5.1 HTML

This is a standard markup language for documents used to display data on a web browser. It is one of the main building blocks of the internet and will be used to develop the web application.

3.5.2 CSS

This is a style sheet language used together with a markup language, such as HTML, in order to describe the presentation of the document such as color of text and animations thus adding character to a web application.

3.5.3   PHP

This is a general purpose, server-side scripting language that helps provide functionality to a website making it dynamic and interactive. It provides functionality such as connection to a database and providing error messages to a user. This will be used to help connect the application to MYSQL.

3.5.4   MYSQL

This is an open source relational database management system. This will be used to store the passenger's data that will be linked to their reference number.

3.6   Testing Procedures

3.6.1   Unit Testing

Unit testing is a type of functional test that, according to Carty (2021), tests the system by making sure that all the individual parts work properly on their own. This method will work perfectly with the scrum methodology that will be used. After the deliverables for the scrum are met, the section of the system that will be built during the scrum will be tested using unit testing to make sure that everything is working as intended.

3.7   Deliverables

3.7.1   System Modules

The different modules in the system are as follows:

Passenger

They are the main focus of the system. The communicate with the airport luggage retrieval system through the front end and provide their information to the system and get a reference number in return for their luggage. When they lose their bags, they input the reference number, which is linked to all their personal details, into the system. When the luggage is found, the airport staff reaches out to them using the information they had provided.

Airport Staff

They help to input the reference numbers of the lost luggage they have found into the system for storage. Once a lost bag is found, they make plans to deliver the luggage to the owners

Front End User Interface

This enables all the users of the system to be able to communicate with the backend of the system. It also contains privilege control in order to ensure users are not accessing the wrong information.

Server

This is the backend of the system that handles the user data. It stores the passenger and staff data, administers reference numbers to passengers, stores the reference numbers of lost luggage and searches for missing luggage using the reference numbers supplied by the passenger. It also controls the access of the database.

Database

It is responsible for storing all the user data for future referencing.

3.7.2   System Architecture

Figure 3.2 illustrates how the different modules that make up the airport luggage retrieval system communicate with each other.
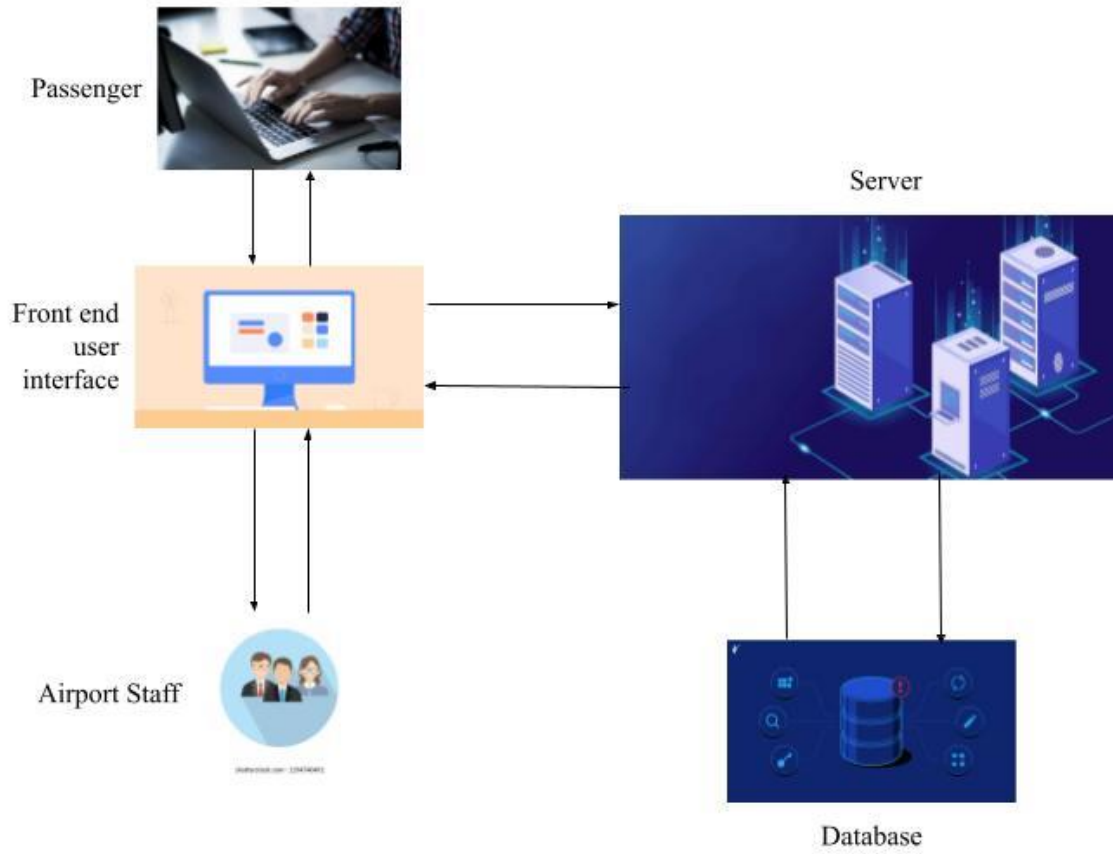
Figure 3.2 System Architecture Diagram

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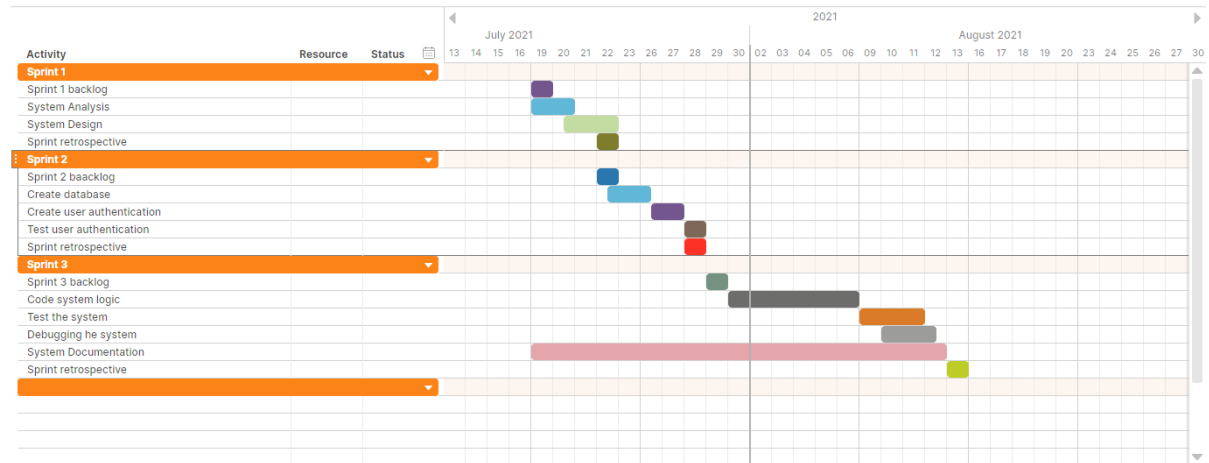   https://www.rtinsights.com/how-iot-technology-can-solve-the-lost-luggage-problem/

Appendix

Appendix 1: Gantt Chart

Figure 3.3 Project Gantt Chart