Hot Air Balloon ISP

Final Year Project

Session 2018-2022

A project submitted in partial fulfillment of the degree of

BS in Computer Science

Department of Computer Science

Faculty of Computer Science & Information Technology

Superior University, Lahore

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*The candidates confirm that the work submitted is their own and appropriate credit has been given where reference has been made to work of others

Plagiarism Free Certificate

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Designation: Senior Lecturer Designation: Senior Lecturer

Signature: _____ Signature: _____

HOD: Dr. Arfan Jaffar

Signature: _____

Project Report

[Hot Air Balloon ISP]

Change Record

Author(s)	Version	Date	Notes	Supervisor's Signature
	1.0		<Original Draft>	
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			<Added Project Plan>	
			<Changes Based on Feedback from Supervisor>	

APPROVAL

PROJECT SUPERVISOR

Comments: _____

_____

Name:_____

Date:_____ Signature:_____

PROJECT MANAGER

Comments: _____

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Date:_____ Signature:_____

HEAD OF THE DEPARTMENT

Comments: _____

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Date:_____ Signature:_____

Dedication

The project Hot Air Balloon Internet Service Provider can help to solve the problem of Internet Service Providing in such areas, where it is difficult to provide the internet

This work is dedicated to my Supervisor ("Respected Sir Shahzad Nemat Malik") because they have supported our team and helped us to implement our team's idea to complete this report.

Acknowledgments

Project Hot Air Balloon ISP (Internet service provider) will be very useful for those areas which have a huge gap of people that have no internet.

Our team thankful our supervisor who gave us the golden opportunity to do this wonderful project on this topic *(Hot Air Balloon IPS), which also helped me do a lot of research. Our team came to know about so many new things we are thankful to them. Moreover, our team would also like to thank our parents and friends who helped us a lot in finalizing this project within the limited time frame.*

Executive Summary

In most northern areas or villages, people face the problem of the internet due to the shortage of mobile towers that provide internet service connections. People are still not connected to the internet. They lost most of their important data due to the internet problem.

Our project Hot Air Balloon ISP(Internet service provider) will be very useful for those areas which have a huge gap of people that have no internet. Using our project, it is also easy to connect the internet to the mountain areas, where it is difficult to spread the network of optical fiber. One more obstacle in this project is politics as this balloon does not know the concept border. Also, it needs a strict regulation for spectrum band as it wants a new brand for this.

Our Project will help the world with education, business, and Wi-Fi connectivity for people, and many more.

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Introduction

Chapter 1: Introduction

Our project Hot Air Balloon ISP (Internet service provider) will be very useful for those areas which have a huge gap of people who have no internet. It is also easy to connect the internet to the mountain areas by using our project, where it is difficult to spread the network of optical fiber. There is one more obstacle in front of this project is politics as this balloon does not know the concept border. Also, it needs a strict regulation for the spectrum band as it wants a new band for this. Our Project will help the world with education, business, and Wi-Fi connectivity for people, and many more.

1.1. Background

On a worldwide scale, providing Internet connection is still seen as one of the biggest concerns. However, in rural and distant places, two-thirds of the world's population lacks access to Internet connectivity. The infrastructure required to offer Internet services is lacking in these places. In order to address these problems, Google X introduced Project Loon, which uses specially constructed balloons that float in the stratosphere to connect consumers in isolated or rural locations to the Internet. This study gives a broad overview of the processes and technology involved in this ground-breaking technological advance. Some of the frequently cited concerns about loon technology are also addressed.

1.2. Motivations and Challenges

Motivations behind this project are that in most rural, or mountains areas people are still facing the problem of the internet. They lost most of their important data due to the unavailability of the internet. We resolve these internet problems by providing this project (Hot air Balloon ISP). People can easily get an internet connection.

1.3. Goals and Objectives

The major goal of this project Loon is to reduce coverage gaps and maintain constant internet connectivity for all users. The main goal of the launch was to coordinate a fleet of balloons to deliver Internet connectivity to the user population already residing on the ground. The

availability of Auto Launchers, which can continually launch a new balloon every half-hour, makes this effort possible. High-speed Internet is first transmitted from the ground-based telecom component to the closest balloon, which then transmits it across the network before returning to the user base on the ground. In the stratosphere, at a height of around 100 km, data transmission is demonstrated.

1.4. Literature Review/Existing Solutions

There is no solution exist at this time. But we will provide the solution. Our Project Hot Air balloon ISP can fly 1km Approximately in the stratosphere, above the surface of the Earth. The software-based technique is used to identify the direction that each balloon should head in and then to direct each balloon into the proper stratum of wind. The balloons can be arranged to create a sizable communication network by swaying with the wind. The unusual engineering difficulties need to be solved because the balloons are placed over the verge of space and are typically deployed between 1 or 2 kilometres above the ground: Due to the thin atmospheric layer, greater UV radiation protection is required. Just 1% of the air pressure is that at sea level.

1.5. Gap Analysis

According to a survey in most of the people of the rural and northern areas are facing the problems of the internet. They have no access to the connectivity of the internet due to the large distance between the signal tower and people. They lost most of their important information due to the unavailability internet.

1.6. Proposed Solution

We will provide internet connectivity in mountain or rural areas where people are facing the problem of the internet. Most of the people visit every year in mountain areas where they face the problem of the internet. We will overcome this problem by providing such a kind of solution.

1.7. Project Plan

We have a plan to complete this project in 2 semesters i.e FYP1 and FYP2. Which includes requirement analysis, feasibility study, planning, documentation, finalizing, designing, and testing. Throughout this project, our supervisors will be in contact and share their valuable input.

1.7.1. Work Breakdown Structure

2. 1. Preparation

3. 1.1. Questionnaire.
4. 1.2. Requirement analysis.
5. 1.3. Feasibility study.

6. 2. Planning

7. 2.1. Documentation.
8. 2.2. Finalizing of deliverables.
9. 2.3. Scheduling of project.

10. 3. Design

11. 3.1. Create design.
12. 3.2. Integrate all the things that are required.

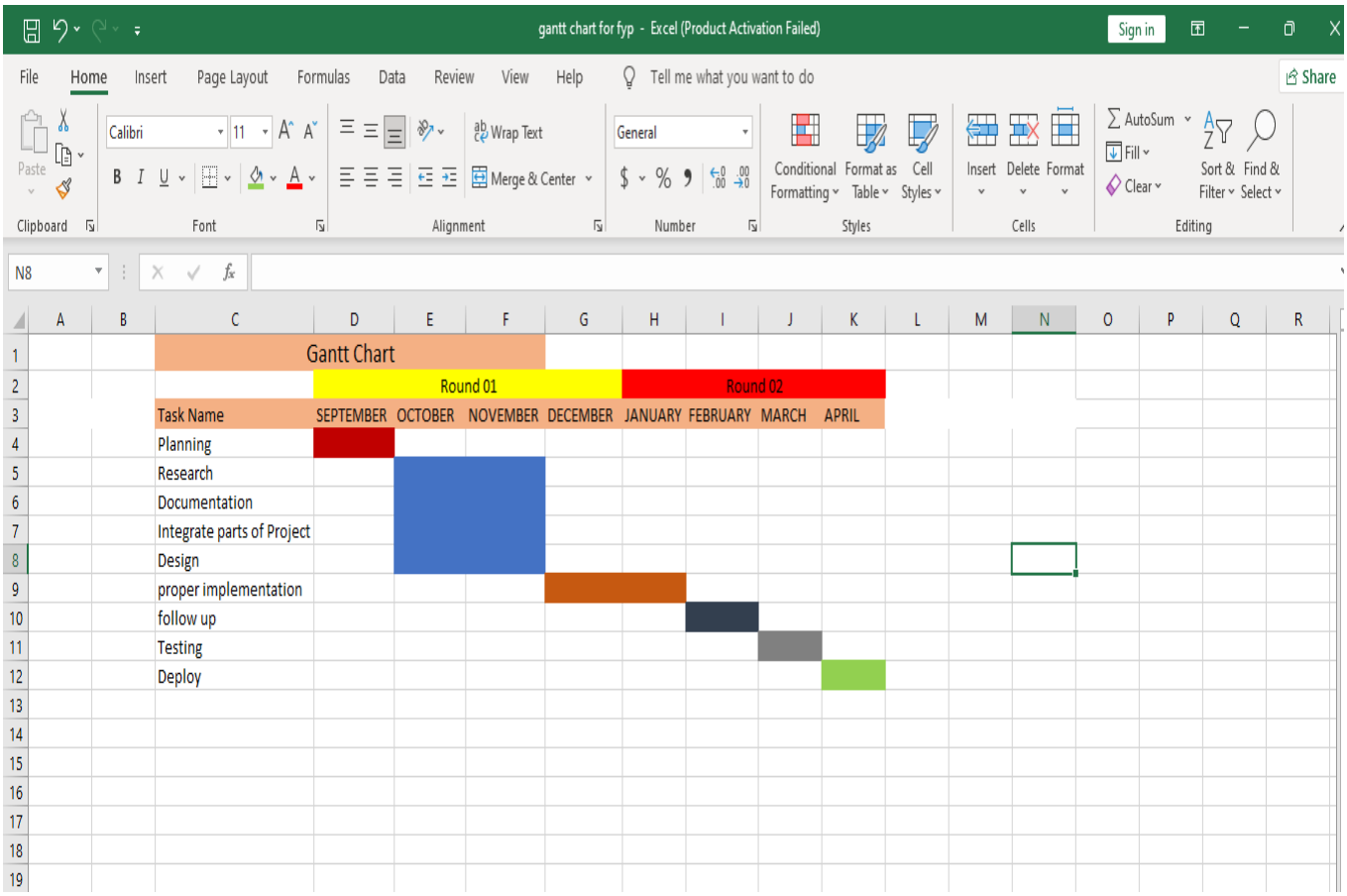
13. 5. Testing

14. 5.1. Functional Testing.
15. 5.2. Non-Functional Testing.

15.1.1. Roles & Responsibility Matrix

WBS#	deliverable time	Execution of the deliverable activity	Duration (No. of days)	Responsive Participants
1.1	Questionnaire.	Research Tools	5	Ahsan, Nawaz
1.2	Requirement analysis.	Analyze requirements for the project.	10	Ahsan, Nawaz
1.3	Feasibility study.	Study requirements for the understanding feasibility of the project	5	Ahsan, Nawaz
2.1	Documentation.	Document all requirements, goals, and actions are taken to achieve those goals	15	Ahsan, Nawaz
2.2	Finalizing	Discuss and finalize	5	Ahsan, Nawaz
2.3	Project Scheduling	Create a schedule to track progress	3	Ahsan, Nawaz
5.1	Functional testing			Ahsan, Nawaz
5.2	Non-Functional Testing			Ahsan, Nawaz

1.8 Gantt Chart



Chapter 2

Software Requirement Specifications

Chapter 2: Software Requirement Specifications

1. Introduction

One of the most revolutionary technologies in our lifetimes has been internet access. The Internet accounts for 4% of national GDPs in G20 economies and more than 21% of GDP growth overall. The Internet has a significant impact on developing nations. Through a designated Internet antenna attached to their infrastructure, consumers can connect to the balloon network and utilise this service. The software algorithms used by Project Loon are used to decide where the balloons should travel. The balloons can be arranged to create a sizable communications network by gliding with the wind.

16.1.1. Purpose

Many of us believe that the internet represents the entire world. However, there are currently 2/3 of the world's population without access to the internet. People use a specialised Internet antenna that is fixed to their building to connect to the balloon network. The signal bounces off of balloons before returning to earth and connecting to the global internet. Therefore, our project's goal is to make it simple for consumers to access the internet from anyplace.

16.1.2. Document Conventions

The document convention of this project is on the basic style that all other project uses.

16.1.3. Intended Audience and Reading Recommendations

The intended audience of this project is all the expertise and technology related to this project who can read all the requirements of software requirement specifications. It also includes stakeholders in other departments, including leadership teams, sales, and marketing.

16.1.4. Product Scope

It can facilitate better communication with disaster-affected areas. It will be accessible everywhere, including the Sahara Desert. It can increase Internet usage in underdeveloped nations in areas like Southeast Asia and the north that cannot afford to install underground fibre optic cable for internet service. Compared to a wired broadband connection, it is quicker, more dependable, and more efficient.

16.1.5. References

"Amount of Online Users." [Online]. Internetlivestats.com/internet-users is accessible.

20739–20746 in C. Praveen, "Project Loon: Internet to Rural and Remote Area," International Journal of Pharmaceutical Technology.

Project Loon: A Glimpse of a New Revolution, J. Kapil, vol. 4, no.

Project Loon: A Balloon-Powered Internet for Everyone, M. Carlson

16.2. Overall Description

16.2.1. Product Perspective

From the product perspective, we draw a use case diagram that shows the complete system of this project which is mentioned in the below content.

16.2.2. Product Functions

A dedicated Internet antenna using radiofrequency technology that is installed on the side of a home or place of business receives signals from the balloons. A router made for home use is connected to the Internet antenna. When a user subscribes to our services, they can easily access the internet because the web traffic that is transmitted via balloon network is ultimately forwarded to the ground stations, where it is connected to the already-existing Internet infrastructure, such as local telecommunications partners and fibre cables. ISPs, or internet service providers, are businesses that give you access to the internet at home in exchange for a regular monthly fee. Consider an ISP as a cable company that links you to the internet rather than TV channels.

16.2.3. Operating Environment

Long-Term Evolution, a wireless communications technology, can connect a balloon to the ground (LTE). To use LTE, the Project collaborates with telecommunications providers to share the cellular spectrum, enabling users to access the Internet from their phones and other LTE-capable devices anywhere in the world. High-speed networks are used by balloons to transport wireless traffic from cell phones and other devices back to the global Internet. The setting in which the software will run, specifically

16.2.4. Design and Implementation Constraints

Balloons from Project Loon are built and intended to handle all challenges. Three basic parts make up a balloon IP: envelopes, solar panels, and electronics. The little box has a method to connect with other balloons and circuit boards that can operate the radio antennas 020006-3. These balloons are kept in operation throughout the night by using lithium-ion batteries to store solar energy. The Project team uses the Global Positioning System (GPS) to monitor each balloon's whereabouts. Each balloon is brought safely to the ground in pre-planned sparsely inhabited locations through coordination under the supervision of the local air traffic control. Additionally, a parachute is immediately launched to carry that specific balloon back to the ground in a safe landing manner. The recovery teams gather the tools so that these balloons can be refurbished and reused in the future.

16.2.5. User Documentation

The user documentation is only the application and website by which the user will guide.

16.2.6. Assumptions and Dependencies

This project is highly dependent on satellite transmission and also the hardware of the project like the balloon and different routers. This also depends on internet data companies if the companies network goes down then the network can also go down.

16.3. External Interface Requirements

16.3.1. User Interfaces

This project's application is its only user interface. The customer can use this app to log in with a few details and purchase internet service package deals. And the user can also see their all-package details from this application.

16.3.2. Hardware Interfaces

The hardware that is used in this project all has its specific functionalities. The balloons devices catch the signals from the satellite and provide the services to their local router and then the local router provides the internet to the users these are the hardware used in this project. While on the other hand there is other hardware also uses which control the activity of the balloon.

16.3.3. Software Interfaces

The software uses in these projects is the latest used by all companies. Traditional routers are standalone computers that run exclusive software. A virtual router, on the other hand, is a software instance that carries out the same tasks as a hardware router.

16.3.4. Communications Interfaces

The balloons only function with specific our Internet antennae and are incompatible with common Wi-Fi networks. Although normal Wi-Fi33 and Loon signals use similar frequencies, the project radios and antennas are built such that they can only pick up Loon signals and filter out the latter. This is done to achieve high bandwidth over the complicated longer distances. The TCP (Transfer Control Protocol)/IP (Internet Protocol), SMTP (Simple Mail Transfer Protocol), FTP (File Transfer Protocol), HTTP (HyperText Transfer Protocol), and HTTPS (HyperText Transfer Protocol Secure) protocols should all be supported by the operating system. Access to web apps like Outlook, Gmail, WhatsApp, Facebook, Twitter, etc. using browsers and other Internet clients

16.4. System Features

The system feature of this Product is very easy all the detail of this feature are mentioned below in the following contents.

16.4.1. System Feature 2

16.4.1.1. Description and Priority

Users with assigned privileges will be able to access Internet services where they will fill out the data, and quantities scheduled for accessing high-priority services.

16.4.1.2. Stimulus/Response Sequences

The user first buys services on the internet and uses them by logging in.

16.4.1.3. Functional Requirements

Users should be logged on to the system to and buy a package from the desired application created by our project and use of our services.

Long-Term Evolution, a wireless communications technology, can connect a balloon to the ground (LTE). In order to use LTE, Our Project collaborates with telecommunications providers to share the cellular spectrum, enabling individuals to access the Internet via their phones and other LTE-capable devices wherever. High-speed networks are used by balloons to transport wireless traffic from cell phones and other devices back to the global Internet.

16.5. Other Nonfunctional Requirements

16.5.1. Performance Requirements

Although performance is not a major issue for many ISP applications, it dominates the crowded quality attribute community. I assume this is the case since it is a characteristic of an application that is frequently simple to quantify and validate. Performance matters when it counts, regardless of the cause. Applications that don't function well in a key area of their behaviour

frequently end up as roadkill on the software engineering highway. An application must complete a certain amount of work within a certain length of time, and/or deadlines must be met for proper functioning, according to a performance quality criteria.

16.5.2. Safety Requirements

Both when the balloons are in the air and after they fall on the ground, their whereabouts(Means Location) are continuously tracked. It is possible to control balloons by raising and lowering them at a specific altitude with winds blowing in the desired direction. The necessary preparation is done to place the balloons in areas that are safe for recovery. All balloons have parachutes as a safety measure to slow their descent in the event of an unplanned landing. Additionally attached are foam bottoms that soften the landing. safety requirements include making a backup of the database every morning. This helps to keep a replica of the database if the database crashes, the replica will be used to restore the database. Also, user passwords must be kept secret to avoid unauthorized users from accessing the system. Passwords must not be shared or kept in the open.

16.5.3. Security Requirements

Data is automatically encrypted during transmission. Additionally, only specific Internet antennas can reach the Internet Service Provider of our system network. Also, user passwords must be kept secret to avoid unauthorized users from accessing the system. Passwords must not be shared or kept in the open.

16.5.4. Software Quality Attributes

Quality attribute requirements are part of an application’s non-functional requirements, which capture the many facets of how the functional requirements of an application are achieved. So, this is important that all the function of Internet Service providers should perform their operations correctly.

16.5.5. Business Rules

The rules and regulations that apply to Internet ISP firms are the same as those that apply to traditional businesses, with a few exceptions for the unique and rapid nature of conducting business electronically. Privacy, data collecting, and customer data use are major concerns for internet firms. This policy must be readily accessible and outline how the business will utilize any personal data gathered. Regulations only require enterprises to declare how they intend to use the information they collect; they do not specify what can be done with it. As a result, your privacy policy needs to make it obvious if your Internet business collects phone numbers with the intention of renting or selling those numbers.

16.6. Other Requirements

There are no other requirements all the requirements are done in the previous objectives

Chapter 3

Use Case Analysis

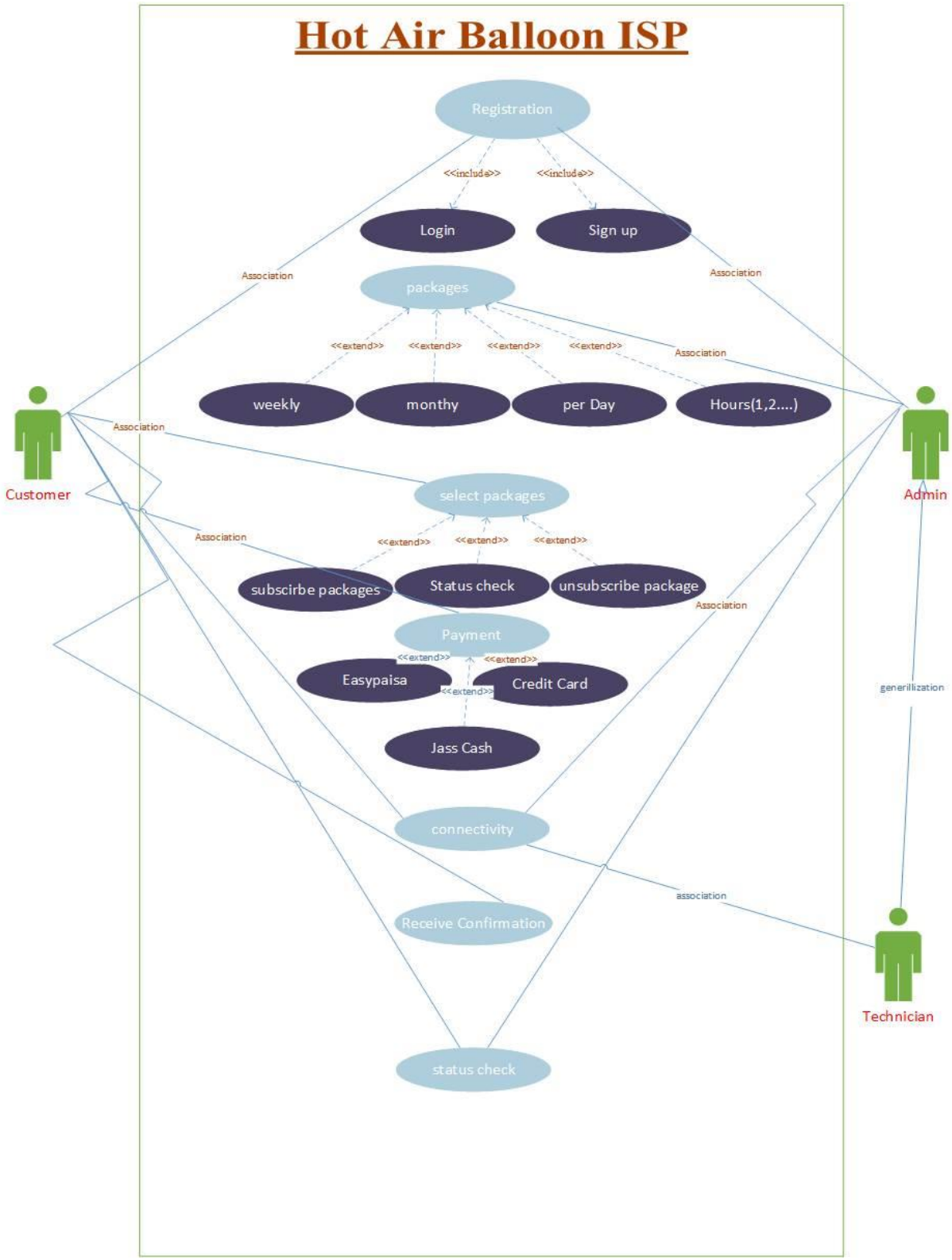
System Analysis

- This chapter is about how users interact with the system to solve a problem
- We compile the system's requirements, taking into account both internal and external factors.
- Identification, clarification, and organization of system requirements as well as a graphic representation of the interactions between system components.

Use Case Model

- The User should be login to the system before it wants to enter the system.
- But before login to the system the customer registers itself.
- The system asks the customer data for registration like its name or further detail about him/her.
- And then he/she can be accessible to log in on that system.
- Then internet packages details will be given to the Customer
- The customer should select his favorite package from the menu.
- Customer can easily subscribe his package from the menu
- After that user move towards the payment method.
- Credit Card, Jazz cash, Easypaisa., At last, he can easily access internet connectivity.

3.1. Use Case Model



3.2. Use Case Descriptions

Use Case1. Customer/Admin Login

The User should be login to the system before it wants to enter the system. But before login to the system the user registers its self. The system asks the customer data for registration like: its name or further detail about him/her. And then he/she can access to log in on that system.

Number	1	
Name	Customer/Admin login	
Summary	In this case, user first, register itself into the system. In the registration form, User should give their data to register. After registration user will be able to login into the system.	
Priority	5	
Preconditions	The user must first register itself to login into the system.	
Postconditions	Receive Confirmation	
Primary Actor(s)	Customer	
Secondary Actor(s)	Admin	
Triggers	User chooses registration option.	
Main Scenario	**Step**	**Action**
	1.	The system displays a registration form.
	2.	The user should enter the given data into the form.
	3.	The user receives the registration confirmation message.
	4.	Now User Login into the system with their username and password.
Extensions	**Step**	Branching Action
	4a	The account does not exist.
Open Issues	**1**	If the user wants to update their password, the system should prompt them

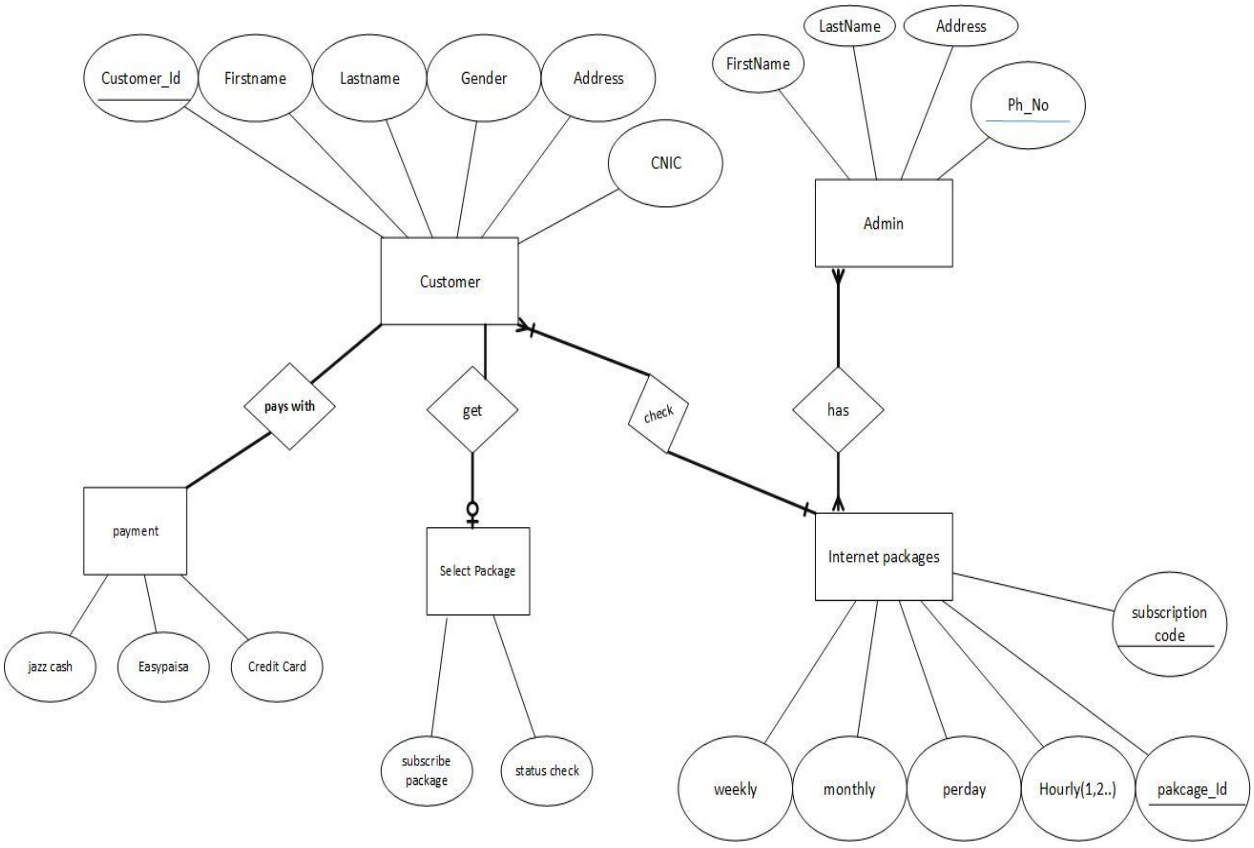
Chapter 4

System Design

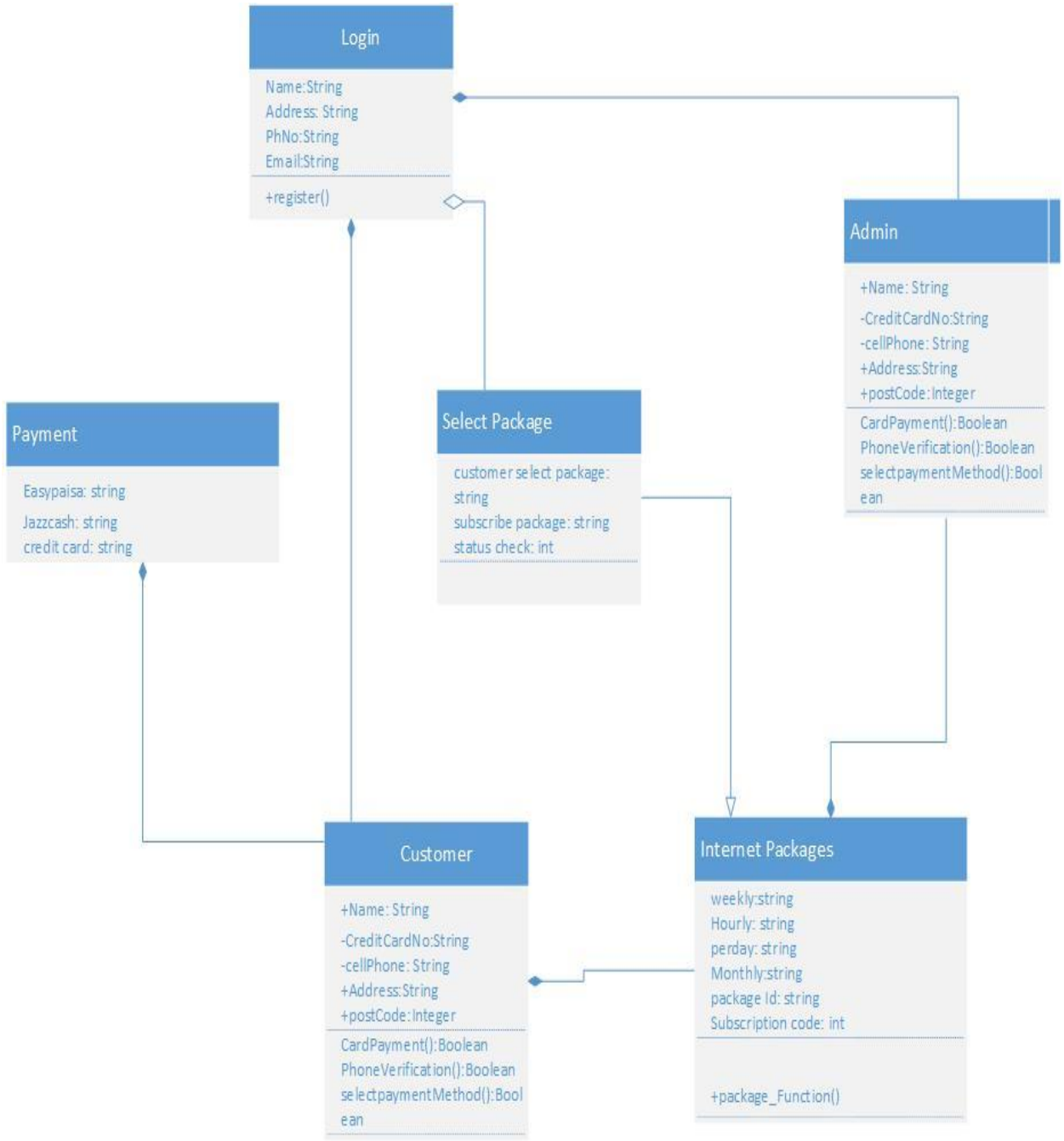
Chapter 4: System Design

In this chapter we will discuss about the overall design of the system. we use different diagrams to show the functionality of the system. In system design we complete the overall system through the using of different diagrams for the better understanding of the developers and the customers. If the customer wants to see our system before the development, we will see the diagrams to the customer so he can understand it very well.

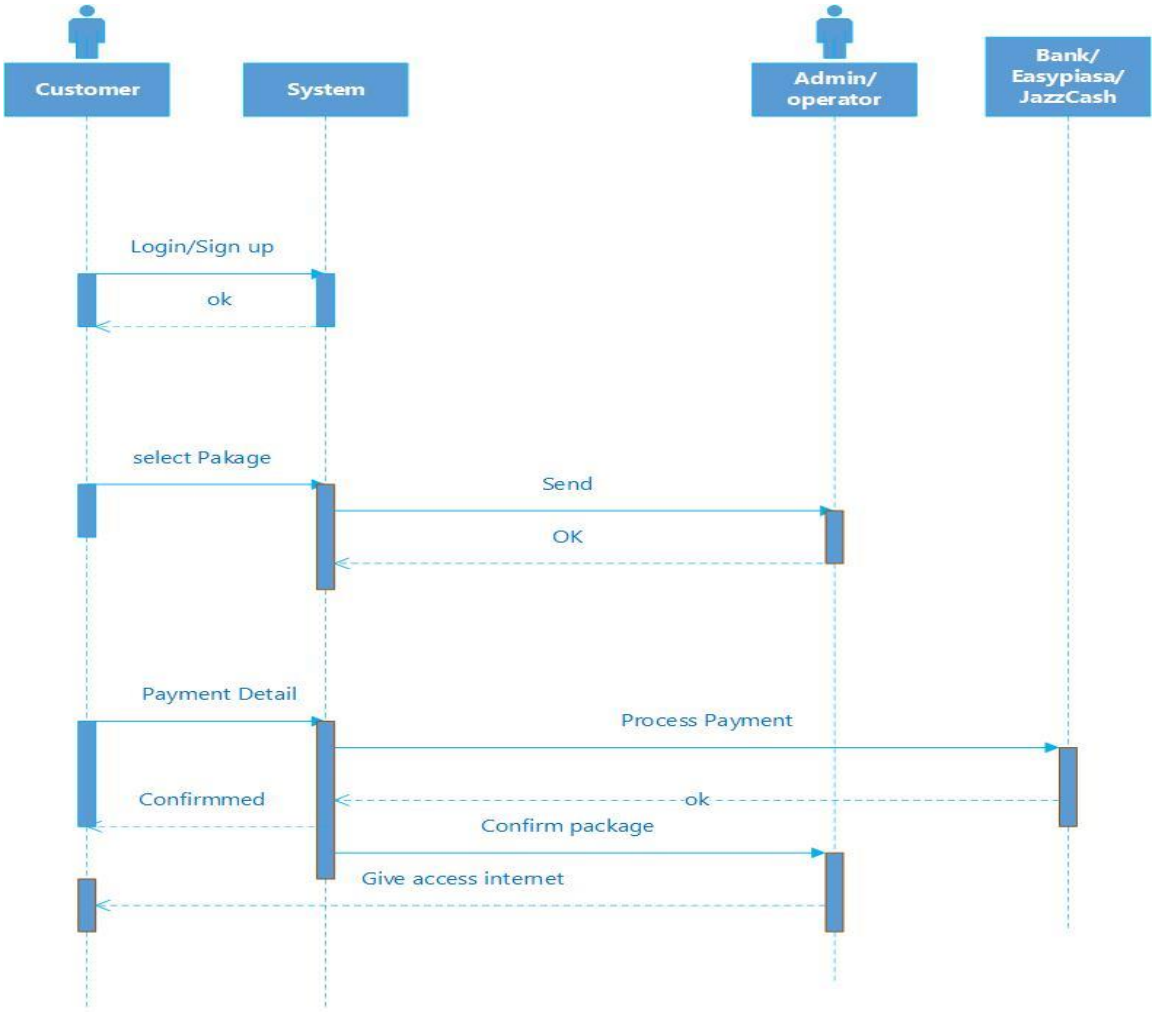
4.1. Entity Relationship Diagram with data dictionary



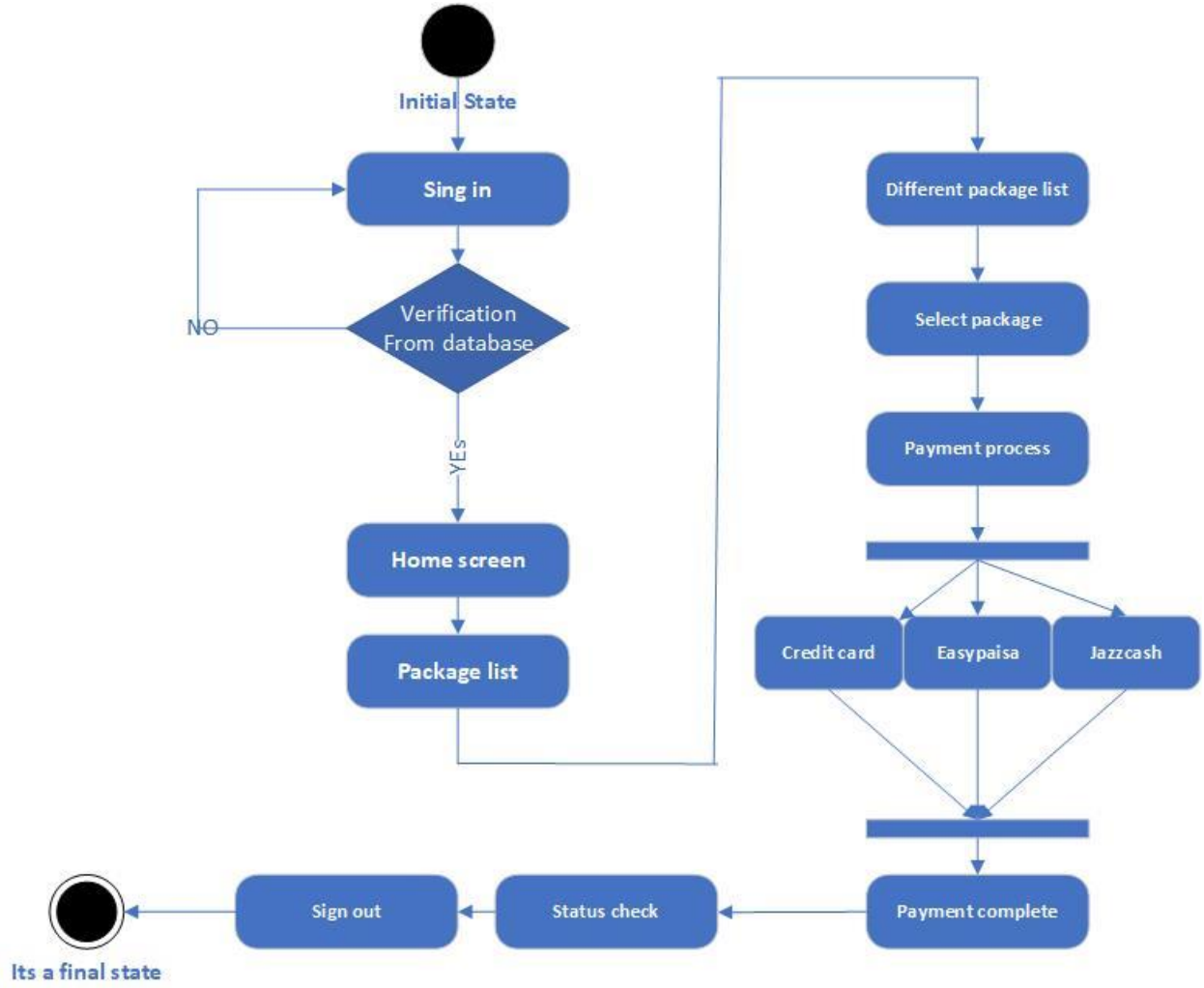
4.2. Class Diagram



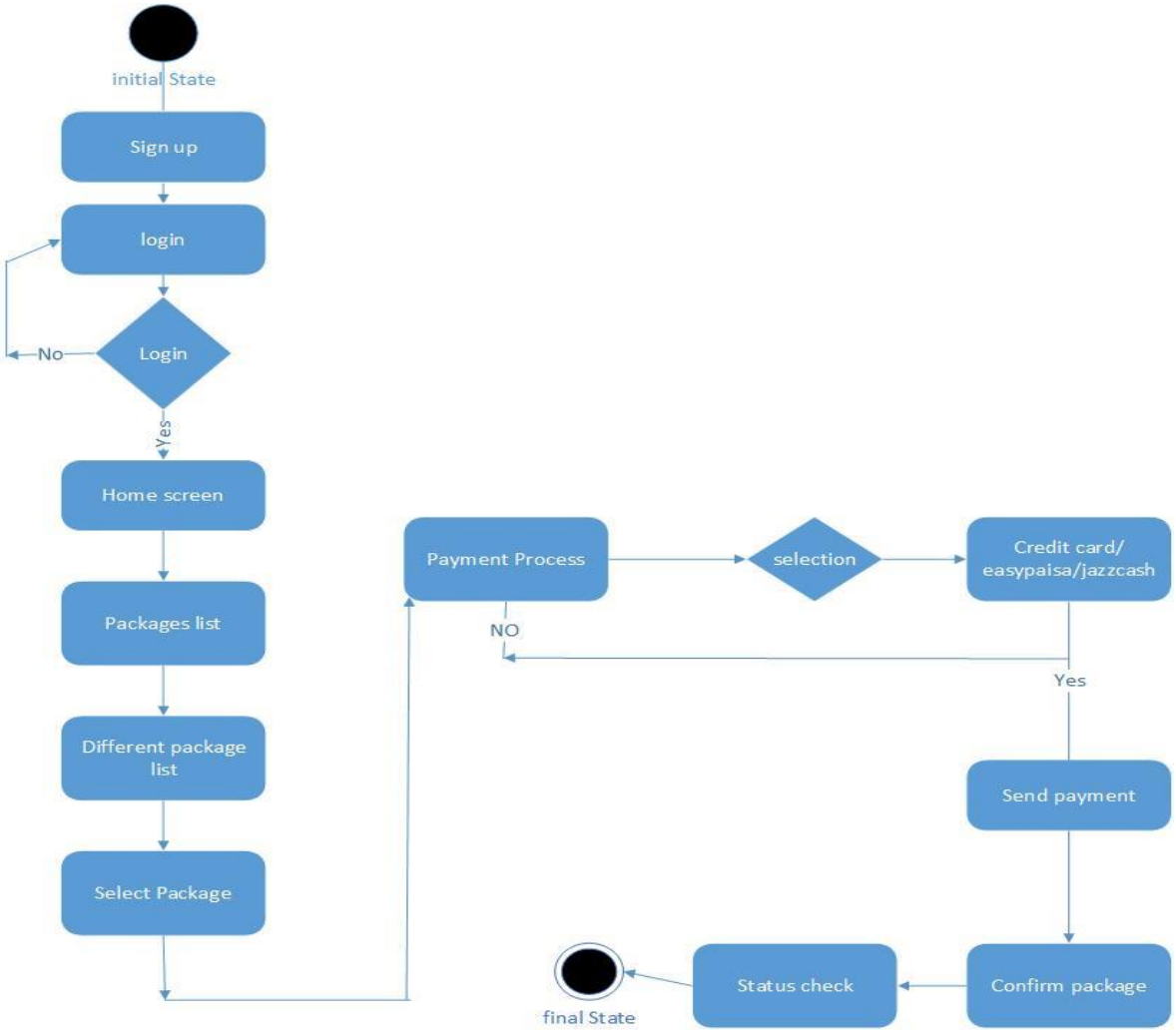
4.3. Sequence / Collaboration Diagram



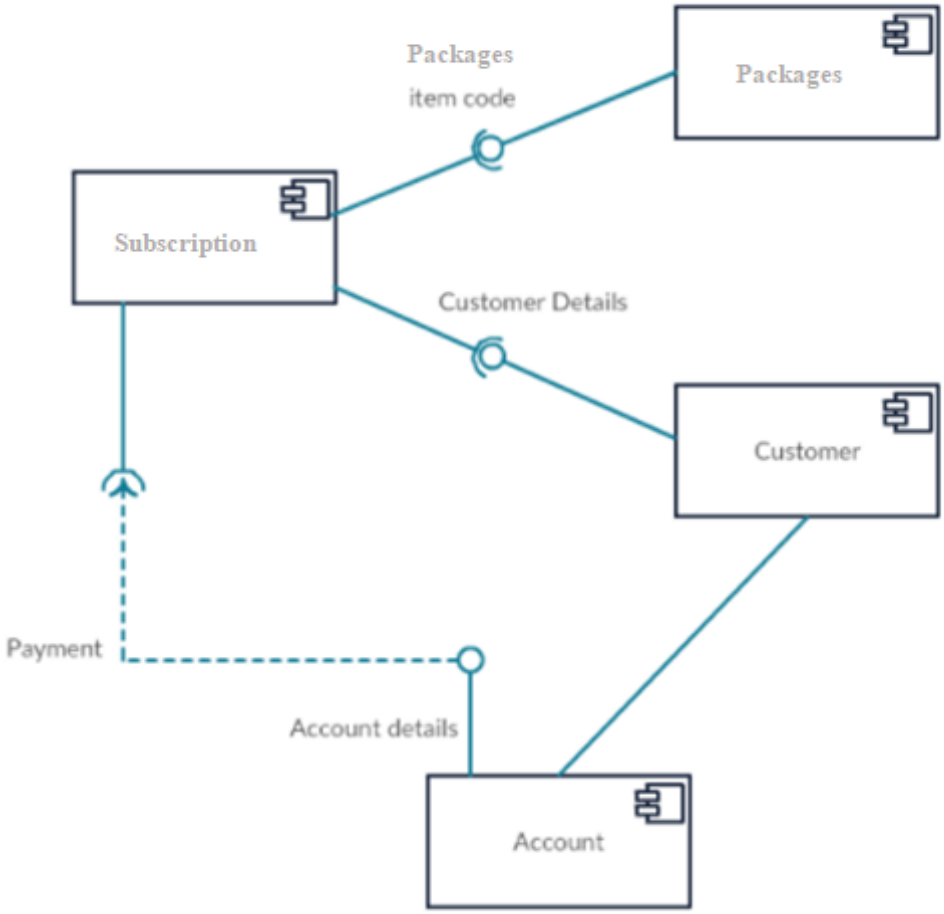
4.4. Activity Diagram



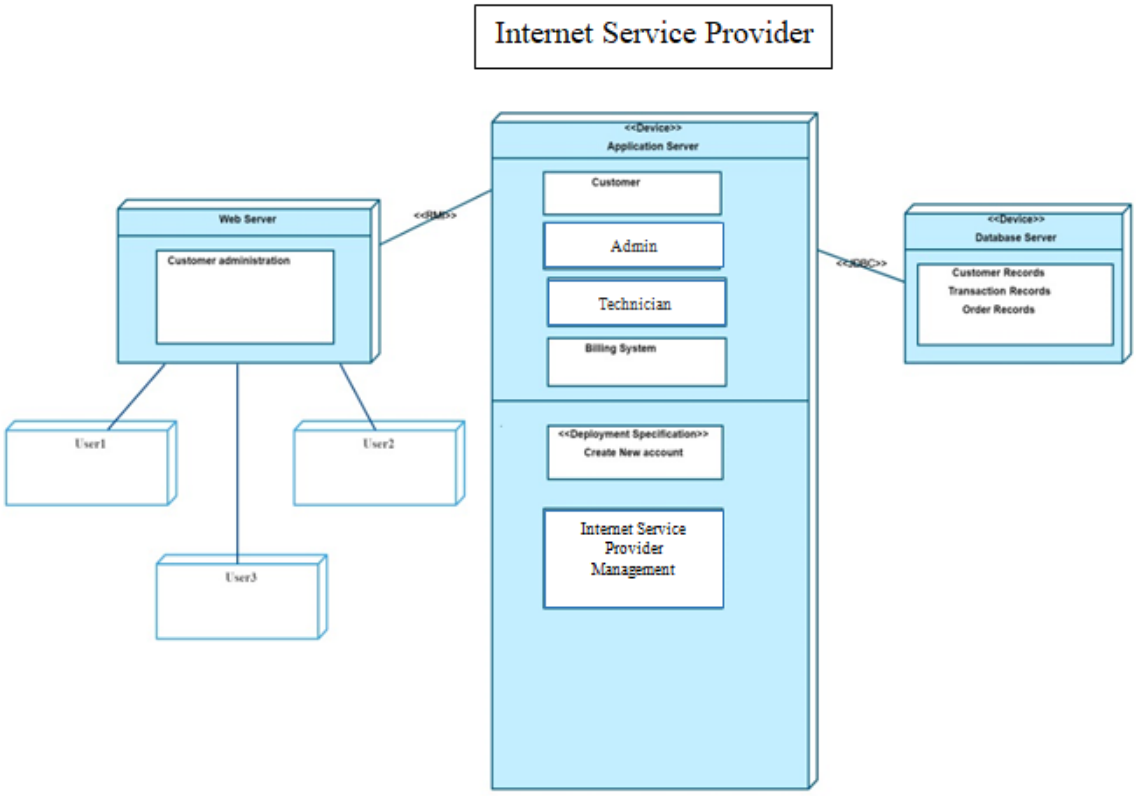
4.5. State Transition Diagram



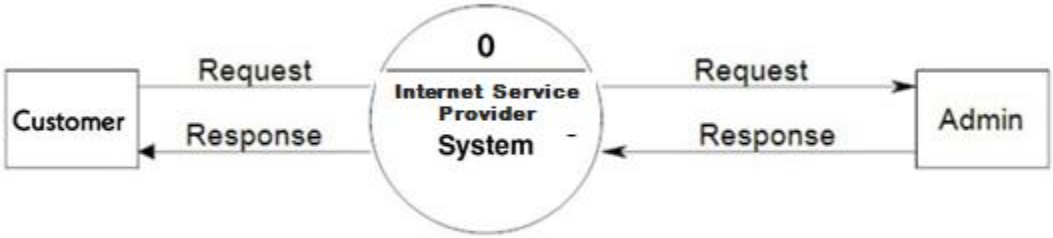
4.6. Component Diagram

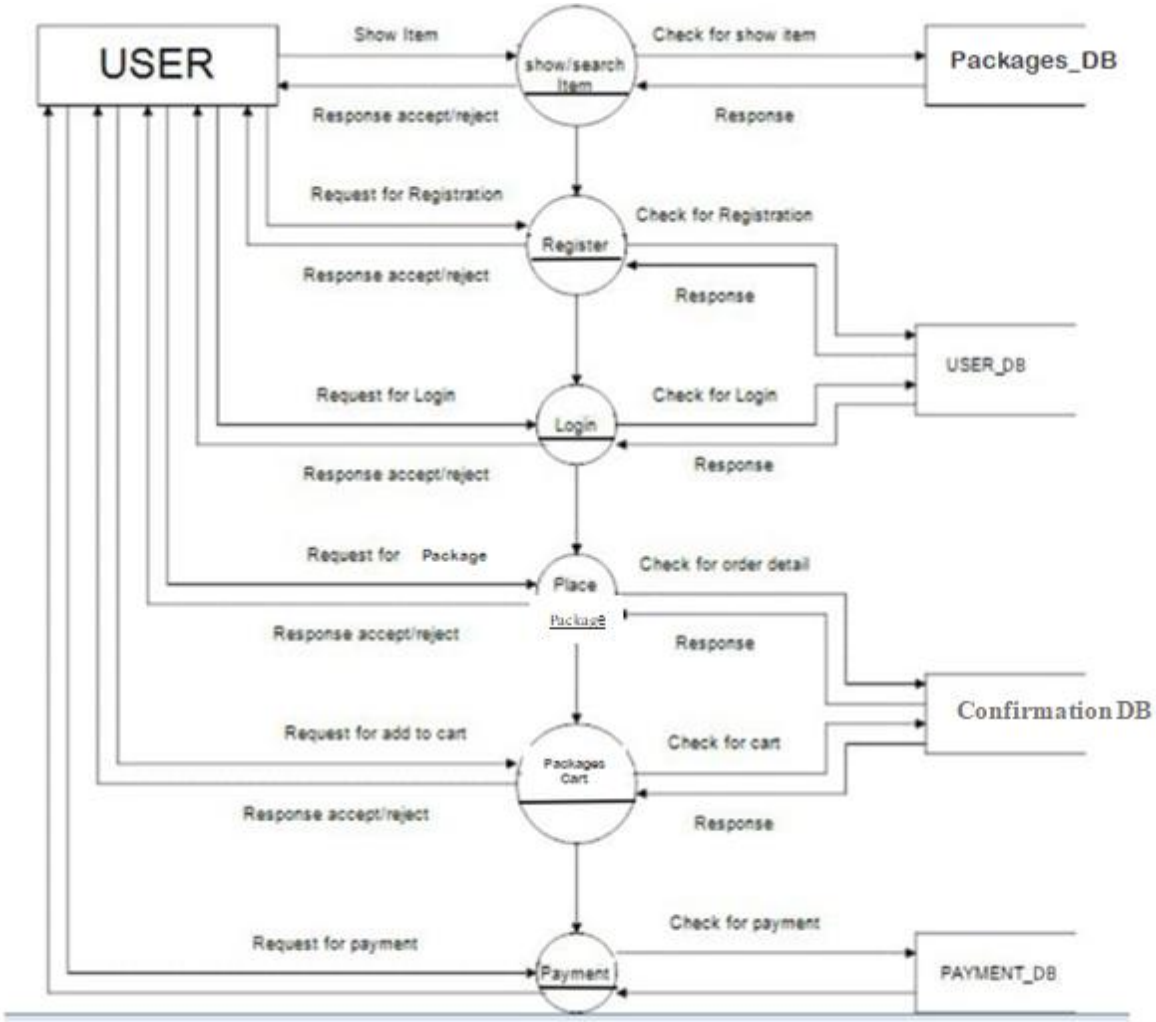


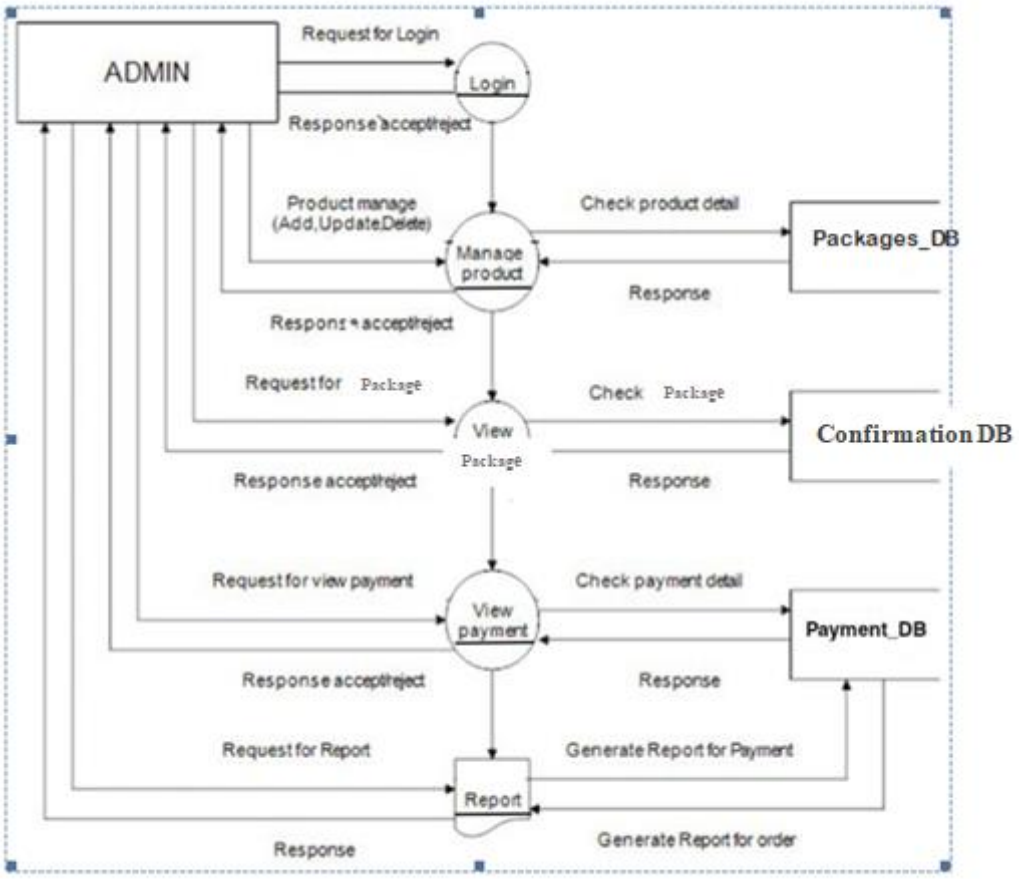
4.7. Deployment Diagram



4.8. Data Flow diagram






ADMIN
Request for Login
Login
Response accept/reject
Product manage
(Add,Update,Delete)
Check product detail
Packages_DB
Manage
product
Response
Respons e accept/reject
Request for Package
Check Package
View
Package
Confirmation DB
Response accept/reject
Response
Request for view payment
Check payment detail
View
payment
Payment_DB
Response accept/reject
Response
Request for Report
Generate Report for Payment
Report
Generate Report for order
Response

Chapter 5

Implementation

Chapter 5: Implementation

- This Chapter turns strategies and plans into actions to accomplish strategic objectives and goals.
- We define you how this project we will built.
- We are ensuring that the information system is operational and used.
- We are ensuring that the information system meets quality standard.

5.1. Important Flow Control/Pseudo codes

- Hot air balloon works internet service provider on hardware
- Connectivity with the satellite
- Users buy internet packages from app
- Sign in/ sign up
- User pay his payment in different ways like jazz cash, Easypaisa and credit Card.

5.2. Tools and Techniques

- Android Studio
- XML
- React Native
- Kotlin
- Python

5.3. Best Practices / Coding Standards

We use best practices and coding standards in this project to improve readability and maintainability.

- Limited use of global variable.
- Using Comments to describe what is code about.
- Error return values and exception handling conventions
- We avoid using a coding style that is too difficult to understand
- The Code is well documented
- No use of GOTO statement
- Each variable should be given a descriptive and meaningful name indicating the reason behind using it

5.4. Version Control

This is the first version of our software.

- Version (1.0)

After we will consider changes in it with the passage of time.

5.5. Best Practices / Coding Standards

The standard we'll use are as follows

- OOAD
- Neat and well maintained
- Easily understandable

Conclusion

Our project Hot Air Balloon ISP (Internet service provider) will be very useful for those areas which have a huge gap of people who have no internet. It is also easy to connect the internet to the mountain areas by using our project, where it is difficult to spread the network of optical fiber. On a worldwide scale, providing Internet connection is still seen as one of the biggest concerns.

However, in rural and distant places, two-thirds of the world's population lacks access to Internet connectivity. We will provide internet connectivity in mountain or rural areas where people are facing the problem of the internet. Most of the people visit every year in mountain areas where they face the problem of the internet. We will overcome this problem by providing such a kind of solution.

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