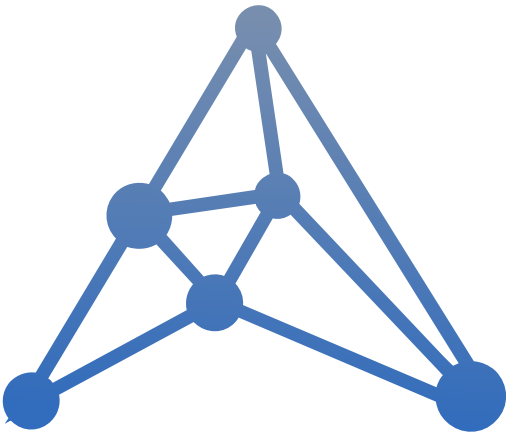

AirCom

Where every connection counts.

AirCom

by

AKASH K RAJ

UJJANI GUPTA

ARPITA DASH

PREETI MAURYA

POCHA GAYATRI

Under the guidance of

SANTOSH KUMAR

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1. ABSTRACT

“AirCom” is a network monitoring and managing website with functionalities like monitoring data usage, postpaid plans, and network load and speed. It has more functionalities like limiting data usage to specific persons/members, monitoring devices connected to the network and accessing resources, customer support modules, and visual data usage reports. The website offers a user-friendly interface that allows users to easily access all module's functionalities. The website dashboard lists all the devices connected to a network and their data usage ability. The website has a module called restriction control for parents, where the parents can set specific data usage limits and site restrictions for kids. The dashboard will provide real-time data usage amount, speed, and network load to understand traffic-causing incidents and efficiently switch networks. It is a network monitoring website to monitor and manage your network.

2. INTRODUCTION

1.1 Problem statement

Traditionally, routing systems have implemented routing and signaling to control traffic forwarding in a network. Route computation has been relatively dependent on static policies that define link cost, route cost, and other factors. However, the requirements have changed, and there is now a high demand for dynamic management and routing due to the advent of highly dynamic traffic steering and service chaining. Additionally, the need for real-time security threat detection and responsiveness via traffic control has become crucial. The new requirements include controlling routing information and traffic paths, as well as extracting network topology information, traffic statistics, and other network analytics from routing systems.

1.2 Motivation

Our motivation to design a network monitoring and managing website comes from the increasingly digitized world where everyone is striving to optimize their network access. When people purchase routing services, numerous devices connect to their network, leading to issues like network traffic that need to be managed. Often, unwanted users gain access to a network and utilize its data, resulting in data theft and potential threats to the host user. Therefore, it is essential to monitor all devices connected to a network and track their data usage and access. Many parents wish to limit their children's internet usage to ensure they are safe and not accessing inappropriate content. When paying for a service, users want to prevent data theft and network issues, highlighting the need for network monitoring and management websites.

1.3 Purpose/objective

The primary purpose of the network monitoring and managing website is to help people manage devices on their network and maximize the benefits of their service plan. It allows users to impose restrictions on certain devices and remove those they do not want on their network. Additionally, it helps users eliminate devices that may pose a threat or engage in data theft. This network monitoring and managing website ensures that only authorized devices are connected to a particular private network. Users can also identify the sources of network traffic. Moreover, parents have the ability to set data usage limits for their children.

2. SYSTEM ANALYSIS AND REQUIREMENTS

2.1 Functional Requirements

- **Login Authentication:** The system should provide secure user authentication mechanisms, including username/password authentication.
- **Signup and Validation:** Users should be able to sign up through forms or interfaces. The system must validate the input data to ensure accuracy, completeness, and adherence to specified formats or constraints, minimizing errors and maintaining data integrity.
- **Data Storage and Retrieval:** The system must store data in a secure and organized manner. Users should be able to retrieve a list of devices connected to their network and view their individual data usage after a specified interval.
- **Reporting and Analytics:** The system should generate reports and analytics based on stored data. Users should be able to access visual reports for individual devices connected to their network, as well as an overall network report showing data usage and network load.
- **Search and Filtering:** Users should be able to search for specific records or data elements. The system should display different devices and plan types based on the search criteria and list all associated details.
- **Scalability:** The system should be scalable to handle an increasing volume of users, data, or transactions. Scalability considerations should be in place for future growth, ensuring the system remains robust and performs well as the organization expands.
- **Mobile Accessibility:** The system should be accessible via mobile devices, either through responsive web design or dedicated mobile applications, promoting flexibility and allowing users to access critical information on the go.

2.2 Stakeholders

Admin

- **Content Management:** The Admin is responsible for managing and updating the website's content. This includes adding new service plans, modifying existing ones, and ensuring that all content is up to date and relevant to the users.
- **Payment Monitoring:** The Admin oversees the payment processing system, ensuring that transactions are secure and that users can easily make payments for their services. They also monitor payment histories and address any payment-related issues that may arise.
- **Customer Support:** The Admin provides customer support by addressing user issues, responding to inquiries, and resolving any user problems. This includes troubleshooting technical issues, managing accounts, and ensuring overall user satisfaction.
- **Development Oversight:** The Admin supervises the development and maintenance of the website. They collaborate with developers to implement new features, fix bugs, and ensure the website runs smoothly and efficiently.
- **Data Analysis:** The Admin monitors and analyzes site usage data to gain insights into user behavior, identify trends, and make informed decisions for future updates. This data is crucial for optimizing the website's performance and improving the user experience.

End User

- **Network Monitoring:** End users utilize the website to monitor their network, specifically tracking the data usage of all devices connected to their network. They can identify which devices are consuming the most data and take appropriate actions.
- **Device Management:** End users have the ability to manage the devices connected to their network. This includes setting restrictions on certain devices, removing unauthorized or unwanted devices, and ensuring that only approved devices have access.
- **Security Management:** End users can monitor and manage security settings to protect their network from potential threats. This includes identifying and removing devices that may pose a security risk or engage in data theft.
- **Parental Controls:** For parents, the website offers tools to set data usage limits for their children, ensuring they have a safe and controlled internet experience. Parents can restrict access to certain websites or limit the time spent online.

- **Data Usage Reports:** End users receive visual reports on data usage, providing a clear overview of how much data each device is consuming. These reports help users make informed decisions about managing their network.
- **Payment and Plan Management:** End users can easily make payments through the website to continue their service plan. They can also view their payment history, manage their subscription, and upgrade or downgrade their service plan as needed.

2.3 Software and Hardware Requirements

Software Requirements:

- **Software Tools:**

  Spring Boot(STS): This is an Integrated Development Environment (IDE) based on Eclipse and specifically designed for developing Spring Framework-based applications.

  Postman: This is an API platform that helps developers create and use APIs. It offers a range of tools to simplify the API lifecycle and streamline collaboration, including: Design, Testing, Documentation, Mocking, and Discovery.

- **Visualization Libraries:**

  Chart.js: This JavaScript library allows for creating interactive and visually appealing charts.

- **Database System:**

  MySQL: A relational database management system that will store and manage the data efficiently.

- **Programming Languages:**

  Java: Used within Spring Boot (STS) for dynamic web application development. It often integrates seamlessly with MySQL.

- **Web Development Tools:**

  HTML: The standard markup language for creating web pages.

  CSS: Cascading Style Sheets for styling and formatting web pages.

  JavaScript: A scripting language used to enhance interactivity and dynamic behavior in web applications.

- **Web Server:**

Apache Tomcat: A free and open-source cross-platform web server solution stack package, including Apache HTTP Server, MySQL database, and interpreters for scripts written in PHP.

Hardware Requirements:

- **Storage:** Adequate storage space for storing the website, associated files, and potentially large datasets is crucial, and implementing a scalable storage infrastructure allows for the accommodation of future data growth.
- **Backup and Redundancy:** Implementing backup solutions and considering redundancy measures to ensure data integrity and availability is essential, establishing a robust strategy that safeguards against data loss and provides a fail-safe mechanism during unforeseen events.
- **CPU and Memory:** Sufficient processing power (CPU) and memory (RAM) to handle data processing and visualization tasks efficiently are critical, and regularly assessing and upgrading the system's capacity ensures optimal dashboard performance.
- **Network:** A reliable network connection to ensure seamless data transfer, especially if dashboards are accessed remotely, is essential for enhancing user experience and optimizing accessibility and responsiveness.
- **Employees Devices:** Ensuring that client devices (computers, tablets, etc.) meet the minimum requirements for accessing and interacting with the dashboard is key, providing clear guidelines and conducting periodic checks to promote a consistent and satisfactory user experience.

3. SYSTEM DESIGN

3.1 Modules Description

1. User Login or Signup Session

- Manages user authentication and registration. Users can log in with their credentials or sign up by entering required details. This module ensures secure access to the system through encrypted passwords and session management.

2. Browsing All the Postpaid Plans

- Allows users to explore and compare various postpaid plans. Users can view details such as data limits, pricing, and additional features. Filtering and sorting options help users select the most suitable plan.

3. Device Monitoring and Analytics

- Tracks data usage and network activity for all connected devices. Provides visual reports and analytics on device performance, usage patterns, and network load to help users optimize their network.

4. Devices Management

- Lets users manage devices connected to their network. Includes functionalities to view, label, restrict, or remove devices. Provides tools for setting usage limits and parental controls.

5. Network Status

- Displays real-time updates on the network's performance. Shows current speed, load, and any potential issues affecting the network. Helps users monitor and maintain optimal network performance.

6. Payment and Billing

- Handles all aspects of financial transactions related to the service plan. Users can view billing history, make payments, and manage subscriptions. Includes features for tracking payment status and handling billing inquiries.

3.2 ER Diagram

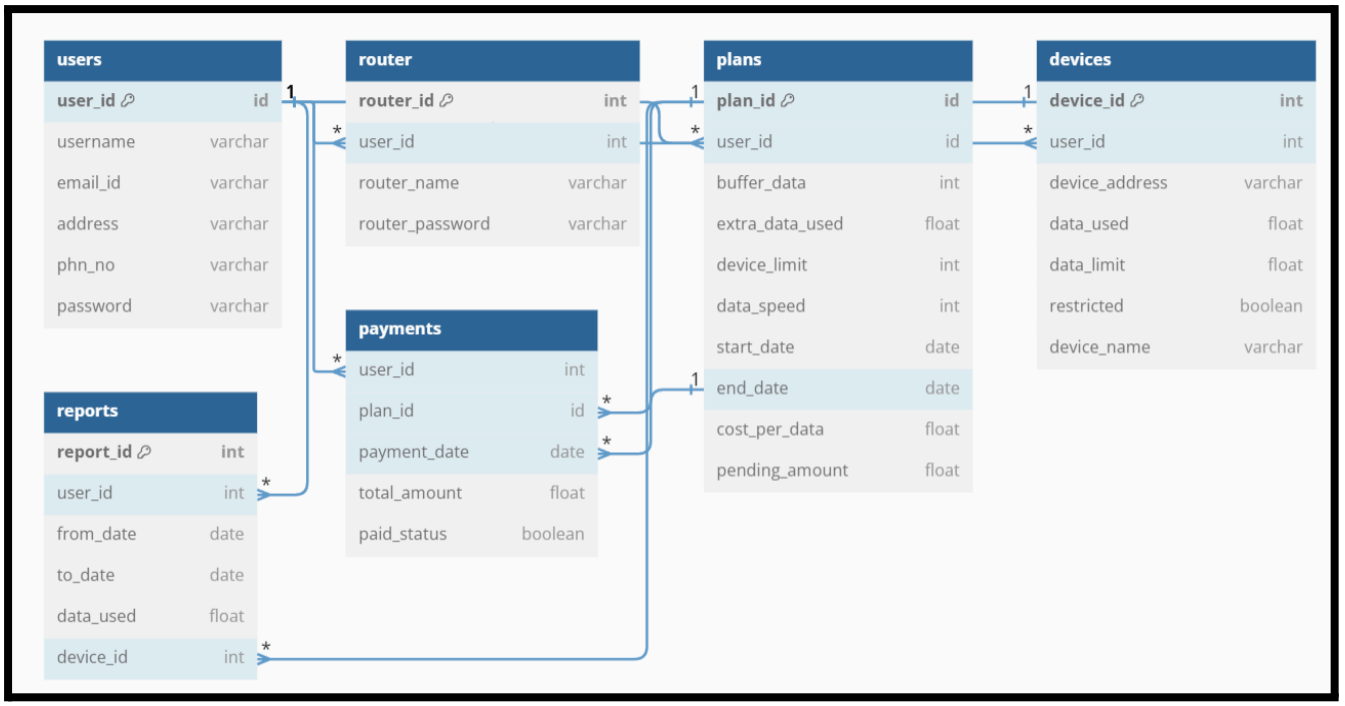


Fig 3.2.1 ER Diagram

3.3 Use Case Diagram

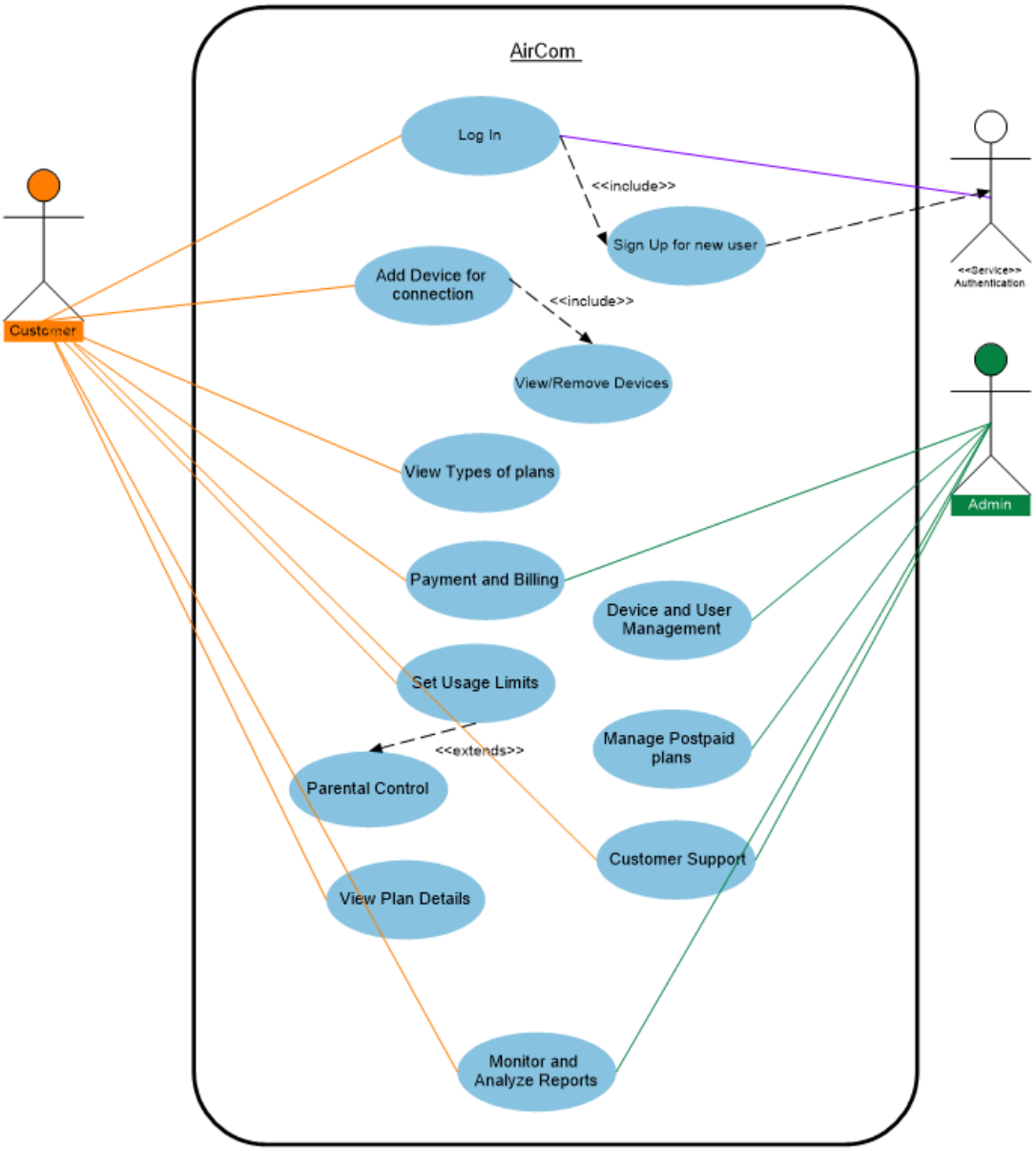


Fig 3.2.2 Use Case Diagram

3.4 Sequence Diagram

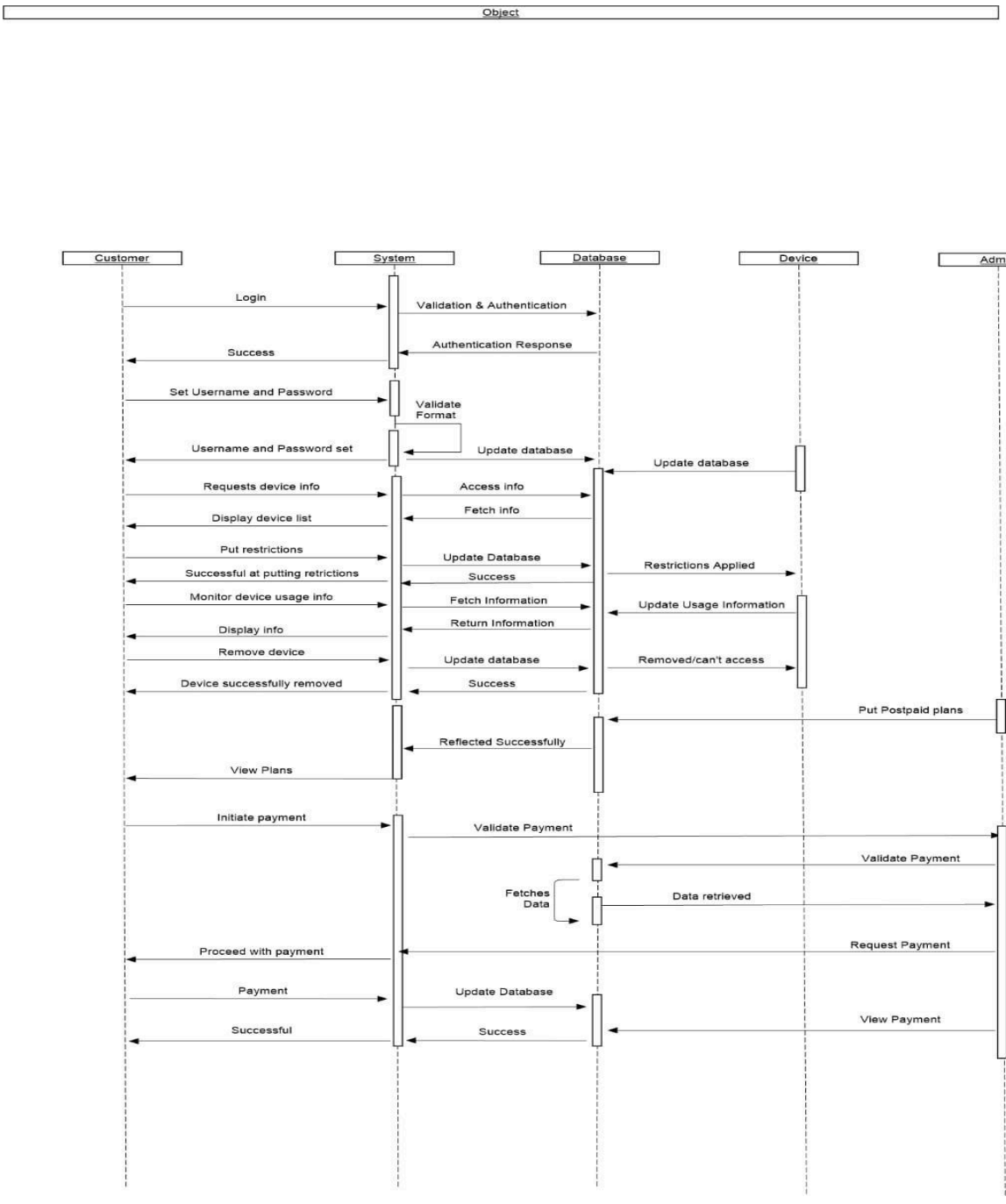


Fig 3.2.3 Sequence Diagram

3.5 Database Design

Table 3.1 User Details

Category	Value	Null
User_id (PK)	Integer	No
Username	Varchar	No
Email	Varchar	No
Address	Varchar	No
Phone_Number	Varchar	No
Password	varchar	No

Table 3.2. Router

Category	Value	Null
Router_id(PK)	Integer	No
User_id [ref: > users:user_id]	Integer	No
Router_name	Varchar	No
Router_password	Varchar	No

Table 3.3 Plans

Category	Value	Null
Plan_id (PK)	Integer	No
User_id [ref: > users:user_id]	Integer	No

Category	Value	Null
Buffer_data	Integer	No
Extra_data_used	Float	No
Device_limit	Integer	No
Data_speed	Integer	No
Start_date	Date	No
End_date	Date	No
Cost_per_data	Float	No
Pending_amount	Float	No

Table 3.4 Devices

Category	Value	Null
Device_id (PK)	Integer	No
User_id [ref: > users:user_id]	Integer	No
Device_address	Varchar	No
Device_name	Varchar	No
Data_used	Float	No
Data_limit	Float	Yes
Restricted	Boolean	Yes

Table 3.5 Reports

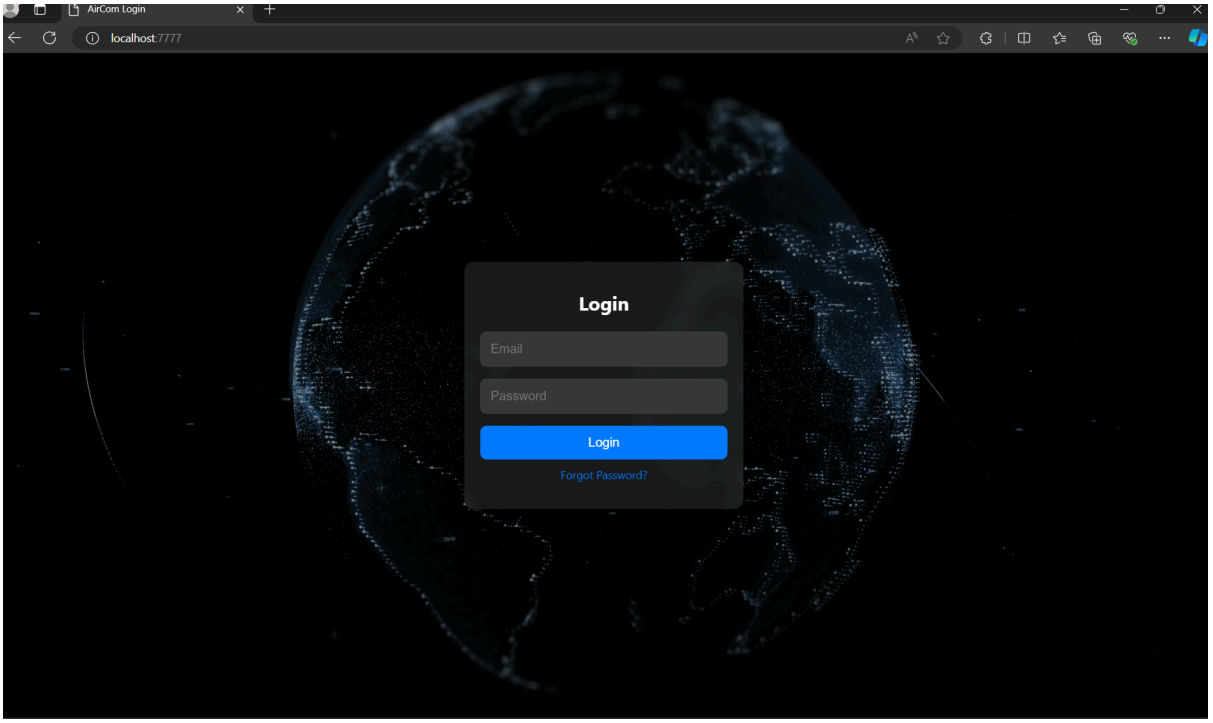
Category	Value	Null
Report_id (PK)	Integer	No
User_id [ref: > users:user_id]	Integer	No
From_date	Date	No
To_date	Date	No
Data_used	Float	No
Device_id[ref:>Devices: Device_id]	Integer	No

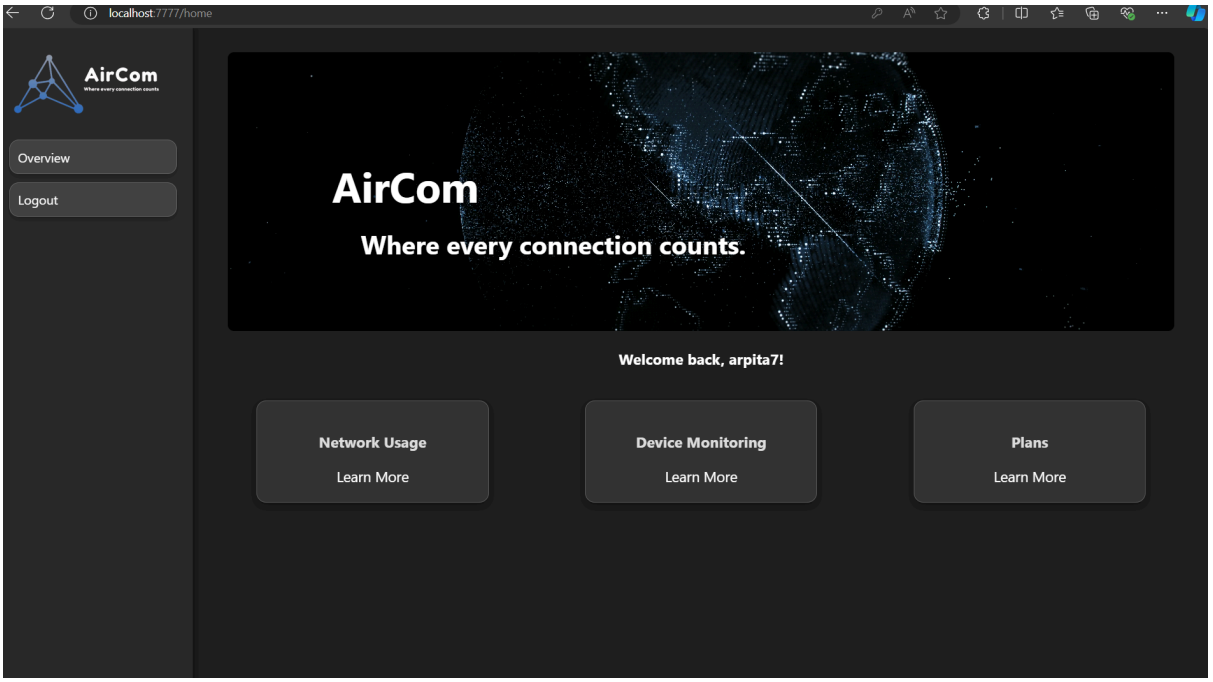
Table 3.6 Payments

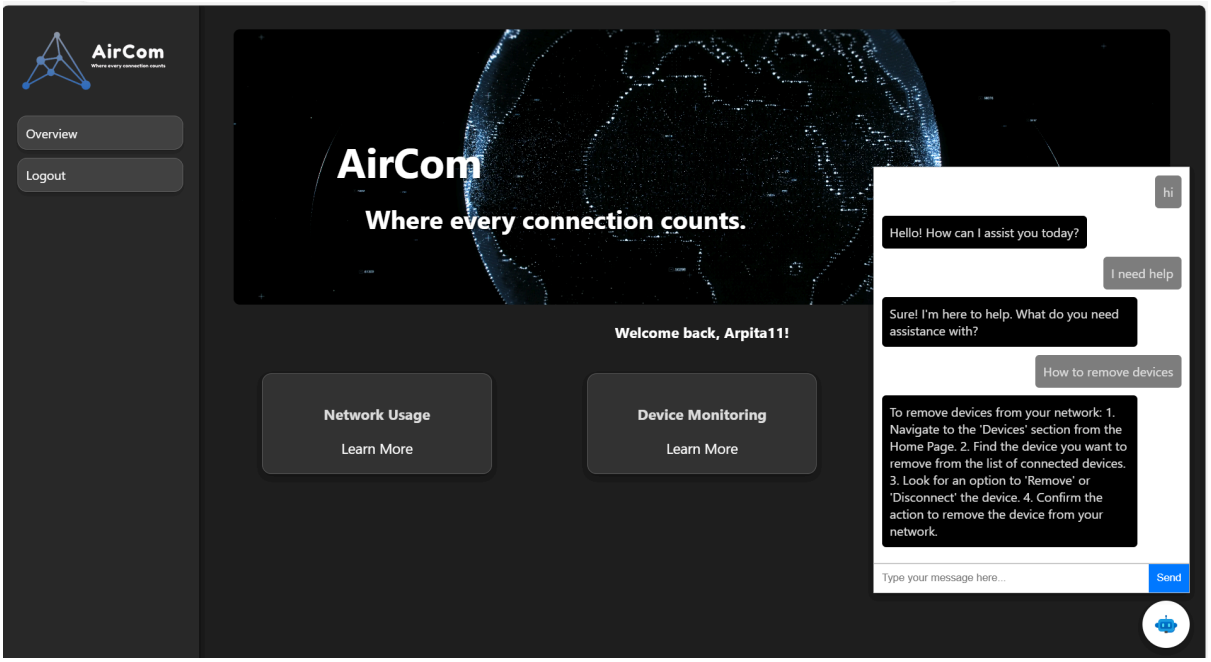
Category	Value	Null
User_id [ref: > users:user_id]	Integer	No
Plan_id [ref: > plans:plan_id]	Integer	No
Payment_date[ref:>plans.end_date]	Date	No
Total_amount	Float	No
Paid_status	Boolean	No

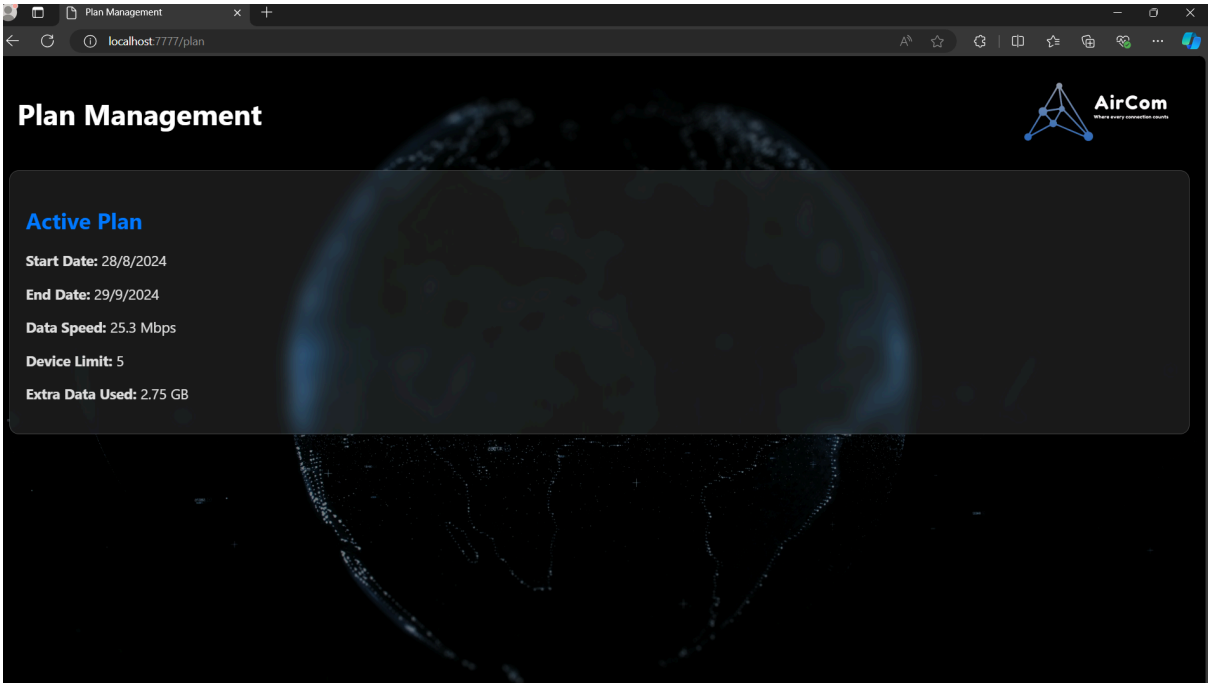
4 IMPLEMENTATIONS

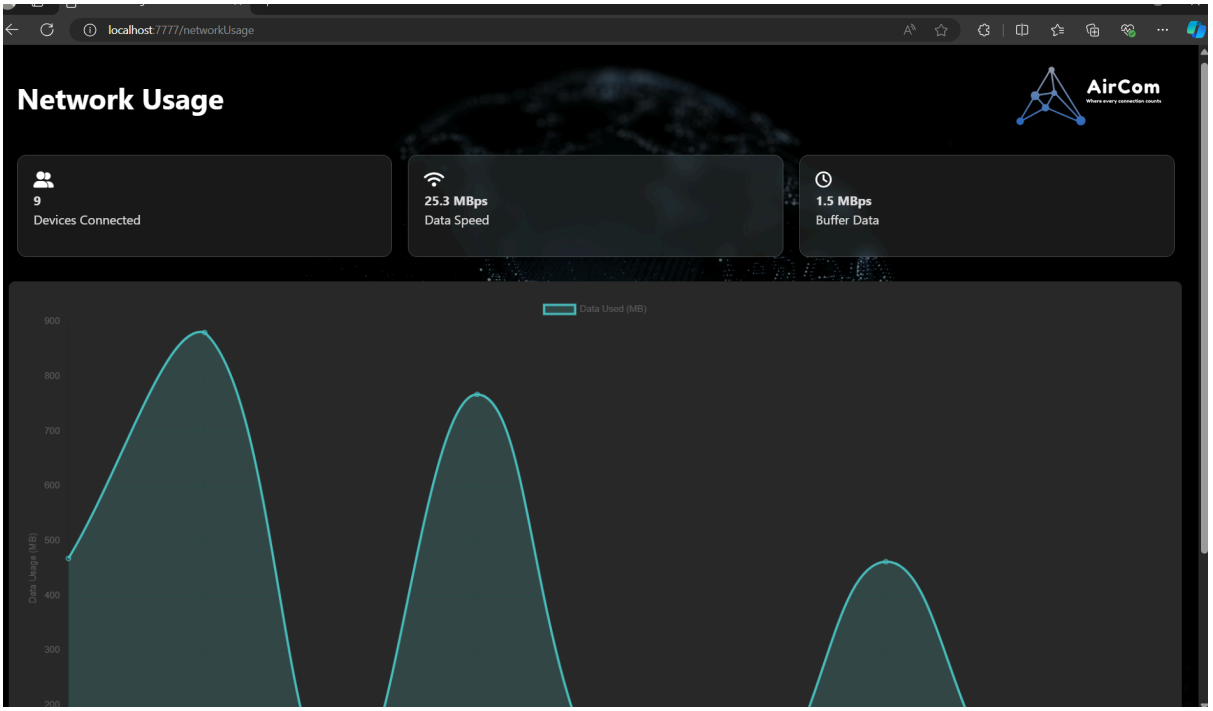
4.1. Screenshots

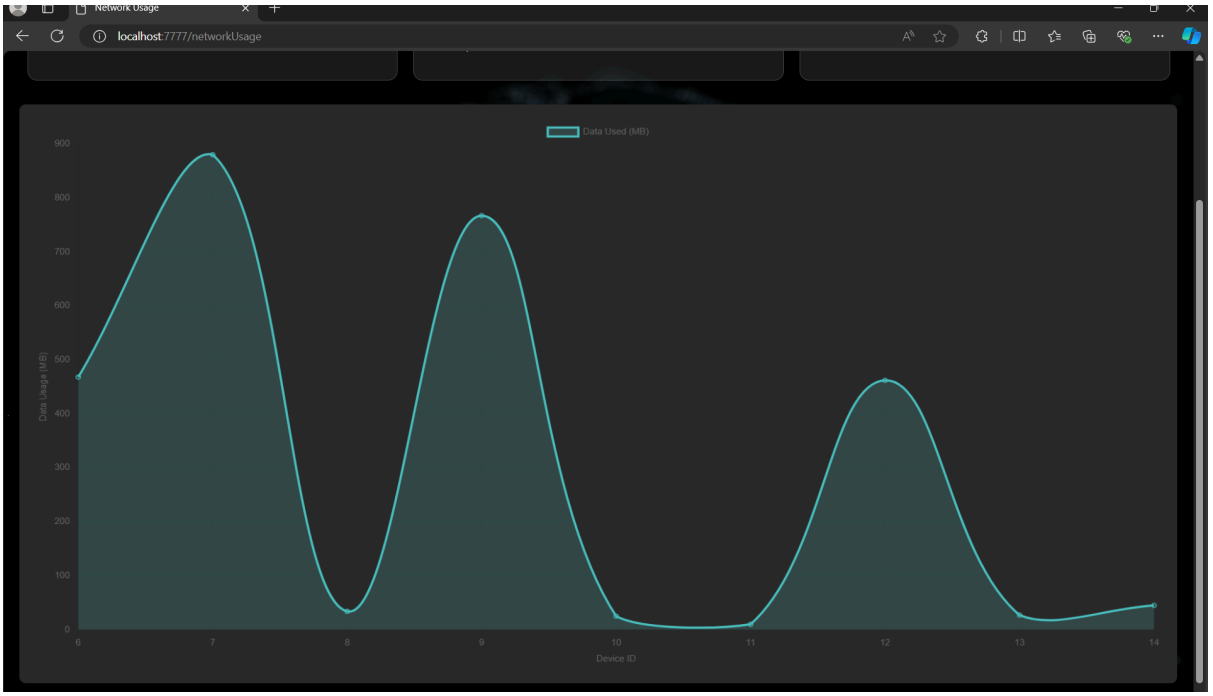


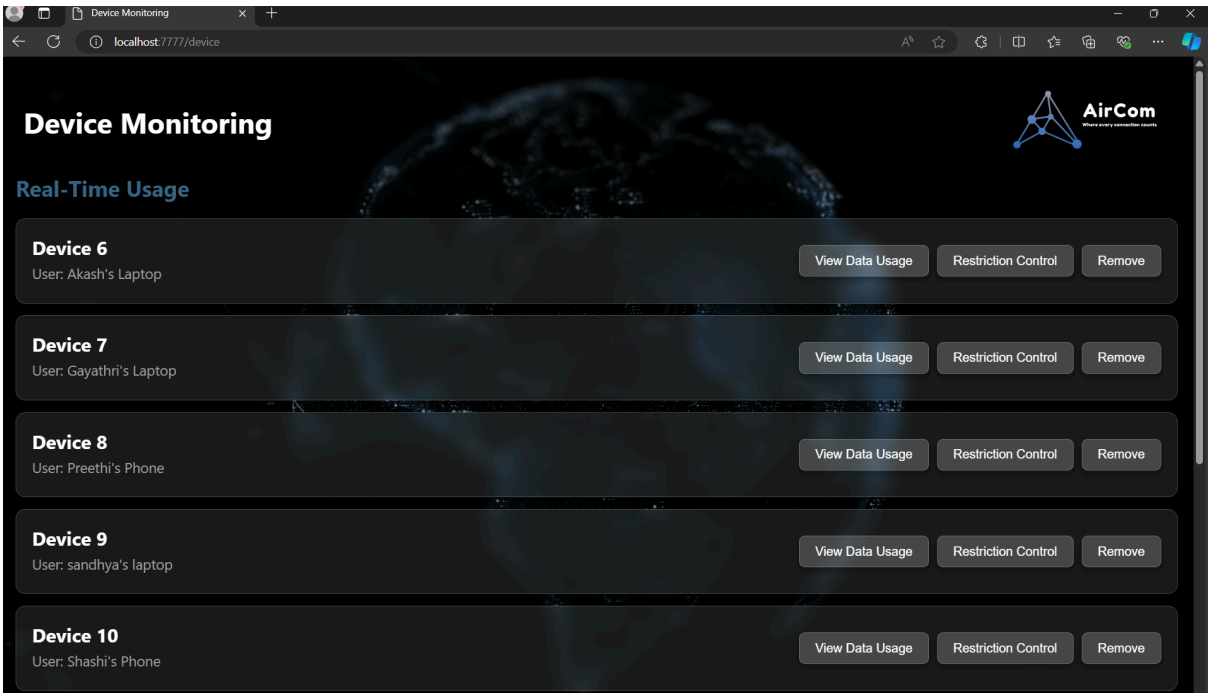


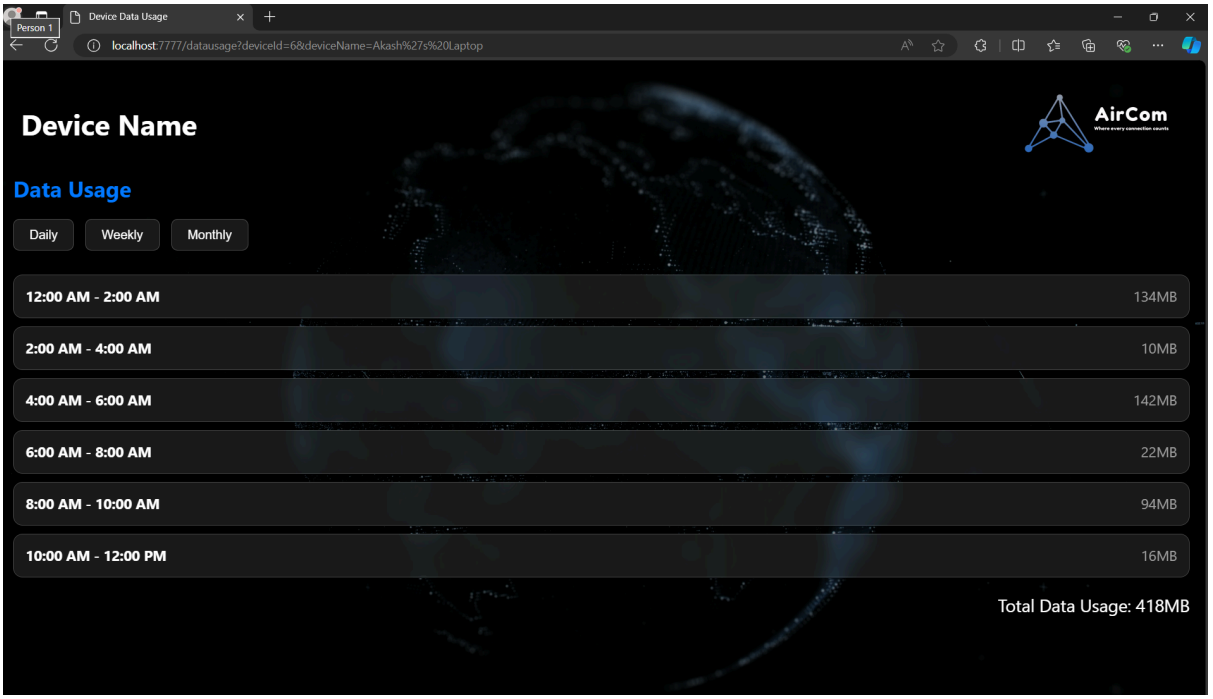

AirCom
Where every connection counts.
Overview
Logout
AirCom
Where every connection counts.
Welcome back, Arpita11!
Network Usage
Learn More
Device Monitoring
Learn More
hi
Hello! How can I assist you today?
I need help
Sure! I'm here to help. What do you need assistance with?
How to remove devices
To remove devices from your network: 1. Navigate to the 'Devices' section from the Home Page. 2. Find the device you want to remove from the list of connected devices. 3. Look for an option to 'Remove' or 'Disconnect' the device. 4. Confirm the action to remove the device from your network.
Type your message here...
Send

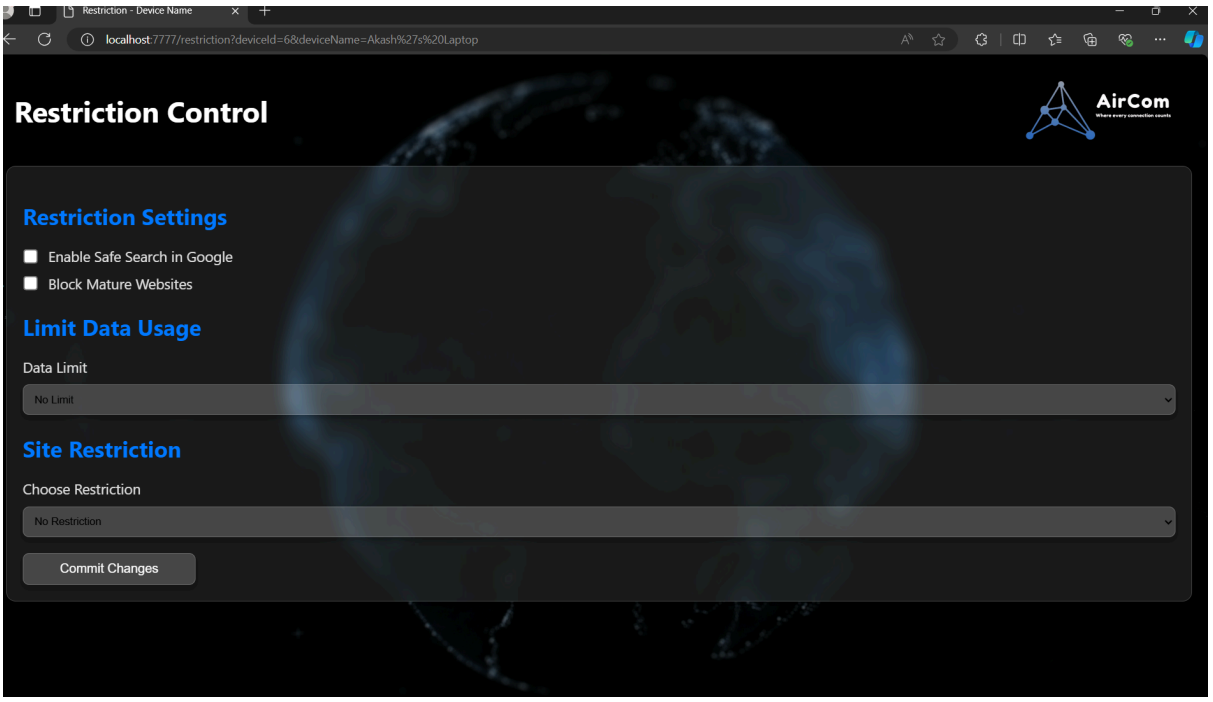

Plan Management
localhost:7777/plan
Plan Management
AirCom
Active Plan
Start Date: 28/8/2024
End Date: 29/9/2024
Data Speed: 25.3 Mbps
Device Limit: 5
Extra Data Used: 2.75 GB


localhost:7777/networkUsage
Network Usage
AirCom
9
Devices Connected
25.3 MBps
Data Speed
1.5 MBps
Buffer Data
Data Used (MB)
Data Usage (MB)
900
800
700
600
500
400
300


Network Usage
localhost:7777/networkUsage
Data Used (MB)
Data Usage (MB)
900
800
700
600
500
400
300
200
100
0
6
7
8
9
10
11
12
13
14
Device ID


Device Monitoring
localhost:7777/device
Device Monitoring
AirCom
Real-Time Usage
Device 6
User: Akash's Laptop
View Data Usage
Restriction Control
Remove
Device 7
User: Gayathri's Laptop
View Data Usage
Restriction Control
Remove
Device 8
User: Preethi's Phone
View Data Usage
Restriction Control
Remove
Device 9
User: sandhya's laptop
View Data Usage
Restriction Control
Remove
Device 10
User: Shashi's Phone
View Data Usage
Restriction Control
Remove


Person 1
Device Data Usage
localhost:7777/datausage?deviceId=6&deviceName=Akash%27s%20Laptop
Device Name
AirCom
Data Usage
Daily
Weekly
Monthly
12:00 AM - 2:00 AM
134MB
2:00 AM - 4:00 AM
10MB
4:00 AM - 6:00 AM
142MB
6:00 AM - 8:00 AM
22MB
8:00 AM - 10:00 AM
94MB
10:00 AM - 12:00 PM
16MB
Total Data Usage: 418MB


Restriction - Device Name
localhost:7777/restriction?deviceId=6&deviceName=Akash%27s%20Laptop
Restriction Control
AirCom
Restriction Settings
Enable Safe Search in Google
Block Mature Websites
Limit Data Usage
Data Limit
No Limit
Site Restriction
Choose Restriction
No Restriction
Commit Changes

5. TESTING

5.1 Test Cases

A strategy for software testing integrates software test cases into a series of well-planned steps that result in the successful construction of software. Software testing is a broader topic for what is referred to as verification and validation. Verification refers to the set of activities that ensure that the software that has been built is traceable to all its user's requirements.

Table 5.1 Test Cases

Step No.	Test Scenario / Validation	Expected Result
1	Verify login module functionality	Authorized users can log in successfully with valid credentials. Error message displayed for invalid credentials.
2	Validate data integration	Dashboard metrics and visualizations update in real-time with accurate data from integrated sources.
3	Test filtering mechanisms	Users can apply filters seamlessly, and dashboard adjusts to display filtered data subsets accurately.
4	Verify accuracy of visualizations	Visualizations accurately represent underlying data sets, providing clear insights without discrepancies.
5	Validate functionality of interactive elements	Interactive elements enhance user experience by providing relevant context and insights upon interaction.
6	Confirm adherence to specified requirements	Dashboard modules and features align with specified requirements, meeting user needs and organizational objectives.

6. CONCLUSION

6.1. Conclusion

The proposed network monitoring and managing website is designed to offer comprehensive solutions for users and administrators. By incorporating modules for secure user authentication, detailed plan browsing, real-time device monitoring, and effective device management, the system ensures users can efficiently oversee and optimize their network. The network status and analytics features provide valuable insights into performance and potential issues, while the payment and billing module simplifies financial transactions and subscription management. Together, these functionalities create a robust platform that enhances network control, improves user experience, and supports seamless management of network resources. This holistic approach addresses the evolving needs of users in a digitalized world, ensuring both security and convenience.