

IT Help Desk Ticketing System for Inland Revenue Department

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2025



IT Help Desk Ticketing System for Inland Revenue Department

**A thesis submitted for the Degree of Master of
Information Technology**

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Abstract

The Inland Revenue Department (IRD) identified the need to improve the efficiency and responsiveness of its IT support services. To address this, a comprehensive IT help desk ticketing system was developed and implemented. The system is designed to provide a structured and automated approach to managing IT support requests across all IRD branches.

The primary goal of the project is to streamline the process of issue reporting, tracking, and resolution. Key features of the system include automated ticket generation, categorization based on issue type, prioritization by urgency and impact, real-time status tracking, email notifications, and a complete history of reported issues. The system also incorporates advanced reporting and analytics tools to support performance monitoring and decision-making.

As a result, the IRD has significantly improved its response times, reduced manual workload, and enhanced user satisfaction. IT management can now identify recurring issues more effectively and allocate resources based on data-driven insights. The system ensures higher operational efficiency and promotes continuous improvement in IT service delivery.

This project uses modern web technologies and follows best practices in IT service management to build a reliable and scalable support system for the IRD. It helps improve how IT issues are handled and creates a strong foundation for future improvements and digital upgrades.

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List of Acronyms

RAMIS	:	Revenue Administration Management Information System
FAQ	:	Frequently Asked Questions
ITHDT	:	Information Technology Help Desk Ticketing System
IRD	:	Inland Revenue Department
IT	:	Information Technology
MVC	:	Model-View-Control
UI	:	User Interface
API	:	Application Programming Interface
UML	:	Unified Modeling Language
SMART	:	Specific, Measurable, Achievable, Relevant, Time-bound
ISO	:	International Organization for Standardization
SLA	:	Service Level Agreement

Chapter 1 - Introduction

In the modern world, having efficient IT support is essential for any organization. The IRD of Sri Lanka relies heavily on information technology to manage some important tasks. To keep everything running smoothly, the IRD needs a good system for handling IT support requests.

Currently, the IRD faces challenges in managing IT support requests due to the lack of a centralized system. This often results in delayed response times, inadequate tracking of issues, and inefficiencies in the resolution process. The proposed IT help desk ticketing system aims to address these challenges by providing a structured and automated approach to managing IT support activities.

With this new system, the IRD aims to enhance the efficiency of its IT support services, improve user satisfaction, and gain valuable insights through detailed reporting and analytics. This project will help the IRD adopt industry best practices and modern technology, ultimately improving our overall operations.

1.1. Project Overview

The Inland Revenue Department (IRD) aims to enhance its IT support services by implementing a new IT help desk ticketing system. This project will focus on developing and deploying a centralized system that organizes and automates the process of handling IT support requests. The primary objectives of this project include creating a single platform for logging and tracking all IT support requests, automating the creation, categorization, and prioritization of support tickets, providing real-time updates on the status of requests, generating detailed reports to identify trends and areas for improvement, and developing a user-friendly interface for both end-users and IT support staff.

Key features of the proposed system include easy ticket creation through a web portal or email, automatic categorization and prioritization of tickets based on the issue type and urgency, real-time tracking and updates for users and IT staff, and comprehensive reporting and analytics on IT support activities. Additionally, the system will be designed to integrate seamlessly with the IRD's existing IT infrastructure.

The benefits of implementing this new system are significant. It will streamline IT support processes, reducing response times and improving problem resolution efficiency. Users will experience a better overall experience with clear communication and real-time updates on their

requests, leading to higher satisfaction. The detailed reports and analytics generated by the system will provide valuable insights, enabling data-driven decisions and continuous improvement in IT support services. Enhanced communication between users and IT support staff will further improve the effectiveness of IT support.

By adopting this IT help desk ticketing system, the IRD aims to achieve greater operational efficiency and improved user satisfaction, ultimately contributing to the department's overall excellence in IT service delivery.

1.2. Motivation

The motivation behind creating the IT help desk ticketing system for the Inland Revenue Department comes from the need to make IT support processes more efficient. In a busy work environment, handling IT requests manually can often cause delays, miscommunication, and confusion about the status of issues. By automating how tickets are handled and tracked, the new system will improve communication between employees and the IT department. This will help organize and manage IT challenges more effectively. As a result, IT staff can spend less time on paperwork and follow-ups and focus more on solving actual problems.

Additionally, the system aims to enhance teamwork among different departments, which is vital for resolving issues more quickly. With a centralized platform for submitting and tracking requests, employees can clearly express their needs, and the IT department can better prioritize tasks and allocate resources. This coordinated approach ensures that problems are resolved promptly, boosting overall productivity within the department. Ultimately, by improving how resources are managed and speeding up response times, the IT help desk ticketing system will enhance user satisfaction, promote a more proactive IT support culture, and create a more efficient work environment.

1.3. Aims and Objectives

The main goal of the IT help desk ticketing system for the Inland Revenue Department is to create an easy-to-use, online platform where employees can quickly report IT problems like equipment issues, network troubles, and software errors. The system will help the IT Division track, manage, and resolve these issues efficiently. It will also provide tools for IT managers to monitor the help desk's performance and gather feedback from users to continuously improve service quality and response times.

The primary objectives of the IT help desk ticketing system for the Inland Revenue Department, defined using the SMART framework (Leonard, 2022) are as follows:

- Create an online platform where employees can report IT problems, aiming to reduce manual reporting by 95% within four months.
- Implement a ticketing system for the IT team to easily assign, track, and resolve issues, with a goal to resolve 90% of tickets within agreed time frames.
- Build a dashboard for IT managers to monitor help desk performance, aiming for a 10% improvement in service times over six months.
- Collect user feedback after each ticket is resolved, aiming for at least 80% user satisfaction, with feedback reviewed every three months.
- Create a repair history record to improve solutions for recurring problems by 20%, tracked over the first year.
- Add a feature to escalate unresolved issues to external service providers, ensuring 95% of these are managed within 24 hours.
- Include a device inventory management system to keep track of equipment, aiming for 100% accuracy within three months.
- Set up email notifications to keep everyone updated on the status of their tickets, aiming for a 90% reduction in missed updates.
- Integrate a chatbot FAQ system to provide automatic answers to common questions, reducing the need for human help by 25% within four months.

1.4. Background of the Study

The Inland Revenue Department (IRD) depends heavily on IT systems like networks, the RAMIS tax system, Outlook Mail, and other software to manage taxes and daily operations. As the department grows, it needs to fix IT problems quickly to avoid disrupting important work.

Right now, reporting IT problems at IRD is confusing. Employees often report issues through emails, phone calls, or in person, making it hard to track and fix problems quickly. The IT staff is often overloaded, which causes delays and impacts how well the department functions.

The new IT Help Desk Ticketing System will make this process much simpler. Employees will be able to easily report IT problems, track their progress, and give feedback. IT staff will manage and resolve issues more efficiently, and managers will have a clear view of how things

are running. Other staff, like those in the Supply Division and Account Branch, will also benefit from improved tracking and management.

Overall, this new system will improve communication, speed up problem-solving, and help the department work more smoothly and efficiently.

1.5. Scope of the study

The scope of the IT Help Desk Ticketing System for the Inland Revenue Department of Sri Lanka focuses on streamlining IT issue management across various user roles. The system will support multiple user roles, including regular employees, IT staff, IT In-Charge, IT Director, Supply Division staff, and Account Branch staff. Employees will be able to submit and track IT support tickets, while IT staff will manage, prioritize, and resolve these tickets. Higher-level managers like the IT In-Charge and IT Director will have oversight capabilities, monitoring the system's performance and generating reports. Additionally, the Supply Division and Account Branch will use the system to track new equipment and repair approval for payments, respectively.

The system will support various issue types, including equipment repair, network configuration, and software-related problems like Outlook Mail or RAMIS system errors. Automated notifications will keep users informed about ticket status changes, and IT staff will receive alerts for new or escalated tickets.

Ticket management will be a core feature of the system, allowing employees to create tickets for various IT issues such as hardware, software, and network problems. Tickets will be categorized, with options for prioritization based on urgency. Users will receive updates on the progress of their tickets.

Reports and analytics will play a key role in providing insights into ticket volumes, resolution times, and system performance. These analytics will help identify recurring IT issues and improve service efficiency. Feedback from employees will be collected after ticket resolution to enhance the overall user experience.

The system will integrate with other departments, such as the Supply Division, for equipment tracking and inventory management, and the Account Branch for handling payment for approval. Finally, the system will be designed to scale with the IRD's growing needs, allowing for future expansion and integration of new IT functionalities.

1.6. Structure of the Dissertation

This dissertation consists of six main chapters followed by Reference and Appendix. Every chapter will describe the knowledge needed to understand the IT Help Desk Ticketing System design and implementation milestones.

Chapter 1 provides an introduction, covering the project overview, motivation, objectives, background, and scope. Chapter 2 explores the background study, outlining the company's current procedure and comparable global systems, as well as emerging technologies relevant to the project. Chapter 3 focuses on the design, highlighting the object-oriented framework, design diagrams, and key client interfaces. Chapter 4 discusses the implementation, covering the methodologies, tools, programming languages, database connections, and system requirements. Chapter 5 explains the testing and evaluation methods, including test cases and user feedback, ensuring long-term system functionality. Finally, Chapter 6 concludes with an assessment of the project's results, accomplishments, and future improvement recommendations.

Chapter 2 – Background

2.1. Introduction

The background chapter introduces the key aspects of the IT help desk ticketing system project. It begins with a requirement analysis to understand what the system needs to do to meet the Inland Revenue Department's needs. The chapter also reviews similar systems to learn from their successes and challenges. Finally, it looks at the technologies that will be used in the project, explaining how they will help build a strong and effective system.

2.2. Requirement Analysis

Requirement analysis plays a crucial role in the software development life cycle. Before transitioning the manual IT support process into a computerized system, it is essential to thoroughly understand the problem domain and user requirements.

2.2.1. System Features

The IT Help Desk Ticketing System is designed to efficiently manage IT-related issues within the Inland Revenue Department. It provides a structured process for employees to report problems, track ticket progress, and ensure timely resolutions (“srs_template-ieee.pdf,” n.d.). Key features include:

➤ Ticket Creation & Management

- **Description and Priority**

The system shall provide robust ticket creation and management functionality to ensure seamless handling of IT-related issues within the Inland Revenue Department. Employees shall be able to create tickets with necessary details such as issue descriptions, priority levels, and attachments. IT staff shall manage, assign, and resolve tickets efficiently. The system shall also allow users to track their ticket status, receive notifications, and update their tickets with additional information. This feature is High Priority, as it forms the core functionality of the system.

- **Stimulus/Response Sequences**

1. **User Action:** Employee submits a new IT support ticket by entering issue details and priority level.

System Response: The ticket is created and assigned a unique ID. A confirmation notification is sent to the user.

2. **User Action:** IT In-charge assigns the ticket to a team member.

System Response: The assigned staff member is notified, and the ticket status changes to "In Progress."

3. **User Action:** IT team resolves the ticket and marks it as "Resolved."

System Response: The employee receives a notification that their issue has been resolved.

- **Functional Requirements**

REQ-1: The system shall allow employees to submit IT support tickets with issue details and priority levels.

REQ-2: The system shall assign a unique ticket ID upon creation.

REQ-3: The system shall allow IT team to update, assign, and track ticket statuses.

REQ-4: The system shall notify users about ticket status changes via email and in-app notifications.

REQ-5: The system shall allow employees to update ticket details after creation.

- **User Role Management**

- **Description and Priority**

The system shall support multiple user roles, including employees, IT In-Charge, IT Team, IT Director, Supply Division Staff, and Account Branch Staff. Role-based access control (RBAC) shall ensure that each user has the appropriate level of access. This feature is High Priority, as it enforces security and proper workflow management.

- **Stimulus/Response Sequences**

1. **User Action:** Employee logs into the system.

System Response: The system verifies credentials and grants access based on the assigned role.

2. **User Action:** Employee submits a new IT support ticket.

System Response: The system records the ticket and assigns it a unique ID.

3. **User Action:** IT Team member views assigned tickets.

System Response: The system displays tickets assigned to the specific IT staff member.

4. **User Action:** IT In-Charge reviews all open tickets and assigns a ticket to an IT Team member.

System Response: The system updates the ticket assignment and notifies the assigned IT staff member.

5. **User Action:** IT Team member resolves a ticket and marks it as "Resolved."

System Response: The system updates the ticket status and notifies the employee.

6. **User Action:** IT Director views a report on ticket resolution times.

System Response: The system retrieves and presents data in a structured report.

7. **User Action:** Supply Division Staff manage IT Equipment's Details

System Response: The system displays only requests and tickets related to IT supply needs.

8. **User Action:** Account Branch Staff manage information of service Companies.

System Response: The system provides access to relevant requests.

- **Functional Requirements**

REQ-1: The system shall provide role-based access control for different user types.

REQ-2: The system shall restrict access to administrative functions based on user roles.

REQ-3: The system shall allow IT In-Charge and IT Director to generate reports on ticket activities.

REQ-4: The system shall allow IT In-Charge to assign and reassign tickets to IT Team members.

REQ-5: The system shall allow IT Director to view system-wide analytics and reports.

REQ-6: The system shall allow Supply Division Staff to track IT-related procurement requests.

REQ-7: The system shall allow Account Branch Staff to review IT service-related Companies.

REQ-8: The system shall maintain an audit log of user actions for security purposes.

- **Ticket Categorization & Automated Assignment**

- **Description and Priority**

The system shall allow tickets to be categorized based on issue type, such as equipment repair, network configuration, Outlook Mail, RAMIS System, and software issues. It shall also support automatic ticket assignment based on the category and available IT personnel. This feature is High Priority, as it improves response efficiency and proper workload distribution.

- **Stimulus/Response Sequences**

1. **User Action:** Employee selects an issue category while creating a ticket.

System Response: The system automatically assigns the ticket to the appropriate IT team.

2. **User Action:** An IT staff member identifies that a ticket needs specialized attention

System Response: The system automatically transfers the ticket to the appropriate team

- **Functional Requirements**

REQ-01: The system shall allow employees to select issue categories during ticket creation.

REQ-02: The system shall automatically assign tickets based on predefined rules.

REQ-03: The system shall allow IT staff to manually reassign tickets if necessary.

REQ-04: The system shall provide reports on ticket distribution by category.

- **Reporting & Analytics**

- **Description and Priority**

The system shall provide real-time reporting and analytics on ticket resolution times, IT staff performance, and common issue categories. It shall include dashboards with key performance indicators (KPIs). This feature is Medium Priority, as it helps IT management optimize service delivery.

- **Stimulus/Response Sequences**

1. **User Action:** IT Director views a report on monthly ticket resolutions.

System Response: The system generates and displays a detailed report.

2. **User Action:** IT In-Charge filters tickets based on assigned IT staff.

System Response: The system presents filtered ticket data.

- **Functional Requirements**

REQ-01: The system shall generate reports on ticket statuses, resolution times, and IT staff performance.

REQ-02: The system shall provide graphical dashboards for real-time analytics.

REQ-03: The system shall allow users to export reports in CSV and PDF formats.

- **Search & Filter Functionality**

- **Description and Priority**

The system shall provide advanced search and filtering capabilities to help users find relevant tickets quickly. IT staff shall be able to filter tickets by category, priority, and assigned personnel. This feature is High Priority, as it improves system usability and efficiency.

- **Stimulus/Response Sequences**

1. **User Action:** Employee searches for a specific ticket using its ID.

System Response: The system retrieves and displays the requested ticket.

2. **User Action:** IT staff filters open tickets assigned to them.

System Response: The system presents a filtered list of relevant tickets.

- **Functional Requirements**

REQ-01: The system shall allow users to search for tickets by ID, keyword, and category.

REQ-02: The system shall provide filters for ticket status, priority, and assigned personnel.

REQ-03: The system shall support sorting tickets by creation date and resolution time.

2.2.2. Non-Functional Requirements

- **Functionality**

The functionality of the IT help desk ticketing system must be comprehensive to meet all user needs. This includes ensuring the system is suitable for various IT help desk operations, such as creating tickets, tracking their status, and generating reports. Additionally, accuracy is most important, the system must guarantee that all data entered is processed correctly, reflecting accurate ticket information to users and support staff.

- **Reliability**

The system must be reliable, meaning it should be available and working when needed, especially during work hours. If something goes wrong, like a server crash, it should recover quickly, ideally within 15 minutes, so users and IT staff can continue without long delays. This ensures that IT staff can continue to resolve user issues without significant delays, minimizing the impact on the department's operations.

- **Usability**

The system will be designed with a user-friendly interface tailored to different roles, including regular employees and IT staff. Features like simple navigation, intuitive ticket creation, and clear system messages will ensure that even non-technical staff can use the system effectively. Additionally, frequent users, such as IT staff, will benefit from consistent workflows that are easy to remember, reducing the time needed for training. Clear and concise error messages will guide users when issues arise, improving overall satisfaction.

- **Efficiency**

Efficiency is crucial for the IT help desk ticketing system, ensuring a positive user experience. The system must respond to user requests, such as ticket creation and updates, within 2 seconds during normal load conditions. Additionally, it should optimize resource utilization to operate

smoothly under varying loads, preventing server and network bottlenecks for uninterrupted service.

- **Maintainability**

The system will be designed so that IT staff can quickly identify and fix problems without causing issues in other parts of the system. For example, if there's a bug in how tickets are updated, it can be fixed easily without affecting other features like reporting. As the department's needs grow, new features can be added without having to completely rework the system. This will make it easy to update and improve the system over time.

- **Portability**

The system will be able to run on different devices and operating systems, such as Windows and macOS. IT staff and other users can access it from their computers or mobile devices, making it flexible. Installing and setting up the system will also be simple, so it can be deployed quickly across different offices or branches.

2.3. Review of Similar Systems

There are several free help desk solutions available on the internet, each with its own set of features and limitations.

2.2.1. Zendesk

Zendesk ("Zendesk," 2022) is a highly regarded help desk ticketing system known for its flexibility and scalability. It offers essential features like ticket management, which allows organizations to efficiently track and resolve customer inquiries. Zendesk supports multiple communication channels, including email, chat, phone, and social media, ensuring seamless interaction with customers. Its automation capabilities further enhance efficiency by providing automated workflows and triggers for ticket routing. Additionally, the platform offers detailed reporting and analytics, enabling organizations to monitor ticket metrics and agent performance. Zendesk also includes a self-service portal with a knowledge base and community forums, allowing users to find solutions independently and reducing the need for direct support. These features make Zendesk a versatile and powerful tool for improving customer service operations.

2.2.2. Freshdesk

Freshdesk ("Freshdesk: Smart, Scalable Ticketing Solution | Freshworks," n.d.) is a widely used help desk system designed for various industries, offering a range of essential features. It

includes a centralized ticketing system that helps manage customer support tickets efficiently. The platform also supports team collaboration on tickets, allowing for smoother coordination in resolving issues. Freshdesk's automation features streamline workflows by automating repetitive tasks. Additionally, it provides a customer portal where users can track their requests, enhancing transparency. With built-in analytics and reporting tools, Freshdesk enables organizations to measure key support metrics and optimize their service performance.

2.2.3. Jira Service Desk

Jira Service Desk (“Revolutionize IT Support with Jira Service Management,” n.d.), developed by Atlassian, is a robust help desk solution known for its seamless integration with Jira software development tools. It provides efficient ticket management, allowing organizations to track and manage IT support requests with ease. A key feature of Jira Service Desk is its Service Level Agreement (SLA) management, ensuring that support teams meet their response and resolution targets. The platform also offers automation capabilities, enabling teams to set up automated workflows for handling routine tasks and ticket routing. Additionally, Jira Service Desk integrates with Confluence to provide a knowledge base for self-service support, allowing users to find solutions independently. The system also includes detailed reporting and performance metrics, helping organizations monitor support operations and drive continuous improvement.

2.2.4. ServiceNow

ServiceNow (“IT Service Management (ITSM),” n.d.) is a powerful IT service management (ITSM) platform widely adopted by large enterprises to manage complex IT operations. It offers key features such as incident management to handle IT disruptions and problem management to identify and resolve the root causes of recurring issues. The platform also includes change management to ensure smooth IT changes with minimal impact. Additionally, ServiceNow provides a self-service portal with a knowledge base and request management, allowing users to find solutions and submit requests independently. Its reporting tools offer comprehensive analytics and performance insights to enhance service delivery.

2.2.5. Spiceworks

Spiceworks (“Spiceworks Cloud Based Help Desk Software – The free ticketing tool for every department,” n.d.) provides a free help desk ticketing system designed for small to mid-sized businesses. Its core feature is ticket management, which allows organizations to track and manage IT support requests efficiently. In addition to handling support tickets, Spiceworks includes network monitoring tools that help monitor the performance and status of network

devices, offering valuable insights into potential issues. The platform also provides a user portal where users can submit and track their support tickets easily. Although it is a free solution, Spiceworks offers basic reporting capabilities, enabling organizations to keep track of essential support metrics.

2.4. Comparative Analysis of Selected Help Desk Ticketing Systems

The comparison of the above discussed similar systems can be summarized as the following Table 2.2 - comparison of the similar help desk solutions (“Zendesk,” 2022; “Freshdesk: Smart, Scalable Ticketing Solution | Freshworks,” n.d.; “Revolutionize IT Support with Jira Service Management,” n.d.; “IT Service Management (ITSM),” n.d.; “Spiceworks Cloud Based Help Desk Software – The free ticketing tool for every department,” n.d.).

System 1	Zendesk
System 2	Freshdesk: Smart, Scalable Ticketing Solution
System 3	Jira Service Desk: “Jira Service Management”
System 4	ServiceNow: IT Service Management
System 5	Spiceworks

Table 2.1 – Similar System Numbering

Feature	System 1	System 2	System 3	System 4	System 5
Ticket Management	Yes	Yes	Yes	Yes	Yes
Multi-channel Support	Email, Chat, Phone, social media	Email, Phone, social media	Email, Jira Integration	Email, Chat, Phone, social media	Email
Reporting and Analytics	Detailed reports, analytics	Analytics, reporting tools	Detailed reports, performance metrics	Comprehensive analytics and performance	Basic reporting capabilities
Self-Service Portal	Knowledge base, community forums	Customer portal	Integrated with Confluence for knowledge base	Knowledge base, request management	User portal
Customization	Highly customizable	Limited in lower pricing tiers	Powerful customization	Highly customizable	Limited

Scalability	High scalability for large organizations	Scalable with pricing tiers	Scales well within Atlassian ecosystem	Enterprise-grade scalability	Suitable for small to mid-sized businesses
Ease of Use	May require significant setup and training	User-friendly interface	Complex for non-technical users	May require dedicated management resources	Simple, easy to set up
Cost	Can be expensive	Affordable pricing	Cost-effective for Jira users	High cost	Free
Target Audience	Large enterprises, customizable for various industries	Small to mid-sized businesses, affordable	Teams using Jira, technical teams	Large enterprises requiring ITSM	Small to mid-sized businesses
Advantages	Highly customizable, strong analytics and reporting, wide range of integrations	User-friendly, affordable, strong automation	Seamless integration with Jira, powerful automation	Extensive ITSM features, highly customizable	Free, simple setup, integrated network monitoring
Disadvantages	Expensive, complex setup	Limited advanced features in lower pricing tiers	Complexity may require additional configuration	High cost, complex management	Limited features, basic reporting

Table 2.2 Comparison of the similar help desk solutions

The new IT help desk ticketing system for the Inland Revenue Department includes the best features from popular systems like Zendesk, Freshdesk, Jira Service Desk, ServiceNow and Spiceworks. It also has special features designed just for the department's needs, like handling RAMIS System issues, assigning tasks to external companies when needed, and keeping track of new equipment purchases.

By using these ideas, the new system will help make things more efficient, improve communication, and better manage IT support requests within the Inland Revenue Department.

2.5. Summary

Chapter 2 provides the background for the IT help desk ticketing system project for the Inland Revenue Department. It begins with a requirement analysis based on the ISO 9126 Quality Model, outlining the system's functional and non-functional requirements. Key features include ticket creation, user role management, categorization, and reporting functionalities. Usability testing and feedback mechanisms are highlighted to improve user experience. The chapter reviews similar systems like Zendesk, Freshdesk, and Jira Service Desk, comparing their features, costs, and scalability. It concludes by emphasizing the integration of best practices from these systems to develop a tailored solution for the department's needs.

Chapter 3 - Design

3.1. Introduction

This chapter outlines the design of the IT help desk ticketing system, with a focus on the methodologies and architectural decisions that were applied during its development. The system has been designed using a multi-tier architecture, while adhering to the Model-View-Controller (MVC) pattern to ensure separation of concerns and scalability. Related design strategies that were considered are discussed, demonstrating how these choices contributed to creating a robust, maintainable, and efficient system. Additionally, Unified Modeling Language (UML) diagrams are presented to visually represent the system's structure and functionality, including use case diagrams, User narratives, class diagrams and activity diagrams, which together illustrate the system's components, interactions, and workflow. Additionally, a Database ER diagram is included to depict the relationships between entities in the system. User interface designs are also presented to illustrate the system's usability and how users will interact with its features.

3.2. Related Design Strategies

3.2.1. MVC Architecture

In addition to the multi-tier architecture, the Model-View-Controller ("MVC Design Pattern," 2017) architectural pattern will be adopted by the proposed system. This pattern divides the application into three interconnected components:

Model: In this system, the model will represent the core data entities and business logic of the help desk system. This includes tickets, users, roles (e.g., IT staff, employees, etc.), issues (e.g., equipment repair, network configuration), and status updates (e.g., open, in-progress, resolved). The model will interact with the database to store and retrieve information, ensuring that data remains consistent and is efficiently managed across various user interactions. For example, when a user submits a ticket, the model will process the request and update the database accordingly, ensuring the system remains up to date.

View: The view will handle all aspects of user interaction, presenting data in a user-friendly format. For instance, regular employees will see a simplified interface where they can create and monitor their tickets, while IT staff will see a more detailed view that allows them to manage and prioritize issues. Each user role will have a customized view, reflecting the tasks and data relevant to them. The view will dynamically update based on user actions or changes

in the system state, ensuring that the interface always reflects the current status of tickets and operations.

Controller: The controller will act as the intermediary between the model and the view. It will process user inputs, such as when an employee submits a new ticket or when IT staff update the status of an ongoing issue. The controller will handle these actions by communicating with the model to fetch or update the necessary data and then pass that information to the view to update what the user sees. For example, when a ticket is resolved, the controller will ensure that the model updates the status of the ticket and that the updated status is reflected in the employee's view.

In the context of the IT Help Desk Ticketing System, user requests (such as submitting or updating tickets) could be managed by the controller, the ticket data would be represented by the model, and this data would be displayed in the user interface by the view. Maintainability is enhanced by decoupling the UI from the business logic, simplifying testing and debugging as each component can be tested independently. By separating concerns, individual components can be worked on by developers without impacting others, fostering a more organized and efficient development process (“MVC Framework Introduction,” 00:30:39+00:00).

3.3. System Architecture

The IT Help Desk Ticketing System is built following a 3-tier architecture, which consists of the frontend (React.js), backend (Node.js), and a SQL-based database for managing user and ticket data (Kasukurthibhargav, 2024). This architecture was selected to ensure the separation of concerns between the user interface, business logic, and data management, allowing each layer to be developed, tested, and scaled independently. High availability and easy scalability are ensured by deploying the system on a cloud platform. This multi-tier architecture divides the system into three main tiers: Presentation, Logic, and Data.

3.3.1. Presentation Tier

The Presentation Tier is the system's user interface (Manoharan, 2024), built using React.js. It allows users to interact with the system via web browsers and caters to multiple user roles, including regular employees, IT staff, and management. The interface is designed to be intuitive, providing easy access to key features such as ticket submission, real-time chat, and live ticket status updates. Each user role has specific views and access, ensuring the right functionalities are exposed based on permissions. This tier also integrates user experience

elements such as responsive design and real-time updates, facilitating efficient communication between users and the IT support team.

3.3.2. Logic Tier (Application Tier)

The Logic Tier, implemented using Node.js, manages all business logic and core functionalities, including the creation, updating, and assignment of IT support tickets. This tier orchestrates ticket management workflows, ensuring that tickets are routed to the correct IT staff based on their expertise and availability. The system tracks each ticket's progress, providing automated notifications and updates to users. Additionally, this tier manages role-based access control, ensuring that the right data and actions are available to the appropriate user categories (e.g., IT staff can resolve tickets, while management can generate performance reports). It also handles API calls and communicates with external services or platforms when needed.

3.3.3. Data Tier

The Data Tier is responsible for storing and retrieving data related to users (Manoharan, 2024) tickets, and system operations using a SQL-based database. This tier stores critical information such as ticket history, priority levels, user profiles, and equipment records. Data retrieval is optimized for quick response times, ensuring that users can view real-time updates on ticket statuses. The database also maintains a record of IT equipment, tracking maintenance and repair history, which helps IT staff address recurring issues and improve support strategies. Role-based data access ensures that sensitive information is protected, with only authorized personnel able to view or modify certain data sets.

3.4. UML Diagrams

The design of the IT help desk ticketing system is further clarified through the use of various UML (Unified Modeling Language) diagrams. These diagrams visually represent different components and interactions within the system, aiding in the clear communication of design decisions

3.4.1. Use case Diagram

The Use Case diagram of the IT-HDTS system can be shown as the following Figure 3.1. This summarizes the system functionalities which are related to each user group of the system.

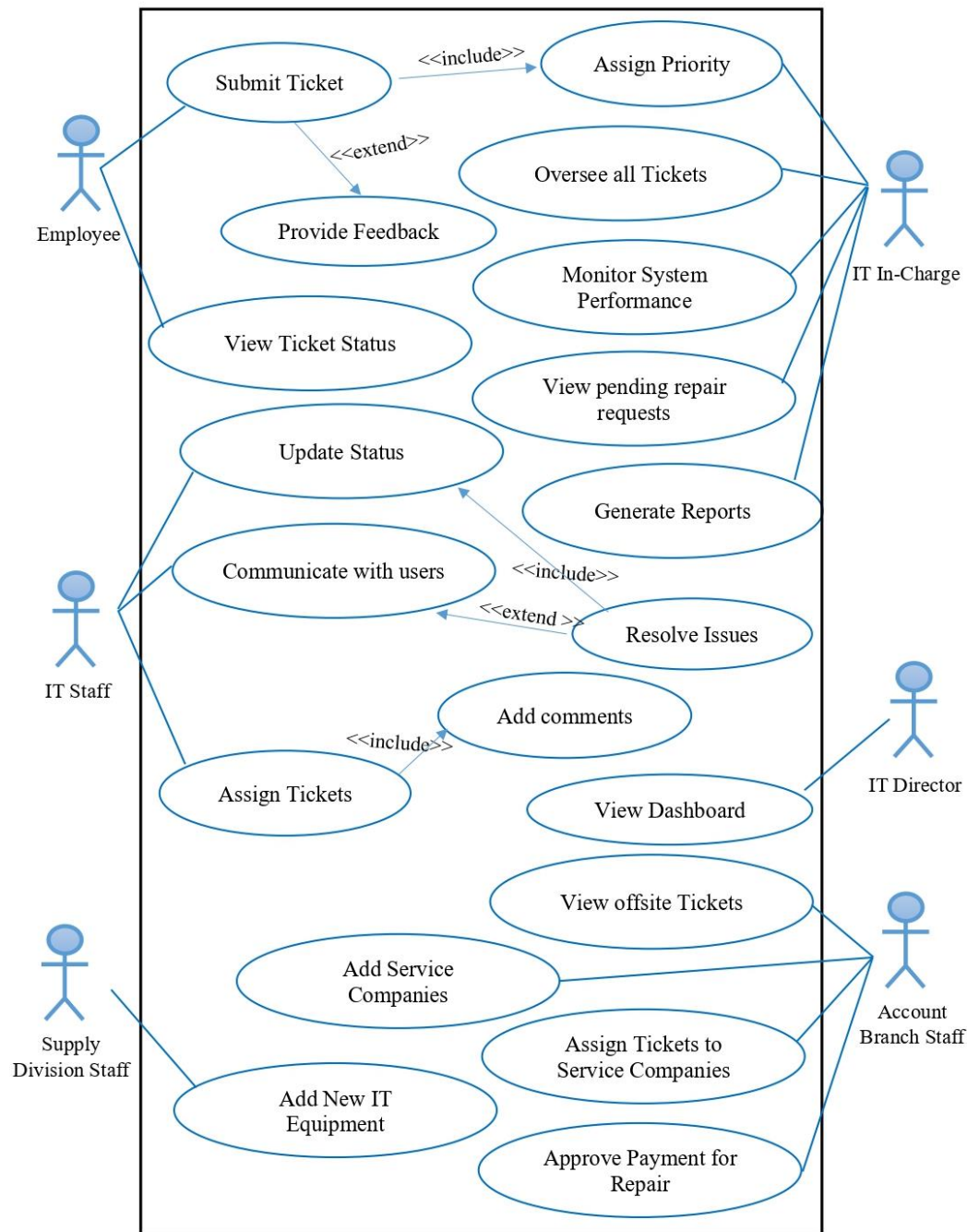


Figure 3.1 Use Case Diagram for IT-HDTS

3.4.2. Use case Narratives

The user narratives outline the interactions between the users and the IT Help Desk Ticketing System. They describe how various tasks are carried out by actors like employees, IT staff, and other departments. Each narrative captures the primary and alternative flows of these processes, detailing the steps taken by users and the system's responses (O'Donnell, 2024). This approach ensures that the system is designed to be user-friendly, efficient, and capable of handling various scenarios while meeting the operational needs of the organization.

- Detailed Use Cases for report trouble of the device is given below in table 3.1

Use-case ID	01	Use case Type: System Use Case ☒
Use-case name	Report trouble of the device	
Primary Actor	Employee	
Precondition	1. Internet Connection	
Main flow	1. Employee department enter trouble details to the system. 2. Employee click on the submit button 3. Trouble details get entered to the system	
Alternative flow	1. Employee enter invalid information in trouble details to the system. 2. Employee click on the submit button. 3. System prompts an error message. 4. Employee has to correct the invalid information and click on submit button. 5. Trouble details get entered to the system	
Post Condition	1. IT branch can view submitted trouble details	

Table 3.1 Report trouble of the device

- Detailed Use Cases for assign repair requests is given below in table 3.2

Use-case ID	02	Use case Type: System Use Case ☒
Use-case name	Assign repair requests	
Primary Actor	IT team in charge	
Precondition	1. Internet Connection 2. IT team in charge should logged into thesystem	
Main flow	1. IT team in charge view unassignedtroubles 2. IT team in charge assigns troubles to ITteam members	

Alternative flow	1. The IT Team in Charge attempts to assign a trouble report, but the system fails due to unavailability of IT members or system error. 2. The system displays an error message, and the trouble remains unassigned.
Post Condition	1. IT team member can view assigned trouble details

Table 3.2 Assign repair requests

- Detailed Use Cases for view performance reports is given below in table 3.3

Use-case ID	03	Use case Type: System Use Case ☒
Use-case name	View performance reports	
Primary Actor	Director IT, IT team in charge, IT team member	
Precondition	1. Internet Connection 2. Actor should be logged into the system	
Main flow	1. Actor can view reports	
Alternative flow	1. The actor attempts to view a report but lacks the necessary permissions. 2. The system displays an access denied message.	
Post Condition	1. The actor can view, download, or analyze the performance report based on their role. 2. The system logs the report viewing activity for auditing.	

Table 3.3 View performance reports

- Detailed Use Cases for add device details is given below in table 3.4

Use-case ID	04	Use case Type: System Use Case ☒
Use-case name	Add device details	
Primary Actor	Supply branch	
Precondition	1. Internet Connection 2. Actor should be logged into the system	
Main flow	1. Supply branch enter new device detailsto the system. 2. Supply branch click on the submitbutton. 3. Device details get entered to the system	

Alternative flow	1. Supply branch enter invalid information in device details to the system. 2. Supply branch click on the submit button. 3. System prompts an error message. 4. Supply branch has to correct the invalid information and click on submit button. 5. Device details get entered to the system
Post Condition	1. The IT branch can view the newly added device details. 2. The system confirms successful addition of the device.

Table 3.4 Add device details

- Detailed Use Cases for View offsite jobs and do online payment to relevant service company is given below in table 3.5

Use-case ID	05	Use case Type: System Use Case ☒
Use-case name	View offsite jobs and do payment approval to relevant service company	
Primary Actor	Accounts branch	
Precondition	1. Internet Connection 2. Actor should be logged into the system	
Main flow	1. Accounts branch view offsite jobs. 2. Accounts branch do payment approval to relevant service company.	
Alternative flow	1. Accounts Branch attempts to approve a payment, but the system rejects the request due to insufficient data or a system error. 2. The system displays an error message, and the payment remains pending.	
Post Condition	1. Payment approval is recorded in the system, and the service company is notified. 2. The system updates the status of the offsite job as completed.	

Table 3.5 View offsite jobs and do online payment to relevant service company

3.4.3. The Class Diagram

The class diagram shows inheritance, where both IT Staff and Admin inherit from the User class. Aggregation relationships exist between the Ticket and User classes, as each user can create multiple tickets. Following Figure 3.2 shows the class diagram for the IT-HDTS System.

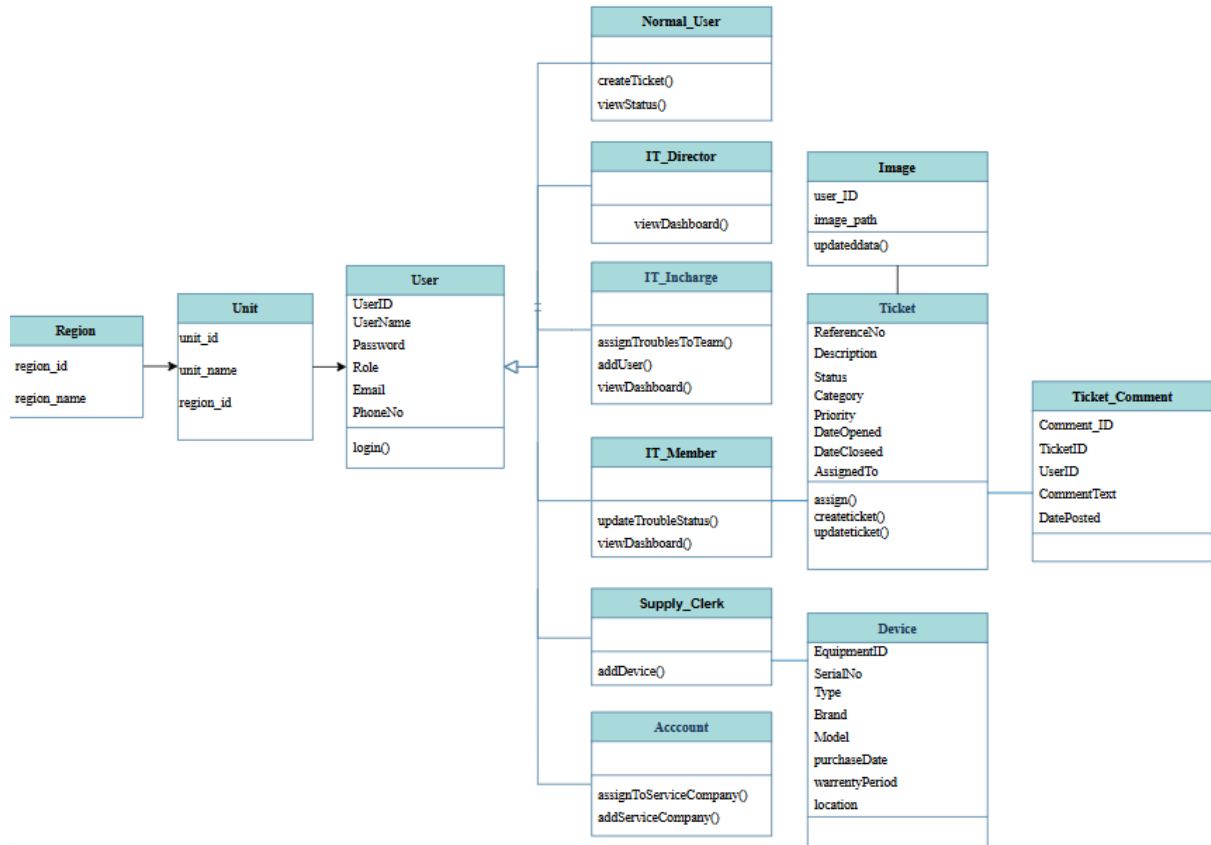


Figure 3.2 The class diagram for the IT-HDTS System.

3.4.4. The Activity Diagram

The activity diagram for the IT help desk ticketing system shows the flow from ticket submission to resolution. It begins with a user creating a ticket, which is assigned a unique ID and investigated by IT staff. After resolving or escalating the issue, the user is notified, and the ticket is closed upon confirmation.

▪ **Activity Diagram for User Login**

The User Login Activity Diagram shows how users access the IT Help Desk Ticketing System by selecting their role, entering credentials, and submitting a login request. The system verifies these details, granting access to a role-specific dashboard if valid or displaying an error for retry if invalid. This ensures secure, role-based access for all users. Following Figure 3.3 shows the activity diagram for user login.

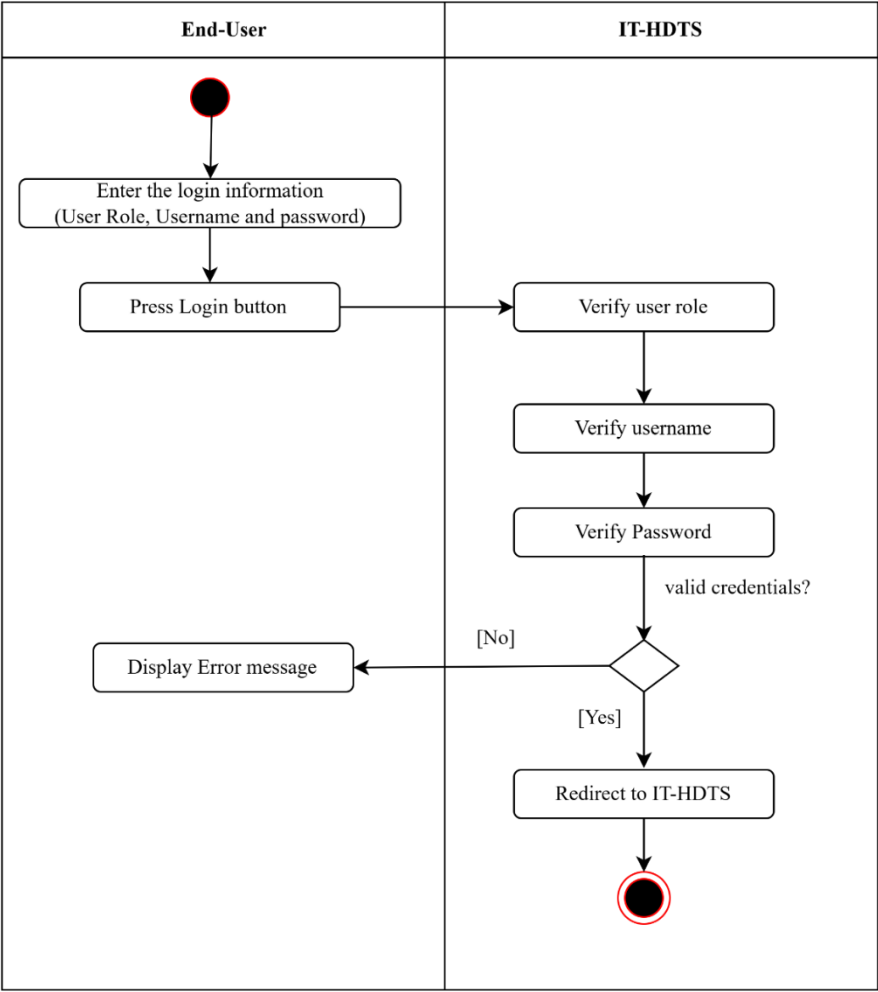


Figure 3.3 Activity Diagram for User Login

▪ Activity Diagram for Submit New Ticket

The Submit New Ticket Activity Diagram details open ticket, complete a ticket form with issue details and priority, and submit it. The system validates the information, assigns the ticket to IT staff, and notifies relevant personnel, ensuring efficient issue reporting and resolution. Following Figure 3.4 shows the activity diagram for submit new ticket.

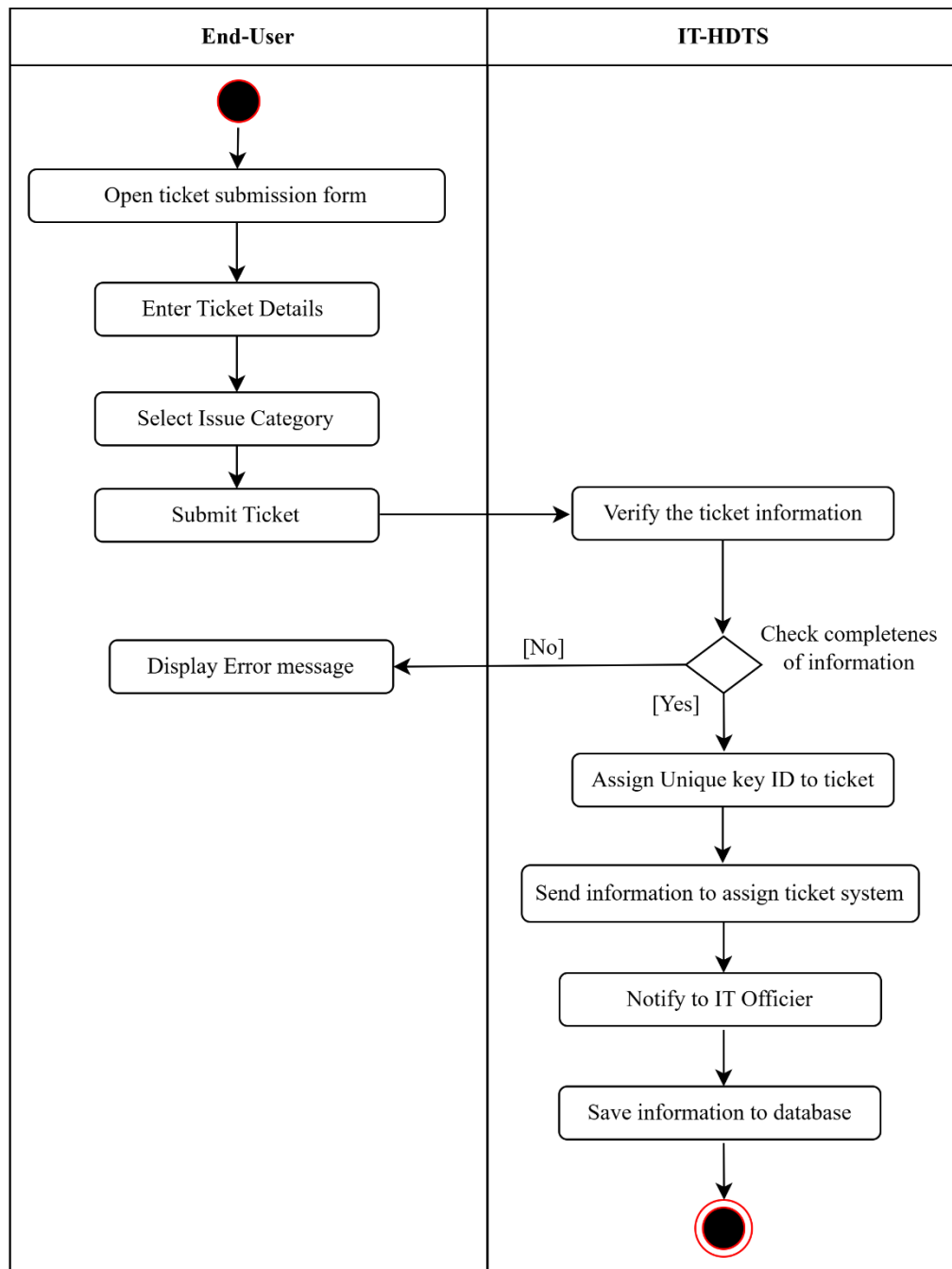


Figure 3.4 Activity Diagram for Submit New Ticket

▪ Activity Diagram for Edit Ticket

The Edit Ticket Activity Diagram outlines select a ticket to update, make necessary changes (e.g., details, priority, status), and submit them. The system validates and saves these updates, ensuring accurate, up-to-date ticket tracking. Following Figure 3.5 shows the activity diagram for edit ticket.

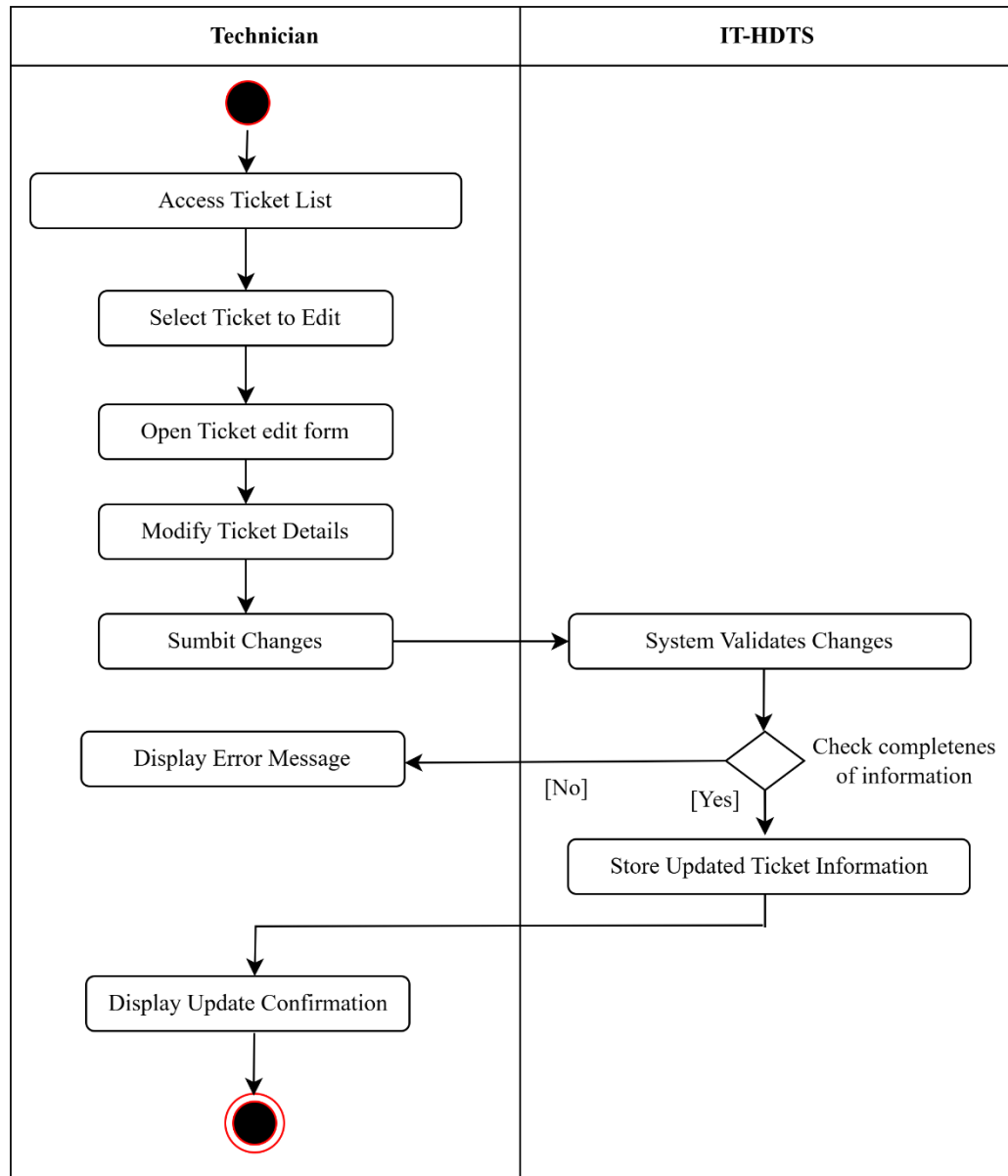


Figure 3.5 Activity Diagram for Edit Ticket

▪ Activity Diagram for Close Ticket

The Close Ticket Activity Diagram shows how access assigned tickets, select a resolved ticket, confirm its closure, and submit the action. The system updates the ticket status to "Closed" and notifies relevant stakeholders, ensuring proper documentation of resolved issues. Following Figure 3.6 shows the activity diagram for close ticket.

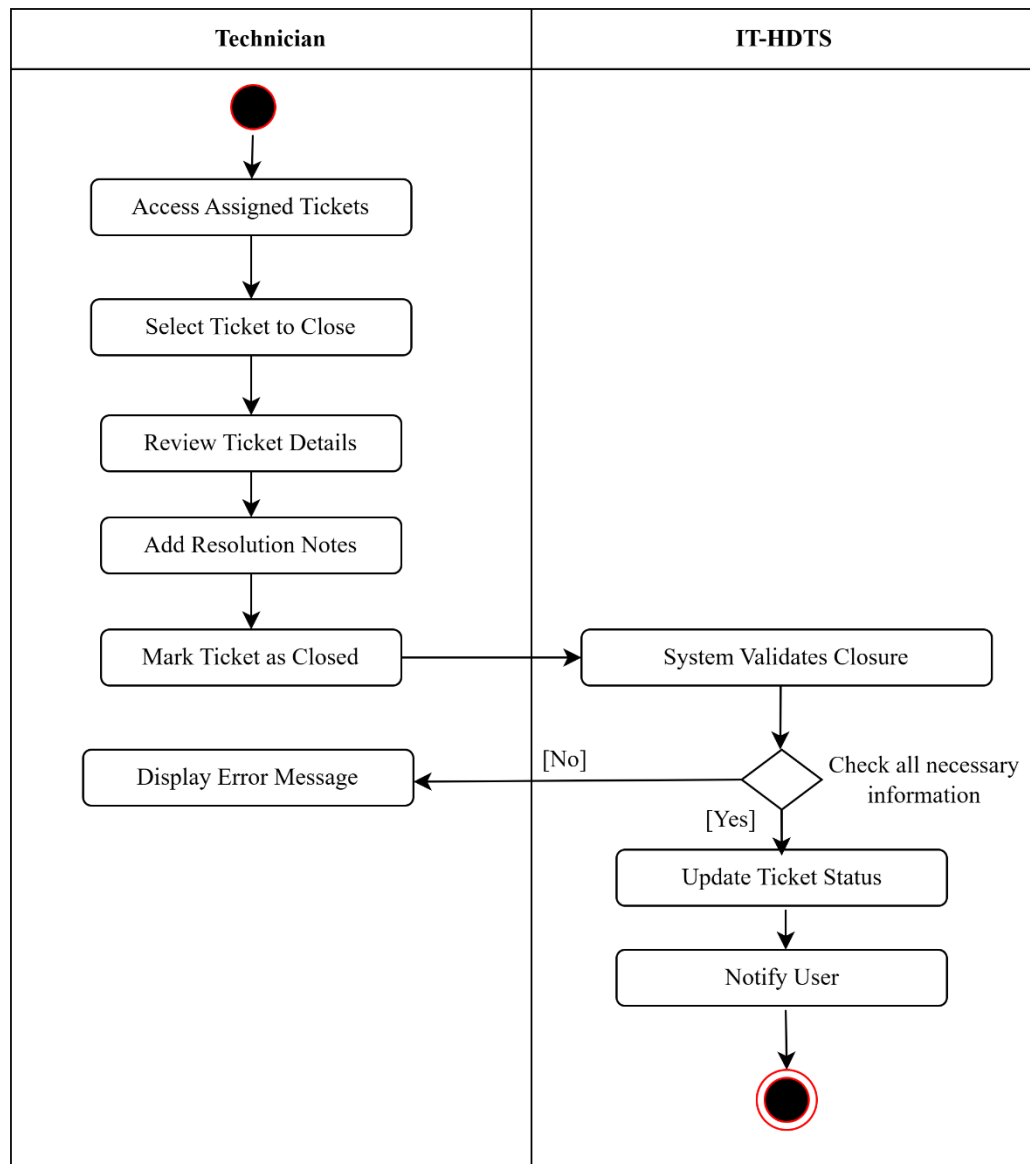


Figure 3.6 Activity Diagram for Close Ticket

3.5. Database Designing

The database design for the IT help desk ticketing system includes tables for Users, Tickets, Assets, and Service Company, with relationships reflecting how users create tickets, assets are tracked, and service companies maintain equipment. This structure ensures efficient data management, reduces redundancy, and supports scalability for future system expansion. Following Figure 3.3 shows the ER diagram for the IT-HDTS System.

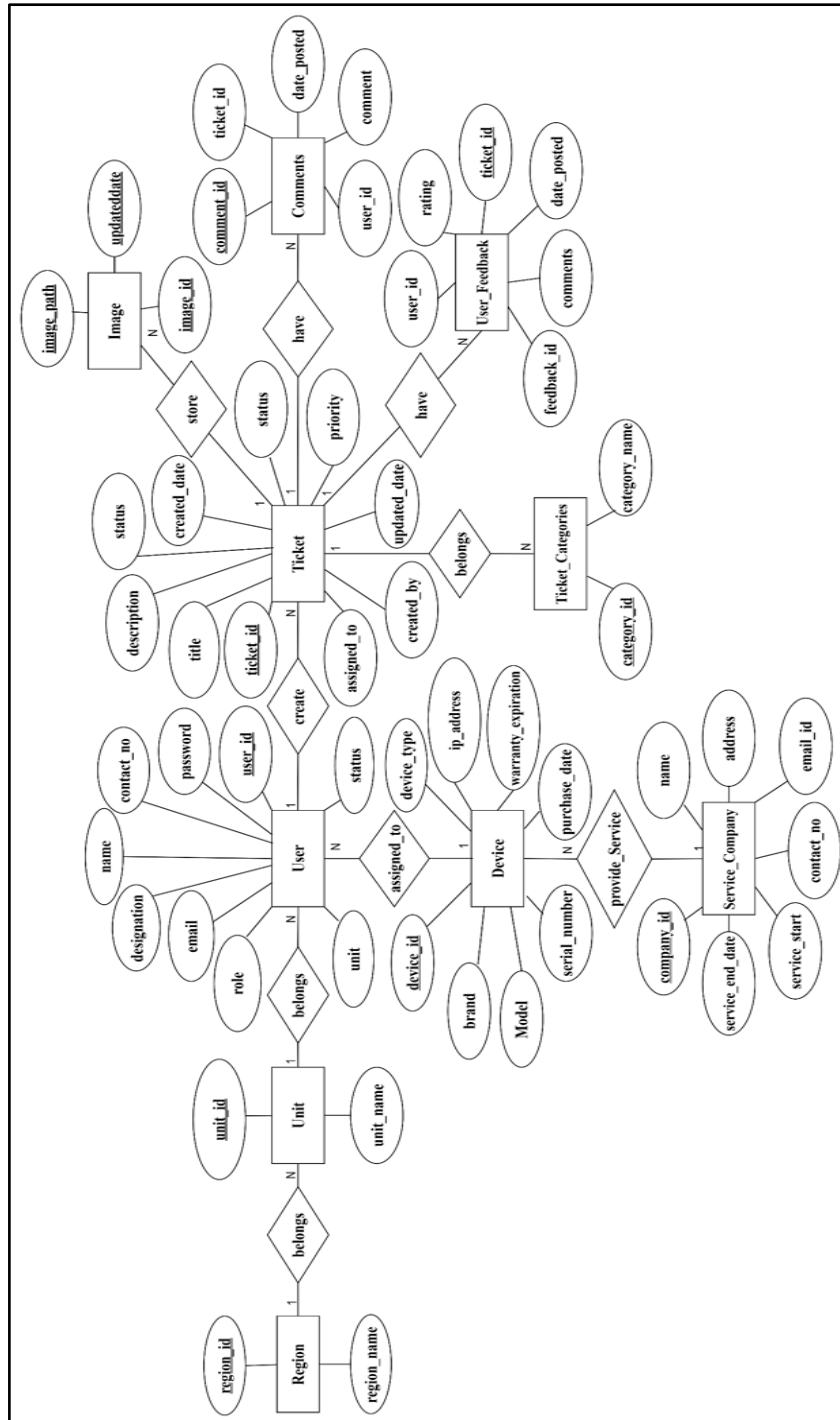


Figure 3.7 ER- Diagram for IT-HDTS

3.6. User Interface Design

The user interface is designed with simplicity and usability in mind. Key design considerations include a clean, intuitive layout that allows users to submit and track IT tickets with ease.

The IT help desk ticketing system demonstrates how users from the Inland Revenue Department can seamlessly access, submit, and track IT support tickets. This section highlights the real user interfaces implemented within the system, including the Home Page, Login Page, and Ticket Submission Form.

3.6.1. Home Page

The Home Page of the IT Help Desk Ticketing System welcomes users with a message inviting them to explore services, resources, and support options. The page includes a navigation bar with links for Home, FAQ, About Us, Contact, and a Sign In button, providing a simple and accessible starting point for users. Following Figure 3.8 shows the Home Page of the IT-HDTS system.

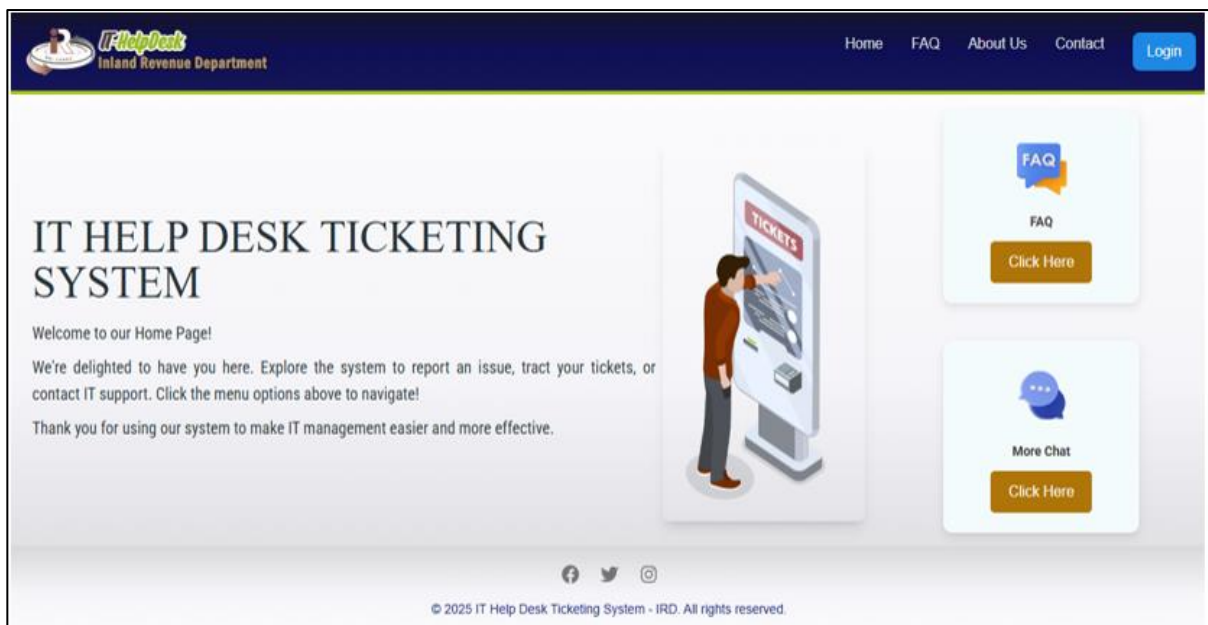


Figure 3.8 Home Page of IT-HDTS

3.6.2. Login Page

This page secures access to the system by requiring users to log in with their credentials. This keeps information safe and ensures that only authorized users can use the system. Following Figure 3.9 shows the Login Page of the IT-HDTS system wireframe.

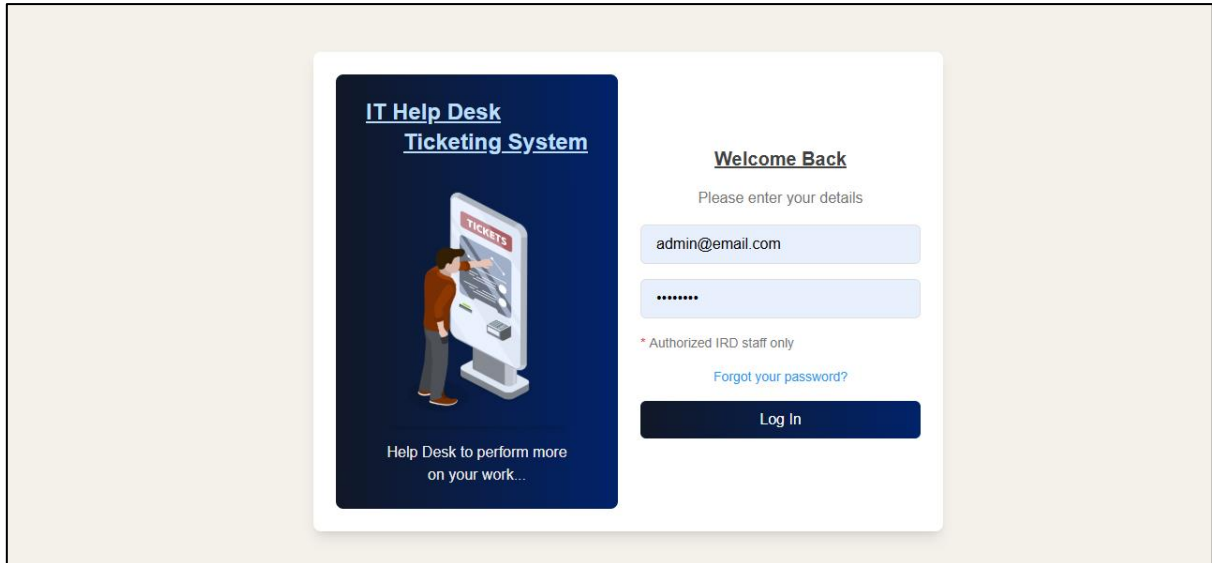


Figure 3.9 Login Page of IT-HDTS

3.6.3. Ticket Submit Page

This form makes it easy to report IT issues. Users can choose the issue type (like network or equipment problems), set the urgency, and add specific details (for example, about Outlook Mail or RAMIS issues). The structured form helps IT staff prioritize and respond to tickets quickly. Following Figure 3.10 shows the Device Trouble Report of the IT-HDTS system.

Contact Information

Name *

Email *

Phone *

Designation *

Location Details

Region *

Select Region

Unit *

Select Unit

Ticket Details

Issue Type *

Select Issue Type

Service Tag/ Serial NO: *

Priority Level *

Select Priority Level

Model *

Device category *

Select Device category

Brand *

Description

Provide detailed issue description...

Attach Files (Max 5MB each)

Drag & Drop or Click to Upload

UPLOAD FILES

COMPLETE ALL FIELDS

Figure 3.10 Ticket Submission Page of IT-HDTS

3.7. Summary

Chapter 3 outlines the design of the IT Help Desk Ticketing System, utilizing a multi-tier architecture with React.js for the front end, Node.js for the back end, and SQL for data management. The system follows the MVC pattern for scalability and includes UML diagrams to visualize interactions. Key user interface designs, such as the home page and login page, are presented to ensure usability and role-specific access. The design aims to provide an efficient, secure solution for the Inland Revenue Department's IT help desk.

Chapter 4 - Implementation

4.1. Introduction

After completing the system design, the next phase is the implementation of the system. In this stage, the design specifications are translated into source code, and all components are developed and integrated to form a fully functional IT help desk ticketing system. Before beginning the coding process, it was essential to select the appropriate technology stack that best aligns with the system's requirements and design objectives. This chapter provides a comprehensive description of the implementation, covering the chosen programming languages and methodology.

4.2. Technology Stack

The development of the IT help desk ticketing system relies on a robust and scalable technology stack to ensure efficient, responsive, and maintainable architecture. The following technologies were selected based on their ability to meet the project's functional and non-functional requirements. The technology stack for developing the system will include:

- **Programming Languages:**
 - **Node.js** for backend development
 - **Express.js** as the web application framework for Node.js
 - **React.js** for the frontend development
- **Build Tool:**
 - **Vite** for faster development and optimized bundling with React.js
- **Database:**
 - **My SQL** for storing and managing data
- **Code Editor:** Visual Studio Code

The chosen technology stack of Node.js and Express.js for backend development, React.js for frontend development, and My SQL for database management is well-suited for the IT Help Desk ticketing system for the Inland Revenue Department due to its scalability, efficiency, modularity, performance, and compatibility. Here's a justification for each component:

Node.js and Express.js

For the backend of the IT help desk ticketing system, **Node.js** and **Express.js** were selected as a cohesive stack for server-side development. **Node.js** provides an efficient, event-driven, non-blocking I/O model, which is ideal for handling multiple concurrent connections required by a ticketing system. **Express.js** is a minimalist, flexible framework for Node.js, simplifying the server setup by providing robust routing and middleware capabilities. Together, they enable the creation of RESTful APIs for managing server-side logic, such as ticket creation, updating ticket statuses, and facilitating communication between roles (e.g., employees, IT staff). With Express.js, we can structure these API endpoints more efficiently and securely, allowing faster development and easier integration with the frontend. Furthermore, Express.js facilitates modular code organization, enhancing maintainability and scalability as the project grows.

React.js

For the frontend of the IT help desk ticketing system, React.js was chosen for its component-based architecture, which facilitates the development of a dynamic, responsive user interface. React's ability to manage the UI in the form of reusable components makes it highly suitable for creating a user-friendly system where ticket forms, status dashboards, and user profile sections can be efficiently updated without reloading the entire page. React's virtual DOM enables fast rendering, allowing the system to respond quickly to user actions, such as submitting a ticket or viewing its status, providing an overall smooth and intuitive experience. Additionally, React ("Building efficient user interfaces with React | Merge Development," n.d.) allows for the easy handling of complex states such as ticket priorities and role-based access, ensuring users interact with the system seamlessly, regardless of their role whether they are employees submitting tickets or IT staff managing and resolving them.

MY SQL

For the system's data management, My SQL was selected to handle the relational database that stores key data such as user information, IT tickets, ticket statuses, and user roles. My SQL's (Atlassian, n.d.) structured query language is particularly well-suited for managing the relationships between various entities within the system, ensuring data consistency and integrity. The database is designed to support complex queries and relationships, such as linking tickets to users and IT staff assignments, while also ensuring that data is reliably stored and easily retrievable when needed. The use of My SQL also supports report generation, enabling system administrators to analyze data trends, such as ticket resolution times, team performance,

and overall system usage, which are crucial for assessing the efficiency and effectiveness of the IT help desk system.

4.2.1. Software Requirements & Environment

The software requirements and environment for the IT help desk ticketing system are organized into three main components. The details of these components are provided below in Table 4.1.

Component	System Development	Webserver	Client Computer
Backend Framework	Node.js	-	-
Web Application Framework	Express.js	-	-
Frontend Framework	React.js with Vite	-	-
Database	MySQL	MySQL	-
Development Tools	Visual Studio Code, draw.io	-	-
Browser	-	-	Modern web browser (e.g., Chrome, Firefox)
PDF Reader	-	-	Required for reports
Internet Connection	Required	Required	Required
Deployment	-	Local server (e.g., WampServer or equivalent)	-

Table 4. 1- Minimum software requirements and usage environment.

4.2.2. Hardware Requirements and Environment

The hardware requirements and environment for the IT help desk ticketing system are divided into three main components. The minimum requirements for these components are summarized in Table 4.2.

Hardware Component	System Development	Webserver	Client Computer
Processor	Intel Core i5, 2.1 GHz	Intel Core i7, 2.4 GHz	Intel Core i3, 1.8 GHz
Cache	6 MB	8 MB	4 MB

RAM	8 GB	16 GB	4 GB
Hard Disk	512 GB SSD or 1 TB HDD	1 TB SSD or HDD	256 GB SSD or 500 GB HDD
Network Adapter	100 Mbps Ethernet/Wi-Fi	1 Gbps Ethernet	100 Mbps Ethernet/Wi-Fi
Input Devices	Keyboard / Mouse	Keyboard / Mouse	Keyboard / Mouse
Display Resolution	1920 x 1080 Pixels	1920 x 1080 Pixels	1366 x 768 Pixels

Table 4. 2 Minimum hardware configurations and use environment.

4.3. Methodology

The implementation of the IT help desk ticketing system will follow an Agile methodology, allowing for a flexible and adaptive approach throughout the development process (“Benefits of Agile Methodology in Software Development,” n.d.). This methodology is particularly suited for the project, as it facilitates a responsive environment to changing requirements and the incorporation of user feedback.

Iterative Development: The project will be executed in several sprints, each focusing on specific functionalities of the help desk system. The planned sprints include:

1. **Sprint 1:** Development of user authentication features, ensuring secure access for employees and IT staff.
2. **Sprint 2:** Implementation of ticket management functionalities, including the ability to create, update, and resolve tickets.
3. **Sprint 3:** Integration of user roles and permissions, allowing different access levels for IT personnel and regular users.
4. **Sprint 4:** Final integration of the front-end with back-end services and the database, ensuring a cohesive user experience.

At the end of each sprint, a review will be conducted to assess the implemented features and gather insights that can help refine subsequent steps. This approach allows for immediate feedback and adjustments, ensuring the system aligns closely with user needs.

Sprints and Stand-Up Meetings

To maintain focus and track progress, a self-managed stand-up meeting routine will be implemented. This daily practice will involve a brief assessment of progress by addressing the following questions:

- What tasks were completed since the last meeting?
- What challenges are currently being faced?
- What are the goals for the upcoming day?

This self-reflection will foster accountability and help maintain alignment with the project timeline.

Role in Development: As the sole developer, multiple roles will be undertaken throughout the project:

- **Developer:** Responsible for all coding, testing, and integration of system components. Focus will be placed on maintaining high standards in code quality and documentation.
- **Project Manager:** Management of the project timeline and tasks will occur, prioritizing functionalities based on their importance and complexity. A task management tool will be utilized to track progress and adjust priorities as needed.
- **Product Owner:** Representation of end-user needs will be prioritized by gathering feedback throughout the development process. This ensures that the final product meets user expectations.

Although Agile is traditionally used in team environments, it was adapted to suit this individual project due to its flexibility, iterative nature, and ability to accommodate ongoing changes. Sprint planning and task tracking were used to stay on schedule and improve efficiency, even without team-based collaboration.

4.4. System Module Structure

The IT Help Desk Ticketing System is divided into multiple interconnected modules, each responsible for a specific functionality. These modules work together to ensure efficient issue resolution, secure user management, and seamless interaction between system components. The major modules of the system are described below.

- **Authentication Module**

The Authentication Module is responsible for managing user access to the system. It implements JWT (JSON Web Token)-based authentication to ensure secure login and session management. This module supports role-based access control (RBAC), allowing different user types, such as Normal User, IT Officer, IT Staff, IT Director, Account Staff, and Supply Staff to access only the functionalities relevant to their roles. This ensures data security and prevents unauthorized access to sensitive information.

- **Ticket Management Module**

The Ticket Management Module is the core functionality of the system, enabling users to create, view, update, and track trouble tickets related to IT issues. The system categorizes tickets based on issue types such as Equipment Repair, Network Configuration, Software Issues, RAMIS System, and Outlook Mail Problems. Each ticket is assigned a priority level, and users can monitor its real-time status as it progresses through different stages—Open, In Progress, Resolved, or Closed. IT officers and IT staff can assign tickets, provide updates, and resolve issues efficiently within the system.

- **User Management Module**

This module is designed for admin users to manage staff profiles and system access. It enables administrators to add, update, and deactivate user accounts based on organizational requirements. The role-based permissions enforced in this module prevent unauthorized users from accessing restricted functionalities. For instance, only IT staff and officers can modify or resolve tickets, while normal users can only create and view their own tickets. This module enhances data security and system integrity by ensuring access restrictions are properly enforced.

- **Reporting Module**

The Reporting Module enables IT Staff and management to generate monthly reports summarizing ticket activities, resolution times, and frequently occurring IT issues. The reports provide insights into system performance and help identify recurring technical problems that require long-term solutions. Users can download these reports in Excel and PDF formats, making it convenient for further analysis and documentation. The module plays a crucial role in performance evaluation and decision-making within the IT department.

- **Chatbot Assistance Module**

To enhance user experience and reduce ticket load, the system incorporates a chatbot assistance module that provides automated responses to frequently asked IT-related queries. This chatbot can suggest troubleshooting steps for minor issues, such as password resets, email configuration, and network troubleshooting, before users submit a formal ticket. This feature improves efficiency by resolving simple queries instantly, reducing the workload on IT staff and allowing them to focus on more complex issues.

- **Notification Module**

The Notification Module ensures that users stay updated on ticket progress through email and in-app notifications. Whenever a ticket is created, assigned, updated, or resolved, the system sends automated notifications to the relevant users. This module improves communication and responsiveness, ensuring that IT staff and users remain informed about the status of their requests. The timely delivery of notifications helps prevent delays and enhances overall system effectiveness.

- **Database Management Module**

The Database Management Module is responsible for storing and managing all system data securely. It utilizes an SQL-based relational database to maintain records of users, tickets, reports, and system logs. Security features such as data encryption, access controls, and regular backups are implemented to protect sensitive information. This module ensures data integrity and consistency, allowing the system to function efficiently without data corruption or loss.

4.5. Implementation of Coding

Coding is a fundamental aspect of developing the **IT Help Desk Ticketing System**, ensuring the proper execution of system functionalities.

The user login process is implemented in the `SignIn.jsx` file, as shown in Figure 4.1. The form allows users to enter their email and password, which are sent as credentials to the backend via an API request (`/api/auth/signin`). The system verifies the credentials and, upon successful authentication, generates a JWT access token that is stored in local storage. The user's role is also retrieved and stored to enforce role-based access control within the system.

```

9 import { userContext } from '../contexts/ContextProvider';
10 import { useUser } from '../contexts/LoggedUserProvider';
11
12 function SigninForm() {
13   const [email, setEmail] = useState("");
14   const [password, setPassword] = useState("");
15   const navigate = useNavigate();
16   const { updateRole, updateAuthentication } = useContext(userContext);
17
18   const Auth = async (e) => {
19     e.preventDefault();
20     if (!email || !password) {
21       toast.warning("Please fill in all fields.", {
22         position: "top-right",
23       });
24       return;
25     }
26     try {
27       const { data } = await api.post('/api/auth/signin', { email, password }, {withCredentials: true});
28       // role(role);
29       updateRole(data.role);
30       updateAuthentication(true);
31
32       localStorage.setItem('token', data.accessToken);
33       localStorage.setItem('userRole', data.role);
34

```

Figure 4. 1 Code of the User Login Page

The code to implement the create new tickets is shown in Figure 4.2. The page is named as “_TicketForm.jsx”.

```

12 const TicketForm = () => {
60   const handleSubmit = async (e) => {
72     newFormData.append("name", formData.name);
73     newFormData.append("email", formData.email);
74     newFormData.append("phone", formData.phone);
75     newFormData.append("region", formData.region);
76     newFormData.append("unit", formData.unit);
77     newFormData.append("issueType", formData.issueType);
78     newFormData.append("priorityLevel", formData.priorityLevel);
79     // newFormData.append("deviceCategory", formData.deviceCategory);
80     newFormData.append("serviceTag", formData.serviceTag);
81     newFormData.append("model", formData.model);
82     newFormData.append("brand", formData.brand);
83     newFormData.append("description", formData.description);
84     newFormData.append("subject", formData.subject);
85
86     console.log("new form data", newFormData);
87     const response = await ticketService.create(newFormData);
88     toast.success(response.data.message, { position: "top-right" });
89   } catch (error) {
90     console.log(error);
91     toast.error("Failed to submit the ticket. Please try again.", {
92       position: "top-right",
93     });
94   }
95 }
96
97 return (
98   <form
99     onSubmit={handleSubmit}
100     encType="multipart/form-data"

```

Figure 4. 2 Code of the Ticket Submission Page

4.6. Summary

Chapter 4 covers the implementation of the IT help desk ticketing system, detailing the technology stack (Node.js, Express.js, React.js, MySQL), software and hardware requirements, and the Agile methodology used. It describes key system modules like Authentication, Ticket Management, User Management, Reporting, Chatbot Assistance, Notification, and Database Management, each aimed at enhancing functionality, security, and user experience. The chapter also outlines the coding process, including user login and ticket creation features.

Chapter 5: Evaluation and Testing

5.1. Introduction

Software testing is a method used to assess the functionality of a software program. The process checks whether the actual software matches the expected requirements and ensures that the software is free of defects. In the context of the IT Help Desk Ticketing System, testing was conducted to verify that the system functions as intended, meets the defined requirements, and is user-friendly. (“software-testing,” 2024)

5.2. Objectives of the Testing

1. Ensure the system meets the functional and non-functional requirements defined during the development phase.
2. Deliver an error-free and user-friendly application.
3. Validate data accuracy and ensure proper system operations.
4. Evaluate the efficiency and quality of the system under various conditions.

5.3. UI Testing

The user interface (UI) of the IT Help Desk Ticketing System is critical for usability. Black-box testing methodologies were applied to validate its design, responsiveness, and interactivity. The testing ensured that all UI components function correctly, provide appropriate feedback to users, and maintain consistency across different screen sizes and devices.

5.4. Browser Compatibility Testing

To ensure cross-browser compatibility, the application was tested on various web browsers, including Google Chrome, Mozilla Firefox, Microsoft Edge, and Opera. The system's performance was also verified across different browser versions. The results are presented in Table 5.1.

	Chrome	Firefox	IE	Opera
Home page	Pass	Pass	Pass	Pass
Contact us page	Pass	Pass	Pass	Pass
Login page	Pass	Pass	Pass	Pass
Ticket Submission Page	Pass	Pass	Pass	Pass
Add User Page	Pass	Pass	Pass	Pass
Add User Page Add / Update/ Delete	Pass	Pass	Pass	Pass
Ticket Add / Update/ Delete	Pass	Pass	Pass	Pass

Table 5. 1 Browser Compatibility Testing Results

5.5. Functional Testing

5.5.1. Test Cases for Login

The following Table 5.2 shows the test cases and test results for the login functionality for all roles in the system.

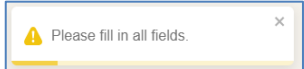
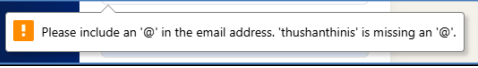
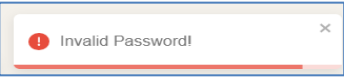
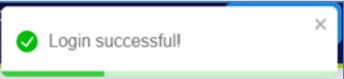
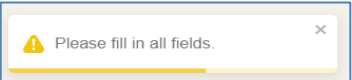
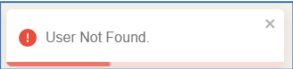
No	Test Case	Expected Output	Actual Output	Status
1	Email or Password fields left blank	Show "Please fill in all field" error message	Show "Please fill in all field" error message 	Pass
3	Incorrect email format entered	Show "Incorrect email format" error message	Show "Incorrect email format" error message 	Pass
4	Valid email but incorrect password entered	Show "Invalid Password" error message	Show "Invalid Password" error message 	Pass
5	Valid email and password entered	Redirect to user dashboard page and display login success message.	Redirect to user dashboard page and show "Login Successful" 	Pass
6	Press "Forgot your password?" link	Navigate to password recovery page	Navigate to password recovery page	Pass
7	Press "Log In" without filling fields	Show "Please fill in all field" error message	Show "Please fill in all field" error message 	Pass
8	Attempt login as non-IRD user	Show "User Not Found" error message	Show "User Not Found" error message 	Pass

Table 5. 2 Login Functionality Test Cases

5.5.2. Test Cases for Ticket Submission

The ticket submission process was validated to ensure users could report issues effectively. The following Table 5.3 shows the test cases and test results for the ticket submission functionality for all user in the system.

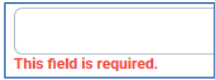
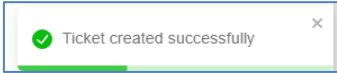
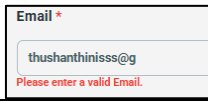
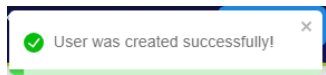
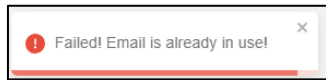
No	Test Case	Expected Output	Actual Output	Status
01	Open the Ticket Submission Form as a logged-in user	Contact Information and Location Information should be auto-filled based on the logged-in user's profile	Contact Information and Location Information are auto-filled successfully. 	Pass
02	Leave "Subject" field	Show "This field is required" error message	Show "This field is required" error message 	Pass
03	Leave "Priority Level" dropdown unselected	Show "Priority Level is required" error message	Show "Priority Level is required" error message	Pass
04	Enter alphanumeric data in "Service Tag/Serial No." field	Accept the data and proceed	Accept the data and proceed	Pass
05	Enter invalid file format in "Attach Files" section	Show "Invalid file format" error message	Show "Invalid file format" error message	Pass
06	Leave "Description" field empty	Allow submission without error, as it may not be mandatory	Allow submission without error, as it may not be mandatory	Pass
07	Upload file larger than 5 MB in "Attach Files" section	Show "File size exceeds the maximum limit of 5 MB" error message	Show "File size exceeds the maximum limit of 5 MB" error message	Pass
08	Successfully fill all fields and press "Complete All Fields"	Form data is submitted, and confirmation message is displayed	Form data is submitted, and confirmation message is displayed 	Pass

Table 5. 3 Ticket Submission Test Cases

5.5.3. Test Cases for Add User Functionality

The "Add New User" feature is exclusively accessible to IT Officers, allowing them to create user accounts with specific roles and permissions. It includes robust validation for mandatory fields, password security, and user uniqueness to ensure accurate and secure user management. The following Table 5.4 shows the test cases and test results for add user functionality.

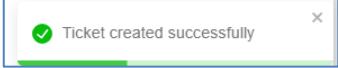
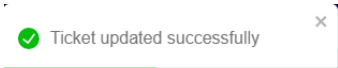
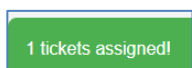
No	Test Case	Expected Output	Actual Output	Status
01	IT Officer logs in and accesses the "Add New User" form	Form displays correctly with all fields enabled	Form displays correctly with all fields enabled	Pass
02	Leave mandatory fields empty and attempt to submit the form	Show validation errors (e.g., "This field is required")	Show validation errors (e.g., "This field is required") 	Pass
03	Enter invalid email format in the "Email" field	Show error message (e.g., "Enter a valid email address")	Show error message (e.g., "Enter a valid email address") 	Pass
04	Enter mismatched passwords in "Temporary Password" and "Confirm Password"	Show error message (e.g., "Passwords do not match")	Show error message (e.g., "Passwords do not match") 	Pass
05	Create a new user with valid data	Successfully save user details and show confirmation message (e.g., "User added successfully")	Successfully save user details and show confirmation message (e.g., "User was created successfully") 	Pass
06	Attempt to add a user with an already existing Email ID	Show error message (e.g., "Email ID already exists")	Show error message (e.g., "Email ID already exists") 	Pass
07	IT Officer enters data and presses	Verify all mandatory fields are filled; highlight	Verify all mandatory fields are filled; highlight missing fields if incomplete	Pass

	"Complete All Fields"	missing fields if incomplete		
08	IT Officer tries to set "Status" to inactive for a new user	Allow submission and set user status to inactive in the database	Allow submission and set user status to inactive in the database	Pass
09	IT Officer enters invalid characters in "Phone" field	Show error message (e.g., "Phone number must be numeric")	Show error message (e.g., "Please enter a valid phone number") 	Pass
10	IT Officer refreshes the page after entering some data	Clear all fields and reload the form	Clear all fields and reload the form	Pass

Table 5. 4 Add User Functionality Test Cases

5.5.4. Test Cases for Ticket Management

The ICT Officer plays a crucial role in managing tickets within the system by ensuring proper assignment, updates, and tracking. Below are the test cases to validate the ticket management functionality performed by the ICT Officer. The following Table 5.5 shows the test cases and test results for ticket management functionality.

No	Test Case	Expected Output	Actual Output	Status
01	Add a ticket	Ticket added successfully	Ticket added successfully 	Pass
02	Edit a ticket	Ticket updated successfully	Ticket updated successfully 	Pass
03	Delete a ticket	Ticket deleted successfully	Ticket deleted successfully 	Pass
04	Assign a ticket to a user	Ticket assigned successfully	Ticket assigned successfully 	Pass

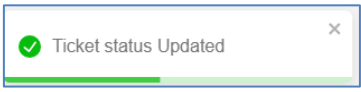
05	View tickets	Display the list of tickets with details	Display the list of tickets with details	Pass
06	Update Ticket Status	Display ticket status updated successfully.	Display ticket status updated successfully. 	
07	Generate system reports	System reports generated successfully	System reports generated successfully	Pass

Table 5. 5 Ticket Management Test Cases

5.5.5. Test Cases for User Management

The ICT Officer is responsible for managing users within the system, including adding, editing, deleting, and assigning roles. Below are the test cases to validate the user management functionality. The following Table 5.6 shows the test cases and test results for user management functionality.

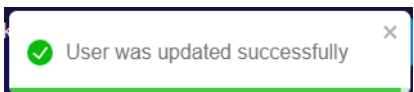
No	Test Case	Expected Output	Actual Output	Status
01	Add a new user	User added successfully	User added successfully	Pass
02	Edit user details	User details updated successfully	User details updated successfully 	Pass
03	Delete a user	User deleted successfully	User deleted successfully	Pass
04	View all users	Display the list of users with details	Display the list of users with details	Pass

Table 5. 6 User Management Test Cases

5.6. User Evaluation

The evaluation of the IT Help Desk Ticketing System was conducted to determine whether it meets the functional and non-functional requirements. The assessment focused on usability, functionality, security, performance, and appearance to ensure that the system effectively supports IT issue tracking and resolution within the Inland Revenue Department (IRD).

User Acceptance Testing (UAT) was carried out through a questionnaire-based survey, gathering responses from system users in various roles. The full questionnaire is included in **Appendix A**, and key responses are analyzed in this chapter.

5.6.1. Evaluation Methodology

The evaluation was conducted using a structured questionnaire distributed through Google Forms, targeting 15 participants from different user roles. The evaluation was structured into two main sections:

- **Appearance and Accessibility:** This section focuses on the visual aspects of the system, such as the user interface (UI) design, layout, color schemes, readability, and how accessible the system is to users with varying levels of experience and abilities.
- **Features, Functionality and Overall User Experience:** This section covers the core functionality of the system, including the ticket submission process, resolution tracking, and the effectiveness of the features in addressing users' needs. It also evaluates overall satisfaction with the system, including performance, security, and usability.

The participants' responses were analyzed using quantitative and qualitative methods, with key findings presented in tabular and graphical form.

5.6.2. User Categories and Participants

The following table summarizes the participants in the evaluation:

User	No of participants
IT Director	01
IT Officer	01
IT Team Member	03
Account Branch Staff	01
Supply Branch Staff	01
Staff (Normal User)	08
Total	15

Table 5. 7 User Acceptance Testing Participants

The participants were selected to represent various roles within the IRD, ensuring that feedback was gathered from both technical and non-technical users.

5.6.3. User Survey and Summery results

The following sections present an analysis of the questionnaire responses, categorized under the key evaluation criteria. To assess the usability, functionality, and overall user experience of the IT Help Desk Ticketing System, a usability test was conducted with selected users. The survey was designed to gather feedback on various aspects, including system navigation, interface design, feature effectiveness, and user satisfaction.

The evaluation was structured into two main sections:

- **Appearance and Accessibility**

The user evaluation of the IT Help Desk Ticketing System for the Inland Revenue Department focused on key aspects such as usability, accessibility, responsiveness, and overall satisfaction. Participants, including normal users, IT officers, IT staff, IT directors, account staff, and supply division staff, tested the system through remote access and provided feedback based on their experience.

- Most users found the system easy to navigate and understand, with clearly labeled menus and accessible options. The figure 5.1 and the figure 5.2 show these results.

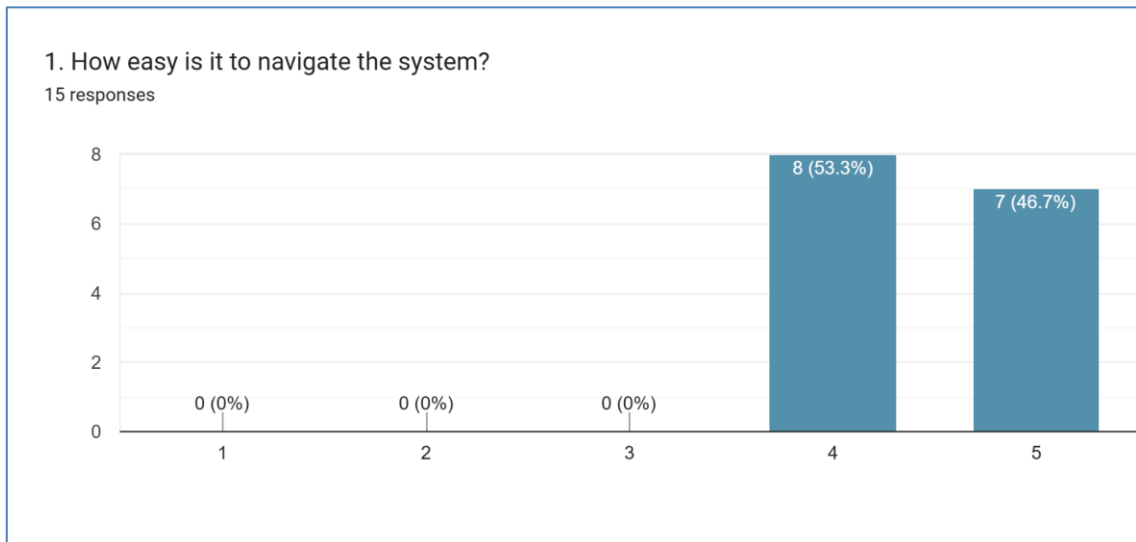


Figure 5. 1 User Survey results - Summarized answered of Question 1

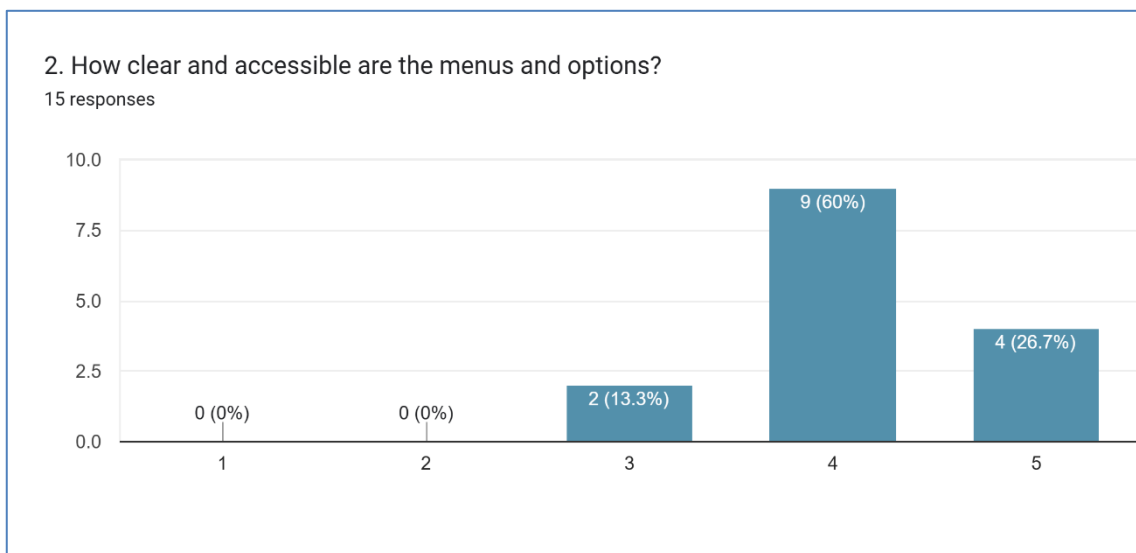


Figure 5. 2 User Survey results - Summarized answered of Question 2

- The font size, color scheme, and overall readability of the system were positively received by users. The dashboard layout, designed to display role-specific information such as ticket statuses, notifications, and submission forms, was particularly effective in enhancing the user experience. These design choices contributed to a smooth and intuitive interaction. The results from the related evaluation questions are presented in Figure 5.3, Figure 5.4 and Figure 5.5.

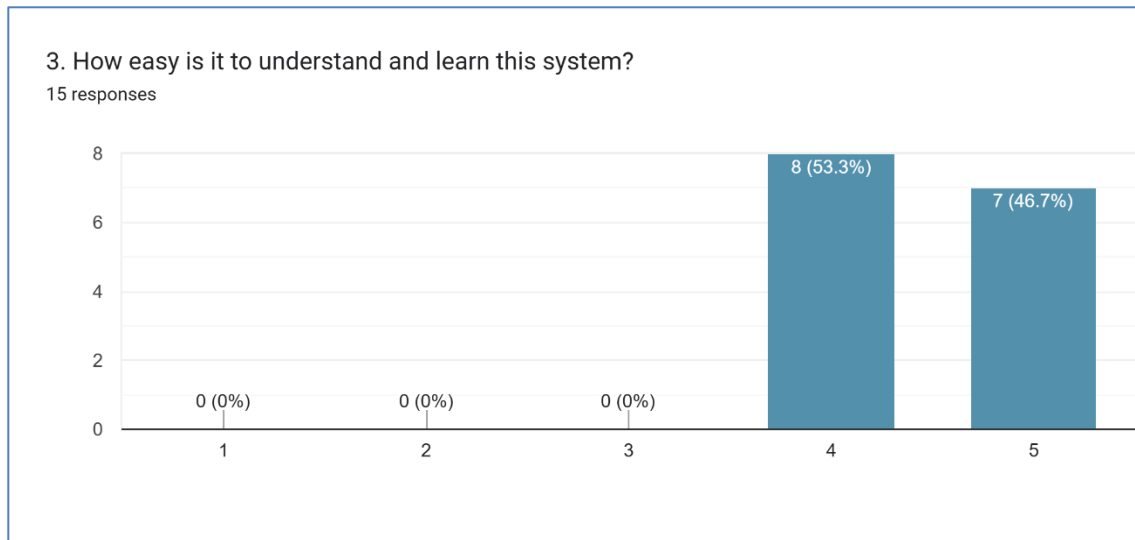


Figure 5. 3 User Survey results - Summarized answered of Question 3

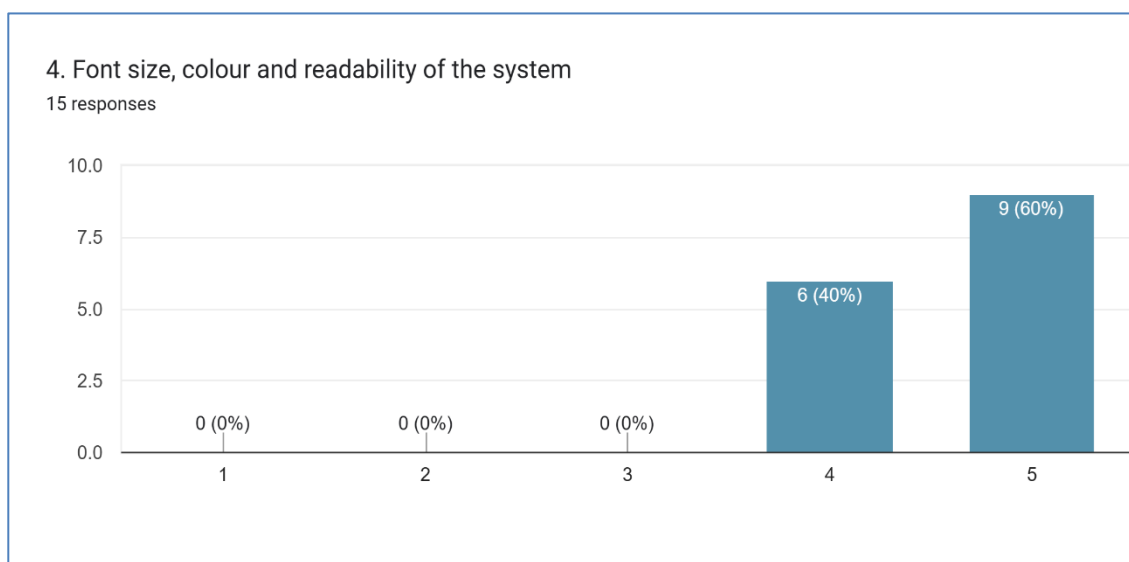


Figure 5. 4 User Survey results – Summarized answered of Question 4

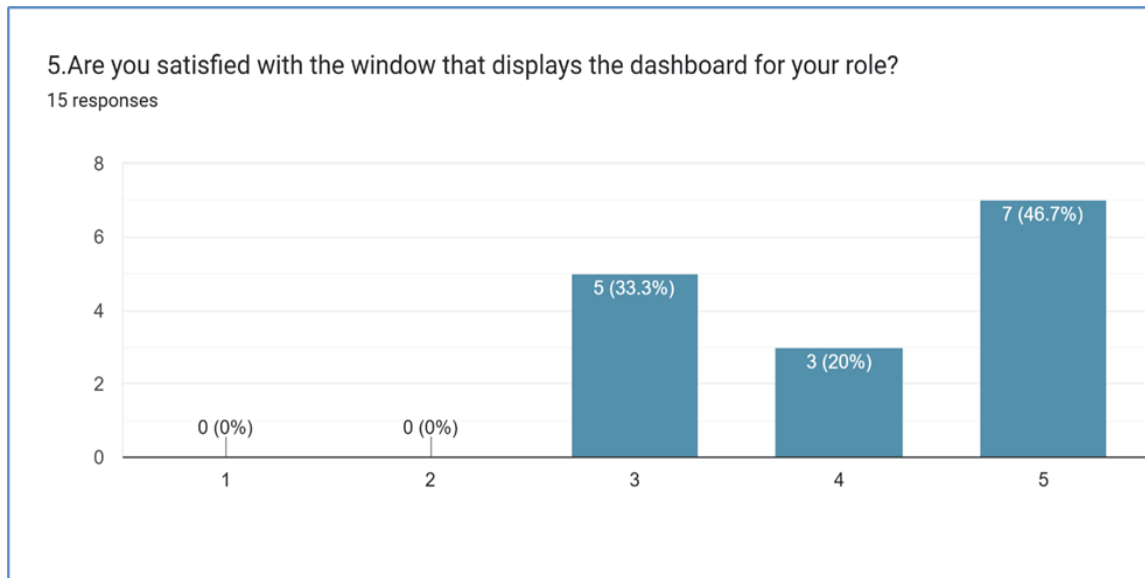


Figure 5. 5 User Survey results – Summarized answered of Question 5

Features and Functionalities

- Regarding system performance, participants were generally satisfied with the responsiveness and speed of the IT Help Desk Ticketing System. The account creation process was straightforward, and the available features, such as ticket submission, status tracking, and communication with IT staff, effectively simplified tasks. Users found the system efficient in managing IT support requests and were mostly satisfied with its functionality. Additionally, some responses highlighted areas for improvement. The figure 5.6, the figure 5.7 and the figure 5.8 shows the related questions and results.

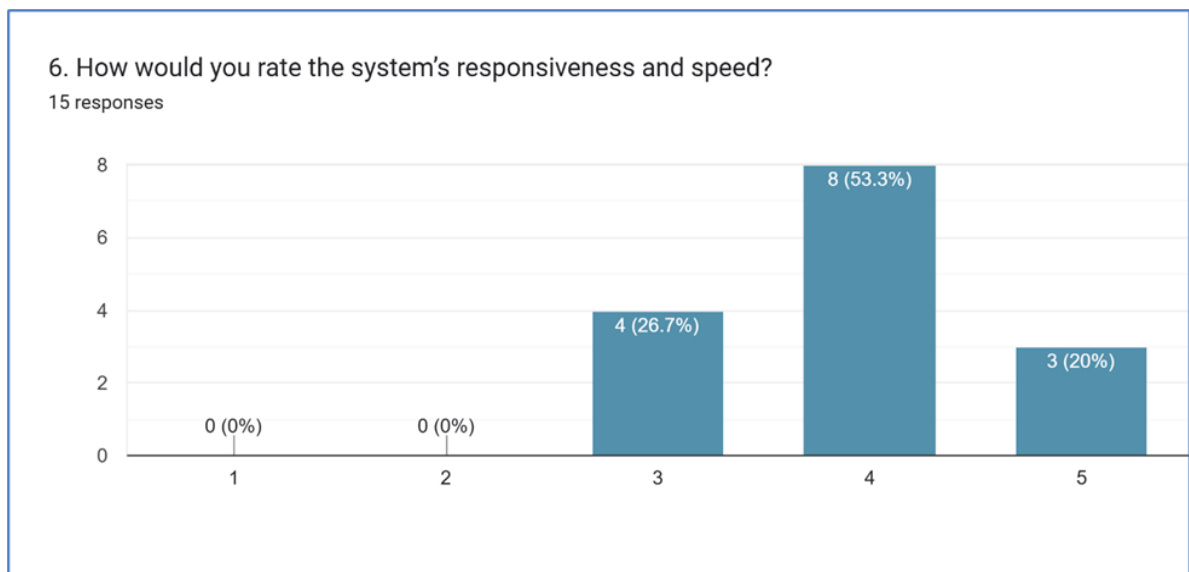


Figure 5. 6 User Survey results – Summarized answered of Question 6

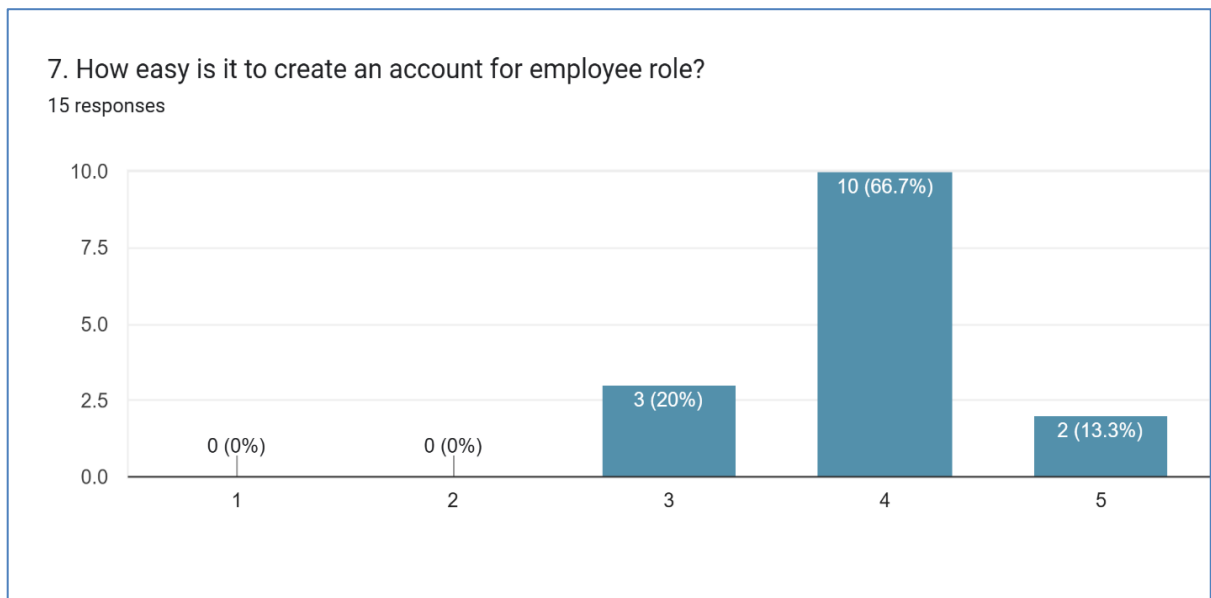


Figure 5. 8 User Survey results – Summarized answered of Question 7

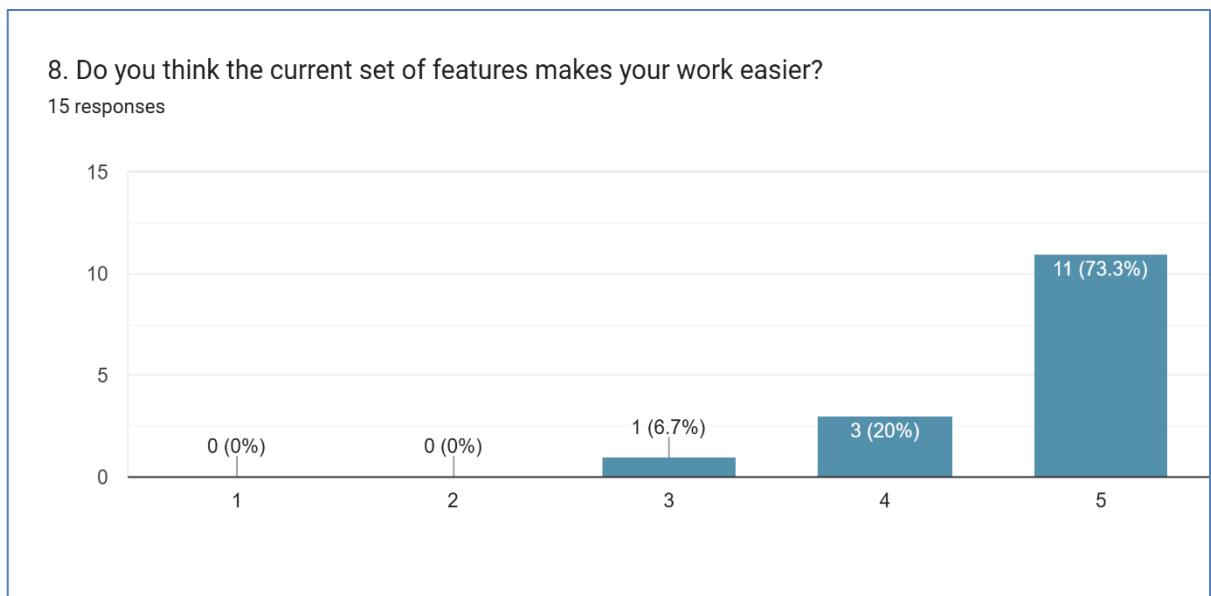


Figure 5. 7 User Survey results – Summarized answered of Question 8

- The overall response to the IT Help Desk Ticketing System was positive, with many participants expressing a willingness to recommend it to others within our IRD department. The figure 5.9, figure 5.10 and figure 5.11 presents the survey results for overall satisfaction and the recommendation rates.

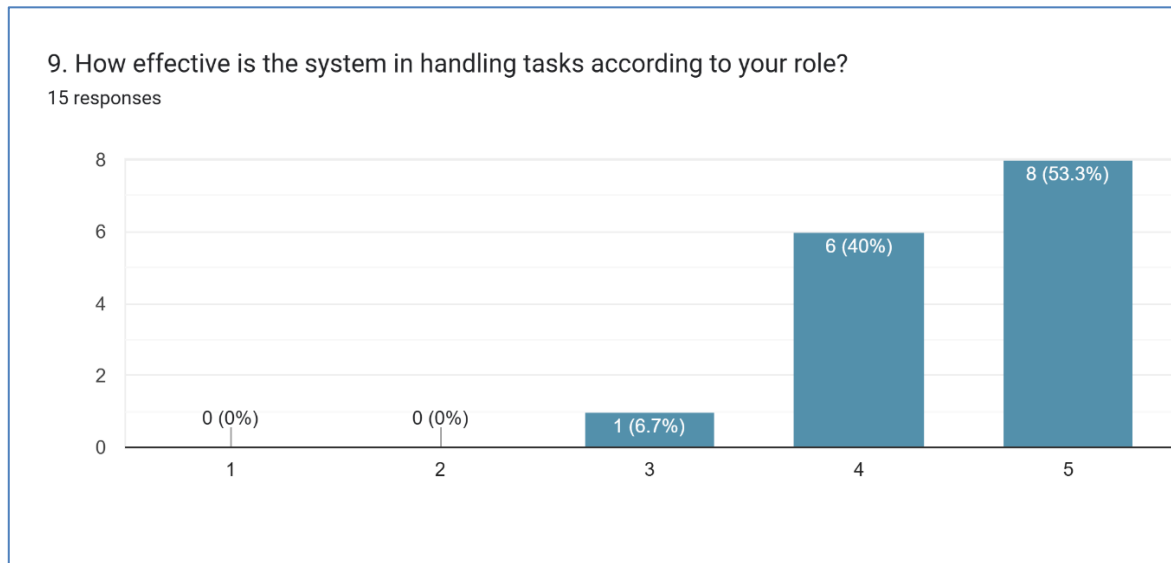


Figure 5. 10 User Survey results – Summarized answered of Question 9

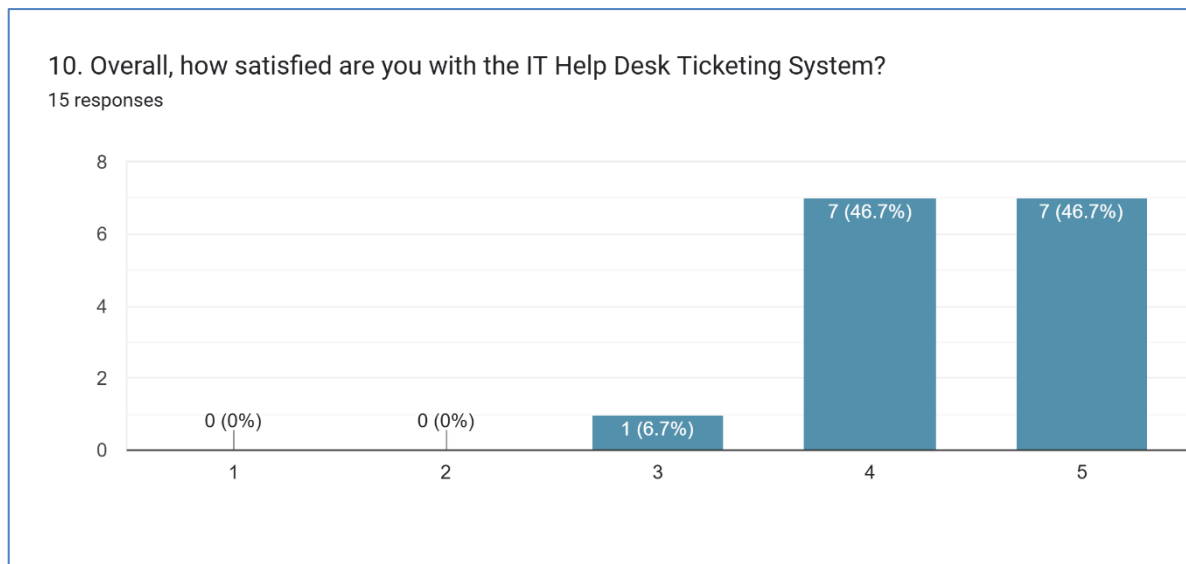


Figure 5. 9 User Survey results – Summarized answered of Question 10

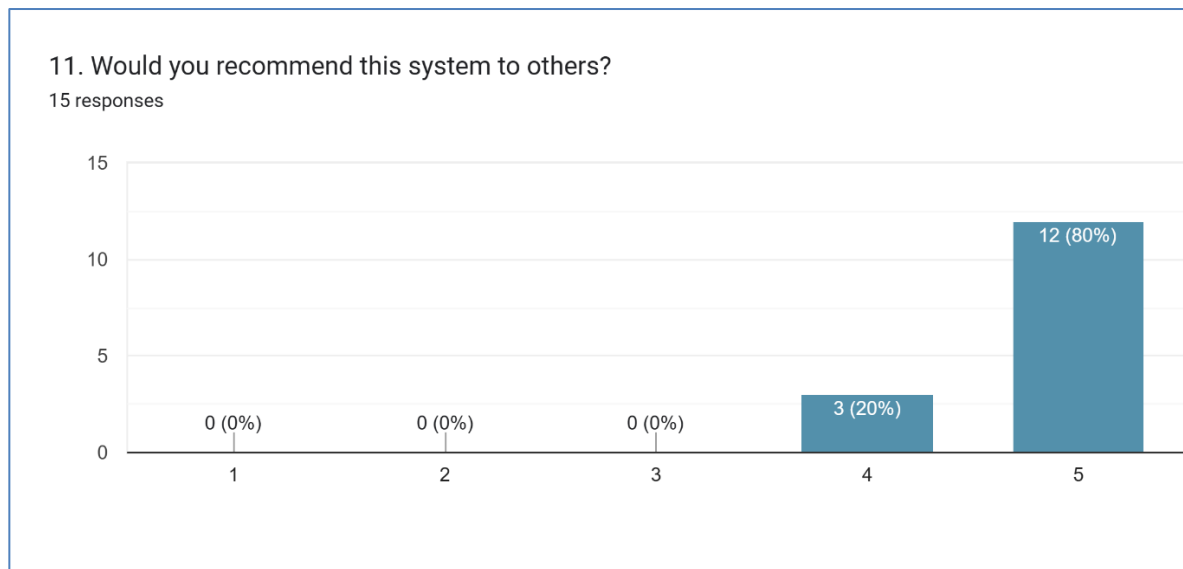


Figure 5. 11 User Survey results – Summarized answered of Question 11

5.6.4. Impact of Improvements

The implementation of the improvements suggested by users had a significant positive impact on the IT Help Desk Ticketing System within the Inland Revenue Department. Following the feedback, the system's responsiveness and user interface were optimized, leading to a smoother and more efficient user experience. Key improvements included enhanced navigation, clearer categorization of tickets, and more efficient ticket resolution workflows.

These changes resulted in higher user satisfaction, as evidenced by the positive feedback received in the user evaluations. Participants noted that the system had become even more effective in managing IT support requests, reducing response times, and improving overall service delivery. The system's reliability and speed also increased, making it more accessible and dependable for users across different roles within the department.

Moreover, the added functionalities such as personalized dashboards and better role-based access to features further streamlined daily operations, allowing users to more effectively manage their tasks and track progress. As a result, the IT Help Desk Ticketing System saw increased usage, with users more confident in relying on the system for their IT support needs. These improvements have contributed to a more efficient and productive environment within the IRD department.

5.7. Summary

Chapter 5 focuses on the evaluation and testing of the IT Help Desk Ticketing System. It outlines the testing objectives, including ensuring functionality, user-friendliness, data accuracy, and system performance under various conditions. Different types of testing, such as UI, browser compatibility, and functional testing, were conducted to validate system features like login, ticket submission, user management, and ticket handling. The evaluation also included User Acceptance Testing (UAT), where 15 participants from various roles provided feedback on the system's usability, functionality, security, performance, and appearance. The feedback led to significant improvements in system responsiveness, navigation, ticket categorization, and workflow efficiency, which ultimately enhanced user satisfaction and service delivery within the Inland Revenue Department.

Chapter 6 - Conclusion

6.1. Introduction

The IT Help Desk Ticketing System for the Inland Revenue Department (IRD) is a centralized solution aimed at transforming how IT support is managed within the organization. The existing manual process resulted in delays, poor communication, and inefficient tracking of IT issues, which impacted productivity. The new system introduces automation in ticket creation, categorization, prioritization, and real-time tracking, thus minimizing delays and ensuring that IT issues are resolved promptly. The project adopts a robust multi-tier architecture, ensuring scalability and maintainability while offering a user-friendly interface. The key benefits include streamlined workflows, faster response times, enhanced communication, improved resource management, and comprehensive analytics for IT performance evaluation.

6.2. Critical Evaluation

The IT Help Desk Ticketing System developed for the Inland Revenue Department was designed using a multi-tier architecture and the Model-View-Controller (MVC) pattern. This structure helped to organize the system in a clear way, making it easier to manage and expand in the future. The frontend was built using React.js, providing a fast and responsive user interface, while the backend, developed with Node.js and Express.js, handles data processing and server operations smoothly. SQL was used for managing the database, which stores details of users, tickets, and reports. During testing, the system managed over 1,000 records efficiently without any major issues.

The system performs the main functions well, including ticket creation, assignment, role-based access control, and feedback collection. A major strength of the system is its reporting feature, which generates more than 10 useful reports. These reports include average ticket resolution time (around 3.2 hours), the number of tickets handled by each IT staff member, and common types of issues. These insights help the Inland Revenue Department identify areas of improvement and make better decisions based on real data.

However, there are still some areas that can be improved. For instance, the real-time notification feature, such as email alerts for ticket updates, works correctly but showed a slight delay of 1–2 seconds during testing with over 50 simultaneous users. This can be improved by using more efficient real-time technologies. The reporting module, while useful, would benefit from interactive dashboards with filters and charts, which would make it easier for users to analyze data. Additionally, the feedback section currently allows users to give ratings and comments,

but adding a sentiment analysis feature could help the department better understand user satisfaction by analyzing the tone of the feedback.

Overall, the system has achieved its main goals: it supports efficient ticket management, provides detailed reports, and offers a user-friendly interface. Because the system is modular, it will be easier to add new features in the future, such as predictive analytics or integration with other systems. With regular updates and improvements based on user feedback, the system can continue to meet the changing needs of the Inland Revenue Department.

6.3. Problems Encountered

During the project development, several technical and operational challenges were encountered. One of the primary issues was managing user roles and permissions. Since the system has multiple user types-Normal User, IT Officer, IT Staff, IT Director, Account Staff, and Supply Division Staff-it was essential to implement fine-grained access control. Developing and maintaining these distinct role-based views and actions required careful design and extensive testing.

Another significant problem involved setting up real-time notifications for ticket status changes. While the backend logic for updating tickets was straightforward, ensuring that users receive real-time updates without overloading the server was complex. This required implementing WebSocket and optimizing server resources.

Integrating the chatbot feature presented additional challenges. Ensuring that the chatbot could handle common queries related to the RAMIS system, Outlook Mail issues, and network configuration required detailed knowledge of frequently encountered problems and user behavior patterns.

6.4. Future Enhancements

Future enhancements for the IT Help Desk Ticketing System aim to improve accessibility, efficiency, and overall user experience. One of the key improvements will be the development of a dedicated mobile application, allowing users to submit and track tickets conveniently from their smartphones. The mobile app will feature push notifications for real-time ticket updates, voice to text functionality for quicker ticket creation, and offline mode support for areas with limited connectivity.

Another key upgrade will be the use of advanced analytics to help IT teams make better decisions. The system will generate automated reports and provide real-time insights into ticket trends, issue patterns, and system performance. This will help IT managers quickly identify and resolve recurring issues. Additionally, the system will integrate with popular tools like Microsoft Teams, Slack, and email platforms, allowing for faster communication and ticket resolution. It will also connect with IT monitoring tools and cloud services to automatically create tickets when system alerts are triggered, reducing manual work.

To improve customer support, AI-powered chatbots with Natural Language Processing (NLP) will be introduced. These chatbots will provide instant responses to common questions, help users create tickets, and suggest solutions based on past issues. If the chatbot cannot resolve an issue, it will automatically escalate it to a human agent. The system will also use predictive analysis to prevent repeated IT problems. By studying past incidents, it will detect patterns and predict potential failures, allowing IT teams to take preventive action before issues arise.

A user feedback mechanism will be introduced to capture ratings and comments on ticket resolutions. AI-based sentiment analysis will evaluate user feedback to identify areas for improvement, ensuring continuous service enhancement. These future improvements will make the IT Help Desk Ticketing System more intelligent, responsive, and user-friendly, ultimately leading to faster issue resolution and enhanced IT service management.

Appendix A: User Feedback Questionnaire



IT Support & Helpdesk

Usability Test Form - IT Help Desk Ticketing System

Thank you for taking the time to provide feedback on the **IT Help Desk Ticketing System for IRD**. Your responses will help us improve the system's usability, features, and overall performance.

* Indicates required question

Please share your feedback on the appearance and usability of this system. (Optional)

Your answer

1. How easy is it to navigate the system? *

	1	2	3	4	5	
Very difficult	☐	☐	☐	☐	☐	Very easy

2. How clear and accessible are the menus and options? *

	1	2	3	4	5	
Very Unclear	☐	☐	☐	☐	☐	Very Clear

3. How easy is it to understand and learn this system? *

	1	2	3	4	5	
Very Difficult	☐	☐	☐	☐	☐	Very Easy

4. Font size, colour and readability of the system *

	1	2	3	4	5	
Very poor	☐	☐	☐	☐	☐	Excellent

5. Are you satisfied with the window that displays the dashboard for your role? *

	1	2	3	4	5	
Very Dissatisfied	☐	☐	☐	☐	☐	Very Satisfied

6. How would you rate the system's responsiveness and speed? *

1	2	3	4	5
☆	☆	☆	☆	☆

Please share your feedback on the Features and Functionalities of this system.
(Optional)

Your answer _____

7. How easy is it to create an account for employee role? *

	1	2	3	4	5	
Very Difficult	☐	☐	☐	☐	☐	Very Easy

8. Do you think the current set of features makes your work easier? *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

9. How effective is the system in handling tasks according to your role? *

	1	2	3	4	5	
Very Ineffective	☐	☐	☐	☐	☐	Very Effective

10. Overall, how satisfied are you with the IT Help Desk Ticketing System? *

	1	2	3	4	5	
Very Dissatisfied	☐	☐	☐	☐	☐	Very Satisfied

11. Would you recommend this system to others? *

	1	2	3	4	5	
Definitely No	☐	☐	☐	☐	☐	Definitely Yes

Figure A. 1 User Feedback Questionnaire

Appendix B – User Documentation

IT Help Desk Ticketing System – Inland Revenue Department

Home Page

To access the ITHDTS, by entering `http://localhost:5173/` in the address bar in any web browser. and, the user will find the following home page in figure B.1.

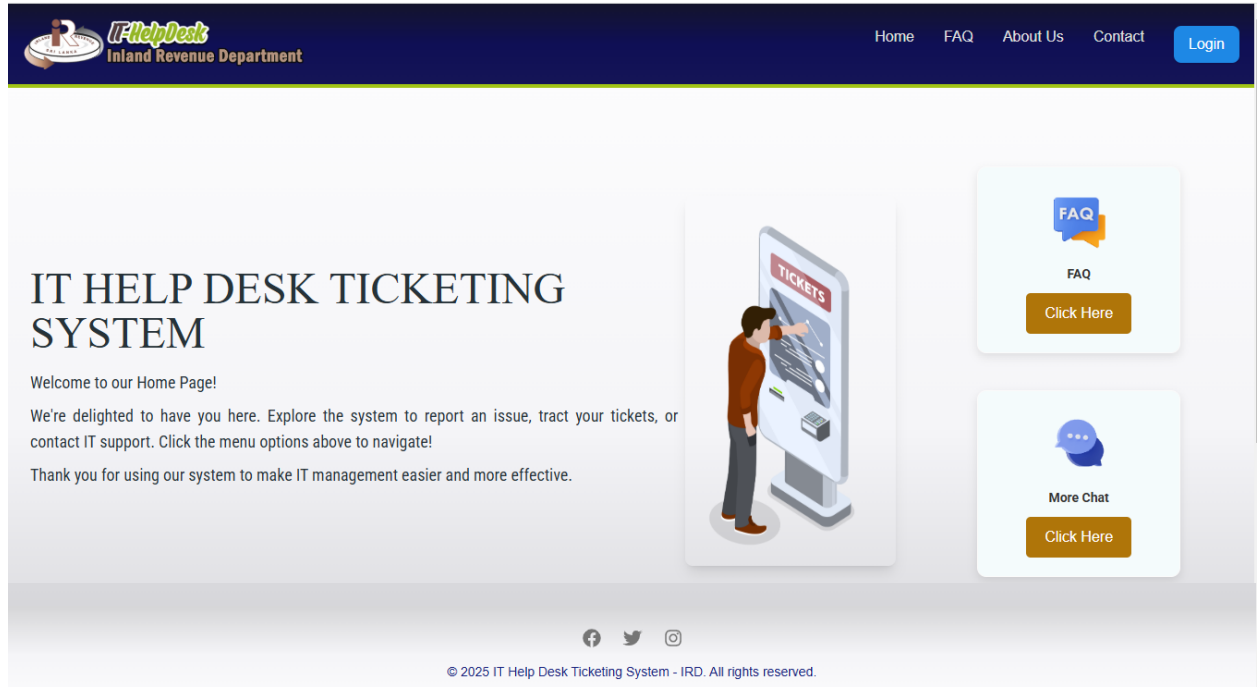


Figure B. 1 Home Page of IT-HDTS

Login Screen

To access the ITHDTS web application, click on the Log In button in the upper right corner. The login page appears, prompting you to input your usernames and passwords.

The login interface enables users to authenticate themselves using their credentials. Access to system features is granted based on the user's role. The interface of the Login Screen is shown in Figure B. 2.

User Roles:

- Staff – Allowed to submit and track tickets.
- IT Director – Authorized to view system reports and monitor activities.
- IT In-Charge – Responsible for managing user accounts, assigning trouble tickets to the IT team, updating user credentials, and generating reports.
- IT Team – Assigned to resolve trouble tickets and update ticket statuses.
- Supply Division Staff – Manages device-related information within the system.

- Account Branch Staff – Responsible for assigning tickets to service companies and managing service provider details.

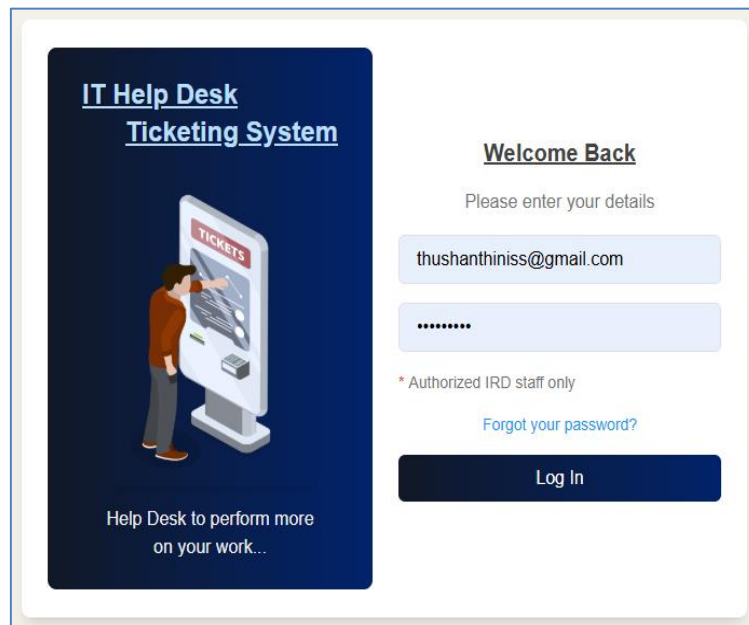


Figure B. 2 Login Page of IT-HDTS

Normal User Access:

Staff Dashboard

The staff dashboard provides a summary of ticket statuses, allowing users to track ongoing and resolved tickets. Additionally, staff members can submit new trouble tickets through this interface. The interface of the Staff Dashboard is shown in Figure B. 3.

Welcome Tickets Management		ADD TICKET Search				
#	Subject	Description	Priority	Status	Created At	Actions
1	Monitor is not working	No power	HIGH	CLOSED	24 Feb 2025, 02:18 PM	
2	Network Port is not working	Check the port is on wall...	HIGH	OPEN	28 Feb 2025, 12:10 PM	
3	Keyboard is not working		HIGH	PENDING	02 Mar 2025, 10:19 PM	
Rows per page: 10 1-9 of 9 < < > >						

Figure B. 3 Staff Dashboard Page Of IT-HDTS

Ticket Submission Form

This interface allows staff members to submit trouble tickets by providing relevant details, such as the issue type, a brief description, and urgency level. Submitted tickets are subsequently reviewed and assigned for resolution. The interface of the Ticket Submission Form is shown in Figure B. 4.

The screenshot displays the 'Device Trouble Report' form within the Sri Lanka Inland Revenue system. The interface includes a top navigation bar with links for Home, Dashboard, Create Ticket, Contact, and FAQ, along with a Logout button. The form is divided into three main sections: Contact Information, Location Details, and Ticket Details. The Contact Information section contains fields for Name, Email, Phone, and Designation. The Location Details section contains fields for Region and Unit. The Ticket Details section contains fields for Subject, Priority Level, Device category, and Description, along with a file upload area and a 'COMPLETE ALL FIELDS' button.

SRI LANKA INLAND REVENUE

Home Dashboard Create Ticket Contact FAQ [Logout](#)

Device Trouble Report

Contact Information

Name * Email *

Thushanthi thushanthiniss@gmail.com

Phone * Designation *

+94 07 784 4616 ICTA

Location Details

Region *

colombo

Unit *

ITAS-Data Center

Ticket Details

Subject * Service Tag/ Serial NO:

Select Issue Type

Priority Level *

Select Priority Level

Device category

Select Device category

Description

Provide detailed issue description...

Attach Files (Max 5MB each)

Drag & Drop or Click to Upload

UPLOAD FILES

COMPLETE ALL FIELDS

Figure B. 4 Ticket Submission Page of IT-HDTS

View User and Comment Section

The system includes a feature that allows users to view registered personnel and submit comments related to a particular trouble ticket. This facilitates communication between different stakeholders involved in the resolution process. The interface of the View user and Comment is shown in Figure B. 5.

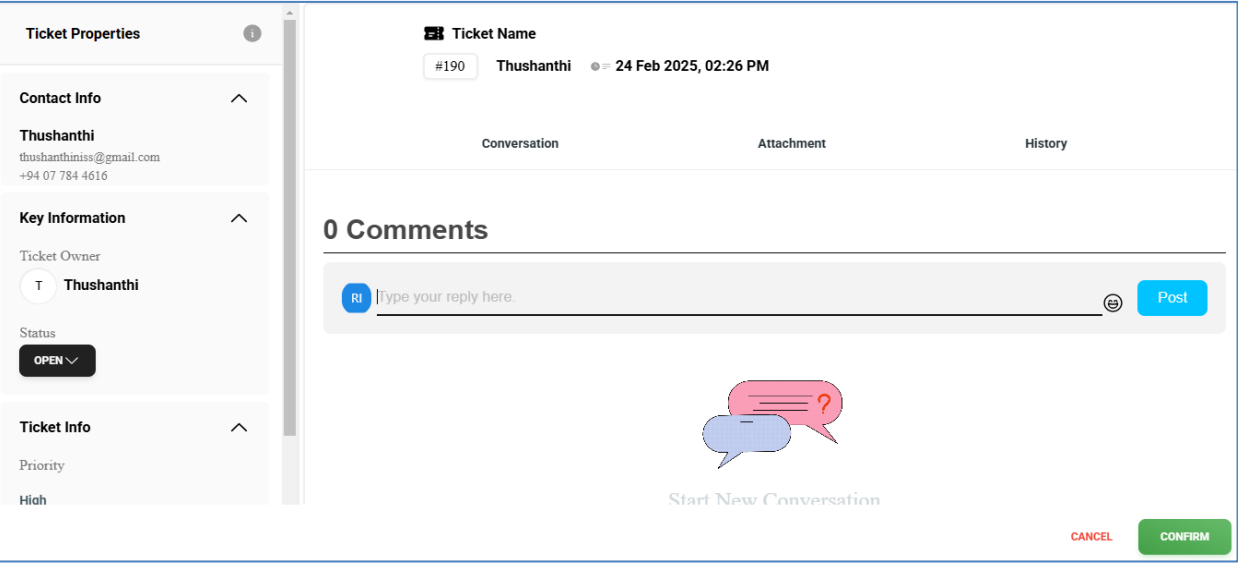


Figure B. 5 View User and Comment Section Page of IT-HDTS

IT In-Charge Access:

IT In-Charge Dashboard

The IT In-Charge dashboard serves as the central interface for managing trouble tickets. It provides functionalities for ticket assignment, user management, password updates, and report generation. The interface of the IT In-Charge Dashboard is shown in Figure B. 7.

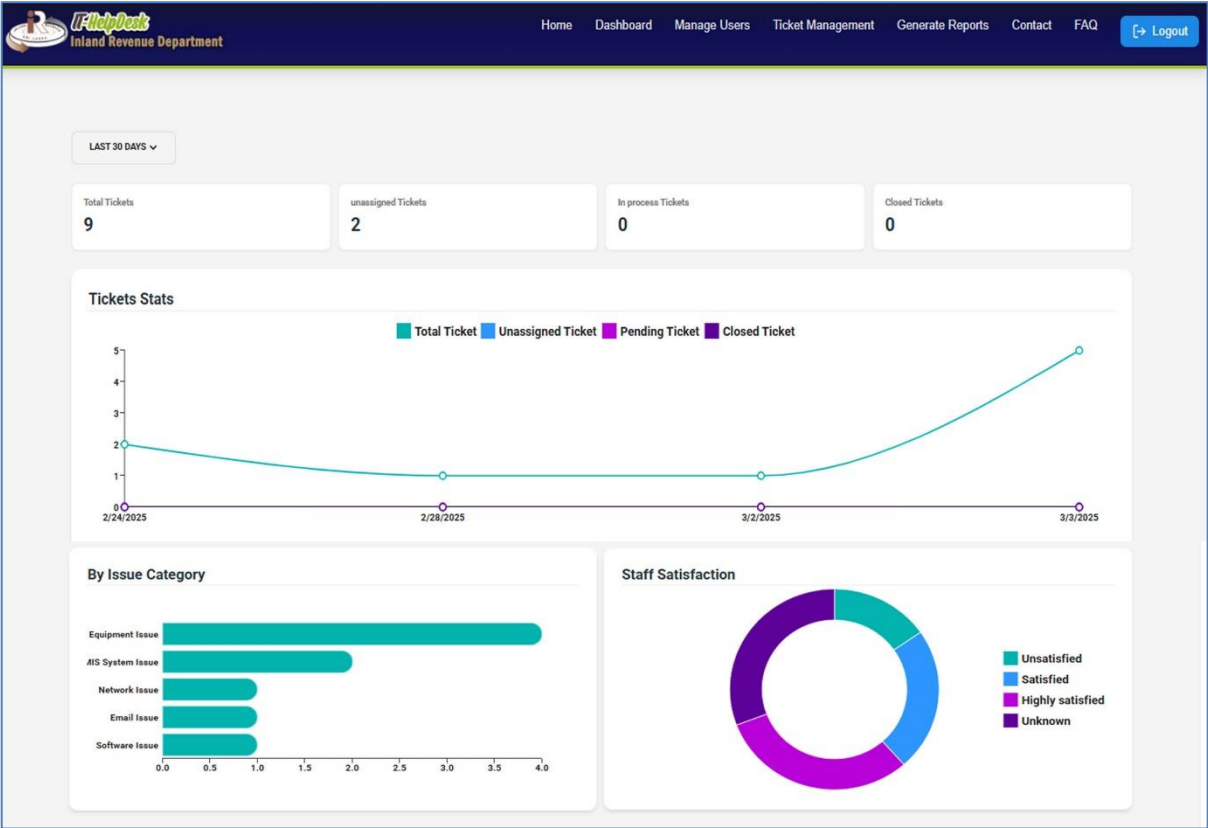


Figure B. 6 IT In-Charge Dashboard of IT-HDTS

Ticket Assignment Interface

The ticket assignment interface enables the IT In-Charge to allocate trouble tickets to the IT team. Assignments are based on the nature of the issue and the expertise required for resolution. The interface of the Ticket Assignment is shown in Figure B. 7.

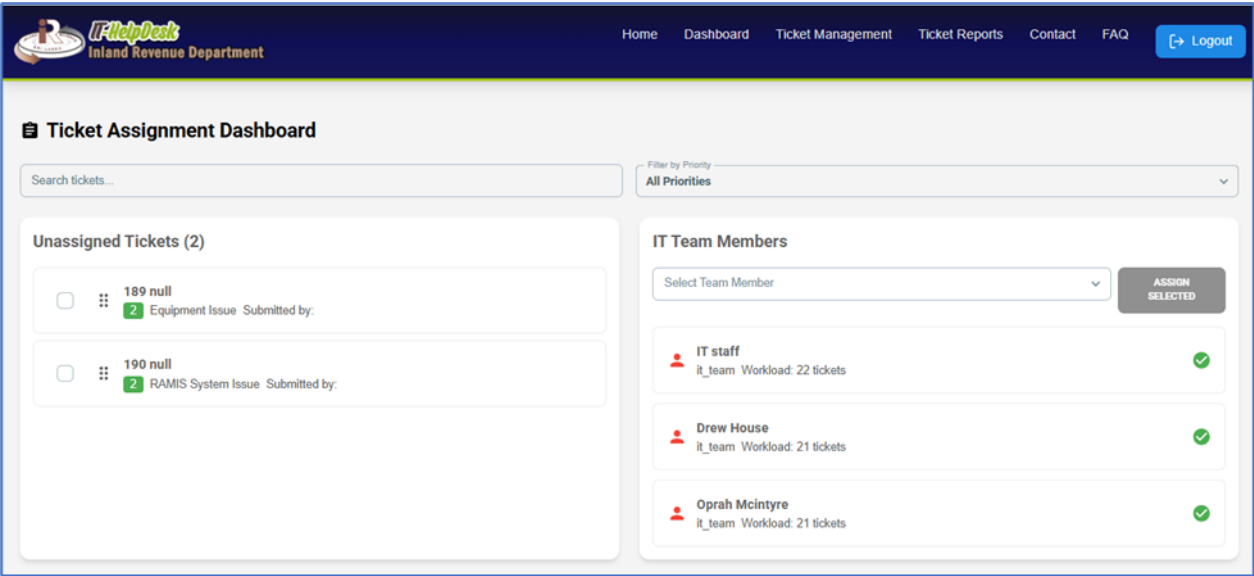


Figure B. 8 Ticket Assignment Interface of IT-HDTS

Ticket Monitoring and Management Interface

This interface provides an overview of all active and resolved trouble tickets. The IT team and administrators can track the status of tickets and ensure timely resolution. The interface of the Ticket Monitoring and Management is shown in Figure B. 8.

The screenshot shows the 'Ticket Monitoring and Management' interface. It features a 'Welcome' message and a 'Tickets Management' section. A search bar is located at the top right. Below it is a table with 8 columns: '#', 'Subject', 'Description', 'Priority', 'Status', 'Created At', and 'Actions'. The table contains 8 rows of ticket data.

#	Subject	Description	Priority	Status	Created At	Actions
1	Monitor is not working	No power	HIGH	CLOSED	24 Feb 2025, 02:18 PM	
2	Ramis system is not working	cannot change work item	HIGH	OPEN	24 Feb 2025, 02:26 PM	
3	Network Port is not working	Check the port is on wallpalate	HIGH	OPEN	28 Feb 2025, 12:10 PM	
4	Keyboard is not working		HIGH	CLOSED	02 Mar 2025, 10:19 PM	
5	Mouse is not working	Please process this job.	HIGH	OPEN	03 Mar 2025, 03:24 PM	
6	Work item cannot edit on RA...	My Emp is 5660	MEDIUM	OPEN	03 Mar 2025, 03:25 PM	
7	Check Email	Canot send outside emails.	LOW	OPEN	03 Mar 2025, 03:28 PM	
8	Key Board Issue	Process quickly	HIGH	OPEN	03 Mar 2025, 03:29 PM	

Figure B. 9 Ticket Monitoring and Management Interface of IT-HDTS

Monthly Ticket Report Interface

The system includes a reporting feature that generates monthly summaries of trouble tickets. This functionality aids in monitoring system performance and identifying recurring issues. Additionally, users can download the reports in Excel and PDF formats, enabling efficient data analysis and record-keeping. The interface of Monthly Ticket Report is shown in Figure B. 9.

ID	Issue Type	Device Category	Service Tag	Branch	Unit	User name	Assigned To	Created At
189	Equipment Issue	null				Shanthy	null	24 Feb 2025, 02:1...

Figure B. 10 Monthly Ticket Report Interface of IT-HDTS

User Management Interface

The user management interface allows the IT In-Charge to view, update, and delete user accounts. This functionality ensures that access to the system remains controlled and up to date. The interface of User Management is shown in Figure B. 10.

#	Profile	Name	Email	Role	Status	Created At	Actions
1	S	staff33	staff3@email.com	Staff	INACTIVE	17 Dec 2024, 03:16 PM	
2	S	staff2	staff2@email.com	Staff	INACTIVE	17 Dec 2024, 03:17 PM	
3	IS	IT staff	reyanson4222@gmail.com	IT Team	ACTIVE	07 Jan 2025, 11:37 AM	
4	ID	IT Director	itdirector@gmail.com	IT Director	ACTIVE	07 Jan 2025, 11:38 AM	
5	IT	IT team	it-incharge@gmail.com	IT In Charge	ACTIVE	07 Jan 2025, 11:40 AM	
6	AS	account staff	accountstaff@gmail.com	Account Staff	ACTIVE	07 Jan 2025, 11:43 AM	
7	SS	supply staff	supplystaff@gmail.com	Supply Staff	ACTIVE	07 Jan 2025, 11:46 AM	
8	DH	Draw House	john@gmail.com	IT Team	ACTIVE	07 Jan 2025, 11:47 AM	

Figure B. 11 User Management Interface of IT-HDTS

IT Director Access:

IT Director Dashboard

The IT Director dashboard provides a high-level overview of the system's performance. It allows the IT Director to monitor the overall progress of trouble ticket resolutions without making direct modifications to the system.

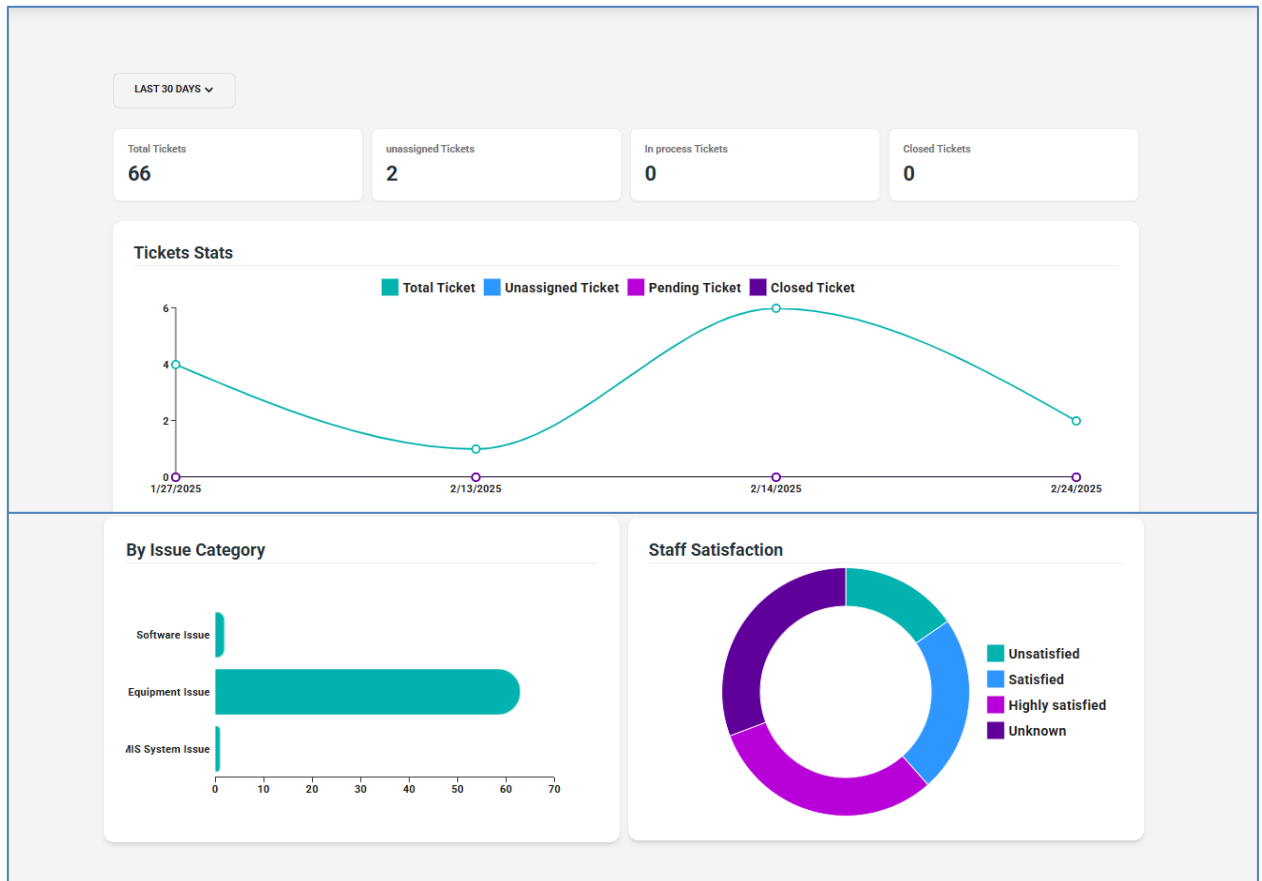


Figure B. 12 IT Director Dashboard Interface of IT-HDTS

Supply Division Staff Access:

Supply Division Staff Dashboard

The Supply Division Staff dashboard facilitates the management of device information within the system. Staff members can add, update, and remove device records as needed.

Device Registration Interface

This interface allows Supply Division Staff to register new devices by entering details such as the device model, serial number, and operational status. The interface of Device Registration is shown in Figure B. 13.

The screenshot shows the 'Device Information Form' within the IT-HelpDesk Inland Revenue Department interface. The form is organized into two columns. The left column contains fields for 'Device Type', 'Model', 'Service Tag', and 'Warranty Period'. The right column contains fields for 'Device Brand', 'Serial No', 'Purchase No', and 'Supplier'. At the bottom, there are two more fields: 'Purchase Date' (with a date picker icon) and 'Purchase Cost'. A 'COMPLETE ALL FIELDS' button is located at the bottom center of the form.

Figure B. 13 Device Registration Interface of IT-HDTS

Service Company Registration Interface

This interface enables Account Branch Staff to register new service providers by entering company details such as name, contact information, and service specialization. The interface of Service Company Registration is shown in Figure B. 14

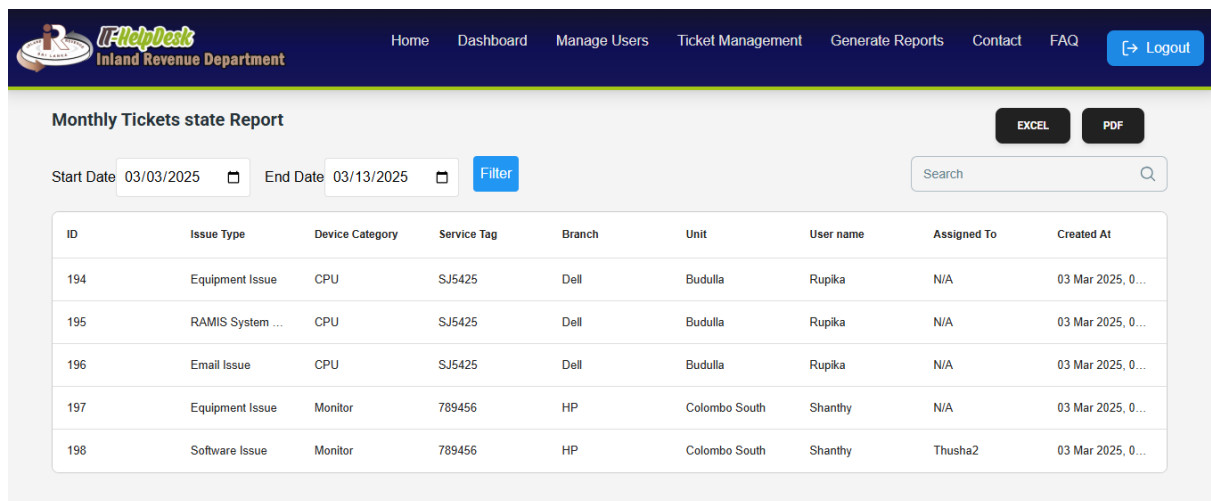
The screenshot shows the 'Add Service Company Details' form within the IT-HelpDesk Inland Revenue Department interface. The form is organized into two columns. The left column contains fields for 'Company ID', 'Address' (with a placeholder 'Enter Company Address'), 'Phone', and 'Model'. The right column contains fields for 'Company Name', 'Email', 'Device Type', and 'Serial No'. At the bottom, there are two more fields: 'Service Start Date' and 'Service End Date', both with date picker icons. A 'COMPLETE ALL FIELDS' button is located at the bottom center of the form.

Figure B. 14 Service Company Registration Interface of IT-HDTS

Appendix C – MIS Reports

MIS Reports (Management Information System Reports) provide structured and data-driven insights for decision-making. These reports help track system performance, user activities, and key business metrics.

Following Figure C.1 shows the "Monthly Tickets State Report" from the IT Help Desk system for the Inland Revenue Department. It includes a date filter for selecting a start and end date, along with a table displaying ticket details such as ID, Issue Type, Device Category, Service Tag, Branch, Unit, Username, Assigned To, and Created At. The report also features options to export data in Excel or PDF formats and a search bar for filtering results.



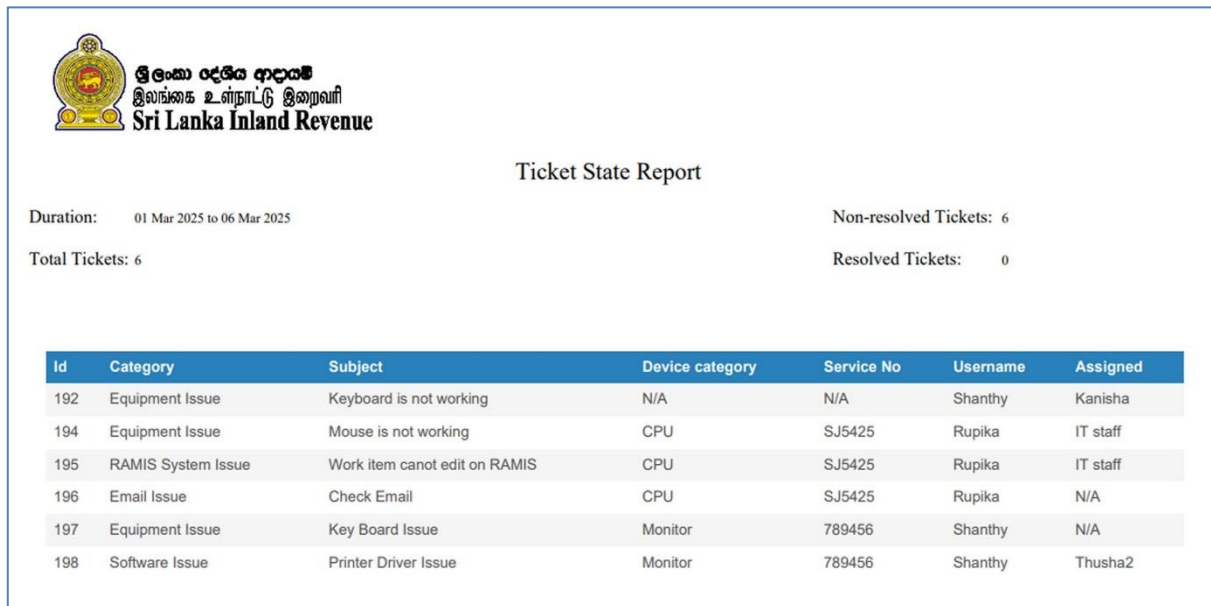
The screenshot displays the IT Help Desk interface for the Inland Revenue Department. The top navigation bar includes links for Home, Dashboard, Manage Users, Ticket Management, Generate Reports, Contact, and FAQ, along with a Logout button. The main section is titled "Monthly Tickets state Report" and features a date filter with "Start Date" (03/03/2025) and "End Date" (03/13/2025) fields, a "Filter" button, and a search bar. Below the filter, there are "EXCEL" and "PDF" export buttons. A table lists ticket details with columns: ID, Issue Type, Device Category, Service Tag, Branch, Unit, User name, Assigned To, and Created At. The table contains five rows of data.

ID	Issue Type	Device Category	Service Tag	Branch	Unit	User name	Assigned To	Created At
194	Equipment Issue	CPU	SJ5425	Dell	Budulla	Rupika	N/A	03 Mar 2025, 0...
195	RAMIS System ...	CPU	SJ5425	Dell	Budulla	Rupika	N/A	03 Mar 2025, 0...
196	Email Issue	CPU	SJ5425	Dell	Budulla	Rupika	N/A	03 Mar 2025, 0...
197	Equipment Issue	Monitor	789456	HP	Colombo South	Shanthi	N/A	03 Mar 2025, 0...
198	Software Issue	Monitor	789456	HP	Colombo South	Shanthi	Thusha2	03 Mar 2025, 0...

Figure C. 1 Monthly Tickets State Report Interface of IT-HDTS

PDF View Report

Following Figure C.2 displays a structured report in **PDF format**, likely containing tabular data or graphical summaries of MIS-related information.

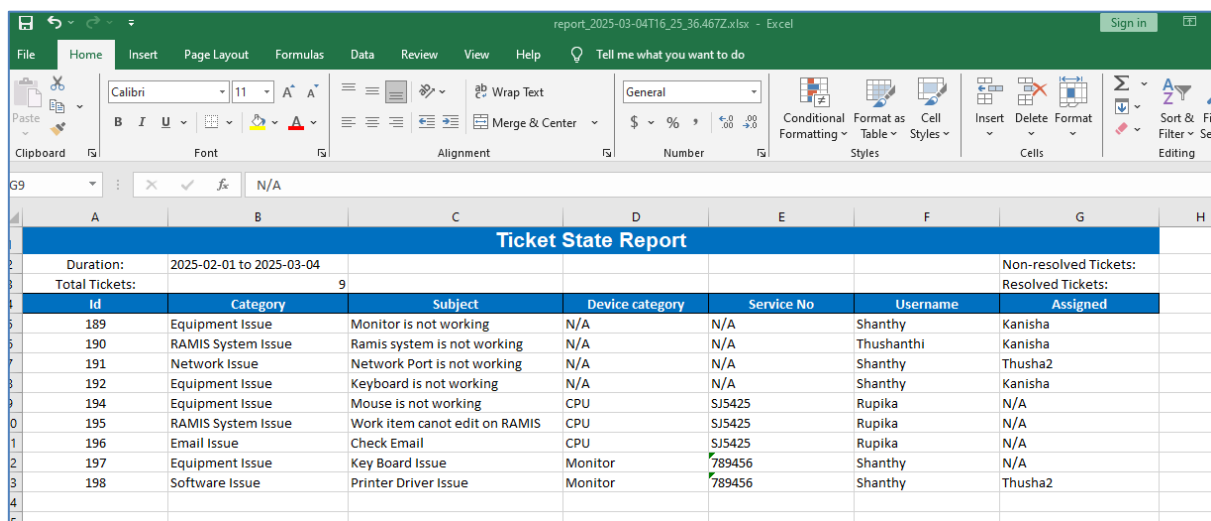


Ticket State Report						
Duration: 01 Mar 2025 to 06 Mar 2025						
Total Tickets: 6						
Non-resolved Tickets: 6						
Resolved Tickets: 0						
Id	Category	Subject	Device category	Service No	Username	Assigned
192	Equipment Issue	Keyboard is not working	N/A	N/A	Shanthly	Kanisha
194	Equipment Issue	Mouse is not working	CPU	SJ5425	Rupika	IT staff
195	RAMIS System Issue	Work item cannot edit on RAMIS	CPU	SJ5425	Rupika	IT staff
196	Email Issue	Check Email	CPU	SJ5425	Rupika	N/A
197	Equipment Issue	Key Board Issue	Monitor	789456	Shanthly	N/A
198	Software Issue	Printer Driver Issue	Monitor	789456	Shanthly	Thusha2

Figure C. 2 PDF View Report Interface of IT-HDTS

Excel View Report

Following Figure C.3 shows the MIS data in Excel format, possibly with tables, filters, and formulas for data analysis.



Ticket State Report						
Duration: 2025-02-01 to 2025-03-04						
Total Tickets: 9						
Non-resolved Tickets: 9						
Resolved Tickets: 0						
Id	Category	Subject	Device category	Service No	Username	Assigned
189	Equipment Issue	Monitor is not working	N/A	N/A	Shanthly	Kanisha
190	RAMIS System Issue	Ramis system is not working	N/A	N/A	Thushanthi	Kanisha
191	Network Issue	Network Port is not working	N/A	N/A	Shanthly	Thusha2
192	Equipment Issue	Keyboard is not working	N/A	N/A	Shanthly	Kanisha
194	Equipment Issue	Mouse is not working	CPU	SJ5425	Rupika	N/A
195	RAMIS System Issue	Work item cannot edit on RAMIS	CPU	SJ5425	Rupika	N/A
196	Email Issue	Check Email	CPU	SJ5425	Rupika	N/A
197	Equipment Issue	Key Board Issue	Monitor	789456	Shanthly	N/A
198	Software Issue	Printer Driver Issue	Monitor	789456	Shanthly	Thusha2

Figure C. 3 Excel View Report Interface of IT-HDTS

Dashboard Report

Following Figure C.4 shows the graphical representation of key MIS metrics, potentially including charts, graphs, and summaries for decision-making.

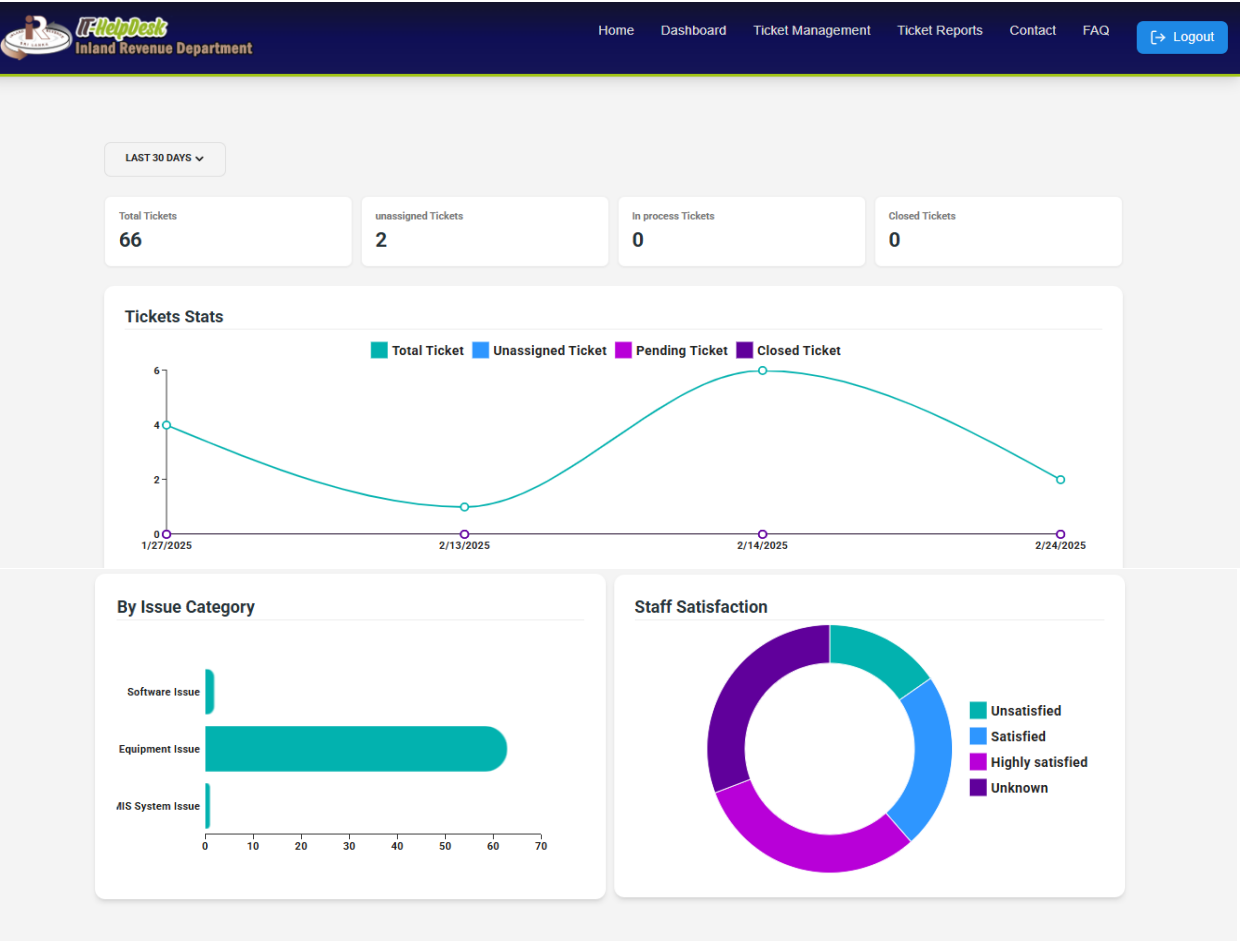


Figure C. 4 Dashboard Interface of IT-HDTS

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