

Incident Management System for People's Bank

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2021**



Incident Management System for People's Bank

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

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University of Colombo School of Computing
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Declaration

The thesis is my original work and has not been submitted previously for a degree at this or any other university/institute.

To the best of my knowledge it does not contain any material published or written by another person, except as acknowledged in the text.

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This is to certify that this thesis is based on the work of

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under my supervision. The thesis has been prepared according to the format stipulated and is of acceptable standard.

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Date: 30th Nov 2021

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Abstract

In this project, an incident management system is successfully developed for the People's Bank of Sri Lanka. The system supports providing reliable and efficient IT service to the bank staff.

A bank always faces certain situations, where an error or issue occurs, or something doesn't operate the way it was designed to be. Here the incident management comes across a way to play a vital role to fix IT services as normal as acceptable.

This incident management system is easy to use and help incident reporting, open for changes and statistics collecting for those with the appropriate authority. Any employee of People's Bank would be able to submit an incident report which the system will notify the incident response at the IT department of the bank to assign the ticket to the relevant parties to solve the problem. The system can gather data and statistics regarding incidents which can be applied as decision support.

This system supposes to be implemented using Apache tomcat, MySQL, JSF, jasper reports and java technology on-site. Since the system is designing to be portable, it can be easily implemented on other banks as well.

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Chapter 1 - Introduction

1.1 Project Overview

An incident is a sudden disturbance that affects or lowers the quality of service. Incident management is an IT service management process that is the corrective measures undertaken by an organization in case of a difficult situation.

An incident management system is the mixture of tools, employees, methods, and communication that operate together in an interruption to recognize and react to the situation as quickly as possible.

1.2 Motivation

In this context, incidents that include application failures, hardware failures such as automated teller machine (ATM) breakdowns, network failures or other IT related service failures; typically cause a significant negative impact on the regular customer service.

According to the People's bank statistics (2021), retail and corporate banking services, with a network of 739 local branches, service centres and has an asset base of LKR 1.873 trillion with over 14 million customers are maintaining. It is vital to have a sophisticated and reliable incident management system to provide efficient and reliable customer service, which reduces the communication gaps between related entities when any problem occurs.

From the people's bank point of view, an incident management system is capable of providing valuable information such as statistics of occurrences specific service or a subject.

Having an incident management system will aim to restore the normal service operation more efficiently by minimizing the negative impact on the business.

1.3 Aims and Objectives

The objectives of the project are to:

- Enhance visibility and communication of incidents to the firm and IT support staff.
- Collaborate effectively to solve the issue faster as a team and eliminate barriers that prevent them from sharing and collaborating.
- Ensure that standardized methods and procedures are used for the efficient and prompt response, analysis, documentation, ongoing management and reporting of incidents.

- Maintain a knowledge management module to minimize the average time service teams take to resolve an incident, from when it was initially reported.
- Line Up incident management actions and priorities them.
- Maintain user satisfaction with the quality of IT service.

1.4 Background of study

As per the Rave Mobile Safety (2021), an incident management system can be defined as *‘An incident management system is a combination of equipment, personnel, procedures, and communications that work together in an emergency to react, understand and respond. Each of the four factors is necessary for an incident management system to be effective.*

Implementation of a proper incident management system always leads to greater efficiency and maximum utilization of organizational resources (Travaglia, 2009). Also, it would improve or enhance the user’s and consumers’ satisfaction (Anderson, 2004). On the other hand, a sound incident management system allows to eliminate or reduce incorrect or irrelevant service requests and incidents (Jensen & Youngs, 2015). This project is going to develop an incident management system for the People’s Bank of Sri Lanka.

The People's Bank is a state-owned commercial bank in Sri Lanka and the bank provides both retail and corporate banking services, with a network of 739 local branches, service centres and has an asset base of LKR 1.873 trillion with over 14 million consumers (People’s Bank, 2021).

In this current situation, there is no proper incident management system in the bank, all the incidents are managed through telephone conversations and email communications and incidents record in excel sheets. This project is to give a solution to this situation effectively and reliably, to provide the best customer service.

1.5 Scope of study

The project scope includes the entire life cycle of an incident. There are six main user levels involve in this system: employee, incident response team, unit head, team member, system admin and the management level. The employee can be any bank staff member from the branch network.

This cycle can be triggered when an employee reports an issue. Once the incident is reported, the incident ticket is generated by the system. The incident response team may notice the

incident by the incident management system and assign it to the relevant parties (Units). The unit head views the incident ticket and assigns it to his team member. Then team member resolves the incident ticket and forwards it to the unit head with his feedback of the incident. If there is any dependency to resolve the incident, the system will provide a facility to mention that. Once the incident response team may notice the resolved incidents, they check the incident status with the incident creator and close or reopen the incident.

All incidents log as incident records, where their status and time can be traced, and a full historical record maintained. Preliminary classification and ranking of the incident that maintain for deciding how the incident would be handled and how much time is needed for its resolution.

There are three incident support levels available in this system.

- By using information from a knowledge base or pre-defined incident models users can resolve simple incidents themselves
- Incident resolved by the internal support team
- The incident escalates to an appropriate third party (vendor) via system generated email.

The system modules will be categorized as follows.

Transaction module -:

- Incident handling
- FAQ management
- Incident request notification and alert workflow
- Vendor management
- Incident status explore

Admin module -:

- Unit and team member management
- User management

Report module

1.6 Structure of the dissertation

This report has been structured into six main chapters, each representing on different aspects of the system.

- Chapter 1-: Describes an introduction and overview of the project.
- Chapter 2: Describes about currently available similar systems, background and requirement analysis of the project.
- Chapter 3: Describes the system design architecture of the project.
- Chapter 4: Contains the detailed explanation of the system implementation and methodologies, strategies and techniques used to develop the application.
- Chapter 5: Provides the testing and evaluation process of the system.
- Chapter 6: This is the conclusion of the project and it describes summary of the result of the project and future works.

Chapter 2 - Background

2.1 Introduction

This chapter will cover the fundamental part of the background: requirement analysis, related technologies, design strategies and existing systems.

The requirement analysis is an elaboration of the user expectation of the application. It contains analysis, records and validates the system requirements as the main tasks.

The similar systems section includes some information about the existing applications. The related technology section will describe what sorts of technologies are used in existing systems. As the final part, this chapter will describe design strategies used in selected existing applications and the proposed application.

2.2 Requirement Analysis

This section describes the basic overview of the functional requirements of the application. It will help readers to get a basic idea about the system.

The functional requirements of the project include as follows:

1. Incident request notification and alert workflow -: An employee can make an incident request via the system. Each request has request-id, request type, requested location, date, time and more details. Once the incident is reported, the incident ticket is generated by the system. Throughout the incident life cycle, its status and time will be maintained by the system. The status of the incident will be open, in progress, closed and reopen. The incident report team will be notified of the incident through the system and then the incident report team member should be assigned the incident request to the relevant unit. The unit head should be accepted that request and assigned it to his team member for further processing.
2. FAQ maintain -: FAQs are pre-defined solution models for each incident type. Solution makers can add his or her tested solutions to this model. The pre-defined solutions will be triggered by the system when the user reports an issue. Therefore, users can resolve some simple incidents by themselves.
3. The vendor maintains -: The system maintains a list of vendors of the People's Bank. Users can add or update and remove these details.

4. Unit and team member maintain -: The system maintains unit, head of the unit and team member details. Admin level users will be able to add, update and remove those detail.
5. Reports generation -: Management and daily reports are available.
6. System notifications -: System notification and alert function available for the pending requests and new feedbacks (FAQs).
7. Email generation -: System-generated email function available to communicate with third-party vendors.
8. User dashboard
9. Incident log

Other than the functional requirements, the *non-functional requirement* of the project includes as follows,

1. Performance and scalability – To achieve this, consider how fast does the system return result and how much will the performance change with a higher workload.
2. Reliability and availability – The system will be available 24/7/365 to achieve high reliability and availability.
3. Usability – The interactive user interfaces will be designed to achieve high usability.
4. Security – Access control mechanism will be used for data security.

2.3 Review of Similar Systems

When reviewing the top-rated incident management solutions that exist in the market, the below products can be identified (dnsstuff, 2020).

1) SolarWinds Service Desk

Solar Winds Service Desk maintains a single platform where it can accept requests from various mediums like phone-based, email-based, web-based etc. This offers a free functional free trial for one month and commercial pricing starts at US \$ 228 per user/agent for a year (Incident Management Software | Remote Ticketing System SolarWinds ITSM, 2021).

2) ServiceDesk Plus

Service desk plus comes with three levels to match the right features for any business.

- Standard: This is the basic version of the software to get teams started.
- Professional: These versions consist of asset management and help desk features.

- Enterprise: In these additional features are there to cover ITIL processes.

Apart from the Incident management functionalities, this can automatically assign tickets to members based on their expertise. Furthermore, this solution has service level agreement tracking and supports escalations, therefore it prevents SLA violations.

3) JIRA Service Desk

This application designs for the banking sector. Hence information security is the major concern of the application. It is possible to use a common issue management system like JIRA and Bugzilla, but they are much open for database administrators and do not satisfy the security concerns (atlassian.com, 2021).

4) Mantis BT

Both Mantis BT and Pager Duty provide an incident response platform for IT firms. Mantis BT is an open-source web-based bug tracking tool and Pager Duty is a commercial tool (mantisbt.org, 2021). Both tools support DevOps teams to create reliable and high-performing applications.

5) OpsGenie

Opsgenie is a modern incident management program for operating always-on services, encouraging development, and operation teams to plan for service disruption and remain in control during the incident (atlassian.com, 2021). With over 210 deep integrations and an extremely adaptable rules engine, Opsgenie centralizes alerts, warns the right people reliably, and facilitates them to collaborate and take instant action. Throughout the whole incident development, Opsgenie tracks all activity and gives actionable visions to enhance productivity and run continuous operational efficiencies.

Features of the Opsgenie:

- Incident management
- Action mapping and reliable alerting
- On-call management and escalation
- Real-time incident event tracking
- Post-incident analysis and reporting

6) PagerTree

PagerTree is another incident management system that simplifies the on-call process by producing it easy to schedule variations, route new incidents and warn the right team members every time (pagertree.com, 2021).

Features of the PagerTree:

- On-call management and escalation
- Real-time notification
- Incident management

Opsgenie and PagerTree systems have all the required main features. In addition to that, the proposed incident management system will consist of a separate knowledge management module (FQA module). It is one of the main requirements of the system, and it has some customized reports also.

Moving further, ServiceDesk Plus is a helpdesk and assets management software that provides a console to monitor and maintain the assets and IT requests. ServiceDesk Plus offers a free trial version and commercial pricing starts at \$495 per year.

This application designs for the banking sector. Hence information security is the major concern of the application. It is possible to use a common issue management system like JIRA and Bugzilla, but they are much accessible for database administrators and do not satisfy the safety concerns (atlassian.com, 2021).

MySafeWorkPlace is a web-based incident management system. It is supporting a wide range of incident categories. Some of them are accounting errors, discrimination, and sabotage. This system is too common and does not offer enough security. As an independent website, it would be complex to integrate it into the bank intranet.

	Free Trial?	Top Features			Bottom Line
SolarWinds Web Help Desk	14-Day	SLA monitoring	Parent-child incident relationships	Automated device discovery	A comprehensive, user-friendly solution that goes well beyond help desk functionality
ManageEngine Service Desk Plus	30-Day	Knowledge base	Customized workflows	SLA tracking	An extended service desk solution that is available on-premises or in the cloud
SolarWinds Service Desk	30-Day	Supports ITIL processes	In-depth dashboards	Automation and machine learning	An award-winning, cloud-based system designed for ITIL processes
Spiceworks Help Desk	Free Tool	User-friendly interface	Real-time alerts	Integration with other systems	A user-friendly support solution with incident tracking and add-on integrations
Freshservice	21-Day	Automatic incident routing	SLA monitoring	Multi-channel ticket entry	A powerful cloud-based service desk that's easy to install and use
JIRA Service Desk	7-Day	Automated rules	Self-service portal	Integration with analytics tools	A popular service desk with a focus on simplifying the user's experience
OpsGenie	14-Day	Multi-channel alerts	Alert enrichment	Custom dashboards	A robust incident-tracking and alerting tool that supports multiple integrations
VictorOps	14-Day	Built-in conferencing tool	Timeline of incident	Context-rich notifications	A well-known incident management tool designed to meet the needs of DevOps
PagerDuty	14-Day	Useful dashboards	Stakeholder updates	Automatic	A leading incident management tool that supports customization and integrations
Zendesk Suite	30-Day	Help centre	Answer bot feature	Multi-channel ticket entry	An extended help desk solution with a focus on customer service

Table 0-1: Best Incident Management Software Tools

Source: (dnsstuff, 2020)

2.4 Related Technologies

Opsgenie system is a large scale alerting and incident response tool. It ensures the actionable and reliable alerting and notification service with the help of machine learning and AI technologies. Opsgenie provides deep integrations most popular chat tools, so the user can take action and collaborate easily. In addition to that, it is combined with a flexible rules engine.

PagerTree is an on-call management tool. It streamlines the on-call management process. It uses a separate module called PagerTree forms. PagerTree forms are simple and easy to use, customers can quickly create an alert outside the PagerTree system (Austin, 2020). Those forms support custom CNAMEs so the user can host them on their domain. This CNAMEs option is secured via HTTPS. Other than this PagerTree system support some chatbot services including Microsoft Teams, Google Hangouts chat and Mattermost

MySafeWorkPlace is an anonymous incident reporting system. From an internet connection or telephone, the user can provide details of the incident to the system. A reporter has the choice to remain anonymous or reveal his identity. This system uses SSL encryption technology to encrypt the report and the identity of the reporter (MySafeWorkplace, 2012).

2.5 Related Design Strategies

Opsgenie and PagerTree systems used a structured design strategy, because both systems have a combination of different components: action mapping and alerting, on-call management and escalating and advance reporting and analysis. These modules are arranged in a hierarchy, and there is strong communication among those components. So, these systems have high cohesion and low coupling arrangement.

On the other hand, Opsgenie and PagerTree systems are structured as three-tier client/server architecture. These are highly scalable applications with massive data loads. These applications get all inputs from the presentation layer, and the application layer handles and process all input data. Furthermore, these systems store some data in the database layer for reporting purposes.

As mentioned about the similar systems, the module based structured design strategy is used for the proposed incident management system. It gives a better understanding of how the problem is being solved. Other than that, it designs as a web-based application. Therefore, it

will structure as three-tier client/server architecture. Java frameworks and MySQL database will use for the project implementation.

2.6 Quality of the Solution

The quality of a solution is a key element when it comes to brand new software development. It is vital to carry out an extensive study about both failed and successful solutions which are in the market, along with its all factors. Therefore, understanding the quality solution quality should be done in a very high standard approach and it should be tested and verified whether the objectives are met at the end of the project.

This software development aimed to provide a solution by joining all the features of existing incident management systems (IM) and implement some new features. This integration will work as one brand new piece of software solution for the incident management system of the People Bank. In this, various existing software features should be critically evaluated and compared (Bashir, Amanullah and Soomro, 2021).

Apart from the currently available features of the other software's we can highlight below,

- An extra layer of security for the banking sector where they can host the database within their virtual private network (VPN).
- Real-time GPS based tracking system for ATM repairs.
- Direct notification of related parties to remind SLA breaches.
- Centralised & branch-based access level for data.

The main positive factor of the solution would be the cost. As per the bank's requirement, this will be a one-time cost and there will be no monthly hosting or licence fee. People bank expects huge savings by investing in this IM project which can be recovered in less than one year.

Cyber-attacks are the number one threats for banks, some data breaches are identified only after many years, therefore the security aspect is a critical element for a bank to protect the data. To overcome the issue, the bank has decided to provide VPN level security measures.

2.7 Feasibility study

A feasibility study is the principal aspect of any new system. It shows the analysis and evaluation of the proposed application. The main concern of this study is to determine whether or not the project is technically and operationally feasible.

Technical feasibility -: The incident management system is a complete web application. The main technologies are,

- Java
- JavaScript
- JSF and PrimeFaces
- MySQL database
- Spring and Hibernate frameworks
- Eclipse IDE

These tools and technologies are freely available and required technical skills are manageable.

Business alignment -: The business alignment of the project is assessed as the key task. At the end of the project, it should be highly beneficial for the bank to provide the best customer service.

Resource and schedule concern -: This is the most important factor for concern. Therefore, pre-assessment is done regarding available resources and time. Resources that are required for the development are a laptop with required software applications. Therefore, it is not an issue about resource availability. Project scope is defined as to complete within two semesters.

2.8 Summary

This chapter mainly concerns the requirement analysis, related technologies, design strategies and review of similar systems.

The requirement analysis helped to identify user expectations, user roles and required system behaviour.

The review of a similar system was very useful to gain knowledge on the latest technologies and new features. It is also important to identify issues and drawbacks of the existing process.

Chapter 3 - Design Architecture

3.1 Introduction

This chapter presents the overall design architecture of the system: system architecture and UML diagrams

The system architecture and design are an elaboration of the key elements, relationships and how they work together with each other of the system. It includes business strategy, quality characteristics, human dynamics, layout, and IT environment as contributory factors.

System architecture and design are considered as two distinct phases: system architecture and system project. In architecture, non-functional requirements are cast. In design, functional needs are considered.

The system architecture section provides an abstraction to manage the system complexity and create the communication mechanism among components.

As the final part of this chapter, will include UML diagrams of the system; Use case diagram, class diagram and activity diagram. It provides the design plan of the system that illustrates the elements of the system, how they fit and work together to fulfil the requirement of the system.

3.2 System Architecture

This section illustrates the system architecture of the application. It will help readers to get a clear idea about the structure of the application.

IEEE defines system architecture as “the process of defining a collection of hardware and software components and their interfaces to establish the framework for the development of a computer system.” It serves as a blueprint for a system and it defines the structure, behaviour and more view of a system. The system architecture consists of a system component and subsystems that will work together to implements the overall system.

This proposed application develops as a web application. The web application consists of two main parts: web components and web container. In this context, the web component is in the form of JSP. Web components run in a web container. Tomcat is the web container for this application. It provides system services for web components.

The incident management system is implemented based on the client-server architecture. This works on the request-response model. The client sends the request to the server for the information and the server responds with the requested information. So it is clear that there

are two sides to the web application: client-side and server-side. The separate programs are running these two sides concurrently.

- The programs relate to the browser and respond to user inputs.
- The programs relate to the server and respond to HTTP requests.

In this application context, Java uses the language to develop server-side code. These server-side codes can respond to HTTP requests, are never seen by the user and creates the page the user requested.

With client-side code, languages include: HTML, CSS and JavaScript.

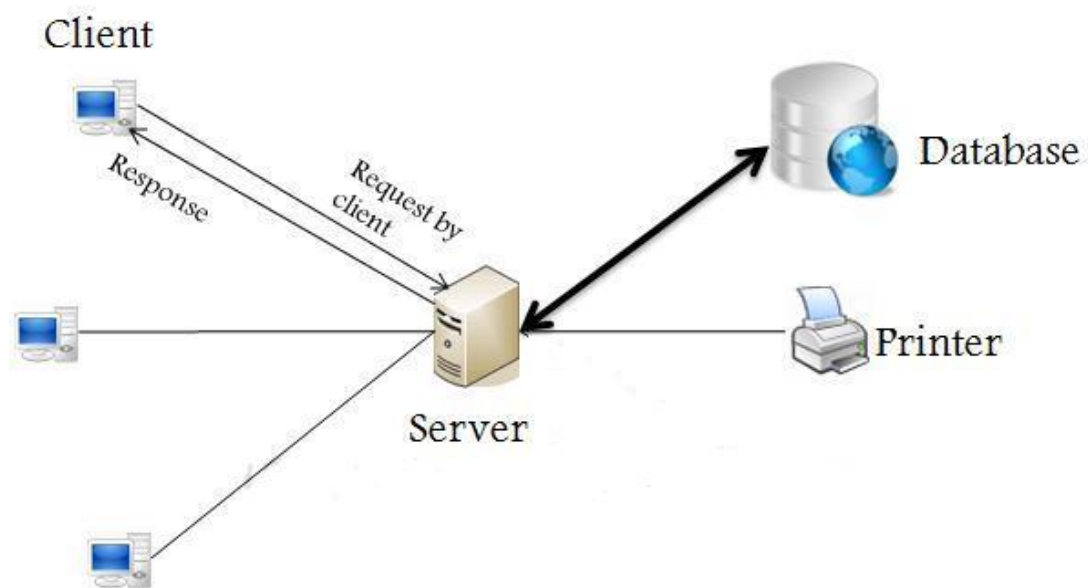


Fig. 0.1:Client Server Architecture

In addition to the client-server model, the proposed incident management application implements using the model-view-controller (MVC) web development architecture.

The MVC is a type of software development architectural pattern that separates the application into three main logical components: the model, the view and the controller. Each of these components is responsible for the handle specific development tasks. Therefore it provides high flexibility and maintainability for the application development and modifications for the project.

The incident management system is structured according to the MVC pattern as follows;

Model -: The model component responsible for all data related logic. It represents the data that is being transferred view and controller component or any other business logic related

data. This system uses MySQL as a relational database. Therefore model components interact with the MySQL database via hibernate framework to get and manipulates the data. As an example incident creator object will retrieve incident creator information from the database, manipulate it and update it.

View -: The view components are responsible for all UI logic of the application. This represents the actual view of the system. The users interact with the system via views. The incident management application uses HTML and CSS for user interaction.

Controller -: The controller component behaves like an interface between model and view. It processes all business logic and incoming requests of the application. Furthermore, it manipulates data using model components and interacts with the views to render the final output to the users. For example, the incident creator controller will handle all interactions and inputs from the incident creator view and update the database using the incident creator

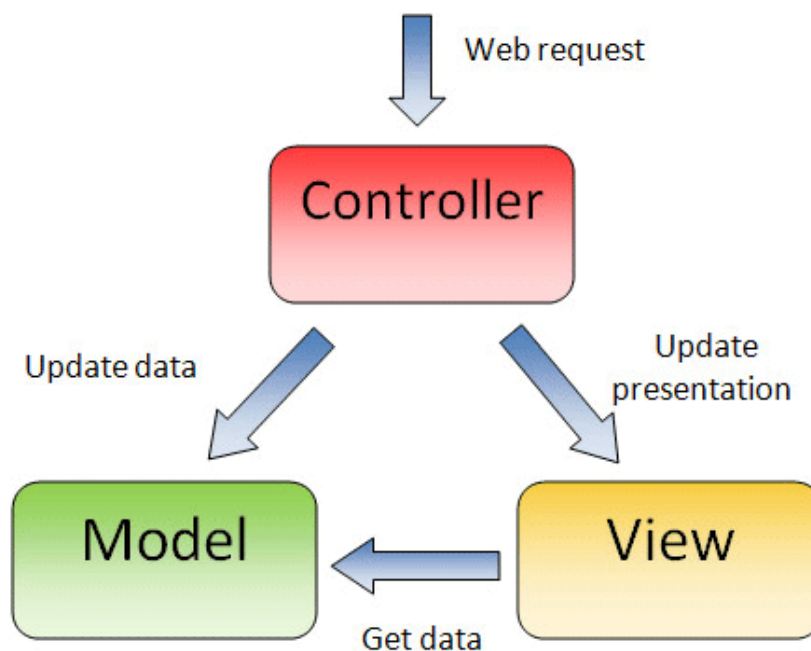


Fig. 0.2. Model – view-controller Architecture

3.3 UML Diagrams

This section describes the design architecture of the incident management application via UML (Unified Modelling Language) diagrams. These diagrams help developers to get understand modelling business process, analysis, design and implementation of complex

applications in a better and simple way. UML diagrams are categorised into two main parts: structural diagrams and behavioural diagrams. The structural diagrams represent the static aspect of the system and behavioural diagrams represent the dynamic behaviour of the application.

The following UML diagrams are used to illustrate the design architecture of the proposed incident management system.

- Use case diagram
- Class diagram
- Activity diagram
- Deployment diagram

3.3.1 Use case Diagram

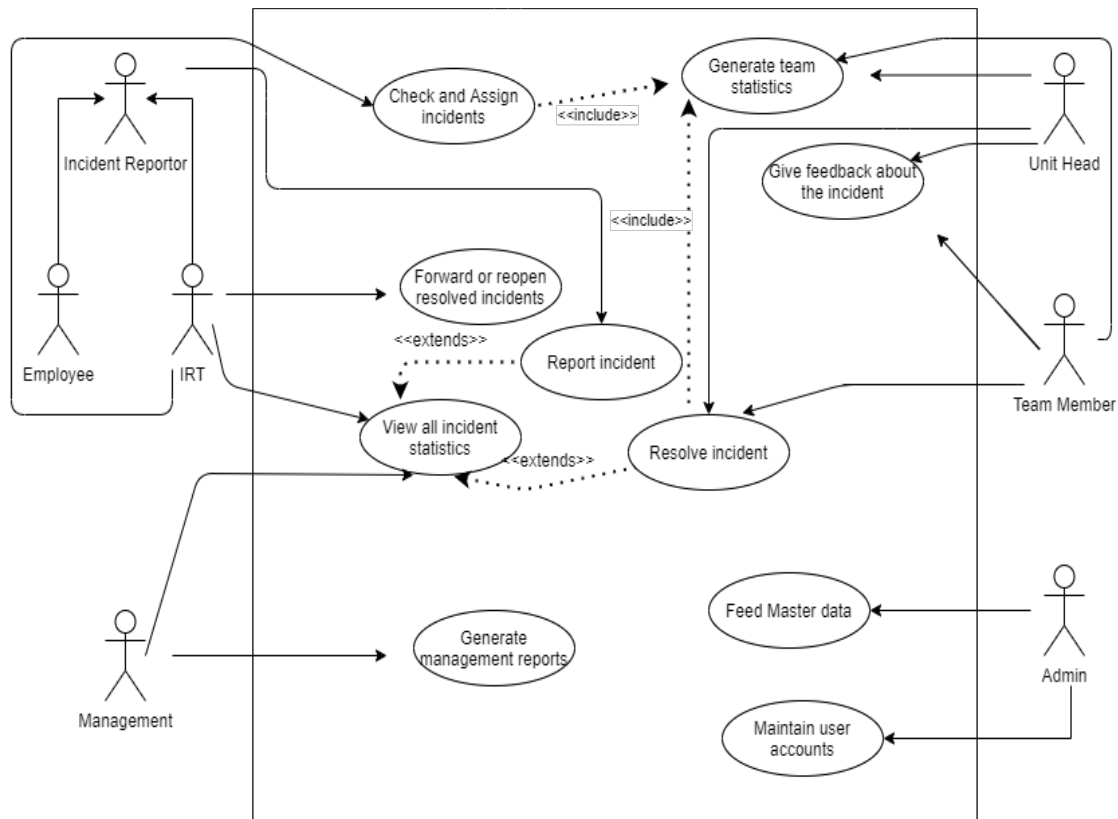


Fig. 0.3. Use case diagram

Fig.3.3 shows the actors, main functionalities and their relationships associates with the incident management system. It captures the dynamic aspects of the application and shows the events and their flow of the proposed system.

In this context, there are six actors; employee, IRT (Incident report team), unit head, team member, management staff and system administrator. There are specific functionalities or use cases for each actor.

Incident reporter -: Incident reporter can be a bank employee or IRT member. The reporting incident is the main task for him.

IRT -: IRT is responsible for the assign incidents to the relevant units and forward resolved issues status to the incident creator or reopens the unresolved issues.

Unit head -: Unit head views and assign the incident to his team members. The team member is responsible for resolve incidents. Team members maintain a feedback repository for each incident for future use.

3.3.2 Class Diagram

The class diagram is a type of static structure diagram. It describes the structure of the system by showing the system's classes, attributes, methods and relationships among classes.

The domain model of the incident management system is represented by two class diagrams. The purpose of the diagram is to show and explain the bank employee and unit structure, incidents, incident status maintenance and manage incident feedbacks.

In the diagram below incident, the creators could be associated with different locations and the location could be a branch or a department. The branch or department could employ multiple incident creators. The location class has a derived attribute address.

The branch staff and IRT (incident report team) member inherits attributes from the incident creator class other than their attributes.

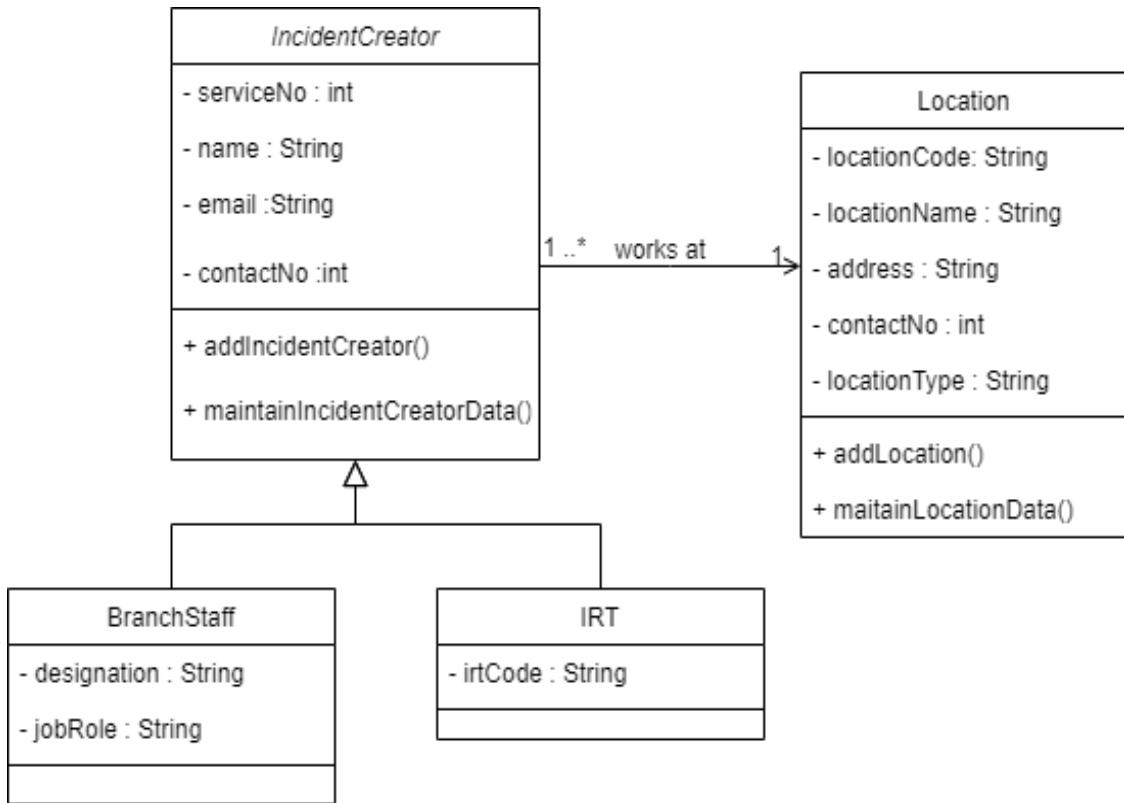


Fig. 0.4. Class diagram for the staff organization

The incident creator reports an incident. Each incident has a unique id, incident type and incident subtype. The incident may have multiple statuses. The IRT member escalates the incidents among relevant units and unit members resolve the incident ticket.

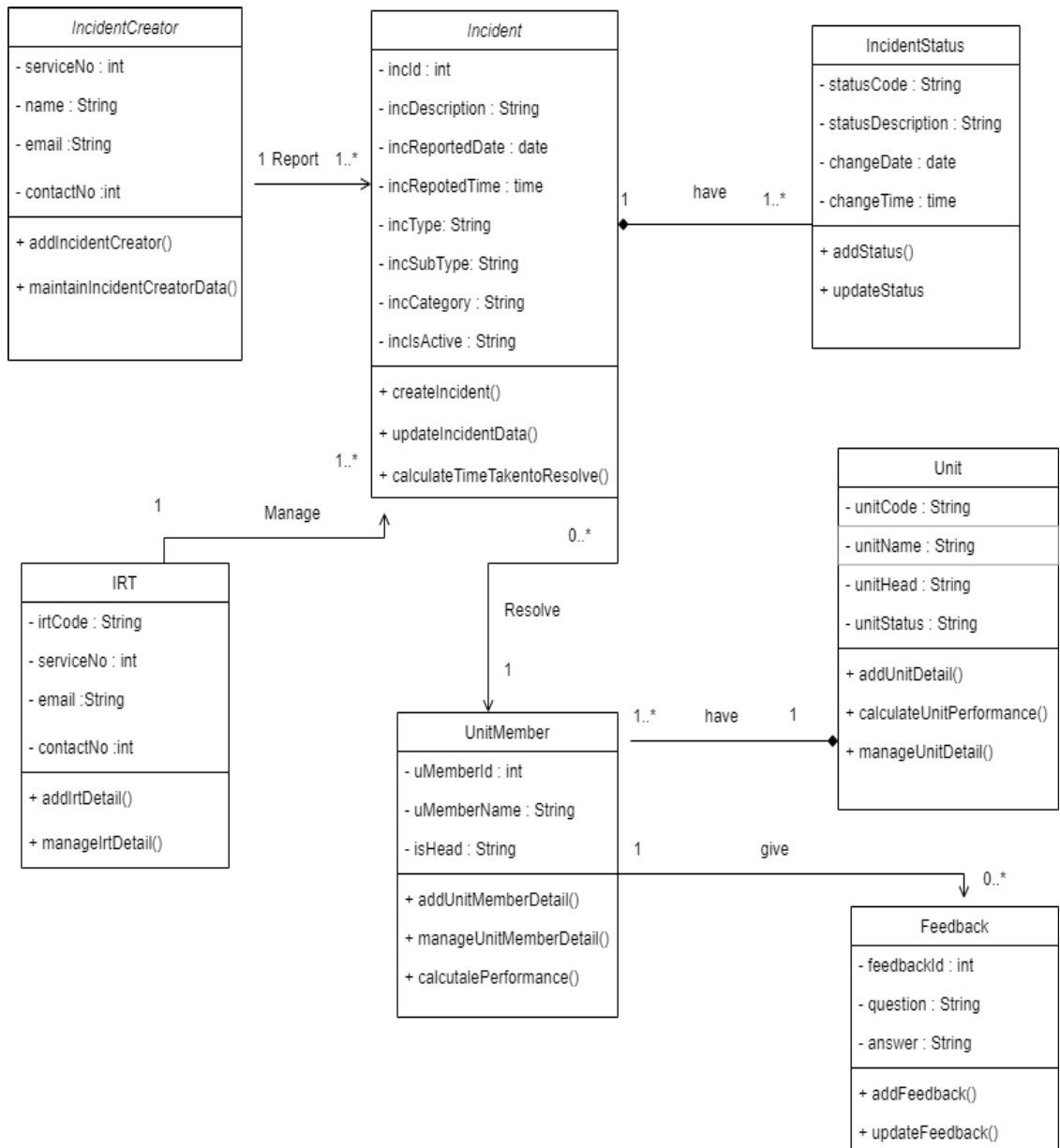


Fig. 0.5. Class diagram for the incident management

3.3.3 Activity Diagram

An activity diagram is a behavioural diagram in UML. It describes the dynamic aspect of the system. The activity diagram is an advanced version of the flow chart that modelling the activity flow from one activity to another of the incident management system.

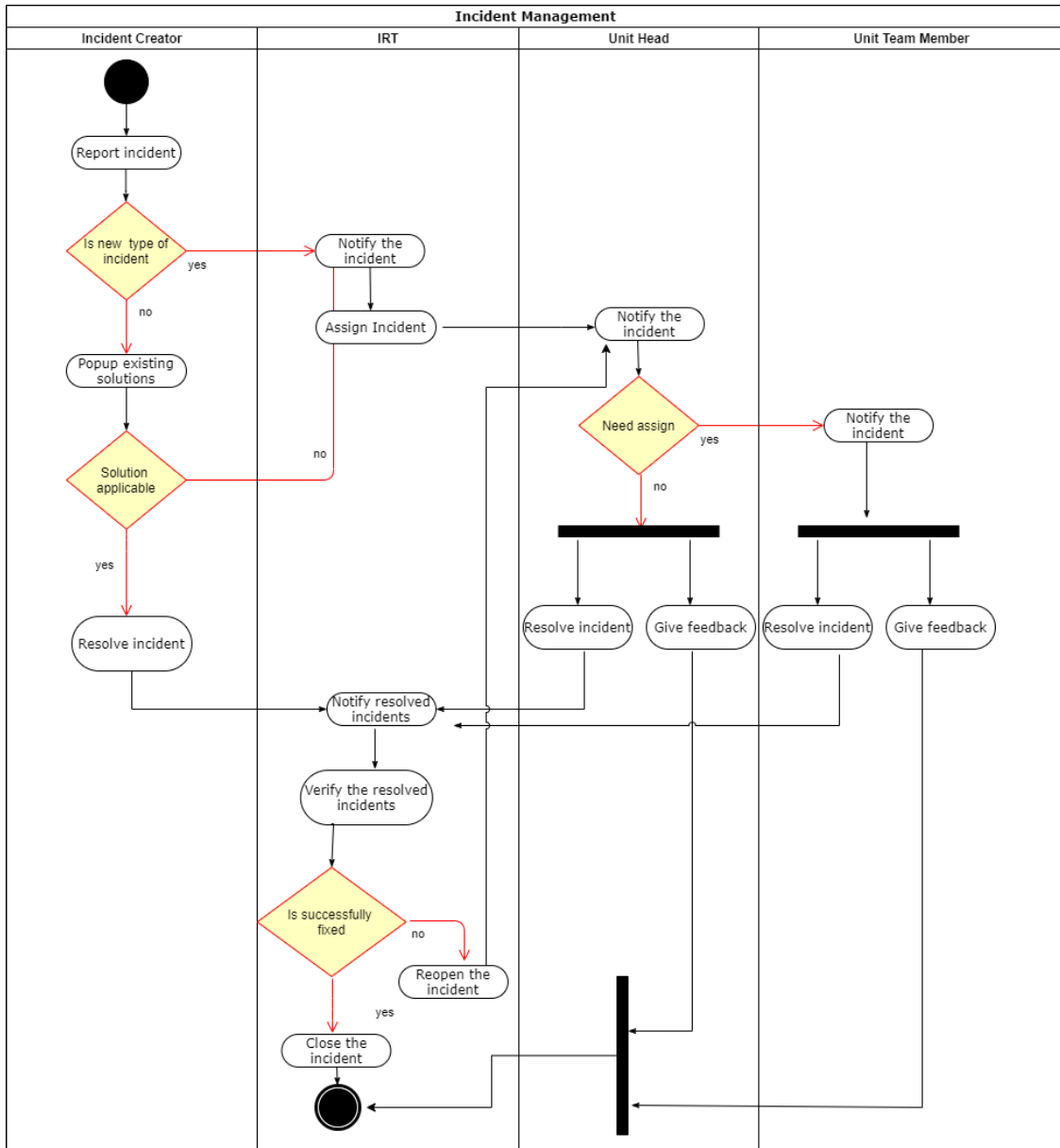


Fig. 0.6. Activity diagram for the incident management

3.4 Summary

This chapter contains the overall system design architecture of the system with its design issues. The UML diagrams used to graphically represents the event flow of the system. The design of the system is one of the most critical factors of system development. It is an advantage to get an idea about how the development team is going to achieve the task before the implementation phase.

Chapter 4 - Methodology

4.1 Introduction

This chapter will cover a detailed explanation of the methodology that is being used to project development.

The method is used to achieve the objectives of the project will accomplish a perfect outcome. To evaluate this project, the methodology is based on System Development Life Cycle (SDLC), generally three major steps, which is planning, implementing and analysis.

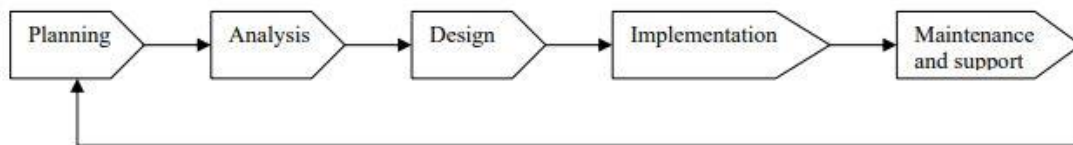


Fig. 0.1 :System Development Life Cycle

This chapter will mainly focus on the implementation phase of the system with module structure, entity relationship diagram with file structure, implementation environment and development tools and technologies.

4.2 Module Structure

The project scope includes the entire life cycle of an incident, from initial reporting to final resolution: Incident identification, Incident logging, Incident categorization, Incident prioritization and incident response.

To be in line with the above process, the system will provide the following module and functions.

<u>Module</u>	<u>Functions</u>
Admin Module	Master Data Management
	Application User Management
Transaction Module	Incident Reporting
	FAQ Management
	Incident request notification and alert workflow
	Vendor Management
	Incident status explore
Reporting Module	Generate Management Reports
	System notification

Table 0-1 . Application Module Structure

4.3 Database Design – ER Diagram

The database design is the core of the whole project implementation. Therefore, there should be a proper understanding of application data flow and where and how the information of the stakeholders will be stored.

The ER data modelling is a method used in the software development life cycle to create the conceptual data model. The primary database design was developed in a way how the data of all the stakeholders are gathered. Primarily the incident management system depends on the 4 main stakeholders: Employee, Incident Report Team, Unit and Team Members. This has clearly stated the four tables, especially for those four stakeholders. The main reason behind the utilize of core data is, the author is not interested in the backend server development. But all the basics of database design serve the purpose of the incident management system.

For the Incident Management system, the author has created the database with more than 30 tables which are shown as separately based on their functionality.

Tables with user-level access control

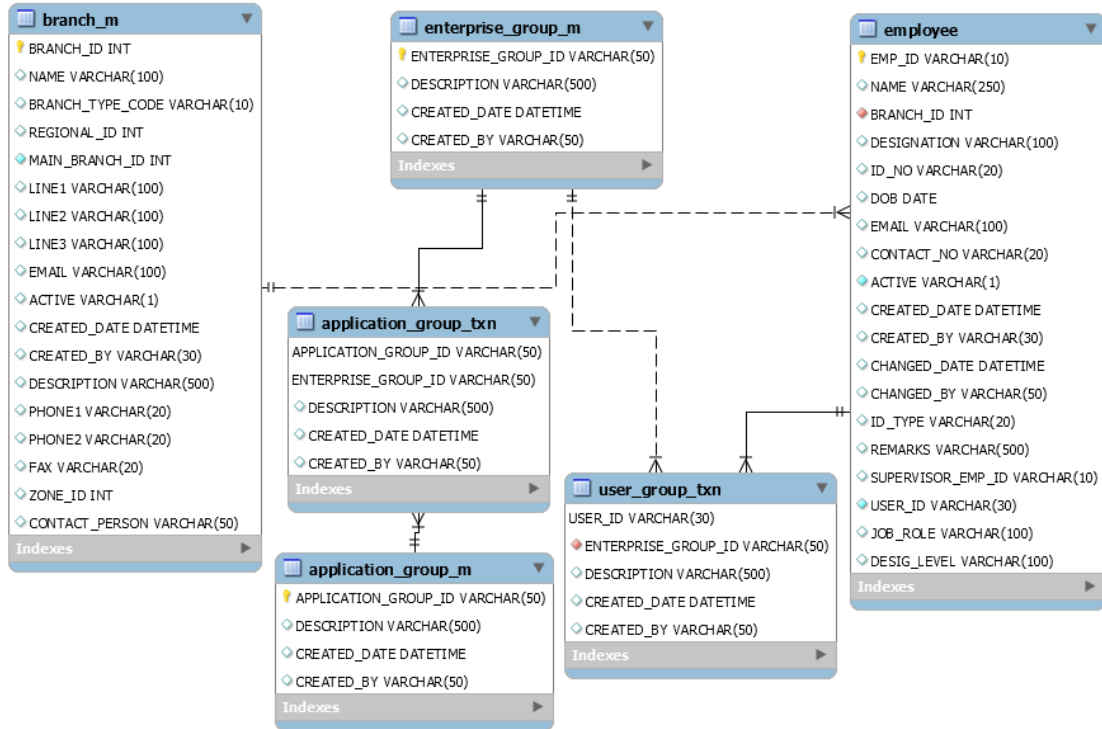


Fig. 0.2: Entity Relationship Diagram for Access Control

Tables with incident request handling

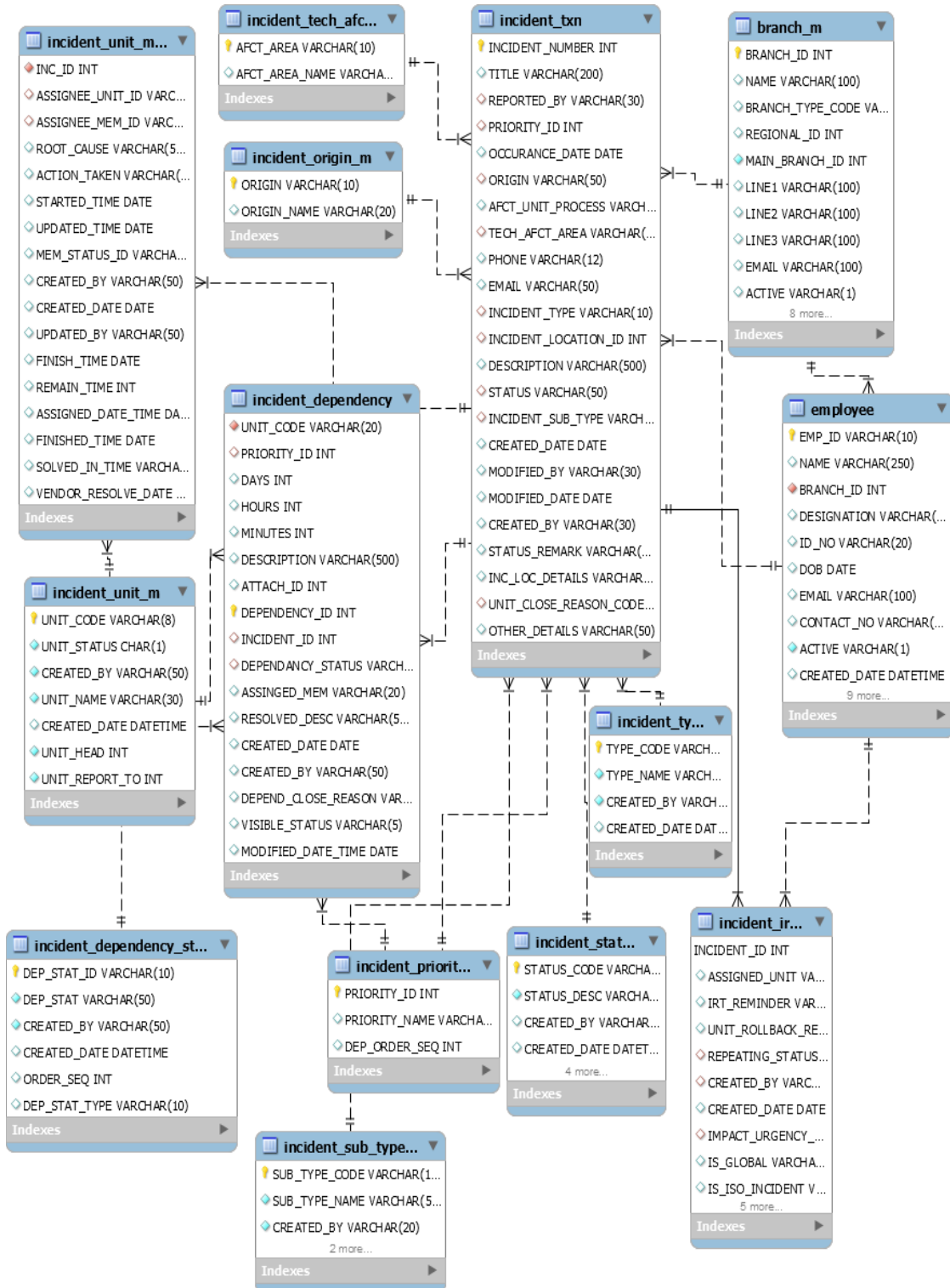


Fig. 0.3: Entity Relationship Diagram for Incident Request Handling

Tables with incident report team functionality

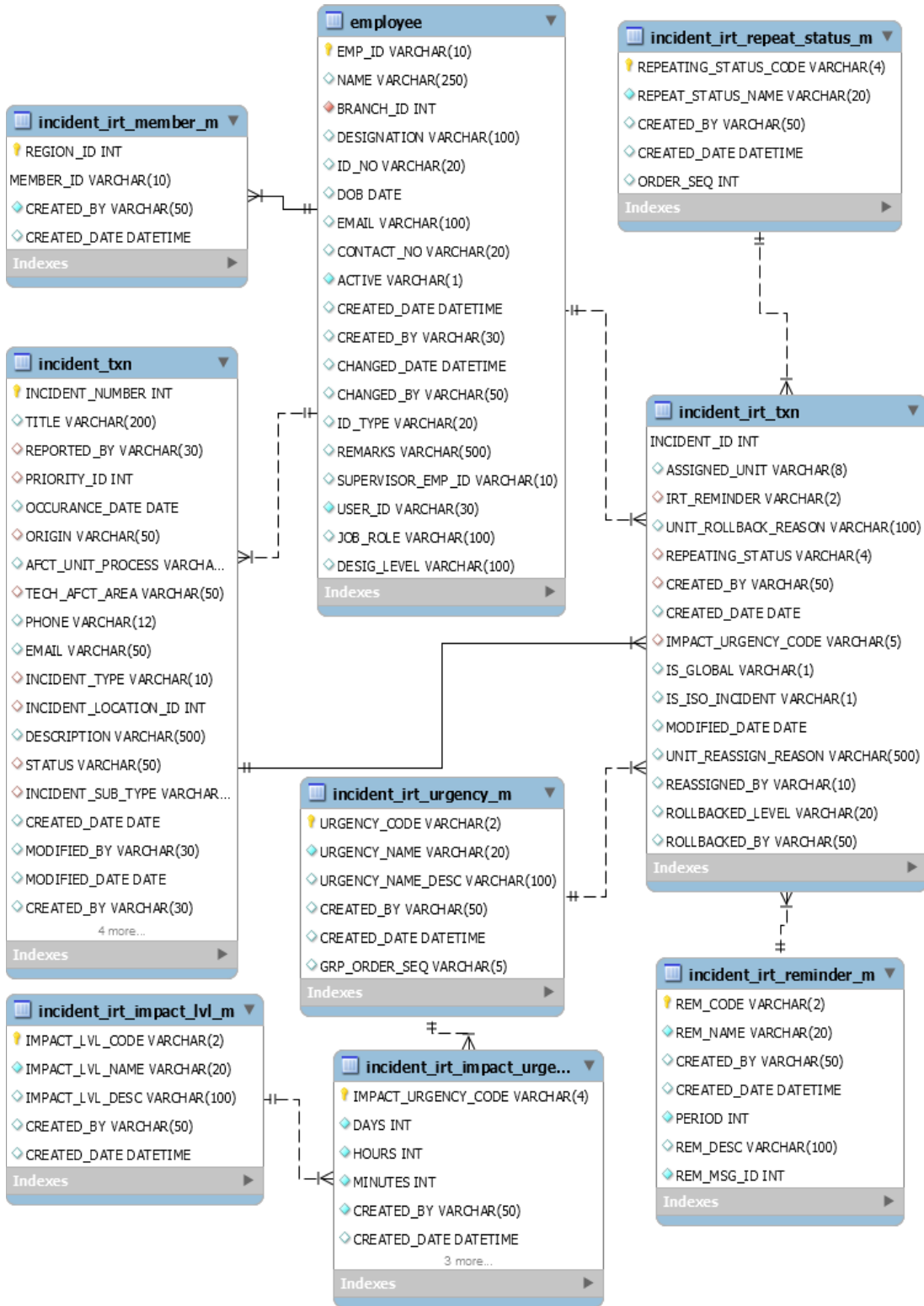


Fig. 0.4: Entity Relationship Diagram for Incident Report Team Functionality

Tables with vendor management

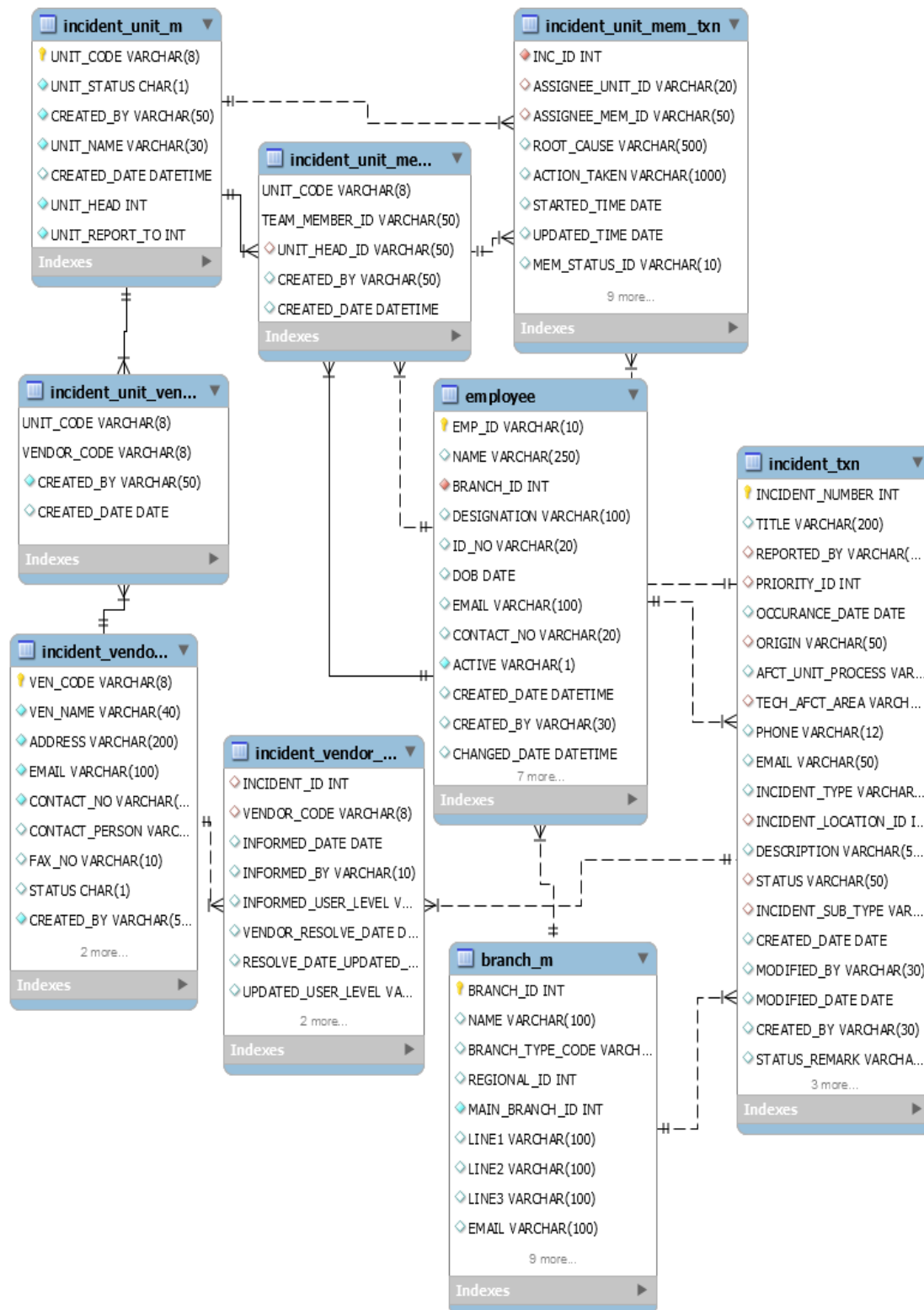


Fig. 0.5:Entity Relationship Diagram for Vendor Management

Tables with FAQ module

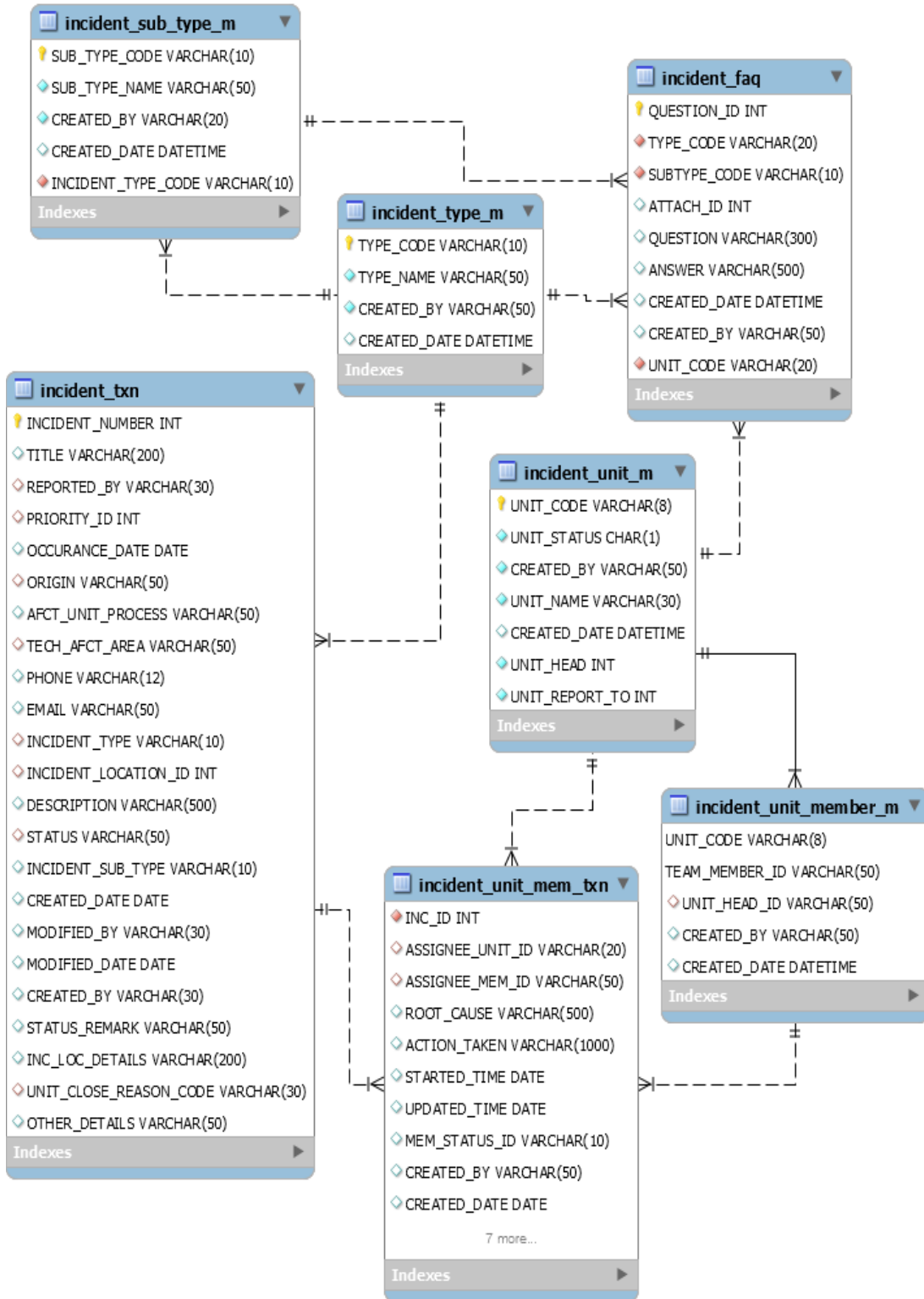


Fig. 0.6: Entity Relationship Diagram for FAQ Module

Some of the important details of the main tables are explained below and the rest of the column names are straightforward by their column name.

1. branch_m table is used to storing all the region, branch, department and pawning centre related information. All the columns are self-explanatory such as BRANCH_ID, MAIN_BRANCH_ID, NAME, BRANCH_TYPE_CODE, etc.
2. employee Table is used for storing the employee-related basic information and the login credential for the application. With this employee table, another four tables are connected as fig 4.2 to handle the access control function.
3. incident_txn Table is the main table of the application to track the incident request related information such as incident reporter detail, reporting date and time, current incident status, available dependency to resolve the incident and priority level of the incident. As fig. 4.3 following tables are the main supporting master tables for the incident_txn table.
 - a. incident_status_m
 - b. incident_priority_m
 - c. incident_type_m
 - d. incident_sub_type_m
 - e. incident_dependency
 - f. incident_origin_m
4. incident_irt_txn Table is used to storing all the incident response team and incident resolve process related information such as assign unit , impact level and reminders.

4.4 Site map

This section describes the list of pages of the web application. It will provide ideas about pages and functions available on the website and the relationship among them. This application is not used user login control, active directory use for that.

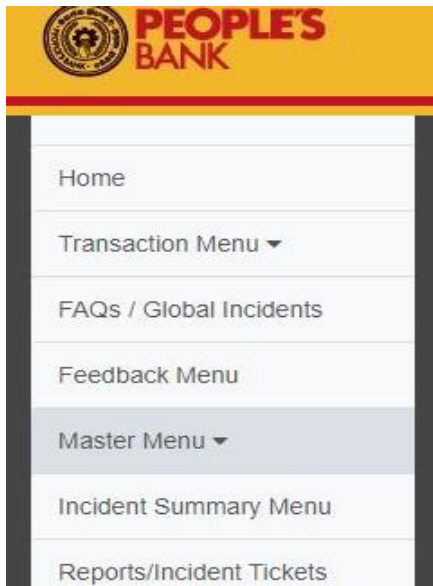


Fig. 0.7: Main Menu

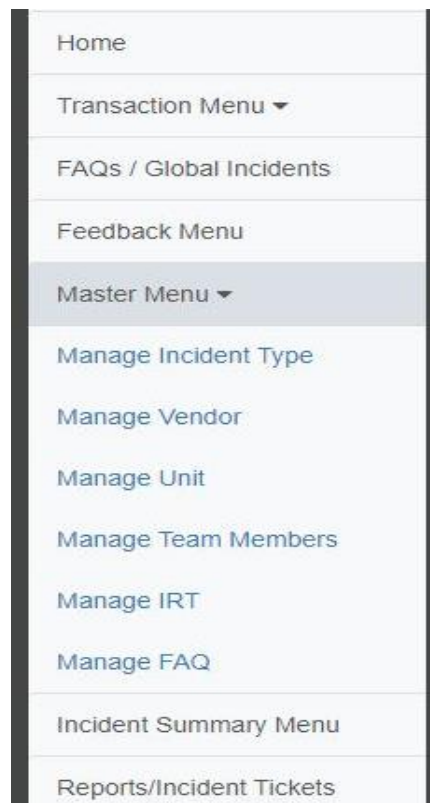


Fig. 0.8: Transaction menu & Master menu

4.4.1 Master Forms

As per the Fig.4.8: Transaction menu & Master menu, there are six master forms developed for the system. This report is not included all the master forms but there is only one is included as an example.

The image displays two screenshots of a web application interface for managing FAQs.

The top screenshot, titled "Manage FAQs", shows a "Create New" button and a table of existing entries. The table has columns for "Incident Type", "Incident Sub Type", "View", "Edit", and "Delete".

Incident Type	Incident Sub Type	View	Edit	Delete
BREAKDOWN	EXPOSURE OF CONFIDENTIAL DATA	View	Edit	Delete
SYSTEM FAILURE	APPLICATION SERVERS	View	Edit	Delete
SYSTEM FAILURE	APPLICATION SERVERS	View	Edit	Delete

Below the table, it indicates "Showing 1 to 3 of 3 entries" and includes pagination controls: "First", "Previous", "1", "Next", "Last".

The bottom screenshot, titled "Create FAQ", shows a form with the following fields:

- * Incident Type:
- * Incident Sub Type:
- * Question:
- * Answer:
- * Unit:

At the bottom of the form are "Save" and "Cancel" buttons.

Fig. 0.9: Sample Master Form – Manage FAQ

As per Fig.4.9: Sample Master Form – Manage FAQ, all master forms provide basic create, edit, delete and view functions according to the requirements.

4.4.2 Transaction Forms

As per the Fig.4.8:Transaction Menu & Menu, there are three transaction forms developed for the system. Incident creation, unit assignment, team member assignment, incident rollback, incident workflow, dependency maintain and vendor involvement functions are handled by transaction forms.

4.4.2.1 Individual Incident UI

Once click on the individual menu icon,

is loaded with existing incidents. User can perform their task according to the access level.

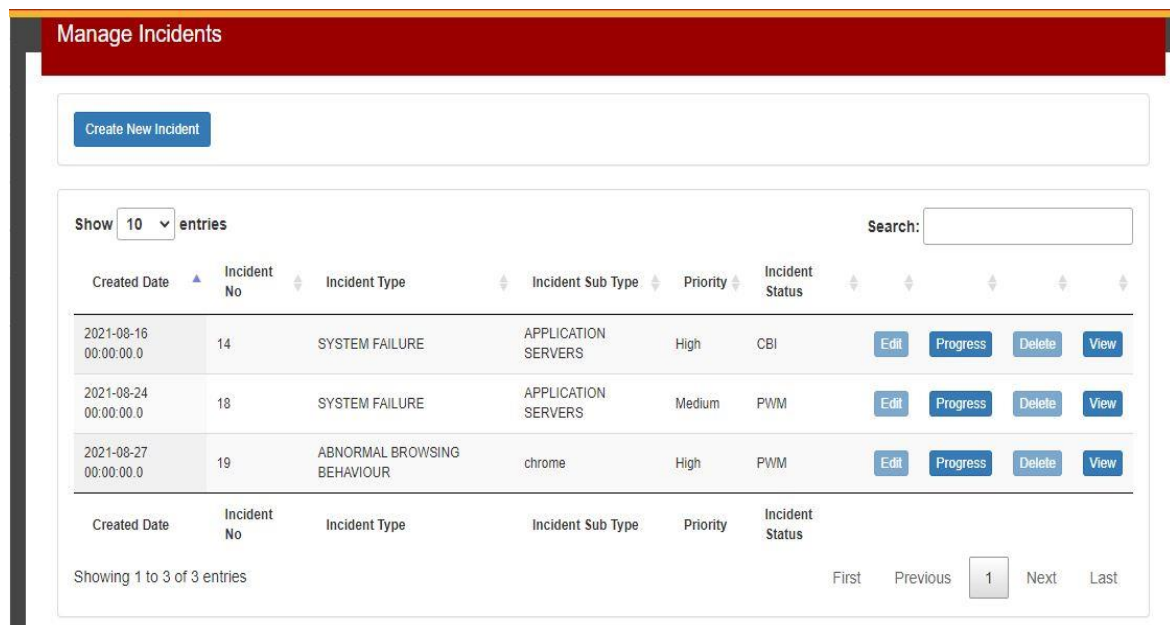
Create New Incident button -: Use to create a new incident

Edit button -: Use to edit the incident before assigning it to the unit.

Delete button -: Use to remove the incident before assign it to the unit.

View button -: Use to view the basic incident detail.

Progress button -: Use to view the status changes of the incident with time.



Manage Incidents

Create New Incident

Show 10 entries Search:

Created Date	Incident No	Incident Type	Incident Sub Type	Priority	Incident Status					
2021-08-16 00:00:00.0	14	SYSTEM FAILURE	APPLICATION SERVERS	High	CBI	Edit	Progress	Delete	View	
2021-08-24 00:00:00.0	18	SYSTEM FAILURE	APPLICATION SERVERS	Medium	PWM	Edit	Progress	Delete	View	
2021-08-27 00:00:00.0	19	ABNORMAL BROWSING BEHAVIOUR	chrome	High	PWM	Edit	Progress	Delete	View	

Showing 1 to 3 of 3 entries First Previous 1 Next Last

Fig. 0.10 : Transaction Form – Individual Incidents

Add Incident

Incident Detail

* Title: Priority: Incident Occurrence Date and Time:
Title is required

* Technically Affected Area: * Affected Unit/Process: * Incident Location:
Select technically affected area **Affected Process is Required** **Select Incident Location**

* Incident Type: * Description: Incident Location Detail:
Select incident type **Description is required**

Incident Subtype:

Reporting Detail

* Reported By:
194902

* Origin: Work Phone: * Work E-mail:
Select origin **Phone number is required** **formAdd:email: Validation Error: Value is required.**

Fig. 0.11. Transaction Form – Create new Incidents

Created Date	Incident No	Incident Type	Incident Sub Type	Priority	Incident Status				
2021-08-16 00:00:00.0	14	SYSTEM FAILURE	APPLICATION SERVERS	High	CBI	<input type="button" value="Edit"/>	<input type="button" value="Progress"/>	<input type="button" value="Delete"/>	<input type="button" value="View"/>
2021-08-24 00:00:00.0	18	SYSTEM FAILURE	APPLICATION SERVERS	Medium	PWM	<input type="button" value="Edit"/>	<input type="button" value="Progress"/>	<input type="button" value="Delete"/>	<input type="button" value="View"/>
2021-08-27 00:00:00.0	19	ABNORMAL BROWSING BEHAVIOUR	chrome	High	PWM	<input type="button" value="Edit"/>	<input type="button" value="Progress"/>	<input type="button" value="Delete"/>	<input type="button" value="View"/>

Showing 1 to 3 of 3 entries

First Previous Next Last

Manage Progress

Progress Info:

Date and Time	Progress Status	By	User Level
2021-08-27 22:33:46.0	Assigned - Unattended		
2021-08-27 16:17:23.0	Unassigned	SAJEEVI	IRT_USER

Fig. 0.12. Transaction Form – View Incident Progress

4.4.2.2 IRT Incident

Once click on the individual menu icon, Fig. 4.13. Transaction Form – IRT Incidents is loaded with existing incidents of the relevant region.

The screenshot shows a web interface titled "Assign Incidents" with a red header. Below the header, there is a search bar and a "Show 10 entries" dropdown. A table displays incident data with columns for Created Date, Incident No, Incident Type, Incident Sub Type, Priority, and Incident Status. Each row includes "Progress" and "View" buttons. At the bottom, there are pagination controls showing "Showing 1 to 4 of 4 entries" and buttons for "First", "Previous", "1", "Next", and "Last".

Created Date	Incident No	Incident Type	Incident Sub Type	Priority	Incident Status		
2021-08-16 00:00:00.0	14	SYSTEM FAILURE	APPLICATION SERVERS	High	CLOSED BY IRT	Progress	View
2021-08-24 00:00:00.0	18	SYSTEM FAILURE	APPLICATION SERVERS	Medium	PENDING W / UNIT	Progress	View
2021-08-27 00:00:00.0	19	ABNORMAL BROWSING BEHAVIOUR	chrome	High	PENDING W / UNIT	Progress	View
2021-09-04 00:00:00.0	20	SERVER DOWN	VIRUS ATTACK	High	INITIAL	Progress	View

Fig. 0.13. Transaction Form – IRT Incident

Once click on the view button user can view the incident classification and assignment section along with incident detail. In this screen, the user can view incident assignment history and similar solutions for the incident type of selected incident. Apart from that IRT users can close the incident, if he/she can fix it.

The screenshot shows a form titled "Incident Classification". It contains several fields: "Impact level:" with a dropdown menu, "* Assigne Unit:" with a dropdown menu, "* Urgency:" with a dropdown menu, "Add Reminder:" with a dropdown menu, and "Closed Reason (By IRT):" with a dropdown menu. Below these are "Target Resolution Time:" fields for "Working days:", "Hours:", and "Minutes:". There is also a "Comments:" text area. At the bottom, there are five buttons: "Close Incident", "Assigned History", "Similar Solutions", "Assign / Reassign", and "Cancel".

Fig. 0.14. Transaction Form – Incident Classification

4.4.2.3 Unit Incident

Once click on the Unit Incident menu icon, team members can view incidents that are assigned to their unit. The unit head is responsible to assign the incident to the team member. Other than that unit head can roll back selected incidents to other units or IRT levels before assigning to a team member.

The screenshot shows a form titled "Incident Assignment". It contains the following fields and controls:

- * Assigned Unit:** A text input field containing "S/W DEV".
- * Assign Incident To:** A dropdown menu with "NAYANI RAJAPAKSHA" selected.
- Assign:** A blue button.
- Pending Incident Count:** A text input field containing "0".
- Pending Dependency Count:** A text input field containing "0".
- RollBack To:** Two blue buttons labeled "Other Unit" and "IRT".

Fig. 0.15. Transaction Form – Unit Incident Rollback & Assignment

The screenshot shows a form titled "Incident Classification" and "Incident Action". It contains the following fields and controls:

Incident Classification

- Impact level:** A text input field containing "L1".
- Urgency:** A text input field containing "M".
- Working Days:** A text input field containing "6".
- Hours:** A text input field containing "0".
- Minutes:** A text input field containing "0".
- Target Resolution time:** A text input field containing "6".
- Actual Resolution time:** A text input field.
- Response Date and Time:** A text input field containing "04/09/2021".

Incident Action

- * Incident Status:** A dropdown menu with "Select Incident Status" selected.
- Status Update Date and Time:** A text input field containing "04/09/2021".
- * Root Cause:** A text area.
- * Action Taken:** A text area.
- * Vendor Solved Date:** A text input field containing "04/09/2021".
- Inform Vendor:** A blue button.

At the bottom, there is a row of five blue buttons: "Incident History", "Add Dependency", "Close Incident", "Save", and "Cancel".

Fig. 0.16. Transaction Form – Unit Incident Resolve, Add dependency and Inform Vendor

4.4.3 Notification



Fig. 0.17. Notification

This application is handled by user notification as per figure Fig. 4.17. Notification. There are two tables, ajax and JSF use to maintain the user notification.

```
<p:poll timeout="120000" interval="6000" listener="#{pollView.increment}" update="txt_count">
  <p:commandLink onclick="PF('sample').show();" >
    <h:outputText id="txt_count" value="#{pollView.number}"/>
  </p:commandLink>
</p:poll>
<h:form id="notiform">
  <h:graphicImage value = "resources/images/icons/bell.png" >
    </h:graphicImage>
  <p:dialog header="Notification Box" widgetVar="sample" height="40" width="350" position="830,50" draggable="false">
    <h:outputText value="Notification List." />
  </p:dialog>
</h:form>
</div>
```

Fig. 0.18. Notification Code

4.4.4 MIS Report Module

The MIS report stands for management information reports, which are reports used by an organization to coordinate, control and visualize data for better decision making.

MIS reports provide a concise and comprehensive view of a business's daily activities and help to evaluate business processes, discover problems and make decisions for the management level people in an organization.

4.4.4.1 Report Module Structure

This report module structured into four main reports.

- Incident Summary Report
- Team member performance Report
- Vendor Summary Report
- Unit Summary Report
- List of incident Tickets

During the day or at the end of the day, the user may be able to retrieve information on any of the incident management operations that were performed in the bank based on the user role and permission.

4.4.4.2 Wireframes and Report Templates

- Incident Summary Report

This report contains the summary view of incidents from their status.

By using this report management level people can take a clear idea about the issue types, locations, unit performance, its dependencies and time to take resolve a particular problem. Therefore this report helps to remain all systems and ATMs with minimum failures.

This report displays the entire incident list for the given date range. Other than that, it facilitates users to different filtration options;

Status, Unit, Impact level, Incident Type, Incident Subtype and many more.

By using this report management people are able to get a broader idea about IT related issues in a bank and how to affect those issues to daily banking operations.

Reports

* Report Name:

* From Date: * To Date:

Incident Summary

* Report Type:

* Unit Name: Incident Status:

Team Member: Incident Location:

Impact Level: Urgency:

Incident Type: Incident Sub Type:

Fig. 0.19 Incident Summary Report UI

As per the context, the incident summary report template is varying depending on the filter criteria.

- All Incident Summary Report Template

INCIDENTS SUMMARY REPORT

From: Date To Date

Incident Number	Created Date & Time	Current Status	Impact Level	Urgency	Incident Type	Location	IRT Member	Assigned Unit & Date	Reporter Name

- Close Incident Summary Report Template

CLOSE INCIDENTS SUMMARY REPORT

From: Date To Date

Incident Number	Created Date & Time	Assigned Unit & Date	Impact Level	Urgency	Close Date & Time	Closed By	Close Reason	Close Reason	Reporter Name

- Resolved Incident Summary Report Template

RESOLVED INCIDENTS SUMMARY REPORT

From: Date To Date

Incident Number	Created Date & Time	Assigned Date & Time	Impact Level	Urgency	Resolved Date & Time	Assigned Unit	Assigned Member	Root Cause	Reporter Name

- Reopened Incident Summary Report Template

REOPENED INCIDENTS SUMMARY REPORT

From: Date To Date

Incident Number	Created Date & Time	Assigned Unit, Date & Time	Impact Level	Urgency	Initial Resolved Date & Time	Reopened By, Date & Time	Reopen Reason	Current Progress

- Team Member Performance Report

This report provides a clear idea about the performance of each team member. By using this report, management people are able to critically evaluate the member of each team within a given date range.

Team member performance report counts within a particular date range how many incidents were allocated to one member, how many of them were resolved by a member, how many of them were closed successfully, and how many pending incidents are there to handle and finally overall member performance.

Fig. 0.20 Team Member Report UI

- Team Member Performance Report Template

TEAM MEMBER PERFORMANCE REPORT

From: Date To: Date

Member	Assigned All Incident Count	Pending Incident Count	Resolved Incident Count	Closed Incident Count	Overall Incident Count For Unit	Overall Performance

- Vendor Summary Report

This report gives a clear idea about incidents which unable to resolve without vendors interaction

The vendor summary report includes that within a particular date range how many issues were raised per vendor and what is the current status of those issues.

- Unit Summary Report

This report gives a clear idea about unit performance.

The unit summary report includes that within a particular date range how many issues were raised per unit and what is the current progress of those issues.

Apart from the above reports, the system facilitates getting a list of the close incident and its incident ticket preview.

Other than the above sections, Dashboard is available in this system.

4.5 Implementation Environment

This describes the technological and physical environment in which the product is to be deployed.

This application develops as a web application. Therefore the application can be accessed through the computer network using a web browser. It usually consists of two parts: a server component that provides and stores data for the user and a client component that is executed in the users' web browsers. Apache Tomcat is used as the application server for the application. The recommended web browser will be Google Chrome.

4.6 Development Tools and Technologies

The incident management system is based on these tools and technologies.

Server	Apache tomcat	It is webserver software
Database	MySql	It is a relational database management system. The program runs as a server providing multi-user access to several databases
frameworks and programming languages	Spring, Hibernate, Java, JavaScript, CSS	Spring and Hibernate are used as server-side frameworks and Java is used as a programming language. JavaScript, CSS and Bootstrap are used as client-side technologies and frameworks.
Tools	Eclipse, Maven	Eclipse is an integrated development environment and Maven is a project management tool

Table 0-2 . Development tools and technologies

The incident management system uses Apache Tomcat as its web server and MySQL as the database management system. Apache is consistent, free, and comparatively straightforward to configure and used for dynamic Web pages, where the content is accessible in a protected way.

MySQL is a freely available open-source Relational Database Management System (RDBMS) that uses Structured Query Language (SQL). SQL is the most popular language for adding, accessing and managing content in a database. It is quick processing, proven reliability, ease and flexibility of use.

In the internal structure of the project, model-view-controller architecture is used along with Spring MVC, hibernate and bootstrap frameworks and java, JavaScript and CSS programming languages.

A Spring MVC is a Java framework. It follows the Model-View-Controller design pattern. It implements all the basic features of a core spring framework like Inversion of Control, Dependency Injection. In Spring MVC, there is a built-in class called DispatcherServlet and works as the front controller. It is responsible to manage the request flow of the application.

Hibernate is a Java framework that simplifies the development of Java applications to interact with the database. It is an open-source, lightweight, ORM (Object Relational Mapping) tool. Hibernate implements the specifications of JPA (Java Persistence API) for data persistence. Apart from these main technologies and tools, this project creates the Maven Project. It is a build automation tool and allows creating projects, dependency, and documentation using Project Object Model and plugins.

4.7 Summary

This chapter mainly covers the implementation phase of the system with its module structure, entity-relationship diagram, file structure and site map. Other than that, it describes methodologies, strategies, tools and techniques used for the project development.

The incident management system is a web-based application. It is implemented on the MySQL database and Apache tomcat application server.

Chapter 5 - Testing and Evaluation

5.1 Introduction

This chapter presents a detailed explanation of the Testing and Evaluation of the incident management application.

‘Testing and Evaluation is the process by which a system or components are compared against requirements and specifications through testing’. The results evaluate the progress of design, performance, compatibility, etc.

This chapter will mainly focus on the related testing types, test cases, user evaluation and results of the testing.

5.2 Related Testing Types

Software testing is the process of checking if the software is work properly and if it meets the software requirements. The goal of software testing eliminates bugs and enhances the quality of the software in terms of performance, user experience, security and so on. In this application context, the following testing types or techniques are used.

5.2.1 Functionality Testing

This process includes database testing, interface testing, and security testing and client-server testing of the system. This performs to test the functionalities of each element on the application.

The testing activities of the website include:

- Test all links are working correctly and making confirm there are no broken links
- Test forms are working as expected
- Test HTML and CSS
- Test business workflow

5.2.2 Usability Testing

Usability testing is an important section of this web project. It tests the user-friendliness of the application. It is tested whether any user can easily use the application without getting stuck.

5.2.3 Interface Testing

Three areas to be tested here are application, web and database server.

- Application: Test requests are sent correctly to the Database and output at the client side is displayed correctly. Errors if any must be caught by the application and must be only shown to the administrator and not the end-user.
- Web Server: Test Web server handles all application requests without any service denial.
- Database Server: This makes sure queries sent to the database provide estimated results.

5.2.4 Compatibility Testing

Compatibility test ensures whether the web applications display correctly across different browsers

5.2.5 Security Testing

This is one of the main testing types of this application. The following activities include this testing type

- Test unauthorized access to secure pages should not be permitted
- Restricted files should not be downloadable without appropriate access
- Check sessions are automatically killed after prolonged user inactivity

5.3 Test Cases and Results of the Testing

This section of the report describes the test cases of the main transaction function of the application with its expected results, actual results and status of the testing.

There are three main transaction functions of the system: Individual Incidents, IRT incidents and Unit Incident.

Individual Incidents -: This is a separate user interface for raise new incidents.

IRT Incidents -: This is a separate user interface for the assigned incident.

Unit Incidents -: This is a separate user interface for update the current status of the incident.

One or group of evaluators evaluate the user interfaces by using test ceases.

5.3.1 Test Case-Manage Incidents

Test Case Scenario		Manage Incident		
Test Case Description		Manage Incident is the main transaction function of the system which allow the user to Create, Edit, View and Delete incidents. Other than that current status of the incident can be viewed.		
Pre-Requisites		Log in to the system as an 'Employee' or 'IRT 'with valid credentials. All master data should be available		
No	Test – Steps	Expected Results	Actual Result	Status (Pass / Fail)
1	<p>1. Log into a valid 'Employee' or 'IRT' profile and Click on Emp Incident in the transaction menu.</p> <p>2. View already created incident details</p>	<p>Should display the already created incident detail in a table with the below fields.</p> <ul style="list-style-type: none"> * Created Date * Incident Number * Incident Type * Incident Sub Type * Priority * Incident Status * Edit button * Progress button * Delete button * View button * Search box <p>The buttons should be automatically disabled or enabled based on the current status of incidents as follows, Initial – 'Edit', 'Delete' and</p>	All incident detail was displayed	Pass

		<p>‘View’ buttons should be enabled</p> <p>Pending – ‘View’ button should be enabled</p> <p>Closed – ‘Progress’ and ‘View’ buttons should be enabled.</p> <p>Reopened - ‘Progress’ and ‘View’ buttons should be enabled</p>		
2	<ol style="list-style-type: none"> 1. Click on Emp Incident in the transaction menu 2. Click on the ‘Create New’ button 	‘Create Incident’ subsection should be displayed	Create Incident subsection was displayed.	Pass
3	<ol style="list-style-type: none"> 1. Click on Emp Incident in the transaction menu. 2. Click on the ‘Create New’ button 3. Enter the required valid data to create a new incident 4. Click on the ‘Submit’ button 	The new incident should be saved with all entered data	New incident creation was successful.	Pass
4	<ol style="list-style-type: none"> 1. Click on Emp Incident in the transaction menu. 2. Click on the ‘Create New’ button 3. Enter invalid data to create a new 	Should display an appropriate error message.	New incident creation was failed and displayed error messages.	Pass

	<p>incident</p> <p>4. Click on the 'Submit' button</p>			
5	<ol style="list-style-type: none"> 1. Click on Emp Incident in the transaction menu. 2. Click on the 'Create New' button 3. Enter required data to create a new incident 4. Click on the 'Cancel' button. 	New incidents should not be saved.	Create incident subsection was closed without saving data	Pass
6	<ol style="list-style-type: none"> 1. Click on Emp Incident in the transaction menu. 2. Click on the 'Edit' button on the selected incident 	'Edit Incident' subsection should be displayed with existing values	'Edit Incident' subsection was displayed.	Pass
7	<ol style="list-style-type: none"> 1. Click on Emp Incident in the transaction menu. 2. Click on the 'Edit' button 3. Update required valid data to edit the existing incident 4. Click on the 'Submit' button 	The existing incident should be saved with all updated data	Updating was successful.	Pass

8	<ol style="list-style-type: none"> 1. Click on Emp Incident in transaction menu. 2. Click on the 'Edit' button 3. Update invalid data to edit the existing incident 4. Click on the 'Submit' button 	Should display an appropriate error message	Updating was failed and displayed error messages	Pass
9	<ol style="list-style-type: none"> 1. Click on Emp Incident in the transaction menu. 2. Click on the 'Edit' button on the selected incident 3. Update required data to edit the incident 4. Click on the 'Cancel' button. 	The selected incident should not be saved with updated data.	Edit incident subsection was closed without saving data	Pass
10	<ol style="list-style-type: none"> 1. Click on Emp Incident in the transaction menu. 2. Click on the 'View' button on the selected incident 	'View Incident' subsection should be displayed without editable mode	'View Incident' subsection was displayed.	Pass

11	<ol style="list-style-type: none"> 1. Click on Emp Incident in the transaction menu. 2. Click on the 'View' button on the selected incident 3. Click on the 'Cancel' button. 	'View Incident' subsection should be hidden.	'View Incident' subsection was closed.	Pass
12	<ol style="list-style-type: none"> 1. Click on Emp Incident in the transaction menu. 2. Click on the 'Progress' button on the selected incident 	'Manage Progress' popup window should be displayed.	Incident progress was displayed in a popup window.	Pass
13	<ol style="list-style-type: none"> 1. Click on Emp Incident in the transaction menu. 2. Click on the 'Delete' button on the selected incident 	The selected incident should be deleted.	The Incident was successfully deleted.	Pass

5.3.2 View and Assign Incidents

Test Case Scenario		View and Assign Incident		
Test Case Description		View and Assign Incident is one of the main transaction functions of the system which allows IRT users to View and Assign incidents to the related unit. Other than that current status of the incident can be viewed.		
Pre-Requisites		Log in to the system as an 'IRT' with valid credentials. Already Created Incidents with initial status should be available All master data should be available		
No	Test – Steps	Expected Results	Actual Result	Status (Pass / Fail)
1	<ol style="list-style-type: none"> Log into a valid 'IRT' profile and Click on IRT Incident in the transaction menu. View already created incident details 	<p>Should display the already created incident detail in a table with the below fields.</p> <ul style="list-style-type: none"> * Created Date * Incident Number * Location *Assigned Unit – If not already assigned N/A should be displayed. * Incident Status * Progress button * View button * Search box <p>The buttons should be automatically disabled or enabled based on the current status of incidents as follows,</p>	Incident detail was displayed.	Pass

		<p>Initial – ‘View’ buttons should be enabled</p> <p>Pending – ‘View’ button should be enabled</p> <p>Closed – ‘Progress’ and ‘View’ buttons should be enabled.</p> <p>Reopened - ‘Progress’ and ‘View’ buttons should be enabled</p>		
2	<ol style="list-style-type: none"> 1. Click on IRT Incident in the transaction menu. 2. Click on the ‘View’ button on the selected incident 	<p>‘Assign/Reassign Incident’ subsection should be displayed with existing values. This section should display incident detail, reporting detail and incident classification detail.</p>	<p>‘Assign/Reassign Incident’ subsection was displayed with existing data</p>	Pass
3	<ol style="list-style-type: none"> 1. Click on IRT Incident in the transaction menu. 2. Click on the ‘View’ button on the selected incident 3. Enter required valid data to the incident classification section. 4. Click on the ‘Assign / Reassign’ button 	<p>The existing incident should be assigned to the unit.</p>	<p>The assignment was successful.</p>	Pass

4	<ol style="list-style-type: none"> 1. Click on IRT Incident in the transaction menu. 2. Click on the 'View' button on the initial incident 3. Enter invalid data to the incident classification section. 4. Click on the 'Assign / Reassign' button 	Should display an appropriate error message	Assignment was failed	Pass
5	<ol style="list-style-type: none"> 1. Click on IRT Incident in the transaction menu. 2. Click on the 'View' button on the selected incident 3. Click on the 'Cancel' button. 	'Assign/Reassign Incident' subsection should be hidden.	'Assign/Reassign Incident' subsection was closed.	Pass
6	<ol style="list-style-type: none"> 1. Click on IRT Incident in the transaction menu. 2. Click on the 'Progress' button on the selected incident 	'Manage Progress' popup window should be displayed.	Incident progress was displayed in a popup window.	Pass

5.3.3 Assign Incident to Team

Test Case Scenario		Assign Incident to Team Members		
Test Case Description		Assign Incident to the team member is one of the main transaction functions of the system which is performed by the unit head. It allows the Unit head to View and Assigns incidents to the team member, rollback to the IRT team or other unit. Other than that current status of the incident can be viewed.		
Pre-Requisites		Log in to the system as a 'UNIT HEAD 'with valid credentials. Already Assigned Incidents should be available All master data should be available		
No	Test – Steps	Expected Results	Actual Result	Status (Pass / Fail)
1	<ol style="list-style-type: none"> Log into a valid 'UNIT HEAD' profile and Click on Unit Incident in the transaction menu. View already assigned incident details 	<p>Should display the already created incident detail in a table with the below fields.</p> <ul style="list-style-type: none"> * Created Date * Incident Number * Location *Unit Name * Team Member * Incident Status * Impact Level * Urgency * Progress button * View button * Search box <p>The buttons should be automatically disabled or</p>	Incident detail was displayed.	Pass

		<p>enabled based on the current status of incidents as follows,</p> <p>Initial – ‘View’ buttons should be enabled</p> <p>Pending – ‘View’ button should be enabled</p> <p>Closed – ‘Progress’ and ‘View’ buttons should be enabled.</p> <p>Reopened - ‘Progress’ and ‘View’ buttons should be enabled</p>		
2	<ol style="list-style-type: none"> 1. Click on Unit Incident in the transaction menu. 2. Click on the ‘View’ button on the selected incident 	<p>‘Incident Assignment’ and ‘Incident Classification’ subsections should be displayed with existing values. The incident Assignment section should display with following;</p> <p>Incident detail</p> <p>Rollback button</p> <p>Incident Assign option</p>	<p>‘Incident Assignment’ and ‘Incident Classification’ subsections was displayed with existing data</p>	Pass
3	<ol style="list-style-type: none"> 1. Click on Unit Incident in the transaction menu. 2. Click on the ‘View’ button on the selected incident 3. Enter required valid data to the incident assignment section. 4. Click on the ‘Assign’ button 	<p>The existing incident should be assigned to the team member.</p>	<p>The incident assignment was successful.</p>	Pass

4	<ol style="list-style-type: none"> 1. Click on Unit Incident in the transaction menu. 2. Click on the 'View' button on the initial incident 3. Enter invalid data in the incident assignment section. 4. Click on the 'Assign' button 	Should display an appropriate error message	The incident assignment was failed	Pass
5	<ol style="list-style-type: none"> 1. Click on Unit Incident in the transaction menu. 2. Click on the 'View' button on the selected incident 3. Click on the 'IRT Rollback' button. 	The selected incident should be rollback to the IRT team.	Incident rollback was successful.	Pass
6	<ol style="list-style-type: none"> 1. Click on Unit Incident in the transaction menu. 2. Click on the 'Progress' button on the selected incident 	'Manage Progress' popup window should be displayed.	Incident progress was displayed in a popup window.	Pass

5.4 User Evaluation

User evaluation was carried out with employees via field observation and conducting interviews with a focus group of employees.

Field observation and interviews give a clear understanding of how the users are using the incident management system to accomplish their tasks. Other than that, it helped to get an idea about what kind of mental model employees have about the system.

5.5 Summary

This chapter contains the testing and evaluation techniques used for the system. It mainly focuses on the related testing types, test cases with results of the testing and user evaluation of the system.

Chapter 6 - Conclusion

An incident is an unexpected interruption to the IT service. This application is to manage the interruptions and failures of IT services.

The incident management application was implemented as a web-based system using Java Server Faces, Primefaces API, Hibernate and SpringMVC. The project consists of three main modules: transaction module, master data module (admin module) and reporting module.

All incidents log as incident records, where their status and time can be traced, and a full historical record maintained. Other than that, the incident notifications and alert workflow were maintained. The initial categorization and prioritization of the incident are maintained for determining how the incident will be handled and how much time is available for its resolution.

As per the objective of minimizing the average time service teams take to resolve an incident, the project was implemented a knowledge management module So that users can fix some interruptions by themselves.

With the help of this project, I have learned and practised the complete life cycle of web development as a full stack with the latest technologies. Also, my research and development skills have been improved after this project.

6.1 Future Works

From the development point of view, the system can enhance automatic communication. By removing the incident response layer can introduce the automatic incident assignment for the relevant unit. This process enhances the efficiency of the service restoration process. Other than that chatbot can introduce to the improved communication process. Furthermore, this application can be extended to the notification process to generate reminders for critical incidents via SMS and reminders for late fixes via email

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Appendix A

A.1 Report Template & UI

This section represents some report templates along with its UI which is not included in implementation chapter.

A.1.1 Incident Ticket

The incident ticket is created for each and every active incident. Athorized user able to view and print the closed tickets by using incident number.

Reports

* Report Name: List of incident Tickets

* From Date: 01/07/2021 * To Date: 12/09/2021 Search

Incident Ticket

Incident Info:

Occured Date	Incident No	Location	Reported By	
2021-08-16 00:00:00.0	14	MATALE	GAYAN	View
2021-08-24 00:00:00.0	18	MATALE	GAYAN	View
2021-08-27 00:00:00.0	19	DUKE STREET	CHALINI	View

[Reset](#)

Fig.A.1:Incident Ticket UI

Incident Tickets

From : 2021-07-01 To : 2021-09-12

Incident Number : 18	Created Date Time : 2021-08-24 00:00:00.0
Location :MATALE	Incident Type : SYSTEM FAILURE
Reporter's Name :GAYAN	Sub Type : APPLICATION SERVERS
Mobile Number : 0115789123	

Assigned Unit	S/W DEV	Impact Level	L1
Assigned Date & Time	24/08/21 12:24	Urgency	M

Target Resolution Time	Day	3	Hours	0	Minutes	0
Actual Resolution Time	Day	3	Hours	0	Minutes	0
Time Difference	Day	0	Hours	0	Minutes	0

Date Time	Unit Name	Team Member Name	Incident Status	Action Taken User Name
24/08/2021 12:00 AM	S/W DEV	NAYANI RAJAPAKSHA	PWM	Navani

Root cause	Data migration Issue
Action Taken	Migrated data converted into new system compatible format

Closed By	Close Reason	Close Date & Time
By Unit	Issue Fixed	25/08/2021

Fig.A.2: Incident Ticket Template

A.1.2 Interview Questions

User Evaluation Interview

Incident Management System for People's Bank

- Please tell me about your relation to the incident management system?
- Describe your typical day at working environment?
- What are the most important tasks you perform in using incident management system?
- How would you describe your past and current experience with incident management?
- How often do you use incident management system?
- Is this system better than the manual process?
- What improvements could be made to make incident management process easier?
- Are you satisfy with incident management system?

Fig.A.3: User Evaluation Interview