

## Incident Management System

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### Abstract

The issues of service excellence and productivity are paramount in any organization, especially organizations such as a bank, tele-com etc. Therefore, we intended to aid the in-service quality of those organizations by bringing software called “Incident Management System” that automates the manual incident handling system. This system registers every incident which affects the organization’s service; and assigns these incidents to the person who resolves and provides solution to problems. Finally, the System produces, summarizes reports regarding incident details in terms of what kind of incidents occurred and which service was affected by these incidents; how many of the incidents were resolved, on progress and closed. In addition, the users of the system have their own accounts (user name and password) for security issues; and a clear and defined classification related with their job responsibility. The system also has incident priority set up which helps classify incidents with risk level; and it can allow escalate incidents between persons holding the same position in an organization or between supervisors and subordinates. Incidents are a common obstacle of organization’s service quality and productivity. This system results in significantly improved ways in which the incidents are timely resolved and the services restored to normal state.

**Keywords:** Incident Management System

### I. Introduction

#### 1.1 Background of the Organization

The history of the Commercial Bank of Ethiopia dates back to the establishment of the State Bank of Ethiopia in 1942. CBE was legally established as a share company in 1963. In 1974, CBE merged with the privately owned Addis Ababa Bank. Since then, it has been playing significant roles in the development of the country and is pioneer in introducing modern banking to the country.

It has more than 1456 branches stretched across the country. It is the leading African bank with assets of 711.96 billion Birr as of June 30, 2019. It plays a catalytic role in the economic progress and development of the country. It is the first bank in Ethiopia to introduce ATM service for local users. Currently CBE has more than 22 million account holders and the number of Mobile and Internet Banking users has reached more than 2.5 million as of June 30<sup>th</sup> 2019. Active ATM card holders have reached more than 8 million. As of June 30, 2019, 2,513 ATMs and 9,539 POS machines were available.

Nowadays, the competitive marketing organizations worry for their services and customers, because organizations should review their service excellence and customer handling in order to stay in the market. To achieve this, organizations possess a better line up system that shows gaps and constraints regarding their services. For such organizations, Incident

Management System is a solution for having functionality in recording their daily problems; accordingly classify and prioritize problems; escalate problems for designated persons; and provide summarized reports for top level managements. Due to this fact, organizations have such kind of automated systems, i.e. “Incident Management System” in order to minimize and manage incidents.

## **1.2 Statement of the Problem**

The Commercial Bank of Ethiopia, is a financial institution which offers a variety of business services such as Retail operation, Credit operation, Finance operation, Trade service operation, Interest Free Banking (IFB) service, Mobile banking, Internet banking, CBE Birr etc. It delivers such services to a wide range of customers of the bank. For this reason, the Bank has extensive transactions; CBE is being exposed to a variety of incidents which are occurring in the different bodies of the bank.

- There is no clear guideline for the present, which group of teams are handling what types of incidents and the like.  
E.g. Data base incident report sending to Network support team etc...
- Incident reports are not managed centrally.  
E.g. Various incidents are reported to support team members’ personal e-mails and mobile phones.
- There is no Incident Response Timeline; there is no standard time duration for resolving an incident; this can be a factor that incident issues are not timely resolved.  
E.g. Simple incidents and complicated incidents may take similar time.
- There is no incident prioritization mechanism; giving the same priority for critical, high, medium, and low incident cases;  
E.g. Branch network connection failure and one printer machine failure;
- There is no instrument to evaluate performance of support team members.  
E.g. Good performer with poor performer;
- There is no clear and defined user classification for handling incidents based upon priority and other parametrical measurements.  
E.g. No category as agent, senior, supervisor, expert etc...;
- There is no place where records are permanently stored for incidents that have already occurred and resolved repeatedly; all incident users use their maximum capacity to resolve incidents rather than referring to records that have previously been resolved and reported.
- There is no formal escalation procedure when a support team employee can not resolve an incident him/herself and needs to hand over the task to a more experienced or specialized employee.
- There is no summarized incidents report to top level managements, and due to that, the management is faced with challenges to make decisions.
- Therefore, the organization should employ this automated incident management system for delivering excellent services.

### **1.3 Objectives of the Project**

#### **General Objective**

The objective of the study is mainly to assess management of incident, with clear assignment and direct escalation for technician and generate summarized and organized reports for the management in order to conduct better decision-making process.

#### **Specific Objectives**

- To replace the manual incident records with automated system;
- To classify incidents within their level of urgency, impact and prioritization;
- To Measure the incident response time from the time an incident record is created until the time the customers are advised, their problems, received, and are being addressed;
- To generate summarized incident report to various levels of authority;
- To assist by giving information about employees' knowledge gap, and aid to prepare training plan for those who have acquired knowledge gaps;
- To improve customer service excellence through enhanced complaint management;
- To easily identify incidents that need escalations for further investigation; and
- To assist to evaluate individual performance based on the recorded information in the system.

### **1.4 Significance of the Project**

The researcher believes that the project offers automated incident management, and due to that, the bank resolves incidents timely, reduces bank customers' complaints and increases productivity.

### **1.5 Beneficiaries of the Project**

This case study will help to provide valuable information and provide a significant outcome to the Commercial Bank of Ethiopia as well as the employees of the Bank, and to other entities, like other banks, customers etc.

#### **To the researcher**

- ❖ To get some knowledge and experience in doing research to solve problems.

#### **To CBE**

- ❖ To emphasize the problem associated with incident management;
- ❖ To get valuable recommendation to improve incident management in the CBE;

#### **To other entities**

- ❖ Other competitor banks will get better insight in controlling incident management.

#### **To employees**

- ❖ To be used as a resource for other studies in the topic under investigation.

## **2. Methodology**

### **2.1 Data collection**

In order to collect sufficient data to answer the project's essential points, we have designed a checklist to get quantified result. The primary data were collected by using observation from the department, i.e. contact center, at the place of the department office. Secondary data were collected through document analysis of department reports and other related materials to make the project complete.

### **2.2 System Development Methodologies**

It refers to the steps that are used to form, plan, and control the process of developing a system, and in this aspect, Rapid Application Design (RAD) is preferred. It is a development methodology that provides advanced development tools, prebuilt objects, and collaboration tools. These tools include graphic user interfaces builder, computer aided software engineering, fourth-generation programming languages, Database Management System (DBMS), code generators, object-oriented techniques. The key is to target steps that can be overlapped and be performed by multiple teams. It is effective at quickly producing thousands of applications. It is most suitable on projects where functionality of the system is clearly visible, whereby the project is of medium/small scale and of short duration. The following are some of its advantages:

- It saves time, cost and human effort;
- It provides a constricted fit between the user requirement and the system specification;
- It concentrates on essential features from the user's point of view; and
- It provides the ability to rapidly change system design as demanded by the user.

### **2.3 Development Environment/programming Tools and other Tools**

Integrated development environment, or IDEs, are software platforms that provide programmers and developers a comprehensive set of tools for software development in a single product. IDEs are built to work with specific application platforms, which is, perform creating, editing, maintaining, supporting and debugging other applications, based upon the details that are suitable. As for development environment, we choose the following integrated development environments:

- ✓ Visual Studio IDE, SQL Server Management Studio, HTML/CSS, Adobe Photoshop , Net Beans IDE, PHP, Atoms, Microsoft Visio 2007
- ✓ Web Browser internet explorer, Mozilla fire fox

### **2.4 Scope and Limitations of the Project**

This project is limited to Help Desk department due to the limitation of the bank organ location, and work flow of incident handling centralized to the bank's Head Office. As a result, this service is not accessible to other bank organs found in other cities than Addis Ababa.

## 2.5 Risks, Assumptions and Constrains

As mentioned in different sections of the project paper regarding assertive assumptions about scope, quality, schedule, budget, risk, and resource, with this reality in mind, we assume to handle the project smoothly. However, some unpredicted constraints or limitations may impact the project and considering such a scenario, the project team's plan set some extra resource in order to handle the situation. On the other hand, all the project teams are employees and due to that, members do not have enough time to spend or contribute to their full capacity to the project preparation and as a result, the project can have a time risk.

## 2.6 Phases and Deliverables of Project

The Incident Management System software development has several steps we need to follow. In addition, each step has its own deliverable output that can determine the quality of the next phase.

**First Step: Requirement analysis phase:** It is important to the success of a system. This step should be documented, actionable, measurable, testable, and traceable that can relate to identify business needs and defined to a level of sufficient details for system design.

**Second Step: Design phase:** System design helps in specifying hardware and system requirements and helps in defining overall system architecture. The system design specification serves as input for the next phase of the model.

**Third Step: Implementation phase:** This is building the target system based on the specification developed in the previous phases. It is the course of transferring the specified algorithms in the design phase into programming language, creating and integrating the system components.

**Fourth Step: Testing phase:** this phase includes all types of functional testing like department testing, integration testing, system testing, and user acceptance testing. These tests as well as non-functional testing are done.

**Fifth Step: Maintenance phase:** Once the customer starts using the developed software, then it creates actual problem on the software; the team delivers support for the specific problems in order to solve.

## 2.7 Incident and Incident Management

Incident is any event that is not part of the standard operation of a service and that causes, or may cause, an interruption to, or a reduction in, the quality of that service. Generally, incidents include such as anything broken or not working, any disruption to IT service, any interruption to IT service and something broken/ down.

Incident management is a process to restore normal service operation as quickly as possible by keeping low impact to the business with proper quality with respectful reporting issues via email, or logging incident, instantly, and defining priority as per the impact and assigning to the right group for quick resolution and escalation to next level for resolving and communicating to the user. The primary purpose of incident management is to restore normal IT service operation as quickly as possible. The goal of incident management is restoration of

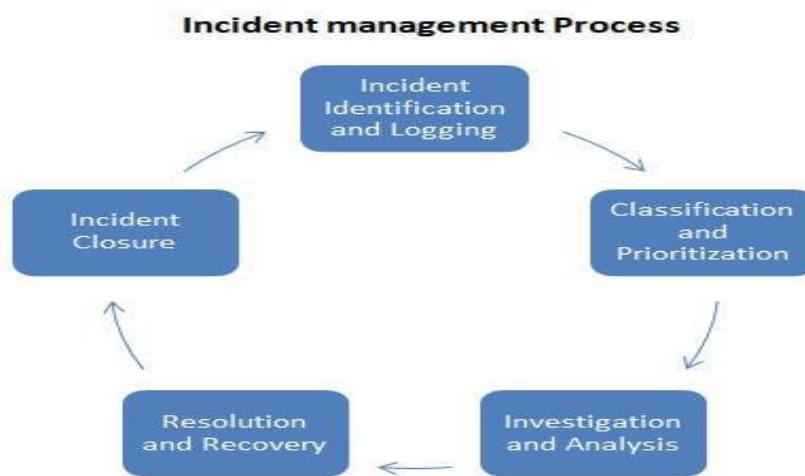
services as quickly as possible and ensuring the best service quality and availability within agreed service levels.

Incident management objective is to ensure that standardized methods and procedures are used for efficient and prompt response, analysis, documentation, on-going management and reporting of incidents. It increases visibility and communications of incidents to business and IT support staff, and align incidents management activities and priorities with those of the business.

The purpose of incident management process is to restore normal service operation as quickly as possible and thereby minimize the adverse impact on business operations, thus ensuring that the best possible levels of service quality and availability are maintained. Normal service operation implies service operating as per the committed service level agreements. The objectives of incident managements are to ensure that standardized methods and procedures are used for efficient and prompt response, analysis, documentation, on-going management and reporting of incidents.

## **2.8 Incident Management Process**

Incident management process is to restore normal service operation as quickly as possible, to minimize the adverse impact on business operations and to ensure that agreed levels of service quality are maintained.



**Figure 11: Incident management process**

### **2.8.1 Incident Identification and Logging**

Incident identification and logging is the first step in incident management to report the identified incident. The end users themselves can do this or agents can do it on their behalf. The IT team needs to capture complete information about the incident using a form template to speed up recovery process. They also need to set up relevant channels for end users to easily report an issue.

### **2.8.2 Incident Classification**

Incident classification is a segment of the incidents with appropriate category/sub-category in-order-to easily identify the right group and agent. Customize incident form with the right fields, set up automated rules for ticket classification, prioritization and assignment, and save valuable time in the process. Correct classification of incidents will help in generating reports faster.

### **2.8.3 Incident Prioritization**

Incident Prioritization is all about how quickly the service desk should address the problem. Assigning the right priority ticket for an incident has a direct impact on deciding service level agreement policy and addressing business critical issues on time. Thus, set up a realistic service level agreement definition to meet customer commitments.

For determining priority in which incidents should be taken care of, the impact, how much the incident affects business and the *urgency*, which is how long resolution can reasonably be delayed, should be considered.

Priority may be made depending on the combination of impact and urgency. For example, high impact and high urgency should dictate top priority, whereas low impact and low urgency dictate low priority, with other impact and urgency values dictating priority levels between high and low.

### **2.8.4 Investigation and Diagnosis**

When an incident is raised, the assigned team performs an initial analysis of the same and sends a resolution to the end user. In the event the resolution is not available immediately, they escalate the incident to the next teams for detailed investigation. Components required to identify, analyze, and contain an incident are reviewed.

### **2.8.5 Incident Resolution and Closure**

One of the primary goals of any IT team is to resolve any incident coming their way, as soon as possible. Efficient communication about the resolution and closure of the resolved tickets is very important. The team can even automate the process of closing the resolved tickets or the users can do it themselves through the self-service portal (<https://freshservice.com/incident-management>).

## **2.9 Incident Management Concepts with Business Aspect**

Incident management system provides feedback about the business activity that is related with IT system incidents and business operation problems. Accordingly, the incident management system has functionality of registering and reporting about the customer complaint, suggestions and gap in terms of existing unqualified work procedure and work guidance, indicating the organization's constraints etc. It finally delivers organized information of the business with the benefit of restoring to normal service operation as quickly as possible by keeping smooth business environment.



## **2.10 Scope of the Proposed System**

Scope of the proposed system in the incident management includes any event which disrupts, or which could disrupt, a service. This includes events which are communicated directly by users, either through the IT Help Desk, through another way of interface such as Event Management to Incident Management tools or direct tickets raised by users in CBE Service Management Tool.

The Scope of Incident Management covers all issues and faults within the CBE environment for end users; all major issues and incidents, unavailability of infrastructure or any system in the CBE environment; potential fault or alerts in the infrastructure systems; and any Violation to Security policies.

## **3 . Survey of Technologies**

### **3.1 Introduction**

Web-Based Applications are becoming fast and wide spreading, larger, more interactive, and more essential to the local as well as international use of computers. The most successful web-based application companies are beginning to realize that key critical factors of success or failure of any web-based application must be highly dependable on delivering a high quality web site. To attain the desired quality of web-based application, it is necessary to suggest a model that organizes and enables the identification of web-based application quality perspectives. These models should construct based upon the resource using on the development process and the web design. Therefore, the developer should contrast and select the best tool of developing and running resource from the available one, due to the fact that it has to have the best web application and the under section addresses web-based application quality and categorizes its quality factors.. (<https://www.sciencedirect.com/science/article/pii/S1110866511000405> n.d.)

### **3.2 Web Development Technologies**

Web development broadly refers to the tasks associated with developing websites for hosting via intranet or internet. The web development process includes web design, web content development, client-side/server-side scripting and network security configuration, among other tasks. Web development is also known as website development. Web development is the coding or programming that enables website functionality, as per the owner's requirements. It mainly deals with the non-design aspect of building websites, which includes coding and writing markup. Web development ranges from creating plain text pages to complex web-based applications, social network applications and electronic business applications. The following are some of the web development applications that are highly/greatly applied throughout the world.

#### **3.2.1 PHP (Hypertext Preprocessor)**

PHP stands for Hypertext Preprocessor ( the acronym does not follow the order of the words). It is an open source, server-side, scripting language used for the development of web



applications. By scripting language, we mean a program that is script-based (lines of code) written for the automation of tasks.

Web pages can be designed using HTML code execution. It is done on the user's browser (client-side); on the other hand, with PHP server-side scripting language, it is executed on the server before it gets to the web browser of the user. PHP can be embedded in HTML, and is well suited for web development and the creation of dynamic web pages for web applications- e-commerce applications, and database applications.

It is considered a friendly language with abilities to easily connect with MySQL, Oracle, and other databases. (<https://study.com/academy/lesson/what-is-php-used-for-uses-advantages.html> n.d.)

PHP is compatible with all major operating systems including Linux, Windows and MAC OS. It is also compatible with most popular web servers such as Apache and Lite Speed.

### **3.2.2 ASP.NET**

ASP.NET is a web development platform, which provides a programming model, a comprehensive software infrastructure and various services required to build up robust web applications for PC, as well as mobile devices.

ASP.NET works on top of the HTTP protocol, and uses the HTTP commands and policies to set a browser-to-server bilateral communication and cooperation.

ASP.NET is a part of Microsoft .Net platform. ASP.NET applications are compiled codes, written using the extensible and reusable components or objects present in .Net framework.

These codes can use the entire hierarchy of classes in .Net framework. The ASP.NET application codes can be written in any of the following languages C#, Visual Basic.Net, Jscript and J#

ASP.NET is used to produce interactive, data-driven web applications over the internet. It consists of a large number of controls such as text boxes, buttons, and labels for assembling, configuring, and manipulating code to create HTML pages. The first version of ASP.Net deployed was 1.0. The most recent version of ASP.Net is version 4.6. ASP.Net is designed to work with the HTTP protocol. This is the standard protocol used across all web applications.

([https://www.tutorialspoint.com/asp.net/asp.net\\_introduction.htm](https://www.tutorialspoint.com/asp.net/asp.net_introduction.htm) n.d.)

### **3.2.3 Java**

Java technologies and frameworks are software libraries that are web-based providing the user interface, or “view-layer”, of Java web applications. Such frameworks are used for defining web pages and managing the HTTP requests generated by those web pages.

Sun Java Studio Enterprise IDE is a strong set of tools having an integrated framework for the enterprise-grade, fast web application development. It offers advanced debugging and development support for the web services and for the development of the Java EE technology-based web applications.

Also termed as Core Java, this is the Java most basic and standard version. It is the cleanest version of Java, a basic foundation for all other editions. J2SE is usually taken into consideration to build web applications for the Desktop environment.

Java Web Application is used to build dynamic websites. Java offers support for the web application through JSPs and Servlets. We can build a website with static HTML web pages but when we want data to be dynamic, we require the web application.

Java is the name for both the programming language that can be used for building complex web applications and for the software platform that uses this programming language as its most essential component. It is widely used by development companies to build secure, robust and scalable web applications.

(<https://www.altexsoft.com/blog/engineering/pros-and-cons-of-java-programming/> n.d.)

## **Conclusion**

All PHP, ASP.NET and Java come with their benefits and drawbacks. Both languages have their own features. However, ASP.NET is easier to use and maintain because of its class library system. Both programming languages are similar and accomplish the same results, but ASP.NET is better than the other two languages so that our team makes a choice based on the needs and requirements of the application.

### **o Database Technology**

Database technology takes information and store, organize, and process it in a way that enables users to easily and intuitively go back and find details they are searching for. Database technologies come in all shapes and sizes, from complex to simple, from large to small. It is important to think about how the database technology you choose will be able to grow as the size of your data grows, as well as how it will interact with any software you use to query your data and with this fact, the developer should choose based up on their needs and requirements, from the available technologies. (<https://www.sisense.com> n.d.)

### **▪ Oracle Database**

Oracle Database is the first database designed for enterprise grid computing, and was the most flexible and cost effective way to manage information and application. Enterprise grid computing creates large pools of industry standard, modular storage and servers. With this architecture, each new system can be rapidly provisioned from the pool of components. There is no need for peak workloads, because capacity can be easily added or reallocated from the resource pools as needed.

The database has logical structures and physical structures. Because the physical and logical structures are separate, the physical storage of data can be managed without affecting the access to logical storage structures.

([https://docs.oracle.com/cd/B19306\\_01/server.102/b14220/intro.htm](https://docs.oracle.com/cd/B19306_01/server.102/b14220/intro.htm) n.d.)

- **SQL Database**

SQL stands for “Structured Query Language.” This language allows us to pose complex questions of a database. It also provides a means of creating database. SQL is very widely used. Many database products support SQL, this means that if you learn how to use SQL, you can apply this knowledge to MS Access or SQL Server or to Oracle or Ingres and countless other databases. SQL Database is used to store data information in structured format. SQL database is a type of database technology that is the most widely used in today’s computing environment. Here, the data is stored in a structured format that provides high levels of functionality. SQL databases are generally more robust, secure and have better performance than other older database technologies.

- **MySQL Database**

MySQL is an open source relational database management system. It is based on the structure query language (SQL), which is used for adding, removing, and modifying information in the database. Standard SQL commands, such as ADD, DROP, INSERT, and UPDATE can be used with MySQL. MySQL can be used for a variety of applications, but is most commonly found on Web servers. A website that uses MySQL may include Web pages that access information from a database.

These pages are often referred to as "dynamic," meaning the content of each page is generated from a database as the page loads. Websites that use dynamic Web pages are often referred to as database-driven websites. Many database-driven websites that use MySQL also use a Web scripting language like PHP to access information from the database. MySQL commands can be incorporated into the PHP code, allowing part or all of a Web page to be generated from database information.

Because both MySQL and PHP are both open source (meaning they are free to download and use), the PHP/MySQL combination has become a popular choice for database-driven websites. (<https://techterms.com/definition/mysql> n.d.)

Oracle, SQL and MySQL have their benefits, and drawbacks. These databases have their own features. However, SQL is easier to use and maintain because of its class library system. Since in our previous class session we were practicing with SQL database, our group members are familiar with it. Therefore, in addition to its broad benefit, familiarity will have an impact to selecting SQL for our project.

### Summary Feature Comparison

The following table includes information about the oracle, MySQL and SQL server database, how they compare. (online prescription management system senior project 2017).

**Table 38: Comparison between Oracle, MySQL and SQL database server**

Feature	Oracle	MySQL	SQL
Interface	GUI,SQL	SQL	GUI, SQL, Various
Language Support	C,C#,C++,Java, Ruby etc...	C,C#,C++,Java, Ruby etc...	Java, Ruby, python, VB and PHP
Operating System	Windows, Linux, Solaris	Windows, Linux, OS X, FreeBSD, Solaris	Windows
Licensing	Proprietary	Open Source	Proprietary
Flexibility		MySQL supports neither XML nor user-defined function	SQL supports XML and user-defined function

### Requirement Analysis

#### Introduction

Software requirement analysis is one of the major phases of software development life cycle. This software engineering phase is the stage at which the project team starts to communicate with the stakeholders to get a better and precise understanding of what the client actual needs from the proposed project. This is done by analyzing how the current system is operating. In doing so, it is possible to clearly identify what feature and functionalities of the existing system will be captured into the proposed system and the feature that cannot be handled by the system.

Therefore, this chapter presents the requirements analysis of the automation of incident management system. It outlines the description of the current system, the proposed system, functional requirements, non-functional requirements, and system models in a form of use case model, sequence diagrams, activity diagrams and class diagrams.

#### Current System

The current system of the bank operates the incidents in totally manual base. Due to that, the following operational gaps present onto the incident transaction events. When issues occur and are reported to the department, the agent who receives this issue was not recording about the incident's starting and ending time. In addition, there are no practices for recording the duration of the resolved incidents. In general, current system has no capability of determining and predicting the time durations of each incident resolving time from beginning to end.

The incidents that are already on process are not classified as major or minor and critical or high priority, but it just processes without consideration of the risk level.

If a case of the incident is not resolved, the assigned agent does not take immediate action to escalate the incident to the next level support group for resolution. If the case of the incident is resolved, the agent that takes over the case has no mechanism to disclose the incident's closure state to the immediate level of authority. In addition, it has no communication to the customers in order to collect satisfaction feedback. In the current system, there is no clear escalation procedure; where if an agent cannot resolve the assigned issues, he will ask or transfer the issues to someone with informal ways; he may prefer the next user based upon friendship relations, or other informal approaches.

### **Proposed System Overview**

The proposed system, i.e. Incident Management System, tries to address the problems of the current manual system with the following object oriented approach from the basic needs with those supporting requirements, and lists functions and process using use case, sequence diagram, activity diagram and class diagram. The proposed system uses the use case diagram to represent discrete and meaningful set of works performed by the users. The need of sequence diagram is to show the interaction of the users with the system to time ordering of the message; similarly, activity diagram also has its own implication to show the workflow of activity. Lastly, the class diagram is used to show the interrelationship and cardinality of each class.

In the proposed system, the following main tasks will be done. The proposed system is registering the members with their respective access roles, responsibilities and privileges. The system has competence of viewing the member profile online through the authorized users such as System admin, team leader, and manager. The proposed system registers and captures every necessary incident information which requires creating an incident record. The key details captured could be:

- ✓ Date or time of the incident,
- ✓ Name and or ID of the person and or group recording the incident,
- ✓ Method of notification such as telephone, automatic, e-mail, in person, etc...,
- ✓ Name and or department and or phone and or location of user,
- ✓ Call back method such as telephone, mail, etc...,
- ✓ Description of symptoms,
- ✓ Incident classification (often broken down into between two and four levels of sub categories, such application dep, network dep, security dep etc...),
- ✓ Incident priority, and
- ✓ Other details.

The proposed system will automatically create and assign ID for each incident when registered on the system, which is used to identify and to track the incident. The proposed system will assign every incident assigns with classification based on the reason or symptom of the incident to the appropriate groups . In the proposed system, anyone who will be authorized as user can edit, delete, view and update each incident records online. He/She will define the incident's propriety after gathering the incident' impact and urgency details from

the users and other sources. In case the incident is not resolved and the assigned agent decided to escalate the case to the next level, the proposed system will deliver the form for assigning the incident to the next level support group for resolution.

The proposed system will give state identification status for each incident when registered on the system. The status will be New, Assigned, In-progress, On-hold, Resolved and Closed. Here is the description of each status:

**New:** This status indicates that the service desk has received the incident but has not assigned it to any service desk agent.

**Assigned:** This status indicates that the incident has been assigned to an individual service desk agent.

**In-Progress:** Means that an incident has been assigned to an agent and he is actively working to diagnose and resolve the incident.

**On-Hold:** Indicates that the incident requires some more information or response from the user or from a third party. In this state, the SLA counting is stopped.

**Resolved:** Means that the service desk has confirmed that a solution to the incident is provided and that the user's service was restored to the SLA levels.

**Closed:** This is the final status, which means incident is completely resolved and that no further actions can be taken.

○ **Requirement Specifications**

Software requirement are the statements of what features, functionalities and services the proposed system should provide. To gather these requirements, the relevant stakeholders from the client side are involved to reflect what they need from the proposed system. The project team used several requirement-gathering techniques like interviewing, actual observation of current system, to acquire user requirements. The requirements are then stated clearly so that final document of software requirement is produced and becomes requirement specification of the system when validated, completed and accepted by the project team.

▪ **Functional Requirement**

Functional requirements focus on the main function, which the new application system will provide. In the proposed system, the important requirements are:

▪ **Input Requirement**

- The system must provide Log in and Log out into the system, and it must ensure that personal information is accessed.
- The system must create user account and also provide a mechanism for changing user's password;
- The system must allow text image as an input data;

▪ **Output Requirement**

- The system must view every incident with their status to authorized users.
- The system must have graphical user interface for login, assigned issues, resisted, and report forms.

- The system must view reports for the different operations made in the system.
  - **Operational Requirement**
- The system must create new user account, amend the existing account, and delete the user accounts.
- The system must register and assign status and transaction identification for each incidents.
- The system must assign specific agents based upon the classification, and the classification point group as Network, Database, system application etc...
- The system must identify the major incidents according to the given priority level of the allocated classification matrix. Here is the priority level classification matrix:

**Table 39 priority parameter matrix based on impact and urgency**

Priority Allocated	Level	Impact		
		High	Medium	Low
Urgency	High	P1	P2	P3
	Medium	P2	P3	P4
	Low	P3	P4	P4

- The system must identify and filter the incident records with complaint and suggestion records.
- The system must register every information - the solutions for each incident problems.
- The system must generate and display the incidents with their status; the system status will be such as New, Assigned, In-Progress, On-Hold, Resolved and Closed.
- The system must ensure that the information is entered with correct format.
- The system must not allow performing any operation unless the users have an authority.
- The system must allow registering, updating, viewing and deleting records.
- The system must generate summarized reports.

▪ **Non Functional Requirement**

The non-functional requirements refer to supporting requirements for the user, and for the realization of the proposed system - those are not directly related to functional behaviors of the system, but they serve as a standard way of developing a system. The following lists of non-functional requirements are essential to successful system developments.

**Reliability:** The system shall be very reliable, easy to use, and all information kept and will remain unchanged (unless the information is incorrect, in which case it needs to be changed).

**Portability:** The system can be accessed in many devices and in different platforms like different WIN versions such as 7,8,10, accessed with different browsers such as Mozilla Firefox, internet explorer, Google Chrome etc...

**Usability:** To make the system clear without difficulty, the system uses a simple GUI user-friendly user interface.



**Performance:** The existing manual system suffers from taking long time of doing some tasks; it is tiresome and not fast. The new system will perform its task and respond within a click of a button. In addition to that, many concurrent users can access at a time.

**Availability:** The system shall be available for use 24 hours a day, 7 days a week; the data storage shall be available for use 24 hours a day, 7 days a week.

**Security:** the system database will be secure from being accessed by any unauthorized person by making the login to the system only restricted to legal persons.

**User Friendly Interface:** Simple and interactive user interface components should be part of the system. This user-friendly interface requirement of the system will be available for all users of the proposed system.

#### ▪ **Actor Description**

Actors are the persons that interact with the system, i.e. Incident Management System, and those actors are:

**System Administrator** is a person who controls the system and gives access privilege to users.

**Agent/Technical** is a person who captures the necessary information, creates and registers in the system.

**Expertise** is the one who receives the escalated issues for future support.

**Supervisor** is a person who controls agent/ technical operational activities; and assigns escalated issues to the expertise.

**Manager** is a person who sees every activity including the system generated, summarized reports.

#### ○ **Software and Hardware Requirement**

##### ▪ **Hardware Requirement**

To implement this software system, the hosting machine should have a minimum capacity for appealing system performance.

- ✓ Processor Speed: Intel® Core TM Dual Core 1 GHZ
- ✓ Installed Memory (RAM): 2GB
- ✓ Hard Disk: 80GB

##### ▪ **Software Requirement**

To execute this software system, the hosting machine should have Window 7 ultimate and later versions of windows family as platform:

- System Type: 32 or 64 Bits operating system
- Browser: Internet explorer, Mozilla Firefox

#### **Functional Modeling**

A functional model describes business processes and the interaction of an information system with its environment. In object-oriented system development, two types of models are used to describe the functionality of an information system, and these are Activity Diagram and Use Cases. Activity Diagram supports the logical modeling of business processes and workflow. Use Cases are used to describe the basic functions of the information system. Both activity

diagrams and uses cases can be used to describe the current as-is system and the to-be system being developed.(Alan Dennis 05/02/2015)

### **Modeling Approach**

The Unified Modeling Language (UML) is a standard language for specifying, visualizing, constructing, and documenting the software system and its components. It is a graphical language, which provides a vocabulary and set of semantics and rules. The UML focuses on the conceptual and physical representation of the system. It captures the decisions and understandings about the proposed systems that must be constructed. It is used to understand, design, configure, maintain, and control information about the system.(Mintesinot Teshome july 2017 ).

## **IV. System Design**

### **4.1. Introduction**

A software design is the process of defining elements of a system like modules, architecture, components and their interface and data for a system based on the specified requirements. It is the process of defining, developing and designing systems, which satisfy the specific needs, and requirements of a business or organization. (googleweblight.com n.d.)

### **4.2. Class and Method Design**

Software design is a process to conceptualize the software requirement into software implementation. It takes the user requirements as problems and tries to find optimal solution. We followed OOP design approach to find the optimal solution. OOP design works on classes, their attributes and behavior. A class is a generalized description or representation of an object. An object is an instance of a class. A class consists of all the attributes, which an object can have, and methods that define the functionalities of the object. In the design, solution attributes are stored as variables and functionalities are defined by means of methods.

## **V. Conclusion and Recommendations**

### **5.1 Conclusion**

The system provides an easy, fast and accurate way of recording, updating, searching and retrieving data, in order to solve existing problems. The team has tried to model the proposed system using the new system developing

Our system is going to do the following tasks:. It registers new user account, updates and removes the registered user profile from database properly so that, the system administrator can play a great deal to authenticate and authorize users. In addition to that, the system controls so that unauthorized users will not be allowed to access the system; they are prohibited through verification of user name and password mechanism, search any user profile information that is needed urgently.

The major tasks of the system are registering and classifying the incident information; assign the registered incidents information to appropriate users or escalating to group of users for giving solutions, and finally generating summarized report for highest authority in order to make decisions.

Due to this fact, it is needed to develop incident management system to CBE. Currently the bank works manually and due to this, the bank has problems of time for managing incident manually. It needs more man power and resources; it had poor security system. Therefore, the proposed system will add a great value to the Commercial Bank of Ethiopia in facilitating to provide an input for making correcting measures and restoration of services as quickly as possible and ensuring the best service quality and availability within agreed service levels.

## **5.2 Recommendation**

Based on our findings during problem identification and requirement analysis, the proposed system will improve the incident management system activity and the Bank system performance. Finally, we recommend that Commercial Bank of Ethiopia has to implement the proposed system to solve existing incident related problems and to meet the automated system requirements of the incident management.

The new system has user-friendly interface to access the recorded incident information. Each form is connected with the database, and so, the recorders maintain data to keep history about the incidents. Each authenticated user has his/her user name and password to enter the system through user login form. Therefore, for more modern system utilization, the implementation of the proposed system into the practical foundation is necessary for the organization and to simplify the business process and reduce error. Therefore, the bank would be in a better position if it replaces its existing manual system with our new system.

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