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# ITSM Using AI Chat-Bot and Data Visualizers

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***Abstract: Information Technology Service Management is the process to plan, implement, deliver and support the IT services to cater the end-users' needs. This project aims to study the existing ITSM systems and implement an improved system aided with technologies like chat-bot and data visualization. To resolve IT issues using quality ticket system, we need a robust service management framework based on ITIL framework. The system works in three distinct steps: Reporting, Managing and Resolving an issue. The aim of an ITSM system restore the undisturbed flow of the everyday business process after resolving the ticket. The chat-bot caters to the smaller needs of the users without having a need to create a ticket in the ITSM system. Data visualization can help the management team as well as the users to visually keep the track of the tickets.***
***Keywords: Information Technology Service Management, Information Technology Infrastructure Library, Chat-bot, Data Visualization, Natural Language Processing.***

## I. INTRODUCTION

This rapid growth of IT in current times is affecting organizations of every field like Business, Healthcare, Education, etc. In fact, the continuous utilization and improvement of IT has become an essential support to business, regardless of the sector that organization belongs to [1]. This dependency on IT has been growing, as has its complexity, forcing the organizations to have an effective management. IT services have a big impact on the competitive advantage being important to have an effective and efficient management [1]. Organizations deploy ITSM systems to accomplish that goal.

### *A. ITSM (IT Service Management)*

ITSM is a part of Service Science that is concerned with planning, organizing, offering, and supporting IT services in order to accomplish objectives of the organization [2]. The need of ITSM emerged from the need of innovation in practices as the nature of IT organizations changed from technology-providers to service providers [3]. ITSM is a means of managing IT operations that puts an emphasis on IT services, clients, service level agreements, and how an IT function executes its daily activities via processes [3].
It is in charge of enforcing significant changes within the company, such as how IT procedures, technology assets, vendors, and employees are managed [2]. ITSM's main goal is to improve the quality of IT services while adhering to service levels agreed upon with the client. In addition to the IT service quality, IT service provider must consider some other principles such as customer relationships and value delivering through IT operations [2]. ITSM provides greater customer satisfaction, higher-quality IT services, improved IT infrastructure, stability and efficiency, a better and clear organisational structure, and lower production costs [4].

### *B. ITIL (Information Technology Infrastructure Library)*

ITIL is the most popular ITSM framework, proposing a collection of best practises to aid IT firms in deploying and utilising IT services that are aligned with their businesses [5]. The latest version, ITIL4 enhances ITIL by restructuring several existing ITSM practices in terms of user experience, value streams, and digital transformation, as well as adopting new working practises like Lean, Agile, and DevOps [6].
The ITIL service value system (SVS) and the four-dimensional model are critical elements of the ITIL4 framework. The SVS depicts how the organization's numerous components and operations collaborate to promote value creation through IT-enabled services. [6]. These can be combined in a flexible way, which requires integration and coordination to keep the organization consistent. ITIL specifies four service management aspects from which each component of the SVS should be considered to ensure a holistic approach to service management [6].

## II. EXISTING WORK

[1] The research paper aims to develop a reference study regarding the details of the main concepts of ITSM after reviewing a total of 47 articles selected from the top journals and conferences. The paper has adopted the SLR methodology to enlighten the ITSM domain and an overview is presented. The benefits, challenges, opportunities, and practices for ITSM implementation were extracted, critically analysed, and then discussed in this paper.

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[4] The research paper focuses on the critical factors necessary for the success of an ITSM project. The paper mentions about the high failure rates of the ITSM projects in spite of huge investments in the projects. IT service management is a combination of people, procedures, and technology dedicated to providing high-quality IT services.
Many firms have trouble adopting ITSM projects because people, process, and technology are not given enough weight. The paper's research used the Delphi approach to evaluate key success elements in ITSM deployment from the three viewpoints indicated above, yielding a list of 48 critical parameters.
[6] The book is considered to be one of the best publications for understanding the implementation practices of ITIL 4, the latest evolution of the most widely adopted guidance ITSM.
The book is beneficial for learners just starting out in service management as well as seasoned professionals who are familiar with older ITIL versions and other industry best practises. It teaches readers about the ITIL 4 service management framework and how it has evolved to accommodate new technologies and working practises. It discusses the principles and serves as a reference tool for practitioners as well as students.
[7] This article aims to explain the adoption factors and implementation steps of ITSM in target organizations. The paper mentions that the ITIL framework is the most widely used framework in most of the organizations. But the organizations face issues in the proper implementation of this framework.
And there are several steps in the implementation of this framework. The paper tries to clarify each of the major issues and suggest a mature guideline on proper implementation of the framework in the target organizations.
[8] The paper aims at giving the overview about building an incident management system based on ITIL framework. The paper explains the concepts regarding service desk, incident management system and how incident management system helps customer in solving their problems. It mentions the designs of incident management system are various, but the definition of the incident states and responsibility of the roles is very vague. Hence, a proper design of the incident management system with well-defined incident states and target-clear responsibilities of the roles.

## III. PROPOSED SOLUTION

The aim is to create an ITSM system in the form of web-based application that incorporate the best practices currently present as well as adopt the advancing technologies of the future like the Artificial Intelligence. Hence, the first and most important step is requirement gathering and then designing some of the UML diagrams related to the project. Hence, the objectives of the system are analysing and determining the present IT infrastructure, services, and processes; creating futuristic management practices; formulating roadmap to elevate the state of business; and creating steps for the roadmap.

### *A. Requirement Elicitation*

The requirements for the proposed system are identified and documented through interviews and observation. Interviews were conducted to identify the parties involved in the incident handling, service request, problems, and constraints. Observations are made to observe directly any incident handling and service requests activities, as well as the assignment of responsibilities.
Incidents management and request management has several activities, namely:

*1)* Define incident and service request classification schemes
*2)* Record, classify and prioritize requests and incidents
*3)* Verify, approve and fulfil service requests
*4)* Investigate, diagnose and allocate incidents
*5)* Resolve and recover from incident
*6)* Close service requests and incidents

Three different models were presented for classifying incidents. An external ITIL consultant created the first model. The MaISSI research team proposed the second model. An IT manager created the third model. The first and second models were very similar. It proposed categorising requests as incidents, problems, or requests for change. In addition, incidents are classified as service requests, hardware failures, or software failures.
In the third model, the concepts were used in a different way than in the first two models (service requests are categorized into incidents, there were no requests for change and problems visible in categories). Finally, the organization started to use the third model with some modifications.

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*B. System Design*

*1) Use Case Diagram:* The Use-Case Diagram showcases all the possible use cases for the proposed system in a condensed form. The diagram shows use cases for normal user, administrator, agents, service manager and request approvers.

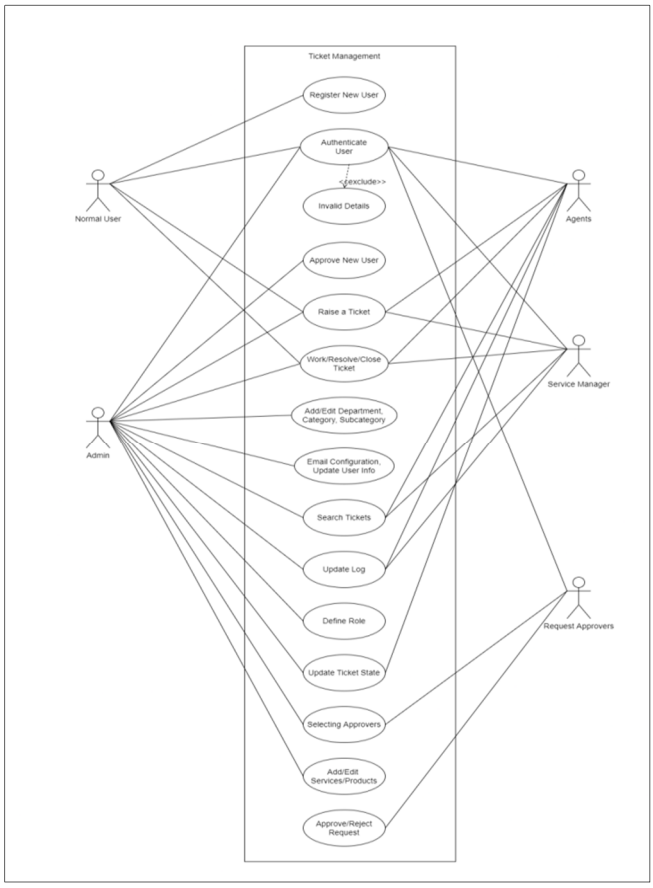



Figure 1: Use Case Diagram

*2) Class Diagram:* The class diagram depicts the system's static structure. The diagram displays the types of users and tickets as well as the enumerations present for the tickets in the form of 'Status' and 'Priority' and interface for the 'Admin' user type.

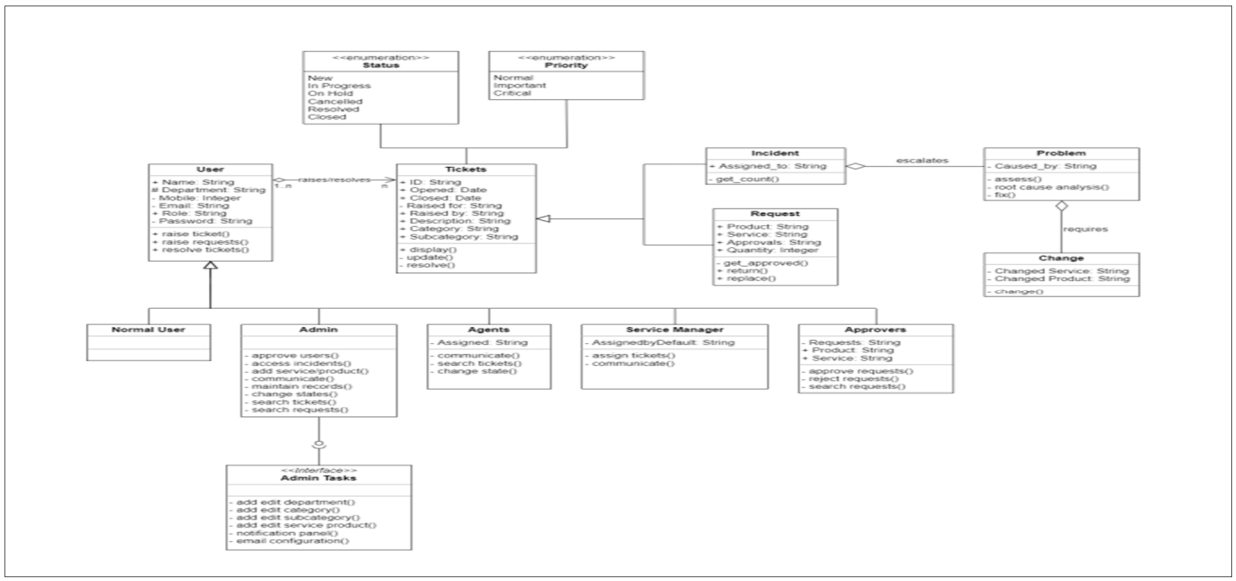



Figure 2: Class Diagram

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## IV. METHODOLOGY

The system will be implemented using HTML and CSS for the Frontend development and using React.JS for the Frontend Framework. We will be using Django for Backend Development and SQLite for the Database. And finally we use REST framework for any APIs if necessary.

### *A. Incident Management*

The incident management's goal is to promptly resolve events that disrupt an organization's IT services' normal operations. An incident is a signal that a component in an IT system has failed in some way. An incident is either reported by the client or automatically generated by a system monitoring/event generation system in a typical service desk. Customers submit incidents by utilizing natural language text to describe the system's status, whereas automatically created incidents only have structured data indicating the system and event-class. Only customer-reported occurrences are considered.

### *B. Request Management*

An IT Team receives a variety of requests which may include requests made for certain services or products. Request management module handles the requests made by customers or employees and manages the entire lifecycle of the requests. The request management module is managed by an IT team where the requests are approved or rejected by the members of the IT team.

### *C. Problem Management*

Problem management is in charge of controlling the life cycle of all problems as well as preventing problems and incidents. It also seeks to prevent repeated occurrences and reduce the impact of those that cannot be avoided. The tasks required to diagnose the fundamental cause of occurrences and determine the problem's resolution are included in resolving a problem. The application of a change to the configuration item in the existing IT environment is frequently required for problem resolution and root cause elimination. Problem Management also keeps track of issues, as well as the proper workarounds and remedies, so that the business can reduce the number and severity of incidents over time. Problem Management has a good link with Knowledge Management in this regard, allowing them to work together.

### *D. Change Management*

The Change Management program takes a methodical approach to managing the life cycle of all changes, allowing for positive changes to be implemented with minimal disruption to IT services. The three categories of service modifications described by ITIL — standard, emergency, and routine — are often supported by Change Management. The state model that is triggered and the change process that must be followed are determined by the change type.

Standard Change, Normal Change, and Emergency Change are the three basic sorts of changes. The change management procedure in our proposed system is similar to incident and problem management, with the exception that each change can be linked to either a problem or an incident. As a result, when doing a change management analysis, the linked problem is considered. The change requirement is based on the root cause analysis of an issue, and the process continues from there. Before being implemented, evaluated, and closed, change management follows a prescribed procedure that involves two levels of approvals.

### *E. Chat-Bot*

In software businesses, a chat-bot for ITSM has been introduced. We have examined certain sample data such as a virtual office structure, a database of staff details, and some other databases to preserve the state or context of the system because the chat-bot is intended to be used in software firms. This information is also used to query the system and create a ticket. To create, test, and deploy chat-bots, RASA Conversational API is employed.

The usage cases that follow are:

*1)* Ticket Categorization
*2)* Knowledge Management
*3)* Reset Password etc.

### *F. Data Visualization*

Data visualization provides real-time and secure information about the status of all the incidents as well as the permissions granted to the users. Data visualization can be widely used across a platform as it provides a better understanding of the system.

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The following are examples of the many sorts of visualisations used:

*1)* Overview of the Circular Percentage Indicator for Incidents, Problems, Change, and Requests
*2)* States and their values are listed in a table.
*3)* A line graph depicting the patterns in incidents, requests, changes, and difficulties over the course of many weeks.
*4)* A bar graph depicting the month-to-month comparisons and concerns of several departments and issues.

## V. CONCLUSION

After the requirement elicitation, the conclusion is that the minimum modules necessary in an ITSM for providing any IT services are Incident, Request, Problem and Change Management. After deciding the modules, the team responsible for handling the tickets are the agents, the administrator and the service manager. And the Request Management requires additional manpower in the form of approval team that handles all the registered requests and work towards fulfilment of those requests. And to assist the users, we implement chat-bot for recurring tickets and data visualization techniques for easy understanding. The chat-bot implemented will assist the user in giving solutions to the users' query. And Data Visualization provides a better understanding of the system through visual means.

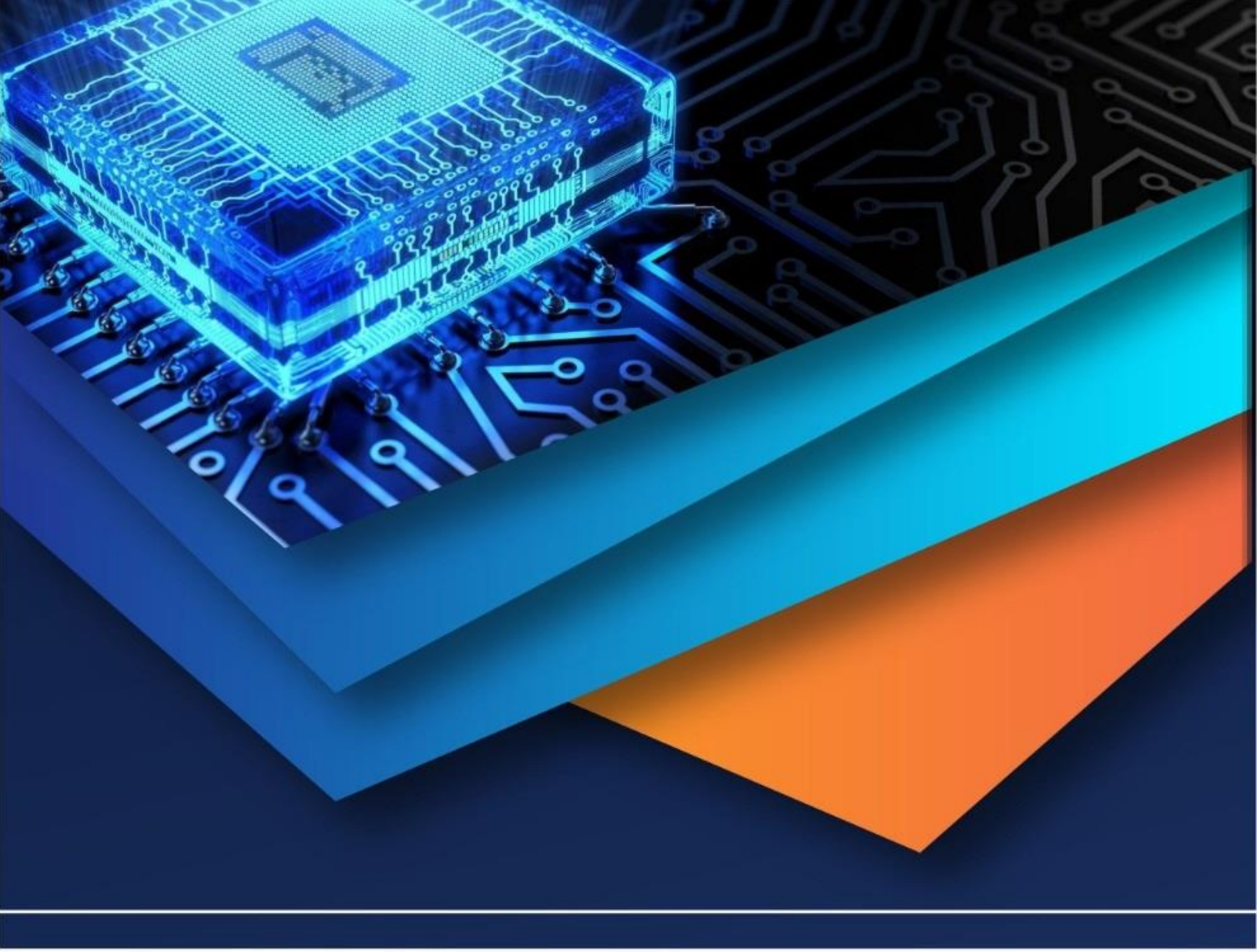
## VI. FUTURE SCOPE

Further work will regard the development of the system with the inclusion of other management practices in the system and improvement of the chat-bot and data visualization techniques.

Processes Assessment, Cloud Computing & DevOps, Lack of Guidelines for Process Improvement, Identifying Processes' Interdependencies and Overlap, and Maturity Models for the Needs of IT Management Providers are some of the opportunities given by the ITSM [1].

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