KL ONE IT: One stop platform for IT tickets

A PROJECT REPORT

Submitted by

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DECLARATION

I undersigned hereby declare that the project report on ”KL ONE IT: ONE STOP PLATFORM STOP FOR IT TICKETS” submitted for partial fulfillment of the requirements for the award of degree of Master of Computer Applications of the APJ Abdul Kalam Technological University, Kerala is a bonafide work done by me under supervision of Prof.Vaheetha Salam.

This submission represents my ideas in my own words and where ideas or words of others have been included,I have adequately and accurately cited and referenced the original sources. I also declare that we havea adhered to ethics of academic honesty and integrity and have not misrepresented or fabricated any data or idea or fact or source in our submission. I understand that any violation of the above will be a cause for disciplinary action by the institute and/or the University and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been obtained. This report has not been previously formed the basis for the award of any degree, diploma or similar title of any other University..

Place: Kollam
Date: 20/05/2022

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CERTIFICATE

This is to certify that, the project report entitled **"KL ONE IT: One stop platform for IT tickets"** is submitted by **MALAVIKA MAHENDRAN (TKM19MCA015)** to the APJ Abdul Kalam Technological University in partial fulfillment of the requirements for the award of the degree of Master of Computer Applications, is a bonafide record of the project work carried out by her under our guidance and supervision. This report in any form has not been submitted to any otheR University or Institute for any purpose.

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ABSTRACT

Raising IT tickets and manually solving them by IT teams is a major problem and one of the most important concerns for many companies. KL One IT is a solution made to solve them. It is the one stop platform for KL(Knowledge Lens) IT team to support and manage all IT tickets and assets for the complete employee of the organization. This system is the main generic tool of the User Support System, for the user support. With the growth of organization the amount of IT issues / support required will increase. The whole support process now is manually handled. It is difficult to keep track of the number of Items closed and if the issue is resolved or not. The KL ONE IT application helps to solve these problems where each user can raise a ticket based on the issue or the support required which is assigned to admins in the IT team with a given set of time based on priority. The main purpose of this project includes supporting a wide variety of users and also to help them maintain their system. It allows users of the production team to get support for encountered problems or questions and access to the user documentation. The main objective of the system is which shows and helps you to collect most of the information about issues of the employees of the company. The interface is very user-friendly.The user can enter into the interface by entering their user id and password.It is either accessible by an employee or admin. The data are well-protected for personal use and makes the data processing very fast.

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Chapter 1

Introduction

Organizations work hard towards maintaining their bottom line. Since the time organizations have started understanding the what and how of customer experience, they have been promoting a customer-centric culture. Simply put, customer-centricity refers to putting the customer at the center of what you do.Acknowledging the need to improve customer support and satisfaction is not enough. The organizations need to put in place the right measures to achieve the goals of delighting their customers. One of the most important ways of doing that is by having a Help-desk Ticketing System.Without a help-desk ticketing system, there's no single data source or central knowledge base to evaluate customer service performance and to better understand customer issues.

The ticketing systems continue to evolve and offer more efficient features that improve customer service agent productivity especially when they offer seamless interaction's with your other business apps. Many of the manual tasks performed in the past are becoming automated so agents can be more customer-focused instead of administrative. As a bonus, change management becomes less necessary as your IT support knows what to do and is all on the same page when it comes to support requests.

KL One IT is such a help desk support system enables the companies to resolve customer issues efficiently by simply automating complaint resolution process with ticket management. The lines can sometimes be blurred between a help desk management system or IT service management. But, the help desk is primarily focused on managing customer concerns whereas, IT service management caters to the needs of the internal functioning as well. It is utilized by a customer support team to develop, manage, and maintain lists of customer issues. This way, end-users experience a high-quality response to customer requests – even through self-service options.This ticketing system receives, sorts, and logs incoming tickets to streamline and organize the customer service problem resolution process, giving your IT support and IT ticketing teams superior project management tools. Over time, this creates a tremendous knowledge base regarding customer behavior.

1.1 Objective

The project aims to achieve the following:-

- *Better team collaboration.*: It provides a satisfactory experience for the end-user while improving team performance.Sending out regular updates on the status of the customer's request becomes easier. The customers will be kept in the loop throughout the life cycle of the ticket and not just when it is resolved.
- *Growth over time*: Admins can utilize the service desk software to learn about the most common issues through the software CRM (Customer Relationship Management) and other features, which can be addressed with internal teams to ensure end-users walk away with a positive experience. Also, teams can identify specific situations where agents are struggling to manage, which could indicate the need for additional training.
- *Improved agent productivity*: Excellent customer service is an invaluable characteristic of any company.By automating these tasks with a support automation platform like Capacity, agents can spend time on higher-value activities like serving customers and training while your help desk software does some of the heavy tasks.
- *Ticket Prioritization*: The admin can set the rules about prioritizing certain tickets or allow the employees to do so. This is particularly helpful in case of High Net Income customers or in case of tickets where the interaction history with the particular customer has been less than satisfactory.

1.2 Company Profile

Knowledge Lens provides a collection of Lens that automates and simplifies the discovery of hidden insights from Big Data .Our mission is to turn the dark data to meaningful business insights. We are Big Data Technology Geeks with extensive Industry expertise and a wide range of Big Data Projects ranging from Big Data Engineering to Data Science.

1.2.1 Products

- **iLens(Intelligent Lens**: iLens provides a single platform for smart integration with various devices or sensors in large enterprises, manufacturing industry, home, commercial properties etc.iLens provides an MQTT interface for seamless integration of various sensor devices in the field to capture time series data in real time. Based on pre-configured rules, iLens is able to generate alerts, alarms based on the rules.

- **MLens**: MLens is a one-step solution which enables you to manage disaster recovery for your big data and platforms.Features of MLens includes Big Data Backup Migration, Automated Disaster Recovery, Data Encryption, compression Archival, High Speed Batch Data Ingestion, Monitoring Scheduling and Secured Access controls.

- **AiLens**: Next Generation Ai platform that offers a collaborative workspace with experiment designer, modelling feature engineering work bench, AI/ML assets repository integrations for enterprise security and DevOps. AiLens is an intelligent assistant for Artificial Intelligence crafted with a unified graphical interface for building Data Engineering and AI/ML pipelines.AiLens includes a unified AI Orchestrator which triggers model execution runs on any runtimes like Tensorflow, SparkML, H2O, MxNet, Theano, Py Torch, AWS / Azure from a console. AiLens is quite flexible as the user experience will be the same. Irrespective of any new technological advancements because of the meta model-driven platform. Intuitive job submission and monitoring framework, secured integration with external entities and inbuilt encryption and role-based access control support make our product stand out with a huge margin.Key features includes any AI Stack, any AI Algorithm, anywhere Unified AI Orchestrator,Simplified User Experience, Intelligent Assistant for AI, Integrated Data Preparation AI Modelling Environment and Seamless Enterprise Security Integration.

- **GLens**:GLens is a Real-Time Data Acquisition, Monitoring and Analytics suite of Products for Industrial Emissions, Effluent Discharges and Ambient Air Monitoring. GLens DAS Software, GLens Server Platform, GLens Environ Data Logger provides a comprehensive solution for all Industry Environmental needs. The platform connects to any analyser, sensor or device in a plug and play model acquiring data in real time.The key features of GLens are: rest based open protocol for multi-client deployment, real time alerts and alarms with SMS and Email integration, remote calibration and configuration of analyzers, plug and play complete protocol integration with any analyzer make and model, integrated and data quality codes as per ISO 7168, integrated analytics and predictive models for effective pollution control and live consolidated industry dashboards.

1.2.2 Services

- **Big Data Engineering Services**: We provide end to end Architecture, Design, Development, Testing and Deployment of Big Data Protects.

- **Big Data Security Services**: We are one of the niche consulting companies to provide specialized Big Data Services.

- **Big Data Analytics Services**: We deliver hidden insights from a wide variety of data sources using our pre-build analytical Lens.

- **Big Data Competency Development**: Without unique Big Data expertise, we provide one of the best Big Data Competency Development programs for the enterprise.

Chapter 2

Literature Survey

Literature review is the comprehensive study and interpretation of literature that relates to a particular topic. When one uses literature review research questions are identified, then one seek to answer this research questions by searching for and analyzing relevant literature. Some importance of literature reviews is that new insights can be developed by the re-analyzing the results of the study. A literature review is both a summary and explanation of the complete and current state of knowledge on a topic as found in academic books and journal articles. There are two kinds of literature reviews you might write at university: one that students are asked to write as a stand-alone assignment in a course, and the other that is written as part of an introduction to, or preparation for, a longer work, usually a thesis or research report. The focus and perspective of your review and the kind of hypothesis or thesis argument you make will be determined by what kind of review you are writing. One way to understand the differences between these two types is to read published literature reviews or the first chapters of theses and dissertations in your own subject area. Analyses the structure of their arguments and note the way they address the issues.

2.1 Purpose of the Literature Review

1. It gives readers easy access to research on a particular topic by selecting high quality articles or studies that are relevant, meaningful, important and valid and summarizing them into one complete report.

2. It provides an excellent starting point for researchers beginning to do research in a new area by forcing them to summarize, evaluate, and compare original research in that specific area.
3. It ensures that researchers do not duplicate work that has already been done.
4. It can provide clues as to where future research is heading or recommend areas on which to focus.
5. It highlights the key findings.
6. It identifies inconsistencies, gaps and contradictions in the literature.
7. It provides a constructive analysis of the methodologies and approaches of other researchers.

2.2 Related Works

Analysis, design and implementation of a help desk management system

As companies grow, so do the complex demands placed on the IT Department. Without a good Help Desk Software, IT Departments can begin losing the ability to effectively provide employees with the technical support they need to do their jobs. Many enterprises rely on IT Ticketing Systems to deliver fast, reliable internal customer service, resulting in improved IT department operations and satisfied employees. This paper describes the process of creating an IT Ticketing System from scratch for the IT Sector of a well-known organization in Albania - Albanian Radio Television, the public broadcaster of the country. The new way of collecting information about IT problems in the institution and also a new way of distributing work to the IT Staff members will bring benefits not only to the IT Sector but also to the employees which this sector supports. The system is developed using Java FX a software platform for creating and delivering desktop applications, as well as rich internet applications from Oracle.[1]

Question Classification Framework for Helpdesk Ticketing Support System using Machine Learning

One of the elements that contribute to the nonuniformity of the question data in Helpdesk Ticketing Support (HTS) System is the diversity of services and users. Most questions that were asked in the HTS are in various forms and sentence styles but usually offer the same meaning. Various state-of-the-art machine-learning approaches have recently been used to automate the question classification process. Question classification, according to the researchers, is important to solve problems like helpdesk tickets being forwarded to the wrong resolver group and causing the ticket transfer process to take effect, and to associate a help desk ticket with its correct service from the start, reducing ticket resolution time, saving human resources, and improving user satisfaction. The key findings in the exploration results revealed that in HTS, tickets with a high number of transfer transactions take longer to complete than tickets with no transfer transaction. Thus, this research aims to develop an automated question classification model for the HTS and proposes to apply the supervised machine learning methods: Na¨ıve Bayes (NB) and Support Vector Machine (SVM). The domain will use a readily available dataset from IT Unit. It is expected that this study will have a significant impact on the productivity of technical and system owners in dealing with the increasing number of comments, feedbacks, and complaints presented by end-users. This paper will present related works and research frameworks for automated question classification for HTS.[3]

Scrum Method in Help-desk Ticketing and Project Management System

Trust, convenience, and user satisfaction are important for service providers or services. Especially in the field of technology, application service providers are very concerned about these three things for their users. Especially when there is a problem with the application, users will need communication with the provider, response and fast resolution of the problem. Application development is also an important factor for providers to improve services to users. PT. Ihsan Solusi Informatika is a company in the field of technology as a provider of banking system services and sharia-based savings and loan cooperatives. Of course, expect good service for users. Reporting management and problem solving as well as project management or system development are needed to improve services. This researcher aims to build a help desk ticketing and project management application using the web-based scrum method. The application is built with HTML, Javascript and Python programming languages. Application testing uses the black-box testing method to show the application is running as needed. The results of the study show that the application built is beneficial for users and of course for service providers to improve services with well-documented reporting and are immediately accepted by all service provider members so that it has an impact on the efficiency of internal performance. This application provides information about reporting problems reported by users, and there is a comment feature for communication between users and service providers.

Development of IT Help desk with Microservices

Often, businesses employ technology in driving business growth. Many applications or systems have been introduced to organizations for process improvement and customer satisfaction. An IT help desk is the system that allows users to submit service requests for reporting problems or their requirements to IT teams for trouble shooting. This paper presents a design of IT help desk with micro service architecture to promote scalability of the system. The implementation includes the classification service that automatically categorizes tickets to the associated IT teams for support. The thesaurus database is utilized for clustering the request subjects. The benefits of the proposed approach would be to enable the scalability and fortify the availability of the system.[7]

Integration of the Helpdesk System with Messaging Service

As IT organization handles information systems and technology receives many services request in the field of operational or implementation of systems and information technology, they had to deal with these problems: a simple ticketing service, IT management mechanism in order to provide services to users of the system, to boost the information service which enabled the process with positive influences. This paper proposes a service desk solution integrated with Messaging services, using Short Messaging Services (SMS) and a push notification application. Here we use the WhatsApp application as a notification media to assist the design of the helpdesk. Analysis and adjustment were made to the ITSM concept using the ITIL V4 framework at the Service Management Practices stage. The results of this study are implementing the ITIL V4 framework to get better helpdesk services and utilizing the Messaging services to increase the promptness of sending tickets.[8]

A Two-Level Automatic Help Desk Based on a New Statistical Approach

In this paper we propose a two-level automatic help desk based on a new statistical approach.

The proposed system is used to simulate a technical support centre as a help desk for a Web site which is used in order to provide the visitors with designing and printing services. In contrary to the existing help desks which employ some expert people to make a technical support group, we propose a help desk capable of answering the preliminary questions received from the user side at the first level automatically. If the user's problem can not be solved at the first level, it can be followed by the user using a ticket at the second level which is supported by the real experts. This statistical approach can be used consistently in different domains and problem spaces withoutany need for a new design, regarding the new domain.[4]

IT Help Desk Service Workflow Relationship with Process Mining

In this paper, the data was initially collected from an IT service department which aimed to handle the computer equipment/server problems and requests of customers whom contacted the company. The IT company has developed a help-desk service in which anyone who requests for any IT service will have to come to this service for help, and the system will automatically generate a ticket for each of the request (i.e., registration number, type of the problem, etc.) and then the system will arrange and assign the work between the a group of IT staff including 5 people in order to address the mentioned customer's problem. The order and sequence of the IT staff to handle the problems is alternatively changed one by one. For example, if the first problem is addressed by IT Expert 1, the second problem is handled by IT Expert 2, and so on until the IT Expert 5, which one cycle is completed and then the forthcoming tasks will be started from IT Expert 1 again. In order to increase the level of the customer satisfaction, the company has set a guideline for each IT Expert in such a way that they need to finish every request (assigned task) within a maximum of 4 hours during the working hours (i.e., 9-12 AM and 1-4 PM). However, the problem that currently the company is facing is that, for some tasks it takes more than 4 hours to handle the customers' requests. In order to discover and investigate what are the main reasons of such delays, and in order to solve the problem, a process discovery Process Mining technique so-called Fuzzy Miner -in terms of both Time Performance and Frequency-Based Analysis metrics- were applied on the collected event logs. Quite surprisingly, the results of the Fuzzy Miner models (based on Time Performance metric) showed that the average time gap between the opening ticket and closing ticket is 4 days, rather than the 4 hours, which is much longer than the targeted guideline. In addition, the results of the Fuzzy Miner models (based on Frequency-Based) could reveal on the sequence and order of the way the activities have been executed and performed while addressing the customers' requests. However, using the Fuzzy Miner techniques did not shed light on the main reasons of the long delays throughout the repairing/customer service process. Accordingly, another type of process mining technique so-called Social Network Miner (based on Handover of Task metric) was used in order to better study the relationships and communicational dependencies amongst the experts. According to the resulting social network graphs, it was understood that out the 5 IT Experts, only 4 of them has really handled most of the workload, while 1 of them performed only 5 tasks per year. By further zooming on this guy, it was realized that not only this guy has performed and accomplished very few number of tasks per year but he has transferred almost all of his assigned tasks to others as well, playing absolutely an inactive and idle role throughout the year. Eventually, the results of the study could help the company to improve the quality of their customer service leading to increased customer satisfaction and improved efficiency.[2]

Efficient Internet Chat Services for Help Desk Agents

This paper presents a model for ”Help Desk chat” which is distinct from the ”buddy-list” model for the conventional collaborative chats. Help desk chat includes several distinct capabilities including scheduling and routing functionality, archival of problem resolution sessions, integration with ticketing databases, unification with knowledge management systems, and efficient interfaces for agents to effectively handle and multi-task several chat sessions. The main motivation is to provide an alternate channel to voice calls that increases help desk agent efficiency while improving end user satisfaction. By implementing an end to end help desk chat system and piloting it in a large global enterprise, we demonstrate that help desk chat indeed meets these goals. Analysis results over numerous help desk chat transcripts quantitatively show the effectiveness of chat over voice across key help desk performance indicators including first call resolution, average speed to answer, average call duration, extent of multi-tasking, and end user satisfaction.[6]

Chapter 3

Methodology

Before starting any project it is important to be clear of the outcomes that are expected and the processes involved that will achieve those outcomes. There are a number of approaches that can betaken in order to manage the resources that are required to complete a successful project. Outline the activities to be carried out in project management as: the feasibility study, planning, project execution.

Whenever a user needs to report a problem or make a question, he will create a ticket. The ticket will have a unique number reference. The ticket should be assigned with priority, so that the admin can understand that the It ticket raised by the user is very urgent and it needs to be done at the fastest time.

The user can reassign the priority of the tickets if they think that the ticket that is raised is not prioritised properly. But it cannot be edited once the ticket is being assigned to any IT team. So the user have to be careful on editing and raising the IT tickets.The admin can reject the tickets if it finds not important. Or the admin can reassign the same ticket if the tickets are not resolved by the assigned IT team. When a ticket has been answered, the IT team should make the ticket as closed because this will trigger the mechanism by which the user who reported that problem will be modified. It is up to the supporters criteria to include a ticket into the data base in order to make it available for all the users or not. User ticket Support infrastructure should allow all users of the production test to the user documentation. A user could be a scientist sing the system or a local system administrator. The ticket support database administrator will take care of the utility and will control the efficiency of the method trying to improve it as much as possible.

Ticket Support systems are mainly used in organizations with big number of users compared to the number of supporters. While there are several solutions available many of them are commercial and there are just a few free tools. We have evaluated some free tools and they are quite similar in approaches and features. The main differences were in appearance and development status.

3.1 Module Description

There are mainly three hierarchical levels of services will be provided: the User Level, the Supporter Level and the Administrator Level. Lets see each of them :

3.1.1 User Level

It is the most basic level. The user can consult with the IT team usually and its done manually in the existing system. If that does not work and the user is not able to solve the problem, the user will create a ticket stating the problem. The user can also create or raise the ticket by giving priority to the problems. There are mainly 3 levels of priority: high, medium and low. Default priority is set to low. The user can set to high priority for those which the ticket has to be solved at less time.

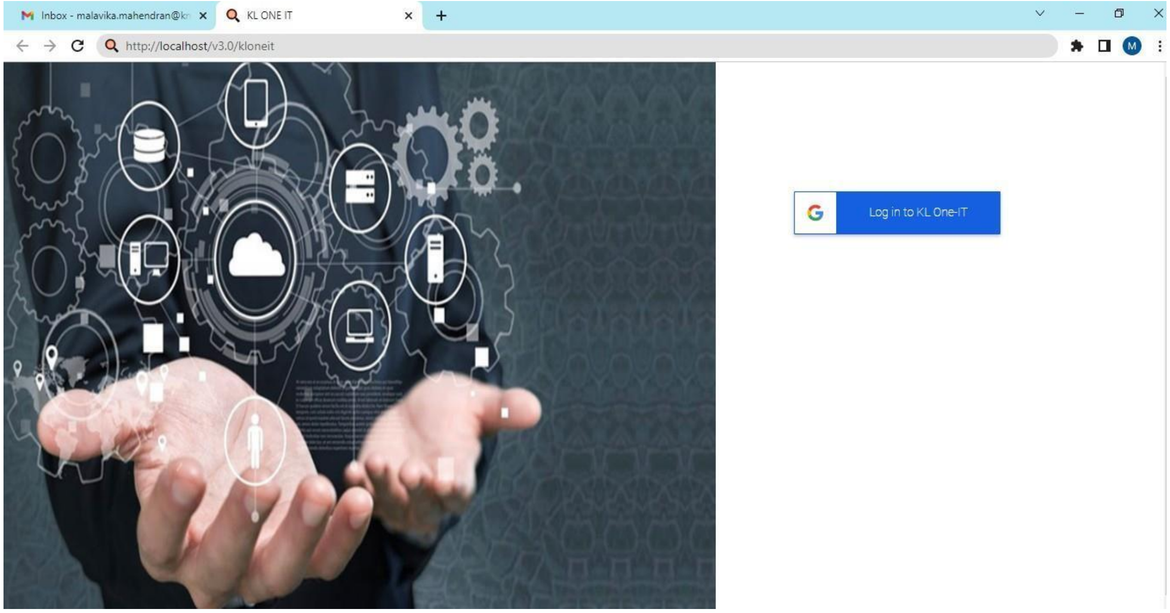


Figure 3.1: Login page for authorised user

Login happens through google SSO (single sign on) and only the users with Knowledge Lens mail id can login into the application.It ensures that the users are authorised and if any unauthorised users try to access it, then they are not permitted to login the system.Users will be able to create tickets, select categories and the subcategories of the ticket.They will be able to see which admin the ticket is assigned to and view the status of the ticket.While raising the tickets user can add multiple images to their tickets.

The issue of usability is an important issue that must be addressed during the design of the user interface.Though the system is not intensively used, it is still important to try to reduce the time it takes to carryout a task. While it is perceivable that cutting the time it takes to carry out a task by fractions of a second-may save certain companies, employing hundreds of people carrying out the same task, a lot of money.More importantly for the company is the need for the interface to be designed so that learning the system is simple and carrying out day-to-day tasks is more efficient than the current system. Many web based systems fail to combat basic usability issues and end up being less efficient than their predecessors.

3.1.2 Admin Level

It is composed by identified experts in several domains. Raised IT tickets are divided among the admins. It is the responsibility of the admin to resolve or complete the tickets assigned to them. They have to look to the priority first and then have to solve all the tickets that has the highestpriority.The admin can reject the IT tickets of the users if they find the IT ticket as unnecessary.They have the chat assisted with them to reply to the admins and users for clarification. The admin will be assigned with some time to resolve the IT tickets raised by the user. If the admin is not able to solve the tickets at the accurate time, then admin should respond to the root admin for the cause of not completing the tickets.Login happens through google SSO (single sign on) and only the admin with Knowledge Lens mail id can login into the application.Comment section to all open tickets. The users, admins and the root admins will be able to comment on the open ticket.

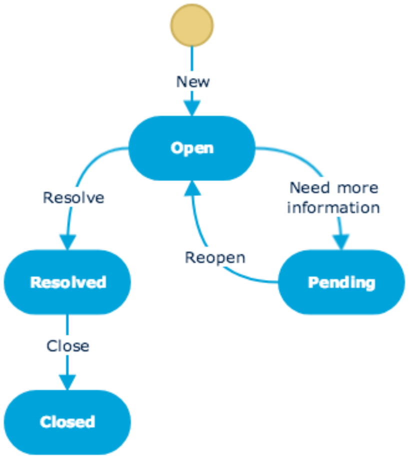


Figure 3.2: Workflow

3.1.3 Root Admin Level

The root admin is responsible to manage the resources, administrate the database, add or remove the admin. It also helps to keep the Ticket Support system in good shape.Login happens through google SSO (single sign on) and only the root admin with Knowledge Lens mail id can login into the application. Root admin can set the role of the user at the initial login or can update the role later. The root admin is mainly responsible for assigning the admins. The rot admin can view the activities and the IT tickets.Root admin dashboard will have a view of all the Total number of raised tickets, total tickets, closed ticket the status of each admin if they are online or offline and the admin performance as status.Root admin will have the privilege to assign tickets to admin, view the admin status to see what are the tickets status and the number of closed tickets.

The users, admins and the root admins will be able to comment on the open ticket.Root admin can view all the images attached to tickets.

3.2 Working

In order to gain access into the Ticket Support system it is mandatory to login if the user/supporter has not an account it is possible to apply for one (Error: ”Access Denied”) by following the link ”register for an account in the login page, where the potential user/supporter will have to fill in a simple form.A ticket should be assigned to a supporter/admin that will be responsible of answering that ticket.In order to help in the assignment of a ticket to a concrete admin, the user can choose the admin for that ticket. By default the new ticket is assigned to the expert with the smaller number of tickets assigned to him. It is important to assign the tickets to an admin if it is being answered or else the root admin can assign the tickets to other admin.

After logging into the Ticket Support System, only those authorised user of the company with email id can access the system. For those unauthorised users, there will be an error message displayed. So the user has to give request to the root admin for access permission or should login with the authorised email id and credentials.

Ticket Options

Ticket Options are split into three items: Create Ticket, My Open Tickets and My Closed Tickets. Next, we will be discussed in detail each one of these user options:

- *Create Ticket*

  A user would create a ticket if he could not solve his problem looking at the information stored in the knowledge database. The resulting ticket will then be assigned automatically to a supporter. This supporter will be notified by an e-mail message. In Error: Reference source not found the page designed for ticket creation is shown. It consists in three sections: User Info, Admin Info and Tickets Info. The user data are listed in the User Info section, while in the two last ones sections there are several fields to be filled in. Notice that, apart from the fields dedicated to the problem description, the rest will be filled in by information which can help to get the question addressed, in a short time, to the right expert.The users have the ability to manipulate the following fields to be able to carry out what it is mentioned previously.

- *My Open Tickets*

  It is possible to keep track of the status of the open tickets owned by the user. Using this option, the user will see a table where all of his open tickets are listed along with additional information related to: the supporters who has received those tickets, the creation date, their status, etc. By clicking on one of the fields located in the column named Short description, the user will find more details about that particular ticket such as the answer of his question. Still in the same page, the user can not only see both the information related to his problem and the previous updates done to it, but he is allowed to add a new comment to the ticket if something has changed in it.

- *My Closed Tickets*

  In a similar way it is possible to consult the closed tickets. Even if the user is not able to reopen a closed ticket, it is still possible to perform an update to a closed one.

Description

Here the user should give a widely description of the problem, providing to the supporter an easy understanding to the question. The correct description of the problem could help to get the problem fixed quickly.

Priority

The user can assign a priority to a ticket, Notice that, priority does not guarantee anything to the user; it is only an indication to the supporter on how urgent is that problem for the user. Therefore, a user can classify his ticket depending on its urgency into three priority levels: High, Medium and Low priority.

Search For Ticket

It allows to make searches into the tickets database.An admin can carry out a search to check the status of his/her ticket that’s already raised.

Resolving a Ticket

Even if answering a ticket is quite easy some concepts should be clarified. The comments can be written in comment section by the admin and the user can see it more clarification.

3.3 System Architecture

The ”Ticketing Support System” software is user-friendly software. The main objective of the system is which shows and helps you to collect most of the information about issues of the employees of the company. The Ticket Support System can be entered using a user id and password. It is accessible either by an employee or admin. Only they can add data into the database.The data can be retrieved easily. The interface is very friendly. The data are well protected for personal use and makes the data processing very fast. This project has been developed using React JS as a front end and back end as Posgre SQL, Python and fast API. A ticket should be assigned to a supporter that will be responsible of answering that ticket. In order to help in the assignment of a ticket to a concrete supporter, the user can choose the supporter group and topic for that ticket. By default the new ticket is assigned to the expert with the smaller number of tickets assigned to him. It is important to assign the ticket to a supporter if it is being answered in order to avoid other supporters in the same group wasting his time or answer duplication. However, to assign a ticket to a supporter doesn’t mean that it cannot be accessed by other supporters or evenanswered.

It acts as a web-based ticket system that manages inquiries, as well another types of support processes. The software also ranks inquiries and classifies them all by priority. At the same time, the software transfers them to the appropriate department for issue resolution. This type of software can also help reduce the amount of training that’s needed for the support staff. As a result, my support staff can become experts in a shorter amount of time. Such an advantage allows fora much speedier resolution of employee ’s IT issues, which in turn frees up my support staff to support an even higher volume of employees.

3.4 System design

A Use Case diagram provides not only a simple way of communicating ideas with users but also, when complete, produces a high level understanding of what must be achieved in the system. The Use Cases were built up over a number of interviews with different people within the organization including stakeholders and a number of Developers and Support Technicians. These results were then summarized both to create the Use Case diagram but also to elaborate on each use case and generate a comprehensive requirements list.

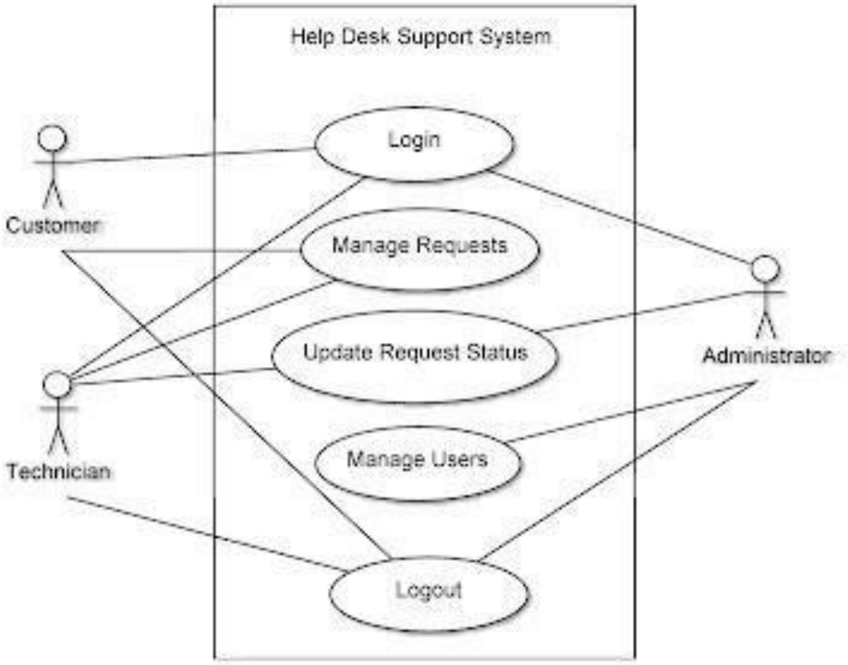


Figure 3.3: Use case diagram

3.5 System Specifications

3.5.1 Software Specification

- Programming Language : Python
- Designing tool : React JS
- Web server : Apache
- Web Browser : Any web browser
- Back-end : Fast API

3.5.2 Hardware Specification

- Processor: 64-bit, four-core, 2.5 GHz minimum per core

- RAM: 24 GB for developer and evaluation use

3.5.3 Software Description

Python

Python is a high-level, interpreted, general-purpose programming language. Its design philosophy emphasizes code readability with the use of significant indentation. Python is dynamically-typed and garbage-collected. It supports multiple programming paradigms, including structured (particularly procedural), object-oriented and functional programming. It is often described as a ”batteries included” language due to its comprehensive standard library. Guido van Rossum began working on Python in the late 1980s as a successor to the ABC programming language and first released it in 1991 as Python 0.9.0. Python 2.0 was released in 2000 and introduced new features such as list comprehensions, cycle-detecting garbage collection, reference counting, and Unicode support. Python 3.0, released in 2008, was a major revision that is not completely backward-compatible with earlier versions. Python 2 was discontinued with version 2.7.18 in 2020. The reasons to choose python are:

- Compatibility
- Readability
- Maintainability
- Interactive
- Robust and Standard library

Fast API

FastAPI is a modern, fast (high-performance), web framework for building APIs with Python 3.6+ based on standard Python type hints. The key features are:

- Fast : Very high performance, on par with NodeJS and Go (thanks to Starlette and Pydantic). One of the fastest Python frameworks available.
- Fast to code: Increase the speed to develop features by about 200 percent to 300 percent.

- Fewer bugs: Reduce about 40 percent of human (developer) induced errors.
- Intuitive: Great editor support. Completion everywhere. Less time debugging.
- Easy : Designed to be easy to use and learn. Less time reading docs.
- Short: Minimize code duplication. Multiple features from each parameter declaration. Fewer bugs.
- Robust: Get production-ready code. With automatic interactive documentation.
- Standards-based: Based on (and fully compatible with) the open standards for APIs: OpenAPI (previously known as Swagger) and JSON Schema.

React JS

React (also known as React.js or ReactJS) is a free and open-source front-end JavaScript library[3] for building user interfaces based on UI components. It is maintained by Meta (formerly Facebook) and a community of individual developers and companies.[4][5][6] React can be used as a base in the development of single-page, mobile, or server-rendered applications with frameworks like Next.js. However, React is only concerned with state management and rendering that state to the DOM, so creating React applications usually requires the use of additional libraries for routing, as well as certain client-side functionality.

- JSX:

  JSX stands for JavaScript XML. It is a JavaScript syntax extension. Its an XML or HTML like syntax used by ReactJS. This syntax is processed into JavaScript calls of React Framework. It extends the ES6 so that HTML like text can co-exist with JavaScript react code. It is not necessary to use JSX, but it is recommended to use in ReactJS.

- Components:

  ReactJS is all about components. ReactJS application is made up of multiple components, and each component has its own logic and controls. These components can be reusable which help you to maintain the code when working on larger scale projects.

- One-way Data Binding:

  ReactJS is designed in such a manner that follows unidirectional data flow or one-way data binding. The benefits of one-way data binding give you better control throughout the application. If the data flow is in another direction, then it requires additional features. It is because components are supposed to be immutable and the data within them cannot be changed. Flux is a pattern that helps to keep your data unidirectional. This makes the application more flexible that leads to increase efficiency.

- Virtual DOM:

  A virtual DOM object is a representation of the original DOM object. It works like a one-way data binding. Whenever any modifications happen in the web application, the entire UI is re-rendered in virtual DOM representation. Then it checks the difference between the previous DOM representation and new DOM. Once it has done, the real DOM will update only the things that have actually changed. This makes the application faster, and there is no wastage of memory.

- Simplicity:

  ReactJS uses JSX file which makes the application simple and to code as well as understand. We know that ReactJS is a component-based approach which makes the code reusable as your need. This makes it simple to use and learn.

- Performance: ReactJS is known to be a great performer. This feature makes it much better than other frameworks out there today. The reason behind this is that it manages a virtual DOM. The DOM is a cross-platform and programming API which deals with HTML, XML or XHTML. The DOM exists entirely in memory. Due to this, when we create a component, we did not write directly to the DOM. Instead, we are writing virtual components that will turn into the DOM leading to smoother and faster performance.

Chapter 4

Result And Discussion

Software Testing is a method to check whether the actual software product matches expected requirements and to ensure that the software product is Defect free. It involves the execution of software or system components using manual or automated tools to evaluate one or more properties of interest. The purpose of software testing is to identify errors, gaps, or missing requirements in contrast to actual requirements. The ultimate aim is quality assurance. Tests are carried out and the results are compared with the expected document. In the case of erroneous results, debugging is done. Tested software product ensures reliability, security, and high performance which further results in time-saving, cost-effectiveness, and customer satisfaction. The main goal of this project stage is to develop a churn prediction model. Specialists usually train numerous models, tune, evaluate, and test them to define the one that detects potential churners with the desired level of accuracy on training data. The following test methods are used to test Customer churnprediction.

4.1 Testing Methods

There are different types of testing methods available.

4.1.1 Manual Testing

Manual Testing is one of the most fundamental testing processes as it can find both visible and hidden defects of the software. The difference between expected output and output, given by the software, is defined as a defect. It is mandatory for every newly developed software before automated testing. This testing requires great efforts and time, but it gives the surety of bug-free software. Manual Testing requires knowledge of manual testing techniques but not of any automated testing tool.

While developing, we fixed the defects and handed it to the tester for retesting. All test cases executed by the tester manually according to the end user's perspective. It ensures whether the application is working, as mentioned in the requirement document or not. Test cases are planned and implemented to complete almost 100 percent of the software application. Test case reports were also generated manually.

4.1.2 Automation Testing

Automation testing is used some specific tools to execute the test scripts without any human interference. It is the most acceptable way to enhance the efficiency, productivity, and test coverage of Software testing. With the help of an automation testing tool. Here we easily approached the test data, handled the test implementation, and compares the actual output against the expected outcome.In this testing, the test automation engineer wrote the test script or use the automation testing tools to execute the application. On the other hand, in manual testing, the test engineer will write the test cases and implement the software on the basis of written test cases. In test automation, the test engineer can execute repetitive tasks and other related tasks.In manual testing, it is a tedious process to implement the repetitive take again and again. The automation testing process is a time-saving process as it spends less time in exploratory testing and more time in keeping the test scripts whereas enhancing the complete test coverage.

Different Approaches of Automation

- GUI (*Graphical user interface) Testing:*

  In this approach, we can implement that software or an application, which contains GUI's. So, that the automation test engineers can record user actions and evaluate them many times.The Test cases can be written in several programming languages like JAVA, C, Python, Perl, etc.

- *Code-Driven*:

  The code-driven technique is the subsequent methodology used in automation testing. In this method, the test engineer will mainly concentrate on test case execution in order to identify whether the several parts of code are performing according to the given requirement or not. Hence, it is very a commonly used method in agile software development.

- *Test Automation Framework:*

  Another approach in automation testing is test automation framework. The test automation framework is a set of rules used to generate valuable results of the automated testing activity. Similarly, it brings together test data sources, function libraries, object details, and other reusable modules.

4.1.3 Integration Testing

Integration testing tests the interface between modules of the software application. The test results were positive. The different modules are first testing individually and then combined to make a system. Testing the interface between the small units or modules is integration testing. It is usually conducted by software integration tester and in continuation to the development. There is a standard for developing system and all developers follows this standard.

4.2 Test Plan

A test plan is a systematic approach to test a system. The plan typically contains a detailed understanding of what the eventual workflow will be. Normally testing of any large system will be in two parts.

- The functional verification and validation against the requirement specification

- Performance evaluation against the indicated requirements

Testing activity is involved right from the beginning of the project. At the very first stage of testing, the goals and objectives are set. This simplifies the limits or boarders of testing process.

Before testing, the tester should plan what kind of data he is giving for test. Give data inputs as functional, boundary, stress, performance, usability values etc.It is the point of reference, based on which testing activities are executed and coordinated among a QA team. The test plan is also shared with Business Analysts, Project Managers, Development teams, and anyone else associated with the project, This mainly offers transparency into QA activities so that all stakeholders know how the software will be tested. The plan is built by QA managers or leads based on input from QA (and sometimes, non QA) team members. Creating it should not take more than 1/3rd of the time allocated for the entire project.

4.3 Test Cases

A Test Case is a set of actions executed to verify a particular feature or functionality of your software application. A Test Case contains test steps, test data, pre-condition, post-condition developed for specific test scenario to verify any requirement. The test case includes specific variables or conditions, using which a testing engineer can compare expected and actual results to determine whether a software product is functioning as per the requirements of the customer.

4.3.1 Formal Test Case

With these types of test cases, the tester writes a test in which the inputs are all known and detailed, such as the preconditions and test data. Formal tests have predefined input, which means they provide an expected output, which the test attempts to validate. Through that we obtained results as expected.

4.3.2 Informal Test Case

Conversely, informal test cases do not have known inputs or outputs. Testers execute these types of test cases to discover and record the outcomes, which can reveal interesting findings about digital quality. Through that we obtained results as expected.

4.3.3 Functionality Test Case

These tests determine whether the target functionality succeeds or fails to perform its function within the system. The QA team writes these types of test cases based on requirements and performs them when the development team is finished with the function. Many different types of functional tests can validate app functionality, including unit tests that check the smallest, isolated segments of functionality possible.

Functional test cases should include:

- a description and/or name of the function under test
- preconditions
- steps for testing
- an expected result

4.3.4 UI Test Case

These tests confirm the user interface (what the end user interacts with) functions as expected. Typically, UI tests focus on an app or web page’s visual elements to confirm they function and perform according to requirements. UI tests often examine display elements such as menus, submenus, buttons, tables and columns to make sure they are readable and consistent. UIs continue to evolve. For this reason, UI tests can also mean validating a voice or video interface. UI tests should also include accessibility concerns, such as whether a screen reader can identify a button on a page. We obtained results as expected.

4.3.5 Integration Test Case

These types of test cases assess how the combined functionality works when merged into the application. While it is important to test individual units of software, it is equally important to make sure disparate systems can communicate with each other effectively. The tester must understand the application flows well to write effective integration tests. API testing is one aspect of integration testing. Applications communicate with each other through APIs, especially as products become more interconnected in today’s mobile-centric world. API testing is a vital exercise to cover with integration test cases.

4.3.6 Performance Test Case

Functional tests check whether the application works. Non-functional tests, such as performance testing, check how the application performs under different types of workloads. A performance test must be specific with each step and expected result documented, as well as input data clearly defined, so that the tester can accurately assess how the system performs in the given conditions. There are a variety of performance testing types, including load, stress, spike and scalability testing. Each type of performance testing, and each individual test, reveals different information about how the system responds to varying user loads. Through that we obtained results as expected.

4.3.7 Security Test Case

These tests identify vulnerabilities within a system or product. Another type of nonfunctional testing, security tests aim to find ways to better protect software assets, as well as identify how the system holds up against common types of attacks, and define the risk associated with the product. Some security tests might include vulnerability scanning, configuration scanning and penetration testing, also called intrusive testing. Ultimately, the point of security testing is to yield actionable feedback that the organization can use to remediate vulnerabilities.Through this test cases, we maintained the security that should be provided to the user including authentication and integrity.

4.3.8 Usability Test Case

Rather than test the application functionality or performance, usability tests examine what prospective end users — not testers — think of a product. UX researchers prepare tests for participants outside the organization to gauge how easy or difficult the product is to use. Organizations can conduct usability testing in a variety of ways, including moderated or un-moderated and remote or in-person. The goal is to take advantage of an end user’s perspective to identify points in the application that would cause them to stop using it. Usability tests can be formal or informal, depending on the goal and method of UX research.

4.3.9 Database Test Case

Just because an app’s functionality, the user interface and APIs are all working doesn’t mean the data is being stored properly. Database tests validate whether the application data is stored in accordance with requirements and regulations. Like functionality tests, database tests can vary in scope, from validation of a small database object to a complex action involving multiple parts of the application. Some criteria that database tests might evaluate include whether the data is stored consistently, whether unauthorized people can access it, and how it is stored locally on a device. Consistent and secure data should be a priority for every business, regardless of the industry’s compliance standards — database tests help achieve that.All data of the user is thus saved safely and its tested.

4.3.10 User Acceptance Test Case

These types of test cases validate the product from the end user’s perspective. An end user or client conducts user acceptance tests in a testing environment to validate the end-to-end flow of the product. User acceptance tests can come in handy when business requirements change during the course of development. Stakeholders do not always effectively communicate these changes to the development team. Through UAT test cases, the organization can document entry and exit criteria that cover gaps in previous tests.The test results were positive.

4.3.11 Exploratory Test Case

These informal test cases occur when the tester evaluates the system on an ad-hoc basis to attempt to discover defects missed by structured testing. While exploratory tests aren’t defined by a prescribed set of actions, the approach still requires some structure, particularly around time-boxing and results documentation, to ensure effective feedback. Exploratory tests can help validate requirements by checking the system in ways not covered in scripted tests. Exploratory testing enables the QA organization to be adaptable and learn from gaps in test coverage.The test results were positive.

4.4 Validation

Validation is determining if the system complies with the requirements and performs functions for which it is intended and meets the organization's goals and user needs. Validation is done at the end of the development process and takes place after verification is completed. It answers the question like: Am I building the right product? It is a High level activity. Performed after a work product is produced against established criteria ensuring that the product integrates correctly into the environment. Determination of correctness of the final software product by a development project with respect to the user needs and requirements.

During verification if some defects are missed then during validation process it can be caught as failures. If during verification some specification is misunderstood and development had happened then during validation process while executing that functionality the difference between the actual result and expected result can be understood. Validation is done during testing like featuretesting, integration testing, system testing, load testing, compatibility testing, stress testing, etc. Validation helps in building the right product as per the customer's requirement and helps in satisfying their needs.

4.5 Output Screens and Results

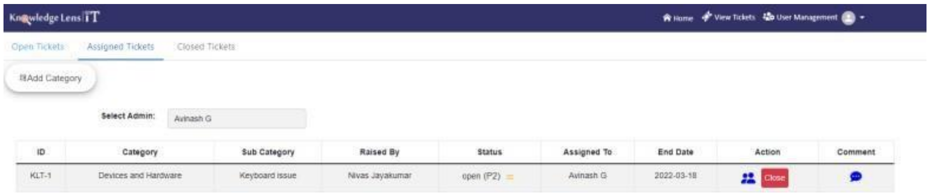
1. *Login Page*: When User hits the URL the Login Page is loaded. Login button in the page redirects to Google SSO (Secure Single Sign-on) Login.

Figure 4.1: Logging through SSO Login

Only the authorised user with the company email can login. For other users, access is denied.They should either have to take the access from the root admin or should sign up with their authorised email.

2. *Landing Page*: The landing page is divided into different pages.

- Dashboard: Contains summary of the admin activity, their status(whether they are online or offline), total tickets raised, no of resolved and unresolved or open tickets.
- Open Tickets/ Raised Tickets: The page where user can create ticket and raise the issue based on priority.
- Assigned Tickets: The tickets which are assigned to various admin for resolving.
- Closed Tickets/ Resolved Tickets: The tickets which are closed by the admin.
- Comment section: The admin, root admin and user have access to this section. They can type their comments over here.



Select Admin: Avinash G

ID	Category	Sub Category	Raised By	Status	Assigned To	End Date	Action	Comment
KLT-1	Devices and Hardware	Keyboard issue	Nivas Jayakumar	open (P2) =	Avinash G	2022-03-18	Close	💬

Figure 4.2: Assigning Admin for solving ticket

Chapter 5

Conclusion

Even if it is always possible to improve the Ticket Support and make it more user friendly, the system is ready to be used and the basic functionality has been achieved. When the first version was released we started a period for testing the Ticket Support but we did not get too much feedback. After that, the system went into production. The project Ticket Support System has been developed based on the business requirements. The project has met its objectives. The system reliability is high and enough security has been provided. The system is very simple in design and to implement. The new computerized system was found to be much faster reliable and user friendly.

5.1 Future Enhancement

Today, the market place is flooded with several Ticket Support options for shoppers to choose from A variety of innovative products and services are being offered spoiling customers for choice. Online Ticket Support System is no more a privilege enjoyed by your company. Today, it is a reality in India in the last couple of years. the growth of Ticket Support system industry in India has been phenomenal as more shoppers have started discovering the benefits of using this platform. There is enough scope for online businesses in the future if they understand the indian shoppers psyche arid cater to their needs.

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APPENDICES

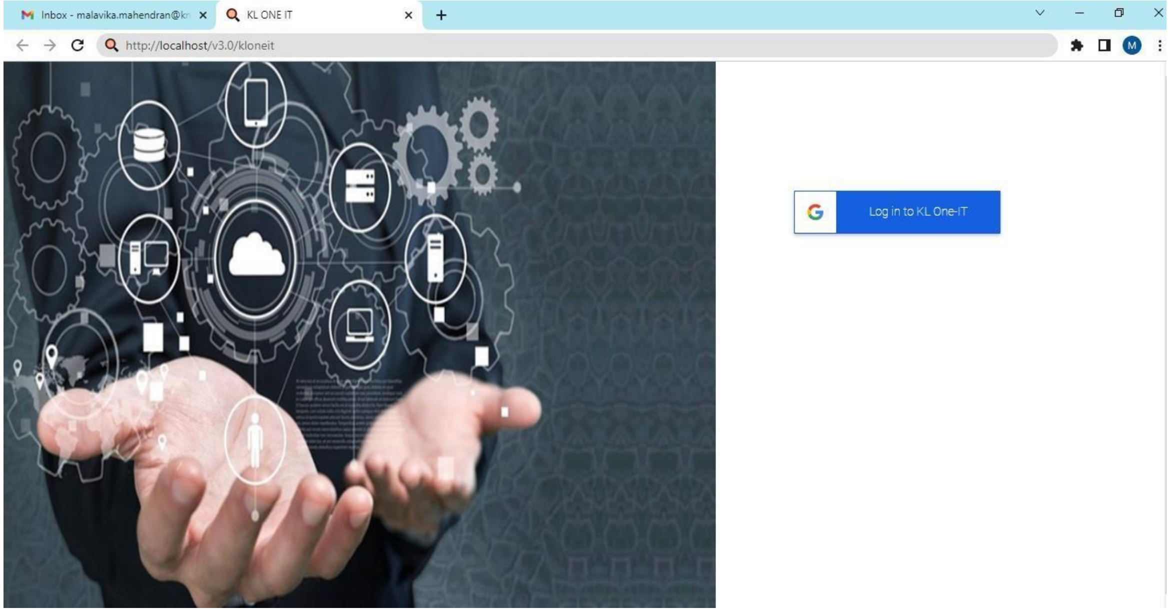
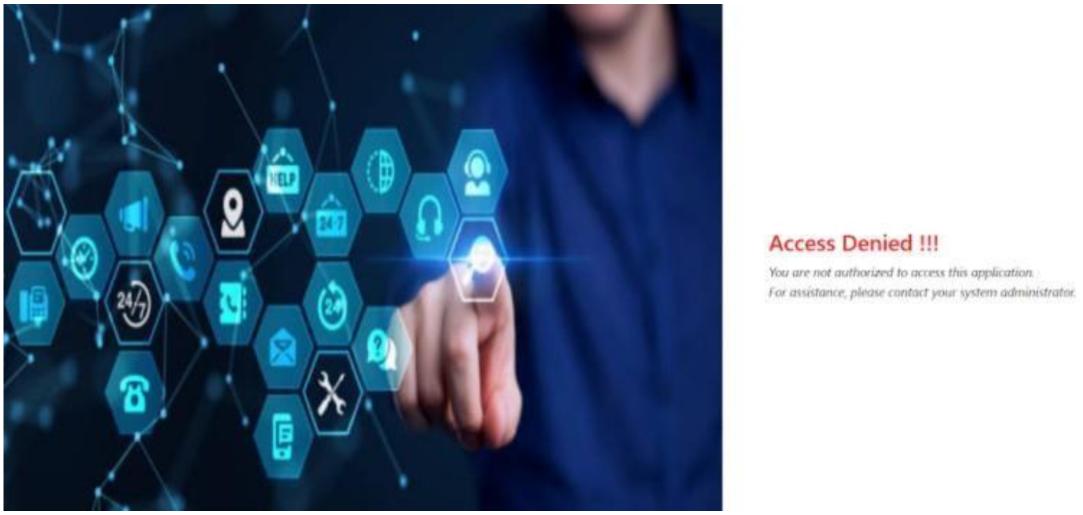


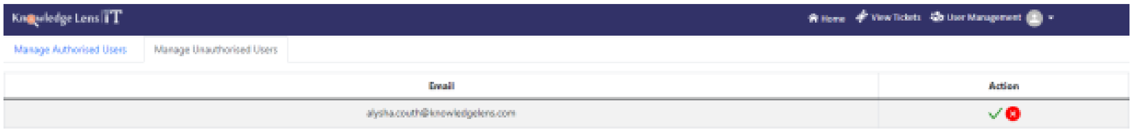
Figure 5.1: Login Page



Access Denied !!!

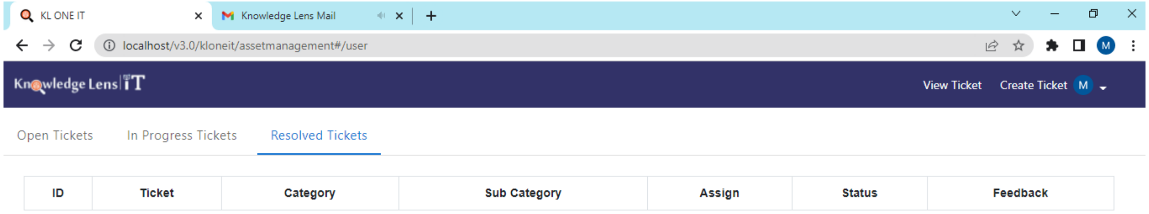
You are not authorized to access this application.
For assistance, please contact your system administrator.

Figure 5.2: Unauthorised user's page



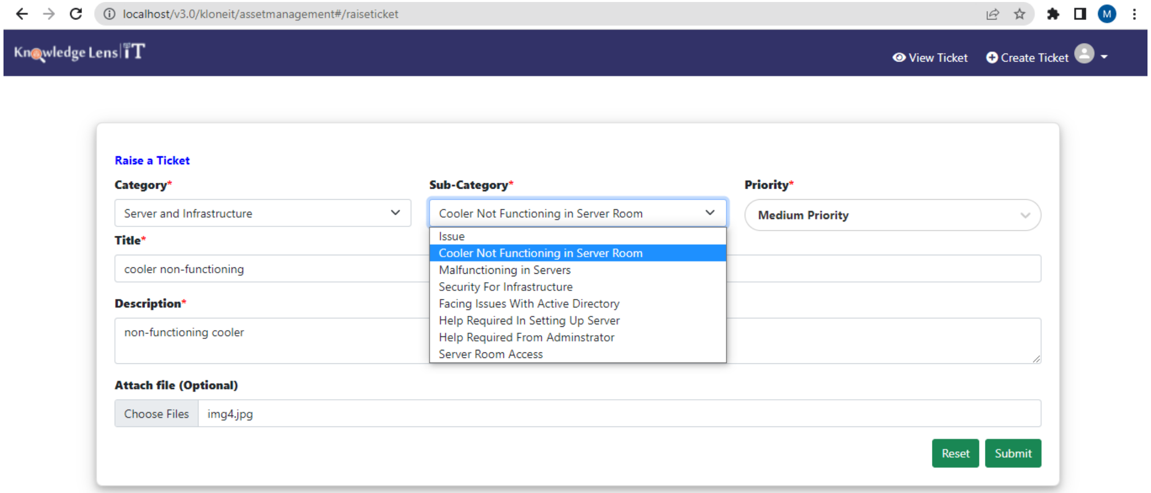
Email	Action
alysha.couth@knowledgelens.com	✓ ☒

Figure 5.3: Giving access to users by root admin



ID	Ticket	Category	Sub Category	Assign	Status	Feedback

Figure 5.4: User Initial Resolved Ticket Page


localhost/v3.0/kloneit/assetmanagement#/raiseticket
Knowledge Lens IT
View Ticket
Create Ticket
Issue
Cooler Not Functioning in Server Room
Malfunctioning in Servers
Security For Infrastructure
Facing Issues With Active Directory
Help Required In Setting Up Server
Help Required From Adminstrator
Server Room Access
Choose Files
Reset
Submit

Raise a Ticket

Category*: Server and Infrastructure

Sub-Category*: Cooler Not Functioning in Server Room

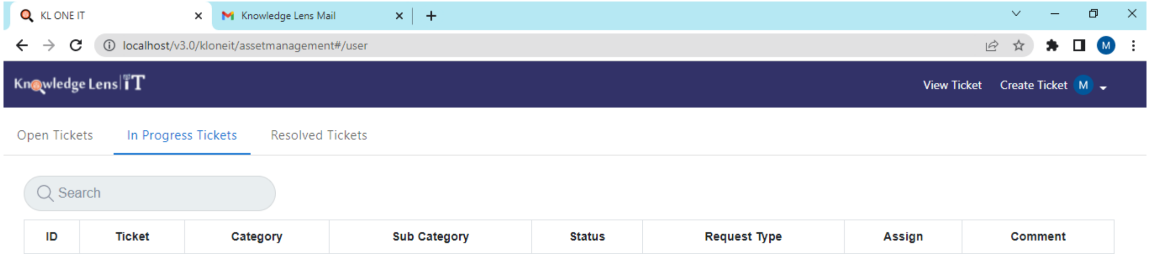
Priority*: Medium Priority

Title*: cooler non-functioning

Description*: non-functioning cooler

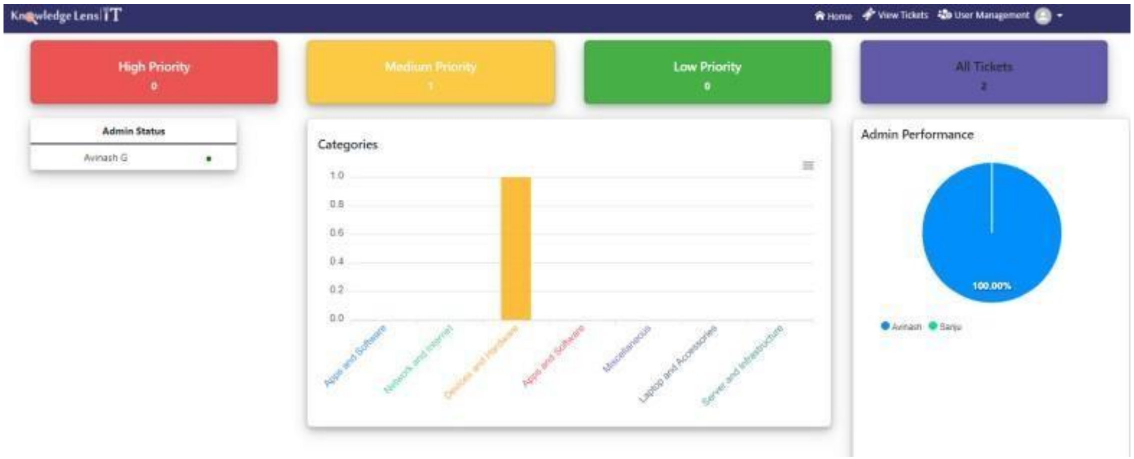
Attach file (Optional): img4.jpg

Figure 5.5: User Page for creating tickets



ID	Ticket	Category	Sub Category	Status	Request Type	Assign	Comment

Figure 5.6: User Initial Assigned ticket Page



High Priority 0

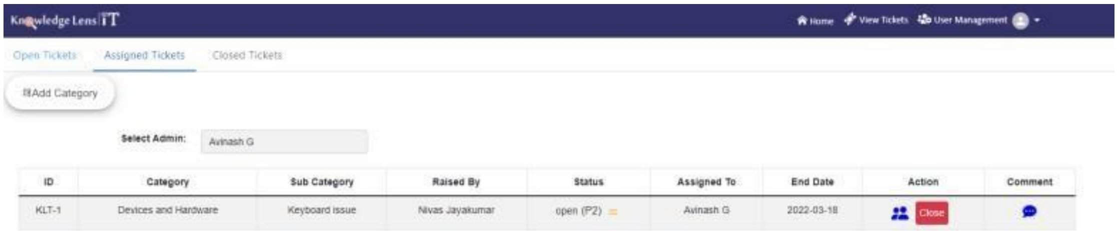
Medium Priority 1

Low Priority 0

All Tickets 2

Admin Status	
Avinash G	●

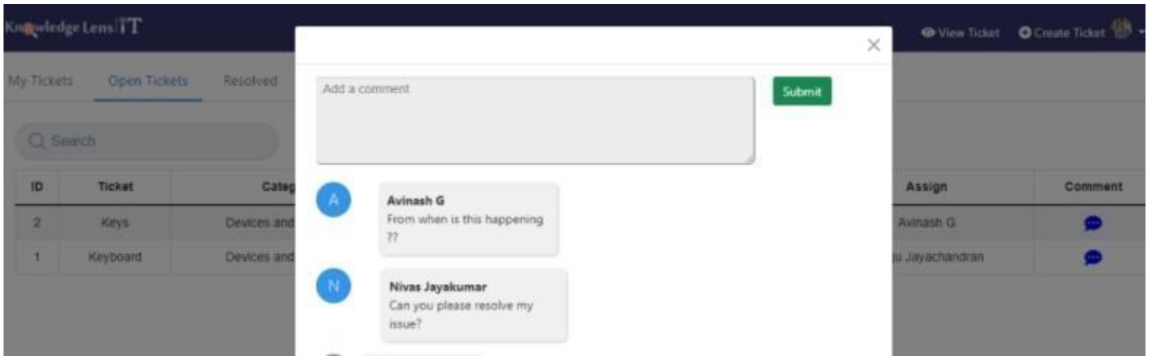
Figure 5.7: Root Admin Page



Select Admin: Avinash G

ID	Category	Sub Category	Raised By	Status	Assigned To	End Date	Action	Comment
KLT-1	Devices and Hardware	Keyboard issue	Nivas Jayakumar	open (P2)	Avinash G	2022-03-18	Close	

Figure 5.8: Assigning Admin for solving ticket



ID	Ticket	Categ	Assign	Comment
2	Keys	Devices and	Avinash G	
1	Keyboard	Devices and	u Jayachandran	

A Avinash G
From when is this happening ??

N Nivas Jayakumar
Can you please resolve my issue?

Figure 5.9: Comment section Page