



An Undergraduate Internship/Project on ITSM Service for Union Limited

By

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Spring, 2022

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May 11, 2022

**Dissertation submitted in partial fulfillment for the degree of Bachelor of
Science in Computer Science**

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Attestation

This is to certify that the report is completed by me, Md.Shahim Uddin Saba (ID:1720586), submitted in partial fulfillment of the requirement for the Degree of Computer Science and Engineering from Independent University, Bangladesh (IUB). It has been completed under the guidance of Ms. Sabrina Alam. I also certify that all my work is genuine which I have learned during my Internship. All the sources of information used in this project and report has been duly acknowledged in it.

Signature

Date May 11, 2022

Md.Shahim Uddin Saba

Name

Acknowledgement

I would like to firstly like to thank the Almighty Allah for giving me the endurance and the ability to work hard, and for giving me the ability to write this report and for giving me the chance to be able to do my internship at Union Limited one of the biggest among the group of companies in Bangladesh. Also, my parents for their unconditional love and support that have sustained, nurtured, and got me ready for this challenge. I would like to thank my honorable faculty and supervisor Ms. Sabrina Alam, Lecturer, Department of Computer Science Engineering, Independent University, Bangladesh, for her invaluable guidance, patience, time, constructive criticism and thoughtful advice regarding various aspects of my internship and preparation of this report. Then I would like to express my gratitude to MR. Hafizur Rahman, Head of IT, for giving me the opportunity to complete my internship at Union Limited and my Development team member MR.Shariful Islam for his guidance and support in this three months internship program. The learning and experiences I have gathered here have helped me a lot as a web developer, system analyst and resource planning and this will surely help me in the next phase of life. I would also like to express my gratitude to all my colleagues for helping me throughout and making the Internship process so much enjoyable. Without them, this journey would have not been easy.

Letter of Transmittal

May 09, 2022

Ms. Sabrina Alam

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Subject: Internship Report submission Spring, 2022.

With due honor and respect, I, Md.Shahim Uddin Saba, from Spring 2022, Section 4, would like to submit my Internship report. This report is written to kindly inform you that I have completed my internship program and its report. My internship was conducted from 1st February 2022 to date. I completed my internship at Union Limited.

This report is based on my experience and the work I did at Union Limited during my internship. The primary goal for my internship was to gain experience in different technology related fields of the company, starting with research and development, documentation, content writing, web development and to get acquainted with best practices.

Over the period of my internship at Union Limited, I found out that I learned and applied a lot of new skills and technologies. The company comprises of a small team for Development, who learn, collaborate, and innovate together.

I would like to thank you immensely for all your guidance and support. I hope and pray that this report fulfills all the requirements and is up to your expectations.

Sincerely,

Md.Shahim Uddin Saba, 1720586

Department of Computer Science Engineering

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Evaluation Committee

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Abstract

In today's world there is a tough economic competition in the corporate sector. A company needs to have a precise and efficient system to provide IT support to its employees. The more the efficient a company can become the more profit it can make out of it. So they are implementing ITSM system for providing IT support to their employees more efficiently.

The task of my team for the project was to gather requirement, design the data, develop, test and implement. As technology has advanced enormously, I will get to learn more every day. In this report I will discuss how to implement a web application that serves the purpose of ITSM services also its design, development, testing phase and benefits it provides.

As it was a new implementation for Union Limited, the company assigned me in the research, design phase, development and testing phase of a SDLC. The web application is based on ASP.NET Core framework with the back-end being C and front-end is designed using HTML, CSS and Bootstrap where the database is designed in MS-SQL.

Working in Union Limited as an intern, added huge experience to my career and gave me a lot of professional knowledge. This report will take us through all the details of web development and experience gathered during this internship period.

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Chapter 1

Introduction

1.1 Overview/Background of the Work

IT service management (ITSM) is the process of designing, delivering, managing, and improving the IT services an organization provides to its end users. ITSM is focused on aligning IT processes and services with business objectives to help an organization grow. In recent days every organization is involved in IT service management in some way. ITSM ensures that incidents, service requests, problems, changes, and IT assets in addition to other aspects of IT services are managed in a streamlined way. Effective ITSM processes can have positive effects on an IT organization's overall function. Like, lower costs for IT operations, higher returns on IT investments, ability to establish well-defined, repeatable, and manageable IT processes, better transparency into IT processes and services etc. [1]

For a large company with a variety of business unit it hard to provide technological support to their employees daily. Previously the company I am working for "Union Limited" [2] used manual method for providing technical support to their employees and didn't have any kind of system for storing information related to those support.

Considering this scenario, I have been assigned the work to develop a website that will collect hardware or software related problems from its employees and IT support team will provide solution to their problems and store the solution information respect to the problems for future use.

Given, that the website will be created using HTML, CSS, Bootstrap at the front-end and at the back-end C Sharp and for database MS-SQL will be used. This provides efficient responsive UI which will be both mobile and desktop compatible. The proposed work focuses on latest website building tools and practices which provide effective

workflow process.

1.2 Objectives

The main objective of the project is to ensure easy process for the employee to post their IT related problems and for the IT support team members to provide support and store the solution information to the database. After the world was hit by the global pandemic most of the companies has faced a huge blow, as it is not possible to provide support physically one by one in the office anymore. This website will allow users to get all the relevant information without the hassle if same problems occurs again. They will be able to carry their operations in a secured manner through encrypted SSL/TLS channel. The most beneficial factor of the website is that, because it is an online-based system, employees can use it on their computers and phones, at any time anywhere.

1.3 Scopes

- Employee Account Creation: Employee can be assigned for different business unit Roles for the system. Like Admin, Normal user etc.
- Login: After logging in, Employees will be displayed on a user's homepage and menu will be shown in the Navbar according by their roles.
- Problem Management: Employees can create Problem. After creating an Problem the system automatically assign an ProblemID and admin can then use the ProblemID to edit it accordingly.
- Solution Management: After creating an Problem the IT support roles user will create solution using the ProblemID. Then the system automatically assign an SolutionID and admin/IT support roles user can then use the SolutionID to edit it accordingly.
- Problem List Page: Employees will be displayed on a page where all the problem will be shown which were posted by logged in user. Here user can also able to view the details of their problem with solution if solution were provided by IT support role users.
- Problem Report: It gives the permission to admin/IT support roles user to create report for problems list.

Chapter 2

Literature Review

2.1 Relationship with Undergraduate Studies

In my under-graduation studies, I acquired a lot of theories about programming and developing an application from start to finish. Most of the courses include both theoretical and lab work. I learned how to operate in a group in lab sessions, which will benefit me in real-world scenarios where I will have to collaborate with my colleagues to complete and deliver a project. It's very similar to working on projects in a group in lab class and working on projects in the office with colleagues.

These are the courses related to my work:

- Data Structures (CSE 203): This is the most basic course that helped us with the ideas of several data structures and their applications such as Stack, Queue, Linked List, Array, Pointer and so on.
- Object-Oriented Programming (CSE 213): In the developing industry most of the data is represented as an object. It also taught how to write modular programs which made codes less repetitive and more reusable.
- Database Management (CSE 303): This was the course that taught me how to design and plan a project. It covered popular planning and strategy practices such as Six Element Analysis, Problem Analysis, System Development Life Cycle, Rich Picture, Requirement Analysis, Entity Relationship Diagram, Business Process Model, Normalization and many more.
- System Analysis and Design (CSE 307): This course gives an overview of Used Case Diagram, Use Case Scenario, SDLC's and how to adopt each one of them to the project.

- Web Application and Internet (CSE 309): This is the course where the development of web applications was taught. It covered very important technologies that are highly in demand in the industry, such as HTML, CSS, Bootstrap, JavaScript, jQuery, View Engines, MS-SQL.
- Data Communication and Networking (CSE 316): This course gives fundamental understanding of Networks, traffic routing and management which helped in understanding certain factors in the cloud deployment phase.

2.2 Related works

- City Bank [3]
- a2i (myGov Platform) [4]

All these organizations use this ITSM to provide better service to their employees which allows them to access information through the internet, making it convenient for them to have a great user experience. All the data are encrypted and secured ensuring reliability. ITSM also provides change management, capacity planning, configuration management, disaster recovery, performance management, availability management, and many others to these organizations.

Chapter 3

Project Management & Financing

3.1 Work Breakdown Structure

WBS is a hierarchical structure which demonstrates a project's breakdown into smaller segments. For my project, I have produced a WBS so that my work is coordinated. WBS covers a visual of all the scopes, risks, points of communication, responsibilities, costs and guarantees that it does not skip essential deliverable. For brainstorming and collaboration, it is the ideal tool for the team. In my WBS, I have used the top-down approach.

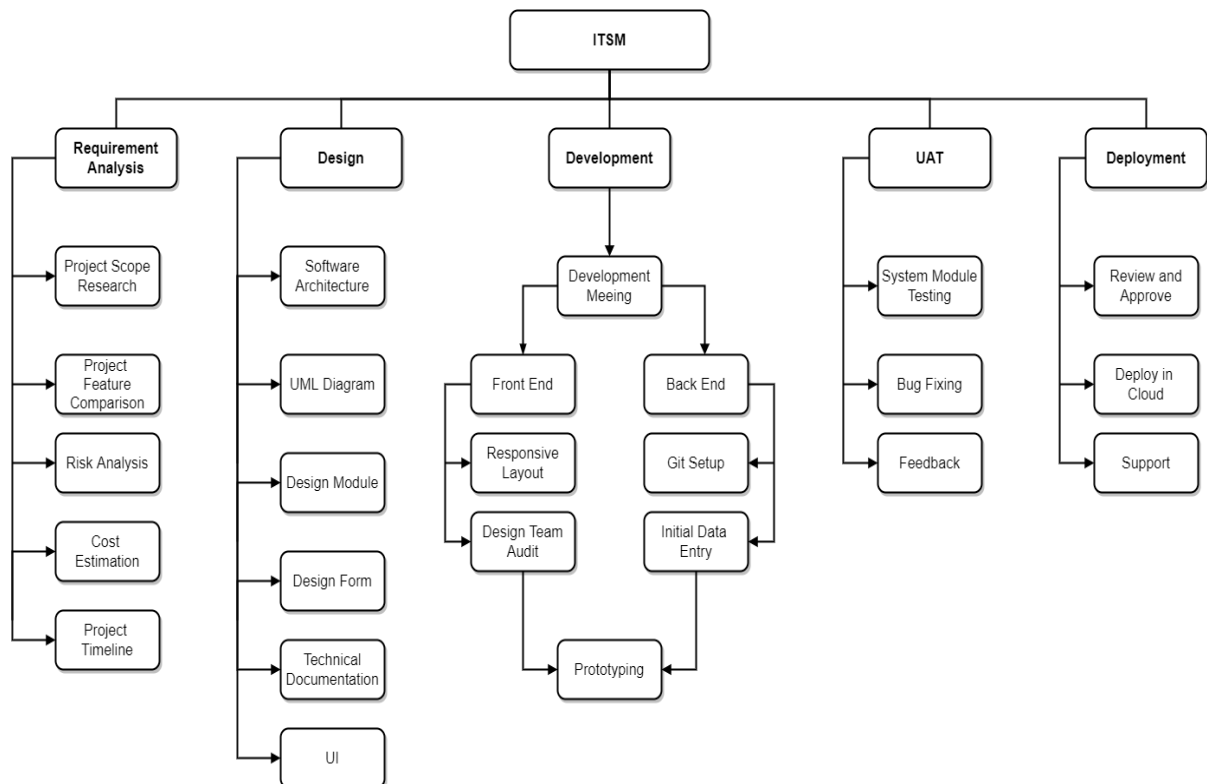


Figure 3.1: WBS of ITSM

In the above diagram, Level 1 has five elements. Each of these elements are the phases of the project. The Level 2 Elements are the unique deliverables in every phase. All the lower-level components are deliverables. The project's primary steps include collecting requirements, designing, developing, testing, and deploying. The child tasks are the tasks that must be done to finish the current phase and go to the next phase. We have also made the cost calculation, resource allocation, and risk assessment, all of which are important for WBS and help us gain a better understanding of the project. A WBS also helps to avoid common project issues including missed deadlines, scope creep, and cost overruns, among others. When built as thoroughly as feasible, the WBS serves as a blueprint for completing what looks to be a difficult undertaking. However, when the project is broken down using a WBS, it becomes far more viable and approachable.

3.2 Process/Activity wise Time Distribution

For Each Section we have described in the WBS Diagram for ITSM System we made a time allocation. The Table below shows them in details.

Task	Days	Work Percentage
Requirement Analysis	15	20
Design	15	10
Development	30	40
User Acceptance Testing (UAT)	12	15
Deployment	10	15
Total	82	100

Table 3.1: Task wise time allocation

It is very important to accurately estimate the overall time required to accomplish the project depending on the activities to be completed. It is also important to create priorities and set goals to complete a successful project. The development phase is by far the most important because it takes the longest to complete. Because we are working in order, if one task is delayed, the rest of the tasks will be delayed as well. As a result, it is important to complete tasks according to the estimated schedule.

3.3 Gantt Chart

To achieve a successful deployment of our web application before the estimated deadline, we created Gantt charts using Excel to schedule all of our planning and tasks correctly. Gantt chart is a representation of the activities and days it takes to complete them. As you can see, we have a compiled overview of the total days each event needs to be completed in sequential manner. [5]

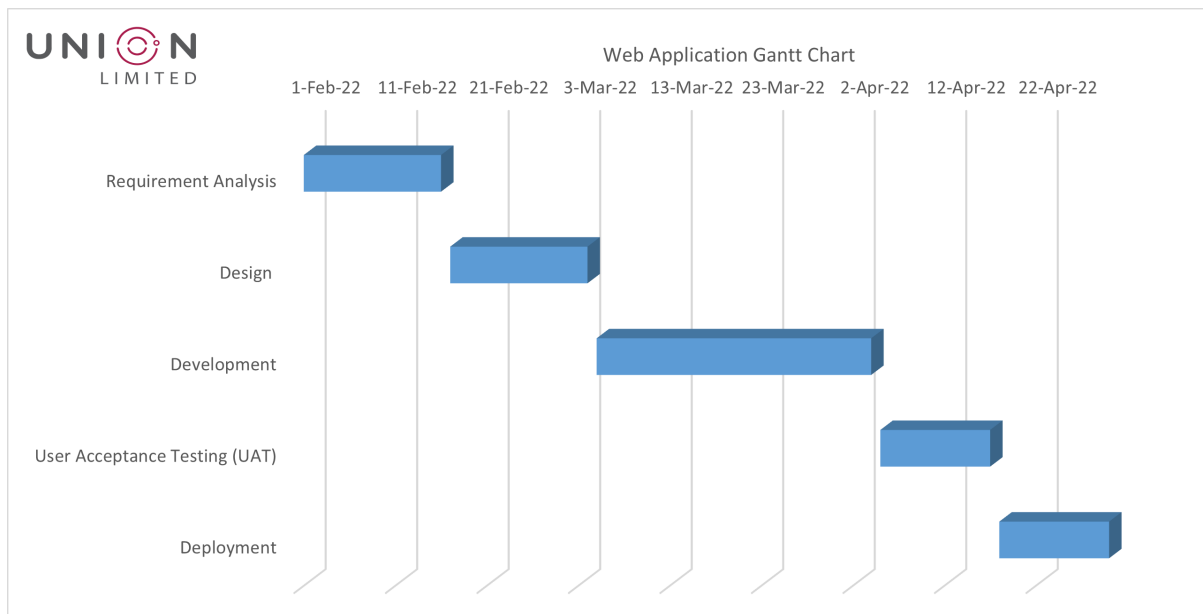


Figure 3.2: Project Planning Gantt Chart

Task	Start	Days to Complete
Requirement Analysis	1-Feb-22	15
Design	17-Feb-22	15
Development	5-Mar-22	30
User Acceptance Testing (UAT)	5-Apr-22	12
Deployment	18-Apr-22	12

Table 3.2: Gantt Chart Timeline

3.4 Process/Activity wise Resource Allocation

The process of allocating and planning available resources in the most efficient and effective way possible is called resource allocation. Projects will always require resources, even though they can be scarce at times. Therefore, the project manager is responsible for the proper timing and allocation of these resources during the project schedule. Therefore, resource allocation is about managing the project and delegating resources to ensure that it runs as smoothly and efficiently as possible. The chart and table below shows how resources are allocated.

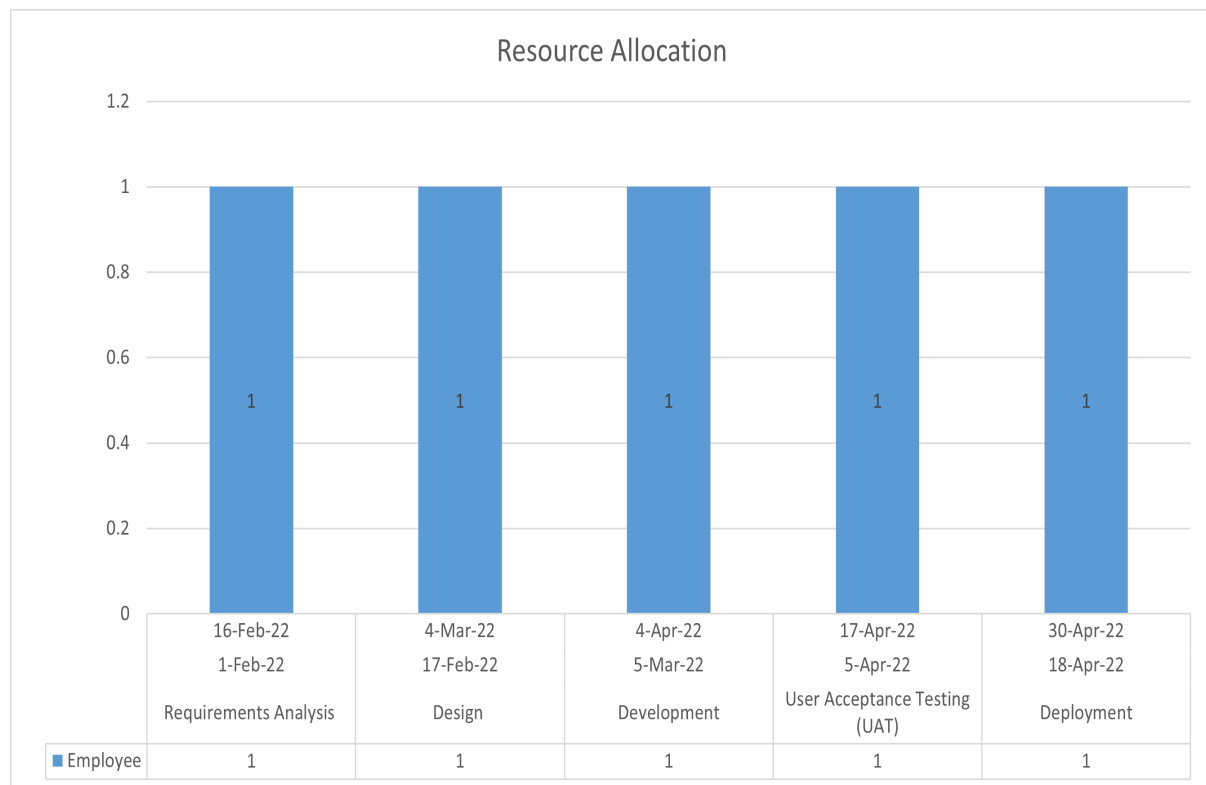


Figure 3.3: Resource allocation of Project

Task	Start	End	Resources	Employee
Requirement Analysis	1-Feb-22	16-Feb-22	Google, Similar projects, Articles	1
Design	17-Feb-22	4-Mar-22	Lucid,Excel,HTML,CSS,Bootstrap	1
Development	5-Mar-22	4-Apr-22	MSSQL,ASP.NET Core,C Sharp	1
UAT	5-Apr-22	17-Apr-22	Testing tools,Test Server,Bug fixing	1
Deployment	18-Apr-22	30-Apr-22	GitHub,IIS	1

Table 3.3: Process wise resource allocation

3.5 Estimated Costing

The cost was calculated on the basis of the features the company requirement for the system. This includes design cost, development cost, deployment cost, local server cost included.

Work Distribution	Costing (Tk)
Designing	5000
Development, Testing	70000
Deployment	5000
Local Server	250000

Table 3.4: Estimated Costing

Chapter 4

Methodology

For a company, it is very important to understand the importance of analyzing the implementation of the ITSM system, as if there is a high chance of failure for the implementation process which can be later very costly for the company to bear. Usually, to deploy the ITSM system the company must follow a specific framework and methodology.

A methodology is a set of approaches, practices, processes, techniques, procedures, and standards for solving problems. They're well-defined processes that show us what to do next, why each step in the software development life cycle is vital, and how to finish a project stage.

We are using an Iterative and Incremental Development Process for this project. Iterative and incremental development is a process that combines iterative design with incremental development. The incremental technique breaks the software development process down into small, achievable increments. Iterative software development refers to the technique of repeating software development processes in cycles known as iterations. Each increment builds on the preceding version, allowing for steady development. A new version of the application is developed after each iteration until the best product is determined. Iterative and incremental software development begins with planning and continues through iterative development cycles that involve ongoing user feedback and incremental feature additions, culminating in the release of completed software at the conclusion of each cycle. [6]

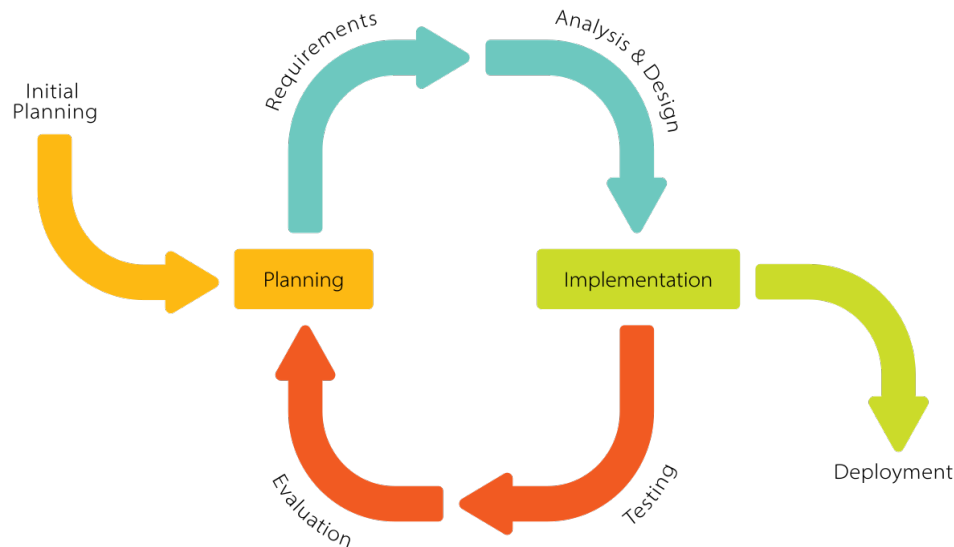


Figure 4.1: Iterative and Incremental Development Methodology

- **Planning Phase:** My organizational supervisor and I discussed the project and gathered all of the requirements for the various capabilities that will be included in the web application. I'll start designing the app after I've written down and defined all of my requirements and concerns.

- **Analysis and Design Phase:** From beginning to end, I will have to develop the entire program in design software. When I finish creating, I need to show it to my organizational supervisor. I proceeded directly into development after the design was approved.

- **Development Phase:** The entire application will be built using the ASP.NET Core framework, which will make all of the static pages dynamic and completely functioning. As we all know, ASP.NET Core is built on the MVC architecture and includes Razor Pages, which is a Razor extension file. With a customized admin site that interacts with an MS-SQL database, these views will be dynamic. This could be the most time-consuming phase. Furthermore, in order to preserve the application's security, we must provide sufficient authentication and authorization for all users.

- **Testing Phase:** The testing phase is an interesting one since strange bugs keep popping up. During this point, I discovered that the software would struggle to cope with large databases. So I had to rework some of my code and keep the algorithms' time and space complexity low in order to increase the application's speed.

- **Evaluation Phase:** This phase will assist us in identifying the system's shortcomings and issues from the client's perspective. The web application can be upgraded and made more sustainable after receiving feedback.

From the above discussion of how to use each step of the methodology, we can see that these approaches reduce overall risk and help the project respond quickly to changes, can quickly and easily adapt to any given change, can achieve transparency and total alignment in the development and testing phases, delivers overall higher quality products, and creates customer satisfaction. For these reasons, I've decided to finish my project using the Iterative and Incremental method.

Chapter 5

Body of the Project

5.1 Work Description

User Support Management (ITSM) is a web application that is being developed by Union Limited to help employees to get support for their IT related problems. Which will provide better support and service to employees and give a good user experience.

Furthermore, the work is mainly related to research, design and deployment phases. At first, I was assigned to do requirements analysis where I did research on other similar web applications and their functionalities, following which I did technical documentation of system analysis and design process of the system which contained use case etc. which allowed me to proceed to development under the supervision of my external supervisor to implement the design. At this moment we are developing the web application.

The resources that I used for requirement analysis are, monitoring manual processes and asking my external supervisor about their requirement and for designing I used excel, lucid chart and visual paradigm. Also, for web development we used Html, CSS, Bootstrap for front end and for back-end we used MSSQL, C Sharp and followed the framework of ASP.NET Core. Finally, the web application will be deployed in local server using IIS.

5.2 Requirement Analysis

5.2.1 Rich Picture

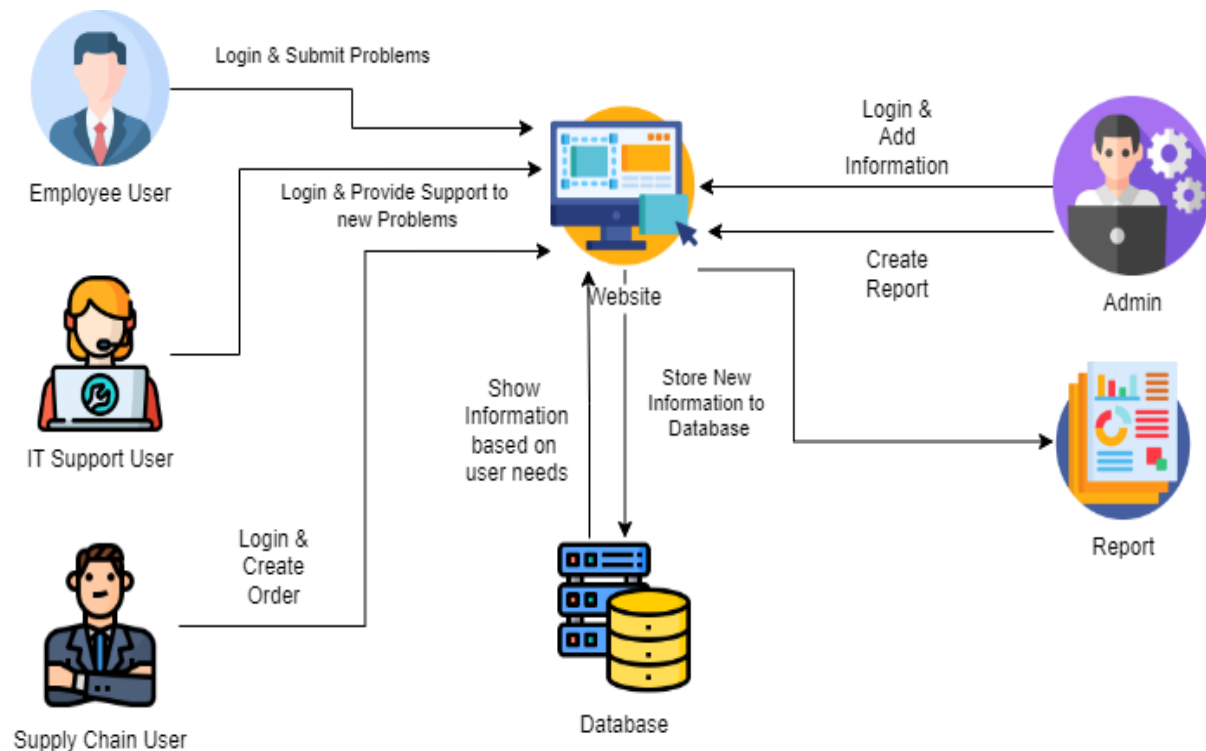


Figure 5.1: Rich Picture

5.2.2 Functional and Non-Functional Requirements

Functional requirements are product features that developers must implement to enable users to accomplish their tasks. A non-functional requirement is a requirement that specifies criteria that can be used to judge the operation of a system, rather than specific behaviors. They are contrasted with functional requirements that define specific behavior or functions. The functional and non-functional requirements of this system are stated below.

Functional Requirements:

1. The authentication system validates the entered user's name, email and unique password upon receiving the information and logs the user into the app by creating an account.
2. The system will generate unique ID for employees.

3. The database will store the data related to the employee. After sometime the user would be able to login.
4. The system will review if the inputted ID and password exists in the system or not.
5. The system will show a message if password is incorrect.
6. The system will show a message if ID is not found in the system's database.
7. The system will show a notification to the user when any updates are made.
8. All role user can create Problem and also able to view the details.
9. IT Support role user can create Problems Solution and also able to view the details.
10. Admins will be able to add, edit, view or remove any information in the system.
11. Admins will be able to crate Report when needed.
12. The application will have customized sections to rearrange the dashboard form the default dashboard for each user to make it unique and more user friendly.

Non-functional requirements

1. Usability: The system is going to be user-friendly and aesthetically pleasing for the users.
2. Maintenance: This system/app is going to be maintained 2 times in a year, it runs smoothly and does not get slow or lag. Any bugs or problems can be fixed easily.
3. Valid data: All the information being updated in the system must be accurate and consistent for the users to take.
4. Scalability: The system can be accessed from any devices like: Computers, Smart-phone's. Apps for smart phones and an aesthetically similar web App for computers are developed.
5. Performance: Performance should always be smooth and easy to understand, such as searching and browsing for officers, submitting information and many more. These should leave a positive experience for users.
6. Service: Employees can use the system from all around the world.
7. Reliability: The system will be backed-up for safety reasons and will not hamper and data during this process.

8. Control: As the system is initialized by the government, privacy will be maintained strictly. It will be completely secured and will be checked by the developer's time to time for any sort of irregularity.
9. Security: The system will be secured and personal information like the user's phone numbers, the email address will be safe.

5.3 System Analysis

5.3.1 Six Element Analysis

Process	System roles					
	Human	Non-Computer Hardware	Computing Hardware	Software	Database	Communication and Network
Login	All User	N/A	Computer	Browser	MSSQL	WAN/LAN
Add New User	System Admin	N/A	Computer	Browser	MSSQL	WAN/LAN
Add New Problem	All User	N/A	Computer	Browser	MSSQL	WAN/LAN
Add Solution	IT Support	N/A	Computer	Browser	MSSQL	WAN/LAN
Add New Order	Supply Chain	N/A	Computer	Browser	MSSQL	WAN/LAN
Create Report	Admin	N/A	Computer	Browser	MSSQL	WAN/LAN
Information Management	Admin	N/A	Computer	Browser	MSSQL	WAN/LAN

Table 5.1: Six Element Analysis of Project

5.3.2 Feasibility Analysis

A feasibility analysis evaluates the projects potential success. It helps to conclude whether the project is worth the investment and time or not. So, we need to do a feasibility analysis after obtaining all the necessary information and before the beginning of

the development phase, which will take the most time. i.e. a measurement for evaluating a software product in terms of how practical product development will be for the company. Feasibility studies are carried out for a variety of reasons, including establishing whether a software product is suitable in terms of development, implementation, and project value to the company. The factors we need to consider for feasibility study are:

- **Needs Assessment:** As the word is self-explanatory, at first, we analyze and extract the faults that the previous manual system had and understand the goals the of the migration. Later, we research on solutions our web application provides to the problems and will it allow future flexible changes, and hence as requirements are met and web application is capable to support all needs, we conclude that there is a need of the web application and move ahead to next step of the procedure. Then, we need to analyze the bank customers need and check if satisfies the customer needs and if all goes well, we execute them in live environment.

- **Technical Assessment:** This is one of the most important where necessary tools and technical support required for an organization to migrate to the new system is analyzed. At first, we need to understand whether the web application will be hosted in the cloud or physical server. Also, we check the infrastructure specifications for hosting the application. So, as we have the professionals for development phase of project, they need to ensure that the web application can perform all functionalities required to solve problems and provide better customer service. Also, since the team has all the required hardware and software needed to develop this system it is technically feasible.

All these assessments allow us to evaluate that the web application is feasible and a good investment considering current scenario and future advancements.

5.3.3 Problem Solution Analysis

While developing the system using established tools and techniques helps us to improve our approach to solving the problems that our team are facing. There are four basic steps in solving a problem:

1. Defining the Problem.
2. Generating alternatives.
3. Evaluating and Selecting alternatives.
4. Implementing Solutions.

There were a number of problems that were encountered while completing the project and they were solved accordingly with those four steps. Some of the problems were:-

- Changing User Roles
- Assigning Permission for Roles
- Create New User Account
- Status Update for New Problem
- Create Solution using Opened Problem Page Id

5.3.4 Effect and Constraints Analysis

The User Support Manager web application helps company employees to have better experience and overcome many drawbacks that previously was not accessible. It allows automation of process and access of information to many problems through its database. There were no such vast records of data before for employees to access and have a view of which hardware/software is causing the hassle. For example: many employees face same issues many times and they have to wait long time to get solution to their problems. This is an issue that needed to be addressed. As many things were done manually due to Covid-19 we understood the need of having knowledge of these information. This system will provide better customer satisfaction solution and experience at an easy few click away.

As we know, reliability, comfort and flexibility are offered for this web application allowing many troublesome factors to be dismissed such as hassle for employees regarding new and old support method for their IT related problems, better service for solving their problems and etc. Also, as it is in cloud when many employees access the server at once which results in huge server miss rather than hits, by use of cloud's auto-load balancing feature we can set policies such as if the server requests cross the server request handling limit then scale up the package and open another server for time being which reduces the chances of server breaking down due to overload of requests and allows customers to have smooth experience.

But also, the system still has limitations which need modifications for further development. There are many modules that are needed but not considered hence, we are still thriving to bring out more changes and add more features/modules to our web application that would bring solutions to many issues and, encourage more and more people to use this web app. This will not only make employee's lives easier but will also be a big advantage during the ongoing pandemic.

5.4 System Design

5.4.1 UML Diagrams

The activity diagram is an important UML diagram that shows the row of one activity to another. The activity diagram of the user and admin help to visualize the row of their activity in graphical form.

Use-case Diagram:

The use case diagram represents the functional requirements of the system. It shows the actors, cases, communication links, system and relationship.

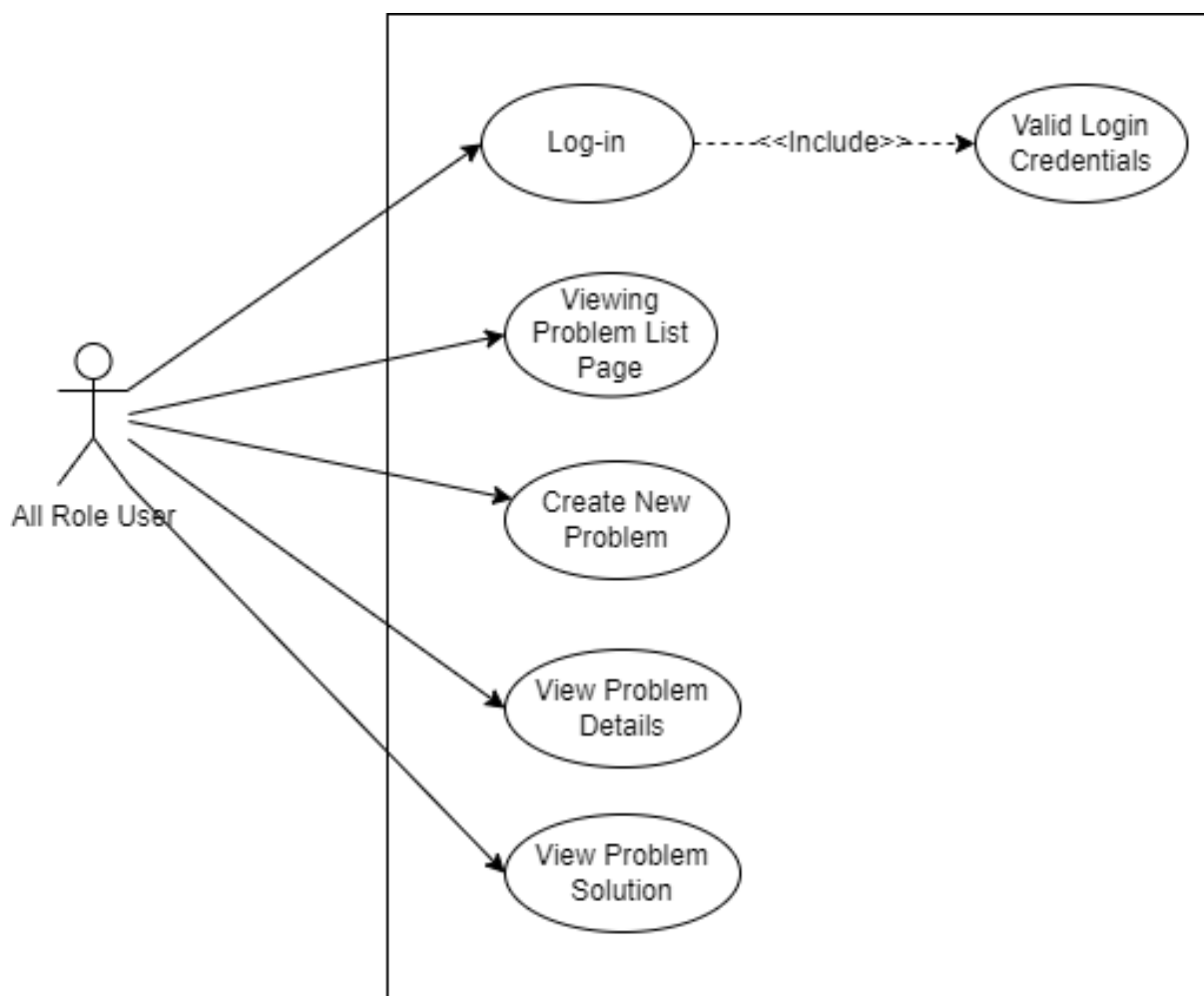


Figure 5.2: Used case Diagram for Problem Page For All User

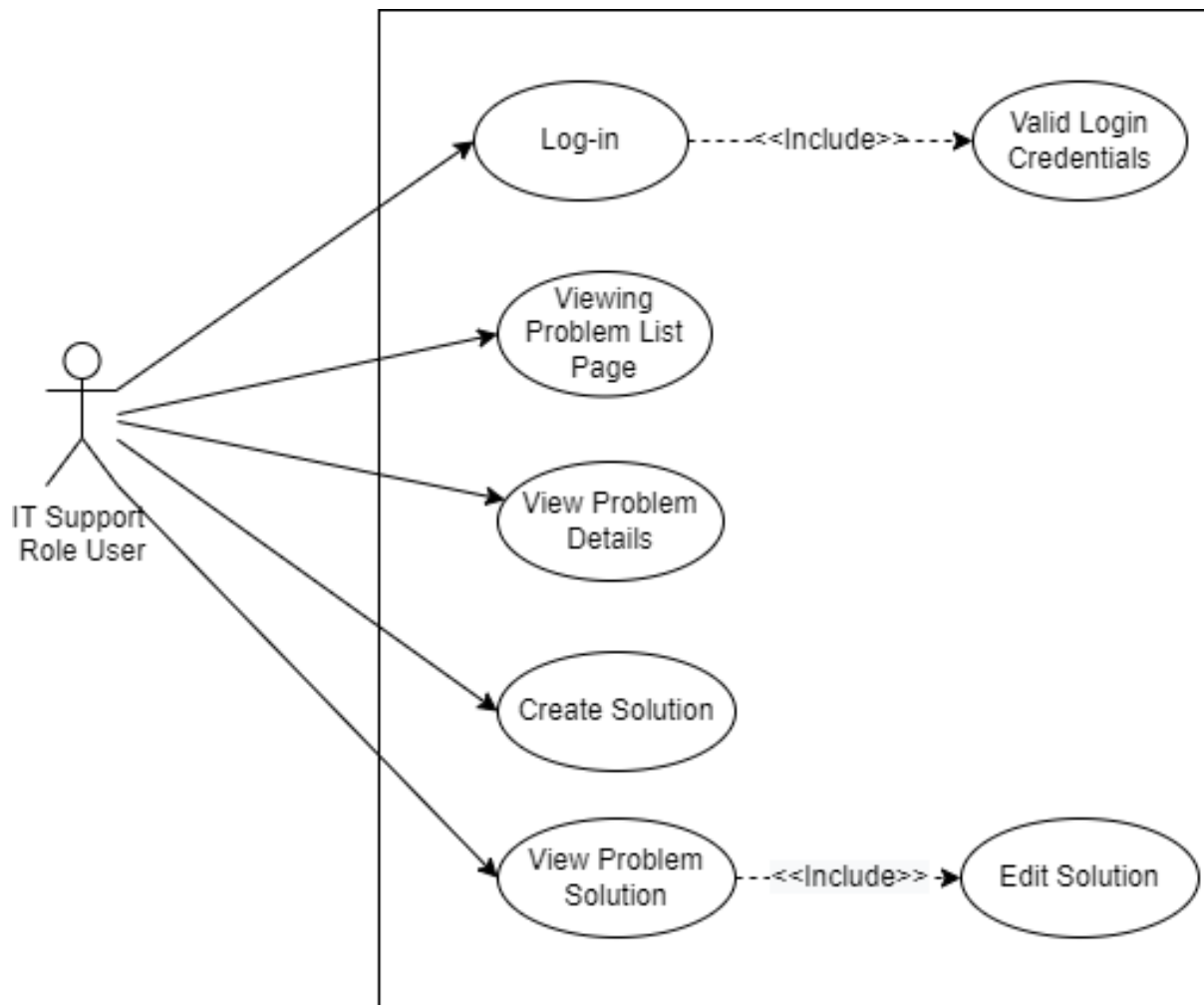


Figure 5.3: Used case Diagram for IT Support Role User Feature



Figure 5.4: Used case Diagram for Supply Chain Role User Feature

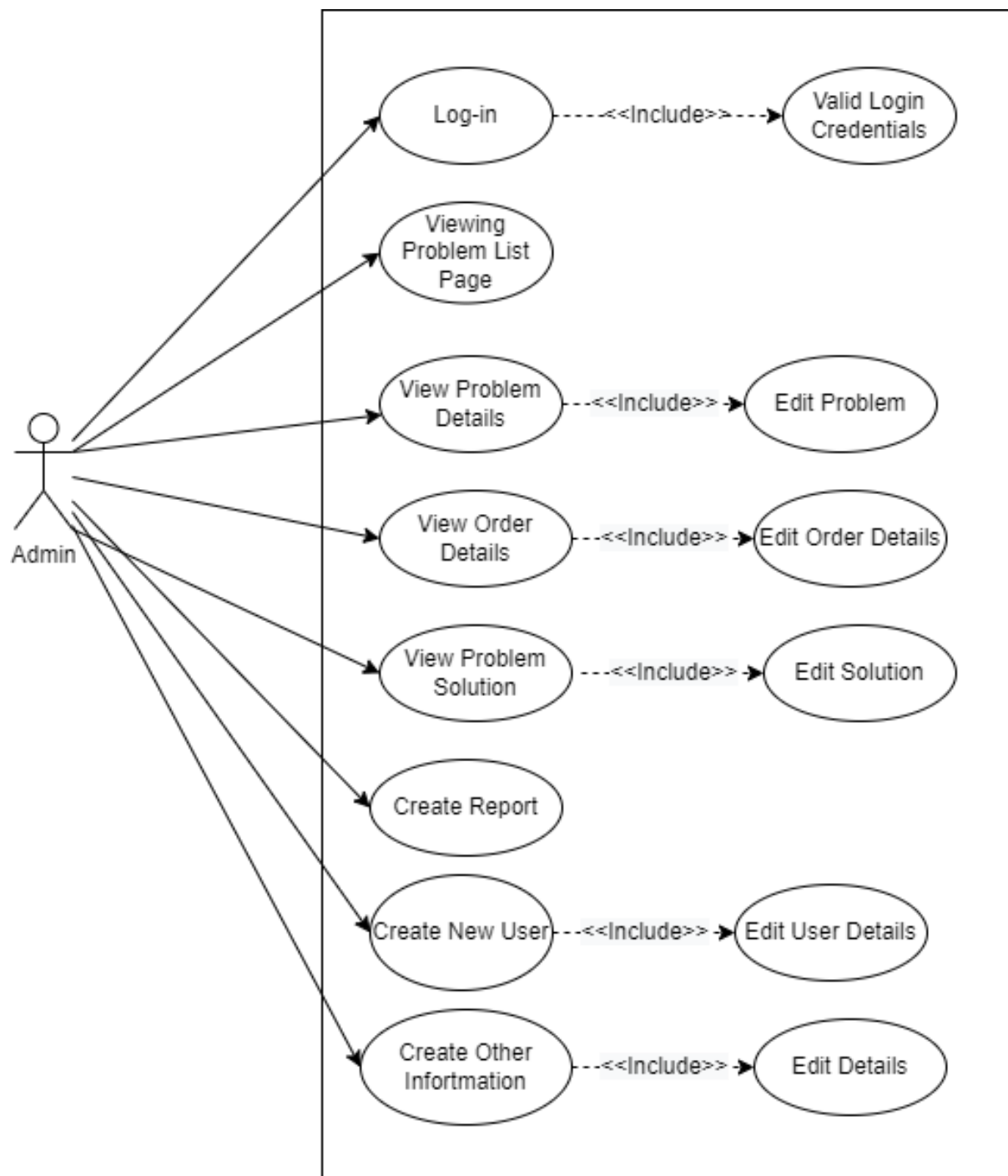


Figure 5.5: Used case Diagram for Admin Feature

Activity Diagram:

Activity diagrams are graphical representations of workflows of step-wise activities and actions with support for choice, iteration and concurrency. In UML, activity diagrams are intended to model both computational and organizational processes (i.e., workflows), as well as the data flows intersecting with the related activities. Although activity diagrams primarily show the overall flow of control, they can also include elements showing the flow of data between activities through one or more data stores.

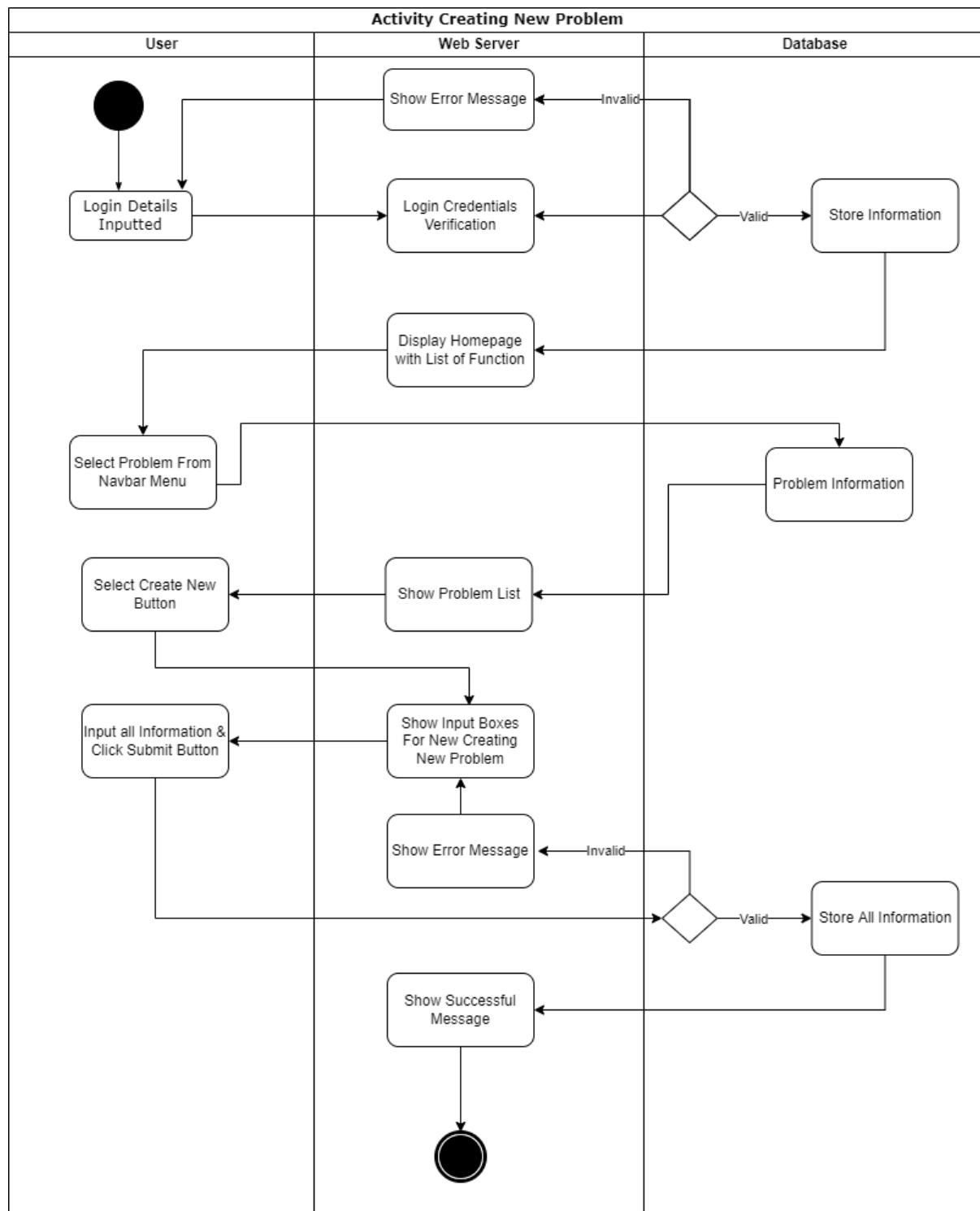


Figure 5.6: Activity Diagram Creating New Problem

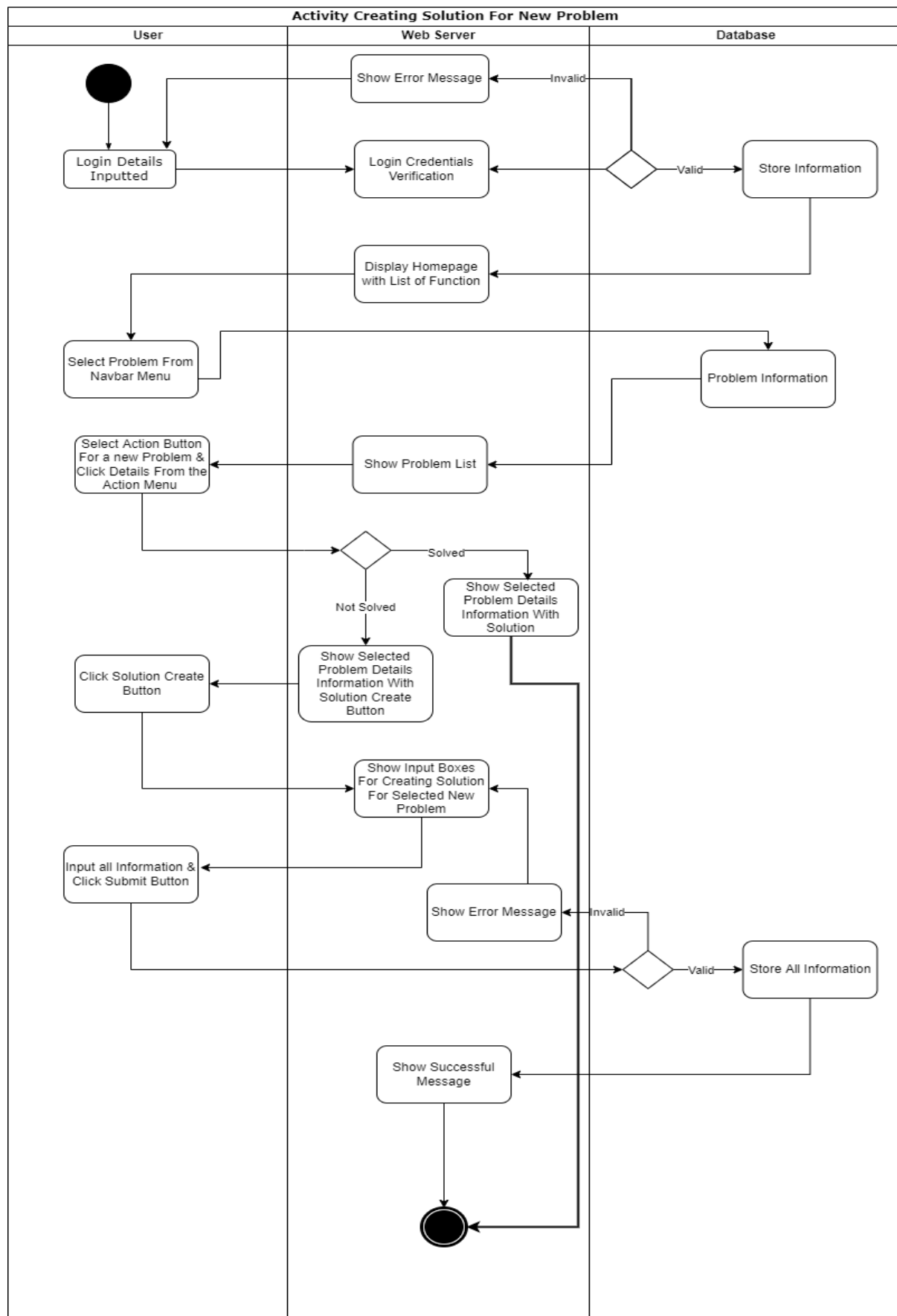


Figure 5.7: Activity Diagram Creating Solution For New Problem

5.4.2 Architecture

There are different types of architecture used in various systems. In our ITSM system we used this architecture.



Figure 5.8: System Architecture

As we can see, the diagram displays the overview of the website architecture. It can be evaluated from here that the whole process in web application can be understood. As you can see the user access the web browser and views the website and these packets are sent to the server via internet and then these requests are forwarded to database server for fetching or storing data as per credentials. The database we are utilizing is MS-SQL which receives request of users from web server, validates and responds to it accordingly. The SQL back-end is connected to an efficient front-end UI that is HTML, CSS, Bootstrap based for good customer experience.

5.5 Implementation

Here I have included all the features a user will receive from this project.

Home Page

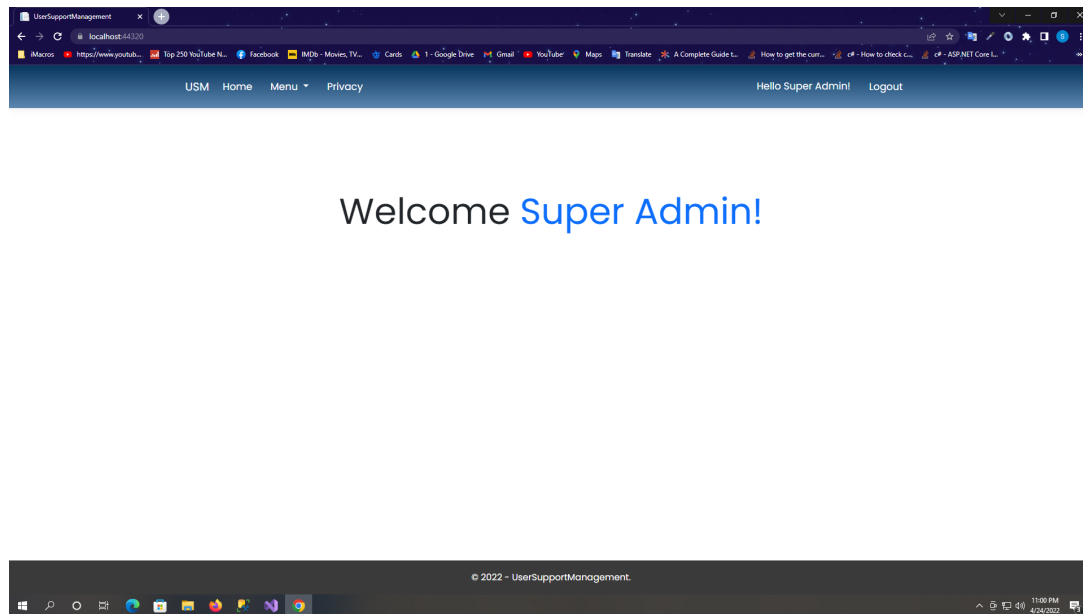


Figure 5.9: Home Page

Login Page

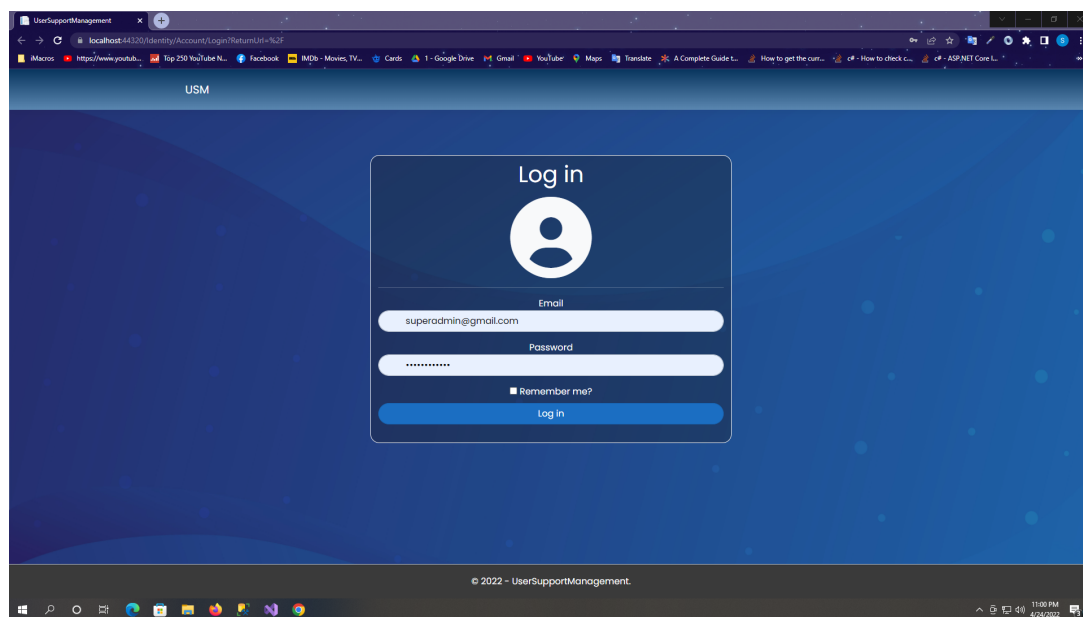
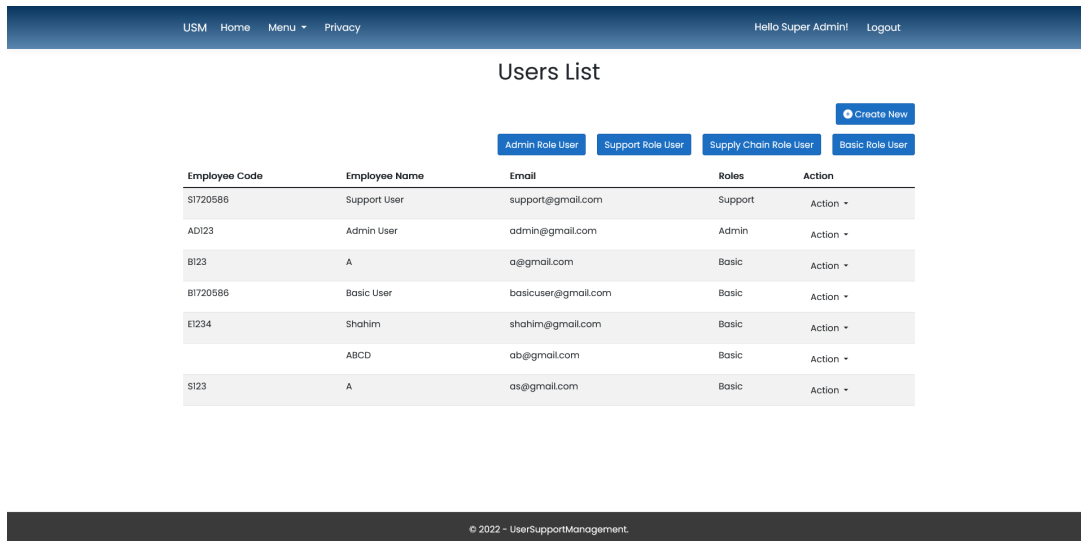


Figure 5.10: Login Page

Users List Page

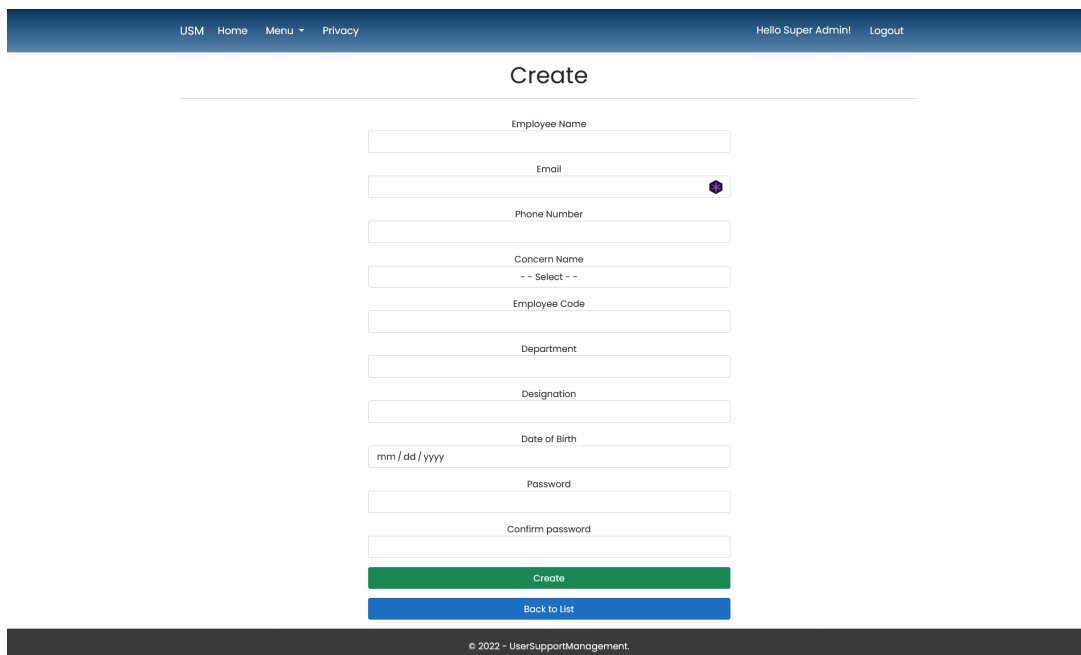


The screenshot shows the 'Users List' page. At the top, there is a navigation bar with 'USM', 'Home', 'Menu', and 'Privacy' on the left, and 'Hello Super Admin!', 'Logout' on the right. Below the navigation bar, the title 'Users List' is centered. To the right of the title, there is a 'Create New' button. Below the title, there are four buttons: 'Admin Role User', 'Support Role User', 'Supply Chain Role User', and 'Basic Role User'. Below these buttons is a table with the following columns: 'Employee Code', 'Employee Name', 'Email', 'Roles', and 'Action'. The table contains six rows of user data. At the bottom of the page, there is a footer with the text '© 2022 - UserSupportManagement.'

Employee Code	Employee Name	Email	Roles	Action
S1720586	Support User	support@gmail.com	Support	Action
AD123	Admin User	admin@gmail.com	Admin	Action
B123	A	a@gmail.com	Basic	Action
B1720586	Basic User	basicuser@gmail.com	Basic	Action
E1234	Shahim	shahim@gmail.com	Basic	Action
	ABCD	ab@gmail.com	Basic	Action
S123	A	as@gmail.com	Basic	Action

Figure 5.11: Users List Page

User Account Create Page



The screenshot shows the 'Create' page for a user account. At the top, there is a navigation bar with 'USM', 'Home', 'Menu', and 'Privacy' on the left, and 'Hello Super Admin!', 'Logout' on the right. Below the navigation bar, the title 'Create' is centered. Below the title, there is a form with the following fields: 'Employee Name', 'Email', 'Phone Number', 'Concern Name' (with a dropdown menu), 'Employee Code', 'Department', 'Designation', 'Date of Birth' (with a date picker), 'Password', and 'Confirm password'. At the bottom of the form, there are two buttons: 'Create' and 'Back to List'. At the bottom of the page, there is a footer with the text '© 2022 - UserSupportManagement.'

Figure 5.12: User Account Create Page

User Role Changing Page

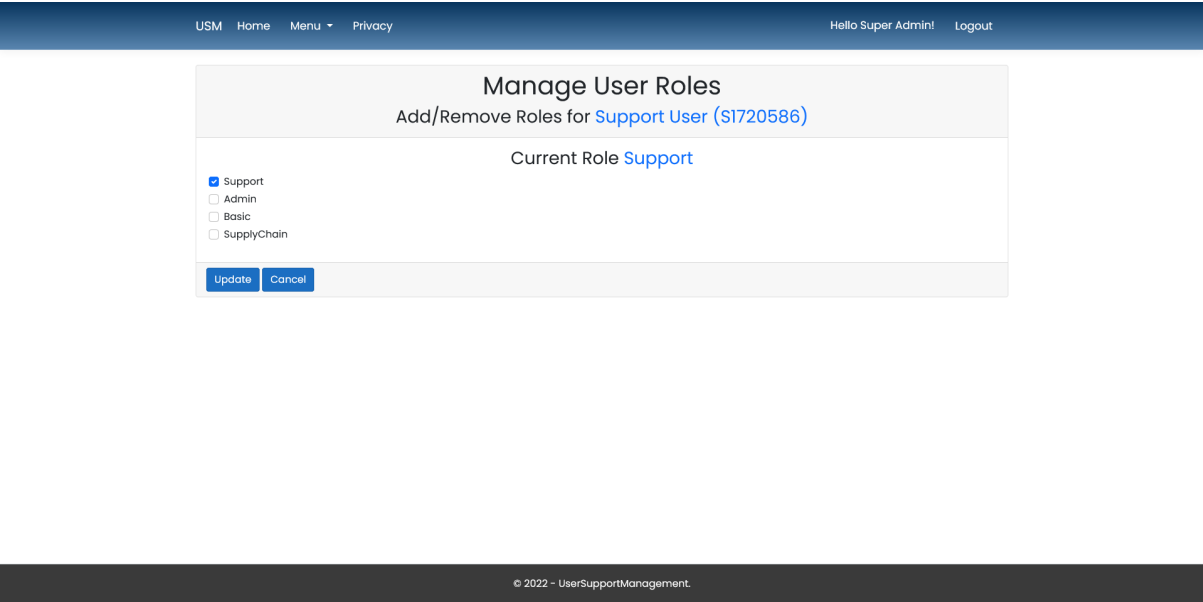


Figure 5.13: User Role Changing Page

All Roles Page

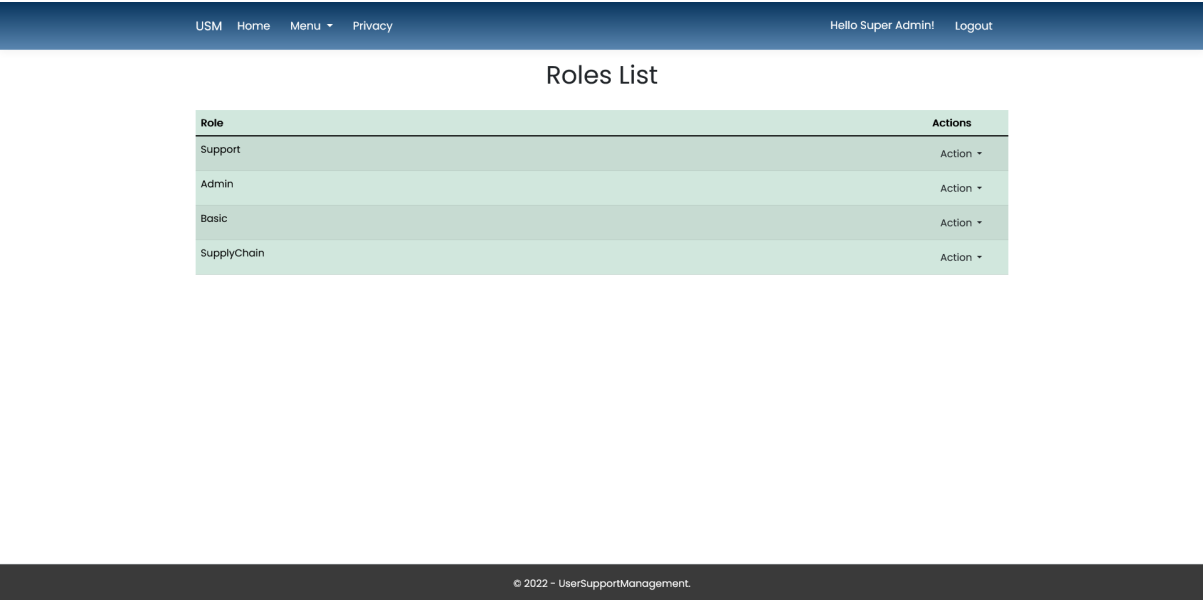


Figure 5.14: All Roles Page

Roles Permission Page

USMHomeMenu ▾Privacy

Hello Super Admin!Logout

Manage Roles Permissions

Add/Remove Permission for [Basic](#)

Type	Permission	Status
Permissions	Permissions.Concerns.View	<input type="checkbox"/>
Permissions	Permissions.Concerns.Create	<input type="checkbox"/>
Permissions	Permissions.Concerns.Edit	<input type="checkbox"/>
Permissions	Permissions.Concerns.Delete	<input type="checkbox"/>
Permissions	Permissions.Vendors.View	<input type="checkbox"/>
Permissions	Permissions.Vendors.Create	<input type="checkbox"/>
Permissions	Permissions.Vendors.Edit	<input type="checkbox"/>
Permissions	Permissions.Vendors.Delete	<input type="checkbox"/>
Permissions	Permissions.ProblemTypes.View	<input type="checkbox"/>
Permissions	Permissions.ProblemTypes.Create	<input type="checkbox"/>
Permissions	Permissions.ProblemTypes.Edit	<input type="checkbox"/>
Permissions	Permissions.ProblemTypes.Delete	<input type="checkbox"/>
Permissions	Permissions.StatusTypes.View	<input type="checkbox"/>
Permissions	Permissions.StatusTypes.Create	<input type="checkbox"/>
Permissions	Permissions.StatusTypes.Edit	<input type="checkbox"/>
Permissions	Permissions.StatusTypes.Delete	<input type="checkbox"/>
Permissions	Permissions.Problems.View	<input checked="" type="checkbox"/>
Permissions	Permissions.Problems.Create	<input checked="" type="checkbox"/>
Permissions	Permissions.Problems.Edit	<input type="checkbox"/>
Permissions	Permissions.Problems.Delete	<input type="checkbox"/>
Permissions	Permissions.Solutions.View	<input type="checkbox"/>
Permissions	Permissions.Solutions.Create	<input type="checkbox"/>
Permissions	Permissions.Solutions.Edit	<input type="checkbox"/>
Permissions	Permissions.Solutions.Delete	<input type="checkbox"/>
Permissions	Permissions.Orders.View	<input type="checkbox"/>
Permissions	Permissions.Orders.Create	<input type="checkbox"/>
Permissions	Permissions.Orders.Edit	<input type="checkbox"/>
Permissions	Permissions.Orders.Delete	<input type="checkbox"/>
Permissions	Permissions.Employees.View	<input type="checkbox"/>
Permissions	Permissions.Employees.Create	<input type="checkbox"/>
Permissions	Permissions.Employees.Edit	<input type="checkbox"/>
Permissions	Permissions.Employees.Delete	<input type="checkbox"/>

© 2022 - UserSupportManagement.

Figure 5.15: Roles Permission Page

Problem List Page

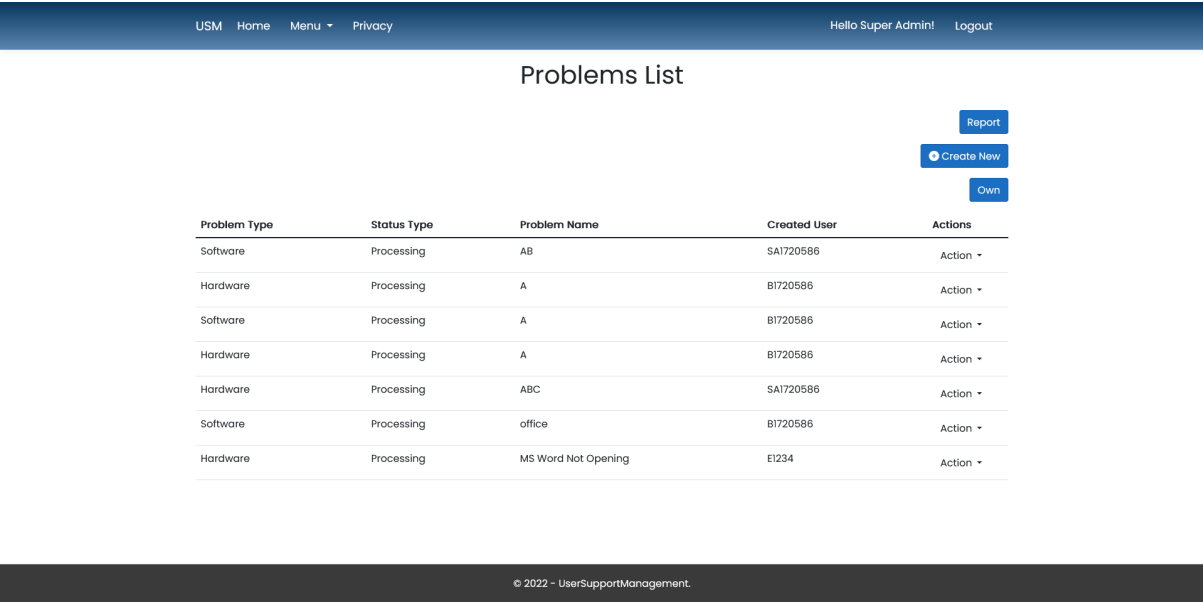


Figure 5.16: Problem List Page

Problem Create Page

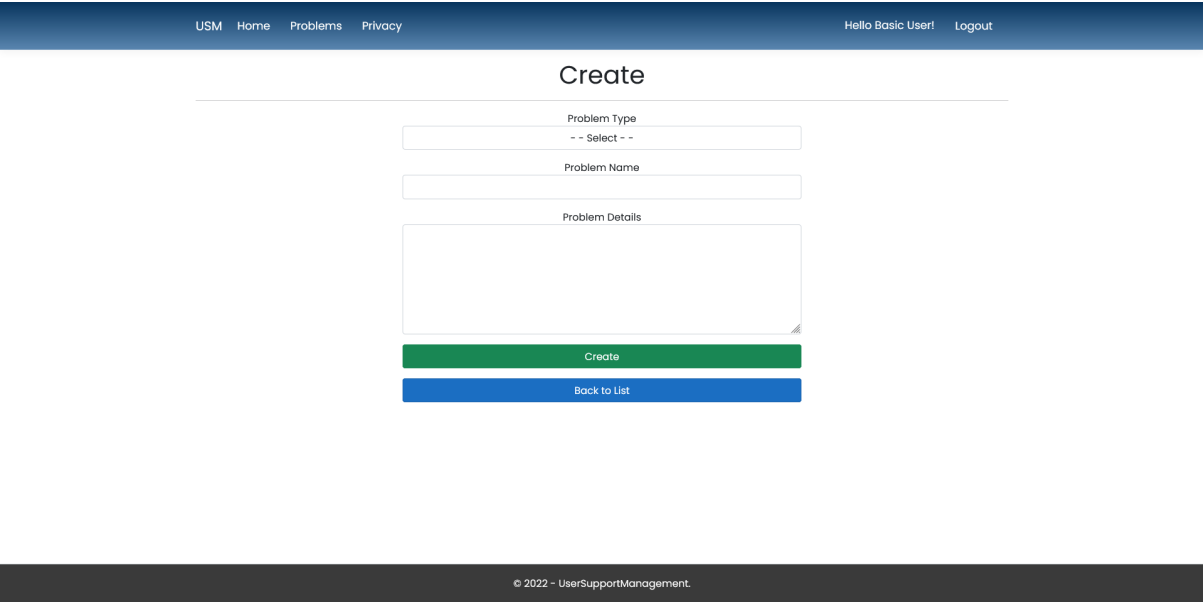


Figure 5.17: Problem Create Page

Problem Details Page

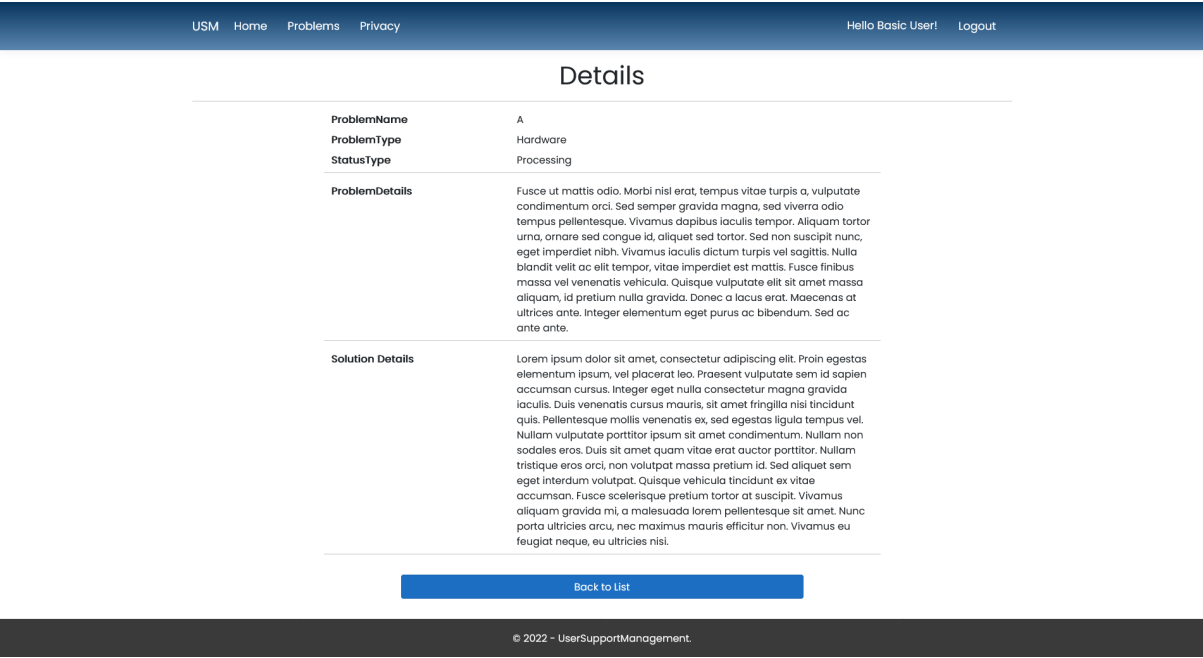


Figure 5.18: Problem Details Page

Solution List Page

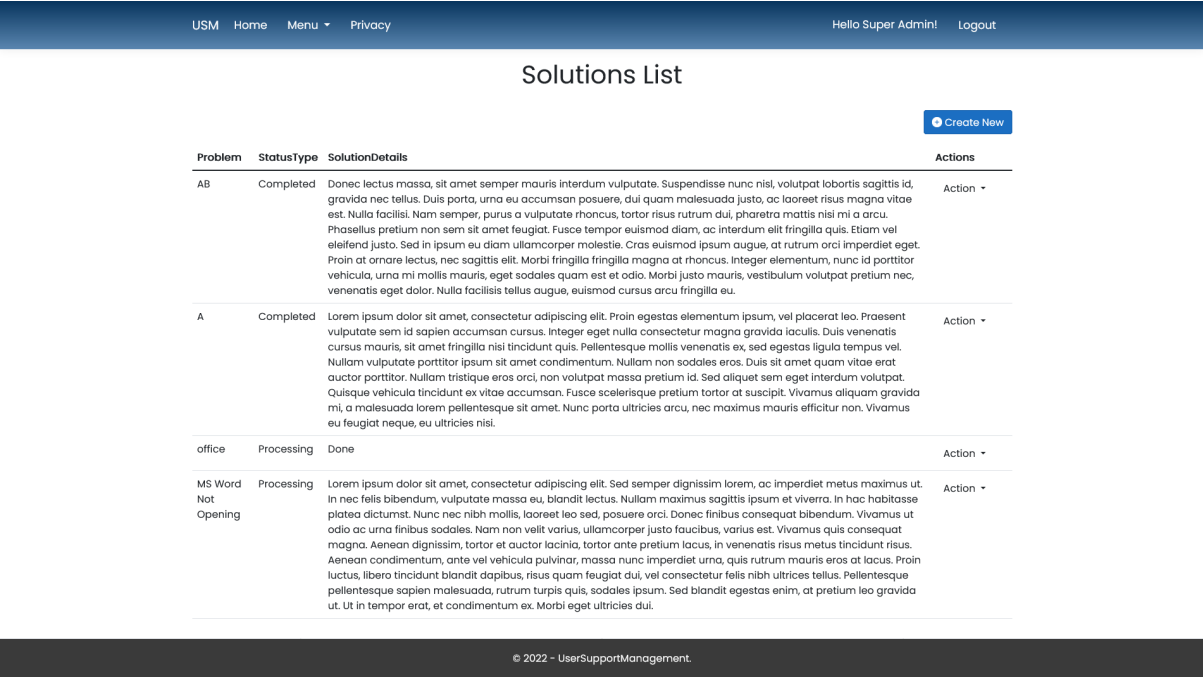


Figure 5.19: Solution List Page

Solution Create Page

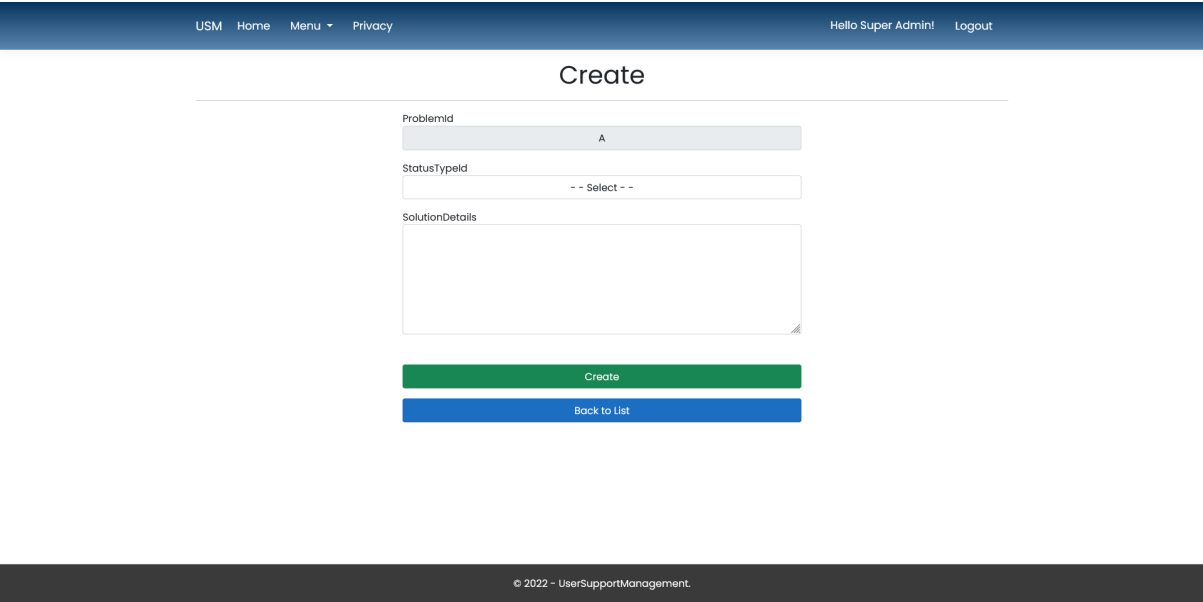


Figure 5.20: Solution Create Page

Order List Page

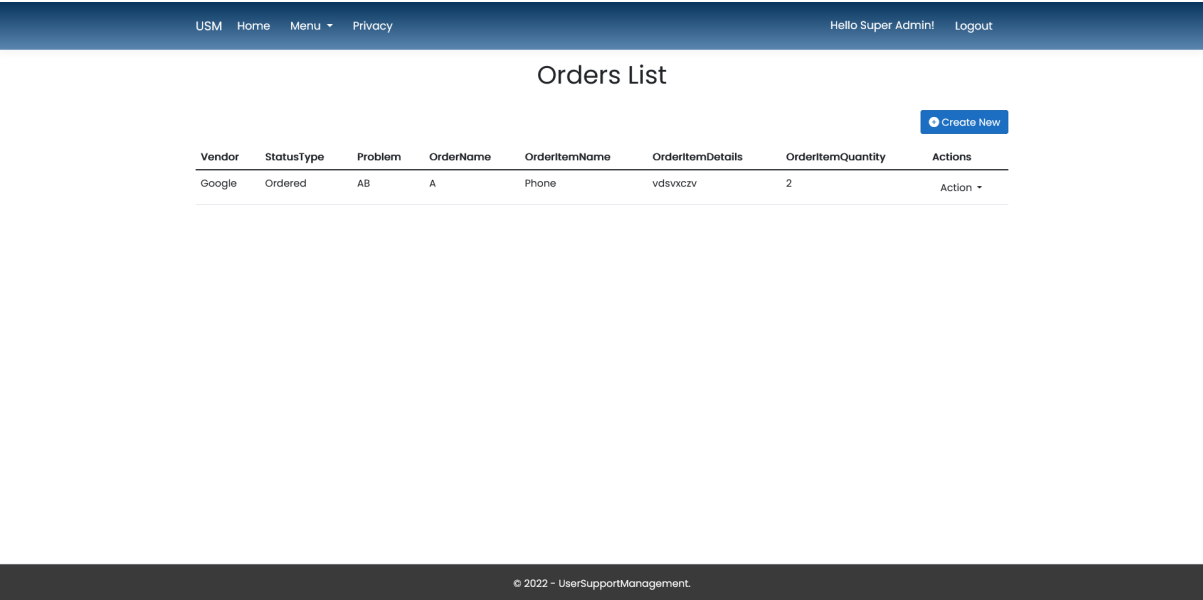


Figure 5.21: Order List Page

Order Create Page

USMHomeMenuPrivacy

Hello Super Admin!Logout

Create

Vendor Name

Google

Status Type

Processing

Problem Name

AB

Order Name

Item Name

Item Details

Quantity

Create

Back to List

© 2022 - UserSupportManagement.

Figure 5.22: Order Create Page

Concern List Page

USMHomeMenuPrivacy

Hello Super Admin!Logout

Concerns List

Create New

ConcernName	ConcernShortName	Actions
Google	G	Action
Apple	A	Action
Samsung	S	Action
Nokia	N	Action
Asus	AS	Action

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Figure 5.23: Concern List Page

Vendor List Page

USMHomeMenuPrivacy

Hello Super Admin!Logout

Vendors List

Create New

VendorName	VendorEmail	VendorPhoneNumber	VendorAddress	Actions
Google	google@gmail.com	3042361288	9620 Airport Blvd	Action

Figure 5.24: Vendor Create Page

Problem Report

User Support Mangement				
Problem List				
SL	Problem Name	Problem Type	Problem Details	Solution Type
1	AB	ProblemType Name	<p>Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aliquam eleifend massa et risus porta, nec lacus mauris blandit. Nunc viverra leo a enim posuere, in cursus purus tristique. Proin feugiat ex lacus non posuere. Ut ac ante rhoncus, mollis neque vitae, sagittis mauris. Duis nec lacus vel nisl molestiae finibus. Duis sit amet justo nec massa faucibus semper. Sed tellus velit, venenatis non placerat eu, incididunt a augue. Quisque sit amet massa convallis, pulvinar nisi vel, tatum eros.</p>	solDetails
2	A	ProblemType Name	<p>Fusce ut mattis odio. Morbi nisi erat, tempus vitae turpis a, vulputate condimentum orci. Sed semper gravida magna, sed viverra odio tempus pellentesque. Vivamus dapibus lacus tempor. Aliquam tortor urna, citiare sed congue id, aliquet sed tortor. Sed non suscipit nunc, eget imperdiet nibh. Vivamus lacus dictum turpis vel sagittis. Nulla blandit velit ac elit tempor, vitan imperdiet est mattis. Fusce finibus massa vel venenatis vehicula. Quisque vulputate elit sit amet massa aliquam, id pretium nulla gravide. Donec a lacus erat. Maecenas at ultrices ante. Integer elementum eget purus ac bibendum. Sed ac ante ante.</p>	solDetails
3	A	ProblemType Name	aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa mmmmmm	solDetails
4	A	ProblemType Name	ppkkkkkkkkkkkkkkkkk	solDetails
5	ABC	ProblemType Name		solDetails
6	office	ProblemType Name	office not responding	solDetails
7	MS Word Not Opening	ProblemType Name	<p>Lorem ipsum dolor sit amet, consectetur adipiscing elit. Nam porta lobortis eros, sit amet rutrum mi molestiae eget. Pellentesque nulla velit, scelerisque ut fnum sit amet, consectetur eleifend justo. Nalla congue nisl ultrices orci molestie gravida. Sed sodales dul leo, id sagitta neque commodo ut. Mauris posuere, eros eu commodo semper, tellus orci accumsan nunc, ex dignissim una sapien in ante. Maecenas vel imperdiet risus. Maecenas tempor vix orci quis pellentesque. Sed venenatis congue blandit, Phasellus bibendum maximus rlib, in scelerisque ex pulvinar vel. Phasellus ultricies est liqua, quis fermentum est auctor in. Donec vel scelerisque lacus.</p>	solDetails

Figure 5.25: Problem Report

5.6 Testing

SI	Test Case Id	Test Case Title	Pre-condition/Test data	Test Steps	Excepted Result	Actual result	Test Case Status	Data used/input data	Comments
1	2201	Login	1. The user should be registered to system. 2. The user should be verified.	1.Go to website. 2. Click on the "Login" Button. 3. Enter the registered and verified email and password and click on "Login" button . 4.Upon clicking the 'Login ' button it should allow the user to log in to system with given permission .	Log in with given permission.	Not allowing to log in , showing a message " Password Incorrect "	Fail	1. basicuser@gmail.com 2. 123Pa\$\$word	N/A
2	2202	New User Create	1. New User all informamtion.	1.Go to website. 2. Enter the registered and verified email and password and click on "Login" button . 3. Click User List from Navbar Menu. 4. Click Create New Account Button. 5. Enter All information related to the user.	New User Account Created.	Create New User account, showing a message "Successfully Created "	Pass	All Information that are needed.	N/A
3	2203	Problem Create	1. The user should be registered to system. 2. The user should be verified. 3. New Problem Information.	1.Go to website. 2. Enter the registered and verified email and password and click on "Login" button . 3. Click Problem List from Navbar Menu. 4. Clcik Create New Problem Button. 5. Enter All information related to the problem.	New Problem Created.	Create New Problem, showing a message "Successfully Created "	Pass	All Information that are needed.	N/A
4	2204	Solution Create	1. The user should be registered to system. 2. The user should be verified. 3. Solution Information.	1.Go to website. 2. Enter the registered and verified email and password and click on "Login" button . 3. Click Problem List from Navbar Menu. 4. Click Details from new problem Action Menu. 5. Click Create Solution. Button form Problem Details Page. 5. Enter All information related to the Solution.	Solution Created.	Create Solution, showing a message "Successfully Created "	Pass	All Information that are needed.	N/A
5	2205	Order Create	1. The user should be registered to system. 2. The user should be verified. 3. New Order Information.	1.Go to website. 2. Enter the registered and verified email and password and click on "Login" button . 3. Click Order List from Navbar Menu. 4. Click Create New Order Button. 5. Enter All information related to the new Order.	New Order Created.	Create New Order, showing a message "Successfully Created "	Pass	All Information that are needed.	N/A

Figure 5.26: Test Case Results

Chapter 6

Results & Analysis

The Union Limited Previously used manual system for providing IT support to their employees, which was very difficult to work on and keep record of the workings. There is no data storing process once someone get any Support, it does not keeps the record of it. As they wanted to shift ITSM system to support their employees and it became very handy and keeps every record that the problems that employees will be facing. Also, cloud will allow admin to operate much more efficiently and will come in handy in terms of utilization and cost saving.

Below are the UI of the web application with analysis and you will get to see the detailed look of results and the steps followed by basic role user for creating a new problem:

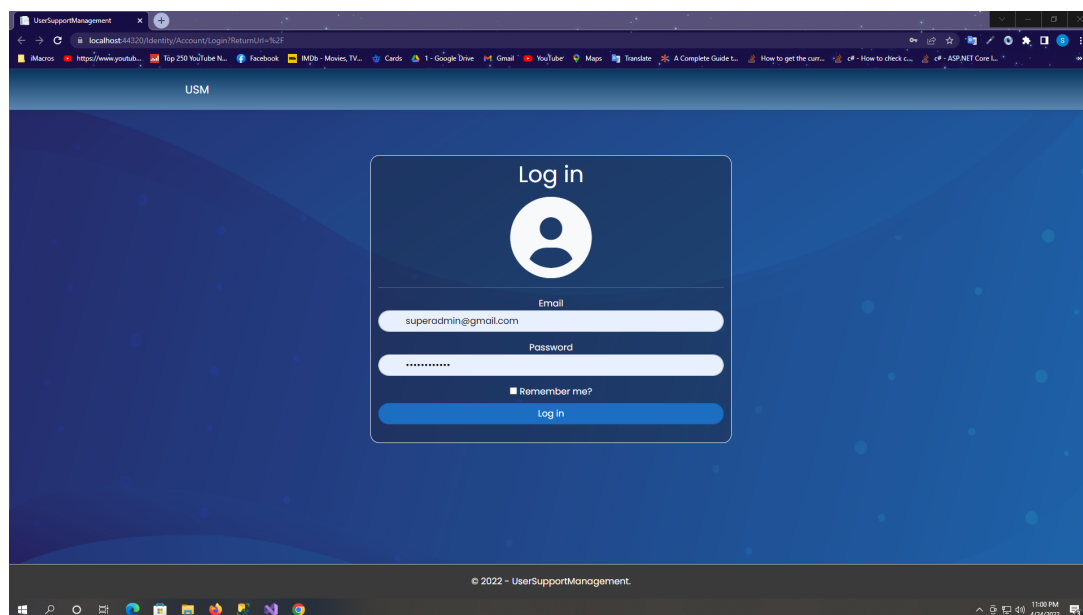


Figure 6.1: Login Page

Here, the basic role user logs into the website using his/her email and password.

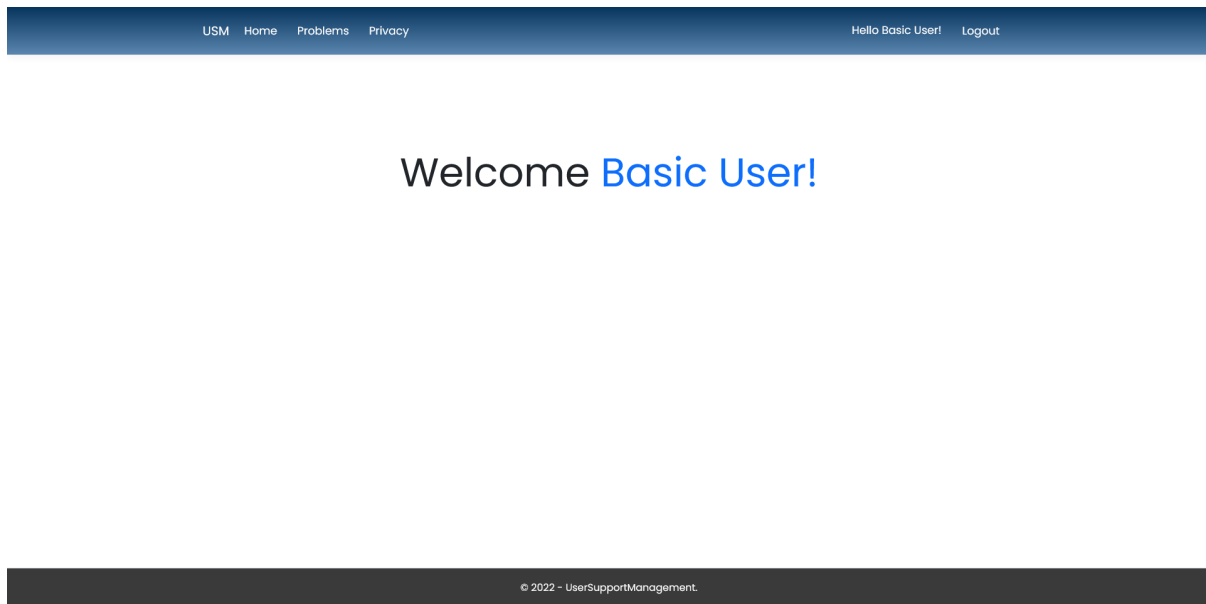


Figure 6.2: Home Page for Basic Role User

From Here, There are few steps to follow to create an New Problem. First, he/she click the the Problem Menu from the Navbar then the the Website Displays Problem List Page.

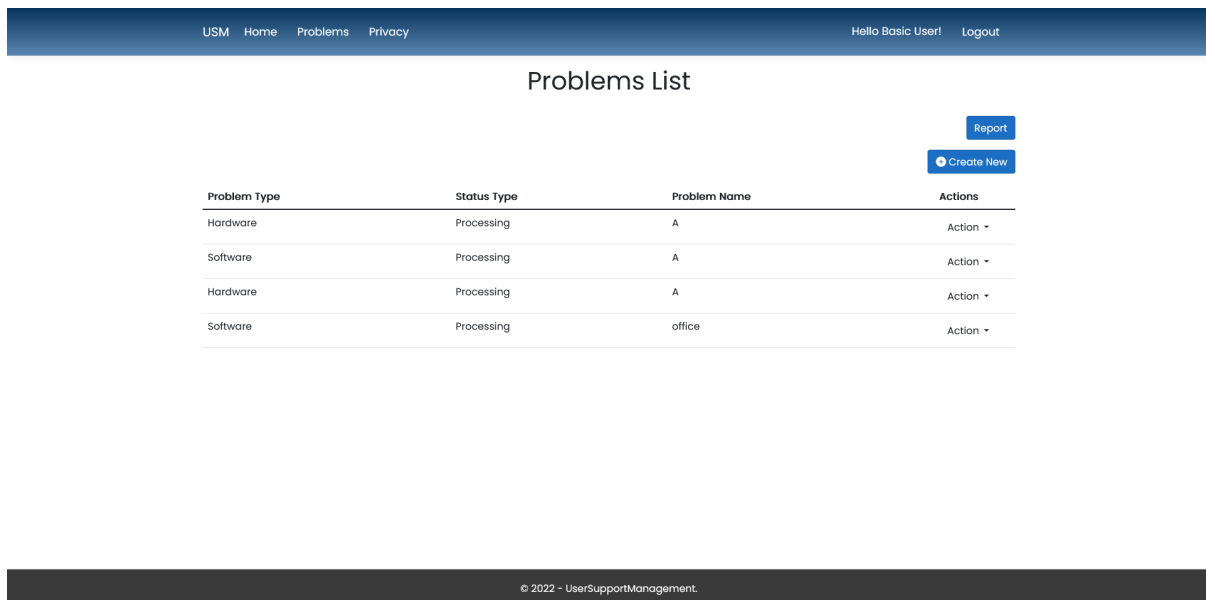


Figure 6.3: Problem List for Basic Role User

Here the user click the Create New Button for Creating New Problem.

Figure 6.4: Create New Problem Page for Basic Role User

Here the user input all the information and click the Create Button for Creating New Problem. And after successful process the Website takes the user to the Problem List Page and shows "Created Successfully" Notification.

Figure 6.5: Notification for Successful New Problem Creation

Here the user click Action Menu for the new Problem and From the Action Menu Click Details Button for Viewing All the Information Related to that Problem.

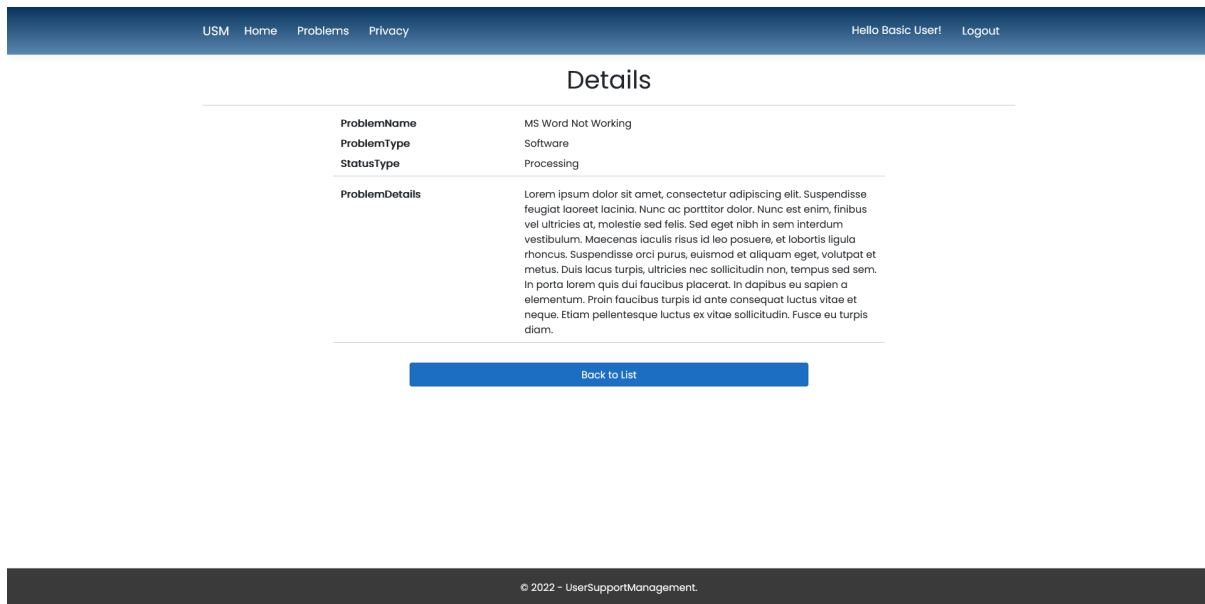


Figure 6.6: Problem Details Page

After sometimes when getting Solution for the Problem the user can Viewing All the Information Related to that Problem including Solution for that Problem.

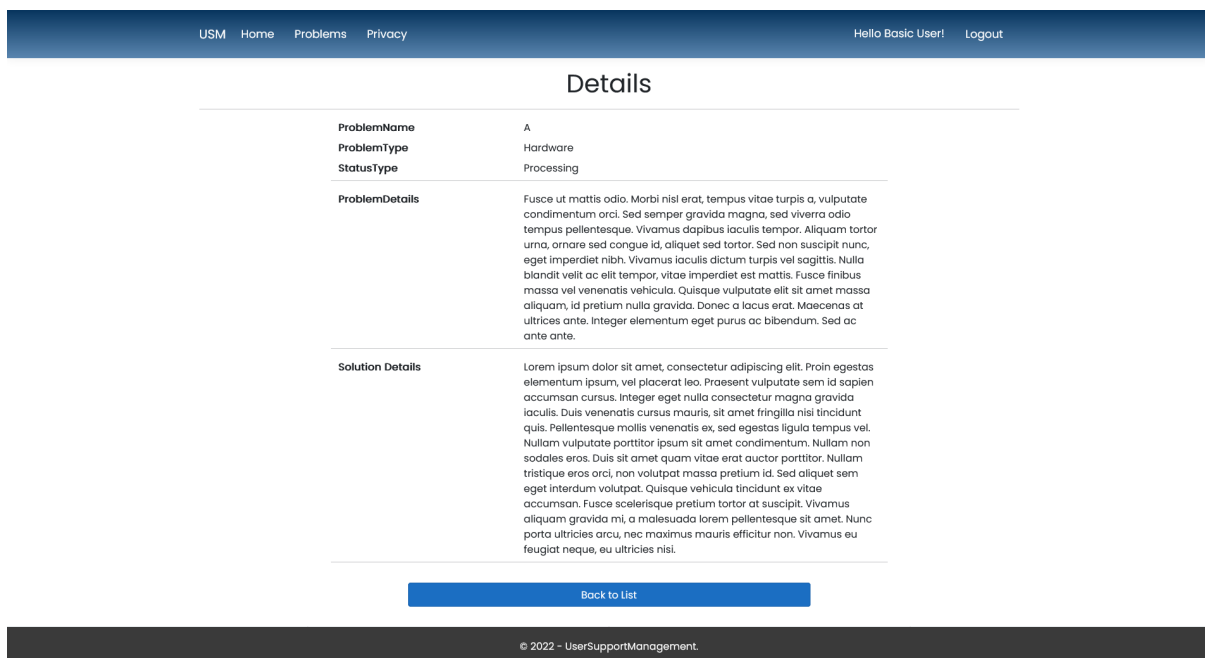


Figure 6.7: Problem Details Page with Solution

Now, as we have seen all the features of our product previously in Chapter 5. So here I will discuss those features here thoroughly. As you can see, we have four user perspectives addressed, the basic users then it support users then supply-chain users and

then the admin. Here, we show the process flow of basic users from creating new problem and get solution for their problem. Here the basic users from create new problem. Later, IT support user provide Solution information for that problem. Then the basic users can view all the details information for that problem with solution. These are the results and analysis done through users like basic users and IT support user perspective.

Chapter 7

Project as Engineering Problem Analysis

7.1 Sustainability of the Project/Work

First and foremost, we must define sustainability in the context of the project. In general, sustainability involves a number of considerations, including economic, social, environmental, and administrative perspectives, all of which highlight the project's cost, value to society, reduced waste, and increased efficiency and resource usage goals. When constructing a project's sustainability, these factors are taken into consideration.

So, why is sustainability such a crucial component of the project? because it helps us to have faith and confidence that the project will provide a beneficial result for a set length of time and will prove to be a worthwhile investment that will generate enough profit and benefits to cover the expenditures of the project. Sustainability also includes maintaining and upgrading the system as needed. [7]

As we have seen the project is sustainable as it provides important and vital service to employees who can post their IT related problem and get solution from IT support Team quickly which will be very helpful. There will be vast data, and this allows society to adapt to new changes and utilize the web application to store data in much more efficient and automated way rather than wasting papers when everything was manual. The stakeholders such as the employee will be benefited from this web application. The web app is user friendly and easy to navigate through and as admin has access rights to all information handling in database there are no sight of issues to be faced.

The advantage of this web application is it is unique web application which offers easier and convenient process flow which saves time. Also, the maintenance as it is un-

der observation if there are bugs found it will be fixed immediately allowing the system sustainability to increase. Moreover, the web application will be updated twice in a year according to the requirements of the employees needs. All the bugs and problems will regularly be updated. All these aspects offer a sustainable ITSM Based User Support Management web application.

7.2 Social and Environmental Effects and Analysis

Social Effects

The main goal of the website was to bring up employees of all the business unit of the company under one website so that the employee could get support for their technical problems even from home during the pandemic rather than personally visiting the office. The web application provides all functionalities that a employee might want when crating a new problem. Also, employees can view his previous problems solution if they are facing same problem again. All these functionalities and features are available to user within their fingertips and have a social effect on the traditional process flow practiced.

Environmental Effects

It's a high time when the system can plays its best role in the global pandemic of COVID-19. The employees can stay at home and continue to get get support for their technical problems from IT support users with ease and comfort. They will find all the information for their problems if same problem occurs within the comfort of their homes rather than going out in this pandemic. As the web application has no carbon footprint as it is digitized, and it somewhat decrease wastage of paper and cause no damage to environment while keep records of all the information.

7.3 Addressing Ethics and Ethical Issues

In the world of smartphones with so much data collection, hacking, cyber-crime, etc. There are some unspoken rules and ethics guidelines that need to be followed when working on creating and releasing an website. To address this worry, I follow certain ethics and analyze ethical issues ahead of time to avoid unethical activities. I made certain that there were no violations of behavior, such as secretly obtaining personal information by

eavesdropping, and that other factors were properly considered. Here are some of the things I thought about:

- **Data Collection:** SSL certificate will be used to encrypt the data exchange between system and user to avoid any data manipulation in the middle. Only necessary data are collected and are transmitted done through an encrypted secure channel to avoid breach of privacy. This ensures privacy and security. Also, as we know, web server collects information about web site visitors through the creation of log files. These automatically generated log files contain information such as the pages a user viewed, the type of browser used, and the duration of a user's visit. So, to create trust it is our responsibility as a web-developer to disclose to our site users that what kind of information we're collecting and how it will be used. [8]

- **Data Storage:** All the data is stored in the database which is backed up in cloud. The admin only has access to the back-end server and database. As it is hosted in cloud only the admin using private key credentials can access the DB server. Hence, there is less risk of data manipulation, breach of data integrity and since the database is backed up, there are low chances of data loss due to system failure or disaster. This ensures authorization, safety and fault management.

- **Data Security:** Data are secured and encrypted allowing data integrity. A super admin account is provided with access rights to manage other user accounts and given access to the server which is only used and accessible by the admin through certain verification methods. Also, we have to consider that knowingly, we do not spread malicious program such as virus which is hosted on our website that can damage users accessing web page.

- **Discrimination:** Employees are not classified based on their religious views, skin color, or language, all are treated equally and with respect.

Chapter 8

Lesson Learned

8.1 Problems Faced During this Period

It was tough for me to do six days office from 9:00 AM to 6:00 PM while continuing other courses. I always tried to give my 100 percent during my internship periods. Collecting the requirement from the different employees were a huge trouble for me. As there were a lot of correction in the requirement according to the requirement provided by them. Research, requirement analysis, and data collection, which are the foundations of the SDLC, were the most difficult aspects. During the design process, several adjustments were necessary in terms of architecture, cost analysis, and resource usage, and subsequently during development and testing, faults in the code were discovered and some concepts were clarified. These were some of the issues I encountered throughout my internship.

8.2 Solution of those Problems

As problems came across, there were also solutions to it through analysis. During my internship period I have gained new knowledges, skills, and met so many new people. I got insights into professional practice and its relative and required skill set. The internship was also good to find out what my strengths and weaknesses are. Starting from adjusting to new time, learning from employee experience. My external supervisor helped me with solving few problems by guiding me through the process work and due to there being active interactions many problem aspects were covered immediately and efficiently. I faced an issue regarding testing part where certain bugs were detected. Due to working with different people and observing different perspectives in team meetings, it helped me to identify the requirements for successful project deployment and necessity of positive team communication. I also learnt how to solve problems and give a solution feedback.

Chapter 9

Future Work & Conclusion

9.1 Future Works

As the project is still under development , the company plans on adding a lot more features and modules to the website to make it even more helpful for the employee to quickly get solution for their technical problems and to make it look more appealing. Moreover in every year there will be two updates of the software according to the company needs and requirements.

9.2 Conclusion

It was a wonderful experience working with Development team in Union Limited as an intern. During the internship period, I have learned and applied a great deal. I was introduced to new cutting-edge technologies and I was pushed to do even better. I was pushed to adapt to changes rapidly and come up with logical solutions. I have used all my knowledges on analyzing the data. During my project, I cooperated with my mentors and seniors to solve the challenges faced. Despite their workload, my supervisors were always there to answer any queries and help me settle nicely. This internship opportunity has taught me how to work under pressure and complete the SDLC before the deadline. I would like to appreciate once again everyone who has made my life as an intern such a great experience. In addition, I gained a deeper understanding of my technical skills, which benefited me personally. Also, I had learnt to work in pressure and fulfill under the deadline.

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