Final Report

For

Employee Grievance Handling System

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1. Introduction

1.1 Introduction

The main intention of this project has been to build a software to upgrade the current manually based in-effective grievance management of ABC Company by an effective automated methodology, which the HR management, who are responsible for addressing the grievances will be able to easily gather all the grievances and take necessary actions for them. After evaluation of the project constraints such as time, hardware and other technologies, the final objectives were decided. This system consists of a web-based application and it includes the functionalities such as,

- User authentication to allow users different levels of accessibilities,
- Administration of Employee details,
- submit new grievances,
- Update grievances, Forward grievances,
- Grievance Status update to the Employee(Grievance Maker).

This Chapter will explain more about the Aim, Objectives, Stakeholders, Project Scope and the Motivation for the project.

1.2 Aim and Objectives

Aim.

- The aim of this Project is to develop a user-friendly Web Application which facilitates HR department to manage grievances effectively and satisfy the employees.

Objectives.

- Critical analysis of system requirements.
- Design and develop a system for solving the problems related for Grievance Handling.
- Evaluation of the proposed system.
- Encourage the employees of the company to work at their best by continuously providing solutions for their grievances by the HR department.

1.3 Project Scope

The main intention of this software is to upgrade the current manually based in-effective grievance management by an effective automated methodology which the HR management who are responsible for addressing the grievances will be able to easily gather all the grievances and take necessary actions for them. After evaluation of the project constraints such as time, hardware and other technologies, the final objectives were decided. This system consists of a web-based application.

To handle the grievances in an effective way while allowing all the responsible parties for handing grievances to involve, following functionalities were identified.

In scope	• User authentication to allow users different levels of accessibilities. • Administration of Employee details. • Submitting new grievances.

	• Update grievances. • Forward grievances. • Grievance Status update to the Employee(Grievance Maker). • Email to inform about the grievance to the grievance maker's department head.
Out of Scope	• Conferencing(Discussion modes). • Word Analysis to detect the Department. • Automated Grievance tracking.

Main Process of the System :

When it comes to the process of this system, when user wants to place grievance he should login to the system and then add his grievance with description and if necessary, user can attach image to describe the grievance. When user add his grievance, it will be passing to the line manager. Then it will pass to Admin, AGM and GM. After the analysis, the response for that grievance will be passed to the related employee.

Stakeholders

This system will be a useful application for a company which has many employees, to handle the grievances according to a standard method by the HR department. Therefore, this application will be useful for any employee in a company and specially for the HR department who is responsible for handling the grievances in a company.

Users:

Users of the System are HR manager (Admin), GM (HR), AGM (HR), Other Company Employees. All the above mentioned users can get an idea about how the system works and technologies used by referring to this document.

Testers:

Testers will need this document to check whether the requirements of the customer which was initially agreed upon are satisfied by the final system.

Developers:

Developers will need this document throughout the process of development of the system to ensure that the agreed set of requirements with the customer is satisfied by the system.

Document Writers:

People who will be responsible for writing Maintenance document and other documents related to the system will need this document to check the initial agreements with the customer and scope of the project.

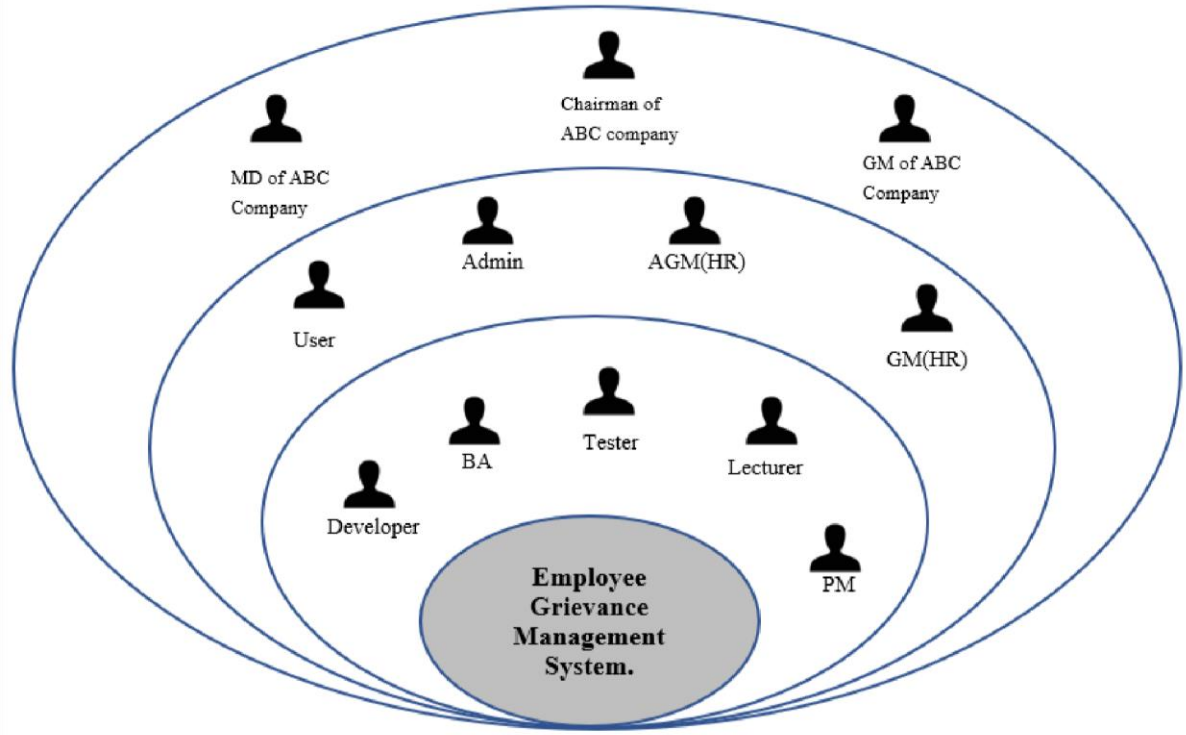

Figure 1 Onion Diagram for Stakeholders

1.4 Motivation

Grievance handling is an integral part of HR management. However, due to the large man power, HR department is currently unable to address individual employee grievances directly.

Majority of the employees are industrial workers in the ABC company. They intensively involve in production process. Higher level of motivation of them is critical for the effective and efficient completion of the production at ABC company. Unless their grievances are timely addressed, it will definitely affect for their motivation level and it directly affect the production process. Hence, in order to achieve continual improvement in production, it is essential to have an effective grievance handling process. To have a suitable grievance handling process for this situation of the ABC company which consist of more than 1500 employees, the optimum solution is to have an automated system which will make it possible for all the workers to place their grievance easily without a language barrier and which will allow the HR department and respective line managers to gather each and every grievance and handle them systematically.

1.5 Summary of the Technical Background

Employee Grievance Handling System has been developed using 2 main frameworks,

- **Spring Framework/Spring Boot(**Application Framework)

  To develop the API's which does the communications between the front end and the database.

- **Angular** (Web Framework)

  To develop the front end of the System.

IDE's used in the process of development

- **Visual Studio Code** :- For front end development using Angular Web Framework.
- **IntelliJ IDEA** :- For Back End Development using Spring Framework.

Software used for the Database Creation

- MySQL Workbench.

Programming Languages used

- Front End Development:- HTML, CSS/Bootstrap, Typescript.
- API's(Controllers) :- Java.
- Databases :- MySQL.

2. Related Work

2.1 Introduction

Grievances, handling is an integral part of HR management. However, due to the large man power, HR department is currently unable to address individual employee grievances directly. This situation has given unaccepted opportunity for trade unions to directly interfere employee grievances.

The company doesn't have any suitable computer-based application to address this issue.

Therefore, there is a requirement for a computer-based application, which is able to automate the process of handling the grievances of the employees in a way that it is possible to gather the grievances from large number of employees around company.

When automating the current manually based grievance handling system of ABC Company, it is required to maintain the standard procedures expected to follow by the company, when handling grievances and taking decisions. And also, there is the need of enabling the workers who are not familiar with English language to submit their grievances in Sinhala.

Therefore, there is a problem of un-availability of a grievance handling software which satisfies all the expected requirements of the ABC Company. Because of that, a new Grievance Handling System has been Developed [1].

2.2 Literature Review

Newgen [2] **:-**

Newgen Employee Grievances Management is a grievance management software that can efficiently manage various cases in your organization. It is an efficient tool that can comfortably plan your appointments, schedule meeting etc.
Being a grievance management software, Newgen Employee Grievances Management can smartly find out case patterns which improve decision making.

LabourSoft [3]**:-**

LabourSoft Grievance Manager is a grievance management software that is capable enough to efficiently manage your organization's daily tasks such as calls, messages, etc. By using the software, you can efficiently deal with and manage the details of a particular case with this grievance management solution.
It has the facility to add more contacts, manage and add files etc.

Features	**Employee Grievance Handling System (Developed System)**	**Newgen Employee Grievance Management Software** [2]**.**	**LaborSoft Software** [3]**.**
Form Management.	✓	✓	✓
Reporting.	✓	✓	✓
Collaboration.	✓	✓	✗

Decision Making.	✓	✓	✓
Business Rules Management.	✓	✓	✗
Multiple Sources.	✗	✓	✗
Case pattern analytics.	✓	✓	✓
Case Management.	✓	✓	✓
Mobile Support.	✓	✓	✗
Resource Management.	✓	✓	✓
Tracking System.	✓	✓	✓
Customization.	✓	✓	✓
Task Management.	✓	✓	✓
Talent Management	✓	✗	✗

Further, this particular software has been formulated unique to this particular company employees. In that, especially considered their familiarity to Technology and it is very user friendly for this set of employees as well as the company formalities.

Other Ongoing Projects

Employee Grievance Handling System(Developed).	**Suraj-Bhandarkar's Grievance Redressal System(Existing System)**
Developed for the employees of a company.	Developed for university Students.
Industrial employees do not have much exposure to computer-based applications.	University Students have a comparatively better knowledge on computer-based applications.
Registration for the system is only allowed for the company employees.	Any user can register through the web application.
Can select the type of the grievance, from a list of categories specific to the organization.	Grievance should be typed.
More user friendly and simple interfaces.	Comparatively complex interfaces.

Similarly, as shown in the above table, many other systems such as

- Eshan-Commits-159's "College Grievance Management System"
- Sneha Sridharan's "Grievance Management System"
- Hariom Verma's "GMsys"
- Harshaa947's "GrievanceManagementSystem"

have focused on the university grievance Management. But the proposed system is mainly focused on the companies with large number of employees, which the HR department face difficulties to Gather and Manage the Grievances effectively.

Grievance handling in the proposed System is mainly based on the Japanese Decision-making model called **"**Ringi System". Therefore, any company which follows

the “Ringi System” will be able to use this application easily and flawlessly. This System is already structured in a way that, after one responsible party for the grievance is completed their part, the grievance is forwarded to the next responsible person according to the “Ringi System”.

2.3 Summary

Grievances, handling is an integral part of HR management. However, due to the large man power, HR department is currently unable to address individual employee grievances directly. This situation has given unaccepted opportunity for trade unions to directly interfere employee grievances.

The company doesn’t have any suitable computer-based application which will satisfy all the requirements and address the issue.

Since it is an important requirement for HR department to involve in employee grievance management process, this Grievance Management System is proposed here with [1].

When compared with existing systems with our developed system the main difference is most of the grievance handling systems are for universities and for their students, the available systems for organizations like Newgen and LabourSoft will not facilitate a way to submit grievances of employees with language difficulties. Manual existing system are not effective to manage large amount of grievances in an organization.

So, this developed system will overcome those issues and will produce better employee grievance handling system for the ABC Company to make their work process smoothly and it will make easier to place grievances and handle them by the management.

3 Project Management

3.1 Introduction

When the project management is done properly in the project, it will affect the success and the quality of every aspect of the project [4].

- **Improve Internal Communication.**
  Working as a group in a project is difficult. But with a proper Management, the complexity of the collaboration can be reduced, and the transparency will increase and it will ensure the accountability even though the members are separated apart due to covid 19 [4].

- **Save Time**
  Because of proper Project Management, it can be ensured that the deliverables of the project are delivered on time while maintaining the standards. And also, Project management will map the deadlines for the project deliverables and therefore the members will be able to know the remaining time for the deadline and how much time will it be taken to complete the project to deliver that particular deliverable. This will enable to identify the level of commitment that is needed by a particular task at a particular time [4].

- **Help to make better decisions.**
  With organized set of records about the progress of the project, a deeper understanding of the project can be taken and where your resources are being spent, whether your project is going out of track, can be identified and if any threat is coming, they can be identified earlier and data driven decisions can be taken in order to successfully provide solutions for them [4].

- **Iterate on the Success.**
  Project Management helps to identify best performance and the areas to be improved in the progress of the project. By using the data of the progress, it will be easy to pinpoint the areas

needed to be improved and the areas that have been committed and done up to the expected level [4].

3.2 Approach

When planning the project, order of tasks to be completed were decided depending on factors such as,

- **The Complexity of the tasks and the time taken:-**

most time consuming and challenging tasks have been scheduled to be done at the early stage of the development.

Reason :-

Most of the risks and the errors can be handled earlier in the software development life cycle to reduce the risk of delaying the delivery of the final system.

- **The deadline of different deliverables of the project:-**

While considering the complexity of the tasks, the submission dates for each deliverable of the project which had to be submitted in the middle of the project such as Project Proposal , SRS and Interim report have been also considered when arranging the order of the tasks to be committed to.

Reason:-

To make sure the tasks related to each deliverable that should be delivered while working on the project is ready before the deadlines.

- **Skill of the members of the team:-**

Other than the above mentioned factors, the familiarity and the skill of the members towards different areas of the project have been considered when dividing the tasks among the team members. Therefore, the Interface development and the documentation has been mainly assigned to one member and the backend of the system and the integration of backend and the front-end has been mainly assigned to another.

Reason:-

To make sure that the time taken for each task is minimal and the quality of the work expected by the stakeholders are maintained, the skill and the familiarity of the members to each task is considered when assigning tasks.

3.3 Initial Project Record

Description of Work		Start-end days
Project Planning	• Conducting a thorough Research about the Grievance Management.	5th Sep– 8th Sep
	• Identify and gather requirements on finalized project topic, "Employee Grievance Management System".	11th September – 13th September
	• Doing a thorough investigation on technologies that should be used for the Project.	9th September – 10rd September
	• Conducting a stakeholder analysis.	13st September – 15nd September
	• Finalizing the project proposal.	16th September – 17th September.
Project Proposal Evaluation		**17th September**
Design	• Design UML diagrams with the identified requirements.	18th September – 23th September
	• Sketch and wireframe the interfaces.	24th September – 28th September
	• Prototype and Visual UX/UI designs.	29th September – 02nd October
	SRS/Design submission	**03rd October**
Coding	• Create database (tables and relationships).	03rd October – 10th October
	• Create sign up, login pages with user profiles.	11th October – 30th October

	Interim Evaluation (Report + Presentation)	**31st October**
	• Developing the E-mail functionality.	01st November – 10th November
	• Developing the grievance forwarding functionalities.	11th November – 17th November
	• Unit/ module testing.	18th November – 21st November
	Prototype Demonstration	**22nd November**
	• Additional coding and finalizing.	23rd November – 26th November
Testing	• Design test cases and validate requirements.	27th November – 01st December
	• Testing documentation.	02nd December – 06th December
Final Report Submission		**06th December**
Final Project Evaluation		

Table 1 Initial Project Plan.

3.4 Final Project Record

Description of Work		Start-end days
Project Planning	• Conducting a thorough Research about the Grievance Management.	5th Sep– 8th Sep
	• Identify and gather requirements on finalized project topic, "Employee Grievance Management System".	11th September – 13th September
	• Doing a thorough investigation on technologies that should be used for the Project.	9th September – 10rd September
	• Conducting a stakeholder analysis.	13st September – 15nd September
	• Finalizing the project proposal.	16th September – 17th September.
Project Proposal Evaluation		**17th September**
Design	• Design UML diagrams with the identified requirements.	18th September – 23th September
	• Sketch and wireframe the interfaces.	24th September – 28th September
	• Prototype and Visual UX/UI designs.	29th September – 02nd October
	SRS/Design submission	**03rd October**
Coding	• Abstract Database Creation.	03rd October – 10th October
	• Prototype Creation and Initiate front End Implementation.	11th October – 30th October

Changes After Initial Plan

	Interim Evaluation (Report + Presentation)	**31st October**
	• Crud Operations of the API.	1st November- 6th November
	• Completing the Implementation of the Interfaces.	1st November- 7th November
	• Implementing Validation Functionalities.	7th November- 11th November
	• Integrating back end and the front End.	12th November – 20th November
	• Developing Grievance Forwarding Functionality.	21st November- 25th November
	• Unit/ module testing	2nd December—5th December
	Prototype Demonstration	**7th December**
	• Additional coding and finalizing.	7th December - 8th December
Testing	• Final Report Documentation.	7th December – 12th December
	• Design test cases and validate requirements.	9th December – December 10th
	Final Report Submission	**12th December**
	Final Project Evaluation	

Table 2 Final Project Plan

Changes After Initial Plan

3.5 Comparison of Initial project plan and the Final Project plan.

Below Gantt chart will show the initial project plan of our grievance handling system.

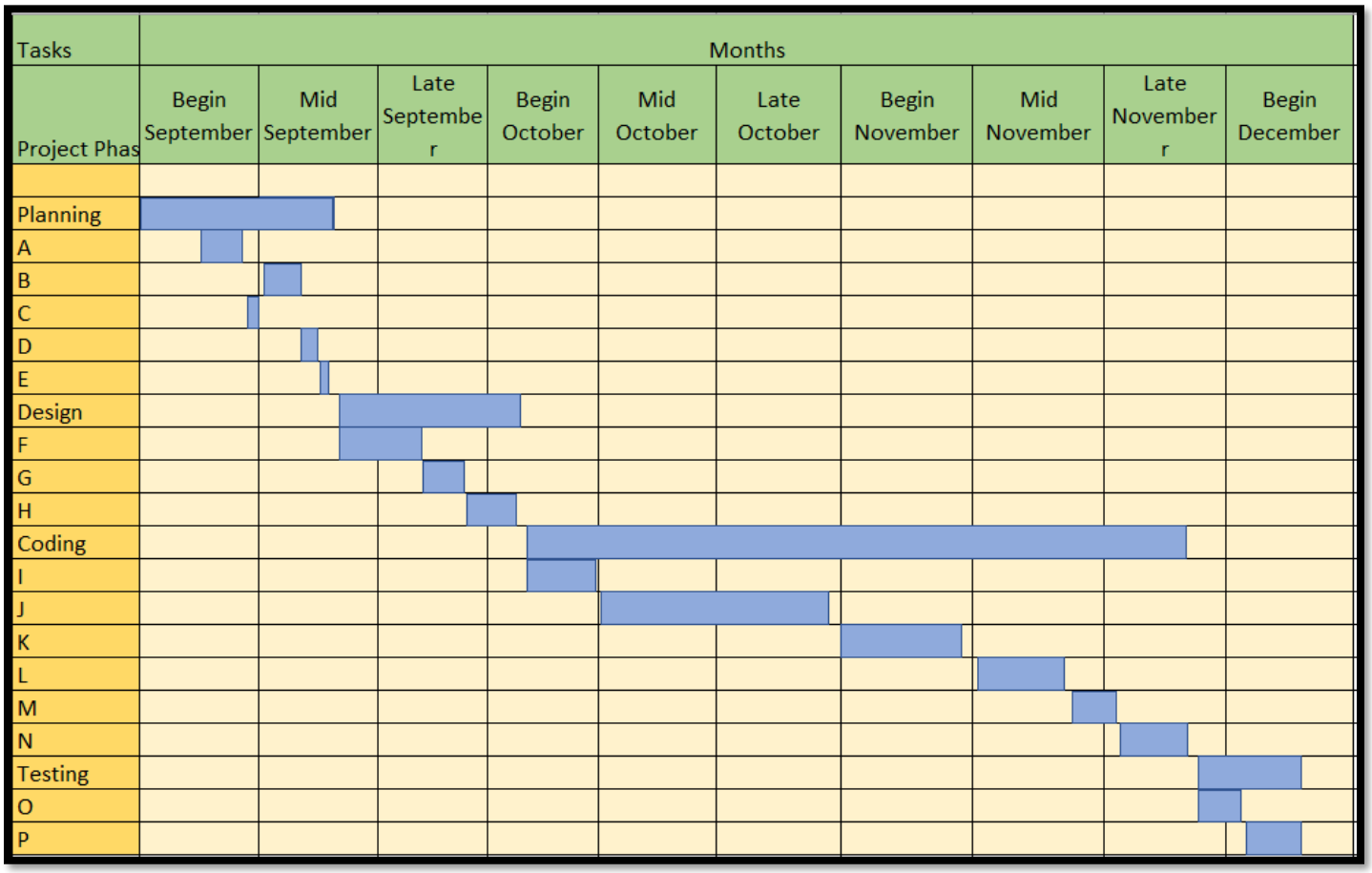

Figure 2 Gantt Chart for the Initial Project Plan.

A - Conducting a thorough Research about the Grievance Management.

B – Identify and gather requirements on finalized project topic, "Employee Grievance Management System".

C – Doing a thorough investigation on technologies that should be used for the Project.

D – Conducting a stakeholder analysis.

E – Finalizing the project proposal.

F – Design UML diagrams with the identified requirements.

G – Sketch and wireframe the interfaces.

H – Prototype and Visual UX/UI designs.

I – Create database (tables and relationships).

J – Create sign up, login pages with user profiles.

K – Developing the E-mail functionality.

L – Developing the grievance forwarding functionalities.

M – Unit/ module testing.

N - Additional coding and finalizing.

O – Design test cases and validate requirements.

P – Testing documentation.

Below Gantt chart will show the final project plan of our grievance handling system after making some changes in the initial project plan.

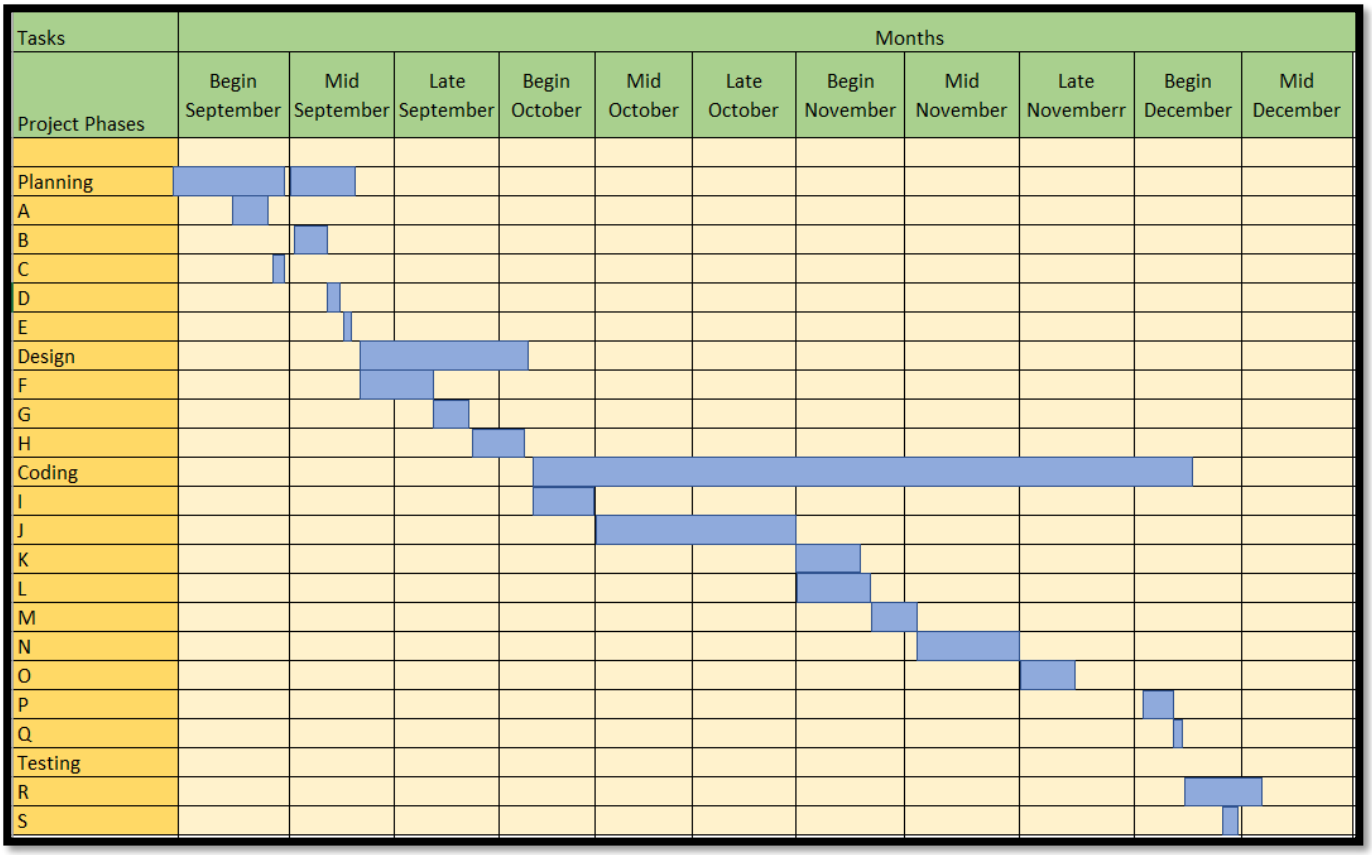

Figure 3 Gant Chart for the Final Project Plan.

A = Conducting a thorough Research about the Grievance Management.

B = Identify and gather requirements on finalized project topic, “Employee Grievance Management System”.

C = Doing a thorough investigation on technologies that should be used for the Project.

D = Conducting a stakeholder analysis.

E = Finalizing the project proposal.

F = Design UML diagrams with the identified requirements.

G = Sketch and wireframe the interfaces.

H = Prototype and Visual UX/UI designs.

I = Abstract Database Creation

J = Prototype Creation and Initiate front End Implementation.

K = Crud Operations of the API.

L = Completing the Implementation of the Interfaces.

M = Implementing Validation Functionalities.

N = Integrating back end and the front End.

O = Developing Grievance Forwarding Functionality.

P = Unit/ module testing

Q = Additional coding and finalizing.

R = Final Report Documentation.

S = Design test cases and validate requirements.

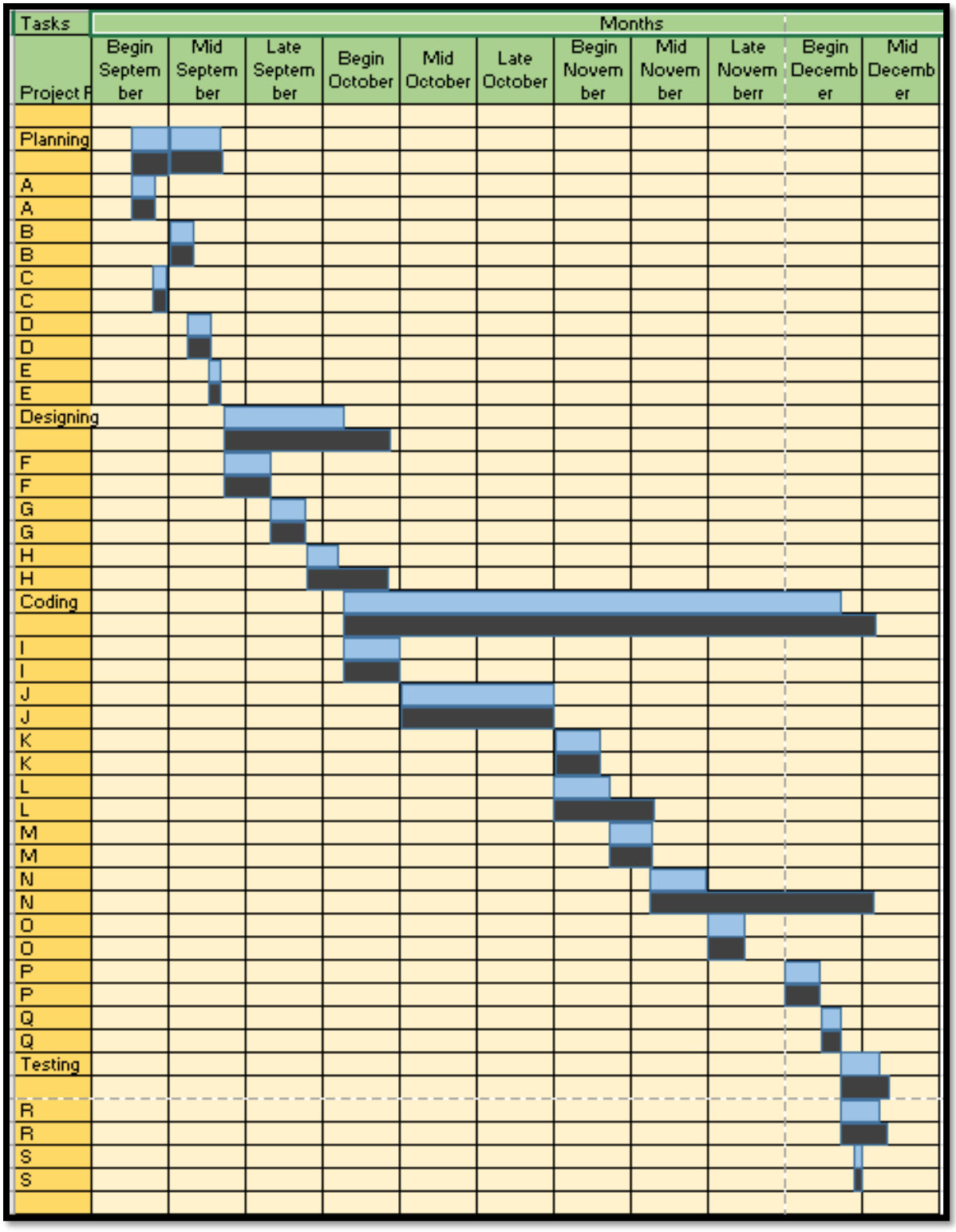

Figure 4 Tracking Gant Chart for the Final Project Plan.

Planed 

Actual time taken 

3.6 Problems and changes in the Plan.

- **Time Constraints.**

  Managing the time for the project with the other academic work has been the most challenging aspect of the project.

  Steps to Overcome the Challenge:-

  In order to overcome that challenge, we have divided the work among ourselves in the group and started working on the project with a common idea about the project and the same goal. Apart from that, we also have decreased the Scope of the project to develop only a web application in order to achieve the final deadline of the project.

  Beginning of the project we planned to develop email functionality within organization. But with the time constraint we have decided to remove email developing functionality from our project plan.

- **Inadequate Knowledge and Experience.**

  Knowledge and Experience on Grievance handling and other new technologies that the group members are not familiar with (Spring Boot) has become a Challenge when it comes to developing a grievance management system.

  Steps to Overcome the Challenge:-

  Knowledge regarding the grievance management of the ABC Company is gained through interviews with an employee of the Company. Further, to overcome the challenge of using technologies that the group members are not familiar with, web Tutorials have been followed

Main changes done in the Plan:-

- **Identifying Changes that has to be done in the Plan in the latter stage of the Project.**

  One of the changes in the approach of development which was identified in the latter part of the project was the requirement to hide the API from the outside world when integrating back-End with the Front End. Therefore, the development of the front End of the Application was decided to be done using Angular Web Framework. Since, this requirement was identified in the last few days of the project, it was a huge challenge for the team to deliver the software within the given time period.

  Steps to Overcome the Challenge by Changing the Plan:-

  Focused mainly on the essential functionalities rather than the additional functionalities which was planned to develop. Then the front end was switched to Angular web framework in the order of necessity of that particular functionality to the users of the system.

- **Changing the initial plan of implementing the system with just a database without API's.**

  The initial plan of the project was to store data of the application in a My SQL database without using API's. But after researching, the initial plan of the project has been changed to store data of the project using API's using Spring Boot(Spring Framework).

  Changes in the Plan:-

  Therefore, initial schedule which has allocated very less time for the back-End and the controller development had to be changed and allocate more time in order to develop API's as well in order to communicate with database.

3.7 Summary

The purpose of project management is to plan and manage a project to successfully complete it's listed goals and deliverables. It involved identifying and managing risks, careful resource management, smart budgeting, and clear communication across stakeholders of the project.

As a summary in this section we mainly discuss about project management and how it will affect to the project. Also approach of the project. In above as we mention project plan consist of project planning, designing, coding and testing.

Compared to the initial project plan, final project plan was bit different since we have made some adjustment such as developing only web application and creating API to get the grievance data for our system.

Finally, after all the changes made we have attached the updated version of project plan and updated Gantt chart in above section.

4 Proposed Solution

4.1 Introduction of the proposed Solution.

This software is developed to upgrade the current manually based in-effective grievance management of ABC Company by an effective automated methodology which is a web application. Using this system, HR management, who are responsible for addressing the grievances will be able to easily gather all the grievances around the company and take necessary actions for them. After evaluation of the project constraints such as time, hardware and other technologies, the final objectives were decided. This system consists of a web-based application and it will include the functionalities such as, User authentication to allow users different levels of accessibilities, Administration of Employee details, submit new grievances, Update grievances, Forward grievances, Grievance Status update to the Employee(Grievance Maker).This system has focused on providing all the workers of the company who may place grievances, with a user-friendly interface and an option to overcome language barriers.

4.2 Solution.

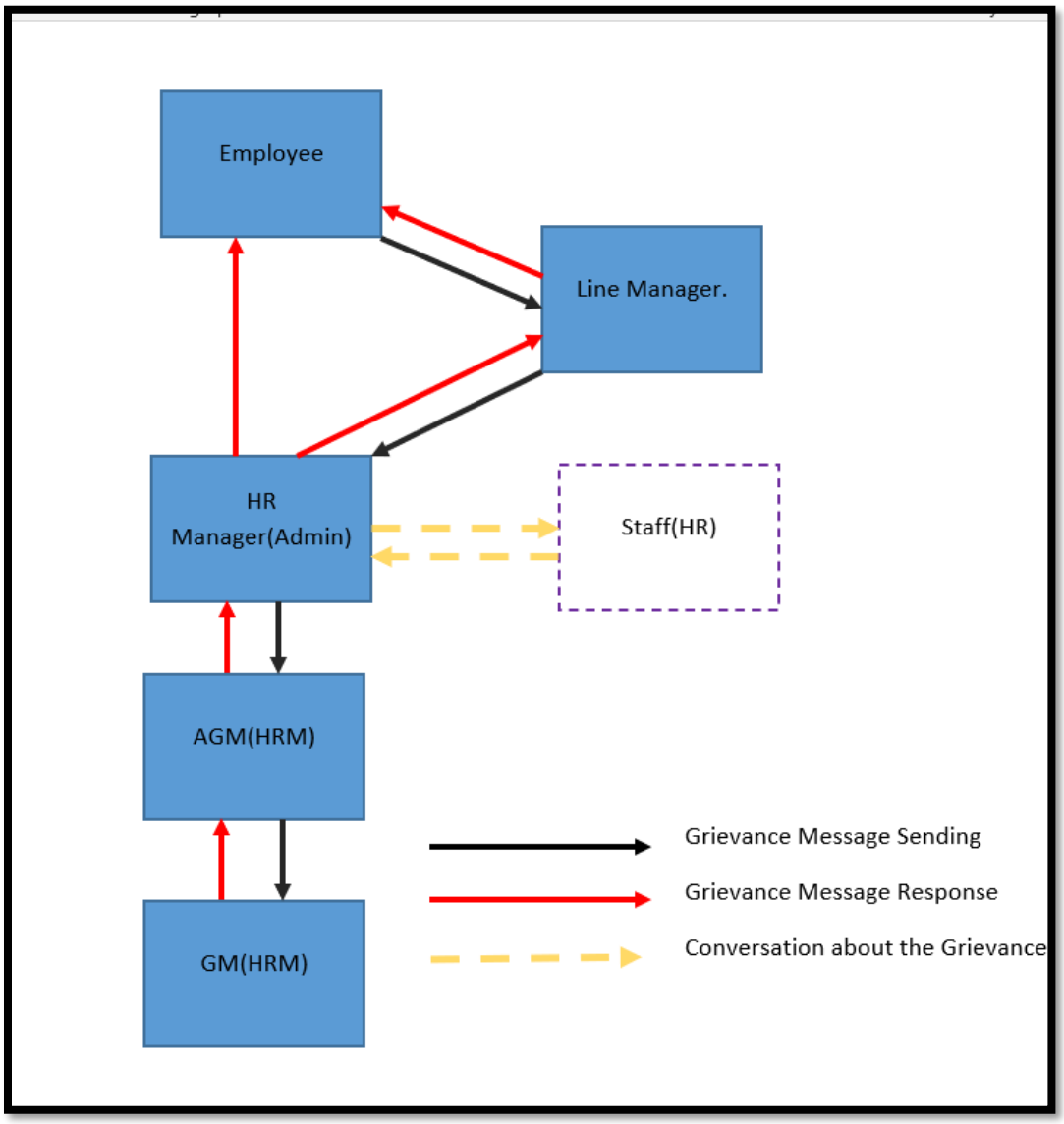

Figure 5 System Architecture of Employee Grievance Handling System.

- As shown in the above figure 5, as an employee place a grievance in the system, that will be first transferred to that particular employee's line manager.
- Line manager has the authority to decide whether it's a grievance that he can provide a solution or, it should be forwarded to the HR Department.
- Therefore, in the system, the line manager can provide a solution and approve the grievance or forward it to the HR Department.
- If the grievance is forwarded to the HR department by the Line Manager, it will be first received by the admin of the system, who is an HR manager of the company.
- The admin may held meetings and discussions with the staff in order to come up with a solution for each grievance which are forwarded to the HR Department. Then the admin will insert the proposed solution for the grievance in the system.
- After the admin submit the proposed solution, that particular grievance will be sent to the AGM of HR Department.
- Then, the AGM will be able to add a comment regarding the proposed solution by the Admin.
- After AGM adds a comment, that particular grievance will be sent to the GM of the HR department.
- GM will have the authority to approve the proposed solution for the grievance by the admin or add a comment and send it back to the admin, in order to do any amendments in the solution. If GM is provided a comment, then after sending it to the admin, the same cycle explained above will repeat.

4.3 Summary

The Employee Grievance Handling System is a web-based application which will facilitate the HR department of ABC company to handle the grievances of the company in an effective way while maintaining the expected standards of handling grievances and decision making. This solution provides a way to overcome the challenge of gathering grievances of each and every worker in the company.

5 System Analysis and Design

5.1 Introduction

System analysis is the way toward noticing the system for investigating or improvement purposes. It applies to information technology where computer-based systems need to be characterized for examination as their makeup and plan.
Under this chapter will explain about, what are the analysis method we used and what kind of designing techniques we used for development process of our system. Software development methodologies like waterfall and agile development concepts, OOP concepts, diagrams like class diagram, ER Diagram, flow charts were used when designing the system.
After identifying the requirements of the users, we converted them in to diagrams and had idea about how the system should be designed. To identify stakeholders, we came up with an onion diagram to make sure that ideas, convenience and satisfaction of all stakeholders are considered when developing the system

5.2 Software Development Methodologies.

Waterfall and Agile Development Concepts.

Since the project should be delivered within short period of time, it is important to focus more on the development than documentation. When developing the system, it is planned to develop incrementally, by initially considering the main functionalities of the system. Therefore, gradually more functionalities added to the system and improvements done during the coding phase.

As mentioned above both waterfall and agile concepts will be used in the project by,

- Following the phases of the software development life cycle sequentially by iterating within each phase.
- Measuring progress through the system rather than comprehensive documentation [5].

Object Oriented Concepts.

Object oriented concepts such as Encapsulation and Abstraction will be used to maintain the required structure of the system [6].

5.3 Feasibility Study

In feasibility study it analyses that considers all of a project's relevant factors, including economic, technical, legal, and time considerations to ascertain the likelihood of completing the project successfully [7].

5.3.1 Time Feasibility

According to the Time feasibility study, schedule that had to be created to develop the Grievance Handling System within the given time, was challenging, but manageable with the academic work. But, as the project went on, a lot of changes had to be done in the schedule due to identification of errors in the initial plan and identification of errors related to identified technologies for the system development in the initial stage of the project. As a result, the schedule had become more and more challenging to stick with.

Finally, due to the extensions of the deadlines, it was possible to complete the system and deliver at the final deadline.

5.3.2 Cost Feasibility

In cost feasibility focused more about measure of the cost-effectiveness of project solution and study do we have enough financial background to develop this system or not.

Since employee grievance handling system has been developed using open-source software, the cost in volved fir the project was minimal.

Therefore, the only cost involved in the project were the basic requirements such as for electricity and internet.

5.3.3 Scope Feasibility

The main intention of this project is to build a software to upgrade the current manually based in-effective grievance management of ABC Company by an effective automated methodology, which the HR management, who are responsible for addressing the grievances will be able to easily gather all the grievances and take necessary actions for them. After evaluation of the project constraints such as time, hardware and other technologies, the final objectives were decided. This system consists of a web-based application and it will include the functionalities such as, User authentication to allow users different levels of accessibilities, Administration of Employee details, submit new grievances, Update grievances, Forward grievances, Grievance Status update to the Employee(Grievance Maker), Email to inform about the grievance to the grievance maker's department head.

5.3.4 Technical Feasibility and Technology Adoption

In technical feasibility whether the solution is technically practical or check whether we have got enough technology to develop this software. As an undergraduate we have the limitation of using high technology for the system. Technologies like Artificial Intelligence could use to develop this system but with the time constraint and lack of knowledge regarding those technologies is technical knowledge barrier that we have faced.

Most of the web frameworks like spring boot framework and Angular frameworks are used to develop the system. Those frameworks were really helpful for us to develop this system. Up to our level we could able to develop mid-level grievance handling system for handle grievances within organization.

Within our scope our final plan was to develop web application. We limit the feature of emailing functionality development because of time constraint. Front-end and back-end were integrated by using 'Angular framework'. MySQL and spring boot framework technologies were used to make the flow of our system.

5.4 Requirement Gathering for the Design.

Developed grievance handling system should give proper solution for the employee grievances that are happening in daily activities of ABC Company. Main requirements of the system were identified as adding grievances to the system, passing the grievances within organization, status update of the grievance and give proper solution for those grievances after the involvement of necessary stakeholders for that particular grievance.

When starting to develop this system, to identify what are the main objectives that we need follow, we went through survey which is to record, what kind of features that we need develop. Survey was done by

preparing structured set of questions to identify the main requirements and passing them to currently working employees in the ABC Company. After collecting their responses, we could identify what are major features that we need to have in grievance handling system. Also, to identify requirements, we went through some of online resources and researched about existing systems and what kind of additions that we should have in our system in order to satisfy the requirements of the ABC Company [8].

In the appendix section survey is attached and diagrams are attached in below sections.

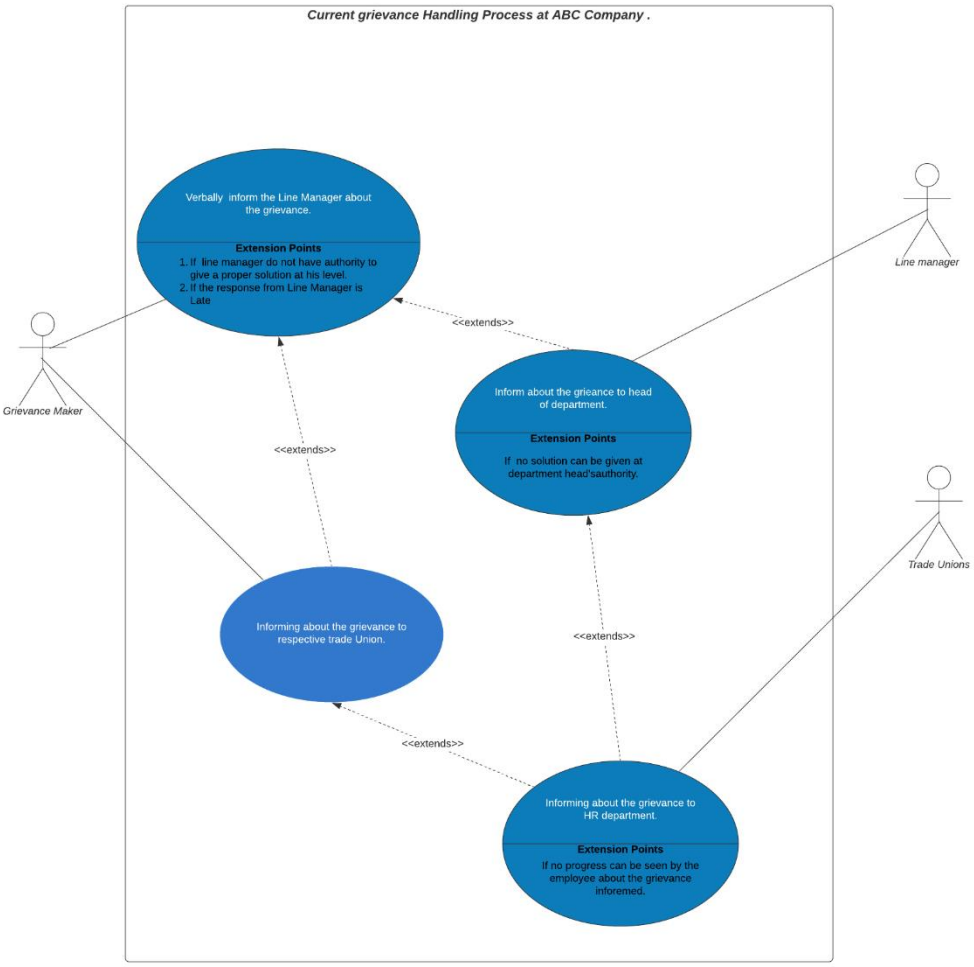

Figure 6 Use Case Diagram for the existing grievance Handling at ABC Company.

Currently employees, inform grievances initially to the line manager. If he can redress the grievance, he will take action, otherwise, forward it to departmental head. Then the employee will be called by departmental head and if he also can't give a solution, these grievances will be forwarded to HR department.

However, due to nature of the jobs, the employees have not get much opportunity to forward the grievances to the line manager and other forward processes. Hence, they tend to forward their grievances directly to their trade union representatives. Then, the grievances will be forwarded to the HR department by the trade union as a demand.

5.5 System Requirements

System requirements are the configuration that a system must have in order for a hardware or software application to run smoothly and efficiently. Failure to meet these requirements can result in installation problems or performance problems from the system.

These are the minimum requirements of the grievance handling system.

- User should have computer or mobile phone with proper internet connection (Network speed higher than 10Mbps).
- In order to login for the system user should be registered in the system.
- To install the system computer should have 4GB RAM with 10GB storage space.
- Input device such as mouse and keyboard should have in the system to manipulate data.
- Standard virus guard is also necessary in order to ensure the security.

5.6 Functional Requirements

User Authenticate

User: All users.

F1 :	Authenticate User
Summary :	The system should allow the users to successfully login once the validated username and password are submitted.
Input :	Entering Username and password
Process :	The system will check with the database for a valid login. If the provided username and password are valid, the main grievance interface applicable to the user is displayed, else the user will be denied of access.
Output :	Message of successful login and display of the grievance interface else an error message for invalid login.

Sending Grievances to the Line Manager by the employees.

Users: Employee (Grievance Maker).

F2 :	Sending grievances to the Line Manager.
Summary :	The system allows the employees to send their grievances to immediate boss after successfully login to the system.
Input :	Add grievances in Grievance interface.
Process :	The system will check whether the details successfully added or not. Then data will be recorded in database system.
Output :	After submitting employee will see successfully sent message or error message.

Status update

Users: Admin

F3 :	Status update.
Summary :	This allows employee and HR manager to check the status of the grievances.
Input :	Select the status.
Process :	In grievance follow up page admin will be able to manually update the status of the grievances with referring to the database system.

Output :	Employee will be able to see the status of their grievances and admin/HR manager will be able to see the status through grievance follow up interface.

Passing the grievances

Users: Line Manager, HR Manager/ Admin, AGM, GM

F4 :	Passing the grievances.
Summary :	The grievances that are submitted by the Grievance Maker will be shared among the responsible parties to handle Grievance.
Input :	Email and messaging within the system.
Process :	Grievances that are taken from the grievance interface will shared to the HR Department, Line manager of the employee and the employee with who placed the Grievance.
Output :	Grievances will be sharing between relevant stakeholders and will be able to see the details.

Filtering the status

Users: Grievance Maker (Employee)

F5 :	Filtering the status
Summary :	Status check option is there to find whether the grievance is solved or not.
Input :	Mouse click event

Process :	When the user select, the choice from the check box it will search for the related details in database and then display all the data.
Output :	User will be able to see the status of the grievance.

Add grievance

Users: Grievance Maker (Employee)

F7 :	Adding a new grievance to the system
Summary :	User will be able to add new grievance to the system using grievance adding page.
Input :	Grievance type, Describe, grievance, Attach image.
Process :	After login user will be navigate to grievance adding page. There user should add the grievance type and need to describe the issue.
Output :	A successful message will be displayed after submit.

5.7 Non-Functional Requirements

- **Consistency** – Consistency of the grievances when it is being updated and being forwarded among the stakeholders of the HR department.
- **Maintainability of the system** - Developers and the testers should be able to maintain the system every time which was required.
- **Learnability of the system** - Employee and organization staff should be familiar with the system and they need to learn about system functions.
- **Confidentiality** – Employee grievances should only be accessed by the relevant stakeholders to that grievance.
- **Usability** - The user-friendly interfaces make the system easier to use and can adapt to it without much constrain.
- **Security** - Unauthorized persons cannot access the system as it requires an authenticated user name and password. Therefore, the reliability of the data is high [9].

5.8 Designing Process of the System

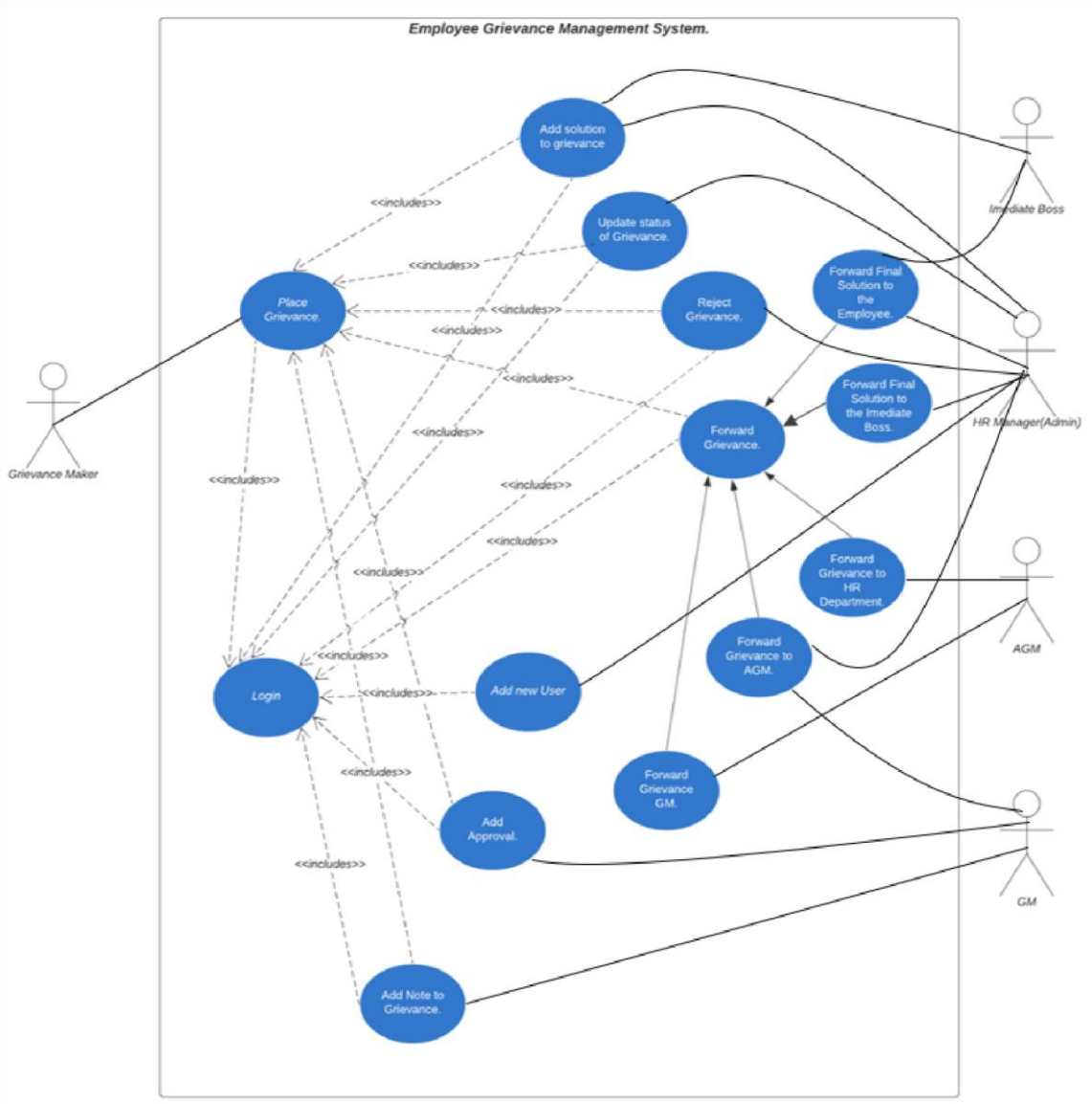

Figure 7 Use Case Diagram to Identify the requirements.

As shown in the above figure 7, the primary actor of the system is the grievance maker. Mainly, the industrial workers of ABC company will fall under this category. And the secondary actors who will facilitate the process of handling grievances are the line Manager, Admin, AGM and GM.

Those different entities will perform different functionalities using the system as mentioned in figure 7.

Data Flow Diagram

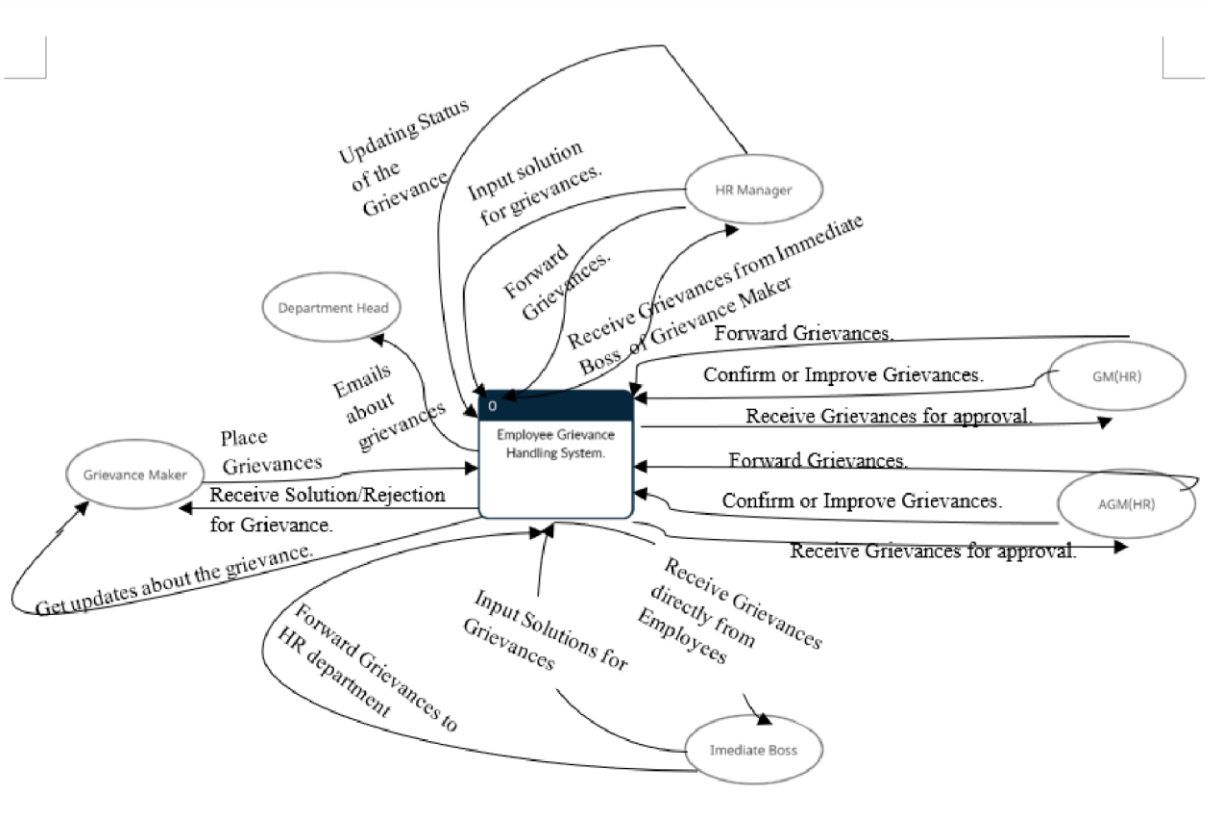

Figure 8 Data Flow Diagram for Employee Grievance Handling System.

As shown in the above figure 8 which is drawn in the designing phase of the system, the entities that will interact with the Employee Grievance Management System are the Grievance maker, Department Head, HR Manager, GM, AGM and the immediate Boss.

The above mentioned entities will use number of functionalities using the system as mentioned in the diagram, according to their role in the system.

ER Diagram

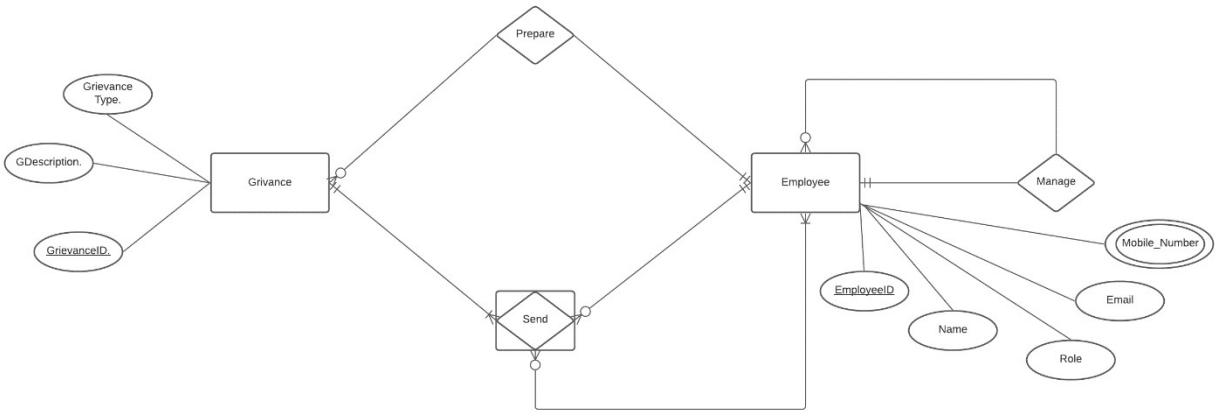

Figure 9 ER Diagram for the Employee Grievance Handling System.

Shown above in the ER diagram is the planned database architecture of the system which was designed in the designing phase of the system. This includes the major entities of the database in the final system. Other than the above mentioned entities in the diagram, additional entities have been also added to maintain the consistency of the functionalities available in the system.

Class Diagram

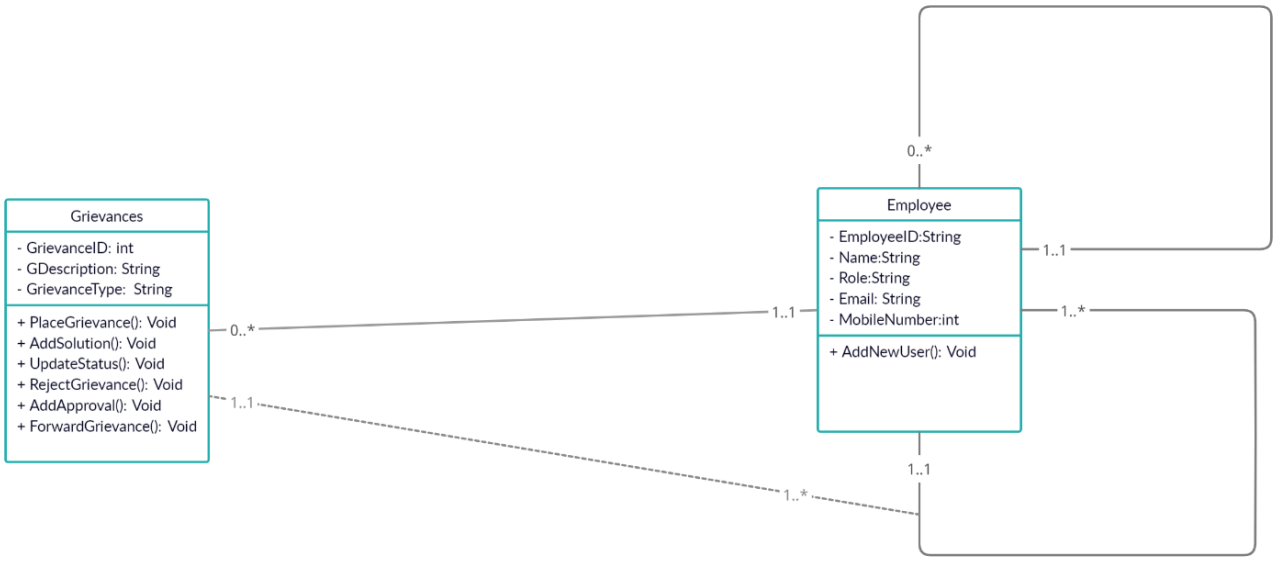

Figure 10 Class Diagram for Employee Grievance Handling System.

Shown above in figure 10 is the class diagram drawn for the Employee grievance handling system which indicates the main entities available in the database as well as their attributes.

Flow chart

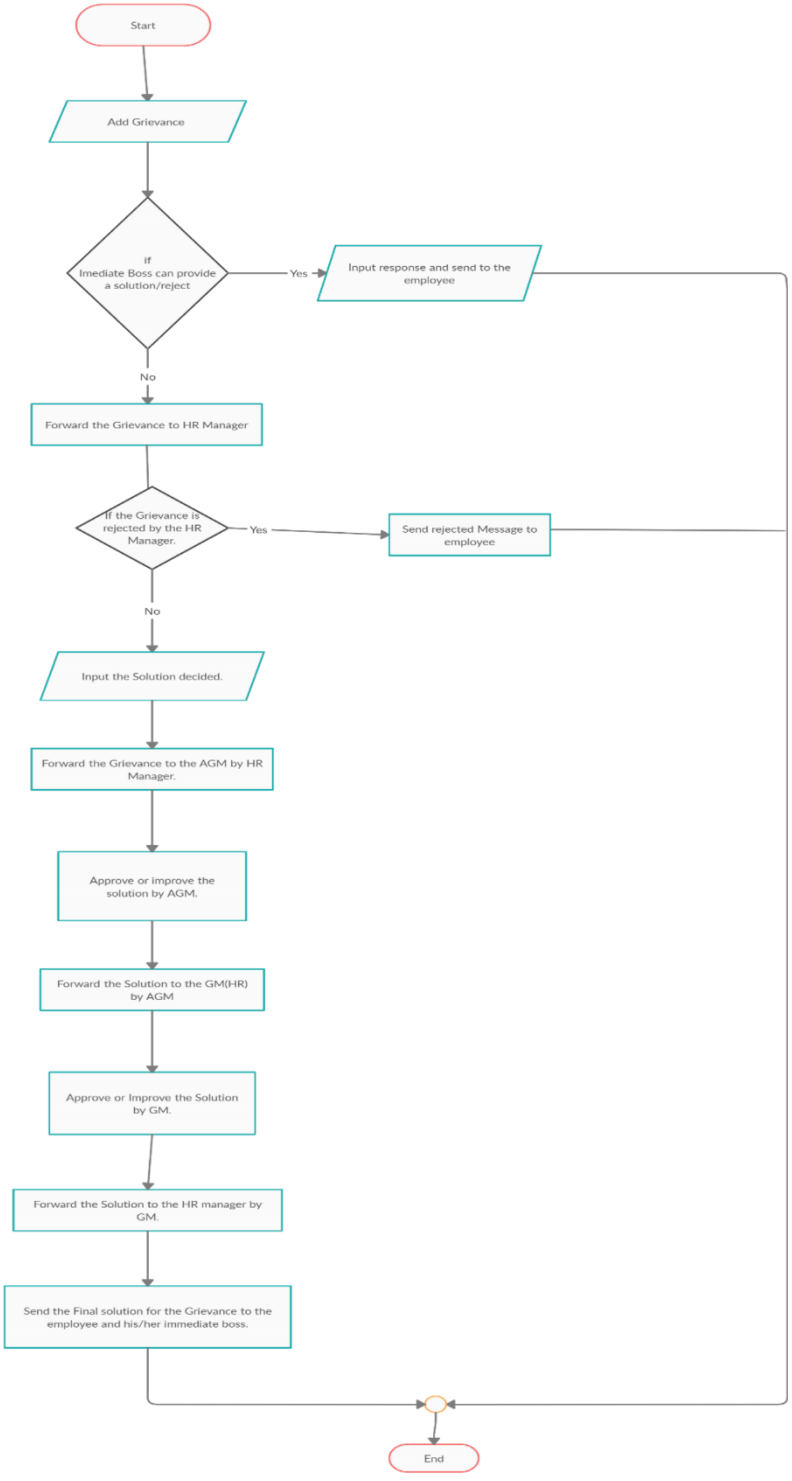

Figure 11 Flow Chart for Employee Grievance Handling System.

Shown above in figure 11 is the flow chart drawn for the grievance handing process of the Employee grievance handling System.

User Interfaces

User Interfaces

These are some of the interfaces design for the system with using sketch and wireframe for the prototype purpose.

Line manager, HR manager, AGM and GM have separate user interface to manage grievances. When the user wants to place the grievance user will be navigating to Home page and after continue he will be able login to the system in Login Interface. In the grievance adding page user will be able to add his grievance with description.

Also user have his own Interface to see the grievance that he recorded and in that page responses will be recorded.

Home page

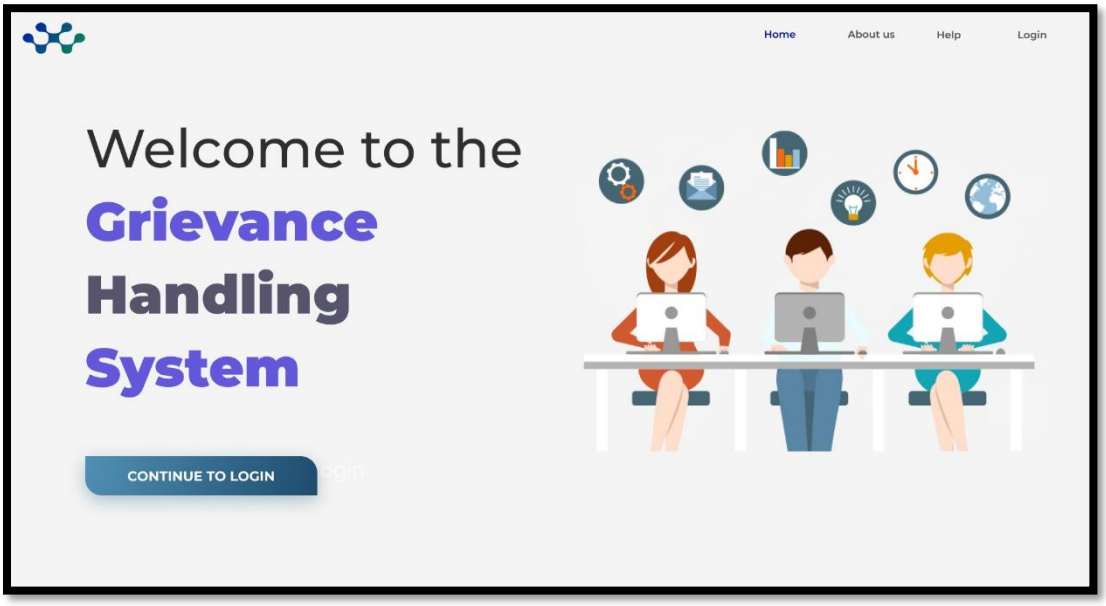

Figure 12 Interface Design for the Home page of Grievance Handling System.

Home page will consist welcome theme and it has “continue to login” button which it will navigate to the login interface.

Login Page

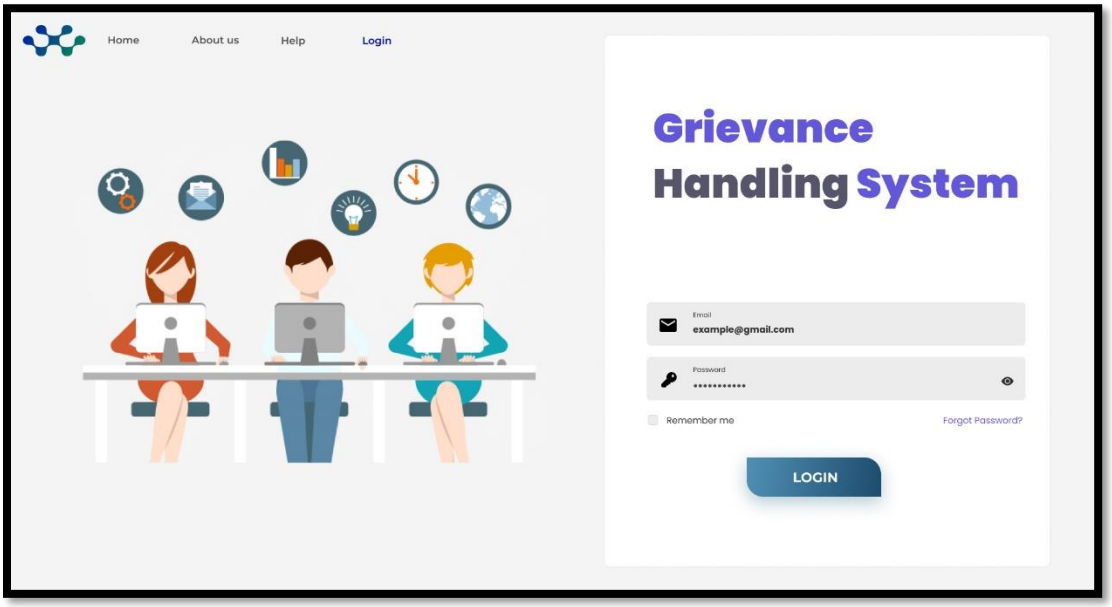

Figure 13 Interface Design for Login Page of Grievance handling System.

When the user clicking the continue to login button in home page user will navigate to login page of the system. In login interface there is field to enter the employee username and password. After entering them correctly user will be able to navigate for the grievance adding page.

Grievance Adding Page

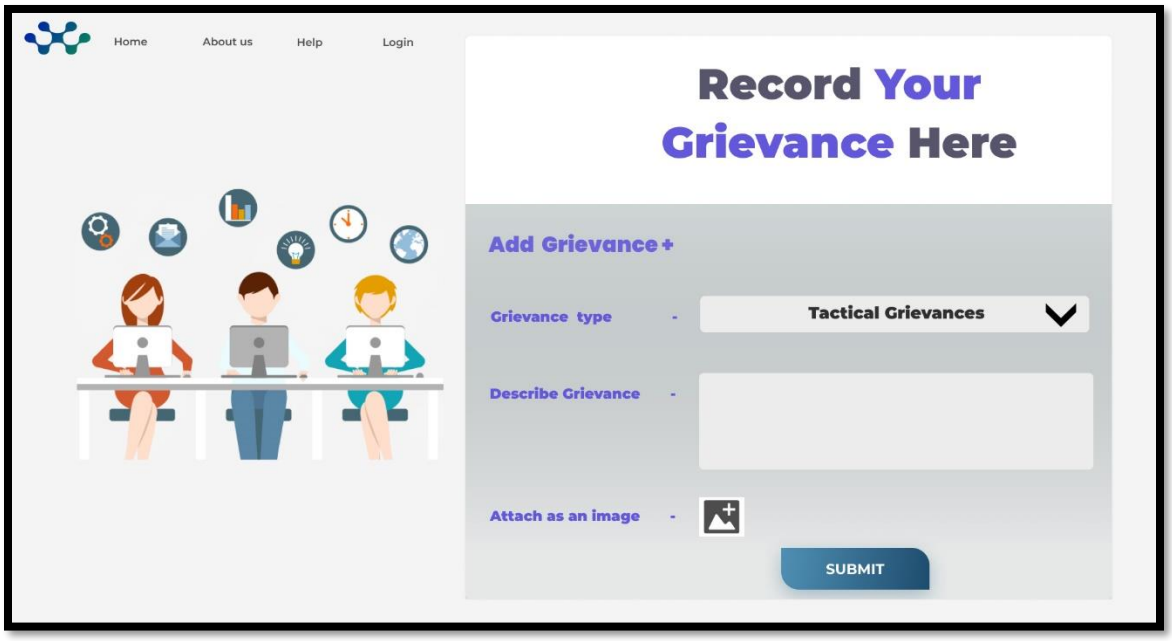

Figure 14 Interface Designed for the Grievance adding page of Grievance Handling System.

After successfully login to the system user will be navigating to the grievance adding page. In grievance adding page user can describe his grievance and if the user want to elaborate more about grievance he can attach it as an image as well. After adding the grievance he can submit those by clicking submit button.

Admin Follow up Page

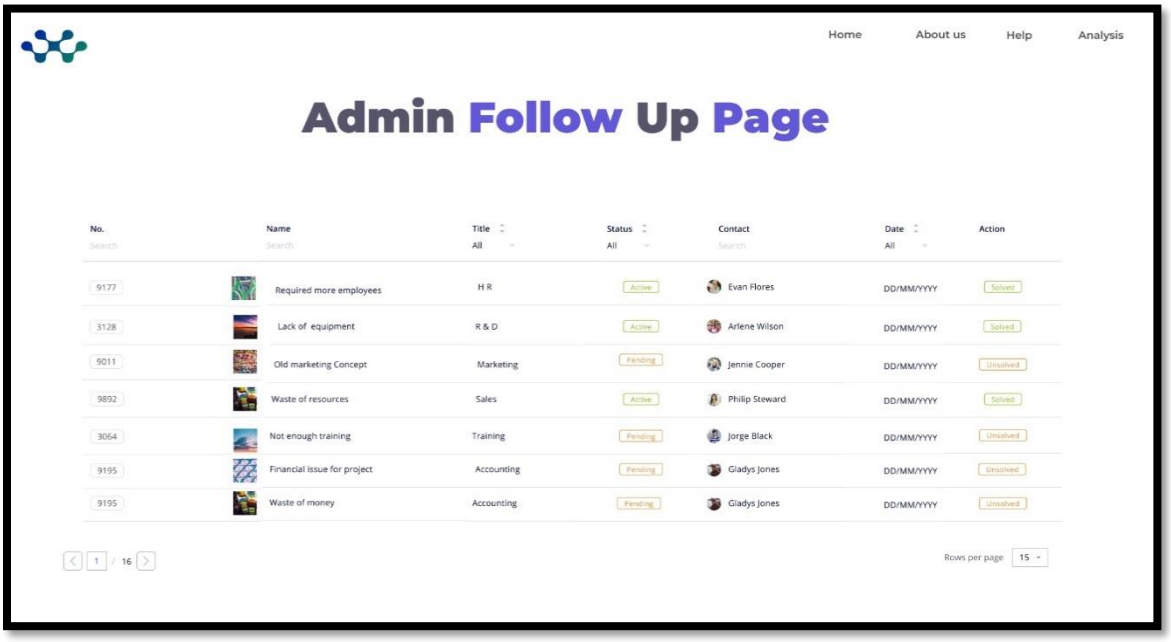

Figure 15 Interface Designed for the Admin Follow Up Page of Grievance handling System.

Admin follow up page is relevant to the HR department. When admin receive grievances he can see grievance number, grievance maker's name, status of the grievance, grievance name, date and the action which was taken to the relevant grievance. In admin interface admin can send the received grievance to the AGM and he can see the responses of AGM and GM.

5.9 Evaluating of the Solution

When we gone through the researches we could identify that there is no such a system to handle grievances of employee. Most of the grievances handling systems are there for universities. In that case came up with idea to develop employee grievance handling system. Which will be more effective in any kind of organization work process.

As mention in the above sections our system will accomplish the solution for any grievances that are happening in employee's work. So this employee grievance handling system provide better solution of forwarding the grievances within short span of time to the higher level managers which manually grievance handling system don't do.

In addition to that this employee grievance handling system will have more privacy when it's come to the employee side. Because when employee placing his grievance he is the only one who can see the grievance. So it will protect his privacy.

Also comparing with the security concerns most of the manual grievance handling system has the risks of protecting employee's data and grievances. But with this provide computer based employee grievance handling system it will cover all the data of the employee and admin is the one who has the authority to see those details.

Overall, this employee grievance handling system cover the lack that before had which is lack of employee grievance handling system. Grievance forwarding features are more efficient than the other systems and it will protect the privacy and security of the employee's details.

5.10 Summary

In this chapter we mainly discussed about system analysis and design. For this employee grievance handling system what are software development methodologies we used. In addition to that feasibility study with various sections and what are functional requirement, Non-functional requirement. After that what was the designing process of the employee grievance handling system and what kind of diagrams we used for designing purpose were discussed in this chapter.

6 System Implementation

6.1 Introduction

Best Practices Adhered to:

declaring understandable identifiers.

The code implemented contains large number of identifiers which are used to store different kinds of data in order to maintain the flow of the system. Therefore, it would be difficult for a person who look at the code to identify the meaning of the code , if the identifiers of data will not reflect the nature of data which it refers to. Therefore, as shown below, the code consist with identifiers with meaningful identifiers.

```
15
16  public class Grievance {
17      @Id
18      @GeneratedValue(strategy= GenerationType.SEQUENCE,generator="ISequence")
19      @GenericGenerator(name="ISequence", strategy="com.example.GrievanceHandling.Entity.IDGenerator",
20              parameters = {
21
22                      @org.hibernate.annotations.Parameter(name=IDGenerator.PREFIX_PARAMETER, value="GRV_"),
23                      @org.hibernate.annotations.Parameter(name=IDGenerator.NUMBER_FORMAT_PARAMETER, value="%05d")
24              })
25      private String grievanceID;
26      @JsonFormat(pattern="dd/MM/yyyy")
27      private Date grievanceDate;
28      @NotBlank(message="Grievance Description is Required")
29      private String grievanceDescription;
30      private String department;
31      private String lineManagerAction="Not Received";
32      private String agmResponse="Not Received";
33      private String gmResponse="Not Received";
34      private String grievanceStatus="Grievance Placed";
35      private String grievanceSolution="Pending";
36      @NotBlank(message="Employee ID is Required")
37      private String employeeID;
38      private String employeeName;
39
```

Figure 16 Code Example for using Understandable identifiers.

Using API's

Using API's will make sure the data will remain consistent and will support the changes in platforms. For an application like "Employee Grievance Management System", which highly depends on data, using API's to control the data will be essential.

Some other advantages of API are,

- Flexibility of the data rendering.
- It has more scope which the different users can customize their experience(Creating accounts etc).
- API enables sending data between different applications [10].

```
@RestController
@CrossOrigin(origins = "http://localhost:4200", maxAge = 3600)
public class GrievanceController {
    @Autowired
    private GrievanceService grievanceService;

    @PostMapping("/grievances")
    public Grievance saveGrievance(@Valid @RequestBody Grievance grievance){
        return grievanceService.saveGrievance(grievance);
    }

    @GetMapping("/grievances")
    public List<Grievance> fetchGrievanceList() { return grievanceService.fetchGrievanceList(); }

    @GetMapping("/grievances/{id}")
    public Grievance fetchGrievanceById(@PathVariable("id") String grievanceID) throws GrievanceNotFoundException {
        return grievanceService.fetchGrievanceById(grievanceID);
    }

    @DeleteMapping("/grievances/{id}")
    public String deleteGrievanceById(@PathVariable("id") String GrievanceId){
        grievanceService.deleteGrievanceById(GrievanceId);
        return "Grievance Deleted Successfully!";
    }
```

Figure 17 Code Example for implementing API's.

Modularizing the code.

Modularizing a program is a process of dividing the whole program in to sub parts which are inter-connected. It will highly affect the understandability of the code and make it possible to reuse a particular piece of code without repetition of the same code multiple times. As shown in the figure, the Employee Grievance Handling System has modularized the code in to multiple parts in order to make the code clear and understandable for a person who is reading the code and also which has been made it possible to reuse codes [11].

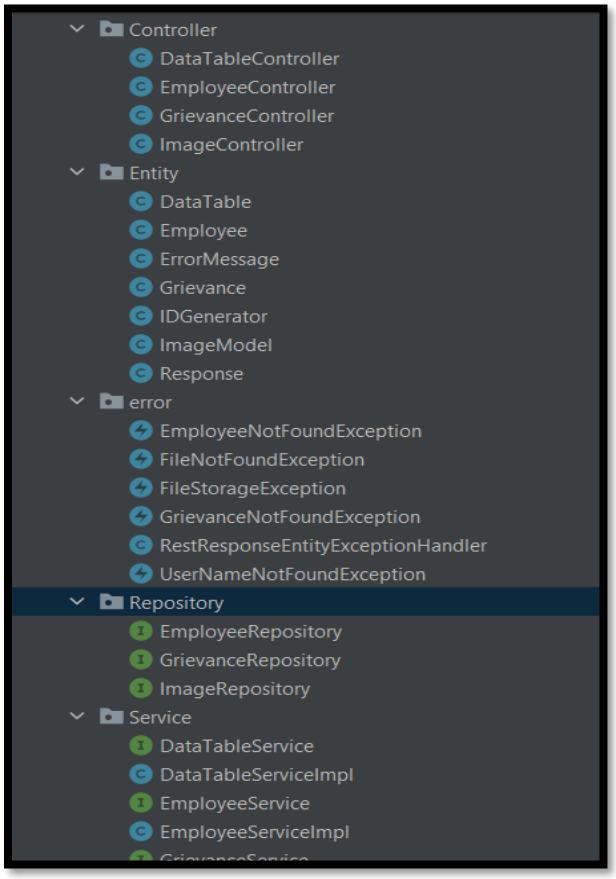

Figure 18 Code Example for Modularizing the Code.

6.2 Implementation Environment and Development Tools

Architecture of the Technologies Used:

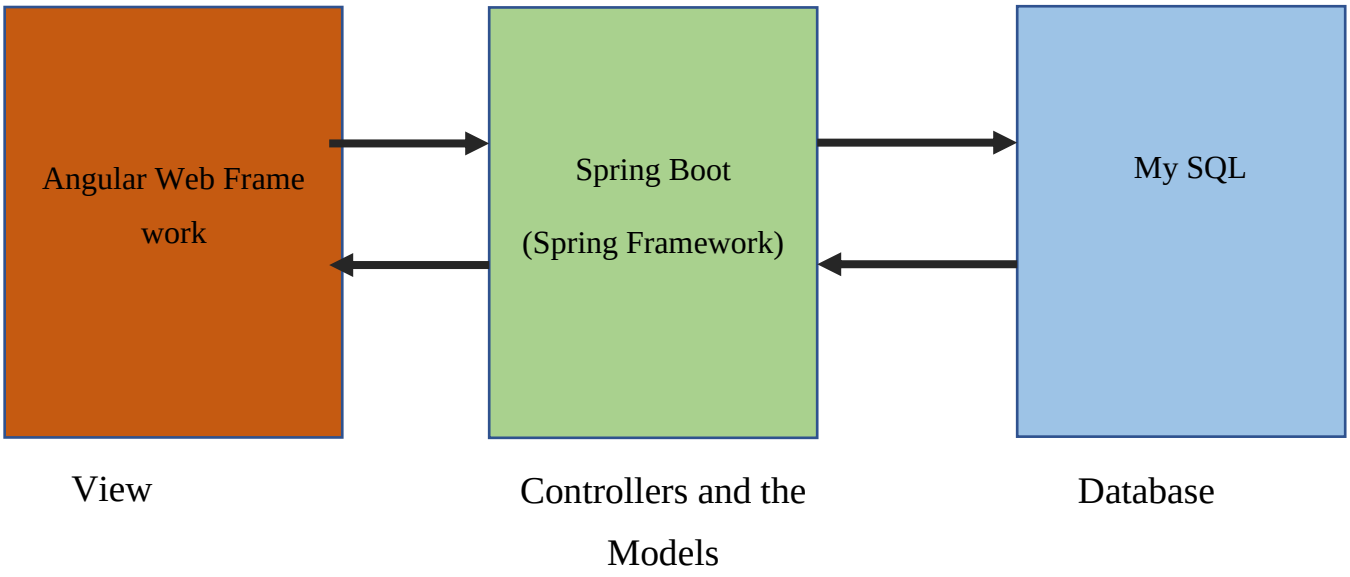

Figure 19 Architectural Diagram for the Main Technologies Used.

Angular:

Angular is an open-source web framework which is primarily used for developing single page applications. It enables the developers to create large applications with consistency [12].

- Autocratic Synchronization with two-way binding:

  Agular framework provides two-way data binding which will maintain the consistency of both view and the model. This has made it convenient for the developers of the Grievance Handling System to maintain the consistency of employee and grievance data while executing different processes within the system [13].

- Modular Structure

Modularity of angular makes it convenient for the developers to manage the code and learn and understand the way of using it [14]. As a team who are using Angular for the first time for this project, it made it easier to understand the concept of using Angular because of the modular structure.

Spring Boot:

Spring is an open-source java-based framework used to create micro service which will make it possible to implement and provide services independently to serve the business level applications.

Spring Boot provides a platform for the java developers to develop production grade applications with less amount of configurations [15].

As a team which is new to this technology, it has made it convenient to use the spring framework with the annotations, and other inbuilt classes to get used to the framework and develop the application. And also due to the expectation of improving the system to a mobile application as well, the spring boot application will make sure the consistency of data can be maintained.

My SQL:

Features:

Scalability and flexibility of database with the ability to edit the database without queries as well.

High performance due to the ability of being served specifically for a certain application. My SQL is capable of rendering for requirements of most of the high performance applications.

High Availability due to the reliability and being consistently available are one of the main advantages of My SQL [16].

6.3 Significant code modules used during the implementation

6.3.1 Flow of the code for all API's (From Repository Class to Controller Class).

Step 1 - Code in the Repository Class :

Other than the built-in methods available in JPA repository, custom methods have been created to retrieve data from the database in the required way for the application by overriding the Repository class which inherits from JPA repository.

```
@Repository
public interface GrievanceRepository extends JpaRepository<Grievance, String> {

    @Query(value="SELECT * FROM grievance WHERE employeeid = ?1", nativeQuery=true)
    public List<Grievance> findByEmployeeID(String employeeId);

    @Query(value="SELECT g.grievanceid, g.grievance_description, e.department, g.grievance_status, g.grievance_date, e.employee_name, g.agm_response, g.gm_response FROM griev
    public List<Object> findByGrievanceStatus();

    @Query(value="SELECT g.grievanceid, g.grievance_description, e.department, g.grievance_status, g.grievance_date, e.employee_name, g.agm_response, g.gm_response FROM griev
    public List<Object> findByGrievanceStatus1();

    @Query(value="SELECT g.grievanceid, g.grievance_description, e.department, g.grievance_status, g.grievance_date, e.employee_name, g.agm_response, g.gm_response FROM griev
    public List<Object> findByGrievanceStatus2();

}
```

Figure 20 Structure of Code implemented in the Repository class.

Step 2 - Service Implementation class :

Abstract methods in the Service Interface have been overridden in the Service Implementation class by calling the methods from the JPA repository(Repository class) to communicate with the database.

```
    @Override
    public List<Object> fetchAdminData() {
        return grievanceRepository.findByGrievanceStatus();
    }

    @Override
    public List<Object> fetchAgmDetails() {
        return grievanceRepository.findByGrievanceStatus1();
    }

    @Override
    public List<Object> fetchgmDetails() {

        return grievanceRepository.findByGrievanceStatus2();
    }
}
```

Figure 21 Structure of code implemented in the Service Implementation class.

Step 3- Code in the Service Interface :

Abstract methods have been implemented in the interface.

Figure 22 Structure of the code Implemented in the Service Interface.

Step 4 - Code in the Controller class :

Methods which are called by the API's are implemented in the controller class.These methods will respond to the HTTP requests sent by external parties by calling methods from the Service Interface.

Figure 23 Structure of the Code implemented in the Controller Class.

6.3.2 Code implemented for Image Uploading

```
@PostMapping("/uploadFile")
public Response uploadFile(@RequestParam("file") MultipartFile file, String grievanceId) {

    ImageModel image=imageService.storeFile(file,grievanceId);

    String fileDownloadLink= ServletUriComponentsBuilder.fromCurrentContextPath() ServletUriComponentsBuilder
            .path("/downloadFile/") UriComponentsBuilder
            .path(image.getName())
            .toUriString();

    return new Response(image.getName(), fileDownloadLink, file.getContentType(), file.getSize());

}


@PostMapping("/uploadMultipleFiles")
public List<Response> uploadMultipleFiles(@RequestParam("files") MultipartFile[] files, String grievanceId){

    return Arrays.asList(files) List<MultipartFile>
            .stream() Stream<MultipartFile>
            .map(file->uploadFile(file, grievanceId)) Stream<Response>
            .collect(Collectors.toList());
}

@GetMapping(path="/get/{id}")
public ImageModel getImage(@PathVariable("id") Long imageId){
    return imageService.getImage(imageId);

}
```

Figure 24 File Upload(to upload images) [17].

Shown above is the API implementation for uploading multiple files in the controller class . This excepts the file request as a multipart file and store in terms of an object of “imageModel” which is a class containing attributes to store the image as a byte array and the image name, type and the grievance id which the image belongs to.

6.1.3 Code Implemented for detecting Selected Images.

```
<div class="complain-container">
    <div class="form-btn">
        <h1>Record <span>your</span><br> Grievance <span>here</span></h1>
    </div>
    <p>Add Complaint +</p><br>



    <form (ngSubmit)="onSubmit()">
        <div class="item">
            <p>Describe your grievance :</p>
            <textarea [(ngModel)]="grievance.grievanceDescription" id="Des" rows="7" cols="40" name="des"></textarea>
        </div><br>

        <label for="image-in">Attached as Image -</label>
        <input type="file" (change)="onFileSelected($event)" name="complaint" multiple= "multiple" id="image-in">
        <button type="submit" class="btn1">Submit</button>
    </form>

</div>
```

Figure 25 code for Grievance Adding interface.

Detecting the selection of files

Assigning the value in the input field to the grievanceDescription attribute of the Grievance object that is to be inserted when submitted.

6.1.4 One of the Code Implemented For Creating Charts.

```
this.grievanceService.getGrievanceTime().subscribe(data=>{
  console.log(data);
  for(var i=0;i<50;i++){
    if(data[i]==null){
      break;
    }
    this.grievanceTime.push(data[i]);

  };
  console.log(this.grievanceTime);



  let times=this.grievanceTime.map(data=> data.timeDifference);
  let grievanceId=this.grievanceTime.map(data=> data.grievanceId1);

  this.chart = new Chart('canvas', {
    type: 'bar',
    data: {
      labels: grievanceId,
      datasets: [
        {
          label:'Grievance Response Time in Days',
          data: times,
          borderColor: '#3cba9f',

        },

      ]
    }


  })
 console.log(times);

 console.log(grievanceId);
```

Figure 26 Structure of the Code implemented for Grievance Analysis Charts(Part 1).

```
console.log(grievanceId);

times.forEach((data)=>{
  this.sum=this.sum+data;
})

this.avgResponseTime=(this.sum/times.length);
console.log( this.avgResponseTime);

})
```

Figure 27 Structure of the Code implemented for Grievance Analysis Charts(Part 2).

Shown above in figure 26 and Figure 27 represents one of the code examples which is implemented in order to generate charts using the data regarding the grievances.

Above mentioned code indicated by the figure 26 and 27 demonstrates a code related to the chart which displays the average respond time for the grievances by the line managers of the company.

6.4 Summary

The Whole system which is developed to handle the grievances, is developed by using the 3 technologies namely, Angular, Spring Boot and My SQL. To make use of these technologies, Visual Studio Code IDE is used together with Angular and IntelliJIDEA has been used for Spring Boot.

7. Testing and Evaluation

7.1 Introduction

Human errors can cause a defect or failure at any stage of the software development projects. The results are classified as trivial or catastrophic, depending on the consequences of the error. The points below shows the significance of testing for a reliable and easy to use system.

- The testing is important since it discovers defects/bugs before the delivery to the client, which guarantees the quality of the software.
- It makes the system more reliable and easy to use.
- Thoroughly tested software ensures reliable and high-performance software operation.
- Regularly testing will find defects of the grievance handling system and it will help to correct them.

If we ignore testing we can observe that due to the presence of defects the system failed to perform the required operation and will not meet the client's requirements. Appropriate testing techniques applied to each test levels along with a proper level of test expertise, ensures an absolute reduction in the frequency of such software failures [18].

7.2 Types and methods of Testing

Testing is very important since it helps to find errors in the grievance handling system. To get complete final output system and to deliver error less system to the customer at the end of

development testing was necessary. These are some testing types that we followed during the development in our grievance handling system [19].

- **Unit Testing**

In the unit testing divide the system in to parts and done the testing. Different parts of the grievance handling system were analysis and tested thoroughly to get proper final product. Mentioning that API, interfaces, diagrams and various technologies of the system were tested one by one to get good outcome.

- **Integration Testing**

After divided system in to parts those parts were combined and done the testing. Through our API, data were taken to the grievance handling system and grievances were transformed to different interfaces form the developed API. So, API and interfaces were created separately. To get the system under working we have to integrate those API and Interfaces. After combining those we have done the integration testing to check whether the system is working properly or not.

- **System Testing**

After Combine all the sections system testing was done. Integrating API and Interfaces done and tested in integration testing. So to complete the system we have went to the begin of the grievance handling system and as an employee we used the system to check whether grievances are passing through the organization and the main purpose of employee grievance handling were managed effectively and correctly.

7.3 Test Plan

Employee Grievance Handling System.	
Test Plan ID	01
Brief Description about the Database.	Employee Grievance Handling System of ABC Company will mainly manage the Information Regarding Grievances placed by employees in the company. Other than that, it will also store other information related to the grievances such as Employee Details, details about the images submitted with grievances.
Introduction to the testing objectives.	This document will mainly describe the plan for testing Employee Grievance handling System for ABC Company and this document will support the following objectives as well, • Testing the features of the system. • Recommended Test Requirements. • Describing the recommended test strategies(Approach). • List the deliverables of the test activities.
Testing Items.	Grievance Placing, Passing Grievances between Stakeholders, Employee Registration, Grievance Analysis Chart Generation, Approving Solutions for Grievance and other basic functionalities.
Features to be tested.	Grievance Adding, Grievance Passing, Analysis Chart Generation, Employee Registration, Approving Grievance Solution, Adding Comments to Suggested Solution, Grievance Status Update.
Testing Environment.	PC, MySQL, Visual Studio Code, IntelliJIDEA, MySQL Workbench, Spring Framework, Angular Web Framework.
Testing Approach	Black Box Testing and White Box testing

Testing Tasks	Test Plan, Test Environment, Test Result(Test Case)
Schedule	24th December 2021, 12.06pm to 2pm

Table 3 Test Plan for Employee Grievance handling System.

7.4 Test Cases

<table>
<tr><td colspan="2">Employee Grievance Handling System for ABC Company.</td></tr>
<tr><td colspan="2">TEST CASE</td></tr>
<tr><td>Test Unit: Add Grievance</td><td>Tester: Tithira Withanaarachchi</td></tr>
<tr><td>Test Case ID: 01</td><td>Test Type: Black Box Testing</td></tr>
<tr><td rowspan="2">Description: Inserting a new Grievance to the system by the user.</td><td>Test Executed By: Tithira Withanaarachchi.</td></tr>
<tr><td>Test Execution Date: 24th December 2021</td></tr>
<tr><td>Title: Grievance Placing.</td><td>Test Execution Time: 9.22pm-9.45pm</td></tr>
</table>

Step No.	Test Steps.	Testing Data.	Expected Result.	Actual result.	Status.	Notes.
01	Login to the System as a User.					
02	Access the Relevant Interface for adding grievances using the button provided in the dashboard.	Grievance Description:- "add grievance" Image(Optional):- PNG type image	Navigate to the user's follow up page displaying the inserted grevance.	Not Displaying the inserted grievance I the dashboard while giving a CORS error in the Console.	Fail	
03	Access the Relevant Interface for adding grievances using the button provided in the dashboard	Grievance Description:- "add grievance" Image(Optional):- PNG type image	Navigate to the user's follow up page displaying the inserted grevance.	Navigate to the user's follow up page displaying the inserted grevance.	Pass	

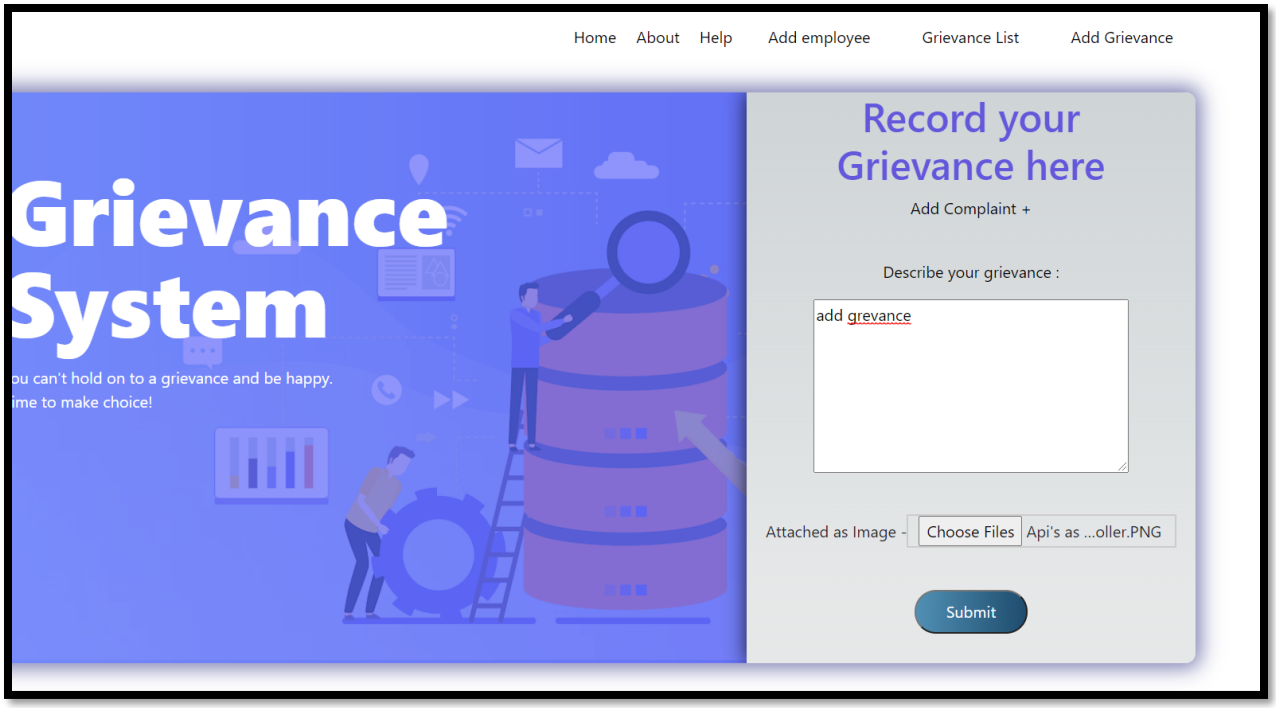

Figure 28 Grievance Adding Interface.

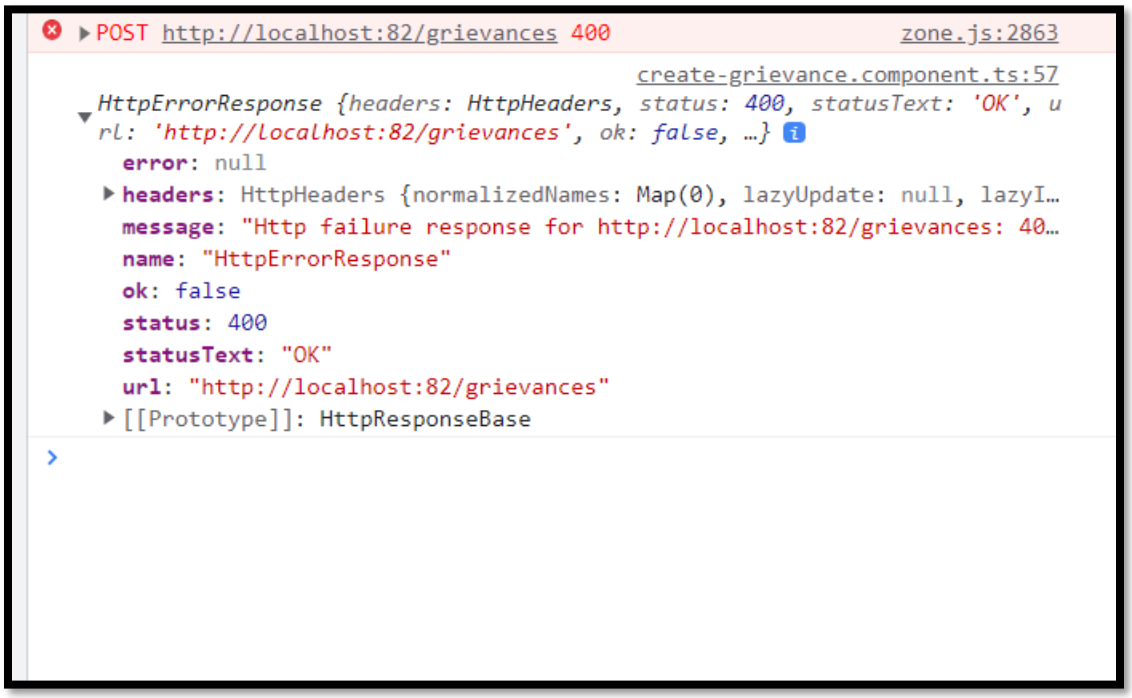

Figure 29 CORS Error displayed in the Console.

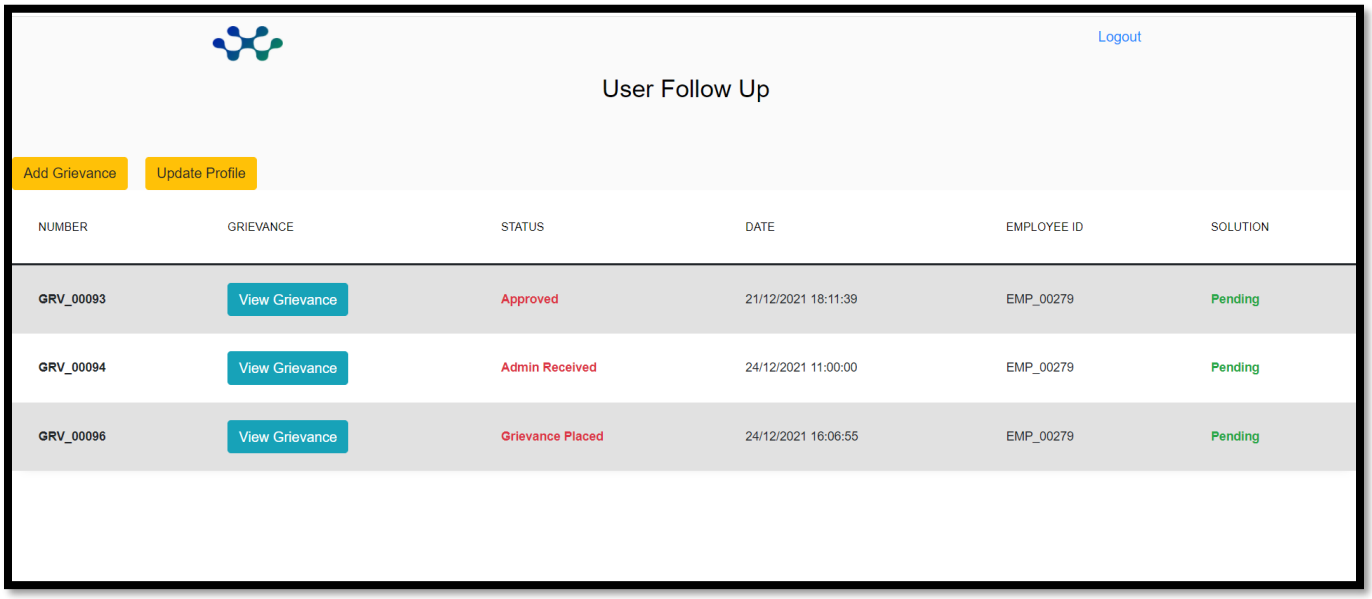

Figure 30 Image of the User Follow Up Page which displays the grievances Placed.

Employee Grievance Handling System for ABC Company.	
TEST CASE	
Test Unit: Grievance Passing	Tester: Tithira Withanaarachchi
Test Case ID: 02	Test Type: Black Box Testing
Description: Passing the Grievance from one entity of the system to another.	Test Executed By: Tithira Withanaarachchi.
	Test Execution Date: 24th December 2021
Title: Forwarding the grievance.	Test Execution Time: 9.22pm-9.45pm

Step No.	Test Steps.	Testing Data.	Expected Result.	Actual result.	Status.	Notes.
01	Login to the System as an Admin.					
02	Access the relevant interface to add the suggested solution.	Solution: "This is the Admin's Solution.				
03	Click the "Send to AGM" Button.	_____	Navigate to the Admin Follow up page and display updated status of the grievance as "AGM reveived".	Navigate to the Admin Follow up page and display updated status of the grievance as "AGM reveived".	Pass.	

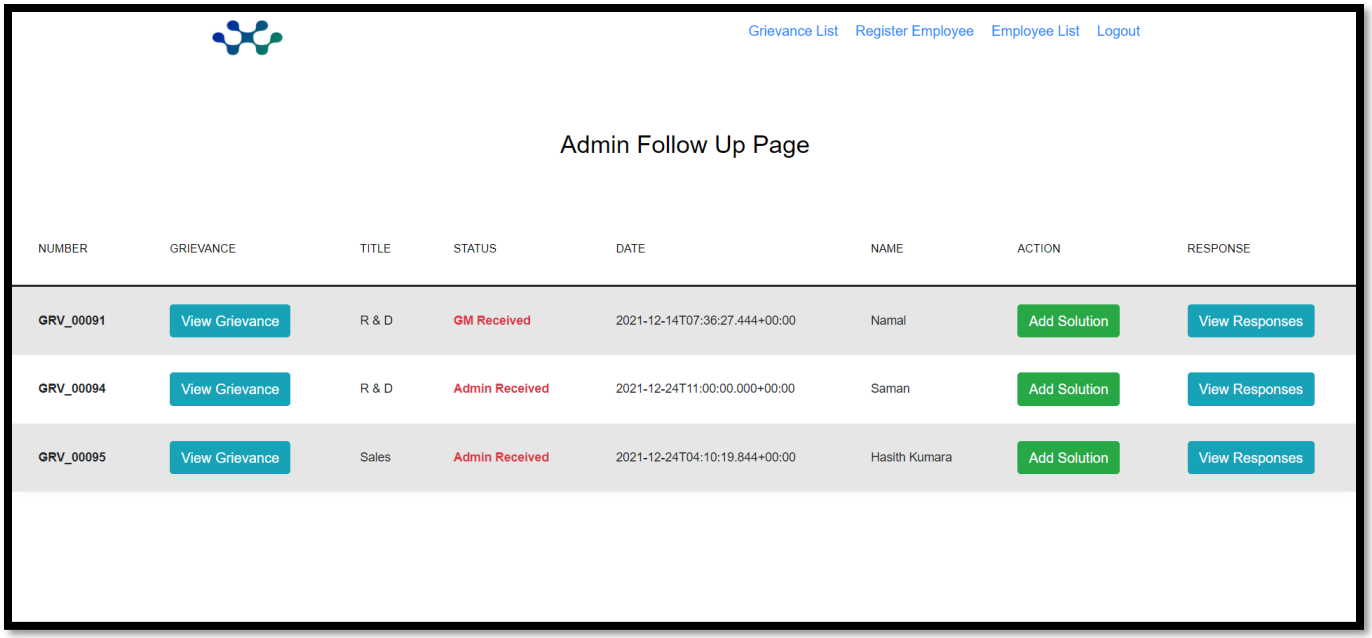

Figure 31 Admin's Follow Up page.

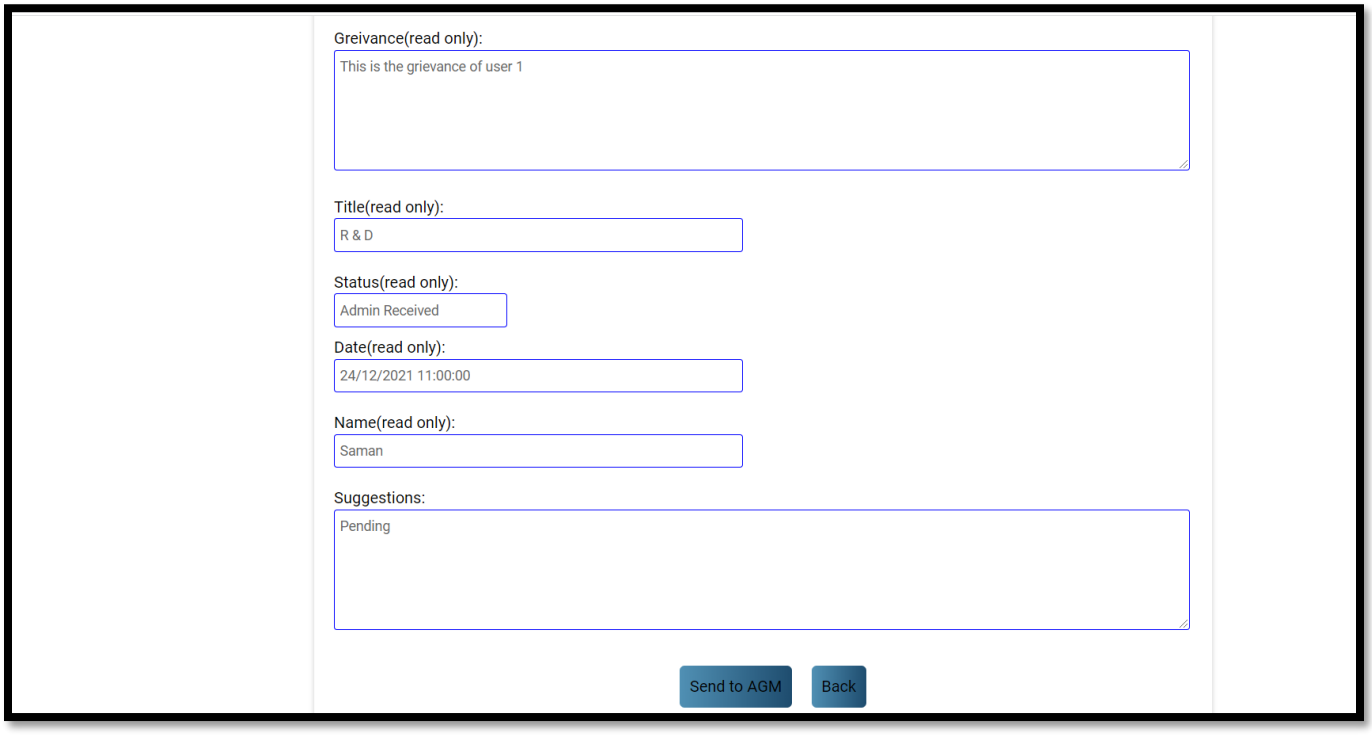

Figure 32 Add comment Page of Admin.

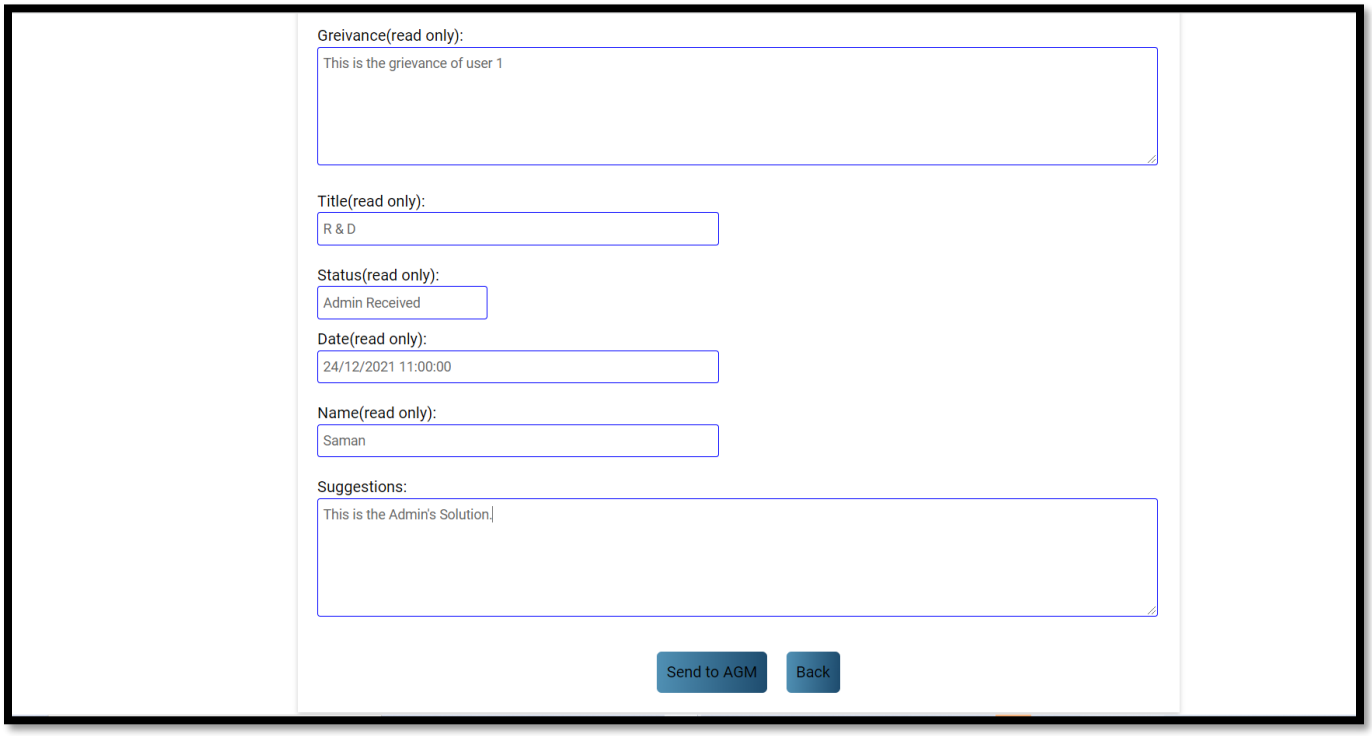

Figure 33 Form with added Comment by Admin

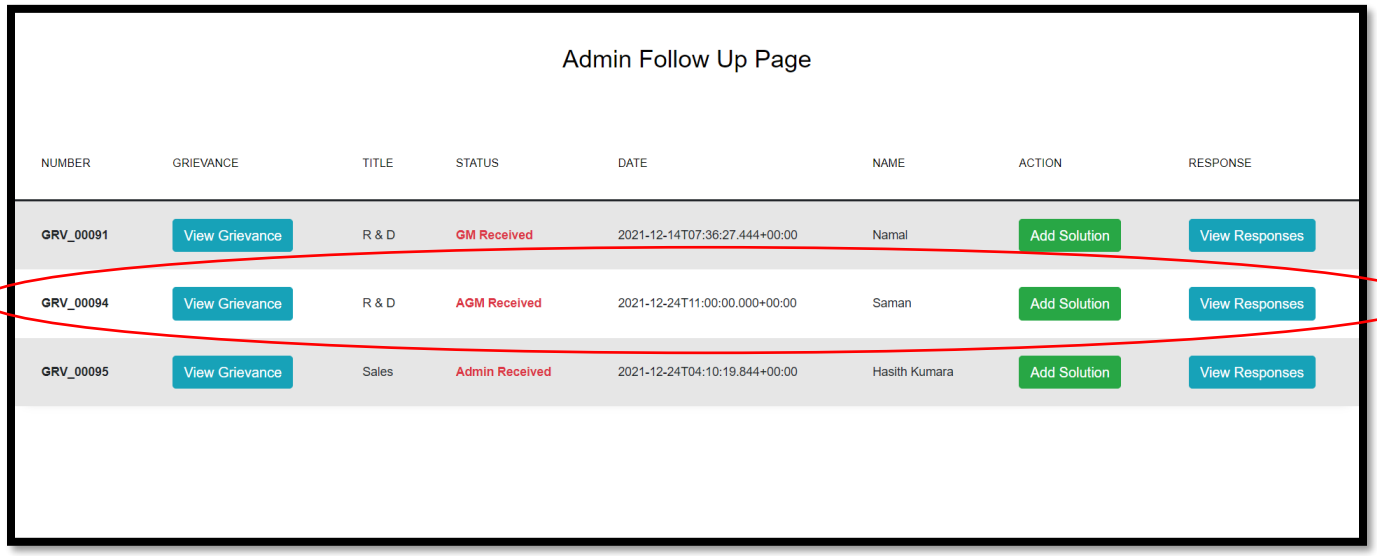

Figure 34 Follow up Page of Admin with Update Status of the Grievance.

Employee Grievance Handling System for ABC Company.	
TEST CASE	
Test Unit: Chart Generation	Tester: Tithira Withanaarachchi
Test Case ID: 03	Test Type: White Box Testing
Description: Generating Charts	Test Executed By: Tithira Withanaarachchi.
	Test Execution Date: 24th December 2021
Title: ChartAnalysis.	Test Execution Time: 9.22pm-9.45pm

Step No.	Test Steps.	Testing Data.	Expected Result.	Actual result.	Status.	Notes.
01	Check the dabase values.					
02	Navigate to the Chart 3 form the Home page which displays Division wise average response time for grievances..	_____	Production=2.5days, Supply Chain management=2, Ship repair business=2.5, Project and Engineering =2, Finance=3	Production=2.5days, Supply Chain management=2, Ship repair business=2.5, Project and Engineering =2, Finance=3	Pass	

	grievance_id1	division	time_difference
▶	GRV_00093	Production	2
	GRV_00094	Production	3
	GRV_00095	Supply Chain Management	1
	GRV_00096	Ship Repair Business	5
	GRV_00097	Finance	3
	GRV_00098	Project and Engineering	2
	GRV_00099	Ship Repair Business	3
	GRV_00100	Supply Chain Management	3
*	NULL	NULL	NULL

Figure 35 Database which contains data about response time for grievances by line Managers.

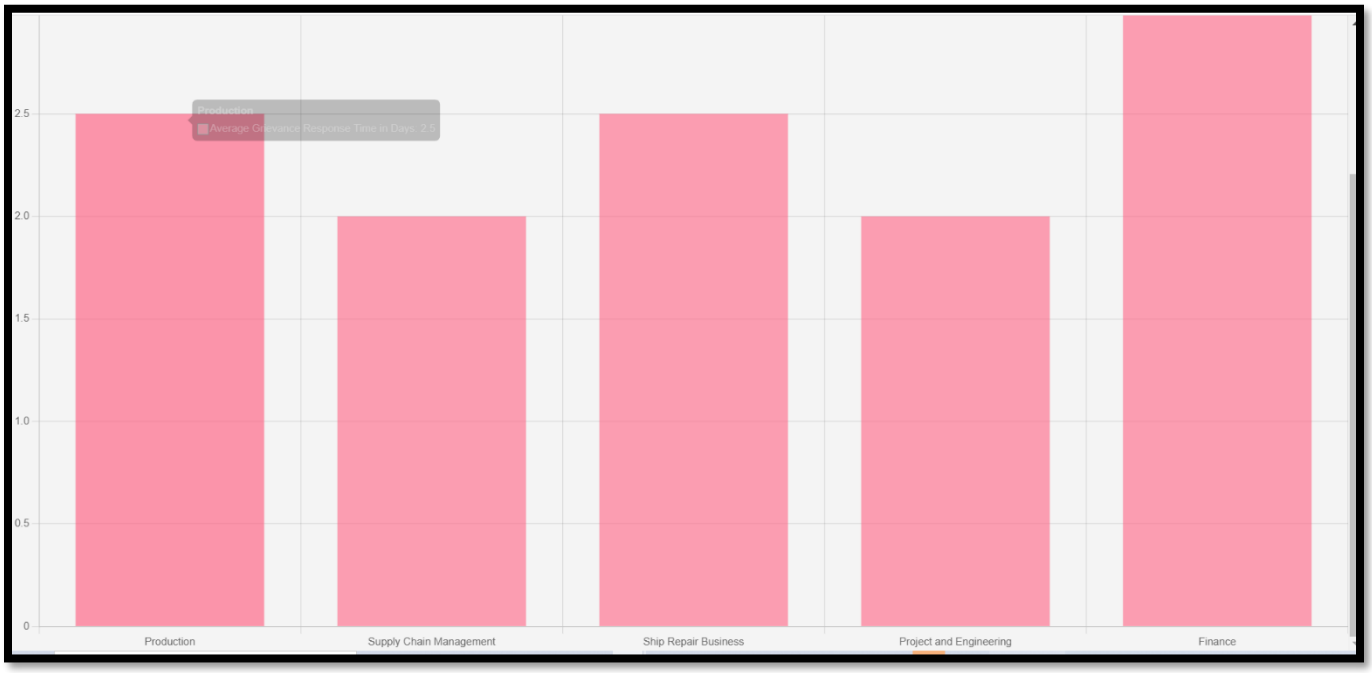

Figure 36 Chart Which shows average response time of line managers in each department.

Employee Grievance Handling System for ABC Company.	
TEST CASE	
Test Unit: Employee Registration.	Tester: Tithira Withanaarachchi
Test Case ID: 04	Test Type: Black Box Testing
Description: Enter new Employees to the System.	Test Executed By: Tithira Withanaarachchi.
	Test Execution Date: 24th December 2021
Title: Add Employee	Test Execution Time: 9.22pm-9.45pm

Step No.	Test Steps.	Testing Data.	Expected Result.	Actual result.	Status.	Notes.
01	Login to the System as an Admin.					
02	Access the relevant interface for adding employees through navigation bar.	Employee name=Saman Kumara, Linemanager=EMP_00266, Role=User, Post= Supervisor, Division=Supply Chain management, Deapartment=R&D, Email=abc@email.com, Mobile number=0716791996, UserName=User3	Navigate to employee list with which includes the inserted data.	Navigate to employee list with which includes the inserted data.	Pass	

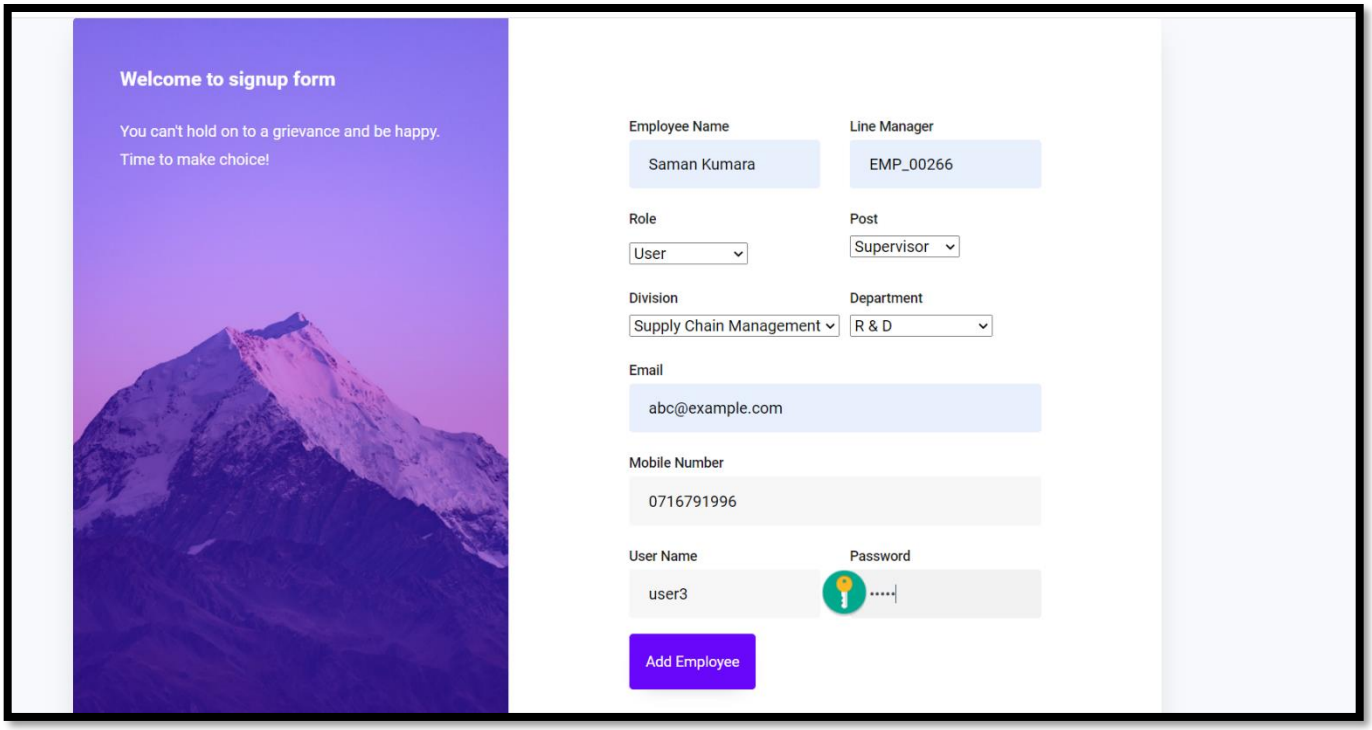

Figure 37 Interface for Registering new Employees to the System.

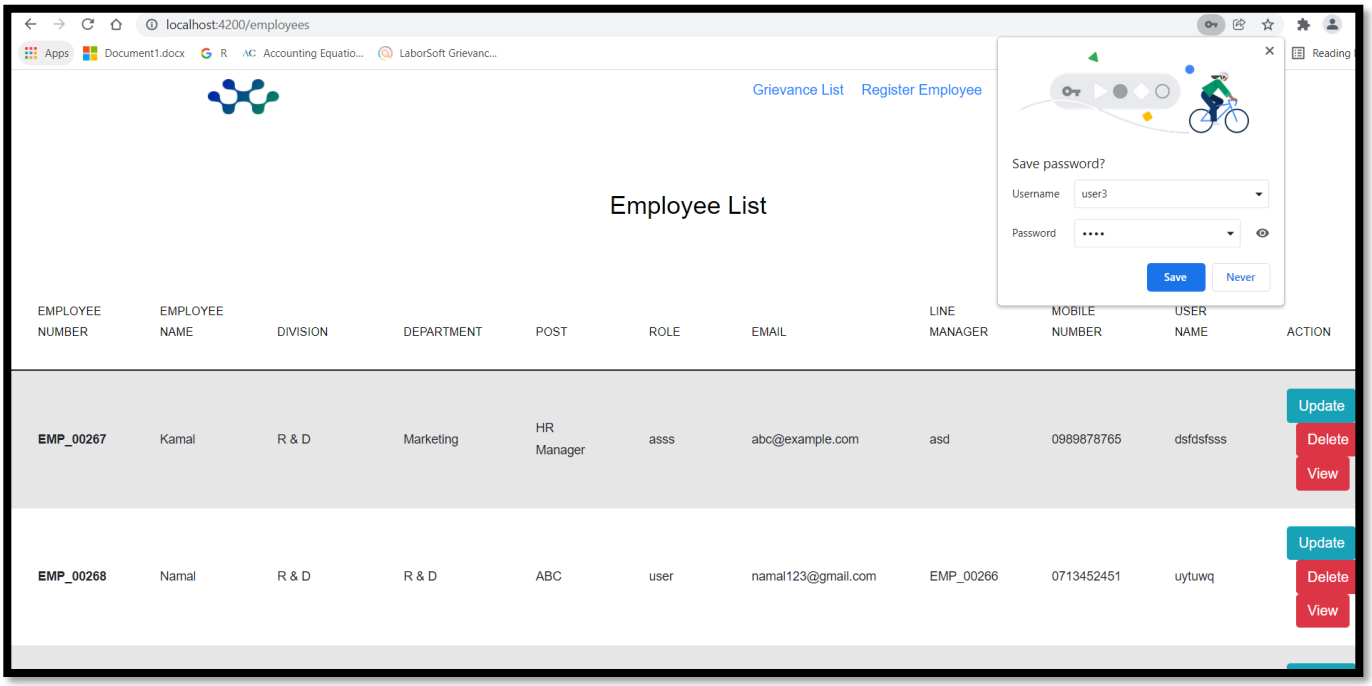

Figure 38 Navigating to the Employee List after adding the new employee.

Figure 39 Newly entered record present in the Employee Table.

Employee Grievance Handling System for ABC Company.	
TEST CASE	
Test Unit: Approving Grievance Solution.	Tester: Tithira Withanaarachchi
Test Case ID: 05	Test Type: Black Box Testing
Description: Approving the grievance Solution By GM.	Test Executed By: Tithira Withanaarachchi.
	Test Execution Date: 24th December 2021
Title: Approve solution.	Test Execution Time: 9.22pm-9.45pm

Step No.	Test Steps.	Testing Data.	Expected Result.	Actual result.	Status.	Notes.
01	Login to the System as a GM.					
02	Click the Buton provided in the follow up page.	_____	Removing the grievance from the table.	Displaying an Cannot Read error in the console without removing the grievance.	Fail	
03	Click the Buton provided in the follow up page	_____	Removing the grievance from the table.	Removing the grievance from the table.	Pass	

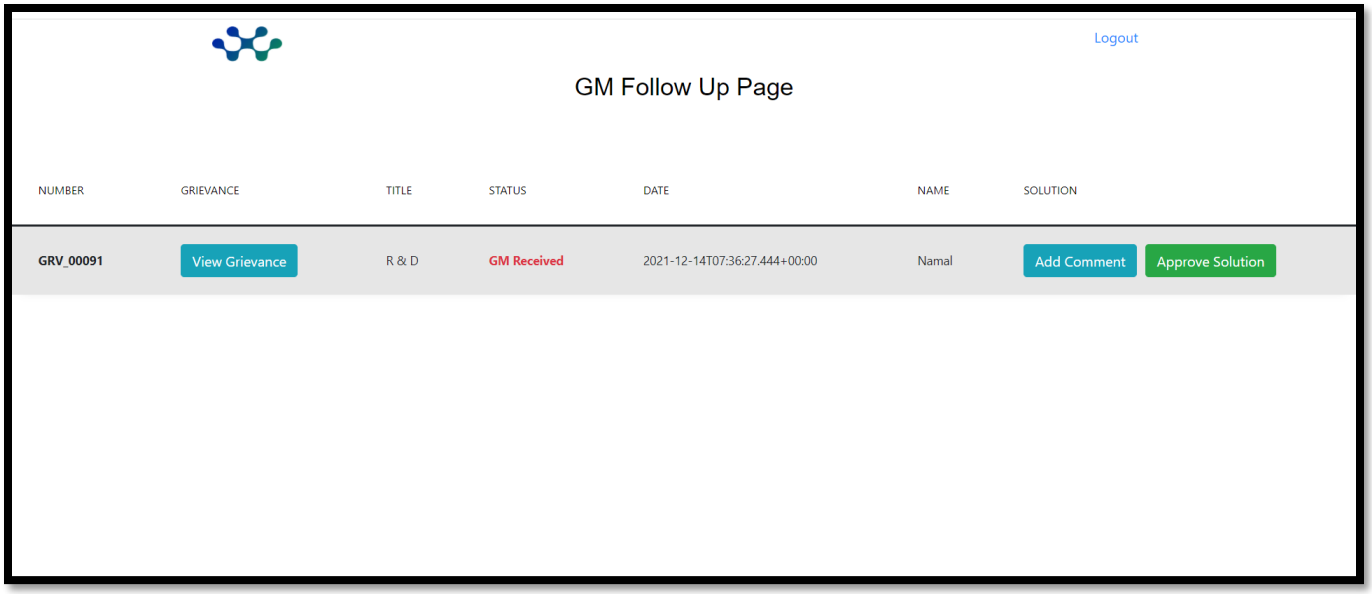

Figure 40 Follow up Page of GM.

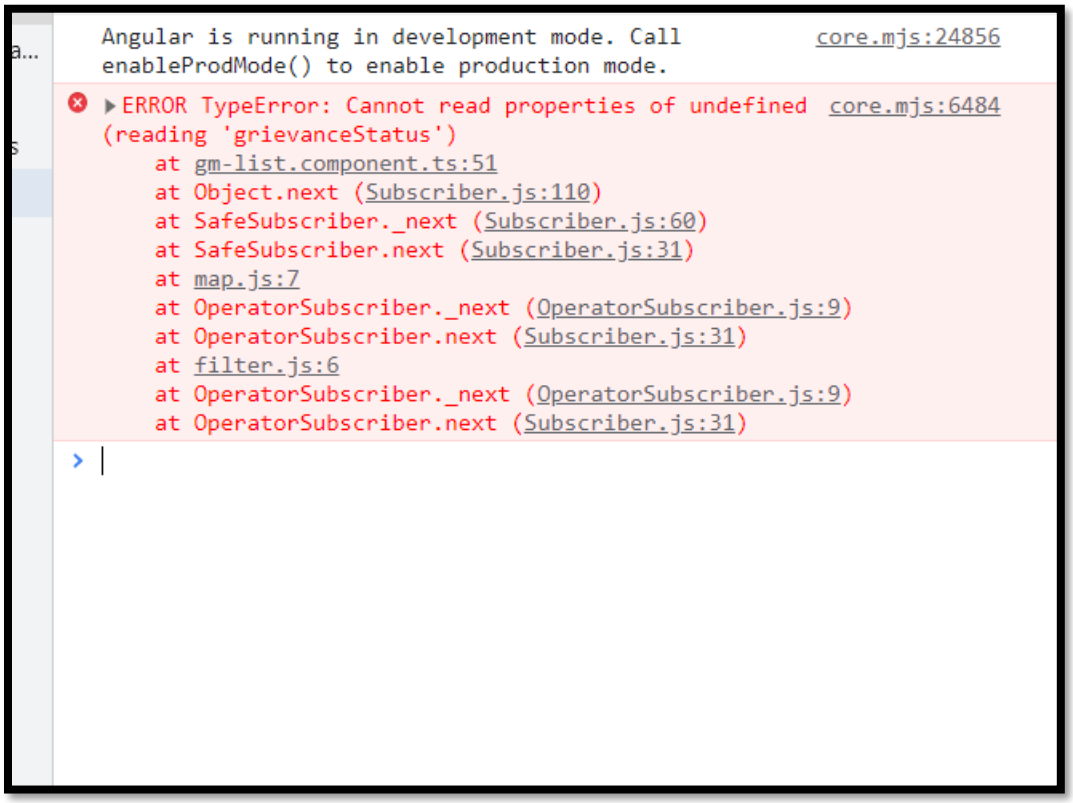

Figure 41 Cannot read properties Error in the Console.

Figure 42 Code line Which Caused the error

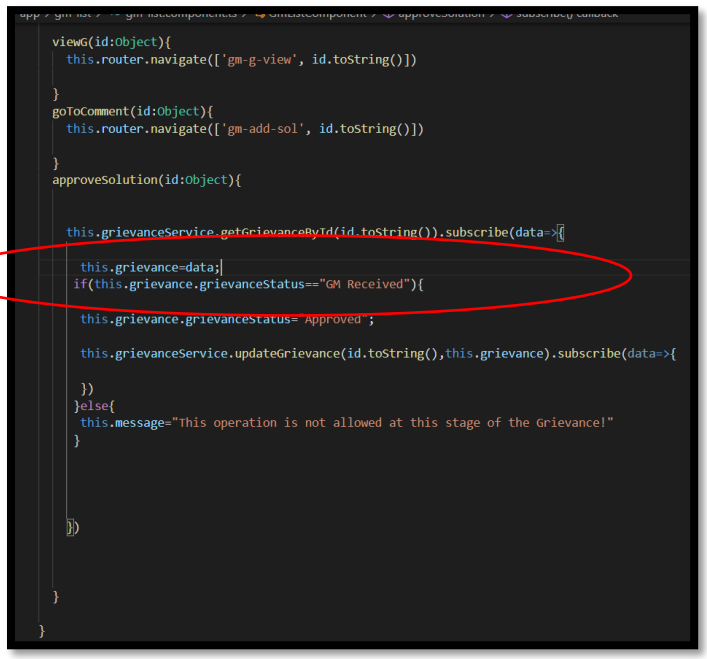

Figure 43 Corrected Code.

Figure 44 Interface which is empty after removing the approved Grievance.

Employee Grievance Handling System for ABC Company.	
TEST CASE	
Test Unit: Adding Comments	Tester: Tithira Withanaarachchi
Test Case ID: 06	Test Type: Black Box Testing
Description: Adding Comments to suggested solution.	Test Executed By: Tithira Withanaarachchi.
	Test Execution Date: 24th December 2021
Title: Add comments	Test Execution Time: 9.22pm-9.45pm

Step No.	Test Steps.	Testing Data.	Expected Result.	Actual result.	Status.	Notes.
01	Login to the System as an AGM.					
02	Access the relevant interface to add comments from the button provided.	Your Comment= “this is AGM’s Comment”				
03	Click “Send to GM”	_____	Navigate to Follow up page by changing the status of the grievance to GM Received.	Navigate to Follow up page by changing the status of the grievance to GM Received.	Pass	

Figure 45 AGM Follow up page.

Figure 46 Interface for AGM to add comments for grievance.

Figure 47 Interface with added comment by AGM

Figure 48 Interface which indicated the grievance with the updated status of GM received.

Employee Grievance Handling System for ABC Company.	
TEST CASE	
Test Unit: Status Update	Tester: Tithira Withanaarachchi
Test Case ID: 07	Test Type: Black Box Testing
Description: Updating the Status of the Grievance.	Test Executed By: Tithira Withanaarachchi.
	Test Execution Date: 24th December 2021
Title: Update the Status.	Test Execution Time: 9.22pm-9.45pm

Step No.	Test Steps.	Testing Data.	Expected Result.	Actual result.	Status.	Notes.
01	Login to the System as an Admin.					
02	Access the relevant page to add solution and add the solution.					
03	Click send to AGM	_____	Navigate to Follow up page by changing the status of the grievance to AGM Received.	Navigate to Follow up page by changing the status of the grievance to AGM Received.	Pass	

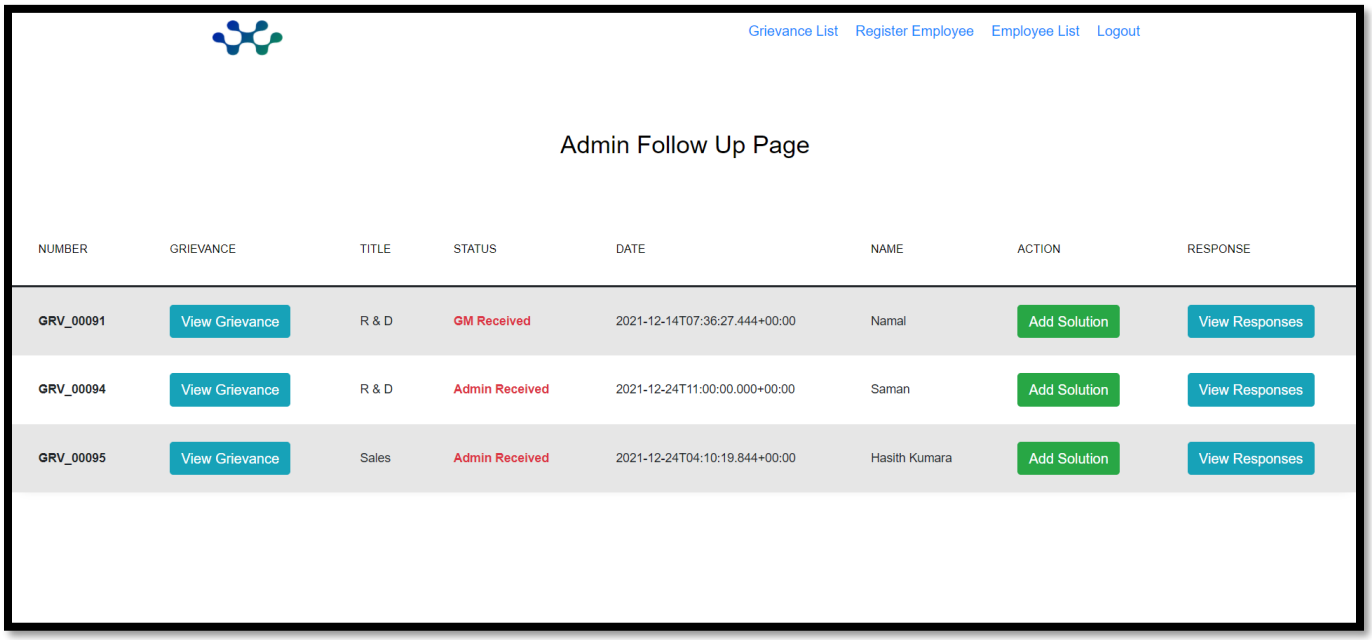

Figure 49 Admin interface with grievances to commit to.

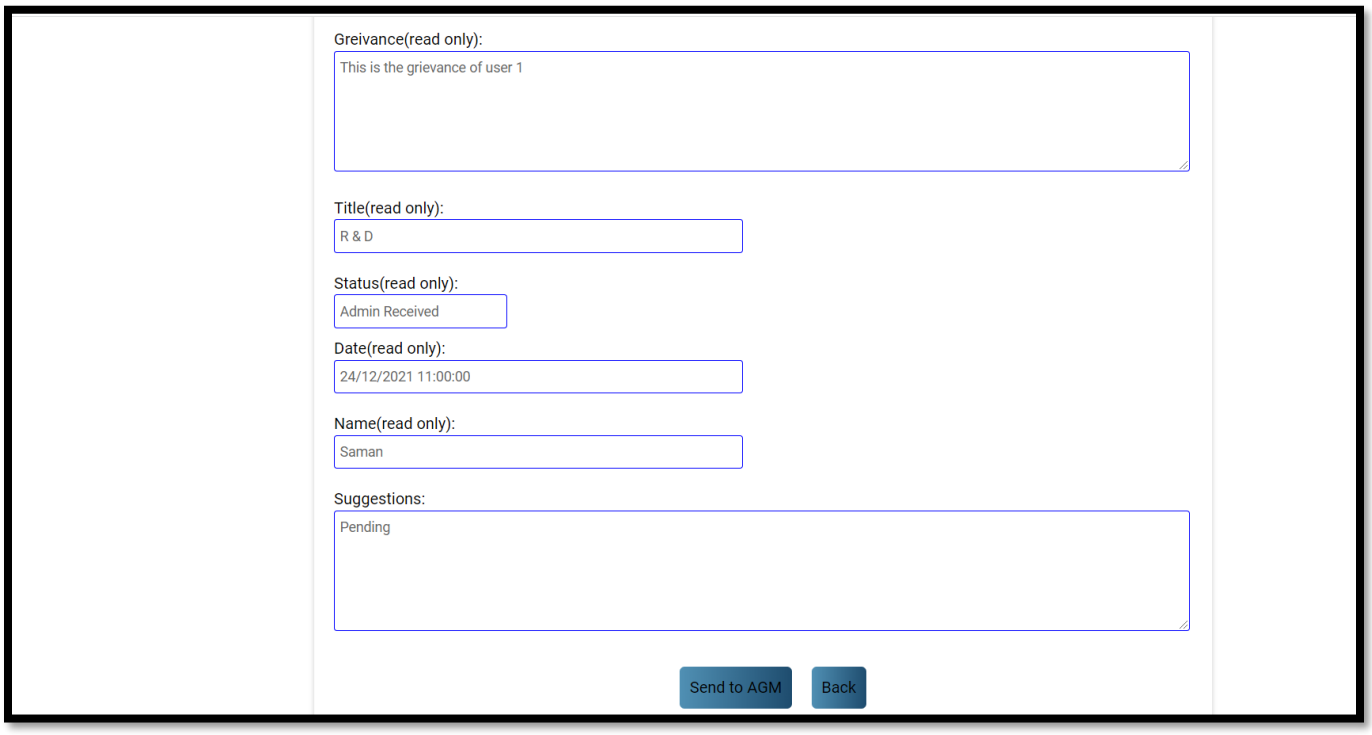

Figure 50 Interface for Admin to add the suggested solution.

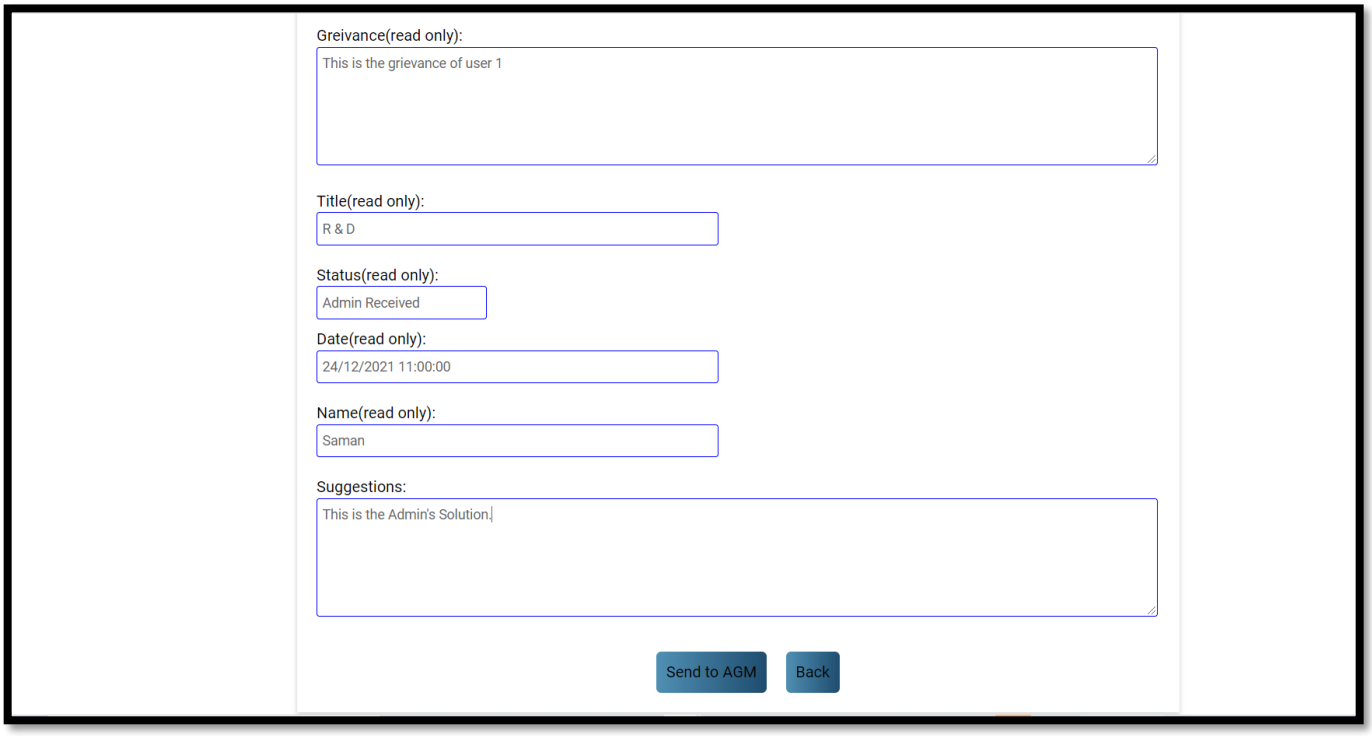

Figure 51 Interface to add Solution for Admin with the inserted solution.

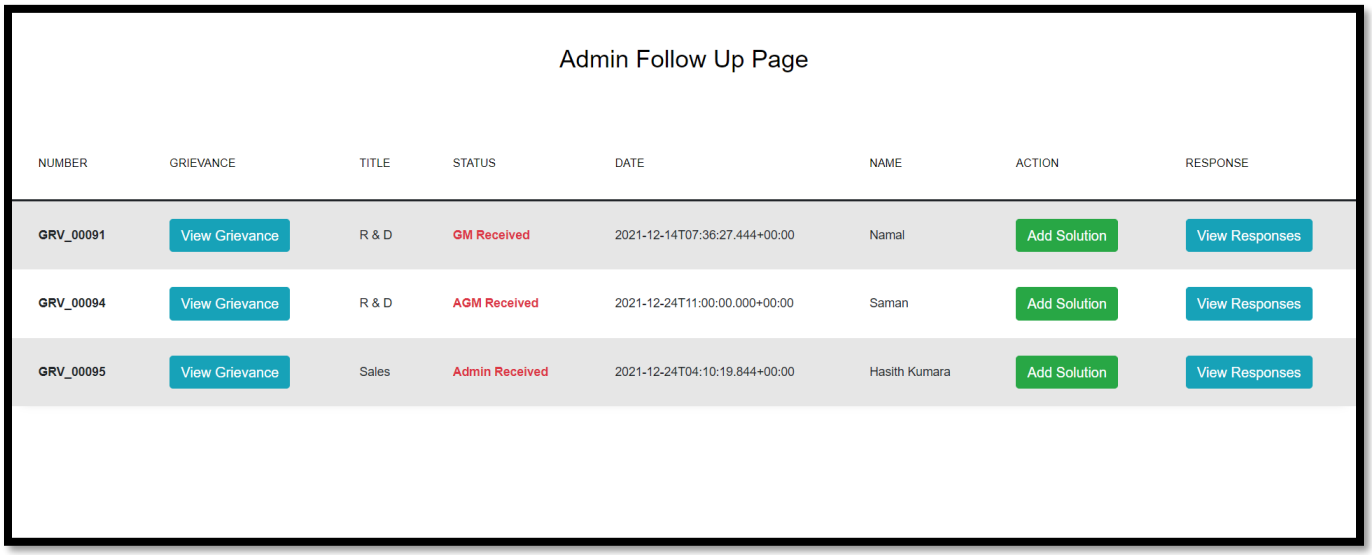

Figure 52 Updated Admin follow up table with the updated status of AGM received, of the grievance committed..

7.5 Evaluation

This employee grievance handling system is made to handle employee grievances. Initial criteria were to develop application. But with the time constraint we had we could only develop a web application. Other than all the work that we have planned went accordingly to the plan.

When gathering the requirements, we have conducted a survey and identified what are main requirements that we need to fulfill. Survey done using employees of the organization and according to their feedbacks we made the system.

When it comes to designing section we created diagrams which are required for the system and interfaces were design for relevant manager and for employee as well. After that we created API and integrated those interfaces.

Then the testing done using test cases and test plans. Each of the features of the system were tested one by one and system testing was also done after completing all the stuffs.

7.6 Summary

Under this chapter we mainly spoke about why testing is important for project and what type of testing we used. Under that unit testing, integration testing and system testing were discussed with relevant to grievance handling system. In addition to that we provided test plan and test cases for this grievance handling system and evaluation of the system.

8. Conclusion and Future Works

8.1 Introduction

In this section we will mainly talk about conclusion of the project and what are future works that are planning to improve this grievance handling system. This employee grievance handling system can be used in any organization to manage their employee grievances effectively.

As mention in above sections grievances will be placed by employee from his account and those grievances will be passing to higher level manages in the organization and they will make a response to their grievances and pass back the solution to employee.

This grievance system is consist of web application. Initial plan was to develop mobile application and developing email functionality but with the time constraint we had we only developed web application. Under this chapter we will be talk about the future works that are planning to do for improvement of this system and what are the lesson we learned and what are the issues that we faced during the project.

8.2 How the Process was carried out

When gathering the requirement we gone through survey and identified what are main requirements that we need to fulfill. Survey done using employees of the organization and according to their feedbacks we made the system.

When planning our works, according to the schedule we first went through the tough works which we facing in the development. Since those hard task were started early we could manage them properly at the end. Small task were kept to the last so we could manage our project works smartly. Having that idea we able to ensure that we don't miss any important features of our system.

When it comes to designing section we created diagrams which are required for the system and interfaces were design for relevant manager and for employee as well. After that we created API and integrated those interfaces.

Using Angular web framework and spring boot framework we created API and integrating section of interfaces were created using Angular framework. At the last phase we realize that our API is visible for everyone who have the access. So it can be issue for the security of our system and details. Therefor at the end before just three days we had to change that. Because of that we came up with idea to integrate all the things using Angular web framework.

Final documentation was done with use of references, diagrams, Requirement analysis, test classes, test plan and project management concepts. All the process were carried out with the project schedule that we have planned. Therefor we could finish our project within the deadline.

8.3 Critical Appraisal

Lesson Learnt

The grievance handling system was developed by two persons. So working with other person was helpful when we had issue we could clarify those after discussing with each other. Also we learnt how to work as a group when developing system and how to adopt for critical situations. Another major advantage is we able to manage the time within the given period and complete the project without any issue at given time period. We haven't got any experience about how to do project before. So doing this was really helpful for us to learn how to do project with high level quality.

Also with the academic works our team able to manage educations and project works better so it will be really helpful for us when we are working in the industry as well because we have the experience of how to adapt for multi-tasking situations.

Problems Faced

When developing this system major issue that we faced is lack of some of the technical experience and technical knowledge. Because after all the section done we just realized that our API is visible to out-side world and anyone who have the API can see the details. So due to those security issues we came up with Angular web framework to avoid those problems.

Also managing academic stuff with project workload was very difficult for us during the project. But support with each other we could handle those situations smartly. With the time constraints we could only came up with web application. Also with less time we couldn't done email functionality within the system.

We developed this system in Covid-19 Pandemic situation. So we develop this system via online communication. It was pretty challenging because we couldn't meet each other physically and

discuss the development process. We know that it’s normal life style in these days but actually it’s bit challenging for us than the normal process.

When developing the system we worked as group. Because of that we could handle any issues that were occurred in the development process. We both of had good communication and understanding between both of us. So those are the strength of our project works. In mentioning weakness we had lack of experience when develop the system and less knowledge about spring boot framework and Angular web framework.

8.4 Future Work

This grievance system is consist of web application. Initial plan was to develop mobile application and developing email functionality but with the time constraint we had we only developed web application.

As we are heading to the future we would be looking to develop mobile application and email functionality within this organization. To this this web application data will be getting through the API that we created. So in future when we come to develop the mobile application we only need to

integrate the mobile development functions only because we have already created API to get the details.

This web application can be used in any kind of situation to place grievance if the user has mobile phone or computer with internet network but developing mobile application would be also effective since most of the people in these days are more familiar with using mobile application.

8.5 Summary

As mention in this document this is system which is to handle employee grievance in any kind of organization. After identifying lack of such a system we came up with idea to develop employee grievance handling system. It consist of grievance adding, status update, grievance forwarding like functionalities.

When developing system we worked as a team and able to handle challenges and complete task on time with any kind of issues which is really important for our experience. In the future we will be planning to create mobile application for this as well because due to time constraint we couldn't develop that. Since we have created API it will be easy for us to create mobile application in future.

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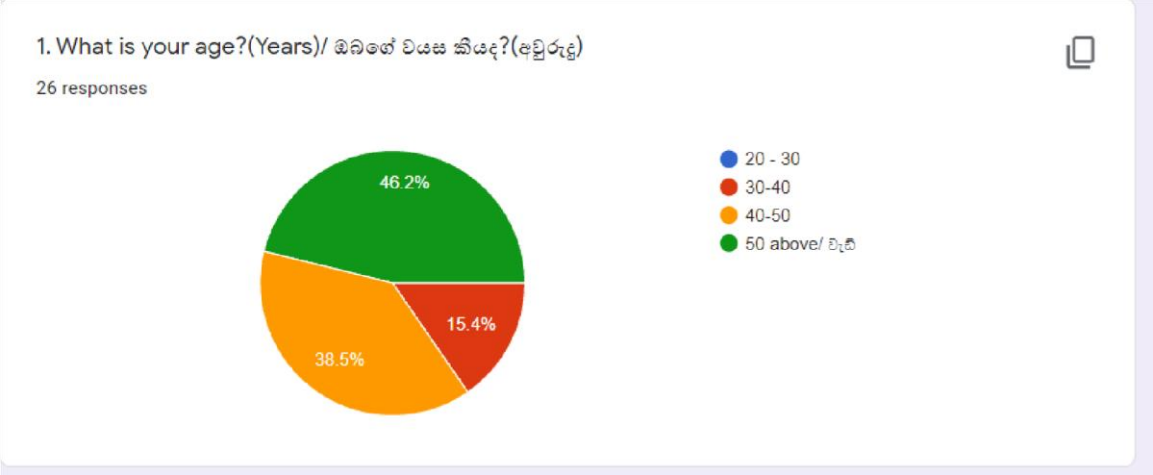
Appendix A: Glossary

Abbreviation	Description
HR	Human Resource.
HRM	Human Resource Management.
APP	Application.
GM	General Manager.
AGM	Assistant General Manager.
MD	Managing Director.

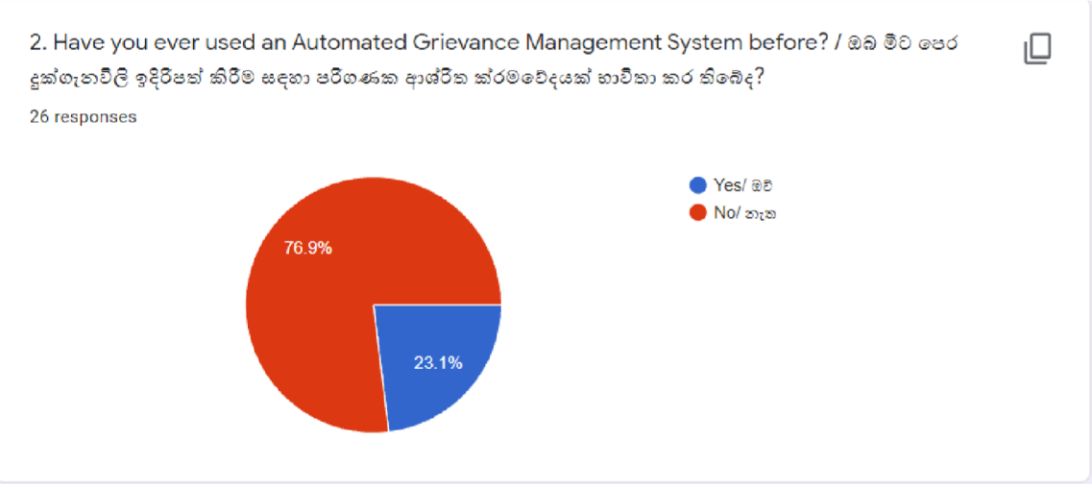
Appendix B:Analysis of the Survey

Grievance Management System will provide an answer for a problem faced by the employees at ABC company. To identify how the system should be developed in a way to effectively address the employees' problems, a Survey has been conducted.

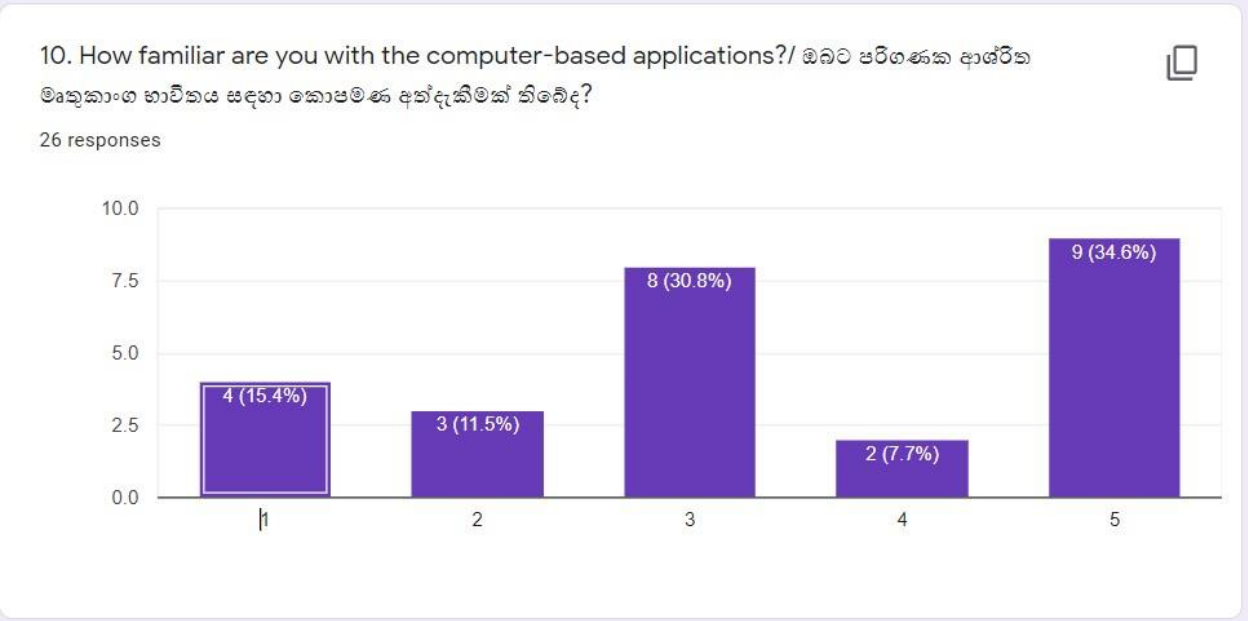
We have considered a random sample of 26 employees and conducted the survey as illustrated.



According to the above mentioned analysis of responses, it shows that majority of the sample is more than 50 years of age which is 46.2%.

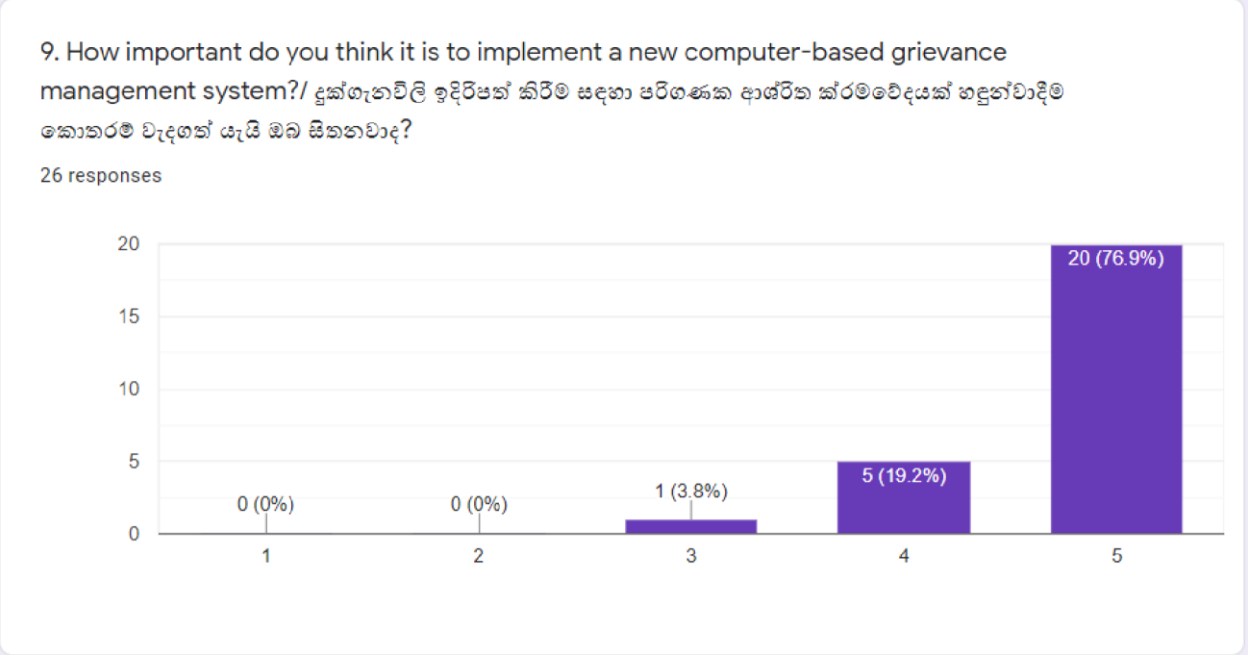


The above pie chart shows that most of the employees which is 76.9% has never used an automated grievance management system before.



The above bar chart shows that the familiarity of employees to the computer-based applications is relatively high. But there are also a certain percentage of employees which is 26.9% less familiarized with computer-based applications. However, this system should also be catered for this 26.9% of employees.

Therefore, considering all the above mentioned analysis of responses, it is evident that, it is important to develop very user friendly, easy to handle Grievance management system.



As shown in the above mentioned bar chart it proves that there is a paramount need of a Computer based Employee grievance management system. This would give employees, a better opportunity to convey their grievances to the management, effectively and efficiently.

Appendix C(Survey)

Employee Grievance Handling System

Questions Responses 26 Settings

26 responses

Not accepting responses

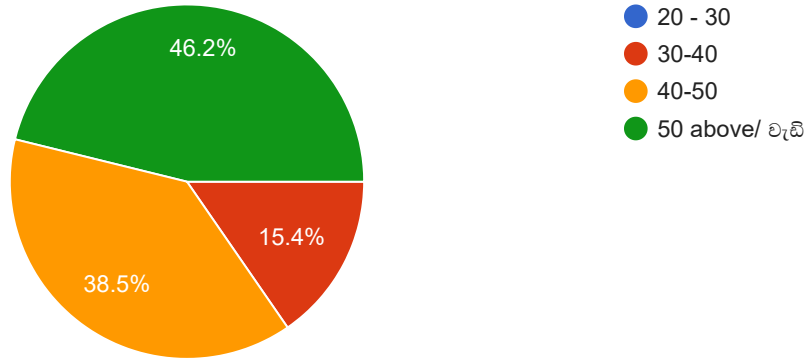
Message for respondents

This form is no longer accepting responses

Summary Question Individual

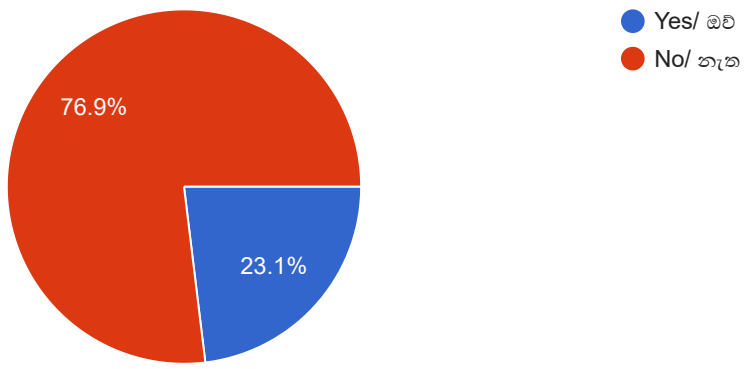
1. What is your age?(Years)/ ඔබගේ වයස කීයද?(අවුරුදු)

26 responses



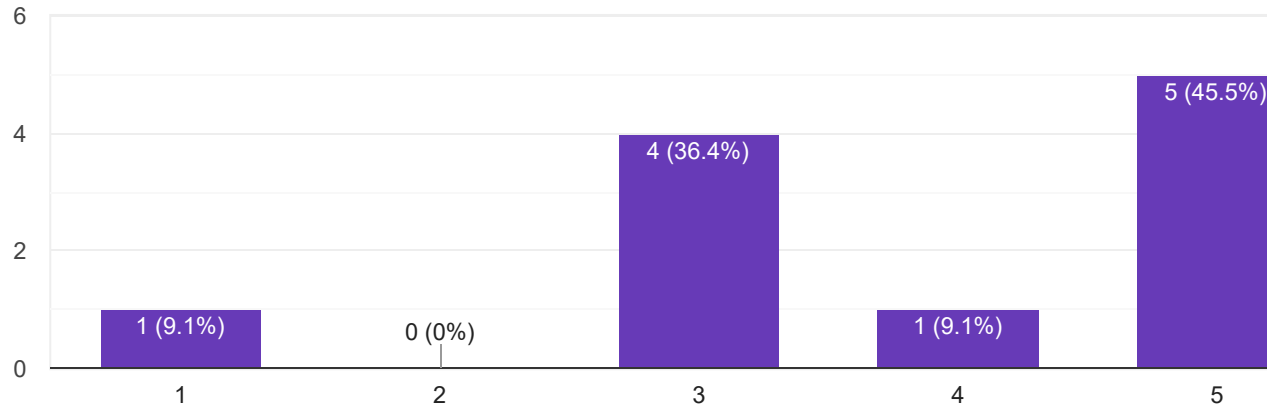
2. Have you ever used an Automated Grievance Management System before? / ඔබ මීට පෙර දුක්ගැනවිලි ඉදිරිපත් කිරීම සඳහා පරිගණක ආශ්‍රිත ක්‍රමවේදයක් භාවිතා කර තිබේද?

26 responses



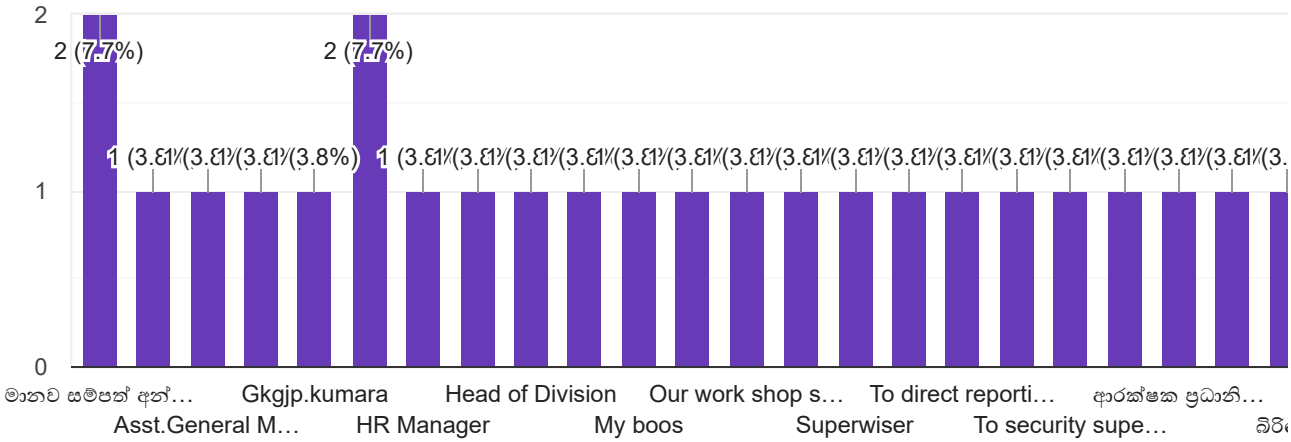
3. If you have used an automated system for redressing Grievances before, How easy do you find it to use(User friendliness)?/ ඔබ මීට පෙර දුක්ගැනවිලි ඉදිරිපත් කිරීම සඳහා පරිගණක ආශ්‍රිත ක්‍රමවේදයක් භාවිතා කර තිබේ නම්, එය භාවිතය කොතරම් පහසු වූවාද?(User friendliness)

11 responses



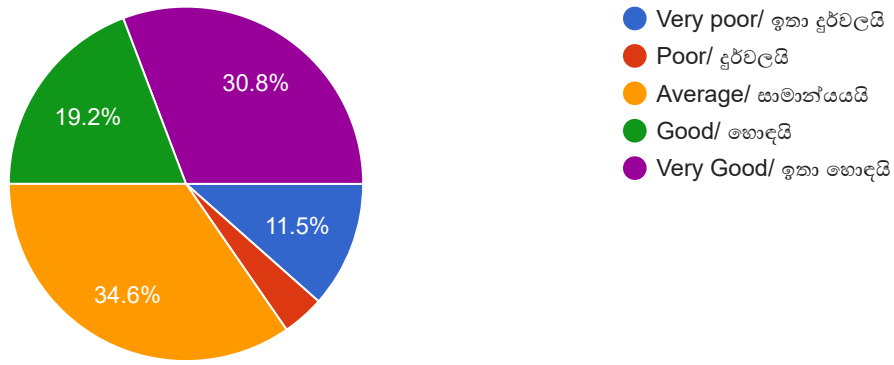
4. To whom do you usually inform about your grievances directly?/ ඔබ වර්තමානයේ පලමුව දුක්ගැනවිලි ඉදිරිපත් කරනුයේ කාහටද?

26 responses



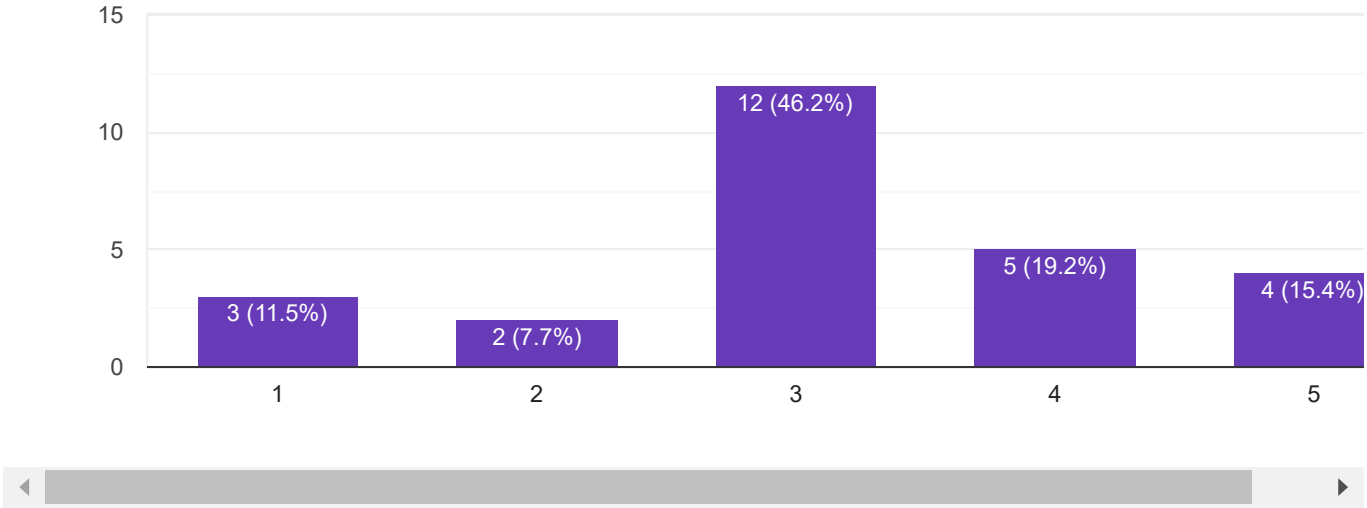
5. What do you think about the opportunity that you have for redressing your grievances at HR department?/ ඔබට යම් දුක්ගැනවිල්ලක් මානව සම්පත් අංශය වෙත ඉදිරිපත් කිරීමට ඇති අවස්ථාව සම්බන්ධව ඔබගේ අදහස?

26 responses



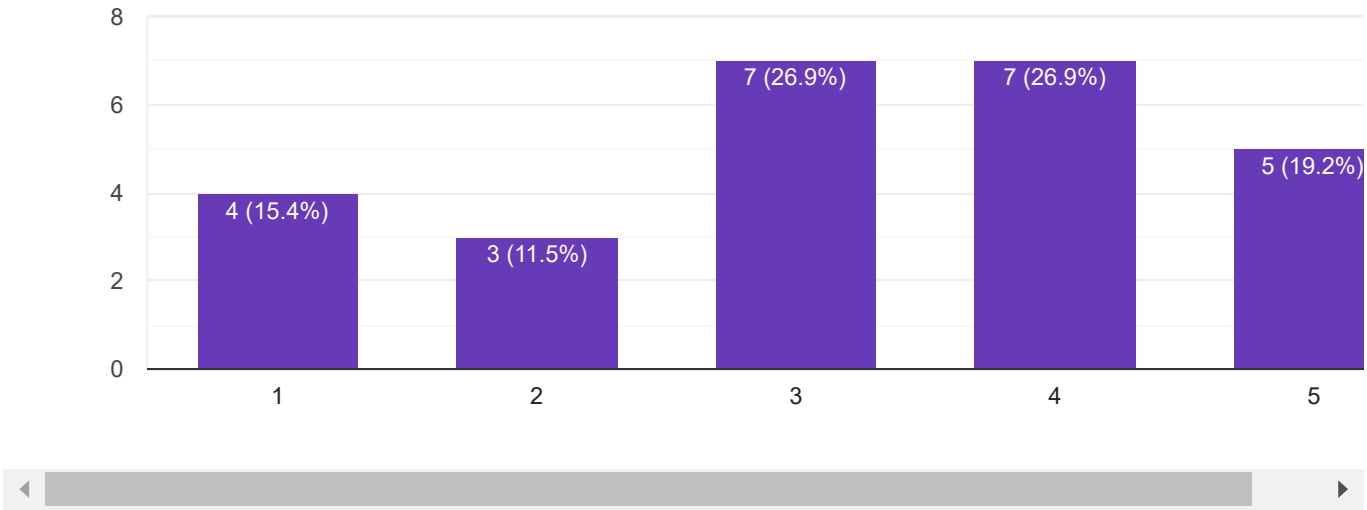
6. How are you satisfied about the time taken by the company to send a response/solution for your grievances?/ ඔබගේ දුක්ගැනවිලි වලට කාර්යාලයෙන් පිලිතුරු ලැබීමට ගත වන කාලය පිලිබඳව ඔබ කොතරම් සෑහීමකට පත්වනවාද?

26 responses



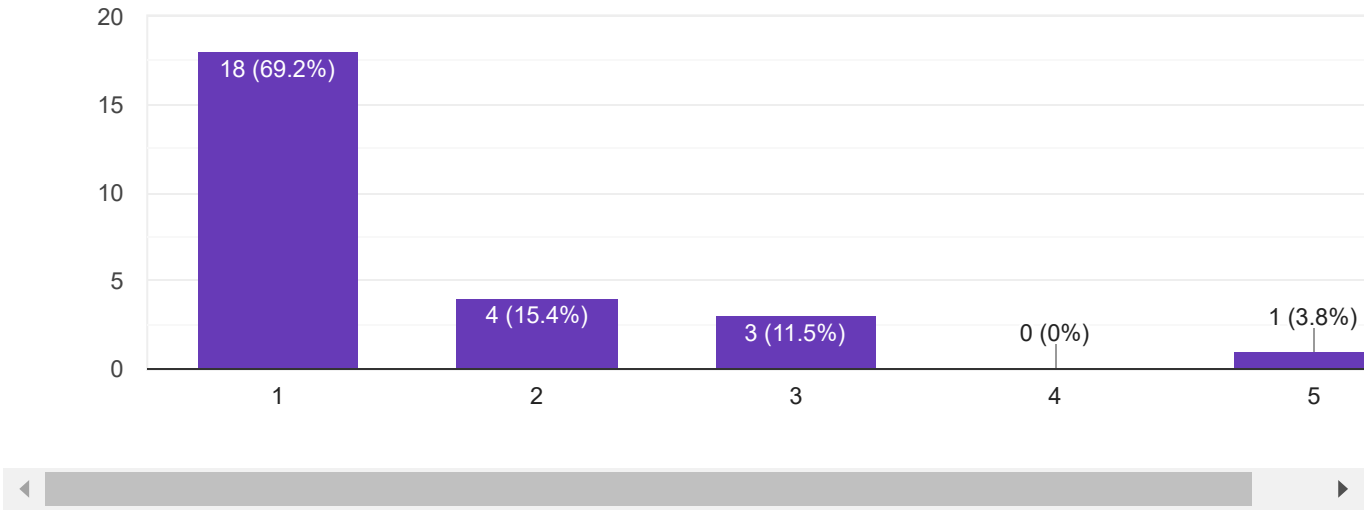
7. How satisfied are you with the current way of grievance handling in your company?/ වර්තමාන දුක්ගැනවිලි කලමණාකරණ ක්‍රමවේදය පිලිබඳව ඔබ කොතරම් සෑහීමකට පත්වන්නේද?

26 responses



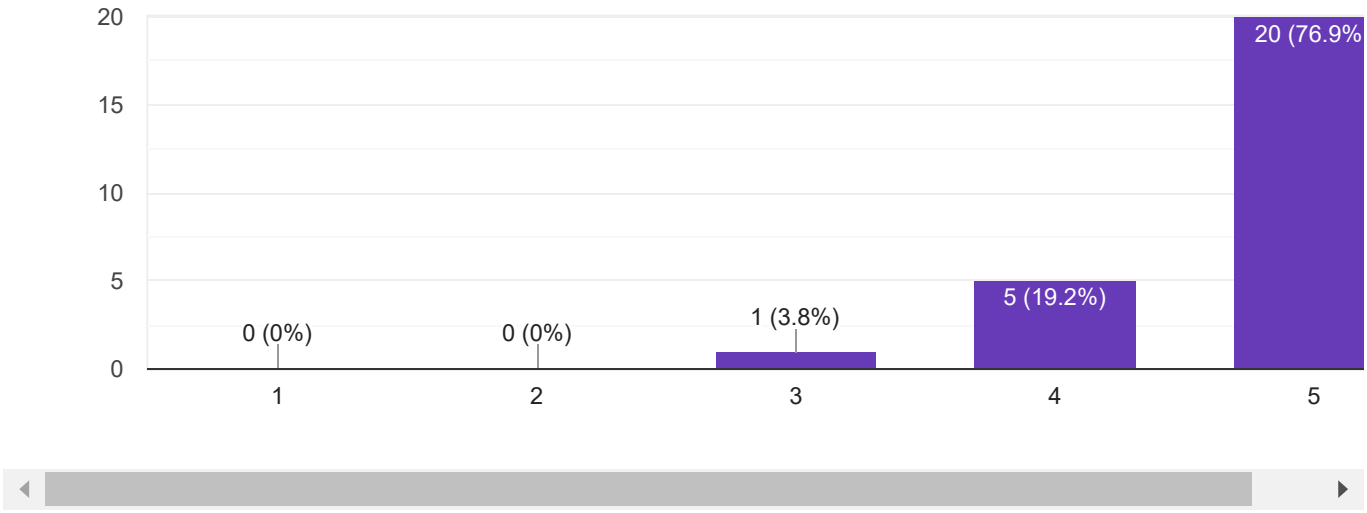
8. How often you may have grievances to report?/ සාමාන්‍යයෙන් කොපමණ වාර ගණනක් ඔබ දුක්ගැනවිලි ඉදිරිපත් කිරීමෙහි නිරතවනවාද?

26 responses



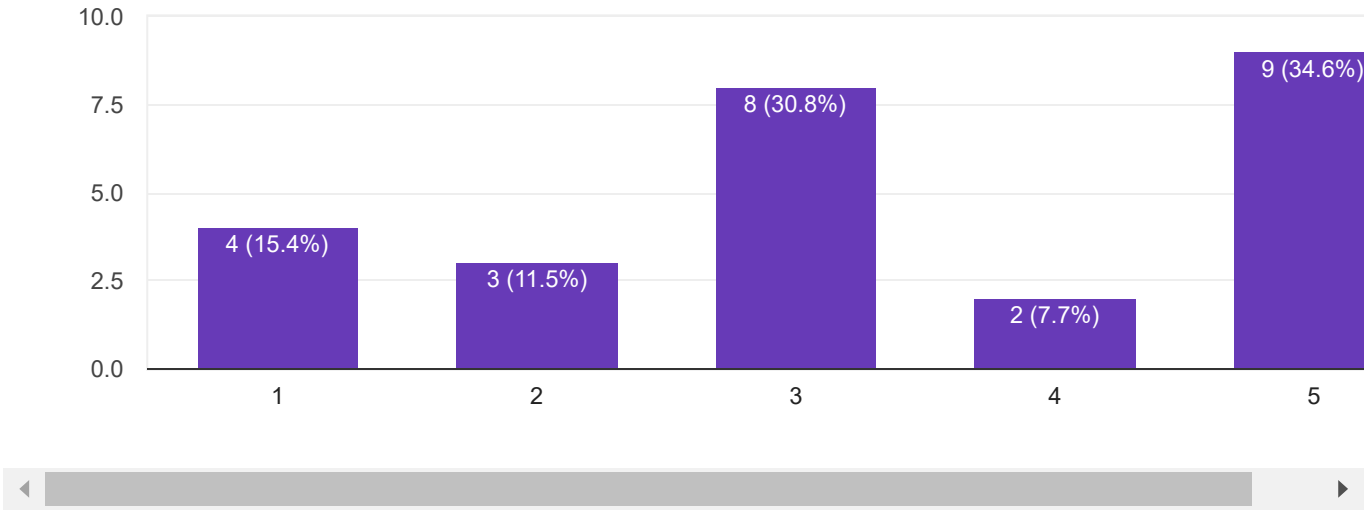
9. How important do you think it is to implement a new computer-based grievance management system?/ දුක්ගැනවිලි ඉදිරිපත් කිරීම සඳහා පරිගණක ආශ්‍රිත ක්‍රමවේදයක් හඳුන්වාදීම කොතරම් වැදගත් යැයි ඔබ සිතනවාද?

26 responses



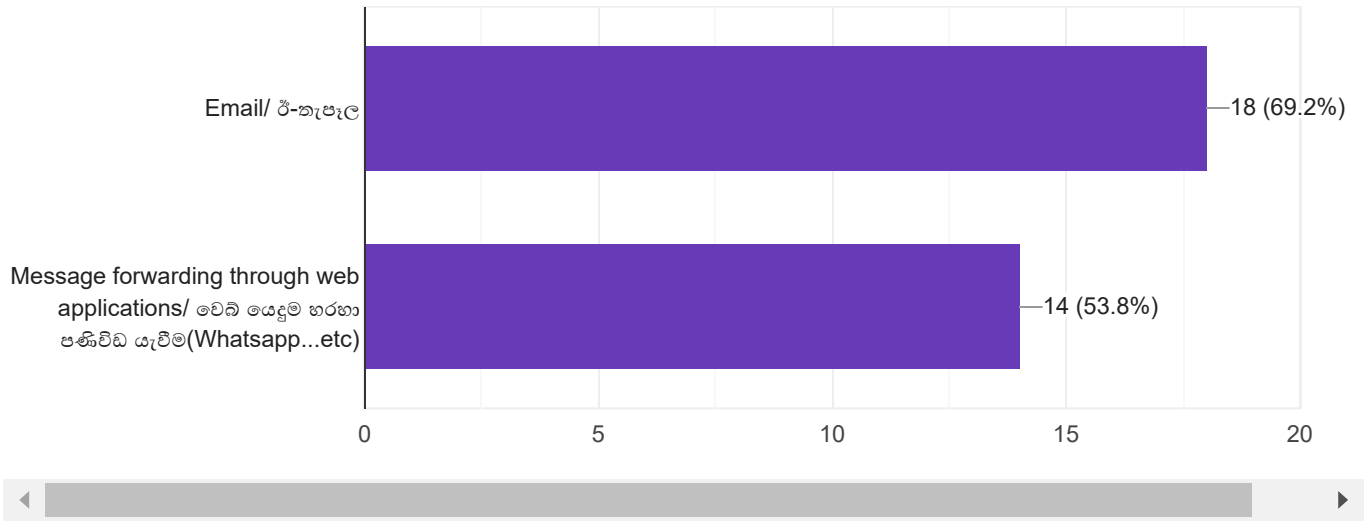
10. How familiar are you with the computer-based applications?/ ඔබට පරිගණක ආශ්‍රිත මෘදුකාංග භාවිතය සඳහා කොපමණ අත්දැකීමක් තිබේද?

26 responses



11. What are the Features that you are familiar with, from the ones mentioned below?/ පහත සඳහන් පහසුකම් අතුරින්, ඔබ මීට පෙර භාවිතා කර ඇති ඒවා මොනවාද?

26 responses



12. If there are any other features that you expect to have in the Grievance Management System, Please mention them below./ ඔබ දුක්ගැනවිලි ඉදිරිපත් කිරීම සඳහා ඇති පරිගණක ආශ්‍රිත ක්‍රමවේදයකින් බලාපොරොත්තු වන වෙනත් පහසුකම් තිබේ නම්, ඒවා පහතින් දක්වන්න.

9 responses

My grievances should be redressed immediately

Should have max time period to give solution, if not should send a alert to higher positions.

භාෂා පරිවර්ථන හැකියාව

Quick Response

Prioroty

Protect our personality

Develop the Information Technology section and protect our personality

Not have yet

Initially it would be important to know that the grievance has reached and read by related grievance handling unit/ officer