DBMS Course Project Report

ON

“UCI: Unified Complaint Interface”

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CERTIFICATE

This is to certify that the project titled **UNIFIED COMPLAINT INTERFACE** by **Dhaval Kumar, Kondury Rishabh, Kushal Jain** has been carried out under my/our supervision and that this work has not been submitted elsewhere for a degree/diploma.

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Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Dhaval Kumar

Kondury Rishabh

Kushal Jain

Acknowledgments

At the outset, We would like to express our wholehearted and deep sense of gratitude to our guide Prof. Dr. Santosh Kumar for his guidance, help and encouragement throughout our project work. We greatly admire his attitude towards research, creative thinking, hard work and dedication in work. We are highly grateful to him for patiently checking all our project work. This project would not have been possible without his bounteous efforts. More than a guide, he is our mentor for shaping our personal and professional life, without whom we would not have been where we are today. We owe our profound gratitude to Prof. Dr. Santosh Kumar for his support in all respects.

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Kondury Rishabh

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ABSTRACT

Urbanization of people from the countryside to migrate to more developed urban areas like towns and cities has resulted in rapid growth in these areas, and with growth, many problems have arisen. The need to manage issues and solve them in a systematic manner has increased drastically and is the prime concern of the authorities and the people. According to the current system, complaints have to be registered on the department's website, which is tedious. In this project, we are proposing a Unified Complaint Interface (UFI), which integrates the databases of different departments and the complainee can register complaints in a unified portal with OTP authentication. The project will focus mainly on decreasing the hassle faced by the user to register complaints by providing an easy-to-use interface.

Keywords:

DBMS, CRUD, Complaint System, HTML, Flask, CSS, API, Urbanization, Responsive, Python, Deploy, Heroku

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Chapter 1

Introduction

1.1 Introduction

The last 100 years have seen a huge change in the global structure of the human population, with the majority of people now living in urban rather than rural environments. In the last 25 years, we have also seen a shift of people from traditional methods to the internet. Alongside these developments can problems related to housing in urban centers and the need for a complaint system to alert local authorities to address these problems. Initially, one had to go to a government office physically to register their complaint, then the introduction of the telephone provided an alternative means to file complaints. Finally, the democratization of the internet brought along the online complaint registration portals. From the last few decades, we have seen many developments that made it easy to file complaints, but that came along with the fragmentation of each complaint system. For Electricity Related problems one has to register it through the local Electricity Board portal, and for water-related issues, the same person has to go through Municipal Corporation Portal. SO, the proposed unified complaint interface focuses on solving the problem by providing a single interface, for the ease of complaint registration without any hassle.

1.2 Motivation

Due to the large influx in the number of complaints related to different problems in urban centers. Common issues include water shortage, electricity cuts, and sewage system-related problems. Various departments deal with their respective issues and they have to maintain their complaint portal, which might be obscure, hard to access, and the complainee has to visit multiple outlets for separate issues.

UCI makes it easier for the user to file the complaint regardless of the problem. Now that some person can go to UCI and register both of his complaints. This will have a significant impact on the current scenario of complaint management for local authorities as UCI also provides them a portal to look at the complaints filed and update the status of the complaint. Due to the simplicity of UCI, it makes it easy to file and view the status of complaints, removing the need for physical queues. For the authorities, it provides a centralized portal making their work easier to work on the issues.

Chapter 2

Need of the Project Models

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- Common issues include water shortage, electricity cuts, and sewage system-related problems.
- Various departments deal with their respective issues and they have to maintain their complaint portal, which might be obscure, hard to access, and the complainee has to visit multiple outlets for separate issues.
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- This will have a significant impact on the current scenario of complaint management for local authorities as UCI also provides them a portal to look at the complaints filed and update the status of the complaint.
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Chapter 3

Contributions

The main parts of the project are the Front End of the website which is developed using HTML/CSS and Bootstrap, the Backend part using Python Flask, connecting the database and declaring the schema of the tables used using SQLite.

The main problem which UCI solves is reducing the hassle of the users by giving ease in registering complaints on a single interface. So, it can be used at anyplace which requires a complaint management system like Railways, Government Corporations. This system is highly scalable and flexible, thus it can be easily deployed at any scenario.

The system is also very secure and with the proper implementation of an authentication system, the system can be made to run on end-to-end encryption. The system can be made highly scalable by using the cloud services, which will send the entire data in the cloud bucket thus reducing the requirement of physical servers.

Chapter 4

Proposed Model/System

4.1 ER Model

ER Model is used to model the logical view of the system from a data perspective, which consists of these components: **Entity, Entity Type, Entity Set.** In the proposed model, the entity is the complaint that has attributes that define the properties of the entity type which is complaintID , name, phone number, and other user details.

The key attribute in the complaint table is a unique complaintID and does not have null values. The complaintID acts as a foreign key for the databases of different departments to maintain the integrity of the relational model.
In this case, the Relational database model seems appropriate as the data can be represented in the form of relations i.e. tables. After modeling the conceptual Entity-Relationship model, we need to convert it to a Relational model and implement it in an RDBMS language. In this project, we are going to use MySQL as it can be easily integrated with our backend which will be built in node.js which is a Javascript Runtime Environment.

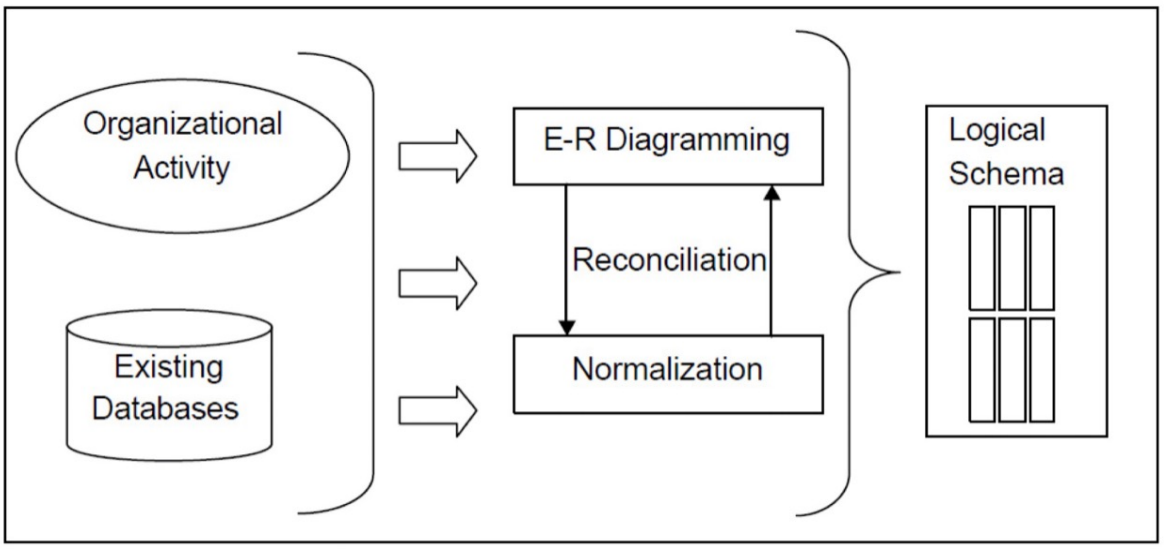

Fig 4.1 Logical Database Design Process

4.2 Relational Model

Relational Model represents how data is stored in Relational Databases. A relational database stores data in the form of relations (tables). Unified complaint interface website, will have a separate database for every department and a common database which will store the complaints about every user. The basic operations to be supported by the model include creation, updation, deletion, and read operations.

Creation: The model will support the creation of new profiles for a user which will be based on Aadhar authentication.

Updation: The complaints can be marked as active or closed by the department admin with special access for the updation operation.

Read: The complaints can be tracked from the user dashboard after authentication.

Deletion: The closed complaints can be deleted from the database.

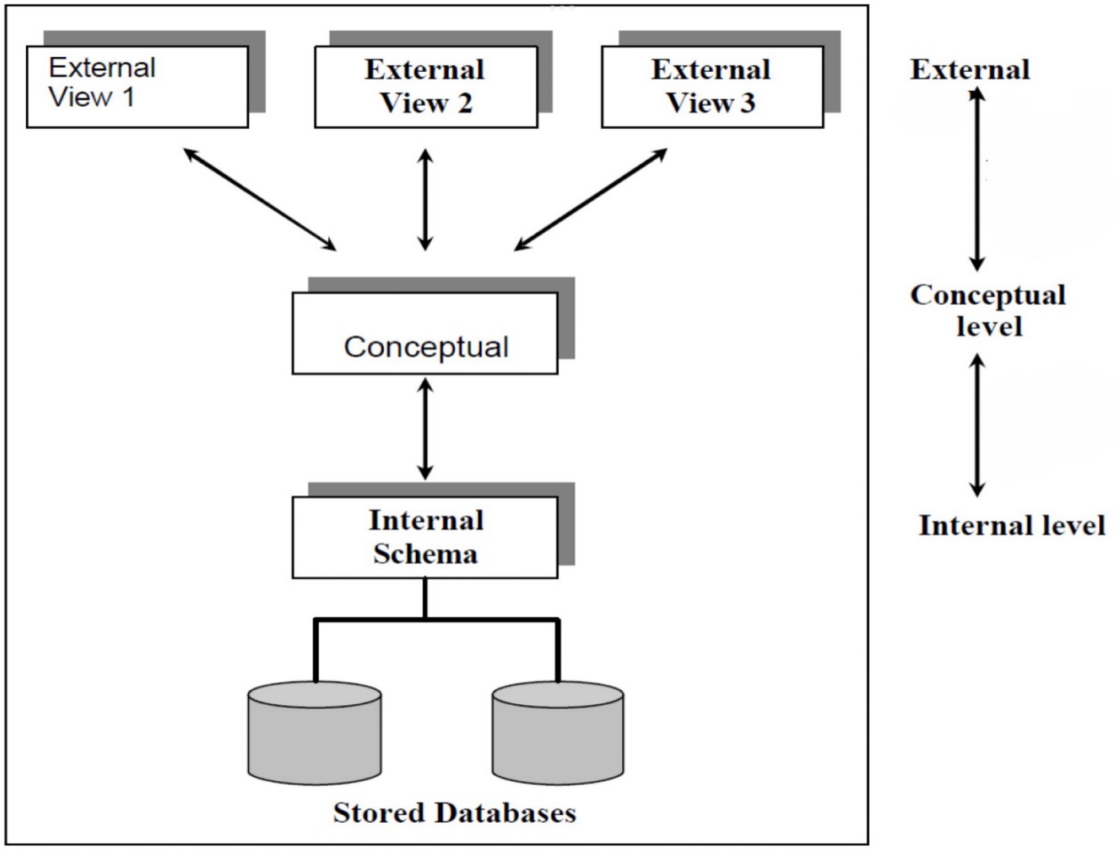

Fig 4.2 Relational Database Model

4.3 Architecture

Architecture : To represent the Database design, we are using a 3-Tier architecture to design, develop, implement, and maintain the database management system. A DBMS architecture allows dividing the database system into individual components that can be independently modified, changed, replaced, and altered. The 3-Tier architecture design is based on the client-server model which has other advantages as it is used in the development and maintenance of functional processes, logic, data access, data storage, and the user interface is done independently as separate modules. Three Tier architecture contains a presentation layer, an application layer, and a database server.

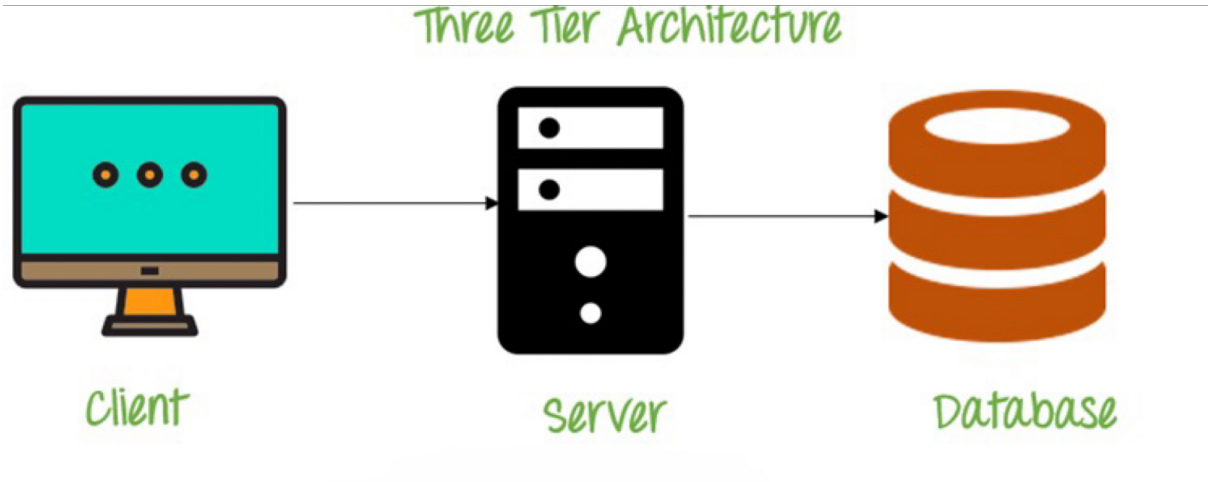

Fig 4.3 Three-Tier Architecture

Chapter 5

Steps of the proposed models/system

5.1 Phase I: Requirement Analysis

In this phase, we determine all the requirements which we need in our database system which are needed by the user as well as the organization which will use it.

These requirements are again categorized into two parts:

a) **Data Model Requirements:**
   These deal with different pieces of data that need to be stored along with their relationships with one another.

   In this project -
   i) Unique Complaint ID
   ii) Unique Identification ID (Aadhar Card)
   iii) Department Name
   iv) Complaint Body

b) **Functional Requirements:**
   This involves day-to-day tasks and operations that are undertaken by the organization for which the database is being developed.

   In this project -
   i) Creating, reading, updating, and deleting complaints.
   ii) Categorization and insertion of complaints into their respective department's database specified by the complainee.
   iii) To display complaints about specific complaint id/department etc.
   iv) Tracking the status of complaint through complaint id.

5.2 Phase II: Converting Data Model to Representational Model

In this phase, the data model is converted to a representational model which in our case is a relational database model, and create a database based on an above model using RDBMS system(i.e., from the providers of the RDBMS system e.g. Oracle, DB2, MySQL).

- **Relational Model -**

  The relational model (RM) represents the database as a collection of relations. A relation is nothing but a table of values. Every row in the table represents a collection of related data values. These rows in the table denote a real-world entity or relationship.

  The table name and column names are helpful to interpret the meaning of values in each row. The data are represented as a set of relations. In the relational model, data are stored as tables.

  In this project, we have the following attributes -
  i) Unique Complaint ID
  ii) Complainee Name/ Anonymous
  iii) Department ID
  iv) Department Name
  v) Complaint Body

  The database of UCI is mainly into the database of the departments, here we have taken only 5 departments, so the schema of each department database is:

  DEPARTMENT_NAME(Complaint_id, Complaint, Actions, SaveChanges)

- **ER Diagram -**

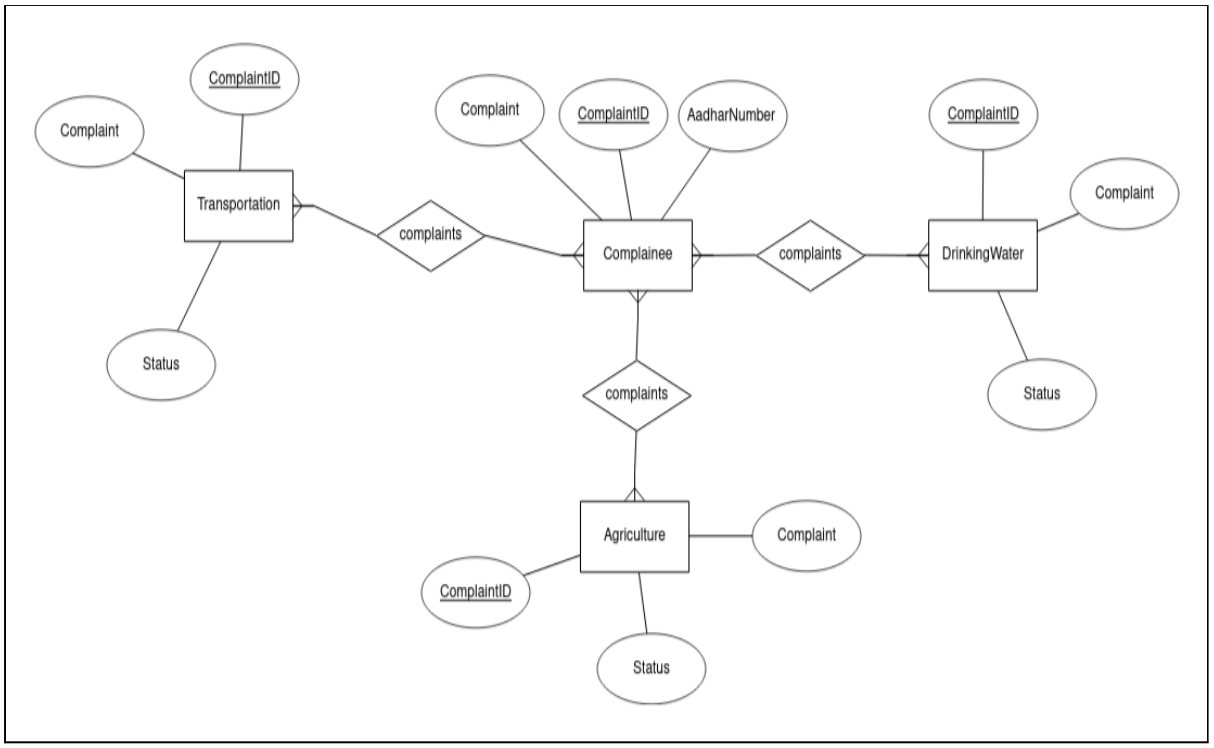

Fig 5.2 ER Diagram

5.3 Phase III: Converting Functional requirements to application programs

In this phase, high-level languages (HLL), like C, C++, Javascript, etc. are used in combination with SQL to communicate with the databases and modify them, to capture the day-to-day activities of the organization (for which the database system is being developed).

In this project, Flask framework is used to communicate with SQLite.

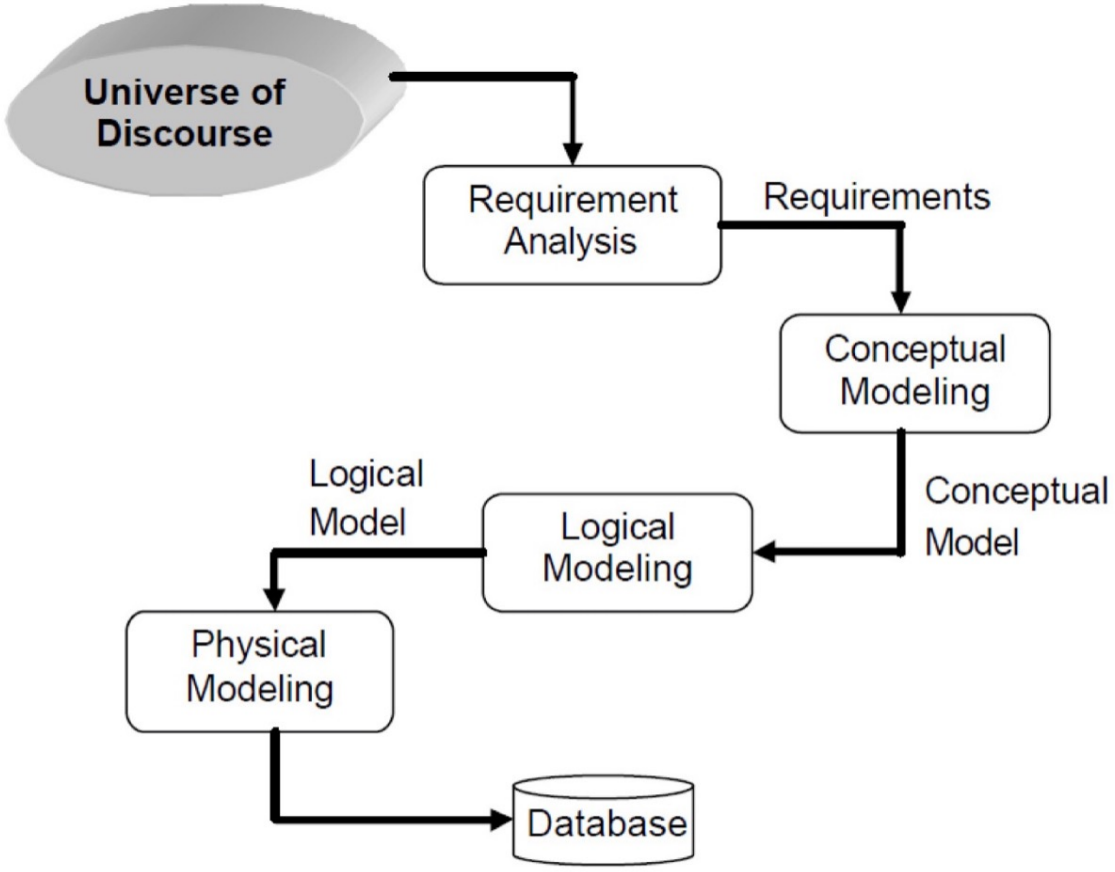

Fig 5.3 Database Development Methodology

5.4 Phase IV: Implementation

1. **Development of Front-End:** This step is to develop a basic design mockup of the website. The implementation part will start with the creation of a static website using HTML5, CSS3, and Bootstrap. Different static pages will be developed for users as well as admins. Our main focus while developing the frontend part of the website was on readability, accessibility, ease of use, and clarity.
2. **Development of Back-End:** For the backend part, we used Flask to create an API for insertion, deletion, updating, and scanning of data from the database. The creation of a link between the database and router takes place.
3. **Integrating frontend with backend**: For integrating the frontend and backend we have set up proper paths and displaying the appreciated data on the front-end using POST/GET requests.
4. **Deployment of the website**: We added a script that will run on the Linux instance where we will deploy our codebase, thus making our website live on the world wide web.

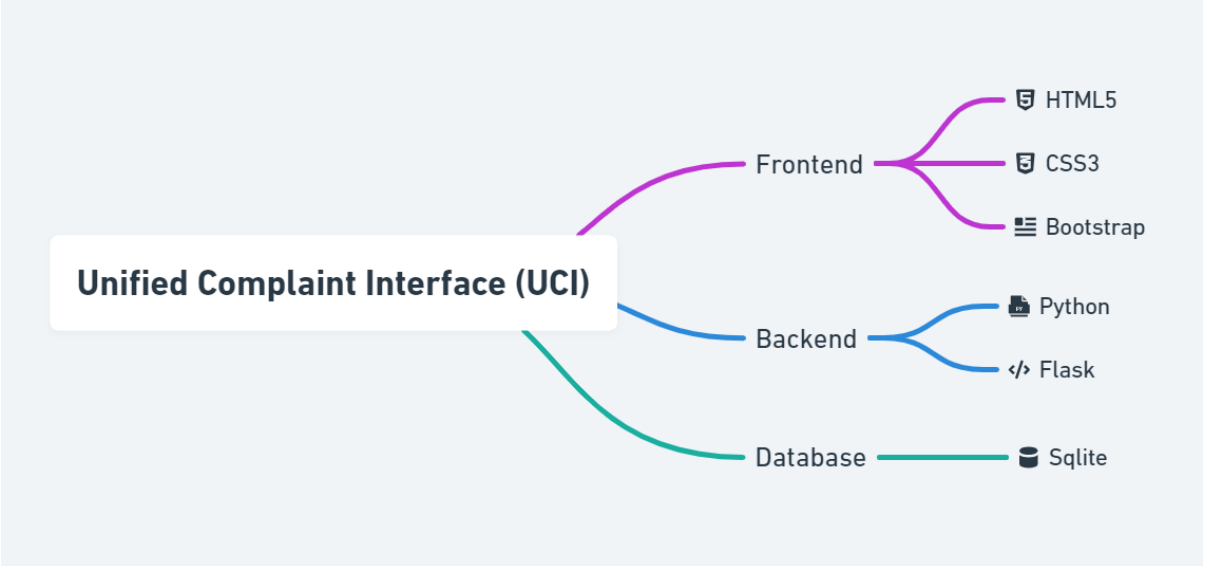

Fig 5.4 Technology Stack

Chapter 6

Results

The end result of the project is the website with a clean and user-friendly interface:

- **Homepage of the website:**

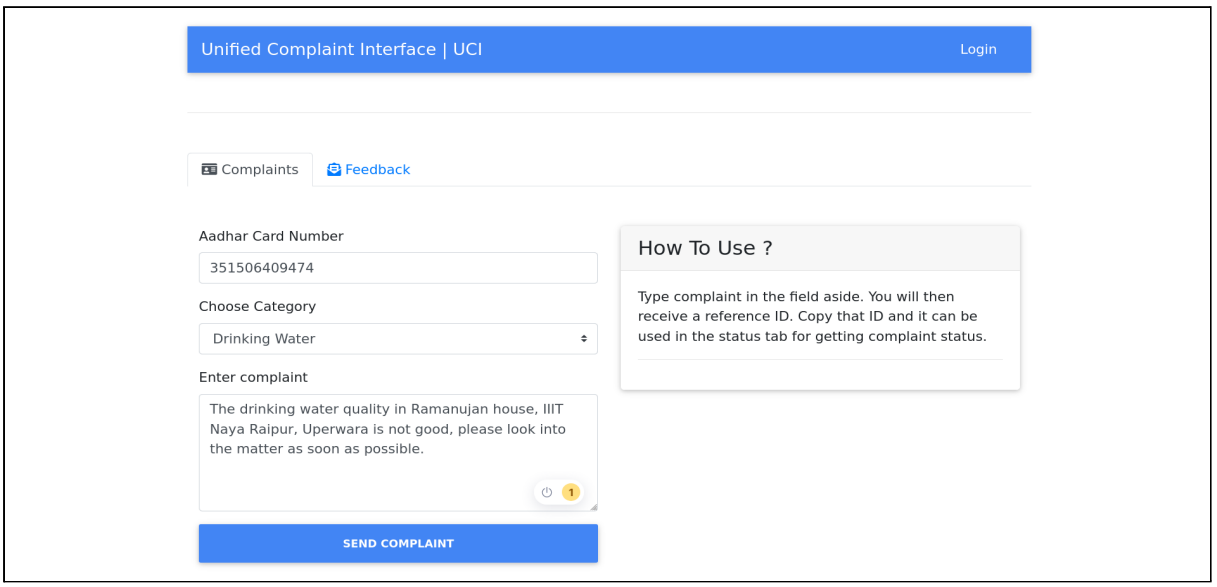

Fig 6.1 Homepage

- **Feedback page to track complaint status:**

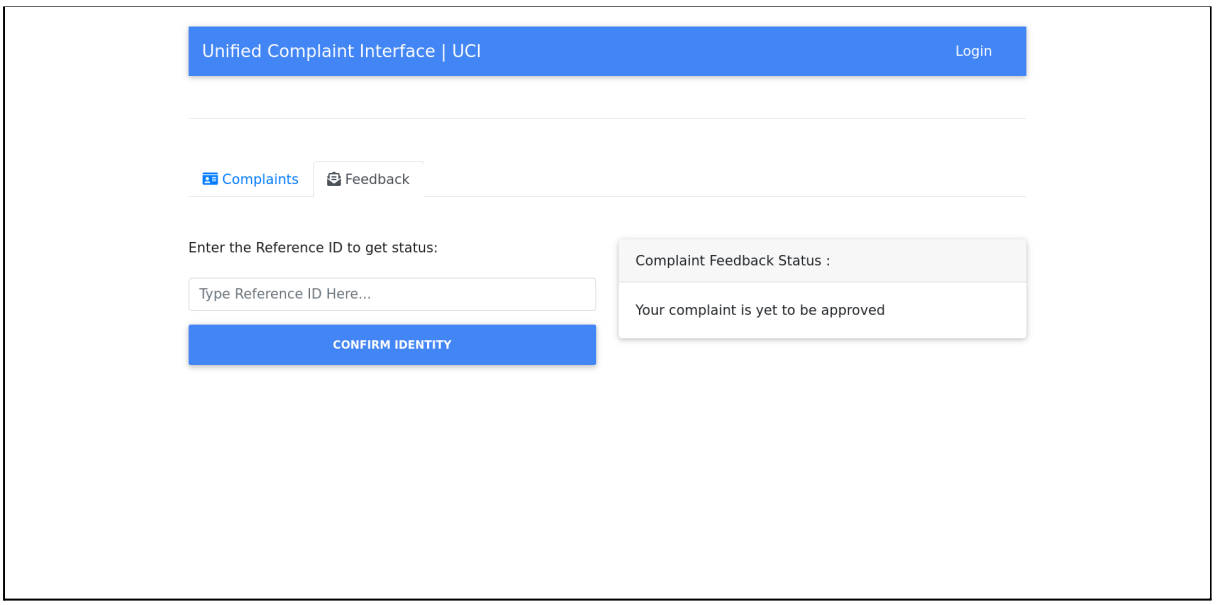

Fig 6.2 Feedback Page

- **Login Page for authorized personnel :**

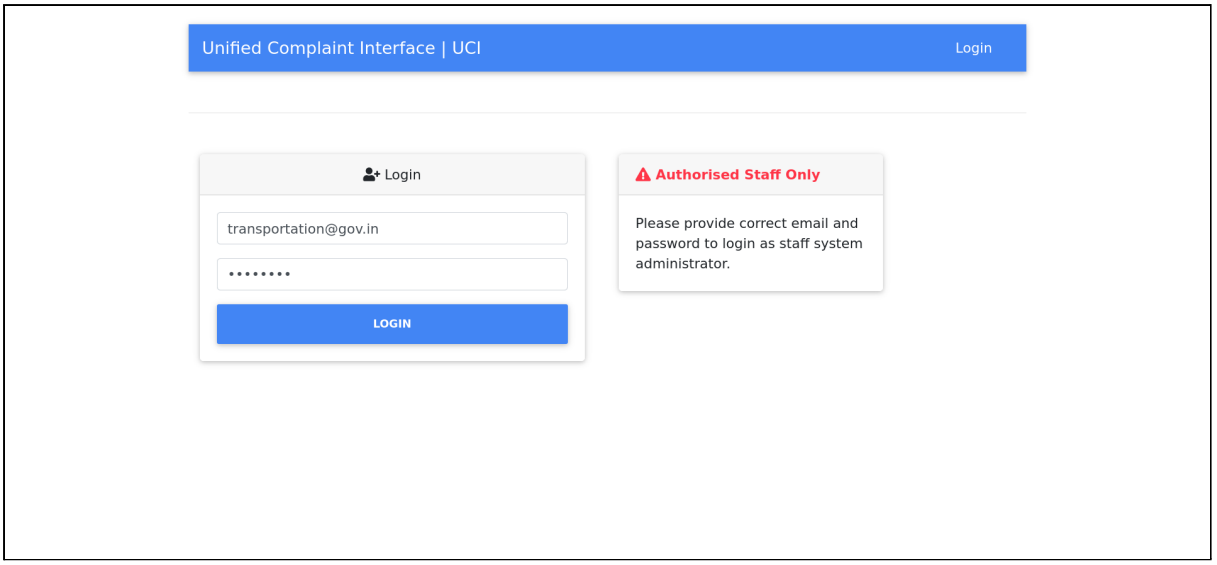

Fig 6.3 Admin Login Page

- **Complaint tracking by the admin :**

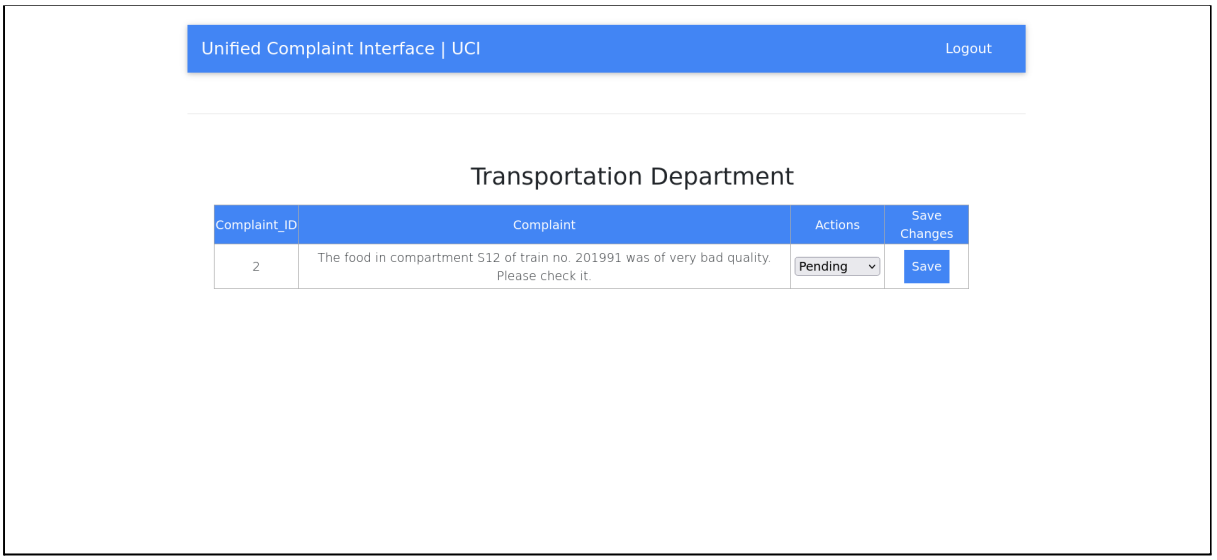

Fig 6.4 Complaint Management Page

Chapter 7

Applications of the project

The main problem which UCI solves is reducing the hassle of the users by giving ease in registering complaints on a single interface. So, it can be used at any place which requires a complaint management system like Railways, Government Corporations. This system is highly scalable and flexible, thus it can be easily deployed at any scenario.

The system is also very secure and with the proper implementation of an authentication system, the system can be made to run on end-to-end encryption. The system can be made highly scalable by using the cloud services, which will send the entire data in the cloud bucket thus reducing the requirement of physical servers.

The interface is responsive, enabling the users to use it on any devices and as the website is hosted on the internet, it makes it very easy for users to access it from anywhere around the world. The UI for the interface is specifically designed to be very simple and clean so that the users from village areas could easily navigate through it and use it for registering complaints.

The interface is also very light, so it doesn't require much time to load and has very few data requirements.

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