Automation Of Grievance Redressal Mechanism

BTech/III Year CSE/V Semester

15CSE302/Database Management Systems

Project Review -2

Rollno	Name
CB.EN.U4CSE18236	**LATHIKA D**
CB.EN.U4CSE18254	**S SNEHA LATHA**
CB.EN.U4CSE18255	**R SREE RANJANI**
CB.EN.U4CSE18257	**SRI SAKTHI MAHESWARI A**

Amrita School of Engineering, Coimbatore

Department of Computer Science and Engineering

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Chapter 4 Normalization

Tables created from relational schema mapping

- User(Aadhar_no, Username(FK), Name, email, City, State, DOB)
- Phone_no(Aadhar_no, phone_no)
- Grievance_status(Grievance_id, id, Aadhar_no (FK), Emp_aadhar (FK)Contact_id, status)
- Department(dep_name, dep_id, No_of_complaints)
- Employee(Emp_aadhar, Username (FK), emp_name, count, email, city, state)
- Phone_no(Emp_aadhar, phone_no)
- Inquires(Emp_aadhar,dep_id,inquiry_sent_date)
- Grievance(grievance_id, Aadhar_no,grievance_type, Received_date, Department)
- Login Details(Username, Password)

All attributes put together in one table:

Grievance_Mechanism (Username, Password, uname, uemail, ucity, ustate, aadharNo, phone_no, u_dob, count, emp_name, emp_aadhar, emp_city, emp_state, ephone_no, count, emp_email, emp_dob, grievance_id, received_date, grievance_type, Inquiry_sent_date, dep_id, Dep_name, no_of_complaints, status,emp_id)

Table populated with 5 records :

Initial Populated Table

Functional Dependencies:

- grievance_id -> dep_id
- grievance_id -> grievance_type
- grievance_id -> received_date
- grievance_id -> status
- username -> uname
- username -> uemail
- username ->ucity
- username ->ustate
- username ->aadhar_no
- username -> password
- username ->phone_no
- username ->u_dob

- username ->emp_name
- username -> emp_aadhar
- username ->emp_city
- username ->emp_state
- username ->ephone_no
- username ->emp_email
- username ->emp_dob
- username ->emp_id
- emp_id-> count
- dep_id -> dep_name
- dep_id -> no_of_complaints
- emp_id -> inquiry_sent_date
- username -> grievance_id

Attribute Closure:

- Grievance_id $^{+}$ = {dep_id, grievance_type, received_date, status}
- Username^{+} = { uname, uemail, ucity, ustate, aadhar_no, password, phone_no, u_dob, emp_name, emp_aadhar, emp_city, emp_state, ephone_no, emp_email, emp_dob, emp_id ,count, inquiry_sent_date}
- Emp_id^{+} = { count,inquiry_sent_date }
- Dep_id^{+} = { dep_name, no_of_complaints }

FD Closure:

- username -> count
- username ->dep_id,grievance_type, received_date, status
- greivance_id -> dep_name, no_of_complaints.
- grievance_id -> dep_name, grievance_type, received_date, status
- username -> uname, uemail, ucity, ustate, aadhar_no, dob, password, phone_no, u_dob, emp_name, emp_aadhar, emp_city, emp_state, ephone_no, emp_email, emp_dob, emp_id
- emp_id-> count, inquiry_sent_date
- dep_id -> dep_name, no_of_complaints

Canonical Cover:

- grievance_id -> dep_name, grievance_type, received_date, status
- username -> uname, uemail, ucity, ustate, aadhar_no, dob, password, phone_no, u_dob, emp_name, emp_aadhar, emp_city, emp_state, ephone_no, emp_email, emp_dob, emp_id
- emp_id-> count, inquiry_sent_date
- dep_id -> dep_name, no_of_complaints, inquiry_sent_date

A Table is in 1NF if it satisfies the below conditions:

- Primary key is there for all the tables
- No Repeating group of columns
- Atomic value of attributes

Checking if they are in 1NF:

- Primary Key: username, grievance_id, dep_id
- Repeating group of columns: There are repeating group of columns like uemail, emp_mail;emp_state,ustate; ucity,emp_city; u_dob, emp_dob so they all can be removed and only one column can be kept for each type and can be put in the same table.
- Atomic value of attributes: No they don't have atomic values so they can be put in different rows. So the primary key can be put like:
  username, grievance_id, dep_id,phone_no

Thus, the tables are in 1NF.

So now the schema is:

Grievance_Mechanism(Username, grievance_id, dep_id, emp_id phone_no, Password, name, email, city, state, aadharNo, dob, phone_no, received_date, count, grievance_type, Inquiry_sent_date, Dep_name, no_of_complaints, status,)

Anomalies:

- Update anomaly: Yes, When a user changes email_id it has to be changed in multiple rows if the user has multiple phone_no.
- Insertion anomaly: Yes, Even if the user has not yet sent any grievance then you can't add the value because grievance_id is one of the attributes in the primary key.

- Deletion anomaly: Yes, if the user deletes his account then the information about the grievance is also lost.

A Table is in 2NF if it satisfies the below conditions:

- It is in 1NF
- No partial dependency exists.

Checking if they are in 2NF:

- They are in 1NF
- The following partial dependency exists
    - grievance_id -> dep_name, grievance_type, received_date, status
      because the attribute grievance id is part of the composite primary key
    - username -> name, email, city, state, aadhar_no, dob, password
      as username is on of the prime attributes
    - dep_id -> dep_name, no_of_complaints
      as dep_id is one of prime attributes

As the tables are not in 2NF it is decomposed, to the tables as mentioned below.

Now the schema is:

- Login_Details(<u>username</u>,password)
- Details(<u>username</u>,name,email,state,city,dob,aadhar_no)
- Phone_no(<u>username</u>,phone_number)
- Department(<u>dep_id</u>,dep_name,no_of_complaints)
- Emp_count(<u>emp_id</u>,count)
- Grievance(<u>grievance_id,username,emp_id,dep_id</u>,grievance_type,received_date,dep_name,status,inquiry_sent_date)
- employee_identification(username,emp_id)

A Table is in 1NF if it satisfies the below conditions:

- All the tables should have a primary hey
- Atomic value of attributes
- No repeating group of columns

Checking if they are in 1NF:

- All the decomposed tables have a primary key
    - Login_Details - username
    - Details - username
    - Phone_no - username
    - Department - dep_id
    - Emp_count - emp_id,
    - Grievance - grievance_id,username,emp_id,dep_id
- No Repeating group of columns - In all the decomposed tables there are no repeating group of columns.
- Atomic value of attributes - All the values are atomic in nature, the multi-valued attribute phone number is put in a different table

Thus the tables are in 1NF.

A Table is in 2NF if it satisfies the below conditions:

- The tables have to be in 1NF
- All non-key attributes are fully functionally dependent on the primary key.

Checking if they are in 2NF:

- All the decomposed tables are in 1NF.
- All decomposed tables Login_Details ,Details,Phone_no,Department, Emp_count have only a primary key with one attribute therefore they have no partial dependencies where as in the case of the table Grievance there exists a partial dependencies as the non prime attributes depend only on greivance_id which is part of the composite primary key. Thus it is further decomposed into tables.

As the decomposed tables are not in 2NF, it is further decomposed, to the tables as mentioned below.

Now the schema is:

- Login_Details(<u>username</u>,password)
- Details(<u>username</u>,name,email,state,city,dob,aadhar_no)
- Phone_no(<u>username</u>,phone_number)
- Department(<u>dep_id</u>,dep_name,no_of_complaints)
- Grievance_dept(<u>username,grievance_id,emp_id</u>)

- Inquiry(emp_id, grievance_id,dep_id,inquiry_sent_date)
- Emp_count(emp_id,count)
- Grievance(grievance_id,grievance_type,received_date,dep_name,status)
- employee_identification(username,emp_id)

A Table is in 1NF if it satisfies the below conditions:

- All the tables should have a primary key
- Atomic value of attributes
- No repeating group of columns

Checking if they are in 1NF:

- All the decomposed tables have a primary key
    - Login_Details - username
    - Details - username
    - Phone_no - username
    - Department - dep_id
    - Grievance_dept - username,grievance_id,emp_id
    - Inquiry - emp_id, grievance_id,dep_id
    - Emp_count - emp_id
    - Grievance - grievance_id
    - Employee_Identification- username, emp_id
- No Repeating group of columns - In all the decomposed tables there are no repeating group of columns, The repeating group of columns where combined earlier.
- Atomic value of attributes - All the values are atomic in nature, the multi-valued attribute phone number is put in a different table.

Thus the tables are in 1NF.

A Table is in 2NF if it satisfies the below conditions:

- The tables have to be in 1NF
- All non-key attributes are fully functionally dependent on the primary key.

Checking if they are in 2NF:

- All the decomposed tables are in 1NF.
- All non-key attributes are fully functionally dependent on the primary key, tables Emp_count, Grievance , Login_Details , Details, Phone_no, Department have only a single attribute primary key, In the other tables there are no practical dependencies.

Thus the tables are in 2NF.

A Table is in 3NF if it satisfies the below conditions:

- Table is in 2NF
- No transitive dependency exists in the relations.

Checking if they are in 3NF:

- The tables are in 2NF as proved above.
- The decomposed tables don't contain any transitive dependencies, therefore it is in third normal form

Thus the tables are in 3NF.

A Table is in BCNF if it satisfies the below conditions:

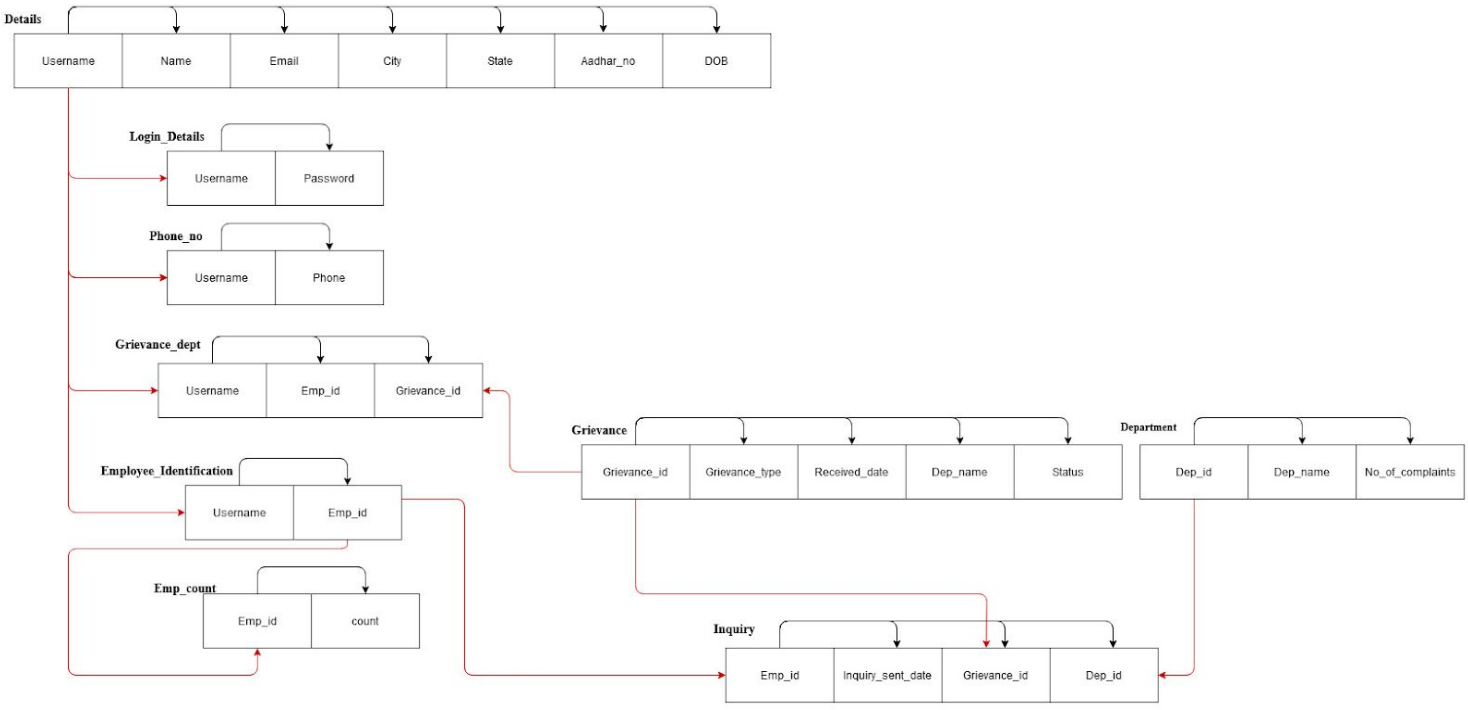
- Table is in 3NF
- No non-trivial dependencies exist, all non prime attributes depend on the primary keys/key of their respective tables.

Thus the tables are in BCNF.

Lossless Decomposition using chase method

Chase Method - XLS

Dependency Diagram:



Dependency Preserving Proof:

Dependencies of each table:

- Login_Details(username,password):
  Dependency: username -> password
- Details (username, name,email,state,city,dob,aadhar_no):
  Dependency: username -> name,email,state,city,dob,aadhar_no
- Phone_no(username,phone_number):
  Dependency: username -> phone_number
- Department(dep_id,dep_name,no_of_complaints):
  Dependency: dep_id -> dep_name,no_of_complaints
- Grievance_dept(username,grievance_id,emp_id):
  Dependency: username -> grievance_id, emp_id
- Inquiry(emp_id, grievance_id,dep_id, inquiry_sent_date):
  Dependency: emp_id -> inquiry_sent_date
- Emp_count(emp_id,count):
  Dependency: emp_id -> count
- Grievance(grievance_id,grievance_type,received_date,dep_name,status):
  Dependency: grievance_id -> grievance_type, received_date, dep_name, status
- Employee_identification(username,emp_id):
  Dependency: username -> emp_id

Union of all dependencies from decomposed table:

- Username -> Password, Name, Email, City ,State,Aadhar_no,DOB,Phone_number, Grievance_id, Emp_id
- Dep_id -> Dep_name, No_of_complaints
- Emp_id -> Count, Inquiry_sent_date
- Grievance_id -> Grievance_type, Received_date, Dep_name, Status

Functional dependencies:

- Username -> Password
- Username -> name
- Username -> email
- Username -> city
- Username -> state
- Username -> aadharNo
- Username -> dob

- Username -> phone_no
- Username ->Emp_id
- Username -> grievance_id
- Dep_id -> Dep_name
- Dep_id -> no_of_complaints
- grievance_id -> dep_id
- grievance_id -> status
- grievance_id -> received_date
- grievance_id -> grievance_type
- emp_id ->count
- emp_id -> inquiry_sent_date

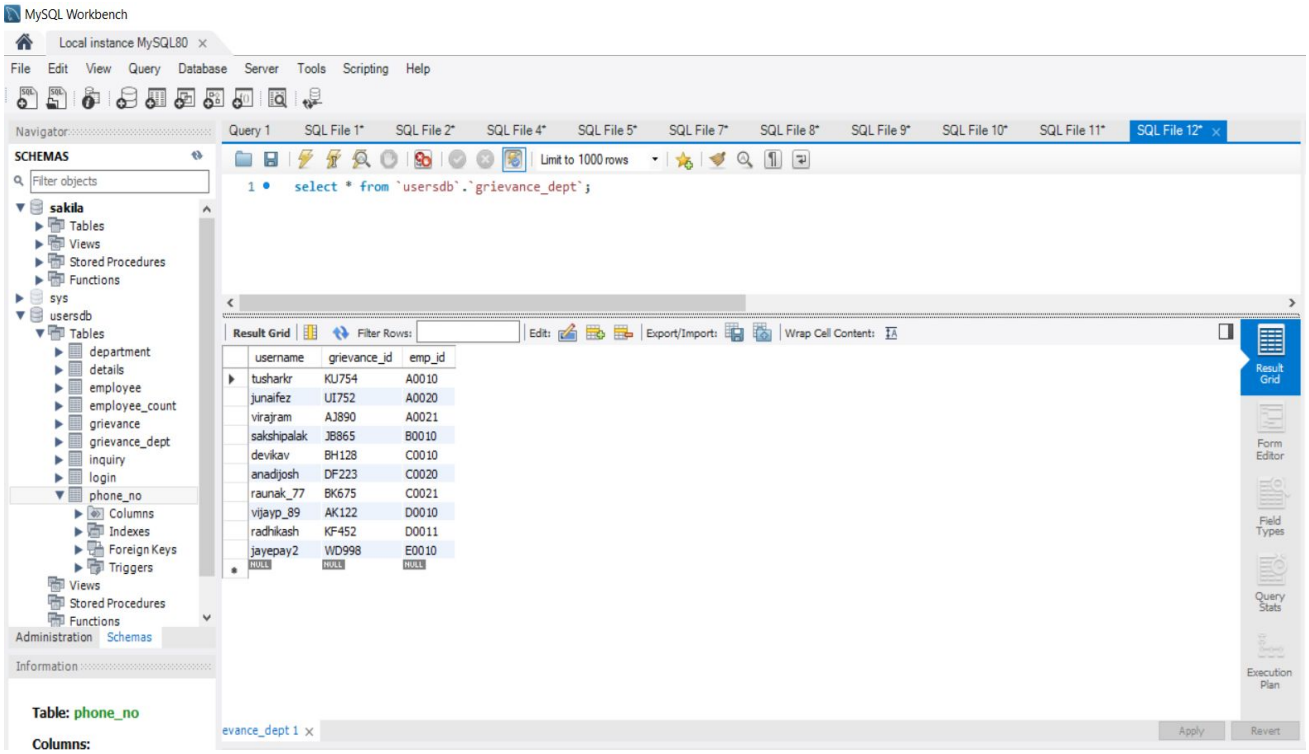
Since all dependencies present in the schema are present in the union of all dependencies from the decomposed table, we can say that the decomposition is dependency preserving.

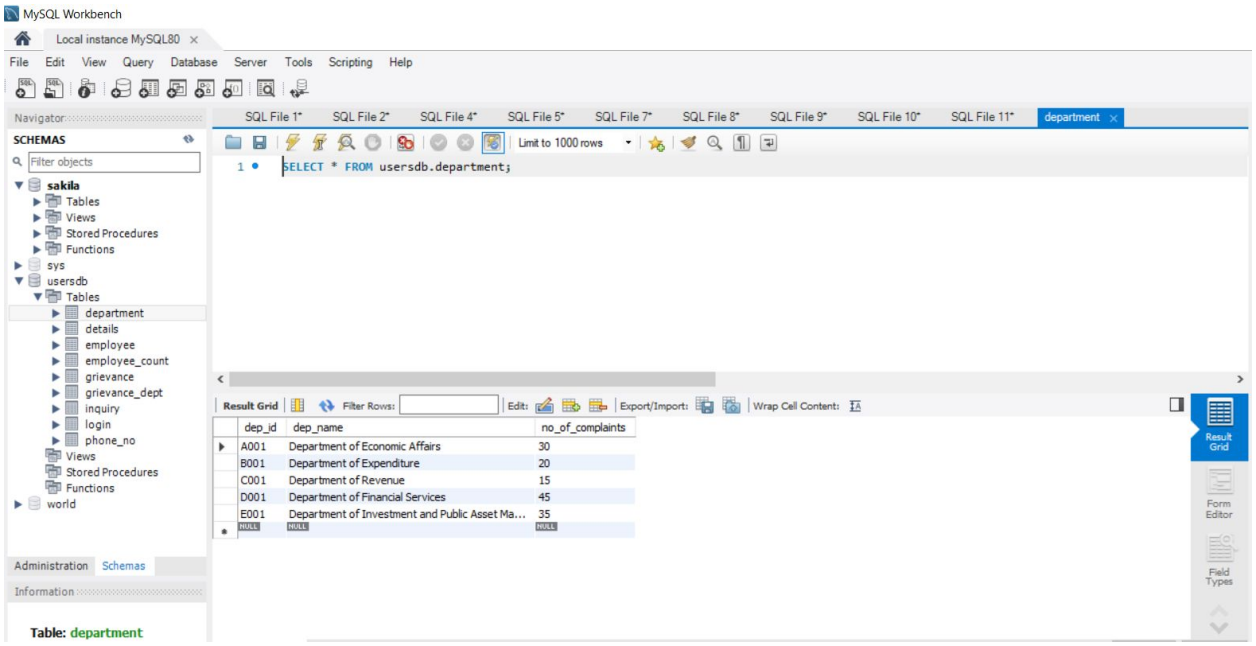
Tables

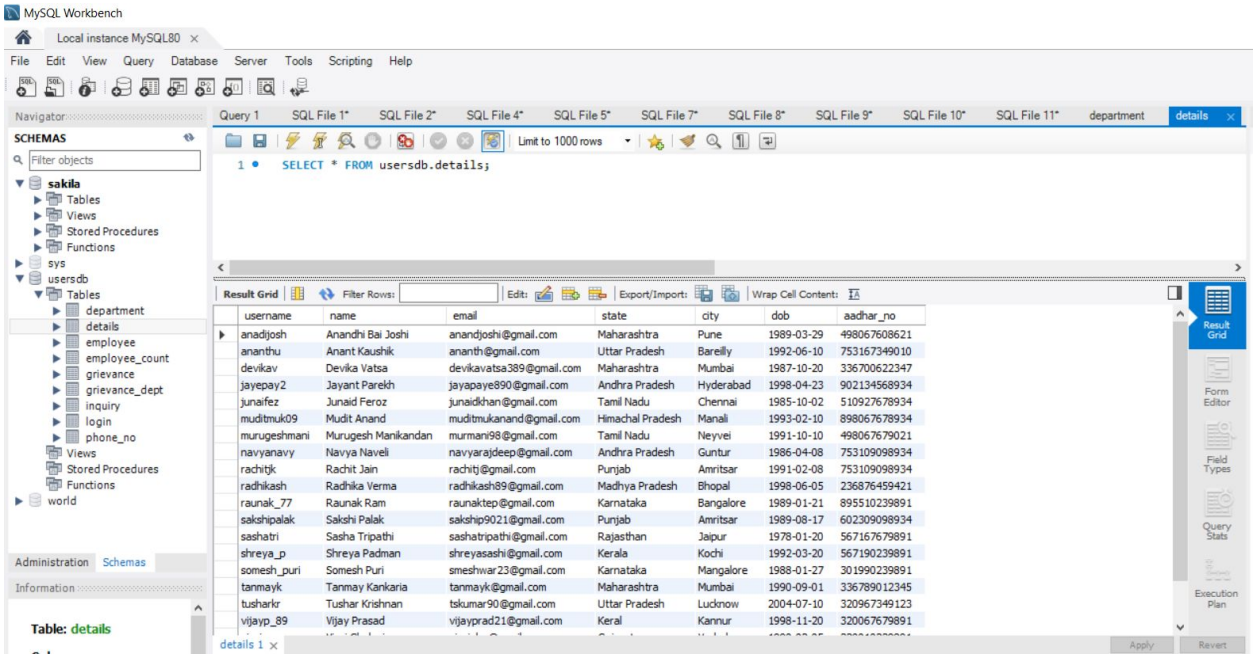
Final Schema with the data

Chapter 5 - Creation of tables:

Database table screenshots:






MySQL Workbench
Local instance MySQL80
File Edit View Query Database Server Tools Scripting Help
SCHEMAS
sakila
usersdb
Tables
department
details
employee
employee_count
grievance
grievance_dept
inquiry
login
phone_no
Views
Stored Procedures
Functions
sys
world
Query 1 SQL File 1* SQL File 2* SQL File 4* SQL File 5* SQL File 7* SQL File 8* SQL File 9* SQL File 10* SQL File 11* department details
Limit to 1000 rows
1 • SELECT * FROM usersdb.details;
Result Grid
Filter Rows:
Edit: Export/Import: Wrap Cell Content:
username name email state city dob aadhar_no
anadijosh Anandhi Bai Joshi anandjoshi@gmail.com Maharashtra Pune 1989-03-29 498067608621
ananthu Anant Kaushik ananth@gmail.com Uttar Pradesh Bareilly 1992-06-10 753167349010
devikav Devika Vatsa devikavatsa389@gmail.com Maharashtra Mumbai 1987-10-20 336700622347
jayepay2 Jayant Parekh jayapaye890@gmail.com Andhra Pradesh Hyderabad 1998-04-23 902134568934
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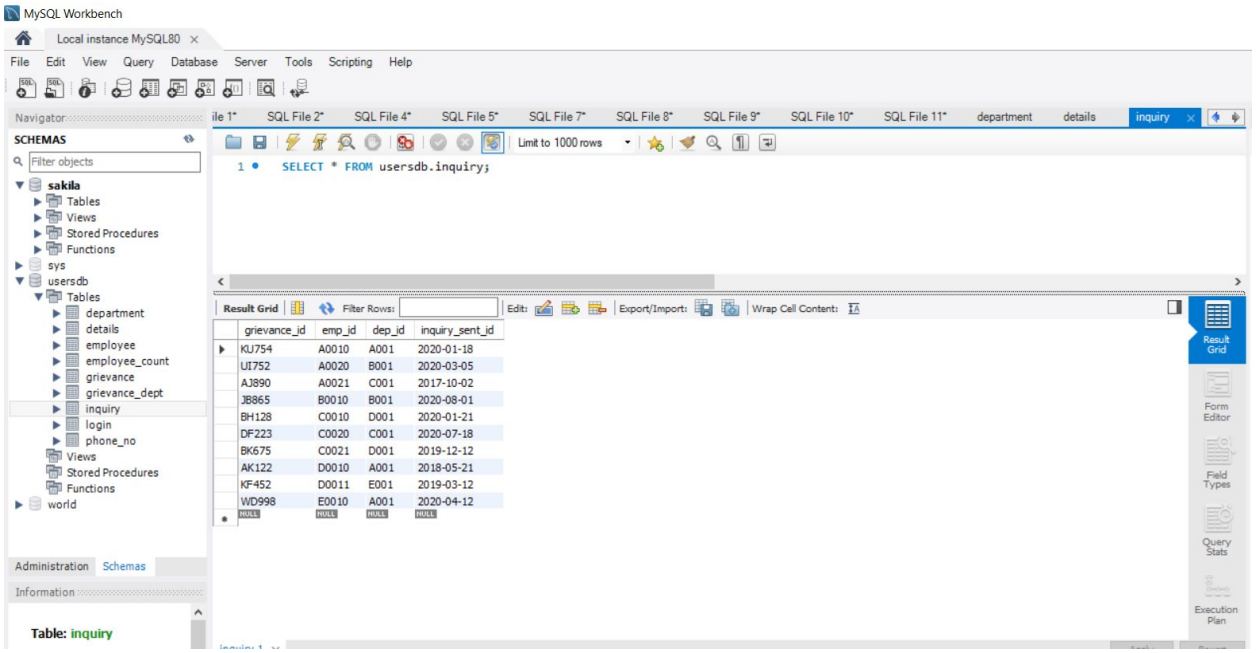
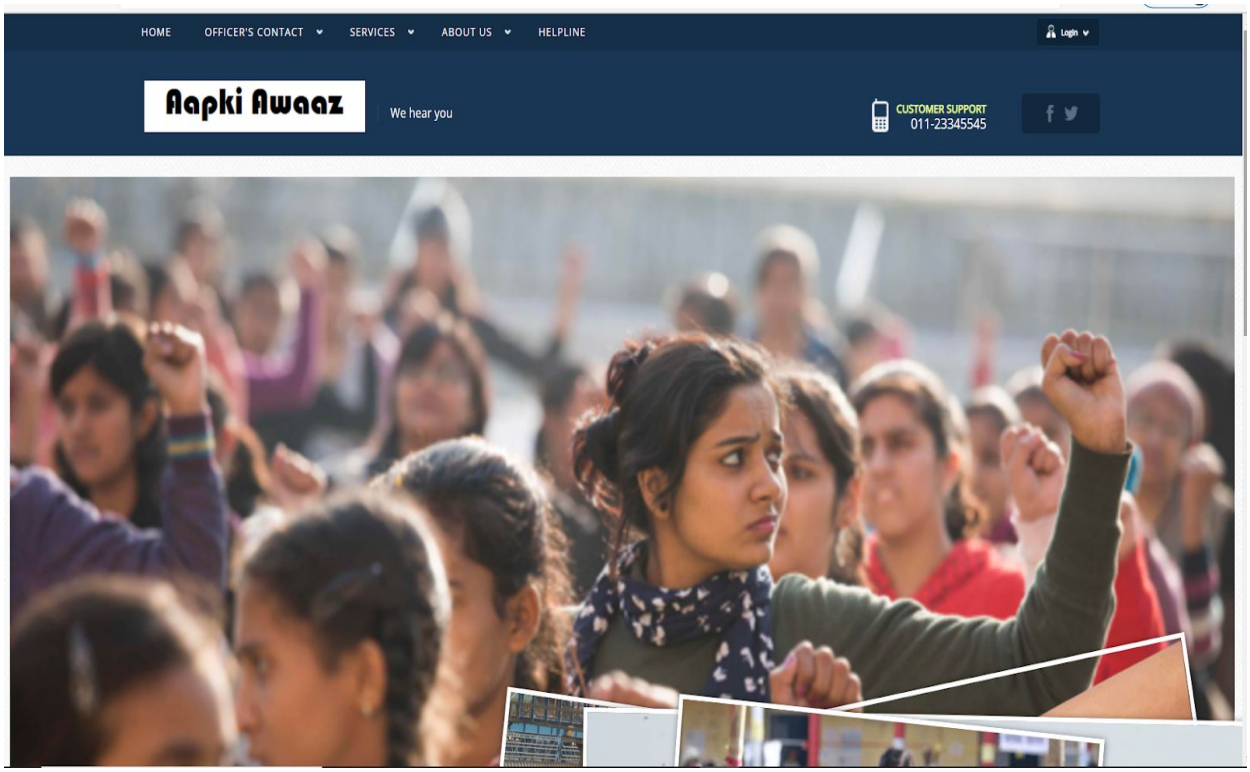
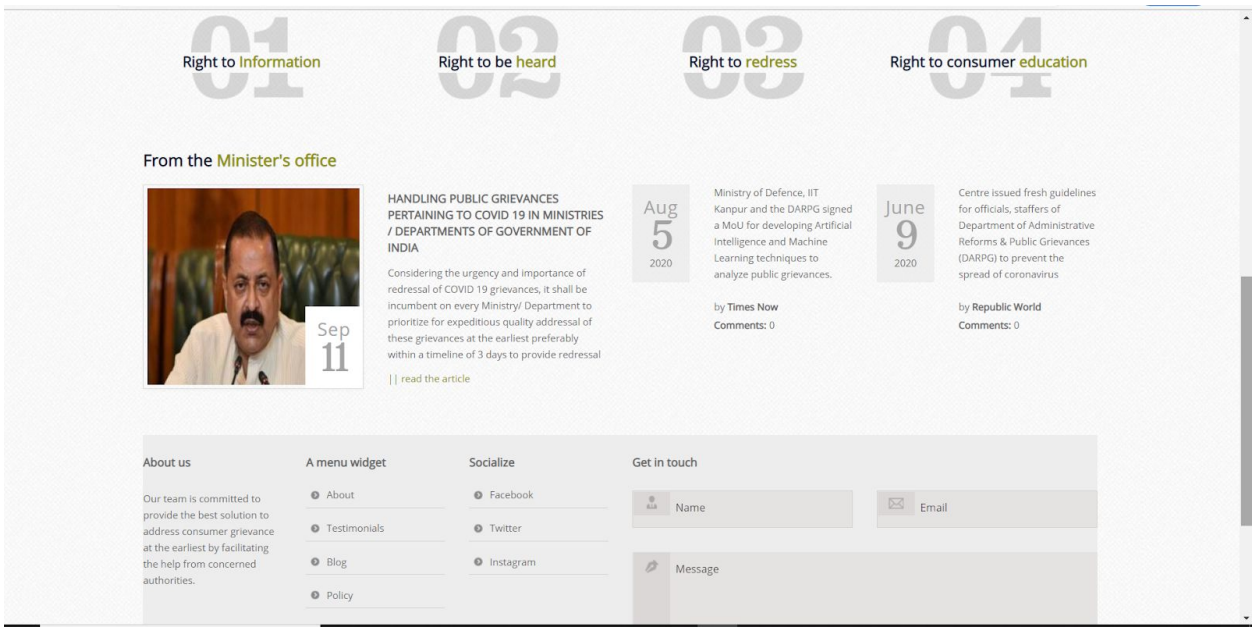
tanmayk Tanmay Kankaria tanmayk@gmail.com Maharashtra Mumbai 1990-09-01 336789012345
tusharkr Tushar Krishnan tskumar90@gmail.com Uttar Pradesh Lucknow 2004-07-10 320967349123
vijayp_89 Vijay Prasad vijayprad21@gmail.com Keral Kannur 1998-11-20 320067679891
Result Grid
Form Editor
Field Types
Query Stats
Execution Plan
Administration Schemas
Information
Table: details
details 1
Apply
Revert


MySQL Workbench
Local instance MySQL80
File Edit View Query Database Server Tools Scripting Help
SCHEMAS
sakila
usersdb
Tables
department
details
employee
employee_count
grievance
grievance_dept
inquiry
login
phone_no
Views
Stored Procedures
Functions
sys
world
SQL File 2* SQL File 4* SQL File 5* SQL File 7* SQL File 8* SQL File 9* SQL File 10* SQL File 11* department details inquiry
Limit to 1000 rows
1 • SELECT * FROM usersdb.inquiry;
Result Grid
Filter Rows:
Edit: Export/Import: Wrap Cell Content:
grievance_id emp_id dep_id inquiry_sent_id
KU754 A0010 A001 2020-01-18
UI752 A0020 B001 2020-03-05
AJ890 A0021 C001 2017-10-02
JB865 B0010 B001 2020-08-01
BH128 C0010 D001 2020-01-21
DF223 C0020 C001 2020-07-18
BK675 C0021 D001 2019-12-12
AK122 D0010 A001 2018-05-21
KF452 D0011 E001 2019-03-12
WD998 E0010 A001 2020-04-12
Result Grid
Form Editor
Field Types
Query Stats
Execution Plan
Administration Schemas
Information
Table: inquiry

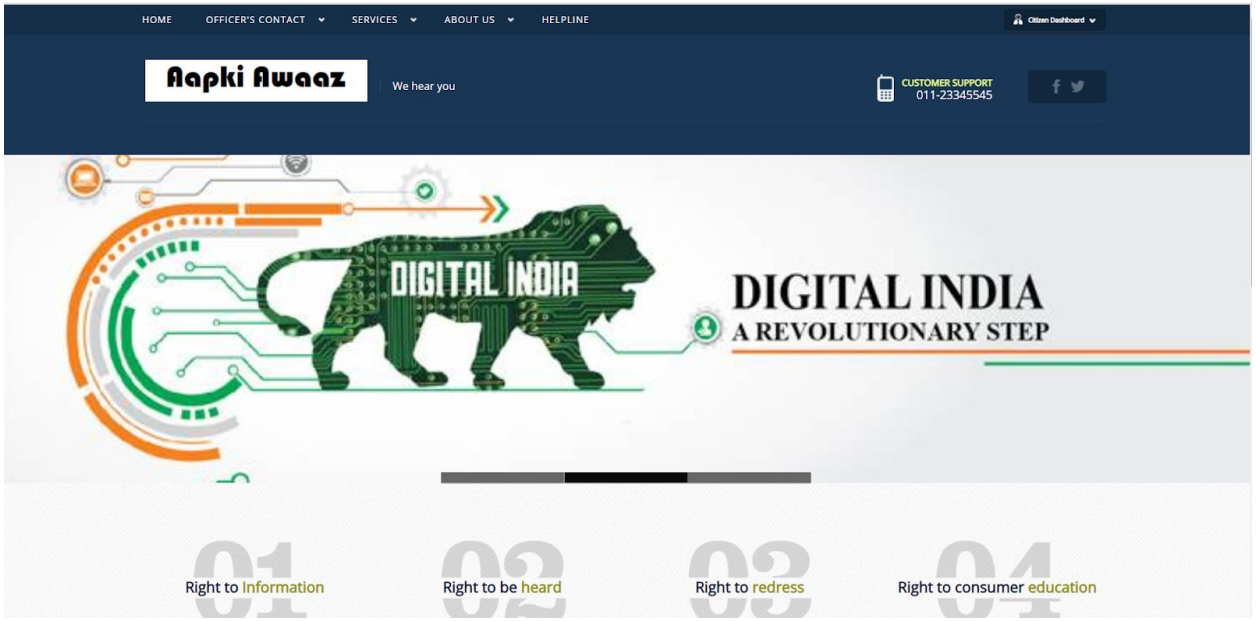
Chapter 6 - UI screenshots:

Website dashboard

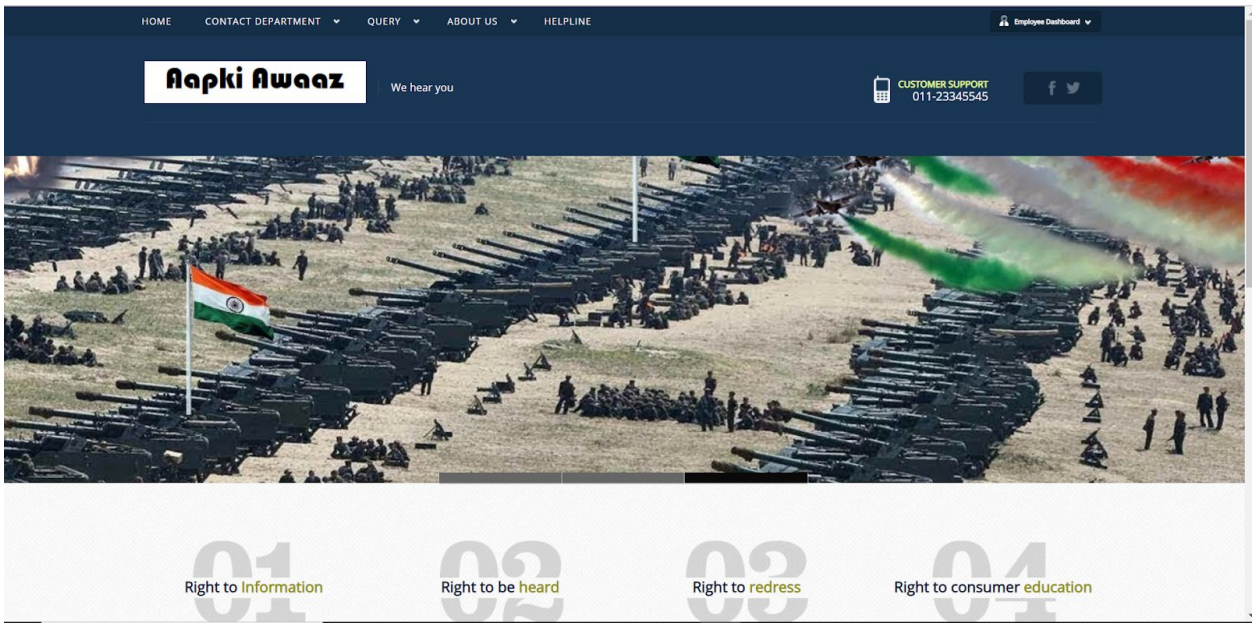




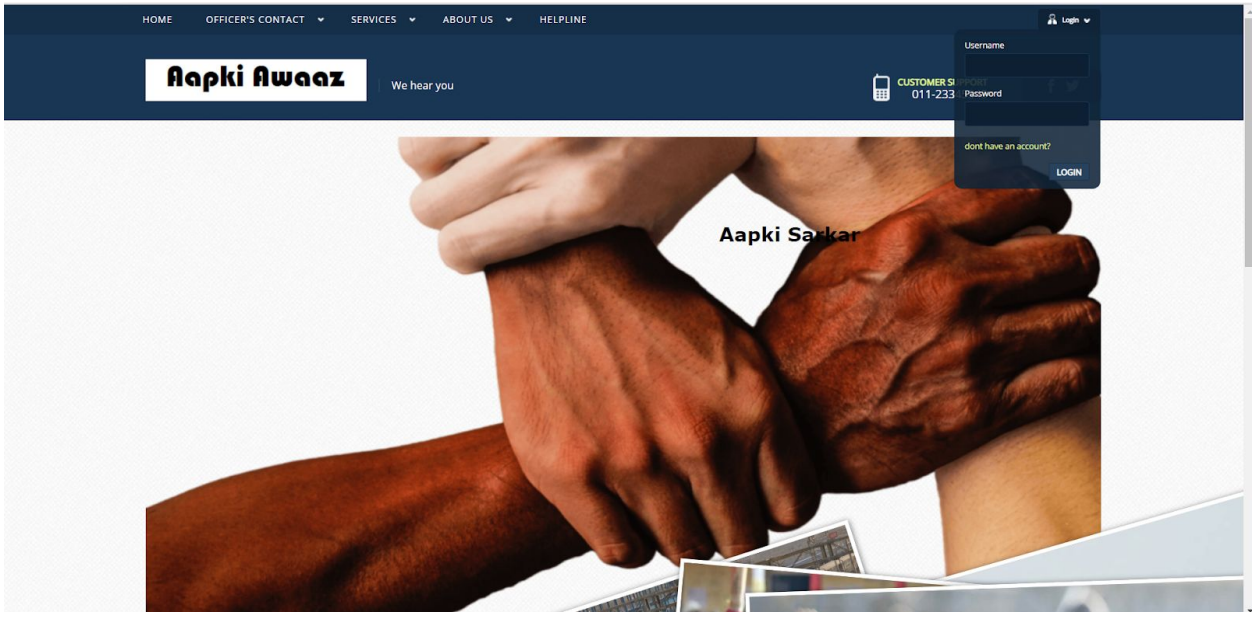
User Dashboard:



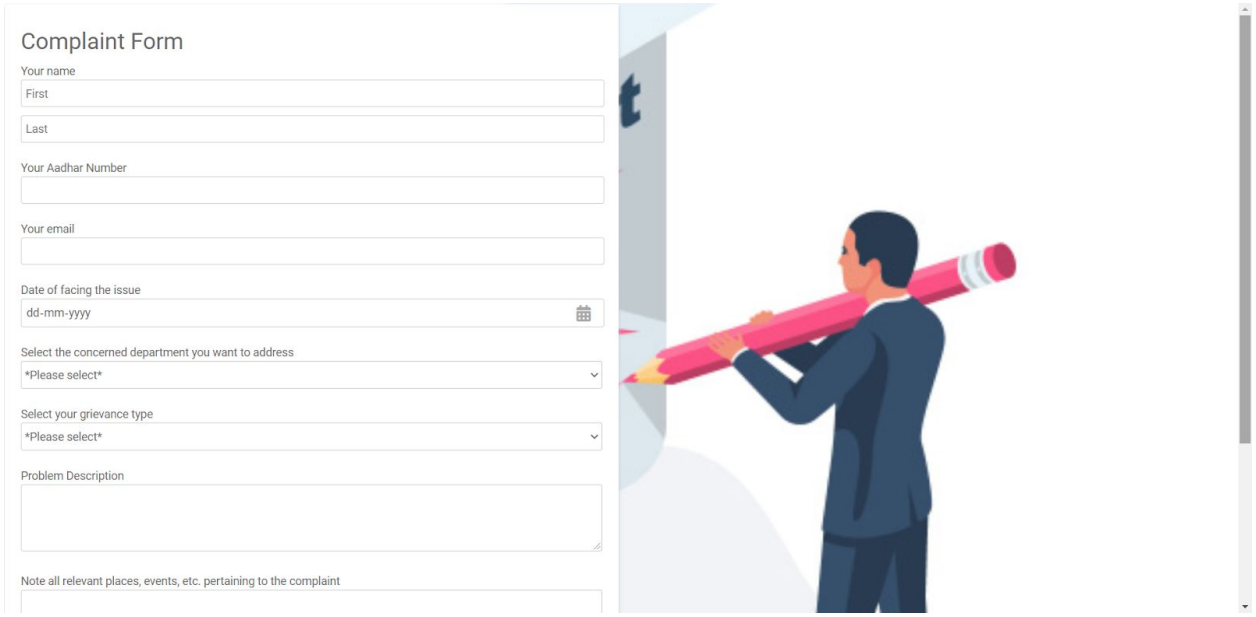
Employee Dashboard:



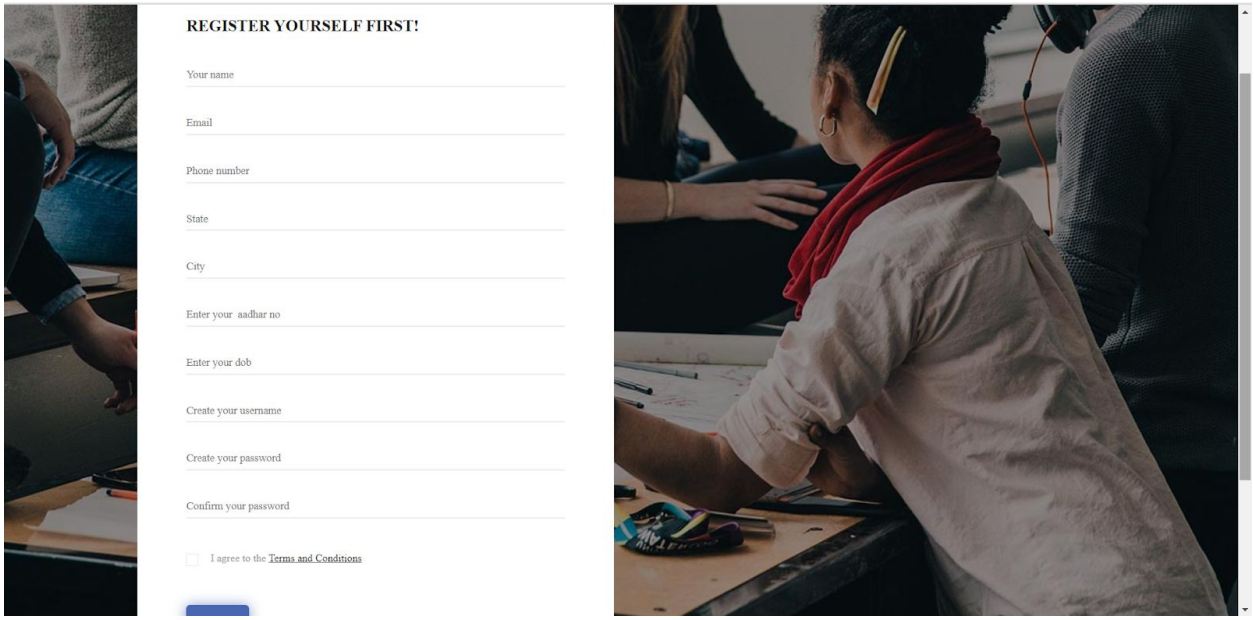
User login page:



Complaint Form:



Registration Form:



References:

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URL:https://data.gov.in/search/site?query=Darpg

[2] Page Title: CPGRAMS-home, Accessed: 6th October 2020

URL:https://pgportal.gov.in/

[3] Page Title: National Government of India, Accessed: 6th October 2020

URL:https://www.india.gov.in/