

Database Management System

Project Review 2

Title - VIT Clubhouse Web Portal

Group Members :

Karan Singh	19BCE2310
Kachireddy Raghavendra Kaushik	19BCE2320
Rishabh Vasudevan	19BCE2290

Slot:

L11 + L12

Faculty Name:

Prof. Kathiravan S.

Normalization

Database normalization is the process of structuring a relational database in accordance with a series of so-called normal forms in order to reduce data redundancy and improve data integrity. It was first proposed by Edgar F. Codd as part of his relational model.

If a database design is not perfect, it may contain anomalies, which are like a bad dream for any database administrator. Managing a database with anomalies is next to impossible.

- **Updation anomalies** – If data items are scattered and are not linked to each other properly, then it could lead to strange situations. For example, when we try to update one data item having its copies scattered over several places, a few instances get updated properly while a few others are left with old values. Such instances leave the database in an inconsistent state.
- **Deletion anomalies** – We tried to delete a record, but parts of it was left undeleted because of unawareness, the data is also saved somewhere else.
- **Insertion anomalies** – We tried to insert data in a record that does not exist at all.

Normalization is a method to remove all these anomalies and bring the database to a consistent state.

→ 1st Normal Form (1NF) -

For a table to be in the First Normal Form, it should follow the following 4 rules:

1. It should only have single(atomic) valued attributes/columns.
2. Values stored in a column should be of the same domain
3. All the columns in a table should have unique names.

→ 2nd Normal Form (2NF) -

For a table to be in the Second Normal Form,

1. It should be in the First Normal form.
2. And, it should not have Partial Dependency.

→ 3rd Normal Form (3NF) -

A table is said to be in the Third Normal Form when,

1. It is in the Second Normal form.
2. And, it doesn't have Transitive Dependency.

→ Boyce-Codd Normal Form (BCNF) -

Boyce and Codd Normal Form is a higher version of the Third Normal form. This form deals with a certain type of anomaly that is not handled by 3NF. A 3NF table which does not have multiple overlapping candidate keys is said to be in BCNF.

For a table to be in BCNF, following conditions must be satisfied:

- R must be in 3rd Normal Form
- and, for each functional dependency ($X \rightarrow Y$), X should be a super Key.

Implementation of Normal Forms

1. User Account Table -

User_Account(email, username, password, name, date_joined, time_table, last_login, is_active)

Functional Dependencies -

User Account

email \rightarrow username, name, password

email \rightarrow date_joined

email, username \rightarrow timetable

last_login \rightarrow is_active

email \rightarrow last_login

Candidate Key - "email"

Checking for various Normal Forms -

- **1st Normal Form (1NF) -**

All the attributes are single valued (atomic). This table is already in the First Normal Form as it satisfies all the conditions discussed above.

- **2nd Normal Form (2NF) -**

Since the Functional Dependencies have no Partial Dependency and it is in 1st Normal Form, this table is already in Second Normal Form.

- **3rd Normal Form (3NF) -**

The table fails the Third Normal Form because in the Function Dependency "**last_login** \rightarrow **is_active**" LHS is not a superkey and RHS contains a non-key attribute.

Converting this table to 3NF -

Splitting the table into two:

1. Attributes - (email, name, password, date_joined, username, last_login, timetable)

Functional Dependencies:

email \rightarrow last_login, date_joined

email \rightarrow name, username, password, timetable

2. Attributes - (last_login, is_active)

Functional Dependencies:

last_login \rightarrow is_active

- **Boyce-Codd Normal Form (BCNF) -**

A table is in BCNF if and only if for every non-trivial Functional Dependency, the LHS is a superkey. The FD "**last_login** \rightarrow **is_active**" is non-trivial and its LHS is not a superkey hence it violates BCNF.

Converting this table to BCNF -

Splitting this table into two:

1. Attributes - (**email, name, password, date_joined, username, last_login, timetable**)

Functional Dependencies:

email \rightarrow last_login, date_joined

email \rightarrow name, username, password, timetable

2. Attributes - (**last_login, is_active**)

Functional Dependencies:

last_login \rightarrow is_active

2. Resources -

Resources(sub_ID, notes, previous_cat_papers, projects, DAs)

Functional Dependencies -

Resources

sub_ID \rightarrow notes, projects

sub_ID \rightarrow previous_cat_papers

sub_ID \rightarrow DAs

Candidate Key - "sub_ID"

Checking for various Normal Forms -

- **1st Normal Form (1NF) -**

All the attributes are single valued (atomic). This table is already in the First Normal Form as it satisfies all the conditions discussed above.

- **2nd Normal Form (2NF) -**

Since the Functional Dependencies have no Partial Dependency and it is in 1st Normal Form, this table is already in Second Normal Form.

- **3rd Normal Form (3NF) -**

For each Functional Dependency, LHS is a super key or the RHS has only key attributes. Hence this table is in the Third Normal Form.

- **Boyce-Codd Normal Form (BCNF) -**

Since all the Functional Dependencies have super keys in the LHS therefore this table is already in Boyce-Codd Normal Form.

3. Clubs -

Clubs(club_name, club_email, club_website, social_handles)

Functional Dependencies -

Clubs

club_name, club_email \rightarrow club_website

club_email \rightarrow social_handles

Candidate Key - "club_name, club_email"

Checking for various Normal Forms -

- **1st Normal Form (1NF) -**

Since "**social handle**" is a multivalued attribute hence this is not in the First normal form.

Converting this table to First Normal Form -

Splitting attribute "**social handle**":

Functional Dependencies:

club_name, club_email \rightarrow club_website

club_email \rightarrow social_handle1, social_handle2

- **2nd Normal Form (2NF) -**

The functional dependency "**club_email \rightarrow social_handle1, social_handle2**" violates definition of 2NF as LHS is a proper subset of Candidate Key.

Converting to 2NF -

Splitting the table in two

1. Attributes - (**club_email, social_handle1, social_handle2**)

Functional Dependencies:

club_email \rightarrow social_handle1, social_handle2

2. Attributes - (**club_name, club_email, club_website**)

Functional Dependencies:

club_email, club_name \rightarrow club_website

- **3rd Normal Form (3NF) -**

club_email \rightarrow social_handle1, social_handle2

The above Functional Dependency violates definition of 3NF: it is non-trivial, LHS is not superkey, RHS contains a non-key attribute.

Converting to 3NF -

Splitting the table in two

1. Attributes - (**club_email, social_handle1, social_handle2**)

Functional Dependencies:

club_email \rightarrow social_handle1, social_handle2

2. Attributes - (**club_name, club_email, club_website**)

Functional Dependencies:

club_email, club_name \rightarrow club_website

- **Boyce-Codd Normal Form (BCNF) -**

The FD club_email, club_name \rightarrow club_website is non-trivial and its LHS is not a superkey. Therefore it violates BCNF

Converting to 2NF -

Splitting the table in two

1. Attributes - (**club_email, social_handle1, social_handle2**)

Functional Dependencies:

club_email \rightarrow social_handle1, social_handle2

2. Attributes - (**club_name, club_email, club_website**)

Functional Dependencies:

club_email, club_name \rightarrow club_website

4. Events -

Events(Event_name, description, poster, date_of_event, club_name)

Functional Dependencies -

Events

Event_name \rightarrow description, poster

Event_name \rightarrow date_of_event

Event_name \rightarrow club_name

Candidate Key - "Event_name"

Checking for various Normal Forms -

- **1st Normal Form (1NF) -**

All the attributes are single valued (atomic). This table is already in the First Normal Form as it satisfies all the conditions discussed above.

- **2nd Normal Form (2NF) -**

Since the Functional Dependencies have no Partial Dependency and it is in 1st Normal Form, this table is already in Second Normal Form.

- **3rd Normal Form (3NF) -**

For each Functional Dependency, LHS is a super key or the RHS has only key attributes. Hence this table is in the Third Normal Form.

- **Boyce-Codd Normal Form (BCNF) -**

Since all the Functional Dependencies have super keys in the LHS therefore this table is already in Boyce-Codd Normal Form.

5. Recruitments -

Recruitments(recruitment_ID, club_name, date, time, venue)

Functional Dependencies -

Recruitments

recruitment_ID \square date, time, venue

recruitment_ID \square club_name

Candidate Key - "recruitment_ID"

Checking for various Normal Forms -

- **1st Normal Form (1NF) -**

All the attributes are single valued (atomic). This table is already in the First Normal Form as it satisfies all the conditions discussed above.

- **2nd Normal Form (2NF) -**

Since the Functional Dependencies have no Partial Dependency and it is in 1st Normal Form, this table is already in Second Normal Form.

- **3rd Normal Form (3NF) -**

For each Functional Dependency, LHS is a super key or the RHS has only key attributes. Hence this table is in the Third Normal Form.

- **Boyce-Codd Normal Form (BCNF) -**

Since all the Functional Dependencies have super keys in the LHS therefore this table is already in Boyce-Codd Normal Form.

6. Chat Rooms -

Chatrooms(room_name, date_created, ip_address)

Functional Dependencies -

Chat Rooms

room_name \square date_created, ip_address

Candidate Key - "room_name"

Checking for various Normal Forms -

- **1st Normal Form (1NF) -**

All the attributes are single valued (atomic). This table is already in the First Normal Form as it satisfies all the conditions discussed above.

- **2nd Normal Form (2NF) -**

Since the Functional Dependencies have no Partial Dependency and it is in 1st Normal Form, this table is already in Second Normal Form.

- **3rd Normal Form (3NF) -**

For each Functional Dependency, LHS is a super key or the RHS has only key attributes. Hence this table is in the Third Normal Form.

- **Boyce-Codd Normal Form (BCNF) -**

Since all the Functional Dependencies have super keys in the LHS therefore this table is already in Boyce-Codd Normal Form.

7. Messages -

Messages(room_name, message, time_stamp, sender_ip)

Functional Dependencies -

Messages

room_name \square message

message \square time_stamp

message \square sender_ip

Candidate Key - "room_name"

Checking for various Normal Forms -

- **1st Normal Form (1NF) -**

All the attributes are single valued (atomic). This table is already in the First Normal Form as it satisfies all the conditions discussed above.

- **2nd Normal Form (2NF) -**

Since the Functional Dependencies have no Partial Dependency and it is in 1st Normal Form, this table is already in Second Normal Form.

- **3rd Normal Form (3NF) -**

The table fails the Third Normal Form because in the Function Dependency “**message** \rightarrow **time_stamp**” LHS is not a superkey and RHS contains a non-key attribute.

Converting this table to 3NF -

Splitting the table into two:

1. Attributes - (**message**, **sender_ip**, **time_stamp**)

Functional Dependencies:

message \rightarrow sender_ip, time_stamp

2. Attributes - (**room_name**, **message**)

Functional Dependencies:

room_name \rightarrow message

- **Boyce-Codd Normal Form (BCNF) -**

A table is in BCNF if and only if for every non-trivial Functional Dependency, the LHS is a superkey. The FD “**message** \rightarrow **time_stamp**” is non-trivial and its LHS is not a superkey hence it violates BCNF.

Converting this table to 3NF -

Splitting the table into two:

1. Attributes - (**message**, **sender_ip**, **time_stamp**)

Functional Dependencies:

message \rightarrow sender_ip, time_stamp

2. Attributes - (room_name, message)

Functional Dependencies:

room_name \rightarrow message

8. Site Manager -

Site_Manager(manager_id, email)

Functional Dependencies -

Site Manager

manager_id \rightarrow email

Candidate Key - "manager_id"

Checking for various Normal Forms -

- **1st Normal Form (1NF) -**

All the attributes are single valued (atomic). This table is already in the First Normal Form as it satisfies all the conditions discussed above.

- **2nd Normal Form (2NF) -**

Since the Functional Dependencies have no Partial Dependency and it is in 1st Normal Form, this table is already in Second Normal Form.

- **3rd Normal Form (3NF) -**

For each Functional Dependency, LHS is a super key or the RHS has only key attributes. Hence this table is in the Third Normal Form.

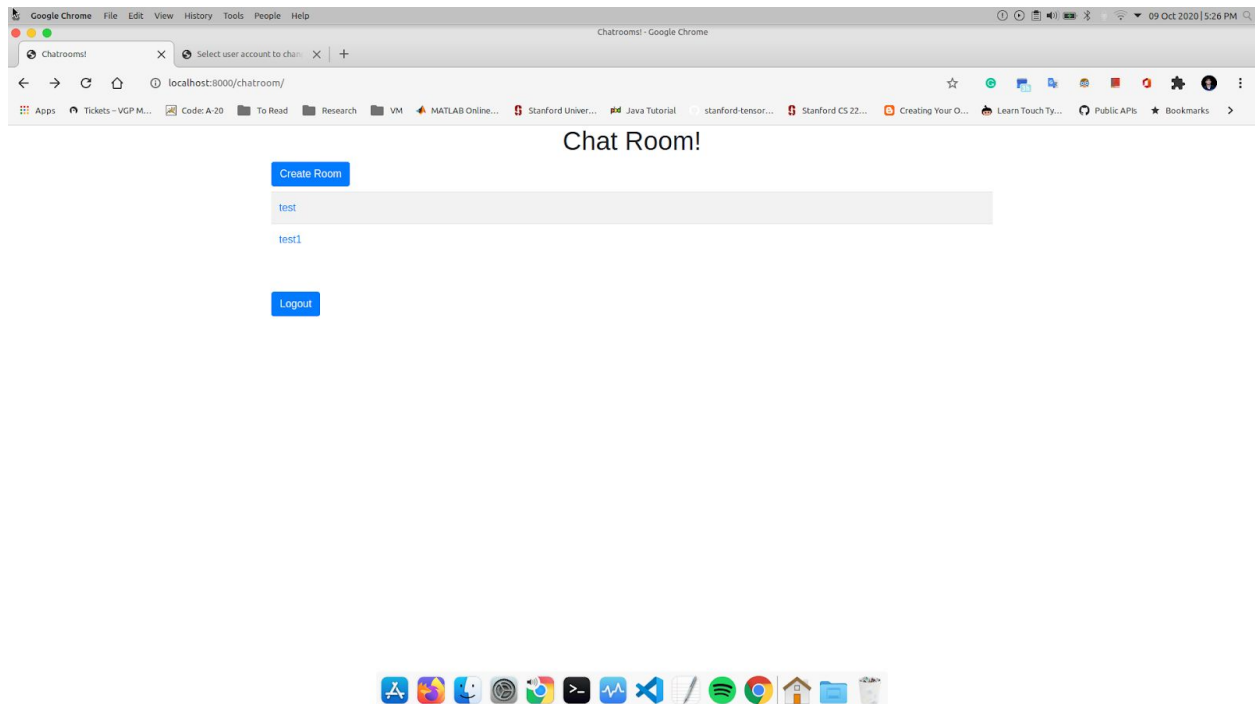
- **Boyce-Codd Normal Form (BCNF) -**

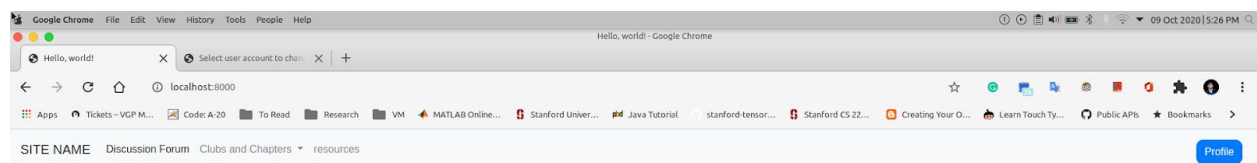
Since all the Functional Dependencies have super keys in the LHS therefore this table is already in Boyce-Codd Normal Form.

Software Used

For implementing this Web Portal we will be using the Django Web Framework as our Backend and we will be making our database in PostgreSQL. Our frontend has been written in multiple languages which include - HTML5, CSS3, Javascript and JQuery.

Screenshots of our partial implementation -





Hello, VITIAN!

Search

Search



VIT Clubs

