

# IT-214 DBMS PROJECT Aadhar Card System (Group ID - T615)

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### **SUMMARY**

We implement the data base of uidai.com website, in that our main motivation is to provide various services to Aadhar-card holders. The following website aims to help user in various ways such as online booking of appointment, updating Aadhar-information, checking status related to their Aadhar-card and to get information about previous transactions.

This web-site provides data to the government, so that they can use it for finding various statistical study on basis these data such as finding total number of Aadhar holder, checking if bank is linked to implement various financial beneficiary scheme. The government can also make various monetary decision regarding enrolment centre which may be burden on government due to less generation of revenue on long run.

The following website also used for user's authentication for government, private and NGO organisation.

## **EXPERIENCE**

The project provided us an opportunity to do a real-life application of various theoretical studies which we learned during our current semester. It also helped us in identifying real life problem and thus solving it.

While implementing our solution we faced many problems such as changing ER and Relational diagram due to various real-life problem which would arise during discussion.

So, we were stuck on whether to allow users without Aadhar cards onto our website. We offer different services for non-Aadhar users, like scheduling appointments for registration. After some discussion, we decided to accommodate both. But then came the challenge of how to manage Aadhar and non-Aadhar users in our system. We thought of putting them in the same database table but needed a way to distinguish between them when scheduling appointments. Finally, we settled on representing them as subclasses, which sorted out our main issue.

Then, when it came to handling service availability, we hit another roadblock. Figuring out the status of services was a bit tricky, but we managed to find a solution in the end. The project provided us a practical learning while solving problem which arise during our project.

# **DDL: -**

```
CREATE SCHEMA AADHAARDATABASE;
SET SEARCH PATH TO AADHAARDATABASE;
CREATE TABLE PIN(
PINCODE INT PRIMARY KEY,
STATE VARCHAR(255)
);
CREATE TABLE LOCAL(
LOCALITY VARCHAR(255) PRIMARY KEY,
PINCODE INT,
STATE VARCHAR(255)
);
CREATE TABLE ENROLLMENT CENTER (
EC ID INT PRIMARY KEY,
EC_TYPE VARCHAR(255),
EC NAME VARCHAR(255),
PIN INT REFERENCES PIN(PINCODE) ON UPDATE CASCADE ON
DELETE CASCADE,
LOCALITY VARCHAR(255) REFERENCES LOCAL(LOCALITY)
ON UPDATE CASCADE ON DELETE CASCADE
);
```

```
CREATE TABLE CITIZEN (
CITIZEN_NO BIGINT PRIMARY KEY,
GENDER CHAR(1),
NAME VARCHAR(255) NOT NULL,
DOB DATE,
LOCALITY VARCHAR(255) REFERENCES LOCAL(LOCALITY)ON
UPDATE CASCADE ON DELETE CASCADE,
PINCODE INT REFERENCES PIN(PINCODE)ON UPDATE
CASCADE ON DELETE CASCADE,
EC ID INT REFERENCES ENROLLMENT CENTER(EC ID) ON
UPDATE CASCADE ON DELETE CASCADE
);
CREATE TABLE REGISTERED USER (
AADHAR NO BIGINT PRIMARY KEY,
CITIZEN NO BIGINT,
REGISTERED MOBILE NO BIGINT,
FOREIGN KEY (CITIZEN NO) REFERENCES
CITIZEN(CITIZEN NO) ON UPDATE CASCADE ON DELETE
CASCADE
);
```

```
CREATE TABLE APPOINTMENT (
APPOINTMENT ID BIGINT PRIMARY KEY,
DATE DATE,
TIME TIME,
AADHAR NO BIGINT REFERENCES
REGISTERED USER(AADHAR NO) ON UPDATE CASCADE ON
DELETE CASCADE
);
CREATE TABLE FINDS(
CITIZEN NO BIGINT,
EC ID INT,
PINCODE INT,
PRIMARY KEY (CITIZEN NO, EC ID),
FOREIGN KEY (CITIZEN NO) REFERENCES
CITIZEN(CITIZEN NO) ON UPDATE CASCADE ON DELETE
CASCADE,
FOREIGN KEY (EC ID) REFERENCES
ENROLLMENT CENTER(EC ID) ON UPDATE CASCADE ON
DELETE CASCADE
);
CREATE TABLE UPDATE REQUIREMENT (
UPDATE TYPE VARCHAR(255) PRIMARY KEY,
UPDATE FEE INT
);
CREATE TABLE APPOINTMENT FOR (
```

```
APPOINTMENT ID BIGINT,
UPDATE TYPE VARCHAR(255),
EC ID INT,
STATUS VARCHAR(255),
PRIMARY KEY (APPOINTMENT ID, UPDATE TYPE),
FOREIGN KEY (UPDATE TYPE) REFERENCES
UPDATE REQUIREMENT(UPDATE TYPE) ON UPDATE CASCADE
ON DELETE CASCADE,
FOREIGN KEY (APPOINTMENT ID) REFERENCES
APPOINTMENT (APPOINTMENT ID) ON UPDATE CASCADE ON
DELETE CASCADE,
FOREIGN KEY (EC ID) REFERENCES
ENROLLMENT CENTER(EC ID) ON UPDATE CASCADE ON
DELETE CASCADE
);
CREATE TABLE UPDATE DOCUMENT (
 UPDATE TYPE VARCHAR(255),
 DOCUMENT VARCHAR(255),
 PRIMARY KEY(DOCUMENT, UPDATE TYPE),
 FOREIGN KEY (UPDATE TYPE) REFERENCES
UPDATE REQUIREMENT(UPDATE TYPE) ON UPDATE CASCADE
ON DELETE CASCADE
);
```

CREATE TABLE DOCUMENTS (

```
DOCUMENT TYPES VARCHAR(255),
DOCUMENT SUBMITTED VARCHAR(255),
PRIMARY KEY(DOCUMENT TYPES, AADHAR NO),
AADHAR NO BIGINT REFERENCES
REGISTERED USER(AADHAR NO) ON UPDATE CASCADE ON
DELETE CASCADE
);
CREATE TABLE ALL STATUS(
STATUS TYPE VARCHAR(255) PRIMARY KEY
);
CREATE TABLE ONLINE CHECK STATUS (
AADHAR NO BIGINT REFERENCES
REGISTERED USER(AADHAR NO) ON UPDATE CASCADE ON
DELETE CASCADE,
STATUS TYPE VARCHAR(255) REFERENCES
ALL STATUS(STATUS TYPE) ON UPDATE CASCADE ON DELETE
CASCADE,
STATUS VALUE VARCHAR(255),
PRIMARY KEY(AADHAR NO, STATUS TYPE)
);
CREATE TABLE EMPLOYEE (
E ID BIGINT PRIMARY KEY,
E NAME VARCHAR(255),
E EMAIL VARCHAR(255),
E PHONE NO BIGINT,
```

```
DEPARTMENT NAME VARCHAR(255),
EC ID INT REFERENCES ENROLLMENT CENTER(EC ID) ON
UPDATE CASCADE ON DELETE CASCADE
);
CREATE TABLE BANK ACCOUNT (
ACCOUNT NO BIGINT,
IFSC CODE BIGINT,
BANK NAME VARCHAR(255),
BRANCH VARCHAR(255),
    PRIMARY KEY(ACCOUNT_NO,IFSC_CODE)
);
CREATE TABLE AADHAR SERVICES (
VIRTUAL ID INT PRIMARY KEY,
LOCK STATUS BOOLEAN,
E KYC STATUS BOOLEAN,
BIOMETRIC LOCK STATUS BOOLEAN,
ACCOUNT NO BIGINT,
    IFSC CODE BIGINT,
    FOREIGN KEY (ACCOUNT NO, IFSC CODE) REFERENCES
BANK ACCOUNT(ACCOUNT NO, IFSC CODE) ON UPDATE
CASCADE ON DELETE CASCADE
);
CREATE TABLE PAYMENT (
```

```
VIRTUAL ID INT,
PAYMENT HISTORY VARCHAR(255),
FOREIGN KEY (VIRTUAL ID) REFERENCES
AADHAR SERVICES(VIRTUAL ID) ON UPDATE CASCADE ON
DELETE CASCADE,
PRIMARY KEY(PAYMENT HISTORY, VIRTUAL ID)
);
CREATE TABLE AVAIL SERVICES (
VIRTUAL ID INT,
AADHAR NO BIGINT,
FOREIGN KEY (VIRTUAL ID) REFERENCES
AADHAR SERVICES(VIRTUAL ID) ON UPDATE CASCADE ON
DELETE CASCADE,
FOREIGN KEY (AADHAR NO) REFERENCES
REGISTERED USER(AADHAR NO) ON UPDATE CASCADE ON
DELETE CASCADE,
PRIMARY KEY(AADHAR NO, VIRTUAL ID)
);
CREATE TABLE FETTCH (
VIRTUAL ID INT,
FETCH HISTORY VARCHAR(255),
FOREIGN KEY (VIRTUAL ID) REFERENCES
AADHAR SERVICES(VIRTUAL ID) ON UPDATE CASCADE ON
DELETE CASCADE,
PRIMARY KEY (FETCH HISTORY, VIRTUAL ID));
```

# FUNCTIONAL DEPENDENCIES AND NORMALIZATION

#### Citizen

Attributes – Citizen (CitizenNo, Gender, Fname, Mname, Lname, Locality,

State, Pincode, Dob, EC ID)

#### Minimal Functional Dependencies Set

CitizenNo ->Fname

CitizenNo -> Gender

CitizenNo ->Mname

CitizenNo ->Lname

CitizenNo -> Locality

CitizenNo -> State

CitizenNo -> Pincode

CitizenNo -> DOB

CitizenNo -> EC ID

Pincode -> State

Locality -> Pincode

Locality -> State

Let find closure of CitizenNo

CitizenNo+ = {CitizenNo,Gender,Fname

 $, Mname, Lname, Locality, State, Pincode, DOB, EC\_ID\}$ 

Since its closure include all attribute of Citizen relation, therefor CitizenNo is Primary Key.

Last 3 functional dependencies does not have super-key on left side of FD hence the given relation is not in BCNF, it is 2NF. We can decompose

it into BCNF by having 3 relation as following

R1(CitizenNo,Gender,Fname,Mname,Lname,DOB,EC\_ID)

R2(Pincode, State)

R3(Locality, Pincode, State)

#### • Enrollment Centre

Attributes – Enrollment Centre

(EC ID,EC Type,EC Name,Pincode,State,Locality)

#### Minimal Functional Dependencies Set

EC ID -> EC Name

EC\_ID -> EC\_Type

EC ID -> Pincode

EC ID -> State

EC\_ID -> Locality

Pincode -> State

Locality -> Pincode

Locality -> State

Let find closure set of EC\_ID

EC\_ID+ = {EC\_ID , EC\_Name
,EC\_Type,Pincode,State,Locality}

Since it involves all attributes of Enrollment Centre relation it is Primary Key.

Last 3 functional dependencies does not have super-key on left side of FD hence the given relation is not in BCNF, it is 2NF. We can decompose

it into BCNF by having 3 relation as following

R2(Pincode, State)

R3(Locality, Pincode, State)

#### Finds

Attribute – Finds(CitizenNo ,EC ID, Pincode)

#### Minimal Functional Dependencies Set

{CitizenNo, EC ID} - > Pincode

Primary Key is {CitizenNo, EC ID}.

Relation is in BCNF as super-key is present on left side of FD.

#### Appointment For

Attributes – Appointment For (AppointmentID, UpdateType, Status, EC ID)

#### Minimal Functional Dependencies Set

{AppointmentID, UpdateType} -> Status

{AppointmentID, UpdateType} -> EC ID

Primary Key is {AppointmentID, UpdateType} as it determines all attribute of given relation

Since primary key is present on left side of all FDs of relation we can say "Appointment For" relation to be in BCNF.

#### Appointment

Attribute – Appointment (AppointmentID, Date, Time, AadharNo)

#### Minimal Functional Dependencies Set

AppointmentID -> AadharNo

AppointmentID -> Date

AppointmentID -> Time

Primary Key is AppointmentID as it determines all other attribute of relation. Relation is in BCNF as all FD has AppointmentID on left side of its FD's.

#### Registered User

Attribute – Registered User (AadharNo, CitizenNo, RegisteredMobileNo)

#### • Minimal Functional Dependencies Set

AadharNo - > CitizenNo

AadharNo -> RegisteredMobileNo

Primary Key is AadharNo as it determines all other attribute of relation. Relation is in BCNF as all FD has AadharNo on left side of its FD's.

#### Documents

Attributes – Documents (DocumentType, AadharNo, DocumentSubmitted)

#### Minimal Functional Dependencies Set

 $\{DocumentType\ , AadharNo\} \ \hbox{->} \ DocumentSubmitted$ 

Primary Key is {DocumentType, AadharNo} as it determines all other attribute of relation. Relation is in BCNF as all FD has {DocumentType, AadharNo} on left side of its FD's.

#### Employee

Attribute – Employee

(E\_ID,Name,Email,PhoneNo,DepartmentName,EC\_ID)

#### Minimal Functional Dependencies Set

E\_ID->Name

E ID -> Email

E\_ID->PhoneNo

E\_ID ->DepartmentName

 $E_ID - > EC_ID$ 

Primary Key is E\_ID as it determines all other attribute of relation. Relation is in BCNF as all FD has E\_ID on left side of its FD's.

#### Aadhar Services

Attribute – Aadhar Services(VirtualID, LockStatus,

EKYCStatus,BiometricLockStatus,AccountNo,FetchHistory(multivalue),Pay mentHistory(multivalue))

#### • Minimal Functional Dependencies Set

VirtualID -> LockStatus

VirtualID -> EKYCStatus

VirtualID -> BiometricLockStatus

VirtualID -> AccountNo

VirtualID- >> FetchHistory

VirtualID ->> PaymentHistory

Primary Key is VirtualID as its closure include all attribute of relation.

However the relation is not in BCNF due to presence of multivalue dependencies such as FetchHistory and PaymentHistory.Since this multivalue dependencies are independent of each other we can so we decompose the given relation into 3 new relation as following

R1 (VirtualID, LockStatus, EKYCStatus, BiometricLockStatus, AccountNo)

R2 (VirtualID, PaymentHistory) R3 (VirtualID, FetchHistory) Now relation is in 4NF.

#### BankAccount

Attribute – BankAccount (AccountNo, IFSCCode, Name,Branch)

#### Minimal Functional Dependencies Set

IFSCCode - > Name

IFSCCode -> Branch

Primary Key is {AccountNo ,IFSCCode} as its closure include all attributes of relation. Relation is in BCNF.

#### Online Check Status

Attribute – Online Check Status (AadharNo, StatusType, Status)

#### • Minimal Functional Dependencies Set

{AadharNo,StatusType} -> Status

{AadharNo, StatusType} together form composite primary key as it closure include all attribute of relation. The relation above is in BCNF as primary key is present on left of above FD.

#### • Update Requirement

Attribute – Update Requirement(Update Type, Update Fee)

#### Minimal Functional Dependencies Set

Update Type -> Update Fee

Update Type is primary key as it closure include all attribute. The relation is in BCNF as primary key is present on left of above FD

#### Update Document

Attribute – Update Document(Update Type, Document)

Update Type and Document together form composite primary key hence there is no FD and table is in BCNF

#### All Status

Attribute – All Status(StatusType)

All status have Status Type as it primary key hence no FD is present and thus table is BCNF.

#### Avail Services

Attribute – Avail Services(VirtualID, AadharNo)

Both (VirtualID, AadharNo) form composite primary key and hence relation is in BCNF.

# **Queries:**

# **Queries For Government:-**1) Find the how much revenue generated month wise for given year(Here year = 2024)? WITH RAS ( SELECT EC ID, DATE, update FEE FROM APPOINTMENT NATURAL JOIN APPOINTMENT FOR NATURAL JOIN UPDATE REQUIREMENT WHERE EXTRACT('YEAR' FROM DATE) = 2024) SELECT EXTRACT('MONTH' FROM DATE) AS MONTH, SUM(update FEE) AS REVENUE FROM R GROUP BY EXTRACT('MONTH' FROM DATE) ORDER BY SUM(update FEE) DESC; 2) Find the users who got error in updating.( besides this government can send the notification for re appointment.) SELECT AADHAR NO, MOBILE NO ONLINE CHECK STATUS NATURAL JOIN REGISTERED USER NATURAL JOIN CITIZEN WHERE STATUS = 'ERROR'.

appointment of less number of people so that government can increase there a number of employes or number of ECs in that area.) SELECT PIN,EC ID,C1/(C1+C2) FROM ((SELECT EC ID, COUNT(APPOINTMENT ID) AS C1 FROM APPOINTMENT FOR WHERE STATUS != 'APPROVED' GROUP BY (EC ID)) AS T1 NATURAL JOIN (SELECT EC ID, COUNT(APPOINTMENT ID) AS C2 FROM APPOINTMENT FOR WHERE STATUS != 'PENDING' GROUP BY (EC ID)) AS T2) NATURAL JOIN ENROLLMENT CENTER ORDER BY(C1/(C1 + C2)) DESC; 4) Find the time-table of appointments of Aadhar-holders in any enrollment center? SELECT APPOINTMENT ID, DATE, TIME, EC id, Aadhar no, UPDATE TYPE FROM APPOINTMENT NATURAL JOIN APPOINTMENT FOR WHERE EXTRACT(MONTH FROM DATE) = 4; 5) Find the Aadhar-numbers who have no benefits of Aadhar-service? SELECT AADHAR NO FROM Registered user WHERE AADHAR NO NOT IN (SELECT AADHAR NO FROM AVAIL SERVICES);

3) Find the which EC work efficiently? (Which EC approved

6) Find how many number of people takes appointments in each enrollment center? SELECT EC ID, COUNT (APPOINTMENT ID) FROM APPOINTMENT FOR group by(EC id); 7) Find the appointment timetable for particular EC on particular date. **SELECT** APPOINTMENT ID, DATE, TIME, UPDATE TYPE, DATE, EC ID FROM APPOINTMENT NATURAL JOIN APPOINTMENT FOR WHERE DATE = '2024-04-26', EC id = 101; 8) Find the Aadhar-holder who don't have Aadhar linked bank account? (For any government subsidy or policy the Aadhar linked bank account is required.) SELECT AADHAR NO FROM APPOINTMENT WHERE AADHAR NO NOT IN (SELECT AADHAR NO FROM AVAIL SERVICES NATURAL JOIN AADHAR SERVICES); 9) Find the Appointment ids where they wants to do updation of Particular update type. SELECT EC ID, APPOINTMENT ID FROM APPOINTMENT FOR WHERE APPOINTMENT ID IN (SELECT APPOINTMENT ID FROM APPOINTMENT FOR WHERE UPDATE TYPE = 'Name Update'); Find the how many employes work in all ECs? 10)

SELECT COUNT(E ID), EC ID FROM EMPLOYEE NATURAL JOIN

ENROLLMENT CENTER GROUP BY EC ID;

```
Find the details of all the employes.
  11)
SELECT E NAME, E PHONE NO, DEPARTMENT NAME FROM
EMPLOYEE;
SELECT E NAME, E PHONE NO, DEPARTMENT NAME FROM
EMPLOYEE WHERE E ID = '1';(particular employe)
  12) Find what percentage of the people have the Aadhar-card state-
    wise?
SELECT (C2*100)/C1 AS Percentage, S1 as STATE
FROM (
  SELECT DISTINCT STATE AS S1, COUNT(CITIZEN NO) AS C1
 FROM (citizen
 NATURAL JOIN pin)
 GROUP BY (STATE)
) AS T1
JOIN (
  SELECT DISTINCT STATE AS S2, COUNT(CITIZEN NO) AS C2
 FROM (registered user
  NATURAL JOIN citizen
    natural join pin)
  GROUP BY STATE
) AS T2
ON T1.S1 = T2.S2;
```

# QUERY FOR CITIZENS : -1) Find the status of updating whether this is completed or not? SELECT AADHAR NO, STATUS TYPE FROM ONLINE CHECK STATUS; 2) Find the avail services status for particular Aadhar card. SELECT \* FROM PAYMENT NATURAL JOIN AVAIL SERVICES WHERE AADHAR\_NO = 111000000011; 3) Find the bank linked details for given Aadhar card. (for user to check whether his bank account is linked with bank or not?) SELECT BANK NAME, BRANCH, ACCOUNT NO, IFSC CODE FROM BANK ACCOUNT NATURAL JOIN AADHAR SERVICES NATURAL JOIN **AVAIL SERVICES** WHERE AADHAR NO = 121000000021; 4) Find the enrollment center and it's type for given pincode. (for user find EC for appointment) Select EC ID, EC TYPE from findS Natural join ENROLLMENT CENTER where pincode ='given'; 5) Find the documents required for do the particular updatation. SELECT DOCUMENT FROM UPDATE DOCUMENT WHERE UPDATE TYPE = 'Biometric Update';

6) Find How many times the user has done the Aadhar updation and other history related to Aadhar card.

SELECT \* FROM AVAIL\_SERVICES NATURAL JOIN AADHAR\_SERVICES NATURAL JOIN FETCH WHERE AADHAR\_NO = '121000000021'

7) Find How many times the user has paid for the aadhar services or updating?

SELECT \* FROM AVAIL\_SERVICES NATURAL JOIN AADHAR\_SERVICES NATURAL JOIN PAYMENT WHERE AADHAR NO = '121000000021'

# **TOP-3 QUERIES**

#### **Queries For Government:-**

1) Find the how much revenue generated month wise for given year(Here year = 2024)?

WITH RAS (

SELECT EC\_ID, DATE, update\_FEE

FROM APPOINTMENT

NATURAL JOIN APPOINTMENT FOR

NATURAL JOIN UPDATE REQUIREMENT

WHERE EXTRACT('YEAR' FROM DATE) = 2024

)

SELECT EXTRACT('MONTH' FROM DATE) AS MONTH,

SUM(update\_FEE) AS REVENUE

FROM R

GROUP BY EXTRACT('MONTH' FROM DATE)

ORDER BY SUM(update\_FEE) DESC;

#### **OUTPUT:-**

	month double precision	revenue bigint
1	5	3900
2	6	3750
3	7	2500
4	4	1650

```
2) Find what percentage of the people have the Aadhar-card state-wise?
SELECT (C2*100)/C1 AS Percentage, S1 as STATE
FROM (
  SELECT DISTINCT STATE AS S1, COUNT(CITIZEN NO) AS C1
  FROM (citizen
  NATURAL JOIN pin)
  GROUP BY (STATE)
) AS T1
JOIN (
  SELECT DISTINCT STATE AS S2, COUNT(CITIZEN_NO) AS C2
  FROM (registered user
  NATURAL JOIN citizen
    natural join pin)
  GROUP BY STATE
) AS T2
ON T1.S1 = T2.S2;
```

#### **OUTPUT:-**

	percentage bigint	state character varying (255)
1	50	Kerala
2	50	Dadra and Nagar Haveli and Daman and Diu
3	50	Goa
4	50	Gujarat
5	50	Haryana
6	50	Himachal Pradesh
7	50	Jammu and Kashmir
8	50	Andhra Pradesh

3) Find the bank linked details for given Aadhar card. (for user to check whether his bank account is linked with bank or not?)

SELECT BANK\_NAME ,BRANCH,ACCOUNT\_NO,IFSC\_CODE FROM BANK\_ACCOUNT

NATURAL JOIN AADHAR\_SERVICES NATURAL JOIN AVAIL SERVICES

WHERE AADHAR\_NO = 121000000021;

#### **OUTPUT:-**

	bank_name character varying (255)	branch character varying (255)	account_no [PK] bigint	ifsc_code [PK] bigint
1	Bank of India	Delhi Main	345678678901	345678