DBMS PROJECT

DONE BY:

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PROBLEM STATEMENT:

This database is about municipal corporation and how it works, in general every city have municipal corporation, we have analysed how data is managed and we have constructed an efficient Database model

This database consists of following important entities
1. Citizen Information
2. Department and employee information
3. Projects and services offered by different departments
4. Issues raised by citizens

It focuses on these entities and relationships between them with all the key constraints and participation constraints

ER DIAGRAM
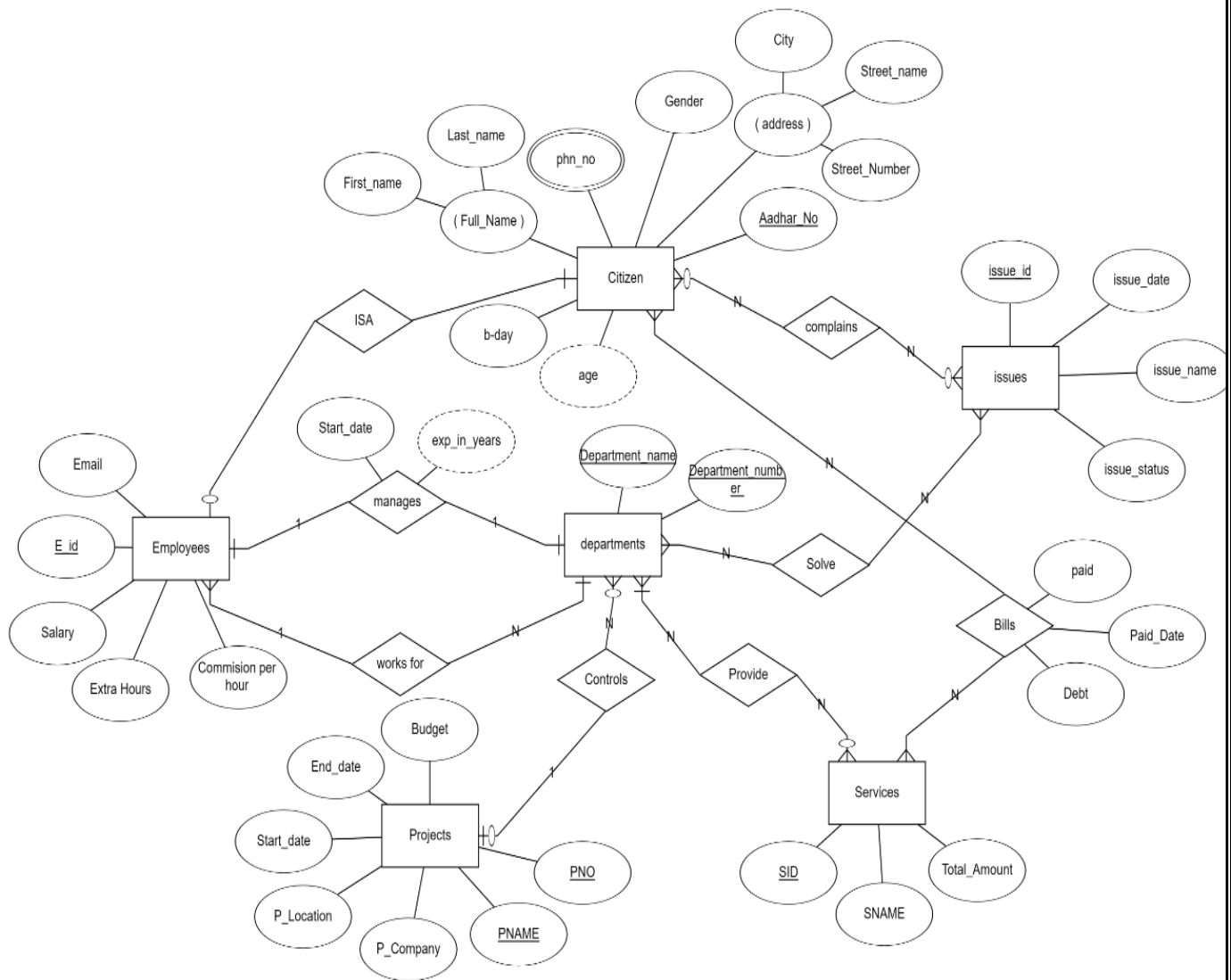
RELATIONSHIPS

S. No	Entity1	Entity2	Relationship Name	Relation	Explanation
1.	Citizen	Issues	Complains	Many to many	There are many issues complained about by many citizens
2.	Departments	Issues	Solves	Many to many	There are many Issues solved by many departments
3.	Departments	Projects	Controls	One to many	A department can control many projects but a project can be controlled by only one department
4.	Departments	Services	Provides	One to many	Each department provides one service, but one service is provided by many departments
5.	Departments	Employees	Manages	Many to one	Each department manages many employees but each employee is managed by only one department
6.	Departments	Employees	Works for	One to many	Employees work for one department but department worked by many employees
7.	Citizen	Employees	ISA		Not all citizens are employees but every employee is a citizen
8.	Citizen	Services	Bills	Many to many	There are many services paid for by many citizens.

ENTITY: CITIZEN

ATTRIBUTES:
AADHAR_NO
FULLNAME:
   FIRSTNAME
   LASTNAME
GENDER,
DOB
AGE()
ADDRESS:
   STREET_NAME
   CITY
   STREET_NUMBER
{PHNO}

NORMAL FORMS:
1NF:
   The above table is not in 1NF as it has multivalued and composite attributes, So a separate table for multi valued attribute should be created and separate columns should be made for all composite sub attributes.

ATTRIBUTES IN TABLE(CITIZEN_PHNO) FORMED WITH MVD:
PHNO
AADHAR_NO

UPDATED ATTRIBUTES IN CITIZEN:
AADHAR_NO
FIRSTNAME
LASTNAME
GENDER
DOB
AGE()
STREET_NAME
CITY
STREET_NUMBER

FUNCTIONAL DEPENDENCIES ON CITIZEN:

$$AADHAR\_NO \rightarrow FIRSTNAME$$
$$AADHAR\_NO \rightarrow LASTNAME$$
$$AADHAR\_NO \rightarrow GENDER$$
$$AADHAR\_NO \rightarrow DOB$$
$$AADHAR\_NO \rightarrow AGE$$
$$AADHAR\_NO \rightarrow STREET\_NUMBER$$
$$AADHAR\_NO \rightarrow STREET\_NAME$$
$$AADHAR\_NO \rightarrow CITY$$
$$DOB \rightarrow AGE$$

CANDIDATE KEY---AADHAR_NO

2NF:

The above table is in 2NF as it doesn't have partial dependency as candidate key is AADHAR_NO and all FDs are from candidatekey->nonprimalkey and nonprimalkey->nonprimalkey so it satisfies 2NF condition.

3NF:

The above table is not in 3nf as it has transitive dependency(dob → age) So, a separate table must be created with attributes dob and age.

ATTRIBUTES IN NEW TABLE(CITIZEN_AGE):

DOB
AGE

UPDATED ATTRIBUTES IN CITIZEN

FIRSTNAME
LASTNAME
GENDER
 STREET_NAME
CITY
STREET_NUMBER

HENCE CITIZEN,CITIZEN_PHNO,CITIZEN_AGE ALL TABLES SATISFIES 1NF,2NF,3NF,BCNF.

<u>ENTITY</u>: EMPLOYEE

<u>ATTRIBUTES:</u>

EMPLOYEEID
EMAIL
SALARY
EXTRAHOURS
COMMISSION_PERHOUR
START_DATE
EXP_IN_YEARS
DEPARTMENT_NO
DEPARTMENT_NAME

<u>NORMAL FORMS:</u>

1NF:

The above table is in 1NF as it doesn't have multivalued and composite attributes, every cell is atomic. Hence, it satisfies all 1NF conditions.

<u>FUNCTIONAL DEPENDENCIES ON EMPLOYEE:</u>

EMPLOYEEID	→	EMAIL
START_DATE	→	EXP_IN_YEARS
EXTRAHOURS,COMMISSION	→	PERHOUR-SALARY
EMPLOYEEID	→	DEPARTMENT_NO,DEPARTMENT_NAME
EMPLOYEEID	→	EXTRAHOURS,COMMISSION_PERHOUR

CANDIDATE KEY --- EMPLOYEEID

2NF:

The above table is in 2NF as it doesn't have any partial dependency i.e, candidate key is EMPLOYEEID and all FDs are from candidatekey->nonprimalkey and nonprimalkey->nonprimalkey so it satisfies 2NF condition.

3NF:

The above table is not in 3nf as it has 2 transitive dependencies(START_DATE → EXP_IN_YEARS,(EXTRAHOURS,COMMISSION_PERHOUR)→SALARY) So, a separate table must be created for each transitive dependency.

ATTRIBUTES IN NEW TABLE(EMPLOYEE_JOB) CREATED BY TRANSITIVE DEPENDENCY(START_DATE → EXP_IN_YEARS):

START_DATE
EXP_IN_YEARS

ATTRIBUTES IN NEW TABLE(EMPLOYEE_SALARY) CREATED BY TRANSITIVE DEPENDENCY((EXTRAHOURS,COMMISSION_PERHOUR) → SALARY):

SALARY
EXTRAHOURS
COMMISSION_PERHOUR

UPDATED ATTRIBUTES IN EMPLOYEE

EMPLOYEEID
EMAIL
EXTRAHOURS
COMMISSION_PERHOUR
START_DATE
DEPARTMENT_NO
DEPARTMENT_NAME

BCNF:

All FDs for entities satisfy BCNF as each attribute is determined by superkey of the entity

   HENCE EMPLOYEE, EMPLOYEE_JOB, EMPLOYEE_SALARY ALL TABLES SATISFIES 1NF,2NF,3NF,BCNF

ENTITY: DEPARTMENT

ATTRIBUTES:
DEPARTMENT_NO
DEPARTMENT_NAME
EMPLOYEEID
PROJECTNO
PROJECTNAME

NORMAL FORMS:

1NF:
     The above table is in 1NF as it doesn't have multivalued and composite attributes, every cell is atomic. Hence, it satisfies all 1NF conditions.

FUNCTIONAL DEPENDENCIES ON DEPARTMENT:
               DEPARTMENT_NO → EMPLOYEEID
               DEPARTMENT_NAME → PROJECTNO,PROJECTNAME
CANDIDATE KEY---(DEPARTMENT_NO, DEPARTMENT_NAME)

2NF:
     The above table is not in 2NF as it has 2
partialdependencies(DEPARTMENT_NO→EMPLOYEEID,
DEPARTMENT_NAME →PROJECTNO,PROJECTNAME) , So, 2 separate tables must be created.

ATTRIBUTES IN NEW TABLE(DEPT_EMP) CREATED BY PARTIAL DEPENDENCY(DEPARTMENT_NO-EMPLOYEEID)
DEPARTMENT_NO
EMPLOYEEID
ATTRIBUTES IN NEW TABLE(DEPT_PROJECT) CREATED BY PARTIAL DEPENDENCY(DEPARTMENT_NAME → PROJECTNO,PROJECTNAME):
DEPARTMENT_NAME
PROJECTNO
PROJECTNAME
One table should contain a total canditatekey for not to have a lossy decomposition i.e,
UPDATED ATTRIBUTES IN DEPARTMENT
DEPARTMENT_NO
DEPARTMENT_NAME

3NF:

The above table is in 3NF as it doesn't have any transitive dependency i.e, every attribute is derived from superkey or candidatekey.

BCNF:

All FDs for entities satisfy BCNF as each attribute is determined by superkey of the entity

HENCE DEPARTMENT, DEPT_EMP ,DEPT_PROJECT ALL TABLES SATISFIES 1NF,2NF,3NF,BCNF.

ENTITY: PROJECT

ATTRIBUTES:
PROJECTNO
PROJECTNAME
P_COMPANY
P_LOCATION
START_DATE
END_DATE
BUDGET

NORMAL FORMS:
1NF:

The above table is in 1NF as it doesn't have multivalued and composite attributes, every cell is atomic. Hence, it satisfies all 1NF conditions.

FUNCTIONAL DEPENDENCIES ON PROJECT:

PROJECTNO,PROJECTNAME → START_DATE,END_DATE
PROJECTNO,PROJECTNAME → P_LOCATION
P_LOCATION → BUDGET
PROJECTNAME → P_COMPANY

CANDIDATE KEY--- (PROJECTNO,PROJECTNAME)

2NF:

The above table is not in 2NF as it has A partial dependency(PROJECTNAME→P_COMPANY,P_LOCATION) , So, a separate table must be created

ATTRIBUTES IN NEW TABLE(PROJECT_REFERENCE1) CREATED BY PARTIAL DEPENDENCY(PROJECTNAME → P_COMPANY):

PROJECTNAME

P_COMPANY

UPDATED ATTRIBUTES IN PROJECT

PROJECTNO

PROJECTNAME

P_LOCATION

START_DATE

END_DATE

BUDGET

3NF:

   The above table is not in 3nf as it has a transitive dependency(P_LOCATION →BUDGET) So, a separate table must be created for the transitive dependency.

ATTRIBUTES IN NEW TABLE(PROJECT_REFERENCE2) CREATED BY TRANSITIVE DEPENDENCY(P_LOCATION → BUDGET):

P_LOCATION

BUDGET

UPDATED ATTRIBUTES IN PROJECT

PROJECTNO

PROJECTNAME

P_LOCATION

START_DATE

END_DATE

BCNF: All FDs for entities satisfy BCNF as each attribute is determined by superkey of the entity

HENCE PROJECT, PROJECT REFERENCE1 ,PROJECT REFERENCE2 TABLES SATISFIES 1NF,2NF,3NF,BCNF.

ENTITY: SERVICES

ATTRIBUTES:
SID
SNAME
TOTAL_AMOUNT

FUNCTIONAL DEPENDENCIES:

SNAME,SID → TOTAL_AMOUNT

SID → SNAME

NORMAL FORMS:

1NF:

It is in 1NF as there are no composite or derived attributes.

2NF:

In this table there is a single candidate key i.e , SID and it only a single attribute so there is no proper subset of this therefore there is no partial dependency. Hence this table is in 2nd normal form.

3NF:

In this table there is no functional dependency with non-prime key determining other non-prime key,therefore there is no transitive dependency.Hence this table is in 3rd normal form.

BCNF:

As candidate key is SID,then super key is SID,SNAME.As super key determining non primal key,its in bc normal form.

BCNF: All FDs for entities satisfy BCNF as each attribute is determined by superkey of the entity

HENCE ALL THE ABOVE TABLES SATISFIES 1NF,2NF,3NF,BCNF.

ENTITY: SOLVE

ATTRIBUTES:
DEPT_NO
DEPT_NAME
ISSUE_ID

FUNCTIONAL DEPENDENCIES:
         DEPT_NO,DEPT_NAME → ISSUE_ID

NORMAL FORMS:
1NF:
    It is in 1NF as there are no composite or derived attributes.
2NF:
     In this table candidate key contains 2 attributes i.e, DEPT_NO and DEPT_NAME , these 2 attributes together determine ISSUE_ID. And part of this candidate key cannot determine others. Therefore there is no partial dependency. Hence this table is in 2nd normal form.
3NF:
     In this table all functional dependencies are from candidate key(prime attributes) i.e DEPT_NO and DEPT_NAME to non prime attributes . Therefore there is no transitive dependency. Hence this table is in 3rd normal form.
BCNF:
      All functional dependencies are from superkey i.e DEPT_NO & DEPT_NAME to all other attributes. Therfore this table is in BCNF.

HENCE ALL THE ABOVE TABLES SATISFIES 1NF,2NF,3NF,BCNF.

ENTITY: PROVIDES

ATTRIBUTES:
SID
DEPTNAME
DEPTNO
There are no functional dependencies.
As there are no dependencies and all attributes together form a primary key.So the table satisfies all normal forms conditions.Therefore it is in 1,2,3,BC normal forms.

ENTITY: BILLS

ATTRIBUTES:
AADHAR_NO
SID
PAID
PAID_DATE
DEBT

NORMAL FORMS:
1NF:
   It is in 1NF as there are no composite or derived attributes.

FUNCTIONAL DEPENDENCIES:
   AADHAR_NO,SID → PAID,PAID_DATE
              PAID_DATE → DEBT

2NF:
   In this table candidate key contains 2 attributes i.e, AADHAR_NO and DEPT_NAME , these 2 attributes together determine PAID ,PAID_DATE. And part of this candidate key cannot determine others. Therefore there is no partial dependency. Hence this table is in 2nd normal form.
3NF:
   The above table is not in 3nf as it has a transitive dependency(PAID_DATE →DEBUT) So, a separate table must be created for the transitive dependency.

ATTRIBUTES IN NEW TABLE(PAYMENT)
PAID_DATE
DEBT

BCNF: All FDs for entities satisfy BCNF as each attribute is determined by superkey of the entity

HENCE ALL THE ABOVE TABLES SATISFIES 1NF,2NF,3NF,BCNF

ENTITY: COMPLAINS

ATTRIBUTES:
AADHAR_NO
ISSUE_ID

FUNCTIONAL DEPENDENCIES:

$$ISSUE\_ID \rightarrow AADHAR\_NO$$

NORMAL FORMS:

1NF:
   It is in 1NF as there are no composite or derived attributes.

2NF:
   In this table candidate key contains 1 attribute i.e, ISSUE_ID which alone determines determine AADHAR_NO. Therefore there is no partial dependency. Hence this table is in 2nd normal form.

3NF:
   In this table all functional dependencies are from candidate key(prime attributes) i.e ISSUE_ID to non prime attributes . Therefore there is no transitive dependency. Hence this table is in 3rd normal form.

BCNF:
   All functional dependencies are from superkey i.e ISSUE_ID to all other attributes. Therefore this table is in BCNF.

HENCE ALL THE ABOVE TABLES SATISFIES 1NF,2NF,3NF,BCNF.

ENTITY: ISSUES

ATTRIBUTES:
ISSUE_ID
DATE_
ISSUE_NAME
STATUS

NORMAL FORMS:

1NF:
   It is in 1NF as there are no composite or derived attributes

FUNCTIONAL DEPENDENCIES:

$$ISSUE\_ID \rightarrow ISSUE\_DATE$$

ISSUE_ID → ISSUE_NAME

DATE_ → STATUS

2NF:

In this table candidate key contains 1 attributes i.e, ISSUE_ID which alone can determine remaining attributes of the entity. And part of this candidate key cannot determine others. Therefore there is no partial dependency. Hence this table is in 2nd normal form.

3NF:

The above table is not in 3nf as it has a transitive dependency(DATE_ →STATUS) So, a separate table must be created for the transitive dependency.

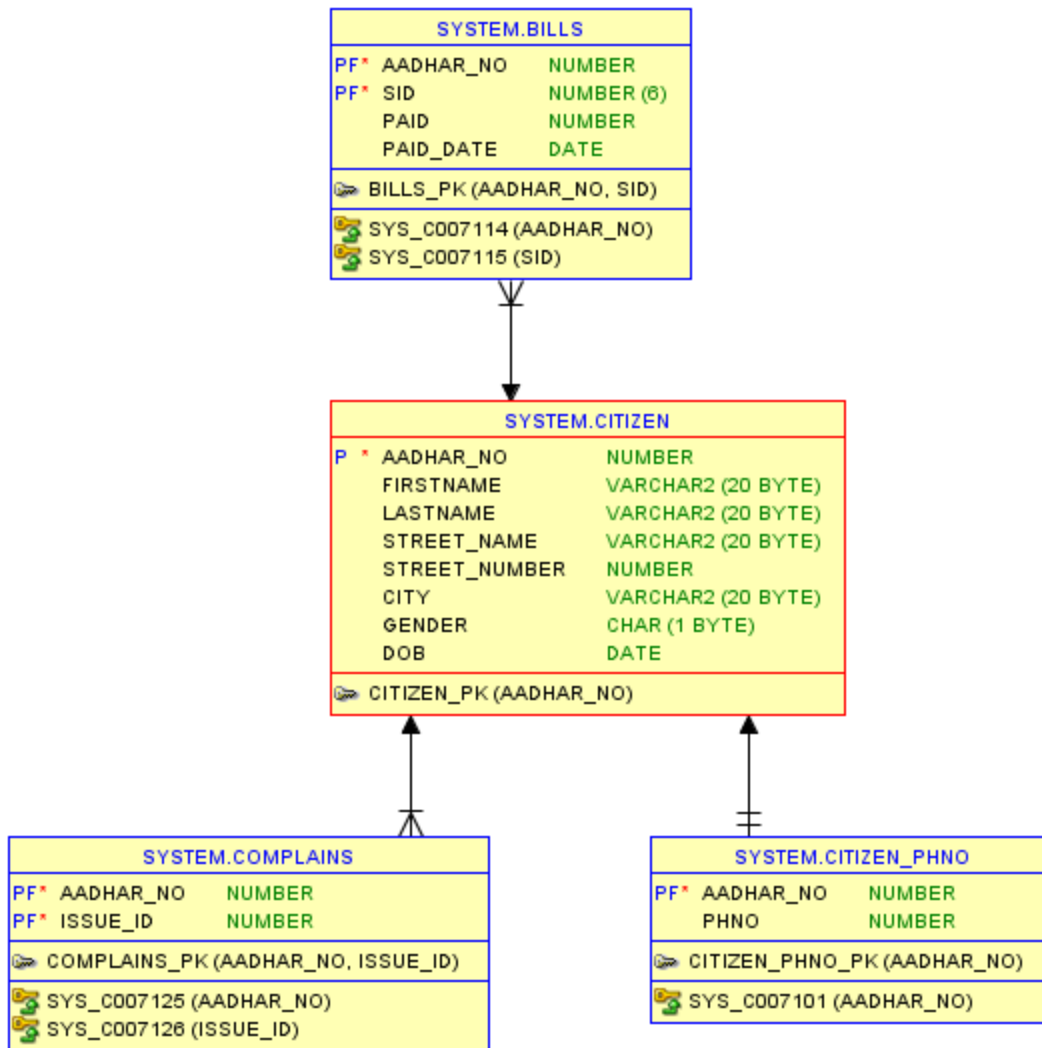**ATTRIBUTES IN NEW TABLE(ISSUE_CHARACTERISTICS)**

DATE_

STATUS

BCNF: All FDs for entities satisfy BCNF as each attribute is determined by superkey of the entity

HENCE ALL THE ABOVE TABLES SATISFIES 1NF,2NF,3NF,BCNF.

**CREATION CODE FOR ALL THE ABOVE TABLES IN SQL:**

CITIZEN

```sql
CREATE TABLE CITIZEN(
AADHAR_NO NUMBER,
FIRSTNAME VARCHAR2(20),
LASTNAME VARCHAR2(20),
STREET_NAME VARCHAR2(20),
STREET_NUMBER NUMBER,
CITY VARCHAR2(20),
GENDER CHAR(1),
DOB DATE,
PRIMARY KEY (AADHAR_NO)
);
```

SYSTEM.BILLS

PF*	AADHAR_NO	NUMBER
PF*	SID	NUMBER (6)
	PAID	NUMBER
	PAID_DATE	DATE

BILLS_PK (AADHAR_NO, SID)

SYS_C007114 (AADHAR_NO)
SYS_C007115 (SID)

SYSTEM.CITIZEN

P *	AADHAR_NO	NUMBER
	FIRSTNAME	VARCHAR2 (20 BYTE)
	LASTNAME	VARCHAR2 (20 BYTE)
	STREET_NAME	VARCHAR2 (20 BYTE)
	STREET_NUMBER	NUMBER
	CITY	VARCHAR2 (20 BYTE)
	GENDER	CHAR (1 BYTE)
	DOB	DATE

CITIZEN_PK (AADHAR_NO)

SYSTEM.COMPLAINS

PF*	AADHAR_NO	NUMBER
PF*	ISSUE_ID	NUMBER

COMPLAINS_PK (AADHAR_NO, ISSUE_ID)

SYS_C007125 (AADHAR_NO)
SYS_C007126 (ISSUE_ID)

SYSTEM.CITIZEN_PHNO

PF*	AADHAR_NO	NUMBER
	PHNO	NUMBER

CITIZEN_PHNO_PK (AADHAR_NO)

SYS_C007101 (AADHAR_NO)

CITIZEN_AGE
CREATE TABLE CITIZEN_AGE(
DOB DATE,
AGE NUMBER,
PRIMARY KEY (DOB)
);

SYSTEM.CITIZEN_AGE

|		
P *	DOB	DATE
	AGE	NUMBER

CITIZEN_AGE_PK (DOB)
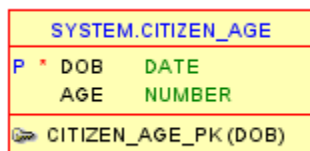
CITIZEN_PHNO
CREATE TABLE CITIZEN_PHNO(
AADHAR_NO NUMBER,
PHNO NUMBER,
PRIMARY KEY (AADHAR_NO),

FOREIGN KEY (AADHAR_NO) REFERENCES CITIZEN
);

```
SYSTEM.CITIZEN_PHNO
PF*  AADHAR_NO      NUMBER
     PHNO           NUMBER
CITIZEN_PHNO_PK (AADHAR_NO)
SYS_C007101 (AADHAR_NO)
```

```
SYSTEM.CITIZEN
P  *  AADHAR_NO        NUMBER
      FIRSTNAME        VARCHAR2 (20 BYTE)
      LASTNAME         VARCHAR2 (20 BYTE)
      STREET_NAME      VARCHAR2 (20 BYTE)
      STREET_NUMBER    NUMBER
      CITY             VARCHAR2 (20 BYTE)
      GENDER           CHAR (1 BYTE)
      DOB              DATE
CITIZEN_PK (AADHAR_NO)
```
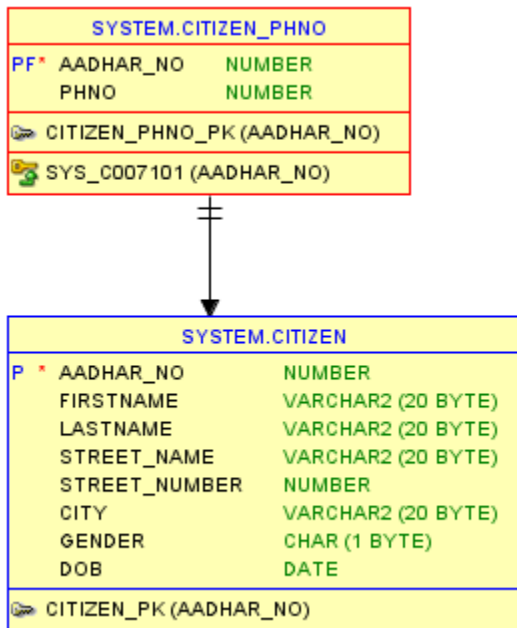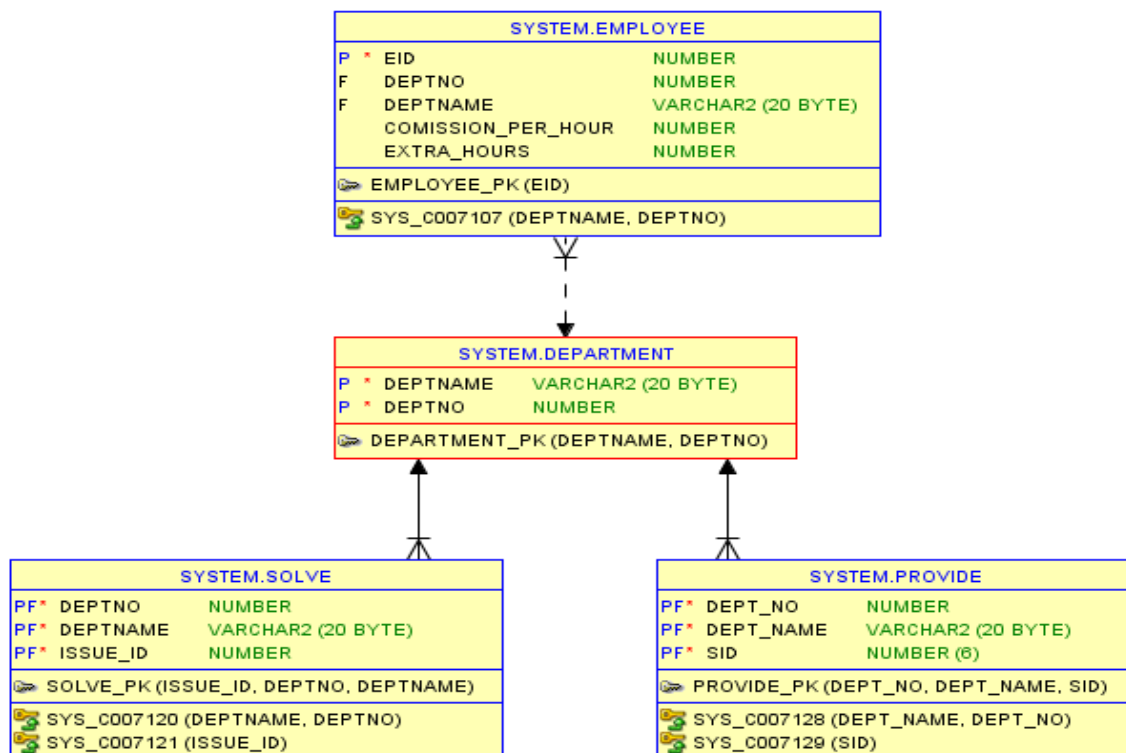
DEPARTMENT:
CREATE TABLE DEPARTMENT(
DEPTNAME VARCHAR2(20),
DEPTNO NUMBER,
PRIMARY KEY (DEPTNAME,DEPTNO)
);

```
SYSTEM.EMPLOYEE
P  *  EID                 NUMBER
F     DEPTNO              NUMBER
F     DEPTNAME            VARCHAR2 (20 BYTE)
      COMISSION_PER_HOUR  NUMBER
      EXTRA_HOURS         NUMBER
EMPLOYEE_PK (EID)
SYS_C007107 (DEPTNAME, DEPTNO)
```

```
SYSTEM.DEPARTMENT
P  *  DEPTNAME    VARCHAR2 (20 BYTE)
P  *  DEPTNO      NUMBER
DEPARTMENT_PK (DEPTNAME, DEPTNO)
```

```
SYSTEM.SOLVE
PF*  DEPTNO      NUMBER
PF*  DEPTNAME    VARCHAR2 (20 BYTE)
PF*  ISSUE_ID    NUMBER
SOLVE_PK (ISSUE_ID, DEPTNO, DEPTNAME)
SYS_C007120 (DEPTNAME, DEPTNO)
SYS_C007121 (ISSUE_ID)
```

```
SYSTEM.PROVIDE
PF*  DEPT_NO     NUMBER
PF*  DEPT_NAME   VARCHAR2 (20 BYTE)
PF*  SID         NUMBER (6)
PROVIDE_PK (DEPT_NO, DEPT_NAME, SID)
SYS_C007128 (DEPT_NAME, DEPT_NO)
SYS_C007129 (SID)
```
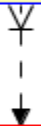
PROJECT:
CREATE TABLE PROJECT
(
PNO NUMBER(5),
PNAME VARCHAR(10),
START_DATE DATE,
END_DATE DATE,
PRIMARY KEY(PNO,PNAME)
);

```
        SYSTEM.DEPT_PROJECT
P * DEPTNAME        VARCHAR2 (20 BYTE)
F   PROJECT_NO      NUMBER (5)
F   PNAME           VARCHAR2 (20 BYTE)
🔑 DEPT_PROJECT_PK (DEPTNAME)
🔑 SYS_C007105 (PROJECT_NO, PNAME)
```

```
        SYSTEM.PROJECT
P * PNO             NUMBER (5)
P * PNAME           VARCHAR2 (10 BYTE)
    START_DATE      DATE
    END_DATE        DATE
🔑 PROJECT_PK (PNO, PNAME)
```

DEPT_PROJECT
CREATE TABLE DEPT_PROJECT(
DEPTNAME VARCHAR2(20),
PROJECT_NO NUMBER,
PNAME VARCHAR2(20),
PRIMARY KEY(DEPTNAME),
FOREIGN KEY(PROJECT_NO,PNAME) REFERENCES PROJECT
);

```
        SYSTEM.DEPT_PROJECT
P * DEPTNAME        VARCHAR2 (20 BYTE)
F   PROJECT_NO      NUMBER (5)
F   PNAME           VARCHAR2 (20 BYTE)
🔑 DEPT_PROJECT_PK (DEPTNAME)
🔑 SYS_C007105 (PROJECT_NO, PNAME)
```

```
        SYSTEM.PROJECT
P * PNO             NUMBER (5)
P * PNAME           VARCHAR2 (10 BYTE)
    START_DATE      DATE
    END_DATE        DATE
🔑 PROJECT_PK (PNO, PNAME)
```

EMPLOYEE:
CREATE TABLE EMPLOYEE(
EID NUMBER,
DEPTNO NUMBER,
DEPTNAME VARCHAR(20),
COMISSION_PER_HOUR NUMBER,
EXTRA_HOURS NUMBER,
PRIMARY KEY (EID),
FOREIGN KEY (DEPTNAME,DEPTNO) REFERENCES DEPARTMENT
);

```
SYSTEM.DEPT_EMP
P  *  DEPT_NO      NUMBER
PF*  EMP_NO       NUMBER
⇨ DEPT_EMP_PK (DEPT_NO, EMP_NO)
⚿ SYS_C007109 (EMP_NO)
```

```
SYSTEM.EMPLOYEE
P  *  EID                    NUMBER
F     DEPTNO                 NUMBER
F     DEPTNAME               VARCHAR2 (20 BYTE)
      COMISSION_PER_HOUR     NUMBER
      EXTRA_HOURS            NUMBER
⇨ EMPLOYEE_PK (EID)
⚿ SYS_C007107 (DEPTNAME, DEPTNO)
```

```
SYSTEM.DEPARTMENT
P  *  DEPTNAME     VARCHAR2 (20 BYTE)
P  *  DEPTNO       NUMBER
⇨ DEPARTMENT_PK (DEPTNAME, DEPTNO)
```

DEPT_EMP:
CREATE TABLE DEPT_EMP(
DEPT_NO NUMBER,
EMP_NO NUMBER,
PRIMARY KEY(DEPT_NO,EMP_NO),
FOREIGN KEY (EMP_NO) REFERENCES EMPLOYEE
);

SYSTEM.DEPT_EMP

P *	DEPT_NO	NUMBER
PF*	EMP_NO	NUMBER

DEPT_EMP_PK (DEPT_NO, EMP_NO)

SYS_C007109 (EMP_NO)

SYSTEM.EMPLOYEE

P *	EID	NUMBER
F	DEPTNO	NUMBER
F	DEPTNAME	VARCHAR2 (20 BYTE)
	COMISSION_PER_HOUR	NUMBER
	EXTRA_HOURS	NUMBER

EMPLOYEE_PK (EID)

SYS_C007107 (DEPTNAME, DEPTNO)

PROJECT_REFERENCE1:
CREATE TABLE PROJECT_REFERENCE1
(
PNAME VARCHAR(10),
PCOMPANY VARCHAR(10),
PRIMARY KEY(PNAME)
);

SYSTEM.PROJECT_REFERENCE1

P *	PNAME	VARCHAR2 (10 BYTE)
	PCOMPANY	VARCHAR2 (10 BYTE)

PROJECT_REFERENCE1_PK (PNAME)

PROJECT_REFERENCE2:
CREATE TABLE PROJECT_REFERENCE2
(
PLOCATION VARCHAR(10),
BUDGET NUMBER(9),
PRIMARY KEY(PLOCATION)
);

SYSTEM.PROJECT_REFERENCE2

P *	PLOCATION	VARCHAR2 (10 BYTE)
	BUDGET	NUMBER (9)

PROJECT_REFERENCE2_PK (PLOCATION)

SERVICES:
CREATE TABLE SERVICES
(

SID NUMBER(6),
SNAME VARCHAR(10),
TOTAL_AMOUNT NUMBER(9),
PRIMARY KEY(SID)
);

```
          SYSTEM.BILLS
PF*  AADHAR_NO     NUMBER
PF*  SID           NUMBER (6)
     PAID          NUMBER
     PAID_DATE     DATE

 BILLS_PK (AADHAR_NO, SID)

 SYS_C007114 (AADHAR_NO)
 SYS_C007115 (SID)
```

```
          SYSTEM.SERVICES
P  *  SID           NUMBER (6)
      SNAME         VARCHAR2 (10 BYTE)
      TOTAL_AMOUNT  NUMBER (9)

 SERVICES_PK (SID)
```
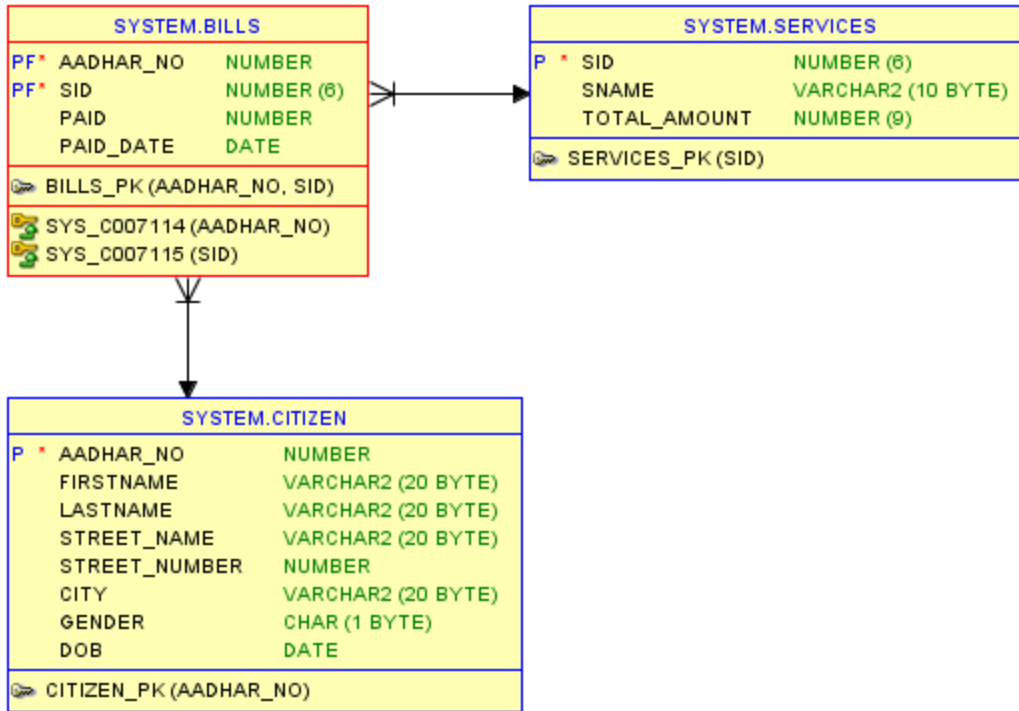
```
          SYSTEM.PROVIDE
PF*  DEPT_NO       NUMBER
PF*  DEPT_NAME     VARCHAR2 (20 BYTE)
PF*  SID           NUMBER (6)

 PROVIDE_PK (DEPT_NO, DEPT_NAME, SID)

 SYS_C007128 (DEPT_NAME, DEPT_NO)
 SYS_C007129 (SID)
```

BILLS:
CREATE TABLE BILLS(
AADHAR_NO NUMBER,
SID NUMBER,
PAID NUMBER,
PAID_DATE DATE,
FOREIGN KEY (AADHAR_NO) REFERENCES CITIZEN,
FOREIGN KEY (SID) REFERENCES SERVICES,
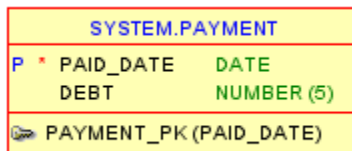PRIMARY KEY(AADHAR_NO,SID)
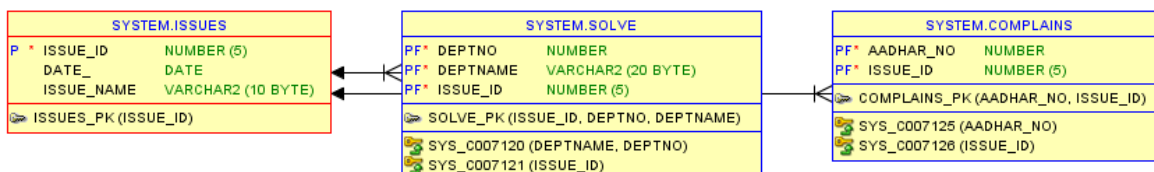);

PAYMENT:

```
CREATE TABLE PAYMENT
(
PAID_DATE DATE,
DEBT NUMBER(5),
PRIMARY KEY(PAID_DATE)
);
```


ISSUES:

```
CREATE TABLE ISSUES
(
ISSUE_ID NUMBER(5),
DATE_ DATE,
ISSUE_NAME VARCHAR(10),
PRIMARY KEY(ISSUE_ID)
);
```
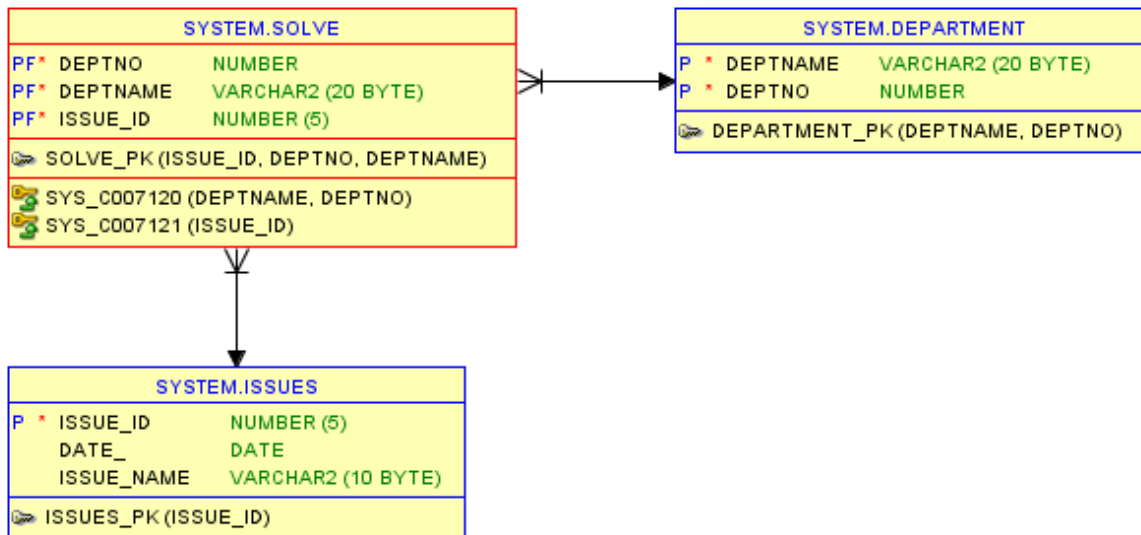
ISSUE_CHARACTERISTICS
CREATE TABLE ISSUE_CHARACTERISTICS
(
DATE_ DATE,
STATUS VARCHAR(10),
PRIMARY KEY(DATE_)
);

```
SYSTEM.ISSUE_CHARACTERISTICS
P * DATE_        DATE
    STATUS      VARCHAR2 (10 BYTE)
ISSUE_CHARACTERISTICS_PK (DATE_)
```

SOLVE:
CREATE TABLE SOLVE(
DEPTNO NUMBER,
DEPTNAME VARCHAR2(20),
ISSUE_ID NUMBER,
PRIMARY KEY (ISSUE_ID,DEPTNO,DEPTNAME),
FOREIGN KEY(DEPTNAME,DEPTNO) REFERENCES DEPARTMENT,
FOREIGN KEY (ISSUE_ID) REFERENCES ISSUES
);

```
SYSTEM.SOLVE                              SYSTEM.DEPARTMENT
PF* DEPTNO      NUMBER                    P * DEPTNAME    VARCHAR2 (20 BYTE)
PF* DEPTNAME   VARCHAR2 (20 BYTE)         P * DEPTNO      NUMBER
PF* ISSUE_ID    NUMBER (5)
                                          DEPARTMENT_PK (DEPTNAME, DEPTNO)
SOLVE_PK (ISSUE_ID, DEPTNO, DEPTNAME)
SYS_C007120 (DEPTNAME, DEPTNO)
SYS_C007121 (ISSUE_ID)


SYSTEM.ISSUES
P * ISSUE_ID       NUMBER (5)
    DATE_          DATE
    ISSUE_NAME     VARCHAR2 (10 BYTE)
ISSUES_PK (ISSUE_ID)
```

EMPLOYEE_JOB
CREATE TABLE EMPLOYEE_JOB(
START_DATE DATE,
EXPERIANCE_IN_YEARS NUMBER,
PRIMARY KEY (START_DATE)
);

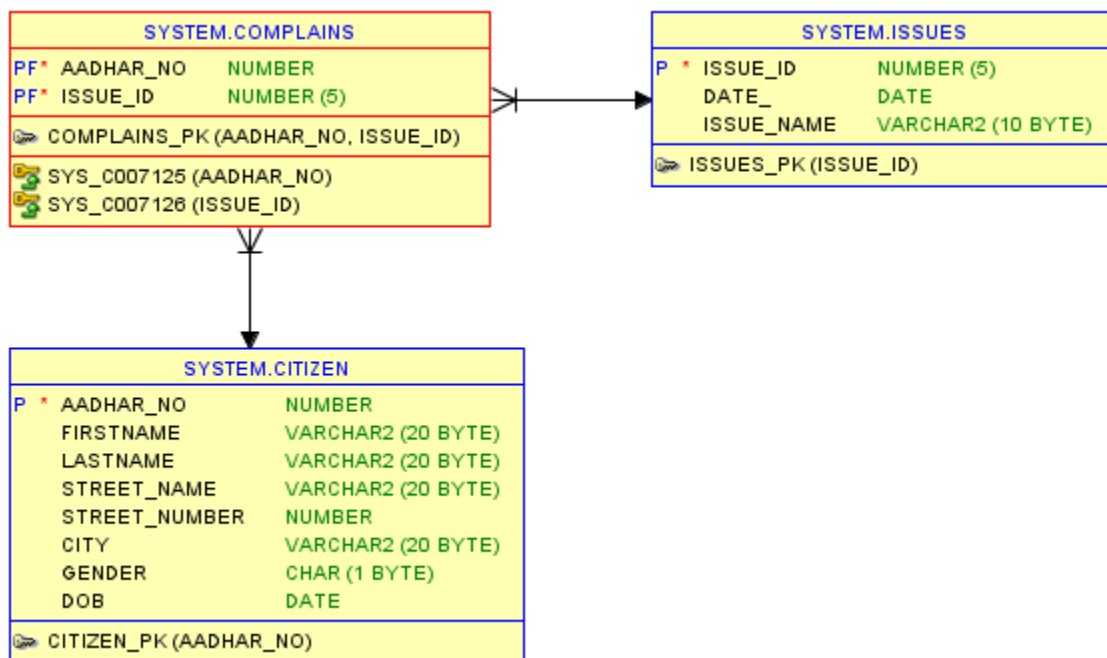| P	*	START_DATE	DATE
		EXPERIANCE_IN_YEARS	NUMBER

🗝 EMPLOYEE_JOB_PK (START_DATE)

EMPLOYEE_SALARY

```
CREATE TABLE EMPLOYEE_SALARY(
EXTRA_HOURS NUMBER,
COMISSION_PER_HOUR NUMBER,
SALARY NUMBER,
PRIMARY KEY(EXTRA_HOURS,COMISSION_PER_HOUR)
);
```

SYSTEM.EMPLOYEE_SALARY

P	*	EXTRA_HOURS	NUMBER
P	*	COMISSION_PER_HOUR	NUMBER
		SALARY	NUMBER

🗝 EMPLOYEE_SALARY_PK (EXTRA_HOURS, COMISSION_PER_HOUR)

COMPLAINS

```
CREATE TABLE COMPLAINS(
AADHAR_NO NUMBER,
ISSUE_ID NUMBER,
PRIMARY KEY (AADHAR_NO,ISSUE_ID),
FOREIGN KEY (AADHAR_NO) REFERENCES CITIZEN,
FOREIGN KEY (ISSUE_ID) REFERENCES ISSUES
)
```

SYSTEM.COMPLAINS

PF	*	AADHAR_NO	NUMBER
PF	*	ISSUE_ID	NUMBER (5)

🗝 COMPLAINS_PK (AADHAR_NO, ISSUE_ID)

🔑 SYS_C007125 (AADHAR_NO)
🔑 SYS_C007126 (ISSUE_ID)

SYSTEM.ISSUES

P	*	ISSUE_ID	NUMBER (5)
		DATE_	DATE
		ISSUE_NAME	VARCHAR2 (10 BYTE)

🗝 ISSUES_PK (ISSUE_ID)

SYSTEM.CITIZEN

P	*	AADHAR_NO	NUMBER
		FIRSTNAME	VARCHAR2 (20 BYTE)
		LASTNAME	VARCHAR2 (20 BYTE)
		STREET_NAME	VARCHAR2 (20 BYTE)
		STREET_NUMBER	NUMBER
		CITY	VARCHAR2 (20 BYTE)
		GENDER	CHAR (1 BYTE)
		DOB	DATE

🗝 CITIZEN_PK (AADHAR_NO)

PROVIDE:

```
CREATE TABLE PROVIDE
(
DEPT_NO NUMBER,
DEPT_NAME VARCHAR2(20),
SID NUMBER(6),
FOREIGN KEY(DEPT_NO,DEPT_NAME) REFERENCES DEPARTMENT,
FOREIGN KEY(SID) REFERENCES SERVICES,
PRIMARY KEY(DEPT_NO,DEPT_NAME,SID)
)
```
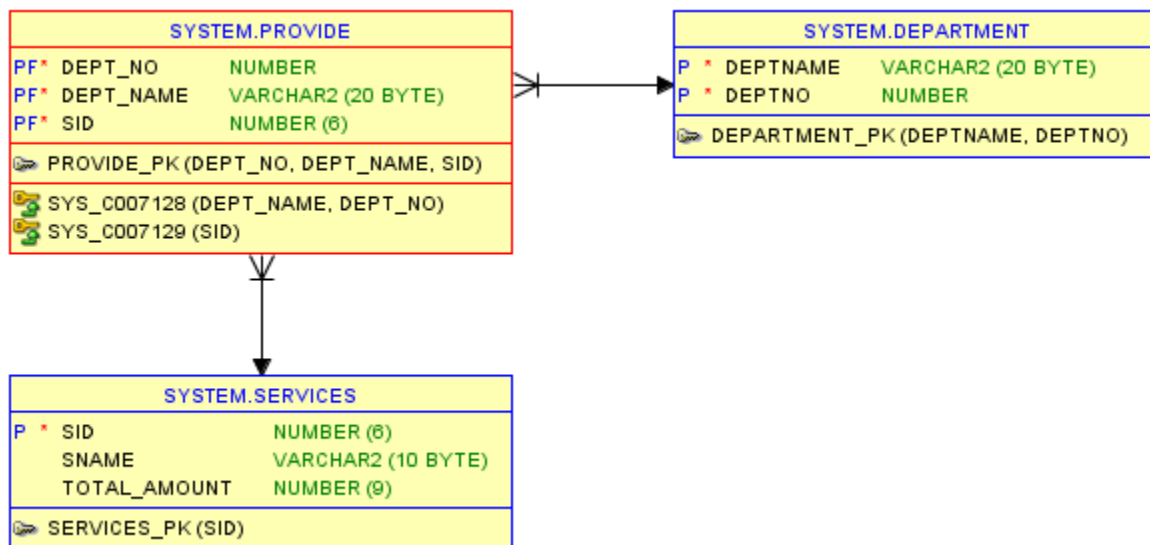
PAYMENT
```
insert into PAYMENT values('12-jan-1988',12345);
insert into PAYMENT values('18-feb-2000',10000);
insert into PAYMENT values('02-mar-2001',13456);
insert into PAYMENT values('17-apr-2020',10005);
insert into PAYMENT values('23-may-2021',12349);
insert into PAYMENT values('07-jun-1976',12454);
insert into PAYMENT values('10-jul-1974',13458);
insert into PAYMENT values('18-aug-2017',10342);
insert into PAYMENT values('12-sep-2001',12454);
insert into PAYMENT values('19-oct-1988',23457);
```

CITIZEN

insert into CITIZEN values(1234,'john','peter','9-hill-street',9,'london','m','12-jan-1988');
insert into CITIZEN values(1235,'preti','varma','gattaih center',1,'khammam','f','13-feb-2012');
insert into CITIZEN values(1237,'sharat','rao','dwaraka nagar',2,'oslo','m','14-mar-2013');
insert into CITIZEN values(1276,'thanmay','prasad','mayuri center',3,'tokyo','f','15-apr-2014');
insert into CITIZEN values(8752,'varun','chowdary','kasba bazar',4,'hyderabad','m','16-may-2015');
insert into CITIZEN values(9626,'akshita','singh','aziz galli',5,'mumbai','f','17-jun-2016');
insert into CITIZEN values(9373,'rohit','kumar','vdos colony',6,'kolkata','m','18-jul-2017');
insert into CITIZEN values(2618,'manogna','chari','bank colony',7,'srinagar','f','19-aug-2018');
insert into CITIZEN values(9625,'shwintik','reddy','doctors colony',8,'delhi','m','10-sep-2019');
insert into CITIZEN values(9653,'jagruthi','peter','teachers colony',9,'warangal','f','11-oct-2020');
insert into CITIZEN values(5378,'harsha','sharma','3-hill-street',10,'chennai','m','18-jan-1989');

CITIZEN_AGE

insert into citizen_age values('07-may-2004',17);
insert into citizen_age values('18-aug-2002',19);
insert into citizen_age values('14-oct-2009',12);
insert into citizen_age values('21-may-2001',20);
insert into citizen_age values('07-apr-2003',18);
insert into citizen_age values('09-aug-2013',7);
insert into citizen_age values('07-oct-2014',6);
insert into citizen_age values('13-dec-2009',12);
insert into citizen_age values('20-nov-2000',21);
insert into citizen_age values('17-oct-1998',23);

CITIZEN_PHNO

insert into CITIZEN_PHNO values(12345,9876543210);
insert into CITIZEN_PHNO values(87654,9123456790);
insert into CITIZEN_PHNO values(46379,8765432190);
insert into CITIZEN_PHNO values(73648,7890654330);
insert into CITIZEN_PHNO values(89435,9654321870);
insert into CITIZEN_PHNO values(94752,7689543219);
insert into CITIZEN_PHNO values(85922,2545624644);
insert into CITIZEN_PHNO values(09582,9786572835);
insert into CITIZEN_PHNO values(64103,9846562765);
insert into CITIZEN_PHNO values(97415,8767542085);

BILLS
insert into BILLS values(12345,123,1000,'27-mar-2014');
insert into BILLS values(95871,235,1500,'4-jan-2013');
insert into BILLS values(97522,876,1200,'10-feb-2012');
insert into BILLS values(64193,165,1400,'22-apr-2015');
insert into BILLS values(78411,986,1060,'5-may-2016');
insert into BILLS values(75193,174,1700,'2-jun-2017');
insert into BILLS values(75173,827,1080,'1-jul-2018');
insert into BILLS values(61083,087,1240,'9-aug-2019');
insert into BILLS values(65193,175,2980,'14-sep-2009');
insert into BILLS values(75191,836,4000,'1-oct-2021');

DEPARTMENT:
INSERT INTO DEPARTMENT VALUES('Accounts and Audit',1);
INSERT INTO DEPARTMENT VALUES('Administration',2);
INSERT INTO DEPARTMENT VALUES('Education',3);
INSERT INTO DEPARTMENT VALUES('Engineering',4);
INSERT INTO DEPARTMENT VALUES('Public Health and Sanitation',5);
INSERT INTO DEPARTMENT VALUES('Revenue',6);
INSERT INTO DEPARTMENT VALUES('Town Planning',7);
INSERT INTO DEPARTMENT VALUES('Urban Poverty Alleviation',8);
INSERT INTO DEPARTMENT VALUES('Secretarial Section',9);
INSERT INTO DEPARTMENT VALUES('Establishment Section',10);

PROJECT
INSERT INTO PROJECT VALUES(1,'Batman','12-01-21','13-04-22');
INSERT INTO PROJECT VALUES(2,'Bender Project.','12-04-21','16-04-22');
INSERT INTO PROJECT VALUES(3,'Canary.','11-01-21','19-04-22');
INSERT INTO PROJECT VALUES(4,'Casanova','18-01-21','23-04-22');
INSERT INTO PROJECT VALUES(5,'Cascade.','22-01-21','03-04-22');
INSERT INTO PROJECT VALUES(6,'Bigfish','09-01-21','01-04-22');
INSERT INTO PROJECT VALUES(7,'Bigfoot','06-01-21','30-04-22');
INSERT INTO PROJECT VALUES(8,'Horned Frogs','12-01-21','13-04-22');
INSERT INTO PROJECT VALUES(9,'Blue Kings','12-01-21','13-04-22');
INSERT INTO PROJECT VALUES(10,'Red Rozes','12-01-21','13-04-22');

DEPT_PROJECT
INSERT INTO DEPT_PROJECT VALUES('Accounts and Audit',1,'Batman');
INSERT INTO DEPT_PROJECT VALUES('Administration',2,'Bender Project');

INSERT INTO DEPT_PROJECT VALUES('Education',3,'Canary');
INSERT INTO DEPT_PROJECT VALUES('Engineering',4,'Casanova');
INSERT INTO DEPT_PROJECT VALUES('Revenue',5,'Cascade');
INSERT INTO DEPT_PROJECT VALUES('Public Health and Snitation',6,'Bigfish');
INSERT INTO DEPT_PROJECT VALUES('Town Planning',7,'Bigfoot');
INSERT INTO DEPT_PROJECT VALUES('Urban Poverty Alleviation',8,'Horned Frogs');
INSERT INTO DEPT_PROJECT VALUES('Secretarial Section',9,'Blue Kings');
INSERT INTO DEPT_PROJECT VALUES('Establishment Section',10,'Red Rozes');

EMPLOYEE:
INSERT INTO EMPLOYEE VALUES(1,1,'Accounts And Audit',1000,2);
INSERT INTO EMPLOYEE VALUES(3,3,'Education',2000,4);
INSERT INTO EMPLOYEE VALUES(4,4,'Engineering',500,2);
INSERT INTO EMPLOYEE VALUES(10,10,'Establishment Section',1000,0);
INSERT INTO EMPLOYEE VALUES(2,2,'Administration',700,2);
INSERT INTO EMPLOYEE VALUES(5,5,'Public Health and Sanitation',1000,2);
INSERT INTO EMPLOYEE VALUES(6,6,'Revenue',1000,2);
INSERT INTO EMPLOYEE VALUES(7,7,'Town Planning',1000,2);
INSERT INTO EMPLOYEE VALUES(8,8,'Urban Poverty Alleviation',1000,2);
INSERT INTO EMPLOYEE VALUES(9,9,'Secretarial Section',1000,2);

SERVICES:
insert into services values(1972,'Sanitation',2500);
insert into services values(2900,'Electricity',1200);
insert into services values(1900,'Public Lbrary',500);
insert into services values(1332,'Schools',5000);
insert into services values(2345,'Food Inspection',2000);
insert into services values(3144,'Water',2000);
insert into services values(4411,'Fire Department',500);
insert into services values(6512,'Police',0);
insert into services values(7654,'Ambulance',0);
insert into services values(8765,'Tranportation',200);

ISSUES:
insert into issues values(123,'12-02-21','Water Overflow');
insert into issues values(234,'17-01-21','Drainage Problem');
insert into issues values(987,'01-04-21','Electricity Cut');
insert into issues values(455,'05-01-21','No Proper Cleaning in Schools');
insert into issues values(562,'27-02-21','Low Food Quality');

```sql
insert into issues values(391,'09-03-21','Late,Slow Tranportation Facility');
insert into issues values(264,'16-04-21','Education in Schools');
insert into issues values(633,'23-02-21','No Proper Cleaning on Roads');
insert into issues values(823,'15-03-21','Short Circuit');
insert into issues values(450,'26-01-21','Water Cut');
```

ISSUE_CHARACTERISTICS:
```sql
insert into issue_characteristics values('12-02-21','Solved');
insert into issue_characteristics values('17-01-21','Solved');
insert into issue_characteristics values('01-04-21','Solved');
insert into issue_characteristics values('05-01-21','In Progress');
insert into issue_characteristics values('27-02-21','In Progress');
insert into issue_characteristics values('09-03-21','In Progress');
insert into issue_characteristics values('16-04-21','In Progress');
insert into issue_characteristics values('23-02-21','Solved');
insert into issue_characteristics values('15-03-21','Solved');
insert into issue_characteristics values('26-01-21','Solved');
```

COMPLAINS:
```sql
insert into complains values(9635,123);
insert into complains values(2618,264);
insert into complains values(1234,234);
insert into complains values(1235,987);
insert into complains values(9373,633);
insert into complains values(9626,455);
insert into complains values(5378,391);
insert into complains values(8752,823);
insert into complains values(1237,450);
insert into complains values(1276,987);
```

DEPT_EMP:
```sql
insert into dept_emp values(1,2);
insert into dept_emp values(3,5);
insert into dept_emp values(5,6);
insert into dept_emp values(7,9);
insert into dept_emp values(9,10);
insert into dept_emp values(10,1);
insert into dept_emp values(2,3);
insert into dept_emp values(4,4);
```

insert into dept_emp values(6,7);
insert into dept_emp values(8,8);

EMPLOYEE_JOB:
insert into employee_job values('01-01-21',10);
insert into employee_job values('23-11-12',23);
insert into employee_job values('21-04-21',45);
insert into employee_job values('15-07-15',36);
insert into employee_job values('18-08-09',5);
insert into employee_job values('07-12-19',3);
insert into employee_job values('10-04-14',16);
insert into employee_job values('05-06-18',9);
insert into employee_job values('13-01-10',4);
insert into employee_job values('30-04-13',0);

EMPLOYEE_SALARY:
insert into employee_salary values(3,100,2500);
insert into employee_salary values(2,150,2520);
insert into employee_salary values(1,40,3400);
insert into employee_salary values(4,200,4900);
insert into employee_salary values(3,100,500);
insert into employee_salary values(3,500,1990);
insert into employee_salary values(2,600,1110);
insert into employee_salary values(4,220,2330);
insert into employee_salary values(1,340,3330);
insert into employee_salary values(1,760,4220);

PROVIDE:
insert into provide values(1,'Accounts and Audit',1972);
insert into provide values(2,'Administration',2900);
insert into provide values(3,'Education',1900);
insert into provide values(4,'Engineering',1332);
insert into provide values(5,'Public Health and Sanitation',2345);
insert into provide values(6,'Revenue',3144);
insert into provide values(7,'Town Planning',4411);
insert into provide values(8,'Urban Poverty Alleviation',6512);
insert into provide values(9,'Secretarial Section',7654);
insert into provide values(10,'Establishment Section',8765);

PROJECT_REFERENCE1:

```sql
INSERT INTO PROJECT_REFERENCE1 VALUES('BATMAN','RK REAL ESTATES');
INSERT INTO PROJECT_REFERENCE1 VALUES('BENDER PROJECTS.','SR REAL ESTATES');
INSERT INTO PROJECT_REFERENCE1 VALUES('Canary','JK REAL ESTATES');
INSERT INTO PROJECT_REFERENCE1 VALUES('Casanova','MK REAL ESTATES');
INSERT INTO PROJECT_REFERENCE1 VALUES('Cascade','MD PROJECTS');
INSERT INTO PROJECT_REFERENCE1 VALUES('Bigfish','L and T Constructions');
INSERT INTO PROJECT_REFERENCE1 VALUES('Bigfoot','Rama Constructions');
INSERT INTO PROJECT_REFERENCE1 VALUES('Horned Frogs','Raghu REAL ESTATES');
INSERT INTO PROJECT_REFERENCE1 VALUES('BlueKings','TS REAL ESTATES');
INSERT INTO PROJECT_REFERENCE1 VALUES('RedRozes','ASR Group');
```

PROJECT_REFERENCE2:

```sql
INSERT INTO PROJECT_REFERENCE2 VALUES('HYDERABAD',890000);
INSERT INTO PROJECT_REFERENCE2 VALUES('BANGLORE',560000);
INSERT INTO PROJECT_REFERENCE2 VALUES('VIZAG',1000000);
INSERT INTO PROJECT_REFERENCE2 VALUES('VISHAKPATNAM',900000);
INSERT INTO PROJECT_REFERENCE2 VALUES('WARANGAL',340000);
INSERT INTO PROJECT_REFERENCE2 VALUES('DELHI',1890000);
INSERT INTO PROJECT_REFERENCE2 VALUES('MUMBAI',8760000);
INSERT INTO PROJECT_REFERENCE2 VALUES('MAHRASTRA',670000);
INSERT INTO PROJECT_REFERENCE2 VALUES('AMRAVATI',1010000);
INSERT INTO PROJECT_REFERENCE2 VALUES('SRINAGAR',240000);
```

SOLVE:

```sql
insert into solve values(1,'Accounts and Audit',123);
insert into solve values(2,'Administration',234);
insert into solve values(3,'Education',987);
insert into solve values(4,'Engineering',455);
insert into solve values(5,'Public Health and Sanitation',562);
insert into solve values(6,'Revenue',391);
insert into solve values(7,'Town Planning',264);
insert into solve values(8,'Urban Poverty Alleviation',633);
insert into solve values(9,'Secretarial Section',823);
insert into solve values(10,'Establishment Section',450);
```

>>>>>>>>>>>>>>>>>>THANK YOU<<<<<<<<<<<<<<<<<<