Report – EER diagram relational mapping:

1. The first entity to be mapped to a relation is the FEDERAL entity to 'FEDERAL' relation. This relation would have only one attribute: 'Fname' and it is also the primary key of the relation. Attributes and their types:
    a. Fname – varchar. For example, it can be 'CDC'

2. The VACCINE entity would be mapped to a new relation with all the simple attributes added to the relation. It has a 1: N relationship 'Shipped_to' with FEDERAL entity and VACCINE is on the N side. Thus, the primary key of FEDERAL relation would be added as foreign key to VACCINE relation. There is also a M: N relationship 'Have' from VACCINE to LOCAL_BODIES. So, this relationship would be mapped to a new relation.
    Attributes and their types:
    a. Mname – varchar because it can be Covaxin
    b. Vac_Type – varchar because it can be Whole virus
    c. Proc_count – int because this is the count value of doses procured
    d. NumDoses_shipped – int because this is the count of doses shipped to the FEDERAL body.
    e. Date_shipped – date because this mentions the date it was shipped.
    f. Fname - varchar

3. The PATIENT entity is mapped to a new relation. It would have all the single valued attributes in the relation but the multivalued attributes are mapped to new relations. The PATIENT entity is related to the VACCINE entity through a 1: N relationship 'Administered_on' where PATIENT is on the N side. Thus, the primary key of the VACCINE relation would be referenced as a foreign key in PATIENT relation. Primary key is the 'Id_num', 'Type_of_Dose' and the foreign key is the 'Vac_Type', Date_shipped, Mname which references the 'Vac_Type', Date_shipped, Mname in VACCINE relation.
    Attributes and their types:
    a. Vac_Type – varchar
    b. Name – varchar because this is the name of the patient
    c. Age – int because this is the age
    d. Contact – decimal (10,0) because this is a 10-digit phone number.
    e. Vac_Phase – varchar (3) because it can be 1A, 1B
    f. Address – varchar because this is the address of the patient
    g. Id_num – unique ID of the patient

h. Date_administered – date. This represents the date of administration
i. Date_shipped – date. This represents when the manufacturer shipped this
j. Mname – varchar
k. Type_of_Dose – int because this can be 1 or 2 only.
l. Occupation – varchar. This represents the occupation of the patient which is needed for finding the right phase
m. Adv_Effects – Boolean. This says if there was an adverse reaction on administration or not
n. Zipcode – decimal (5,0). This represents 5-digit zip code of where the patient got administered.
o. County – varchar. This represents the county where the patient got administered.

4. The multivalued attribute Allergies is mapped to a new relation 'ALLERGIES'. The Allergy name would be shown in an attribute 'Allergy'. The attribute 'Id_num' and 'Type_of_Dose' are also added to this relation. The 'Id_num', 'Type_of_Dose' attribute would be the foreign key referencing the 'Id_num', 'Type_of_Dose' in the parent relation which is PATIENT. The primary key would be the combination of 'Allergy', 'Id_num' and 'Type_of_Dose'.
Attributes and their types:
   a. Allergy – varchar. This represents an allergy
   b. Id_num – int. Unique ID of the patient.
   c. Type_of_Dose – int

5. The multivalued attribute Med_condition is mapped to a new relation 'MED_Condition'. The Condition name would be shown in an attribute 'cond'. The attribute 'Id_num' and 'Type_of_Dose' are also added to this relation. The 'Id_num', 'Type_of_Dose' attributes would be the foreign key referencing the 'Id_num', 'Type_of_Dose' in the parent relation which is PATIENT. The primary key would be the combination of 'cond', 'Id_num' and 'Type_of_Dose'.
Attributes and their types:
   a. Cond – varchar. This represents a condition.
   b. Id_num – int
   c. Type_of_Dose – int

6. The STATES entity is mapped to a new relation 'STATES'. The attributes are added to the relation. The STATES entity is also related to the FEDERAL entity by a 1: N relationship 'Supplies_to' where STATES is on the N side. Thus, while mapping the 'STATES' relation, the primary key of 'FEDERAL' relation is added as foreign key to 'STATES' relation. The attributes would be 'Sname', 'Spopulation', 'No_of_Doses', 'Fname'. The 'Fname' foreign key references 'Fname' in the 'FEDERAL' relation.
Attributes and their types:
   a. Sname – varchar. This represents the name of the state
   b. Spopulation – int. This represents the population of the state.

     c.   No_of_doses – int. This represents the number of doses it received from the Federal body.

     d.   Fname – varchar. Represents the Federal body name

7. The LOCAL_BODIES entity is mapped to a new relation 'LOCAL_BODIES'. The attributes of the entity are added to the relation. The 'LOCAL_BODIES' relation is also related to the 'STATES' relation by a 1: N relationship 'Distributes_to' where LOCAL_BODIES is on the N side. Thus, while mapping this relationship, the primary key of 'STATES' relation is added as foreign key on the 'LOCAL_BODIES' relation. The attributes are 'County','Lpopulation','Sname','Zipcode'. The primary key would be 'County' and 'Zipcode'. The foreign key would be Sname which references Sname of 'STATE' relation.
Attributes and their types:
     a.   County – varchar. Represents the county name.
     b.   Lpopulation – int. Represents the population of the zipcode locality.
     c.   Zipcode – decimal (5,0). Represents a 5-digit zipcode.

8. The VACCINATION_CAMPS entity would be mapped to a new relation. The simple attributes of the entity would be added to the relation. Since it is a disjoint subclass of LOCAL_BODIES, the primary key of LOCAL_BODIES become the primary key of VACCINATION_CAMPS and the primary key would also be the foreign keys which reference the primary key of the parent LOCAL_BODIES relation.
Attributes and their types:
     a.   Location – varchar. Represents the location where the vaccination camp is held.
     b.   County – varchar.
     c.   Zipcode – decimal (5,0)

9. The HEALTH_CARE_CENTERS entity would be mapped to a new relation. The simple attributes of the entity would be added to the relation. Since it is a disjoint subclass of LOCAL_BODIES, the primary key of LOCAL_BODIES become the primary key of HEALTH_CARE_CENTERS and the primary key would also be the foreign keys which reference the primary key of the parent LOCAL_BODIES relation.
Attributes and their types:
     a.   Name – varchar. Represents the name of the health care center.
     b.   Type – varchar. For example, 'hospitals'
     c.   County – varchar
     d.   Zipcode – decimal (5,0)

10. The LABS_AND_PHARMACIES entity would be mapped to a new relation. The simple attributes of the entity would be added to the relation. Since it is a disjoint subclass of LOCAL_BODIES, the primary key of LOCAL_BODIES become the primary key of LABS_AND_PHARMACIES and the

primary key would also be the foreign keys which reference the primary key of the parent LOCAL_BODIES relation.

Attributes and their types:

    a. Name – varchar. Represents name of the lab or pharmacy such as 'CVS'.

    b. Type – varchar. Represents if it is a 'lab' or 'pharmacy'

    c. County – varchar

    d. Zipcode – decimal (5,0)

11. The 'Have' relationship is an M: N relationship and thus would be mapped to a new relation 'HAVE'. The attributes on the relationship would be added as simple attributes to the relation. The primary key of this relation would be combination of the primary keys of both 'VACCINE' and 'LOCAL_BODIES' relation. The primary key attributes also would be the foreign key referencing the corresponding primary keys of the relations connected to the relationship 'HAVE'.

Attributes and their types:

    a. No_of_doses – int. This represents the number of doses received by the local body

    b. Date_received – date. This represents the date when the doses were received.

    c. Vac_type – varchar. Represents the type of the vaccine

    d. Date_shipped – date. Represents when the doses were shipped by the manufacturer.

    e. Mname – varchar. Represents the manufacturer name

    f. County – varchar. Represents the county of the local body.

    g. Zipcode – decimal (5,0). Represents the zipcode of the local body.

CREATE TABLE COMMANDS:

```
create table FEDERAL(

Fname varchar(50),

primary key(Fname)

);
```

```
create table VACCINE(

Mname varchar(50),

Vac_Type varchar(50),

Proc_count int NOT NULL,
```

```sql
NumDoses_shipped int NOT NULL,

Fname varchar(50),

Date_shipped date,

primary key(Vac_Type,Date_shipped,Mname),

foreign key(Fname) references FEDERAL(Fname)

);




create table STATES(

Sname varchar(50),

Spopulation int,

No_of_doses int,

Fname varchar(50),

primary key (Sname),

foreign key (Fname) references FEDERAL(Fname)

);




create table LOCAL_BODIES(

County varchar(50),

Lpopulation int,

Sname varchar(50),

Zipcode decimal(5,0),

primary key (County,Zipcode),

foreign key (Sname) references STATES(Sname)

);
```

```sql
create table PATIENT(

Vac_Type varchar(50),

Name varchar(50),

Age int,

Contact decimal(10,0),

Vac_Phase varchar(3),

Address varchar(50),

Id_num int,

Date_administered date,

Date_shipped date,

Mname varchar(50),

Type_of_Dose int,

Occupation varchar(50),

Adv_Effects Boolean,

Zipcode decimal(5,0),

County varchar(50),

primary key(Id_num,Type_of_Dose),

foreign key(Vac_Type,Date_shipped,Mname) references VACCINE(Vac_Type,Date_shipped,Mname),

foreign key(County,Zipcode) references LOCAL_BODIES(County,Zipcode)

);


create table ALLERGIES(

Allergy varchar(50),

Id_num int,

Type_of_Dose int,

primary key(Allergy,Id_num,Type_of_Dose),

foreign key(Id_num,Type_of_Dose) references PATIENT(Id_num,Type_of_Dose)

);
```

```sql
create table MED_Condition(

cond varchar(50),

Id_num int,

Type_of_Dose int,

primary key(cond,Id_num,Type_of_Dose),

foreign key(Id_num,Type_of_Dose) references PATIENT(Id_num,Type_of_Dose)

);




create table VACCINATION_CAMPS(

Location varchar(50),

County varchar(50),

Zipcode decimal(5,0),

primary key (County,Zipcode),

foreign key(County,Zipcode) references LOCAL_BODIES(County,Zipcode)

);




create table HEALTH_CARE_CENTERS(

Name varchar(50),

Type varchar(50),

County varchar(50),

Zipcode decimal(5,0),

primary key (County,Zipcode),

foreign key(County,Zipcode) references LOCAL_BODIES(County,Zipcode)

);
```

```
create table LABS_AND_PHARMACIES(

Name varchar(50),

Type varchar(50),

County varchar(50),

Zipcode decimal(5,0),

primary key (County,Zipcode),

foreign key(County,Zipcode) references LOCAL_BODIES(County,Zipcode)

);
```

```
create table HAVE(

No_of_doses int,

Date_received date,

Vac_type varchar(50),

Date_shipped date,

Mname varchar(50),

County varchar(50),

Zipcode decimal(5,0),

primary key(Vac_Type,Date_shipped,Mname,County,Zipcode),

foreign key(Vac_Type,Date_shipped,Mname) references VACCINE(Vac_Type,Date_shipped,Mname),

foreign key(County,Zipcode) references LOCAL_BODIES(County,Zipcode)

);
```

The commands can also be found in the file CommandsProject2.txt