Project for Database Design

Phase III. Implementation

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1. **Pre-Illumination**

For clearly describing the implementation of our database, we separate this report into four sections.

In Section 1 we normalize the original relational schema into third normal form and changed part of our relational schema because of some requirement from Phase II. We then explained what are changed.

In Section 2 we drew a dependency diagram for each relation table one by one.

In Section 3 we began our process of building a database in Oracle using SQL statements, which contains three parts.

Part one is the creation of database, including tables, all other structures as well as data type and format, Part two is the creation of views corresponding to five distinct requirements from Question d, and Part three is the creation of Queries to satisfy the 14 requirements from Question e.

Finally, in Section 4, a short summary is given at the end of this report.

1. **3NF Normalized Relational Schema**

Firstly, according to the requirement of phase III and with purpose to simplify the relation model for this database, we have set the relations/tables conforming to 3NF Normalization. There is no transitive dependency of the non-prime attributes of a relation to the key attribute:

* The PERSON table has primary key Person\_Id. The other attributes are non-prime and are directly functionally dependent on the primary key.

|  |
| --- |
| **PERSON** |
| Person\_Id |
| First\_Name |
| Middle\_Name |
| Last\_Name |
| Gender |
| Address |
| DOB |

* Since a person can have multiple contact numbers, and more than one person can have the same contact number (for example a minor has same contact as of their parent), so a separate table CONTACT with super key Fk\_Person and Number is created. This also follows 3NF as there is no non-prime key. Fk\_Person is the foreign key referencing Person\_Id of PERSON table.

|  |
| --- |
| **CONTACT** |
| Fk\_Person |
| Number |

* Class1 Patient is a Person who can consult only one doctor. So CLASS1\_PATIENT is comprised of Fk\_Person, which acts as the primary key and is the foreign key referencing to Person\_Id which is the primary key of PERSON, and Fk\_Doctor, which references the primary key of DOCTOR table. The non-prime attribute is directly functionally dependent on the primary key.

|  |
| --- |
| **CLASS1\_PATIENT** |
| Fk\_Person |
| Fk\_Doctor |

* Class2 Patient is identified by a person and the admission date. So CLASS2\_PATIENT comprises of Fk\_Person, which is the foreign key referencing to Person\_Id of PERSON table, and the Admission\_Date, which together act as the composite primary key. The other attribute Fk\_Room is the foreign key which references to Room\_Id of the ROOM table, and it is directly functionally dependent on the primary key attribute.

|  |
| --- |
| **CLASS2\_PATIENT** |
| Fk\_Person |
| Admission\_Date |
| Fk\_Room |

* Since a Class2 Patient can consul multiple Doctors and a Doctor can be consulted by multiple Class2 Patients, so a separate relation CONSULTATION is created which contains foreign keys to primary key of CLASS2\_PATIENT and primary key of DOCTOR as the super key.

|  |
| --- |
| **CONSULTATION** |
| Fk\_Class2\_Patient |
| Fk\_Doctor |

* The VISITOR table has Fk\_Class2\_Patient as the primary key, which is the foreign key referencing to the primary key of CLASS2\_PATIENT. The other non-prime attributes are directly functionally dependent on the primary key.

|  |
| --- |
| **VISITOR** |
| Fk\_Class2\_Patient |
| Name |
| Address |
| Contact |

* The TREATMENT\_DETAILS table has the foreign keys Fk\_Class2\_Patient referencing to primary key of CLASS2\_PATIENT, Fk\_Medicine referencing to primary key of MEDICINE, and Fk\_Treatment referencing to primary key of TREATMENT as the super key.

|  |
| --- |
| **TREATMENT\_DETAILS** |
| Fk\_Class2\_Patient |
| Fk\_Medicine |
| Fk\_Treatment |

* The MEDICINE\_ASSOC table has the foreign keys Fk\_Treatment referencing to primary key of TREATMENT and Fk\_Medicine referencing to primary key of MEDICINE as the super key. This table is created to signify that multiple medicines can be used for a treatment, and multiple treatments can require the same medicine.

|  |
| --- |
| **MEDICINE\_ASSOC** |
| Fk\_Treatment |
| Fk\_Medicine |

* The TREATMENT table has primary key Treatment\_Id, and the other non-prime attributes Name, Start\_Date and End\_Date are directly functionally dependent on the primary key.

|  |
| --- |
| **TREATMENT** |
| Treatment\_Id |
| Name |
| Start\_Date |
| End\_Date |

* The MEDICINE table has primary key Medicine\_Code, and the other non-prime attributes Name, Price, Quantity, and Expiry\_Date are directly functionally dependent on the primary key.

|  |
| --- |
| **MEDICINE** |
| Medicine\_Code |
| Name |
| Price |
| Quantity |
| Expiry\_Date |

* The DOCTOR table has primary key Fk\_Person, which is the foreign key referencing to Person\_Id of PERSON table. The other non-prime attributes Start\_Date, Role, Specialization, and Doc\_Type are directly functionally dependent on the primary key.

|  |
| --- |
| **DOCTOR** |
| Fk\_Person |
| Start\_Date |
| Role |
| Specialization |
| Doc\_Type |

* The RECEPTIONIST table has primary key Fk\_Person, which is the foreign key referencing to Person\_Id of PERSON table. The other non-prime attribute Start\_Date, is directly functionally dependent on the primary key.

|  |
| --- |
| **RECEPTIONIST** |
| Fk\_Person |
| Start\_Date |

* The NURSE table has primary key Fk\_Person, which is the foreign key referencing to Person\_Id of PERSON table. The other non-prime attribute Start\_Date, is directly functionally dependent on the primary key.

|  |
| --- |
| **NURSE** |
| Fk\_Person |
| Start\_Date |

* The ROOM table has the primary key Room\_Id. The Fk\_Nurse is the foreign key referencing to primary key of NURSE table. This, along with the other non-prime attributes Room\_Type, Start\_Time, End\_Time are directly functionally dependent on the primary key.

|  |
| --- |
| **ROOM** |
| Room\_Id |
| Fk\_Nurse |
| Room\_Type |
| Start\_Time |
| End\_Time |

* The RECORD table has the primary key Record\_Id. The Fk\_Person is the foreign key referencing to primary key of PERSON table. This, along with the other non-prime attributes Appointment\_Date, Visit\_Date, Description, and Fk\_Receptionist, which is the foreign key referencing to primary key of RECEPTIONIST table, are directly functionally dependent on the primary key.

|  |
| --- |
| **RECORD** |
| Record\_Id |
| Fk\_Person |
| Appointment\_Date |
| Visit\_Date |
| Description |
| Fk\_Receptionist |

* The PAYMENT table has the primary key Payment\_Id. The Fk\_Person is the foreign key referencing to primary key of PERSON table. This, along with the other non-prime attributes Payment\_Date, Insurance\_Id, Amount\_Due, Cash\_Amount, and Fk\_Receptionist, which is the foreign key referencing to primary key of RECEPTIONIST table, are directly functionally dependent on the primary key.

|  |
| --- |
| **PAYMENT** |
| Payment\_Id |
| Fk\_Person |
| Payment\_Date |
| Insurance\_Id |
| Amount\_Due |
| Cash\_Amoount |
| Fk\_Receptionist |

(put updated figure here.)

*Figure 1*

1. **Dependency Diagram**

We now draw a dependency diagram for each table from Figure 1 as follows:

* 1. Hospital Personnel

There is only one attribute in the left-hand side of the functional dependencies, which is the key of relational schema Hospital Personnel, Person\_ID. Therefore, every other attribute of this relational schema is functionally dependent on Person\_ID.

The dependency diagram is shown as Figure 3.

Person\_ID First\_Name Middle\_Name Last\_Name Birth\_Date Phone Address

Hospital Personnel

Figure 3. Dependency Diagram of Hospital Personnel

2.2 XXXXXX Please list dependency diagram for every table using above forms.

2.XX Final Results

After drawing the dependency diagrams one after another, Figure XX shows the final results for the whole database including the ones who do not have any functional dependencies.

Figure XX. Whole Dependency Diagram for XXX Database

1. **Implementation of Database** 
   1. Creation of Database with SQL Statements

After normalizing every relational schema into third normal form and modifying some details, it is the time to implement our database using SQL languages into Oracle.

* + 1. Table Creation

Using SQL statement, we created XX tables as follows: !

Hospital\_Personnel: (This is an Example)

CREATE TABLE Hospital\_Personnel ( Person\_ID char(11), not null, First\_Name varchar(20) not null, Middle\_Name varchar(20) not null, Last\_Name varchar(20) not null, Birth\_Date date, Phone char(12), Address varchar(50), PRIMARY KEY (Person\_ID));

* + 1. A Database State We insert some values into the database in order to test our SQL create view and query statement.

Here we just give one example of insertions as follows:

INSERTION OF TABLE HOSPITAL\_PERSONNEL -------------------------------------------------------------------------------------------------------- insert into Hospital\_Personnel values ('000-00-0000', 'Emily', 'A', 'Navathe', date'1980-04-30', --------------------------------------------------------------------------------------------------------------------------- Table 2 shows the states for Hospital Personnel database schemas. (Example) Hospital\_Personnel Person\_ID FName M LName Birth\_Date Phone Address 000-00-0000 Emily A Navathe 1980-04-30 214-456-7626 2665 Main St., Denton, TX 75083 111-11-1111 Tom B Brown 1956-01-12 214-369-8759 263 Green St., Dallas, TX 75076 222-22-2222 Jimmy C Johnson 1980-02-03 469-765-9754 Apt.14, 3663 Beltline Blvd., Dallas, TX 75034’ 333-33-3333 Sally D Smith 1976-03-26 214-436-6336 744 Walnut St., Dallas, TX 75074 444-44-4444 Jeniffer E Smack 1957-04-05 214-567-4767 467 Parker St., Plano, TX 75076 555-55-5555 Smuel F Sunder 1997-05-20 972-456-2552 18675 Chase Oak St., Frisco, TX 75034 666-66-6666 Raja G Farage 2000-06-03 972-832-9317 556 Spring St., Mosquite, TX 75087 777-77-7777 Kenneth H Chenault 1979-07-16 214-134-8643 2445 Wolf Creek St., Greenvill, TX 75056 888-88-8888 Brett I Cotton 1956-08-19 469-295-3694 24567 Walnut St., The Colony, TX 75032 999-99-9999 Adam J Daley 1935-09-24 469-478-3688 865 Park St., Garland, TX 75073’ 101-01-0101 George K Cobb 1945-01-12 469-658-3978 263 Beltline Ave., Carleton, TX 75008 121-21-2121 Ivor L Page 1943-08-19 972-843-6823 1247 Floyd Rd., Richardson, TX 75075 131-31-3131 Joseph M Tomason 1969-11-17 972-987-9843 9454 RoyleLine Blvd., Irving, TX 75042 141-41-4141 Sara N Gaddis 1974-04-27 972-345-9734 345 King St., Fort Worth, TX 75023

(Please list all your table instance/data here.)

Till now we finished the process of creating tables and database states.

* 1. Creation of Views (Answer for Question d)
     1. Employees-Hired (This is an Example)

This view returns the First Name, Last Name, and Date Hired of all Hospital Employees CREAT VIEW Employees-Hired AS SELECT First\_Name, Last\_Name, Date\_Hired FROM Hospital\_Personnel, Employees WHERE Person\_ID=Emp\_ID

* 1. Creation of SQL Queries (Answer for Question f)

Now we give out the SQL Queries for each of 14 questions listed in Question e as follows:

* + 1. For each Job Class list all the staff members belonging to this class. (This is an example)

SELECT Job\_Class, Emp\_Type, First\_Name, Last\_Name FROM Employees, Hospital\_Personnel WHERE Person\_ID=Emp\_ID AND Emp\_type = 'S' ORDER BY Job\_Class;

1. **Conclusion**

In this report we modified the EER diagram and relational schemas for XXX Database according to the requirement of Phase III. We also give dependency diagram for each relational schema in database. Then we created tables for each relational schema and write the SQL statements for the views and queries listed in Question d and Question e.