**Project 1:**

**Database Model Development for Kaiser Permanente Health Center**

1. **Description of the Model**
2. **ER Diagram for the Model.**
3. **SQL statements to develop database tables for different entities.**

**Explanation of Company and ER Diagram**

**About company -**

Kaiser Permanente is the largest nonprofit integrated healthcare system with over 9.6 million members.KP-California consists of Northern and Southern California regions.KP has prepaid integrated system consist of three distinctly separate, but related entities: a health plan that bears insurance risk, medical groups of physicians, and a hospital systems. I have chosen Kaiser Permanente hospital Systems to study its business process as part of project1.

**Business Process –**

Kaiser Permanente is often seen as a prime example of integrated care. KP provides members with an end-to-end experience; they own and operate a large number of clinics, hospitals, laboratories, Departments and pharmacies. At all their hospitals, patients can receive primary and secondary care. Patients can also undergo laboratory and imaging tests and get prescriptions filled. At some clinics, they can even undergo same-day outpatient surgery. This way, they take care of most of their patients’ health care needs in a single facility. Primary care services include everything from basic health checkups to disease-management programs. Even if patients need to be hospitalized, care delivery is seamless because all physicians and other health professionals have access to KP Health Connect, electronic medical record database. KP Health Connect updates itself in real time, the records are never out of date. KP Health Connect also facilitates the care pathways because it includes documentation templates, alerts, appointmnet reminders, and other clinical-decision support capabilities. Members can schedule appointments in several ways: online, by telephoning a call center, or while talking to a physician Physicians provide only part of patient care, the remainder is delivered by nurses, pharmacists, and other team members, following the pathways’ protocols. Patients will be billed according their services taken from the hospitals from different department. KP found that the combination of a good data environment, strong end-to-end processes, clear communications, and a patient-centric focus creates integrated care. It also encourages everyone within the system to do their best.

**ER Diagram for Kaiser Permanente Hospital System**



**Explanation of ER Diagram –**

**Entities And Attributes Explained**

For the above ER diagram – following are the entities defined –

1. **Hospital** – In the hospital Management System **Hospital** corresponds to one Entity, Hospital has the following attributes –
2. Hopital\_ID – It is a primary key for Hospital of datatype Integer
3. Hospital\_Name – It is a name of the Hospital of datatype varchar2
4. Hospital\_Address – It is address of the Hospital of datatype varchar2
5. Hospital\_Phone\_No – It is Phone\_No of the Hospital of datatype varchar2
6. Hospital\_City-It is city of Hospital where it is located of datatype varchar2
7. **Department** – In the hospital Management System **Department** corresponds to one Entity,In the hospital there will be many Department.Department has the following attributes –
8. Department\_ID – It is a primary key for Department of datatype Integer
9. Department\_Name – It is a name of the Department of datatype varchar2
10. Department\_Location – It is Location of the Department of datatype varchar2
11. Hopital\_ID – It is a Foreign key for Department of datatype Integer
12. **Staff** – The entity **Staff** corresponds to different types of employees in the hospital. Staff has the following attributes –
13. Staff\_ID – It is a primary key for Staff of datatype Integer
14. Hopital\_ID – It is a Foreign key for Staff of datatype Integer
15. Staff\_FName – It is a Firstname of the Staff of datatype varchar2
16. Staff\_LName – It is a Lastname of the Staff of datatype varchar2
17. Staff\_Address – It is address of the Staff of datatype varchar2
18. Staff\_DOB – It is Date Of birth of the Staff of datatype DATE
19. **Doctor** – The entity **Doctor** corresponds to different types of doctors in the hospital. Doctor has the following attributes –
20. Doctor\_ID – It is a primary key for Doctor of datatype Integer
21. Staff\_ID – It is a Foreign key for Doctor of datatype Integer
22. Doctor\_FName – It is a Firstname of the Doctor of datatype varchar2
23. Doctor\_LName – It is a Lastname of the Doctor of datatype varchar2
24. Doctor\_Address – It is address of the Doctor of datatype varchar2
25. Doctor\_DOB – It is Date Of birth of the Doctor of datatype DATE
26. **Appointment** – The entity **Appointment** corresponds to many appointments scheduled for doctors and patients. Appointment has the following attributes –
27. Appointment\_ID – It is a primary key for Doctor of datatype Varchar2
28. Doctor\_ID – It is a Foreign key for Appointment of datatype Integer
29. Patient\_ID – It is a Foreign key for Appointment of datatype Integer
30. Appointment\_Date – It is a appointment date for the Doctor and patient of datatype date
31. Appointment\_Time – It is a appointment time for the Doctor and patient of datatype Time.
32. **Patients** – The entity **Patients** corresponds to different types of patients visiting the hospital for different kind of care. Patients has the following attributes –
33. Patient\_ID – It is a primary key for Patients of datatype integer
34. Doctor\_ID – It is a Foreign key for Patients of datatype Integer
35. Patient\_FName – It is a Firstname of the Doctor of datatype varchar2
36. Patient\_LName – It is a Lastname of the Doctor of datatype varchar2
37. Patient\_Address – It is address of the patient of datatype varchar2
38. Patient\_DOB – It is Date Of birth of the patient of datatype DATE
39. **Bills** – The entity **bills** corresponds to different types of bills for patients specific care. One patient can see doctors from different department. Patient will receive bills from different departments.Patients has the following attributes –
40. Bill\_ID – It is a primary key for Bill of datatype Integer
41. Bill\_Name – It is a name of the bill of datatype varchar2
42. Bill\_type – It is Type of the bill of datatype varchar2
43. Patient\_ID – It is a Foreign key for bill of datatype Integer

**Relationship between Entities**

**Hospital-Department:One** Hospital can have different Departments.One specific Department belongs to one specific Hospital Hence there is an optional one-to-many relationship between Hospital and Department.

**Hosiptal-Staff**:One Hospital has Many Staffs, One particular Staff belongs to one specific hospital at a time. Hence there is an mandatory one-to-many relationship between Hospital and Department

**Staff-Doctor**:Doctor is a part of staff member.Staff member includes many doctors in the group. Hence there is an optional one-to-many relationship between Doctor and Staff.

**Doctor-Appointment**:Doctor is scheduled for many appointments for specific date and different time slots. Hence there is an optional one-to-many relationship between Doctor and Appointment

**Patient-Appointment**:One patient can have one particular appointment for the specific date and time. Hence there is an optional one-to-one relationship between Patient and Appointment

**Patient-Bills**:One Patient will have many bills for different kinds of services.One specific bill belongs to one patient. Hence there is an optional one-to-Many relationship between Patient and Bills

**Following are the SQL statements to develop the database model** –

CREATE TABLE HOSPITAL\_T

( HOSPITAL\_ID INTEGER NOT NULL,

HOSPITAL\_NAME VARCHAR2(30) NOT NULL,

HOSPITAL\_ADDRESS VARCHAR2(50),

HOSPITAL\_CITY VARCHAR2(30),

CONSTRAINT HOSPITAL\_T\_PK PRIMARY KEY (HOSPITAL\_ID)

) ;

CREATE TABLE DEPARTMENT\_T

( DEPARTMENT\_ID INTEGER NOT NULL,

DEPARTMENT\_NAME VARCHAR2(20) NOT NULL,

DEPARTMENT\_LOCATION VARCHAR2(20),

HOSPITAL\_ID INTEGER NOT NULL,

CONSTRAINT DEPARTMENT\_T\_PK PRIMARY KEY (DEPARTMENT\_ID, HOSPITAL\_ID),

CONSTRAINT DEPARTMENT\_T\_FK FOREIGN KEY (HOSPITAL \_ID)

REFERENCES HOSPITAL\_T (HOSPITAL\_ID),

);

CREATE TABLE STAFF\_T

( STAFF\_ID INTEGER NOT NULL,

STAFF\_FNAME VARCHAR2(20) NOT NULL,

STAFF\_LNAME VARCHAR2(20) NOT NULL

STAFF\_ADDRESS VARCHAR2(50),

STAFF\_DOB DATE,

HOSPITAL\_ID INTEGER NOT NULL,

CONSTRAINT STAFF\_T\_PK PRIMARY KEY (STAFF \_ID, HOSPITAL\_ID),

CONSTRAINT STAFF\_T\_FK FOREIGN KEY (HOSPITAL\_ID)

REFERENCES HOSPITAL\_T (HOSPITAL\_ID),

);

CREATE TABLE DOCTOR\_T

( DOCTOR\_ID INTEGER NOT NULL,

DOCTOR\_FNAME VARCHAR2(20) NOT NULL,

DOCTOR\_LNAME VARCHAR2(20) NOT NULL

DOCTOR\_ADDRESS VARCHAR2(50),

DOCTOR\_DOB DATE,

STAFF\_ID INTEGER NOT NULL,

APPOINTMENT\_ID INTEGER NOT NULL,

CONSTRAINT DOCTOR\_T\_PK PRIMARY KEY (DOCTOR\_ID, STAFF\_ID, APPOINTMENT\_ID),

CONSTRAINT DOCTOR \_T\_FK1 FOREIGN KEY (STAFF \_ID)

REFERENCES STAFF\_T (STAFF\_ID)

CONSTRAINT DOCTOR \_T\_FK2 FOREIGN KEY (APPOINTMENTT\_ID)

REFERENCES APPOINTMENT\_T (APPOINTMENT\_ID)

);

CREATE TABLE APPOINTMENT\_T

( APPOINTMENT\_ID INTEGER NOT NULL,

DOCTOR\_ID INTEGER NOT NULL,

PATIENT\_ID INTEGER NOT NULL,

APPOINTMENT\_TIME TIME,

APPOINTMENT\_DATE DATE,

CONSTRAINT APPOINTMENT\_T\_PK PRIMARY KEY (APPOINTMENT\_ID, DOCTOR\_ID, PATIENT\_ID),

CONSTRAINT APPOINTMENT\_T\_FK1 FOREIGN KEY (DOCTOR \_ID)

REFERENCES DOCTOR\_T (DOCTOR\_ID),

CONSTRAINT APPOINTMENT\_T\_FK2 FOREIGN KEY (PATIENT\_ID)

REFERENCES PATIENT\_T (PATIENT\_ID)

);

CREATE TABLE PATIENT\_T

( PATIENT\_ID INTEGER NOT NULL,

PATIENT\_FNAME VARCHAR2(20) NOT NULL,

PATIENT\_LNAME VARCHAR2(20) NOT NULL

PATIENT\_ADDRESS VARCHAR2(50),

PATIENT\_DOB DATE,

APPOINTMNET\_ID INTEGER NOT NULL,

CONSTRAINT PATIENT\_T\_PK PRIMARY KEY (PATIENT\_ID, APPOINTMENT\_ID),

CONSTRAINT PATIENT\_T\_FK FOREIGN KEY (APPOINTMENT\_ID)

REFERENCES APPOINTMENT\_T (APPOINTMENT\_ID)

);

CREATE TABLE BILLS\_T

( BILL\_ID INTEGER NOT NULL,

PATIENT\_ID INTEGER NOT NULL,

BILLS\_NAME VARCHAR2(30) NOT NULL,

BILLS\_TYPE VARCHAR2(30),

CONSTRAINT BILL\_T\_PK PRIMARY KEY (BILL\_ID, PATIENT\_ID),

CONSTRAINT BILL\_T\_FK FOREIGN KEY (PATIENT\_ID)

REFERENCES PATIENT\_T (PATIENT\_ID)

) ;