***CONCEPTUAL BUSINESS MODEL FOR A HOSPITAL***

***(****using concepts of Data Analysis for Business)*

*Prepared by : Ayushi Kanwar*

*CSE-CORE*

*SRMIST ,KTR ,Chennai*

***CONCEPTUAL BUSINESS MODEL OF A HOSPITAL***

***Ideas incorporated in the business model:***

1. DEPARTMENT
2. DOCTOR
3. PATIENT
4. APPOINTMENT
5. MEDICAL HISTORY OF PATIENTS
6. MEDICATIONS
7. TESTING LAB RECORDS
8. PHARMACY INVENTORY
9. PATIENT STAY RECORDS
10. BILLING SYSTM
11. ICU RECORDS
12. EMERGENCY DEPTT RECORDS

*THE ARROWS/LINKING LINES RESPRESENT:*

*ONE TO ONE RELATIONSHIP*

*ONE TO MANY RELATIONSHIP*

*MANY TO MANY RELATIONSHIP*

*MANY TO ONE RELATIONSHIP*

***RELATIONAL DATA MODEL***

***RELATIONAL DATABSE***

|  |
| --- |
| ***DEPARTMENT*** |
| DEPTT\_ID <PK> |
| DEPTT\_ NAME |
| HEAD\_OF\_ DEPARTMENT |
| DOCTORS\_LIST |

|  |
| --- |
| ***DOCTORS*** |
| DOCTOR \_ID <PK> |
| DEPTT\_ID <FK> |
| DR\_NAME |
| DESIGNATION |
| OPD\_DAYS |
| SURGERY\_DAYS |

|  |
| --- |
| ***APPOINTMENTS*** |
| APPOINTMENT\_ID <PK> |
| PATIENT\_ID <FK> |
| APPOINTMENT\_DATE |
| APPOINTMENT\_TIME |
| DOCTOR\_ID <FK> |
| ROOM\_NO |

|  |
| --- |
| ***PATIENTS*** |
| PATIENT\_ID <PK> |
| PATIENT\_NAME |
| DEPTT­\_ ID <FK> |
| APPOINTMENT\_ ID |
| CONTACT\_DETAILS |
| ADDRESS |
| MED\_REC\_ID |

|  |
| --- |
| MEDICAL\_RECORDS |
| MED\_REC\_ID <PK> |
| PATIENT\_ID <FK> |
| LAB\_RECORDS |

***THE 5 TABLES/ENTITIES ARE:***

1. DEPARTMENT
2. DOCTORS
3. PATIENTS
4. APPOINTMENTS
5. MEDICAL\_RECORDS

***ATTRIBUTES:***

1. DEPTT\_ID <PK> DEPARTMENT
2. DEPTT\_ NAME
3. HEAD\_OF\_ DEPARTMENT
4. DOCTORS\_LIST
5. DOCTOR \_ID <PK>
6. DEPTT\_ID <FK>
7. DR\_NAME
8. DESIGNATION DOCTORS
9. OPD\_DAYS
10. SURGERY\_DAYS
11. PATIENT\_ID <PK>
12. PATIENT\_NAME
13. DEPTT­\_ ID <FK>
14. APPOINTMENT\_ ID PATIENTS
15. CONTACT\_DETAILS
16. ADDRESS
17. MED\_REC\_ID
18. APPOINTMENT\_ID <PK>
19. PATIENT\_ID <FK>
20. APPOINTMENT\_DATE
21. APPOINTMENT\_TIME APPOINTMENTS
22. DOCTOR\_ID <FK>
23. ROOM\_NO
24. MED\_REC\_ID <PK>
25. PATIENT\_ID MEDICAL\_RECORDS
26. LAB\_RECORDS

***PRIMARY KEYS: (Represented by <PK>)***

1. DEPTT\_ID NATURAL KEY
2. DOCTOR \_ID NATURAL KEY
3. PATIENT\_ID NATURAL KEY
4. APPOINTMENT\_ID NATURAL KEY
5. MED\_REC\_ID NATURAL KEY

***FOREIGN KEYS have been represented as <FK> IN ATTRIBUTES IN THE TABLE ABOVE***

***DATA DERIVED FOR THE 5 TABLES :***

|  |  |
| --- | --- |
| ***TABLE NAME*** | ***SOURCE*** |
| ***DEPARTMENT*** | CUSTOMER AND PEOPLE SYSTEM |
| ***DOCTORS*** | CUSTOMER AND PEOPLE SYSTEM |
| ***PATIENTS*** | CUSTOMER AND PEOPLE SYSTEM |
| ***APPOINTMENTS*** | CUSTOMER AND PEOPLE SYSTEM |
| ***MEDICAL\_RECORDS*** | CUSTOMER AND PEOPLE SYSTEM |

***Sensitive Data and Data Quality issues***

***DATA PRIVACY:***

***Since a medical and healthcare related business model has been prepared it’s very important to understand that planning to enter this arena of business comes with a lot of responsibility as its database system will be containing very sensitive type of information which is among the tightly controlled and regulated information.***

***Any kind of negligence in terms of data will lead to dire consequences as this kind of information comes under PHI that stands for PROTECTED HEALTH INFORMATION*** *which comes under legal standards and is defined by the law.*

*The medical history database field in our business model contains sensitive information about the patients including the past, present or future physical or mental health or condition of an individual, the provision of health care to an individual or the past, present or future payment for the provision of health care to an individual. And which either identifies the individual or with respect to which there is a reasonable basis to believe the information can be used to identify the individual.*

*Therefore any kind of mishandling of the sensitive data can shatter the business completely which will accompany financial loss and most importantly loss of reputation and integrity.*

*DATA QUALITY:*

*No database can be termed as an ideal or a perfect database and therefore the hospital management database is also prone to data quality errors:*

*Some of the possible errors can be:*

1. *Accuracy:*

*A general error can arise while entering the data i.e. incorrect numbers or string values (basically human typing error).*

*This can lead to information extraction failure or wrong information extraction.*

*Ex. Spelling a patients name wrongly, entering wrong DOB*

*AFFECTED ELEMENT : PATIENTS OR DOCTORS DATABASE*

1. *Conformance/validity error:*

*Syntax error can occur while working with SQL i.e. basically coding error which can lead to failure of the entire database.*

*AFFECTED ELEMENT: WHILE CREATING THE DATABASE*

1. *Uniqueness error:*

*When it comes to storing patients’ details any mistake done in storing the information can lead to a uniqueness blunder as a large number of patients will exist with the exact same name and any kind of error can lead to some serious medical blunders which might even cost a life.*

*AFFECTED ELEMENT: IN PATIENTS ,DOCTORS,MEDICAL \_RECORDS DATABASE*

***ANALYSIS: SQL QUERIES FOR THE GIVEN HOSPITAL DATABASE***

***EXTRACT 1:***

***Since any organization must know in what department their organization has been performing the best or what department is the most popular and in highest demand ,we can use the hospital database to extract the department which is in high demand amongst the patients ,so that it can be upgraded with a more skilled staff, higher number of staff members and better infrastructure.***

**SQL QUERY**

SELECT DEPTT\_ID ,COUNT(\*) AS NUM\_OF\_PATIENTS

FROM PATIENTS

GROUP BY DEPTT\_ID

ORDER BY NUM\_OF\_PATIENTS DESC

**SOLUTION:**

**The first entry in the table will be the most popular department with the most number of patients.**

***EXTRACT 2:***

***Second interesting extract can be the appointment time that most patients prefer so that the authorities can try and make maximum appointments possible at that particular period of time by appointing maximum staff at that time for the organization’s benefit and also for the patients’ convenience.***

SELECT A.APPOINTMENT\_TIME, COUNT (\*) AS NUM , B.APPOINTMENT\_ID

FROM APPOINTMENTS A

LEFT JOIN PATIENTS B

ON A.APPOINTMENT\_ID=B. APPOINTMENT\_ID

GROUP BY APPOINTMENT\_TIME

ORDER BY NUM DESC

***On studying the above table an analyst will be able to extract the time period which is in maximum demand i.e. HAVING MAXIMUM VALUE FOR NUM .***