DATABASE MANAGEMENT SYSTEMS
ITE1003

HOSPITAL MANAGEMENT SYSTEM

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ABSTRACT

Hospitals currently use a manual system for the management and maintenance of critical information. The current system requires numerous paper forms, with data stores spread throughout the hospital management infrastructure. Often information (on forms) is incomplete, or does not follow management standards. Forms are often lost in transit between departments requiring a comprehensive auditing process to ensure that no vital information is lost. Multiple copies of the same information exist in the hospital and may lead to inconsistencies in data in various data stores. A significant part of the operation of any hospital involves the acquisition, management and timely retrieval of great volumes of information. This information typically involves; patient personal information and medical history, staff

information, room and ward scheduling, staff scheduling, operating theater scheduling and various facilities waiting lists. All of this information must be managed in an efficient and cost wise fashion so that an institution's resources may be effectively utilized. HMS will automate the management of the hospital making it more efficient and error free. It aims at standardizing data, consolidating .ta ensuring data integrity and reducing inconsistencies.

The Hospital Management System (HMS) is designed for any Hospital to replace their existing manual, paper based system. The new system is to control the following information; patient information, room availability, staff and operating room schedules, and patient invoices. These services are to be provided in

an efficient, cost effective manner, with the goal of reducing the time and resources currently required for such tasks. A significant part of the operation of any hospital involves the acquisition, management and timely retrieval of great volumes of information. This information typically involves; patient personal information and medical history, staff inforrnation, room and ward scheduling etc

INTRODUCTION

Hospital are the essential part of our lives, providing best medical facilities to people suffering from various ailments, which may be due to change in climatic conditions, increased workload, emotional trauma stress etc. It is necessary for the hospitals to keep track of its day-to- day activities & records of its patients, doctors, nurses, ward boys and other staff personals that keep the hospital running smoothly & successfully.

But keeping track of all the activities and their records on paper is very cumbersome and error prone. It also is very inefficient and a time-consuming process observing the continuous increase in population and number of people visiting the hospital. Recording and maintaining all these records is highly unreliable, inefficient and error-prone. It is also not economically & technically feasible to maintain these records on paper. Thus keeping the working of the manual system as the basis of our project. We have developed an automated version of the manual system, named as "Hospital Management System"

The main aim of our project is to provide a paper-less hospital up to 90%. It also aims at providing low-cost reliable automation of the existing systems. The system also provides excellent security of data at every level of user-system interaction and also provides robust & reliable storage and backup facilities.

Advantages of Computerized Hospital Management System

❑ Immediate access of data

❑ User friendly interface

❑ Time saving

❑ Data can be easily inserted/updated/deleted

❏ Saving paper work

Data is easily approachable

Hospital management system helps in registering and maintaining patients record. A unique ID is assIgned to each patient whenever he or she registers . This helps in maintaining unique record for each patient and it becomes easier for the hospital to assign doctors to them. Necessary details such as address, phone, name etc are stored in the patients record and can be later retrieved. Some of the patients are required to be admitted in the hospital so they are assigned rooms based on their preference and necessity. A room has attributes such as Patient ID, Employee Type,, Room Type, Room No. A patient can buy medicine based on the prescription given to them by their doctors. A prescription includes medicine name and in how much quantity one should take medicine .

This has hospital has mainly three types of employees .ie Doctor, nurse and Receptionist A patient is attended by a doctor based on his illness. A doctor sees a patient based on his patient id only.

Second under this category is nurse, their main work is to take care of the patients. A nurse also governs the patients room.

Third under this category is receptionist, their main function is to maintain and keep the reocrds properly, so that they can be retrieved whenever required. A record details of everyone like it has details of patients, their id etc. It has also details of all the employees working there.

[Note-here, emlployee is futher divided into entities doctor, nurse and receptionist, following the Specialization model(top-down desugn process) as they are distinctive from each other in the

employee set.

Hence these subgroups become lower-level entity set that have attributes or participate in relationship that do not apply to higher-level entity set ie.,employee.

DATA AND FUNCTIONAL REQUIREMENTS

1.Employee module

This module keeps track of employee name and who work in hospital.

Column	Type	Null	Default
EID	varchar	NO	
EName	varchar	NO	

Column	Type	Null	Default
EAddress	varchar	YES	
ECNo	number	YES	
EJob	varchar	YES	
ESal	number	YES	

2. Medicine module:

This module keeps track of medicines name and who can buy those medicines

Column Type Null Default

Column	Type	Null	Default
MID	varchar	NO	
Quantity	varchar	NO	
PID	varchar	NO	
MName	varchar	NO	

3. Patient module

It keeps track of all details about patients. Patient Id, are entered in a form and stored for future reference. Also particular patient details can be viewed in the table using a separate form with an attribute PID.

Column Type Null Default

Column	Type	Null	Default
PID	varchar()	No	

Column	Type	Null	Default
PID	varchar	No	
Dname	varchar	Yes	
D_Sp	varchar	Yes	
Address	varchar()	yes	

Column	Type	Null	Default
EID	varchar()	No	

CNo	number	Yes
D_O_Ad	varchar	yes
D_O_Dis	varchar	yes

4. Doctor Module:

It keeps all the information about the doctor. From doctorID to address and specializations, this table structure consists of everything.

Column	Type	Null Default
EID	varchar	No

5. Nurse Module: This module consists information about nurse's name and their id.

Column	Type	Null Default
EID	varchar	No
PID	varchar	No
NName	varchar	yes

6. Receptionist module: This module consists information about receptionist's name and their id.

Column	Type	Null Default
EID	varchar	No
RName	varchar	yes

7. Bill Module: This module contains all the info about bills, its amount etc.

Column	Type	Null Default
Bill_No	varchar	No
Bill_amount	varchar	No *PID*
	varchar	No

8. Rooms module: This module contains all information about the rooms which the patients are allotted along with room id,type of room etc.

Column	Type	Null	Default
ReID	varchar	No	
RoNo	number	No	
RType	varchar	No	
PID	varchar	No	
EID	varchar	No	
EType	varchar	No	

ER-DIAGRAM

Relational tables

Table-1 –Employee

Attributes	Description	Data type	condition
EID	Employee ID	Varchar2	Primary Key
EName	Employee Name	Varchar2	
EAddress	Employee Address	Varchar2	
ECNo	Contact Number	Varchar2	
Ejob	Job Description	Varchar2	
Esal	Employee Salary	Number	

Table2-patient

Attributes	Description	Datatype	Condition
PID	Patient ID	Varchar2	Primary key
Name	Patient Name	Varchar2	
Address	Pateint Address	Varchar2	

CNo	Contact Number	Number	
D_O_Ad	Date of admission	Varchar2	
D_O_Dis	Date Of dIscharge	Varchar2	
Re_id	Room id	varchar2	Foreign Key(ref-room)

Table 3-doctor

Attribute	Description	Data type	Condition
EID	Employee ID	Varchar2	Foreign Key(ref-employee)
DName	Doctor's Name	Varchar2	
D_Sp	Specialization	Varchar2	

Table4-Nurse

Attribute	Description	Data type	Condition
EID	Employee ID	Varchar2	Foreign Key(ref-employee)
NName	Nurse's Name	Varchar2	

Table5-receptionist

Attribute	Description	Datatype	Condition
EID	Employee ID	Varchar2	Foreign Key(ref-employee)

	Rname	Receptionist's Name	Varchar2	

Table6-Bill details

Attributes	Description	Data type	Condition
Bill_Id	Bill id	Varchar2	Primary key
PID	Patient ID	Varchar2	Foreign Key(ref-patient)
Bill _amount	Bill amount	Varchar2	

Table-7 Room

Attributes	Description	Datatype	Condition
ReID	Room Record ID	Varchar2	Primary Key
RoNO	Room Number	Number	
Rtype	Room Type	Varcher2	
EID	EmployeeID	Varchar2	Foreign Key(ref-employee)
Etype	Employee Type	Varchar2	

Table-8 Medicines

Attribute	Description	Data type	Condition
MID	Medicine ID	Varchar2	Primary key
Quantity	Quantity	Number	
MName	Medicine Name	Varchar2	
PID	Pateint_ID	Varchar2	Foreign Key(ref-patient)

Table-9 Attend

Attribute	Description	Data type	Condition
PID	Patient_id	Varchar2	Foreign key (ref-patient)
EID	Employee *ID*	varchar2	Foreign key (ref-employee)

Table-10 Govern

Attribute	Description	Data type	Condition
Re_id	Room_ID	Varchar2	Foreign key (ref-room)
EID	Employee ID	varchar2	Foreign key (ref-employee)

Hospital database schema

Employee

EID	EName	EAddress	ECNo	Ejob	Esal

Patient

PID	Name	Address	CNo	D_O_ad	D_O_Dis	Re_Id

Doctor

EID	DName	D_Sp

Billdetail

Bill_Id	PID	Billamount

Nurse

EID	NName

Receptionist

EID	Rname

Medicine

MID	Quantity	Mname	PID

Room

Re_id	RoNo	Rtype	EID	Etype

Attend

PID	EID

Govern

Re_id	EID

```
Command Prompt - sqlplus                                        —   □   ✕

SQL> desc employee;
 Name                                      Null?    Type
 ---------------------------------------- -------- --------------------------
 EID                                       NOT NULL VARCHAR2(5)
 ENAME                                              VARCHAR2(15)
 EADDRESS                                           VARCHAR2(20)
 ECNO                                               NUMBER(10)
 EJOB                                               VARCHAR2(10)
 ESAL                                               NUMBER(6)

SQL> select * from employee;

EID   ENAME            EADDRESS                   ECNO EJOB              ESAL
----- ---------------- -------------------- ----------- ---------- -----------
E001  arpit            X_colony agra         987321654 DC               50000
E002  Sagar            Q_nagar,vellore      9876542589 RP               30000
E003  Soumik           e_colony vellore     9873852581 NS               10000
E004  Abir             R_colony vellore     9800852581 RP               20000
E005  Soumik           T_colony vellore     9000852581 NS               10000
E006  Nandini          y_colony vellore     9563852581 DC               50000
E007  Deblina          xy_colony vellore    9563812581 NS               10000

7 rows selected.

SQL>
```
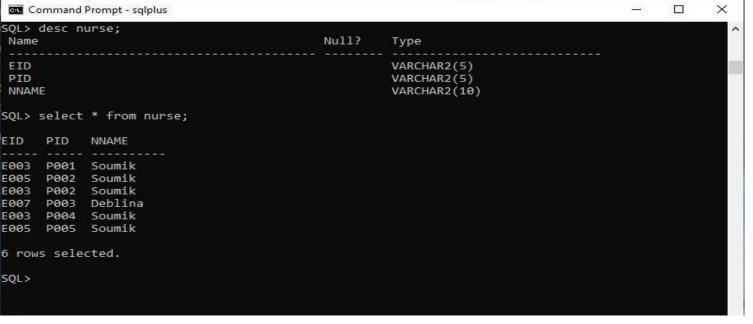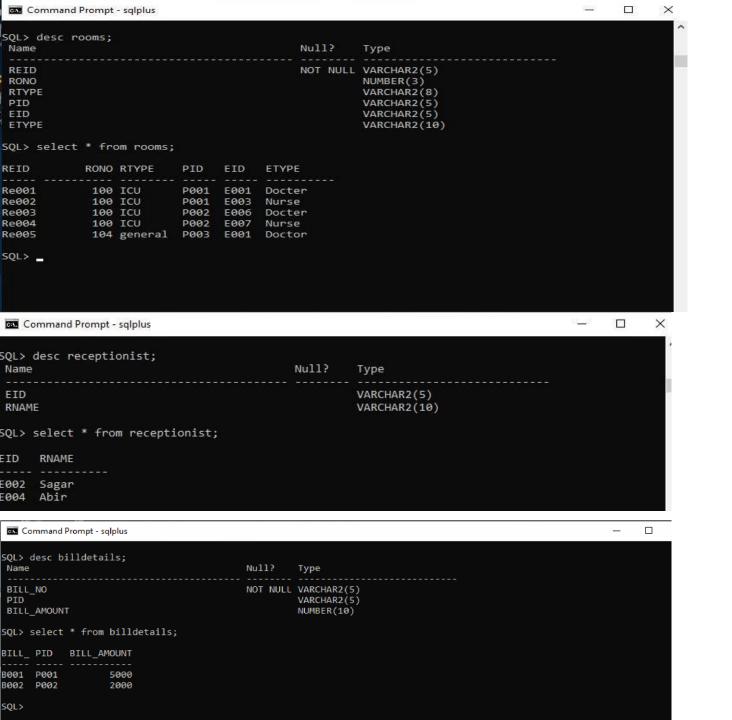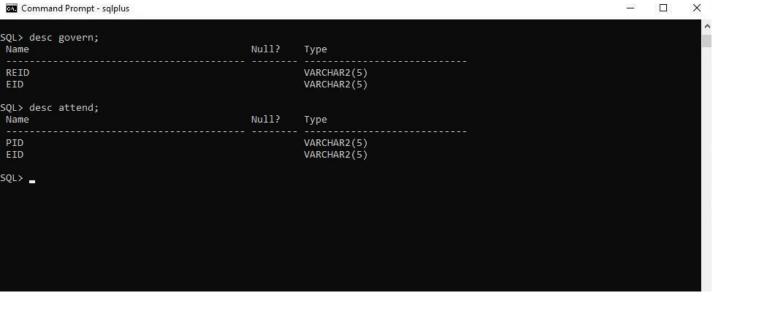
```
Command Prompt - sqlplus                                        —   □   ✕

SQL> desc patient;
 Name                                      Null?    Type
 ---------------------------------------- -------- --------------------------
 PID                                       NOT NULL VARCHAR2(5)
 EID                                                VARCHAR2(5)
 NAME                                               VARCHAR2(10)
 ADDRESS                                            VARCHAR2(15)
 CNO                                                NUMBER(10)
 D_O_AD                                             DATE
 D_O_DIS                                            DATE

SQL> select * from patient;

PID   EID   NAME       ADDRESS                CNO D_O_AD    D_O_DIS
----- ----- ---------- --------------- ---------- --------- ---------
P001  E001  RAM        XYZ_agra        9887774441 01-JAN-19 10-JAN-19
P002  E001  RAMAN      AAZ_agra        9884274441 06-JAN-19 09-JAN-19
P003  E006  AMAN       A_Orai          9454274441 06-FEB-19 13-FEB-19
P004  E001  ROHIT      Bcolony Orai    9454274321 03-FEB-19 13-FEB-19
P005  E006  MOHIT      Ramnagar Orai   9452074321 23-MAR-19 13-APR-19

SQL>
```

```
Command Prompt - sqlplus                                              —  □  ✕

SQL> desc doctor;
 Name                                          Null?    Type
 --------------------------------------------- -------- -----------------------------
 EID                                                    VARCHAR2(5)
 PID                                                    VARCHAR2(5)
 DNAME                                                  VARCHAR2(10)
 D_SP                                                   VARCHAR2(10)

SQL> select * from doctor;

EID   PID   DNAME      D_SP
----- ----- ---------- ----------
E001  P001  Arpit      MBBS
E001  P002  Arpit      MBBS
E006  P003  Nandini    MD
E001  P004  Arpit      MBBS
E006  P005  Nandini    MD

SQL> _
```

```
Command Prompt - sqlplus                                              —  □  ✕

SQL> desc nurse;
 Name                                          Null?    Type
 --------------------------------------------- -------- -----------------------------
 EID                                                    VARCHAR2(5)
 PID                                                    VARCHAR2(5)
 NNAME                                                  VARCHAR2(10)

SQL> select * from nurse;

EID   PID   NNAME
----- ----- ----------
E003  P001  Soumik
E005  P002  Soumik
E003  P002  Soumik
E007  P003  Deblina
E003  P004  Soumik
E005  P005  Soumik

6 rows selected.

SQL>
```

```
SQL> desc rooms;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 REID                                      NOT NULL VARCHAR2(5)
 RONO                                               NUMBER(3)
 RTYPE                                              VARCHAR2(8)
 PID                                                VARCHAR2(5)
 EID                                                VARCHAR2(5)
 ETYPE                                              VARCHAR2(10)

SQL> select * from rooms;

REID        RONO RTYPE    PID   EID   ETYPE
----- ---------- -------- ----- ----- ----------
Re001        100 ICU      P001  E001  Docter
Re002        100 ICU      P001  E003  Nurse
Re003        100 ICU      P002  E006  Docter
Re004        100 ICU      P002  E007  Nurse
Re005        104 general  P003  E001  Doctor

SQL>
```

```
SQL> desc receptionist;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 EID                                                VARCHAR2(5)
 RNAME                                              VARCHAR2(10)

SQL> select * from receptionist;

EID   RNAME
----- ----------
E002  Sagar
E004  Abir
```

```
SQL> desc billdetails;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 BILL_NO                                   NOT NULL VARCHAR2(5)
 PID                                                VARCHAR2(5)
 BILL_AMOUNT                                        NUMBER(10)

SQL> select * from billdetails;

BILL_ PID   BILL_AMOUNT
----- ----- -----------
B001  P001         5000
B002  P002         2000

SQL>
```

```
Command Prompt - sqlplus                                    —  □  ✕

SQL> desc govern;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 REID                                               VARCHAR2(5)
 EID                                                VARCHAR2(5)

SQL> desc attend;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 PID                                                VARCHAR2(5)
 EID                                                VARCHAR2(5)

SQL>
```

```
SQL> select * from medicines;

MID    PID    QUANTITY MNANE
-----  -----  ---------- -----------
M1     P001            3 crocin
M2     P001            4 cerin
M3     P003            2 WEE
M4     P005            7 XYZ
M5     P003            1 QYZ

SQL>
```

REVIEW-III

Select statements (for data retrieval) should involve join
1.)Name the patient who are admitted in RoNO=100?

```
mysql> select Name,RoNO from patient join room on patient.Re_id=room.ReID where room.RoNO=100;
+--------+------+
| Name   | RoNO |
+--------+------+
| RAM    |  100 |
| RAMAN  |  100 |
| AMAN   |  100 |
| ROHIT  |  100 |
+--------+------+
4 rows in set (0.11 sec)
```

Select statements (for data retrieval) should involve nested query

2.)Write the name of patient treated by Dr. Soumik?

```
mysql> select name from patient where PID in (select PID from attend where EID in (select EID from employee where Ename="Soumik" and EJob="DC"));
+-------+
| name  |
+-------+
| AMAN  |
| MOHIT |
+-------+
2 rows in set (0.00 sec)
```

3.)Select statements (for data retrieval) should involve group by and having clause
4.)List the average salaries of each Nurse,Doctor and reception average salary
and average salary of the Department should be greater than 10,000?

```
mysql> select Ejob,avg(ESal) from employee group by EJob having avg(Esal)>=10000;
+------+------------+
| Ejob | avg(ESal)  |
+------+------------+
| DC   | 24000.0000 |
| NS   | 18000.0000 |
| RP   | 10000.0000 |
+------+------------+
3 rows in set (0.00 sec)
```

Update statements should have embedded select

5.)Shift patient Rohit from ICU to general ward.

```
mysql> update patient set Re_id ="RE005" where PID="P004";
Query OK, 1 row affected (0.05 sec)
Rows matched: 1  Changed: 1  Warnings: 0

mysql> select * from patient;
+------+-------+--------------+-----------+-----------+-----------+-------+
| PID  | Name  | Address      | CNo       | D_O_Ad    | D_O_Dis   | Re_id |
+------+-------+--------------+-----------+-----------+-----------+-------+
| P001 | RAM   | XYZ_agra     | 988777444 | 01-JAN-19 | 10-JAN-19 | RE001 |
| P002 | RAMAN | AAZ_agra     | 977777444 | 10-JAN-19 | 16-JAN-19 | RE002 |
| P003 | AMAN  | A_orai       | 945427444 | 6-FEB-19  | 13-FEB-19 | RE003 |
| P004 | ROHIT | Bcolony Orai | 945427432 | 03-FEB-19 | 13-FEB-19 | RE005 |
| P005 | MOHIT | Ramnagar Orai| 945420732 | 23-mar-19 | 13-APR-19 | RE005 |
+------+-------+--------------+-----------+-----------+-----------+-------+
```

Delete a record using embedded select

6.)Delete medicines name 'T-hep'?

```
mysql> delete from medicines where MName="T-hep";
Query OK, 1 row affected (0.04 sec)

mysql> select * from medicines;
+------+----------+-------------------+------+
| MID  | Quantity | MName             | PID  |
+------+----------+-------------------+------+
| M002 |        4 | Paracetamol,T-Hep, | P002 |
| M003 |        4 | O-choretol,T-Hep, | P003 |
| M004 |        1 | O-choretol,T-Hep, | P004 |
+------+----------+-------------------+------+
3 rows in set (0.00 sec)
```

.)Write the PL/SQL procedure to increase to the salary of an employee by a given percent?

A.)

7

```
Connected to:
Oracle Database 18c Express Edition Release 18.0.0.0.0 - Production
Version 18.4.0.0.0

SQL> CREATE OR REPLACE PROCEDURE adjust_salary(
  2         in_employee_id IN EMPLOYEE.EID%TYPE,
  3         in_percent IN NUMBER
  4  ) IS
  5  BEGIN
  6     UPDATE employee
  7     SET ESAL = ESAL + ESAL * in_percent / 100
  8     WHERE EID = in_employee_id;
  9  END;
 10
```

```
 23
 24  SELECT salary FROM employees WHERE employee_id = 200;
 25  -- call procedure
 26  exec adjust_salary(200,5);
 27  -- after adjustment
 28  SELECT salary FROM employees WHERE employee_id = 200;
```

7.)Write PL/SQL function to count the total number of patient?

```sql
CREATE OR REPLACE FUNCTION totalPateint
RETURN number IS
    total number(2) := 0;
BEGIN
    SELECT count(*) into total
    FROM patient;

    RETURN total;
END;
/
```

```
SQL> DECLARE    c number(2); BEGIN    c := totalPateint();    dbms_output.put_line(
/

  2
  3  DECLARE
  4      c number(2);
  5  BEGIN
  6      c := totalPateint();
  7      dbms_output.put_line('Total no. of patient: ' || c);
  8  END;
  9  /
DECLARE    c number(2); BEGIN    c := totalPateint();    dbms output put line('Tota
```

8)a Write a trigger command to calculate salary changes?

```sql
SQL> CREATE OR REPLACE TRIGGER display_salary_changes
  2  BEFORE DELETE OR INSERT OR UPDATE ON EMPLOYEE
  3  FOR EACH ROW
  4  WHEN (NEW.EID > 0)
  5  DECLARE
  6     sal_diff number;
  7  BEGIN
  8     sal_diff := :NEW.ESAL  - :OLD.ESAL;
  9     dbms_output.put_line('Old salary: ' || :OLD.ESAL);
 10     dbms_output.put_line('New salary: ' || :NEW.ESAL);
 11     dbms_output.put_line('Salary difference: ' || sal_diff);
 12  END;
 13  /
```

b) Write a trigger command to check age limit?

```sql
SQL>
SQL> CREATE TRIGGER  Check_age  BEFORE INSERT ON employee
  2  FOR EACH ROW
  3  BEGIN
  4  IF NEW.age < 25 THEN
  5  SIGNAL SQLSTATE '45000'
  6  SET MESSAGE_TEXT = 'ERROR:
  7          AGE MUST BE ATLEAST 25 YEARS!';
  8  END IF;
  9  END;
 10
```

CONCLUSION

The project Hospital Management System (HMS) is for computerizing the working in a hospital. It is a great improvement over the manual system. The computerization of the system has speed up the process. In the current system, the front office managing is very slow. The hospital managing system was thoroughly checked and tested with dummy data and thus is found to be very reliable. The software takes care of all the requirements of an average hospital and is capable to provide easy and effective storage of information related to patients that come up to the hospital. It generates test reports and also provides the facility for searching the details of the patient. It also provides billing facility on the basis of patient's status whether it is an indoor or outdoor patient. The system also provides the facility of backup as per the requirement. FUTURE ENHANCEMENTS: The proposed system is Hospital Management System. We can enhance this system by including more facilities like pharmacy system for the stock details of medicines in the pharmacy. Providing such features enable the users to include more comments into the system