Mountain View Community Hospital

Case Requirements

Mountain View Community Hospital is a not-for-profit, short-term general hospital. It is the only hospital in the city of Mountain View, a rapidly growing city with a population of about 25,000 people in the heart of the Rocky Mountains. MVCH serves the surrounding rural areas as well as the city of Mountain View. At the present time the hospital has 100 beds. However, plans call for expansion to 150 beds in the near future.

Hospital Organization

As with most hospitals, MVCH is divided into two organizational groups. The physicians, headed by Dr. Browne (Chief of staff) are responsible for providing quality medical care to their patients. The group headed by Ms. Baker (hospital administrator) provides the nursing, clinical, and administrative support required by the physicians to service their patients.

Present Information Systems

MVCH leases its server and storage equipment from a major hardware vendor. Plans call for adding a faster processor, additional memory and/or possibly moving to virtual disk storage in the next budget cycle year; however, the extent of these additions has yet to be determined.

Present information systems are batch-oriented and include application programs for Patient Accounting, Billing, Accounts Receivable and Financial Accounting. These application packages were obtained from a software vendor specializing in hospital applications.

Nathan Heller, who was recently appointed head of Information Systems, identified the following deficiencies with the present system:

1. The system does not support the medical staff by recording or reporting the results of laboratory tests and procedures.

2. Since the system is batch-oriented, it does not support on-line procedures such as patient registration or inquiries regarding billing.

3. The system does not accumulate costs by department or cost centre.

4. The system is inflexible and does not respond well to changing management needs or to the frequent changes in reporting requirements of external health systems agencies.

Management at MVCH had for some time recognized that the present information systems were not responsive to their needs. Mr. Lopez, the Hospital's assistant administrator, who had previous experience with database systems in a large city hospital, had advocated that MVCH investigate the database approach. Mr. Heller was hired as manager of Information Systems partly because of his experience with database systems. Following are the major documents, reports and displays that are required by MVCH Hospital.

Patient Display

A display of the data maintained for each patient is shown in figure 3-1. A clerk in the Admissions Office would enter this data when a patient is first admitted to the hospital. A patient record should be able to be retrieved by supplying either the patient number or patient name. When a patient is later readmitted, the data is up-dated.

Figure 3-1.

```
PATIENT-NO:          12345
PATIENT-NAME:        Baker, Mary A.
PATIENT-ADDRESS:     300 Oak St.
CITY-PROV-PC:        Mountain View, BC V1V 1V1
TELEPHONE:           250 555-5555
SEX:                 F
HCN:                 444 333 222
LOCATION:            328B
EXTENSION:           623
DATE-ADMITTED:       10/02/2014
FINANCIAL-STATUS:    ESI
DISCHARGE-DATE:
```

Most of the fields are self-explanatory with a few exceptions. LOCATION is the room and bed location the patient is assigned to. The first three digits indicate the room and the last character indicates the bed in the room. The location is updated with any other information when and if the patient is re-admitted. FINANCIAL-STATUS is the patients second financial source of health coverage after provincial Medicare, if the patient doesn't have a second source of health coverage, the financial status is listed as "Self". DISCHARGE-DATE is the most recent date the patient was discharged. When the patient is re-admitted, this field is reset to null.

A patient's record should be maintained on-line for a period of two years after the last discharge. If the patient is not readmitted within two years, the record is archived and removed from the active database. At the present time there are about 15,000 active patient records in the MVCH information system.

Physician Display

Some 50 physicians refer their patients to MVCH. A possible display showing typical physician data is shown in figure 3-2.

Figure 3-2.

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PHYSICIAN-NO:        4321
PHYSICIAN-NAME:      M. D. Thayer
TELEPHONE:           250 555-4444
SPECIALTY:           Paediatrics
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Physician-Patient Report

Each referring physician requires a daily report showing the patients who are currently admitted to the hospital and who were referred by that physician. The format for this report is shown in figure 3-3. At any given time, each physician has an average of two patients under her or his care at the hospital.

Figure 3-3.

PHYSICIAN-NO: 4042   DATE: 10/04/2014

PHYSICIAN-NAME: DUNN, A. J.

PATIENT-NO	PATIENT-NAME	LOCATION	DATE-ADMITTED
12870	Gonzalez, P. T.	103A	09/28/2014
23819	Thomas, Marie	214C	10/04/2014
61431	Cuadra, L. R.	281B	10/02/2014

Daily Revenue Report

The Daily Revenue Report is a listing of all revenue-generating transactions that have been reported on a particular day. The format of this report is shown in figure 3-4.

Figure 3-4.   Daily Revenue Report 10/04/2012

PATIENT-NO	PATIENT-NAME	LOC	FIN. SOURCE	COST-CENTRE	ITEM-CODE	DESC	CHARGE	TOTAL
12345	Baker, Mary	101A	Assure	100	2000	Semi-Private Room	200.00	
			Self-Pay	100	2005	Television	5.00	
			Assure	110	1580	Glucose	25.00	
								230.00
56789	Killy, J. C.	210C	ESI	100	2001	Private Room	250.00	
			ESI	125	3010	Chest X-Ray	30.00	
								280.00

The transactions on this report are sorted by patient, as shown in the figure. The only field that requires additional explanation is the COST-CENTRE. This is an organizational subdivision used for accounting purposes.

For each item that is charged to a patient, a clerk would enter the transaction on-line. Following are guidelines to be used in this process.

1. As a clerk enters a transaction, he or she determines the financial source for that item and patient combination from patient record.

2. Each item (identified by an ITEM-CODE) can be associated with one and only one cost centre.

3. The charge for a particular item is the same for all patients.

Patients at MVCH incur an average of about five charge transactions per day per stay at the hospital.

Room Utilization Report

The Room Utilization Report (figure 3-5) is also a daily report that shows the occupancy of the hospital rooms. It is used for scheduling and control purposes.

Figure 3-5.   Room Utilization Report 10/04/2014

LOCATION	TYPE	PATIENT-NO	PATIENT-NAME	DATE-ADMITTED
100A	SP	30854	Kuhn, Gregory	10/03/2014
100B	SP			
101A	SP	12345	Baker, Mary	10/02/2014
101B	SP	41932	Darnell, Joann	09/30/2014

The field TYPE indicates the type of accommodations for each room location. Possible values would include PR: Private, SP: Semiprivate, IC: Intensive Care, W3: Ward, 3 beds and W4: Ward, 4 beds.

Patient Bill

A statement is printed and mailed to the patient three days after being discharged from the hospital. The format of this statement is shown in figure 3-6. The various charges are grouped by cost centre as shown.

Figure 3-6.   Patient Bill

PATIENT NO: 12345   DATE: 10/07/2014
PATIENT NAME: Mary Baker   DATE ADMITTED: 10/04/2014
PATIENT ADDRESS: 300 Oak St.   DISCHARGE DATE: 10/06/2014
                        Mountain View, BC
                        V1V 1V1

COST-CENTRE	NAME	DATE CHARGED	ITEM-CODE	DESCRIPTION	CHARGE	BALANCE DUE
100	Room & Board	10/04/2014	2000	Semiprivate Room	200.00	
		10/04/2014	2005	Television	5.00	
		10/05/2014	2000	Semiprivate Room	200.00	
		10/06/2014	2000	Semiprivate Room	200.00	
				Subtotal		605.00
110	Laboratory	10/04/2014	1580	Glucose	25.00	
		10/05/2014	1585	Culture	20.00	
				Subtotal		45.00
125	Radiology	10/05/2014	3010	Chest X-ray	30.00	
		10/05/2014	3010	Chest X-ray	30.00	
				Subtotal		60.00
				Balance Due		$710.00

The balance due is the balance before the patient's insurance coverage pays its share. The average length of stay for a patient is three days.

Revenue Analysis

The Revenue Analysis report is a weekly report that shows the total revenues, by cost centre, and the distribution of revenues by method of payment. The format of this report is shown in figure 3-7.

Figure 3-7.   Revenue Analysis   Date: 10/06/2014

COST-CENTRE	NAME	NO-OF-TRANS	TOTAL CHARGES	ASSURE	ESI	SELF PAY	OTHER
100	Room & Board	682	124,210.58	69,225.18	12,842.30	5,947.05	36,196.06
110	Laboratory	536	11,941.29	8,620.00	2,315.19	906.10	100.00
125	Radiology	215	4,862.75	2,914.25	1,020.25		928.25

Maintaining an Open Dialog

Nathan and his team are keenly interested in openness and transparency between competing groups so that any final solutions come as close as possible to an accurate representation of the efficient and effective data structure that the hospital hopes to benefit from.

Case Requirements

In groups of **three**, prepare a formal report containing your group's recommendations for the database design for Mountain View Community Hospital. This report should contain at a minimum:

- Cover page and a table of contents (pagination throughout the report)
- An introductory memo that includes ==*your understanding of the business problem*== and ==*how your group approached the development of a solution*==.
- A mission statement and a list of applicable mission objectives.
- A full System Description including System Boundary and major User Views. You should include diagrams and a full explanatory narrative.
- Your group's final 3NF design in the standard format…
  tableName (primaryKeyField(s), otherField(s), foreignKeyField(s), …)
  …with each field separated by a coma.
- A list of all (including candidate keys) functional dependencies for all tables.
- A data dictionary indicating the domain (name, meaning and description) for each field of each table.
- Enclose the complete report in some form of "nice" report cover for presentation to the client.

Your report should be prepared with the utmost care and close attention paid to report structure, sentence structure, spelling and grammar. This report will be presented to Nathan, Dr. Browne and Ms. Baker as one item to be considered in their decision of which group to go with for the database design.

In addition to the report, you will have to create a development database to help illustrate the system functionality to the hospital team using SQL Server 2012.

- Create the database, all tables and all required relationships to allow for the development of supporting applications.
- All tables should contain a reasonable amount of development data. At a minimum include data for 20 patients, 12 physicians and four or five Cost Centres each with at least two items per centre. All tables related to tables containing data on those objects listed should also have an appropriate amount of data to test your database properly against these requirements.

Create a Windows form application using VB or C# and Crystal Reports to create two different reports against your SQL Server database.

- The **"Room Utilization Report"** for all rooms.
- The **"Physician-Patient Report"** for all patients currently in the hospital.

Think about how views (stored procedures) could help you with this program. Also, be sure to consider the program Style Guide when writing this application. Full marks are only achievable on this component for solutions that include all necessary aspects of the Style Guide including full, descriptive documentation.

Due Dates

1. Groups must be set. If you miss this deadline you will be randomly assigned to any available group.

   .... Friday, February 15th

2. Book your formative consultations for items 3 - 5 below, again, either in class, or via email, inform Stephen of your group's preferences. Appointments begin at as soon as class begins and should be planned for 10 minutes in length. If you miss this deadline you will be assigned a date and time for your group's meetings. Your WHOLE group must be in attendance for each formative consultation.

   ....Monday, March 25th @ 6:00 PM.

3. Draft Mission Statement & Objectives (formative feedback only) – Week 9

   a. Submitted in person, during class time, with your group.

4. Draft 3NF Normalization (formative feedback only) – Week 10

   a. Submitted in person, during class time, with your group.

5. Draft System Definition & User Views (formative feedback only) – Week 11

   a. Submitted in person, during class time, with your group.

6. Short (10 minute) presentation to the rest of the class, and invited guests, presenting your understanding of the business problem and demoing your solution (reports) to the problem. All group members must be involved in the presentation; you can demo your database and present your solution with the assistance of a PowerPoint, Prezi, YouTube or even interpretive dance; you should all be prepared to field questions. This is not a technical presentation as much as an informative presentation to convince higher-ups that you're team has a great solution. Focus on convincing us you understand the problem(s).

   ....Week 13 or 14 (Scheduled in class)

7. Final formal report/proposal hard copy handed in; SQL Server database and VB/Crystal Reports Application submitted to DC Connect.
   .... Immediately following your group presentation

<center>*Late submissions will not be accepted*</center>

You are expected to make good use of the discussion board for this case to meet the requirement of "openness and transparency" as outlined in the case details. All questions for Nathan or other members of his team should be posted to the "Mountain View" discussion board made available for this case.

There will also be individual group discussion boards for each group to use for brainstorming, open communications, planning and the sharing of ideas among the group. There will be a component of your group mark based on your ability to collaborate with others through the group discussion board and the Mountain View discussion board.

Evaluation Notes

- The overall mark assigned to your solution will be adjusted for each individual team member according to an assessment by your peers of your contributions to the project. This adjustment can be equal to up to 60% of your total final mark for the case. Everyone is expected to contribute to discussion, question generation, problem solving, normalization, report writing database and application development and your final presentation. How your group splits up some of the tasks is up to you and your group.

- This case is worth 30% of your overall mark in this class, as such you and your group should ensure that you remain on task, and while collaborative problem solving is considered necessary for this sort of work, each group must submit their own proposal for this case. Plagiarism of any degree will not be tolerated.