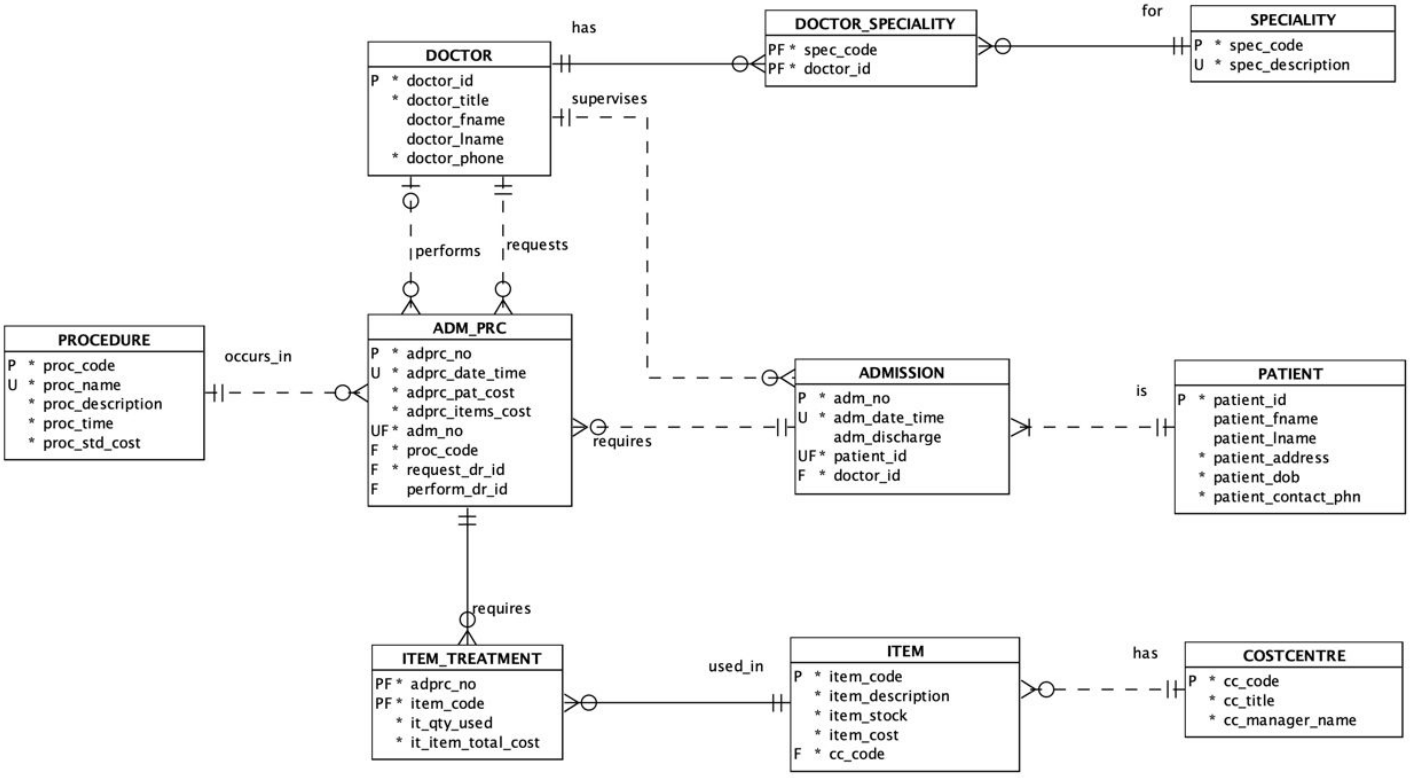
MONASH University
Information Technology

FIT9132 Introduction to Databases

2019 Semester 1

Assignment 2 - SQL - Monash Hospital 2 (MH)

This assignment is based on a part of the solution from assignment 1 where you developed a model for Monash Hospital. The logical model for assignment 2 is shown below (it is also available from Moodle as a PDF):



For this assignment, you will populate these tables with appropriate test data and write the SQL queries and triggers specified below. You must ensure that any activities you carry out in the database conform to the requirements of the model displayed above.

The schema/insert file for creating this model is available in the archive ass2-student.zip - this file creates the Monash Hospital Version 2 tables and populates several of the tables - you should read this schema carefully and be sure you understand the various features. You **must not alter the schema file in any manner, it must be used as supplied**. Penalties will apply to queries that use subqueries and views unnecessarily. In handling dates, default date format must not be assumed; you must make use of the to_date and to_char functions in all date situations. Failure to do so will incur a 50% grade penalty for questions involving dates.

You may need to rerun the schema, especially when you have been experimenting with your solutions and may have corrupted the database unintentionally. If you suspect that there might be such problems, simply rerun the schema. The schema includes the appropriate drop commands at the head of the file.

The ass2-student.zip archive also contains five SQL scripts for you to code your answers in, you should ensure these files are ***regularly pushed to Git so a clear development history is available***.

In each file fill in the header details with you name and student ID before beginning any work.

Assignment Tasks

Using the supplied schema file (mh_ass2_schm_insert.sql) create the tables for the Monash Hospital system and insert the supplied values. This provides a starting point for the following activities.

Q1. Data Manipulation (20 marks):

(a) **Load selected tables with your own additional test data:** using the supplied **Q1a-mh-insert.sql** script file, and the SQL commands which will insert, as a minimum, the following sample data -

- 10 PATIENTS,
- 15 ADMISSIONS,
- 20 ADMISSION PROCEDURES
- 15 ITEM_TREATMENTS

Please note, these are the *minimum number of entries you must insert*; you are encouraged to insert more to provide a richer data set to draw from. The primary key values for this data must be hardcoded values (ie. not make use of sequences) and consist of values below 200000. Dates for admissions should be chosen in the period between the 1st January 2019 and the 20th May 2019.

For this task **ONLY**, you you may lookup and include values for the loaded tables/data directly where required.

The script must contain a single COMMIT statement as the last line of the script, ie. all listed actions should be treated as a single transaction. You are *not* required to adjust the item_stock for an item which is used. You may assume that the preloaded values represent the item stock after all of your data has been loaded.

In carrying out this task you must not add any further data to tables which were previously populated by the supplied schema file.

[10 marks]

Design your test data so that you get output for the SQL scripts/queries specified below - this may require you to add further data as you move through completing the required tasks. Queries that are correct and do not produce output using your test data will lose 50% of the marks allocated, so you should carefully check your test data and ensure it thoroughly validates your SQL queries.

For all subsequent questions (Q1b onwards) you are **not permitted** to manually:

- lookup a value in the database, obtain its primary key or the highest/lowest value in a column, or
- calculate values external to the database eg. on a calculator

and then use such values in your answers.

You must ONLY use the data as provided in the text of the questions. Where a particular case for word is provided you must use that case. You may divide names such as Peter Xiue into a first name of Peter and a last name of Xiue. **Failure to adhere to this requirement will result in a mark of 0 for the relevant question**.

(b) For the following tasks, your SQL must correctly manage transactions and use sequences to generate new primary keys for numeric primary key values (under no circumstances may a new primary key value be hard coded as a number). Your answers for these tasks must be placed in the supplied SQL Script **Q1b-mh-dm.sql**

(i) Create a set of sequences which will allow you to enter data into the PATIENT, ADMISSION and ADM_PRC tables - all such sequences must start at 200000 and go up in steps of 10 (ie. the first value is 200000, the next 200010 etc)

[2 marks]

(ii) Peter Xiue who lives at "14 Narrow Lane Caulfield" was admitted on the 16th May 2019 at 10 AM as a new patient. He was born on the 1st October 1981 and has a contact phone number of 0123456789. His supervising doctor will be Dr Sawyer HAISELL (you may assume that this doctor's name is unique). Peter has not been discharged as yet. Add Peter to the Monash Hospital system.

[4 marks]

(iii) Dr Decca BLANKHORN has changed her "Thoracic surgery" specialisation to "Vascular surgery" (you may assume that this doctors name is unique). In making this change you may not use insert or delete.

[2 marks]

(iv) Following several legal challenges, the hospital has decided that they no longer wish to support the "Medical genetics" specialisation and want it removed from the areas in which a doctor can indicate a specialisation. In arriving at your solution remember you are not permitted to alter the supplied schema in any form, including using an alter statement on the created tables.

[2 marks]

Q2. SQL Queries (40 marks):

Your answers for these tasks must be placed in the supplied SQL Script **Q2-mh-queries.sql**

(i) List the doctor title, first name, last name and contact phone number for all doctors who specialise in the area of "ORTHOPEDIC SURGERY" (this is the specialisation description). Order the list by the doctors' last name and within this, if two doctors have the same last name, order them by their respective first names.

[3 marks]

(ii) List the item code, item description, item stock and the cost centre title which provides these items for all items which have a stock greater than 50 items and include the word 'disposable' in their item description. Order the output by the item code.

[3 marks]

(iii) List the patient id, patient's full name as a single column called 'Patient Name', admission date and time and the supervising doctor's full name (including title) as a single column called 'Doctor Name' for all those patients admitted on the 14th March 2019. Your output must include at least two admissions on this date which occurred at different times. Order the output by the admission time with the earliest admission first. Typical output would have the form:

PATIENT_ID	Patient Name	ADMDATETIME	Doctor Name
100187	Sebastien Bodsworth	14-Mar-2019 08:00	Mr Graham Brown
100175	Doralin O'Brogane	14-Mar-2019 14:00	Mr Graham Brown
102345	Wendy Lee	14-Mar-2019 14:00	Mr Graham Brown

[4 marks]

(iv) List the procedure code, name, description, and standard cost where the procedure is less expensive than the average procedure standard cost. The output must show the most expensive procedure first. The procedure standard cost must be displayed with two decimal points and a leading $ symbol, for example as $120.54

[5 marks]

(v) List the patient id, first name, last name, date of birth and the number of times the patient has been admitted to the hospital where the number of admissions is greater than 2. The output should show patients with the most number of admissions first and for patients with the same number of admissions, show the patients in their date of birth order. Your output must include at least two patients with the same number of admissions. Typical output will have the form:

PATIENT_ID	PATIENT_LNAME	PATIENT_FNAME	DOB	NUMBERADMISSIONS
102345	Lee	Wendy	25-May-1981	4
100118	Edscer	Carita	06-Dec-1994	4
100128	Coskerry	June	16-Aug-1992	3
100114	MacGillespie	Florri	22-Oct-1992	3

[5 marks]

(vi) List the admission number, patient id, first name, last name and the length of their stay in the hospital for all patients who have been discharged and who were in the hospital longer than the average stay for all discharged patients. The length of stay must be shown in the form 10 days 2.0 hrs where hours are rounded to one decimal digit. Typical output would have the form:

ADM_NO	PATIENT_ID	PATIENT_FNAME	PATIENT_LNAME	STAYLENGTH
100120	100175	Doralin	O'Brogane	10 days 2.0 hrs
100100	100187	Sebastien	Bodsworth	10 days 3.0 hrs
100200	100118	Carita	Edscer	12 days 22.0 hrs
100190	100116	Frannie	Matthai	13 days 1.0 hrs
100230	100140	Gwenora	Culter	14 days 3.0 hrs
100080	100152	Neils	Gravatt	15 days 0.0 hrs
100070	100140	Gwenora	Culter	7 days 0.0 hrs

[6 marks]

(vii) Given a doctor may charge more or less than the standard charge for a procedure carried out during an admission procedure, the hospital administration is interested in finding out what variations on the standard price have been charged. The hospital terms the difference between the procedure standard cost and the *average* actual charged procedure cost which has been charged to patients for all such procedures which have been carried out as the "Procedure Price Differential". For all procedures which have been carried out on an admission determine the procedure price differential. The list should show the procedure code, name, description, standard time and the procedure price differential in procedure code order. Typical output would have the form:

PROC_CODE	PROC_NAME	PROC_DESCRIPTION	PROC_TIME	Price Differential
15509	X-ray, Right knee	Right knee Bi-Lateral 2D Scan	20	1.63
32266	Hemoglobin concentration	Measuring oxygen carrying protein in blood	15	-4.00
43114	Heart surgery	Insertion of a pacemaker	45	-14.67
43556	Vascular surgery	Removel of varicose veins	120	-6.90
49518	Total replacement, Right knee	Right knee replacement by artificial joint	180	-13.12
54132	Plastic surgery	Burn surgery to repair skin	170	-56.00
65554	Blood screen	Full blood test	10	-2.00

[6 marks]

(viii) List for every procedure, the items which have been used and the maximum number of those items used when the procedure was carried on an admission. Your list must show the procedure code, procedure name, item code and item description and the maximum quantity of this item used for the given procedure.

For example, Vascular Surgery may require one standard anaesthetic pack, and then a number of Bupivacaine injections; sometimes one has been used sometimes two - the required listing will show:

43556	Vascular surgery	AN002	Std Anaesthetic Pack	1
43556	Vascular surgery	BI500	Bupivacaine Inj .5% 10ml Steriamp	2

If the procedure has not been carried out on any admission or has not used any items then the item code, item description and maximum quantity columns must show "---". The output must be in procedure name order. Typical output would have the form:

PROC_CODE	PROC_NAME	ITEM_CODE	ITEM_DESCRIPTION	MAX_QTY_USED
43111	Angiogram	---	---	---
12055	Appendectomy	---	---	---
65554	Blood screen	OV001	Interlink Vial Access Cannula	1
17122	Childbirth	---	---	---
19887	Colonoscopy	---	---	---
27459	Corneal replacement	---	---	---
33335	Eye test	---	---	---
71432	Genetic testing	---	---	---
43114	Heart surgery	AN002	Std Anaesthetic Pack	1
43114	Heart surgery	AP050	Amethocaine 0.5% 20s Prev Tetracaine 0.5%	1
43114	Heart surgery	OV001	Interlink Vial Access Cannula	2
15511	MRI	---	---	---

[8 marks]

Q3. PL/SQL (20 marks):

Your answers for these tasks must be placed in the supplied SQL Script **Q3-mh-plsql.sql**

For **each of these questions**, as part of your answer, you must create a set of SQL commands which will demonstrate the successful operation of your trigger (as an example see the file emp_dept-test-trigger.sql from the emp-dept trigger lab exercise). Place these commands below your trigger definition for each of the tasks. Ensure your trigger definition finishes with a slash(/) and blank following line as detailed in the lab 11 notes.

(i) The hospital has decided that it would like to be able to change the item_code for an ITEM, for example, change KN056 for the "Right Knee Brace" to KNR56. Code a trigger which will support this request. A message should be displayed to indicate the change has occurred successfully.

[4 marks]

(ii) Write a trigger which will prevent a patient's first and last names from being entered with both names blank (null).

[8 marks]

(iii) Write a trigger which will automatically adjust the stock level of an item when an item is recorded as being used in an admission procedure. The items used in an admission procedure are recorded immediately after the procedure has been completed. You may assume that the items used in an admission procedure after being recorded in the system are not permitted to be deleted or updated.

[8 marks]

Q4. Design Modifications (20 marks):

Your answers for these tasks must be placed in the supplied SQL Script **Q4-mh-mods.sql**

These tasks should be attempted only after Q1, Q2 and Q3 have been successfully completed. They are to be completed on the "live" database ie. the database with the data loaded from your previous work.

(i) The hospital is experiencing an issue where stocks of some items are allowed to get unreasonably low and as a consequence cause admission procedures to be postponed due to insufficient stock. The hospital administration would like to include a re-order level for items so that when a stock item falls to this level it will be a warning to procurement staff that the item needs to be re-ordered.

An analysis of the current stock levels for all items has resulted in a decision that this reorder stock level for a particular item should be set initially for the current stock held at half the current stock of the item. For example, the current stock level of SS006 "Stainless Steel Pins" is 100, the reorder level for SS006 should thus be set at 50.

All new items added to the items table must be required to provide a re-order stock level.

Change the database to satisfy this requirement.

[6 marks]

(ii) Initially, the hospital administration was only interested in the lead doctor who performed an admission procedure. A review of this approach has resulted in a request to change the database so that, from this point forward, all doctors who perform an admission procedure will be recorded. Some procedures, for example, an Angiogram may require a team of doctors.

The hospital wishes to record, for all the doctors involved, whether the doctor was the Lead doctor (the doctor in charge) or an Ancillary doctor (a doctor assisting).

Prior admission procedures will be viewed as only having a Lead doctor based on the doctor who is recorded as performing the admission procedure.

Change the database to satisfy this requirement. After making the change add a doctor to one of your admission procedures as an Ancillary doctor.

[14 marks]

SUBMISSION REQUIREMENTS

Due Date: **Friday 31st May 2019 at 10PM (Week 12)**

*Please note that since this submission is at 10PM you **cannot** depend on your tutors availability if you need to resubmit, please be VERY CAREFUL with your submission.* It is strongly recommended that you submit several hours before this time.

For this assignment there are five files you are **required** to submit:

- Q1a-mh-insert.sql
- Q1b-mh-dm.sql
- Q2-mh-queries.sql
- Q3-mh-plsql.sql
- Q4-mh-mods.sql

You are required to submit these files to Moodle before the assignment due date/time, they must **NOT** be zipped together. If you need to make any comments your marker/tutor should be aware of please place them at the head of each of your solutions script in the "Comments for your marker:" section.

Before submission you should carefully check you have all files uploaded and that the file contents are as you wish, missing files and incorrect contents (such as a blank file) will incur grade penalties.

Late submission will incur penalties as outlined in the unit guide, including those which are late due to a failure to click the "Submit Assignment" button.