ASSIGNMENT TWO 15 marks

Due Fri Oct 25 2024 at 8pm

Released on 16/9/2024, last updated xx/10

This assignment should be done in a group of no more than 2 students.

This assignment needs to be completed in a group of no more than 2 student members. If such a group is formed, both members must come from the same campus, and also within the tutorial classes of the *same tutor* whenever possible. While lecturers and tutors will help as much as they can, it is essentially each student's own motivation and responsibility to form a group for this assignment. By default, each student is working in a group containing a single member of himself. Students may however make use of the student communication board to advertise their availability in seeking an assignment partnership.

In the rare case of one group member becoming seriously ill or uncontactable or not responding, the other member should consider forming a different group or working on his or her own for the assignment. As in real life, everyone should have a contingency plan, or Plan B, and failure of assignment partnership at any point of time will not be accepted as the legitimate reasons for an assignment extension. However, a student is obligated to properly notify his or her existing assignment partner in good time should it become imperative that the student need to terminate the existing partnership due to unexpected circumstances.

Marks are not necessarily always proportional to the complexity of the questions or the amount of time required to have the problems solved, as we may often need to allocate more marks to the more fundamental theories and techniques to ensure they are well covered.

Students enrolled in INFS2002 - Database Design and Development (Advanced) must also complete the advanced part by the same due date.

- For all the SQL queries in this assignment, students need to submit their SQL statements constructed *directly*, that is, not to generate the SQL script for you by the GUI, as this would defeat the purpose of practicing how to formulate SQL queries directly.
- All required screenshots must be clearly readable, and the relevant text in on the screenshots must be directly legible on a normal A4-sized printout of the submitted document. Otherwise the screenshots will be deemed having not been submitted.
- Students' main document submitted for their answers to this Assignment must be written in **Microsoft Word**, not in PDF.

Q1. Selected additional exercises (5 marks)

i. Complete Questions α and γ in the Additional Exercises for Practical 8. (**2**=.5+1.5 **marks**)
ii. Complete Questions β and ε in the Additional Exercises for Practical 10. (**2**=.5+1.5 **marks**)
iii. Complete Questions α and β in the Additional Exercises for Practical 11. (**1**=.5+.5 **mark**)

Q2. Database modelling (5 marks)

In this part, you are asked to design a database to support a **Beauty Salon Booking System**. The major business requirements are summarised below in the *Mini Case: A Beauty Salon Booking System*. You are asked to develop a detailed Entity-Relationship model for this mini case. Your ER model should consist of a detailed ER diagram integrated with itemised discussions on the features of the entities and relationships and all the assumptions you made where applicable. The ER diagram and the accompanying document should identify keys, constraints, entity types, relationship types, specialisation/generalisation if any, etc. You must use the same notation scheme for the ER diagram as the textbook (use UML notations as shown in the last

page of the textbook, and don't use Crew Foot notations), and the ER diagram should be strictly in the way the textbook uses for.

i. The ER diagram should include, among others, representative attributes for all entity types, proper subclassing if any, and correct participation multiplicities for the relationship types. It should be meaningfully and well designed, and should also include all relevant and necessary aspects, and indicate any supplementary business rules if you decide to introduce. In any case, supply at least 1 concise business rule that you feel quite important to your resulting database design. (**3 marks**)

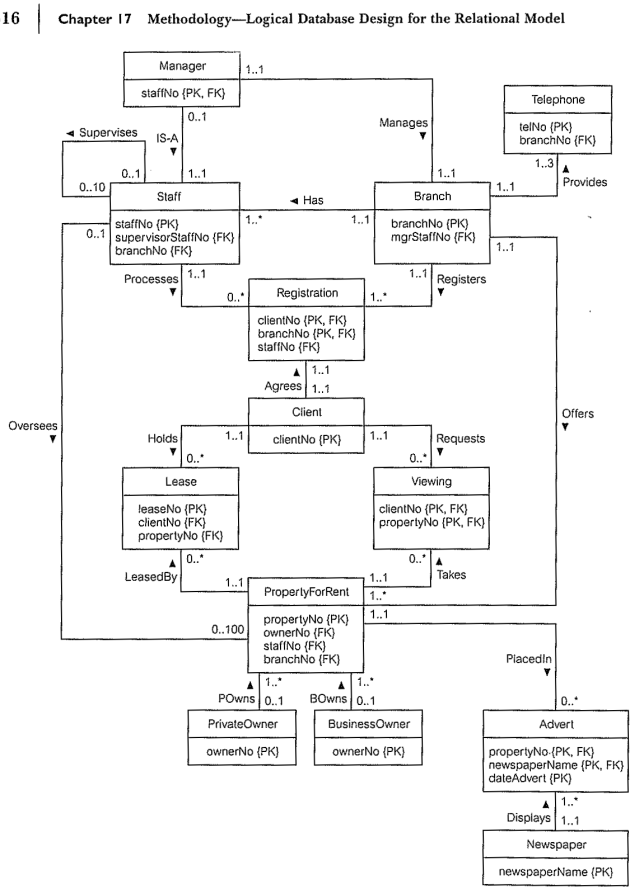


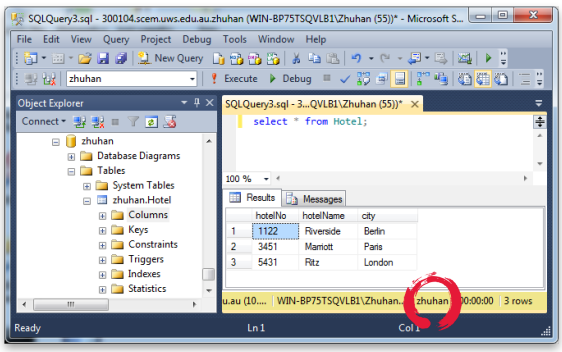
Figure 17.9 Global relation diagram for *DreamHome*.

ii. Map the above ER diagram into a global relation diagram (GRD). The GRD should be in a form similar to Figure 17.9 (page 554, or 516 for edition 5) of the textbook, but all the attributes should be kept there too. Include in the diagram all the primary keys, foreign keys, additional candidate keys if any, and the multiplicity/cardinality constraints. (**2 marks**)

iii. Please note that an ERD is the artefact of the conceptual database design phase, while a GRD is the artfact of the logical database design phase which relates to the relational models. As such, a good ERD should be conceptually more concise and the relationships there should in general remain so rather than becoming extra entities as in a *relational* model.

Q3. More analysis and SQL (5 marks)

i. Create the database tables in SQL (runnable on the School's Microsoft SQL Server) for all the relations in your relation diagram, and enforce there all the relevant constraints including primary keys and foreign keys. Fill the tables with sufficient data - generally around 3 tuples or more per table, but should be sufficient to illustrate meaningfully the working of the general queries to be completed below. List the content of your tables with screenshots. Screenshots of active windows (under Microsoft Windows) can be obtained by pressing **CTRL-ALT-PRTSC** keys together, see the example on the right. Your screenshots must contain your username as in the above example, and you may list several tables on a single screenshot if you wish and the screenshots would remain legible. We note that part of marks on the table data are implicitly absorbed into that for the query questions below as the corresponding table data need to be made sufficiently suitable in order to be able to illustrate the full features in the query results. (**1.5 marks**)



ii. (**Queries with truly illustrative data**) Write in SQL the commands to complete the following queries, and show your results in screenshots. Where parameters for the queries below are not completely specified, the parameters should be chosen so as to generate non-trivial (non-empty) results for the queries. We note that providing sufficient and suitable set of table data is critical in properly testing the validity of the SQL queries. The followings will in general be considered as a potential sign of having an incorrect or incomplete/unvalidated answer or solution:

- An SQL query just or always returns nothing;

- No differentiating data records: records of a table only get into the query results in the manner of having all or none, with nothing in-bewteen;
- Table data are not representative of all possibilities of the logic with the SQL queries.

(**2.5 marks**: see breakdown below)

- (a) List all the timed services along with the therapists who can provide such services. The list should be sorted alphabetically in the service names. (**0.5 marks**)
- (b) For a given day, say, 2024-11-11, list all the names of the therapists who have/had at least one booking/appointment on that day. Don't repeat the names in the list. (**0.5 marks**)
- (c) List the names of all the clients along with the corresponding total number of bookings. (**0.5 marks**)
- (d) List all therapists and the corresponding therapeutic services they are registered to provide at the Beauty Salon. Sort the output according to their staff name, type of service (timed or itemised), and finally the name of the service. (**0.5 marks**)
- (e) For each timed service, list the names of the therapists whose hourly rates are the cheapest, along with their actual hourly rates. (**0.5 marks**)

iii. For your final designed database, find a scenario in which a relatively prominent business data integrity can not be ensured by your current primary keys and foreign keys, nor by adding directly more of such keys or check clauses in the created tables. In other words, the data integrity ensured by the keys within the database may not be enough to ensure all the data integrity within the business context. Write a SQL statement that will determine if such a problem exists or not, and where, for any given state of the database. (**1 mark**)

- A single plain-text file containing SQL statements for creating all the tables and making all the queries. The script should be executable on the School's Microsoft SQL Server, otherwise the corresponding marks in the above listed items will be deducted accordingly. **Marks will be deducted** in the corresponding questions if this SQL script in plain-text file is not submitted.
- Each student must state explicitly who he or she once teamed up with if that person is currently no longer the group member for the submission, unless no shared work is involved. Students are not permitted to have their shared work for this assignment with more than one person (the team member) including potential former team member, unless approved by the subject coordinator in writing.

Mini Case: A Beauty Salon Booking System

Beauty Salon is a system to be designed to manage the booking for a single beauty parlour. The beauty parlour has a number of staff members most of which are beauty therapists. All beauty therapies will be conducted within the parlour, and as such, there is no need to consider the room availabilities for the booked therapies. Each booking is to be made between a client and any staff member, for a therapy to be conducted by the same staff or a different therapist. For simplicity, we assume all therapists are available outside the timeslots that have already been booked. Moreover, this booking system will not deal with any physical payments other than just recording in the system the total cost for each booked therapy.

Beauty Care and Treatments: There are a number of beauty treatments or services a therapist can undertake, including manicure, pedicure, waxing, threading, facials and massages, to name a few. Different therapists may be able to provide different ranges of specific services, depending on the actual individuals. Some (item-based) services such as waxing will be charged per item while others (time-based) such as massage will be charged per half an hour or per hour. The fees for item-based services are fixed across all the therapists. But the fees for time-based services, hourly or half-hourly, may vary among the therapists due to their different level of expertise. While all thereapists can each perform all itemised services, not all will offer timed services.

Clients: Each regular client or patron will typically have her own client record set up on the system, and this will allow her to more easily make a booking. However, a non-regular customer will also be able to turn up in the beauty parlour and request a service to be done to her. Such customers don't have to create their client profiles and can still receive the services when they just turn up in the parlour, provided there are suitable therapists available at the parlour at the time.

Business Activities: For the typical business activities, the *Beauty Salon* system will allow one to view which appointments have been made on any given day for any particular therapist, list all the available therapists for a given period of time, and many more.

Note on Submission

- This assignment must be submitted electronically via *v*WSU before the due date. No email submissions will be accepted.
- It is the students' responsibility to retrieve and keep all their submission receipts, as shown in this demonstration page. If in doubt, consult your tutors well before the submission due date. After each submission, a receipt will be automatically emailed back to the student's email account regardless of whether additional email address has been specified on the submission page. Hence, **if you don't receive a receipt, then your submission definitely failed**.
- Submitted files may be zipped together as a single **zip** file (but not as a **zipx** or **rar** file), if a student wishes to do so. However, no other file compression or file archiving formats will be accepted for the submission. If any students insist on submitting their files in **rar** or other non-zip compression formats, a penalty of **1 mark** may be deducted.
- A typical submission should consists of, but not limited to,
    - the **main document in Microsoft Word** that describes your solutions question by question, in the right order, including pertinent diagrams, screenshots, and SQL scripts whenever relevant.
    - a plain text file containing all SQL scripts in the order of their appearance in the main document, separated by relevant comments similar to

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--  Question 2(iv) - Original question briefly put here ...
--  ... more comments if any
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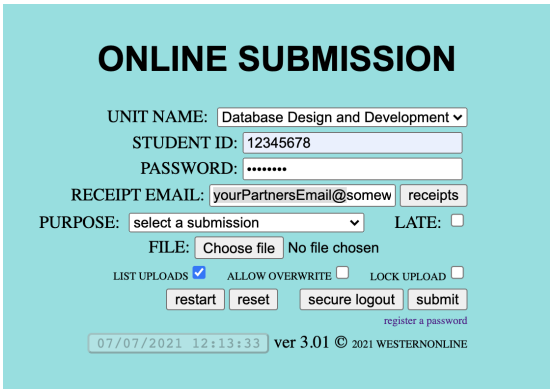
- The electronic submission should contain the paper work in Microsoft Word, and the pertinent SQL source code (say, **BSBS.sql** or **BSBS.txt**) should be in a separate file and should be in the *plain text*

format. Otherwise **1 mark** may be deducted for the missing separate SQL source file even if the code is already contained in the main Word document.

- Please note that if your SQL source code gets rejected by the SQL Server at the School, you automatically lose up to 50% of the marks allocated to that coding part. The best approach is to place all SQL scripts in a single text file and have it executed in a single go on the School's database server.
- Each group must submit exactly one copy of their assignment solution electronically by one of the team members. If the other group member really wants to submit it as well due to whatever reasons, then the name of the submitted files must start with "**please_ignore_**" (such files will not be treated as regular submissions and will be ignored during the marking). Otherwise **1 mark** may be deducted for the duplicated electronic submission.
- If you are submitting your assignment as a group of two, it is highly recommended that you enter your assignment partner's email address into the RECEIPT EMAIL field of the submission page so that your partner will also receive an email confirmation on your submission. As the submitter, you will be automatically emailed a receipt to your student email account anyway. You can also enter multiple email addresses separated by commas.



- If you are using or modifying a portion of resources from the Internet or the like as a part of your answer, then you are required to cite their references or urls as well, unless these resources come from the lecture notes or tutorial/practicals on our own subject website.
- Electronic submission on *the* due date after 8pm before 12 midnight will still be accepted without penalty. However, any submission failure in that period due to either the student faults or the fault or malfunction of the School's or WSU's servers will not be accepted as the legitimate reasons for a late submission. Beware that School's servers often need to be shut down for maintenance from late Fridays or just before public holidays.
- Late submissions will attract a daily incremented late penalty of 10% per day.

- A statement must be provided as the covering page for the **authorship** (student number/s and name/s) and the **work distribution** in percentage (e.g. 50% for David and 50% for Louise) *agreed* among all the group members. If this statement is absent, then it will be assumed that all group members have made equal amount of contribution to the assignment solution. Achieving a 50%/50% work distribution is also the goal of this team work; the person who contributes less than 50% may result in having less mark than the other team member.
- The main purpose of having an assignment team is to enable students to discuss the database design with another student so as to better understand everything there, rather than splitting the actual work. Hence, regardless of whether a team member contributed 100% or just 50%, the mark remains the same. However, a team member may receive less marks if he contributes less than 50%.
- Students are expected to continue with their existing assignment group or form a new group if they haven't formed a group for Assignment 1. If any student is making a new assignment group, thus leaving a previous assignment group, he must first obtain a written approval from his tutor or the subject coordinator, unless he will not make use of any work jointly done in the previous team work.
- Students are welcome to leave a hardcopy of their assignment 2 with their marking tutors directly, on any agreed terms between the students and the tutors, prior to their work being already marked, so that on top of the regular feedback in the form of marking sheets additional and more concrete comments or suggestions may be written back to the assignment work on the relevant spots. However, please bear in mind that the electronic submission is *the* official submission, submitting a hardcopy without submitting the electronic copy within the due date will be deemed NOT having submitted the assignment.
- Any student submitting the assignment on his own must state explicitly whether he was once in a group with another student, and what part of the submitted work actually inherited from a previous joint team work. Failure to make this statement may result in a plagiarism case lodged if the work is similar to another student's, and a late addition of such a statement may lead to the assignment being considered as a late submission.

- **A friendly reminder:** Assignment group members should each maintain a constant, effective, and productive communication with their respective assignment partner, and should always have a contingency plan, Plan B, for the potential failure of the partnership no matter how impossible it may appear at the time. While partners will typically all do their best to contribute to the better

understanding of the assignment, there can be unforeseeable circumstances or misadventures that could result in an abortive termination of the partnership. Hence it is each student's own responsibility to ensure that his or her partnership is working, and he or she has a plan B for any potential partnership breakdown. This is a trade-off for all the advantages of having an assignment partner. Hence please always keep a copy of everything about your assignment *yourself*. Failure of a partnership at any time will not be accepted as an excuse for the failure to submit the assignment in time.

ACKNOWLEDGEMENT: This document may have included excerpts from the prescribed textbook by Thomas Connolly and Carolyn Begg, and is also based on an earlier delivery some years back at WSU by Dr Eshan Vossough who may have in turn made use of other contributors' work.