

# ASSIGNMENT TWO 15 marks

Due Fri Oct 25 2019 at 8pm

Released on 24/9/2019, 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.

Students enrolled in 300941 - 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  $\alpha$  and  $\gamma$  in the Additional Exercises for Practical 8. (**2=.5+1.5 marks**)
- ii. Complete Questions  $\beta$  and  $\varepsilon$  in the Additional Exercises for Practical 10. (**2=.5+1.5 marks**)
- iii. Complete Questions  $\alpha$  and  $\beta$  in the Additional Exercises for Practical 11. (**1=.5+.5 mark**)

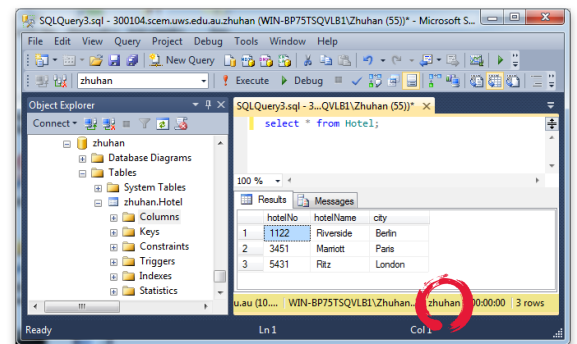
## Q2. Database modelling (5 marks)

In this part, you are asked to design a database to support a **Coach Booking System**. The major business requirements are summarised below in the Mini Case: A Coach 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. We note that our past experiences show drawing an ER diagram on Microsoft Powerpoint gives one better control and flexibility when compared with drawing diagrams with Microsoft Word.

- 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. **(3 marks)**
- 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, and the multiplicity constraints. **(2 marks)**
- iii. Please note that an ERD is the artefact of the conceptual database design phase, while a GRD is the artifact 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. **(2 marks)**
- ii. 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. **(2 marks)**
  - o (a) For a given coach and a given date, list all the names of the clients who have a booking with the coach for that day. **(0.5 marks)**
  - o (b) List all the coaches and their respective total number of coaching hours that are ever booked for. **(0.5 marks)**
  - o (c) For a given date, say 1 Oct 2019, list all the coaches booked for that day, the corresponding booked coaching timeslot and venue, and the name of the client. The output should be properly sorted. **(0.5 marks)**
  - o (d) For a given timeslot, say 1 Oct 2019 between 10-11am, and for a training item, say tennis or anything of your choice, list all the coaches who are still available, that is, who have not been booked for the timeslot yet. **(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 unit coordinator in writing.

# Mini Case: A Coach Booking System

**Coach Booking** is a database system to be designed to manage the booking of personal coaches on a variety of training items such as mathematics and physics in science, swimming and tennis in sports and ballet and Latin dance in entertainment.

Each **coach** may offer private training lessons on several **training items** depending on their respective skills or expertise. A coach may charge different hourly rates on different training items, and each coach typically has a default training **venue** or office for each of his offered training item although such venues may vary across different training items. If a coach doesn't have a default training venue for a particular training item, then the client needs to provide a suitable venue separately such as a tennis court in a sports centre for the tennis training. If a coach offers to travel on certain training items, regardless whether he has a default venue, an extra cost may be incurred depending the estimated time of the needed travelling. The rate for such travelling depends on the individual coaches but is independent of the training items.

Each coach will be recorded for his personal details such as the name, email address, telephone number, address, and postcode, and will also be recorded for his personal **achievements** such as the qualifications, certificates, or awards, including the year of conferment. Each **client** or trainee will be recorded for his contact details and each **venue** will be recorded at least for its venue name, telephone number, address, and postcode.

When a client makes a booking with a coach on a particular training item, the booking needs to keep track of the date of the booking, the booked date and time to start the coaching/training, total number of hours for the booked session, the total amount due and paid, the payment status as well as the completion status for the booked coaching. If a venue other than the default training venue is assigned to the booking, then the estimated total travelling time for the coach will also be recorded with the booking.

## Note on Submission

- This assignment must be submitted electronically via vWSU 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. 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

```
%%  
%% Question 3-ii-(a) - List names of the clients having a booking ...  
%%
```

- The electronic submission should contain the paper work in Microsoft Word, and the pertinent SQL source code (say, named **CBS.sql** or **CBS.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 50% of the marks allocated to that coding part.
- 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.

- Each submission must be accompanied by a declaration of the ownership of the submitted work as described in the [Learning Guide Companion](#). No signature is however required for the electronic submissions. Please note that an examiner or lecturer/tutor has the right not to mark this assignment if a pertinent declaration is not present in your submission.
- [Late submissions](#) will attract a daily incremented late penalty of 10% per day.
- 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.
- A statement on 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 unit 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.