6th Deliverable – Database design (73 marks)

Based on your understanding of the client's requirements, you will design a relational database system. In order to describe this design, referring to the initial class diagram (3rd deliverable), you will produce an ER diagram and describe the relational table structure. By examining the user stories, you will discover the entities and their relationships.

You will also determine the physical characteristics of the database system. You are free to use Oracle, or an implementation of SQL for this implementation, taking into account the hardware requirements of each DBMS, as well as your ability to integrate it with the rest of your implementation. You will explain the technical specifications for storing and retrieving data. The goal is to create a design for storing data that will provide adequate performance and ensure database integrity, security and recoverability. It is at this point that you need to consider the size of the database, both now and for the future (three to five years). You also need to think about how quickly the database needs to be accessed.

Your deliverable should include the following:

- (3 marks) Front matter (see 1st deliverable)
- (4 marks) Executive Overview (see above for a description).
- (3 marks) Business problem – what is the business problem that the new system will resolve. It may have changed now that you have a better understanding of what the client wishes to be able to do.
- (10 marks) Narrative description of the database design. Here are three different examples from previous students' deliverables:

  > *… We have 4 actors taking part in this system. They are the admin, students, teachers and librarians. Each actor has their respective task, differentiating the importance of each of them. For example, the admin is able to look at how many times a particular student logs in to book a room, and they can see what times are at peak for study room bookings. A regular student would not have access to that type of information, and therefore that would not be one of their tasks. …*
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  > *… When the Marketing Director wants to add a new client's information, he has to add the client's Contact number, advertisement ID, the business name, the full name of the person to contact in that business, the address, the telephone number, fax number, email and the day the client was contacted. The Marketing Director or the Secretary can also view and update the existing clients' information stored in the database. The users can also add new advertisement information on their new clients such as which business sector or section they want to be, edition, size of the advertisement and the city they are in. The users can also view and update the existing advertisement info on existing clients in their database. When the users choose to view the advertisement, the cost of the advertisement is also displayed and the contract information. …*
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  > *There are two actors in total, which are the manager and his employees. The manager can view, edit, add or remove employees from the Employees database, he can view, edit, add or remove clients from the Clients database, he can add, remove or edit appointments from the Appointments database, he can view or edit the schedule from the Schedule database, he can view Projects from the Projects database and he can add, view or edit supplies from the Supplies database. Meanwhile, the employees can only view supplies from the Supplies database and view the schedule from the Schedule database. This database design prevents important information from being inappropriately meddled with by unknowledgeable staff, which is why the employees' access to the database is restricted as such. …*

- (5 marks) Include a block diagram showing how each user uses the application to interact with the various parts of the database. Show the interaction between the user and the various tables. Something like the following (*Figure 2*), with appropriate labels:

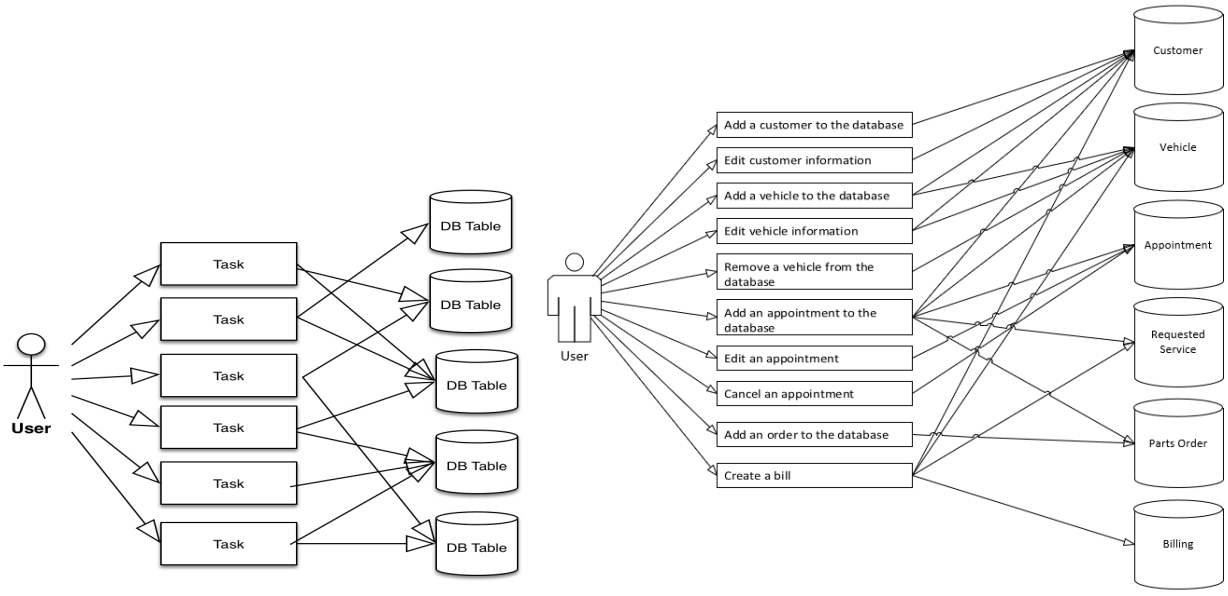

Figure 2: Example block diagram

- (10 marks) Appendix 1 – Create a data dictionary, complete with entities, relations and attribute types.
- (15 marks) Appendix 2 – Using MS Visio, produce an ER diagram of the database supporting the information system, complete with cardinalities (5 marks). Reproduce the class diagram from the 3rd deliverable and explain how and why your ER diagram is both similar to, and different from, the class diagram in Appendix 5 of the 3rd deliverable (10 marks).
- (4 marks) Appendix 3 – Descriptions and explanations of
  - (2 marks) Indexes and the database architecture of your design. What indexes are you going to be using in which tables, and why?
  - (2 marks) Query optimization in your design. There are going to be many queries. Do you need to optimize them? If so, why and how? If not, why not?
- (9 marks) Appendix 4 – The projected size of the database (in MB or GB), now and for the next three to five years. For each table, determine the maximum size of each record. Then, estimate the maximum number of records per table, and then come up with a value for the maximum size of the table. This will give you the maximum size of the database now. Make assumptions about how the number of entries in the database will grow, and then use that number to determine the future size of the database. Show the detailed calculations and assumptions made to arrive at your estimate.
- (5 marks) Appendix 5 – Explain the access speed required, and how your design will permit this. How often will the database be accessed? How much data will need to be stored or retrieved? What kind of response time will be necessary?
- (2 marks) References/Bibliography/Works cited (APA Style)
- (3 marks) Spelling, grammar and formatting