158.337 (Extramural) - Project Instructions: Part A

Follow the given set of steps to complete Part A of the assignment project. Turn the work in for grading by the due date **(Tuesday, 5th April 4.00 pm).**

Note: Make sure you have altered the password of your Oracle a/c from the given default. You do not want other people accessing your account. Remember it is your responsibility to protect your work.

PART A
Logical and Physical Database Design

Read the **City Council Library Case Study** given in the **Appendix A.** There are **three** steps to be completed in Part A.

Part A: Step 1 **(25 marks)**
Create a **logical (relational) data model (e.g. Database or ER diagram).** Use J Developer or Visio to create this diagram.

Use appropriate naming conventions while naming tables, attributes, relationships, etc. Also use appropriate data-types, data sizes, etc. in the diagram and ensure to flag PKs, FKs, etc.

There should be **two** business rules for each relationship (association) shown on diagram. State these business rules very clearly under a **separate** section (in your report). Similarly, state any **reasonable** assumptions under a **separate** section as this helps us better evaluate of your model design.

Examine each table's (entity's) attributes for dependencies and apply the rules of normalisation discussed in Chapter 6 of the textbook. You are required to show the detailed normalisation process (e.g. how you move from one normal form to another, etc.) in the submitted work. Use dependency diagrams for depicting all the relationships among a table's attributes. Normalise tables up to the highest possible NF.

Part A: Step 2 **(9 marks)**
Generate **physical model** based on the logical model created in Step 1. To create the required set of tables, relationships, constraints, etc. may consider to first writing SQL scripts using a text editor (e.g. Notepad). Use SQL Developer for initial checking / debugging and running of the code.

Check carefully the DDL code in your script file and make sure that all the attribute definitions (e.g. names, data types, data sizes, domain values including defaults, etc.), table constraints (entity integrity, referential integrity, etc.), etc. are specified correctly.

Validate your work by ensuring that query transactions {(a) - (h) listed towards the end of the case study} are supported by your design. Make sure that the physical design is a **robust** one and meets the requirements of a good design and remember

normalisation alone does not produce a good design. In the end, ensure that both logical and physical designs are consistent with each other.

Run your final scripts to generate the database (i.e. physical model). Use your Oracle a/c to implement the final code.

Part A: Step 3 **(6 marks)**

Now create appropriate test data to populate the tables you created in Step2. You can use SQL Developer to directly enter data or run a script file that contains SQL INSERT statements.

There should be reasonably sufficient number of rows of test data across all the tables but **no table should contain less than five rows.** Make sure your test data **appropriately and sufficiently reflects** (this could sometimes mean adding more than 5 rows in some tables) **and does not violate any of the constraints declared** while creating the database. **Set up all the tables and their constraints in the correct order before you load any data into the database.**

Note: In general, apply good naming conventions which are also self-explanatory (e.g. name create table script file as createTables.sql, annotate your code with appropriate comments to enhance readability, etc.).

Assignment Submission

Organize your **final project report** (word document) to include complete requirements of the assignment. Make sure the report contents are also in the order of the laid requirements. There are **three** parts to this assignment submission, a **report** and two other resources - **database and scripts. You must put your final project report, all the files you used as solution to Part A into a "single" zip file and should submit it via the Stream Assignment link.**

Checklist for project report (word document – soft copy)

1. A logical relational model (**database or ER diagram**) that is laid out **clearly** and **legibly** for grading. The text font size should not be very small (otherwise risk losing marks)*. The diagram should show all the entities, attributes (with appropriate data types), primary keys, foreign keys and relationship details (appropriate association names, cardinality, strength (identifying-non-identifying), participation (mandatory or optional)), etc. Make sure you have applied normalisation process to arrive at this model.

2. A list of reasonable assumptions. In your report, include a **discussion of any reasonable assumptions** you made especially about the ambiguous aspects of the case study. We anticipate that **each person's design will differ**** from the other based on the underlying assumptions.

3. A list of business rules for each relationship on your diagram (clearly state two unambiguous rules for each relationship).

4. Readable printout of the SQL command file used to create your Oracle tables which include declarative constraints in the CREATE TABLE commands.

5. A formatted, readable printout of the contents of the tables. Include printout of the any script file you used to populate (INSERT commands) the tables.

Checklist for submission under your Oracle a/c

Physical design of the assignment problem i.e. all the tables with test data must be available via your Oracle a/c.

Checklist for Stream submission

Final project report, Database design and data scripts, should be uploaded in Stream as a single zipped file under the Assignment upload link. Use the **ID Number** as the name of your zipped file.

Check your project work and make sure that all the scripts run with no errors. Check that appropriate names have been given to all files.

Note:

Enter your name, student id number on the project marking sheet **(Appendix B). Submit the completed project report with a marking sheet as a word document (we will print this). Make sure to provide the Oracle username in your report. Submit the project report and all the script files as a single .zip file to the Stream assignment link. Include your physical database design along with data under your Oracle a/c.**

Plagiarism and other project guidelines:

*If your diagram is too small then ZERO mark would be awarded. Make sure that the layout of your diagram is good (e.g. avoid many criss-crosses, etc.) and the font size of the entities, attributes etc. is at least Arial 11 (or similar size if using a different font family, style). Make your diagram easy to read for the grader.

A **ZERO mark will be given to **ALL** the collaborating parties. Any partial copying will also be awarded straight ZERO.

Make sure all your work is complete. Graders will not be chasing you for the parts missed in your submission.

Not adhering to the assignment requirements (e.g. no hard copy) will also be given straight **ZERO.**

Note: Turnaround time for assignment could be up to three weeks.

Appendix A

City Council Library Case Study

A large city council wishes to create a database to control its local libraries. Each library has a number of employees, one of whom is designated as the manager of the library and is responsible for supervising employees and the general day-to-day management of the library.

Each library stores a number of books and CDs. Books are stored on the shelves and CDs are stored in a number of racks in the centre of the library. Generally, a library stocks a number of copies of each book title and each CD. Details of book publishers are maintained but not CD publishers.

To find an item, searches can be performed based on the book/CD title, the author/artist's name, the category of the book/CD, or the publisher's name.

A customer has to first register as a member of a library before he/she is allowed to borrow any book(s)/CD(s); however they can borrow from any of the council's local libraries. Each member is assigned a member ID. The loan is given for up to two weeks. Late returns incur a fine of $1 per day per item. The system should be able to use email to inform the members about their late returns, due fines, etc. The items can be renewed once after which they must be returned. The borrowed items can be returned to any local library.

Query Transactions

The following transactions **must be** supported by your database design. This however does not mean your model is complete and/or good. You should also check your model against the case study description provided above and your personal experience of using library services. You are however, **not required** to implement these transactions (i.e. do not write the queries in SQL code).

a) Present a report listing library details (e.g. location, telephone, web address, etc.) along with the Manager name for each library.
b) Present a library-wise, position-wise listing of employees who are earning over $50,000 and would retire in the next 15 months. Report should be able to display employee number, complete name, sex, various contact details, IRD number, etc.
c) Present a report listing all the books along with their authors. Include all the details such as ISBN, title, year of publication, etc.
d) Present a category-wise report listing all the CDs along with their artists that were released in the last two years.
e) Present a report listing all the city council library employees who have completed 10 years in service. Present the report in ascending order of employee last name.
f) Present a report listing all the library members (ordered by family name) who are aged between 11-16 years and have borrowed any item(s) from the adult fiction category in the last six months.
g) Present a report that displays category-wise total number of books in a library.
h) Present a weekly report listing all the members who are required to pay fines for the late returns. Sort this report using member's first name.

Appendix B

158.337 Project Marking Sheet

(Attach this page to the project report BEFORE you turn it in.)

(Please make sure you provide all the requested details)

Oracle Account: IT337_____

ID number, Name

_____

(Grader's section, please do not write below this)

PART A: _____/40marks

Logical Database Design Comments: /25 marks

Physical Database Design Comments: /15 marks

Part A: 40%, Part B: 60% (Total Course Percentage for the project – 25%)