# INFS2200/INFS7903 Relational Database Systems

Semester 2, 2010

## Assignment (Individual): -

## Oracle Database Application & Administration

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| **Deadline** | 6pm Friday, 22 Oct 2010 | **Marks** | 20% |
| **Online Submission** | http://submit.itee.uq.edu.au/select.php?coursecode=INFS2200 http://submit.itee.uq.edu.au/select.php?coursecode=INFS7903 . | | |

**Objectives**

This assignment is to design and create a database by using Oracle XE. The database administration issues will also be addressed for this database. The assignment consists of five questions.

**Submission**

- The online submission requires you to compress all your files into a single file named as infs2200-s9999999.zip, where s9999999 is the prefix of your email address for INFS2200 students. For INFS7903 students, the file name should be infs7903-s9999999.zip, where s9999999 is also the prefix of your email address.
- The assignment submission comprises of 5 separate files. The files should be named as Q1, Q1, … Q5.
- The answer to Question 1 is strictly limited to no more than four A4 pages. The document can be in either PDF or MS Word format, (or .txt file).
- For Questions 2, 3, 4, and 5, students must provide the solutions in SQL scripts. Each question answer should be provided in a separated script file.
- Submissions must be online before the submission deadline. Later submission will be penalized by 20% deduction of the total marks for every 24 hours. Please make sure your submitted compressed file is not corrupted. Otherwise a zero

mark will be given. Please backup your assignment work always. The file corruption or the lost of files will never be accepted as a reason of later submission.

**Marking**

- Question 1 will be marked on how well the student describes the system under development. The description should be clear, concise, and consistent. Presentation will be also considered.
- For Questions 2, 3, 4, and 5, we will create a database user for each student in our local Oracle system. The user will be granted the DBA role. After that, for each question, we will run the corresponding script files using the RUN (i.e., @) command (e.g. @Q1.txt) and check if the script is executed successfully with expected output. For scripts which cannot be compiled for any reason (e.g. syntax errors), we will mark the source code but will limit the marks to a maximum of the half of the total mark of the question.

**Assignment description:** ***Healthcare Remote Monitoring Database***

Many old people now live alone at home. You are required to create a central database that is used to record healthcare remote monitoring data. With the in-house Bluetooth/Wireless technology and broadband Internet connections, the healthcare professionals seating in a central office can then provide consultations and services to the right person at right time through the using of WWW. This database should be designed to record the personal information as well as the home-collectable healthcare related diagnostic data. In addition to general diagnostic data such as heart beats and blood pressure that is transmittable via the Internet, many other types of data can also be home-collectable via the sensors without supervision. Appendix A shows a list of diagnoses that can be conducted at home by using sensors without personal training or conducted by the monitored person with little initial training or given instructions. We assume the persons who have subscribed to this remote home healthcare system can be trained to handle the specified tests that are related to the disease to be monitored, e.g., Breast Cancer. The home-collected data including samples can either be physically transported to the central office by a courier or by the home-installed Internet-connected electronic sensors.

You are required to design and implement the following (Questions 1-2).

## Question 1 (5 marks):

***Database conceptual design***

- (**1 mark**) Briefly describe the context and the application of the database under development. Why is this system needed? Who will need access to the database?
- (**2 marks**) Draw an Entity Relationship Diagram (ERD) which describes the structure of the database and map the ERD into the relational database schema, identify all the primary keys and foreign keys. Explain the data entities and its attributes. Note that the size of the ERD is limited to 4-6 entity types; each entity type has no more than 5 attributes.
- (**2 marks**) Create the (Context Diagram and Level-0) Data Flow Diagram (DFD) which describes the business logic of the database.

## Question 2 (7 marks):

***Database physical design***

Use SQL script(s) to create the database schema including all the data integrity constraints, indexes, and triggers. Use SQL to define at least one CHECK constraint, one UNIQUE constraint, and 4 indexes. Also define at least 2 triggers. Students need to explain those constraints, triggers, and indexes.

***From Question 3, you will need DBA privileges. Please make sure that the user account you are using is granted the DBA role.***

## Question 3 (2 marks):

Write a PL/SQL script to kill the user who doing most physical reads to the hard-disk.

*Hint: Students need to access to the V$SESSION and V$SESS_IO to find out the user who is doing most physical reads. After that, use the ALTER SYSTEM KILL SESSION to terminate the user's session.*

## Question 4 (3 marks):

- **(1.5 mark)** Write a PL/SQL script to find out which SQL statement causes most physical reads per execution and the user who is executing that statement.
  *Hint: Students need to access to the V$SQLAREA and DBA_USERS views to query the performance information of SQL statements and usernames of the users who are executing the statements.*

- **(1.5 mark)** Write a PL/SQL script to find out which SQL statement consumes largest number of memory per execution and the user who is executing that statement.
  *Hint: similar to the first script, students also need to access to the V$SQLAREA and DBA_USERS views; however, students will need to extract information from the BUFFER_GETS column instead of the DISK_READS column.*

## Question 5 (3 marks):

- **(1 mark)** Write PL/SQL code to create a table called INDEX_SIZE_TRACKING with the following attributes:
  - Index Name: name of the index. Type: VARCHAR(255). This is the primary key of the table.
  - Allocated Space: the memory space (in bytes) allocated to the index. Type: NUMBER
  - Used Space: the memory space used by the index. Type: NUMBER
  - Last Update: the time when index details are updated to this table. Type: VARCHAR(255)

  For each of the indexes defined in Question 2, there will be one entry in this table to keep track of storage details of the index.

- **(2 marks)** Write a PL/SQL script to query index statistics data and update tracking entries in the INDEX_SIZE_TRACKING table. If there is no existing entry for the index, create a new one; otherwise, update the existing one.

  *Hint: students will need to access to the INDEX_STATS view to query indexes' storage information. Information about allocated space and used space of indexes are in the columns BTREE_SPACE and USED_SPACE. Note that before accessing the INDEX_STATS view, students need to execute the ANALYZE INDEX command to collect index statistics. When inserting/updating an entry in the INDEX_SIZE_TRACKING table, students also need to query system date and time from the system variable SYSDATE.*

**APENDEX A**

**Home Collectable-Healthcare Data** [i]

| Condition | Test Process | Tool Name | Method |
|---|---|---|---|
| Allergy | quantitative screening test | MyAllergyTest kit | Skin needle prick with visible result |
| Glucose, Protein, pH (Uri-3) and seven other diagnostic chemical panels (Uri-10) in human urine | urinalysis reagent strips | Uri-Strip K | Dip strip in urine with visible result |
| Colorectal cancer | occult blood screen | EZ DETECT™ | Test pad is placed in the toilet bowl along with a bowel movement with visible result |
| Breast cancer | Breast Self-Examination Pad and Kit | AWARE™ | Reduces friction between the fingers and the breast tissue thereby facilitating and enhancing the early detection of suspicious abnormalities or lumps during routine breast self-examination |
| Prostate Cancer | PSA Screening Test | LANDMARK | Skin needle prick with visible result |
| Anaemia | Anemia Haemoglobin Meter | BioSafe® | Skin needle prick with visible result |
| Diabetes | Glucose Diabetes test | CHEMCARD™ | Skin needle prick with visible result |
| High cholesterol | Home Cholesterol Test | VENTURE™ | Skin needle prick with visible result |
| HIV | HIV-1 Test | Home Access® | Skin needle prick with visible result |
| Hepatitis C | Hepatitis C Test | Home Access® | Skin needle prick with visible result |
| Influenza | Influenza A/B Test | QuickVue | Nasal specimen swab sent to pathologist |
| Thyroid problems | Thyroid Stimulating Hormone test | Landmark Diagnostics | Skin needle prick with visible result |
| Kidney disease | Albumin in urine | FlexSite At Home Kidney Screen | Mail urine sample to pathologist |
| Skin cancer | Skin monitoring system | Visiderm | Each transparent Visiderm sheet becomes a dated record of a mole. Subsequent recordings create a method of comparing the present mole to prior recordings and documenting and noticing even subtle changes. |
| Osteoporosis | key bone marker, deoxypyridinium (D-Pyd) | Osteo Check | Mail urine sample to pathologist |
| Hormone balance | estradiol, progesterone, and testerone levels | Female Check | Mail saliva sample to pathologist |
| Minerals and toxins | MINERALS: Calcium, Chromium, Cobalt, Copper, Iodine, Magnesium, Manganese, | Mineral Check by Body Balance | Mail hair sample to pathologist |

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| | Selenium, Strontium, Sulfur, Zinc<br><br>TOXIC ELEMENTS: Aluminum, Antimony, Arsenic, Bismuth, Cadmium, Lead, Mercury, Nickel, Tin | | |
| Cancer causing radon | Radon | Radon Home Test Kit | Mail home air samples to pathologist |
| Heart disease | C-Reactive Protein | CRP | Skin needle prick sent to pathologist |
| Heart disease | Lipid test | Lipids | Skin needle prick sent to pathologist |
| Acute ear infection | Middle Ear Infection Monitor | EarCheck EC-2 | Ear monitor with visible result |
| Genetic Health Risks | DNA | Premium Home DNA Test | Skin needle prick sent to pathologist |
| Liver cancer | check if elements in the blood match genetic information about the diseases | Digital Bio Disc | Skin needle prick with visible result |
| Diabetes | check if elements in the blood match genetic information about the diseases | Digital Bio Disc | Skin needle prick with visible result |
| Cancer | breast, ovarian, lung, uterine, prostate, testicle, colorectal, pancreas, liver, stomach, thyroid | Cancersafe®test | Blood sample sent to pathologist |
| Ovarian cancer | ovarian cancer test | OvPlex™ | Blood sample sent to pathologist |
| Bladder cancer | Urine test | BTA stat test | Urine on screening test pad with visible result |

[i] This list is provided by Dr Lisa New