CMSC 508 – Database Theory Virginia Commonwealth University, Spring 2017

Final project: Phase II: database implementation

Due date: May 5, 2017

The objective of the second phase of the final project is to implement the database designed in the first phase using SQL and provide an interface to access and manipulate the data. Students may realize that it is necessary to consider modifications to the design in order to have a working solution satisfying expected functionality (iterative life cycle). Students must translate the design into a functional solution by:

1) Creating tables using proper data types, constraints, and keys according to the design proposed.
2) Populating the tables using exemplary data, maintaining the consistency and integrity of the data.
3) Creating SQL queries to select, insert, update, and delete data from tables, according to the expected functionality described in the problem statement.
4) Creating views, triggers, and procedures to facilitate the usage and manipulation of the database.
5) Creating a software interface to facilitate the final user the access and manipulation to the data (e.g. a Java/C++/Python software connecting to the database, a PHP website with interactive forms to query and manipulate the data, a phone app interacting with the database server, etc).

The main aim is to implement the database satisfying the information and functional requisites extracted from the analysis of the problem statement, in order to demonstrate the students' expertise and proficiency on the use of database methodologies to create an accurate and faithful database. The implementation must reflect all expected information, scenarios, and functionality by providing a user-friendly interface to the final user. Students must deliver:

1) **Final documentation** (Upload the following documents in Blackboard):
    a. Updated problem statement.
    b. Updated Entity-Relationship diagram.
    c. Updated relational design (including functional dependencies and normalization).
    d. Database: SQL scripts for creating the database tables, views, triggers, and procedures.
    e. Interface software: source code and documentation of the interface to the database.

2) **Running database and interface**. Jasmine server is provided to implement the solution using Oracle SQL. It also has Apache web server running with PHP. Should you need any other software installed in the server to facilitate your interface, please let me know. Students are responsible for providing all necessary information to facilitate the instructor the evaluation of the projects. Should any user/password be required to access user/administrator profiles in the interface, they must be provided as well to test all the functionality and its correctness.

All transactions, errors and constraint-checking must be carried out using the proper database procedures, and the interface should reflect the result of the operation. The consistency, integrity, and security of the information in the database is a priority.

Students will present the project to the instructor in a 10-minutes appointment to be scheduled May 4-12 to illustrate the functionality of the running database and interface.

Use of 3rd-party code is allowed, as long as it is referenced properly. However, the project will be evaluated according to the student's capability of developing his/her own code, and the completeness and functionality of the database.

Should you decide to implement a web-based interface, use of HTML5, AJAX, CSS, etc. technologies will be positively valued but it is not a requisite (i.e., this is not a web programming course, but learning such languages will be beneficial for your professional career). Following, there are some tips to access server:

Accessing the server via ssh (within VCU network or VPN):

ssh jasmine.cs.vcu.edu -p 20035 -l vcueid (vcueid is your username and passwd is your V#)

Instructions for accessing the web folder:

Connect to the host **jasmine.cs.vcu.edu** using a SFTP client such as Filezilla. The SFTP port is **20035**, the username is your VCU eID, the password is your V#. There is a folder named *public_html* where you must place your website files. After uploading the files, you may access at the address http://jasmine.cs.vcu.edu:20038/~username/myfile.php where username is your VCU eID. (20038 is the Apache webserver port, while 20037 is the Oracle SQL port). The main page must be named index.php

Recommended tutorials for PHP + Oracle (installation prerequisites are obviously not required)

Tutorial: Developing a PHP Web Application with Oracle Database 11g
http://www.oracle.com/webfolder/technetwork/tutorials/obe/db/oow10/php_webapp/php_webapp.htm
Tutorial: Web 2.0 Applications with PHP and Oracle Database 11g
http://www.oracle.com/webfolder/technetwork/tutorials/obe/db/11g/r2/prod/appdev/opensrclang/php/php.htm

Example of connection setup in php:

```
<?php
// Create connection to Oracle
$conn = oci_connect('oracleusername', 'oraclepassword', 'localhost:20037/xe');     // this is localhost, i.e., jasmine.cs.vcu.edu
if (!$conn) {
  $m = oci_error();
  echo $m['message'], "\n";
  exit;
}
else {
  print "Connected to Oracle!";
}
// Close the Oracle connection
oci_close($conn);
?>
```