

# COMS 4111 INTRODUCTION TO DATABASES

## Spring 2014 -- Alex Biliris

[Course Info](#) | [Syllabus](#) | [Policies](#) | [TAs & Office Hours](#) | [Grades](#)

[hw1](#), [hw2](#), [hw3](#), [hw4](#) | Project 1: [Part 1](#), [Part 2](#), [Part 3](#), [Contest](#) | Project 2

## COMS 4111, Spring 2014

### Project 1, Part 2

(worth 25% of overall Project 1 grade)

**Due: Wednesday February 26, 5 p.m. EST.**

#### Your team and "project mentor"

You will do Part 2 of Project 1 with the same team as for Part 1. If your team partner dropped the class and you did **not** submit a contingency plan for this with your Part 1 submission, then unfortunately you will still have to complete the whole project by yourself. If your team partner dropped the class and you did submit a contingency plan for this with your Part 1 submission, then you are welcome to switch to this reduced version of your project.

For continuity, the TA who grades your Part 1 (who may not necessarily be the TA with whom you first met to discuss your project) will grade the two remaining parts of your project. This TA will be your **"project mentor"** for the remainder of your project. You are welcome to contact other members of the class staff (including the instructor) about your project, but your project mentor should be your main contact, for continuity, since your mentor will be grading all parts of the project.

The name of your project mentor must be clearly stated in the comments section of your grade for Part 1; if not, please email all TAs asking them who is the mentor of your team. Once you read these comments for your Part 1 submission, please modify your database according to your mentor's instructions.

As mentioned earlier, team partners are expected to fully collaborate with each other on solving the project. However, communication about project details with somebody other than your partner is not permitted, and is considered cheating. If in doubt about what kinds of consultations are allowed, check with the instructor, or see the Computer Science Department's policies and procedures on [academic honesty](#). Questions of a general nature that may be of interest to the whole class should be posted to Piazza.

## Overview of Part 2 of Project 1

For **Part 2** of this project, you should implement your relations of Part 1 over an [Oracle Database](#) server and load your tables with some real or realistic data, as you outlined in Part 1.

#### What you need to do for Part 2

1. Familiarize yourself with the Oracle DBMS by reading the materials available at <http://www.oracle.com/technology/documentation/index.html>. Our servers are running Oracle 10gr2. The documentation for Oracle 10gr2 can be found at <http://www.oracle.com/pls/db102/homepage> and <http://www.oracle.com/pls/db102/toc?pathname=server.102%2Fb14200%2Ftoc.htm&remark=portal+%28Getting+Started%29>. Please **check these materials carefully before sending email** to the class staff with questions on syntax or supported features.
2. Set up your Oracle database and change your Oracle account password (see below). You only need to set up one Oracle account/database per team. You don't need to turn anything in for this part.
3. **Make all suggested changes** to the overall design in general, and to the SQL schema in particular, according to the comments you received for your Part 1 from your project mentor. Your Part 2 grade will be based in part on how well you have incorporated your project mentor's comments. If you have any questions about these comments, please contact your project mentor as soon as possible to clarify.
4. **Create all the SQL tables** in your revised SQL schema on your Oracle account, **including all constraints** that you could specify in the table declarations.
5. Add any additional **attribute-based CHECK constraints and tuple-based CHECK constraints** (as discussed in class) that you need so as to express any real-world constraints of your application that are missing from your SQL schema. Note that Oracle does not support general assertions, and that triggers are slightly different from our class description. You do not need to use triggers for this project, and you can ignore any real-world constraints that you could not capture with either **good-style** (as discussed in class) attribute- or tuple-based CHECK constraints, or with PRIMARY KEY, UNIQUE, FOREIGN KEY, and NOT NULL constructs. (Hint: "Good-style" attribute- or tuple-based CHECK constraints tend to refer only to the table in which they are defined, not to other tables.)
6. **Insert into each table in your database, on average, at least 10 tuples of real or "realistic" data**, as you described in your Part 1 project description. This data will help you test and play with your database. Of course, issue queries of your choice to make sure that everything works as you intend.

## Setting up your Oracle database

#### Oracle accounts

You should have received an email from Andrew ([ajk2214@columbia.edu](mailto:ajk2214@columbia.edu)) with your Oracle database username and password. This email was sent to

your [@columbia.edu](mailto:@columbia.edu) email address. If you have not received such an email within a day after this project is posted, please contact Andrew immediately.

**Note:** Even though each student was assigned their own Oracle account, you should only set up **one single Oracle account/database per team**. That way, you will both have access to the tables you create. Pick just one of the two accounts arbitrarily and work on it together with your team-mate.

**Note:** The database you create for this project will reside on one of the Oracle servers that we provide and in the user account you arbitrarily selected. You will access the Oracle servers remotely from your own computer or from your CS account on the Unix servers.

## Oracle servers

For this class, we have four identical Oracle database servers:

ADB on [w4111b.cs.columbia.edu](http://w4111b.cs.columbia.edu)  
ADB2 on [w4111c.cs.columbia.edu](http://w4111c.cs.columbia.edu)  
ADB3 on [w4111f.cs.columbia.edu](http://w4111f.cs.columbia.edu)  
ADB4 on [w4111g.cs.columbia.edu](http://w4111g.cs.columbia.edu)

You may use any server, as we have created **independent** accounts for you on all of them. We have set up multiple servers to help balance load and provide some redundancy. If one server goes down, you may continue development on others. It is important to note that the servers, though identical, are **independent** and not linked in any way. That is, none of your data on one machine will be replicated on the other machine. You should use the **exp** command frequently so you can restore your data on the other machine if your development machine crashes; you should use the **imp** command to automatically recreate your schema and data on the other machine. **See the “Important note on backups” section below** for details about using both the **exp** and **imp** commands.

[CRF](#) has asked us to request that students in cs4111 not call or send emergency tickets to CRF regarding a crashed database server (or any other such problem) outside of CRF's working hours. If you have any server status related issues, please post on Piazza.

## Connecting to the Oracle servers

You connect to an Oracle sever by accessing the Oracle **SQL\*Plus** client. The client passes your commands to the server, it retrieves the results from the server and presents them to you. See “**Software Installation and Setup**” below for installation instructions.

1. Connect to the Oracle server using **SQL\*Plus** (check [our useful SQL\\*Plus tips](#)):

To connect to the Oracle server on [w4111b.cs.columbia.edu](http://w4111b.cs.columbia.edu): `sqlplus <username>@ADB`

To connect to the Oracle server on [w4111c.cs.columbia.edu](http://w4111c.cs.columbia.edu): `sqlplus <username>@ADB2`

To connect to the Oracle server on [w4111f.cs.columbia.edu](http://w4111f.cs.columbia.edu): `sqlplus <username>@ADB3`

To connect to the Oracle server on [w4111g.cs.columbia.edu](http://w4111g.cs.columbia.edu): `sqlplus <username>@ADB4`

At the Password: prompt, enter the password that was emailed to you.

2. Change your password at the Oracle prompt by typing:

```
ALTER USER <username> IDENTIFIED BY <your new password>;
```

Note that all SQL commands issued from within the SQL\*Plus client **need to end in ";"** (or carriage-return followed by "/") to be sent to the server. Pressing <enter> without a semicolon will continue the same command on the next line.

3. Exit your SQL\*Plus session by typing `exit;`.

## What to submit

You will submit this part of the project **electronically on CourseWorks** directly. Here is how you should proceed:

1. Create a directory named **<your-UNI>-proj1part2**, where you should replace **<your-UNI>** with the Columbia UNI of one teammate (for example, if the teammate's UNI is **abc123**, then the directory should be named **abc123-proj1part2**).
2. Generate the dump file **expdat.dmp** using Oracle's export utility **exp** and place it inside the **<your-UNI>-proj1part2** directory. The export utility lets you store your database objects in an external file. Note that the **exp** command must be executed from your shell if you are using Unix, or from the command prompt if you are using Windows, **not** from within SQL\*Plus. The **exp** command creates a file called **expdat.dmp** in the directory where it is executed. Here is how you should run **exp** (in the following, **table-1**, **table-2**, ..., **table-n** are the names of all the tables that you defined in your database):

1. For the Oracle server on [w4111b.cs.columbia.edu](http://w4111b.cs.columbia.edu):  
**exp userid=<userid>/<password>@ADB TABLES=table-1,table-2,...,table-n ROWS=Y**
2. For the Oracle server on [w4111c.cs.columbia.edu](http://w4111c.cs.columbia.edu):  
**exp userid=<userid>/<password>@ADB2 TABLES=table-1,table-2,...,table-n ROWS=Y**
3. For the Oracle server on [w4111f.cs.columbia.edu](http://w4111f.cs.columbia.edu):  
**exp userid=<userid>/<password>@ADB3 TABLES=table-1,table-2,...,table-n ROWS=Y**
4. For the Oracle server on [w4111g.cs.columbia.edu](http://w4111g.cs.columbia.edu):  
**exp userid=<userid>/<password>@ADB4 TABLES=table-1,table-2,...,table-n ROWS=Y**

3. Generate the **queries.txt** file, a **plain-text file**, inside the **<your-UNI>-proj1part2** directory that contains:

Your and your partner's names/UNIs at the top, followed by three "interesting" SQL queries over your database with a sentence or two per query explaining what the query is supposed to compute. The goal of these queries is to help us better understand your application. You

will not be graded on these queries, but we strongly suggest that you submit well-formed queries that run without problems, so please make sure that you have tested your queries by running them on your database exactly as submitted (use copy and paste).

4. (Unix option only) Tar and gzip the <your-UNI>-proj1part2 directory, to generate a single file <your-UNI>-proj1part2.tar.gz (containing the expdat.dmp and queries.txt files), which is the file that you will submit.
5. (Windows/Mac option only) Zip the <your-UNI>-proj1part2 directory, to generate a single file <your-UNI>-proj1part2.zip (containing the expdat.dmp and queries.txt files), which is the file that you will submit.
6. Login to Courseworks at <https://courseworks.columbia.edu/> and, as described in the course [Policies](#) webpage, attach your <your-UNI>-proj1part2.tar.gz file (from Unix) or your <your-UNI>-proj1part2.zip file (from Windows).
7. Hit the "Submit" button.

## Grading for Part 2

Your grade for Part 2 of Project 1 will be split as follows:

1. **Quality of final SQL schema and implementation on Oracle: 10 points.**  
We will evaluate the overall quality of your final SQL schema on Oracle, especially in terms of how thoroughly you incorporated any revisions suggested by your project mentor in the grading of Part 1 of your project.
2. **Quality of constraint handling: 10 points.**  
We will evaluate how well you managed to capture real-world constraints through primary key, foreign key, unique, and attribute- and tuple-based CHECK constraints.
3. **Quality of the real-world (or at least realistic) data that you loaded into the database: 5 points.**

---

## Notes

### Important note on backups

To avoid losing any data, we strongly suggest that you periodically use the Oracle export utility, **exp**, as explained above to generate a file with all your schema definitions and with the data that you uploaded to your database. You should then save this file in a safe place. For a variety of technical reasons that are not under our control, **we cannot provide backups of the contents of your Oracle account, so do back up your data frequently.**

- **Oracle Export Utility exp:** Please refer to Step 2 of the “What to submit and when” section above.
- **Oracle Import Utility imp:** The **imp** import utility allows you to import database objects that were previously exported using the **exp** command. In case of a server crash, you can reconstruct your database (both the schema and the data) from the output of the **exp** command. So we strongly suggest that you run the **exp** command frequently and save its output in a safe place!

To use the import utility **imp** to import your table schemas and data, as recorded in an expdat.dmp file produced by **exp**, proceed as follows:

- For the Oracle server on w4111b.cs.columbia.edu: **imp userid=<userid>/<password>@ADB file=expdat.dmp full=yes**
- For the Oracle server on w4111c.cs.columbia.edu: **imp userid=<userid>/<password>@ADB2 file=expdat.dmp full=yes**
- For the Oracle server on w4111f.cs.columbia.edu: **imp userid=<userid>/<password>@ADB3 file=expdat.dmp full=yes**
- For the Oracle server on w4111g.cs.columbia.edu: **imp userid=<userid>/<password>@ADB4 file=expdat.dmp full=yes**

### Important instructions on Oracle timeouts and limit on the number of connections

At any given time, each user can have a **maximum of 5 open connections to each Oracle server**. Also, a connection will be **automatically closed by Oracle if the connection has been idle for 20 minutes**. (In this case, you will receive the following error message: “ERROR at line 1: ORA-02396: exceeded maximum idle time, please connect again.”) These limits are in place to make the Oracle servers more stable and avoid overload-originated server crashes as much as possible. **If you find out that your SQL\*Plus session has ended “automatically” and/or you are unable to connect to the Oracle servers using SQL\*Plus, please check the following before emailing the TA's or posting a question on CourseWorks:**

- **Make sure that you don't have open connections to the server in other windows** (or machines!). Recall that you cannot open more than 5 simultaneous connections to your Oracle account on a server.
- **Wait for 20 minutes and try again:** after 20 minutes, all your idle connections will be closed automatically by Oracle. So even if you forgot to close some connections from a computer that you don't remember at all, after 20 minutes your idle connections will be closed and you will go below the 5-connection limit, so you should be able to connect at that point.

## Data Importation

To populate your relational database, you may load your data directly into to your tables using SQL insert statements. Alternatively, if your data reside in a file in a comma-delimited format, a convenient way to load the file into your database is to use the [Oracle SQL\\*Loader](#) utility; invoke the loader on the command line as follows:

```
sqlldr userid=user/pass@ADB control=sample.ctl data=dfile.dat
```

where *user* and *pass* are your Oracle login credentials, *sample.ctl* is the name of your SQL\*Loader control file, and *dfile* specifies the name of the datafile containing the data to be loaded. If you invoke SQL\*Loader without specifying any parameters, SQL\*Loader displays a help screen with the available parameters and their default values. Please read the documentation for details.

You may use any of these options to populate part or all of your schema. In any case, you will not be graded on the method you used to populate your schema, and you do not need to submit your load scripts with the project.

## Strings

We suggest that for variable-length string attributes such as names, use VARCHAR2 as the domain instead of a fixed-length CHAR domain. VARCHAR2 will simplify your handling of such attributes in Part 3, particularly if you are following the Web Front-End Option. A CHAR column automatically fills white spaces until the fixed length which means that in a CHAR(10) column "test" will be "test ". This may be a problem, because "test" is not equal to "test ".

## Commit

By default, SQL\*Plus does not generate commits automatically. You will need to issue a "commit" at the end of your updates. Example:

```
SQL> update employees set salary = 0 where ssn = 355282907;
1 row updated.
SQL> commit;
Commit complete.
```

## A word about Oracle errors

You can show precise schema error information by typing "sho err" after getting error message like "Warning: Type created with compilation errors."

---

## Computer usage

You can choose to do this project on your own computers or on the CS department Unix servers.

- If you work on your own computer, you will need to install software. See “**Software Installation and Setup**” below.
- If you work on the CS department Unix machines, you will need a CS account and need to do some quick setup steps. You can request a CS account here: <https://www.cs.columbia.edu/~crf/accounts/cs.html>. Then see “**Software Installation and Setup**” below for the quick setup steps you must take.

Note that it is possible for each team member to work on their own computer, or for one team member to work on their own computer while the other works on Unix. However, as you may need to share files during the course of the project (for example, data files you wish to upload to your database, or scripts you create to work with your database), you should consider what will be most effective way for you and your partner to collaborate.

## Important note for Mac users

While all of the substantial work of the project can be done on a Mac computer, there is one final step in the project -- exporting the files you'll need to upload to CourseWorks -- that cannot be done on a Mac. The Oracle client for Mac does not support imp/exp commands - you will also not be able to export your files for backup purposes. If you have a Mac, you have a few options:

- If your partner has a Windows computer or is working on Unix, your partner can do the export step.
- if your partner also has a Mac, then:
  - One or both of you can install a Windows Virtual Machine on your Mac to do the export step on your own computer.
  - One or both of you can open a CS account in order to do the export step on Unix.

## Important note on sharing CS accounts

It is a violation of Columbia security rules to share a single Columbia computer account. If you need to share files on a university owned computer, please follow the steps in [Sharing files in CS accounts](#) prepared by CRF.

---

## Software Installation and Setup

Regardless of the machine you will be using, you will need to connect to one of the Oracle servers by accessing the Oracle **SQL\*Plus** client. The following sections explain how to install the client software depending on the machine you are using.

### Windows computers

You will need to install the **Oracle XE client** software, which is freely available from Oracle. This software will allow you to access the Oracle servers remotely from your Windows computer.

1. Download the Oracle XE client for Windows from <http://www.cs.columbia.edu/~biliaris/4111/Oracle10gR2XE.zip>
2. Click on the downloaded executable to install Oracle XE.
3. Configure your Oracle client by going to the directory in your Oracle installation that contains file **tnsnames.ora**. For example, if you installed

Oracle XE in your **C:** drive, this file will be in directory **C:\oracle\app\oracle\product\10.2.0\server\NETWORK\ADMIN**. Edit file **tnsnames.ora** by adding the following lines at the end of the file. These lines specify the Oracle servers for the class with which your client will be able to communicate:

```

ADB =
(DESCRIPTION =
  (ADDRESS = (PROTOCOL = TCP)(HOST = w4111b.cs.columbia.edu)(PORT = 1521))
  (CONNECT_DATA =
    (SERVER = DEDICATED)
    (SERVICE_NAME = ADB)
  )
)

ADB2 =
(DESCRIPTION =
  (ADDRESS = (PROTOCOL = TCP)(HOST = w4111c.cs.columbia.edu)(PORT = 1521))
  (CONNECT_DATA =
    (SERVER = DEDICATED)
    (SERVICE_NAME = ADB)
  )
)

ADB3 =
(DESCRIPTION =
  (ADDRESS = (PROTOCOL = TCP)(HOST = w4111f.cs.columbia.edu)(PORT = 1521))
  (CONNECT_DATA =
    (SERVER = DEDICATED)
    (SERVICE_NAME = ADB)
  )
)

ADB4 =
(DESCRIPTION =
  (ADDRESS = (PROTOCOL = TCP)(HOST = w4111g.cs.columbia.edu)(PORT = 1521))
  (CONNECT_DATA =
    (SERVER = DEDICATED)
    (SERVICE_NAME = ADB)
  )
)

```

4. To connect to one of our Oracle servers, you will need to open a command prompt to access the Oracle **SQL\*Plus** client. Then you will be able to set up your database as discussed in the section “**Connecting to the Oracle servers**” above.

## Mac computers

You will need to install the **SQLPlus** client, which is freely available from Oracle. This software will allow you to access the Oracle servers remotely from your Mac computer.

1. Download Oracle Instant Client here (make sure you get the right version for you mac: 32 or 64 bit):  
<http://www.oracle.com/technetwork/topics/intel-macsoft-096467.html>  
 To get SQLPlus working you need to download "Instant Client Package - Basic" and "Instant Client Package - SQLPlus". You'll have to register a free account with Oracle before downloading.
2. Expand these downloaded files and put the contents of both into the same folder. Let's say you put yours in: /Applications/instantclient\_10\_2.  
 Put the following in your .bash\_profile file:

```

export ORACLE_BASE=/Applications/instantclient_10_2
export ORACLE_HOME=$ORACLE_BASE
export ORACLE_SID=ADB
export EDITOR=vi

```

```

export CLASSPATH=$ORACLE_HOME/jdbc/lib/ojdbc14.jar:$ORACLE_HOME/jlib/orai18n.jar:$CLASSPATH
export DYLD_LIBRARY_PATH=$ORACLE_HOME
export LD_LIBRARY_PATH=$ORACLE_HOME/lib:$LD_LIBRARY_PATH
export PATH=$ORACLE_HOME:$ORACLE_HOME/bin:$PATH

```

3. Create the file tnsnames.ora in /etc and add the following to the file:

```

ADB =
(DESCRIPTION =
  (ADDRESS = (PROTOCOL = TCP)(HOST = w4111b.cs.columbia.edu)(PORT = 1521))
  (CONNECT_DATA =

```

```

(CONNECT_DATA =
  (SERVER = DEDICATED)
  (SERVICE_NAME = ADB)
)
)

ADB2 =
(DESCRIPTION =
  (ADDRESS = (PROTOCOL = TCP)(HOST = w4111c.cs.columbia.edu)(PORT = 1521))
  (CONNECT_DATA =
    (SERVER = DEDICATED)
    (SERVICE_NAME = ADB)
  )
)
ADB3 =
(DESCRIPTION =
  (ADDRESS = (PROTOCOL = TCP)(HOST = w4111f.cs.columbia.edu)(PORT = 1521))
  (CONNECT_DATA =
    (SERVER = DEDICATED)
    (SERVICE_NAME = ADB)
  )
)
ADB4 =
(DESCRIPTION =
  (ADDRESS = (PROTOCOL = TCP)(HOST = w4111g.cs.columbia.edu)(PORT = 1521))
  (CONNECT_DATA =
    (SERVER = DEDICATED)
    (SERVICE_NAME = ADB)
  )
)

```

4. To connect to one of our Oracle servers, you will need to open a Terminal window to access the Oracle SQL\*Plus client. Then you will be able to set up your database as discussed in the section “Connecting to the Oracle servers” above.

### Important note for teams using only Mac computers:

A Windows/Unix machine is necessary for running **imp/exp** commands on the Oracle client. These commands are necessary for backup and project submission purposes. The Oracle client for Mac does not support imp and exp commands. If both members of the team work on Macs only, you will have to work with a Windows virtual machine on your Mac for backup and submission. The instructions for creating a Windows virtual machine on your Mac can be found here: [Running Windows 7 using VMware Fusion for Mac](#). Once you run a Windows virtual machine on your Mac, setup Oracle on the Windows virtual machine by following the Oracle setup instructions for Windows users (above section).

### The tnsnames.ora and .bash\_profile files on macs

If you are facing problems with creating or editing the tnsnames.ora and .bash\_profile files on macs, here are the instructions to setup these two files:

# The .bash\_profile file is edited (if it exists already) or created (if one doesn't exist beforehand) by the following steps:

Start Terminal

Type "cd ~/" to go to your home folder

Type "touch .bash\_profile"

Type "open -e .bash\_profile" to open it in TextEdit

Edit according to the project instructions and save the file

# For tnsnames.ora, the instructions for creating (or editing if it already exists) are as follows:

Start Terminal

Type "cd /etc" to go to the etc folder

Type "sudo touch tnsnames.ora"

Enter your mac password when prompted

Type "sudo chmod 777 tnsnames.ora"

Type "open -e tnsnames.ora" to open it in TextEdit

Edit according to the project instructions and save the file

### Unix users

No software installation is needed. Follow the instructions below to set up your environment.

1. Request a **CS account** here: <https://www.cs.columbia.edu/~crf/accounts/cs.html>.
2. Use **ssh** to **clic.cs.columbia.edu** to access Linux machines in the CLIC cluster.

3. Add the following lines to your `.bashrc` file or equivalent:

```
export ORACLE_BASE=/usr/lib/oracle/xe/app/oracle
export ORACLE_HOME=$ORACLE_BASE/product/10.2.0/server
export EDITOR=vi

export CLASSPATH=$ORACLE_HOME/jdbc/lib/ojdbc14.jar:$ORACLE_HOME/jlib/orail8n.jar:$CLASSPATH
export LD_LIBRARY_PATH=$ORACLE_HOME/lib:$LD_LIBRARY_PATH
export PATH=$ORACLE_HOME/bin:$PATH
```

After editing your `.bashrc` file, please logout and login again, so that the new version of the file is loaded.

4. To connect to one of our Oracle servers, you will need to use the Unix command prompt to access the Oracle SQL\*Plus client as discussed in the section “Connecting to the Oracle servers” above.

---

## Frequently-asked questions

- **Q: Can you give us some ideas on how to use the Oracle SQL\*Plus client?**

A: Please check our [useful SQL\\*Plus tips](#).

- **Q: Why use Oracle for Parts 2 and 3 of Project 1? Can I use my favorite DBMS instead?**

A: As much as we would like to be more flexible, we just don't have the staff to handle several diverse systems and platforms. Unfortunately, you cannot use any other DBMS.

- **Q: Why are we using Oracle instead of MySQL or PostgreSQL?**

A: Oracle generally supports more advanced functionality than MySQL and PostgreSQL do.

- **Q: How do I learn more about Oracle? Is <feature X> supported on Oracle?**

A: Please check Oracle documentation at <http://www.oracle.com/pls/db102/homepage> and [http://www.oracle.com/pls/db102/to\\_toc?pathname=server.102%2Fb14200%2Ftoc.htm&remark=portal+%28Getting+Started%29](http://www.oracle.com/pls/db102/to_toc?pathname=server.102%2Fb14200%2Ftoc.htm&remark=portal+%28Getting+Started%29).

- **Q: I can't log in on the machines running Oracle servers using the userid and password as specified above. How do I fix this?**

A: You do **not** have accounts on the **machines** running the Oracle servers; your accounts are for the Oracle DBMS only. This means that you cannot **ssh** to the machines that run the Oracle servers. Rather, you should login to one of the CLIC machines using your regular CS account **userid**, and follow the instructions above on starting a client locally to connect to the **remote** Oracle server, assuming you are following the Unix Option.

- **Q: I can't find my `.bashrc` file. How do I proceed?**

A: You should simply create a plain-text file called `.bashrc` in your home directory and paste the commands on the project description into the file.