CS145 Programming Assignment #4

Due Sunday May 23*

NOTE: *For this assignment you will want to refer to* Object-Relational Features of Oracle 8.† *You may use your small database if it is sufficient to demonstrate that you have done the required work.*

1. **Transactions.**

   This is a trivial problem to exercise transaction support in Oracle. Since it would be difficult for you to simulate multiple users operating on your database, you will simply experiment with the properties of transaction `COMMIT` versus `ROLLBACK`.

   (a) Show a session in which you perform one or more data modification commands, then commit the transaction using "`COMMIT;`". Issue queries before and after executing the transaction to demonstrate that the modification has been made on the database.

   (b) Now show a session in which you perform one or more similar data modification commands, but then abort the transaction using "`ROLLBACK;`". Issue queries before and after executing the transaction to demonstrate that the modification has *not* been made on the database.

2. **Making Your PDA Object-Relational.**

   (a) Declare at least 2 data types that could be used with the data of your PDA. You need to choose types such that:

   - There are at least two methods included among these types; not every type must have methods, however.
   - At least one type is suitable as a column type.
   - At least one type is suitable as a row type for a table.

   Remember to `CREATE TYPE BODY` when there are methods. Do not forget that a slash `/` is needed to cause compilation. Turn in your type declarations in a `.sql` file, together with an Oracle session script showing the successful compilation of these declarations.

   (b) Declare some tables that could hold data associated with your PDA. Choose tables such that:

   - At least one table has a column type defined in (a) for one of its columns.
   - At least one table should be of a row type defined in (a).
   - At least one reference type (`REF`) must be involved, either in your table declarations or in the types from (a) themselves.

   Turn in your `CREATE TABLE` commands in a `.sql` file, and an Oracle session script showing their successful execution.

   (c) Write `INSERT` commands with subqueries to populate your new tables with the data from the original tables of your PDA. Turn in a list of your `INSERT` commands together with an Oracle session script showing their successful execution.

*Please refer to CS145 Course Information Page (`http://www.stanford.class/cs145/info.html`) for submission instructions and late policy.

†`http://www.stanford.edu/class/cs145/or-objects.html`

(d) Write 4 or more queries on your new tables. Among these queries, you should demonstrate the following features at least once:

- Use of methods
- Access of fields within a column type
- Dereferencing with `.`
- Dereferencing with `DEREF`

Turn in a list of all your queries and an Oracle session script showing their successful execution.

3. **Nested Tables in Oracle 8.** (This part is completely optional.)

Another structuring tool provided in Oracle 8 is the ability to have a table with a column whose value is not just an object, but a bag (multiset) of objects, i.e., a table. Nested tables are covered in depth in *Object-Relational Features of Oracle 8*.

- Declare a table type defined from one of the other types you declared in 2(a).
- Declare a table for your PDA that uses the table type for one of its columns.
- Write an `INSERT` command to populate the new table with the data from the original tables of your PDA.
- Write 2 or more queries on your new table. Demonstrate the following features at least once:
  - Access of data within a table type
  - Use of a table type's value in a `FROM` clause