PL/SQL Project-Section: 0

1. What is a PL/SQL basic block?
   1. A PL/SQL basic block is the structure for which all PL/SQL programs are built onto. It consists of the minimum components necessary in order to run a simple PL/SQL program. Included are the keywords DECLARE, BEGIN, and END. Also included in the basic block structure is the keyword EXCEPTION; however the inclusion of the EXCEPTION and DECLARE are functionally optional, as PL/SQL programs are capable of operating without it.
2. What are scalar variables? What data types can be used for scalar variables in PL/SQL? How can you declare local variables?
   1. Scalar variables are variables that have no internal components. Another characteristic of scalar variables is they carry only a single value; unlike composite variables which may carry several values stored in an underlying data structure.
   2. There are four families of data types available for scalar variable declaration, these include the number, character, Boolean and date/time data type families. The number family includes BINARY\_INTEGER, DEC, DECIMAL, DOUBLE PRECISION, FLOAT, INT, INTEGER, NATURAL, NATURALN, NUMBER, NUMERIC, PLS\_INTEGER, POSITIVE, POSITIVEN, REAL, SIGNTYPE, and SMALLINT. The character family includes CHAR, CHARACTER, LONG, LONG RAW, NCHAR, NVARCHAR2, RAW, ROWID, STRING, UROWID, VARCHAR, VARCHAR2. The Boolean family includes simply BOOLEAN. The date/time family includes DATE, INTERVAL DAY TO SECOND, INTERVAL YEAR TO MONTH, TIMESTAMP, TIMESTAMP WITH LOCAL TIME ZONE, and TIMESTAMP WITH TIME ZONE.
   3. Local variables are declared using a programmer defined name, a datatype, and a value. An example of a declared variable is “l\_emp\_first\_name VARCHAR2 := ‘Terrence’;” A scalar variable must be initialized with a value, that value may be set to “NULL.”
3. The CREATE GLOBAL TEMPORARY TABLE command creates global temporary tables (GTTs). Explain how these GTTs differ from regular tables.   
   (Please note: We want you to research the “CREATE GLOBAL TEMPORARY TABLE” command, not the “DECLARE GLOBAL TEMPORARY TABLE” command.)
   1. Unlike normal tables, the data in GTT is only temporary for the session in which they are being used, while the tables themselves are permanent structures within memory..
4. Inside a PL/SQL block, you can declare data types called “records” which are complex or composite data types. What is the different between a “composite data type” and a “scalar data type”? How do you declare a record data type? How can you assign values to the components of a record?
   1. Complex and composite data types differ from scalar data types in that they have internal components, typically in the form of underlying data structures which can have many pieces of data associated with them.
   2. A RECORD data type can be declared using the keyword RECORD, or by using %ROWTYPE.
   3. Values can be assigned to the individual components of a record by using the (:=) assignment operator, using the SELECT…INTO statement, or by using the FETCH…INTO statement.
5. PL/SQL can define “tables” which could be “associative array”, “nested table” and “varray”. Briefly explain each one.
   1. Associated array- PL/SQL tables that can be indexed using BINARY INTEGER’s, VARCHAR2’s, or variables.
   2. Nested Table- Single column tables which are given a specific scripting order upon retrieval. This allows for array like access, and can be used t create two dimensional “array-like” tables.
   3. VARRAY- A sequentially indexed array of a specific data type. The size of a VARRAY can vary depending on the amount of data that needs to be held.
6. What are database cursors? Explain “implicit cursors”, “explicit cursors”, cursors that are used within for loops, and cursors that are used with OPEN, FETCH and CLOSE. Check the file called **Database Code/Cursor1\_Implicit\_To\_Explicit.sql** to see examples ranging from the “most implicit” to “most explicit”.
   1. A cursor is a control structure which allows for the traversal of elements (or rows) within a PL/SQL statement.
   2. Implicit cursors are opened by the database itself in order to process statements in a PL/SQL block.
   3. An explicit cursor is one declared by the programmer, within the DELCARE statement of a PL/SQL block. Explicit cursors are used to process many statements using LOOPS, FOR LOOPS and WHILE LOOPS.
   4. OPEN, FETCH, and CLOSE are used to manually process cursors, which have been declared in the opening of a PL/SQL statement, in the body of the PL/SQL block.
7. What is “exception handling”? How does the code handle when errors occur?
   1. Exception handling is the use of predefined, or user defined, error handling statements that allow a PL/SQL code block to continue processing (or end acceptably) when unexpected input is received.
8. In Oracle, what are a “procedures” and “functions”? How do you call procedures and functions? What are input parameters? How can you use output parameters?
   1. Procedures and functions are predefined applications that can be used to process and manipulate data, although functions cannot be used to process SQL statements.
   2. Procedures and functions are called outside of the code blocks themselves once the block has been run and compiled.
   3. Input parameters are inputs that are sent to procedures to be processed, they are sent to the procedures during the call.
   4. Output parameters are ones that can only be changed while inside of the PL/SQL block.
9. What is a PL/SQL package?
   1. A PL/SQL package is a package of PL/SQL statements which can be run in an utomated fashion.
10. In Oracle, what is a “trigger”? Explain the difference between “BEFORE”, “AFTER” and “INSTEAD OF” triggers. Explain the purpose of “:new” and “:old” inside trigger code.  
    Look at the file: **Final Project/TradeOrder\_ShareholderView.sql**   
    Please describe the purpose and usage of the SHAREHOLDER\_VIEW and the SHAREHOLDER\_INSTEAD trigger.
    1. A Trigger is a predefined condition which, when met, will trigger an action to be taken.
    2. BEFORE is used in the CREATE TRIGGER header; it refers to actions which are taken before a condition is met.
    3. AFTER is used is also used in the CREATE TRIGGER header and refers to actions which are taken after certain conditions are met.
    4. The INSTEAD OF keywords are used for triggers created over views to ensure the correct usage of INSERT, UPDATE, and DELETE statements.
11. What is a "SAVEPOINT"?
    1. The SAVEPOINT keyword is used in transaction processing. In particular, it can be used in conjunction with the ROLLBACK TO keyword in order to undo actions up to a certain point.
12. Explain “READ COMMITTED”, and “SERIALIZABLE”, and “deadlock”.
    1. READ COMMITTED is an isolation level that allows queries to have access only to data that has been committed before the current query started.
    2. SERIALIZABLE is an isolation level that allows transactions to have access only to data that has been committed before the current transaction started.
    3. DEADLOCK – A deadlock occurs when two or more sessions are waiting for data locked by one another.