Oracle Basics (PL/SQL)

Lesson 03 Exception Handling

Lesson Objectives

- To understand the following topics:
  - Error Handling
  - Declaring Exceptions
    - Predefined Exceptions
    - User Defined Exceptions
      - Raising Exceptions
  - OTHERS exception handler

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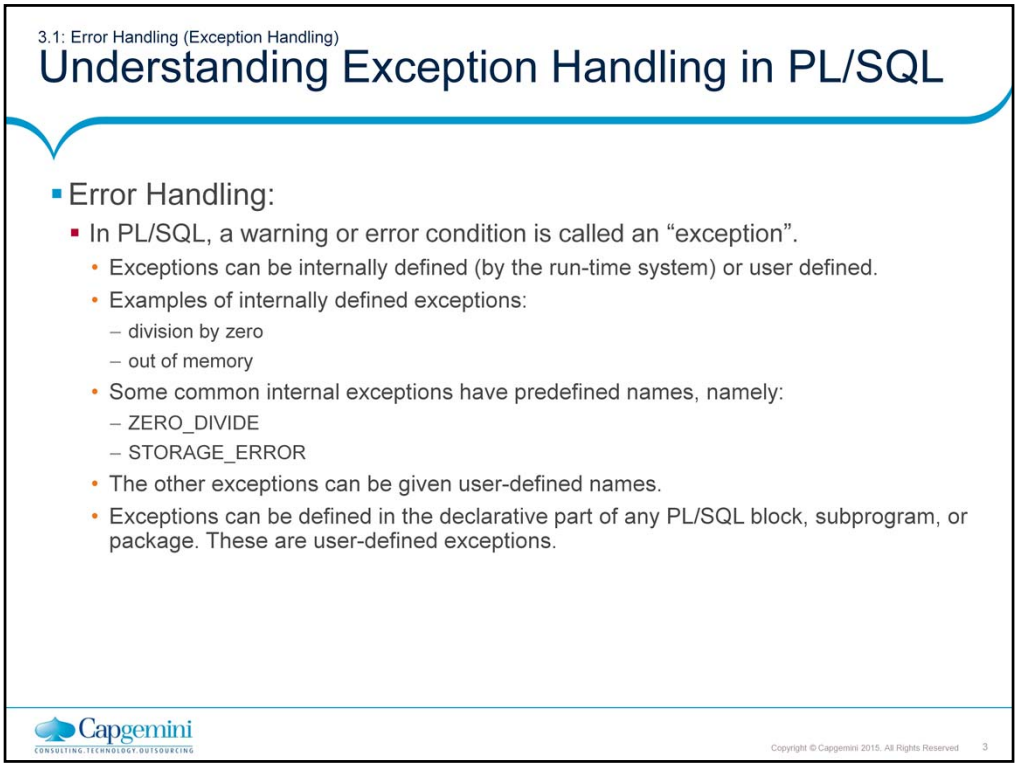
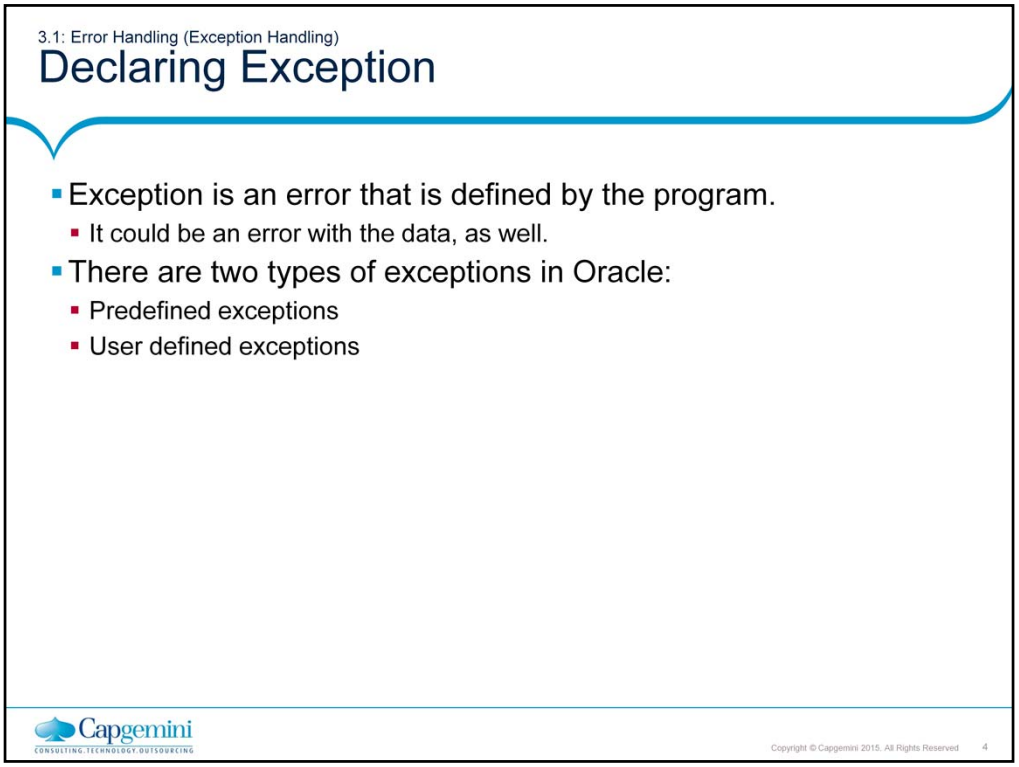


Error Handling:

- A good programming language should provide capabilities of handling errors and recovering from them if possible.
- PL/SQL implements Error Handling via “exceptions” and “exception handlers”.

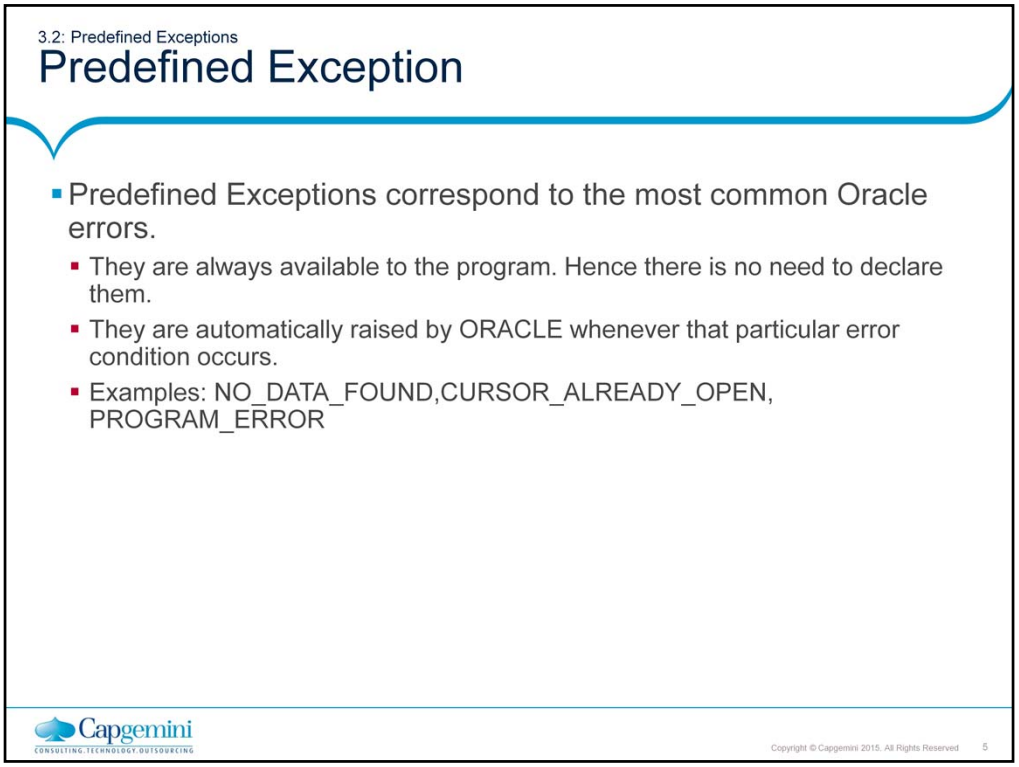
Types of Errors in PL/SQL

- **Compile Time errors:** They are reported by the PL/SQL compiler, and you have to correct them before recompiling.
- **Run Time errors:** They are reported by the run-time engine. They are handled programmatically by raising an exception, and catching it in the Exception section.



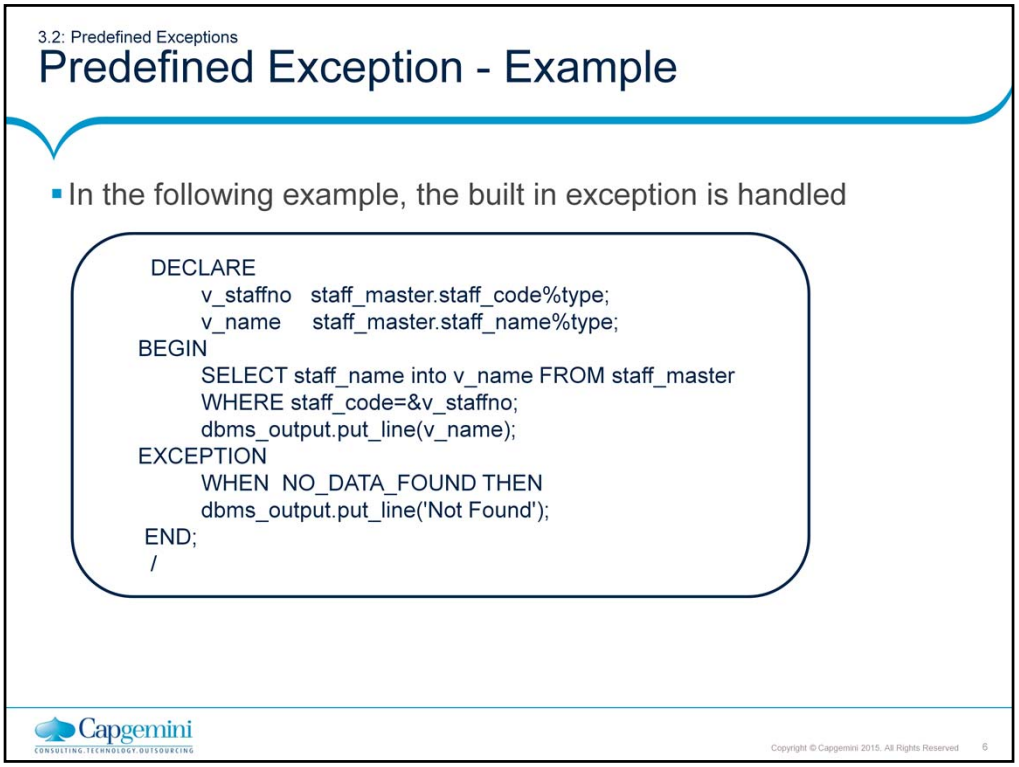
Declaring Exceptions:

- Exceptions are declared in the Declaration section, raised in the Executable section, and handled in the Exception section.

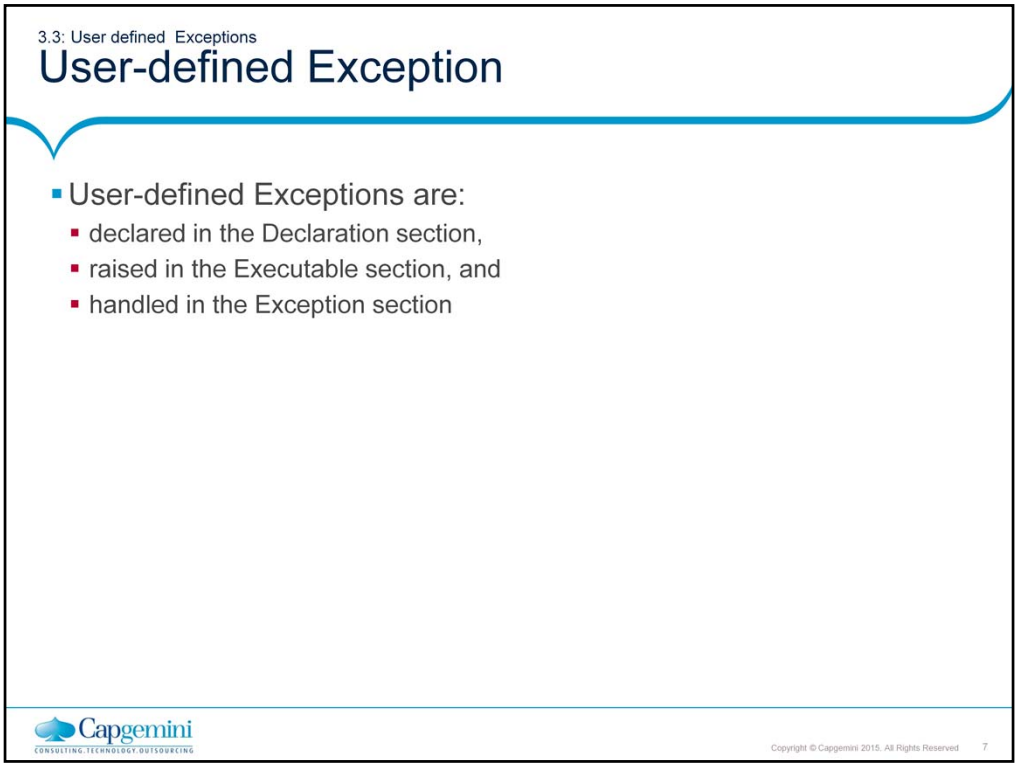


Predefined Exceptions:

- An internal exception is raised implicitly whenever your PL/SQL program violates an Oracle rule or exceeds a system-dependent limit. Every Oracle error has a number, but exceptions must be handled by name. So, PL/SQL predefines some common Oracle errors as exceptions. For example, PL/SQL raises the predefined exception NO_DATA_FOUND if a SELECT INTO statement returns no rows.
- Given below are some Predefined Exceptions:
  - NO_DATA_FOUND
    - This exception is raised when SELECT INTO …. statement does not return any rows.
  - TOO_MANY_ROWS
    - This exception is raised when SELECT INTO …. statement returns more than one row.
  - INVALID_CURSOR
    - This exception is raised when an illegal cursor operation is performed such as closing an already closed cursor.
  - VALUE_ERROR
    - This exception is raised when an arithmetic, conversion, truncation, or constraint error occurs in a procedural statement.
  - DUP_VAL_ON_INDEX
    - This exception is raised when the UNIQUE CONSTRAINT is violated.



Predefined Exceptions:
In the example shown on the slide, the NO_DATA_FOUND built in exception is handled. It is automatically raised if the SELECT statement does not fetch any value and populate the variable.



User-Defined Exceptions:

- These exception are entirely user defined based on the application. The programmer is responsible for declaring, raising and handling them.

3.3: User defined Exceptions

User-defined Exception - Example

- Here is an example of User Defined Exception:

```
DECLARE
      E_Balance_Not_Sufficient EXCEPTION;
      E_Comm_Too_Large EXCEPTION;
      …
BEGIN
      NULL;
END;
```

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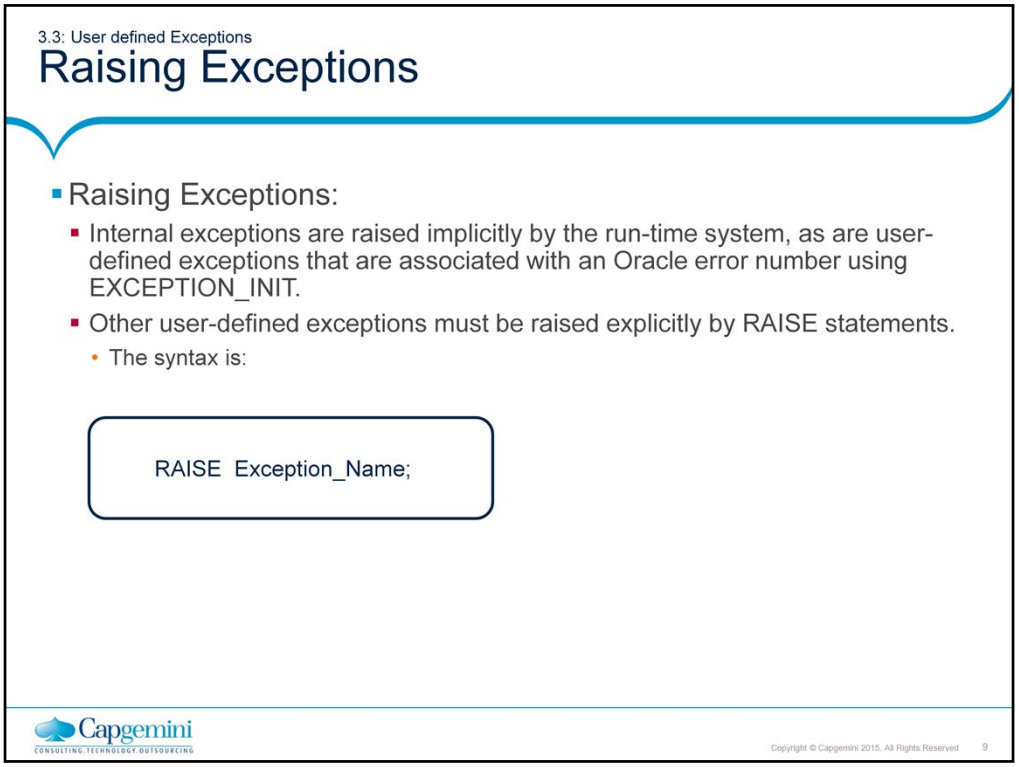

Raising Exceptions:
When the error associated with an exception occurs, the exception is raised. This is done through the RAISE command.

3.3: User defined Exceptions

Raising Exceptions - Example

- An exception is defined and raised as shown below:

```
DECLARE
      ...
      retired_emp EXCEPTION ;
BEGIN
      pl/sql_statements ;
      if error_condition then
                  RAISE retired_emp ;
                              pl/sql_statements ;
EXCEPTION
      WHEN retired_emp THEN
      pl/sql_statements ;
END ;
```

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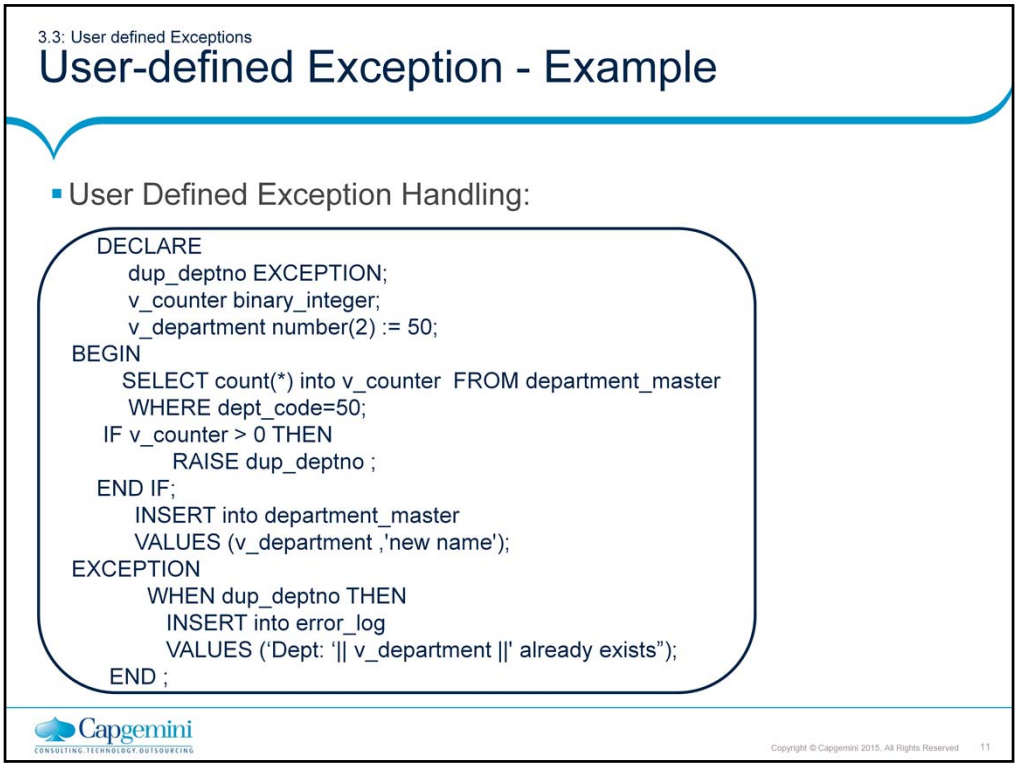

The example on the slide demonstrates user-defined exceptions. It checks for department no value to be inserted in the table. If the value is duplicated it will raise an exception.

3.4: OTHERS Exception Handler

OTHERS Exception Handler

- OTHERS Exception Handler:
  - The optional OTHERS exception handler, which is always the last handler in a block or subprogram, acts as the handler for all exceptions that are not specifically named in the Exception section.
  - A block or subprogram can have only one OTHERS handler.

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3.4: OTHERS Exception Handler

OTHERS Exception Handler (contd..)

- To handle a specific case within the OTHERS handler, predefined functions SQLCODE and SQLERRM are used.
  - SQLCODE returns the current error code. And SQLERRM returns the current error message text.
  - The values of SQLCODE and SQLERRM should be assigned to local variables before using it within a SQL statement.

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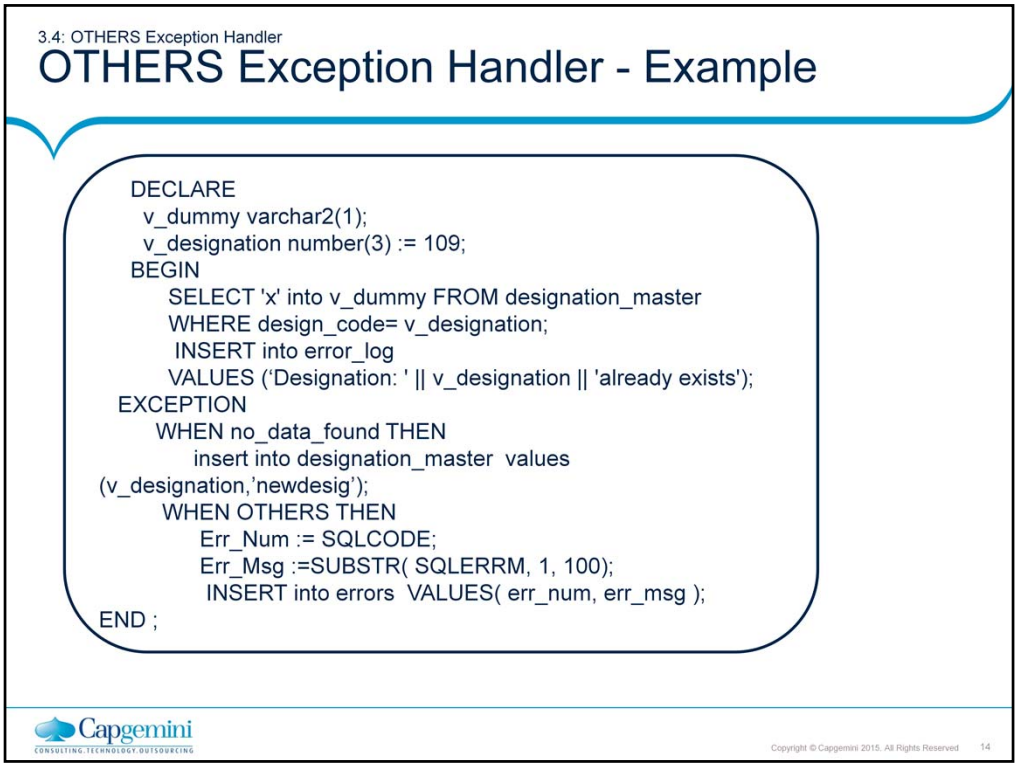
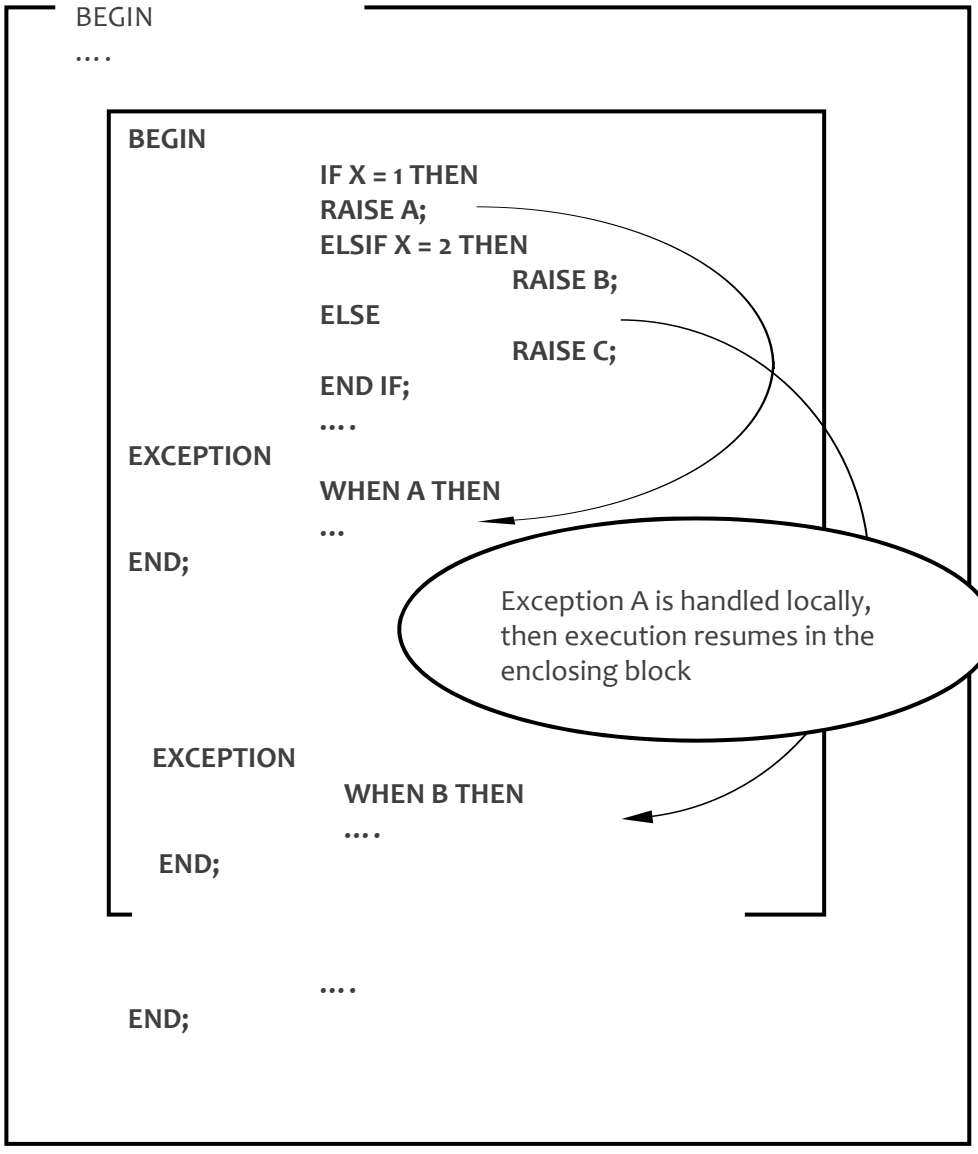


The example on the slide uses OTHERS Exception handler. If the exception that is raised by the code is not NO_DATA_FOUND, then it will go to the OTHERS exception handler since it will notice that there is no appropriate exception handler defined.

Also observe that the values of SQLCODE and SQLERRM are assigned to variables defined in the block.

Propagation of Exceptions:

- When an exception is raised, if PL/SQL cannot find a handler for it in the current block or subprogram, then the exception propagates. That is, the exception reproduces itself in successive enclosing blocks until a handler is found or there are no more blocks to search.



Masking Location of an Error:

- Since the same Exception section is examined for the entire block, it can be difficult to determine, which SQL statement caused the error.

```
SELECT
SELECT
SELECT
EXCEPTION
WHEN  NO_DATA_FOUND THEN
--You Don't Know  which caused the NO_DATA_FOUND
END ;
```

```
DECLARE
V_Counter  NUMBER:= 1;
BEGIN
SELECT ……
V_Counter := 2;
SELECT  ……
V_Counter :=3;
SELECT  …
WHEN NO_DATA_FOUND THEN
 -- Check values of V_Counter to  find out which SELECT
statement
 -- caused the exception NO_DATA_FOUND
END ;
```

```
BEGIN
-- PL/SQL Statements
BEGIN
SELECT ….
EXCEPTION
WHEN NO_DATA_FOUND THEN
      --
END;
BEGIN
SELECT ….
EXCEPTION
WHEN NO_DATA_FOUND THEN
      --
END;
BEGIN
SELECT ….
EXCEPTION
WHEN NO_DATA_FOUND THEN
      --
END;
END ;
```

Masking Location of an Error (contd.):

```
BEGIN
--------
./* PL/SQL statements */
BEGIN
SELECT ……..
WHEN  NO_DATA_FOUND  THEN
-- Process  the error for NO_DATA_FOUND
END;

/* Some more PL/SQL statements
This will execute irrespective of when
NO_DATA_FOUND */
 END;
```

Summary

- In this lesson, you have learnt about:
  - Exception Handling
    - Predefined Exceptions
    - User-defined Exceptions
  - OTHERS exception handler

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Review – Questions

- Question 1: ___ returns the current error message text.
- Question 2: ___ returns the current error code.

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