Oracle 11g – PL SQL

Writing Control Structures

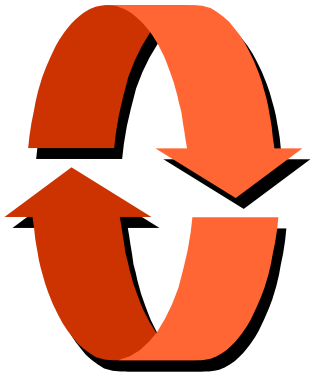
About Controlling PL/SQL Flow

About controlling the Flow of Execution in a Language applying to Procedural Blocks :

- Controlling PL/SQL Execution using IF Conditional
- Various Constructs of `IF` statement
- Use `CASE` expressions
- Identify & Construct various `Loop` statements (includes, `Simple, While & For Loop`)
- Control block flow using nested loops and labels

Controlling PL/SQL Execution Flow

- You can change the logical execution of statements using conditional `IF` statements and loop control structures.
- Conditional `IF` statements:
  - `IF-THEN-END IF`
  - `IF-THEN-ELSE-END IF`
  - `IF-THEN-ELSIF-END IF`



IF Statements

Syntax:

```
IF condition THEN
  statements;
[ELSIF condition THEN
  statements;]
[ELSE
  statements;]
END IF;
```

If the employee name is Gietz, set the Manager ID to 102.

```
IF UPPER(v_last_name) = 'GIETZ' THEN
  v_mgr := 102;
END IF;
```

Simple IF Statements

If the last name is Vargas:

- Set job ID to SA_REP
- Set department number to 80

```
. . .
IF v_ename       = 'Vargas' THEN
   v_job        := 'SA_REP';
   v_deptno     := 80;
END IF;
. . .
```

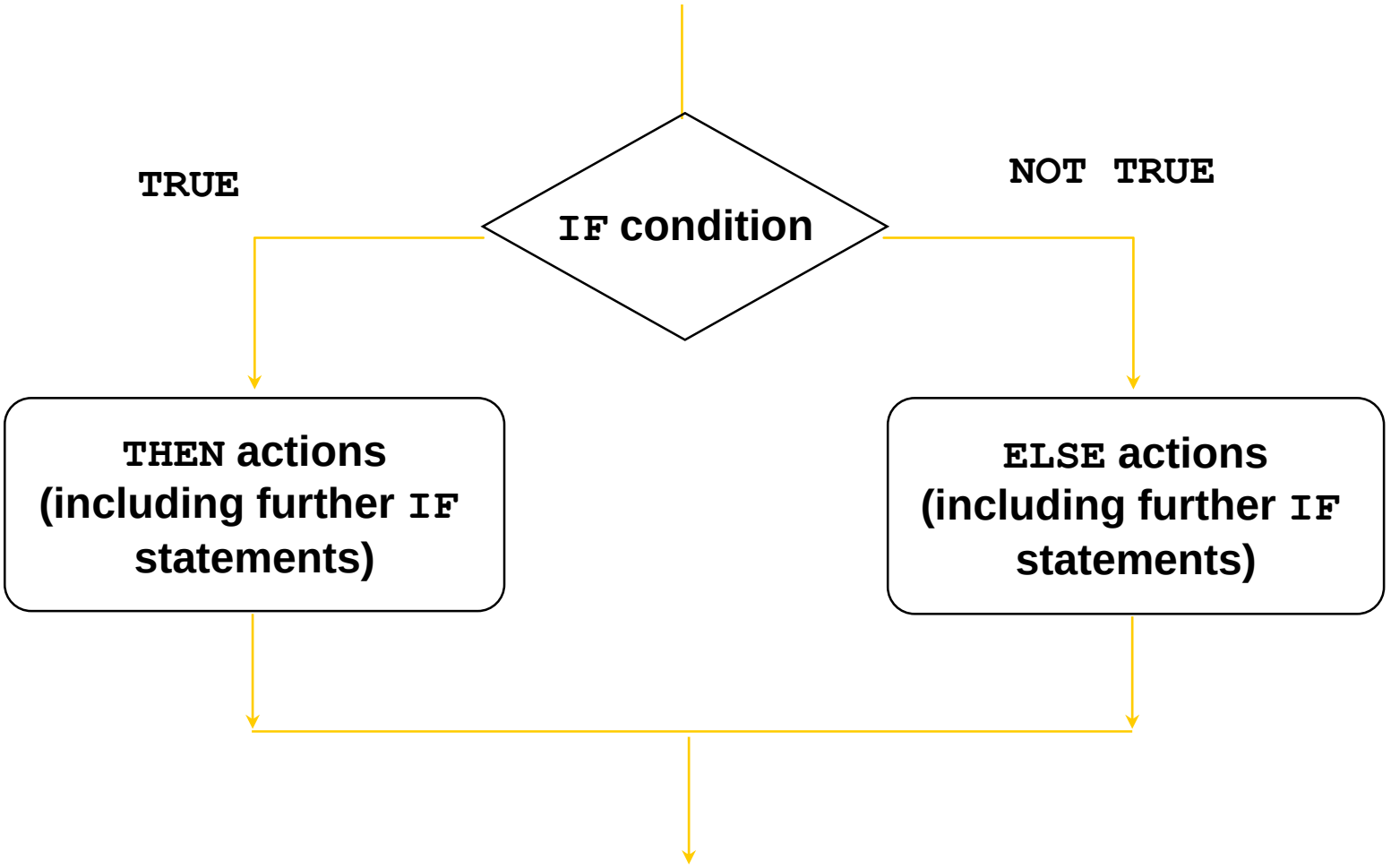
Compound IF Statements

If the last name is Vargas and the salary is more than 6500:

Set department number to 60.

```
. . .
IF v_ename  = 'Vargas' AND salary > 6500 THEN
   v_deptno := 60;
END IF;
. . .
```

IF-THEN-ELSE Execution Flow



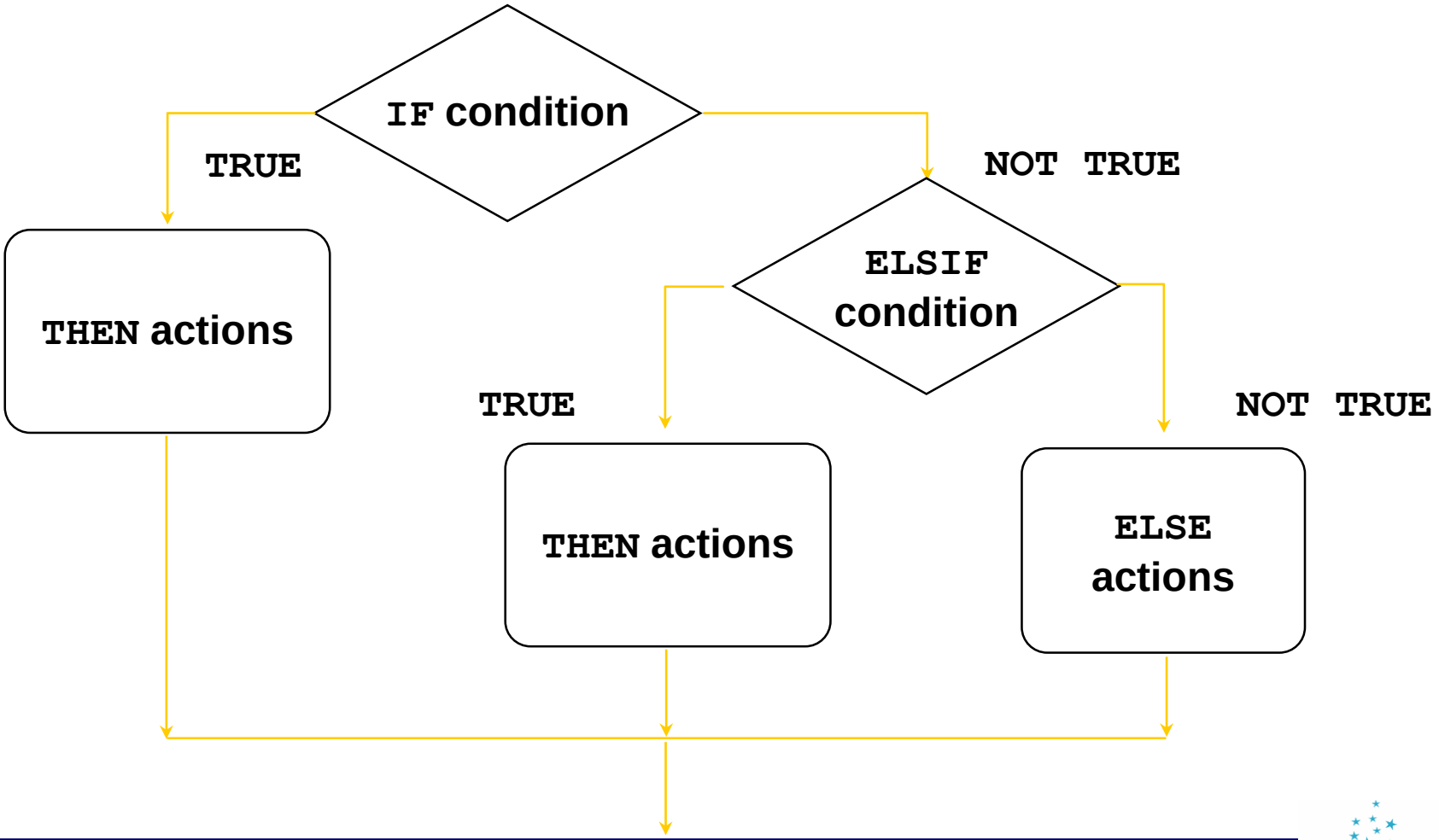
IF-THEN-ELSE Statements

Set a Boolean flag to TRUE if the hire date is greater than five years; otherwise, set the Boolean flag to FALSE.

```
DECLARE
   v_hire_date  DATE := '12-Dec-1990';
   v_five_years BOOLEAN;
BEGIN
. . .
IF MONTHS_BETWEEN(SYSDATE,v_hire_date)/12 > 5 THEN
   v_five_years := TRUE;
ELSE
   v_five_years := FALSE;
END IF;
...
```

IF-THEN-ELSIF

Statement Execution Flow



IF-THEN-ELSIF Statements

For a given value, calculate a percentage of that value based on a condition.

Example:

```
. . .
IF    v_start > 100 THEN
      v_start := 0.2 * v_start;
ELSIF v_start >= 50 THEN
      v_start := 0.5 * v_start;
ELSE
      v_start := 0.1 * v_start;
END IF;
. . .
```

CASE Expressions

- A CASE expression selects a result and returns it.
- To select the result, the CASE expression uses an expression whose value is used to select one of several alternatives.

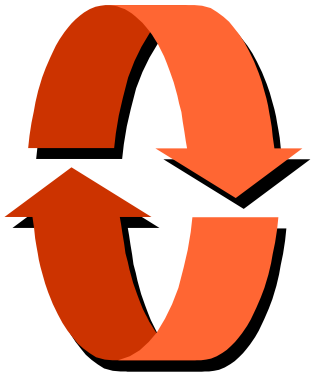
```
CASE selector
   WHEN expression1 THEN result1
   WHEN expression2 THEN result2
   ...
   WHEN expressionN THEN resultN
  [ELSE resultN+1;]
END;
```

CASE Expressions: Example

```
SET SERVEROUTPUT ON
DECLARE
   v_grade CHAR(1) := UPPER('&p_grade');
   v_appraisal VARCHAR2(20);
BEGIN
    v_appraisal :=
      CASE v_grade
         WHEN 'A' THEN 'Excellent'
         WHEN 'B' THEN 'Very Good'
         WHEN 'C' THEN 'Good'
         ELSE 'No such grade'
      END;
DBMS_OUTPUT.PUT_LINE ('Grade: '|| v_grade || '
                       Appraisal ' || v_appraisal);
END;
/
```

Iterative Control: LOOP Statements

- Loops repeat a statement or sequence of statements multiple times.
- There are three loop types:
  - Basic (Simple) loop
  - FOR loop
  - WHILE loop



Basic Loops

Syntax:

```
LOOP                                        -- delimiter
  statement1;
  . . .                                     -- statements
  EXIT [WHEN condition];                    -- EXIT statement
END LOOP;                                   -- delimiter
```

```
condition     is a Boolean variable or
              expression (TRUE, FALSE, or NULL);
```

Basic Loops

Example:

```
DECLARE
  v_country_id    locations.country_id%TYPE := 'CA';
  v_location_id   locations.location_id%TYPE;
  v_counter       NUMBER(2) := 1;
  v_city          locations.city%TYPE := 'Montreal';
BEGIN
  SELECT MAX(location_id) INTO v_location_id FROM locations
  WHERE country_id = v_country_id;
  LOOP
    INSERT INTO locations(location_id, city, country_id)
    VALUES((v_location_id + v_counter),v_city, v_country_id);
    v_counter := v_counter + 1;
    EXIT WHEN v_counter > 3;
  END LOOP;
END;
/
```

WHILE Loops

Syntax:

```
WHILE condition LOOP
   statement1;
   statement2;
   . . .
END LOOP;
```


Condition is evaluated at the beginning of each iteration.

Use the WHILE loop to repeat statements while a condition is TRUE.

WHILE Loops

Example:

```
DECLARE
  v_country_id      locations.country_id%TYPE := 'CA';
  v_location_id     locations.location_id%TYPE;
  v_city            locations.city%TYPE := 'Montreal';
  v_counter         NUMBER  := 1;
BEGIN
  SELECT MAX(location_id) INTO v_location_id FROM locations
  WHERE country_id = v_country_id;
  WHILE v_counter <= 3 LOOP
    INSERT INTO locations(location_id, city, country_id)
    VALUES((v_location_id + v_counter), v_city, v_country_id);
    v_counter := v_counter + 1;
  END LOOP;
END;
/
```

FOR Loops

Syntax:

```
FOR counter IN [REVERSE]
    lower_bound..upper_bound LOOP
  statement1;
  statement2;
  . . .
END LOOP;
```

- Use a FOR loop to shortcut the test for the number of iterations.
- Do not declare the counter; it is declared implicitly.
- 'lower_bound .. upper_bound' is required syntax.

FOR Loops

Insert three new locations IDs for the country code of CA and the city of Montreal.

```
DECLARE
  v_country_id    locations.country_id%TYPE := 'CA';
  v_location_id   locations.location_id%TYPE;
  v_city          locations.city%TYPE := 'Montreal';
BEGIN
  SELECT MAX(location_id) INTO v_location_id
    FROM locations
    WHERE country_id = v_country_id;
  FOR i IN 1..3 LOOP
    INSERT INTO locations(location_id, city, country_id)
    VALUES((v_location_id + i), v_city, v_country_id );
  END LOOP;
END;
/
```

FOR Loops

Guidelines:

- Reference the counter within the loop only; it is undefined outside the loop.
- Do *not* reference the counter as the target of an assignment.

Guidelines While Using Loops

- Use the basic loop when the statements inside the loop must execute at least once.
- Use the `WHILE` loop if the condition has to be evaluated at the start of each iteration.
- Use a `FOR` loop if the number of iterations is known.

Nested Loops and Labels

- Nest loops to multiple levels.
- Use labels to distinguish between blocks and loops.
- Exit the outer loop with the `EXIT` statement that references the label.

Nested Loops and Labels

```
...
BEGIN
  <<Outer_loop>>
  LOOP
    v_counter := v_counter+1;
  EXIT WHEN v_counter>10;
    <<Inner_loop>>
    LOOP
      ...
      EXIT Outer_loop WHEN total_done = 'YES';
      -- Leave both loops
      EXIT WHEN inner_done = 'YES';
      -- Leave inner loop only
      ...
    END LOOP Inner_loop;
    ...
  END LOOP Outer_loop;
END;
```