WORKING WITH TRIGGERS

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Program 1

Write a code in PL/SQL to develop a trigger that enforces referential integrity by preventing the deletion of a parent record if child records exist.

CREATE OR REPLACE TRIGGER prevent\_parent\_deletion BEFORE DELETE ON employees

# FOR EACH ROW DECLARE

pl\_dept\_count NUMBER; BEGIN

# SELECT COUNT(\*)

INTO pl\_dept\_count FROM department

WHERE dept\_id = :OLD.employee\_id; IF pl\_dept\_count > 0 THEN

RAISE\_APPLICATION\_ERROR(-20001, 'Cannot delete employee record as department records exist.');

# END IF; END;

DELETE FROM employees WHERE employee\_id = 70;



Write a code in PL/SQL to create a trigger that checks for duplicate values in a specific column and raises an exception if found.

CREATE OR REPLACE TRIGGER prevent\_duplicate\_manager\_id BEFORE INSERT OR UPDATE ON employees

# FOR EACH ROW DECLARE

pl\_count NUMBER; BEGIN

# SELECT COUNT(\*)

INTO pl\_count FROM employees

WHERE manager\_id = :NEW.manager\_id AND employee\_id != :NEW.employee\_id; IF pl\_count > 0 THEN

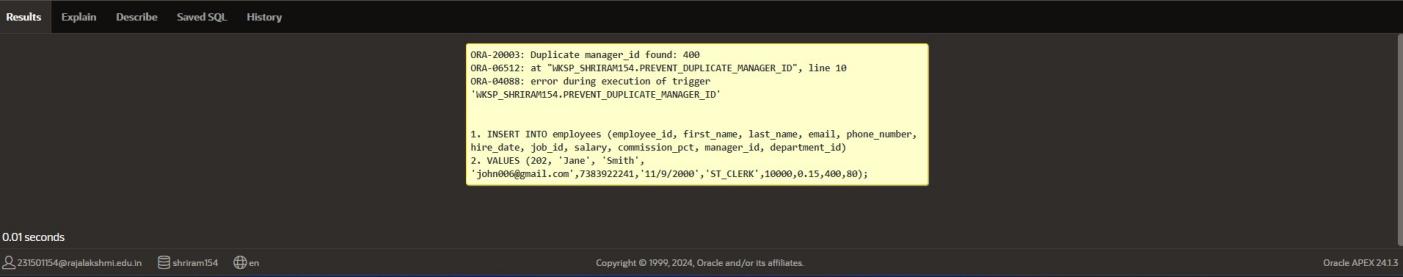
RAISE\_APPLICATION\_ERROR(-20003, 'Duplicate manager\_id found: ' ||

:NEW.manager\_id); END IF;

# END;

INSERT INTO employees (employee\_id, first\_name, last\_name, email, phone\_number, hire\_date, job\_id, salary, commission\_pct, manager\_id, department\_id)

VALUES (202, 'Jane', 'Smith', 'john006@gmail.com',7383922241,'11/9/2000','ST\_CLERK',10000,0.15,400,80);



Write a code in PL/SQL to create a trigger that restricts the insertion of new rows if the total of a

column's values exceeds a certain threshold.

CREATE OR REPLACE TRIGGER restrict\_salary\_insertion BEFORE INSERT ON employees

# FOR EACH ROW DECLARE

total\_salary NUMBER; threshold NUMBER := 100000;

# BEGIN

SELECT SUM(salary) INTO total\_salary FROM employees;

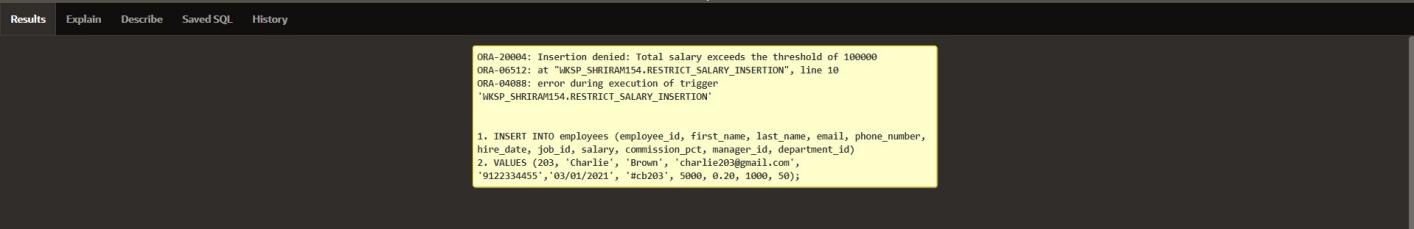
IF (total\_salary + :NEW.salary) > threshold THEN

RAISE\_APPLICATION\_ERROR(-20004, 'Insertion denied: Total salary exceeds the threshold of ' || threshold);

# END IF; END;

INSERT INTO employees (employee\_id, first\_name, last\_name, email, phone\_number, hire\_date, job\_id, salary, commission\_pct, manager\_id, department\_id)

VALUES (203, 'Charlie', 'Brown', 'charlie203@gmail.com', '9122334455','03/01/2021', '#cb203', 5000, 0.20, 1000, 50);



Write a code in PL/SQL to design a trigger that captures changes made to specific columns and logs them in an audit table.

CREATE OR REPLACE TRIGGER audit\_changes AFTER UPDATE OF salary, job\_id ON employees FOR EACH ROW

# BEGIN

IF :OLD.salary != :NEW.salary OR :OLD.job\_id != :NEW.job\_id THEN INSERT INTO employee\_audit (

employee\_id, old\_salary, new\_salary, old\_job\_title, new\_job\_title, change\_timestamp, changed\_by

# ) VALUES (

:OLD.employee\_id,

:OLD.salary,

:NEW.salary,

:OLD.job\_id,

:NEW.job\_id, SYSTIMESTAMP, USER

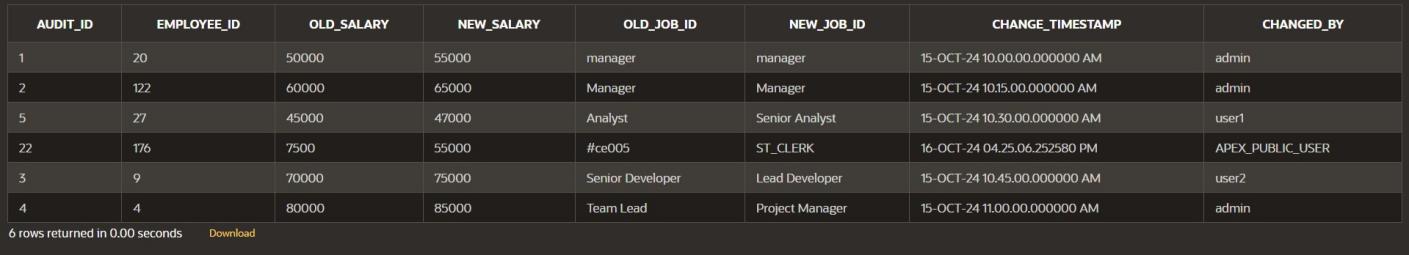
# ); END IF;

**END;**

UPDATE employees

SET salary = 55000, job\_id = 'ST\_CLERK' WHERE employee\_id = 176;

SELECT \* FROM employee\_audit;



Write a code in PL/SQL to implement a trigger that records user activity (inserts, updates, deletes) in an audit log for a given set of tables.

CREATE OR REPLACE TRIGGER trg\_audit\_employees AFTER INSERT OR UPDATE OR DELETE ON employees FOR EACH ROW

# DECLARE

v\_old\_values CLOB; v\_new\_values CLOB;

# BEGIN

**IF INSERTING THEN**

v\_old\_values := NULL;

v\_new\_values := 'employee\_id: ' || :NEW.employee\_id || ', ' || 'first\_name: ' || :NEW.first\_name || ', ' ||

'salary: ' || :NEW.salary;

INSERT INTO audit\_log (action, table\_name, record\_id, changed\_by, new\_values) VALUES ('INSERT', 'employees', :NEW.employee\_id, USER, v\_new\_values);

# ELSIF UPDATING THEN

v\_old\_values := 'employee\_id: ' || :OLD.employee\_id || ', ' || 'first\_name: ' || :OLD.first\_name || ', ' ||

'salary: ' || :OLD.salary;

v\_new\_values := 'employee\_id: ' || :NEW.employee\_id || ', ' || 'first\_name: ' || :NEW.first\_name || ', ' ||

'salary: ' || :NEW.salary;

INSERT INTO audit\_log (action, table\_name, record\_id, changed\_by, old\_values, new\_values)

VALUES ('UPDATE', 'employees', :NEW.employee\_id, USER, v\_old\_values, v\_new\_values);

# ELSIF DELETING THEN

v\_old\_values := 'employee\_id: ' || :OLD.employee\_id || ', ' || 'first\_name: ' || :OLD.first\_name || ', ' ||

'salary: ' || :OLD.salary; v\_new\_values := NULL;

INSERT INTO audit\_log (action, table\_name, record\_id, changed\_by, old\_values) VALUES ('DELETE', 'employees', :OLD.employee\_id, USER, v\_old\_values);

# END IF;

INSERT INTO employees (employee\_id, first\_name, salary) VALUES (3, 'Ball', 50000);



UPDATE employees SET salary = 55000

WHERE employee\_id = 3;



DELETE FROM employees WHERE employee\_id = 3;

SELECT \* FROM audit\_log;



Write a code in PL/SQL to implement a trigger that automatically calculates and updates a running total column for a table whenever new rows are inserted.

CREATE TABLE transactions ( transaction\_id NUMBER PRIMARY KEY, amount NUMBER,

running\_total NUMBER

**);**

CREATE OR REPLACE TRIGGER update\_running\_total FOR INSERT ON transactions

# COMPOUND TRIGGER

TYPE amount\_array IS TABLE OF NUMBER INDEX BY PLS\_INTEGER;

new\_amounts amount\_array;

# BEFORE EACH ROW IS BEGIN

new\_amounts(:NEW.transaction\_id) := :NEW.amount; END BEFORE EACH ROW;

# AFTER STATEMENT IS BEGIN

**DECLARE**

v\_total NUMBER; BEGIN

SELECT NVL(MAX(running\_total), 0) INTO v\_total

FROM transactions;

FOR i IN new\_amounts.FIRST .. new\_amounts.LAST LOOP v\_total := v\_total + new\_amounts(i);

UPDATE transactions

SET running\_total = v\_total WHERE transaction\_id = i;

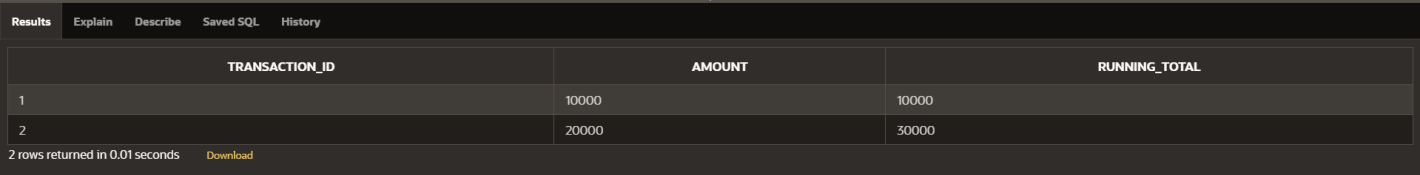
# END LOOP; END;

**END AFTER STATEMENT;**

END update\_running\_total;

INSERT INTO transactions (transaction\_id, amount) VALUES (1, 10000);

INSERT INTO transactions (transaction\_id, amount) VALUES (2, 20000);



Program 7

Write a code in PL/SQL to create a trigger that validates the availability of items before allowing an order to be placed, considering stock levels and pending orders.

CREATE TABLE inventory ( item\_id NUMBER PRIMARY KEY,

item\_name VARCHAR2(100), stock\_level NUMBER

**);**

CREATE TABLE orders (

order\_id NUMBER PRIMARY KEY, item\_id NUMBER,

quantity NUMBER, order\_status VARCHAR2(20),

CONSTRAINT fk\_item FOREIGN KEY (item\_id) REFERENCES inventory(item\_id)

**);**

CREATE OR REPLACE TRIGGER validate\_stock\_before\_order BEFORE INSERT ON orders

# FOR EACH ROW DECLARE

v\_stock\_level NUMBER; v\_pending\_orders NUMBER;

# BEGIN

SELECT stock\_level INTO v\_stock\_level FROM inventory

WHERE item\_id = :NEW.item\_id; SELECT NVL(SUM(quantity), 0) INTO v\_pending\_orders

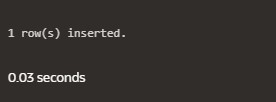
FROM orders

WHERE item\_id = :NEW.item\_id AND order\_status = 'Pending';

IF (:NEW.quantity + v\_pending\_orders) > v\_stock\_level THEN RAISE\_APPLICATION\_ERROR(-20001, 'Insufficient stock for item: ' || :NEW.item\_id);

# END IF; END;

INSERT INTO orders (order\_id, item\_id, quantity, order\_status) VALUES (1, 101, 5, 'Pending');



INSERT INTO orders (order\_id, item\_id, quantity, order\_status) VALUES (2, 103, 20, 'Pending');

