**Ex.No:13 Roll No:231901002**

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**WORKING WITH TRIGGER**

**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

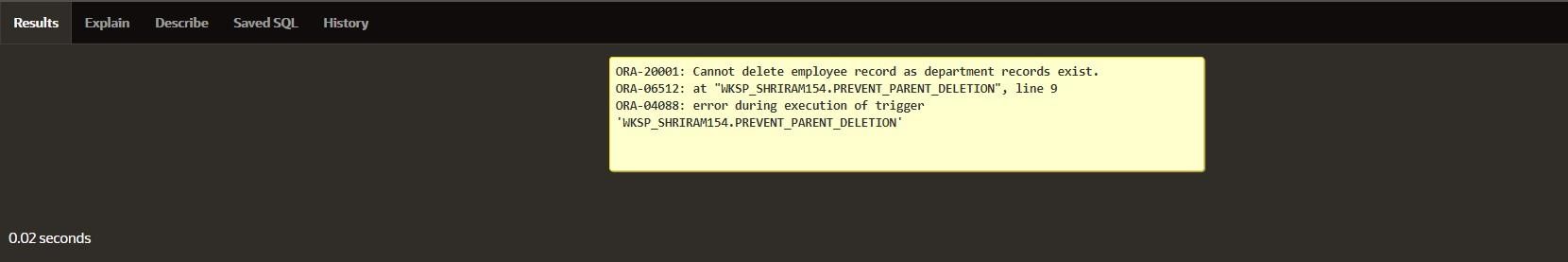
WHERE dept\_id = :OLD.employee\_id;

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

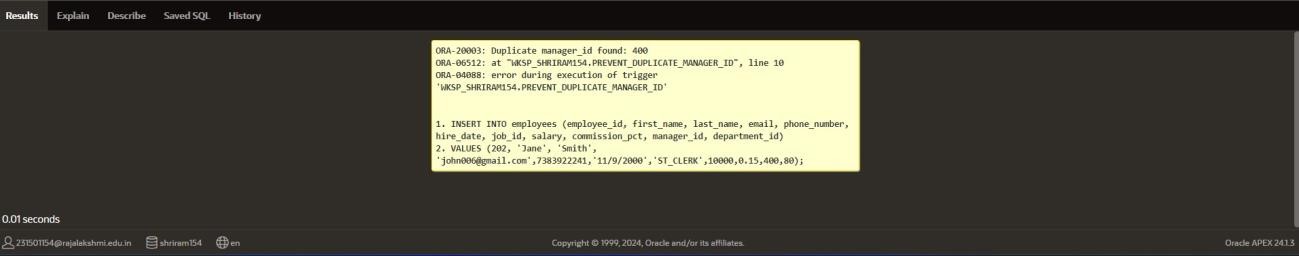
IF;

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

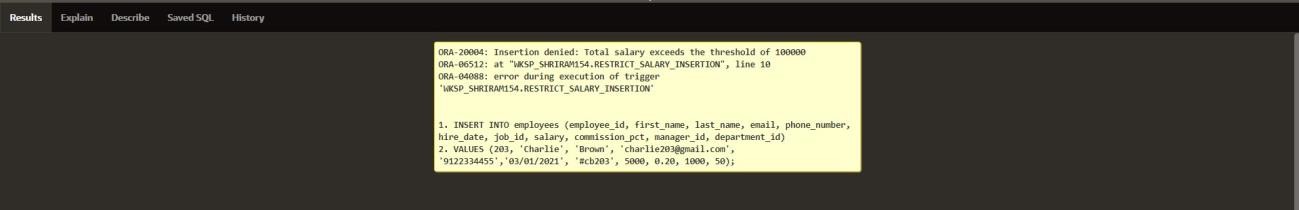
RAISE\_APPLICATION\_ERROR(-20004, 'Insertion denied: Total salary exceeds the

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;



**Program 5**

**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

DECLAREv\_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;

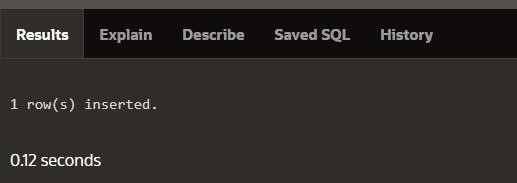
INSERT INTO audit\_log (action, table\_name, record\_id, changed\_by, old\_values)

VALUES ('DELETE', 'employees', :OLD.employee\_id, USER, v\_old\_values); END IF;

END trg\_audit\_employees;

INSERT INTO employees (employee\_id, first\_name, salary)

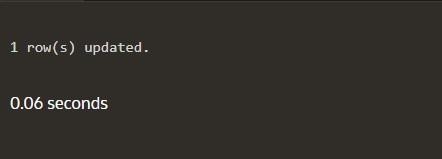
VALUES (3, 'Ball', 50000);



UPDATE employees

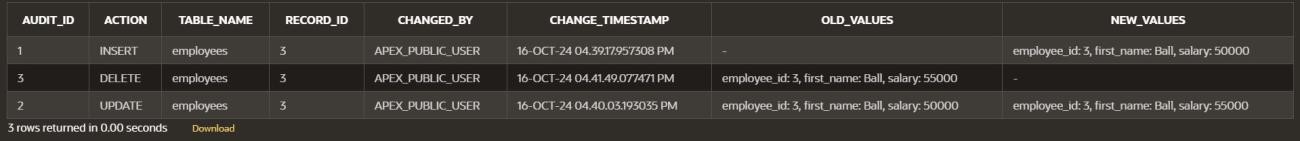
SET salary = 55000

WHERE employee\_id = 3;



DELETE FROM employees WHERE employee\_id = 3;

SELECT \* FROM audit\_log;



**Program 6**

**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;

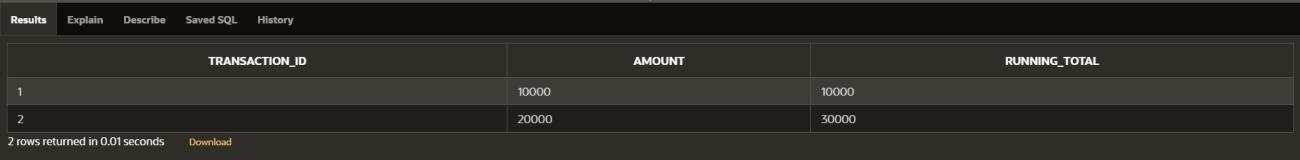
END AFTER STATEMENT;

END update\_running\_total;

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

INSERT INTO transactions (transaction\_id, amount)

VALUES (2, 20000);



**Program 7**

**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

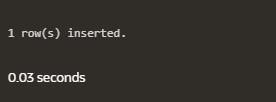
AND order\_status = 'Pending';

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');

