-- 1. Creating Library Table

CREATE TABLE Library (

book\_id INT PRIMARY KEY,

book\_title VARCHAR(255),

author VARCHAR(255),

publication\_year INT,

quantity INT

);

-- 2. Creating Library\_Audit Table to log changes

CREATE TABLE Library\_Audit (

audit\_id INT GENERATED ALWAYS AS IDENTITY PRIMARY KEY,

action\_type VARCHAR(10),

book\_id INT,

book\_title VARCHAR(255),

author VARCHAR(255),

publication\_year INT,

quantity INT,

action\_time TIMESTAMP DEFAULT CURRENT\_TIMESTAMP,

old\_value VARCHAR(255)

);

-- 3. Before Row-Level Trigger (For Update/Delete)

CREATE OR REPLACE TRIGGER before\_lib\_update\_delete

BEFORE UPDATE OR DELETE ON Library

FOR EACH ROW

BEGIN

INSERT INTO Library\_Audit (

action\_type,

book\_id,

book\_title,

author,

publication\_year,

quantity,

old\_value

)

VALUES (

CASE

WHEN UPDATING THEN 'UPDATE'

WHEN DELETING THEN 'DELETE'

END,

:OLD.book\_id,

:OLD.book\_title,

:OLD.author,

:OLD.publication\_year,

:OLD.quantity,

'Old Value Before Change'

);

END;

/

-- 4. After Row-Level Trigger (For Update)

CREATE OR REPLACE TRIGGER after\_lib\_update

AFTER UPDATE ON Library

FOR EACH ROW

BEGIN

INSERT INTO Library\_Audit (

action\_type,

book\_id,

book\_title,

author,

publication\_year,

quantity,

old\_value

)

VALUES (

'UPDATE',

:NEW.book\_id,

:NEW.book\_title,

:NEW.author,

:NEW.publication\_year,

:NEW.quantity,

'New Value After Update'

);

END;

/

-- 5. Before Statement-Level Trigger (For Update/Delete)

CREATE OR REPLACE TRIGGER before\_lib\_update\_delete\_statement

BEFORE UPDATE OR DELETE ON Library

BEGIN

INSERT INTO Library\_Audit (

action\_type,

book\_id,

book\_title,

author,

publication\_year,

quantity,

old\_value

)

SELECT

CASE

WHEN UPDATING THEN 'UPDATE'

WHEN DELETING THEN 'DELETE'

END,

book\_id,

book\_title,

author,

publication\_year,

quantity,

'Statement-Level Old Values'

FROM Library;

END;

/

-- 6. After Statement-Level Trigger (For Update/Delete)

CREATE OR REPLACE TRIGGER after\_lib\_update\_delete\_statement

AFTER UPDATE OR DELETE ON Library

BEGIN

DECLARE

v\_action\_type VARCHAR(10);

BEGIN

IF UPDATING THEN

v\_action\_type := 'UPDATE';

ELSIF DELETING THEN

v\_action\_type := 'DELETE';

END IF;

INSERT INTO Library\_Audit (

action\_type,

book\_id,

book\_title,

author,

publication\_year,

quantity,

old\_value

)

SELECT

v\_action\_type,

book\_id,

book\_title,

author,

publication\_year,

quantity,

'Statement-Level Final Values'

FROM Library;

END;

END;

/

-- 7. Inserting test records into Library Table

BEGIN

INSERT INTO Library (book\_id, book\_title, author, publication\_year, quantity)

VALUES (1, 'The Great Gatsby', 'F. Scott Fitzgerald', 1925, 10);

INSERT INTO Library (book\_id, book\_title, author, publication\_year, quantity)

VALUES (2, 'To Kill a Mockingbird', 'Harper Lee', 1960, 5);

INSERT INTO Library (book\_id, book\_title, author, publication\_year, quantity)

VALUES (3, '1984', 'George Orwell', 1949, 7);

INSERT INTO Library (book\_id, book\_title, author, publication\_year, quantity)

VALUES (4, 'Pride and Prejudice', 'Jane Austen', 1813, 3);

INSERT INTO Library (book\_id, book\_title, author, publication\_year, quantity)

VALUES (5, 'Moby Dick', 'Herman Melville', 1851, 8);

END;

/

-- 8. Update Example (to trigger the Before and After Row-Level Triggers)

UPDATE Library

SET quantity = 15

WHERE book\_id = 1;

-- 9. Delete Example (to trigger the Before and After Row-Level Triggers)

DELETE FROM Library

WHERE book\_id = 2;

-- 10. Display Audit Logs to see how the triggers have logged actions

SELECT \* FROM Library\_Audit;