

P8

Problem Statement:

Row-level BEFORE and AFTER trigger on Library table. Audit old values for updates and deletes into Library_Audit.

Code:

```
-- P8: Library audit triggers (MySQL)
CREATE TABLE Library (
    book_id INT PRIMARY KEY,
    title VARCHAR(200),
    author VARCHAR(150),
    qty INT
);

CREATE TABLE Library_Audit (
    audit_id INT AUTO_INCREMENT PRIMARY KEY,
    book_id INT,
    title VARCHAR(200),
    author VARCHAR(150),
    qty INT,
    operation_type VARCHAR(20),
    op_time TIMESTAMP DEFAULT CURRENT_TIMESTAMP
);

DELIMITER $$

CREATE TRIGGER lib_before_update
BEFORE UPDATE ON Library
FOR EACH ROW
BEGIN
    INSERT INTO Library_Audit(book_id, title, author, qty, operation_type)
    VALUES (OLD.book_id, OLD.title, OLD.author, OLD.qty, 'BEFORE_UPDATE');
END$$
DELIMITER ;

DELIMITER $$

CREATE TRIGGER lib_after_update
AFTER UPDATE ON Library
FOR EACH ROW
BEGIN
    INSERT INTO Library_Audit(book_id, title, author, qty, operation_type)
    VALUES (OLD.book_id, OLD.title, OLD.author, OLD.qty, 'AFTER_UPDATE');
END$$
DELIMITER ;

DELIMITER $$

CREATE TRIGGER lib_before_delete
BEFORE DELETE ON Library
FOR EACH ROW
BEGIN
    INSERT INTO Library_Audit(book_id, title, author, qty, operation_type)
    VALUES (OLD.book_id, OLD.title, OLD.author, OLD.qty, 'DELETE');
END$$
DELIMITER ;
```