**NAME- Piyush Kakkar; UID-23BCC70018; SUB-ADBMS**

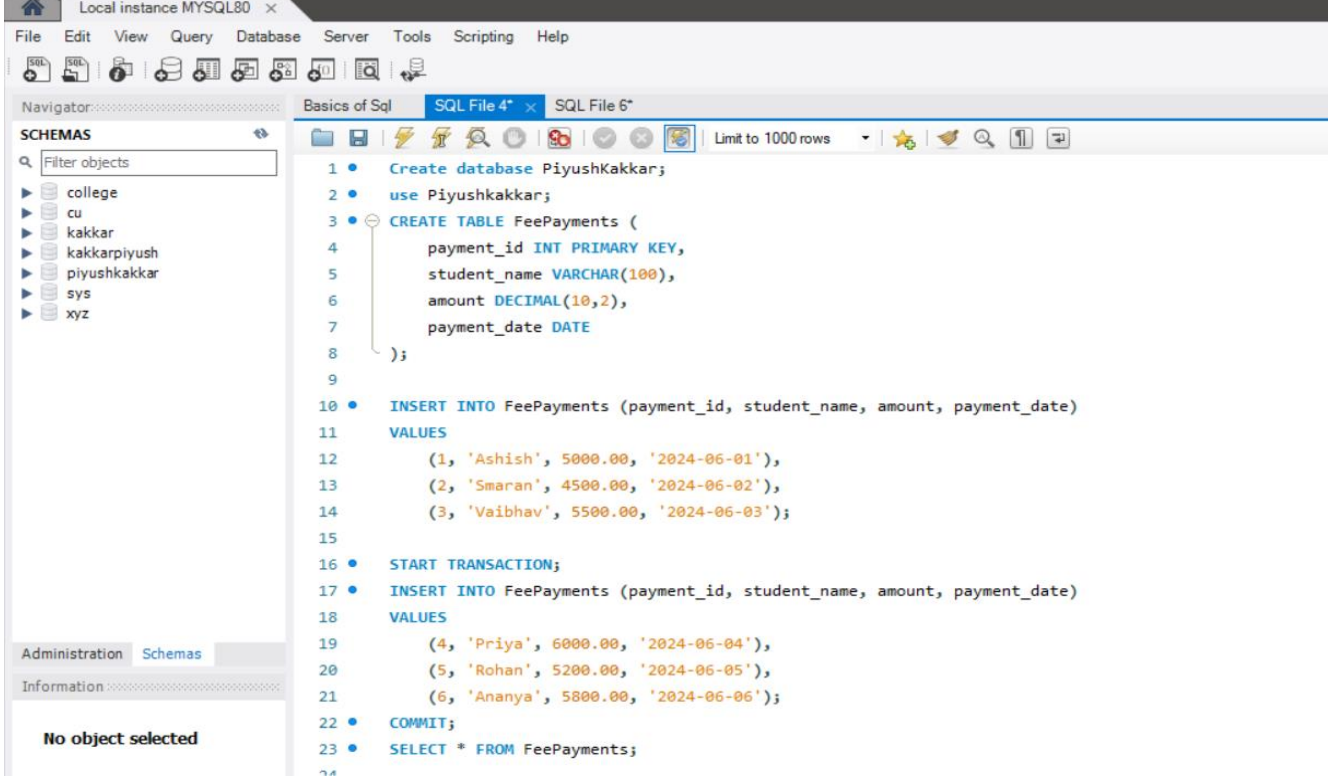
# EXP-10

- **AIM:** To demonstrate the ACID properties of database transactions (especially Atomicity and Consistency) by performing multiple inserts into the FeePayments table, handling failures using ROLLBACK, and ensuring the database remains in a consistent state.
- **THEORY:**

- Transactions in DBMS: A transaction is a sequence of SQL operations treated as a single unit. Either all operations succeed (COMMIT) or none (ROLLBACK).
- ACID Properties:
- Atomicity: Ensures all operations in a transaction are completed, or none are.
- Consistency: Database moves from one valid state to another.
- Isolation: Transactions do not interfere with each other.
- Durability: Once committed, changes are permanent.
- Use Case of Transactions:
- Insert multiple fee payment records.
- If any insert fails (e.g., duplicate payment_id or invalid data), the entire transaction is rolled back.
- SQL Commands Used:
- START TRANSACTION / BEGIN: Begin a transaction
- COMMIT: Save changes permanently
- ROLLBACK: Undo changes due to failure

- **CODES:**

- Part A: Insert Multiple Fee Payments (Successful Transaction)


Local instance MYSQL80
File Edit View Query Database Server Tools Scripting Help
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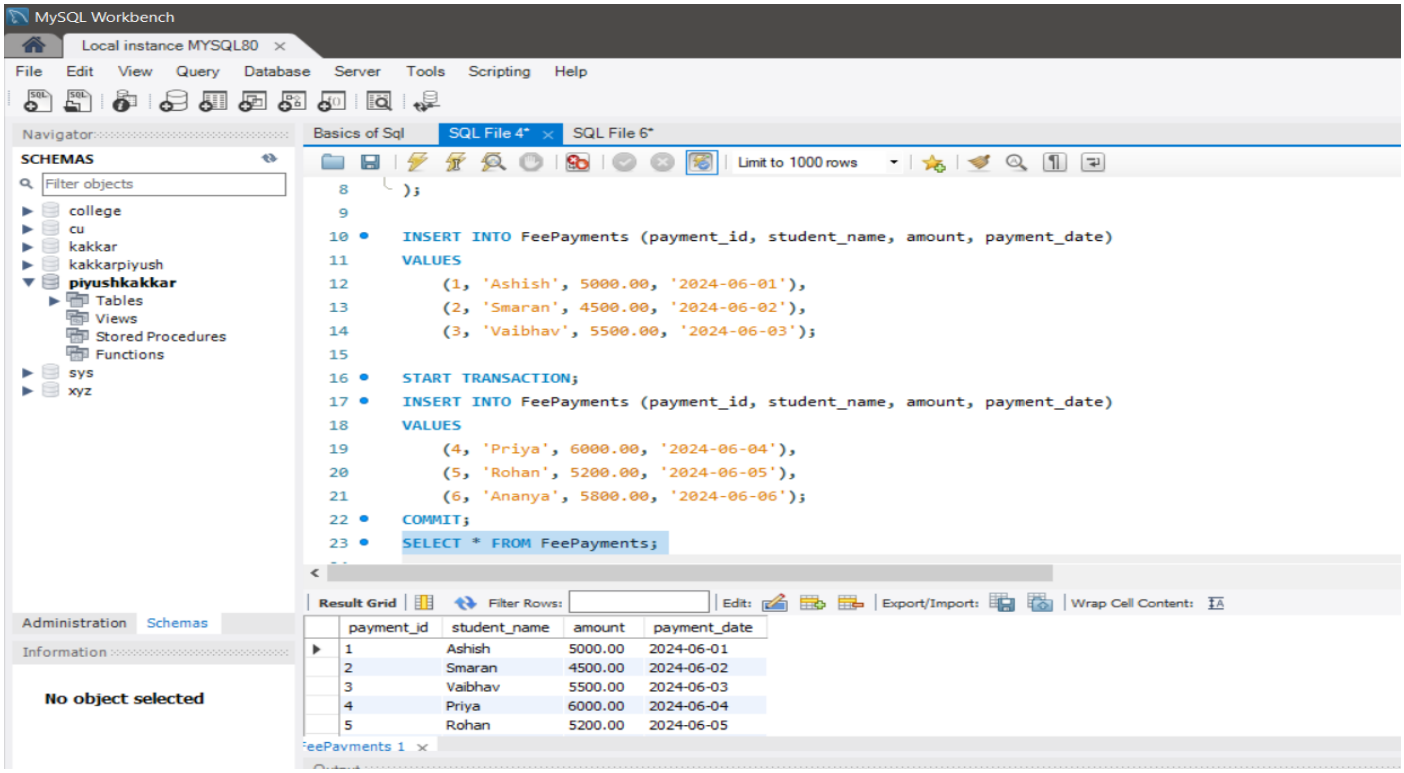
Information
No object selected
Basics of Sql
SQL File 4*
SQL File 6*
Limit to 1000 rows
Create database PiyushKakkar;
use Piyushkakkar;
CREATE TABLE FeePayments (
payment_id INT PRIMARY KEY,
student_name VARCHAR(100),
amount DECIMAL(10,2),
payment_date DATE
);
INSERT INTO FeePayments (payment_id, student_name, amount, payment_date)
VALUES
(1, 'Ashish', 5000.00, '2024-06-01'),
(2, 'Smaran', 4500.00, '2024-06-02'),
(3, 'Vaibhav', 5500.00, '2024-06-03');
START TRANSACTION;
INSERT INTO FeePayments (payment_id, student_name, amount, payment_date)
VALUES
(4, 'Priya', 6000.00, '2024-06-04'),
(5, 'Rohan', 5200.00, '2024-06-05'),
(6, 'Ananya', 5800.00, '2024-06-06');
COMMIT;
SELECT * FROM FeePayments;


MySQL Workbench
Local instance MYSQL80
File Edit View Query Database Server Tools Scripting Help
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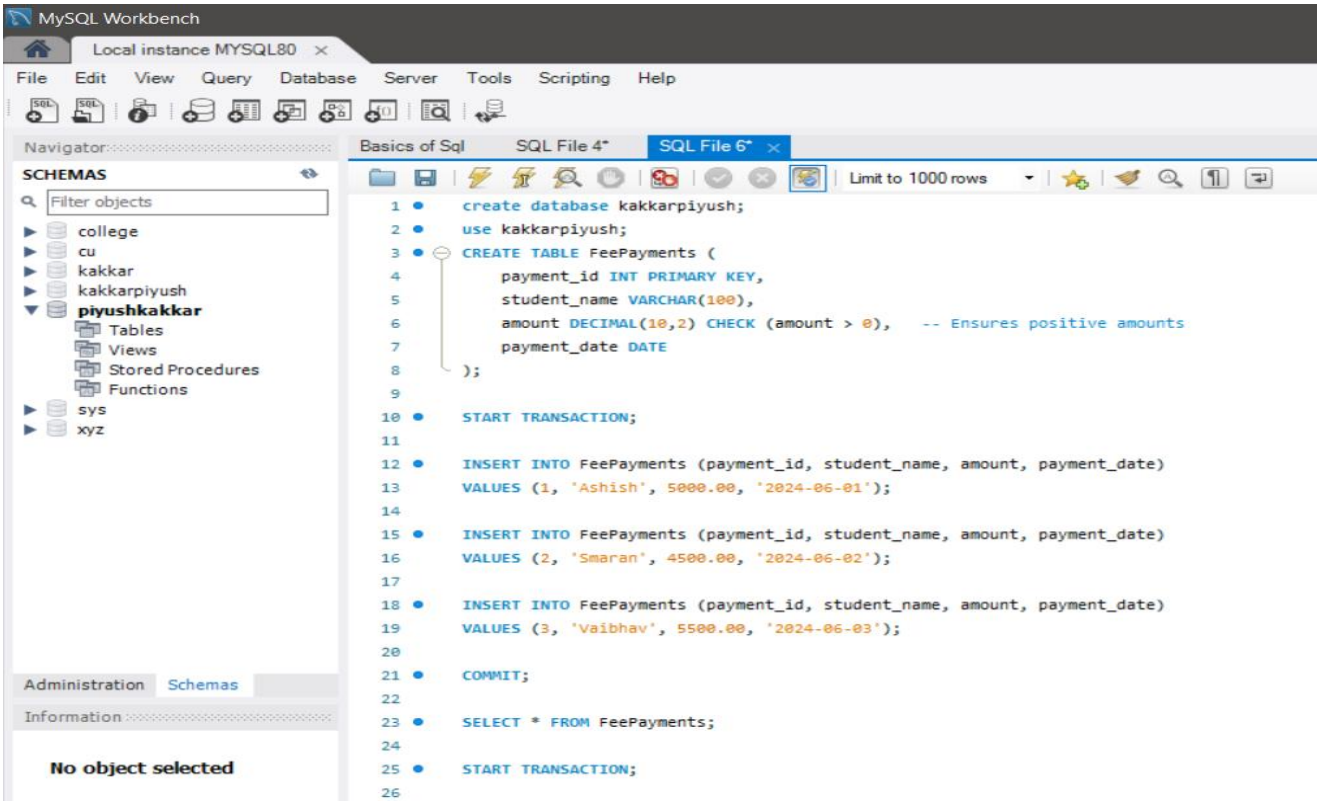
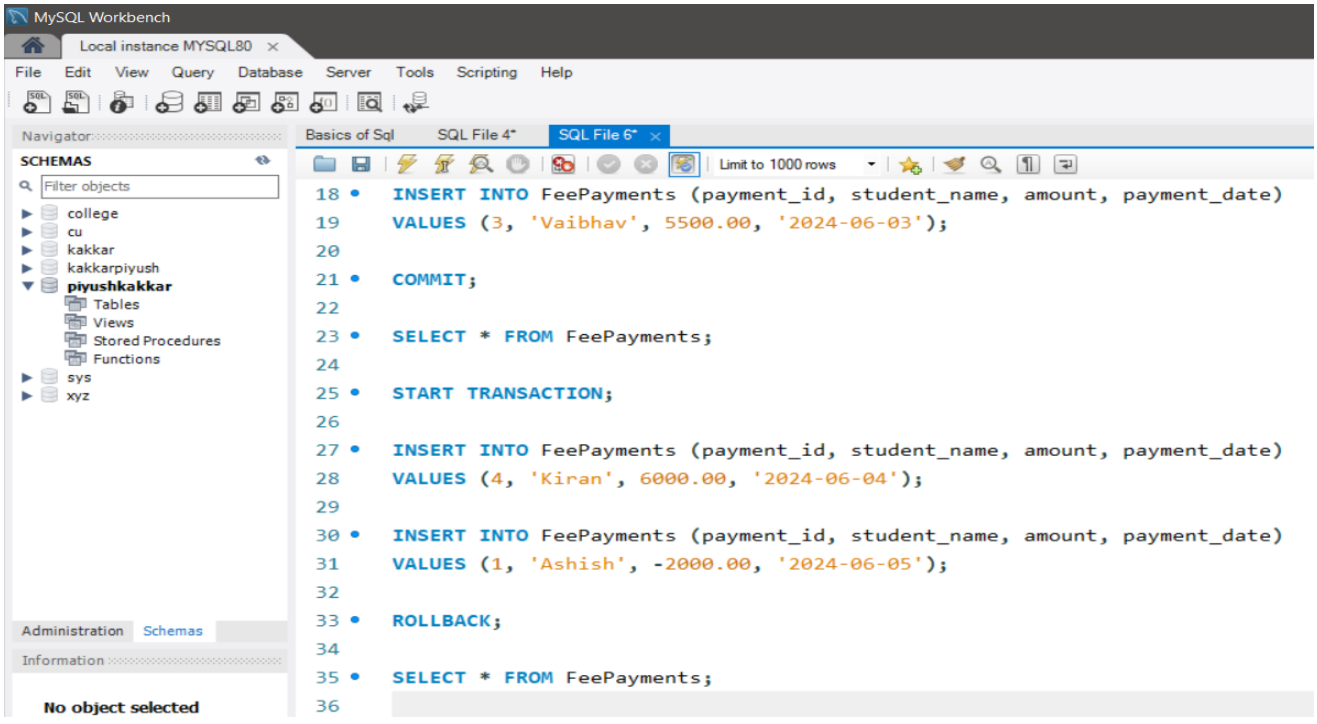
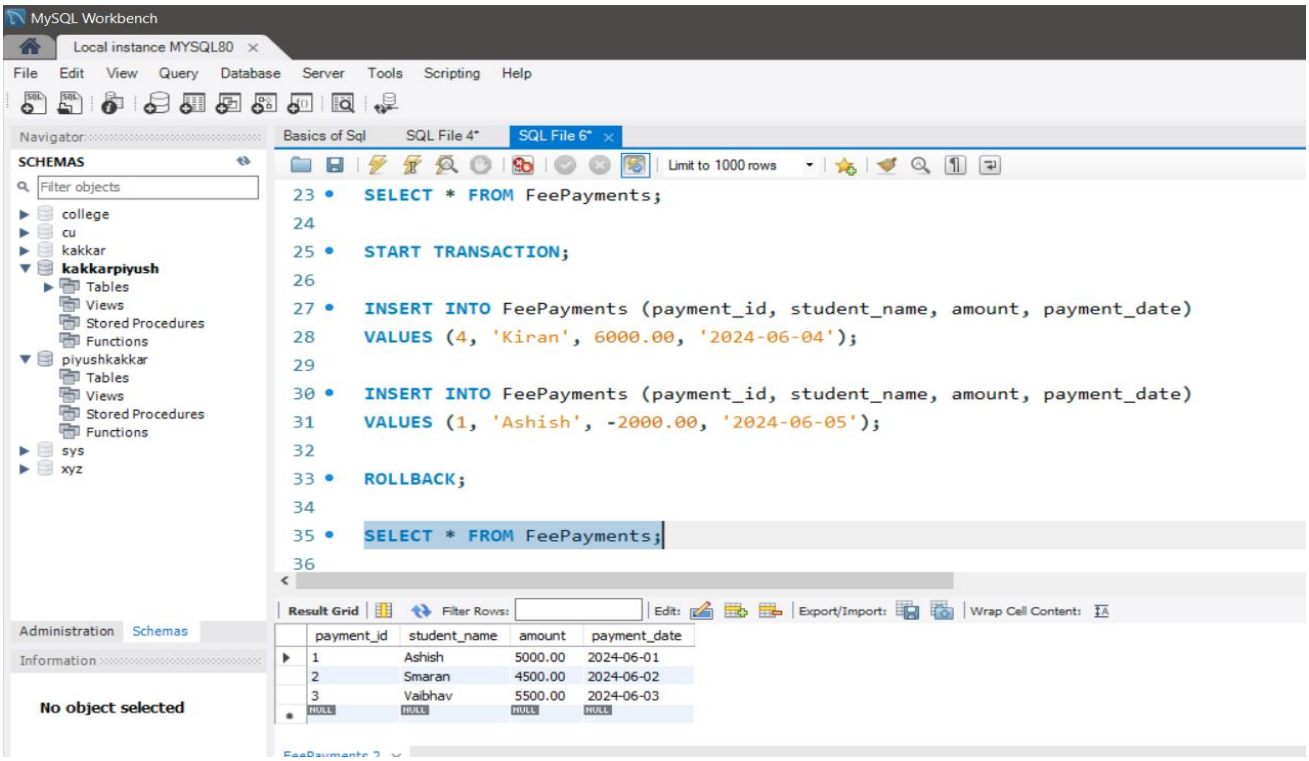
VALUES
(4, 'Priya', 6000.00, '2024-06-04'),
(5, 'Rohan', 5200.00, '2024-06-05'),
(6, 'Ananya', 5800.00, '2024-06-06');
COMMIT;
SELECT * FROM FeePayments;
Result Grid
Filter Rows:
Edit:
Export/Import:
Wrap Cell Content:
payment_id student_name amount payment_date
1 Ashish 5000.00 2024-06-01
2 Smaran 4500.00 2024-06-02
3 Vaibhav 5500.00 2024-06-03
4 Priya 6000.00 2024-06-04
5 Rohan 5200.00 2024-06-05
eePayments 1

- Part B: Failed Transaction with ROLLBACK






- Part C: Partial Failure Demonstration START TRANSACTION;

## -- First insert valid

INSERT INTO FeePayments (payment_id, student_name, amount, payment_date)
VALUES (5, 'Rohit', 5000.00, '2024-06-05');

-- Second insert invalid (NULL student_name)
INSERT INTO FeePayments (payment_id, student_name, amount, payment_date)
VALUES (6, NULL, 4700.00, '2024-06-06');

ROLLBACK;

SELECT * FROM FeePayments;

- **OUTPUTS:**

| payment_id | student_name | amount | payment_date |
|---|---|---|---|
| 1 | Ashish | 5000.00 | 2024-06-01 |
| 2 | Smaran | 4500.00 | 2024-06-02 |
| 3 | Vaibhav | 5500.00 | 2024-06-03 |

- **LEARNING OUTCOMES:**

1. Learned how to use **transactions** in SQL with START TRANSACTION, COMMIT, and ROLLBACK.
2. Understood **Atomicity**, ensuring all operations in a transaction succeed or none are applied.
3. Observed **Consistency**, maintaining valid database state even when transactions fail.
4. Gained experience handling **transaction failures** caused by constraint violations or duplicates.
5. Practiced **ACID principles** in action, reinforcing database reliability and integrity.