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DAY 6:

Assignment 5:

Demonstrate the creation of an index on a table and discuss how it improves query performance. Use a DROP INDEX statement to remove the index and analyze the impact on query execution.

ANSWER:

Step 1: Create a Table

Step 2: Insert Sample Data

Step 3: Create an Index

Step 4: Analyze Query Performance with the Index

Step 5: Drop the Index

Step 6: Analyze Query Performance without the Index

Discussion on the Impact of Indexes

With Index:

- When the index idx_author is present, the EXPLAIN output should show that the query uses the index to quickly find the relevant rows.
- The index allows the database to locate the rows by author more efficiently, reducing the number of rows that need to be scanned.
- This results in faster query execution, especially if the table is large.

Without Index:

- When the index is dropped, the EXPLAIN output will show that the query performs a full table scan.
- Without the index, the database has to scan all rows in the Books table to find the matching rows.
- This can significantly slow down the query, particularly as the number of rows in the table increases.

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Example of the Full Process

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-- Step 1: Create the Employees table
CREATE TABLE Employees (
   employee_id INT PRIMARY KEY AUTO_INCREMENT,
   first_name VARCHAR(50) NOT NULL,
   last_name VARCHAR(50) NOT NULL,
   department_id INT,
   salary DECIMAL(10, 2) NOT NULL,
   hire_date DATE NOT NULL,
   INDEX idx_department (department_id)
);

-- Step 2: Insert sample data
INSERT INTO Employees (first_name, last_name, department_id, salary, hire_date)
VALUES
   ('John', 'Doe', 1, 50000.00, '2020-01-15'),
   ('Jane', 'Smith', 2, 60000.00, '2019-05-20'),
   ('Michael', 'Johnson', 1, 55000.00, '2021-02-10'),
   ('Emily', 'Williams', 3, 48000.00, '2020-11-30'),
   ('David', 'Brown', 2, 62000.00, '2018-07-25');

-- Step 3: Create an index on the department_id column
CREATE INDEX idx_department ON Employees(department_id);

-- Step 4: Analyze query performance with the index
EXPLAIN SELECT * FROM Employees WHERE department_id = 1;

-- Step 5: Drop the index
DROP INDEX idx_department ON Employees;

 --Step 6: Analyze query performance without the index
EXPLAIN SELECT * FROM Employees WHERE department_id = 1;
```