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.

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.

Example of the Full Process

-- Step 1: Create the Books table

```
CREATE TABLE Books (
    book_id INT PRIMARY KEY AUTO_INCREMENT,
    title VARCHAR(255) NOT NULL,
    author VARCHAR(255) NOT NULL,
    isbn VARCHAR(13) NOT NULL UNIQUE,
    published_year YEAR NOT NULL,
    available_copies INT NOT NULL CHECK (available_copies >= 0),
    publisher_id INT,
    genre VARCHAR(100)
);
```

-- Step 2: Insert sample data

```
INSERT INTO Books (title, author, isbn, published_year, available_copies, publisher_id, genre)
VALUES
('The Great Gatsby', 'F. Scott Fitzgerald', '9780743273565', 1925, 3, 1, 'Classic'),
('To Kill a Mockingbird', 'Harper Lee', '9780060935467', 1960, 5, 2, 'Classic'),
('1984', 'George Orwell', '9780451524935', 1949, 4, 3, 'Dystopian'),
('Pride and Prejudice', 'Jane Austen', '9780141439518', 1813, 2, 4, 'Romance'),
('The Catcher in the Rye', 'J.D. Salinger', '9780316769488', 1951, 6, 5, 'Classic');
```

-- Step 3: Create an index on the author column

```
CREATE INDEX idx_author ON Books(author);
```

-- Step 4: Analyze query performance with the index

```
EXPLAIN SELECT * FROM Books WHERE author = 'George Orwell';
```

-- Step 5: Drop the index

```
DROP INDEX idx_author ON Books;
```

-- Step 6: Analyze query performance without the index

```
EXPLAIN SELECT * FROM Books WHERE author = 'George Orwell';
```