Project Title: University Database Management System

Prepared By: Omar Adel Mahmoud

1. Introduction

This project aims to design and implement a relational database for a university. The system manages students, instructors, departments, and courses, ensuring data integrity through primary and foreign keys.

2. Database Design Choices

- **Normalization:** Data is organized into related tables to reduce redundancy.
- **Constraints:**
    - PRIMARY KEY: Used for unique identifiers (e.g., StudentID, DeptCode).
    - FOREIGN KEY: Used to maintain relationships (e.g., linking students to departments).
    - UNIQUE: Applied to SSN and Course Numbers to prevent duplication.
- **Stored Procedure:** I encapsulated all 10 required queries into a single procedure named GenerateUniversityReports for efficiency and easy execution.

3. Execution & Results

- **Sample Data:** I inserted 15 students, 10 instructors, and 5 departments to test the system.
- **Complex Queries:**
    - Used JOIN to link instructors with their courses.
    - Used GROUP BY and HAVING to filter students registered in more than 3 courses.
    - Used Subqueries to find instructors earning more than their department's average.

4. Screenshots Explanation

Result 1: Displays the total count of instructors in each department. (e.g., Computer Science has 2 instructors).

Result 2: Identifies the department offering the maximum number of courses (The output shows "Computer Science").

Result 3: Provides a detailed list of instructors alongside the names of the courses they are teaching.

Result 4: Shows the number of students enrolled in each department based on their "Major".

Result 5: Financial analysis identifying the department with the highest total salary expenditure.

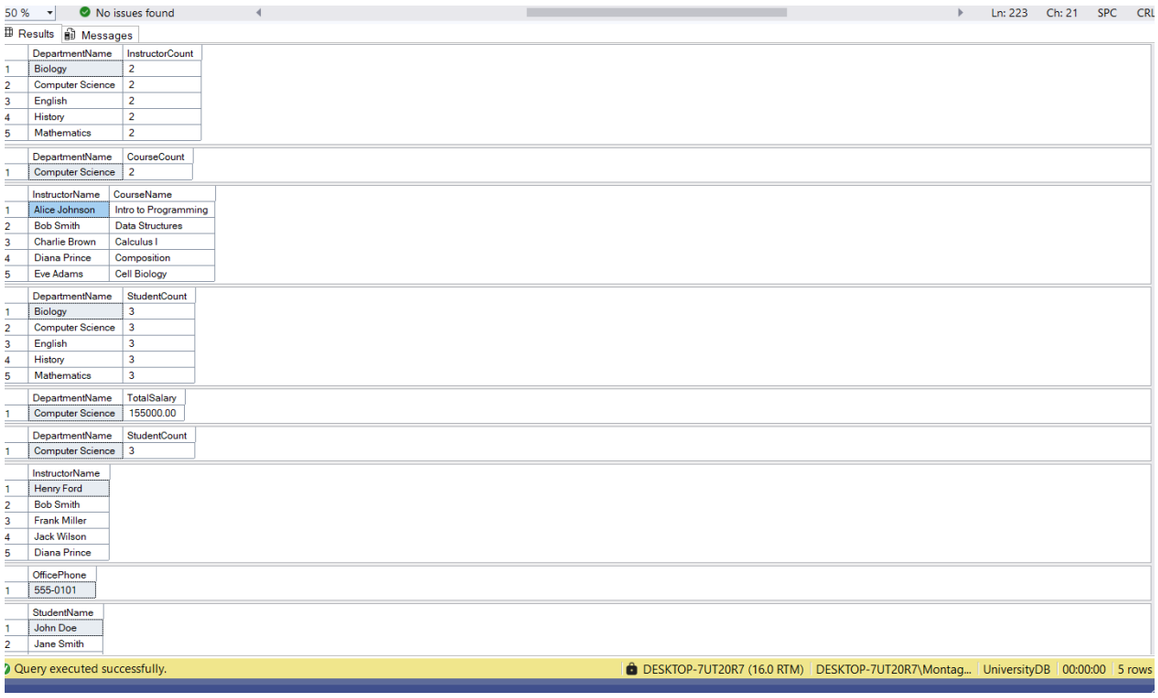
Result 6: Displays the department that has the largest student body (Maximum students).

Result 7: Lists instructors who are "Top Earners" (those whose salary is higher than the average salary within their specific department).

Result 8: Provides the office telephone number of the department where the highest-paid instructor in the university works.

Result 9: Highlights "High-Participation" students who are registered in more than 3 courses (e.g., John Doe and Jane Smith).

Result 10: Shows a breakdown of how many unique instructors are assigned to teach each specific course.



50 % No issues found Ln: 223 Ch: 21 SPC CRL

Results Messages

	DepartmentName	InstructorCount
1	Biology	2
2	Computer Science	2
3	English	2
4	History	2
5	Mathematics	2

	DepartmentName	CourseCount
1	Computer Science	2

	InstructorName	CourseName
1	Alice Johnson	Intro to Programming
2	Bob Smith	Data Structures
3	Charlie Brown	Calculus I
4	Diana Prince	Composition
5	Eve Adams	Cell Biology

	DepartmentName	StudentCount
1	Biology	3
2	Computer Science	3
3	English	3
4	History	3
5	Mathematics	3

	DepartmentName	TotalSalary
1	Computer Science	155000.00

	DepartmentName	StudentCount
1	Computer Science	3

	InstructorName
1	Henry Ford
2	Bob Smith
3	Frank Miller
4	Jack Wilson
5	Diana Prince

	OfficePhone
1	555-0101

	StudentName
1	John Doe
2	Jane Smith

Query executed successfully. DESKTOP-7UT20R7 (16.0 RTM) DESKTOP-7UT20R7\Montag... UniversityDB 00:00:00 5 rows

ERD Diagram :