**Case Study 3: Generating Student Transcript with a Stored Procedure and UDF**

**Detailed Problem Statement**:

* The university’s registrar office is responsible for generating student transcripts, which include details such as course codes, course names, credit hours, grades, enrollment dates, course status, and the student’s overall GPA.
* Currently, this process involves running multiple SQL queries to retrieve data from the Students, Courses, and StudentCourses tables, followed by manual GPA calculations or separate queries to compute the GPA.
* This fragmented approach is inefficient, prone to errors (e.g., missing courses or incorrect GPA calculations), and time-consuming, especially when generating transcripts for multiple students.
* The lack of an integrated solution hinders the registrar’s ability to provide timely and accurate transcripts for students, academic advisors, or external entities (e.g., employers or graduate schools).
* Additionally, there is no single, automated mechanism to combine course details with GPA calculations, leading to redundant efforts and potential inconsistencies in transcript formats.

**Requirements**:

* Develop an automated solution to generate a complete student transcript, including:
  + Student details (ID, full name).
  + Course details (course code, name, credit hours, grade, enrollment date, status).
  + The student’s GPA, calculated dynamically using an existing GPA calculation function.
* The solution must consolidate all required data into a single, cohesive output that is easy to read and exportable for reporting purposes.
* The solution should integrate with the existing SQL Server database (UniversityDB) and leverage reusable components (e.g., a GPA calculation UDF) to ensure consistency.
* The system must handle large datasets efficiently and provide accurate results even for students with extensive course histories.
* The solution should be secure, restricting access to authorized staff, and maintainable for future updates.

**Stakeholders**:

* Students requesting official transcripts for academic or professional purposes.
* Registrar staff responsible for generating and validating transcripts.
* Academic advisors using transcripts for student counseling and program planning.
* Database administrators ensuring system performance and data integrity.

**Current Challenges**:

* Multiple queries are needed to compile transcript data, increasing processing time.
* Manual GPA calculations or separate queries lead to inconsistencies and errors.
* No standardized format for transcripts, causing variations in output across departments.
* High administrative workload for generating transcripts, especially during peak periods (e.g., graduation).

**Proposed Solution**: A stored procedure (GenerateStudentTranscript) that retrieves course and student data and integrates the CalculateStudentGPA UDF to produce a complete transcript with course details and GPA in a single execution.