**SQL Database Management Project - Orders and Employee Database**

**Overview:** This project is a three-part endeavour focused on SQL database management, with the final part emphasizing SQL database administration. It extended the Employee Database from the previous project by addressing real-world challenges. Through hands-on SQL tasks, the project involved optimizing database functionality, enhancing usability, and ensuring long-term stability. The scope included solving specific data issues raised by a supervisor, automating processes, and implementing advanced SQL features like user-defined functions and stored procedures.

**PART 1: Orders Database and SQL Queries** In this project, I worked on the design and querying of an eCommerce orders database using **MS SQL Server Management Studio**. The database consisted of multiple tables, including customer orders, product details, and shipment methods. Key objectives included:

* **Database Design:** Implemented the schema for the *Orders* and *Product* data stores, populating them with test records adhering to business specifications.
* **SQL Query Development:** Constructed 20 complex SQL queries to extract meaningful data, such as order totals, shipment methods, and customer order details. Queries ranged from equijoins to subqueries and aggregate functions.
* **Data Integrity:** Ensured referential integrity between primary and foreign keys across the schemas.
* **Result Presentation:** Captured and formatted query outputs for presentation.

**Key Skills Utilized:**

* SQL Querying (SELECT, JOIN, WHERE GROUP BY, and Subqueries)
* Database Design and Schema Creation
* Data Validation and Referential Integrity

**PART 2: Employee Database and Management** In this project, I worked with a human resources database system for a growing company, focusing on database creation, management, and testing using **Microsoft Visio** for ERD design and **SQL scripts** for database operations.

* **Data Modelling:** Designed the employee data model using crow’s foot notation, ensuring entity and attribute relationships for multiple tables such as Employees, Departments, Roles, and EmployeeContacts.
* **SQL Scripting:** Created CREATE TABLE, INSERT, UPDATE, and DELETE SQL scripts to establish the database, insert and update records, and clean up test data.
* **Recursive Queries and Views:** Developed complex SQL views to display hierarchical relationships between managers and subordinates, as well as identifying employees without emergency contacts.
* **Testing and Maintenance:** Verified the functionality of the database with test data, ensuring all constraints and relationships were upheld.

**Key Skills Utilized:**

* SQL Table Creation and Management
* Entity-Relationship Diagram (ERD) Design
* Database Constraints (Primary Key, Foreign Key, Default Values)
* Data Integrity and Maintenance

**Technologies Used:**

* **SQL Server**
* **Microsoft Visio** for database modeling
* **SQL scripting** for table creation, data manipulation, and testing.

**PART 3: SQL Database Administration** Key tasks and solutions implemented include:

1. **Database Modifications:**
   * **Issue Resolution:** Addressed design flaws in the *EmployeePersonal* table to allow employees to record multiple allergies. Modified the table design to make the field open-ended, ensuring that HR could correctly file insurance claims.
   * **Enhancing Usability:** Added intersection tables to allow employees to input multiple addresses, ensuring accurate data without modifying the existing structure.
   * **Referential Integrity:** Adjusted the PK-PK relationship between *EmployeeAddress* and *Address* tables to a PK-FK relationship, stabilizing the database without data loss.
2. **SQL Scripting:**
   * **Custom Function Creation:** Developed a user-defined function, LastNameFirst#, to concatenate employee first and last names.
   * **Medical Concerns View:** Created a view, EmployeesMedicalConcerns, listing employees with known allergies, making it easier for HR to track medical needs.
   * **Stored Procedure for Salary Field:** Proposed and implemented a stored procedure to format salary data, converting it from INT to CHAR with appropriate currency formatting, improving data presentation.
3. **Database Performance and Maintenance:**
   * **Data Cleansing Automation:** Proposed a strategy to automate data cleansing using stored procedures, reducing manual work while maintaining data integrity.
   * **Concurrency Control:** Considered concurrency issues like dirty reads and non-repeatable reads when managing multiple stored procedures that may conflict, ensuring proper database functionality.

**Key Skills Utilized:**

* SQL Administration (Database Repair, Optimization, and Usability Enhancements)
* Writing and Testing SQL Queries, Views, and Stored Procedures
* Database Security and Integrity (PK-FK Relationships, Referential Integrity)
* User-defined Functions, Automated Data Cleansing
* Concurrency Control and Database Stability

With this project added, your portfolio will now reflect the complete range of skills you gained through the **SQL Queries**, **SQL Management**, and **SQL Administration** projects. This structure highlights your comprehensive understanding of SQL databases from design to optimization.