**Little Lemon Restaurant Management System: Project Summary**

**1. Project Objective**

The primary objective of this project was to design, build, and deploy a comprehensive database management system for the Little Lemon restaurant. The system is engineered to handle core operational data, including customer information, staff details, table bookings, and customer orders. The project successfully demonstrates a full data workflow, from database creation and data ingestion to implementing business logic and enabling data visualization.

**2. Core Components & Technologies**

The project integrates several key technologies to create a robust and functional system:

* **Database:** MySQL was used as the relational database management system to store and manage the data.
* **Automation & ETL Script:** A Python script, executed within a Jupyter Notebook (LittleLemonDB\_Final\_Project.ipynb), was developed to automate the entire database setup process. It uses the mysql.connector library for database interaction and pandas for data manipulation and loading from an external file.
* **Database Design:** The database schema and ER Diagram were designed and visualized using MySQL Workbench (LittleLemonDB\_ ER\_Diagram.mwb).
* **Data Visualization:** A Tableau Packaged Workbook (LittleLemonDB\_Tableau.twbx) was created to connect to the MySQL database for data analysis and the creation of interactive dashboards.

**3. Database Schema Design**

The project features a well-structured, normalized relational database to ensure data integrity and minimize redundancy. The schema, as detailed in the ER Diagram (LittleLemonDB\_Diagram.png), consists of four primary tables:

* **Employees**: Stores information about staff members, including their roles and salaries.
* **Customers**: Contains details for each customer, such as their name and contact information.
* **Bookings**: Manages table reservation data, linking a specific Customer to a Booking which is handled by an Employee.
* **Orders**: Details the menu items associated with each Booking, including bill amounts and quantities.

The relationships are logically structured to reflect restaurant operations: a Customer makes a Booking, and each Order is tied to that Booking. This creates a clear and efficient data hierarchy.

**4. Automation and Data Management**

The Python script (LittleLemonDB\_Final\_Project.ipynb) is the engine of this project. Its key functions include:

* **Automated Setup:** The script automatically connects to MySQL, drops any pre-existing database to ensure a clean slate, and creates the LittleLemonDB database and all its tables.
* **Data Ingestion (ETL):** It handles a two-stage data loading process:
  1. Initial sample data for all tables is inserted programmatically.
  2. A larger dataset of orders is read from an Excel file, processed using pandas, and inserted into the appropriate normalized tables. This simulates a real-world ETL (Extract, Transform, Load) process.
* **Stored Procedures:** To encapsulate business logic and streamline common database operations, five stored procedures were created:
  1. GetMaxQuantity(): Retrieves the largest order quantity.
  2. ManageBooking(): Checks if a table is already booked on a given date.
  3. AddBooking(): Adds a new customer and their booking in a single transaction.
  4. UpdateBooking(): Modifies the table number for an existing booking.
  5. CancelBooking(): Deletes a booking and its associated order.

**5. Data Analysis and Visualization**

The project culminates in a data visualization component using Tableau. The LittleLemonDB\_Tableau.twbx workbook is configured to connect directly to the MySQL database. This enables the creation of dynamic dashboards to analyze key business metrics, such as:

* Sales trends over time.
* Most popular menu items and cuisines.
* Customer booking patterns and peak hours.
* Employee performance metrics.

This provides a powerful business intelligence layer on top of the operational database, allowing stakeholders to make data-driven decisions.

**6. Conclusion**

This project successfully establishes a complete and scalable data management solution for Little Lemon. It demonstrates proficiency in database design, process automation with Python, ETL principles, and data visualization with Tableau, representing a full-cycle data project from conception to analysis.