**Ma's Tacos Restaurant Management System**

**Final Presentation Draft**

**1. Project Overview & Context**

**Introduction**

* Ma's Tacos is a family-owned Mexican restaurant seeking to leverage data technology solutions
* Focus on customer engagement, transaction analysis, and targeted marketing strategies
* Comprehensive system to track reservations, orders, customer feedback, and loyalty

**Problem Domain**

* Manual reservation and order tracking leading to inefficient operations
* Limited customer insights and relationship management capabilities
* Inability to identify popular menu items and peak business hours
* Lack of formalized feedback mechanism for service improvement

**Key Stakeholders**

* Restaurant Owners ("Mom and Pop") - Need business intelligence for decision-making
* Customers - Seeking convenient reservation, ordering, and loyalty rewards
* Staff - Require efficient systems for order management and customer service
* Business Analysts - Need data-driven insights for restaurant optimization

**2. Artifacts**

**System Architecture Overview**

A diagram of a computer

AI-generated content may be incorrect.**POS (Point of Sale)**

* Customer-facing ordering system
* Menu item management
* Order processing and payment handling
* Integration with kitchen display system

**OLTP (Online Transaction Processing)**

* SQL Server database architecture for real-time transactions
* Entity model including Customers, Orders, OrderItems, MenuItems, Reservations
* TimeSlots management for capacity planning
* SurveyResponses for customer feedback collection

**ETL/ELT Pipeline**

* Data extraction from OLTP systems
* Transformation for analytical purposes
* Loading into data warehouse structures
* Scheduled and event-driven processing

**OLAP (Online Analytical Processing)**

* Star schema design with fact and dimension tables
* Time dimension for temporal analysis
* Customer dimension for demographic insights
* Menu dimension for product analysis
* Aggregated metrics for performance evaluation

**Visualization & Reporting**

* Executive dashboards for owners
* Operational reports for staff
* Analytical views for business intelligence
* Customer-facing loyalty status displays

**3. Roles Played**

**Database Administrator (DBA)**

* Designed and implemented relational database schema
* Established backup and recovery procedures
* Optimized database performance
* Ensured data integrity and security compliance

**Data Engineer**

* Developed ETL/ELT processes
* Built data pipelines for real-time analytics
* Implemented data quality checks and validation
* Managed integration between systems

**Data Warehouse Architect**

* Designed multi-dimensional data model
* Implemented star schema for analytical queries
* Created aggregation strategies for performance
* Established historical data management policies

**Data Analyst/Scientist**

* Developed predictive models for customer behavior
* Created segmentation analysis for targeted marketing
* Performed menu optimization analysis
* Generated insights from customer feedback data

**4. Component Walkthrough**

**Reservation System**

* Web and mobile interfaces for customer bookings
* Time slot management with capacity constraints
* Integration with customer database for personalization
* Special requests handling and tracking

**Order Management System**

* Complete order lifecycle (New → In Progress → Ready → Served → Completed)
* Menu item management and inventory integration
* Special instructions handling
* Upsell recommendation engine

**Customer Management**

* Profile creation and management
* Loyalty points accumulation and redemption
* Marketing preferences and communication management
* Customer history and preferences tracking

**Feedback System**

* Post-order survey generation
* Rating collection (food, service, ambience)
* Sentiment analysis of free-text comments
* Follow-up workflow for negative feedback

**5. Analytics & Dashboards**

**Finance Analytics**

* Revenue trends by day, week, month, and year
* Sales analysis by menu category and individual items
* Average transaction values and ticket sizes
* Payment method distribution and trends
* Cost analysis and profit margin calculations

**Visualizations:** Time series charts, bar/column charts, geographic heat maps

**Customer Demographics Analytics**

* Customer segmentation by visit frequency and spending
* Order patterns by demographic groups
* Loyalty program participation and impact analysis
* Reservation patterns and preferences

**Visualizations:** Cohort analysis tables, segment comparison charts, customer journey maps

**6. Challenges & Solutions**

**Technical Challenges**

* **Challenge:** Integrating real-time order data with analytical systems **Solution:** Implemented change data capture techniques with event-based triggers
* **Challenge:** Managing peak-time database performance **Solution:** Implemented query optimization and selective denormalization
* **Challenge:** Ensuring data consistency across systems **Solution:** Developed validation routines and reconciliation processes

**Conceptual Challenges**

* **Challenge:** Defining meaningful customer segments **Solution:** Combined RFM (Recency, Frequency, Monetary) analysis with preference data
* **Challenge:** Balancing privacy concerns with personalization **Solution:** Implemented opt-in mechanisms and anonymization techniques

**Future Improvements**

* More granular inventory tracking integrated with ordering
* Enhanced marketing automation based on customer preferences
* Mobile app development for seamless customer experience

**7. Trends & Further Exploration**

**OLTP Evolution**

* On-premise vs. cloud-based solutions comparison
* Microservices architecture for restaurant operations
* Real-time OLTP systems with event sourcing

**Modern Data Warehousing**

* Column-oriented databases like Apache Druid
* Cloud data warehouses (Snowflake, BigQuery, Redshift)
* Data mesh architecture for distributed ownership

**Real-time Data Pipelines**

* Apache Kafka for event streaming
* Stream processing with Apache Flink
* Change data capture technologies

**Visualization Technologies**

* Interactive dashboards with Tableau
* Self-service BI with Power BI
* Embedded analytics for operational systems

**8. Reflection & Learning**

**Technical Growth**

* Deeper understanding of end-to-end data architecture
* Practical experience with data pipeline development
* Insight into performance optimization techniques

**Business Insights**

* Restaurant industry-specific KPIs and metrics
* Customer behavior patterns and loyalty dynamics
* Operational efficiency optimization strategies

**Surprising Discoveries**

* Impact of time slot management on overall restaurant efficiency
* Strong correlation between server assignments and customer satisfaction
* Seasonality effects on menu item popularity

**9. Q&A and Live Demo**

**Demonstration Components**

* Reservation system workflow
* Order processing sequence
* Customer feedback collection
* Analytics dashboard navigation

**Key Discussion Points**

* System scalability for multiple locations
* Data security and privacy considerations
* Integration possibilities with third-party services