# Ma’s Tacos Mexican Restaurant Project Definition

For definitions of each section’s purpose, refer to the posted template on our Canvas page.

# Background Statement

We are a consulting company providing services for a new restaurant, our first and only client.

What’s the name of our company? Ma’s Tacos

# Intentions

We intend to bring data technology solutions that meet the needs of the restaurant, ensuring seamless monetary transactions and providing payment type analysis and insights. Our analysis will include customer engagement data based on food orders, customer surveys, and marketing strategies to promote traffic.

# Values

We prioritize accurate, relevant, and meaningful data while avoiding redundant or unnecessary statistics.

Security considerations are a fundamental aspect of our work.

# Focus

## Breadth

Our effort will include customer experience management

### Processes:

* Reservations
* Marketing Strategies
* Customer Surveys

### Information:

* Financial data
* Customer data
* Employee data
* Inventory process

### Events:

* Transaction events
* Inventory events
* Scheduling events

### Groups/Org Units:

* Customers
* Employees
* Food
* Payroll
* Analysts/Financial analysts

### Location:

* MN

## Depth

We require detailed and precise data to support informed and strategic business decisions.

## Emphasized Perspectives

* Customer engagement
* Analytics based on customer interaction

## Universality

Our solutions are designed for Ma’s Tacos, with the potential to be adapted for other restaurants in the future.

# Scope of Integration

Database software to analyze customer trends, customer reservations, monitor popular inventory items which can affect marketing strategies to promote traffic to Ma’s Tacos.

* Customer engagement/analytics:
  + Track past orders to properly manage inventory
  + Identify popular food items and vice versa
  + Identify volume of customers based on time of day
  + Reservation system that captures customer email for surveys and announcements if opt in.
* Marketing:
  + Create specials and deals based on least popular items from customer analytics
  + Create deals based on time of day
  + Create a credit system based on how many times customer has ordered items from Ma’s Tacos.
* Customer Surveys
  + Track what customers think of the food and environment at Ma’s Tacos
  + Feedback from customers to improve marketing strategies

# Context

We have a goal to identify customer interaction through physical food orders and customer surveys to identify strong and weak areas of Ma’s Tacos.

# Stakeholders

* Customers
* Mom and Pop
* Analysts
* Employee

# Candidate Solutions

Integration with Microsoft SQL Server to collect data and analyze the best approaches to manage customer relationships and guide traffic to Ma’s Tacos.

ERD

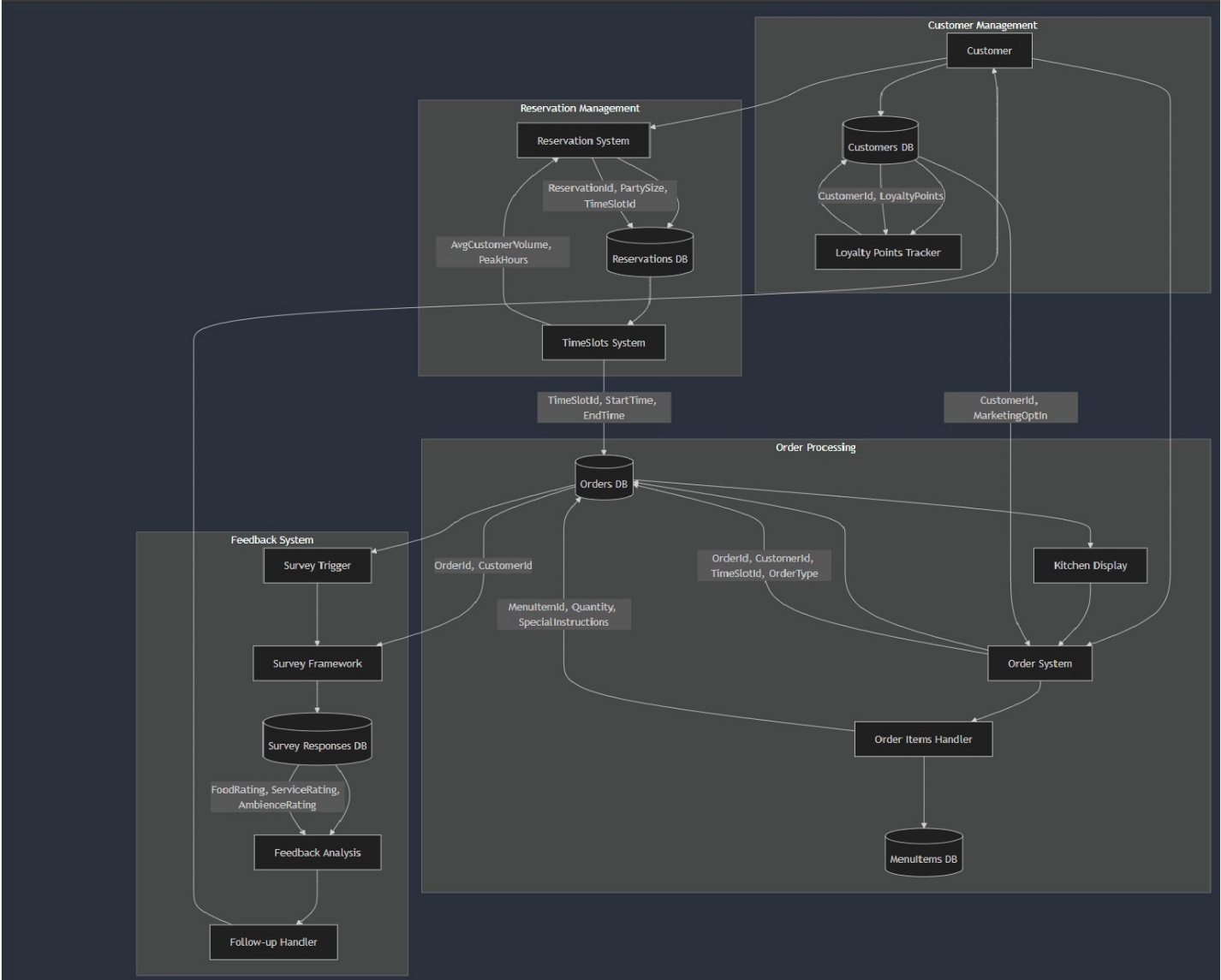
A diagram of a computer

AI-generated content may be incorrect.

Artifacts:

* Customer engagement through membership/loyalty system
* Reservations system that also offers customers membership/loyalty system
* Track popularity of menu items which can affect menu changes or deals
* Customer engagement through survey system which is done on every order

Data Flow Diagram

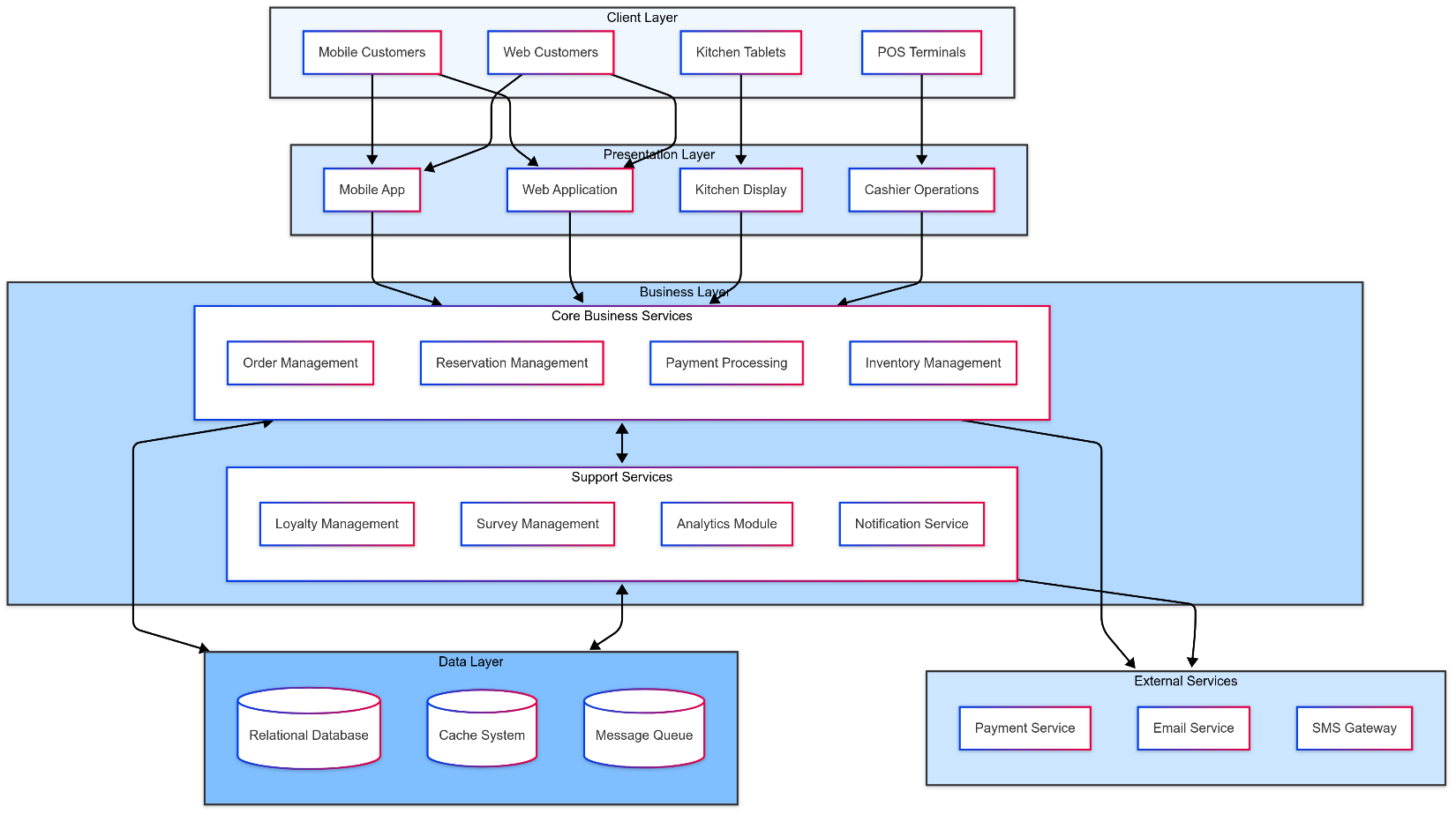


* Clear separation of systems:
  + Order processing
    - Processes orders which can have many order items driven by menu items.
    - This system triggers Feedback system.
  + Feedback System
    - Generates surveys for customer interaction and follow up.
  + Customer Management.
    - Sets up new or returning customers to accrue loyalty points.
  + Reservation system
    - Reservation system set time slots for customers through timeslot system.

State Transition Diagram

|  |  |
| --- | --- |
| Reservation States:   * Transition from pending->confirmed->seated->completed * Possible cancellations * Links to Order Process   Order States:   * New ->InProgress->Ready->Served->Completed * Initiates Survey Process   Feedback Collection:   * Survey response workflow * Follow-up states based on ratings |  |

Conceptual Architecture Diagram



**Ma's Tacos DevOps Pipeline (Development Project Focus)**

**1. Planning & Requirements**

* Requirements gathering from restaurant stakeholders (customers, Mom and Pop owners, employees)
* Business analysis focused on customer engagement, ordering, and survey processes
* Data modeling and schema design (based on existing ERD with Orders, Customers, MenuItems, etc.)
* Scope definition encompassing reservation systems, order processing, and customer analytics

**2. Development Environment Setup**

* Source code management system configuration
* Development database setup mirroring the production SQL Server environment
* Local development environment standardization across the team
* Development tools and library selection for consistent implementation

**3. Component Development Tracks**

* **Reservation System**
  + Time slot management implementation
  + Party size handling and special requests tracking
  + Integration with customer database
* **Order Processing System**
  + Menu item management
  + Order status tracking (New → InProgress → Ready → Served → Completed)
  + Kitchen display interface development
* **Customer Management System**
  + Customer profile creation and management
  + Loyalty points tracking and redemption functionality
  + Marketing opt-in preference management
* **Survey & Feedback System**
  + Survey trigger implementation after order completion
  + Rating collection (food, service, ambience)
  + Follow-up workflow for negative feedback

**4. Continuous Integration**

* Automated build configuration for each component
* Unit testing implementation for core business logic
* Integration testing between interconnected systems
* Code quality analysis and enforcement
* Security scanning for customer data protection

**5. Continuous Delivery**

* Development to staging environment promotion process
* Database migration scripts and version control
* User acceptance testing procedures with restaurant staff
* Performance testing under expected load conditions
* Feature flag implementation for controlled rollouts

**6. Deployment Pipeline**

* Production environment configuration for restaurant systems
* Rollback procedures for failed deployments
* Database backup and recovery processes
* Zero or minimal-downtime deployment strategy

**7. Monitoring & Support**

* Application performance monitoring setup
* Error logging and alerting configuration
* Database performance monitoring
* Key business metrics tracking (order volume, reservation fulfillment)

**8. Feedback Loop Integration**

* Survey results aggregation into development priorities
* Issue tracking and bug management process
* Feature request evaluation procedure
* Regular stakeholder review meetings for development direction

**9. Documentation**

* System architecture documentation
* API specifications for potential future integrations
* User manuals for restaurant staff
* Data dictionary for database maintenance

**10. Security & Compliance**

* Customer data protection measures
* Payment processing security implementation
* Data retention policies
* Regular security assessment schedule

This pipeline specifically addresses the restaurant's needs for customer engagement tracking, order analysis, and feedback collection while providing a structured approach to developing and deploying the required systems.

**Ma's Tacos Project - Key Questions to Ponder:**

**Solution Purpose & Scope**

* **What capability am I building a solution for?**
  + Creating customer engagement tracking through reservations, ordering, and feedback systems
  + Developing a loyalty program to drive repeat business
  + Building analytics capabilities to identify popular menu items and peak business hours
* **What problem am I trying to solve with this data solution?**
  + How to optimize menu offerings based on customer preferences
  + How to increase customer loyalty and repeat visits
  + How to improve service quality through targeted feedback analysis
  + How to manage reservations efficiently to maximize table utilization
* **Who are the end users or stakeholders for my solution?**
  + Restaurant management ("Mom and Pop")
  + Customers (for reservations, ordering, and surveys)
  + Kitchen staff (for order management)
  + Business analysts (for data-driven decision making)
* **How will success be measured for my part of the project?**
  + Increased customer retention rates
  + Higher customer satisfaction ratings in surveys
  + More efficient inventory management
  + Improved marketing campaign effectiveness through targeted promotions

**Data Sourcing & Preparation**

* **Where will I source data from?**
  + Point-of-sale (POS) systems for order and payment information
  + Reservation system for customer bookings and time slot utilization
  + Customer surveys for feedback and satisfaction metrics
  + Loyalty program for customer engagement patterns
* **What format will the source data be in?**
  + SQL Server database records for orders, menu items, and customers
  + Survey responses potentially in structured form data
  + Potentially API integrations with third-party reservation platforms
* **How will I ensure data accuracy and completeness?**
  + Validation rules for customer information collection
  + Required fields for critical ordering data
  + Verification processes for surveys to ensure authenticity

**Solution Components & Architecture**

* **What are the solution components?**
  + Reservation system with time slot management
  + Order processing system with menu item tracking
  + Customer database with loyalty point accumulation
  + Survey generation and analysis system
  + Analytics dashboard for management insights
* **How will I ingest, transform, store, and present the data?**
  + Data will flow from customer interactions through our outlined systems
  + SQL Server will store relational data across tables shown in ERD
  + Transformation will occur to aggregate menu popularity and customer preferences
  + Presentation will likely involve dashboards for management
* **What will my data flow look like from source to final output?**
  + Matches data flow diagram with order processing triggering feedback collection
  + Customer interactions feeding into loyalty management
  + Time slot system supporting both reservations and order capacity planning

**Tools, Technologies, & Resources**

* **What programming languages, databases, or platforms will I use?**
  + Microsoft SQL Server
  + Potential web/mobile interfaces for customer-facing components
  + Reporting tools for analytics and management dashboards

**Data Security & Compliance**

* **Do I need to consider data privacy, security, or regulatory requirements?**
  + Encryption of customer personal information (names, emails, phone numbers)
  + Secure handling of payment type data
  + Marketing opt-in permissions management
* **How will I protect sensitive data in transit and at rest?**
  + Encryption of customer data in the database
  + Secure transmission of survey links and marketing materials
  + Limited access to customer financial and personal information

**Project-Specific Questions**

* **How will the loyalty point system influence customer behavior?**
  + What point thresholds should trigger rewards?
  + How will points be calculated (per visit, per dollar spent, etc.)?
  + Will there be tiered loyalty levels?
* **What metrics will best identify menu item popularity?**
  + Raw sales numbers vs. profit margin contribution
  + Seasonal variations in menu item performance
  + Correlations between specific items and customer return rates
* **How will survey data drive operational improvements?**
  + Threshold ratings that trigger management follow-up
  + Integration of feedback into staff training
  + Connection between specific survey questions and business outcomes
* **What reservation patterns will maximize table utilization?**
  + Optimal time slot durations for different party sizes
  + Peak hours management strategies
  + No-show prediction and overbooking calculations

**AI-Powered Data Analytics Implementation for Ma's Tacos**

**Introduction**

This document outlines a comprehensive strategy for implementing AI-powered data analytics for Ma's Tacos restaurant management system. By leveraging artificial intelligence and machine learning techniques, Ma's Tacos can transform raw data into actionable insights, enhance customer engagement, optimize operations, and increase profitability.

**Key Analytics Objectives**

1. Customer Behavior Analysis
2. Menu Performance Optimization
3. Operational Efficiency
4. Marketing Campaign Effectiveness
5. Predictive Analytics for Business Planning

**AI-Powered Analytics Implementation**

**1. Data Collection & Processing Framework**

**Data Sources**

* **Transaction Data**: Orders, payments, and menu item selections
* **Customer Data**: Demographics, loyalty points, reservation history
* **Operational Data**: Peak hours, table utilization, order fulfillment times
* **Customer Feedback**: Survey responses and ratings
* **Marketing Data**: Campaign engagement and conversion rates

**AI-Enhanced ETL (Extract, Transform, Load)**

* Implement automated data extraction from MySQL database
* Use AI for data cleaning and normalization
* Create data pipelines for regular analytics updates
* Establish real-time data streaming for dashboard updates

**2. Customer Analytics Platform**

**Customer Segmentation**

**AI Implementation**: Use clustering algorithms (K-means, hierarchical clustering) to identify distinct customer segments based on:

* Ordering patterns
* Visit frequency
* Average spend
* Menu preferences
* Response to promotions

**Customer Lifetime Value Prediction**

# Example clustering code

from sklearn.cluster import KMeans

import pandas as pd

# Connect to MySQL database

conn = mysql.connector.connect(

host="localhost",

user="username",

password="password",

database="mas\_tacos"

)

# Query customer data

query = """

SELECT c.CustomerId, c.LoyaltyPoints,

COUNT(DISTINCT o.OrderId) AS OrderCount,

AVG(o.TotalAmount) AS AvgSpend,

MAX(o.OrderTime) AS LastOrderDate

FROM Customers c

JOIN Orders o ON c.CustomerId = o.CustomerId

GROUP BY c.CustomerId

"""

customer\_data = pd.read\_sql(query, conn)

# Prepare data for clustering

X = customer\_data[['LoyaltyPoints', 'OrderCount', 'AvgSpend']]

X\_scaled = StandardScaler().fit\_transform(X)

# Apply K-means clustering

kmeans = KMeans(n\_clusters=4, random\_state=42)

customer\_data['Segment'] = kmeans.fit\_predict(X\_scaled)

# Analyze segments

segment\_profiles = customer\_data.groupby('Segment').agg({

'LoyaltyPoints': 'mean',

'OrderCount': 'mean',

'AvgSpend': 'mean',

'CustomerId': 'count'

}).rename(columns={'CustomerId': 'Count'})

**AI Implementation**: Develop ML regression models to predict future value of customers  
**Business Impact**: Identify high-value customers for personalized retention strategies

**Churn Prediction**

**AI Implementation**: Classification algorithms to identify at-risk customers  
**Business Impact**: Enable proactive retention campaigns before customers leave

**3. Menu Analytics & Optimization**

**Menu Item Performance Analysis**

**AI Implementation**: Association rule mining to identify item combinations frequently ordered together  
**Business Impact**: Create effective combo deals and menu layouts

**Price Elasticity Analysis**

**AI Implementation**: Statistical models to determine optimal price points

# Example association rule mining

from mlxtend.frequent\_patterns import apriori, association\_rules

# Query order items data

query = """

SELECT o.OrderId, oi.MenuItemId

FROM Orders o

JOIN OrderItems oi ON o.OrderId = oi.OrderId

"""

order\_items = pd.read\_sql(query, conn)

# Convert to basket format

basket = order\_items.pivot\_table(index='OrderId', columns='MenuItemId', aggfunc=lambda x: 1, fill\_value=0)

# Apply Apriori algorithm

frequent\_itemsets = apriori(basket, min\_support=0.05, use\_colnames=True)

rules = association\_rules(frequent\_itemsets, metric="lift", min\_threshold=1.5)

# Find strong associations

strong\_rules = rules[rules['lift'] > 2]

**Business Impact**: Maximize revenue without decreasing demand

**Menu Recommendation Engine**

**AI Implementation**: Collaborative filtering for personalized menu suggestions  
**Business Impact**: Increase average order value through targeted upselling

**4. Operational Intelligence**

**Demand Forecasting**

**AI Implementation**: Time series forecasting models (ARIMA, Prophet) to predict customer volume  
**Business Impact**: Optimize staffing levels and inventory management

**Table Utilization Optimization**

**AI Implementation**: Optimize reservation time slots based on historical patterns

# Example demand forecasting

from prophet import Prophet

# Query historical customer volume

query = """

SELECT DATE(OrderTime) as date, COUNT(\*) as order\_count

FROM Orders

GROUP BY DATE(OrderTime)

ORDER BY date

"""

daily\_orders = pd.read\_sql(query, conn)

daily\_orders.columns = ['ds', 'y'] # Prophet requires these column names

# Create and fit model

model = Prophet(seasonality\_mode='multiplicative')

model.fit(daily\_orders)

# Make future predictions

future = model.make\_future\_dataframe(periods=30) # 30 days forecast

forecast = model.predict(future)

# Plot forecast

fig = model.plot(forecast)

**Business Impact**: Maximize seating capacity and revenue

**Sentiment Analysis on Customer Feedback**

**AI Implementation**: NLP models to extract sentiment and topics from survey responses  
**Business Impact**: Identify areas for improvement and measure impact of changes

**5. Marketing Campaign Analytics**

**Campaign Effectiveness Prediction**

**AI Implementation**: Predictive models to estimate ROI of marketing campaigns  
**Business Impact**: Allocate marketing budget to highest-performing channels

**Personalized Marketing Automation**

**AI Implementation**: ML models to determine optimal timing and content for customer communications  
**Business Impact**: Increase campaign conversion rates through personalization

**6. Visualization & Reporting**

**Interactive Dashboards**

* Real-time KPI monitoring
* Drill-down capabilities for detailed analysis
* Role-based access control for different stakeholders

**Automated Insights**

* AI-generated narrative explanations of data trends
* Anomaly detection with automated alerts
* Actionable recommendations based on data patterns

**Technical Implementation**

**Technology Stack**

**Data Storage & Processing**

* MySQL database (existing)
* Data warehouse for analytics (Amazon Redshift or Snowflake)
* Apache Airflow for ETL orchestration

**Analytics & AI Tools**

* Python with data science libraries (pandas, scikit-learn, TensorFlow)
* R for statistical analysis
* Jupyter Notebooks for exploratory data analysis

**Visualization**

* Tableau or Power BI for interactive dashboards
* Custom web dashboards using D3.js for specialized visualizations

**Implementation Phases**

**Phase 1: Foundation (1-2 months)**

* Set up data pipeline from MySQL to analytics environment
* Implement basic dashboards for core KPIs
* Deploy initial customer segmentation model

**Phase 2: Advanced Analytics (2-3 months)**

* Implement predictive models for demand forecasting
* Deploy menu optimization analytics
* Set up automated reporting

**Phase 3: AI Enhancement (3-4 months)**

* Implement recommendation engines
* Deploy NLP for feedback analysis
* Set up ML-based marketing optimization

**Expected Business Impact**

**Revenue Optimization**

* 10-15% increase in average order value through targeted recommendations
* 5-8% increase in customer retention through proactive engagement
* 15-20% improvement in marketing campaign effectiveness

**Operational Efficiency**

* 20-30% reduction in food waste through improved demand forecasting
* 10-15% increase in table utilization during peak hours
* 8-12% reduction in labor costs through optimized scheduling

**Customer Experience Improvements**

* More personalized service leading to higher satisfaction ratings
* Faster issue resolution based on feedback analysis
* Enhanced loyalty program participation

**Conclusion**

The implementation of AI-powered data analytics will transform Ma's Tacos from a data-collecting organization to a data-driven business. By leveraging artificial intelligence to extract insights from existing data, Ma's Tacos can make more informed decisions, create personalized customer experiences, and ultimately increase profitability.

This framework provides a comprehensive roadmap for implementation while remaining flexible enough to adapt to changing business needs and priorities. The phased approach ensures that Ma's Tacos can start realizing value quickly while building toward more sophisticated analytics capabilities over time.