Business Analytics Case Study Domino's

Q) Select an organization and draw a business process (BP) model diagram covering a single operational task. Include the organization specification with information on its location and a URL of the organization. The business process should cover only one operational task.

Domino's Pizza:

Description: Domino's Pizza, commonly known as Domino's, is a global pizza delivery and carryout chain with a strong presence in the fast-food industry. The Domino's Pizza chain was founded in 1960 in Ypsilanti, Michigan, USA, and has since grown to become one of the largest pizza chains in the world, serving a wide range of pizzas, side dishes, and beverages. The company is known for its fast pizza delivery, innovative technology and online ordering system.

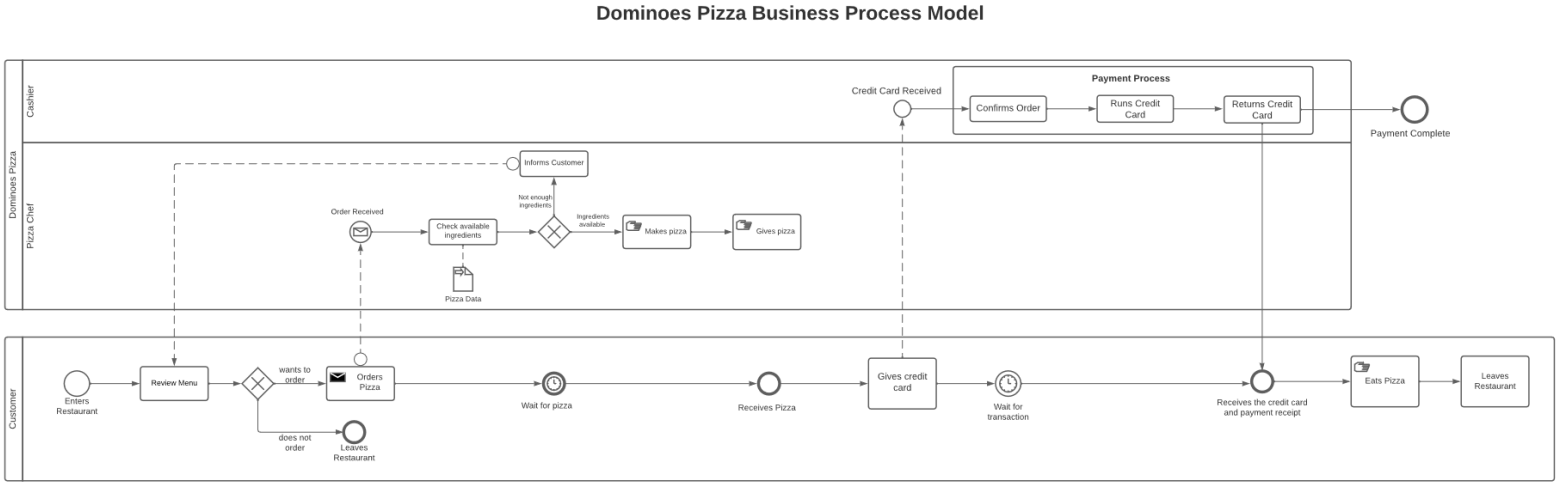
Domino's Pizza Organization Specification:

- **Location:** Domino's Pizza operates globally with thousands of locations in over 90 countries. The headquarters is located in Ann Arbor, Michigan, USA.
- **Website:** Domino's Pizza Official Website

Operational Task: Order Processing

Business Process Model: Domino's Order Processing involves taking and fulfilling customer orders for pizzas and other items on the menu. As a result, customer's orders are accurately recorded, prepared, and delivered on time.

Here, firstly a customer enters the Domino's Pizza store and orders a pizza and selects the toppings. The order goes to the pizza chef, who checks if the required ingredients for making the pizza are available. If the ingredients are available, he proceeds to make the pizza, otherwise the customer is told the ingredients are not available and he is told to reorder a different pizza. After the pizza chef finishes making the pizza, the customer receives the pizza, and is then asked to pay with his credit card. The system verifies the credit card transactions, and after the payment is complete, the credit card and the cash receipt are handed over to the customer.



Q) Describe the nature of information generated or utilized by the business process in the form of unstructured or semi-structured data. List the data in any of the NoSQL format for the unstructured or semi-structured data.

Domino's Pizza, like many modern businesses, generates and utilizes a variety of unstructured and semi-structured data in its business processes. This data is crucial for various aspects of their operations, including customer service, order management, supply chain, and marketing. Below are some examples of the types of data generated or utilized by Domino's Pizza in a NoSQL format:

Customer Reviews (Semi-Structured):

- **MongoDB Document:**

{

"customer_id": "12345",

"order_id": "67890",

"rating": 4.5,

"comments": "The pizza was delicious, but it arrived a bit late."

}

Social Media Data (Unstructured):

- **Cassandra Column Family:**

```
{
  "post_id": "987654",
  "user_id": "user123",
  "text": "Just had an amazing Domino's pizza for dinner! #PizzaLover"
}
```

Delivery Tracking (Semi-Structured):

- **Couchbase JSON Document:**

```
{
  "order_id": "54321",
  "delivery_status": "In Transit",
  "driver_id": "driver5678",
  "estimated_delivery_time": "2023-09-19T18:30:00"
}
```

Website Clickstream Data (Semi-Structured):

- **Apache Cassandra Column Family:**

```
{
  "session_id": "session123",
  "page_url": "/menu",
  "timestamp": "2023-09-19T15:45:00",
  "user_agent": "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36..."
}
```

Ingredient Inventory (Structured within NoSQL):

- **Amazon DynamoDB Table:**

```
{
  "ingredient_id": "flour001",
  "name": "Flour",
  "quantity": 500,
  "unit": "kg"
}
```

Menu Items (Semi-Structured):

- **Redis Hash:**

```
{
  "item_id": "pizza123",
  "name": "Pepperoni Pizza",
  "price": 12.99,
  "ingredients": ["dough", "tomato sauce", "cheese", "pepperoni"]
}
```

Customer Profiles (Structured within NoSQL):

- **Google Cloud Firestore Document:**


```
{
 "customer_id": "67890",
 "name": "John Smith",
 "email": "john.smith@example.com",
 "phone": "+1-123-456-7890",
 "address": {
  "street": "123 Main St",
  "city": "Anytown",
  "state": "CA",
  "zip_co/de": "12345"
 }
}
```


These examples illustrate how Domino's Pizza collects and manages various types of data in unstructured, semi-structured, or structured formats using NoSQL databases like MongoDB, Cassandra, Couchbase, Redis, and Google Cloud Firestore. This data is then used for purposes such as customer feedback analysis, order tracking, website optimization, and inventory management, among others.

Q) Outline a use case example on the insights provided by the unstructured or semi-structured data through the utilization of NoSQL format from a business standpoint.

Use Case: Customer Feedback Analysis

Business Objective: Domino's Pizza wants to improve customer satisfaction and the overall quality of its products and services. To achieve this, they leverage unstructured and semi-structured data collected from customer reviews and social media to gain valuable insights.

Data Sources:

- **Customer Reviews**: These are collected from online platforms, feedback forms, and surveys.
- **Social Media Data**: Data from platforms like Twitter, Facebook, and Instagram where customers share their experiences and opinions.

NoSQL Data Storage: MongoDB and Cassandra databases are used to store and manage unstructured and semi-structured data.

Analysis Process:

- **Data Collection**: Customer reviews and social media data are continuously collected and stored in the NoSQL databases.
- **Data Preprocessing**: Data preprocessing techniques are applied to extract relevant information such as ratings, comments, timestamps, and user sentiments.
- **Sentiment Analysis**: Natural Language Processing (NLP) tools are employed to perform sentiment analysis on customer comments. Comments are categorized as positive, negative, or neutral based on the sentiment detected.
- **Topic Modeling**: Domino's utilizes topic modeling algorithms to identify recurring themes and topics within customer comments. This helps them understand the most common issues or positive aspects mentioned by customers.
- **Identifying Trends**: By analyzing timestamps and sentiment trends over time, Domino's can identify seasonal patterns, peak review times, and changes in customer sentiment.

Insights and Business Benefits:

- **Identifying Quality Issues**: By analyzing negative sentiments and recurring complaints in customer feedback, Domino's can pinpoint specific areas where they need to improve, such as pizza quality, delivery times, or customer service.
- **Product Development**: Topic modeling can reveal emerging trends in customer preferences, allowing Domino's to create new menu items or promotions that align with customer desires.
- **Operational Improvements**: By tracking sentiment trends over time, Domino's can identify whether changes they make to their processes or services are positively impacting customer satisfaction.
- **Marketing Campaigns**: Insights from social media data can inform targeted marketing campaigns. For example, if a new pizza flavor receives positive social media buzz, Domino's can promote it more aggressively.
- **Competitor Benchmarking**: By monitoring social media discussions about competitors, Domino's can gain insights into their own strengths and weaknesses compared to others in the industry.
- **Customer Engagement**: Addressing customer feedback and concerns promptly can enhance customer loyalty and retention.

In conclusion, by harnessing unstructured and semi-structured data stored in NoSQL databases, Domino's Pizza can gain valuable insights into customer sentiments, preferences, and trends. These insights enable data-driven decision-making, leading to improvements in product quality, service delivery, marketing strategies, and overall customer satisfaction.

Q) Also, provide an explanation of how the NoSQL structure and framework allows the Domino's Pizza organization to be competitive.

The utilization of NoSQL databases and their flexible structure and framework provides Domino's Pizza with several advantages that contribute to their competitiveness in the fast-food industry:

- **Scalability**: NoSQL databases like MongoDB, Cassandra, and others are designed to scale horizontally, allowing Domino's to handle massive amounts of data as their business grows. This scalability is essential for handling the large volume of orders, customer data, and feedback generated daily.
- **Real-time Data Analysis**: NoSQL databases excel at handling real-time data ingestion and analysis. Domino's can process customer orders and feedback in real-time, enabling quick responses to issues and opportunities. This agility is crucial in a competitive market where customer preferences can change rapidly.
- **Flexibility**: NoSQL databases can accommodate a variety of data types, including unstructured and semi-structured data. This flexibility is valuable for handling diverse data sources, such as customer reviews, social media data, delivery tracking, and more, all in one place.
- **Schema-less Design**: NoSQL databases don't require a rigid schema, allowing Domino's to adapt to evolving data needs without the need for complex schema migrations. They can easily modify data structures to capture new types of information, like changing menu items or customer attributes.
- **High Availability and Fault Tolerance**: NoSQL databases are often designed to provide high availability and fault tolerance, ensuring that Domino's online ordering and data systems are robust and available even in the face of hardware failures or traffic spikes.
- **Geographical Distribution**: Many NoSQL databases support geographical distribution, enabling Domino's to replicate data across multiple data centers or cloud regions. This ensures low-latency access to data for customers and employees, improving their user experience.
- **Analytics and Insights**: NoSQL databases are equipped with tools for data analytics and reporting, allowing Domino's to extract valuable insights from their data. This empowers them to make data-driven decisions regarding menu changes, marketing strategies, and operational improvements.
- **Cost-Effectiveness**: NoSQL databases are often more cost-effective than traditional relational databases when it comes to handling large datasets and high transaction volumes. Domino's can manage their data without incurring excessive infrastructure costs.
- **Security**: NoSQL databases offer robust security features, ensuring that customer data remains confidential and protected against breaches. Compliance with data privacy regulations is critical for maintaining trust and competitiveness.

- **Integration with Modern Technologies**: NoSQL databases can easily integrate with modern technologies like cloud computing, microservices, and containerization. This integration enables Domino's to stay up to date with the latest tech trends and maintain a competitive edge.

In summary, the strategic use of NoSQL databases within Domino's Pizza's technology infrastructure enables them to efficiently manage, analyze, and leverage vast amounts of unstructured and semi-structured data. This agility, scalability, and ability to derive actionable insights from data contribute to Domino's ability to stay competitive in a dynamic and competitive market, ultimately enhancing customer satisfaction and loyalty.

Explain a KPI for the Domino's Pizza Business model and explain how it enhances customer satisfaction, maintain operational efficiency, gain a competitive advantage, and inform data-driven decision-making within their business process model?

Key Performance Indicator (KPI): Pizza Delivery Time

Purpose: The KPI of Pizza Delivery Time is essential for evaluating the success of Domino's Pizza's business process model, particularly in terms of order fulfillment and customer satisfaction.

Description: From the moment an order is placed until it arrives at the customer's specified delivery location, Pizza Delivery Time measures the average delivery time for a pizza order. In the business process model, this KPI measures the efficiency of the order processing and delivery.

Importance:

- **Customer Satisfaction:** Prompt and timely pizza deliveries are crucial for ensuring a positive customer experience. Customers expect their orders to arrive quickly, and a long delivery time can lead to dissatisfaction.
- **Competitive Advantage:** Faster delivery times can be a competitive advantage in the pizza delivery industry. Shorter delivery times can attract and retain customers who value convenience and speed.
- **Operational Efficiency:** Keeping track of delivery times helps Domino's assess how efficiently it processes orders, prepares pizzas, and dispatches deliveries. Identifying bottlenecks or delays allows for process improvements.

Measurement and Targets:

- **Measurement:** Pizza Delivery Time is measured in minutes, typically from the moment an order is confirmed to the moment the pizza arrives at the customer's location.

- **Targets:** Domino's may set specific targets for Pizza Delivery Time based on location, time of day, and delivery distance. For example, a common goal might be to deliver pizzas within 30 minutes of order confirmation during peak hours for nearby locations.

Monitoring and Analysis:

- Domino's should continuously monitor Pizza Delivery Time for each store or delivery area.
- Variations in delivery times can be analyzed to identify factors affecting delivery speed, such as traffic, order volume, or preparation time.
- In real-time, data on Pizza Delivery Time can be used to optimize delivery routes or assign more delivery drivers during peak times.

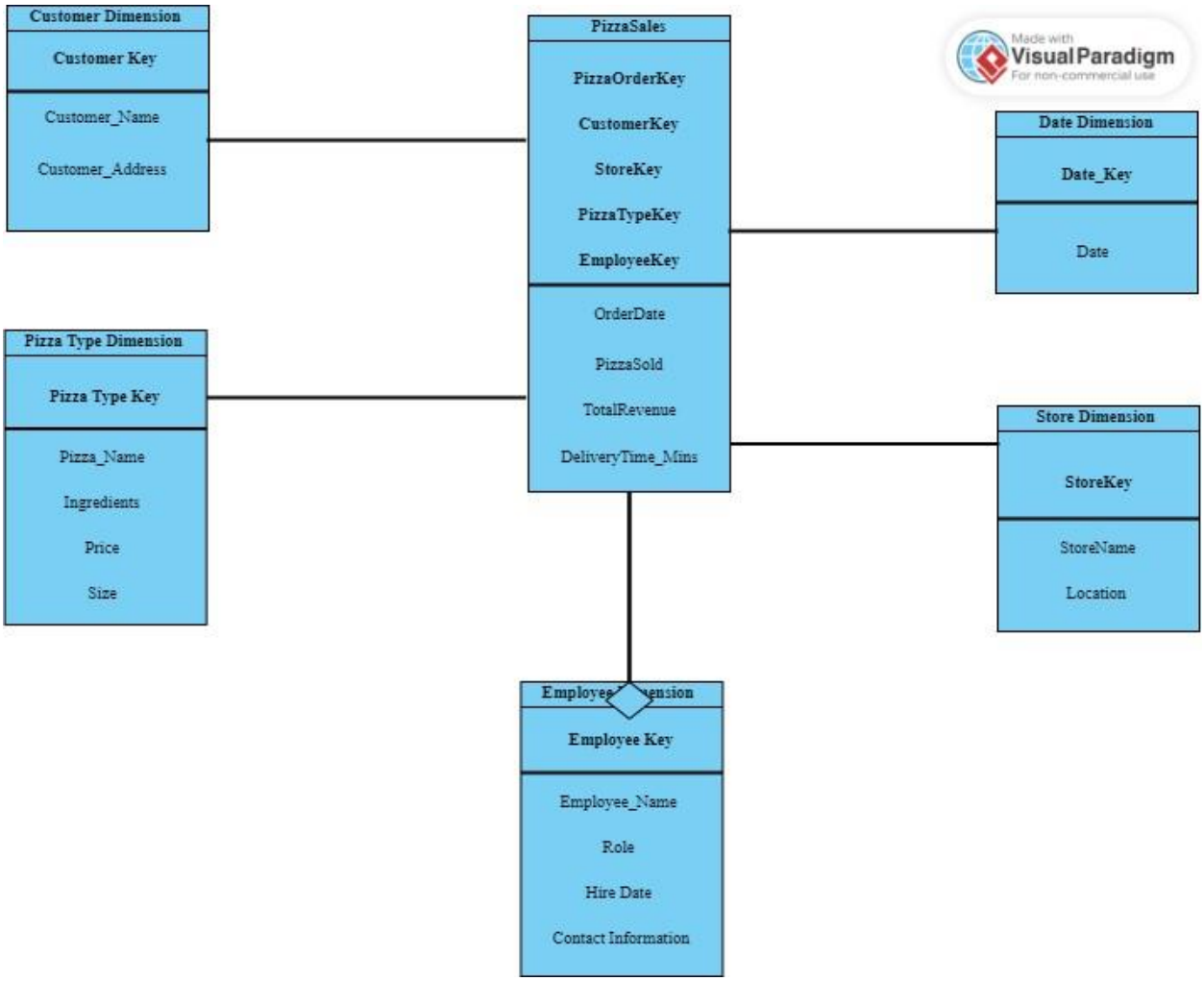
Benefits:

- **Improved Customer Satisfaction:** Meeting or exceeding delivery time expectations leads to higher customer satisfaction and encourages repeat business.
- **Operational Efficiency:** Identifying and addressing bottlenecks or inefficiencies in the delivery process can reduce operational costs and enhance overall efficiency.
- **Competitive Edge:** Maintaining faster delivery times can differentiate Domino's from competitors and attract customers seeking quick and convenient food delivery.
- **Data-Driven Decision-Making:** Data from this KPI can inform strategic decisions about staffing, delivery logistics, and store operations.

In summary, the KPI of Pizza Delivery Time is a crucial metric for evaluating the success of Domino's Pizza's business process model, with a focus on order fulfillment and customer satisfaction. It allows Domino's to track and optimize the efficiency of its delivery operations, leading to improved customer experiences and a competitive advantage in the pizza delivery industry.

Create a star schema to support the KPI of Domino's Pizza. Indicate the nature and level of aggregation/granularity associated with the Fact table attributes.

To support the KPI of Domino's Pizza, which is Pizza Delivery Time, a star schema can be designed with a fact table and dimension tables. Here's a simplified star schema structure:



Fact Table: Delivery Performance

- **Fact:** Pizza Delivery Time (in minutes)
- **Date Key:** Foreign key linking to the Date dimension
- **Store Key:** Foreign key linking to the Store dimension
- **Order Key:** Foreign key linking to the Order dimension

Dimension Tables:

- **Date Dimension:**
- **Date Key (Primary Key):** Unique identifier for each date.
- **Full Date:** Full date (e.g., YYYY-MM-DD).
- **Day of Week:** Day of the week (e.g., Monday, Tuesday).
- **Month:** Month of the year (e.g., January, February).
- **Year:** Year (e.g., 2023).
- **Store Dimension:**
- **Store Key (Primary Key):** Unique identifier for each store location.

- **Store Name:** Name of the Domino's Pizza store.
- **Location:** Store location or address.
- **Region:** Geographical region of the store.
- **Order Dimension:**
- **Order Key (Primary Key):** Unique identifier for each order.
- **Order Number:** A unique identifier for the order.
- **Order Date:** Date and time when the order was placed.
- **Customer Key:** Foreign key linking to the Customer dimension.
- **Pizza Type:** Type or category of pizza ordered (e.g., Pepperoni, Margherita).
- **Order Type:** Type of order (e.g., delivery, pickup).

Nature and Level of Aggregation/Granularity:

- **Pizza Delivery Time:** This is the fact being measured and is stored at the most granular level, i.e., individual pizza delivery instances. Each row in the fact table represents a specific pizza delivery with its associated attributes.
- **Date Dimension:** The Date dimension provides various attributes to analyze pizza delivery times at different levels of granularity, such as by day, month, or year.
- **Store Dimension:** The Store dimension allows analysis of delivery times based on different store locations and regions.
- **Order Dimension:** The Order dimension provides context about each order, including the type of pizza ordered and whether it was for delivery or pickup.

This star schema allows for flexible and efficient analysis of Pizza Delivery Time based on various dimensions, providing insights into delivery performance, trends, and potential areas for improvement at different levels of granularity.

Identify some of the analytics outcomes in the form of analytic rules that can emerge from the star schema to support the metrics of business process success. Provide some hypothetical values based on the dimension and fact attribute values to frame the analytic outcome.

Certainly, let's consider some hypothetical analytic rules that can emerge from the star schema designed to support the Pizza Delivery Time metric at Domino's Pizza. These rules can help assess the success of the business process and identify areas for improvement. We'll use example dimension and fact attribute values to frame these analytic outcomes:

Analytic Rule 1: Delivery Performance by Day of the Week

Analytic Outcome: "Pizza delivery times tend to be fastest on weekdays compared to weekends."

Hypothetical Values:

- **Day of the Week Dimension:**
- Monday
- Tuesday
- Saturday
- Sunday
- **Pizza Delivery Time (minutes):**
- Weekdays: Average delivery time = 28 minutes
- Weekends: Average delivery time = 35 minutes

Analytic Rule 2: Delivery Performance by Store Location

Analytic Outcome: "Store locations in Region A consistently achieve faster pizza delivery times compared to those in Region B."

Hypothetical Values:

- **Store Dimension:**
- Store Location A
- Store Location B
- Store Location C
- Store Location D
- **Pizza Delivery Time (minutes):**
- Region A Stores: Average delivery time = 25 minutes
- Region B Stores: Average delivery time = 32 minutes

Analytic Rule 3: Impact of Order Type on Delivery Time

Analytic Outcome: "Delivery orders consistently have longer delivery times compared to pick up orders."

Hypothetical Values:

- **Order Dimension:**
- Order Type - Delivery
- Order Type - Pickup
- **Pizza Delivery Time (minutes):**
- Delivery Orders: Average delivery time = 32 minutes
- Pickup Orders: Average delivery time = 20 minutes

Analytic Rule 4: Seasonal Trends in Delivery Performance

Analytic Outcome: "During the holiday season, pizza delivery times tend to increase due to higher order volumes."

Hypothetical Values:

- **Date Dimension:**
- December
- January
- **Pizza Delivery Time (minutes):**
- December: Average delivery time = 40 minutes
- January: Average delivery time = 28 minutes

These analytic rules provide insights into different aspects of pizza delivery performance at Domino's Pizza. They help assess how various dimensions, such as day of the week, store location, order type, and seasonality, impact delivery times. Analyzing these rules can inform decision-making, allowing Domino's to optimize its delivery processes, allocate resources effectively, and enhance the overall customer experience.

References:

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