**Multiple-Choice Questions (MCQs)**

**Definition-based Questions:**

1. **What is a data warehouse?**  
   a) A database for real-time transactions  
   b) A type of data management system for business intelligence and analytics  
   c) A place to store operational data  
   d) A type of OLTP system

**Answer**: b

1. **What is the primary goal of OLAP systems?**  
   a) Performing real-time transactions  
   b) Supporting queries and analytics  
   c) Managing inventory systems  
   d) Performing data normalization

**Answer**: b

1. **What is the function of a surrogate key in a data warehouse?**  
   a) Storing natural business identifiers  
   b) Providing unique, artificial identifiers  
   c) Managing transaction IDs  
   d) Handling NULL values in fact tables

**Answer**: b

1. **What is dimensional modeling?**  
   a) A database normalization technique  
   b) A methodology for designing data warehouses  
   c) A transactional database design  
   d) A data lake management technique

**Answer**: b

1. **Which of the following describes a transactional fact table?**  
   a) Stores aggregated data for a specific period  
   b) Tracks business processes with multiple milestones  
   c) Records individual events or transactions  
   d) Stores only non-additive facts

**Answer**: c

1. **What is normalization in database design?**  
   a) The process of aggregating data for analysis  
   b) Organizing data to reduce redundancy and improve consistency  
   c) Adding new rows to fact tables for tracking history  
   d) A technique to speed up OLAP queries

**Answer**: b

1. **What is the difference between OLTP and OLAP systems?**  
   a) OLTP focuses on transactions while OLAP supports analysis  
   b) OLTP stores historical data while OLAP stores real-time data  
   c) OLTP is for query optimization and OLAP is for data entry  
   d) OLTP uses denormalized tables and OLAP uses normalized tables

**Answer**: a

1. **What are additive facts?**  
   a) Facts that can be summed across all dimensions  
   b) Facts that cannot be summed  
   c) Facts that are stored as percentages  
   d) Facts used only in transactional systems

**Answer**: a

1. **What is the role of a conformed dimension in a data warehouse?**  
   a) Stores numeric data  
   b) Maintains consistency across different fact tables  
   c) Tracks historical changes in business processes  
   d) Manages security access to the data warehouse

**Answer**: b

1. **What is the primary use of ETL in data warehousing?**  
   a) To perform real-time queries  
   b) To extract, transform, and load data into the warehouse  
   c) To manage security for analytical systems  
   d) To normalize data for reporting

**Answer**: b

**Case-study based Questions:**

1. **A retail company wants to track the daily sales for each store and generate weekly and monthly reports. What type of fact table would be most appropriate for this scenario?**  
   a) Transactional fact table  
   b) Periodic snapshot fact table  
   c) Accumulating snapshot fact table  
   d) Factless fact table

**Answer**: b

1. **A logistics company wants to track orders from placement to delivery, including milestones such as shipping and arrival. Which fact table should they use?**  
   a) Transactional fact table  
   b) Periodic snapshot fact table  
   c) Accumulating snapshot fact table  
   d) Factless fact table

**Answer**: c

1. **In a sales data mart, what would be an example of a conformed dimension?**  
   a) Customer ID that appears in both sales and returns fact tables  
   b) A factless fact table to record sales attendance  
   c) The discount applied to each sale  
   d) The total revenue for each quarter

**Answer**: a

1. **Your business needs to perform analysis on the inventory levels of products across multiple warehouses, but only for specific dates. Which fact type would be most suitable?**  
   a) Additive facts  
   b) Semi-additive facts  
   c) Non-additive facts  
   d) Derived facts

**Answer**: b

1. **If a business needs to analyze student attendance at events without storing any numerical data, what kind of fact table would be used?**  
   a) Transactional fact table  
   b) Periodic snapshot fact table  
   c) Accumulating snapshot fact table  
   d) Factless fact table

**Answer**: d

1. **A company wants to track sales by location and time, but also record the type of products sold. Which database schema would simplify their queries?**  
   a) Star schema  
   b) Snowflake schema  
   c) One big table schema  
   d) OLTP schema

**Answer**: a

1. **What kind of query would you use to combine data from two tables based on a related column?**  
   a) SELECT statement  
   b) JOIN statement  
   c) UPDATE statement  
   d) WHERE statement

**Answer**: b

1. **What SQL operation would be used to fetch data from a table without modifying it?**  
   a) INSERT  
   b) DELETE  
   c) SELECT  
   d) UPDATE

**Answer**: c

1. **A company needs to calculate total sales and average order size across various products. What type of facts are these?**  
   a) Additive facts  
   b) Semi-additive facts  
   c) Non-additive facts  
   d) Factless facts

**Answer**: a

1. **What type of SQL join returns all records from the left table and matching records from the right table?**  
   a) INNER JOIN  
   b) LEFT JOIN  
   c) RIGHT JOIN  
   d) FULL OUTER JOIN

**Answer**: b

1. **A team needs to analyze revenue trends for the past 10 years. What kind of system would provide efficient querying for this data?**  
   a) OLTP  
   b) OLAP  
   c) Data lake  
   d) NoSQL database

**Answer**: b

1. **If a company wants to capture sales data at both the daily and monthly level, which data aggregation approach would improve query performance?**  
   a) Aggregate fact tables  
   b) Factless fact tables  
   c) Accumulating snapshot tables  
   d) Periodic snapshot tables

**Answer**: a

1. **A company is analyzing the sales performance of two business units over the same timeframe. Which dimension would help in this comparison?**  
   a) Conformed dimension  
   b) Degenerate dimension  
   c) Derived dimension  
   d) Normalized dimension

**Answer**: a

**Short Answer Questions**

1. **Explain the data warehouse lifecycle.**  
   The data warehouse lifecycle involves understanding business needs, designing a dimensional model, the ETL process, and building the warehouse to meet analytical requirements.
2. **Compare Kimball's dimensional modeling and Inmon's normalized approach.**  
   Kimball's model is bottom-up and denormalized, making it user-friendly for business processes, while Inmon’s model is top-down and normalized, focusing on data integration and long-term scalability.
3. **Describe the three types of fact tables.**
   1. **Transactional fact tables** capture events at their most granular level, 2) **Periodic snapshot tables** store aggregated data for time periods, and 3) **Accumulating snapshot tables** track business processes with milestones.
4. **What is normalization, and why is it important in OLTP systems?**  
   Normalization organizes data into related tables to reduce redundancy and ensure consistency, which is critical for the efficiency and integrity of transactional databases.
5. **Explain how conformed dimensions ensure consistency in data analysis.**  
   Conformed dimensions are reused across multiple fact tables, ensuring uniformity in analysis across different business processes.
6. **What is the role of OLAP cubes in data warehousing?**  
   OLAP cubes provide multidimensional views of data for rapid analysis and precompute aggregations, making them ideal for analytical queries.
7. **What is a data mart and how is it used?**  
   A data mart is a focused subset of a data warehouse that provides data for specific business functions, such as marketing or finance, allowing for targeted analysis.