Case Study Based Question

Case Study 1: Retail Management System

A retail company is developing a system to manage its inventory across multiple store branches. Each store can stock multiple items, and each item may be available in multiple stores. The system must support dynamic querying, reporting, and relational data integrity (e.g., stock updates, store-wise sales).

Q1. Which type of DBMS is best suited for this retail system?
A. Hierarchical DBMS
B. Network DBMS
C. Object-Oriented DBMS
D. Relational DBMS

Answer: D. Relational DBMS

Explanation: Relational DBMS handles many-to-many relationships and supports relational integrity.

Q2. Which of the following is a key advantage of using RDBMS in this context?
A. Fast binary data access
B. Easy representation of one-to-one relationships only
C. Support for SQL, transactions, and data normalization
D. Tree-structured navigation

Answer: C. Support for SQL, transactions, and data normalization

Explanation: RDBMS offers SQL, transactions, and normalization for consistent inventory and sales tracking.

Case Study 2: Hospital Information System

A hospital wants to develop a patient management system. Each patient may visit multiple departments and interact with multiple doctors. Each doctor may treat many patients. The system must also track medical records, prescriptions, and lab reports.

Q1. Which DBMS model would best represent this many-to-many relationship system?
A. Hierarchical DBMS
B. Network DBMS
C. Relational DBMS
D. Object-Oriented DBMS

Answer: C. Relational DBMS

Explanation: Relational DBMS effectively manages many-to-many relationships like doctors and patients.

Q2. If the hospital wants to include multimedia files (like MRI scans, X-rays) and attach behavior like `displayImage()` or `annotateImage()` to these records, which DBMS model fits best?
A. Hierarchical
B. Network
C. Relational
D. Object-Oriented

Answer: D. Object-Oriented

Explanation: Object-Oriented DBMS supports behavior-rich multimedia like scans with methods.

Case Study 3: University Database

A university stores data about students, their enrolled courses, and the departments offering those courses. The university's IT department initially used a hierarchical model, but now they want to handle more flexible course structures and optional cross-department electives.

Q1. Why is the hierarchical model not suitable for this system anymore?
A. It does not support parent-child relationships
B. It lacks backup features
C. It struggles with many-to-many relationships like students enrolling in multiple courses
D. It supports only text data

Answer: C. It struggles with many-to-many relationships like students enrolling in multiple courses

Explanation: Hierarchical DBMS is rigid and fails with many-to-many structures like courses and students.

Q2. Which model should they migrate to for more flexibility and normalization?
A. Object-Oriented
B. Relational
C. Flat-file
D. Hierarchical

Answer: B. Relational

Explanation: Relational DBMS offers flexible schemas and supports normalization.

Case Study 4: Social Media App

A social media company stores user data, profile pictures, videos, and status updates. Each user object may have methods like `postStatus()`, `uploadMedia()`, and `addFriend()`.

Q1. Which DBMS model is most appropriate for designing such a system with real-world entity behaviors?
A. Object-Oriented DBMS
B. Relational DBMS

C. Network DBMS
D. Flat File System

Answer: A. Object-Oriented DBMS

Explanation: Object-Oriented DBMS models real-world entities and behaviors like posting and adding friends.

Q2. If the company instead wanted structured data querying (e.g., total posts per user, most liked post), what model would complement the object-oriented features?
A. Hierarchical DBMS
B. Network DBMS
C. Relational DBMS
D. Spreadsheet

Answer: C. Relational DBMS

Explanation: Relational DBMS enables efficient querying and analytics on structured user data.

Case Study 5: Airline Reservation System

An airline maintains a system to track flights, passengers, bookings, and seat allocations. Some flights are linked to multiple booking agents, and agents can handle bookings for many different flights.

Q1. Which DBMS type best handles this many-to-many and dynamic linking?
A. Relational DBMS
B. Hierarchical DBMS
C. Object-Oriented DBMS
D. File-based System

Answer: A. Relational DBMS

Explanation: Relational DBMS manages dynamic many-to-many links like flights and agents.

Q2. If the legacy system used a hierarchical model, what would be a common issue in handling booking agents?
A. Slow search speed
B. Inability to handle multiple parent records (e.g., flight ↔ agent)
C. High storage cost
D. Complex query support

Answer: B. Inability to handle multiple parent records (e.g., flight ↔ agent)

Explanation: Hierarchical DBMS cannot support multiple parent-child relationships like agent ↔ flight.

Case Study 6: Online Learning Platform

An edtech company offers courses to students across the globe. Each course includes modules, quizzes, assignments, and video lectures. Students can enroll in multiple courses, and instructors may teach several courses. They also want to attach behaviors to course content (e.g., `playVideo()`, `submitAssignment()`).

Q1. Which DBMS is best suited for representing this system with behavior-linked objects?
A. Relational DBMS
B. Object-Oriented DBMS
C. Hierarchical DBMS
D. Network DBMS

Answer: B. Object-Oriented DBMS

Explanation: Object-Oriented DBMS is ideal for content with methods like playVideo() or submitAssignment().

Q2. If the platform instead needed robust querying, report generation, and scalability with structured tabular data, which DBMS model should be chosen?
A. Object-Oriented DBMS
B. Hierarchical DBMS
C. Relational DBMS
D. Network DBMS

Answer: C. Relational DBMS

Explanation: Relational DBMS supports structured data, reporting, and scalability.

Case Study 7: E-commerce Product Catalog

An e-commerce site stores product information, customer data, reviews, and categories. Products may belong to multiple categories, and customers can review multiple products. The system also handles dynamic price changes and inventory.

Q1. Which DBMS type best handles many-to-many relationships like products–categories and customers–reviews?
A. Network DBMS
B. Hierarchical DBMS
C. Relational DBMS
D. Object-Oriented DBMS

Answer: C. Relational DBMS

Explanation: Relational DBMS is best for many-to-many links like products–categories and reviews.

Q2. If the company wanted to track user actions (like `addToCart()`, `rateProduct()`) as behavior-rich objects, which DBMS could enhance this capability?
A. Hierarchical
B. Flat-file

C. Relational
D. Object-Oriented

Answer: D. Object-Oriented

Explanation: Object-Oriented DBMS supports behavior-rich interactions like addToCart().

Case Study 8: Telecom Billing System

A telecom operator needs to track customer plans, call records, SMS usage, and payments. Each customer may have multiple services (voice, data, broadband), and detailed logs are maintained for regulatory compliance.

Q1. Which DBMS model ensures accurate, normalized, and scalable data storage for this structured data?
A. Object-Oriented
B. Network
C. Relational
D. Hierarchical

Answer: C. Relational

Explanation: Relational DBMS handles large-scale structured logs and ensures data integrity.

Q2. If their legacy system used a hierarchical DBMS, what would be a major limitation when trying to link a customer to multiple independent service plans?
A. Excessive disk usage
B. Cannot store numerical data
C. Cannot easily represent many-to-many relationships
D. Does not support indexing

Answer: C. Cannot easily represent many-to-many relationships

Explanation: Hierarchical DBMS fails with flexible many-to-many service plan relationships.

Case Study 9: Digital Library System

A digital library maintains e-books, authors, and borrowing history. Each book may be co-authored by several authors, and each author may write multiple books. The system must support search by author, genre, and borrower.

Q1. Which DBMS model is most efficient for storing these complex relationships and querying them?
A. Network DBMS
B. Relational DBMS
C. Hierarchical DBMS
D. Object-Oriented DBMS

Answer: B. Relational DBMS

Explanation: Relational DBMS supports complex queries across co-authored books and genres.

Q2. If the library also wanted to store multimedia content (e.g., audiobooks) with behaviour such as `play()`, `pause()`, what DBMS model would be most appropriate?
A. Network DBMS
B. Hierarchical DBMS
C. Relational DBMS
D. Object-Oriented DBMS

Answer: D. Object-Oriented DBMS

Explanation: Object-Oriented DBMS allows storing media with interactive behaviour methods.

Case Study 10: Banking CRM System

A bank is building a customer relationship management (CRM) system to track customer profiles, transaction histories, support tickets, and feedback. They also want to implement advanced analytics on structured transactional data.

Q1. What DBMS model should they use for structured storage and analytical reporting?
A. Hierarchical
B. Object-Oriented
C. Relational
D. Network

Answer: C. Relational

Explanation: Relational DBMS is ideal for structured transaction data and analytical queries.

Q2. If the CRM includes custom workflows and object behaviours such as `closeTicket()`, `escalateIssue()`, what additional DBMS feature might they need?
A. Network relationships
B. Tree-based data structure
C. Object support and encapsulation
D. Data denormalization

Answer: C. Object support and encapsulation

Explanation: Object-Oriented DBMS allows custom behaviours in CRM like ticket escalation.