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Database

Year 2 semester 2

A library database stores and manages information about books and borrowers in a simple and organized manner. The books tables holds unique information such as a book-id, title, author, genre and year it was published, while the borrowers table hold information like the borrowers library ID, name, address, contact number and links to any borrowed book using the book ID as a foreign key. This structure ensures that the library can track which books are borrowed, by whom and when.

Book ID	Title	Author	Genre	Year of release

Membership ID	Name	Address	Contact number

Data integrity is maintained by using primary keys, which prevent duplicate entry and foreign keys which enforce valid relationships between tables. Additional constraints ensure that books cannot be borrowed if they are unavailable, a borrower records with active loans cannot be deleted and that all fields contain valid and consistent data. Together these measures guarantee that the database is accurate, reliable and resistant to errors, maintaining consistent and trustworthy records over time.

Question 2:

Order ID	Customer name	Product 1	Product 2	Product 3
101	Makara	book	pencil	notebook
102	David	pencil	eraser	

1NF

Order ID	Customer name	Product
101	Makara	Book
101	Makara	Pen
101	Makara	Notebook
102	David	Pencil
102	David	Eraser

To normalize the orders table into 1NF, repeating groups of products must be eliminated. In the unnormalized table, multiple products are stored in separate columns (product 1, product 2 and product 3) which causes redundancy and difficulty in querying. By converting the structure into 1NF, each product becomes a separate row linked to the same order ID and customer. This ensures that every field contains only atomic (indivisible) values with no repeating or multi-valued attributes. The new table makes it easier to query, update and maintain consistency, while also preparing the data for higher levels of normalization.

Question 3:

Scalability in an e-commerce database ensures the system can handle increasing workloads as the business grows. As customer numbers, product catalogues and transactions rise, a scalable database can expand smoothly without performance loss, now there are two types of scalability; vertical and horizontal scalability. Vertical scalability improves processing power and storage, while horizontal scalability distributes data across and reliability. This allows the database to process large volumes of orders, manage real-time inventory updates and support peak traffic during sales or promotions. Ultimately, scalability keeps the platform responsive, prevents downtime and delivers consistent user experience, directly supporting growth and long-term business success.

Question 4:

First normal form(1NF) is the foundational stage of database normalization, ensuring all that data is organized into a clear, atomic values. In 1NF, each table column must hold a single, indivisible value and no repeating groups or arrays are allowed. Each row must be uniquely identifiable usually with the primary key, while columns must contain consistent data types with unique names. The purpose of 1NF is to eliminate redundancy, reduce data anomalies and improve accuracy. By enforcing atomicity, 1NF creates a structured, reliable database design that simplifies queries and supports higher levels of normalization for better efficiency.

Write a 150 word description of using windows to organise files for a school project. Include 3 OS interactionsz