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INSY6112 assignment

Question.1

Recommendation for Database Type

1. Recommended Database Type

Simply described, a NoSQL database is a non-relational database that does not follow the usual table-based structure of relational databases. Instead, it provides a variety of data models such as key-value pairs, documents, columns, and graphs.

The recommended database type for the social networking platform is a NoSQL database. NoSQL databases are designed to handle large-scale, dispersed data environments efficiently. They offer flexible schema design, horizontal scalability, and fast processing, making them ideal for real-time applications such as social media platforms. (geeksforgeeks.org, 2025)

2. Reasons for using a NoSQL database.

A NoSQL database includes built-in sharding and does not use tables to store data. As a result, any limits in your database server can simply be transferred to another server. This move reduces the strain on your memory limits while yet allowing you to add more info on the fly.

Flexibility
One intriguing characteristic of NoSQL databases is that they have fewer restrictions than relational databases. Its capacity to manage massive volumes of semi-structured data across many data models makes it suitable for a wide range of industries. (www.intersystems.com, n.d.)

This flexibility is crucial for rapid data production and deployment.

Scalability and High Data Volume ManagementNoSQL databases feature horizontal scaling, which enables the platform to add more servers as user activity increases. This ensures that the system can effectively handle millions of users and their interactions without sacrificing speed. (InfoSeeMedia, n.d.) (geeksforgeeks.org, 2025)

Real-time analytics and fast queries Performance NoSQL databases offer fast data processing, allowing for real-time analytics like trending topics and engagement metrics. Their distributed architecture enables rapid reads and writes, resulting in a seamless user experience with real-time feed changes and notifications. (www.intersystems.com, n.d.)\

3. The types of data stored in the database

User data includes usernames, profile details, preferences, and activity history.

Content data includes posts, photos, videos, comments, and user-generated content.

Interaction data include likes, shares, reactions, and engagement patterns.

Real-time analytics data includes metrics such as post reach, interaction rate, and trending topics.

System logs provide user activity, security events, and error tracking information.

(geeksforgeeks.org, 2025)

4. Types of NoSQL Databases

1. Column-Oriented
Column-oriented NoSQL databases store data in columns. These column sets are referred to as column families, and users can query them immediately rather than wading through all of the data records.

Column-oriented databases store data in columns rather than rows, making them ideal for processing large-scale analytical queries. They are often utilised in applications that require real-time analytics. Examples include Apache Cassandra and HBase.

2. Graph-Based
In graph-based NoSQL databases, each data element is represented as a node, with edges indicating relationships between data items. Each node and edge has a unique identifier.

Graph-based databases differ from others in that there are no tables or columns. However, this paradigm is highly adaptable and can scale across several devices. Furthermore, graph-based databases outperform relational databases in terms of query and join performance.

Graph-based databases are commonly used for:

Social networks
Fraud detection
Knowledge graphs and logistics handling
However, employing a graph-based database is not always suitable as a stand-alone solution, which is why most graph-based databases are used in conjunction with traditional databases to serve certain purposes. (katz, 2022)

3.Document-Oriented
Document-oriented databases, like key-value databases, use key-value pairs. However, they save the key-value pairs as documents. Most document-oriented databases accept JSON, XML, and BSON document formats.

Document-oriented databases are well known for their query speed and versatility. They offer nested documents and indexing to boost query speed while allowing developers to modify documents as needed. (katz, 2022)

Document-oriented databases are commonly used for:

Blogging Platforms
Content management systems
Real-time analytics.
E-commerce applications.
However, employing document-oriented databases for an application with sophisticated transactions and queries can reduce the program's performance. (katz, 2022)

4. Key-Value Pair-based
Key-value pairs are the most basic sort of NoSQL database. It only contains two columns, 'key' and 'value', and the key can only have string values, whilst the value can hold JSON, strings, Blob, XML, and so on. The fundamental idea behind this design is to create a hash table with a unique key and a pointer to a data item.

With this simple design, key-value pair NoSQL databases can manage large amounts of data while still storing schema-free data.

Key-value pair databases are commonly used for:

Session-based applications, such as shopping carts
Applications with several state changes
Scalable data handling for dictionaries and collections. (katz, 2022)

5. The Three Vs of Big Data in the Scenario

Veracity refers to data quality and accuracy, as well as an organization's faith in its data. Data with missing pieces or untrustworthy sources may call its credibility into question. (Ben Lutkevich, 2025)

Value relates to how beneficial data is to the organisation that collects and uses it. The value is determined by the quality and quantity of insights extracted from the data. The way an organisation obtains value from big data varies depending on its business requirements and operations. The other Vs frequently contribute to value. (Ben Lutkevich, 2025)

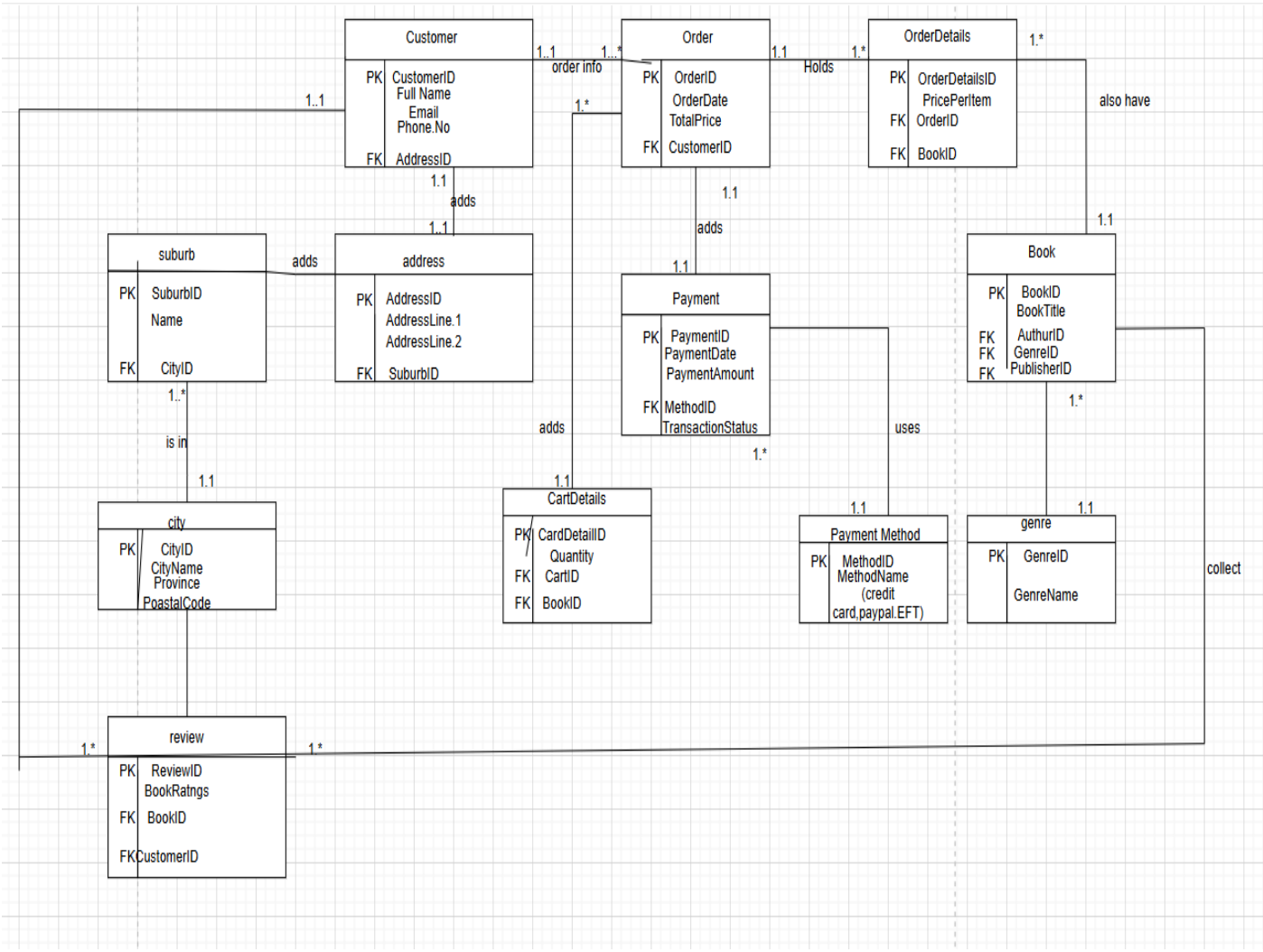
Variability refers to how the data can be used, formatted, and structured. (Ben Lutkevich, 2025)

The platform supports a variety of data formats, including structured (user profiles), semi-structured (JSON-based posts), and unstructured (videos and photos). NoSQL databases can support this variation without imposing strict schema limitations.

Conclusion

A NoSQL database is the best fit for the social media platform due to its scalability, flexible schema, and ability to process real-time analytics rapidly. Implementing NoSQL technologies such as document, key-value, column-family, and graph databases will result in optimal performance and a consistent user experience.

ENTITY DIAGRAM



(app.diagrams.net<>, n.d.)

These are the relationships the connect the entities and attributes together I n the diagram fir furthermore explanation…

Customer and Order → (Customer can place several orders).

Order & OrderDetails: (An order includes many books.)

OrderDetails and Book Many-to-One (a book can appear in several orders).

Order & Payment: (each order has a single payment).

Customer & Review: (A customer can leave several reviews.)

Book & Review: . (A book can receive many reviews.)

Address and Suburb: Many-to-One (Suburb belongs to a certain city).

Suburbs and Cities: (each city has several suburbs).

Conclusion

Entity Relationship Diagram for an Online Bookshop.
The online bookstore's Entity-Relationship Diagram (ERD) depicts the relationships between various entities in the system, allowing for efficient management of customers, books, orders, payments, and reviews. The logical design uses UML notation and adheres to database normalisation standards by avoiding many-to-many links with associative (junction) tables like OrderDetails and CartDetails. (visual-paradigm <>, n.d.)

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