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INFORMATION SYSTEMS 1B

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**QUESTION ONE**

A definition of the recommended database type

A relational database is like a collection of connected spreadsheets where the relationships make it easy to manage and retrieve data without duplication (Oracle, 2021). NoSQL databases are created to handle large volumes of unstructured, semi-structured, or structured data. They are developer-friendly... in addition they store data in forms that are to the kind of data objects used in applications. I recommend using the NoSQL database (MongoDB, 2022). NoSQL allows you to persist your data as documents (or graphs) which may map much more closely to your data model. NoSQL databases are well-suited for storing large amounts of semi-structed or unstructured data, serving real-time data to users, and big data and analytics applications (Michal Tobia, 2023).

Motivation for choosing NoSQL

The four different kinds of NoSQL; Document store, Key-value store, Column store and the Graph store. NoSQL databases are optimized for handling large volumes of data quickly, making them an ideal solution for big data applications. They are specifically designed to scale and efficiently process massive datasets, ensuring high performance even in fast, high-volume environments. By preventing data from becoming a bottleneck, NoSQL allows applications to run seamlessly, maintaining speed and reliability even when dealing with vast amounts of information. NoSQL databases are built with redundancy and high availability in mind, addressing the risk of hardware failure at the architectural level. They store multiple copies of data across several nodes, ensuring continuous access even if one node fails. NoSQL databases support a multi-model approach with flexible schemas, making them ideal for flexible development and evolving application needs. Unlike relational databases that require fixed schemas and complex adjustments, NoSQL allows you to store various data types together without restructuring the entire database. This flexibility supports rapid development and easy adaptation as project requirements change. (GeeksforGeeks, 2025)

Discussion of the Types of Data Stored in NoSQL

Document databases store data in flexible documents made up of key-value pairs. These documents can include simple data types or complex structures like clustered objects, without enforcing a fixed schema. Each document is accessed using a unique key, and queries can retrieve full documents or specific parts, such as individual fields. Many document databases also support secondary indexes and features like aggregation and full-text search for more advanced querying. A key-value store is a type of database that stores data as a collection of key-value pairs. In this type of data store, each data item is identified by a unique key, and the value associated with that key can be anything; a string, number, object, or even another data structure. A [column data store](https://www.scylladb.com/glossary/wide-column-database/) is a database that stores data in columns rather than rows. In a wide column data store, data is organized into column families, which are groups of columns that share the same attributes. Each row in a wide column data store is identified by a unique row key, and the columns in that row are further divided into column names and values. The most significant benefit of having column databases is that you can store large amounts of data in one column. This feature allows you to reduce disk resources and the time it takes to retrieve information from it. Graph databases are designed to store and challenge highly connected data by modelling information as entities and their relationships. These relationships carry meaningful context, allowing users to traverse the graph by following specific connection types or strengths. Graph databases use specialized query languages to efficiently navigate or match structural patterns, returning results as literals, lists, maps, or traversal paths. (Amazon Web Services, 2025)

List and Definitions of Four Types of NoSQL Databases

Graph databases stand out in the NoSQL family for their unique approach to managing relationships by organizing data as entities and relationships. This interconnected structure allows for complex, efficient queries across deeply linked data, making graph databases ideal for applications where understanding and analyzing the depth of relationships is crucial. (Yetunde Salami, 2024)

Column-Family Stores are a specialized type of NoSQL database designed for efficient handling of large-scale datasets. By organizing data into columns instead of rows, they enhance data compression and optimize access patterns. These databases support wide-column storage, horizontal scalability, and flexible schemas within column families, while also leveraging efficient storage mechanisms to manage vast amounts of data effectively. (Yetunde Salami, 2024)

Document databases are an advanced type of NoSQL database that store data, offering flexible schemas that support complex, nested data structures. This flexibility allows for sophisticated queries and data manipulation. Key features include schema flexibility, support for nested documents and arrays, rich query languages, and advanced indexing with full-text search capabilities for efficient data retrieval. (Yetunde Salami, 2024)

Key-value stores are the simplest type of NoSQL database, organizing data as pairs of unique keys and their associated values. This straightforward model enables fast and efficient data retrieval, making them ideal for applications that require quick access to large datasets. Key features include simplicity and high performance. Schema-less flexibility that allows adding new items without predefined structures (Yetunde Salami, 2024)

The Three Vs of Big Data in This Scenario

Big data is high-volume, high-velocity and/or high-variety information assets that demand cost effective, innovative forms of information processing that enables enhanced insight, decision making, and process automation (Gartner, Inc.,n.d)

Volume refers to the amount of data that are generated every second from various sources such as social media, sensors, transactions, and more. Handling this massive scale of data requires scalable storage and processing solutions.

Variety refers to the number of types of data which include; text, images, videos, reactions, and even virtual reality content. NoSQL databases are well suited to store this diverse and unstructured data without the need for predefined schemas.

Velocity refers to the speed of data processing that is created, collected, and processed. Real-time or near-real-time data processing is often critical for timely insights and decision making (TechTarget Network, 2024 ).

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