Information Systems
INSY6112
Assignment 1

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QUESTION 1

Based in the provided scenario, the most applicable type of database is NoSQL. As Vettor, et al. (2020) says, NoSQL databases are used to rapidly store and process large volumes of non-relational and semi-structured data.

The NoSQL database is the most applicable database for the given scenario. Ana-Gabriela (2024) lists the following benefits of NoSQL databases, which are:

- Performance;

  a. They can process large volumes of data quickly, according to Ana-Gabriela (2024), and can deliver output in real time, improving the overall user experience.

- Flexible schema; and

  a. Ana-Gabriela (2024) says they do not press tough constraints aren't imposed on data. This allows the database to tolerate may varieties of dissimilar data (e.g. text, video and shares), with a highly abstract structure.

- Horizontal scalability.

  a. Ana-Gabriela (2024) says they can be distributed across many servers in different locations.

There are several different variants of NoSQL databases, with varying methods of storing data. As pointed out by Vettor, et al. (2020), these include:

- Key-value databases;

  a. NoSQL databases which store datapoints as a series of key-value pairs (like rows) nested in buckets, like rows in tables (Coronel, et al., 2020). They are the simplest variant of NoSQL database, and the keys, much like in relational databases, are used to uniquely identify each pair in a bucket. However, unlike relational databases, different

keys are not related between buckets, increasing scalable and processing speed (which the social media platform needs).

- Document stores;

    a. NoSQL databases which are similar to key-value databases, but store data in documents (Coronel, et al., 2020). each document uniquely identified by a key, with each document and key value comprising a key-value pair, within a collection. Posts containing many different forms of data could easily be stored in these documents.

- Wide-Column stores; and

    a. NoSQL databases which organises data into columns, and the columns into blocks (Coronel, et al., 2020). They are very good at handling queries across few attributes and many objects. This would be useful in the social media system, where there are many millions of objects.

- Graph stores.

    a. NoSQL databases which can store relationships between objects (Coronel, et al., 2020). Each object is called a node, and a relationship between nodes is an edge. They are very good for tracking interactions and relations between objects, such as a social media user liking another user's post.

NoSQL databases are ideal for big data (Ana-Gabriela, 2024). Oracle (2020) says the first 3 Vs of big data are as follows, and would also relate to the social media platform in the following ways:

- Volume;

    o This is the large amount of data (Oracle, 2020). A social media platform of the sort described in the scenario, may have many petabytes of data in its information systems. This data will also be constantly increasing, prompting a need for scalability within the system. Some types of data, such as videos, will be more complex, and thus larger than

more primitive types, such as text. Some data might not even have a pre-specified size, such as live streams.

- Velocity; and
  - This is the speed at which data is received or processed (Oracle, 2020). The social media platform's system will constantly be receiving input and interaction from millions of users, which need to be processed, stored and even retrieved in searches for specific pages, users and posts. Additionally, the system must process data in real-time, to deliver new, popular content to users in real-time, and keep them engaged.
- Variety.
  - This refers to the variety of different datatypes (Oracle, 2020). The rise of new datatypes, such as digital audio, digital video and GIFs, is particularly applicable in the social media platform. These cannot be handled as the tighter, more specific datatypes of relational databases, thus enforcing the need of the NoSQL model. The platform's data variety also includes more primitive types, such as text, on top of the previously mentioned types – perfect for the NoSQL model.

QUESTION 2

Coronel, et al. (2020) and Watt and Eng (2014) where referred to in creating the following diagram, in

response to the presented scenario.
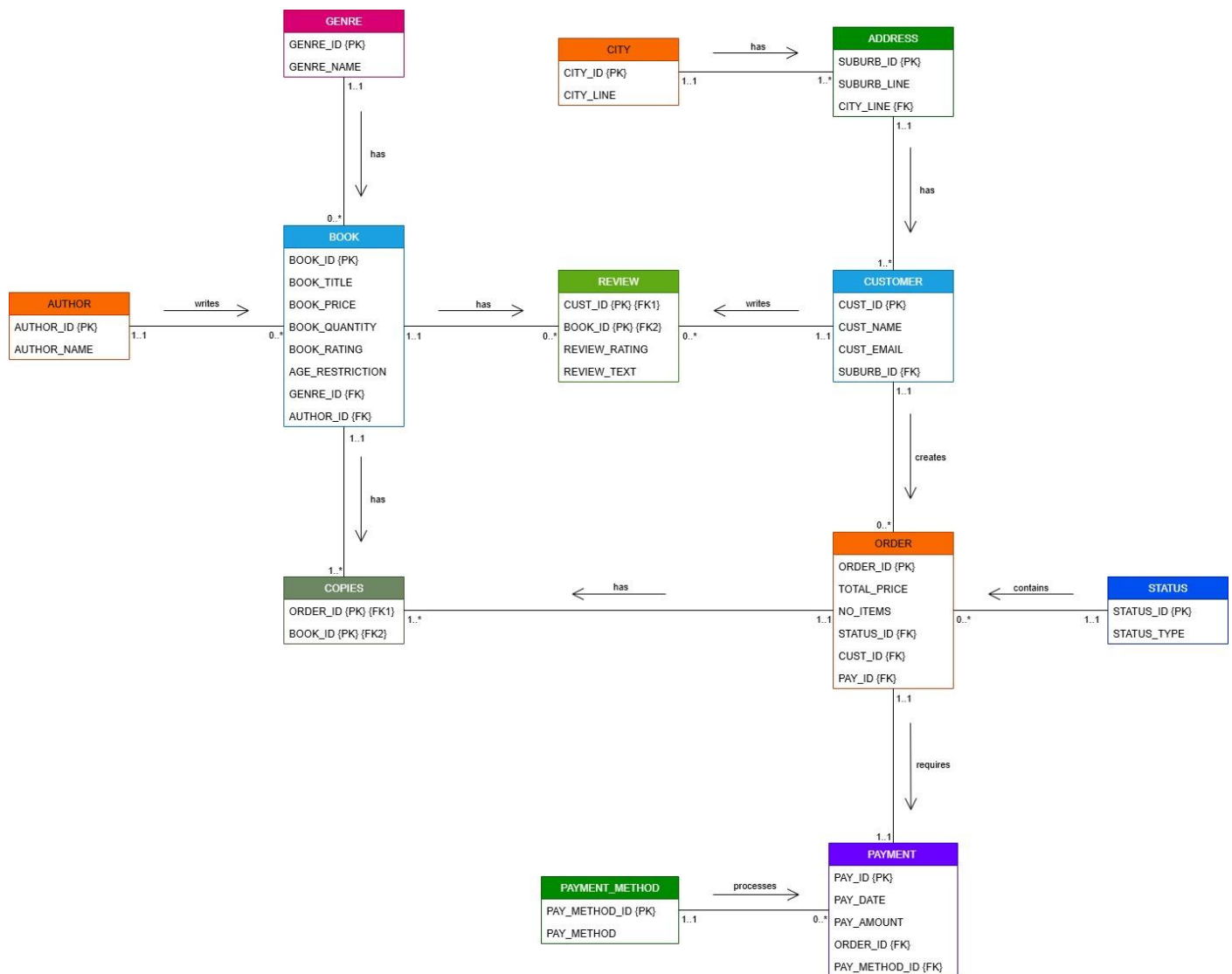
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