Applied Research

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1. Introduction

The purpose of this document is the conduct some research on which type of database is best to use on Online Boutique Shopping Cart. For research purpose we are going to settle between MySQL and MongoDB, to see what the best option are.

2. Research question

Which database is best to use on Boutique Shopping Cart?

1. **What are the differences between MySQL and MongoDB?**

   Strategy: library

   Methods: community research, literature study, SWOT analysis

2. **What are the similarities between MySQL and MongoDB?**
   Strategy: library
   Methods: community research, literature study
3. **What is the performance and speed between MySQL and MongoDB?**
   Strategy: library
   Methods: community research, SWOT analysis
4. **How is the data being stored between MySQL and MongoDB?**
   Strategy: library
   Method: community research, SWOT analysis
5. **How is the data relationship between MySQL and MongoDB?**
   Strategy: library, workshop
   Method: community research, SWOT analysis, gap analysis
6. **How does querying work in MySQL and MongoDB?**
   Strategy: library, workshop
   Method: community research, SWOT analysis, gap analysis
7. **Between MySQL or MongoDB, which one suits the use cases for on Boutique Shopping Cart?**
   Strategy: workshop, field
   Method: prototyping, explore user requirements

8. **Between MySQL or MongoDB, based on statistics and Database Structure of tables for my Boutique Shopping Cart?**
   Strategy: workshop, field
   Method: prototyping, explore user requirements

3. Sub-question result

Here we will give answers and information we got on the internet or from peers to these sub-questions. What choose MySQL and MongoDB instead of going through all the database and choose which one is better.

3.1 What are the differences between MySQL and MongoDB?

Here are the differences between MySQL and MongoDB

MySQL

MySQL is an open-source relational database management system (RDBMS) develop by Oracle. MySQL is a Structure Query Language (SQL). These SQL are to access the data in the database using command such as 'CREATE', 'UPDATE', 'INSERT' and 'DELETE'. MySQL stored its data in a table. Learning and using MySQL is easy, with the easy-to-use interface. When it comes to databases,

people start with MySQL. In MySQL, you need to pre-define your database schema based on your requirements and set up rules that help you to govern the relationships between fields in your tables. MySQL can be written in C, C++, Eiffel, Java, Perl, PHP, Python, Ruby, and Tcl.

MongoDB

MongoDB is a document-based non-relational database, developed and maintained by MongoDB Inc. MongoDB is a NoSQL (Not only SQL) database. It stored its data in the form of JSON-like document. This offers the developers the flexibility to work with evolving data models. In MongoDB you don't need to any pre-define schema. MongoDB can be connected using 10+ programming language drivers (C++, Java, Python, JavaScript, etc) and also provides end-to-end security and management tools for automation, monitoring, and backup.

(Acharya, February 1, 2022) (Deshpande, Feb 14, 2022) (Wilfred, October 10, 2020)

3.2 What are the similarities between MySQL and MongoDB?

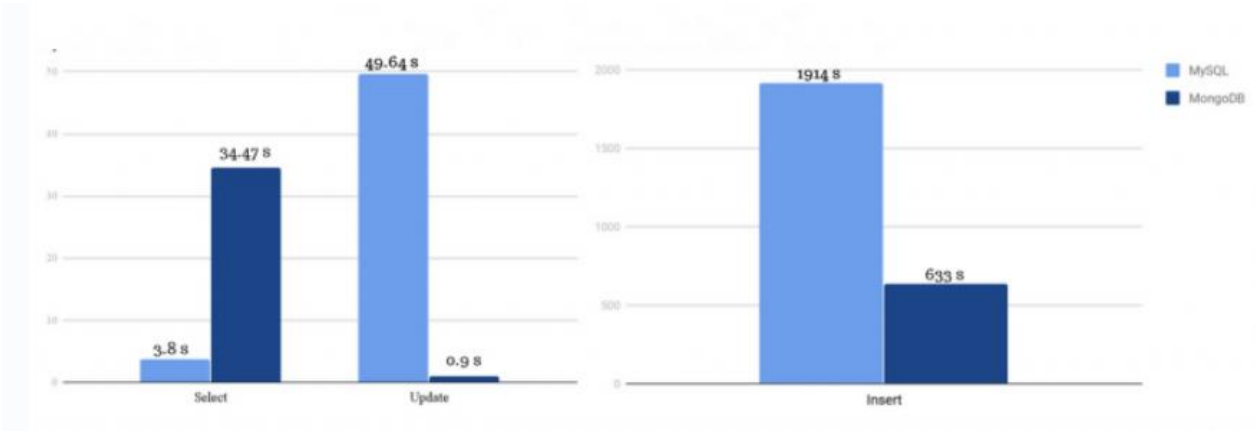
Here are the similarities between MySQL and MongoDB.

MySQL and MongoDB are alike. At there core they both are database management system. MySQL and MongoDB store the data on a computer or network. MySQL and MongoDB support the following language, like Java, Python, Node.js (in support of JavaScript) and Server-side PHP (or hypertext pre-processor).

(Education, 3 November 2021)

3.3 What is the performance and speed between MySQL and MongoDB?

It is important to consider the performance and speed of each database for your project. Mongo also can handle large amounts of unstructured data over MySQL. It is relatively faster than MySQL because of its document-based data storage. MySQL is quite slow compared to MongoDB when it comes to dealing with large amount of data in the database. It is also unable to cope with large and unstructured amounts of data. There is also an article confirming this test which I'm going to reference it in here. The test was done with MySQL 5.7.9 and MongoDB 3.2.0. These was conducted on a separate m4.xlarge Amazon instance with the ubuntu 14.4 x64 and default configurations, all tests were performed for 1000000 records.



In the MySQL vs. MongoDB speed debate, MongoDB usually comes out as the winner. MongoDB can accept large amounts of unstructured data much faster than MySQL thanks to slave replication and master replication. Depending on the types of data that you collect, you may benefit significantly from this feature.

MongoDB doesn't force you into a vendor lock-in, which gives you the opportunity to improve its performance. If a vendor doesn't provide you with superb client services, then you can search for an alternative that will help make your database more efficient and flexible.

(Shah, November 23, 2017) (Acharya, February 1, 2022)

3.4 How is the data being stored between MySQL and MongoDB?

In MongoDB the data is stored in an JSON-like document with no schema restriction/ constrain, with more flexibility. You can easily modify the data without hassle. Each MongoDB database contains collections, which in turn, are filled with documents. These documents can have multiple various field and types of information, for allowing data storage of documents that varies in content and sizes. In MySQL you need to first define on how the tables and columns will be organize and define the restriction on the schema, which is hard to modify later on, and the data is stored in rows of a table.

(Mariana Berga, February 11, 2021) (Acharya, February 1, 2022) (Shah, November 23, 2017)

3.5 How is the data relationship between MySQL and MongoDB?

MongoDB doesn't support JOIN syntax, instead it has JOIN equivalent- $lookup operator. It works by storing part of the data in multi-dimensional forms as arrays by putting one document in the other one, that is called embedding. One of the best parts about MySQL is the JOIN operations. JOIN allows two or multiple tables to link up by a single SELECT command in a single query.

(Shah, November 23, 2017) (Wilfred, October 10, 2020)

3.6 How does querying work in MySQL and MongoDB?

MongoDB uses unstructured query language, that create query in JSON document. You need to first the define a specify property of the documents to obtain matching result. To perform a query, you usually need very extensive operators using JSON that are linked to each other. Each property is viewed by MongoDB as having an implied Boolean AND. Boolean OR queries are natively assisted, but to accomplish this, you must use a special operator ($or). MySQL is a structure query language, which communicate with the database table. MySQL is considered a strong language, despite its simplicity. It consists primarily of two parts: Data Definition Language DDL & Data Manipulation Language DML. The following commands to query the data in MySQL database- 'SELECT', 'UPDATE', 'INSERT' and 'DELETE'.

(Shah, November 23, 2017) (Wilfred, October 10, 2020) (Mariana Berga, February 11, 2021)

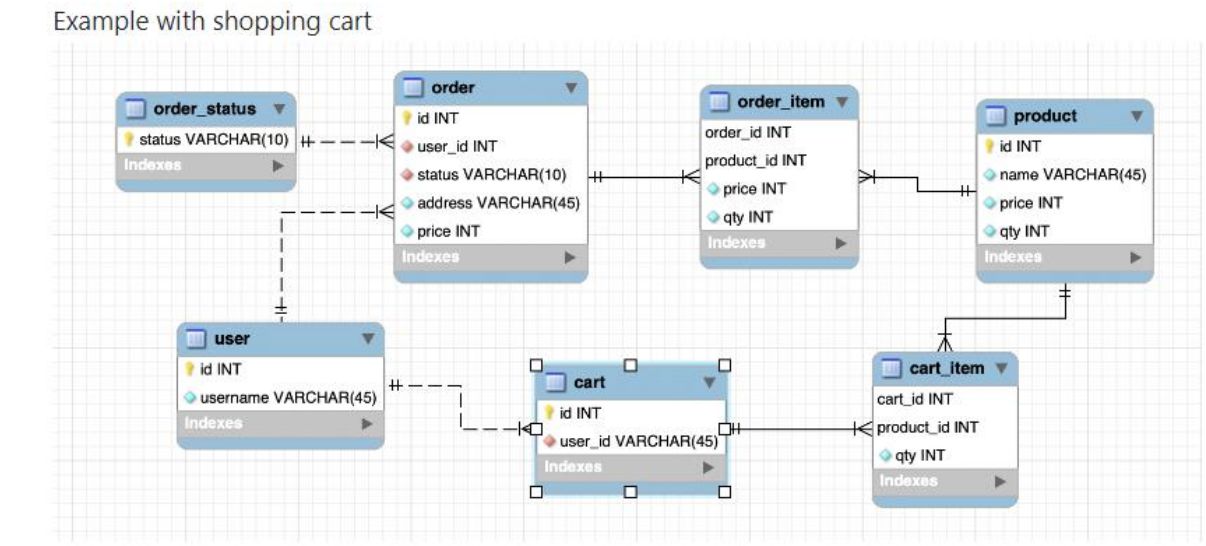
3.7 Between MySQL or MongoDB, which one suits the use cases for Web shop(Shopping-Cart)?

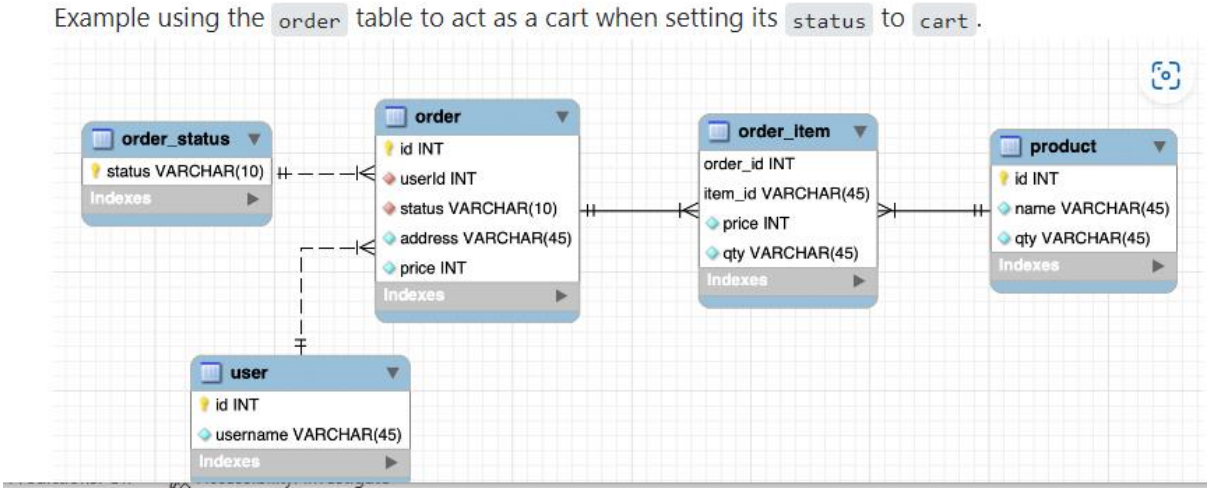
For both databases, MySQL and MongoDB can be suited for Web shop-Shopping Cart. It only depends on if the company wants fast response and good performance in the use cases, the best option would be MongoDB. But we also have joins implemented which it will look a bit difficult on MongoDB, but for MySQL it's easy to implement.

3.8 Between MySQL or MongoDB, Based on Statistics and Database Structure that suits the use cases for Web shop (Shopping-Cart)?

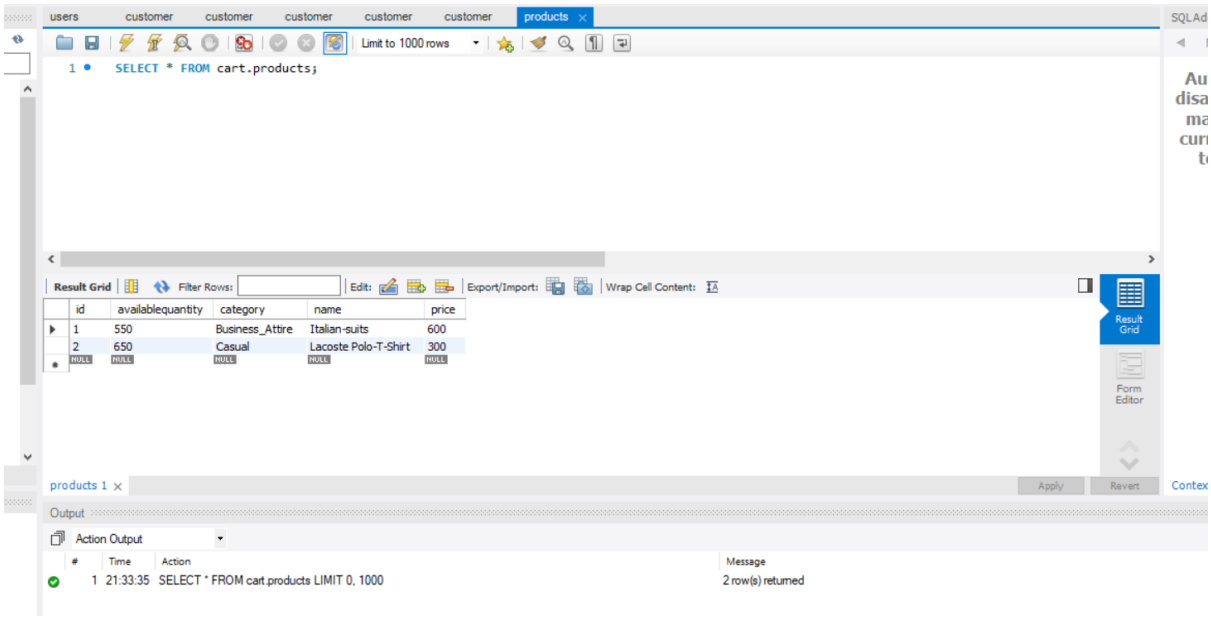
For both databases, MySQL and MongoDB can be suited for Web Shop-Shopping Cart. It only depends on if the company wants fast response and good performance in the use cases, the best option would be MongoDB. But we also have joins implemented which it will look a bit difficult on MongoDB, but for MySQL it's easy to implement.

MYSQL Relational Database Structure:





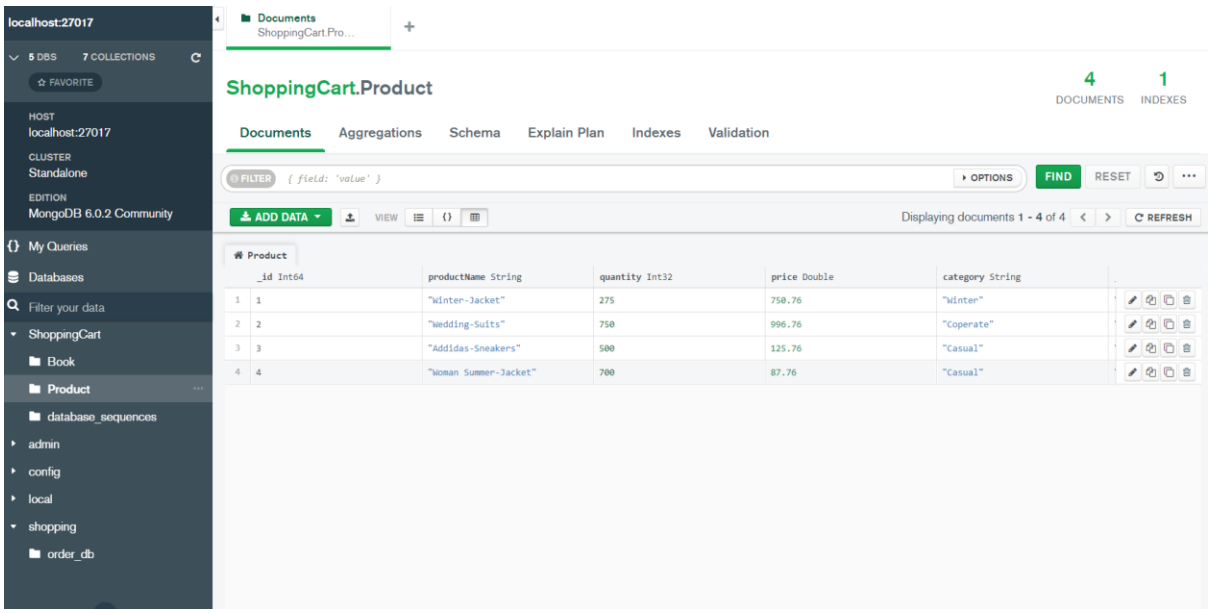
It really depends on your use cases. Having the cart and cart item tables in the first example is just an extra level of **normalization** which may be needed in some contexts (depending on how



MONGODB-NON-SQL STRUCTURE:

Discover and document relationships between data entities and visualize them with automatically built diagrams. Give everyone a better overview of related entities from any point in the shopping Cart catalogue.

To create an ER diagram, you need entities (collections) and relationships. Data do discover entities and their fields. It is a bit more complicated (as always) with the relationships. MongoDB is not a relational database, it is a document store, so traditional ER modelling does not apply. However, we can stretch the concept to fit JSON documents



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  "quantity": 275,
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}
```

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  "quantity": 750,
  "price": 996.76,
  "category": "Coperate",
  "_class": "com.example.mongodbdemo.persitence.entity.Product"
}
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  "quantity": 500,
  "price": 125.76,
  "category": "Casual",
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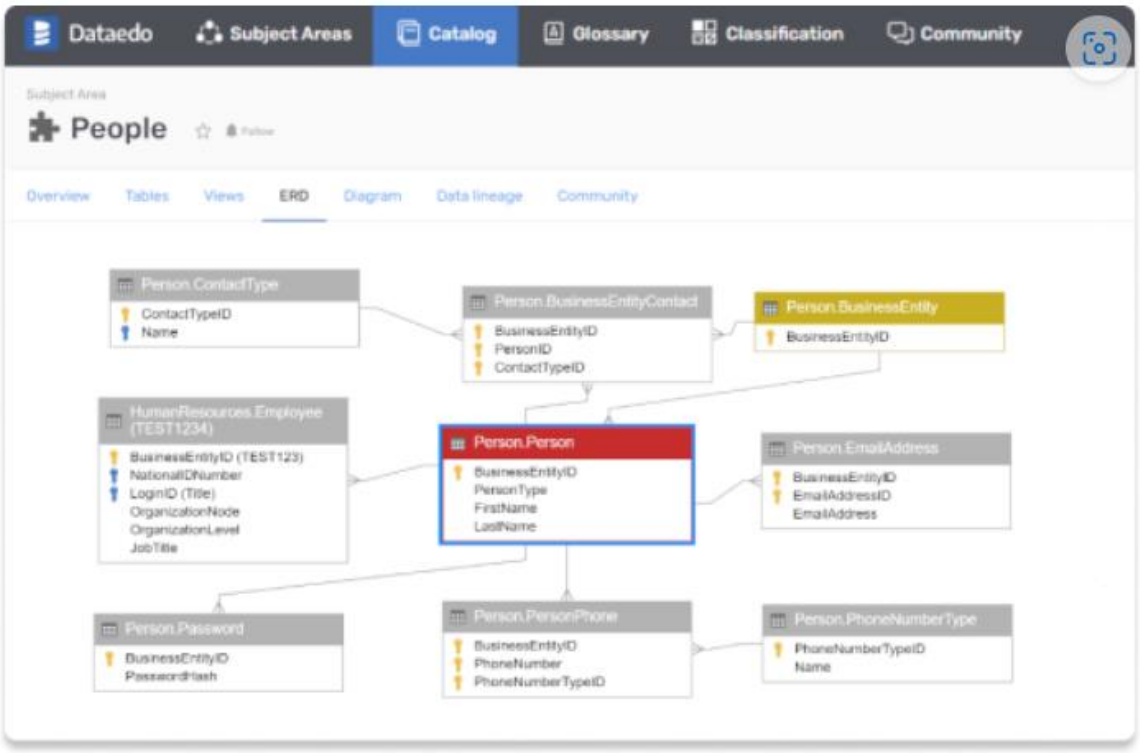

4. Conclusion to the main question.

All sign leads to MongoDB for its fast performance and the flexibility of modifying the collection of the database, but there would be a big learning curve and time consuming if you're new to database. With MySQL, the interface is very simple, understandable and if you're new to database, it's very easy to learn it. There are millions of tutorials on MySQL. The best option is the easy learn curve MySQL.

5. References

Acharya, D. P. (February 1, 2022). *MongoDB vs MySQL: Which Is the Better Database Management System?* https://kinsta.com/blog/mongodb-vs-mysql/.

Deshpande, C. (Feb 14, 2022). *MongoDB Vs. MySQL: Which One is Better.* https://www.simplilearn.com/tutorials/mongodb-tutorial/mongodb-vs-mysql.

Education, I. C. (3 November 2021). *MySQL vs. MongoDB: What's the Difference?* https://www.ibm.com/cloud/blog/mysql-vs-mongodb#:~:text=MongoDB%20is%20a%20document%2Dbased%20non%2Drelational%20database%20management%20system,open%2Dsource%20relational%20database).

Mariana Berga, T. F. (February 11, 2021). *MongoDB vs MySQL: what are the differences?* https://www.imaginarycloud.com/blog/mongodb-vs-mysql/.

Shah, M. (November 23, 2017). *MongoDB vs MySQL: A Comparative Study on Databases.* https://www.simform.com/blog/mongodb-vs-mysql-databases/.

Wilfred, T. (October 10, 2020). *MongoDB Vs MySQL: Which One Is A Better Database?* https://codersera.com/blog/mongodb-vs-mysql/#:~:text=MongoDB%20is%20faster%20than%20MySQL,than%20the%20rigidity%20of%20MySQL.