Comparative Study of CouchDB and MongoDB – NoSQL Document Oriented Databases

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ABSTRACT
A comparison between MongoDB and Apache CouchDB keeping the data and other environments same using Java programming language and Apache JMeter confirms that the MongoDB document write rate is many times faster than the Apache CouchDB.

General Terms
Performance, Reliability

Keywords
SQl, NoSQL, Database, MongoDB, CouchDB, Big Data.

1. INTRODUCTION
In this paper, it is purported to compare the behaviour of NoSQL document oriented databases. There are number of document based NoSQL databases available, but all have different mechanisms to store the data in document format.

The comparisons are important as they provide overview of usage of NoSQL databases as per the user requirements.

The methodology envisages the use of Java programming language to highlight the comparative results for two widely used document oriented databases – MongoDB and Apache CouchDB.

2. NoSQL DATABASES
There are various document oriented NoSQL databases available, both open source and licensed. However it is a rigorous proposition to decide which is to be used and when. So there is need for performance comparison of various document oriented NoSQL databases.

The leading document oriented NoSQL databases are: MongoDB , CouchDB, Couchbase, Terrastore, RavenDB. OrientDB. This paper however covers the comparison of MongoDB and CouchDB.

3. COMPARITIVE ANALYSIS AND RESULTS
For comparing the insertion rate (processing time), read / write operations of two leading NoSQL document-oriented databases - the MongoDB and CouchDB, the object oriented programming language, Java, with performance measuring tool Apache JMeter, is used. Some performance evaluation tests have been carried out. Though the database sizes used for the analysis are comparatively smaller, a clear difference in various factors of comparison has been observed. The environment used for conducting these tests was same for both MongoDB and CouchDB.

Table 1. Benchmarking parameters

Sr. No.	Entity	Value
1.	Operating System	Windows 7 (64 bit architecture)
2.	RAM	8 GB
3.	Document used	JSON with approximate 160 bytes

Table 2. Databases and Tools Configuration

Sr. No.	Entity	Value
1.	MongoDB	2.6.3
2.	Apache CouchDb	1.6.1
3.	Apache JMeter	2.13
4.	Mongo VUE – GUI Tool for MongoDB	1.6.9.0
5.	Java	1.7.45
6.	Futon on Apache CouchDB 1.6.1	
7.	Springsource Tool Suite (Eclipse for Java)	3.6.4

The methodology followed for comparing the databases is:

1. Define the configurations
2. Install the databases
3. Define the data set to be used
4. Write Java programs to connect with both the databases and insert the defined volume of data (document) in both databases individually.
5. Measure the insertion rate / response time using Apache JMeter
6. Analyze the results by plotting graphs and charts.

The loads used for the activity are:

1) 100 users and no loop, 100 samples, one by one execution for CouchDB and MongoDB; and
2) 10 users and 10 as loop, 100 samples, one by one execution for CouchDB and MongoDB.

The charts and results for the tests conducted are depicted below:

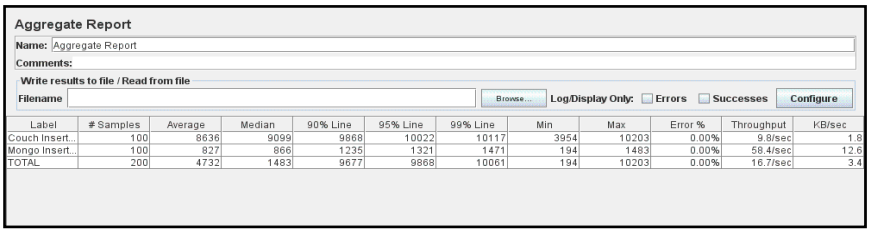

Fig 1: The aggregate report for insertion rate for CouchDB and MongoDB.

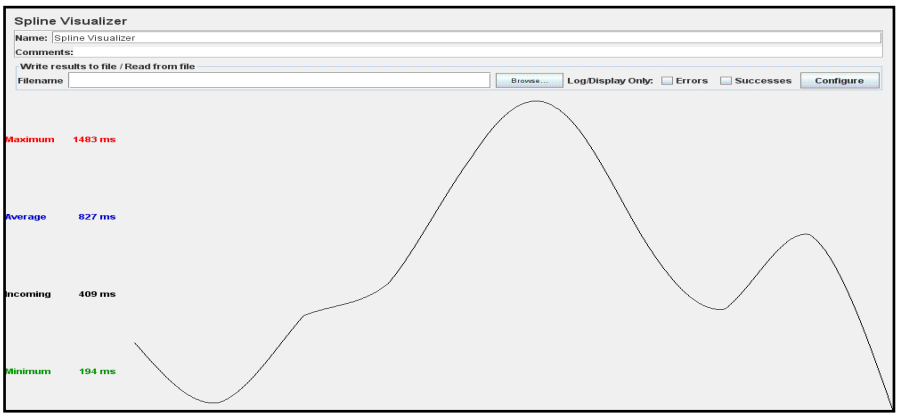

Fig 2: The Spline Visualizer for MongoDB document insertion test.

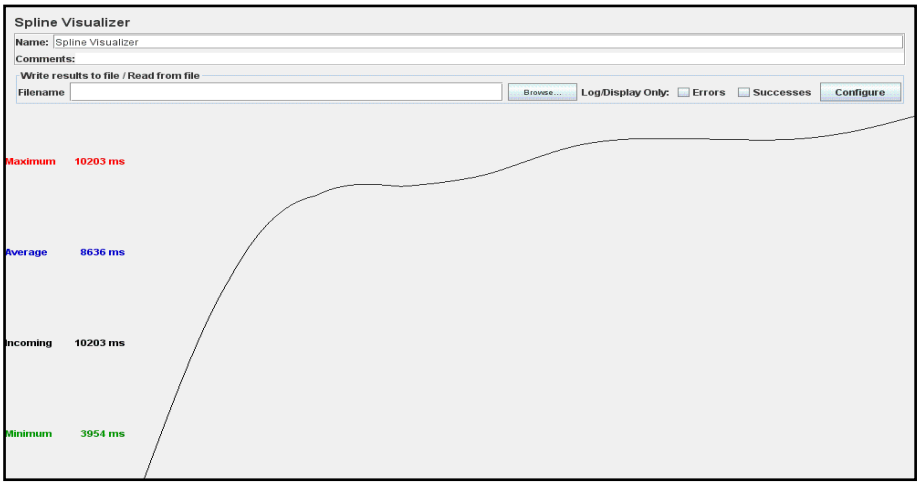

Fig 3: The Spline Visualizer for CouchDB document insertion test.

4. CONCLUSION

The average response time for MongoDB is 827ms with throughput of 58.4per sec. for 100 samples.

The average response time for CouchDB is 8636ms with throughput of 9.8 per sec. for 100 samples.

In MongoDB, the document insertion rate is approximately 10 times better than Apache Couch DB under the stated conditions and environment.

The performance can be more generalized defining the nodes for the server and replication for MongoDB and CouchDB.

Table 3: Comparison MongoDB vs. CouchDB

Parameter	**MongoDB**	**Apache CouchDB**
Installation	Easy with shell utilities	Easy and Fast with web utilities
Type	Collection Oriented	Schema Free – Flat Address Space
Data Storage	BSON – "Binary Serialized dOcument Notation" format	JSON – "JavaScript Object Notation" format.
Protocol	Custom	HTTP
Response Time	Faster	Slower as compared to MongoDB

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