Database scaling Research

TwitterV2

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# Introduction

The purpose of this research is to find out how to scale my MongoDB database deployment in my NetLab Kubernetes environment.

Due to the topic of the research being quite small, there are no sub-questions.

# Research question & methods

Main research question:

How can I scale a MongoDB database, which is deployed on Kubernetes?

* Literature study
  + I will be Googling and querying ChatGPT how to scale a MongoDB database deployed on Kubernetes.
* Prototyping
  + Create a prototype of a scaled-up MongoDB database and deploy it on Kubernetes.
* Non-functional test
  + Test whether the prototype database has high availability, and the data is correctly persisted.

# Answers

Scaling MongoDB on Kubernetes involves a combination of Kubernetes' native scaling features and MongoDB's inherent replication capabilities. Scaling can be done by creating a MongoDB Replica Set. A MongoDB Replica Set is a group of mongo processes that maintain the same data set. Replica sets provide redundancy and high availability and are the basis for all production deployments. You can configure a replica set to have any number of secondary nodes. Kubernetes StatefulSets are ideal for deploying and managing stateful applications like MongoDB. They manage the deployment and scaling of a set of Pods and provide guarantees about the ordering and uniqueness of these Pods.

Basically, a StatefulSet MongoDB needs to be created, which includes a minimum of 3 replicas and a command used for creating a MongoDB Replica Set:[[1]](#footnote-1)

A screenshot of a computer program

Description automatically generated

Figure 1 Example MongoDB deployment as a StatefulSet

After deploying the StatefulSet, according to ChatGPT, there are some commands to be executed through the MongoDB pods.

First, the replica set must be initialized:

A screenshot of a computer

Description automatically generated

Figure 2 Initiating the MongoDB replica set

Second, adding the rest of the pods as members of the replica set:

A screenshot of a computer

Description automatically generated

Figure 3 Adding the rest of the pods as members of the MongoDB Replica Set

At this point, the Replica Set should be up and running.

Now, to create a prototype within my NetLab environment, I started by following the steps from above. After executing all of the commands, I checked the status of the Replica Set and made sure that everything with the primary and secondary replicas was correct:

A computer screen shot of a program code

Description automatically generated

Figure 4 Primary and Secondary replicas inside of the Replica Set working.

Now that everything was ready, I connected to the database using MongoDB-Compass:

A screenshot of a computer

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Figure 5 Connecting to the Replica Set.

After making sure the prototype was functioning, I integrated it into TwitterV2 by changing the connection string within the web application.

Now that the MongoDB Replica Set was integrated into TwitterV2, it was time to test whether the database had high availability and correctly persisted data while multiple database pods were working at the same time. I created a [video](scaled%20up%20db%20showcase.mp4) of the test.

# Conclusion

Scaling up a MongoDB database, which is deployed on Kubernetes, is done by creating a manifest file with the needed configuration, initiating the MongoDB Replica Set within one of the Kubernetes mongo pods, and adding the rest of the pods as members of the MongoDB Replica Set. Last but not least, the connection strings of the web application have to be edited.

# Sources

*[Answered] How can you scale MongoDB on Kubernetes?* (n.d.). https://www.dragonflydb.io/faq/mongodb-scaling-kubernetes

1. *[Answered] How can you scale MongoDB on Kubernetes?* (n.d.). https://www.dragonflydb.io/faq/mongodb-scaling-kubernetes [↑](#footnote-ref-1)