Proseminar Distributed Systems

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Exercise Sheet 09

Intro

This exercise sheet will extend your work done for the previous exercise sheet. This time you will start multiple instances with `redis-server` installed, set up a Redis cluster with these instances, and work with the cluster.
This exercise sheet consists of 2 exercises, upload your solutions to OLAT before midnight on the day before the next proseminar.

Exercise 1 (Running Redis Cluster)

a) Read through the Redis cluster tutorial[1] to get familiar with running a Redis cluster. Use your code from the previous exercise sheet and add code to manage the cluster with at least the following functionalities:

- Extend your code to be able to start multiple instances, all running a `redis-server`.
- Use a minimum of 6 instances. [2]. If more than 6 nodes are used, use a multiple of two to meet the requirement of using one replica node for each master node.
- Modify the user data to create a custom Redis configuration file on each instance. Make sure to set `port`, `cluster-enabled`, `cluster-config-file`, `cluster-node-timeout`, `appendonly`, `requirepass`[3], and `masterauth`. Study the Redis cluster tutorial and documentation to find suitable values.
- Store the public and private ip addresses of the nodes started.
- Once all the nodes are up and running (`Status check: 2/2 checks passed`), initiate the cluster as described in the Redis cluster tutorial (i.e. `redis-cli --cluster create ...`).

Upload your updated code as solution.

b) Log into one of the nodes of the cluster and execute the Redis command `cluster info` [4]. Copy the output of `cluster info` into a textfile or PDF, and briefly explain the informations.

Upload the output of cluster info and your explanation as textfile or PDF.

[1] https://redis.io/topics/cluster-tutorial
[2] As stated in the Redis cluster tutorial, the minimum number of master nodes to use is 3 with each master node having at least 1 replica node.
[3] https://redis.io/commands/auth
[4] https://redis.io/commands/cluster-info

Hint

Since we are now running not only a single node but multiple nodes with password-protection in cluster mode, you may find the parameters `-a <PASSWORD>` [a] and `-c` of `redis-cli` helpful.

[a] https://redis.io/topics/rediscli

Exercise 2 (Inserting Data into Redis Cluster)

Use Redis command-line interface to import the data in the file `salary.txt` (OLAT) into the cluster and answer the following questions:

- Find out how many key value pairs are stored at each node and explain how Redis distributes data over the nodes, i.e. "why is the key value pair ('something', 7.8) on node X.".
- What happens in the cluster when you force a failure at a master node by manually stopping the Redis server?
- How does the cluster handle the situation of a master node reconnecting to the cluster? What steps are executed by the cluster?
- If you add another pair of master and replica nodes to the cluster, after the cluster is already initiated, what data will be redistributed to that new nodes and why?

Upload your answers as textfile or PDF.