

CSCI B-534 Distributed Systems

-Avinash Reddy Mettukuru

Memcached-lite

AIM: To mimic a Memcached server functionality with a persistent memory in Java.

File Structure:

```
/src
-Server.java
-ClientHandle.java
-LookUpCache.java
-Client.java
-cache.json
-Makefile
-jackson-annotations-2.13.3.jar
-jackson-core-2.13.3.jar
-jackson-databind-2.13.3.jar
```

Dependencies: Please find the included jar files for “jackson-fasterxml” included in “src” directory.

Implementation:

Server:

In java, I have used the abstraction to create a custom class “LookUpCache” from HashMap. In this class we save the persistent file to save all the key-value pairs that our server receives, that saves in JSON format. I have used “ReaderWriterLock” to synchronize between different clients and to eliminate any problems caused by concurrent updates and reads. To make the server compatible with standard “memcache” libraries I have introduced a dummy flags, so our server response after getting a GET request will be:

```
VALUE <key> <flag> <value-bytes> \r\n (this <flag> is the dummy response)
<value> \r\n
```

Client:

A client will connect to the server with the given host address and port. We can terminate a client by giving the escape character(!q) as an input. For a SET method we need to provide the value as an input after providing a valid SET command.

Working:

Makefile:

In the Makefile, we can use the “runServer” command to run the server by providing port, cache_path, an ideal command will be:

```
make runServer port=8080 cache_path=cache.json
```

To run the client, we can use the “runClient” command by providing the make command like:

```
make runClient addr=127.0.0.1 port=8080
```

We can use the “clean” command to delete the existing java compiles class’s to force recompile them.

make clean

Output:

Client-1:

```
Command Prompt - ssh gh  X  Windows PowerShell  X  +  v
avmett@gh:~/ds/src/main/java$ make runClient
javac Client.java
java Client
Enter the Queries:
Escape character is !q
GET test
VALUE test 6
Python
END
SET hello 4
test
STORED
get hello
VALUE hello 4
test
END
get test
VALUE test 6
pyhton
END
!q
Closed client
avmett@gh:~/ds/src/main/java$
```

Client-2

```
Command Prompt - ssh gh  X  Windows PowerShell  X  +  v
** For general Luddy computing information, please see:
**   https://help.luddy.indiana.edu/
**
** To submit a problem report or question, please see:
**   https://help.luddy.indiana.edu/request
**
** Run "config" command to see the hardware configuration of this system
*****
Last login: Tue Jan 31 22:07:28 2023 from 69.151.177.5
avmett@gh:~$ cd ds/src/main/java/
avmett@gh:~/ds/src/main/java$ make runClient
java Client
Enter the Queries:
Escape character is !q
GET Name
VALUE Name 5
!q
Closed client
avmett@gh:~/ds/src/main/java$ make runClient
java Client
Enter the Queries:
Escape character is !q
GET hello
VALUE hello 4
test
END
SET test 6
pyhton
STORED
!
```

Client using Standard pymemcache library:

```
Command Prompt - python  X + v
Microsoft Windows [Version 10.0.22621.1105]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Avinash>python
Python 3.9.12 (main, Apr  4 2022, 05:22:27) [MSC v.1916 64 bit (AMD64)] :: Anaconda, Inc.

Warning:
This Python interpreter is in a conda environment, but the environment has
not been activated. Libraries may fail to load. To activate this environment
please see https://conda.io/activation

Type "help", "copyright", "credits" or "license()" for more information.
>>> from pymemcache.client.base import Client
>>> cl = Client(('localhost',8080))
>>> cl.get('Name')
b'Python'
>>>
```