

Structure

- MessengerService:

Interface defining shared behaviors between Server and Client

- MessengerServiceImpl:

Implement key-value storage with HashMap

- Client:

Get remote object MessengerService from Registry

- Server:

Creat Registry and bind remote object to Registry

Compile

- javac *.java

run

- To run a server:
- \$ java Server <port of current server> <ports of all server replicas>
- or
- \$ java Server <port of current server>
in which case the port must within default ports of [8080, 8081, 8082, 8083, 8084]
- e.g. \$java Server 8080 8080 8081 8082 8083 8084``
- or \$java Server 8083 8080 8081 8082 8083 8084``
- To run a client:
- java Client <port>

Examples

Client connects to Server 1, puts <a, 1> and gets <a, 1>

```
1. java Client 8080 (java)

+ Project_2 git:(master) x java Server 8080
Mar 07, 2019 3:53:17 PM MessengerServiceImpl <init>
INFO: Current thread: main
Mar 07, 2019 3:53:18 PM Server <init>
INFO: Listening to port: 8080
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: Current thread: RMI TCP Connection(2)-172.16.210.90
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: PUT (a, 1)
Mar 07, 2019 3:54:13 PM MessengerServiceImpl get
INFO: Current thread: RMI TCP Connection(2)-172.16.210.90
Mar 07, 2019 3:54:13 PM MessengerServiceImpl get
INFO: GET a, value is 1
[]

+ Project_2 git:(master) x java Server 8081
Last login: Thu Mar 7 15:52:45 on ttys006
+ Project_2 git:(master) x java Server 8081
Mar 07, 2019 3:53:26 PM MessengerServiceImpl <init>
INFO: Current thread: main
Mar 07, 2019 3:53:26 PM Server <init>
INFO: Listening to port: 8081
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: Current thread: RMI TCP Connection(2)-172.16.210.90
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: PUT (a, 1)
[]

+ Project_2 git:(master) x java Server 8082
Last login: Thu Mar 7 15:53:05 on ttys000
+ Project_2 git:(master) x java Server 8082
Mar 07, 2019 3:53:32 PM MessengerServiceImpl <init>
INFO: Current thread: main
Mar 07, 2019 3:53:32 PM Server <init>
INFO: Listening to port: 8082
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: Current thread: RMI TCP Connection(2)-172.16.210.90
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: PUT (a, 1)
[]

+ Project_2 git:(master) x java Server 8083
Last login: Thu Mar 7 15:53:06 on ttys001
+ Project_2 git:(master) x java Server 8083
Mar 07, 2019 3:53:37 PM MessengerServiceImpl <init>
INFO: Current thread: main
Mar 07, 2019 3:53:37 PM Server <init>
INFO: Listening to port: 8083
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: Current thread: RMI TCP Connection(2)-172.16.210.90
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: PUT (a, 1)
[]

+ Project_2 git:(master) x java Server 8084
Last login: Thu Mar 7 15:53:08 on ttys002
+ Project_2 git:(master) x java Server 8084
Mar 07, 2019 3:53:40 PM MessengerServiceImpl <init>
INFO: Current thread: main
Mar 07, 2019 3:53:40 PM Server <init>
INFO: Listening to port: 8084
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: Current thread: RMI TCP Connection(2)-172.16.210.90
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: PUT (a, 1)
[]

+ Project_2 git:(master) x java Client 8080
Last login: Thu Mar 7 15:53:09 on ttys003
+ Project_2 git:(master) x java Client 8080
Mar 07, 2019 3:53:45 PM Client <init>
INFO: Connected to port 8080
Enter operation (GET, PUT or DEL)
PUT
Enter key
a
Enter value
1
Mar 07, 2019 3:53:50 PM Client execute
INFO: PUT (a, 1)
Enter operation (GET, PUT or DEL)
GET
Enter key
a
Mar 07, 2019 3:54:13 PM Client execute
INFO: GET a, value is 1
Enter operation (GET, PUT or DEL)
```

Client connects to Server 4, delete <a> and gets <a, not exist>

```
1. java Client 8083 (java)
+ Project_2 git:(master) x java Server 8080
Mar 07, 2019 3:53:17 PM MessengerServiceImpl <init>
INFO: Current thread: main
Mar 07, 2019 3:53:18 PM Server <init>
INFO: Listening to port: 8080
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: Current thread: RMI TCP Connection(2)-172.16.210.90
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: PUT (a, 1)
Mar 07, 2019 3:54:13 PM MessengerServiceImpl get
INFO: Current thread: RMI TCP Connection(2)-172.16.210.90
Mar 07, 2019 3:54:13 PM MessengerServiceImpl get
INFO: GET a, value is 1
Mar 07, 2019 3:54:54 PM MessengerServiceImpl del
INFO: Current thread: RMI TCP Connection(11)-172.16.210.90
Mar 07, 2019 3:54:54 PM MessengerServiceImpl del
INFO: DELETE a
[]

+ Project_2 git:(master) x java Server 8081
Last login: Thu Mar 7 15:52:45 on ttys006
+ Project_2 git:(master) x java Server 8081
Mar 07, 2019 3:53:26 PM MessengerServiceImpl <init>
INFO: Current thread: main
Mar 07, 2019 3:53:26 PM Server <init>
INFO: Listening to port: 8081
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: Current thread: RMI TCP Connection(2)-172.16.210.90
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: PUT (a, 1)
Mar 07, 2019 3:54:54 PM MessengerServiceImpl del
INFO: Current thread: RMI TCP Connection(9)-172.16.210.90
Mar 07, 2019 3:54:54 PM MessengerServiceImpl del
INFO: DELETE a
[]

+ Project_2 git:(master) x java Server 8082
Last login: Thu Mar 7 15:53:05 on ttys000
+ Project_2 git:(master) x java Server 8082
Mar 07, 2019 3:53:32 PM MessengerServiceImpl <init>
INFO: Current thread: main
Mar 07, 2019 3:53:32 PM Server <init>
INFO: Listening to port: 8082
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: Current thread: RMI TCP Connection(2)-172.16.210.90
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: PUT (a, 1)
Mar 07, 2019 3:54:54 PM MessengerServiceImpl del
INFO: Current thread: RMI TCP Connection(9)-172.16.210.90
Mar 07, 2019 3:54:54 PM MessengerServiceImpl del
INFO: DELETE a
[]

+ Project_2 git:(master) x java Server 8083
Last login: Thu Mar 7 15:53:06 on ttys001
+ Project_2 git:(master) x java Server 8083
Mar 07, 2019 3:53:37 PM MessengerServiceImpl <init>
INFO: Current thread: main
Mar 07, 2019 3:53:37 PM Server <init>
INFO: Listening to port: 8083
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: Current thread: RMI TCP Connection(2)-172.16.210.90
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: PUT (a, 1)
Mar 07, 2019 3:54:54 PM MessengerServiceImpl del
INFO: Current thread: RMI TCP Connection(10)-172.16.210.90
Mar 07, 2019 3:54:54 PM MessengerServiceImpl del
INFO: DELETE a
Mar 07, 2019 3:55:01 PM MessengerServiceImpl get
INFO: Current thread: RMI TCP Connection(10)-172.16.210.90
Mar 07, 2019 3:55:01 PM MessengerServiceImpl get
INFO: a does not exist
[]

+ Project_2 git:(master) x java Server 8084
Last login: Thu Mar 7 15:53:08 on ttys002
+ Project_2 git:(master) x java Server 8084
Mar 07, 2019 3:53:40 PM MessengerServiceImpl <init>
INFO: Current thread: main
Mar 07, 2019 3:53:40 PM Server <init>
INFO: Listening to port: 8084
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: Current thread: RMI TCP Connection(2)-172.16.210.90
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: PUT (a, 1)
Mar 07, 2019 3:54:54 PM MessengerServiceImpl del
INFO: Current thread: RMI TCP Connection(9)-172.16.210.90
Mar 07, 2019 3:54:54 PM MessengerServiceImpl del
INFO: DELETE a
[]

+ Project_2 git:(master) x java Client 8083
Mar 07, 2019 3:54:45 PM Client <init>
INFO: Connected to port 8083
Enter operation (GET, PUT or DEL)
DEL
Enter key
a
Mar 07, 2019 3:54:54 PM Client execute
INFO: a deleted successfully
Enter operation (GET, PUT or DEL)
GET
Enter key
a
Mar 07, 2019 3:55:01 PM Client execute
INFO: a does not exist
Enter operation (GET, PUT or DEL)
```

Server 1 disconnects, Client tries to PUT <b, 2> to Server 4 and fails. Error message: Server not ready

```
1. java Client 8083 (java)

x -jonyProject_2 (zsh) x java (java) x java (java)

+ Project_2 git:(master) x java Server 8080
Mar 07, 2019 3:53:17 PM MessengerServiceImpl <init>
INFO: Current thread: main
Mar 07, 2019 3:53:18 PM Server <init>
INFO: Listening to port: 8080
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: Current thread: RMI TCP Connection(2)-172.16.210.90
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: PUT (a, 1)
Mar 07, 2019 3:54:13 PM MessengerServiceImpl get
INFO: Current thread: RMI TCP Connection(2)-172.16.210.90
Mar 07, 2019 3:54:13 PM MessengerServiceImpl get
INFO: GET a, value is 1
Mar 07, 2019 3:54:54 PM MessengerServiceImpl del
INFO: Current thread: RMI TCP Connection(11)-172.16.210.90
Mar 07, 2019 3:54:54 PM MessengerServiceImpl del
INFO: DELETE a
^C
+ Project_2 git:(master) x []

x java (zsh) x java (java) x java (java)

Last login: Thu Mar 7 15:53:06 on ttys001
+ Project_2 git:(master) x java Server 8083
Mar 07, 2019 3:53:37 PM MessengerServiceImpl <init>
INFO: Current thread: main
Mar 07, 2019 3:53:37 PM Server <init>
INFO: Listening to port: 8083
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: Current thread: RMI TCP Connection(2)-172.16.210.90
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: PUT (a, 1)
Mar 07, 2019 3:54:54 PM MessengerServiceImpl del
INFO: Current thread: RMI TCP Connection(10)-172.16.210.90
Mar 07, 2019 3:54:54 PM MessengerServiceImpl del
INFO: DELETE a
Mar 07, 2019 3:55:01 PM MessengerServiceImpl get
INFO: Current thread: RMI TCP Connection(10)-172.16.210.90
Mar 07, 2019 3:55:01 PM MessengerServiceImpl get
INFO: a does not exist
Mar 07, 2019 3:56:26 PM MessengerServiceImpl put
WARNING: Servers not ready
[]

Last login: Thu Mar 7 15:53:08 on ttys002
+ Project_2 git:(master) x java Server 8084
Mar 07, 2019 3:53:40 PM MessengerServiceImpl <init>
INFO: Current thread: main
Mar 07, 2019 3:53:40 PM Server <init>
INFO: Listening to port: 8084
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: Current thread: RMI TCP Connection(2)-172.16.210.90
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: PUT (a, 1)
Mar 07, 2019 3:54:54 PM MessengerServiceImpl del
INFO: Current thread: RMI TCP Connection(9)-172.16.210.90
Mar 07, 2019 3:54:54 PM MessengerServiceImpl del
INFO: DELETE a
[]

Last login: Thu Mar 7 15:53:05 on ttys000
+ Project_2 git:(master) x java Server 8082
Mar 07, 2019 3:53:32 PM MessengerServiceImpl <init>
INFO: Current thread: main
Mar 07, 2019 3:53:32 PM Server <init>
INFO: Listening to port: 8082
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: Current thread: RMI TCP Connection(2)-172.16.210.90
Mar 07, 2019 3:53:50 PM MessengerServiceImpl put
INFO: PUT (a, 1)
Mar 07, 2019 3:54:54 PM MessengerServiceImpl del
INFO: Current thread: RMI TCP Connection(9)-172.16.210.90
Mar 07, 2019 3:54:54 PM MessengerServiceImpl del
INFO: DELETE a
[]

DEL
Enter key
a
Mar 07, 2019 3:54:54 PM Client execute
INFO: a deleted successfully
Enter operation (GET, PUT or DEL)
GET
Enter key
a
Mar 07, 2019 3:55:01 PM Client execute
INFO: a does not exist
Enter operation (GET, PUT or DEL)
PUT
Enter key
b
Enter value
2
Mar 07, 2019 3:56:26 PM Client execute
INFO: Servers not ready
Enter operation (GET, PUT or DEL)
[]
```