Report for Distribution system AS2

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1.Main implementation choice

Java socket

Java socket was chosen for implementing this assignment to support main functionality.

2.Main functionality of simulation

Client

Client is the requester and receiver of the service, it needs to send request to the server. So, the client program includes the scan input functions to get the client request and communication functions to support the connection to the server.

Server

Server is the provider of the service. So, it required variables to receive and store the user input then use functions to process them then feedback the results to the client. For this task the service function are the methods used in AS1 to elect leader from a circuit network by LCR or HS algorithm.

3.Development details

Client

Generate socket first and then initialize input output stream

Use PrintStream object output and BufferedReader object input to send and receive messages.

```
String message0=input.readLine();    String reply=scan.nextLine();
System.out.println(message0);        output.println(reply);
```

Client build connection with server first by java socket methods. Then read the feed back from server and send user input each round.

Extra function for receiving the log: the final round server asks the client to get the log, if client choose YES server will transfer a long one line String of the whole log and client will cut it into lines and display.

Server

Setting port by port number and socket based on port number for client to connect first.

Try catch algorithm to run simulating service

Server collect user input each round and after 4 rounds collected all the required variable then run the simulation by method to run the simulation method “AS2SimulatingService” which could return an array of two String include basic result and simulate log, then send back the simulation results and send back simulating log on users’ option.

4.Test log

Basic client operation:

To start, run the server program first. The server is setting to wait for client connection.

Then run the program of the client. Connection is already setting, server told client the content for the service it to simulate LCR and HS algorithm then let client to select which algorithm to simulate.

```
COMP212AS2_Server (run) × COMP212AS2_Clint (run) ×
run:
Server says: Hello Client /127.0.0.1. This is server 0.0.0.0/0.0.0.0 speaking. Our connection has been successfully established!
Server says: This is a LCR/HR simulator. Please input which algorithm you would like to simulate, "1" for LCR and "0" for HS
```

Select 1 to simulate LCR

```
COMP212AS2_Server (run) × COMP212AS2_Clint (run) ×
run:
Server says: Hello Client /127.0.0.1. This is server 0.0.0.0/0.0.0.0 speaking. Our connection has been successfully established!
Server says: This is a LCR/HR simulator. Please input which algorithm you would like to simulate, "1" for LCR and "0" for HS
1
Server says: Please input the node number in the network
```

Input 6 to simulate network with 6 nodes

```
COMP212AS2_Server (run) × COMP212AS2_Clint (run) ×
run:
Server says: Hello Client /127.0.0.1. This is server 0.0.0.0/0.0.0.0 speaking. Our connection has been successfully established!
Server says: This is a LCR/HR simulator. Please input which algorithm you would like to simulate, "1" for LCR and "0" for HS
1
Server says: Please input the node number in the network
6
Server says: Please input which alpha you would like to genarate ID (alpha is a small interger)
```

Input 3 to Set alpha=3

```
COMP212AS2_Server (run) × COMP212AS2_Clint (run) ×
run:
Server says: Hello Client /127.0.0.1. This is server 0.0.0.0/0.0.0.0 speaking. Our connection has been successfully established!
Server says: This is a LCR/HR simulator. Please input which algorithm you would like to simulate, "1" for LCR and "0" for HS
1
Server says: Please input the node number in the network
6
Server says: Please input which alpha you would like to genarate ID (alpha is a small interger)
3
Server says: Please select how to generate ID for nodes "1" for random and "2" for clock wise, "3" for counter clockwise
```

Input 1 to Select random id and get results, end request.

```
COMP212AS2_Server (run) × COMP212AS2_Clint (run) ×
run:
Server says: Hello Client /127.0.0.1. This is server 0.0.0.0/0.0.0.0 speaking. Our connection has been successfully established!
Server says: This is a LCR/HR simulator. Please input which algorithm you would like to simulate, "1" for LCR and "0" for HS
1
Server says: Please input the node number in the network
6
Server says: Please input which alpha you would like to genarate ID (alpha is a small interger)
3
Server says: Please select how to generate ID for nodes "1" for random and "2" for clock wise, "3" for counter clockwise
1
Server says: The network runs 12 rounds and send 16 messages
Server says: If you'd like to get while process log, input "Y". If you would like to end, input any other character
```

When user input Y in the end, the service will pass the whole simulate log to the client. (It works on LCR and HS both, page limited so here display LCR)

```
Server says: If you'd like to get while process log, input "Y". If you would like to end, input any other character
Y
num:1  ID:7  states:unknown  data:null  NextNode:2  PreviousNode:6  Terminate:false  Leader in momery:0
num:2  ID:18  states:unknown  data:null  NextNode:3  PreviousNode:1  Terminate:false  Leader in momery:0
num:3  ID:9  states:unknown  data:null  NextNode:4  PreviousNode:2  Terminate:false  Leader in momery:0
num:4  ID:16  states:unknown  data:null  NextNode:5  PreviousNode:3  Terminate:false  Leader in momery:0
num:5  ID:14  states:unknown  data:null  NextNode:6  PreviousNode:4  Terminate:false  Leader in momery:0
num:6  ID:1  states:unknown  data:null  NextNode:1  PreviousNode:5  Terminate:false  Leader in momery:0
Node:<num:1 ID:7> pass 0 to next node <num:2 ID:18>
Node:<num:2 ID:18> pass 7 to next node <num:3 ID:9>
Node:<num:3 ID:9> pass 18 to next node <num:4 ID:16>
Node:<num:4 ID:16> pass 9 to next node <num:5 ID:14>
Node:<num:5 ID:14> pass 16 to next node <num:6 ID:1>
Node:<num:6 ID:1> pass 14 to next node <num:1 ID:7>
Parallel execute 1 finish
Node:<num:3 ID:9> pass 18 to next node <num:4 ID:16>
Node:<num:5 ID:14> pass 16 to next node <num:6 ID:1>
Node:<num:6 ID:1> pass 16 to next node <num:1 ID:7>
Parallel execute 2 finish
Node:<num:1 ID:7> pass 14 to next node <num:2 ID:18>
Node:<num:4 ID:16> pass 18 to next node <num:5 ID:14>
Node:<num:6 ID:1> pass 16 to next node <num:1 ID:7>
Parallel execute 3 finish
Node:<num:1 ID:7> pass 16 to next node <num:2 ID:18>
Node:<num:5 ID:14> pass 18 to next node <num:6 ID:1>
Parallel execute 4 finish
Node:<num:6 ID:1> pass 18 to next node <num:1 ID:7>
Parallel execute 5 finish
Node:<num:1 ID:7> pass 18 to next node <num:2 ID:18>
Parallel execute 6 finish
Node:<num:2 ID:18> chosen as the leader
Node:<num:2 ID:18> told Node:<num:3 ID:9> to terminate
Parallel execute 7 finish
Node:<num:3 ID:9> told Node:<num:4 ID:16> to terminate
Parallel execute 8 finish
Node:<num:4 ID:16> told Node:<num:5 ID:14> to terminate
Parallel execute 9 finish
Node:<num:5 ID:14> told Node:<num:6 ID:1> to terminate
Parallel execute 10 finish
Node:<num:6 ID:1> told Node:<num:1 ID:7> to terminate
Parallel execute 11 finish
Node:<num:1 ID:7> told Node:<num:2 ID:18> to terminate
Parallel execute 12 finish
num:1  ID:7  states:normal  data:null  NextNode:2  PreviousNode:6  Terminate:true  Leader in momery:18
num:2  ID:18  states:Leader  data:null  NextNode:3  PreviousNode:1  Terminate:true  Leader in momery:18
num:3  ID:9  states:normal  data:null  NextNode:4  PreviousNode:2  Terminate:true  Leader in momery:18
num:4  ID:16  states:normal  data:null  NextNode:5  PreviousNode:3  Terminate:true  Leader in momery:18
num:5  ID:14  states:normal  data:null  NextNode:6  PreviousNode:4  Terminate:true  Leader in momery:18
num:6  ID:1  states:normal  data:null  NextNode:1  PreviousNode:5  Terminate:true  Leader in momery:18

<The query is completed and Connection with client /127.0.0.1 is now closing...
成功构建（总时间：2 分钟 20 秒）
```

Server side:

```
COMP212AS2_Server (run) × COMP212AS2_Clint (run) ×
run:
Connection established with a new client with IP address: /127.0.0.1

Received a new message from client /127.0.0.1
Client says: 1
Received a new message from client /127.0.0.1
Client says: 6
Received a new message from client /127.0.0.1
Client says: 3
Received a new message from client /127.0.0.1
Client says: 1
This is the altomatic static of run result of such network
There are 6 nodes in the network
Algorithm used 7 rounds to elect the leader
Algorithm used 12 parall execute rounds to make all nodes terminate
Algorithm passed 16 message in total
Leader ID: 18   Correct ID from sort of all ID:18
The algorithm succeed to get the right leader
Connection with client /127.0.0.1
num:1  ID:7  states:unknown  data:null  NextNode:2  PreviousNode:6  Terminate:false  Leader in momery:0*num:2  ID:18  sta
Received a new message from client /127.0.0.1
Client says: Y
```

Counter clockwise and clock wise ID

```
COMP212AS2_Server (run) × COMP212AS2_Clint2 (run) ×
run:
Server says: Hello Client /127.0.0.1. This is server 0.0.0.0/0.0.0.0 speaking. Our connection has been successfully established!
Server says: This is a LCR/HR simulator. Please input which algorithm you would like to simulate, "1" for LCR and "0" for HS
1
Server says: Please input the node number in the network
2000
Server says: Please input which alpha you would like to genarate ID (alpha is a small interger)
3
Server says: Please select how to generate ID for nodes "1" for random and "2" for clock wise, "3" for counter clockwise
3
Server says: The network runs 4000 rounds and send 2001000 messages <The query is completed and Connection with client /127.0.0.1 is now closing...\n>
```

```
COMP212AS2_Server (run) × COMP212AS2_Clint2 (run) ×
run:
Server says: Hello Client /127.0.0.1. This is server 0.0.0.0/0.0.0.0 speaking. Our connection has been successfully established!
Server says: This is a LCR/HR simulator. Please input which algorithm you would like to simulate, "1" for LCR and "0" for HS
1
Server says: Please input the node number in the network
2000
Server says: Please input which alpha you would like to genarate ID (alpha is a small interger)
3
Server says: Please select how to generate ID for nodes "1" for random and "2" for clock wise, "3" for counter clockwise
2
Server says: The network runs 4000 rounds and send 3999 messages <The query is completed and Connection with client /127.0.0.1 is now closing...\n>
```

For HS

```
COMP212AS2_Server (run) × COMP212AS2_Clint2 (run) ×
run:
Server says: Hello Client /127.0.0.1. This is server 0.0.0.0/0.0.0.0 speaking. Our connection has been successfully established!
Server says: This is a LCR/HR simulator. Please input which algorithm you would like to simulate, "1" for LCR and "0" for HS
0
Server says: Please input the node number in the network
5000
Server says: Please input which alpha you would like to genarate ID (alpha is a small interger)
3
Server says: Please select how to generate ID for nodes "1" for random and "2" for clock wise, "3" for counter clockwise
1
Server says: The network runs 26382 rounds and send 208115 messages <The query is completed and Connection with client /127.0.0.1 is now closing...\n>
```

COMP212AS2_Server (run) × COMP212AS2_Clint2 (run) ×

```
run:
Connection established with a new client with IP address: /127.0.0.1

Received a new message from client /127.0.0.1
Client says: 0
Received a new message from client /127.0.0.1
Client says: 5000
Received a new message from client /127.0.0.1
Client says: 3
Received a new message from client /127.0.0.1
Client says: 1
This is the altomatic static of run result of such network
There are 5000 nodes in the network
Algorithm used 13 phases to elect the leader
Algorithm used 26382 parall execute rounds to make all nodes terminate
Algorithm passed 208115 message in total
Leader ID: 14996   Correct ID from sort of all ID:14996
The algorithm succeed to get the right leader
Connection with client /127.0.0.1 is now closing...
```