

CSci 364 Concurrent and Distributed Programming  
Spring, 2023  
HW2

Design and implement a simplified message-oriented-middleware (MOM) server using JDK 17+. Your server will enable clients that send messages and clients that read messages to communicate without connecting directly to each other or connecting to the MOM server at the same time.

Your server shall add received messages to the end and remove read messages from the head of a FIFO queue.

Your server shall listen on a port number specified as a command-line argument. (port > 1023)

Your server queue max size (max number of messages stored) shall be specified as a command-line argument. (size > 0)

Your server shall allow more than one client to connect at the same time. (This server must be multi-threaded.)

Your server shall allow a client to disconnect from the server without effecting the server or other clients (see the “close” command below).

Messages exchanged between clients and the server shall be single-line XML-formatted strings as follows.

```
<message><cmd></cmd><data></data></message>
```

The client shall send messages to the server with one of the following commands.

cmd	data
write	Message to be added to the queue tail
read	
size	
close	

The write command is used to submit a message to the queue. The read command is used to retrieve a message from the queue. The size command asks for the number of messages currently stored in the queue. The close command is used to end a client thread.

Here is an example of a message from a client requesting

```
<message><cmd>read</cmd><data></data></message>
```

The archive distributed with this assignment includes code you can use to build and parse XML-formatted message. Documentation for this code is available via the ant gendocs target.

The server shall send a reply to each message received. The reply will echo the cmd element sent by the client. The data element in the reply is indicated below.

cmd	data	Condition
write	ok	if queue is not full
	Error: Queue Full	if queue is full
read	<the message at queue head>	if queue is not empty
	Error: Queue Empty	if queue is empty
size	<the current number of messages in the queue>	
close	ok	

Your server must appropriately synchronize access to the queue.

### Bonus points

Eligibility requirements:

1. The main assignment must be fully functional and correct before you can earn any bonus points.
2. Late assignments are not eligible for bonus points.

Implement an administrative interface to your MOM server as follows.

Your admin interface server shall listen on a special admin port.

The admin port number is the third command-line argument.

Only one admin client can connect to the server at a time. (This administrative interface must not be multi-threaded.)

The format for messages exchanged between the server and the admin client is the same as above.

cmd	data
size	
clean	
reset	
close	

A single admin client may connect and

The size command asks for the number of messages currently in the queue. (The same as for non-admin clients.) The clean command removes all messages from the queue. The reset command closes all non-admin client connections.

cmd	data
size	<the number of messages currently in the queue>
clean	ok
reset	ok
close	ok

### Grading Rubric

In addition to the grading rubric for HW1,

1. No magic numbers in source code. You must not use literal values in statements. Literal values must be assigned to constants with meaningful names.

```
if (port < 1024) {
    server.usage();
    System.exit(1);
}
```

Instead, you must declare and initialize a constant. The use the named constant.

```
static final int MIN_PORT = 1024;
...
if (port < MIN_PORT) {
    server.usage();
    System.exit(1);
}
```

2. The main method (public static void main(...)) must not include a throws clause.

### Submit to Blackboard

Make sure your name is in each source file. Use meaningful file names.

Submit your src/ directory (with Java source files) and your Ant build script using the directory structure below. These files should be submitted as a zipped or tarred:

ex. hw2-lastname-first.zip or hw2-lastname-first.tar

```
hw2-yourname/
    build.xml
    src/[your Java source files]
    lib/
```