

Assignment 1: Java RMI

# 1 Testing

To run and test the code, I wrote a short shell script based off those provided in RMI Compute Server Example code provided on Canvas which compiles the code and launches three terminals: one running the rmiregistry, one running the ApplicationServer, and one running the ApplicationClient.

```
1 #!/bin/bash
2
3 src_path="/home/andrew/edu/year4/semester2/CT4I4/assignments/assignment1/code/src"
4
5 # compile code
6 javac -d . server/*.java client/*.java interfaces/*.java implementations/*.java
7
8 # start rmi registry (in a new terminal)
9 $TERM -e rmiregistry -J-Djava.rmi.server.codebase=file:$src_path &
10 sleep 1
11
12 # start server (in a new terminal)
13 $TERM -e java -cp $src_path -Djava.rmi.server.codebase=file:$src_path/ server.ApplicationServer &
14 sleep 1
15
16 # start client (in a new terminal)
17 $TERM -e bash -c "java -cp $src_path -Djava.rmi.server.codebase=file:$src_path/ client.ApplicationClient ;
  ↵ zsh"
```

Listing 1: run.sh

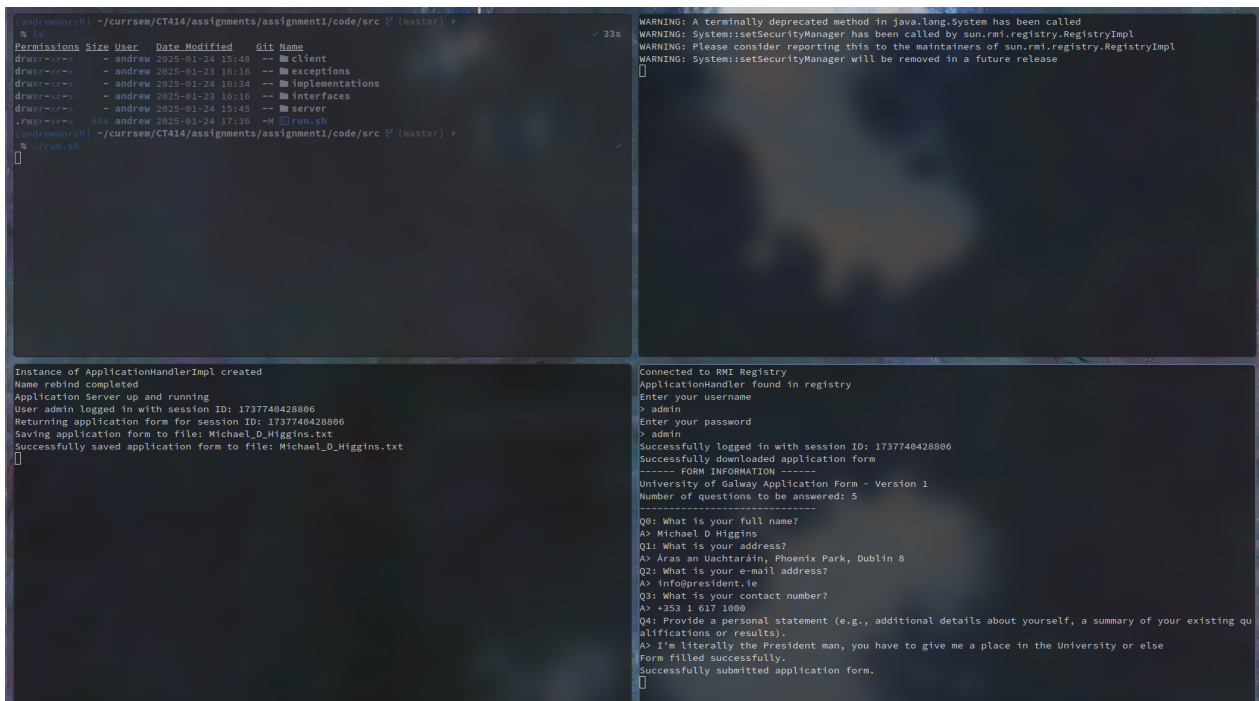


Figure 1: Screenshot of all four terminal windows. From left to right, top to bottom: the window running run.sh, the window running the rmiregistry, the window running the ApplicationServer, & the window running the ApplicationClient

As can be seen in the ApplicationClient terminal window above, I tested the application by logging in with username & password admin, and filling in application details. The details entered were saved into a file called Michael\_D\_Higgins.txt, with the name of the file being the applicant's name with all whitespace replaced with underscores (to avoid any spaces-in-filename headaches).

```

[andrew@arch] ~/currsem/CT414/assignments/assignment1/code/src P (master) +
% ls
Permissions Size User Date Modified Git Name
drwxr-xr-x - andrew 2025-01-24 15:48 -- client
drwxr-xr-x - andrew 2025-01-23 16:16 -- exceptions
drwxr-xr-x - andrew 2025-01-24 16:34 -- implementations
drwxr-xr-x - andrew 2025-01-23 16:16 -- interfaces
drwxr-xr-x - andrew 2025-01-24 15:45 -- server
-rw-r--r-- 459 andrew 2025-01-24 17:41 -N Michael_D_Higgins.txt
-rwxr-xr-x 604 andrew 2025-01-24 17:36 -M run.sh
[andrew@arch] ~/currsem/CT414/assignments/assignment1/code/src P (master) +
% bat Michael_D_Higgins.txt
File: Michael_D_Higgins.txt
1 Q0: What is your full name?
2 A0: Michael D Higgins
3
4 Q1: What is your address?
5 A1: Áras an Uachtaráin, Phoenix Park, Dublin 8
6
7 Q2: What is your e-mail address?
8 A2: info@president.ie
9
10 Q3: What is your contact number?
11 A3: +353 1 617 1000
12
13 Q4: Provide a personal statement (e.g., additional details about yourself, a summary of your existing qualifications or results).
14 A4: I'm literally the President man, you have to give me a place in the University or else
15
[andrew@arch] ~/currsem/CT414/assignments/assignment1/code/src P (master) +
%

```

Figure 2: Contents of the saved application form file

The output file contained all the questions and answers from the application form, as expected.

### 1.1 InvalidCredentialsException

To test that an appropriate exception was thrown when a user attempted to login with invalid credentials, I tried a few invalid logins. The desired behaviour, as can be seen in the output screenshot below, was that the ApplicationHandlerImpl class would throw an InvalidCredentialsException when the ApplicationClient invoked its ApplicationHandler.login() method. The ApplicationClient would then handle this exception gracefully, prompting the user to re-enter their login details until they entered valid details.

```

[andrew@arch] ~/currsem/CT414/assignments/assignment1/code/src P (master) +
% ls
Permissions Size User Date Modified Git Name
drwxr-xr-x - andrew 2025-02-02 17:57 -M client
drwxr-xr-x - andrew 2025-02-02 17:49 -M exceptions
drwxr-xr-x - andrew 2025-02-02 17:55 -M implementations
drwxr-xr-x - andrew 2025-01-23 16:16 -- interfaces
drwxr-xr-x - andrew 2025-01-24 15:45 -- server
-rwxr-xr-x 604 andrew 2025-02-02 17:59 -M run.sh
[andrew@arch] ~/currsem/CT414/assignments/assignment1/code/src P (master) +
% ./run.sh
WARNING: A terminally deprecated method in java.lang.System has been called
WARNING: System:setSecurityManager has been called by sun.rmi.registry.RegistryImpl
WARNING: Please consider reporting this to the maintainers of sun.rmi.registry.RegistryImpl
WARNING: System:setSecurityManager will be removed in a future release
Instance of ApplicationHandlerImpl created
Name rebind completed
Application Server up and running
Login failed with user root and password root
Login failed with user andrew and password password123
User admin logged in with session ID: 1738519476221
Returning application form for session ID: 1738519476221
Connected to RMI Registry
ApplicationHandler found in registry
Enter your username
> root
Enter your password
> root
Username or password incorrect, try again.
Enter your username
> andrew
Enter your password
> password123
Username or password incorrect, try again.
Enter your username
> admin
Enter your password
> admin
Successfully logged in with session ID: 1738519476221
Successfully downloaded application form
----- FORM INFORMATION -----
University of Galway Application Form - Version 1
Number of questions to be answered: 5
-----
Q0: What is your full name?
A>

```

Figure 3: Failed logins with invalid credentials, handled gracefully

## 1.2 InvalidSessionIDException

Since my `ApplicationHandlerImpl` class would reject session IDs older than 60 seconds (the low value being chosen for testing purposes, a more practical value would be, say, 10 minutes), I simply waited 60 seconds after logging in to answer the very last question, ensuring that the form submission method would be invoked with an expired session ID, the desired behaviour (as can be seen in the output below) being that the client would receive an `InvalidSessionIDException`, and gracefully terminate the program.

```
[andrew@arch] ~/currsem/CT414/assignments/assignment1/code/src P (master) +
% ls
Permissions Size User Date Modified Git Name
drwxr-xr-x - andrew 2025-02-02 17:57 -- client
drwxr-xr-x - andrew 2025-02-02 17:49 -- exceptions
drwxr-xr-x - andrew 2025-02-02 17:55 -- implementations
drwxr-xr-x - andrew 2025-01-25 10:16 -- interfaces
drwxr-xr-x - andrew 2025-01-24 15:45 -- server
-rwxr-xr-x 559 andrew 2025-02-02 18:15 -- run.sh
[andrew@arch] ~/currsem/CT414/assignments/assignment1/code/src P (master) +
% ./run.sh

Instance of ApplicationHandlerImpl created
Name rebind completed
Application Server up and running
User admin logged in with session ID: 1738520201402
Returning application form for session ID: 1738520201402

WARNING: A terminally deprecated method in java.lang.System has been called
WARNING: System::setSecurityManager has been called by sun.rmi.registry.RegistryImpl
WARNING: Please consider reporting this to the maintainers of sun.rmi.registry.RegistryImpl
WARNING: System::setSecurityManager will be removed in a future release

ApplicationHandler found in registry
Enter your username
> admin
Enter your password
> admin
Successfully logged in with session ID: 1738520201402
Successfully downloaded application form
----- FORM INFORMATION -----
University of Galway Application Form - Version 1
Number of questions to be answered: 5
-----
Q0: What is your full name?
A> Testy McTest
Q1: What is your address?
A> Test Avenue
Q2: What is your e-mail address?
A> test@example.com
Q3: What is your contact number?
A> 123
Q4: Provide a personal statement (e.g., additional details about yourself, a summary of your existing qualifications or results).
A> this question was answered at least 60 seconds after logging in
Form filled successfully.
Invalid session ID, exiting...
[andrew@arch] ~/currsem/CT414/assignments/assignment1/code/src P (master) +
% 
```

Figure 4: Session ID expiring after 60 seconds