

Setup:

1. Obtain code from git repository (download or clone):
<https://github.com/tecnico-distsys/T08-SD18Proj.git>
2. Open terminal on project root T08-SD18Proj. To install project run:
 - mvn install -DskipTests

Note: If on windows, running demoTest.bat will preform steps 1 to 3.

F1 - Success

1. Open 3 terminals on folder T08-SD18Proj/station-ws and run the following command to execute each station server:
 - T08_Station1: mvn exec:java
 - T08_Station2: mvn exec:java -Dws.i=2
 - T08_Station3: mvn exec:java -Dws.i=3
2. Open a terminal on folder T08-SD18Proj/binas-ws and run the following command to execute the binas server:
 - T08_Binas: mvn exec:java
3. Open a terminal on folder T08-SD18Proj/binas-ws-cli and run the following command to execute the binas client:
 - BinasClient: mvn exec:java
4. Verify that the *binas client* returned the following output:

```
[INFO] -----
[INFO] Building binas-ws-cli 1.0-SNAPSHOT
[INFO] -----
[INFO]
[INFO] --- exec-maven-plugin:1.5.0:java (default-cli) @ binas-ws-cli ---
BinasClientApp running
Creating client using UDDI at http://t08:Ta4TXUB@uddi.sd.rnl.tecnico.ulisboa.pt:9090 for server with name T08_Binas
Found http://localhost:8080/binas-ws/endpoint
T08_Station1 initialized with bonus 5
User username@domain sucessfully created with initial credit: 20
Bina rented from T08_Station1
Bina returned to T08_Station1
User username@domain current credit is 24
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 6.794 s
[INFO] Finished at: 2018-05-02T19:53:47+01:00
[INFO] Final Memory: 19M/211M
[INFO] -----
```

```

41
42
43      /*****
44      Fault Tolerance Demonstration
45
46      F1 - Normal function
47      F2 - Fault tolerance
48      *****/
49
50      String email = "username@domain";
51      String stationID = "T08_Station1";
52      int bonus = 5;
53
54      client.testInitStation(stationID, 20, 40, 10, bonus);
55      System.out.println(stationID + " initialized with bonus " + bonus);
56
57
58      /**
59       * F1 - Creates user successfully
60       *
61       * F2 - First execution: Creates user successfully
62       *       - Second execution: User already exists (in remote replica manager)
63       */
64      try {
65          client.testInit(20);
66
67          UserView user = client.activateUser(email);
68          System.out.println("User " + user.getEmail() + " sucessfully created with initial credit: " + user.getCredit());
69
70      } catch (EmailExists_Exception eee) {
71          System.out.println("Already exists user " + email + " with credit: " + client.getCredit(email));
72      }
73
74
75      client.rentBina(stationID, email);
76      System.out.println("Bina rented from " + stationID);
77
78      client.returnBina(stationID, email);
79      System.out.println("Bina returned to " + stationID);
80
81
82      System.out.println("User " + email + " current credit is " + client.getCredit(email));
83

```

The code above is executed by *binas client* main class:

- i. It tries to activate the user with email "username@domain". There is no registry of that user in the binas server nor in the stations, therefore the operation is successful, and a new user is created with initial credit of 20;
- ii. The user rents a bina, therefore its credit is updated in binas server and all stations to 19.
- iii. The user returns the bina, and its credit is updated in binas server and all stations to 24.

5. Repeat step 3 (Run the binas client)

6. Verify that the *binas client* returned the following output:

```

[INFO] -----
[INFO] Building binas-ws-cli 1.0-SNAPSHOT
[INFO] -----
[INFO]
[INFO] --- exec-maven-plugin:1.5.0:java (default-cli) @ binas-ws-cli ---
BinasClientApp running
Creating client using UDDI at http://t08:Ta4TXUB@uddi.sd.rnl.tecnico.ulisboa.pt:9090 for server with name T08_Binas
Found http://localhost:8080/binas-ws/endpoint
T08_Station1 initialized with bonus 5
Already exists user username@domain with credit: 24
Bina rented from T08_Station1
Bina returned to T08_Station1
User username@domain current credit is 28
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 4.222 s
[INFO] Finished at: 2018-05-02T20:14:47+01:00
[INFO] Final Memory: 15M/242M
[INFO] -----

```

The same code is executed by *binas* client main class:

- i. It tries to activate the user with email “username@domain”. There is a registry of the user in the *binas* server (cache hit), with credit of 24. Therefore *UserNotExists_Exception* is returned by the *binas* server. Its created a local user registry with the most recent credit info in the stations.
- ii. The following reads of the user’s credit result in cache hits, avoiding the remote invocations on the stations.
- iii. The following updates of the user’s credit also result in cache hits, therefore the execution of the read phase is avoided. However, both the local user registry in the *binas* server and the remote user registries are updated in all stations.

F2 – Fault Tolerance

7. Stop the *binas* server by pressing enter in the respective terminal.

8. Repeat steps 3 and 4 (Run *binas* server and *binas* client, in that order)

9. Verify that the *binas* client returned the following output:

```
[INFO] -----
[INFO] Building binas-ws-cli 1.0-SNAPSHOT
[INFO] -----
[INFO]
[INFO] --- exec-maven-plugin:1.5.0:java (default-cli) @ binas-ws-cli ---
BinasClientApp running
Creating client using UDDI at http://t08:Ta4TXUB@uddi.sd.rnl.tecnico.ulisboa.pt:9090 for server with name T08_Binas
Found http://localhost:8080/binas-ws/endpoint
T08_Station1 initialized with bonus 5
Already exists user username@domain with credit: 28
Bina rented from T08_Station1
Bina returned to T08_Station1
User username@domain current credit is 32
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 5.557 s
[INFO] Finished at: 2018-05-02T20:40:22+01:00
[INFO] Final Memory: 19M/213M
[INFO] -----
```

The same code is executed by *binas* client main class:

- i. It tries to activate the user with email “username@domain”. There’s no registry of the user in the *binas* server (cache miss), however there are remote replicas of user with credit of 28. Therefore *UserNotExists_Exception* is returned by the *binas* server. Its created a local user register with the most recent credit info in the stations.

10. Stop *station* T08_Station3 *server*, in order to verify that the protocol still works with a minimum of quórum of 2 stations available.

11. Stop the *binas* server by pressing enter in the respective terminal.

12. Repeat steps 3 and 4. (Run *binas* server and *binas* client, in that order)

13. Verify that the *binas* client returned the following output:

```

[INFO] -----
[INFO] Building binas-ws-cli 1.0-SNAPSHOT
[INFO] -----
[INFO] --- exec-maven-plugin:1.5.0:java (default-cli) @ binas-ws-cli ---
BinasClientApp running
Creating client using UDDI at http://t08:Ta4TXUB@uddi.sd.rnl.tecnico.ulisboa.pt:9090 for server with name T08_Binas
Found http://localhost:8080/binas-ws/endpoint
T08_Station1 initialized with bonus 5
Already exists user username@domain with credit: 32
Bina rented from T08_Station1
Bina returned to T08_Station1
User username@domain current credit is 36
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 5.214 s
[INFO] Finished at: 2018-05-02T20:41:29+01:00
[INFO] Final Memory: 19M/213M
[INFO] -----

```

The same code is executed by binas client main class:

- i. It tries to activate the user with email “username@domain”. There no a registry of the user in the *binas server* (cache miss), however there are remote replicas of user with credit of 32, in T08_Station1 and T08_Station2. Therefore UserNotExists_Exception is returned by the *binas server*. Its created a local user register with the most recent credit info in the stations.