Distributed Systems - Assignment 2

Distributed Player Status System (DPSS) using CORBA

Concordia University

Engineering and Computer Science

Assignment -2
Distributed Player Status System (DPSS) - CORBA

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Development tools

All code is written in IntelliJ IDE, Java JDK version 8.

Build and Run

IntelliJ:

- Open the project in folder DPSS
- Setup the SDK
- Add runtime params for all the below classes (`-ORBInitialPort 1050 - ORBInitialHost`
- Run: AmericaGameServer, EuropeGameServer, AsiaGameServer.
- Run: PlayerClient (to launch a player window)
- Run: AdminClient (to launch a Admin window)
- To run multiple clients change the configuration to “Allow parallel run”.

Command Line:

- Move to *DPSS* directoy: **cd DPSS**.
- Create a new folder named *dist* in the current folder : **mkdir dist**
- Compile the code (outputting into dist folder): **javac -d dist src/**/*.java**
- Move to *dist* folder: **cd dist**

- Run all 3 servers using following commands (will have to open different terminals):

Run ORBD through cmd:

```
start orbd -ORBInitialPort 1050
```

Start Servers:

```
start java Server.America.AmericaServer -ORBInitialPort 1050 - ORBInitialHost
localhost
start java Server.America.AmericaServer -ORBInitialPort 1050 - ORBInitialHost
localhost
start java Server.America.AmericaServer -ORBInitialPort 1050 - ORBInitialHost
localhost
```

- Run the clients (will have to open in different terminals):

```
java PlayerClient -ORBInitialPort 1050 -ORBInitialHost localhost
java AdminClient -ORBInitialPort 1050 -ORBInitialHost localhost
```

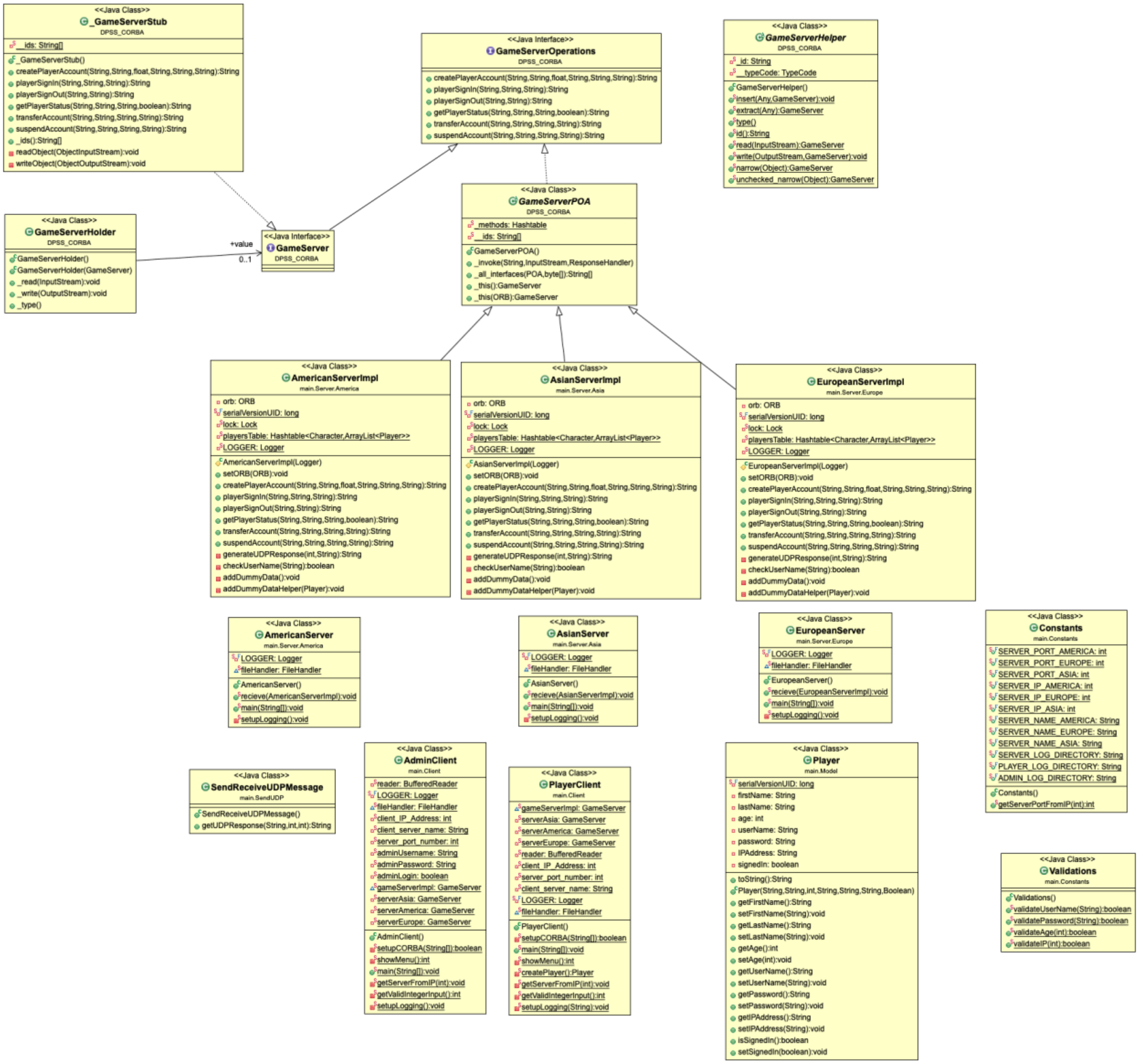
Architecture

Three different servers (America, Europe and Asia) are started, which then start their own UDP sockets for communication. Each of these servers bind their implementation object with unique names under Naming Context.

Client (Player and Admin) program handles the user interactions. A client initializes ORB and obtains reference to the root naming context. Now to make a request to a server it looks up the name in the naming context and receives reference to that server's CORBA object.

Intercommunication between the servers is handled through UDP requests. These will be discussed in detail later.

Class diagram:



<<Java Class>>
_GameServerStub
DPSS_CORBA
__ids: String[]
_GameServerStub()
createPlayerAccount(String,String,float,String,String,String):String
playerSignIn(String,String,String):String
playerSignOut(String,String):String
getPlayerStatus(String,String,String,boolean):String
transferAccount(String,String,String,String):String
suspendAccount(String,String,String,String):String
_ids():String[]
readObject(ObjectInputStream):void
writeObject(ObjectOutputStream):void
<<Java Interface>>
GameServerOperations
DPSS_CORBA
createPlayerAccount(String,String,float,String,String,String):String
playerSignIn(String,String,String):String
playerSignOut(String,String):String
getPlayerStatus(String,String,String,boolean):String
transferAccount(String,String,String,String):String
suspendAccount(String,String,String,String):String
<<Java Class>>
GameServerHelper
DPSS_CORBA
_id: String
__typeCode: TypeCode
GameServerHelper()
insert(Any,GameServer):void
extract(Any):GameServer
type()
id():String
read(InputStream):GameServer
write(OutputStream,GameServer):void
narrow(Object):GameServer
unchecked_narrow(Object):GameServer
<<Java Class>>
GameServerHolder
DPSS_CORBA
GameServerHolder()
GameServerHolder(GameServer)
_read(InputStream):void
_write(OutputStream):void
_type()
+value
0..1
<<Java Interface>>
GameServer
DPSS_CORBA
<<Java Class>>
GameServerPOA
DPSS_CORBA
_methods: Hashtable
__ids: String[]
GameServerPOA()
_invoke(String,InputStream,ResponseHandler)
_all_interfaces(POA,byte[]):String[]
_this():GameServer
_this(ORB):GameServer
<<Java Class>>
AmericanServerImpl
main.Server.America
orb: ORB
serialVersionUID: long
lock: Lock
playersTable: Hashtable<Character,ArrayList<Player>>
LOGGER: Logger
AmericanServerImpl(Logger)
setORB(ORB):void
createPlayerAccount(String,String,float,String,String,String):String
playerSignIn(String,String,String):String
playerSignOut(String,String):String
getPlayerStatus(String,String,String,boolean):String
transferAccount(String,String,String,String):String
suspendAccount(String,String,String,String):String
generateUDPResponse(int,String):String
checkUserName(String):boolean
addDummyData():void
addDummyDataHelper(Player):void
<<Java Class>>
AsianServerImpl
main.Server.Asia
orb: ORB
serialVersionUID: long
lock: Lock
playersTable: Hashtable<Character,ArrayList<Player>>
LOGGER: Logger
AsianServerImpl(Logger)
setORB(ORB):void
createPlayerAccount(String,String,float,String,String,String):String
playerSignIn(String,String,String):String
playerSignOut(String,String):String
getPlayerStatus(String,String,String,boolean):String
transferAccount(String,String,String,String):String
suspendAccount(String,String,String,String):String
generateUDPResponse(int,String):String
checkUserName(String):boolean
addDummyData():void
addDummyDataHelper(Player):void
<<Java Class>>
EuropeanServerImpl
main.Server.Europe
orb: ORB
serialVersionUID: long
lock: Lock
playersTable: Hashtable<Character,ArrayList<Player>>
LOGGER: Logger
EuropeanServerImpl(Logger)
setORB(ORB):void
createPlayerAccount(String,String,float,String,String,String):String
playerSignIn(String,String,String):String
playerSignOut(String,String):String
getPlayerStatus(String,String,String,boolean):String
transferAccount(String,String,String,String):String
suspendAccount(String,String,String,String):String
generateUDPResponse(int,String):String
checkUserName(String):boolean
addDummyData():void
addDummyDataHelper(Player):void
<<Java Class>>
AmericanServer
main.Server.America
LOGGER: Logger
fileHandler: FileHandler
AmericanServer()
recieve(AmericanServerImpl):void
main(String[]):void
setupLogging():void
<<Java Class>>
AsianServer
main.Server.Asia
LOGGER: Logger
fileHandler: FileHandler
AsianServer()
recieve(AsianServerImpl):void
main(String[]):void
setupLogging():void
<<Java Class>>
EuropeanServer
main.Server.Europe
LOGGER: Logger
fileHandler: FileHandler
EuropeanServer()
recieve(EuropeanServerImpl):void
main(String[]):void
setupLogging():void
<<Java Class>>
Constants
main.Constants
SERVER_PORT_AMERICA: int
SERVER_PORT_EUROPE: int
SERVER_PORT_ASIA: int
SERVER_IP_AMERICA: int
SERVER_IP_EUROPE: int
SERVER_IP_ASIA: int
SERVER_NAME_AMERICA: String
SERVER_NAME_EUROPE: String
SERVER_NAME_ASIA: String
SERVER_LOG_DIRECTORY: String
PLAYER_LOG_DIRECTORY: String
ADMIN_LOG_DIRECTORY: String
Constants()
getServerPortFromIP(int):int
<<Java Class>>
SendReceiveUDPMessage
main.SendUDP
SendReceiveUDPMessage()
getUDPResponse(String,int,int):String
<<Java Class>>
AdminClient
main.Client
reader: BufferedReader
LOGGER: Logger
fileHandler: FileHandler
client_IP_Address: int
client_server_name: String
server_port_number: int
adminUsername: String
adminPassword: String
adminLogin: boolean
gameServerImpl: GameServer
serverAsia: GameServer
serverAmerica: GameServer
serverEurope: GameServer
AdminClient()
setupCORBA(String[]):boolean
showMenu():int
main(String[]):void
getServerFromIP(int):void
getValidIntegerInput():int
setupLogging():void
<<Java Class>>
PlayerClient
main.Client
gameServerImpl: GameServer
serverAsia: GameServer
serverAmerica: GameServer
serverEurope: GameServer
reader: BufferedReader
client_IP_Address: int
server_port_number: int
client_server_name: String
LOGGER: Logger
fileHandler: FileHandler
PlayerClient()
setupCORBA(String[]):boolean
main(String[]):void
showMenu():int
createPlayer():Player
getServerFromIP(int):void
getValidIntegerInput():int
setupLogging(String):void
<<Java Class>>
Player
main.Model
serialVersionUID: long
firstName: String
lastName: String
age: int
userName: String
password: String
IPAddress: String
signedIn: boolean
toString():String
Player(String,String,int,String,String,String,Boolean)
getFirstName():String
setFirstName(String):void
getLastName():String
setLastName(String):void
getAge():int
setAge(int):void
getUserName():String
setUserName(String):void
getPassword():String
setPassword(String):void
getIPAddress():String
setIPAddress(String):void
isSignedIn():boolean
setSignedIn(boolean):void
<<Java Class>>
Validations
main.Constants
Validations()
validateUserName(String):boolean
validatePassword(String):boolean
validateAge(int):boolean
validateIP(int):boolean

Techniques Used

1. CORBA using Java IDL

- CORBA is used to a design specification for an Object Request Broker (ORB). This ORB provides the mechanism required for distributed objects to communicate and invoke server methods.

2. UDP

For below communication between server UDP is used:

- **transferAccount()** - When a user request to transfer account to another server, a UDP request with user information is generated which instructs the other server to add player to it's database and responds with the status. If successful the player is removed from old server.
- **getPlayerStatus()** – When admin requests this method on a server, that server sends UDP request to other two servers to get the player info.
- **createPlayer()** – When a user tries to create a new player on a server, that server sends a UDP request to other servers to check if Username already exists.

2. Multi-threading

- All servers run on their individual thread
- All UDP requests are sent on a new thread
- All client requests are sent on a new thread

3. HashTables - Data Structure

- Player data on server are stored in a Hashtables. Hashtables are thread-safe and promote concurrency.

4. Locks

- Lock (ReentrantLock) is used for proper synchronization to allow multiple users to perform operations for the same or different accounts at the same time.

Challenges Faced

1. Setup ORB architecture on Linux based system

- The commands to setup and run ORBD were different for Linux based systems. Initially I was trying to follow commands written in the tutorial but had to modify some to get the project to work.
- Also, CORBA is not supported by after Java 8. So, had to set JAVA_HOME to JDK 8 for development and testing.

2. Managing ORBD port

- Once ORBD is assigned to a port, it has to be restarted every time to successfully rerun the project on Linux.
- There should be only a single instance of ORBD running.

Most Challenging part

Managing ORBD port

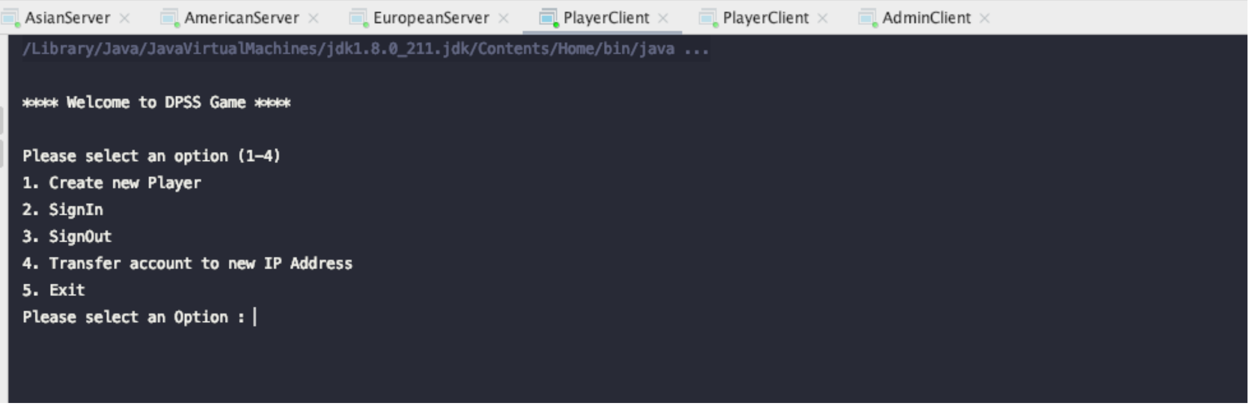
I followed below steps to manage ORBD on ports:

- Find instances running on a port : `netstat -vanp tcp | grep 1050`
- Find the PID for the port: `lsof -i :1050`
- Kill the current instance: `Kill -9 PID`
- Start new instance: `orbd -ORBInitialPort 1050&`

Testing

Intro screens:

Player Screen:

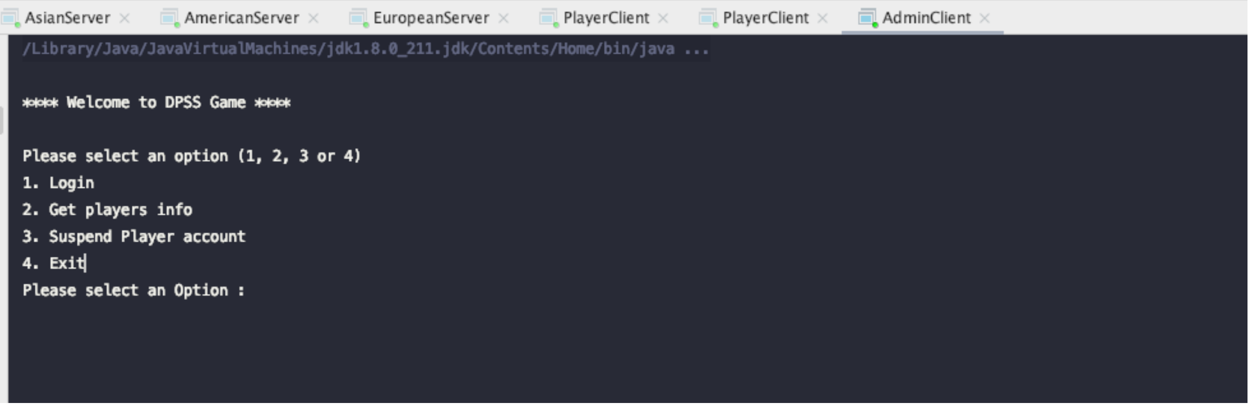


```
/Library/Java/JavaVirtualMachines/jdk1.8.0_211.jdk/Contents/Home/bin/java ...

**** Welcome to DPSS Game ****

Please select an option (1-4)
1. Create new Player
2. SignIn
3. SignOut
4. Transfer account to new IP Address
5. Exit
Please select an Option : |
```

Admin Screen:



```
/Library/Java/JavaVirtualMachines/jdk1.8.0_211.jdk/Contents/Home/bin/java ...

**** Welcome to DPSS Game ****

Please select an option (1, 2, 3 or 4)
1. Login
2. Get players info
3. Suspend Player account
4. Exit
Please select an Option :
```

Player testing:

In this section we will be testing Player Client functionalities.

Test Number	Scenario	Reason
1	Create player	Major functionality
2	Login player	Major functionality
3	Login player who is already logged in	Major functionality, Concurrent access
4	Logout player	Major functionality
5	Transfer Player to another server	Major functionality
6	Create a user (Already on another server)	Major functionality

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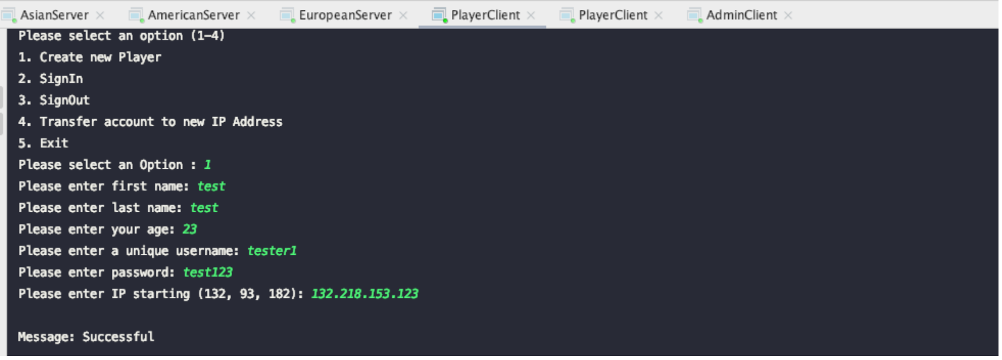
1. Create player - *createPlayerAccount* (*FirstName, LastName, Age, Username, Password, IP Address*)

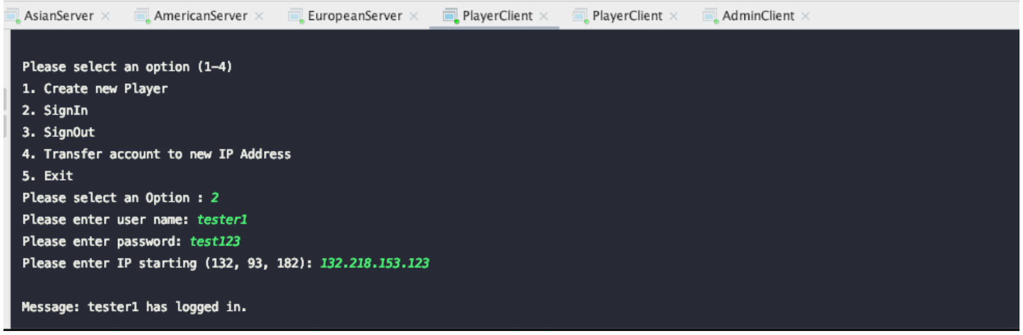


```
Please select an option (1-4)
1. Create new Player
2. SignIn
3. SignOut
4. Transfer account to new IP Address
5. Exit
Please select an Option : 1
Please enter first name: test
Please enter last name: test
Please enter your age: 23
Please enter a unique username: tester1
Please enter password: test123
Please enter IP starting (132, 93, 182): 132.218.153.123

Message: Successful
```

Input data is validated.
Player created successfully and message is displayed.

2. Login player - *playerSignIn* (*Username, Password, IPAddress*)

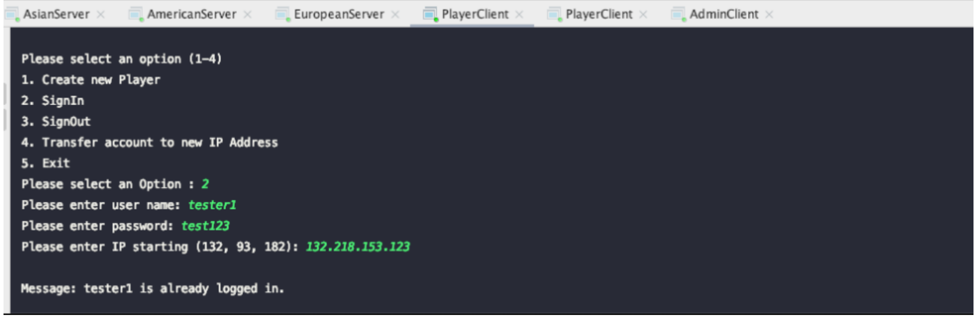


```
Please select an option (1-4)
1. Create new Player
2. SignIn
3. SignOut
4. Transfer account to new IP Address
5. Exit
Please select an Option : 2
Please enter user name: tester1
Please enter password: test123
Please enter IP starting (132, 93, 182): 132.218.153.123

Message: tester1 has logged in.
```

Player data is validated. Player logged in successfully and message is displayed.

3. Login player who is already logged in.



```
Please select an option (1-4)
1. Create new Player
2. SignIn
3. SignOut
4. Transfer account to new IP Address
5. Exit
Please select an Option : 2
Please enter user name: tester1
Please enter password: test123
Please enter IP starting (132, 93, 182): 132.218.153.123

Message: tester1 is already logged in.
```

Player log in unsuccessfully because player is already logged in and message is displayed.

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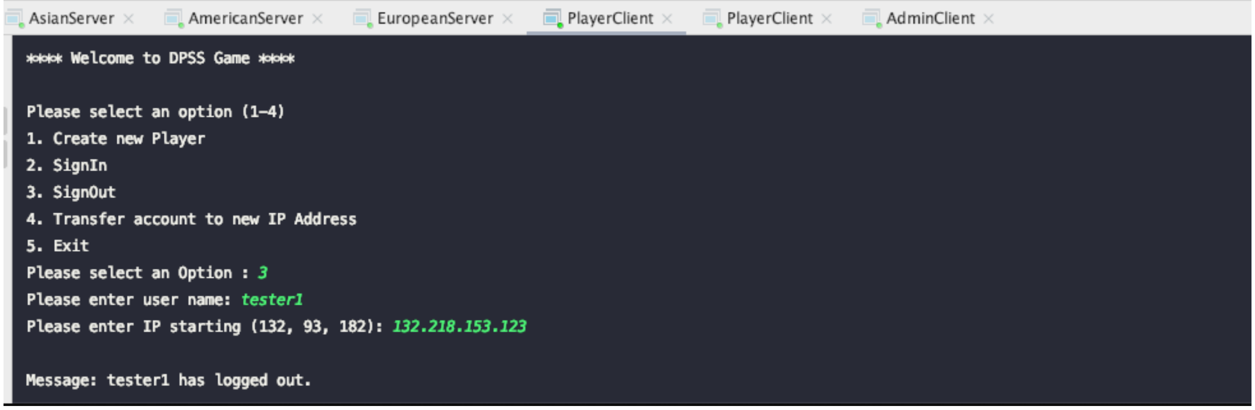
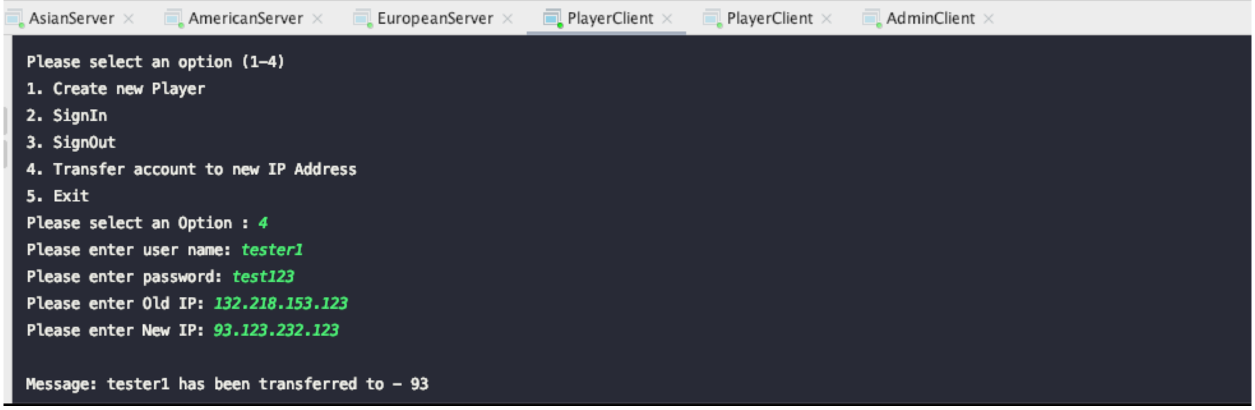
4. Logout player - *playerSignOut* (*Username, IPAddress*)



```
**** Welcome to DPSS Game ****

Please select an option (1-4)
1. Create new Player
2. SignIn
3. SignOut
4. Transfer account to new IP Address
5. Exit
Please select an Option : 3
Please enter user name: tester1
Please enter IP starting (132, 93, 182): 132.218.153.123

Message: tester1 has logged out.
```

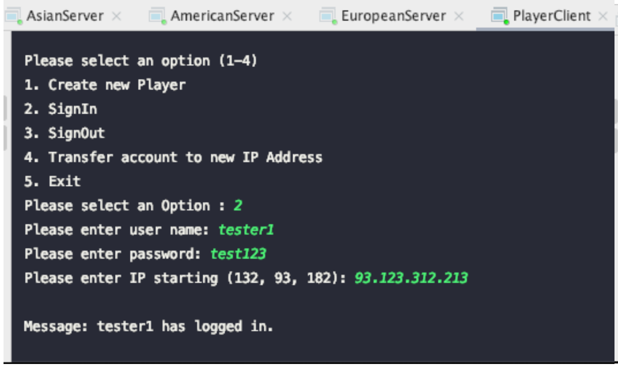
Player data is validated.
Player logged out successfully and message is displayed.

5. Transfer Player to another server - *playerSignOut* (*Username, IPAddress*)

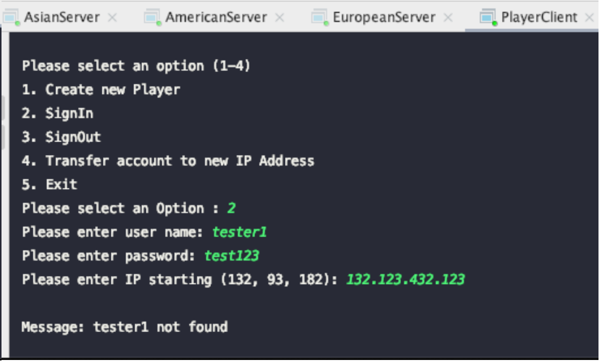


```
Please select an option (1-4)
1. Create new Player
2. SignIn
3. SignOut
4. Transfer account to new IP Address
5. Exit
Please select an Option : 4
Please enter user name: tester1
Please enter password: test123
Please enter Old IP: 132.218.153.123
Please enter New IP: 93.123.232.123

Message: tester1 has been transferred to - 93
```

The player is transferred to it’s new server and then removed from old server.



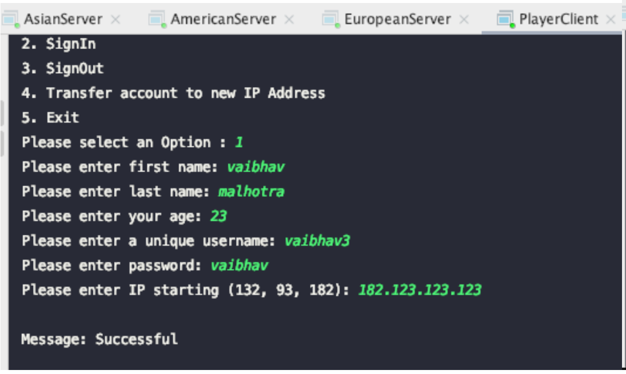
```
Please select an option (1-4)
1. Create new Player
2. SignIn
3. SignOut
4. Transfer account to new IP Address
5. Exit
Please select an Option : 2
Please enter user name: tester1
Please enter password: test123
Please enter IP starting (132, 93, 182): 93.123.312.213

Message: tester1 has logged in.
```



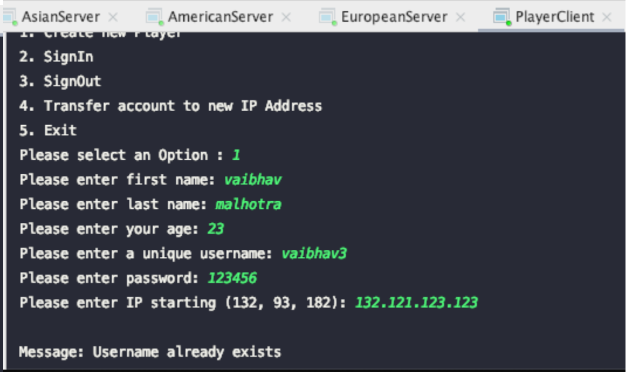
```
Please select an option (1-4)
1. Create new Player
2. SignIn
3. SignOut
4. Transfer account to new IP Address
5. Exit
Please select an Option : 2
Please enter user name: tester1
Please enter password: test123
Please enter IP starting (132, 93, 182): 132.123.432.123

Message: tester1 not found
```

The player is now on server IP 93(New Server). Player not available on server IP 132(Old Server)

6. Try to create a user (Already on another server)



```
2. SignIn
3. SignOut
4. Transfer account to new IP Address
5. Exit
Please select an Option : 1
Please enter first name: vaibhav
Please enter last name: malhotra
Please enter your age: 23
Please enter a unique username: vaibhav3
Please enter password: vaibhav
Please enter IP starting (132, 93, 182): 182.123.123.123

Message: Successful
```



```
1. Create new Player
2. SignIn
3. SignOut
4. Transfer account to new IP Address
5. Exit
Please select an Option : 1
Please enter first name: vaibhav
Please enter last name: malhotra
Please enter your age: 23
Please enter a unique username: vaibhav3
Please enter password: 123456
Please enter IP starting (132, 93, 182): 132.121.123.123

Message: Username already exists
```

Player creation unsuccessful on server 132, Because player already existed on server 182.

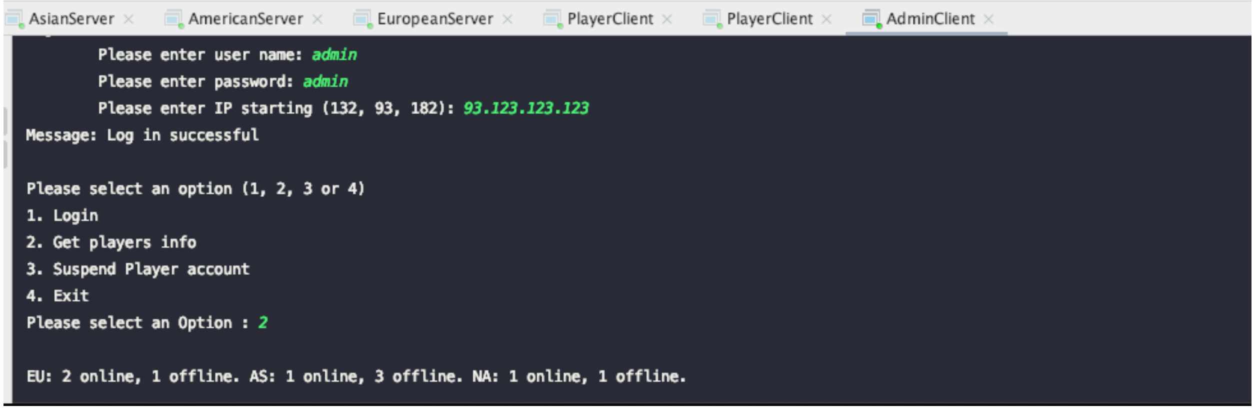
Admin testing:

In this section we will be testing Admin Client functionalities.

Test Number	Scenario	Reason
7	Get player status from different servers	Major functionality, Concurrent access
8	Suspend player account	Major functionality

7. Get Player status from different servers - *getPlayerStatus* (*AdminUsername, AdminPassword, IPAddress*)

a. On server IP 93

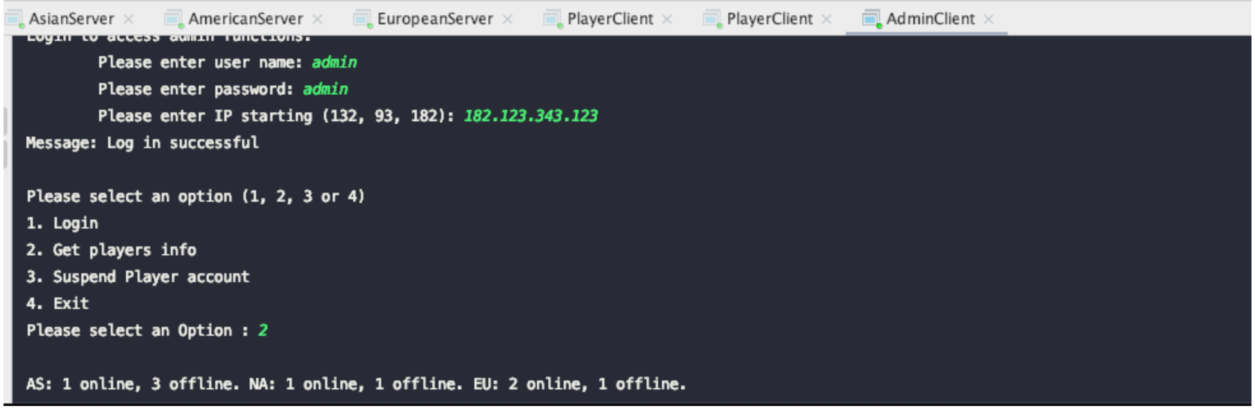


```
        Please enter user name: admin
        Please enter password: admin
        Please enter IP starting (132, 93, 182): 93.123.123.123
Message: Log in successful

Please select an option (1, 2, 3 or 4)
1. Login
2. Get players info
3. Suspend Player account
4. Exit
Please select an Option : 2

EU: 2 online, 1 offline. AS: 1 online, 3 offline. NA: 1 online, 1 offline.
```

Admin has logged in successfully on server IP 93 i.e server Europe.

Europe server sends request to Asia and America Server to gets their player status, appends it’s result and displays.

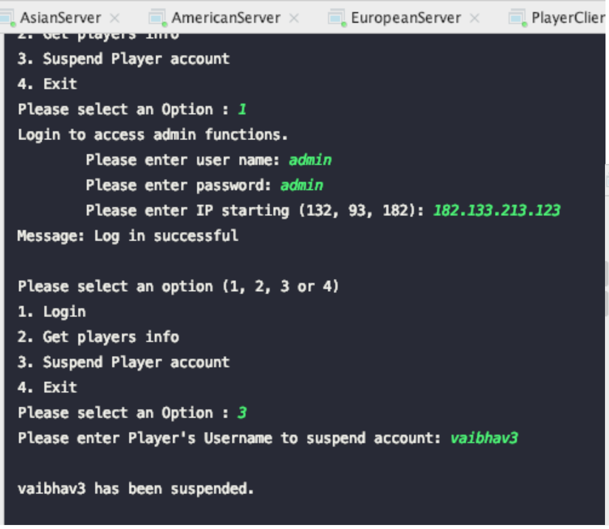
b. On server IP 182



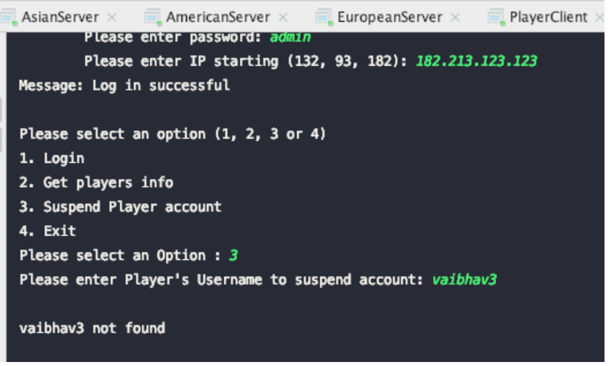
```
Login to access admin functions.
        Please enter user name: admin
        Please enter password: admin
        Please enter IP starting (132, 93, 182): 182.123.343.123
Message: Log in successful

Please select an option (1, 2, 3 or 4)
1. Login
2. Get players info
3. Suspend Player account
4. Exit
Please select an Option : 2

AS: 1 online, 3 offline. NA: 1 online, 1 offline. EU: 2 online, 1 offline.
```

Admin has logged in successfully on IP 182 i.e on server Asia.
Asia server sends request to Europe and America Server to get player status, appends result and displays.

8. Suspend Player account (AdminUsername, AdminPassword, AdminIP, UsernameToSuspend)



```
2. Get players info
3. Suspend Player account
4. Exit
Please select an Option : 1
Login to access admin functions.
        Please enter user name: admin
        Please enter password: admin
        Please enter IP starting (132, 93, 182): 182.133.213.123
Message: Log in successful

Please select an option (1, 2, 3 or 4)
1. Login
2. Get players info
3. Suspend Player account
4. Exit
Please select an Option : 3
Please enter Player's Username to suspend account: vaibhav3

vaibhav3 has been suspended.
```



```
        Please enter password: admin
        Please enter IP starting (132, 93, 182): 182.213.123.123
Message: Log in successful

Please select an option (1, 2, 3 or 4)
1. Login
2. Get players info
3. Suspend Player account
4. Exit
Please select an Option : 3
Please enter Player's Username to suspend account: vaibhav3

vaibhav3 not found
```

Admin suspended player with username – *vaibhav3* on server IP *182.*
Player could not login with username – *vaibhav3* on server IP *182* because it has been suspended.

Multithreading and atomicity testing:

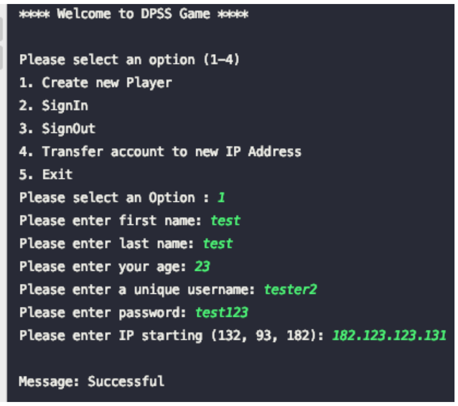
Test Number	Scenario	Reason
9	Multiple player account creation	Test Concurrency
10	Suspend player account	Test Atomicity

9. Multiple account creation

Scenario: 3 PlayerClients are trying to create new accounts simultaneously
Player1 – Username – tester2, server – 182 (Asia)
Player2 – Username – tester2, server – 93 (Europe)

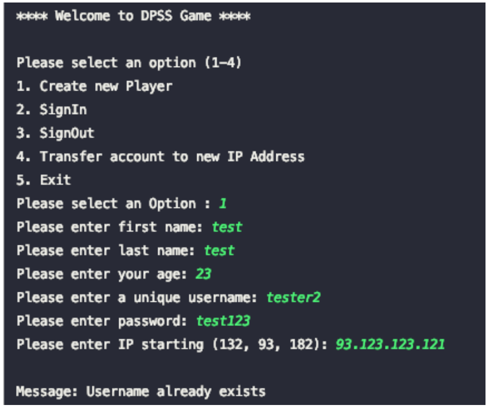
As we can see that Player1 was successful but as Username – tester2 was already taken at Asian server, Player2 was unable to create an account. The time difference between 2 calls is of microseconds. This tests the concurrent access to the data-structures in the project.

PLayerClient1



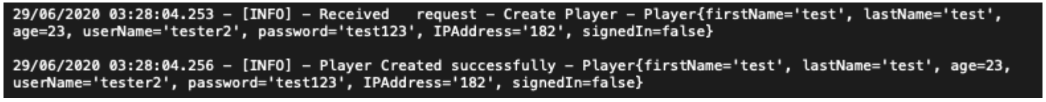
```
**** Welcome to DPSS Game ****

Please select an option (1-4)
1. Create new Player
2. SignIn
3. SignOut
4. Transfer account to new IP Address
5. Exit
Please select an Option : 1
Please enter first name: test
Please enter last name: test
Please enter your age: 23
Please enter a unique username: tester2
Please enter password: test123
Please enter IP starting (132, 93, 182): 182.123.123.131

Message: Successful
```

PlayerClient2



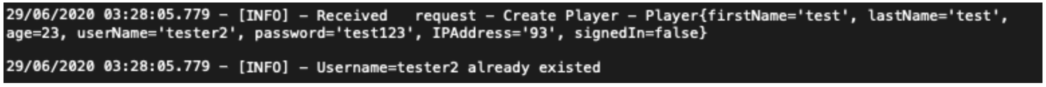
```
**** Welcome to DPSS Game ****

Please select an option (1-4)
1. Create new Player
2. SignIn
3. SignOut
4. Transfer account to new IP Address
5. Exit
Please select an Option : 1
Please enter first name: test
Please enter last name: test
Please enter your age: 23
Please enter a unique username: tester2
Please enter password: test123
Please enter IP starting (132, 93, 182): 93.123.123.121

Message: Username already exists
```

Logs from Asia



```
29/06/2020 03:28:04.253 - [INFO] - Received   request - Create Player - Player{firstName='test', lastName='test',
age=23, userName='tester2', password='test123', IPAddress='182', signedIn=false}

29/06/2020 03:28:04.256 - [INFO] - Player Created successfully - Player{firstName='test', lastName='test', age=23,
userName='tester2', password='test123', IPAddress='182', signedIn=false}
```

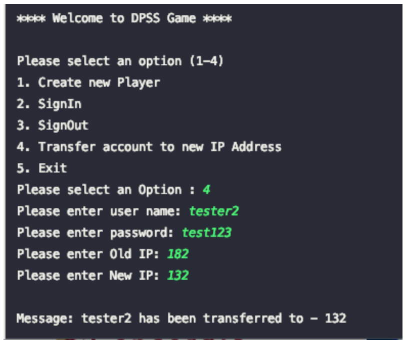
Logs from Europe



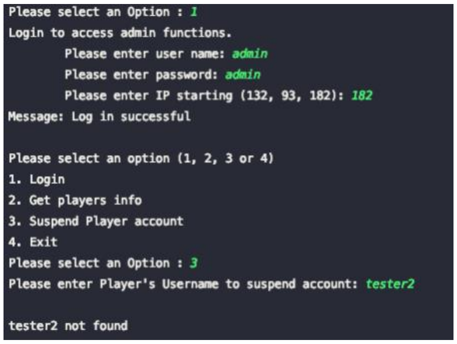
```
29/06/2020 03:28:05.779 - [INFO] - Received   request - Create Player - Player{firstName='test', lastName='test',
age=23, userName='tester2', password='test123', IPAddress='93', signedIn=false}

29/06/2020 03:28:05.779 - [INFO] - Username=tester2 already existed
```

10. Suspending and transferring account at the same time

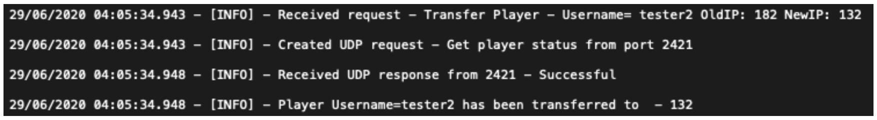
Scenario: Transfer request and suspend request are generated at the same time. For atomicity only one of the requests should be successful. In our case transfer was successful.



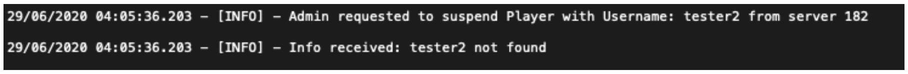
```
**** Welcome to DPSS Game ****

Please select an option (1-4)
1. Create new Player
2. SignIn
3. SignOut
4. Transfer account to new IP Address
5. Exit
Please select an Option : 4
Please enter user name: tester2
Please enter password: test123
Please enter Old IP: 182
Please enter New IP: 132

Message: tester2 has been transferred to - 132
```



```
Please select an Option : 1
Login to access admin functions.
        Please enter user name: admin
        Please enter password: admin
        Please enter IP starting (132, 93, 182): 182
Message: Log in successful

Please select an option (1, 2, 3 or 4)
1. Login
2. Get players info
3. Suspend Player account
4. Exit
Please select an Option : 3
Please enter Player's Username to suspend account: tester2

tester2 not found
```



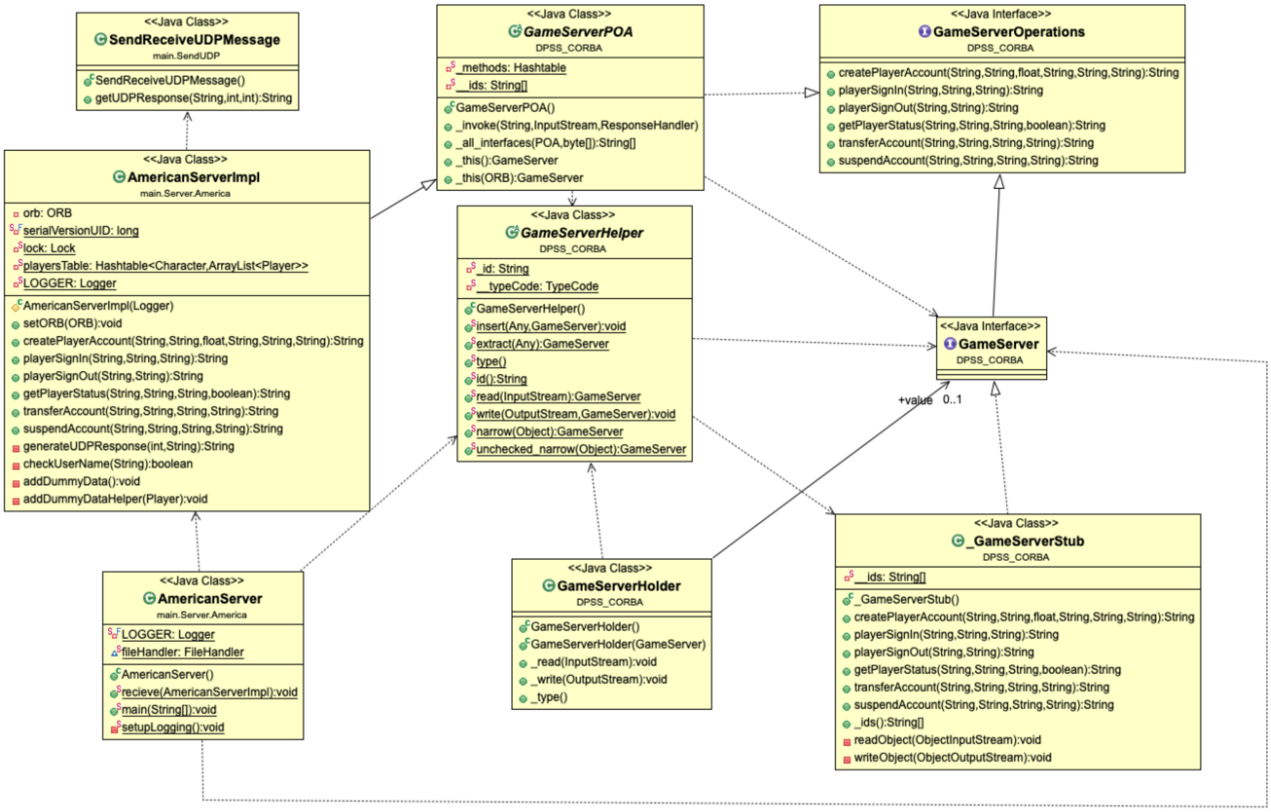
```
29/06/2020 04:05:34.943 - [INFO] - Received request - Transfer Player - Username= tester2 OldIP: 182 NewIP: 132
29/06/2020 04:05:34.943 - [INFO] - Created UDP request - Get player status from port 2421
29/06/2020 04:05:34.948 - [INFO] - Received UDP response from 2421 - Successful
29/06/2020 04:05:34.948 - [INFO] - Player Username=tester2 has been transferred to  - 132
```



```
29/06/2020 04:05:36.203 - [INFO] - Admin requested to suspend Player with Username: tester2 from server 182
29/06/2020 04:05:36.203 - [INFO] - Info received: tester2 not found
```

Server Architecture Design

For simplicity only one server is shown in below diagram:



<<Java Class>>
SendReceiveUDPMessage
main.SendUDP
SendReceiveUDPMessage()
getUDPResponse(String,int,int):String
<<Java Class>>
GameServerPOA
DPSS_CORBA
_methods: Hashtable
__ids: String[]
GameServerPOA()
_invoke(String,InputStream,ResponseHandler)
_all_interfaces(POA,byte[]):String[]
_this():GameServer
_this(ORB):GameServer
<<Java Interface>>
GameServerOperations
DPSS_CORBA
createPlayerAccount(String,String,float,String,String,String):String
playerSignIn(String,String,String):String
playerSignOut(String,String):String
getPlayerStatus(String,String,String,boolean):String
transferAccount(String,String,String,String):String
suspendAccount(String,String,String,String):String
<<Java Class>>
AmericanServerImpl
main.Server.America
orb: ORB
serialVersionUID: long
lock: Lock
playersTable: Hashtable<Character,ArrayList<Player>>
LOGGER: Logger
AmericanServerImpl(Logger)
setORB(ORB):void
createPlayerAccount(String,String,float,String,String,String):String
playerSignIn(String,String,String):String
playerSignOut(String,String):String
getPlayerStatus(String,String,String,boolean):String
transferAccount(String,String,String,String):String
suspendAccount(String,String,String,String):String
generateUDPResponse(int,String):String
checkUserName(String):boolean
addDummyData():void
addDummyDataHelper(Player):void
<<Java Class>>
GameServerHelper
DPSS_CORBA
_id: String
__typeCode: TypeCode
GameServerHelper()
insert(Any,GameServer):void
extract(Any):GameServer
type()
id():String
read(InputStream):GameServer
write(OutputStream,GameServer):void
narrow(Object):GameServer
unchecked_narrow(Object):GameServer
<<Java Interface>>
GameServer
DPSS_CORBA
+value
0..1
<<Java Class>>
AmericanServer
main.Server.America
LOGGER: Logger
fileHandler: FileHandler
AmericanServer()
recieve(AmericanServerImpl):void
main(String[]):void
setupLogging():void
<<Java Class>>
GameServerHolder
DPSS_CORBA
GameServerHolder()
GameServerHolder(GameServer)
_read(InputStream):void
_write(OutputStream):void
_type()
<<Java Class>>
_GameServerStub
DPSS_CORBA
__ids: String[]
_GameServerStub()
createPlayerAccount(String,String,float,String,String,String):String
playerSignIn(String,String,String):String
playerSignOut(String,String):String
getPlayerStatus(String,String,String,boolean):String
transferAccount(String,String,String,String):String
suspendAccount(String,String,String,String):String
_ids():String[]
readObject(ObjectInputStream):void
writeObject(ObjectOutputStream):void

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Steps followed on start of each server:

- Creates and initializes an ORB instance
- Gets a reference to the root POA and activates the GameServerPOA
- Creates a server instance (the implementation of one CORBA Server object) and tells the ORB about it.
- Gets a CORBA object reference for a naming context in which to register the new CORBA object and gets the root naming context.
- Registers the new object in the naming context under it's unique name.
- Registers the server instance to a UDP socket.

Steps followed by each client:

- Creates and initializes an ORB
- Obtains a reference to the root naming context
- Looks up "ServerName" in the naming context and receives a reference to that CORBA object
- Invokes the server object's operations