Distributed Systems
Exercise Sheet 4, Tuesday, 14:15
Klingemann, SS 2023

Deadline: 23rd May 2023

1st Assessed Exercise

1. Communication via Sockets
Understand the example code and test the programs. Client and server can run on the same machine.
Hint: You can address your own machine using the name `localhost`.

2. Realize a remote method invocation by using plain sockets (without any middleware)
Use UDP-sockets for this task.
Extend the client and server so that the client can invoke methods on the server and a corresponding return value is delivered to the client.
Therefore, you have to extend your account-management-system of a bank from Sheet 3. Use two account-objects on the server. Objects of the classes account and accounting entry only exist on the server and must not be used on the client.
The client should be able to invoke three different methods on the account-objects. The first method is the adding of a new accounting entry-object. The client provides the server with the values of the three attributes and gets an acknowledgement as a reply. The second method is the query for the dates of all accounting entry-objects of the account (an additional method of the class account). The third method returns the name of the account.
The client has to offer the possibility to choose an account-object and call one of the three methods. Hence, to solve this task, you have to transport the information about the object, the method and the corresponding parameters by means of sockets. Similarly, you have to transport the return-value.
Solve this task by creating a class Message. A message-object should contain different attributes for the different pieces of information that are necessary for the method invocation. This object can then be serialized using the class `ObjectOutputStream`. You can use the class `ByteArrayOutputStream` to transform the object into an array of bytes. Do not forget the interface `Serializable`.

Organisatorical matters

- You have to solve the exercise completely on your own! (No working in groups!)
- It is necessary but not sufficient to present a working program. Moreover, you have to be able to explain all parts of your program, be able to answer questions with respect to your program and make small extensions of you program.
- Your program has to be created completely within the exercise slot.
- If you violate one of the rules above, this implies that you definitely fail in this exercise.
- You can only present solutions that correspond to the exercise slot you are assigned to.
- It is in your responsibility to present your solution in time before the deadline. The assessment of your solution can only be guaranteed if you finish your program 60 minutes before the end of the exercises.
- To take part in the exam it is required to solve at least three of five assessed exercise sheets.