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Advanced Aspects of Object-Oriented Programming (SS 2015)

Practice Sheet 11 (Hints and Comments)

Exercise 1 JCoBox-Chatsystem

See provided sources. Note, that no explicit synchronization is needed, in contrast to the multi-thread version of Exercise 10.

Exercise 2 ThermoControl System Using Synchronous Messages

See provided source.

Exercise 3 Distributed Programming with RMI

a) According to the W3C: *A Web service is a software system designed to support interoperable machine-to-machine interaction over a network. It has an interface described in a machine-processable format (specifically WSDL). Other systems interact with the Web service in a manner prescribed by its description using SOAP-messages, typically conveyed using HTTP with an XML serialization in conjunction with other Web-related standards.*

   RMI is directly supported by the language and uses real java-objects as parameters and message receivers. With some exceptions they behave like standard objects, whereas a webservice uses its own message format and it transfers messages not objects. Webservices cannot provide callbacks, because they don't have access to the object system. Additionally, RMI is type safe by design whereas webservices interact using XML which first has to be deserialized into Java objects to be type safe.

b) A scenario would be a producer consumer system, where the client acts as a producer and sends the server a reference to the produced object. The server can than use this remote-reference to retrieve information about the produced object.

   An RMI server exports a remote object to a stub. This stub is than registered at the RMI registry, such that the client can retrieve a stub that is connected to the corresponding object on the server. The client than creates an instance of a remote object and also exports it to a stub. The client can now use the server-object-stub to call a method on the server object and pass the client-object stub as a parameter. The server can than use the client-object-stub to perform a callback on the client.

c) As remote objects are not copied during transfer, the usage of a remote object as parameter or return value exposes the remote object, even if it has not been registered before. The name service only serves as a central repository to find objects by their name, it has to be used to establish the first connection between two machines. After that, references to remote objects may be passed freely around.