

Advanced Aspects of Object-Oriented Programming (SS 2013)

Practice Sheet 11 (Hints and Comments)

Exercise 1 Asynchronous vs. synchronous Calls

a) Synchronous calls: all methods are executed in the order they appear in the snippet. Output:

```
i=5  
i=9
```

Asynchronous calls: it is unknown, when the methods are executed:

```
i=5  
i=9
```

or, if C handles the message send by B before the one of A

```
i=9  
i=5
```

b) With synchronous communication methods are executed completely before the control returns to the caller. That means that the order of execution of methods corresponds to the order of the send messages. In asynchronous contexts, the order of messages may change. Depending on the language, certain guarantees about the message order can be given, but in most cases the order will not be total but some partial order. E.g. in JCoBox it is guaranteed, that if an object a of CoBox a sends two messages to objects in another CoBox, these messages will be handled in the same order as they have been send, but the system makes no guarantees about messages send to or by other CoBoxes.

In multi-threaded contexts the usage of synchronous communication is easier because the behaviour is “easier” to predict. But synchronous communication is a source for deadlocks, which are less likely in asynchronous settings, but for the price of even less predictable behaviour.

Exercise 2 JCoBox-Chatsystem

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

Exercise 3 ThermoControl System Using Synchronous Messages

See provided source.