



## SS2019 – Component-based Software Engineering

# Implementing Component-Based Systems–Part I

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## Task 1 Transparency Problems

A transparency problem describes software concerns that should be transparent (invisible, hidden) when you write or deploy a component. This task repeats the different kinds of transparency problems.

- a) What can be subject of secrets wrt. transparency problems of component-based systems?
- b) What aspects of transparency do you know? How are they aligned with the secret subjects?
- c) What is language transparency and how can it be achieved?
- d) Why is location transparency important? Give an example.

## Task 2 Enterprise JavaBeans (EJB)

*Enterprise JavaBeans* (EJB)<sup>1</sup> is a Java-based composition system for designing and executing modularized, component-based systems.

- a) Is EJB a composition system? Describe the component model, composition technique and composition language.
- b) Compare EJB components to the definition of components by Szyperski et al. [1].
- c) Which transparency problems does EJB address? Which transparency problems are not addressed?

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<sup>1</sup><https://www.oracle.com/technetwork/java/javaee/ejb/index.html>

## Task 3 Implementation of the Factory Automation Application – Part 1

In the last exercise you designed a simple management application for factory automation for a 3D-printing service. In this task you will start to implement parts of your design in EJB (*Version 3*). EJB is a mature and powerful composition system. We will use EJB to implement parts of the factory automation use case, described in exercise 2. To get familiar with EJB, you will install the required tools and work yourself through the listed tutorials. In this first part you are going to implement 3 components, such as the customer-, product-, and order-management. All components offer interfaces to add, remove and list customers, products and orders. You do not have to implement a front-end for your components. However, you must test their individual functionality.

*Note: You can work in groups of up to five students.*

- a) Setup your development environment following the tutorial for *JBoss 6.1*.<sup>2</sup>
  - Download and install *Eclipse IDE for Enterprise Java Developers*.<sup>3</sup>
  - Download and install *JBoss AS 6.1.0.Final*.<sup>4</sup>
  - Install the *JBoss Tools 4.11.0 Final* via the Eclipse Marketplace.
- b) Read and reconstruct the tutorial for creating a [simple EJB 3 application](#).<sup>5</sup>
- c) Now create a new EJB project for your *Factory Automation Application*.
  - Implement the customer manager component.
  - Implement the stock manager component.
  - Implement the order manager component.
- d) Test your components.
- e) Prepare a short presentation and demo (maximum 5 minutes) of your application!

## References

- [1] Clemens Szyperski, Jan Bosch, and Wolfgang Weck. Component-oriented programming. In *European Conference on Object-Oriented Programming*, pages 184–192. Springer, 1999.

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<sup>2</sup><http://theopentutorials.com/tutorials/java-ee/ejb3/...jboss-6-1>

<sup>3</sup><https://www.eclipse.org/downloads/packages/release/2019-03/r/eclipse-ide-enterprise-java-developers>

<sup>4</sup><http://download.jboss.org/jbossas/6.1/jboss-as-distribution-6.1.0.Final.zip>

<sup>5</sup><https://ibytecode.com/blog/how-to-create-a-simple-ejb3-project-in-eclipse-jboss-6-1>