

## Implementing Component-Based Systems

### Task 1: Transparency Problems

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

- 1a) What can be subject of secrets w.r.t. transparency problems of component-based systems?
- 1b) What aspects of transparency do you know? How are they aligned with the secret subjects?
- 1c) What is language transparency and how can it be achieved?
- 1d) Why is location transparency important? Give an example.

## Task 2: Open Services Gateway initiative (OSGi)

OSGi is a hardware-independent composition system for designing and executing modularized, component-based systems.

**2a)** Is OSGi a composition system? Describe the component model, composition technique and composition language.

**2b)** Compare OSGi components to the definition of components by Szyperski.

**2c)** Which transparency problems does OSGi address?

### 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 your design in OSGi. OSGi is a mature and powerful composition system. We will use OSGi to implement parts of the factory automation use case, described in exercise 2. To get familiar with OSGi, you will install the required tools and work yourself through the listed tutorials. In this first part you are going to implement 3 components. The customer-, product-, and order-management, the product 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 up to 3 students.*

- 3a) Read and reconstruct the following tutorials:
  - <http://www.vogella.com/tutorials/OSGi/article.html>
  - <http://www.vogella.com/tutorials/OSGiServices/article.html>
- 3b) Implement the customer manager component.
- 3c) Implement the product manager component.
- 3d) Implement the order manager component.
- 3e) Test your components.
- 3f) Prepare a short presentation and demo (maximum 5 minutes)!