

## Designing Component-Based Systems

### Task 1: Components

Components are the central elements of component-based systems. This task repeats the terminology and the fundamentals of components.

- 1a) Malcolm Douglas McIlroy was talking about *Components Off The Shelf*, already in 1969 [1]. What is the main idea of COTS and why would this be beneficial?
- 1b) What is a facet and what is facet classification? Give an example.
- 1c) What is a *component repository*, a *component market* and a *component trader*?
- 1d) What are the key modeling elements of *UML Components*? What is the graphical notation? Give an example.
- 1e) Why should big component-based systems be structured hierarchically?

### Bibliography

1. Malcolm Douglas McIlroy, *Mass produced software components*. In: Software Engineering: Report of a conference sponsored by the NATO Science Committee, Garmisch, Germany, 7-11 Oct. 1968. Scientific Affairs Division, NATO. Januar 1969. Abgerufen am 10. Oktober 2014..

## Task 2: Cheesman/Daniels

The Cheesman/Daniels process helps to identify UML-Components, by stepwise refinement, starting with a requirements specifications.

- 2a) What is a domain model and why is it necessary?
- 2b) What is a business component, according to Cheesman and Daniels?
- 2c) What should be visible from a component? How is that related to the *Information Hiding Principle*?
- 2d) How is the Cheesman/Daniels Process related to technologies like EJB, CORBA, COM+?

### Task 3: Factory Automation

This task will be used as a basis for the other exercises. You can either solve the task alone or form groups with up to 4 students.

*Note: The solutions have to be presented in the next exercise.*

You are supposed to develop a component-based management system for factory automation. The company you are developing the system for, provides customizable 3D-printing services. Customers must first have registered and must be approved. Afterwards they can upload 3D-printing jobs. The company provides multiple different types of 3D printers and different types of finishing procedures. Depending on the concrete order of an individual customer, a process is generated (e.g., print, finish, paint). In such a process, multiple different machines (e.g., 3D printers, painting machines) are involved. The company also uses mobile robotic platforms to move parts between the individual machines. Furthermore the machines are equipped with robot arms to move the parts between the machine and the mobile robot. The robots act autonomously but receive their tasks from a central process management system. After the production process finished, the product is transported to a central store and shipped to the customer. The customer also receives an invoice. Invoices are managed by a central invoicing system.

- 3a) Design the application following the Cheesman/Daniels process. Create the required models.
- 3b) Create 1 PDF-File, containing your models in a readable format.