Middleware – learning goals

Note. This form describes the goals for the lecture/exam material. Each student has additioal, extended level goals acquired through the compulsory essay.

Main theme	***Prerequisites***	***Approaching the goals*** ***(passing level; almost or just passing)***	***Reaches the goals*** ***(average performance)***	***Extensive learning goals*** ***(max grade level)***
Roles of middleware	• Some programming experience (java) • understanding of basic software development process and its tools (OhTu) • understanding of basic operating system and communication system services (KJ, TilPe)	• able to compare various middleware categories and emphasise their specialities •	• discuss and select middlewares suitable for the selected software architecture • identify the concepts and services of interest for each middleware type • understand the development cycle of the middleware solutions	• critical discussion of middleware goals, understanding mismatch and overlaps between groups

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Relationship of software architecture, software engineering process and tools, and middleware	•	• able to describe what kind of architectural and procedural expectations and provisions are built in into each middleware type • recognize ideas of service-oriented computing and MDA/MDD	• discuss with a goal of finding incompatibilities between intended software architecture, software engineering tools and selected middleware • identify communication patterns and architectural styles supported by various middleware products and be able to retrieve sufficient detail for appropriate design decision • understand the goals and foundations of service-oriented computing and model-driven approaches	• discuss product-line issues in a working environment •

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Architectures and addressed challenges of different kinds of middlewares	• object-oriented programming in Java; calling remote objects • services provided and basic techniques for providing them in the OSI stack or IP stack • process management by operating system • recognises the concept of transaction • recognises the problems and solutions of concurrent computing and remote computing	• able to discuss different communication semantics • able to describe basic architecture for most of the following: object-oriented, component-oriented, transaction-oriented, message-oriented middleware, service-oriented middleware, model-oriented middleware • recognise the concept of interoperability	• able to recognise and apply various approaches for design for remote communication and processing with specific requirements • is able to describe how different transparencies are implemented • able to describe basic architecture for object-oriented, component-oriented, transaction-oriented, and message-oriented middleware • able to refine the architecture in terms of refining it with solutions for specific problems like transparency support, composition or management of objects, components, or services • understands how upper level concepts are implemented using the previous level services • able to refine interoperability • is able to explain the basic idea of reflective middleware • understands the challenges and approaches for QoS management, mobility or secure platforms	• able to describe what kind of interoperability and by what means is supported by a type of middleware • has a wide knowledge of a middleware family supporting modern features