

The Building Block Method -

Component-Based Architectural Design for Large Software-Intensive Product Families

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Abstract:

One of the critical issues in developing large software-intensive systems is to allow for easy evolution and extension of these systems. For this purpose, the development of a software architecture that supports evolution and extension of the software is of crucial importance. The software architecture describes the decomposition of the software into parts that should be manageable and understandable, and should localise change. To serve a broad range of customers, products are often not developed as single systems but as a family of similar products that share a common base.

This thesis presents a component-based architectural design method for large software-intensive product families. The so-called Building Block Method (BBM) focuses on the identification and design of Building Blocks. Building Blocks are software components that can be independently developed and deployed.

The BBM takes descriptions of application domain functionality, commercial product features, system qualities and technology choices as input and produces a number of architectural models and construction elements.

The identification and specification of Building Blocks are based on three design dimensions, namely object design, aspect design, and concurrency design. Object design is the transformation of application domain objects in several steps into programming language objects. Aspect design is a means for achieving system qualities. Concurrency design maps objects and aspects to computing resources.

Relations between Building Blocks are such that a system can be integrated and tested incrementally. A specific product is configured from a subset of all the Building Blocks that make up the family.

The BBM is described in the form of a core method and a method specialization for centrally controlled distributed embedded systems. The specialized method has been applied to the development of telecommunication and medical imaging systems.

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