

Building very high quality components: Issues and solutions

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A promising approach for better software engineering is to rely on reusable components of guaranteed quality, or *trusted components*. This series of lectures explores some of the conceptual and practical problems raised by this goal, and describes techniques for building trusted components. It is essentially based on the experience of developing and using object-oriented class libraries, especially EiffelBase and other Eiffel libraries equipped with contracts. The presentation will address both engineering aspects and techniques of proving classes based on a formal semantics.

The lectures are organized as follows.

1. *Issues of reuse and quality*

- The role of reuse in the software lifecycle. Management aspects.
- Trusted components: a definition
- The notion of Trusted Component. Low road and high road.
- Towards a Component Quality Model. Steps and levels
- Approaches to component certification.

2. *The anatomy of a reusable library*

- The EiffelBase library; purpose and structure
- Using inheritance for a container library
- Contracts for container classes

3. *Semantic basis for class proofs*

- The Current Calculus
- Modeling the reference structure
- Modeling the notion of class
- Modeling inheritance
- Modeling polymorphism and dynamic binding

4. *Example proofs*

- List classes and their features

References

(All by Bertrand Meyer)

Object-Oriented Software Construction, 2nd edition, Prentice Hall, 1997

Reusable Software, Prentice Hall, 1994

The Grand Challenge of Trusted Components, keynote at ICSE 25. Portland, Oregon, May 2003, see <http://www2.inf.ethz.ch/~meyer/publications/ieee/trusted-icse.pdf>

Collection of papers on proofs of program correctness, see detailed references and the papers themselves at <http://www.inf.ethz.ch/~meyer/ongoing/references/>