On Software Components

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Software Component Evolution


procedures Modules classes VB

OO++
Java
GP
Software Component Definitions

"logically cohesive, loosely coupled module that denotes a single abstraction."
(Grady Booch, 1987)

"already implemented units that we use to enhance the programming language constructs."
(Ivar Jacobson, 1993)

"self-contained, clearly identifiable pieces that describe and/or perform specific functions, have clear interfaces, appropriate documentation, and a defined reuse status."
(Johannes Sametinger, 1997)

"unit of composition with contractually specified interfaces and explicit context dependencies only."
(Clemens Szyperski, 1997)
Software Component Granularity

- High granularity
  - Specialized
  - Reusable
  - Efficient
- Low granularity
  - Generic
  - Composable

What is this component for?
What is the difference to that other one?
How do I use it?
e.g. container

Do I have to take this junk as well?
The component I need is not there!

a few large components

component granularity

a lot of small components

What is this component for?
What is the difference to that other one?
How do I use it?
e.g. container
Software Component Interfaces

- **Service contracts**
  - **Clients**: what to expect and how to deploy
  - **Providers**: what to implement

- **Formal contracts**
  - **Syntax**: interface
  - **Behavior**: pre and post conditions ...
  - **Support composition**: validation
Design Patterns

- Catalog of solutions to recurring problems in the object-orientation scene
  - Taxonomy of elementary OO architectures
- Orthogonal to domain matters
- Composition
  - Adapter: incompatible interfaces
  - Bridge: decouple abstraction and implementation
The Adapter Pattern
The Bridge Pattern
Frameworks

- Arrangement of classes that captures a reusable design
  - Abstract: implementation inheritance
  - Concrete: reusable implementations

- Whitebox framework
  - Inheritance and overriding

- Blackbox (component framework)
  - Interfaces and composition

- System-wide properties