

# **An Object-Z / CSP Based Approach for the Specification of Architectural Connectors**

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Our objective in this work is to propose a semantically safe “combination” of Object-Z and CSP for specifying architectural connectors. The approach, which considers connectors as first-class entities, intends to support incremental development of specifications, as well as verification of properties. We start from the very informal definition that software architecture is a collection of computational components together with a collection of connectors, and follow the formal framework set by [1]. In this framework a connector specification relies on the explicit definition of the notions component, port, role, glue, connector, and attachment.

In the suggested approach, roles, ports and glue, which as considered as components, are specified (in the same way as computational components) by Object-Z classes. The internal behavior of these components is governed by preconditions on adequate state variables. The behavior of the connector is specified by a parallel composition of the roles and their glue. The attachment of ports (which are refinements of roles) as roles is specified by a CSP process parameterized by Object-Z classes.

The fact that both languages have common semantic basis [4, 5, 6, 7, and 8], enables using and / or developing a unified method of refinement for the integrated notation.

Among the similar work we might cite: [1, 2, and 9]. In [1] all aspects of architectural connectors are specified in a CSP-like notation. [2], which abstracts of the notion of glue, defines ports and roles as basic types. In [9], connectors are categorical entities, ports are not defined explicitly, and components are seen as refinement of roles.

## **References**

1. R. Allen and D. Garlan, A Formal Basis for Architectural Connection, 1998
2. G. Abowd, R. Allen and Garlan, Formalizing style to understand descriptions of software architectures, 1994
3. M. Shaw and D. Galan, Formulations and Formalisms in Software Architecture, 1996
4. G. Smith and J. Derrick, specification, refinement and verification of concurrent systems – an integration of Object-Z and CSP, 2001
5. G. Smith and J. Derrick, Refinement and Verification of Concurrent systems specified in Object-Z and CSP, 1997
6. G. Smith and J. Derrick, Abstract Specification in Object-Z and CSP, 2002
7. J. Derrick and G. Smith, Structural Refinement in Object-Z / CSP, 2000
8. G. Smith, A Semantic Integration of Object-Z and CSP for the Specification of Concurrent Systems, 1998
9. J.L. Fiadeiro, A. Lopes and M. Wermelinger, A Mathematical Semantics for Architectural Connectors, 2002
10. T. McComb and G. Smith, Architectural Design in Object-Z, 2004
11. T. Bures, Generating Connectors for Homogeneous and Heterogeneous Deployment, 2006

