DISTRIBUTED FEATURE COMPOSITION: AN ARCHITECTURE FOR TELECOMMUNICATION SERVICES

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CURRENT PROBLEMS OF TELECOMMUNICATION SOFTWARE

Telecommunication networks are complex, distributed, and long-lived. In addition to the common problems of all software with these characteristics, telecommunication software has some severe problems that are particular to this application domain at this time.

Feature interaction is a source of unmanageable complexity [1]. A clean separation is needed between a customer-oriented service layer and a resource-oriented transmission layer, so that the latter can be upgraded easily as technology improves [2]. This is especially important because of the ongoing unification of circuit-switched and packet-switched transmission technologies [3]. More service providers now provide more features, so interoperation of features across network boundaries is an increasing problem. Finally, although multimedia telecommunication services are growing in popularity and practicality, they are not well understood [4].

DISTRIBUTED FEATURE COMPOSITION

Distributed Feature Composition (DFC) is a new architecture for the description of telecommunication services [5].

The primary design goal of DFC was feature modularity, which it achieves by adapting principles of the pipe-and-filter architecture [6] to the telecommunication domain. Other important design goals were abstraction away from most implementation detail, and susceptibility to formal reasoning. As it appears to achieve all these goals to a useful degree, it provides a good foundation for the application of formal methods to telecommunications.

DFC SOLUTIONS TO SOFTWARE PROBLEMS

In a DFC description of a feature set, feature interactions are structured and minimized. This may make it possible to determine all feature interactions analytically. It may also make it easy for designers to adjust their feature descriptions until the only feature interactions are desirable ones [7]. Furthermore, full or partial formal models may make it possible to prove that a feature set has desirable global properties [8].

Preliminary investigations indicate that the service layer of a telecommunication network can be organized using the DFC architecture, and yet be implemented efficiently on many kinds of physical network. DFC also appears to be helpful in understanding interoperation and multimedia telecommunication services.

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