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Automatic Generation of Network Protocol Gateways

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The emergence of networked devices in the home has made it possible to develop applications that control a variety of household functions. However, current devices communicate via a multitude of incompatible protocols, and thus gateways are needed to translate between them.

Gateway construction, however, requires an intimate knowledge of the relevant protocols and a substantial understanding of low-level network programming, which can be a challenge for many application programmers.

This talk presents a generative approach to gateway construction, z2z, based on a domain-specific language for describing protocol behaviors, message structures, and the gateway logic. Z2z includes a compiler that checks essential correctness properties and produces efficient code. We have used z2z to develop a number of gateways, including SIP to RTSP, SLP to UPnP, and SMTP to SMTP via HTTP, involving a range of issues common to protocols used in the home. Our evaluation of these gateways shows that z2z enables communication between incompatible devices without increasing the overall resource usage or response time.

This is joint work with Yérom-David Bromberg, Laurent Réveillère, and Gilles Muller, and was published in Middleware 2009.