COTS Middleware for Real-time Distributed Interactive Simulations – Fact or Fiction?

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Abstract

Current and planned real-time distributed interactive simulation systems must collaborate with many event sources, provide interactive response to human operators, and respond flexibly to unanticipated factors arising at run-time. Moreover, large-scale federated simulation systems must run largely autonomously, shielding operators from unnecessary details, while simultaneously communicating and responding to events at an accelerated operational tempo. In next-generation simulation "systems of systems" it will be hard to predict or even approximate system configurations or workload mixes a priori.

While it is possible in theory to develop complex real-time distributed interactive simulation systems from scratch, contemporary economic and organizational constraints, as well as increasingly complex requirements, are making it implausible to do so in practice. Thus, the role is played by ``commodity-off-the-shelf'' (COTS) hardware and software has become increasingly significant. In its formative years, COTS middleware, such as CORBA, was generally unsuited for real-time distributed interactive simulation systems due to it lack of

1. Standard QoS interfaces in standard specifications
2. QoS enforcement mechanisms
3. Real-time programming features,
4. Optimize efficiency, predictability, and dependability.

However, the current generation of middleware specifications and implementations provide much better QoS support for real-time distributed interactive simulation systems.

This talk describes how the evolution of middleware capabilities, particularly the OMG Real-time CORBA standardization effort and the DMSO HLA/RTI, and the maturation of COTS middleware implementations make it increasingly well-suited as the infrastructure for real-time distributed interactive simulation systems. The material in this talk is based on experience gained with the TAO Real-time CORBA ORB and the SAIC reference implementation of the HLA/RTI, which is based on TAO.

Speaker Bio

Dr. Schmidt is an Associate Professor in the Electrical and Computer Engineering Department at the University of California, Irvine. He is currently serving a Program Manager at the DARPA Information Technology Office (ITO), where he leads the national effort on distributed object computing middleware. His research focuses on design patterns, implementation, and experimental analysis of object-oriented frameworks that facilitate the development of high-performance, real-time distributed object computing systems on parallel processing platforms running over high-speed networks and embedded system interconnects.

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