ECE Department Scholarly Paper Presentation

TITLE: ON PERFORMANCE ANALYSIS OF SERVICE-ORIENTED ARCHITECTURES

Presented by Ashraf M. Abusharekh
Advisor: Dr. Alexander H. Levis
Date: 04/29/2009 at 1:00-2:00pm
Location: The Engineering Building Room 3202

Architectural models must provide insight into the logical, behavioral and performance aspects of the systems that are to be deployed conformant to the architecture. Recently, service orientation was introduced as a design paradigm to build Service-Oriented Architectures (SOAs). Service-Oriented Architecture behavior and performance doesn't only depend on its business services but also on the Enterprise Service Bus (ESB) services that enable loose coupling, services implemented by other systems, and the underlying technological network supporting the SOA environment. Traditional executable architectural models synthesized for stovepipe architectures cannot capture the complexity of an SOA.

In this seminar, an approach for constructing an ESB-based SOA compliant to DoDAF v.1.5 and a systematic methodology for performance evaluation and prediction of the architecture are presented. The architecture defines business services and processes necessary to accomplish its operational concept, and is capable of participating in the net-centric environment (NCE). The participation in NCE is achieved by allowing the SOA to dynamically federate with NCE systems through COI registries and by utilizing the net-centric enterprise services to share enterprise-level information. The performance evaluation and prediction methodology involves the development and implementation of a hybrid executable model that is capable of capturing and predicting the dynamic behavioral and performance aspects of an ESB-based SOA. The architecture of the executable model makes use of two models: Colored Petri Nets generated using CPN Tools to capture the logical and behavioral aspects of the SOA and a communication network model generated using the OMNeT++ network simulator to capture the underlying technological network that enables the SOA. The executable model utilizes the services of the ESB to predict the performance of business processes. The methodology starts by synthesizing the hybrid executable model from the DoDAF v.1.5 architecture artifacts produced during the architecture design phase and produces relevant Measures of Performance (MOPs) and Measures of Effectiveness (MOEs).

Bio: Ashraf Abusharekh is a Ph.D. candidate in the Electrical and Computer Engineering department at George Mason University. Ashraf is a GRA in the System Architectures Laboratory since January 2006. He has a Bachelor's degree in Physics from Al-Ahzhar University, Gaza (2001), and a master's degree in Computer Engineering from George Mason University (2004) where he conducted research on Public Key Cryptography at the Cryptography and Network Security Implementations Lab.
Ashraf received the Clinton Scholarship (2002-2004), the Office of Diversity Programs and Services' Vision Awards - Academic Excellence (2003), the ECE department's Academic Achievement Award (2004) and the Volgenau School of Information Technology and Engineering student competition on Service Oriented Architecture research first prize. His research interests include discrete event system modeling and simulation, computer networks, cryptography and network security.