

## **GSAW 2008 Tutorial C:**

Service Oriented Architecture in the Context of Ground Systems

**Length:** Full day

### **Overview:**

The purpose of this tutorial is to provide an introduction to service oriented architecture (SOA) in the context of ground systems. The course begins with a high level discussion of the essence of SOA that includes its definition, approach, and the identification of technical and organizational barriers to adoption. Then an abstract functional description is provided to establish the top-level architecture of an SOA implementation. This provides a context for discussions on the core infrastructure services that are needed to rollout a basic SOA as well as an approach for the development of service-oriented application software. An introduction to information architecture is provided next that describes techniques for achieving interoperability across an SOA implementation. This more general talk is followed-up by a case study that applies information architecture best practices to an exemplar ground data system. The course concludes with a discussion of SOA maturity models and roadmaps for the incremental evolution of technologies and organizational practices.

**Instructors:** Steven Fonseca, Dan Crichton, Jeff Estefan, Adans Ko, Costin Radulescu, Jeff Singer, NASA Jet Propulsion Laboratory

### **Biographies:**

Dan Crichton:

Daniel Crichton is a program manager and principal computer scientist at the Jet Propulsion Laboratory where he manages the Planetary Data System Engineering office. He is also the Principal Investigator for Informatics for the Early Detection Research Network (EDRN), a biomedical research network of over 40 institutions performing research in the discovery of cancer biomarkers. He chairs international working groups on Information System Architecture in space and planetary science including the Information Architecture Working Group for the Consultative Committee on Space Data Systems (CCSDS). He has also served as the Principal Investigator for the Object Oriented Data Technology task which was selected as Runner-Up for NASA Software of the Year in 2003 and managed the startup of JPL's Enterprise Architecture project. He has worked on numerous data system projects for science, engineering and institutional projects and has authored several papers including two book chapters on science information system architectures. He holds both a M.S. and B.S. in Computer Science.

Jeff Estefan:

Jeff Estefan is the Division Chief Technologist for the Systems and Software Division at NASA's Jet Propulsion Laboratory in Pasadena, California where he is responsible for overseeing the technology development and infusion efforts performed by the Division. Jeff is the primary JPL representative to the Organization for the Advancement of Structured Information Standards (OASIS) and voting member of the Reference Model for SOA Technical Committee and Reference Architecture for SOA Subcommittee. He helped develop the Reference Model for SOA v1.0, an OASIS Standard, and is currently working on development of the OASIS Reference Architecture for SOA specification. Jeff has worked for a number of organizations in various technical and leadership capacities including GN&C systems engineering at The Boeing Company in Seattle, planetary navigation system engineering at JPL, worldwide solution architecting for the IBM Software Group, and, more recently, technology portfolio management and Enterprise Architecture at JPL. Jeff earned his M.S. in Applied Mathematics from the University of

Washington, his B.S. in Mathematics from Washington State University, and served as an Aeronautical Engineering Duty Officer for the U.S. Naval Air Reserve from 1988 to 1998. He received an honorable discharge from military service with the grade of Lieutenant Commander.

Steven Fonseca:

Steven Fonseca currently serves as Chief Software Architect for the Deep Space Information Services Architecture where he is chartered with the development of a service-oriented architecture for Jet Propulsion Laboratory's (JPL) Deep Space Network and Advanced Multi-Mission Operations System. Previously he spent three years working at NASA Ames Research Center beginning with a post doctorate study looking at peer-to-peer based infrastructures offering expressive publication and subscription languages. Steven then joined the Mission Control Technologies Project where he served as Architect and Engineering Lead for a set of frameworks to build ground systems from semantically interoperable composed components. Steven researched the engineering of ontology-based applications while subgroup lead for NASA's C3I Information Architecture Team. Steven completed his PhD in Computer Science from UC Santa Cruz for work on "Methodological and Software Artifacts Support for Agent-Oriented Component Reuse and Engineering" in collaboration with and funding from Hewlett Packard Laboratories. Before completing an MS in Computer Science from UC Santa Cruz, he completed a BS in Computer Engineering from UC Davis. At that time Steven was interested in computer architecture and digital circuit design. He spent time working in a digital signal processing lab and held several short term positions at Intel.

Adans Ko:

Mr. Adans Y. Ko is the Software Systems Engineer at JPL. He is responsible for the Ground Data System Software Architecture for Advanced Multi-Mission Operation System (AMMOS), which includes mission planning, mission design, sequencing, mission downlink, and instrument science operations for current and future NASA missions and the Deep Space Network. He received NASA's Exceptional Service Medal for his work on Voyager's onboard Computer Command Subsystem for mission to Uranus and Neptune. He was the Development Manager of the Mission Planning and Sequence Subsystem. He got his B.S.C.S. degree from the Utah State University, Logan, Utah. In 1982, his M.B.A. degree from University of California, Los Angeles in 1993.

Costin Radulescu:

Costin Radulescu is a senior member of the technical staff of Instrument Software and Science Data Systems at the Jet Propulsion Laboratory in Pasadena, California. His background includes design and implementation of various real-time telemetry and ground data systems ranging from embedded onboard applications to multi-mission data management systems. Currently his work focuses on the infusion of different registry standards and technologies within a Service-Oriented-Architecture. Costin is very much in touch with the industry, and he is a recipient of the American Council of Engineering (ACEC) Award for real-time data systems innovation and design. Costin earned his B.S. in Computer Science from California State Polytechnic University, Pomona.

Jeff Singer:

Jeff Singer is the Lead Development Engineer for the Messaging Services Products and Telecommand Common Software tasks at the Jet Propulsion Laboratory in Pasadena, California. Jeff is also a member of the Command Control subsystem team, performing in the role of software engineer. Jeff has worked for a number of organizations in technical lead positions including TMINUS10 and PLEX Systems. Jeff has also spent time in the finance industry, serving as a precious metals trader for Imperial Bank, including

participation in development of trade systems. Jeff earned his M.S. in Computer Science from California State University Fullerton and his B.S. in History and Philosophy from Claremont McKenna College.

**Who Should Attend:**

The course is suitable for a broad audience of technical and business managers that are looking to gain a familiarity with the service oriented architecture style and its value in the context of ground systems. No specific technical background is required; topics will be covered at an introductory level.