

GSAW 2013 Tutorial B:

Cloud Computing for Ground Systems

Length: Half day

Overview:

We will provide a range of material that will introduce participants to the basic concepts of cloud computing, and then proceed to specific technical areas within the cloud computing arena:

(1) Basic Cloud Concepts/A Cloud Reference Model and Roadmap, Dr. Craig A. Lee

Basic cloud concepts based on the NIST Definition of Cloud Computing will be presented. These concepts will be put into a reference model for cloud-based, satellite ground systems, with a roadmap sketched out from an initial capability to a target architecture.

(2) OpenStack and the DODCS project, Dr. Steve Crago

OpenStack is an open source cloud software stack with literally hundreds of contributors across academia and industry. The Dynamic, On-Demand Computing Systems (DODCS) is incorporating support for GPUs into the OpenStack code base.

(3) Cloud Benchmarks and the Cloud Tester Project, Dr. Douglas Enright

Benchmarking cloud performance is a critical part of evaluating cloud benefits. This talk discusses how virtualization and on-demand provisioning can affect performance. The Cloud Tester Benchmarking Suite is then described for quantitatively assessing various aspects of cloud performance.

(4) Cloud Security

Cloud security is commonly cited as a major stumbling block to cloud adoption. This segment will cloud security issues and how they can be addressed, such as the use of the Trusted Platform Modules on modern processors to establish "chains of trust" for running systems.

(5) Big Data and Hadoop, Ramesh Rangachar

"Big Data", the Map-Reduce paradigm, and the Hadoop open-source implementation, is an approach to managing vast amounts of unstructured and structured data. Cloud computing is an enabler of Big Data analytics, by providing on-demand access to a shared pool of computing resources that can be rapidly provisioned and released. This segment will provide an introduction to Big Data and Hadoop -- its best practices, opportunities and risks.

(6) Open Discussion/Future Directions

We will conclude with a half-hour of open floor discussion on cloud technology and adoption issues in satellite ground systems.

Instructors: Craig Lee, Douglas Enright, The Aerospace Corporation; Steve Crago, USC/Information Sciences Institute (ISI) East; Ramesh Rangachar, Creative Information Technology Inc.

Biographies:

Dr. Craig A. Lee is a Senior Scientist in the Computer Systems Research Department of the Aerospace Corporation. He has worked in high-performance parallel and distributed computing for the last thirty years. This work has led to Dr. Lee's involvement in the Open Grid Forum (OGF) where he served as President from 2007 to 2010. Dr. Lee served as the main liaison between OGF and the DMTF, SNIA, TMF, the Open Cloud Consortium, Cloud Security Alliance, OMG, and OASIS. Dr. Lee is now on the OGF Board of Directors and heavily involved with NIST, having contributed significantly to the NIST Cloud Standards Roadmap and supporting the NIST Cloud Technology Roadmap. He has served on the program committee for many conferences and workshops, and has served as a panelist for the NSF, NASA, DOE, and as an international evaluator for INRIA. He is an associate editor of Future Generation Computing Systems (Elsevier) and on the editorial board of the International Journal of Cloud Computing (Inderscience). Dr. Lee has published over 70 technical works, including four book chapters and seven edited volumes and issues.

Dr. Steve Crago is a Senior Project Leader at USC/ISI East with interests in computer architecture, multiprocessors, novel computing architectures, embedded processing, performance analysis and optimization, including processing time, throughput, efficiency and scalability challenges.

Dr. Douglas Enright is a Senior Engineering Specialist in the Computer Systems Research Department of the Aerospace Corporation.

Ramesh Rangachar has over 20 years of experience in Information Technology and Telecommunications. He has extensive experience in the design and development of mission-critical systems, technology infusion, project management, and information assurance. Ramesh is leading efforts to keep CITI at the cutting edge of innovative solutions that include Open Source Platforms, Cloud Computing, Big Data, and Identity Management. Prior to joining CITI, Ramesh worked as Senior Manager at Intelsat, where he was responsible for system integration and operational support of satellite ground systems. He has also worked as Adjunct Assistant Professor at the University of Maryland, University College and as a guest researcher at the National Institute of Standards and Technology. He has a Masters in Mechanical Engineering from the University of Maryland.

What Participants Should Expect to Learn:

The participants should understand the basic concepts and motivations for cloud computing, and how they can be deployed to advantage in a satellite ground system. They should also understand the outstanding technical and adoption issues that must be resolved in order to realize the expected benefits of cloud computing.

Who Should Attend:

As a new tutorial in a rapidly developing technical area, we are not assuming any specific knowledge of cloud computing. We will present some basic material to hopefully orient the attendees, and then proceed to more detailed material. Based on the outcome, we will be able to better gauge how much interest there is in this topic, and what level(s) of material are needed.