GSAW 2022 Tutorial A:

Realizing Cloud-based Satellite Operations: Best Practices & Lessons Learned

Overview:
Cloud service offerings have the potential for significant operational and cost performance benefits over traditional satellite operations solutions. However, taking full advantage of the flexibility and adaptability offered by Cloud Service Providers requires rethinking many aspects of satellite operations from mission planning and contact scheduling to security, failover, and continuity of operations. For government operators, realizing a cloud-based future is also complicated by the need to maintain operational support for existing assets during transition, the need for up-skilled and re-skilled teams, and process changes for managing operations and controlling costs.

This tutorial will scratch the surface of three key aspects for Realizing Cloud-based Satellite Operations:

- Adapting Cloud Technologies for Mission Critical Operations – Will examine how Cloud technologies can be leveraged to support, enhance & evolve traditional satellite operations concepts
- Secure Resilient Cloud Operations – Will examine how to cost effectively build operational resilience and security in the cloud
- Migrating legacy Ground systems to the Cloud – Will discuss strategies for cost-effective cloud migration of existing operational assets

Through practical examples, this tutorial will explore the lessons learned and best practices derived from real-world experience of implementing cloud-based satellite operations capabilities from across the federal government. The tutorial will explore alternative capability migration approaches from re-hosting to re-architecting and addressing aspects of both satellite and data operations. Participants will gain an understanding of the important success factors that influence the outcomes of migration decisions.

Instructors:
Stephen Marley and Sheryl Olguin, The Aerospace Corporation;
John Faure, L3Harris;
Shawn Miller, Raytheon Intelligence & Space; and
Joe Foster (NASA/GSFC)

Biographies:
Dr. Stephen Marley
As a Ground Systems Enterprise Architecture Dr. Marley's is focused on complex/scientific data information systems in support of environmental observation science and ground system operations. With nearly 30 years' experience of developing environmental satellite ground systems, he has successfully led and/or participated in the designing of satellite ground systems for the European Space Agency's European Remote Sensing satellites, NASA's Earth Observing System, USGS Landsat program, and most recently NOAA's Geostationary and Polar satellite programs. Currently, working within the Ground Architecture team at

NOAA, Dr. Marley is helping to establish Enterprise Architecture best practices and tools defining the technical framework for the realization of the future NOAA Ground Enterprise. Dr. Marley is a graduate in Infrared Astronomy from the University of Leeds. He is also a Certified Enterprise Architect, an Associate Editor of The Journal of Enterprise Architecture, and a proud alum of the International Space University.

Sheryl Olguin has over 30 years' experience bringing creative thinking and entrepreneurial approaches to new technology roll-outs, leadership of design, management and implementation of complex enterprise systems and software, and enterprise/web/mobile applications. Prior to joining Aerospace, was COO of Naviscent, a Silicon Valley based UX agency focused on applying UX/UE research, design, and engineering practices to Fortune 1000 and Global 2000 corporations' enterprise systems and Internet/Mobile enabled solutions for optimal value, technical innovation, and maximum user engagement. At Harris Corp, Ms. Olguin led the Corporate Internet technology strategy team, web development center of excellence, and managed the digital datacasting aspects of the Harris/PBS strategic initiative to advance the US Digital TV transition by demonstrating capabilities, educating engineers, and informing US Broadcast management of business models enabled.

John Faure is a senior scientist at L3Harris Technologies who has 37 years of experience in the software industry. He also worked at startup company during the dot com era where he specialized in large information systems integration projects. His career has focused on building large, distributed software systems including a replacement space shuttle launch system (Core); Delta, Atlas and Titan launch preparation system (Launch Operations & Support Contract); NextEra Energy power plant monitoring and control (Generation Commercial Management); Government Printing Office (GPO) online digital archive (FDSYS); GOES-R Ground Segment and several other systems. He has been the architect of the GOES-R Ground System for 15 years, since the risk reduction study phase. He has worked on the problems of moving large satellite ground systems to the cloud for 5 years, benefitting from approaches and lessons learned by L3Harris 20+ operational and mission critical cloud systems. His first focus for developing cloud architectures was optimizing recurring costs while building secure, highly available and performant systems. His current interest is in applying AI technologies to space systems in the cloud.

Shawn Miller is a Principal Engineering Fellow and Certified Architect with Raytheon Intelligence & Space (RI&S). Within RI&S, he is currently the Technical Director for Environmental Intelligence and Civil Space, overseeing current technical performance and planned capabilities and technological evolution of multiple programs in the weather, water and climate enterprise. Prior to his current assignment, Shawn was the Chief Architect on the Joint Polar Satellite System (JPSS) Common Ground System (CGS). He has been working in various aspects of weather and satellite programs for 30 years, 24 with Raytheon. He obtained a PhD in Aerospace Engineering Sciences at the University of Colorado, Boulder, in 1995, and worked as a postdoctoral researcher in the Department of Meteorology at the University of Maryland. Shawn remains engaged in a number of activities outside of Raytheon, most notably with the American Meteorological Society (AMS), for which he was named a Fellow in 2019. He is a Past Chair of the AMS Board on Enterprise Economic Development (BEED), under the AMS Commission on the Weather, Water and Climate Enterprise (CWWCE), a current member of the AMS Committee for Open Environmental Information Services (COEIS), and an AMS Nonresident Policy Fellow.

Joe Foster is the Cloud Computing Program Manager based out of NASA's Goddard Space Flight Center located in Greenbelt, Maryland and joined NASA in September 2018. In this role Joe run's the Agency's newly formed Mission Cloud Platform which is a streamlined platform for the Agency's Flight, Science and Engineering projects to quickly and securely move to the Cloud without having to be Cloud experts themselves. Joe also serves on several Agency-wide working groups as part of Digital Transformation initiatives. In addition to these roles, Joe is matrixed out part time as the Cloud Service Lead / Technical Adviser to the Nancy Grace Roman Space Telescope Ground System Management team to develop their science processing pipeline to be fully cloud native. Joe previously served as an IT program manager with the National Geospatial-Intelligence Agency (NGA) from 2010–2018, where he migrated 60 separate activities from on-premises data centers to the cloud; spearheaded adoption of the DevOps Pipeline; and conceptualized the system that is being used by the Agency to plan and track the cloud migration of more than 650 applications. He served on NGA's Cloud Leadership Team, Cloud Adoption Management Group, and DevOps Council, as well as 2 Intelligence Community-wide Cloud forums, the Intelligence Community IT Enterprise steering committee, and the ICITE Mission Users Group Forum. Joe is a U.S. Army veteran who served as a Chemical Weapons Specialist from 1998–2005. Joe has a Bachelor's of Science degree in Statistics from the University of Maryland College Park. He also completed his Master of Business Administration at the Robert H. Smith School of Business, University of Maryland College Park, with a concentration in Decision Science and Organizational Strategy in 2009.

Description of Intended Students and Prerequisites:
- Familiarity with Cloud concept is desirable, but not necessary

What can Attendees Expect to Learn:
- Attendees will learn about the current state of Cloud-based ground system services, considerations of secure & resilient satellite operations in the cloud, and approaches to cost effectively migrate legacy systems & services