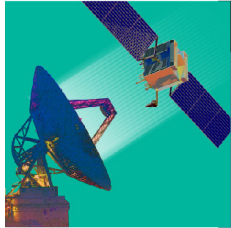


Working Group Outbrief



Ground System Architectures Workshop



Session 11E

Cloud Computing and Big Data Technologies for Ground Systems IX

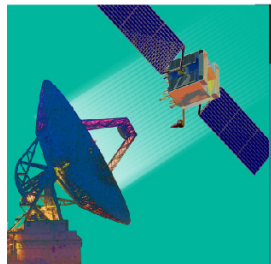
Ramesh Rangachar and Craig Lee,
The Aerospace Corporation

Approved for public release. OTR 2019-00520.



Session Goals

- Discuss the current trends, best practices, and lessons learned in using Cloud Computing and Big Data technologies
- Key Focus Areas:
 - *State of the art in Cloud Computing and Big Data*
 - *Cloud and Big Data reference models*
 - *Cloud-based ground systems*
 - *Cloud and Big Data technologies*
 - *Cloud security, standards, and compliance*
 - *Acquisition strategies for cloud-based systems*
 - *Cloud computing economics*
 - *Cloud performance management*

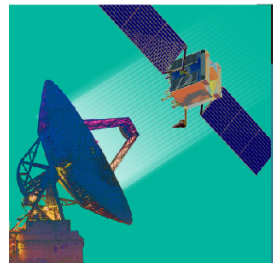


Ground System Architectures Workshop



Session 11E

Presenters/Panelists



| Title | Presenter | Organization |
|--|------------------|---------------------------|
| Introduction | Ramesh Rangachar | The Aerospace Corporation |
| ESOC's Successes, Complications and Opportunities in using Cloud Computing and Big Data Technology | James Eggleston | ESA/ESOC |
| Cloud-Enabled Architecture for the NESDIS Ground Enterprise | Kathryn Shontz | NOAA/NESDIS |
| Embracing Chaos | Onik Quddus | Booz Allen Hamilton |
| NOAA/NESDIS Enterprise Data Management (EDM) and Enterprise Product Generation (EPG) Proving Ground in the AWS Cloud | Rich Baker | Solers, Inc. |
| Real-Time Data Fanout in the Cloud | Jake Albrecht | The Aerospace Corporation |
| Town Hall Meeting: Moderated discussion on key focus areas | | |



Key Points

- ESOC is using cloud computing and machine learning
 - *Starting with auxiliary systems; not yet for online operational use*
- NOAA/NESDIS is working on 4 cloud pilot projects
 - *Focused on cloud-native implementations*
- BAH: Best way to prevent failure is to “embrace the chaos” to ensure success
 - *Discussed cloud resiliency reference architecture and best practices*
- Solers prototyped environmental data processing services in a FedRAMP-approved Amazon Web Services (AWS) cloud environment
 - *Native AWS cloud services; AWS Data Lake Architecture*
- Key discussion topics:
 - *Data-centric design*
 - *How to manage performance in a shared, multi-tenant environment?*
 - *How to manage reliability/availability/COOP/DR in a cloud?*
 - *Multi-cloud*
 - *Containerization*



Conclusions

- Cloud computing implies relinquishing ownership/control of something
 - *Hardware, software, network, data, access, performance, etc.*
- Organization confidence and trust must be established
 - *Pilots, Prototypes, Proof-of-Concepts*
 - *Demonstrate value w/o betting the farm*
- Best practices and reference architectures increase success rate and lower risk
- Consistent theme: established processes and policies can be impediments to modernization
 - *Management must provide leadership*
- Expand scope of workshop to include *data-centricity*
 - *Natural extension of the Big Data paradigm*