Ground System Architectures Workshop

Session 11D
Data Center Migration for Ground Systems: Geospatial Clouds

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• Cloud computing offers the potential for significant economies of scale, improved utilization of servers, more flexible allocation of resources, and workload management
  – Cloud computing entails the dynamic provisioning of processing, storage, and networks in a data center to essentially become a generic hosting environment, prompting the concept of "Data Center Migration" for ground system operators

• How do we apply cloud computing in support of satellite ground systems?
  – Serious challenges concerning security, performance management, portability, interoperability, costing models, lack of standards, etc.

• How do we integrate geospatial standards and tooling with dynamically provisioned resources?
  – Geospatially referenced data are central to many ground systems
• Cloud Computing in Ground Segments: Earth Observation Processing Campaigns
  – Fabrice Brito, Terradue, s.r.l.
• Geoprocessing in the Cloud
  – Brian Levy, Open Solutions Group & DIA
• OGC Standards to Enable SensorWebs for Disaster Management
  – Dan Mandl, NASA Goddard & Open Geospatial Consortium
• Eucalyptus-based Event Correlation
  – Nehal Desai, The Aerospace Corporation
• Developing Cloud Standards
  – Craig Lee, Open Grid Forum & The Aerospace Corporation
• Open Floor Discussion
Key Points

- **Enormous Interest in Clouds -- inside and outside of Gov**
  - Government organizations mentioned during workshop: NASA Ames, JPL, 12 Federal Reserve Banks, US Postal Service, DIA, DARPA, NSF, Missile Defense, DISA, Army, AF JSPOC, NRO, NSA, Consolidated Data Centers of the DNI
  - Informal GSA survey identified >50 government cloud projects

- **Hot Button Issues:**
  - Security -- Information Assurance
    - Increased functionality increases threat
    - Traceability, auditing, cleansing of systems in a virtualized environment
    - Can we handle DCID 6.3 in a cloud?
  - Performance Management
    - NUMA shared memory at scale
    - Unique IO devices
    - Communication demands
Conclusions

• Cloud Computing offers tremendous economies of scale and flexibility
  – Data Center Migration concept
  – … but Cloud Computing is not for every application or mission

• Private clouds are much more attractive for initial adoption
  – Many traditional security methods can be applied
  – Policy can be decided by the cloud owners

• Possible Testbeds
  – ADF-X -- converged utility computing infrastructure
  – NASA Ames Nebula
  – Open Cloud Consortium testbed

• Possible Demonstrations
  – Data Reprocessing Campaigns
  – NASA sensor web projects for disaster mitigation/response