NASA Briefing for Unidata

Christopher Lynnes
EOSDIS System Architect
Cloud Computing

High-level direction to “consider cloud computing” to satisfy EOSDIS Big Data requirements
EOSDIS Works with (pretty) Big Data

...Volume

Cumulative Archive Volume

Distribution Volume
Cloud Prototypes

Better Inter-usability

Archive and Distribution

Processing Activities

Archive Mgmt

Data

imagery exports

metadata exports

Better RMA

GIBS

CMR

Earthdata Search

Other NASA Cloud-Based Data Analytics & Processing Services

Analytics Optimized Storage

End-User Analysis Support Toolbox

End Users

Key

- Archive Mgmt
- Analytics Support
- Application Hosting

Better Science
Archive and Distribution Prototype(s)

Benefits from Archive in the Cloud
- Cost savings for storage of Big Data?
- Avoid data downloading and local data mgmt

- Alaska Satellite Facility Web Object Storage prototype
  - Distribute Sentinel radar data from Amazon storage

- Global Imagery Browse Service in the Cloud

- Ingest and Archive management prototype
Cloud Analytics Prototypes

Benefits from Cloud Analytics

- Analyze data at scale
- Analyze datasets together easily
- Avoid data downloading and local mgmt

Analysis support toolbox to attract users to cloud analytics

- Community open source tools
- DAAC-developed tools
- Cloud analytics examples and recipes
OPeNDAP + HDF in Cloud Web Object Storage

Web Object Storage ≠ File System
- OPeNDAP needs high-performance internal random access

Approaches
- Use file system emulator (e.g., FUSE)
- Pull files from WOS and cache on EBS
- Store variables (or chunks) as objects
- Use HTTP range gets based on maps of data
Dataset Interoperability Recommendations for Earth Science

1. Maximize HDF5/netCDF4 interoperability via API accessibility
2. Include Basic CF Attributes
3. Use CF “bounds” attributes
4. Verify CF compliance
5. Distinguish clearly between HDF and netCDF packing conventions
6. When to employ packing attributes
7. Mapping between ACDD and ISO
8. Group Structures in HDF5 and netCDF4 Files
9. Make HDF5 files netCDF4-Compatible and CF-compliant within Groups
10. Include time dimension in grid structured data
11. Order dimensions to facilitate readability of grid structure datasets
12. Consider “balanced” chunking for 3-D datasets in grid structures
13. Include datum attributes for data in grid structures
HDF Product Designer

Fig. 25 HPD Desktop Tools menu for HPD Online tools