Earthdata Cloud Analytics Project

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Earth Observing System Data and Information System (EOSDIS)

- Capture and clean data
- Downlink process
- Archive
- Subset
- Distribute

Users

- Research
- Applications
- Education
Over time, EOSDIS archive volumes increase exponentially.
Distribution increases similarly to cumulative volume
How do we support user analysis of very large data volumes?
Solution: Data-proximal Analysis

Data Archive → Data Analysis
Goals

1. Enable big compute next to big data
2. Encourage user adoption of cloud for analytics
3. Maximum analytics capability at minimum cost
   a. Use capabilities within NASA more effectively and efficiently
   b. Leverage analytics capabilities of external partners
Key Features

1. Satisfy a diverse user community
2. Support analysis in the cloud without egressing data
3. Facilitate multi-dataset comparison and fusion
4. Support batch, interactive and streaming modes
5. Support distributed filesystems and databases
6. Support cost constraints and cost-sharing
Earthdata Cloud Analytics Guiding Principles

1. Infusion- and innovation-friendly framework and building blocks
2. No monolithic systems
3. Open code and services
4. Interoperability and reuse
5. No unnecessary duplication ("undifferentiated heavy lifting")
Architectural Concept

Earth Science Data Analytics the Cloud-Native Way:

Everything is a Service

This approach produces key important benefits for the user community and EOSDIS
Abstract Analytics Workflow

data → Extract → Transform → Load → Analyze → Visualize
Earthdata Cloud Analytics Reference Architecture

Extract \rightarrow Preprocessing \rightarrow AODS¹ \rightarrow Analysis \rightarrow Visualization

Cumulus Data Archive

¹ Analytics Optimized Data Store
Interactive Mode: Analytics-Optimized Storage

Cumulus Data Archive → Preprocessing as-a-service → AODS\(^1\) as-a-service → Analysis as-a-service → Visualization as-a-service

\(^1\) Analytics Optimized Data Store
Batch Mode

Preprocessing as-a-service
Analysis as-a-service
Visualization as-a-service

Cumulus Data Archive

AODS\(^1\) as-a-service

\(^1\) Analytics Optimized Data Store
Streaming Mode

Cumulus Data Archive → Preprocessing as-a-service → Event Analytics as-a-service → Visualization as-a-service
Open Pipeline Provides Outputs at Different Stages Appropriate for a Diverse User Base

Cumulus Data Archive

Preprocessing as-a-service

AODS¹ as-a-service

Analysis as-a-service

Visualization as-a-service

End-User-Specific Analysis

¹ Analytics Optimized Data Store
Open Pipeline Provides Outputs at Different Stages Appropriate for a Diverse User Base

Cumulus Data Archive

Preprocessing as-a-service

AODS\(^1\) as-a-service

Analysis as-a-service

Visualization as-a-service

End-User-Specific Analysis

End-User Cloud-Native Analysis

\(^1\) Analytics Optimized Data Store
Open Pipeline Provides Outputs at Different Stages Appropriate for a Diverse User Base

- Preprocessing as-a-service
- AODS\(^1\) as-a-service
- Analysis as-a-service
- Visualization as-a-service

Cumulus Data Archive

End-User-Specific Analysis
End-User Cloud-Native Analysis

End-User Interpretation

\(^1\) Analytics Optimized Data Store
Open Pipeline Provides Outputs at Different Stages Appropriate for a Diverse User Base

Cumulus Data Archive

- Preprocessing as-a-service
  - End-User-Specific Analysis

AODS\textsuperscript{1} as-a-service

- End-User Cloud-Native Analysis

Analysis as-a-service

- End-User Interpretation

Visualization as-a-service

Data Exploration

\textsuperscript{1} Analytics Optimized Data Store
Open Pipeline Enables Integration with Other Data, Scripts, and Workflows

Cumulus Data Archive

- Preprocessing as-a-service
- AODS¹ as-a-service
- Analysis as-a-service
- Visualization as-a-service

End-User-Specific Analysis
End-User Cloud-Native Analysis
End-User Interpretation
Data Exploration

¹ Analytics Optimized Data Store
Open Pipeline Enables Integration with Exploitation Platforms

Preprocessing as-a-service

AODS\(^1\) as-a-service

Analysis as-a-service

Visualization as-a-service

Cumulus Data Archive

\(^1\) Analytics Optimized Data Store