Earthdata Cloud Analytics Project

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Earth Observing System Data and Information System (EOSDIS)

data downlink

capture and clean

process

archive

subset

distribute

Research

Applications

Education

Users
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

Preprocessing as-a-service

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

Analysis as-a-service

Visualization as-a-service

Cumulus Data Archive

Extract Transform Load

\(^1\) Analytics Optimized Data Store
Interactive Mode: Analytics-Optimized Storage

Cumulus Data Archive → Preprocessing as-a-service → AODS¹ as-a-service → Analysis as-a-service → Visualization as-a-service

¹ Analytics Optimized Data Store
Batch Mode

Cumulus Data Archive

Preprocessing as-a-service

Analysis as-a-service

Visualization as-a-service

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

\(^1\) 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

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

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

- Preprocessing
- AODS\(^1\)
- Analysis
- Visualization

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\(^1\) as-a-service
  - End-User Cloud-Native Analysis

- Analysis as-a-service
  - End-User Interpretation

- Visualization as-a-service
  - Data Exploration

\(^1\) Analytics Optimized Data Store
Open Pipeline Enables Integration with Other Data, Scripts, and Workflows

- 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
- Data Exploration

\(^1\) Analytics Optimized Data Store
Open Pipeline Enables Integration with Exploitation Platforms

Preprocessing as-a-service

AODS¹ as-a-service

Analysis as-a-service

Visualization as-a-service

¹ Analytics Optimized Data Store