In Your Orbit

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Introduction

- Rapid growth in planetary science and NASA missions

- Importance of sensor models in mapping planetary surfaces

- Challenges of accessing NASA's vast SPICE database

- **Capstone Project:** cloud-based service for ISD retrieval

- **GOAL:** Improve accessibility for new planetary scientists

Problem Statement

- Image Support Data (ISD) crucial for planetary missions
- USGS Astrogeology generates ISDs from satellite images
- Current system issues (complex, expensive, data size, inefficient)
- New system will be faster, free, and user friendly
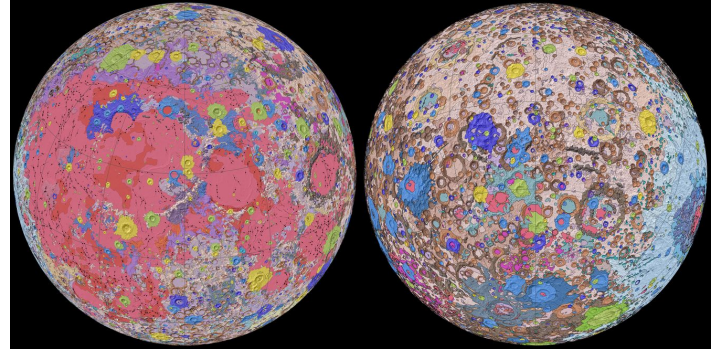
Solution Overview

- **ISD Generation:** The web service generates ISD using ALE, a NASA tool for ephemeris data.

- **Caching for Speed:** Stores frequently requested ISDs on Amazon DynamoDB for fast retrieval.

- **AWS Integration:** Uses Amazon ECS for scalability, enabling the service to handle large volumes of requests.

- **Data Efficiency:** Compressed JSON format reduces data size, speeding up data transfer and minimizing storage needs.
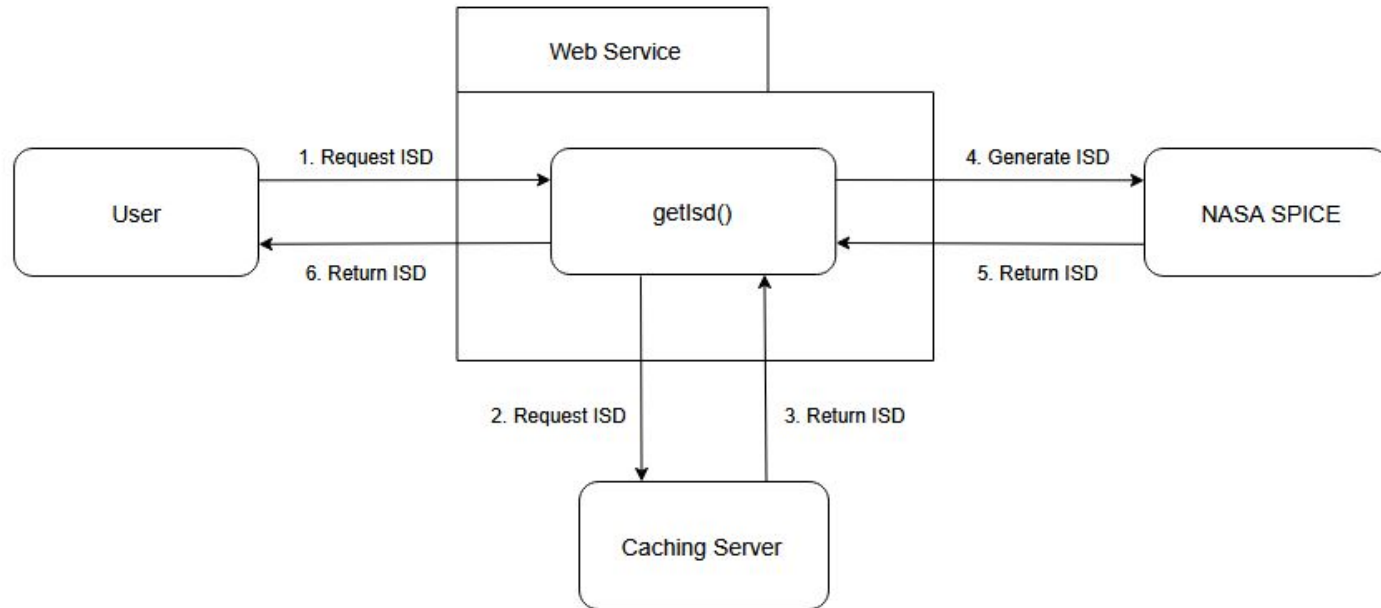
Implementation Overview

- The Key User and Functional Requirements are:

  - Queryable system for retrieving ISDs

  - Web Service that acts as interface between user and ISD retrieval

  - Caching server that stores and updates ISDs

Implementation Diagram
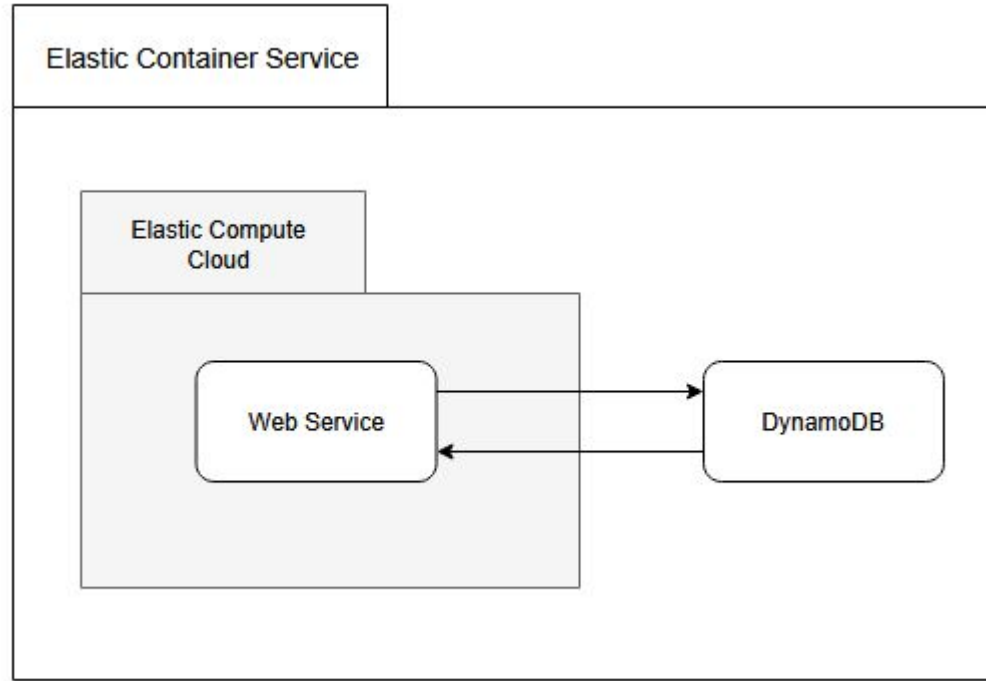
Implementation Details

Web Service:

Implementation Details

Caching Server:

Hash ID	ISD JSON Object	Source
f0087dfs78df	"ISD { Key {[].....}}"	Source { [].....}
...	...	...

Challenges

AWS Implementation Challenges

- Problem: We need to implement our system on AWS for scalability, but there is little to no comprehensive documentation. Even the available resources online are often outdated, making navigation difficult.
- Solution: We are tackling this by piecing together information from multiple sources, leveraging AWS support forums, and experimenting with AWS services in a controlled test environment.

ISIS and ALE System Navigation

- Problem: Understanding and integrating ISIS and NASA's ALE tool has been challenging due to complex documentation and the steep integration.
- Solution: We are creating internal documentation, running test cases, and consulting with the experts to streamline the integration process.

Hash Scheme and GET Request Limitations

- Problem: We need to implement a hashing scheme for ID retrieval via FastAPI, but we must ensure that the generated hash fits within the GET request limits.
- Solution: We are researching different hashing algorithms to balance efficiency and size constraints, ensuring compatibility with FastAPI's single endpoint approach for ID retrieval.

Schedule
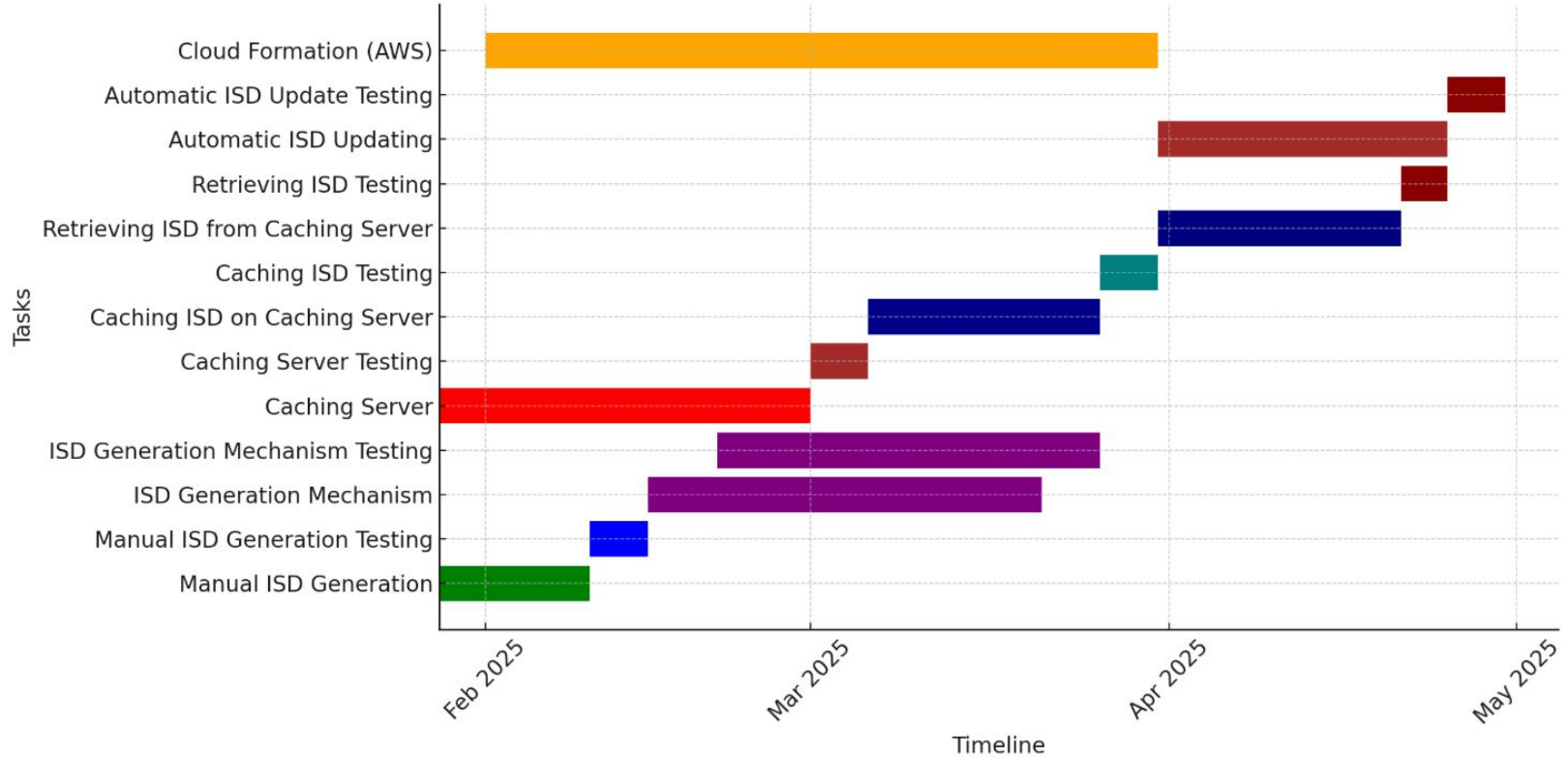
Conclusion

- We are developing a Web Service and Caching Server for USGS and NASA

- Solution will allow easy generation, querying and retrieval of ISDs

- Need to generate, store, retrieve and update ISDs

- Potential risks are both scalability and accuracy related

- Our team has a strong foundation, prepared to handle any risks and deploy a successful solution

- Next, we are creating tech demos and actively developing for preparation to deliver our solution