FOSS Big Data Storage Solution
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Introduction
NASA projects require a reliable system to store large volumes of data. Accordingly, it is crucial to develop a lightweight, reliable, and scalable database. Current NASA databases bear costly license fees with undesirable speed and flexibility. The purpose of utilizing the AERO Institute as an IT test bed, or “sandbox,” is to design, build, test, and implement software solutions prior to transfer to NASA projects. The Sandbox will design an end-to-end flight data management software solution for Compact Fiber Optic Sensing System (C-FOSS) data collected with the APV3 unmanned vehicle. Cassandra will be validated as a lightweight, open source database capable of managing big data while providing a cluster, fault-tolerant system.

System Requirements
- Store a minimum of 2GB of C-FOSS data in multiple file formats (.csv, .log, .xml, and .jpg)
- Use benchmark tests to verify the speed, flexibility, and reliability of data stored in the Cassandra database
- Create user-friendly interface to query C-FOSS data

Software Development Lifecycle

Methodology
- Read FOSS .csv file and upload to Database
- Invoke Cassandra Web Service to query FOSS data
- Return data to client in XML format
- Parse XML data on client
- Display modified data through AERO Portal

Developing The Database
As a technical liaison between the IT team and the C-FOSS scientists, the developer was in charge of gathering and writing system requirements, producing phase goals, and generating an understanding of the projects scope to ensure the databases future launch.

Software Architecture
Diagram of flight data management software architecture. Design is loosely-coupled with a lightweight front-end that invokes the Cassandra web service to query C-FOSS data from the Cassandra database. Server clustering enables fault tolerant, redundant data storage.

Conclusion
Validation tests prove that uploads are accurate and reliable; a javascript found no discrepancies between the original and uploaded data set. Cassandra coupled with the Astyanax API is a viable solution for storing big data.

Future Scope
Next steps include designing, building, and implementing a method for querying and comparing data from C-FOSS, Piccolo, and Arduino simultaneously. The portal will also include an upload tool to automatically load files into the database.

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