Developing a Telemetry Archiving Architecture to Support Multiple, Simultaneous Missions

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Introduction

- It is possible to support multiple missions with a single telemetry archiving architecture
  - Archive: repository for long-term storage of telemetry in packet format
- Development costs are shared across missions
- Initial cost is significant but is then drastically reduced for subsequent missions

Overview

- Background
- High Level Architecture
- Benefits
- Conclusion

Response to Multiple Missions

- Resources were divided into common functional areas vs. the traditional mission-based teams to reduce redundancy
- Migrated to a Common Ground Software approach to support the simultaneous development of multiple NASA missions
  - Effort to develop applications that can be used on all missions w/ little to no customization

Migration of Legacy Code

- Common Ground Software code infrastructure was designed
  - used across all functional areas for all missions
- Inherited code evaluated for adaptation to support multiple missions in functionality and code structure
- Risk areas identified
  - Telemetry Archiving Architecture

Goals for the Archiving System

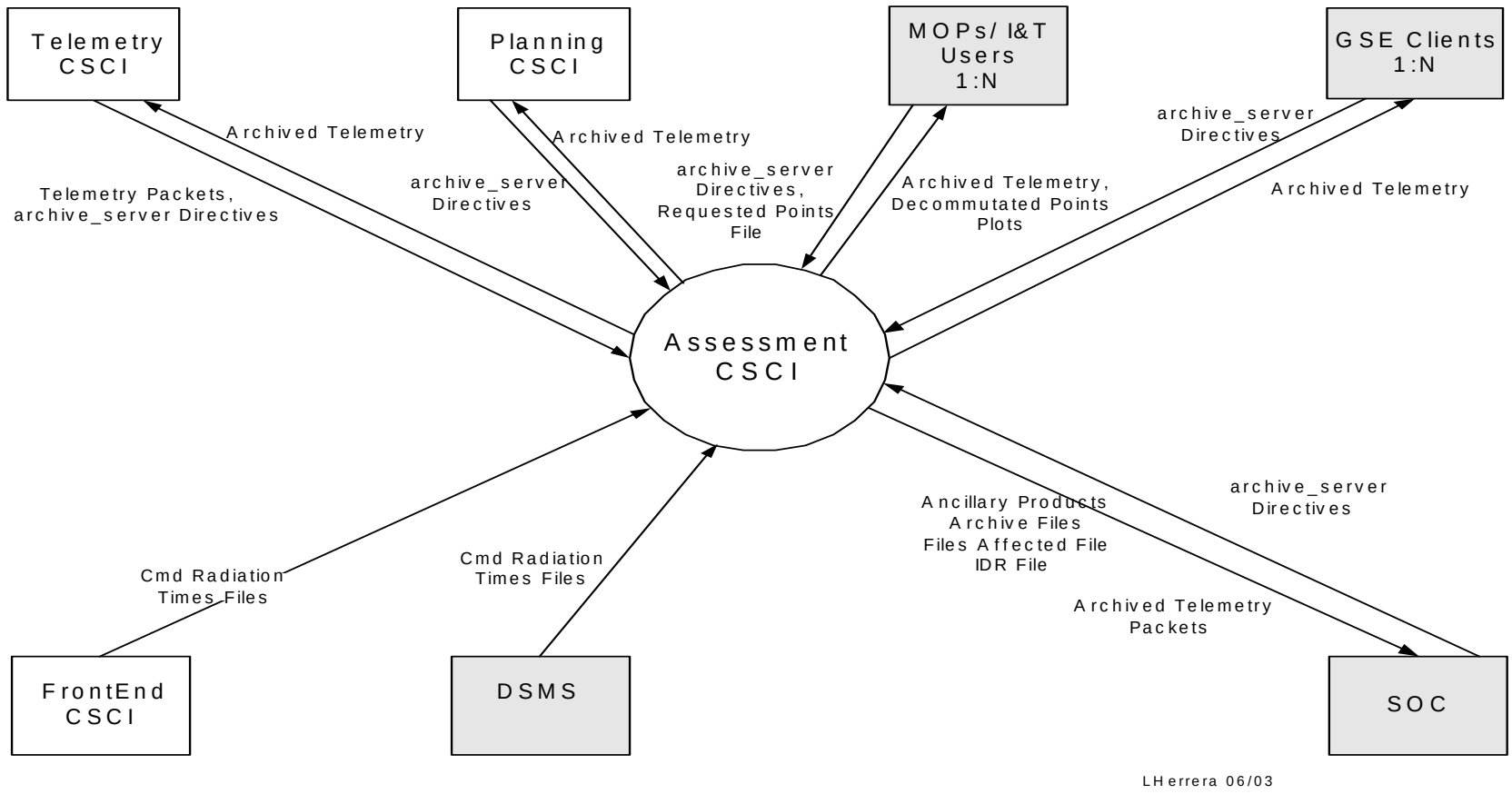
- Faster and consistent response and processing
- A robust and flexible system
  - Key for development for multiple missions
  - Allow mission specific modifications
  - Lower maintenance costs and support time
- Allow mission specific requirements and configurations
- Support wide variety of users: Developers, I&T, MOps, Science Centers
- Interface w/ EPOCH T&C

Key Design Decisions

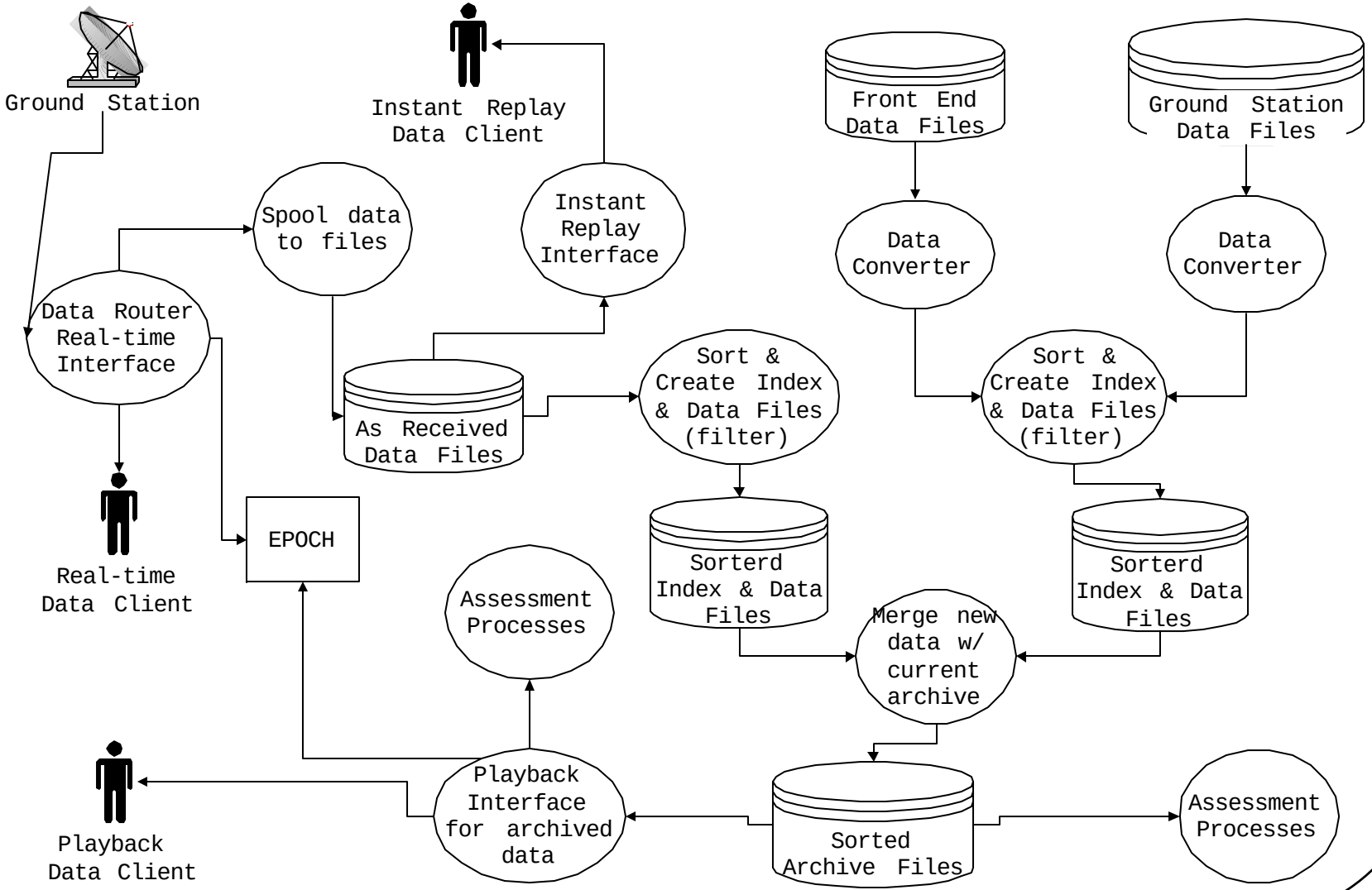
- Provide 3 types of access to data
  - Real-time, Instant Playback, Long-term Playback
- Ability to “plug in” different processes to convert data from multiple sources and formats
- Long running, file based processing vs sockets
  - applications monitor input directories for new files
- Archive built from real-time and off-line file processing
- Access to available archive data while new data is added

Context Diagram

Assessment CSCI Context Diagram



System Data Flow



Component Based Architecture

- Allows for flexibility in configuration
  - Each mission can customize the system
  - Only necessary “plug in” components used
- Small components focused on a single function have proven to be easier to develop, test, and maintain
- Future components can be added to create additional layers of functionality

Archiving Architecture

- Seamless merging of data from multiple sources with configurable filtering capabilities
- Allows multiple points of access to data while processing it into the long term archive
- Archive files can be used directly as data products to science centers
- Ability to archive by ground receipt and/or spacecraft time
- Efficient processing & quick turn around of large amounts of data

Common Architecture

- Provides common look & feel to all users
  - Mission Operations personnel will be shared across missions
- Increases confidence in architecture and code
  - Tested on multiple missions
  - Fixes are shared across missions
- Allows large re-use, reduced time and cost for development of new missions
  - A telemetry archiving system can be brought on-line for a new mission in a week

Conclusion

- Lower development time & cost
  - core system developed w/ 1.5 resources in ~8 months
- Supports the needs of all current missions
  - All benefit from optimization/features required for one
- Experienced minimal user reported defects
- Changed the nature of developer support
  - Increase confidence in code due to smaller, robust processes
  - Complexity of configuration remains an issue
    - Most problems now reported due to configuration not application defects