Contribution ID: **15** Type: **Poster Presentation**

Design of Software Framework for Space Astronomical Satellite

Abstract:
With the advancement of space science and the rapid development of satellite control and navigation technology, the observation means become increasingly complex, larger scale and higher requirements for data processing are generated. The observation data needs to undergo a series of specialized algorithms and processes to generate data products that can meet the diverse requirements of scientific researchers. In recent years, the number of space astronomical satellites dominated by the Institute of High Energy Physics is increasing, the scale and accuracy of the generated observational data are also increasing. The traditional data processing method is to provide a dedicated set of data processing algorithms and workflows for each satellite, with low standardization and low reusability. Therefore, it is necessary to design a software framework specifically for space astronomical satellite data processing. This paper will design a reliable and efficient software framework based on the open-source framework Daisy to support the implementation and operation of astronomical satellite data processing tasks. The framework aims to achieve standardization of the data processing workflows of various satellites, promote code reuse, and reduce development costs.
The software framework mainly consists of several modules, including datastore, algorithm, workflow, support library and so on. The datastore module is responsible for storing various data acquired at different stages, such as calibration data, metadata, and data products. In this part, the memory management function is implemented to manage and operate various data read and generated during the data processing workflow, release memory reasonably, optimize resource allocation, and mitigate memory inflation issues that may arise from the processing of large-scale data efficiently. The algorithm module integrates various commonly used algorithms for astronomical data processing, standardizes all algorithms, and divides them into three steps: initialization, execution and destruction. Workflow is responsible for the flow control of task execution, loading algorithms, organizing and orchestrating the execution order of modules, and implementing business processing logic. The support library is composed of public library, satellite private library and so on. The former provides a suite of shared functions, algorithms, and tools that can be utilized across multiple satellite missions, improving development efficiency, reducing costs and risks, and promoting code reuse. The latter contains targeted algorithms and tools developed for specific astronomical satellites, implementing the core business logic and addressing special requirements of corresponding projects and enhancing security.
Experiments show that the software framework proposed in this paper can provide universal and extensible functionalities for data processing in the field of astronomical satellites, and support the processing and analysis of satellite data. By leveraging this framework, researchers can cope with the growing demand for astronomical satellite missions and large-scale satellite data processing. This can also improve the efficiency and accuracy of data processing, which is of great significance.
Keyword:
Software Framework; Space Astronomical Satellite; Data Processing

Primary authors: Ms ZHANG, Hongmei (Computing Center, Institute of High Energy Physics, Chinese Academy of Sciences, Beijing 100049, China National High Energy Physics Scientific Data Center, Beijing 100049, China); Ms XIU, Yixuan (Computing Center, Institute of High Energy Physics, Chinese Academy of Sciences, Beijing 100049, China School of Nuclear Science and Technology, University of Chinese Academy of Sciences, Beijing 100049, China); Ms WANG, Shuang (Computing Center, Institute of High Energy Physics, Chinese Academy of Sciences, Beijing 100049, China National High Energy Physics Scientific Data Center, Beijing 100049, China)

Presenter: Ms XIU, Yixuan (Computing Center, Institute of High Energy Physics, Chinese Academy of Sciences, Beijing 100049, China School of Nuclear Science and Technology, University of Chinese Academy of Sciences, Beijing 100049, China)

Track Classification: Track 5: Virtual Research Environment (including tools, services, workflows, portals, ... etc.)