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Author: Dr. Peng Wang
Equipment Academy, China, zbxysimon@hotmail.com

DESIGN AND IMPLEMENTATION OF THE SPACE ENVIRONMENT INFORMATION SERVICE PLATFORM

Abstract

The space environment, as one of the main natural environment of spacecraft, is one of the main causes of abnormal and fault of spacecraft, and it has important influence on the spacecraft and space activities. Any stage of the space mission, from the feasibility analysis to the final completion of the task, needs the support of the space environment. Especially Demonstration of project, equipment development and testing stage of spacecraft, needs more standardized and uniform space environment data, and relies on real space environmental parameters to deduce physical mechanism of spacecraft and the space environment. And the space environment data is the basis for the design and operational reliability of the spacecraft. The space environment data in the space mission is currently facing the following problems. Firstly, the definition, expression and application of space environment data are not consistent. Lacking of uniform data exchange protocol specification and standard makes it difficult to share. Secondly, Lacking of effective space environmental data analysis tools, it is difficult to quickly get useful information from the mass space environment data. Thirdly, the existing space environment data platform is weak in service function, and can't meet the diverse needs of users. In the paper, on the basis of the standardized description of the space environmental data, a design framework of space environment data service platform is proposed. The key technology, including integration of heterogeneous data, mass data efficient storage and access, and data multidimensional analysis on dynamic calling of model, are studied. And the space environment data service platform is implemented. This paper mainly includes the following three parts: (1) Standardization description of space environmental data, includes the classification system of space environmental data, the unified data resource classification framework for shared swap, and the meta-data description rules and methods, are studied. (2) The SOA (Service-Oriented Architecture) framework of space environment data service platform is designed, basing the technology system such as component, service, network and so on. And it includes information transmission layer, basic environment layer, data resource layer, integrated framework layer, data exchange layer and portal layer. (3) The space environment data service platform is developed. And the technical implementation of this platform allows for the following, include the hardware design and software design, typical applications scenario and some model, data base and analysis tools.