NASDA's Earth Observation Satellite Data Archive Policy for the Earth Observation Data and Information System (EOIS)

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Abstract

NASDA's new Advanced Earth Observing Satellite (ADEOS) is scheduled for launch in August, 1996. ADEOS carries 8 sensors to observe earth environmental phenomena and sends their data to NASDA, NASA, and other foreign ground stations around the world. The downlink data bit rate for ADEOS is 126 MB/s and the total volume of data is about 100 GB per day. To archive and manage such a large quantity of data with high reliability and easy accessibility it was necessary to develop a new mass storage system with a catalogue information database using advanced database management technology. The data will be archived and maintained in the Master Data Storage Subsystem (MDSS) which is one subsystem in NASDA's new Earth Observation data and Information System (EOIS). The MDSS is based on a SONY ID1 digital tape robotics system. This paper provides an overview of the EOIS system, with a focus on the Master Data Storage Subsystem and the NASDA Earth Observation Center (EOC) archive policy for earth observation satellite data.

Introduction

The NASDA Earth Observation Center (EOC) is developing a new Earth Observation data and Information System (EOIS) to archive and distribute level 0 and processed data and information related to Japanese (MOS, JERS and ADEOS) and foreign (LANDSAT, SPOT and ERS) earth observation satellites. This paper provides an overview of the Master Data Storage Subsystem (MDSS) and NASDA's EOC data archiving policy. The MDSS archives processed data and is based on a SONY ID1 tape robotics system and FDDI networks.

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NASDA EOC Data Archive Policy

The EOC, NASDA's primary data center, receives, records, processes, archives, and distributes earth observation satellite data and related information from Japanese and foreign EO satellites. NASDA's EOC has maintained raw data using HDDT (High Density Digital Tape) and processed data using 9-track magnetic tape since NASDA's EOC was established. Maintaining the present archive of 50,000 magnetic tapes is cumbersome and expensive. Thus, NASDA's EOC is developing the MDSS utilizing ED1 digital tapes.

Master Data Storage Subsystem Overview

The MDSS (see Figure 1) consists of three SONY ID1 digital tape recorders, an ID1 digital tape library (file bank system), robotics, work stations, and an FDDI network. A midsize ID1 digital tape holds 36 Gigabytes which is 300 times more than an MT. The MDSS archives 736 ID1 midsize tapes which is equivalent to 220,800 magnetic tapes (see Figure 2). The archiving cost for ED1 tapes is around 0.75 dollar/GB which is 270 times cheaper than magnetic tape. Thus, NASDA's EOC adopted ID1 tapes to archive level 0 and processed data. The physical format for ID1 tapes is the SONY ID1 special format, the logical format of level 0 data is NASDA's special format and the logical format of processed data is HDF or CEOS superstructure.

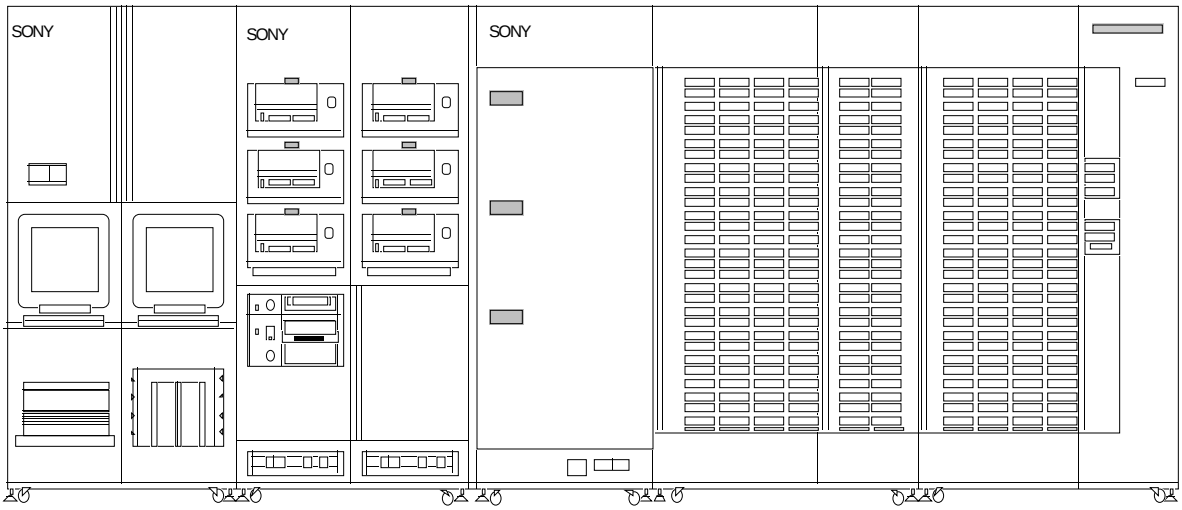

Figure 1. Master Data Storage Subsystem (MDSS)

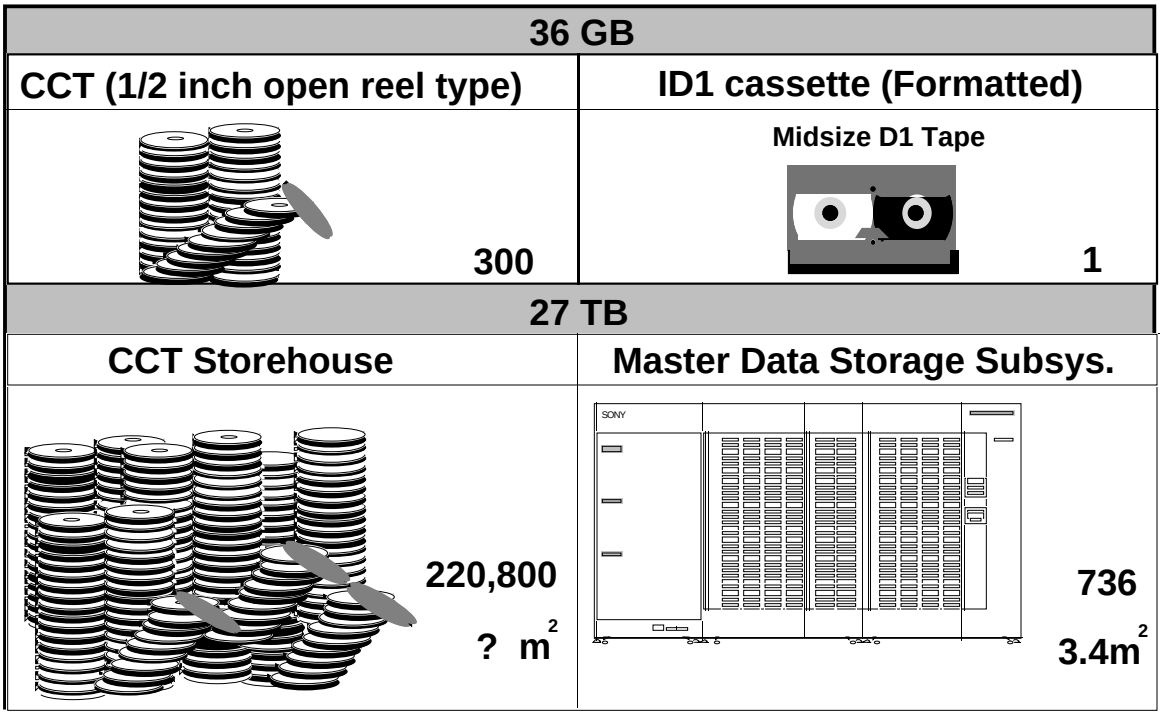

Figure 2. Improved Storage Space Utilization

In response to user requests, within 10 minutes the MDSS can simultaneously transfer 3 different 100 MB files to EWS (SONY NEWS) buffer disks. After staging a 100 MB data file (one granule of data), the file is transferred from a NEWS to a client subsystem such as the Media Conversion Subsystem (MCS) or the Film Generation Subsystem (FGS) using the EOIS communications protocol. The MDSS is also capable of ingesting existing processed data from magnetic tapes, converting the format and writing the data to ID1 tapes.

Master Data Subsystem Development

NASDA's EOC began developing the MDSS in March, 1994 and will complete development by the end of 1996. The MDSS will archive data not only for existing satellites (JERS-1, MOS-1/1b, LANDSAT, SPOT and ERS) but also new Japanese EO satellites (ADEOS, the Advanced Earth Observing Satellite, will be launched in August, 1996). In addition, NASDA's EOC is also developing other EOIS subsystems such as the catalogue subsystem, browse data distribution subsystem, data distribution subsystem, media conversation subsystem and the ADEOS receiving, recording and processing subsystem for ADEOS and existing satellite operations.

Conclusion

Starting from the end of 1996 NASDA's EOC will archive all earth observation satellite data on ID1 digital tapes. NASDA's EOC is also studying advanced data base management techniques using object oriented technology to integrate the MDSS, which uses ID1 data recorders, with other newly developed EOIS subsystems such as the Browse Data Distribution Subsystem (BDS) which uses RAID disk and Magnetic Optical Jukebox technology, and the Catalogue Subsystem (CATS) which uses RAID disk storage.