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SOHO Long-term ARchive (SOLAR)

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Abstract. The SOHO Long-term Archive (SOLAR) is one of the three European archives for the Solar and Heliospheric Observatory (SOHO) ESA/NASA data. SOLAR is foreseen to be operational during the SOHO mission (recently extended to 2007) and for a 10-year period following the mission end (2007-2017). This paper presents an architectural overview of the archive implemented at the Astronomical Observatory of Turin, and gives a brief description of the web-based Graphical User Interface used to remotely access the data.

Key words. astronomical data bases: miscellaneous – sun: general

1. Introduction

SOLAR is one of the three long-term European archives of SOHO, mirroring the NASA Goddard Space Flight Center (GSFC) archive. The other two mirrored archives are located at the Rutherford Appleton Laboratory (UK) and the Multi-Experiment Data Operation Centre (MEDOC) of the Institut d'Astrophysique Spatiale (France). SOLAR provides a system to store and retrieve observations from SOHO. The database operates as a catalog. It does not store the actual scientific observations but information about the data (metadata) along with pointers that link each catalog entry with the actual observation. An Oracle Relational Database Management System (RDBMS) is used to store the catalog information, C routines are used to extract metadata from FITS files and Oracle PL/SQL routines are used to populate the database tables. As a typical relational database, it consists of tables of highly structured records with fixed-length fields. Keywords and fields are defined on the basis of the keywords determined by the instrument science teams. SOLAR stores the following types of datasets and data products: Calibrated Scientific Data (the observational data of 12 instruments working on board SOHO), Summary Data (a simple collection of daily observations of the instruments), Software (packages developed by the instrumental teams to reduce and analyze the observations).

2. System architecture

The SOLAR architecture has been developed to provide a flexible storage and re-

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trieval of approximtely 1.7 TB up to 2.7 TB of non compressed data. The actual configuration is based on 3 servers connected via a Fiber Channel (FC) line at 1 GB/sec in a private network. The main server hosts the RDBMS and is connected through a SCSI bus to a 254 GB RAID disk array dedicate to the storage of the RDBMS software and the SOLAR catalog data. A 1 TB DLT library is connected to the server over the FC line and is used to backup the entire system. Furthermore a hierarchical storage management software could be used to increase the global amount of the available file system space, allowing the migration of files from the local or NAS file systems to the DLT library. This hybrid solution could expand the available storage space from 1.7 TB of pure, on-line data by 1 TB of near-on-line data for a total accessible capacity of 2.7 TB. The actual observation files (in FITS format) are stored in a Network Attached System (NAS). The NAS has been a suitable solution because of its RAID support and overall lower cost. The third server is a webserver (HTTP).

3. Remote catalog access

It is widely recognized that there is a need for good methods for disseminating large amounts of digital data generated by space missions. The SOHO archives adopt the World-Wide-Web (WWW) as the platform to disseminate mission information and allow access for data retrieval. The Graphical User Interfaces (GUI) developed by the MEDOC team allows to build very complex operations within a single query. An alternative non-Java, web-enabled interface has also been developed by the ESA team at GSFC providing catalog search and retrieval facilities. The interface has been installed in the site and it has been operational at the SOHO-GSFC web site[1] since March 2001 with great success. Furthermore through the WWW interface it is possible to perform a multi-step query process with progressively refined queries. At the end of the process the user decides either to save the information related to the requested data files or to retrieve them; in the latter case the requested observations are compressed into a cache area and then made available for download via a temporary web address, specific to the request. SOLAR Archive is operating since the beginning of March 2002[2].

[1] `http://soho.nascom.nasa.gov/archive`

[2] `http://solar.to.astro.it`

4. Conclusions

SOLAR together with SOLRA (INAF, O. A. Trieste) and ARTHEMIS (INAF, O. A. Napoli) archives forms SOLARNET, the first complete network of thematic (solar physics) archives of astrophisycal data in Italy. SOLAR and SOLARNET are becoming an essential part of the European Grid for Solar Observations (EGSO), a 3–year project funded by the European Union under the 'Information Scientific Technologies' programme. EGSO will lay the foundations of a Worldwide Virtual Solar Observatory. The SOLAR system contributes in making data sets available to the local participating science teams and the wider solar physics community. This will be accomplished by maintaining the data obtained by the scientific teams working with SOHO for 10 years after the end of the mission (until 2017); providing the necessary basic software to analyze scientific data; providing access to a wider audience that will allow the use of SOHO data for public outreach (see Antonucci et al. 2001; Dimitoglou & Sanchez 2001).

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