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THE PROJECT OF DISTRIBUTED INFORMATION SYSTEM OASIS

V. Vitkovskij[1], O. Zhelenkova[1], N. Kalinina[1], V. Shergin[1], V. Chernenkov[1], T. Kiyashko[2], L. Pischik[2] and V. Kondratenko[2]

[1] *Special Astrophysical Observatory, Nizhnij Arkhyz, Karachaevo-Cherkessia 369167, Russian Federation*

[2] *Computer Center of Rostov State University, Rostov, Russia*

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Abstract. The SAO archive of observations keeps the raw observational and calibration data collected with various acquisition systems. A server running Oracle and web-based technology are expected to be used for distribution of the archive data.

Key words: astronomical databases – observation data archives

1. INTRODUCTION

The Special Astrophysical Observatory of the Russian Academy of Sciences is the ground-based astronomy center with the largest Russian telescopes BTA and RATAN-600. The observatory has stored a large amount of unique observing material in the optical and radio ranges. Now the observatory archive includes the raw and calibration data received on BTA and Zeiss-1000 almost by all observation methods and the data of the continuum radiometers of RATAN-600.

The general observatory archive contains a set of local archives. A local archive is an archive of observational data collected by a certain acquisition system (Vitkovskij et al. 1987, Kononov et al. 1990). A feature of these archives is the large variety of data representation: formats, internal structure, methods of deriving and processing. The volume of observational data in the optical range since 1987 up to

2000 is of the order of 50 Gb, and in the radio range since 1982 up to 2000 it is of the order of 7 Gb.

Mainly data are saved in FITS (Wells et al. 1981, Greisen & Harten 1981) or FITS-similar self-documented formats. The next carriers are applied to a data storage: DAT-cartridge, magnetic-optical and optical disks.

To get Web-based access to observational data the Informatics Department of SAO RAS and the Computer Center of the RSU develop the search information system OASIS (Kiyashko et al. 1999).

2. TECHNOLOGY OF THE OBSERVATION PROCESS AND THE ARCHIVING CASCADE SCHEME

The activity of the observatory includes observations, acquisition, archiving and processing of observational data. For realization of the archive system we consider separate stages of this cycle as a uniform technological and information process. The technological structure of the observation process includes:

(1) planning of observing time,

(2) the observation itself,

(3) archiving of observational data,

(4) data access,

(5) processing and interpretation of observational material.

The information structure includes:

(1) primary input information for a control and acquisition system to pass from an observation schedule,

(2) secondary input information received during the observation process when the correction of the initial terms is done,

(3) primary output information from a control and acquisition system as a data file itself,

(4) secondary output with parameters added and changed by preliminary reduction and data access information,

(5) final output data and parameters from a data processing and interpretation system.

The information in a file header comes from the following sources: the telescope control system, the data acquisition system and the user interface. Each method of observation is connected to a certain software and hardware. The local archive input is the ac-

quisition system output. The process of observation archiving starts after putting the file on a disk.

The archive consists of four levels of storage: a buffer archive, an intermediate archive, an operating archive and CD-library. The data archiving scheme is of cascade type, i.e., the data pass sequentially from one archive level to the other, staying on each level for the certain period of time, except for the fourth, where they are stored constantly.

In the application for use by the buffer archive the principal observer determines an information stream, terms of exchange between the acquisition system and the buffer archive (daily, on the set ending, etc.), the format of observational data, and also duplication of files both on the acquisition system computer and in the buffer archive.

The buffer archive is a disk space area of the dedicated file server. After the end of the observational program all the obtained data are stored in this area. Then data are transferred to an intermediate archive on magnetic-optical disks. The operative archive on RAID is the next storing level. In the operative archive level the data are ordered and immersed into a the Data Base Management System (DBMS) environment. At the same time it is possible to correct the observation parameters and perform garbage collection. After correcting the information, the image is formed and the data are written on the disk. Each CD-disk is placed into a constant storage CD-library.

3. BASIC PRINCIPLES OF THE OBSERVATIONAL DATA ARCHIVE

For the system realization we have established the basic principles of the observational data archive of SAO:

(1) the main archive item is an observation,

(2) it is decided to keep all observations in the archive,

(3) a current observation goes directly into the archive,

(4) the archive is transparent for the user: "what we have is what we get"; the target request archive data format is the same as the source data format,

(5) observational data can be copied to the user's archive by his request from any archive level,

(6) old observations move to the archive system on demand,

(7) exclusive author rights to use the archive data containing information about astrophysical objects belong to the principal investigator of the observational program during two years,

(8) the strict bound between the raw data and the processed data is not provided: it is possible to store both processed and partially reduced data,

(9) the observational data archive is a part of the SAO data bank.

The main archive system requirements are safe keeping of the data, network data access, access control, absence of rigid restrictions on formats of keeping data.

The basic service functions of the archive system are: a convenient user interface using standard web-browsers; archiving raw data with all necessary data for preliminary processing; standard inquiries; access organization to demand data by network.

4. THE SEARCH-INFORMATION SYSTEM OASIS

The realization of service functions and fulfillment of requests to the archive is made by means of the search information system. The archive system of SAO includes the archives of experimental data and the search-information system OASIS on the basis of a database management system. The system has a two-level organization and this structure allows to take off format restriction. One level is an inquiry part, where a service information block is stored on each observation. Parameters for a unique identification of an observation are put down in this block. The second level is a permanent storage of observation data files.

The investigation of the observation cycle object area was carried out. The following basic object classes were chosen: an observation, an object, a program of observation and a method of observation. The entries and the relations between them define the structure and parameters of the service information block (SIB). The SIB keeps parameters for unique identification of the observation, organization of standard inquiries, the information about file location and the number of requests to it, a file format and the information about control data access.

As the telescopes of the observatory are shared tools for the astronomical community, the exchange of observational data between the participants is supposed. In OASIS we are going to use an Oracle server and Web-based technologies for the realization of a distributed system. A user interface will dynamically form HTML-requests.

The system OASIS will have several categories of the users to have various access levels. The following user categories are assumed: the applicants of the programs of observations; the astronomers having access to archival data; the manager of the data archive; any Internet user have access to an open information.

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