

## **ASTROTOP : AUTOMATION OF STORAGE, RETRIEVAL AND TREATMENT OF OBSERVATIONS**

S. V. Krasheninnikov, A. A. Nazarov, F. A. Novikov and  
V. I. Skripnichenko

*Institute of Theoretical Astronomy, Russian Academy of Sciences,  
Nab. Kutuzova 10, St. Petersburg 191187, Russia*

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The history of the application of computer technology in astronomical research goes far back into the past. However, we believe that programming concepts and program development tools used in astronomical research fail to measure up to the current trends in programming methodology. The parallel coexistence of data retrieval and data treatment tools can be observed. This parallelism brings about the development of either closed applications based on commercial DBMS or too complicated program development environments.

The main idea of Table Oriented Programming is to combine the full potential of data models with flexible modules for astronomical calculation. TOP seems to be a technology suited for astronomical data storage, retrieval and numerical treatment.

TOP technology can be briefly described as follows:

- Data structure item of TOP model is a finite rectangular table. The table can be looked at from two points of view (Krasinsky et al. 1989, Novikov 1990): (1) the table is a data array which can be, for example, stored as a file; (2) the table is an iterative procedure that yields a sequence of tuples.
- Each cell in the table may contain a pointer to another table. Therefore, purely virtual tables (procedures), actual tables (files) and arbitrary mixtures of them are allowed in a TOP model (Krasheninnikov 1995).

- TOP algebra of nine operations on a set of finite tables is defined. One of these operations is a regular application of a calculation module to a sequence of tuples (Krasheninnikov 1995, Novikov 1990).
- The table expression interpreter is a combination of two different algorithms. The first algorithm obtains tuples of the resulting table one by one, passing the tuples of the source tables through table expression. The second algorithm obtains the entire resulting table at once by calculating intermediate results and reducing the table expression. Combining these algorithms in various proportions enables us to reduce both the memory and the time needed for simultaneous interpretation (Krasheninnikov 1995).

From the viewpoint of the data model theory, TOP models belong to the class of relational data models. Data manipulation facilities of a TOP model are similar to those of relational models. By applying the data model theory to TOP models we prove that TOP models are relationally complete (Krasheninnikov 1995). We can put aside normalized relations and stress the basic principle: we need not store what we can calculate.

The latest TOP system version (TOP-5) was developed within the Object Oriented Programming paradigm using Borland Pascal with Objects 7.0. TOP-5 can handle astronomical data bases containing up to 2 Gb. The data can be stored in different formats supported by the ODBC protocol.

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