

INTEGRATION OF
DATA BASE DESIGN
IN
PROGRAMMING LANGUAGES

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In 1978, the ASTRA research group at the University of Trondheim was formed to create a prototype of a relational data base machine with appropriate software. A major part of this development was the definition and implementation of an integrated data definition and manipulation language ASTRAL (1).

The language is now currently under implementation, and a compiler will be working by the end of the year. The following "high level" description will give an idea of what ASTRAL is.

- 1) ASTRAL is a superset of PASCAL. It contains the relational datatype TABLE, which to the user is a (flat) FILE of a RECORD-type. ASTRAL contains powerful relational expression mechanism derived from the relational calculus.
- 2) Separate compilation is achieved by a technique whereby the compilers dictionary is exported to a dictionary module. A succeeding import of a dictionary module will restore the compiler status to that of the time of the export.
- 3) A data model is then a separately compiled module on the outermost level, containing only declarations of data and local procedures. Data belonging to a model are permanent.

- 4) Attached to a data model, there may exist a number of submodels. A submodel may give access rights to various parts of the data and procedures defined in the model. A submodel may also contain local data and procedures. Submodel data are permanent.
- 5) The models and submodels define a hierarchy of modules. The application programs are connected to the submodels. Data local to an application program are temporary.
- 6) Semantic constraints are implemented as procedures triggered on attempts to modify a table.

In our design philosophy, we have chosen a pragmatic and simplistic approach, summarised by:

- 1) The conceptually simple relational model.
- 2) The expressive power of predicate calculus for query formulation.
- 3) The popular but powerful programming language PASCAL.
- 4) A strictly hierarchical structure of data definition modules.

The conference will hopefully give a better understanding of the underlying concepts, and maybe challenge some of our adoptions.

References

- 1 Amble, Bratbergsengen, Risnes:

ASTRAL - A Structured and Unified Approach to Data Base Design and Manipulation.

IFIP TC-2 Working Conference on Data Base Architecture 1979 (North-Holland).

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