BOOKS

Books should be sent to the editor-in-chief. Selected books, which are within the scope of SCP and are not proceedings, will be reviewed. Others may be mentioned.


With the apparition of the relational model, databases are a field which are combining, in a nice way, theoretical and practical aspects. Today, there exist many books describing mostly practical aspects covering database models (i.e. hierarchical, network and relational) and database management systems (DBMS).

Dr. Maier’s book is centered on theoretical aspects for relational databases and is remarkable on many points. First, it is a very comprehensive and clear synthesis of more than ten years’ research in relational theory. It covers all the main contributions which have been made in this area: relational algebra, dependencies, normal forms, query decomposition and optimization, null values, etc.

Second, it includes original contributions made by the author for instance on database semantics.

Third, this book is intended to be used by students (graduate level) where they can find precise definitions, clear developments and interesting exercises. The book can then be used as a good introduction for future research in the area.

This book of more than 600 pages is divided into fifteen chapters and includes almost 300 references. We may regret, however, that there is no table which summarizes all the symbols and special notations used throughout the text: this would improve drastically the readability of the book.

Roughly speaking, the book can be divided into four parts. The first one includes chapters 1 to 3. It introduces basic concepts and definitions, both in an intuitive way and using a formal notation. Relations, relation schemes are introduced together with relational algebra.

The second part spans over chapters 4 to 9 and deals with all kinds of data dependencies (functional, multivalued, join etc.). It develops normal forms and decomposition theory. This part is the kernel of the book and reflects the huge amount of work which has been done in this area.

The third part (chapters 10 and 11) deals with formal aspects of relational query languages. Both tuple and domain relational calculus are defined as the basis of operational database languages. Basic topics such as completeness and query optimization are also presented.
The last part includes chapters 12 to 14 and is less homogeneous than the others. Various topics are discussed which cover more recent development in database research: null values, logic and databases, etc. The book terminates with an overview of four relational languages: SQL, QBE, QUEL, PIQUE. They are a good illustration of the bridge between theoretical and practical aspects.

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The field of data structures has been at the center of computer science for several decades, and it continues to develop in new directions. The study of data structures for central memory was initiated in the fifties, was merged into a coherent body of knowledge during the sixties (largely due to Knuth's "The Art of Computer Programming"), and has become a standard course in computer science ever since. The study of data structures suitable for disk storage developed somewhat later, mainly by adapting structures known from central memory to the exigencies of disks, where one access takes as long as tens of thousands of central memory accesses: for example, B-trees as a class of balanced trees where the node capacity is tailored to the size of a disk block, or extendible forms of hashing to guarantee two-disk-access retrieval of any single record in highly dynamic files.

Both central memory and disk are modelled fairly well as random access storage devices, that differ only in access time (by a factor of about $10^5$, say from 1 µsec to 100 msec) and in the size of the unit of data accessed (by a factor of $10^2$ to $10^3$, say from Bytes to Kilobytes). Most data structures known make explicit use of random access, and are not readily adapted to other types of storage devices. What, then, are efficient data structures for storage systems with more restricted access capabilities? There is a significant amount of research literature pertaining to this question, but little by way of comprehensive surveys. C.K. Wong's book is the most comprehensive treatment available today on the algorithmic aspects of data structures for mass storage systems with restricted access capabilities.

The book consists of three parts, entitled "Linear Storage", "Two-dimensional Storage", and "Magnetic Bubble Memory". Tape is the prototypical linear storage medium, but disk can also be so regarded. For example, when minimization of head travel in a disk is of interest, it is useful to view the set of cylinders as forming a linear storage device. Two-dimensional storage devices are primarily arrays of tape cartridges housed in compartments and accessed by an x-y mechanism.

The first two parts of the book, on linear and on two-dimensional storage, have a similar structure. First, the problem is treated of arranging records in a static file (no insertions or deletions) with known access frequencies so as to minimize head travel. In the one-dimensional case when the head can move in both directions the