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APPENDIX

It was stated in Section 4.1 that it is possible to have a system for which the use of an unsuitable in-process schedule causes greater mean delays with asynchronous than synchronous I/O. To construct an example of such a system let the I/O device be infinitely fast and let the transactions require a deterministic number K of CPU visits, each requiring processing Δ, $K\Delta = x$. Then synchronous I/O with one process involves a mean delay of $x(1 - \rho/2)/(1 - \rho)$, $\rho = \lambda x$, by the Pollaczek–Khinchin formula. Now with asynchronous I/O, the delay will depend on the details of the in-process scheduling algorithm. Suppose that a transaction after completing a CPU visit of length Δ and a zero-time I/O visit is placed on the tail of the (one) process queue. Then for K large, the CPU scheduling will appear like processor sharing with a mean delay of $x/(1 - \rho)$, that is $(1 - \rho/2)^{-1}$ times larger than that of synchronous I/O. If the in-process schedule was instead to serve first the transaction nearest completion then the delay for both disciplines would be the same. Note that the system we have constructed is completely CPU-bound and so no capacity advantage ensues from asynchronous I/O.

Book Reviews

Continued from p. 129

W. H. INMON
Effective Data Base Design
Prentice-Hall, New York, 1981. 228pp. £16.20.

This is a book which is low on theory, fairly high in practical content. It does not attempt the usual 'compare and contrast' of different systems but concentrates almost exclusively on the structures and terminology of the IMS hierarchical data model. Within that limitation, it contains some useful material, exploring in detail the many choices and compromises which must be made during the database design process.

The author presents his two main objectives of *performance* (execution time and storage optimization, power and convenience for the user) and *flexibility* (minimization of trouble and cost when circumstances and requirements change) and describes some principles and techniques applicable to each. Needless to say they are frequently in conflict and he goes on to suggest the questions which should be considered when deciding between them, for instance the stability of the application, the experience of the users, and the complexity of the data. There are discussions on the deliberate and controlled use of redundancy, on splitting very large databases into more manageable parts, and on coding standards to ensure that programs are written as independently as possible of the current form of the data so as to reduce the effect of its subsequent restructuring.

The book is not elegantly written—it often reads as if dictated—and some of the diagrams need further explanation to make their point fully. The author is at his best when most specific, as in his account of a 'design review' when a decision as to which of two possible structures to adopt was made objectively after analysis of the overall number of DBMS calls implied by each. I was pleased to see a whole chapter devoted to the problems of handling time-dependent data; this is a subject too often neglected even in textbooks with a much broader theoretical scope than this one.

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J. FITZGERALD, ARDRA FITZGERALD AND W. D. STALLINGS JR
Fundamentals of Systems Analysis (2nd Edn)
Wiley, Chichester, 1981. 590pp. £11.90 (£6.00 paper).

There are many books on Systems Analysis and Design but very few are comprehensive enough to cover all the aspects of this very broad area. This edition is a fairly comprehensive work divided into three parts—An Introduction, the Steps of Systems Analysis and the Tools of Systems Analysis. All these parts contain chapters on relevant topics, with each chapter having Selections for Further Study, Questions followed by Situation Case Studies. A reasonable glossary is provided at the end with three useful appendices. I found the following chapters, which do not normally appear in books on Systems Analysis, useful material.

These are Selling the System, Designing New System Controls (+ Appendix), Records Retention, Report Analysis and the Research Needs of the Analyst (+ Appendix). Unfortunately, a major omission is a chapter (or chapters) covering computer file design and database techniques, but this is explained by their statement that a Systems Analyst is '... more like a general manager who determines the design of the overall systems, obtains the necessary help ... and follows the system through design, implementation, follow-up and re-evaluation'. This has presupposed the initial stages of Terms of Reference, Feasibility Study and Initial Systems Study have been completed.

The Instructor's Manual, which is designed to be used with the main text book and complements it is a helpful adjunct for teaching purposes.

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