

Correspondence

Dear Sir,

Re Binary-Relational Storage Structures (Vol. 25 No. 3 August 1982)

I am not a mathematician, just a practical programmer; but, to my non academic mind a simple binary operator or function called say 'look up' seems a lot more useful and easier to understand concept, than a binary relation.

If you define a binary operator say "·" which combines two operands to produce a 'value' (the value of the uniquely defined data element). Then a simple but powerful data base algebra can be constructed which uses notation which is familiar to all users i.e. algebra.

The basic binary operation is

$\langle \text{data item name} \rangle \cdot \langle \text{data item name} \rangle \mapsto \text{value}$

The expression is evaluated by reference to a data dictionary which defines the 'location' of the value in the physical storage. By the use of the widely-understood bracketed expressions, relationships between 'records' can be evaluated, for example

$(\langle \text{data item name} \rangle \cdot \langle \text{data item name} \rangle) \cdot \langle \text{data item name} \rangle$

Thus

$\langle \text{Product-code} \rangle \cdot \langle \text{Qty-on-hand} \rangle \mapsto 100$

$(\langle \text{Product-code} \rangle \cdot \langle \text{Unit} \rangle) \cdot \langle \text{U-description} \rangle$
 $\mapsto \text{"ONE BINARY FUNCTION"}$

The last expression means look up the unit code in the stock record and then using this code look up its defined description in the Unit definition record. The concept of record and file is not needed but for most DP people the idea is useful, and I have used these terms to make the example seem more real. I have used ideas like this in my General ledger which has been in commercial use for nearly a year (DH Software Systems).

Yours faithfully

D. HARPER
90 Baycliff Rd
West Derby
Liverpool 12
UK

Dear Sir,

The Mechanization of Theories of Systems Analysis

I often wonder if you do it deliberately—the simultaneous publication of two papers which, while apparently on different topics, illuminate

each other. In this instance I refer to the relation between Systems Analysis¹ and Artificial Intelligence.²

First of all a tiny quibble about the names used by Wood-Harper and Fitzgerald for the two paradigms of systems analysis. Contrary to their express wish I think the authors have been "ensnared in the controversies that surround discussions of the philosophy of science". The distinction they wish to draw is not so much between science and systems as between how science is done and how it is taught and applied. Not even in physics can the holistic approach be totally ruled out, since no physical system is truly closed. Not even in psychology can the logical possibility of reducing the phenomena to an axiomatic, teachable, and experimentally confirmed set of rules be eliminated.

It might well be said "the products of inductive learning can be termed 'scientific' or 'unscientific' according to whether or not the research-generated descriptions make sense to the human practitioner". In other words the ways in which the sciences advance appear to be remarkably similar to the machine-learning methods described by Dr Michie.

What I think I am doing as a system analyst is applying the scientific method to commercial and industrial subject matter; rarely, indeed, in the mode of a mathematical physicist, but there is a strong resemblance to the activities of geologists and biologists. One of the reasons why this is not trivial is connected with the possible nonexistence of the 'human window'—the overlap between what is humanly intelligible and what is humanly executable. This is especially relevant to the situation where more than one human user has an interest in the existing or proposed system. Typically the three methods to the right of Wood-Harper and Fitzgerald's figure can be applied in some appropriate mix where there is almost complete agreement on what is already being done, and how, and why between those have to prepare input for a system and those who use its output.

Very often, though (cf. Thomas and Burns³) there is a real or perceived conflict of interest between departments or grades of staff and there may be no one individual who can both understand and carry out the task under study. These conflicts may well be aggravated by the blinkered use of analytical techniques, leading to the failure of the project. (And as a consequence the removal of the analyst from the set of the gainfully employed—where this

is done voluntarily it should be known in future as 'Zuidema's gambit'). The diplomatic skills necessary to cope with such artificial stupidity appear to be relatively rare, and harder to cultivate than system design techniques. Perhaps, however, they are easier than chess, and it may be possible to devise a computer-assisted learning system. The sort of taxonomy proposed by Wood-Harper and Fitzgerald is a necessary first step, and Michie's paper suggests a feasible approach.

Yours faithfully

P. J. COATES
P.O. Box 71608
Ndola
Zambia

References

1. A. T. Wood-Harper and G. Fitzgerald, *Comput. J.* **25**, 12 (1982).
2. D. Michie, *Comput. J.* **25**, 105 (1982).
3. R. C. Thomas and A. Burns, *Comput. J.* **25**, 148 (1982).

Dear Sir,

Jumping to some purpose

I must rebut the criticism of Messrs Missala and Rudnicki (*Comput. J.* **25**, 286 (1982)).

My contribution was not a program, but a specimen fragment of a program, and as such depends on its (unstated) context. My assumption that at least one element of array "A" already holds significant contents is no more in error than the assumption (by all contributors) that arrays "A" and "B" have a lower bound of one and an unknown upper bound which (somehow) will not be exceeded. The context needs to cope with these matters.

That said, I agree that the sentinel technique brings a further improvement, provided that the context does not preclude writing garbage into unused elements.

As to where the semi-colons should be, I find that placing virtually all significant punctuation (which includes IF, THEN, FI, REPEAT etc.) at the left hand end (indented as appropriate) enables structuring to be scanned and checked more readily, and almost independently of the detailed text.

Your faithfully,

G. L. ROBINSON
93 Warnham Court Rd,
Carshalton Beeches
Surrey SM5 3ND
UK