

Chain Mail

Indexing is one way of structuring large quantities of data, such as names and addresses. The Linked List or chain is an alternative with distinct advantages



Pointing The Way

A Linked data structure starts with a simple Listhead variable, which points to the element of the main array that comes first in the list, in this case number 2 (Atkins). Examining the contents of element number 2 in the Lookup array will point us to number 3 (Carter), the next entry in the alphabetical list. This process continues until we reach Smith, when Lookup (5) contains 0, indicating that the end of the list has been reached

In a computer's memory there is only data, byte after byte of it, stored in thousands of voltage patterns. Meaning is given to those bytes by the data structure that the central processor imposes. Those various data structures decide whether any particular byte is interpreted as part of an instruction, or as digits belonging to a larger number, or as a character code.

From the user's point of view some kinds of data structure are virtually wired into computers. Programming languages usually demand that data be structured in a limited number of ways. BASIC imposes the idea of numeric and string data types, and supplies variables and array structures for manipulating those types. Other languages usually support those and additional structures. The strength and variety of its data types are major components of a language's power.

The BASIC data structures — variables and arrays — will be all that we need to simulate some other ways of looking at data.

The indexed array is a useful data structure, and easily implemented in BASIC. It has its limitations, however, particularly when the data to which it refers is likely to change often and/or unpredictably.

Suppose British Telecom keeps a file of its new subscribers for eventual inclusion in the next issue of the telephone directory. Until that time, the names and addresses have to be kept in alphabetic order for easy reference, but the file is constantly growing, and the additions arrive unpredictably. On Monday the file NewSub\$ () might look like this when it's read into the array:

NewSub\$ ()	Index ()
(1) Jones	(2)
(2) Atkins	(3)
(3) Carter	(6)
(4) Rogers	(1)
(5) Smith	(4)
(6) Drake	(5)

The array Index () shows the order in which to read NewSub\$ () so that the entries are in alphabetic order. Thus, the first item alphabetically is NewSub\$ (2), Atkins. The second item is NewSub\$ (3), Carter. In this example only the names are shown, but in fact a directory entry comprises name, initials, and address — typically about 60 characters. Moving blocks of 60 characters around in memory is slow (as sorting requires