DYNAMIC STORAGE ALLOCATION ON A COMPUTER WITH VIRTUAL MEMORY

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Abstract

We compare several dynamic storage strategies under the assumption that they will be used on a computer with virtual memory. On such a computer the total (virtual) memory referenced by a process may exceed the actual amount of random-access memory available to the process, and it is usually more important to minimize the number of page faults than the virtual memory required by the process. We show that dynamic storage allocation strategies which work well on computers without virtual memory may exhibit poor paging behaviour in a virtual memory environment. We suggest some new dynamic storage allocation strategies which are intended to mininize the number of page faults while keeping the total (virtual) memory used within reasonable bounds. The new strategies can be implemented efficiently and are preferable to well-known strategies such as the first-fit strategy if the blocks being allocated are appreciably smaller than the page size. Even in the simple case that all blocks are of one fixed size, the new strategies may be preferable to the widely used strategy of keeping a singly-linked list of free blocks and allocating them according to a stack (i.e. last-in, first-out) discipline.

Comments

Only the Abstract is given here. The full report appeared as [1], and a shorter version appeared as [2].

References

1. R. P. Brent, "Dynamic storage allocation on a computer with virtual memory", Report CMA-R37-84, CMA, ANU, September 1984; and Report TR-CS-84-06, DCS, ANU, October 1984, 42 pp. rpb090.
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