MULTIPROGRAMMING FOR A SMALL-SCALE SCIENTIFIC COMPUTER SYSTEM.

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SUMMARY

Use of the technique of multiprogramming has hitherto been confined entirely to the larger computer systems. In this thesis, the author puts forward the proposition that multiprogramming can be used to considerable advantage in a quite small computer system, particularly where the computer is used for scientific work.

The factors which have attracted designers of large computers to multiprogramming are considered, and it is shown that these factors apply also for smaller systems. To develop a case for multiprogramming, the author investigates a theoretical model of a small multiprogram computer, and discusses results from a computer simulation study of an equivalent model.

Much of the material in the thesis deals with a multiprogram system developed by the author for a low-cost computer. This computer, CIRRUS, has been designed and constructed within the University of Adelaide. The author's principal aim in developing the multiprogram system has been that the computer should be made to behave as "a set of separate and independent computers".

The CIRRUS system is covered in detail. The methods by which multiprogram control functions have been provided and measures taken to ensure that these functions could be provided economically are described. The author discusses the conditions which it was felt should be fulfilled, and steps taken to satisfy these conditions. A number of features of the system which might be considered novel are also described.

The question of efficient processor utilization in a multi-operator computer system is discussed. Results from the computer simulation study are also used in this context to justify arguments which the author puts forward.