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SCIENCE AND ENGINEERING RESEARCH COUNCIL
RUTHERFORD APPLETON LABORATORY

COMPUTING DIVISION

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issued by
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Notes on a visit to Professor J Iliffe
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Professor Iliffe has now been awarded a one year feasibility study entitled "Active Memory Erase". The purpose of the meeting was to give Iliffe some feedback on the discussion of his grant by C&C and to discuss his next submission.

Iliffe's new machine is intended to be a stand-alone machine unlike the DAP. Iliffe has developed a simulator for the machine which runs under Unix. An environment for the development of systems software has been created, based on a low level BCBL type language.

One of the basic features of the design is the ability to make use of array operations for operating system functions. The system is intended to be a set of dynamic resources. Store for example can be created and recovered dynamically. Array operations are used for such things as searching discs and garbage collection. The system also supports capabilities. Control and protection are brought down into the hardware. Data items are tagged.

Languages such as Pascal and C would be implemented on the system through interpreters. Iliffe intends to use array operations to allow rapid switching between different languages. A PhD student is looking at this area.

An effort has been made to make array operations as unobtrusive as possible. A natural unit in the machine is the plane as well as the word or byte. Operations on planes are accumulator oriented. Iliffe's language currently does not support structures, and would need extensions for serious programming.

The simulator is used in Iliffe's course on Computer Design. He has a simple command interpreter which allows data structures to be set up, programmes to be run, etc.

The strength of the machine for programmers in conventional languages lie in the better environment it may provide in terms of file access storage management etc and rapid switching between different languages. Languages such as APL could well have their array functions modelled in the hardware.

Illiffe is currently investigating performance behaviour of the simulator, looking at parameters such as locality data reference etc. He feels detailed logic design is necessary before the best code style to support can be ascertained.

The success of the feasibility study will very much depend on the quality of the person attracted to the RA post. The majority of the labour will be spent on refining the design, the intention being to come up with a well costed proposal for the construction of a single machine at the end of the project. The remaining effort will be spent on improving the language facilities.

Array Fortran is seen as a second stage to the work. Illiffe now has firm links with the robotics and image processing groups at QMC and firmly intends his machine to be exploited in these areas. He also feels it could be useful in production systems and speech recognition, areas where rapid pattern searching is necessary.

Illiffe was told of the sub-committees concerns about the software aspects of the work. The coordinators were reassured that Illiffe is aware of the issues and has firm applications in mind. At this stage it is clear that more simulation work is necessary.