THE NEXT LARGE MACHINE FOR S.R.C. - A FAST ATLAS?

Now that the 1908 is a doubtful starter for consideration as a suitable replacement for Atlas we have considered the factors which might affect our choice of a suitable machine. There is a strong pressure to buy British and we therefore must look at possible ways in which a large British system could be made available by 1968/69. It has been mentioned several times in the past that a straight-forward fast copy of Atlas would be a good idea, but this was dropped by ICT for reasons best known to themselves. We would like to consider this proposal in some detail again.

There is no doubt that the Atlas project has not made a very favourable impression on the computer world, due mainly to the inability of ICT to make the hardware work reliably. However, we should not lose sight of the fact that the ideas and novel features of the hardware are of a high order and we now see that most of these new concepts do in fact work. For example, the one level store gives minimal trouble and we are virtually unaware of the existence of this device. M. Baylis at a recent meeting pointed out the great success of the developing of instructions and indicated that this idea was not being used in the large American systems. We are aware also of the enormous load of work which is dealt with by the system and the complexity of the load, in terms of different compilers, modes of input and output, cannot be equalled by any other computer system. There are of course things to be said against Atlas, firstly the unfortunate history of the hardware, some difficulties with the shifting operations, orders of some finesse which are now becoming available on the new machines 1108 etc. and the high order of maintenance required. The deficiencies must however be given a proper weight in influencing our future policy and some of the intriguing new devices must not be allowed to swamp the basic requirements of a computer service.

To be most effective during the next five years our ability to take jobs from the current and proposed University machines to run on Atlas will be of great importance. There exists already a very powerful set of pre-processors which will not be available immediately on American machines and some assessment of the effort required to have directly compatible services between University machines and ourselves must be made.

What are the requirements for a new machine? First and foremost is the need for computing speed about which everyone agrees. Factors of 5-10 or more over Atlas are known to be achievable and the demand for work to be done more quickly and the ever widening circle of users makes this obvious. With the increase in speed, other facilities become much more possible. Multi-access from consoles can be achieved with the ability to satisfy a reasonably large group of users (200 or so). The new American machines are considered suitable for the job because of this power and also because large backing stores are to be available. There is also the facility of multiprocessing, a device to deal with several aspects of a program or several programs simultaneously. Does this have any advantages over providing speed of execution - is it cheaper for example? In some cases multiprocessing cannot be any more efficient than a large processor if a job needs the whole of the available store. The word length is tending to 64 bits. How important is this to the majority of users? It can be agreed that the extra cost of dealing with an extra 16 bits more than offsets the extra time needed for these jobs which rely on arithmetic to high order, e.g. A.O.L. Atkin. It appears that speed, capacity and the facility to handle online consoles are the major features required of a large new machine.

Because of the difficulty in designing and providing a suitable alternative to Atlas it does appear that a fast version of Atlas has several advantages.

1. The design and logic are already established.

2. The hardware which could be used is known to be more reliable than the existing hardware.

3. The operating system is well tried and is probably the most sophisticated anywhere.

4. Our ability to deal with most of the programs from other University machines is known.

5. With the addition of the disc the problem of multi-access via small computers is being solved in what could be a relatively inexpensive and easily expandable way.

6. There are some good ideas in Atlas which should be further capitalised   on.

7. Apart from conversational software there does not appear to be any other major advance that should be pushed.

8. Provided that the assumption that this is engineeringwise possible it could be relatively cheap.

9. A fast Atlas in 1969 would still be in the top class of machines and would allow some critical looks to be taken at the difficulties of say the 91, 6800 etc.

10. There are good precedents for doing this 709, 7090, 7094 and 803, 503?

11. The software people will have enough on hand to get conversational modes operating and effort need not be put on compilers, operating systems etc. There is of course a requirement for some other compilers, e.g. PL/1.

12. It is likely that this could be done in the time available and the support to the British industry would be timely.

13. Existing programs - Met. Office - would run without a need for rewriting for another machine. They have a need for a large 'number cruncher'.

14. Any work done on multi-access for a limited group of users could be immediately applied to a larger group. Present plans could go ahead with the knowledge that effort now is useful in the future.

15. The addition of a large fast machine to the present proposed satellite/Atlas link via a disc would allow a good deal of flexibility - jobs being filtered through according to the length of job and the presence of queues at the lower levels. We would have a hierarchy of machines which would be extremely powerful for a wide variety of work.

Some disadvantages now:-

1. The project will not appeal to those who wish for some new design and logic, with a feeling that we ought to follow the American nations of what is required.

2. Atlas has not a good write-up, but we should distinguish ideas from the failure of hardware.

3. Some bad features of the order code would be carried through - shifting instructions. (Is this necessarily so; couldn't we have a shifting Acc?)

4. The maintenance of Atlas is difficult and other machines may be simpler to maintain.

5. It is not a member of a system of computers, e.g. 1900 series, 360 series.

6. The arrangements for dealing with multi-access via a small satellite may not be the best solution to this problem.

7. The addition of more core store, which is essential, may present problems. (Atlas 5 has 128K)

8. The need to have a strict control so that too many 'nice' ideas were not introduced which would set the project back.

9. The cost for such a project must be kept within reasonable limits of comparable American machines.

10. The attachment of the disc whilst being reckoned highly feasible may have some problems lying in wait.

11. It may be difficult to get other organisations to agree to support such a project. Recent experiences with IBM and CDC on software should however be remembered, and the point made that the proposal capitalises an existing software with known efficient throughput.

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12. It depends on ICT's willingness to do this; but is this insurmountable? Given the design which I presume we have a right to, would English Electric build it! It would be a good idea to try them for price in any case.

The proposal must be looked at critically to decide whether opting for the large American machines would give us real advantages. We must avoid the phrase it would be nice to have "x" and give a lot more weight to what the majority of users expect of a Computer Service. What seems to be important is that we should have some machine which is still of world class by 1970 and a (what shall we call it) "MAPS x 10" would still look pretty good in four years time. There is a danger in reaching to use more advanced technology that the real point of the exercise is lost, i.e. to provide computing at a reasonable cost. The whole case rests on the technical point; can the engineering of a machine 10 times faster than Atlas be carried out without a serious risk of failing to achieve this factor of 10 with a very reliable performance. If the answer is yes, then we consider that very serious consideration should be given to this proposal.

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