

UNIVERSITI PULAU PINANG

REPORT OF THE

ACADEMIC PLANNING BOARD COMMITTEE

ON

COMPUTER REQUIREMENTS

DECEMBER 1971

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A P P E N D I X A

COMPUTER INSTALLATIONS AND USERS IN MALAYSIA

CHAPTER I

INTRODUCTION, FINDINGS AND RECOMMENDATIONS

1.1. Terms of Reference

The Academic Planning Board Committee on Computer Requirements was formed in May 1971 to look into the various computing needs of the University and to consider how these needs can best be met. The possibility of assisting in the needs of the community, both in the government and private sectors, was also to be considered. In pursuing its task, the Committee has investigated the following broad areas:

- (i) the possibility of offering courses in Computing in the University
- (ii) the computing needs of staff and postgraduate students in their research
- (iii) the feasibility of computerizing the administrative, financial and library functions of the University
- (iv) the computing requirements and problems of the community.

The main findings and recommendations of the Committee are summarized in the final section of this Chapter.

1.2. Computers: Their Nature and Importance

In the brief twenty-five years since the general-purpose digital computer first appeared it has come to play an increasingly vital role in society. Computer technology has been advancing so rapidly that it now pervades virtually every major aspect of human activity. The progress made since the vacuum tubes of the first generation machines to the present day use of monolithic integrated circuitry has been indeed remarkable. Microminiaturization of the circuitry has made computers very compact and increased their speed more than a hundred thousand

times. At the same time the cost of a unit of computation has plunged in proportion. Along with the advances in hardware there has also been an equally remarkable progress in the area of software. Today we have a wide range of high level languages, sophisticated operating systems and parallel processing through multiprogramming and time-sharing.

The advances in both hardware and software have been accompanied by a phenomenal growth in the range of applications. To mention but a few, there are now such diverse uses as routine business data processing, numerical computation, linguistic research, library automation, medical diagnosis, class and examination scheduling, record-keeping, computer-assisted instruction and the simulation of complex socio-economic and engineering phenomena.

We are now in the midst of the Computer Revolution, an event no less significant than the Industrial Revolution. It has been brought about partly by our need to cope with an increasing volume of data. The computer is no longer an esoteric device but a powerful information-processing tool of immense versatility. It is a growing reality which is here to stay. It is therefore imperative that we have in this country the necessary expertise to exploit this new technology and to adequately meet its challenge. As a University dedicated to the ideal of training applied-oriented scientific personnel for the needs of the community, Universiti Pulau Pinang should undertake to provide this country with the necessary expertise.

As an indication of the growing importance of computers, there are now some 100,000 computers in the world in contrast to the few one-of-a-kind research machines in the early 1950's. However the vast majority of these are installed in the developed countries.

While computers have been proliferating in the advanced countries, notably in the United States, the developing countries have been very slow in utilizing them. No doubt this is partly due to the lack of expertise in the field. Nevertheless computers are not exactly new to this part of the world. Already there are more than twenty computer installations in this country and there are an even larger number of users without equipment. But the machines installed are mostly small and they are being applied mainly in such bread-and-butter areas as payroll, accounting and inventory control.

Appendix A gives a list of computer installations in Malaysia as well as a partial list of users who do not have their own equipment. IBM expects at least half of those non-equipment users will have computers of their own over the next five years.

Computing in Malaysia suffers from a lack of trained personnel, especially of the higher calibre. This shortage has been quite acute in the government sector. In a recent study by the Development Administration Unit of the Prime Minister's Department, it was found that less than half of the sixty approved positions for systems analysts and programmers has been filled. The corresponding picture in the private sector is not very much better.

To aggravate the staff shortage problem further there is now a continual loss of personnel to Singapore where computing is developing much more vigorously than in this country. Many have been encouraged to work there by the greater challenge the more sophisticated applications offer.

Most of the systems analysts and programmers in this country have not undergone formal training in Computing Science. They have received their training on the job either from computer manufacturers or from more experienced personnel in existing installations. Systems analysts and programmers so trained are usually very proficient at the routine business data processing problems. But because of the narrowness of their training most of them are unable to make sophisticated use of computers. We feel that there is an urgent need to remedy this situation by upgrading the level of computing expertise in this country. One way of doing this is to provide an advanced formal course in Computing Science.

Although there is a rather obvious need for producing well-trained computer personnel in this country, there is still no university in this country offering a formal programme in Computing Science. In contrast most of the universities and colleges in the United States of America, Canada, United Kingdom and Australia are offering some programme in computing, whether in the guise of Computing Science, Data Processing or Information Science. In fact programming is already being taught in various high schools in these countries.

Despite the lack of computing expertise in this country, there is a general awareness of the growing importance of computers. Many are anxious to learn more about them and this is evidenced by the attendance at our recent seminar on computer applications held in August. The two computer appreciation courses conducted in the University were well attended by both staff and students. It is also known that every year a number of students go overseas to pursue a course in computing because it is unavailable at home.

From our recent survey of government and commercial organizations and from our other investigations, we feel that our undergraduates should be exposed to computing as a normal part of their curricula as soon as possible. The School of Physics and Mathematics, fully aware of this need, has introduced courses in computer programming for its second and final year students. In the next academic year it plans to conduct second and third year courses in programming for all the Science (Natural and Applied) and non-Science students. The Committee lauds this initiative by the School and strongly urges that such basic courses in computing be maintained for subsequent years. The aim here is to equip our students with an adequate basic knowledge of computers - to understand their potential, limitations and dangers - so that they will be better prepared for a world in which the computer will become increasingly indispensable.

The Committee also feels that Universiti Pulau Pinang should take the initiative to offer a formal course in Computing Science, leading either to an M.Sc. or a post-graduate Diploma in Computing Science. In general, courses of study in this University are designed to be application-biased. It is also a fundamental principle of the University to offer courses of study in those fields which have a direct bearing on the graduate manpower needs of the country. Our advocacy of the formal course is therefore fully in line with the general thinking of the University.

Our programme in Computing Science will lead ultimately to an upgrading of computing expertise in this country and this will indirectly benefit local management and industry. With the emphasis of the Second Malaysia Plan on Science and Technology, we feel that the adoption of this proposal will be a step in the right direction.

With the development of high level languages such as FORTRAN and BASIC, it has become relatively easy to learn to program a computer. But the development of programming skill is very dependent on the availability of a computer on which numerous runs may be made.

In conducting its programming courses the School of Physics and Mathematics is faced with the difficulty of having no computer of its own. As an interim measure it is using an IBM System/360 Model 20 installed at the Penang Port Commission. This machine is however small and cannot support such programming courses adequately. The only procedure-oriented compiler languages available on it are a PL/I subset and a very restricted FORTRAN compiler which has no load-and-go capability. It has been necessary to opt for the more complicated PL/I language because of the extreme inconvenience associated with the available version of FORTRAN. Unfortunately there is little alternative at present since this is the only available computer in Penang.

1.3. Findings and Recommendations

It is both desirable and feasible to offer basic undergraduate courses in computing. We recommend that such courses be made a normal part of the undergraduate curriculum. We suggest that they be incorporated into the second and third year courses in Mathematics and Quantitative Methods.

There is a great interest in, and a substantial need for, a computer facility for the pursuit of research by staff and postgraduate students. The Committee accordingly recommends that adequate computing facility be made available for research. It also recommends that appropriate service courses in computing be made available for staff and postgraduate students.

The computerization of the data processing activities of the Registry, Bursary and Library would improve the overall efficiency of the administration. Accordingly we recommend that computer-based procedures for handling these activities be adopted as far as possible.

There is a substantial interest in and a potential demand for computer facilities by government and private organizations in Penang and the nearby region of North Malaya. We recommend that the University assist these bodies as fully as possible in their computing needs.

There is a need for a formal advanced course in Computing Science in this country to meet its computer manpower requirements as well as to raise the level of expertise in computing. The Committee recommends that the University take steps to implement such a programme either in 1974 or 1975.

The above recommendations can be best implemented by the establishment at the University of Penang of a Computer Centre with a computer system of adequate capacity and sophistication. This will make unnecessary the wasteful proliferation of small machines while at the same time providing North Malaya with a machine adequate to meet most of its needs. We recommend that such a Computer Centre be established at the University as soon as possible.