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Exportability

Exportability is a word which has recently come into vogue as a succinct way of discussing the ability to communicate to others the fruits of programming efforts. We observe that this communication can, in fact, be done at at least three levels.

1. The first level of exportability is in the realm of ideas and insight. The research results which are embodied in Multics as well as the many sub-system and application program developments which are possible in a Multics environment will need to be discussed and explored in talks, articles, papers and eventually text books. It is anticipated that this process, which is already underway, will contine with increased intensity, and will result in a diversity of publications ranging over a) basic system documentation of the Multics System Programmers Manual (MSPM), b) various manuals educating users on the better ways to exploit the Multics environment, c) manuals explaining the managerial issues involved in administering and operating a computer utility, and d) papers discussing unsolved problems in ~~the~~ computer utility design. However, it is not expected that the process of communicating ideas will be fully successful unless in addition there is an attempt to have face-to-face discussion and contact with visiting technical persons. One way that this could be accomplished would be to have in summer 1969 a several week long workshop in which invited computer specialists

from throughout the country were able to familiarize and acquaint themselves with the full import and techniques involved in developing and using the Multics System.

The above sequence of steps, of course, resemble very closely those which occurred at the initiation of Project MAC when it began to exploit the Compatible Time-Sharing System (CTSS). Starting with the summer study of 1963, the influence of CTSS has been widespread; it has specifically influenced and been imitated in a variety of subsequent time-sharing systems and has consistently been used as a benchmark of comparison for other efforts. A great deal of this success we believe is explicitly due to the ability that persons have had to study the systems, explore the implications, and to evaluate work of the users of CTSS. Similarly we expect that an operating Multics system would serve as a continuous laboratory for the export of ideas to the influential persons of the computing world.

2. A second level of exportability is in the ability to exchange programs and subroutines between one computer installation and another. This is straightforwardly accomplished by means of language-based exportability. Thus if it is desired to distribute a new subroutine development to someone at another computer installation and it has been written with appropriate caution using a language such as PL/I, then it is possible to recompile and use the program (with perhaps a minor amount of editing) even though a radically different computer system is in service. Even at this early period of language development, it appears definite that the Multics system will have implementations of at least the following

exportable languages:

a) Fortran IV

b) PL/I

c) AED

d) Snobol

e) BCPL

3. The third level of exportability is at the level of the application program sub-system. Here the pertinent issues regarding exportability are the precise characteristics of the host computer system environment. At one extreme the environment change is nil and exportability is trivial if both installations are using identical brands of equipment, models, configurations and operating systems. Since this is almost never true even among IBM customers there is inevitably some work attached to exporting sub-systems. This work increases as systems become more different in critical ways such as word lengths, character sets, etc. to the point where it is not possible to carry a system from one machine to another if certain features such as a file system in secondary storage or interactive time-sharing terminals are not available. Nevertheless there are a great many sub-systems such as DYNAMO, the BCPL translator and the AED translator which can exist in several computer environments and are exportable. Our expectation with the Multics system is that as the value of the features which it embodies become more widely understood and appreciated, that there will be new computer systems

which will have a Multics-like environment. Of course, for those organizations such as BTL and RADC which are attempting to be pace-setters, there will be straightforward communication, exchange and exportation of all programming work that is useful to the overall community since a principal asset of a Multics installation regardless of its configuration is that the user and the subsystem programs all see the identical environment. We do not consider it unreasonable to assume that as Multics becomes more successful than the number of Multics systems will increase as more and more organizations feel the straight-jacketing constraints of contemporary computer systems.