FYI
J.K.L.

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MacAIMS Multics Memo A.1.1

To: Distribution

From: R. C. Goldstein

Subject: MacAIMS on Multics

Introduction:

The purpose of this memo is to set forth some of the reasons for implementing MacAIMS on Multics and at the same time, establish policies and procedures for the new effort.

It has been clear for some time that CTSS did not provide an adequate environment for an operational version of MacAIMS. The most evident weaknesses were the small memory size and the insufficient access control capabilities. However, numerous other characteristics of the system including character sets and console communication facilities also caused some difficulty. Finally, we are forced to prepare for the scheduled shutdown of CTSS no later than the end of this calendar year.

Many of these problems were known at the time the project was started and a serious effort was made to keep the implementation as machine-independent as possible. The choice of the AED language, for example, was made largely on the basis that AED was also available under the CP-67/CMS operating system and was in the process of being implemented for Multics.

At this point in time, when a decision concerning the next environment for MacAIMS must be made, three possibilities are available: CP-67/CMS, Multics, and the ITS time-sharing system implemented on the PDP-6/10 system under development by the Dynamic Modeling and Computer Graphics groups. We can eliminate CP-67/CMS from consideration on the grounds that it offers little improvement over CTSS except for a larger memory and is a relatively expensive system to use. Furthermore, at this date, it still does not have an adequate file system which is crucial to a system of this kind.

The Dynamic Modeling PDP-10 system would offer us a large memory and virtually free machine time. An AED compiler is not available for the PDP-10, but one could probably be procured at nominal cost if we wished to move in this direction. The system available to us also promises to eventually offer extremely fine graphics facilities which would be of great value. There are two main drawbacks to this choice. In the first place, procurement of the hardware and design of the system software has proceeded much more slowly than previously anticipated. It now seems unlikely that the system would be available at all (on a time-sharing basis) until fall, and it would be subject to frequent service interruptions tor a considerable period after that to permit expansion of the hardware. The second problem with regard to this system is the fact that the planners have decided to implement an practically open system, intentionally omitting the kind of user identification and file security that is essential for MacAIMS. I feel that this fact alone eliminates it from further consideration. Two other points can be made. Although this system will have a substantially larger memory than CTSS, it will not be different in structure. That is, the same memory limitation problem will arise; it may only take a little longer to manifest itself. Secondly, interest has been expressed in using MacAIMS on behalf of organizations not part of Project MAC, or even M.I.T. This would be very difficult if the system were implemented on a private, one-of-a-kind system.

The third alternative, Multics, offers a superb environment for a system of this type. It provides for an essentially infinite user memory space and the most sophisticated access control ever implemented. It also has the advantage of being currently operated on a service basis by IPC which is committed to maintaining its availability. There also seems to be a very high probability that Multics will soon become available outside the M.I.T. community, first via the ARPA network, and later through duplicate systems operated by private companies. The main question marks with regard to Multics are cost, language and responsiveness. Initial experience indicates that Multics will be cheaper to use per console hour than CTSS despite the much higher quality of service. In any case, cost is not currently of any significance due to a contractual agreement which commits Project MAC to purchasing a very large block of Multics time this year. Furthermore, there is every reason to believe that as the software is improved and as new hardware becomes available, the cost of using Multics will decrease very rapidly.

There is also some doubt concerning the ability of Multics to respond fast enough to make possible a highly interactive

system. As far as can be determined, Multics response time today appears comparable to CTSS and it will certainly get better in the future.

The language issue deserves fairly careful consideration. AED was originally chosen for MacAIMS because of its superiority to the other languages available on CTSS as well as the expectation that it was going to be available on Multics. More recently, the Multics group decided that there was not sufficient demand for AED to warrant implementing it. This forces us into a consideration of PL/1. Our study to date indicates that PL/1 is an excellent language for our purpose. We have been able to find nothing in AED that can not be done in PL/1, and in addition, PL/1 contains a number of features which are absent from AED. Also, since PL/1 is, in some sense, the "standard" language of Multics, it is receiving an extremely high level of support.

It appears that converting a program directly from AED to PL/1 would be a relatively straight-forward task for a programmer. While we will continue to keep this prospect in mind, for the time being our strategy will be to sidestep the conversion process by neatly winding up current AED efforts on CTSS and continuing to use them there. Our Multics work in PL/1 will concentrate on areas that have not yet been implemented. Later on, as these areas reach a satisfactory state, we will re-implement in the new environment the functions which are now working on CTSS. By this time, we will have gained enough experience with them to warrant a substantial rewriting job.

Documentation:

Another area where our past performance has clearly been inadequate has been that of program documentation. Poor documentation hurts the programmer as well as the user. It means that other people working on the system can not make use of your procedures, and of course, that you can not make use of theirs. Most of you have had, at one time or another, to take time to sit down and explain one of your procedures to somebody else. Some of you have had to do this many times. Then, you have to help them debug their program because they don't have full knowledge of what your procedure is doing. It should be clear that everybody's task is made easier if each program is documented accurately and clearly when it is written. Be forewarned that strict documentation standards will be rigidly enforced for MacAIMS on Multics.

This documentation will take the form of MacAIMS Multics Memos (MMMs). There will be three series of memos dealing with the following subject matter:

series A: Background and general information. These memos will present plans and policies and periodically report on progress. Most of them will probably originate with me.

series B: Data Base documentation. This series will cover the organization of the data base and its associated structure tables. It should contain all information needed to write a program to properly access the MacAIMS data base.

series C: Program documentation. These memos will describe specific procedures. The first edition of each series C memo will be written prior to that start of programming. It will state the purpose of the procedure and the anticipated calling sequence. This memo must be submitted and approved before programming can begin. When the procedure has been written and debugged, an updated memo must be provided in order to have the procedure accepted for inclusion in the system. The updated memo will contain any corrections to the information in the preliminary edition discuss the strategy and limitations of the procedure, and give an example of its use.

The C series of memos will be further subdivided by functional area. The detailed breakdown will be determined as the memos are submitted and we see what categories they fall into.

Drafts of all MMMs should be submitted to Eileen Moore in room 806. They may be submitted in any legible form, although submission in the form of an "edm" file on Multics will save some work and expedite distribution.

All MMMs will be distributed in hardcopy form to the entire MacAIMS group. Series A memos will also be sent to an additional group of people interested in following the progress of the system but not directly concerned with its development. All MMMs will also be stored online in ">udd>MacAIMS>Documentation".