MASSACHUSETTS INSTITUTE OF TECHNOLOGY

PROJECT MAC

June 26, 1969

Mr. C. W. Dix, Manager, Engineering
General Electric Company
Large System Department
13430 North Black Canyon Highway
Phoenix, Arizona  85029

Dear Walker:

It is taking us longer than I expected it would to
determine a good response to your letter of May 2, 1969,
withdrawing General Electric's commitment to the plan for
Multics that we had developed at the beginning of the year.
Even at this date, I cannot give you a proposal wholly
agreed upon here.  I do want to describe the state of our
thinking, however, and suggest a plan that looks interesting
to me.

The essential problem that your withdrawal from the
commitment to offer a commercial service poses for us is
"only" an economic one.  As you know, the final phases of
the development of the Multics operating system are progressing
according to schedule, and Multics is looking very good.  It
seems to me almost unthinkable to let Multics get just to
the point of proving itself in public service and then see
it die for lack of a test.  That simply must not be allowed
to happen.  So let me sketch briefly the economic problem
that faces us and then suggest the plan I have in mind.

The problem is, in essence, that there is not enough cash
flow in M.I.T.'s use of time-shared computer systems to support
a full-scale Multics/645 in addition to the CTSS/7094 and the
CP-CMS/360-67 that are already in service.  In the process
of developing Multics, Project MAC has paid far more for
computers than is normal or generally approved for an ARPA
contract project, and indeed has spent money scheduled for
later use.  As a result, Project MAC cannot continue to

pay the $800,000 to $1,200,000 a year that it has been costing to rent, operate, and maintain the part of the 645 equipment that has been charged to us.

Ever since his visit with you in April, Mr. Richard Mills, Director of Information Processing Services at M.I.T., has been trying to develop a plan for making Multics available to the M.I.T. Computer community in such a way as to ensure support for that part of the 645 that Project MAC cannot support. Even making certain assumptions about use of Multics by other universities in the New England area, he has not been able to create a sure and satisfactory plan. He has not ceased to try, but time is passing, and I feel that it is necessary to find a definite solution soon.

The solution that I propose calls for co-operation and support from you as well as from Project MAC, the M.I.T. Information Processing Center, and the M.I.T. Administration. But it is a positive, forward-looking solution that will, I believe, ensure the success of Multics. The plan follows:

1. Project MAC and GE will continue their active support of and participation in the Multics Development Program through the third quarter of 1969, and Multics will "go public" in October 1, 1969, with the level of efficiency assumed in our recent plans. All agreements are off if the October 1, 1969, date is not met, but there appears to be very little chance of that.

2. To "go public" means (1) to become available to the M.I.T. community, (2) to become available, through reciprocal access arrangements already in effect, to other universities in the New England area, (3) to become available to GE, and perhaps also (4) to become available to other organizations. (The Bell Telephone Laboratories could be included in the latter group.)

3. At the outset (October 1), the equipment base of Multics will be System B in the configuration now planned jointly by GE and Project MAC for October 1. During the period September 1, 1969 to December 31, 1969, the equipment base will be augmented, through the addition of System A and other hardware, to the level of two System B configurations. These will be operated either in interconnection or as two separate

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systems. M.I.T. will pay rental on the present System A configuration, effective (retroactively) February 1, 1969, as per your letter of May 2, 1969.

4.  The service offered will be at two levels, "Essential Multics" and "Comprehensive Multics." (Arrangements are now being made to permit access to simple, essential time-sharing services at approximately half the cost of full, comprehensive Multics.) The basis of charging will be the hardware (rental) cost of one System B configuration plus the operating maintenance, consulting, and overhead costs associated with two System B configurations. The initial assumption, used in calculating the charging rate, will be that two System B configurations will support 120 x E + 60 x C consoles, and that, on the average, half the consoles will be in use. E is the fraction of the total system devoted to Essential Multics, and C is the fraction devoted to Comprehensive Multics. (C + E = 1). Preliminary estimates suggest that, if all charges are mapped into console hours, the cost of Essential Multics will be $2.00 to $3.00 per console hours, and the cost of Comprehensive Multics will be $4.00 to $6.00 per console hour. (Actually, of course, the total charge to each user would be divided up into so much for "connect time," so much for "CPU time", so much for disk space, and so on, but it is easier to do broad planning in terms of all-inclusive console hours.) Charging will be based on the preceding plan even during the interval, if any, when there is only one System B at work.

5.  In order to ensure a viable Multics for a considerable period of time, Project MAC will allocate from its research funds $400,000 per year to Multics access for members of Project MAC, GE will allocate from its funds $400,000 per year to Multics access for members of GE, and M.I.T. will allocate from its general, computing, and/or research funds $200,000 a year to Multics access for the M.I.T. community (excluding Project MAC) and/or other organizations (excluding GE). The foregoing allocations will be regarded as guarantees, and the sums will, if needed, be devoted to meet Multics expenses, whether or not the access is actually used, and the Project MAC allocation will be taken up first, then the GE allocation, and last the M.I.T. (non-MAC) allocation, until all Multics

costs have been covered.  The guarantees will be made for a period of three years from October 1, 1969, except in the case of Project MAC, which will make its guarantee for a period as long as possible, up to three years, from October 1, 1969, but not at any time extending beyond the current limit of funding of the main MAC contract from ARPA.  (That contract now extends through January, 1971.  Six months of funding beyond that date have been approved but not yet contracted.)

6.  GE may offer Multics as a normal commercial business venture at any time, but will remain committed to the foregoing unless an alternative acceptable to M.I.T. is offered.  At such time as GE offers a commercial service, M.I.T. will cease to offer Multics to new business and industrial companies, but may continue to offer it to any that are already participating.

7.  GE will continue its existing commitment to deliver follow-on Multics-compatible hardware within 18 months ("best effort") or 24 months ("penalty clause") of receipt of a firm order.  If M.I.T. gets a follow-on system before the aforementioned 3-year period has expired, the new equipment may either supplement or replace the 645 equipment -- or partly supplement and partly replace it -- and, in the event of partial or complete replacement, the charge to M.I.T. based on the System A configuration will be correspondingly reduced or discontinued.

8.  Both GE and Project MAC will continue actively to improve and augment the Multics software, even after Multics goes public, but not necessarily at the present level of effort.  Project MAC will continue to improve the operating system and will mount a strong effort to develop user-oriented software subsystems.

That is the plan.  It seems to me to give Multics an excellant chance to show what it can do.  The fact that the costs of the two services are so low will make them affordable, and the fact that the services will be excellent will make them desirable. The contributions the plan calls upon Project MAC and the Administration of M.I.T. to make are supportable.  The contributions it calls on GE to make are, I think, the least painful of all the things we could ask.  The 645 equipment is available and might as well be used.  The $400,000 worth of access to Multics

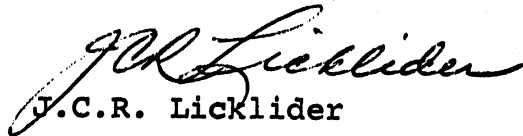Mr. C. W. Dix, G.E.                                    June 26, 1969

is a bargain, and it will do great things for GE, especially
in the area of large software systems.  Best of all, the fact
that we shall be able to promise the user-community long-term
access at reasonable cost will ensure the development of a
large amount of user-oriented software.

There is no doubt in my mind that there will be plenty of
demand for Multics.  The main problem here, as I indicated, is
lack of funds to support a whole Multics.  A secondary problem
is that, if the costs of Essential and Comprehensive Multics
were $4.00 to $6.00 and $8.00 to $12.00 per console hour,
respectively, instead of $2.00 to $3.00 and $4.00 to $6.00, it
would be hard to get enough potential users to wade in and see
how good the water is.  The plan solves both those problems.

The M.I.T. Administration will see this plan only a day or
two before you will, and it will doubtless not be willing to
give its approval without due deliberation.  I hope that you
will have the plan examined in GE, and of course I hope both
M.I.T. and GE will approve it.  If not, I don't know what we
can do.  If so, I think Multics will be headed for a great
future.

                              Yours sincerely,

                              J.C.R. Licklider

JCRL:em

P.S.: I went away on a trip, and a longer time elapsed than I
      had expected.  The plan has not yet been reviewed by the
      Information Processing Board, but individual members of
      the Administration have seen it and like it.  I hope that
      you will see it as a basis for moving forward into the
      phase of Multics in which it becomes the focus of a very
      productive on-line community of users.

P.S.: The GE allocation mentioned is to cover use internal to
      GE.  If GE offers a commercial service, as is suggested
      in numbered paragraph 6, then either GE will offer the
      service through separate equipment at a GE location or
      some other arrangement suitable to GE and M.I.T. will be
      worked out to isolate M.I.T. from operation of and respon-
      sibility for the commercial service.