MPL-49   April 17, 1970

TO: Multics Performance Log

FROM: J. H. Saltzer

SUBJECT: Observations of 2 cpu, 384k System Performance

DATE: April 17, 1970

On April 2, 1970, Multics system 7.1b was run for several hours with a full configuration of 2 CPU's and 384k words of core memory. A PDP-8 simulator run was completed during this time; 23 users were competing for resources. Two observations may be made from the statistics reported in that run (MPM101).

1. The time charged to the simulated user was 26.9 seconds, about 4.4 seconds more than normally observed for 1816 missing page faults. For example, in MPM99, there were 2089 missing pages, and a charged time of 23.6 seconds. After deducting 1.1 seconds for processing 273 additional page faults a 4 ms. apiece, we would expect 22.5 seconds to be charged. The 4.4 second surplus is probably entirely due to interference for access to core memory (3 boxes) and access to locked supervisor data bases (Active Process Table, system segment table.) Since paging activity was very low, it is likely that core memory interference was the largest contributor. Supporting this hypothesis is the calculation that in a perfectly matched 2 cpu, 3-memory box system, each cpu would appear to run at 5/6 normal speed (83 1/3%) due to memory interference if accesses occur at random. The observed rate was 84% of normal.

2. The mean time between page faults was quite large--in the range of 40 to 80 ms., indicating that there was plenty of core memory available. On the other hand, multiprogramming idle time was quite high (31% of one cpu) indicating that there were frequent lost opportunities to run programs. The conclusion is that it is safe to use a value of eligibility above 3 in this configuration. Since there are available 284 user pages in this configuration compared with 156 normally, plausible trial value for eligibility would be:

$$\frac{284}{156} \times 3 = 5.5$$

If sharing effects are at all significant a value of six should be safe.