March 4, 1969

TO: Multics Performance Log

FROM: J. H. Saltzer

SUBJECT: Change in Page Fault Distribution upon adding Ring zero
          Typewriter Device Interface Module.

About 25% of the performance inprovement provided by the Ring zero
typewriter DIM seems to have come about from a shift in the page fault
distribution. The mean of this distribution has dropped about 10%: some
categories of page fault lengths have increased despite an overall
reduction in page fault number.

One possible explanation for the unexpected behavior is that the
reduced pressure on core memory (from a smaller working set required to
do I/O) results in shorter average search time for page removal
candidates. Unfortunately, there is currently no meter available on
that search length to verify this hypothesis.

If the hypothesis is correct, runs with 384k of core memory should
show a significantly shorter average page fault time as well as fewer
page faults.

This effect acts as an accelerator to push the system into deep
overload when a slight overload begins; it would appear that average
page removal candidate search time might be a good candidate as a
sensitive measure of system overload.

A chart of the page fault distribution of systems 2.2 and 2.2A is
attached, to exhibit the observed changes.

Multics Page fault time distribution   3/7/69   JHS

Change on adding Ring 0 Typewriter DIM ; Using "Typical User" Certification Script
Command Processing only (Logins section excluded)

Area under curve is proportional to
Total time in page fault handling

Mean dropped about 10%

Fault Count

5000
4000
3000
2000
1000

mean

mean

System 2.2 (old Tw DIM)

System 2.2A
(new Tw DIM)

1-2   2-4   4-8   8-16   16-32   32-64
(1)   (3)   (6)   (12)   (24)

Processing Time, Milliseconds