

MPL-34

TO: Multics Performance Log

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SUBJECT: Result of Daily Multics Performance Measurements  
(Period: August 19 to September 1)  
Comparison of 3.8 and 3.1.1 System Performance

DATE: September 4, 1969

Though the daily measurement of Multics was interrupted on account of the one-week PDP-8 troubleshooting encountered in the above period, several runs were made recently. In this note the result of those runs and the observations about it will be described.

Because the new "edm" command is installed, the standard script MFTN3, which is used in the daily measurements, was modified to match the new "edm" conventions. Actually "s" was replaced by "w" and "q" with zero think time between them, considering "w" "q" as one sub-command. Therefore, neither the total think time involved in the script nor the total number of interactions have been changed; so that the coming measurement results can be directly compared with the former results.

1. Summary of the measurements

time unit: second  
average: per interaction

Date	Run #	# of users	system	Total CPU time	Total # of P. F.	Total real time	Average CPU time	Average # of P. F.
8/19	MPM25	18	3.4	--	--	--	--	--
8/27	MPM26	17	3.7	63.097	3785	3210	.956	57
8/28	MPM27	17	3.8	73.907	3834	3450	1.119	58
8/29	MPM28	17	3.8	67.540	3526	2610	1.023	53
8/29	MPM29	7	3.8	59.323	2964	2430	.898	44
8/30	MPM30	6	3.8	57.154	2825	2370	.865	42
8/30	MPM31	5	3.8	50.974	2184	2310	.772	33
9/1	MPM32	8	3.8	51.411	2280	2250	.778	34

- Notes: 1. Only the first half of the script was run in MPM25.
2. Many drum errors (about 100 non-fatal errors/hour) occurred in MPM26 and MPM27. Accordingly, the total real time was rather long in each case.

3. The execution time of "fortran" was very long in MPM27, making the total CPU time very long. The CPU time spent by "fortran" was 16.4 seconds.

2. The current system performance relative to 3.1.1

The performance of the current system summarized on the previous page was compared in detail with that of 3.1.1 in two cases, namely in a heavy load case and a light load case. The results appear on the following pages.

A comparison of the system performance (CPU time) in a heavy load case (Table 1 and 2) shows an interesting result. Some observations about it are given below.

1. Generally speaking, CPU time spent by each command of the script on the current system became shorter than before. The performance ratio is

$$\frac{\text{Average total CPU time on 3.7-3.8}}{\text{Average total CPU time on 3.1.1}} = \frac{68.2}{72.2} = 0.945$$

Therefore, about 5% improvement in CPU time is observed.

2. The "login" command runs much faster than before.
3. The "edm" command runs much faster than before. Four runs of "edm" in the script gained 4.1 seconds.
4. The "fortran" command requires much longer CPU time than before at the first time it is issued. Further usage of "fortran" required rather shorter CPU time.

On the other hand, a comparison of the system performance in a light load case (Table 3 and 4) shows that the current system performance in a light load situation is much worse than before. However, the result seems to be rather inaccurate because the performance of the few user system strongly depends on what and how those few users are computing.

Table 1

3.1.1 System Performance

\*\*\* Heavy Load Case \*\*\*

CPU time spent by each command (second)

Run #	MPM13	MPM15	MPM16	Average
Date	7/29	7/31	8/1	
# of users	17	17	17	17
system #	3.1.1	3.1.1	3.1.1	3.1.1
login	10.1	10.2	10.2	10.2
edm	7.2	7.3	7.7	7.4
fortran	8.6	10.2	10.7	9.8
edm	4.1	3.7	4.9	4.2
fortran	6.1	6.1	6.5	6.2
rename	1.7	2.0	2.0	1.9
print	1.3	1.4	1.4	1.4
"execution"	3.2	3.6	3.4	3.4
List	2.0	2.1	3.0	2.4
setacl	3.1	2.7	2.8	2.9
remove	1.6	2.0	1.6	1.7
edm	5.0	7.2	7.1	6.4
fortran	6.0	5.7	6.3	6.0
edm	4.0	3.7	3.8	3.8
fortran	6.1	6.4	6.2	6.2
rename	1.2	1.4	1.2	1.3
print	1.0	1.1	1.3	1.1
"execution"	2.1	2.2	2.2	2.2
List	1.3	1.1	1.2	1.2
setacl	1.2	1.4	1.4	1.3
remove	1.3	1.4	1.5	1.4
Total	68.1	72.6	75.9	72.2

Table 2

Current System Performance

\*\*\* Heavy Load Case \*\*\*

CPU time spent by each command (second)

Run # Date # of users system #	MPM26 8/27 17 3.7	MPM27 8/28 17 3.8	MPM28 8/29 17 3.8	Average — 17 3.7~3.8	Comparison of this and 3.1.1
login	6.0	6.6	6.3	6.3	-3.9
edm	5.5	6.5	6.2	6.1	-1.3
fortran	12.3	16.4	10.2	13.0	+3.2
edm	3.5	3.3	4.3	3.7	-0.5
fortran	5.5	5.5	6.6	5.9	-0.3
rename	1.6	1.6	1.7	1.6	-0.3
print	1.0	1.0	1.3	1.1	-0.3
"execution"	3.1	3.3	3.6	3.3	-0.1
List	3.0	2.3	2.1	2.5	+0.1
setacl	2.3	2.5	2.4	2.4	-0.5
remove	1.3	1.9	1.4	1.5	-0.2
edm	4.1	5.1	5.1	4.8	-1.6
fortran	5.5	5.5	6.0	5.7	-0.3
edm	2.6	3.4	3.3	3.1	-0.7
fortran	5.1	7.0	5.3	5.8	-0.4
rename	0.9	1.4	1.1	1.1	-0.2
print	0.8	1.0	1.1	1.0	-0.1
"execution"	2.0	2.6	2.3	2.3	+0.1
List	1.0	1.2	1.2	1.1	-0.1
setacl	1.1	1.3	1.4	1.3	±0.0
remove	1.0	1.0	1.1	1.0	-0.4
Total	63.1	73.9	67.5	68.2	-4.0

### Table 3

#### 3.1.1 System Performance

\*\*\* Light Load Case \*\*\*

CPU time spent by each command (second)

Run #	MPM12	MPM17	MPM10	Average
Date	7/29	8/2	7/27	—
# of users	4	7	9	6.7
system #	3.1.1	3.1.1	3.1.1	3.1.1
login	6.9	7.9	8.7	7.8
edm	2.6	5.3	5.4	4.4
fortran	6.0	7.1	9.0	7.4
edm	1.4	2.7	3.4	2.5
fortran	3.6	4.0	4.9	4.2
rename	1.2	1.3	1.4	1.3
print	.6	1.0	1.1	.9
"execution"	2.0	2.8	3.1	2.6
List	1.3	1.6	2.0	1.6
setacl	1.5	1.8	2.4	1.9
remove	.8	1.1	1.8	1.2
edm	1.4	3.7	3.6	2.9
fortran	3.7	4.4	4.6	4.2
edm	1.9	2.4	2.1	2.1
fortran	3.5	4.1	4.3	4.0
rename	.7	.9	1.1	.9
print	.4	.8	1.1	.8
"execution"	1.2	1.7	2.0	1.6
List	.7	1.0	.9	.9
setacl	.7	.9	1.0	.9
remove	.9	1.0	1.2	1.0
Total	36.0	49.7	56.4	47.4

# Table 4

## Current System Performance

\*\*\* Light Load Case \*\*\*

CPU command spent by each command (second)

Run #	MPM31	MPM30	MPM29	MPM32	Average	Comparison
Date	8/30	8/30	8/29	9/1	—	of
# of users	5	6	7	8	6.5	this
system #	3.8	3.8	3.8	3.8	3.8	and 3.1.1
login	4.6	5.0	4.8	4.6	4.8	- 3.0
edm	3.8	6.1	4.2	5.0	4.8	+ 0.4
fortran	8.5	10.4	10.8	7.9	9.4	+ 2.0
edm	2.4	3.5	3.1	2.5	2.9	+ 0.4
fortran	4.0	4.8	4.5	4.5	4.5	+ 0.3
rename	1.7	1.8	1.5	1.5	1.6	+ 0.3
print	.8	1.1	.8	.9	.9	± 0
"execution"	2.8	3.3	3.0	3.1	3.1	+ 0.5
List	1.5	2.0	1.7	1.8	1.8	+ 0.2
setacl	2.0	2.4	2.6	2.1	2.3	+ 0.4
remove	1.2	1.5	1.4	1.2	1.3	+ 0.1
edm	3.4	2.9	3.5	3.2	3.3	+ 0.4
fortran	4.3	4.2	5.5	4.3	4.6	+ 0.4
edm	2.9	2.5	3.6	2.4	2.9	+ 0.8
fortran	4.6	4.4	4.8	4.1	4.5	+ 0.5
rename	1.0	1.1	1.2	1.1	1.1	+ 0.2
print	.8	.6	.9	.8	.7	- 0.1
"execution"	1.9	1.7	2.3	2.0	2.0	+ 0.4
List	1.1	.9	1.3	.9	1.1	+ 0.2
setacl	1.5	1.1	1.3	1.2	1.3	+ 0.4
remove	.8	.7	1.1	1.1	.9	- 0.1
<b>Total</b>	<b>51.0</b>	<b>57.2</b>	<b>59.3</b>	<b>51.4</b>	<b>54.7</b>	<b>+ 7.3</b>