

MPL-16

TO: Multics Performance Log
FROM: J. H. Saltzer, A. Sekino
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SUBJECT: New File System Performance measurements

The new file system as installed in Multics system 3.0.2 has been exercised by the PDP-8 user simulator during an ordinary console session. A command-by-command comparison of the result with CTSS measurements appears as table 1. Several observations may be made.

1. The total time required to complete the "typical user" script during the Multics console session, 84.6 seconds, was 23 seconds more than it took to do the same script during a Multics certification run (which has no think-time and is completely controlled.) This time difference is completely accounted for by a four-fold increase in the number of missing-page faults in console session as compared with the certification run.
2. For the most part, individual command execution time, excluding paging, are somewhat better than on CTSS. After linking, edm, listf, and delete are especially good performers: in each instance, execution time is half that of CTSS. The print command consistently is a poor performer relative to CTSS.
3. If the FORTRAN command is substituted as the exhibition translator, it is expected to perform somewhat better than CTSS MAD. This change will be made as soon as possible. With this change, the only system improvement needed to exceed CTSS performance is to identify and control the source of the excessive paging rate. The chart on the last page emphasizes this observation.

Central Processor Time required to perform representative commands, as measured by Ready Messages

	CTSS 4/11/69			MULTICS 3.0.2			5/13/69
	Run Time	Swap Time	Total Time	Non-page Time	Page Time	Total Time	
edl	2.5	1.6	4.1	2.9	3.7	6.6	edm
mad	2.7	.4	3.1	9.4	3.7	13.1	dummy_epl
edl	2.8	1.7	4.5	1.1	2.5	3.6	edm
mad	2.8	.5	3.3	7.7	1.5	9.2	dummy_epl
rename	2.3	.4	2.7	1.7	1.2	2.9	rename
print	.4	.4	.8	.7	.6	1.3	print
loadgo	6.2	.9	7.1	.4	1.1	1.5	(run prog)
listf	1.7	.4	2.1	1.7	1.3	3.0	list
delete	2.3	.4	2.7	1.8	.8	2.6	remove
Sub-totals	23.7	6.7	30.3	27.4	16.4	43.8	
edl	2.4	1.6	4.0	1.3	2.6	3.9	edm
mad	2.4	.8	3.2	7.9	1.4	9.3	dummy_epl
edl	2.3	2.1	4.4	1.5	2.6	4.1	edm
mad	3.4	.4	3.8	8.2	2.2	10.4	dummy_epl
rename	2.1	.2	4.4	1.6	2.6	4.2	rename
print	.7	.4	1.1	.8	1.6	2.4	print
loadgo	6.1	.8	6.9	.7	1.5	2.2	(run prog)
listf	1.3	.4	1.7	.8	.8	1.7	list
delete	2.2	.5	2.7	1.1	1.5	2.6	rename
Sub-totals	22.9	7.2	30.1	23.9	16.8	40.7	
Two-pass Total	46.6	13.9	60.5	51.3	33.2	84.5	

* page time is estimated at 8.0 ms per page fault.

Condition of experiments:

1. CTSS date: 4/11/69

time: 2213.2

Number of users: 18

User File directory size: 3 records

Disc not recently reloaded

2. Multics date: 5/12/69

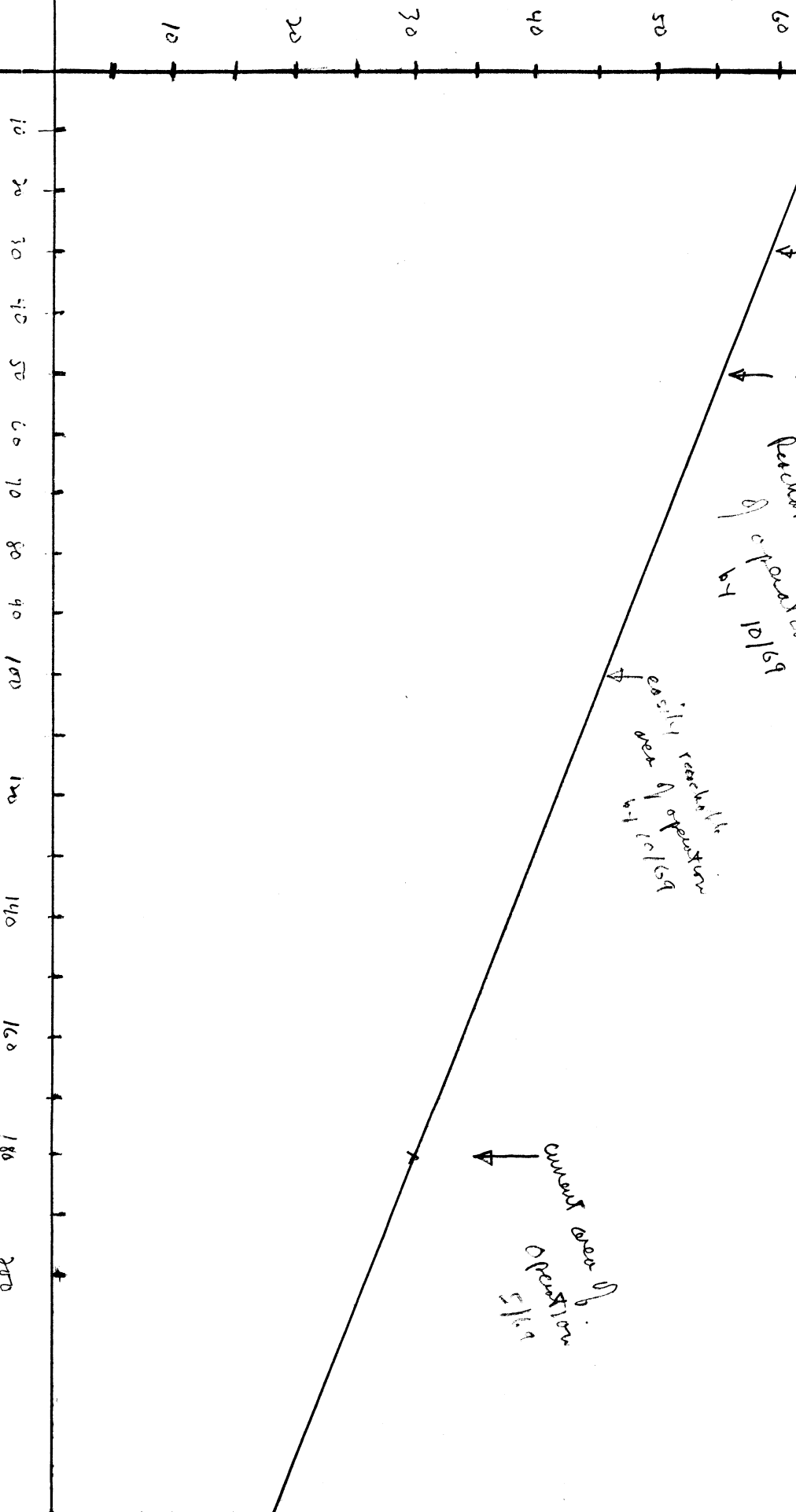
time: 1357

Number of users: 4 at login

system: MTS 3.0.2

Number of users debugging Fortran programs
 Versus Working set size
 5/19/69

Maximum
 # of users
 110 people
 with
 2000



Possible upper
 limit

Potential
 percentage
 of operations
 in 10/69

essentially
 per operation
 in 10/69

Current size of
 operation
 5/19/69

Average number of page faults per command