

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

6 / 23 19

Memo to Prof. Saltzer Room _____ Ext. _____

Here is MPM130. This is the measurement of the full configuration system.

The result suggests that the system can support more users.

from Akira Room _____ Ext. _____

MURAN BOSTON

MPM130

6/23/71

users = 50

MFTN3

15.11A

***** MULTICS PERFORMANCE ANALYSIS *****

USER NO	COMMAND	TIME	CPU TIME	NO OF P.F.
0	login	1142	3.200	0 + 90
	edm	1151	5.733	42 + 340
	fortran	1152	5.566	12 + 216
	edm	1157	2.502	33 + 156
	fortran	1158	4.346	3 + 211
	rename	1159	1.015	1 + 45
	print	1159	1.139	2 + 39
	a_prime\$prime	1201	2.768	2 + 104
	list	1201	.695	7 + 23
	df	1202	1.655	6 + 46
	edm	1211	4.114	100 + 247
	fortran	1212	4.228	8 + 204
	edm	1217	2.542	43 + 134
	fortran	1218	3.537	1 + 183
	rename	1218	.795	1 + 41
	print	1219	.862	2 + 27
	b_prime\$prime	1220	1.656	18 + 50
	list	1221	.619	1 + 33
	df	1222	.842	1 + 31
	logout			+

384 K core
2 CPUs

2 DS270 channels
interlaced memory

***** SUMMARY *****

USER NO	TOTAL CPU TIME	TOTAL REAL TIME	TOTAL NO OF P.F.	NO OF INTER-ACTIONS	AVERAGE CPU TIME	AVERAGE RESPONSE TIME	AVERAGE NO OF P.F.
USER 0	44.614	2307	283 + 2129	66	.675	5.7 (3.5)	4+ 32

*****#users

(25.419	1142	108 + 1179	33	.720	5.9 (3.7)	3+35	51 first half
	19.195	1133	175 + 950	33	.582	5.3 (3.4)	5+28	49 second half

↑ except "fortran"

The system seems to be capable of loading more users.

tcm -all

Total metering time 0:19:17

Ave queue length	9.67	} ←
Ave eligible	5.68	
Working-set factor	.50	
Working-set addend	0	
Te first (seconds)	2	
Te last (seconds)	2	
Ti max (seconds)	8	

IDLE TYPE	TIME	%
Total idle	0:05:29	14.23
Multi-prog idle	0:02:55	7.57
Loading idle	0:00:26	1.13
Non-multi-prog idle	0:02:08	5.53
Zero idle	0:00:00	0.00

← not exactly saturated. The system can support some more users.

COUNTER	TOTAL	ATB	#/INT
Interactions	590	1.962 sec	
Loadings	2988	.388 sec	5.064
Blocks	2310	.501 sec	
Wakeups	2377	.437 sec	
Waits	69275	16.714 msec	117.415
Notifies	202958	5.705 msec	
Schedulings	2706	.428 sec	4.586
Pre-empts	70091	16.520 msec	118.798

Time	%Int	%Cum	Ave	%T	%CumT
0.0	57	57	.238	43	43
.5	10	67	.728	24	66
1.0	3	70	1.295	13	79
1.5	2	72	1.829	11	90
2.0	1	73	2.355	6	96
2.5	1	74	2.937	7	103
3.0	0	74	3.348	4	108
3.5	0	75	3.922	3	111
4.0	0	75	4.369	3	114
4.5	0	75	5.033	2	117
5.0	0	75	5.441	1	118
5.5	0	75	6.062	1	119
6.0	0	75	6.291	0	119
6.5	0	75	7.043	2	121
7.0	24	100	7.341	565	686
7.5	0	100	8.068	-594	100

DEPTH	%PF	TBPF	%GTW	TBS	%CPU
1	19.8	32.7	17.5	22.3	22.6
2	21.0	36.1	18.9	24.1	26.3
3	20.2	29.5	20.6	17.3	20.7
4	17.3	24.6	18.7	13.6	14.9
5	14.3	21.4	15.7	11.7	10.8
6	10.3	20.8	11.6	11.0	7.6
7	.5	0.0	.5	0.0	.5

r 1202 3.020 12+52

hmu

Multics 15.11A, load 53.0/54.0; 52 users

r 1202 .392 1+24

fsm -all

Total metering time ! 0:21:37

	#	ATB		
Deactivations	3995	.325	sec.	
Seg Faults	5376	.241	sec.	
Bound Faults	178	7.289	sec.	
Setfaults (all)	10808	120.048	msec.	
Setfaults (acc)	146	8.887	sec.	
Updates	5373	241.482	msec.	
Steps	13533	95.875	msec.	
Skips (ehs)	3429	.378	sec.	
Skips (inf)	3913	.332	sec.	
Skips (level)	1933	.671	sec.	
Skips (init)	0	0.000	sec.	
Skips (ring)	10	129.748	sec.	
Skips (lock)	45	28.833	sec.	
Skips (pc)	8	162.185	sec.	
AST Sizes	4	16	64	64
Number	408	160	90	0
Need	3181	707	307	0
Steps	10898	1390	863	0
Ave Steps	3.4	2.0	2.9	0.0
Grace (sec)	48.6	149.4	132.2	0.0

	#	ATB	
Needs	107062	12.119	msec.
Ceiling	1	21.625	min.
Laps	962	1.349	sec.
Steps	364524	3.559	msec.
Skip wired	8301	156.304	msec.
Skip used	206362	6.287	msec.
Skip mod	35694	35.350	msec.
Skip os	7105	182.615	msec.

315 pages, 39 wired.

Average steps 3.405

	DRUM	DSU270	DSU170
Left	644	10359	3307
Reads	88220	14696	1289
ATR	14.707	88.288	1006.579
Writes	60256	8399	280
ATR	21.533	154.480	4633.857
ATB I/O	8.739	56.180	826.947
% Cncty	23	93	10
Ave Latency	23.151	82.033	74.516 ←
N Errors	0	10	0
F Errors	0	1	0

r 1204 2.985 4+44

mmu;ttm -all

Multics 15.11A, load 52.0/54.0; 51 users

Total metering time 0:24:09

	%	AVE
✓ Page Faults	10.16	3427.517
Drum interrupts	5.14	2144.429
Getwork	7.93	1248.947
Seg Faults	3.78	18053.220
Round Faults	.32	47803.904
✓ Interrupts	7.26	3953.233
Gate faults	3.29	3670.000
MP Idle	7.94	
Loading idle	1.22	
MP Idle	4.42	
Zero idle	0.00	
Other	48.54	

← The system is not exactly saturated.

r 1205 1.247 2+72

mmmt -all;intm2 -all

Total metering time 0:24:43

Working-set factor	.50
Working-set addend	0
Min-eligible	2
Max-eligible	6
% bad pre-paging	18.93
Drum faults/pre-paging	1.28
% drum priority moves	16.34
% misses	4.14
Ave post size	27.13
Ave purge size	11.14
% purged	41.07
Ave pre size	16.86
Ave pre-pagings	8.86
% pre-paged	52.55
Thrashing percentage	3.92
Ave post in core	21.92
Ave working-set size	10.69
Ave used in quantum	23.25
Pre-page time	20.03
Post-purge time	19.64
Calls	3379

Total metering time 0:24:43

	ATB lock	loop %	loop time
ntl	6.3 ms.	4.15	.523 ms.
tcl	3.1 ms.	.36	.022 ms.

all locks 4.51 ← out of 100 % . ~~This implies that~~

r 1206 1.448 1+30

rcd

```

cpu b 5
cpu a 4
gioc a 2 0 7 11 13
mem c 200 on
mem d 200 on
mem e 200 on
} 2 CPUs @ 384 Kcore
clock b 1 25 edt 4
drum 0 7700 1 4 5 6
d170 0 105340 a 37 8. 102030405 607
d270 0 60650 a 27 10. 501060207 3100411
rart mult 0 7700 0 57650 0 104340 0 0
rart salv 0 0 57650 1000 0 0 0 0
rart dump 0 0 0 0 104340 1000 0 0
schd 400000 20 20 100
sst 16. 408. 160. 90. 0.
int 27 30 31 32 37
ppds 9. 250. 1000.
ttyb 5
tty a 60 3 1200.
tty a 70 3 1200.
tty a 100 32. 133.
tty a 200 32. 133.
tty a 400 14. 110.
tty a 300 24. 150.
intk 77 mult

```

r 1207 1.801 1+32

hmu

Multics 15.11A, load 52.0/54.0; 51 users

r 1208 .321 1+21

```

ttvm
total metering time 3.12 hr, .11797611e+03 terminal hr
min output buffer 538 chars, 35 sec.
ave output buffer 1105 chars, 73 sec.
ATP output blocks 35 1352 sec.
ATB status .164 6.212 sec.
% status queued 3.7%
ATB quit 17.7 671.0 sec.
ATP dialups 59.7 2259.1 sec.
ATB cycle 1.4 54.0 sec.
output buffer eff. 86%
ave interrupt time 4.507 ms. 2.9%
max interrupt time 323.111 ms.

```

	total	1050	2741	M37	T300	ARDS	2741	M35
cur # dialed	52	3	32	13	1	2	1	0
ave # dialed	37.8	2.9	22.7	9.3	.4	2.0	.4	.2
input rate	2.3	.2	.3	.2	.2	.4	.1	.9
output rate	35.5	2.7	4.7	3.9	3.1	11.8	3.9	5.4

r 1208 1.801 1+56

rz@hmu

Multics 15.11A, load 53.0/54.0; 52 users

r 1209 .336 5+11

rzd scs 245
245 000001100110
r 1210 .634 3+38

Memory is interleaved.

rzd scs 201
201 0000000000002
r 1210 .494 3+27

da -d270

Connects = 95714, 23439.

Queue empty.

r 1210 .312 6+13

da -d270

Connects = 95859, 23523.

Queue empty.

Two DS270 channels are in operation.

r 1210 .342 6+15

tcq

avg = 14, elapsed time = 0 sec, 24 active last 15 sec.

flags	tu	dtu	te	ts	ti	tssc	event	d	ws	process
WNLETI	674	674	2216	0	0	.003	23471	1	41	initializer
NLEI	61	61	969	0	0	.221	0	0	4	Sekino
NLEI	183	183	396	0	0	.022	21350	2	11	IO
LEI	15	17	254	0	0	.076	7504	3	1	Bensoussan
NLEI	253	254	247	2144	6217	.070	11750	2	18	Scherer
NLEI	14	15	161	2007	6246	-.008	23220	1	10	Tilden
WNI	0	0	0	0	0	1.023	0	0	50	Pogran
W	681	682	0	0	0	.975	0	0	8	IO
W	657	658	14	2003	8000	1.357	0	0	6	Translator
	949	949	6	2001	8000	3.103	0	0	3	Backup
	94	95	40	4002	8000	8.175	0	0	24	Weizenbaum
	38	38	10	0	8000	27.080	0	0	4	Thurber
	460	460	16	0	8000	13.105	0	0	13	Bruce

r 1211 2.683 14+115

tru

Multics 15.11A, load 50.0/54.0; 49 users

r 1212 .442 4+19