MPM116
1/29/71
users = 40
MFTN3
14.4

256 K core
1 CPU
w.s. factor = .50

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

USER NO	COMMAND	TIME	CPU TIME	NO OF P.F.
0	login	1521	3.524	30 + 210
	edm	1530	4.823	225 + 191
	fortran	1534	5.527	39 + 414
	edm	1539	2.200	105 + 175
	fortran	1540	3.929	16 + 274
	rename	1540	1.148	9 + 146
	print	1541	1.150	10 + 90
	a_prime$prime	1543	3.114	14 + 199
	list	1543	.910	7 + 99
	df	1544	1.522	8 + 78
	edm	1553	3.231	198 + 212
	fortran	1554	4.055	19 + 339
	edm	1559	2.366	98 + 206
	fortran	1601	3.673	23 + 378
	rename	1601	.851	7 + 101
	print	1602	.659	8 + 30
	b_prime$prime	1603	2.169	25 + 159
	list	1604	.661	8 + 61
	df	1605	1.673	9 + 220
	logout			+

********** 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	43.661	2611	828 + 3372	66	.661	14.7 (5.5)	12+ 51	
**********								# users
(	24.323	1357	433 + 1666	33	.736	18.7 (5.2)	13 + 50	40 first half
	19.338	1221	395 + 1706	33	.587	10.8 (5.8)	11 + 51	40 second half)

↑ average except "fortran"

Note: (1) The response time of 5.5 second fortran command was 194 seconds (over 3 min.).

(2) Compare this result with that of MPM111.

MPM116

```
tcm -all

Total metering time     0:32:03

Ave queue length       17.00
Ave eligible            4.36
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                0:04:00    12.51
Multi-prog idle           0:03:44    11.66
Non-multi-prog idle       0:00:00     0.00
Zero idle                 0:00:00     0.00

  COUNTER        TOTAL          ATB          #/INT

Interactions       423       4.548 sec
Loadings          2279        .844 sec       5.388
Blocks            2106        .914 sec
Wakeups           2211        .870 sec
Waits           118193      16.278 msec    279.416
Notifies        266725       7.213 msec
Schedulings       2372        .811 sec       5.608
Pre-empts        85726      22.443 msec    202.662

 Time %Int %Cum    Ave     %T    %CumT

 0.0   71   71    .228     18       18
  .5   13   84    .738     10       28
 1.0    5   89   1.292      7       35
 1.5    7   96   1.932     14       49
 2.0    2   97   2.322      4       53
 2.5    1   98   2.858      3       56
 3.0    0   99   3.488      1       58
 3.5    1   99   3.902      2       60
 4.0    0   99   4.482      1       60
 4.5    0   99   4.784      0       61
 5.0    0  100   5.526      1       62
 5.5    0  100   5.949      1       63
 6.0    0  100   6.291      0       63
 6.5    0  100   7.190      1       64
 7.0    0  100   7.340      0       64
 7.5    0  100   8.041     35      100

DEPTH   %PF   TBPF   %GTW   TBS   %CPU

   1    30.7  14.7   26.8   11.5  31.8
   2    26.3  15.2   26.4   10.2  28.1
   3    20.0  13.9   21.5    8.7  19.6
   4    13.8  12.7   14.8    8.0  12.4
   5     8.2  12.7    9.1    7.6   7.3
   6     4.0  13.7    4.5    8.2   3.9
   7      .5   0.0     .5    0.0    .5

r 1552  2.365  2y+30
```

note

MTBPF is approximately half of that of 384K core system.

max. eligible = 6

Multics 14.4, load 41.0/41.0; 40 users

r 1552 .275 7+16

fsm -all

Total metering time 0:34:30

Deactivations	2100
Ast grace	0:01:20
Used ASTs	432
Free ASTs	1
Held ASTs	189
Seg Faults	3256

	#	ATB
Needc	162340	12.753 msec.
Steps	624316	3.316 msec.
Ceiling	177	.195 min.
Laps	3365	.615 sec.
Skip wired	18390	112.581 msec.
Skip used	386691	5.354 msec.
Skip mod	48460	42.723 msec.
Skip os	8435	245.449 msec.

165 pages, 31 wired. ← 256 k core
Average steps 3.846

	DRUM	DSU270	DSU170
Left	1300	10361	16057
Reads	144401	14224	939
ATB	14.338	145.554	2204.861
Writes	78140	6817	467
ATB	26.496	303.706	4433.328
ATB I/O	9.303	98.397	1472.521
% Cpcty	22	53	7
Ave Latency	23.241	79.570	61.814
N Errors	0	0	0
F Errors	0	0	0

← increased traffic

r 1553 1.637 27+32

ttm -all
Total metering time 0:35:58

	%	AVE
Page Faults	11.66	1960.439
Drum interrupts	5.61	1083.672
Getwork	10.34	974.225
Seg Faults	2.31	14853.456
Interrupts	6.00	3434.837
Gate faults	3.21	3670.000
MP Idle	11.61	
Loading idle	.85	
NMP Idle	0.00	
Zero idle	0.00	
Other	48.41	

← note

r 1554 1.259 7+67

```
hmu

Multics 14.4, load 41.0/41.0; 40 users

r 1555  .376  7+25

>udd>m>w>o>ppmt -all

Total metering time    0:36:05

Working-set factor          .50
Working-set addend            0
Min-eligible                  2
Max-eligible                  6
% bad pre-paging          48.04
Drum faults/pre-paging     1.80
% drum priority moves     15.83
% misses                   3.07
Ave post size             73.43
Ave purge size            15.21
% purged                  20.72
Ave pre size              25.48
Ave pre-pagings           13.39
% pre-paged               52.57
Thrashing percentage      16.85
Ave post in core          41.37
Ave working-set size      23.66
Ave used in quantum       61.19
Pre-page time             20.84
Post-purge time           25.18
Calls                      2511

r 1556  1.246  27+50

>udd>m>jhs>cf

cpu  b  5                    <-- 1 CPU
gioc  a  2  0  7  11  13
mem  e  200  on              <-- 256 K core
mem  d  200  on
mem  c  200  off
drum  0  7700  1  4  5  6
clok  a  0  25  est  5
d270  0  104270  a  37  16  103040506  71213141516  211
d170  0  64050  a  27  6  102030405
part  mult  0  7700  0  103270  0  64050  0  0
part  salv  0  0  103270  1000  0  0  0  0
int  27  30  31  32  37
sst  50
schd  400000  20  20  100
rpds  11  1000
ttyb  4  144
tty  a  300  40  150.
tty  a  100  40  133.
tty  a  200  40  133.
tty  a  60  3  1200.
intk  77  mult

r 1556  1.457  8+19

hmu

Multics 14.4, load 42.0/41.0; 41 users
```

```
>udd>m>w>o>q
avq = 15, elapsed time = 644 sec, 13 active last 15 sec.
flags     tu dtu   te   ts    ti     tssc event d  ws process
NLERI     54  15 1945    0     0   -.000     0 0   9 Sekino
NLEI      79  11 1064    0     0   -.088 71202 2  11 Niles
NLEI     155  30  414    0     0   -.108 12301 1  16 Haber
WNLEI     85   5  392    0     0   -.059     0 0  35 Sorrentino
NLEI      82  18  325    0  2343    .037     0 0  80 EFranklin
LEI       10  10  320    0     0    .004     0 0   8 Ammons
W         31   5    0    0     0   1.611     0 0  12 Friedman
W         64  13    0    0     0   1.232     0 0  20 Bishop
W        243   6   44    0  6219   5.212     0 0  52 Translator
          36  12    7    0  8000 367.563     0 0  10 Weaver
          20  14   28    0  8000 241.164     0 0  22 Misunas
W        184   8   40    0  8000 228.399     0 0  61 Willis
         134  21   12    0  8000 159.685     0 0  20 Snyder
W         66  16   32    0  8000 149.078     0 0  41 Webber
W        307  16   29    0  8000  63.840     0 0  33 Bruce
         408   8   27    0  8000   6.925     0 0  79 Backup
r 1559  3.993  34+257

rzd scs 200
   200  200000000000
r 1559  .527  7+49

ppm -all
Pre-paging mode is ON.
r 1559  .349  8+25

hmu

Multics 14.4, load 41.0/41.0; 40 users

r 1559  .257  7+14

ttm -all

Total metering time    0:42:04

                       %        AVE

Page Faults          11.76     1995.127
Drum interrupts       5.55     1084.560
Getwork              10.21      970.461
Seg Faults            2.36    15013.939
Interrupts            6.00     3425.093
Gate faults           3.16     3670.000
MP Idle              11.48
Loading idle           .84
NMP Idle              0.00
Zero idle             0.00
Other                48.63

r 1600  1.849  7+157
```

MPM11π
2/1/71
users = 44
MFTN3
14.4 b

384 k core
2 CPUs

w.s. factor = .50

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

USER NO	COMMAND	TIME	CPU TIME	NO OF P.F.
0	login	1434	3.675	12 + 141
	edm	1443	7.463	185 + 295
	fortran	1444	5.198	22 + 238
	edm	1448	2.468	83 + 122
	fortran	1449	4.760	22 + 250
	rename	1450	1.058	2 + 56
	print	1451	1.147	7 + 46
	a_prime$prime	1452	3.534	36 + 114
	list	1453	.792	8 + 44
	df	1453	1.190	8 + 38
	edm	1502	3.982	148 + 192
	fortran	1503	3.101	9 + 134
	edm	1508	2.628	70 + 126
	fortran	1509	2.910	6 + 164
	rename	1509	.574	3 + 33
	print	1510	.796	2 + 45
	b_prime$prime	1511	2.279	28 + 61
	list	1512	.583	2 + 34
	df	1513	.890	7 + 32
	logout			+

********** 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	45.353		648 + 2024	66	.687	4.9 (3.2)	9+ 30	
********** # users								
(	27.610		373 + 1203	33	.837	6.1 (3.4)	11 + 36	44 first half
	17.743		275 + 821	33	.538	3.7 (3.0)	8 + 24	44 second half)

↑ average except "fortran"

Note: (1) Compare this result with that of MPM113.
(2) Generally speaking, the result is very good.

tcm -all

MPM117

Total metering time 0:23:05

Ave queue length	6.45
Ave eligible	4.85
Working-set factor	.50
Working-set addend	0
Te first (seconds)	2
Te last (seconds)	2
Ti max (seconds)	8

note

IDLE TYPE	TIME	%
Total idle	0:07:23	16.01
Multi-prog idle	0:04:45	10.32
Non-multi-prog idle	0:01:55	4.16
Zero idle	0:00:00	.03

COUNTER	TOTAL	ATB	#/INT
Interactions	607	2.282 sec	
Loadings	3036	.456 sec	5.002
Blocks	2186	.634 sec	
Wakeups	2212	.626 sec	
Waits	76389	18.135 msec	125.847
Notifies	229571	6.034 msec	
Schedulings	2755	.503 sec	4.539
Pre-empts	83832	16.524 msec	138.109

Time	%Int	%Cum	Ave	%T	%CumT
0.0	72	72	.225	34	34
.5	13	85	.736	19	53
1.0	5	90	1.283	14	67
1.5	5	95	1.872	18	85
2.0	1	96	2.377	6	90
2.5	1	97	2.857	6	96
3.0	1	97	3.353	4	100
3.5	1	98	3.864	6	106
4.0	0	98	4.371	4	109
4.5	0	99	4.967	4	114
5.0	0	99	5.423	2	116
5.5	0	99	5.913	2	118
6.0	0	99	6.291	0	118
6.5	0	99	7.171	2	120
7.0	0	99	7.643	2	122
7.5	1	100	8.202	-29	100

DEPTH	%PF	TBPF	%GTW	TBS	%CPU
1	20.2	32.8	17.2	23.5	21.7
2	21.2	35.8	18.6	24.9	24.8
3	19.7	31.4	19.9	18.9	20.3
4	17.4	26.7	19.2	14.7	15.3
5	13.8	26.0	16.1	13.5	11.9
6	10.7	25.4	12.0	13.8	9.0
7	.5	0.0	.5	0.0	.5

note

r 1456 2.843 42+55

Multics 14.4b, load 46.0/45.0; 45 users

r 1456 .459 2+30

fsm -all

Total metering time 0:25:15

Deactivations	3812
Ast grace	0:00:28
Used ASTs	420
Free ASTs	0
Held ASTs	209
Seg Faults	5062

	#	ATB
Needc	123004	24.637 msec.
Steps	386680	7.837 msec.
Ceiling	2890	.017 min.
Laps	1068	2.837 sec.
Skip wired	4156	729.174 msec.
Skip used	221958	13.653 msec.
Skip mod	24116	125.661 msec.
Skip os	13446	225.379 msec.

293 pages, 34 wired. ← 384 K core
Average steps 3.144

	DRUM	DSU270	DSU170
Left	1034	9591	16462
Reads	104262	14966	992
ATB	29.066	202.489	3054.887
Writes	72255	7539	422
ATB	41.941	401.969	7181.156
ATB I/O	17.168	134.657	2143.174
% Cpcty	24	78	10 ← increased traffic
Ave Latency	22.872	116.477	70.736
N Errors	0	0	0
F Errors	0	0	0

note !

r 1457 1.648 13+32

ttm -all

Total metering time 0:26:29

	%	AVE
Page Faults	11.15	4165.796
Drum interrupts	5.87	2639.559
Getwork	8.88	1500.554
Seg Faults	2.15	12915.843
Interrupts	4.80	4208.770
Gate faults	2.41	3670.000
MP Idle	9.60	
Loading idle	1.39	
NMP Idle	4.28	
Zero idle	.02	
Other	49.44	← note

r 1458 1.387 7+37

```
hmu

Multics 14.4b, load 45.0/45.0; 44 users

r 1458  .329  10+15

>udd>m>w>o>ppmt -all

Total metering time    0:26:46

Working-set factor          .50
Working-set addend            0
Min-eligible                  2
Max-eligible                  6
% bad pre-paging          29.14
Drum faults/pre-paging      .81
% drum priority moves     15.90
% misses                   5.96
Ave post size             53.74
Ave purge size            18.34
% purged                  34.12
Ave pre size              26.94
Ave pre-pagings           11.74
% pre-paged               43.56
Thrashing percentage       6.69
Ave post in core          40.56
Ave working-set size      20.40
Ave used in quantum       45.90
Pre-page time             25.67
Post-purge time           36.34
Calls                      3248

r 1459  1.172  18+26

>udd>m>jhs>cf

cpu  a  4                    } <-- 2 CPU's
cpu  b  5
gioc  a  2  0  7  11  13
mem  d  200  on              }
mem  e  200  on              } <-- 384 K core
mem  c  200  on              }
drum  0  7700  1  4  5  6
clok  a  0  25  est  5
d270  0  104270  a  37  16  103040506  71213141516  210
d170  0  64050  a  27  6  102030405
part  mult  0  7700  0  103270  0  64050  0  0
part  salv  0  0  103270  1000  0  0  0  0
int  27  30  31  32  37
sst  50
schd  400000  20  20  100
ppds  11  1000
ttyb  4  144
tty  a  300  40  150.
tty  a  100  40  133.
tty  a  200  40  133.
tty  a  60  3  1200.
intk  77  mult

r 1500  1.412  7+9
```

```
>udd>m>w>o>q
avq = 8, elapsed time = 0 sec, 19 active last 15 sec.
flags     tu dtu   te   ts   ti     tssc event d  ws process
NLERI     49  49 1043    0    0     .549     0 0   9 Sekino
NLEQI    425 425  285 4001 8000     .003 14201 2  11 Reed
NLERI     92  93  901    0 8000    -.000     0 0   8 Morris
LEI       35  36   41    0    0     .000     0 0  20 Pinella
W         73  74    0    0    0     .203     0 0   9 PRogers
r 1501  2.448  9+119

hmu

Multics 14.4b, load 45.0/45.0; 44 users

r 1501  .279  5+15

rzd scs 200
   200  600000000000
r 1502  1.478  8+79

ppm -all
Pre-paging mode is ON.
r 1502  .495  7+22

hmu

Multics 14.4b, load 45.0/45.0; 44 users

r 1502  .337  7+17

>udd>m>w>o>q
avq = 6, elapsed time = 120 sec, 17 active last 15 sec.
flags     tu dtu   te   ts   ti     tssc event d  ws process
NLERI    308   4  888    0    0    -.003 70400 1  16 Testa
NLERI     42  12 1903 4040 6019    -.115     0 0  65 Dunten
NLEI     221   7  647    0    0     .003 55604 2   8 Hill
NLEI     259  17  779 2188 2026     .006   702 1  29 IO
NLERI     55   6  103    0 2306    -.138     0 0  56 Sekino
LEQI     476  51  249 6002 8000    -.117     0 0   7 Reed
W         81   1    0    0    0     .744     0 0  18 Dixon
W         97   4    0    0    0     .733     0 0  33 Morris
W        149   4    0    0    0     .725     0 0  36 Morneault
r 1503  4.001  26+147

hmu

Multics 14.4b, load 45.0/45.0; 44 users

r 1504  .386  3+23
```

hmu

Multics 14.6b, load 51.0/51.0; 50 users

r 1509 .320 7+10

fsm -all

Total metering time 0:23:59

Deactivations	4991
Ast grace	0:00:19 ←
Used ASTs	411
Free ASTs	0
Held ASTs	225
Seg Faults	6268

	#	ATB
Needc	124694	23.085 msec.
Steps	388206	7.415 msec.
Ceiling	2434	.020 min.
Laps	1084	2.655 sec.
Skip wired	4151	693.452 msec.
Skip used	220158	13.075 msec.
Skip mod	26082	110.364 msec.
Skip os	13121	219.383 msec.

292 pages, 34 wired. ← 384 K core system
Average steps 3.113

	DRUM	DSU270	DSU170
Left	753	12483	12634
Reads	106384	15250	422
ATB	27.058	188.755	6821.135
Writes	69626	7717	29
ATB	41.343	373.010	99259.276
ATB I/O	16.354	125.333	6382.526
% Cpcty	25	83	3
Ave Latency	23.109	116.649	66.827 ← DS270 is getting saturated.
N Errors	0	0	0 DS170 is rarely used.
F Errors	0	0	0

r 1510 1.677 13+29

ttn -all

Total metering time 0:25:15

	%	AVE
Page Faults	12.14	4040.703
Drum interrupts	6.20	2475.936
Getwork	9.67	1425.169
Seg Faults	3.35	15003.249
Interrupts	5.21	4280.719
Gate faults	2.73	3670.000
MP Idle	15.23 ←	increased very much.
Loading idle	2.02	
NMP Idle	0.00	
Zero idle	0.00	
Other	43.45 ←	decreased accordingly.

hmu

Multics 14.6b, load 51.5/51.0; 50 users

r 1511 .395 10+19

>udd>m>w>o>ppmt -all

Total metering time 0:25:35

Working-set factor	.50
Working-set addend	0
Min-eligible	2
Max-eligible	6
% bad pre-paging	37.31 ← increased.
Drum faults/pre-paging	1.04
% drum priority moves	14.97
% misses	12.42
Ave post size	61.02
Ave purge size	19.65
% purged	32.20
Ave pre size	27.33
Ave pre-pagings	12.06
% pre-paged	44.14
Thrashing percentage	7.02
Ave post in core	43.39
Ave working-set size	22.53
Ave used in quantum	50.82
Pre-page time	27.10
Post-purge time	41.20
Calls	2762

r 1512 1.165 2+30

>udd>m>jhs>cf

cpu b 5 } 2 CPUs
cpu a 4
gioc a 2 0 7 11 13
mem d 200

MPM118
2/19/71
users = 47
MFTN3
14.6b

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

384 K core
2 CPUs
w.s. factor = .50

USER NO	COMMAND	TIME	CPU TIME	NO OF P.F.
0	login	1433	3.458	0 + 101

hmu

Multics 14.6b, load 48.5/51.0; 47 users

r 1513 .301 7+10

>udd>m>w>o>q
avq = 22, elapsed time = 0 sec, 23 active last 15 sec.

flags	tu	dtu	te	ts	ti	tssc	event	d	ws	process
NLERI	46	47	1741	0	0	.001	0	0	7	Sekino
WNLERI	748	749	1631	4040	2185	-.001	0	0	52	Retriever
WLEI	7	8	1701	2145	4090	.032	54700	2	54	Voydock
WLEI	7	8	1409	2005	4126	.008	37001	1	26	Webber
LEI	225	225	631	0	0	.001	0	0	6	Willis
LEI	137	138	206	0	0	.272	0	0	23	Stone
W	28	28	0	0	0	2.983	0	0	12	Quinones
W	58	58	0	0	0	2.896	0	0	6	PDP8
W	181	182	0	0	0	2.251	0	0	13	Vezza
W	1336	1337	0	0	0	2.067	0	0	14	IO
W	177	177	0	0	0	1.472	0	0	17	Bruck
W	15	16	0	0	0	1.264	0	0	49	Somers
W	1296	1297	0	0	0	.678	0	0	16	initializer
W	56	57	0	0	0	.314	0	0	13	Hill
	219	219	42	0	6002	273.273	0	0	26	Grochow
W	140	141	72	0	6039	33.837	0	0	67	Haber
W	469	469	47	0	6078	65.187	0	0	84	Fateman
	53	53	229	0	6082	35.381	0	0	30	Chang
W	146	147	51	0	6138	32.455	0	0	45	Thurber
	20	20	71	0	6323	179.557	0	0	47	Taylor
W	527	527	53	6020	8000	328.405	0	0	26	Translator
W	14	15	0	0	0	330.252	0	0	11	KHuber
	134	134	96	4011	8000	352.445	0	0	63	Backup
	49	50	43	0	8000	525.617	0	0	25	RHart
	60	61	43	0	8000	417.863	0	0	18	Spier

r 1515 5.108 38+218

rzd scs 200
200 600000000000
r 1516 1.547 3+64

ppm -all
Pre-paging mode is ON.
r 1516 .527 7+22

hmu

Multics 14.6b, load 47.5/51.0; 46 users

r 1516 .284 7+13