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MASSACHUSETTS INSTITUTE OF TECHNOLOGY

PROJECT MAC

Reply to: Project MAC
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Telephone: (617) 253-6016

April 1, 1975

Mr. Robert Scott, Director
Information Processing Services
Room 39-565

Dear Bob:

In our last meeting, we disagreed about the current utilization of Multics, especially the amount of revenue-producing use. I have reviewed my source data and tried to develop a systematic (perhaps a little oversimplified) analysis of Multics use for the last three months; I would like to receive your opinion of my analysis. There is a problem that the Multics accounting system does not directly produce the numbers I was interested in--they must be calculated from reported figures and in some cases estimated.

My method of calculation is to identify, on the one hand, cpu hours of directly charged use by paying customers, and on the other, cpu hours of directly charged use by IPC/PDO users who are doing system programming and extra maintenance due to HISI development. Then, on the assumption that all other cpu use (daemons, paging, operations and accounting, minimum maintenance) is supporting those two activities proportional to their use, I derive total hours of cpu time in revenue support and total hours in non revenue support. I then calculate utilization on the basis that no more than 40 cpu hours per day could be obtained with round-the-clock operation of 2 cpu's.

This calculation, detailed in the enclosed pages, yields the following utilizations:

	Jan, 1975	Feb, 1975	March, 1975
in revenue use	18%	15%	15%
in non revenue use	8%	5%	5%
not used	74%	80%	80%

As you have pointed out, one could never expect to develop 100% utilization, but if one took 60% utilization as a "full" machine, then

in January the machine was 1/3 filled by paying customers, and in February and March it was 1/4 filled by paying customers. It is on the basis of this calculation that I made the statement that 3 to 4 times as many paying customers could be supported by the present configuration. Please let me know if there is another interpretation of the source data which supports a radically different conclusion.

Thanks for your help in gathering the information.

Sincerely yours,

Jerome H. Saltzer
Associate Professor
Head, Computer Systems Research Division

JHS/mw

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January, 1975 Multics usage, in cpu hours

Direct use by

Paying customers	88 hr.	70%
Non paying IPC/PDO	38 hr.	30%
	126 hr.	100%

Support use

Daemons	48 hr.	
Operations and Maintenance	10 hr. (est.)	
Paging and interrupt time	121 hr.	
	179 hr.	x 70% = 125 hr.
		x 30% = 54 hr.

Total revenue support	88 + 125 = 213 hr.
non revenue support	30 + 54 = 92 hr.

Utilization 40 hr/day x 30 days = 1200 hr.

$\frac{213}{1200}$ = 18% in revenue use

$\frac{92}{1200}$ = 8% in non revenue use

$\frac{895}{1200}$ = 74% not used

February, 1975 Multics usage, in cpu hours

Direct use by

Paying customers	73 hr.	76%
Non paying IPC/PDO	23 hr.	24%
	96 hr.	100%

Support use

Daemons	33 hr.	
Operations and Maintenance	10 hr. (est.)	
Paging and interrupt time	79 hr.	
	122 hr.	x 76% = 93 hr.
		x 24% = 29 hr.

Total revenue support	73 + 93 = 166 hr.
non revenue support	23 + 29 = 52 hr.

Utilization 40 hr/day x 28 days = 1120 hr.

$\frac{166}{1120}$ = 15% in revenue use

$\frac{52}{1120}$ = 5% in non revenue use

$\frac{902}{1120}$ = 80% not used

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March, 1975 Multics usage, in cpu hours

Direct use by

Paying customers	77 hr.	76%
Non paying IPC/PDO	24 hr.	24%
	101 hr.	100%

Support use

Daemons	29 hr.
Operations and Maintenance	10 hr. (est.)
Paging and interrupt time	80 hr.
	119 hr. x 76% = 90 hr.
	x 24% = 29 hr.

Total revenue support	77 + 90 = 167 hr.
non revenue support	24 + 29 = 53 hr.

Utilization 40 hr/day x 28½ days = 1140 hr.

$\frac{167}{1140}$ = 15% in revenue use

$\frac{53}{1140}$ = 5% in non revenue use

$\frac{920}{1140}$ = 80% not used