RESOURCE CONTROL AND ACCOUNTING ON CALL TSS

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I Resources. This section details the various physical and logical divisions of the hardware resources. An attempt is made to explain the rationale of control and the units of control for each category. Broadly speaking, control of various resources is necessary for the smooth operation of the system, independent of considerations of revenue,,while access to other resources is limited only by the user's ability to pay for them.

A) CPU time. The CP is apportioned among active users according to their individual weights. (The scheduling algorithm is not discussed here.) CP time is potentially the system's most precious resource and is accounted in units of micro-seconds consumed.

B) Central memory. Because the system architecture keeps only one process in CM at any given time, the only limit is the number of physical cells available. Charges for CM arise only indirectly in the form of CP time consumed in swapping.

C) PP time. The system has no mechanism of charging specific PP tasks to a given user, so PP utilization is on the house.

D) ECS. Extneded core storage is really the system's "working memory". It is a precious resource and its orderly utilization is crucial to smooth operation of the system. When a user is active, the objects he is referencing must reside in ECS. These active objects are divided into two categories for control purposes, those which can be moved out on to the disk to free space in a pinch, and those which cannot. These are refferred to, respectively, as

1) Swapped ECS

2) Fixed ECS

NOT SPACE

and are controlled separately. ECS is controlled in units of words and is accounted for in units of words*micro-seconds/1024.

E) Disk storage. The disk serves as storage for files and is divided into

1) Permanent disk space

2) Temporary disk space.

[redacted]

I E) Disk storage (cont). Into permanent disk space are stored those files which are supposed to persist in the system from one user run to another. Temporary space is allocated to the user when he logs on and is destroyed when he logs off. The 8,000,000 words of disk are (statically?) divided about 50-50 between the two uses. Thus, if the system had 1000 subscribers, there would be 4000 words of permenent storage apiece.

Units -

F) Peripheral equipment.

Main 200 terminals by next year

administrative DP

classes

pre enrollment

real time 5-10 ms.

agreed to 100 ms response most of the time, but ~~every~~ every 30 min or so may hang for 1-2 seconds

(1) Disk $\frac{1}{40}$ $400 000 $

10,000 $/mo

16×10^6 words on disk

3[$]000 512 word/records

10,000 $/mo

.33 ¢/record/mo disk

(2) ECS ~~$ / 40~~ 1M $

+ 25,000 $ ~~/word~~ mo

~~1000 $/word/day~~

~~40 $/word/hour~~

~~40 × 5000 $ word/hour~~

~~25000~~

100 5K blocks

250 $/5K blocks/mo

10 $/5K blocks/~~day~~

(3) 10$/CPU/second

Accounting

A) Global (201 Campbell Hall considerations)

1) Attached to each user are 2 quantities:

a) amount he is willing to be responsible for; he is to be terminated if he tries to spend more

b) a "warning level"; when his expenditures pass this level, the user is informed & has to do something special in order to continue. What was is done must be ~~feasible from~~ doable from the TTY; perhaps just answer "YES" to a query from the accounting routine.

2) It should be possible to calculate charges for a wide variety of resources

a) CPU time
b) ECS space
c) Disk space
d) tape mounting & tape drive time
e) pages output on the line printers
f) others - please explicitly add any that interest you
g) connect time

3) Users should have some fairly flexible priority scheme ~~as far~~ for CPU access. CPU usage is charged at a rate ~ priority.

a) If a user is authorized to run with a high priority, p, he should be able to switch among priorities $\leq p$ at will from the ~~console~~ TTY

b) a "garden variety" user should be able to command a higher-than-normal priority for some small fraction of his allowable expenditures

4) ~~Control of "sub-users"~~ Local control. It is desireable to be able to enforce certain limits on an individual logged on under a ~~certain~~ given job number. ~~which~~ These limits may be well below the resources commanded by the job number perse. The outstanding example is a class job number.

a) Limit the CPU time for any single log on or the number. This prevents a student from burning the entire resources of a class by accidentally hanging in a loop

b) Limit the permanent disk-space that can be created at a setting

B) The problem of stopping at a given limit. Basically, if you let a guy burn his resources right up to the limit, do you callously destroy his disk files which would otherwise accrue deficit charges by occupying disk space? Probably you don't want to do that. On the other hand, if you hedge his expenditures to cover his ~~permanent~~ continuing charges, it's

a) hard

b) you may leave him with some money he can't spend

Roughly, ∃ 3 kinds of charges

1) immediate, ie CPU time + tape hanging
2) continuing, ie permanent disk space
3) delayed, ie leaving stuff to be printed later.