RESOURCE CONTROL AND ACCOUNTING ON CALL TSS

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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) **CPM 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 the only limit is the number of physical cells available. CM at any given time, 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.** Extended 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 referred to, respectively, as

1) **Swapped ECS**

2) **Fixed ECS**

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.
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 permanent storage apiece.

Units -

F) Peripheral equipment.
claim 200 form with by next year

administrative DP

classes

pre-enrollment

real time 15-10 min

got 100 me response most of the time but 30 min or so my hang for 1-2 records
1. Disk
   - $400,000
   - $10,000/mo
   - $16 \times 10^6$ words on disk
   - $333$ $512$ words/records
   - $10000$ $$/mo
   - $33$ $$/record/mo disk

2. ECS
   - $114$ $\$/month
   - $25000$ $$/mo
   - $1000$ $$/day
   - $40$ $$/hour
   - $40 \times 5000$ $$/word/hour
   - $25000$
   - $100$ $5K$ blocks
   - $250$ $$/5K$ blocks/mo
   - $10$ $$/5K$ blocks/day
   - $10$ $$/CPU/second

3.
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 fall this level, the user is informed and has to do something special in order to continue. Whatever is done must be feasible from the budget; 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) EDS space
   c) Disk space
   d) Tape mounting / Tape drive time
   e) Page output on the line printer
   f) Others - please explicitly add any that interest you
   g) Connect time

3) Users should have some fairly flexible priority scheme for CPU access.
   CPU usage is charged at a rate proportional to priority.
   a) If a user is authorized to run with a high priority, he should be able to advance among priorities as he will from the console
   b) A "garden variety" user should be able to command a higher-than-normal priority for a small fraction of his allowed expenditures
4) Control of "hard" task resources:

It is desirable to be able to enforce certain limits on an individual logged on under a certain group job number. These limits may be well below the resources commanded by the job number per se. 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 letting in a loop.

b) Limit the permanent disk space that can be created at a sitting.

B) The problem of topping at a given limit. Basically, if you let a guy have his resources right up to the limit, do you callously destroy his disk files which would otherwise accrue defense charges by occupying disk space? Probably you don't want to do that. On the other hand, if you hedge him against charges by covering his charge, it's

1) hard
2) you may leave him with some money he can't spend

Roughly 3 kinds of charges:

1) immediate, i.e. CPU time - top hanging
2) continuing, i.e. permanent disk space
3) delayed, i.e. having stuff to be printed later.