UNIVERSITY OF EAST ANGLIA
COMPUTING CENTRE

GEORGE 3/4 INTEGRAL ACCOUNTING SYSTEM

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1.0 Description

In standard GEORGE there are two possible accounting mechanisms for jobs, a simple built in system or a user written journal accounting program (JAP). The disadvantage of the built in system is its simplicity. It only allows job costing according to JOBTIME used. The disadvantage of a JAP is that the user has to wait and probably run another job before finding out the cost of the previous one. For example at UEA the JAP is run about once an hour.

An integral accounting system (IAS) has been designed to combine the advantages of both systems. There are some restrictions as described in Section 3.0. It is still necessary to run a periodic JAP type program to account for events which happen before and after the job is run (offline input and output) and to produce user group reports etc.

Although IAS has been written to perform according to the algorithm used by the established UEA JAP, it is easily modified by redefining preset charging coefficients for each resource item considered.

The items reported at ENDJOB time which are available for possible charging are listed below. They include standard data as well as the newly introduced items.

1.1 Resource items available for charging

JOBTIME	requested and used.
MAXSIZE	requested and used.
MAXQUOTA	requested and used (G4).
JOBTIME	used in predefined core slots.
FILESTORE	traffic.
EXOFILE	"
MAG.TAPE	"
COMMAND ISSUER	"
INTER-PROCESSOR	"
EDITOR	"
PAGING	" (G4)

FILE RETRIEVE COUNT - separate count for ARCHIVE files.

JOB ELAPSED TIME

ONLINE PERIPHERALS ELAPSED TIME

LISTFILE REQUESTS

MAXIMUM ONLINE BACKING STORE USED

URGENCY

2.0 EXAMPLE OUTPUT

```
END OF MACRO
JOB ABANDONED : WAITTIME EXCEEDED
MAXIMUM ONLINE BS USED 38 KWORDS
JOB REQUESTED JT = 1800 SECS, AND USED 112 SECS.
JOB REQUESTED MZ = 40960 WORDS AND USED 40960 WORDS
TIME(S)<CORE(KWORDS)> USED 3<0-20K>,0<20-40K>,102<40K->
DISC FILESTORE TRAFFIC 4005 TRANSFERS
DISC EXOFILE TRAFFIC 6818 TRANSFERS
MAGNETIC TAPE TRAFFIC 6577 TRANSFERS
COMMAND ISSUER TRAFFIC 0 TRANSFERS
INTER PROCESSOR TRAFFIC 0 TRANSFERS
0 FILES RETRIEVED INCLUDING 0 ARCHIVE FILES
EDITOR TRANSFERS 0
JOB ELAPSED TIME 0 HRS 16 MINS
UNIT DA61 ONLINE FOR 14 MINUTES
UNIT MT31 ONLINE FOR 7 MINUTES
UNIT DA51 ONLINE FOR 8 MINUTES
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       ITEM              COST
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  JOB HANDLING        =     3
  LISTFILE REQUESTS   =     2
  PROCESSOR/STORE     =    64
  PERIPHERAL TRAFFIC  =    87
  ONLINE PERIPHERALS  =   136
                TOTAL =   292
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ELAPSED TIME LIMITED COST 246
COST ESTIMATE 246 : BALANCE ESTIMATE 25106 : BUDGET 11135
19.29.06 1.52 FINISHED : 1 LISTFILES
```

Notes

(i) Items having zero cost are not featured in the table.

(ii) The system is currently running passively alongside the UEA JAP which is why the final message reads COST ESTIMATE.

3.0 RESTRICTIONS

(1) HLS cannot put NEEDS data onto the JOBQ.

(2) Data collected before a job is SAVED by HLS is not retained. The job start date and time is reset when the job is UNSAVED. Elapsed times reported do not therefore include the SAVED time.

(3) INPUT before the job starts and OUTPUT after the job finishes cannot be accounted for. These items must either be recorded by a JAP program or be the subject of separate built in accounting code. Local modifications to GEORGE already have this potential.

Restrictions (1) and (2) above could be lifted.

4.0 Technical Details

Data is collected on a 40 word extension to the JOBQ block for each job running. LOGOUT goes DOWN TO ACCOUNTS for analysis of the data.

4.1 CHAPTERS EDITED AND REASON

LOGOUT	DOWN to ACCOUNTS
ACCOUNTS (NEW)	Reporting job statistics and calculating job cost.
RELPER))	Peripheral online time and transfer counts
PUTPER)	(DOWN to ONLACC if online).
ONLACC (NEW)	For online peripheral elapsed time calculations.
SETJOBQ) UNSAVE)	Set up the JOBQ extension and save the job started date and time.
EDITOR	Save transfer counts.
LOADPROG) CORE) GIVE) PROSTART)	Down to COREACC (for calculation of time/core usage in predefined core slots) each time a core image is changed in size.
COREACC (NEW)	
SCHEDENX	File retrieval accounting.

4.2 EXTENSION TO JOBQ BLOCKS

The following universals define the length and format of the JOBQ extension.

AUEAEXTJB = 40 for a 40 word extension.

AUEAJBLK = AMILLP+1 (G3) defines the first word of
= AMILLP+3 (G4) the extended block.

4.3 RESOURCE USAGE WORDS

Universals

AUEAIPU	=	AUEAJBLK+8	IPC traffic
AUEACIU	=	" +9	*CI traffic
AUEAFSU	=	" +10	Filestore traffic
AUEABSU	=	" +11	Exofile traffic
AUEAMTU	=	" +12	Mag. Tape traffic
AUEAFRU	=	" +13	Total files retrieved
AUEAAFRU	=	" +14	Archived files retrieved
AUEAEDU	=	" +15	Editor transfers
AUEAJBSD	=	" +16	Job start date
AUEAJBST	=	" +17	Job start time
AUEAMZU	=	" +18	MZ used
AUEAPTU	=	" +19	Pageturns (G4)
AUEAOLU	=	" +20	Online unit table
AUEACORU	=	" +32	Processor/store usage table
AUEAMULTF	=	" +36	Urgency multiplying factor
AUEADIVDF	=	" +37	Urgency dividing factor
AUEAJBTI	=	" +38	Time used since last
AUEAJBTI+1		+39	core review (ms)

4.4 ONLINE UNITS TABLE

There is a three word entry for each online peripheral up to a preset limit of four units. Events for additional units are ignored.

AUEAOLC = 4 defines the table length (4 x 3 words).

```
WO UNIT.GEOG.NO.
W1 TIME ONLINED (K9s)
W2 ACCUMULATED ELAPSED TIME (K9s)
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Note that peripheral transfers are accumulated separately.

4.5 PROCESSOR/STORAGE USAGE TABLE

AUEACORU	time used	slot 1
AUEACORU+1	time used	slot 2
AUEACORU+2	time used	slot 3
AUEACORU+3	unused	

The slot size used is preset in COREACC. When the jobs core image is changed in size COREACC increments the time used in the appropriate core slot and resets the base time in (AUEAJBTI, AUEAJBTI+1) ms.

4.6 TOTAL CHARGE WORDS

Universals

	AUEAWJB	=	AUEAJBLK	job handling
	AUEAWLF	=	" +1	listfile requests
*	AUEAWMS	=	" +2	processor/store
*	AUEAWPT	=	" +3	pageturns
*	AUEAWFT	=	" +4	peripheral traffic
	AUEAWFR	=	" +5	archived file retrieval
*	AUEAWOL	=	" +6	online units

* 'variable' charge rate applied depending on URGENCY.

4.7 CHARGING COEFFICIENTS AND CHARGING RATES

Universals

AUEACJB	= 3	job handling
AUEACLF	= 2	per listfile request
AUEACMS	= 3	core/mill per 'slot' per 10s.
AUEACPT	= 3	per 100 pageturns if > 'limit'
AUEACFT	= 8	per 1000 filestore transfers
AUEACFR	= 10	retrieval of an archived file

NOTES

i) 'slot' is preset to the desired value in COREACC (20K at UEA).

ii) 'limit' is preset to a limiting core size in ACCOUNTS. Core images below 'limit' are not charged for paging.

iii) Online peripheral charging is based on the elapsed time in use together with a fixed charge for 'handling' which depends on the peripheral type. A preset table in ACCOUNTS defines the fixed charge and the charge rate per minute of elapsed time. This table could be altered by a restore tim mend.

iv) Urgency is related to a multiplying factor and a dividing factor by a preset table in ACCOUNTS. These factors are applied to resource charges which are declared to be 'variable'.

v) The total cost of a job is limited by an elapsed time rate of a preset number of units per minute. If the cost of a job is calculated to exceed the elapsed time limit then the elapsed time cost is charged to the user.