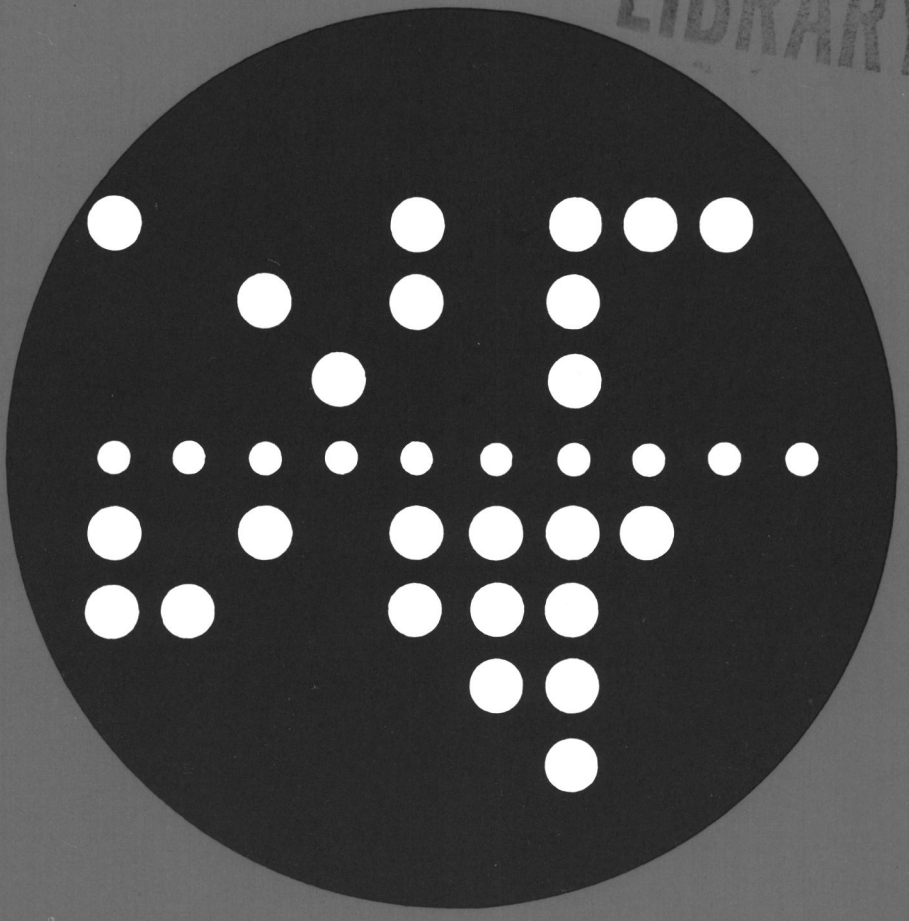
COMPUTING CENTRE NEWSLETTER

November 1980 - N. **46**



Commission of the European Communities

JOINT
RESEARCH
CENTRE

Ispra Establishment

CONTENTS

EDITORIAL NOTE

The Computing Centre Newsletter is published monthly except for August and December.

It describes developments, modifications and specific topics in relation to the use of the computing installations of the Joint Research Centre, Ispra Establishment.

The aim of the Newsletter is to provide information of importance to the users of the computing installations, in a form which is both interesting and readable.

The Newsletter also includes articles which are of intellectual and educational value in order to keep the users informed of new advances in computer science topics.

Administration and contact address:

Ms. A. Cambon (tel. 730)
Support to Computing
Building 36
J.R.C. Ispra Establishment
21020-ISPRA (Varese)
Italy

Plus de Mémoire Centrale à Disposition

J. Pire

Dans le courant du mois d'octobre, la possibilité d'accès à de nouvelles classes de travaux a été annoncée.

Nous rappelons que les classes actuellement disponibles sont:

Mémoire	Travaux C.P.U. Bound	Travaux I/O Bound
100 K	1	A
200 K	2	B
300 K	3	C
400 K	4	D
600 K	5	E
800 K	6	F
1000 K	7	G
1200 K	8	H
1400 K	9	I
2000 K	J	
3000 K	K	
4000 K	L	

Nous rappelons également que les travaux C.P.U. bound sont ceux où l'utilisation de l'unité centrale est prépondérante par rapport à l'utilisation des unités périphériques (disques, bandes, imprimantes).

Le type du travail (C.P.U. bound ou I/O bound) est d'ailleurs imprimé sur les listes correspondant à chaque exécution. Nous demandons à nouveau aux utilisateurs de tenir compte de ces informations lors de passages ultérieurs d'un même programme.

Si les indications varient de passage à passage (travaux à la limite entre les 2 types) il convient d'opter pour travaux I/O bound.

Par ailleurs nous avons constaté que de gros programmes de type scientifique devenaient I/O bound par suite de la structure à overlay imposée par le manque de mémoire et étaient exécutés par conséquent en classe I.

Nous espérons que la mise à disposition des nouvelles classes J, K, L permettra de supprimer les structures compliquées d'overlay, de rendre ces programmes à leur veritable type (C.P.U. bound) et de raccourcir ainsi notablement les temps d'exécution.

Nous nous excusons de l'incohérence dans la manière de désigner les classes, produite par l'introduction des 3 nouvelles.

Jusqu'à présent les classes à désignation numérique (1 a 9) concernaient les applications du type calcul scientifique et les classes à désignation alphabétique (A a I) les travaux du genre traitement de masses de données.

La nécessité de n' utiliser qu'un seul caractère pour désigner une classe nous a forcé à étendre par des lettres (J, K, L) les classes pour travaux du type scientifique. Nous avons préferé cette solution a celle consistant à changer la désignation des classes existantes et de forcer tous les utilisateurs a modifier toutes leur cartes $ CLASS.

Errata Corrige

1. There is an error in the Newsletter N. 45 (October 1980), page 6,the second line should read:

   "This example shows the use of the NAG double precision library"

2. There is an error in the Newsletter N. 45 (October 1980), page 10, the specification of the FIELD subcommand should be as follows:

   FIELD [pos-1 [pos-2 | *]] [ON | OFF] [TRUNC | NOTRUNC] [LIST | NOLIST]

Modifications to the Utilization Algorithm for the AMDAHL 470/V7A

J. Pire

In article "Un Nouvel Ordinateur a Ispra" (Newsletter N. 43, July 1980) it was said that, following the bench-mark tests, we were lead to hope that the improvement in the performance of the central processing unit (CPU) of the new AMDAHL 470/V7A computer system would be of the order of a factor of 4. This should indeed be the case when we are able to execute the computer workload using exclusively the MVS operating system.

The bench-mark tests have now been re-executed using the current operating system (MVT). For these tests the increase in performance varied considerably from job to job. However, the increase in performance was always at least by a factor of 2. Therefore, to avoid any undesirable problems for the users, we have decided to use a multiplicative coefficient of 2 for the CPU time (which is one of the parameters of the charging algorithm).

From 1st September 1980 the charging algorithm has been as follows:

For Batch Jobs

$$T_f = K_0 \times T_{CPU} + K_1 \times (IO_D + IO_T)$$

$$+ 1.2 \times MEM \times (K_2 \times IO_T + K_3 \times IO_D)$$

$$+ K_4 \times MEM \times T_{CPU}$$

For TSO

$$T_f = 1.5 \times (K_0 \times T_{CPU} + K_1 \times IO_D + 0.009 \times T_C + 0.001 \times NL)$$

where:

T_f = The charged "time" (in "equivalent hours")

T_{CPU} = The CPU time used (in hours)

IO_D = The number of Input/Output operations for disks

IO_T = The number of Input/Output operations for magnetic tapes

MEM = The requested memory size in megabytes

T_C = The connect time in hours

NL = The number of "logons"

K_0 = 2

K_1 = 2×10^{-6}

K_2 = 3×10^{-6}

K_3 = 7×10^{-6}

K_4 = 1.2

The availability of 8 Megabytes of main storage on the AMDAHL 470/V7A enables us to exploit more fully the increased speed of the CPU of the system and also allows us to accept scientific programs which need large amounts of main storage.
So, large programs may now be executed without the necessity of performing the time consuming process of program "overlaying". Also, it may be more efficient to remove the use of overlays in existing programs and execute them using a larger region of store. In this way many programs which were previously "I/O bound" (due to overlaying), will become "CPU bound".

The charging algorithm in its present form (see previous section) treats such large store, CPU bound jobs in an unaceptable manner.

Therefore, from 1st January 1981 the charging algorithm (as given in the previous section) will be modified as follows:

For Batch Jobs

$$T_f = K_0 \times T_{CPU} + K_1 \times (IO_D + IO_T)$$

$$+ 1.2 \times MEM \times (K_2 \times IO_T + K_3 \times IO_D)$$

$$+ \boxed{K_4' \times MEM \times T_{CPU}}$$

For TSO
(No change)

$$T_f = 1.5 \times (K_0 \times T_{CPU} + K_1 \times IO_D + 0.009 \times T_C + 0.001 \times NL)$$

[Where K_0, K_1, K_2, K_3, T_f, T_{CPU}, IO_D, IO_T, MEM, T_C, NL are as before].

The only change is for batch jobs in the term shown in $\boxed{\quad}$.

This term now becomes a composite summation term dependent on the memory size requested.

K_4' = 1.2 for the part of the memory requested in the range $0 < MEM \leq 0.6$Mbytes
= 0.6 for the part of the memory requested in the range $0.6 < MEM \leq 1.6$Mbytes
= 0.3 for the part of the memory requested in the range $1.6 < MEM \leq 2.6$Mbytes
= 0.15 for the part of the memory requested in the range $2.6 < MEM \leq 3.6$Mbytes
= 0.075 for the part of the memory requested over 3.6Mbytes

This composite term is formed by the summation of the individual elements. For example, if a job which requested 3.2Mbytes of store, used 1.0 hours of CPU, then the composite term would be:

$$1.0 \times (1.2 \times 0.6 + 0.6 \times 1.0 + 0.3 \times 1.0 + 0.15 \times 0.6) = 1.71$$

T_{CPU} $K_{4(1)}'$ $MEM_{(1)}$ $K_{4(2)}'$ $MEM_{(2)}$ $K_{4(3)}'$ $MEM_{(3)}$ $K_{4(4)}'$ $MEM_{(4)}$

Note. The control on the "time" used by a batch job (i.e. as specified by the user in "$ TIME") does not make use of the charging algorithm as specified above, but the algorithm:

$$T_E = T_{CPU} + (K_2 \times IO_T + K_3 \times IO_D)$$

users should keep this in mind when estimating their job time.

Examples of Job Charging

TSO usage

Consider a user who has:

a) logged on 100 times (NL=100)
b) had 20 hrs connect time (T_C=20)
c) used 0.2 hrs CPU (T_{CPU}=0.2)
d) performed 20000 I/O disk transfers (IO_D=20000)

$$T_f = 1.5 \times (2 \times 0.2 + 2 \times 10^{-6} \times 20000 + 0.009 \times 20 + 0.001 \times 100) = 1.08 \text{ "hours"}$$

(T_{CPU}, IO_D, T_C, N_L)

Batch Usage

Example 1

Consider a job which:

a) requests 2.0 Megabytes of store (MEM=2.0)
b) uses 0.5 hours of CPU (T_{CPU}=0.5)
c) performs 2000 disk transfers (IO_D=2000)
d) performs 1000 magnetic tape transfers (IO_T=1000)

$$T_f = 2 \times 0.5 + 2 \times 10^{-6} \times (1000 + 2000) + 1.2 \times 2.0 \times (3 \times 10^{-6} \times 1000 + 7 \times 10^{-6} \times 2000)$$

(T_{CPU}, IO_T, IO_D, MEM, IO_T, IO_D)

$$+ 0.5 \times (1.2 \times 0.6 + 0.6 \times 1.0 + 0.3 \times 0.4)$$

(T_{CPU}, $\sum K_i' \times MEM$)

$$= 1.0 + 6 \times 10^{-3} + 40.8 \times 10^{-3} + 0.5 \times 1.44 = 1.7668 \text{ "hours"}$$

The job time evaluation estimate (i.e. "$ TIME" to be requested):

$$T_E = 0.5 + 17 \times 10^{-3} = 0.517 \text{ "hours"} = 31 \text{ "mins"}$$

Example 2

Consider a job which:

a) requests 1.4 Megabytes (MEM=1.4)
b) uses 0.5 hours of CPU (T_{CPU}=0.5)
c) performs 32000 disk transfers (IO_D=32000)
d) performs 1000 Magnetic tape transfers (IO_T=1000)

$$T_f = 2 \times 0.5 + 2 \times 10^{-6} \times (32000 + 1000)$$

$$+ 1.2 \times 1.4 \times (3 \times 10^{-6} \times 1000 + 7 \times 10^{-6} \times 32000)$$

$$+ 0.5 \times (1.2 \times 0.6 + 0.6 \times 0.8)$$

$$T_f = 1.0 + 66 \times 10^{-3} + 1.68 \times (227 \times 10^{-3}) + 0.60 = 2.04736 \text{ "hours"}$$

Time to be requested:

$$T_E = 0.5 + 227 \times 10^{-3} = 0.727 \text{ "hours"} = 44 \text{ "mins"}$$

****
* NOTE *
****

Users are asked to pay attention to the fact that there may be changes to their output "box" number from the beginning of January 1981.
Each user will receive notification of this change before the Christmas holidays.

QED Notes(3)

M. Dowell

QED provides abbreviations for commonly used sequences of QED subcommands.
These subcommands, which are not available using the normal EDIT subcommands, allow the abbreviation of certain individual subcommands and, in some cases, the composition of two subcommands into one new facility.
The following table gives lists of various subcommand sequences and valid abbreviations.

QED Subcommand Sequence	Valid Abbreviation
DOWN nnn	+nnn
UP nnn	-nnn
L * KKK	/KKK
DOWN nnn L * kkk	+nnn/kkk
UP nnn L * KKK	-nnn/kkk
TN FIND find-parms	FT find-parms
TN C * 99999 change-parms	CT change-parms

Therefore, for example, to change all of the occurrences of a string "abc" in a dataset to "def" starting from the top the user may type:

```
CT /abc/def/ all
```

Instead of:

```
TN
C * 99999 /abc/def/ all
```

STATISTICS OF COMPUTING INSTALLATION UTILIZATION
REPORT OF COMPUTING INSTALLATION EXPLOITATION
FOR THE MONTH OF OCTOBER 1980.

	YEAR 1979	YEAR 1980	
General			
Number of working days	23 d	23 d	
Work hours from 8.00 to 24.00 for	16.00h	16.00h	
Duration of scheduled maintenance	26.84h	22.67h	
Duration of unexpected maintenance	23.00h	18.17h	(1)
Total maintenance time	49.84h	40.84h	
Total exploitation time	318.16h	327.16h	
CPU time in problem mode	169.04h	320.72h*	
Batch Processing			
Number of jobs	8523	9005	
Number of cards input	1493900	798000	
Number of lines printed	25907000	28577000	
Number of cards punched	103500	37000	
CPU time	145.29h	288.00h*	
Number of I/O (Disk)	22348000	24304000	
Number of I/O (Magnetic tape)	4954000	4872000	
T.S.O			
Number of LOGON's	3900	5164	
Number of messages sent by terminals	227603	333347	
Number of messages received by terminals	1229793	2243198	
CPU time	21.32h	29.78h*	
Number of I/O (Disk)	2711240	4513000	
Connect time	2591.66h	3002.90h	
IMS			
Total time service is available	210.58h	133.55h	
CPU time	2.43h	2.94h *	
Number of I/O (Disk)	806500	396000	

* Real CPU has been multiplied by a factor of 2 to indicate the increased throughput of the Amdahl.

(1) Covering all the configuration.

UTILIZATION OF COMPUTING CENTRE BY OBJECTIVES & APPROPRIATION ACCOUNTS FOR THE MONTH OF OCTOBER 1980.

		AMDAHL 470/V7A equivalent time in hours
33001	Reactor Safety	256.43
33002	Plutonium Fuel and Actinide Research	16.30
33003	Safety of Nuclear Materials	8.99
33004	Fissile Materials Control and Management	9.65
33005	Super-SARA Test Programme SSTP	42.93
33011	Solar Energy	0.04
33012	Hydrogen Production, Energy Storage and Transport	0.26
33013	Thermonuclear Fusion Technology	57.56
33014	High Temperature Materials	1.56
33021	Protection of the Environment	19.75
33022	Remote Sensing from Space	4.68
33041	Informatics	73.18
33043	Support to the Community Bureau of References	1.18
33044	Training and Education	-
33046	Provision of Scientific and Technical Services	13.19
1.20.1 1.20.2	General Administration - JRC General Services - Administration - Ispra	72.50
1.20.3	General Services - Technical - Ispra	1.72
1.30.3	Central Workshop Ispra	1.65
1.40.2	ESSOR	2.14
	TOTAL	583.71
1.94.0	Services to External Users	20.43
	TOTAL	604.14

Note. This table has been modified to use the new terminology for the designation of the objectives.

BATCH PROCESSING DISTRIBUTED BY REQUESTED CORE MEMORY SIZE

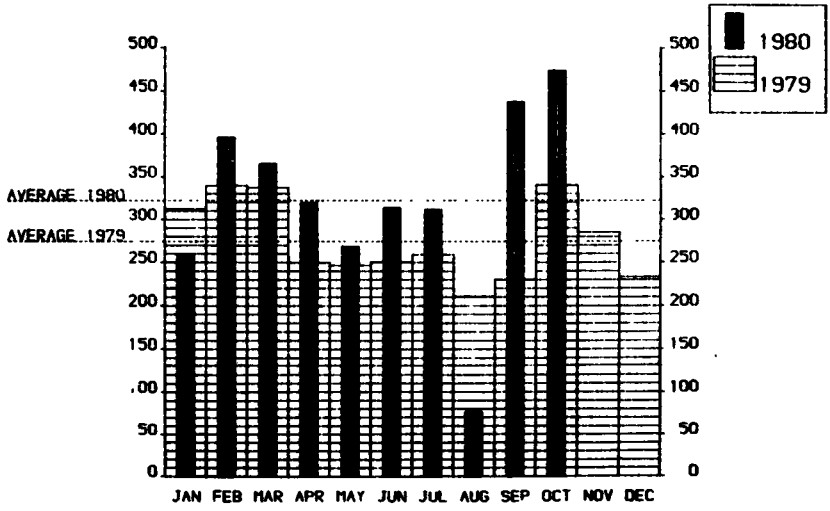
	100 K	200 K	300 K	400 K	600 K	800 K	1000 K	1200 K	1400 K	>1400 K
No. of jobs	2833	2353	1324	1084	504	197	123	24	59	4
Elapsed time	71	183	142	252	83	65	57	12	66	2
CPU time	2.7	51.5	30.7	92.5	18.8	26.4	30.6	6.0	22.1	0.3
"Equiv" time	27	83	58	135	36	32	37	7	35	2
"Turn" time	0.5	1.1	1.3	1.5	1.5	2.0	1.6	2.1	3.1	6.3
I/O (disk)	2266	4038	3843	5809	2361	850	770	170	1807	21
I/O (tape)	2666	963	166	771	200	2	35	8	-	-

NOTE.
All times are in hours.
"Equiv" means equivalent.
"Turn" means turn around.
All I/O transfers are measured in 1000's.

PERCENTAGE OF JOBS FINISHED IN LESS THAN:

TIME	15mn	30mn	1hr	2hrs	4hrs	8hrs	1day	2day	3day	6day
%year 1979	33	47	60	74	89	98	99	100	100	100
%year 1980	40	56	69	82	92	97	99	100	100	100

HISTOGRAM OF TOTAL EQUIVALENT TIME(HRS)



Projected total For 1980 = 3863 Hours(using average)

Total For 1979 was = 3292 Hours

REFERENCES TO THE PERSONNEL/FUNCTIONS OF THE COMPUTING CENTRE

			Room	Tele.
Manager of The Computing Centre		J.Pire		
Responsible for User Registration	Ms.	G.Rambs		
Operations Sector				
Responsible for the Computer Room		A.Binda-Rossetti		
Substituted in case of abscence by:				
Responsible for Peripherals		G.Nocera		
Systems Software Sector				
Responsible for the sector		D.König		
Substituted in case of abscence by:		P.A.Moinil		
Responsible for TSO Registration		C.Daolio		
Informatics Support Sector				
Responsible for the Sector		H.de Wolde	1883	787
Secretary	Mrs.	G.Hudry	1873	787
Responsible for User Support		M.Dowell	1886	701
General Inf./Support Library	Mrs.	A.Cambon	1871	730
Advisory Service/List of Consultants (See Note 1)			1870	730

A.Inzaghi, A.A.Pollicini, R.Meelhuysen, H.I. de Wolde, M.Dowell

NOTE 1. The advisory service is available in the same room as the Computing Support Library (room 1870). Exact details of the advisory service times for a specific week can be found at the head of any output listing (for that week).
Any informatics problem may be raised. However, the service is not designed to help users with problems which are their sole responsibility. For example, debugging of the logic of programs and requests for information which can easily be retrieved from available documentation.
If necessary, other competent personnel from the informatics division may be contacted by the consultant but not directly by the users.
The users should only contact the person who is the consultant for that specific day and only during the specified hours.
Outside the specified hours general information may be requested from Mrs. A. Cambon in the Computing Support Library.

HOW TO OBTAIN COMPUTING CENTRE DOCUMENTATION

Persons interested in receiving copies of the Computing Centre "green books" or in receiving regularly the "Computing Centre Newsletter" are requested to complete the appropriate part of the following form and send it to :-

Ms. A. Cambon

Support To Computing

Building 36

Tel. 730.

Indicate with a (✓) which options are required.

Please add my name to Newsletter mailing list	( )
Please send me copies of the following "green books":	
JRC-TSO Primer	( )
GRAPHIT	( )
Towards a New Programming Style	( )
LIBRARIAN	( )

NAME .....

ADDRESS .....

.....

.....

TELEPHONE .....