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W. R. CHURCH
Computer Center
NEWSLETTER

23 April 1971
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OS JOB CLASS DEFINITIONS--SOME CHANGES

The following revisions to the Job Class definitions will become effective on 1 May 1971. These modifications are being made after a detailed review of the observed effect of the present class structure on turnaround time, total productivity of the system, new services, etc.

Changes include:

- a. highest priority class (A) broadened to include all small, one-step jobs such as WATFOR, SAMOS, ALGOLW, LISP 1.5, and single-step FORTRAN, PL/1, etc.,
- b. increased incentives to reduce job run times, and
- c. a more logical labelling of the classes.

Your job turnaround time clearly depends on its job class--the higher the class the better--and the mixture of classes of jobs run at certain periods of the day. Although the Center has certain standard mixtures defined for each shift, the actual multi-programming load may have to be varied because of configuration constraints (e.g., some hardware unavailable) or an observed shift in workload distribution.

OS/MVT JOB CLASSES AFTER 1 MAY 1971

| CLASS | MAXIMUM CORE | MAXIMUM TOTAL TIME | MAXIMUM TOTAL** SYSOUT (PRINT) (2314 CYLINDERS) | TAPES ALLOWED | 2311 DISKS ALLOWED |
|-------|---|--------------------|---|---------------|--------------------|
| A* | 100K | 20 sec | 6 | NO | NO |
| B | 100K | 20 sec | 16 | NO | NO |
| C | 150K | 20 sec | 16 | NO | NO |
| D | 100K | 4 min | 16 | NO | NO |
| E | 150K | 4 min | 16 | NO | NO |
| F | 250K | 20 sec | 16 | NO | NO |
| G | 250K | 4 min | 16 | NO | YES |
| H | 100K | 4 min | 25 | YES | YES |
| I | 250K | 4 min | 25 | YES | YES |
| J | 350K | 4 min | 25 | YES | YES |
| K | ANY JOB THAT DOES NOT QUALIFY FOR ABOVE CLASSES | | | | |

* Class A will only contain one-step jobs such as WATFOR, SAMOS, ALGOLW, LISP 1.5, and some FORTRAN G, PL/1, COBOL jobs (e.g., compile or execute only).

**Each 2314 cylinder holds approximately 1000 (if blocked) and 520 lines (unblocked) of print.

In addition, any job that also fits the following table will be given a higher execution and print priority than others in the same class.

| CLASS | SYSOUT CYLINDERS | TIME |
|---------|------------------|-------|
| A | 3 | 5 sec |
| B, C, F | 6 | 5 sec |
| D, E, G | 6 | 1 min |
| H, I, J | 10 | 1 min |

Example: Job (120K, 1 min, 3 cylinders) is a high priority class E.

Impact on User

Your job is classified when it is read into the system. The class table is designed so that the majority of the present OS jobs will fall in the most desirable classes. On the other hand, these classes are also intended to reward the user who minimizes his core, time, and print requirements by giving him faster turnaround.

The classes are necessarily restrictive in the use of 2311 disks and tapes because these devices are not available to OS/MVT at certain times of the day. What do you do? Nothing if your job runs in less than 20 seconds CPU time. However, if you expect your job to run for longer than 20 seconds, you must override the TIME parameter for OS jobs by punching on your green JOB card

after all other information:

TIME=mm or TIME=(,ss) or TIME=(mm,ss)

where mm and ss are the number of minutes and seconds (1 - 2 digits), respectively. If you fail to do so, your job will be terminated after 20 seconds worth of CPU time.

After 1 May the TIME overrides in EXEC cards will be ignored. However, the REGION overrides on EXEC cards will still apply.

CONSULTATION SERVICE DATA

During the current academic quarter the programming staff will be collecting data on the volume, nature and origin of questions referred to the consultation service in In-146. This information will assist us in evaluating this aspect of our user services and it will provide records for labor audit purposes. We are asking each customer to fill out the upper portion of a "Consultation Data Card" just before he brings each problem to the consultant on duty. The consultant will fill out the rest of the card and keep it. A supply of cards is available at the door of In-146.

CP/CMS NOTES

Read/Write Access Technical Memorandum

The Center has recently published a memorandum describing commands needed to access files of private users on either a read-share or write-share basis. Use of these techniques can allow optimal utilization of available disk space. Extra copies are available in the Information Services Office, In-147.

P-Disk Initialization

Each private user must issue the following CMS command before he first utilizes his P-Disk space:

FORMAT P ALL

and he must reply YES to the following query:

** "FORMAT P" WILL ERASE ALL YOUR P-DISK (0191) FILES ** **
DO YOU WISH TO CONTINUE? ENTER "YES" OR "NO":

Editing

If a file is being edited or created by EDIT when the system goes down, it may be completely lost. To prevent the updated or new file from being lost, issue the FILE or SAVE request frequently. Files on the permanent disk are as current as they were when the last READY message was typed out.

E8

E8 is a system routine which can be called from a FORTRAN program. It allows the user to OFFLINE PRINT FILE FT08FO01 during program execution and conserve permanent file space. If the user calls E8 more than once, he should issue the CMS command CLOSIO PRINTER OFF prior to executing his program in order to coalesce output files and at the end of execution he should issue the CMS command CLOSIO PRINTER ON to release the file to the offline printer. No parameters are required for this subroutine; the appropriate statement is simply CALL E8.

CLASS PROJECT NUMBERS

We remind users that all project numbers for class work during Quarter III expired on 27 March 1971. If any user continues to run a program generated initially as a class project, he must obtain a new individual project number for such work. Faculty members who teach courses which utilize the computer system must obtain a project number for each such class. These numbers are issued by the Information Services Office, In-147.

OPTIMUM OS REGIONS

During February 1971 the core storage requested by the OS REGION parameter and the core actually used was closely watched. (The core actually used by your job step is listed on the same line as the CPU time in your printed output.) Fifty percent of our users seem to be using this information wisely since they used exactly the amount of core that they requested, but twenty percent of the jobs wasted more than 28K, and ten percent wasted more than 48K of their GO step REGION. When you request more core than you use, this core is not available for anyone else and the net effect is that fewer jobs are processed by the system. You may also penalize yourself by having your job run in a lower priority class than necessary!

The question then arises as to how one can possibly compute the REGION before the job is run the first time. The best way is to ask for a region that the job will obviously run in, and then look at the output and reduce the region on subsequent runs whenever possible.

OPTIMUM PL/1 DECLARATIONS

In PL/1 any variable which does not need dynamic storage allocation should be declared "STATIC." If not, PL/1 asks the system for core each time the procedure is used. Also, it initializes the variables one by one if the INITIAL feature is used. This increases the core requirements of a procedure unnecessarily since initialized dynamic arrays use 26 bytes per array element even when the elements themselves are only four bytes long. The 26 bytes consist of machine code to initialize the elements and this significantly increases the execution time. Example: A program containing an initialized array 60 by 7 was observed to "grow" by over 10,000 bytes when the array was changed from "STATIC" to the default "DYNAMIC"; compile time was doubled, and estimated

execution time (assuming no looping) would have been increased by 900%.

COBOL USERS GUIDE

A guide to COBOL is now available to help programmers to use COBOL more easily at NPS. It contains helpful information on Job Control Language and its relationship to COBOL programs. Additionally, it contains a discussion and checklist of common errors and ideas on debugging to correct them more quickly. The COBOL USERS GUIDE (Technical Note 0211-11) is available from the Manager of Information Services in In-147.

YOUR PERSONAL COPY OF THE SOURCE LIBRARY DIRECTORY

The Directory for IBM System/360 Source Library (Appendix C of the Users Manual) now resides as a data set in the OS system. Any user may obtain a personal copy by submitting the following job:

```
// .....standard green job card.....  
// EXEC LIBDIR  
/* (orange)
```

The past procedures for maintaining the Directory will continue to be followed. All additions, deletions, and revisions since the previous edition will be reported in the Computer Center Newsletter and be printed on the last page of the Directory. The date on the first page will be changed whenever a revised edition is created.

COSMIC LIBRARY

As one result of IBM's unbundling policy, appointment of a third-party distribution agent for the SHARE Program Library became necessary. The Computer Software Management and Information Center (COSMIC), located at the University of Georgia, was selected to serve this function.

The Computer Center will shortly become a subscriber to this service. Each program will cost \$15.00, plus 10¢ per page of documentation.

IBM Type IV (Customer-Contributed) programs have also been transferred for distribution by COSMIC. We are hoping to receive a catalog of all available programs in the near future.

OS FORTRAN-G DEBUG FACILITY TO DETECT ILLEGAL SUBSCRIPTING

One of the most common sources of the "addressing exception" (OC5) error completion code is illegal subscripting. WATFOR users are fortunate in that an illegal subscript is trapped, an error message automatically is generated, both the variable and the illegal subscript value are printed and execution terminates. The FORTRAN-G compiler has a similar facility, but the user must specifically ask for this service and execution will continue regardless of subscript errors.

To request the subscript checking facility the user should insert the following statement

```
DEBUG UNIT(a),SUBCHK(N1,N2...N) [NB. Begins in column 7]
```

in the main program and in every subroutine in which checking for an illegal subscript is desired. The DEBUG statement immediately precedes the END statement. The UNIT option specifies the logical unit to be used for printing invalid subscripts. Any unit other than 5 or 7 is available for use. Normally, most users will desire this output on "6" (FT06F001), but if a unit other than 6 is coded, the user must also furnish a JCL card in the form:

```
//GO.FTOXFOOL DD SYSOUT=A
```

where X is the number used in the UNIT option. If the UNIT option is not specified at all, the standard output data set (FT06F001) is used. The parameters of the SUBCHK option name the particular arrays the user wants to have tested for valid subscripts. If no parameters are coded, all arrays are checked.

Each subscript is tested against the limits specified for the array; only invalid subscripts are printed in the output data set. Program execution continues using the incorrect subscript. Single dimension subscript errors are obvious; however, the invalid subscripts of a multi-dimensioned array are presented as a linear index which is computed as shown below. Here I, J, K represent the actual numbers appearing in a DIMENSION statement and L, M, and N represent current subscript values:

```
DIMENSION A(I,J,K)
```

```
...  
X = A(L,M,N)
```

Then the Linear Index = $(N-1)*(I*J)+(M-1)*I+L$

Example: DIMENSION A(2,3,4)

```
...  
X = A(2,2,2)  
Linear Index =  $1*6+1*2+2=10$ 
```

AVAILABLE COMPUTER CENTER PUBLICATIONS

The following publications are available on a need-to-use basis to users at the Information Services Office, In-147.

1. Users Manual (available to any registered user)
2. CP/CMS Users Guide (obsolete edition--available to anyone)
3. WATFOR Compiler Error Messages (All)
4. Read/Write Access to Private User Files Under CP/CMS (Limited)
5. COBOL Users Guide, TN-0211-11 (Limited)
6. Users Guide to BRUIN Under CP/CMS (Limited)
7. Continuous System Modeling Program on OS (Limited) *CSMP*

In addition, the following items are available for interested users at the Center's Administrative Office, In-130:

1. Plotting Package for NPS IBM/360 (TN-0211-03)
2. User Libraries Under OS (TN-0211-05)
3. LIBREX---Keyword in Context Program (TN-0211-07)
4. Procedure for Converting 7-Track Magnetic Tape to 9-Track Magnetic Tape (TN 0211-08)
5. Runge-Kutta Solution of Ordinary Differential Equations with Built-In Input and Output Routines (INTEG1 and INTEG2)

ADDITIONS TO PROGRAM LIBRARIES

The following subroutines have been added to the statistics library (STATLIB) since the previous edition of the Newsletter:

| | |
|--------|---|
| BMD07D | Description of Strata with Histograms |
| BMD09S | Transgeneration |
| CHISQR | Chi-Square Test for a Contingency Table |
| NONPAR | Mann-Whitney U-Test, Kendall and Spearman Rank Correlations |

The following subroutines have been added to SSPLIB under CP/CMS since the last edition of the Newsletter:

| | |
|--------|--|
| ALLMAT | Eigenvalues and -Vectors of Arbitrary Complex Matrix |
| DALMAT | Eigenvalues and -Vectors of Arbitrary Complex Matrix, Double-Precision |
| DIRECT | Minimization of Function by Direct Search (Hooke and Jeeves) |
| DLSQ | Least-Squares Solution, Linear Over-Determined System |
| DMINV | Matrix Inversion and Determinant, Gauss-Jordan, Double Precision |
| DSIMQ | Simultaneous Linear Equation Solver, Double Precision |
| GIVHO | Eigenvalue/Vectors of Real, Symmetric Matrix, Givens-Householder |
| LSQPL2 | Least Squares Polynomial Fitting (Even or Uneven Intervals) |
| NEWRA | Roots of Complex Polynomial by Newton-Raphson |
| SINV | Invert Symmetric Positive Definite Matrix |
| DSINV | Ditto in Double Precision |
| SURFIT | Least Squares Surface Fit with Orthogonal Polynomials |
| ZACF | Zeros of an Arbitrary Complex Function (Traub's Method) |

UPDATE 3 TO USERS MANUAL

Each registered owner of the Users Manual should have received a copy of the Update 3 packet. If you have not, see the Information Services Manager, In-147. Please note that Update 2 was cancelled.

DISTRIBUTION

List 4

Less D-2, D-3, D-4, D-5, E
F, F-1,
F-4, F-5, F-6

2 copies to B-3

50 copies to B-2