

PROGRAMMING STAFF NOTE 47 A

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SUBJ: Supervisor Calls to the I/O System

Purpose

Some calls to the I/O routines are available only to the supervisory system. The following is an attempt to explain the usage of these calls.

Usage

The first call to the file system must be IOINIT:

IOINIT. (ERRLOC, DATLOC, TIMLOC, ENBLOC)

This program must be called only once (each time CTSS is brought up) to initialize the I/O system.

ERRLOC: location of general I/O error program to be used when a call to an I/O routine specifies no error return.

DATLOC: location containing today's date.  
\*

ENBLOC: location containing enable bits.

Before any user (including CTSS) can use the I/O routines a call must be made to USTAT:

USTAT. (Y(N)...N, Q1...Q1L, Q2...Q2L, ..., QN...QNL)

USTAT informs the I/O routines of the location of blocks of storage to be used in servicing this user. USTAT initializes these blocks by storing zero in the first location of each. If Q1L is zero, all attempts to use device "c" will be ignored but location Q1 will still be zeroed.

Y(N)...N will be used to store all information pertaining to this user including a list of his active files.

Q1...Q1L will be used for queueing I/O requests for the 1th device.

In order to set all user options which govern calls to the I/O routines, SETUSR must be called:

\* TIMLOC: location containing current time.

SETUSR. (DUSER, RCODE, AUTHNO, LIMITS, RELLOC, PRIOR)

SETUSR sets the I/O system to operate for CTSS (DUSER=1) or current CTSS user (DUSER=2) and sets the user's options. The I/O system must have this information before it can operate properly for a user.

DUSER user number.

RCODE user's restriction code.

AUTHNO author number for files this user will create (binary representation of user's programmer number, usually).

LIMITS protection limits of user.

RELLOC user's relocation register.

PRIOR user's I/O priority; priority of CTSS is 1; priority of a user is 2.

Error code:

03. illegal user number

To set the file system to operate for a user without setting options for that user, a call can be made to CHNGUS:

CHNGUS. (DUSER)

Error code:

03. illegal user number

Since user options are stored in a block specified by USTAT, they cannot be set before USTAT is called. The order of calls to initialize I/O for a user therefore is

CHNGUS. (DUSER)  
 USTAT. (Y(N)...N, Q1...Q1L, Q2...Q2L, ..., QN...QNL)  
 SETUSR. (DUSER, RCODE, AUTHNO, LIMITS, RELLOC, PRIOR)

To set the supervisor interrupt procedure, a call can be made to SETRAP:

SETRAP. (IFUNCT)

Henceforth the I/O system will reflect interrupts to the supervisor by a call to IFUNCT:

IFUNCT. (DUSER, ICODE, IR4, ILC, INFO(N)...N)

DUSER: 1, CTSS; 2, user  
 ICODE: interrupt code  
 IR4: user's x4 when he entered I/O routines  
 ILC: user's location counter when he entered I/O routines  
 INFO(N): checksum of file in question  
 ICODE = 1, 2, 3 currently ignored  
 = 4 file interlocked  
 = 5 file no longer interlocked  
 = 6 I/O queue full or waiting on I/O

The I/O system must be informed of which memory unit (A or B) is calling it, in which memory are the buffers, and which memory to read from or write into. The call is SETAB:

SETAB. (CALLER, BUFFER, MEMORY)

Each argument is either 1, 2, 5 or 6. 1 is memory A; 2 is memory B. 5 and 6 are A and B respectively, but the file system is also requested to check all references to the specified memory for protection mode violation.

To request the current setting of certain I/O switches, the supervisor can call GETUSR:

GETUSR. (DUSER, CALLER, BUFFER, MEMORY)

This returns the latest values set by CHNGUS (or SETUSR) and SETAB.

To save the status of all active files for the current user, a call is made to USAVE:

USAVE. (COUNT, Z(M)...M)

On return from USAVE, COUNT contains the number of words saved in the array Z.

The information saved in the array Z is in the form of 8 words for each active file. These 8 words are as follows:

words 1, 2 First and second names of UFD in which file exists

words 3,4 NAME1 and NAME2 of file  
 word 5 Status of file (R,W,RW)  
 word 6 BUFF,,LENGTH; address and length of buffer assigned  
 to file. If 0, no buffer.  
 word 7 RELLOC of next word to be read from file. If 0, read  
 pointer is in initiated position  
 word 8 RELLOC of next word to be written into file. If 0,  
 write pointer is at initiated position.

Error Code:

03. Array Z is too small.

To terminate all I/O for a user, IOSTOP is called:

IOSTOP.(DUSER)

DUSER=1, CTSS; DUSER=2, current user  
 DUSER=0, all I/O in process is terminated.

To restart I/O after a call to IOSTOP, IOSTRT is called:

IOSTRT.(DUSER)

If DUSER=0, all I/O which was not specifically stopped  
 is started. In other words, the following set of calls  
 would stop all I/O, then restart I/O for CTSS, but not  
 for the current user:

IOSTOP.(2)  
 IOSTOP.(0)  
 IOSTRT.(0)

If a machine reset has occurred such that data-channel traps may have  
 been lost, IORSET should be called to clear out any busy flags in the  
 file system I/O adapters, and flag any I/O as likely to have a trans-  
 mission error.

IORSET.

When the user's core image is no longer available, all active files  
 must be removed from active status. This is done by a call to RESETF.

RESETF.

All files in read status are closed; files in write  
 status, which have grown in length by at least one  
 track since the last time they were closed, are lost.

Error code:

03. Machine or system error

When a user logs out, his file directory on the disk is brought up to date by a call to UPDATE.

UPDATE.

The call causes the core-A copy of the track usage table and user file directory to be written on the disk. Partial updating of the user's information is done each time he is attached to another file directory because ATTACH causes the core-A copy of his file directory (only) to be written on the disk. A complete updating of user information can only be done by UPDATE.

Error code:

03. Machine or system error

Before CTSS is taken down, a call must be made to IOFINI.

IOFINI

IOFINI waits until all I/O currently in progress is completed, then calls UPDATE for DUSER.

Friendly warning regarding all I/O calls:

Those routines that have errors should have error returns. Except for the addition of error returns (with error codes) to those calling sequences, all calls should be made as described. Calling sequence length are not variable.

All arguments are checked for protection mode violations - even those in block notation with a zero word-count. All addresses, therefore, must be valid.

In USTAT, the initiated locations of all blocks Q1...Q1l will be zeroed, even when the length Q1l is zero.