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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 contaning 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 QiL is zero, all attempts to use
             device "c" will be ignored but location Qi 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...QiL will be used for queueing I/O requests for the ith 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 $Q_1...Q_{i1}$ will be zeroed,
even when the length Q_{iL} is zero.