New Technical Notes

Macintosh

Developer Support

Drive Queue Elements

Devices

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This note expands on *Inside Macintosh*'s definition of the drive queue, which is given in the File Manager chapter.

As shown in *Inside Macintosh*, a drive queue element has the following structure:

```
DrvQEl = RECORD
    qLink:    QElemPtr; {next queue entry}
    qType:    INTEGER;  {queue type}
    dQDrive:  INTEGER;  {drive number}
    dQRefNum: INTEGER;  {driver reference number}
    dQFSID:   INTEGER;  {file-system identifier}
    dQDrvSz:  INTEGER;  {number of logical blocks on drive}
    dQDrvSz2: INTEGER;  {additional field to handle large drive size}
END;
```

Note that dQDrvSz2 is only used if qType is 1. In this case, dQDrvSz2 contains the high-order word of the size, and dQDrvSz contains the low-order word.

Inside Macintosh also mentions four bytes of flags that preced each drive queue entry. How are these flags accessed? The flags begin 4 bytes before the address pointed to by the `DrvQElPtr`. In assembly language, accessing this isn't a problem:

```
        MOVE.L  -4(A0),D0   ;A0 = DrvQElPtr; get drive queue flags
```

If you're using Pascal, it's a little more complicated. You can get to the `flags` with this routine:

```
FUNCTION DriveFlags(aDQEPtr: DrvQElPtr): LONGINT;

   VAR
      flagsPtr : ^LONGINT; {we'll point at drive queue flags with this}

   BEGIN
      {subtract 4 from the DrvQElPtr, and get the LONGINT there}
      flagsPtr := POINTER(ORD4(aDQEPtr) - 4);
      DriveFlags := flagsPtr^;
   END;
```

From MPW C, you can use:

```
long DriveFlags(aDQEPtr)
DrvQElPtr    aDQEPtr;

{ /* DriveFlags */
    return(*((long *)aDQEPtr - 1));  /* coerce flagsPtr to a (long *)
                                        so that subtracting 1 from it
                                        will back us up 4 bytes */
} /* DriveFlags */
```

Creating New Drives

To add a drive to the drive queue, assembly-language programmers can use the function defined below. It takes two parameters: the driver reference number of the driver which is to "own" this drive, and the size of the new drive in blocks. It returns the drive number created. It is vital that you **not** hard-code the drive number; if the user has installed other non-standard drives in the queue, the drive number you're expecting may already be taken. (Note that the example function below arbitrates to find an unused drive number, taking care of this problem for you. Also, note that this function doesn't mount the new volume; your code should take care of that, calling the Disk Initialization Package to reformat the volume if necessary).

```
AddMyDrive  PROC     EXPORT
;----------------------------------------------------------------------------
;FUNCTION AddMyDrive(drvSize: LONGINT; drvrRef: INTEGER): INTEGER;
;----------------------------------------------------------------------------
;Add a drive to the drive queue. Returns the new drive number, or a negative
;error code (from trying to allocate the memory for the queue element).
;----------------------------------------------------------------------------
DQESize     EQU      18          ;size of a drive queue element
;We use a constant here because the number in SysEqu.a doesn't take into
;account the flags LONGINT before the element, or the size word at the end.
;----------------------------------------------------------------------------
StackFrame  RECORD   {link},DECR
result      DS.W     1           ;function result
params      EQU      *
drvSize     DS.L     1           ;drive size parameter
drvrRef     DS.W     1           ;drive refNum parameter
paramSize   EQU      params-*
return      DS.L     1           ;return address
link        DS.L     1           ;saved value of A6 from LINK
block       DS.B     ioQElSize   ;parameter block for call to MountVol
linkSize    EQU      *
            ENDR
;----------------------------------------------------------------------------
        WITH     StackFrame     ;use the offsets declared above

        LINK     A6,#linkSize   ;create stack frame

        ;search existing drive queue for an unused number

        LEA      DrvQHdr,A0     ;get the drive queue header
        MOVEQ    #4,D0          ;start with drive number 4
CheckDrvNum
        MOVE.L   qHead(A0),A1   ;start with first drive
CheckDrv
        CMP.W    dqDrive(A1),D0 ;does this drive already have our number?
        BEQ.S    NextDrvNum     ;yep, bump the number and try again.
        CMP.L    A1,qTail(A0)   ;no, are we at the end of the queue?
        BEQ.S    GotDrvNum      ;if yes, our number's unique! Go use it.
```

```
        MOVE.L   qLink(A1),A1   ;point to next queue element
        BRA.S    CheckDrv       ;go check it.

NextDrvNum
        ;this drive number is taken, pick another

        ADDQ.W   #1,D0          ;bump to next possible drive number
        BRA.S    CheckDrvNum    ;try the new number

GotDrvNum
        ;we got a good number (in D0.W), set it aside

        MOVE.W   D0,result(A6)  ;return it to the user

        ;get room for the new DQE

        MOVEQ    #DQESize,D0    ;size of drive queue element, adjusted
        _NewPtr  sys            ;get memory for it
        BEQ.S    GotDQE         ;no error...continue
        MOVE.W   D0,result(A6)  ;couldn't get the memory! return error
        BRA.S    FinishUp       ;and exit

GotDQE
        ;fill out the DQE

        MOVE.L   #$80000,(A0)+  ;flags: non-ejectable; bump past flags

        MOVE.W   #1,qType(A0)   ;qType of 1 means we do use dQDrvSz2
        CLR.W    dQFSID(A0)     ;"local file system"
        MOVE.W   drvSize(A6),dQDrvSz2(A0)  ;high word of number of blocks
        MOVE.W   drvSize+2(A6),dQDrvSz(A0) ;low word of number of blocks

        ;call AddDrive

        MOVE.W   result(A6),D0  ;get the drive number back
        SWAP     D0             ;put it in the high word
        MOVE.W   drvrRef(A6),D0 ;move the driver refNum in the low word
        _AddDrive               ;add this drive to the drive queue

FinishUp
        UNLK     A6             ;get rid of stack frame
        MOVE.L   (SP)+,A0       ;get return address
        ADDQ     #paramSize,SP  ;get rid of parameters
        JMP      (A0)           ;back to caller
;----------------------------------------------------------------------------
        ENDPROC
```

Further Reference:

- The File Manager
- The Device Manager