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Identification

The I/O Device Assignment Module
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Purpose

The I/O device assignment module is the module of the hardcore supervisor through which any request to assign an I/O device to a process must ultimately be directed. This module accepts assignment requests only from the procedures of the hardcore supervisor, principally the resource assignment module (see section BT.1.01).

I/O Device Assignment

To assign an I/O device for subsequent use by a process the following call is provided for the exclusive use of hardcore supervisor procedures.

```
call assign_io_device (device_name, process_id,
                       device_index, ret_stat);
```

The parameters used in this call are declared in the following PL/I statement and are described in detail below.

```
dcl device_name char (*),

    process_id bit (70),

    device_index fixed bin (17),

    ret_stat bit (36);
```

device_name - This parameter specifies a symbolic name of up to 32 characters which uniquely defines the I/O device to be assigned. For example, this quantity may be the symbolic name of a specific GIOC channel or tape handler.

process_id - This parameter specifies the process identification of the process to which the specified I/O device is to be assigned.

device_index - Upon successful completion of this call, the device index (BD.8.03) of the newly assigned device is returned as the value of the device_index parameter. This quantity is used in subsequent calls to the hardcore supervisor pertaining to this device and its associated event cell (see BD.8.03).

ret_stat - This parameter specifies a bit string in which any errors generated during the execution of this call are recorded. Specific bits in this string are set ON ("1"b) to indicate that the corresponding error condition exists (see below). This string is set to all zeros if no error conditions are encountered.

Upon receiving this call, the device assignment module attempts to find the specified device name in a table of the hardcore supervisor known as the device configuration table (DCT). If the device name is found in the DCT, the assignment module determines from information in the DCT what type of device is to be assigned (e.g. GIOC channel, tape handler, etc.). The assignment module then calls the appropriate assignment entry in the hardcore supervisor to attempt to assign the device to the specified process. For example, if the device is a GIOC channel, the assignment module calls the "define$channel" entry of the GIOC interface module (GIM). Upon return from this call, the assignment module returns any error status in ret_stat and returns the device index to its caller.

Error Conditions

The following list provides the bit assignments in the ret_stat parameter for the various error conditions that may be detected by the device assignment module.

bit (1) - device_name not found

bit (2) - DCT entry is incorrect

The Device Configuration Table

The device configuration table (DCT) is a segment of the hardcore supervisor and contains information pertaining to each individually assignable I/O device available to the Multics system. This table is constructed from information on the Multics system tape during the loading of the Multics system and may undergo some modification during system initialization or reconfiguration. However, during normal Multics operation, access to this table is set to "read only".

The DCT is subdivided into two parts. The first part consists of an array of entries each of which contains a symbolic device name, certain device independent information and a pointer to a block of device dependent information. The second part consists of a free storage area into which the blocks of device dependent information are allocated.

The following PL/I statement provides the declaration of the items stored in the device independent portion of the DCT and is followed by a detailed description of each item. (Note: the identifiers in capitals are used to denote integer constants to be determined before compilation).

```
dcl  1 dct ctl (p),

       2 ndevices fixed bin (17),

       2 device_names (max) char (32),

       2 description (MAX),

         3 type bit (6),

         3 device_index bit (17),

         3 device_rp bit (18),

       2 var area ((AREA_SIZE));
```

ndevices specifies the actual number of devices described in the DCT, device names is an array of symbolic device names, description is an array of structures containing the device independent information corresponding to each device name and var is a free storage area into which the device dependent information is allocated. The individual items in the description structure are described below.

type - This item specifies the type of the device and by convention also defines the hardcore supervisor entry used to assign the device. The following list provides the device type codes, the devices represented by these codes and the entry points used to assign these devices.

type 1 = GIOC channel, "define$channel"

type 2 = tape handler, "assign_tape_handler"

device_index - This item specifies the device index associated with the device.

device_rp - This item is a pointer (in relative form) to a block of device-dependent information for this device.

The following PL/I statement provides the declaration of the items stored in the DCT for a GIOC channel (type 1) and is followed by a detailed description of each item.

```
dcl 1 channel_info ctl (p),

    2 cdt_list (CDT_MAX) char (32),

    2 giocno fixed bin (17),

    2 channo fixed bin (17),

    2 connectno.fixed bin (17),

    2 statno fixed bin (17),

    2 statmap (7) bit (3)
```

cdt_list - This item specifies an array containing the names of the class driving tables which may be used to drive this channel.

giocno - This item specifies the GIOC to which the channel is connected.

channo - This item specifies the physical channel number within the GIOC.

connectno - This item specifies the connect channel to be used when dealing with this channel.

statno - This item specifies the number of status channels accessible to this channel.

statmap - This item is an array of physical status channel pointers which may be accessed by this channel. This array is arranged in order of descending priority from statmap (1) to statmap (statno).

The following PL/I statement provides the declaration for the items stored in the DCT for a tape handler (type 2) and is followed by a detailed description of each item.

```
dcl 1 handler_info ctl (p),

    2 address fixed bin (17),

    2 nchanls fixed bin (17),

    2 device_names (MAX_CHAN) char (32);
```

address - This item specifies the physical address of the tape handler within its tape controller.

nchanls - This item specifies the number of different GIOC channels through which the tape handler may be accessed. Note: depending on the type of tape controller, a tape handler may be accessible through more than one GIOC channel.

device names - This item contains an array of device names for the GIOC channels through which the tape handler may be accessed.