TO: MSPM Distribution
FROM: S. L. Rosenbaum
SUBJ: BD.4.00 - The Search Module Overview
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The attached section is a minor revision of section
BD.4.00. The major change is to the interface between
the Search Module and the Segment Management (formerly
Segment Housekeeping) Module. The Search Module returns
a path name and leaves the job of getting the associated
segment up to the Segment Management Module. The new
calling sequence to the Search Module reflects this change.

Identification

Search Module Overview
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Purpose

The Search Module's main task is to direct a search for
segments whose exact location, i.e., path name, in the
Multics system is not known. A Search Module which can
be directed by the user is essential to a system in which
the user controls his file system structure. The Search
Module must be self-sufficient enough to satisfy the demands
of an unconcerned user and yet flexible enough to allow
a user to take advantage of and to provide for situations
which are peculiar to him, his particular file structure
and his procedures.

The Search Module is easy to use, requiring no knowledge
by the user of the Search Module's internal composition;
on the other hand, the user must be aware of his own file
structure if he wishes to direct the Search Module.

References

Section BD.4.00 presents an overview of the Search Module,
its operation and its related data bases. The remainder
of BD.4.00 provides a more detailed operational description.
Section BX.13.00 contains the instructions for operating
the Search Module from the user's point of view and a
description of the Search Module commands. It is recommended
that the reader be familiar with sections BD.3.00 - "Segment
Management Module Overview", BG.00 - "Summary of the Basic
File System" and BD.6.02 - "System Skeleton".

Discussion

When a procedure references a segment by a particular
symbolic name for the first time, a fault tag2 fault occurs
and control is passed to the Linker. The Linker calls
the Segment Management Module for a segment pointer. If
the Segment Management Module is unable to establish a
segment pointer for the symbolic call name, the Segment

Management Module calls the Search Module for searching
advice. The Search Module directs the searching by successively
calling Directory Control to look in a sequence of directories
for an acceptable segment, and then the Search Module
returns the path name of the segment to the Segment Management
Module.

The Search Module obtains a specific sequence of directories
to use by answering the following questions: What symbolic
call name caused the linkage fault to occur? What procedure
wants a segment for the call name? In what ring did the
fault occur? What kind of advice should be used? Where
is the advice stored? What is the advice?

When the Segment Management Module calls the Search Module,
it passes along the symbolic call name for which a segment
is sought, and the pointer to the faulting segment (the
procedure which referenced the call name). In return,
the Segment Management Module expects a pointer to a segment
for the calling name. To this end, the Segment Management
Module invokes the Search Module with the call:

        call search (name, callerptr, dirname, entry, errtn,
                errcode)

where:

    name: is the symbolic call name passed by the
                Linker to the Segment Management Module.

    callerptr: is the pointer to the actual segment referencing
                name, i.e., the faulting segment-not the Linker.

    dirname: is the path name of the directory which
                contains the entry to be used for name.

    entry: is the entry name of the segment to be used for
                name.   (Hence, the path name of the segment is
                "dirname > entry".)

    errtn: is the statement to which the Search Module
                returns in the event of an error.

    errcode: contains a code number in the event of an error.

The possible codes and their respective meanings appear in
section BX.13.01.

The Search Module uses any of three types of searching
advice: enforced, user or default. An administrator
at any level may enforce advice in order to regulate the
searching techniques of the users under him. For example,
an instructor may wish to restrict his class to using
utility routines which appear in a certain library when
a linkage fault occurs in the user base ring. In general,
the system administrator enforces advice upon all users
for linkage faults occuring in the administrative ring
where the protected supervisor resides. A user may prescribe
his own searching technique but it is ignored if advice
has been enforced upon him for linkage faults in the ring
in which his fault occured. When neither an administrator
nor the user supplies searching advice for linkage faults
in a ring, the system provides a standard searching technique.

The Search Module is itself composed of two parts: the
Search Module Driver and the Search Module Interpreter,
described in BD.4.01 and BD.4.02, respectively. The Search
Module Driver is in charge of obtaining the searching
rule statements to be interpreted and returning the desired
path name to the Segment Management Module. The Search
Module Interpretor is solely in charge of interpreting
the searching rule statements decreed by the Driver.
In the course of fair exchange, the Interpreter expects
to be passed a pointer to a searching rule statement.
The Driver expects a symbolic path name upon return of
the Interpreter.