Identification

Perform an abnormal return
unwinder
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Purpose

An "abnormal return" is an exiting from a procedure to
a point other than the one (immediately after the call)
which would normally be returned to through use of the
standard Multics return macro. The target point is a
PL/I-type label, which contains a Stack pointer that corresponds
to a frame which has not yet been returned to in the process
at hand; typically, this label is passed as an argument.
Because of the fact that the locus of control of a process
may contain protection-ring crossings, the abnormal return
must be effected by a procedure which is part of the Multics
protection mechanism. Therefore, to perform an abnormal
return to label lbl, the user calls procedure unwinder
with lbl as argument. Labels at which inter-ring abnormal
returns are acceptable must be specifically established
as "doors" in the protection walls by use of the setacl
command (see BX.8). Detailed discussion of the Unwinder
is to be found in BD.9.05. Definitions of terms are to
be found in BD.9.00.

In performing an abnormal return, the Unwinder fulfills
three basic functions. The first two are essentially
system-oriented: balancing the books of the protection
mechanism, and releasing Stack frames of procedures which
are being bypassed (i.e., to which neither normal returns
nor abnormal returns will be taken). The third function
of the Unwinder is to offer the user the ability to perform
"unfinished business" in the bypassed procedures. That
is, starting with the procedure which calls it, the Unwinder
will invoke any procedures which are found as handlers
for the condition name "cleanup", as deposited in the
signal vector by calls to condition; see also BD.9.04,
BY.12.04. For example, a "cleanup" handler might free
storage which was allocated by the procedure it is established
for. On normal return from a procedure, "cleanup" handlers
should be removed from the signal vector by calls to reversion
(BD.9.04, BY.12.05) so that the Unwinder will not erroneously
attempt to invoke them in the event of a subsequent abnormal
return.

Usage

The calling sequence is

       call unwinder (lbl);

with declaration

       dcl lbl label;

where

lbl is the target of the abnormal return; i.e., the label
       to which the present procedure is to exit.

Error Handling

The Unwinder employs the standard Multics error-handling
technique (see BY.11). There are three errors which could
be of interest to the user: 1) The inter-ring target
label is not a door; 2) The inter-ring target label is
a door, but does not correspond to a Stack frame of the
process at hand; 3) The intra-ring target label (which
need not be a door) does not correspond to a Stack frame
of the process at hand. If the user has a condition handler
established for "Unwinder_err", it may return to the Unwinder,
in which case the Unwinder returns to its own caller.

It is most important to note that the target label must
belong to a Stack frame (that is, be in a procedure) which
has not been returned to at the point in the process when
the abnormal return is taken; particular care must be
taken in this respect when the label is not passed as
an argument, but is, for example, treated as an "external
static" entry in the PL/I sense.

Implementation

Details of the implementation of the Unwinder are to be
found in BD.9.05.