

MCR10136
Add Info Segment for `patch_ring_zero` Program
Revision 1.1

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1 Problem Description

The very useful program, `patch_ring_zero(prz)` has no info segment, nor any documentation in Multics manuals. Its cousin, `ring_zero_dump(rzd)`, does.

The issue is reported in this ticket: <https://multics-trac.swenson.org/ticket/148>.

2 Proposed Fix

The proposed fix is to add an info segment for this program.

The proposed info segment contents are shown below:

2023-06-27 `patch_ring_zero`, `prz`

Syntax as a command:

```
prz SEGNAME OFFSET VALUES
prz SEGNO OFFSET VALUES
```

Function: allows privileged users to patch locations in ring 0. If necessary, the descriptor segment is patched to give access to patch a write-protected segment. Only one VALUE is required, the 2nd through Nth are optional.

This command requires access to the highly privileged gate, `hphcs_`.

Arguments:

SEGNAME

is either a pathname, the name of a ring 0 segment, or an octal segment number to the segment to be patched.

OFFSET

is the (octal) offset of the first word to be patched.

VALUES

One or more (octal) values to be patched, starting at the offset specified by OFFSET. Only one value is required, although any number can be specified.

SEGN0

is the octal segment number of a segment to be patched.

Notes:

Neither patch_ring_zero (prz) nor the hphcs_gate entries it calls, deals with the potential problem of segment caching. If the segment which is being cached does not permit write access, the segment descriptor is patched to allow such access. It is therefore possible that other processes may have read access to the segment being patched and have the segment contents in any hardware memory cache.

While the dps8 simulator used to run Multics in the post-hardware era doesn't support a hardware memory cache, the original hardware did. If the segment being patched is at all at risk of being in hardware memory cache, it is advisable to use patch_ring_zero (prz) in a session with no other processes but the Initializer running (e.g. booted with "boot stan") or after ensuring that no other processes could reference the segment being patched.

This info segment will be installed in /doc/privileged, where other privileged program info segments, or those for programs not normally used by regular users, are installed.

3 Documentation

The new info segment is the documentation. Note the paragraph in the "Notes" section that deals with segment encacheability. While this isn't an issue for use under the dps8 simulator, it is a potential issue on the original Multics hardware or any future hardware that supports a hardware memory cache.

4 Test

No testing is necessary other than verification that the syntax matches the code, and that the info segment passes the verify_info checks.

5 Version History

2023-06-17	1.0	Initial version of the MCR.
2023-06-27	1.1	Added brief section in the info segment regarding the issues with this command and cache memory.