

Below is the help information for the new command options delivered with APAR VM65396.

CP SET SPECEX

SET SPECEX

```
>>--SET--SPECEX--+--DEFAULT--.-ON--.------+-----><
|                                     '-OFF-'                                     |
|-----'.-----.-userid-.-.-DEFAULT-.-.'-----|
| '-FOR-'  '-*-----'  | -ON-----|                                     |
|                                     '-OFF-----'                                     |
```

Authorization

Privilege Class: C

Purpose

Use SET SPECEX to control enablement of speculative execution in the machine based on the virtual machine that is dispatched. Speculative execution is an optimization mechanism designed into the processor to improve system performance.

The standard virtual-machine isolation and protection mechanisms in z/VM are designed to prevent code run in an unprivileged virtual machine from interfering with or gaining unauthorized access to resources or data owned by the z/VM control program or by other guests. SET SPECEX OFF offers an additional layer of protection to defend against sophisticated information-leak attacks that might be attempted by malicious or compromised code in an untrusted virtual machine. Disabling speculative execution may increase system overhead and reduce capacity or throughput.

z/VM maintains a system-wide default setting for speculative execution. The default when z/VM is IPLed is SPECEX ON. In addition, SET SPECEX allows this default to be overridden for specific virtual machines.

The z/VM administrator's decision to disable speculative execution may be based on the degree to which the code running in the virtual machines is known and controlled, and on the level of risk from unauthorized discovery of data in the memory of CP or other virtual machines. For example, an open multi-tenant cloud platform may call for greater protection than a well-managed company-internal system.

Operands

DEFAULT

specifies that the system-wide default is to be set.

FOR userid

FOR *

specifies that a user-specific override is to be set, taking precedence over the system default when this virtual machine is run. An asterisk refers to the virtual machine of the command issuer.

ON

OFF

indicates that speculative execution should be enabled (ON) or disabled (OFF) under the specified conditions.

FOR userid DEFAULT

cancels the user-specific override for the named user. Subsequent execution of this virtual machine will be governed by the system-wide default SPECEX setting.

Usage Notes

1. At z/VM IPL, the default setting is SPECEX ON and applies to all users. If you want the default to be OFF, you can insert the following statement in the directory of the primary-system operator userid (usually OPERATOR):
`COMMAND SET SPECEX DEFAULT OFF`

Since the operator is automatically logged on at IPL, this will put the setting into effect before any virtual machine can run.

2. A user-specific override remains in effect only until the user logs off. At logon, each user receives the system default setting. To establish a persistent override for the user, you can insert the following statement into either the USER or IDENTITY directory entry, or the PROFILE entry included by this entry:
`COMMAND SET SPECEX FOR * {ON|OFF}`
This will ensure that the setting is put into effect as soon as the user logs on.
3. As long as APAR VM65396 is installed on the source and destination systems, VMRELOCATE will preserve a user-specific override set for the relocated virtual machine. Relocation to a system without VM65396 will cause the override to be lost. Conversely, if a virtual machine is relocated from a system without VM65396 to a system with the APAR, the guest will inherit the default at the destination system.
4. Machine support is required to implement SPECEX OFF. If the support is not available, the requested OFF setting will be recorded, and will

be preserved by VMRELOCATE as described above, but will not be effective on this system.

Examples

Following this sequence of commands on a freshly IPLed system with the required machine support:

```
set specex default off
set specex for alice on
set specex for bob off
```

speculative execution will be disabled when running any user except ALICE.

If the following command is then issued:

```
set specex default on
```

speculative execution remains disabled for user BOB, since his setting was explicitly overridden. All other users (including ALICE) then run with speculative execution enabled.

Messages

- o HCP002E Invalid operand - operand
- o HCP003E Invalid option - command contains extra option(s) starting with option
- o HCP026E Operand missing or invalid
- o HCP045E userid not logged on
- o HCP1056I SPECEX OFF request set, but required machine support not installed

CP Query Specex

>>--QUERY--SPECEx-----><

Authorization

Privilege Class: C

Purpose

Use the QUERY SPECEx command to determine the settings for system default and user overrides to speculative execution functionality. Availability of the required machine support for controlling speculative execution is also reported.

Response

A complete response to QUERY SPECEx consists of Response 1, Response 2, and zero or more instances Response 3, as shown below.

Response 1:

```
Machine support for SPECEx control {is      } installed.
                                   {is not }
```

This line indicates whether the firmware support required for SET SPECEx functionality is present in the machine on which z/VM is running.

Response 2:

```
SPECEx DEFAULT {OFF      }
                {ON      }
                {ON (requested OFF but machine support not installed)}
```

This response indicates the system-wide default setting for SPECEx, as set by the most recent SET SPECEx DEFAULT command. If no such command has been issued, the setting at z/VM IPL is SPECEx DEFAULT ON. The default setting applies to all users except those for whom an override has been set via SET SPECEx FOR userid.

The third form of this response indicates that SET SPECEx DEFAULT OFF was issued on a machine without the required support to implement that setting. The OFF request is remembered to allow it to go into effect later if the machine support is applied.

Response 3:

```
SPECEx FOR userid {OFF      }
                  {ON      }
                  {ON (requested OFF but machine support not installed)}
```

This response indicates the override setting for an individual user, as set by SET SPECEX FOR userid {ON|OFF}. The override value applies to that user regardless of the system default, and regardless of any changes to that system default. The override can be canceled by SET SPECEX FOR userid DEFAULT.

The third form of this response indicates that SET SPECEX FOR userid OFF was issued on a machine without the required support to implement that setting. The OFF request is remembered to allow it to go into effect later if the machine support is applied, or if the user is relocated to a machine with the support.

Note, there may be users on the system that are not listed in this response. This means they are operating under the system-wide default setting.

Messages

- o HCP003E Invalid option - command contains extra option(s) starting with option