z/OS 3.2 IBM Education Assistant

Solution Name: WLM Resiliency Actions

Solution Element(s): WLM

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Agenda

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Trademarks

- See url http://www.ibm.com/legal/copytrade.shtml for a list of trademarks.
- Additional Trademarks:
  - None

Objectives

- Address spaces in the SYSSTC service class are kept at a second highest dispatching priority 254.
- Not all work is appropriate for SYSSTC because, if the work is CPU-intensive and uses a high amount of processor cycles, this could cause CPU delays for other important work in the system.
  - Only trusted work that is not going to use a lot of CPU but requires fast CPU access and absolutely needs a higher dispatch priority than other work is appropriate for the SYSSTC service class.
- That’s why z/OS operators and system programmers have the requirement to detect work that uses a lot of CPU but is not appropriate for SYSSTC before other important work suffers or the availability of the entire system is impacted.

Overview

- Who (Audience)
  - z/OS operator
- What (Solution)
  - Provide a new WLM dynamic severity check with IBM Health Checker for z/OS
  - When CPU consumption of address spaces running in system-supplied WLM service class SYSSTC exceeds one of the specified threshold levels, an alert is raised
- Wow (Benefit / Value, Need Addressed)
  - New WLM check *WLM_SCLASS_SYSSTC* periodically monitors CPU consumption in service class SYSSTC
  - When threshold levels are exceeded, a message is issued and address spaces with high CPU consumption are reported
  - The operator can take appropriate actions like reclassifying or cancelling work which is not appropriate for SYSSTC

Usage & Invocation (1)

- WLM check *WLM_SCLASS_SYSSTC* is inactive by default. To use this check, you must activate it on the SDSF CK panel or use following MODIFY command
  - `F HZSPROC,ACTIVATE,CHECK=(IBMWLM,WLM_SCLASS_SYSSTC)`
- The check accepts the following parameters:
  - PARM('[THRESHOLD_LOW(value%)][,THRESHOLD_MED(value%)][,THRESHOLD_HIGH(value%)]')
  - At least one threshold parameter is required to indicate a threshold of CPU consumption in WLM service class SYSSTC. Specify the threshold value as a percentage of total CPU time that all work can consume on the system. This check supports dynamic severity setting and threshold keywords to correspond with the severity levels. The severity of the exception is based on the provided corresponding thresholds.
  - The variable for the parameters is as follows:
  - ***value***
    - An integer in the range 1–100 followed by % indicating the warning threshold percent.
    - Default: THRESHOLD_LOW(20%),THRESHOLD_MED(40%),THRESHOLD_HIGH(60%)

Usage & Invocation (2)

- This sample shows how you can update the parameters and default checking interval by a MODIFY command
  - `F HZSPROC,UPDATE,CHECK=(IBMWLM,WLM_SCLASS_SYSSTC), PARM('THRESHOLD_MED(50%),THRESHOLD_HIGH(70%)'),INTERVAL=0:02`

- Verbose support:
  - Yes. If VERBOSE(YES) is specified on the check and one of the specified threshold percentages is exceeded, all address spaces in the SYSSTC service class that consume CPU will be displayed at the1 end of the check report. With VERBOSE(NO), only up to 10 top CPU consuming address spaces in the SYSSTC service class will be displayed.

Usage & Invocation (3)

- User override of IBM values:
  - The following sample shows the defaults for customizable values for this check. Use this sample to make permanent check customizations in an HZSPRMxx parmlib member used at IBM Health Checker for z/OS startup. If you just want a one-time only update to the check defaults, omit the first line (ADDREPLACE POLICY) and use the UPDATE statement on a MODIFY *hzsproc* command. Note that using non-POLICY UPDATEs in HZSPRMxx can lead to unexpected results and is, therefore, not recommended.

```
ADDREPLACE POLICY[(policyname)] [STATEMENT(name)]
UPDATE
CHECK(IBMWLM,WLM_SCLASS_SYSSTC),
ACTIVE,
VERBOSE(NO),
INTERVAL(00:01),
SEVERITY(LOW),
PARM('THRESHOLD_LOW(30%),THRESHOLD_MED(50%),THRESHOLD_HIGH(70%)'),
DATE('date_of_the_change'),
REASON('Your reason for making the update')
```

Usage & Invocation (4)

- Messages

IWMH103I **CPU consumption in SYSSTC service class is *percent*%. The {low|medium|high} threshold of *threshold-value*% is not reached. No action is required.**

Explanation

CHECK(IBMWLM,WLM_SCLASS_SYSSTC) determined that the actual CPU consumption in service class SYSSTC is currently in the expected range. The level of CPU consumption is below all the threshold(s) being supplied.

For information on setting THRESHOLD_LOW, THRESHOLD_MEDIUM, and THRESHOLD_HIGH, see the section on 'WLM_SCLASS_SYSSTC' in *IBM Health Checker for z/OS User's Guide*.

In the message text:

percent
CPU consumption in the SYSSTC service class as percentage of total amount of CPU time that all work can consume on the system.

threshold-value
Threshold value supplied in THRESHOLD_LOW, THRESHOLD_MEDIUM, or THRESHOLD_HIGH.

System action

Processing continues.

Operator response

None.

System programmer response

None.

IWMH104I **CPU consumption in SYSSTC service class is *percent*%. The {low|medium|high} threshold of *threshold-value*% is reached.**

Explanation

CHECK(IBMWLM,WLM_SCLASS_SYSSTC) determined that the CPU consumption in service class SYSSTC has reached one of the threshold levels supplied.

Address spaces in the SYSSTC service class are kept at a very high dispatching priority. Not all work is appropriate for SYSSTC because, if the work is CPU intensive, it could use a high amount of processor cycles, which could cause CPU delays for other important work in the system. Only trusted work that is not going to use a lot of CPU but requires fast CPU access and absolutely needs a higher dispatch priority than other work is appropriate for WLM service class SYSSTC.

In the message text:

percent
CPU consumption in the SYSSTC service class as a percentage of total amount of CPU time that all work can consume on the system.

threshold-value
Threshold value supplied in THRESHOLD_LOW, THRESHOLD_MEDIUM, or THRESHOLD_HIGH.

System action

Processing continues.

Operator response

Notify the system programmer.

System programmer response

Use diagnostic tools (such as the Resource Monitoring Facility) to help determine the CPU consumption of all address spaces assigned to the SYSSTC service class. Verify that the address space(s) are appropriate for SYSSTC. If not, consider using the RESET command to change the service class of the address space or to quiesce it. Also, update your WLM service definition to assign a service class of lower importance.

Usage & Invocation (5)

- Example of a success message

```
CHECK(IBMWLM,WLM_SCLASS_SYSSTC)
SYSPLEX: PLEX1 SYSTEM: SYS1
START TIME: 08/28/2024 08:47:20.195675
CHECK DATE: 20240425 CHECK SEVERITY: MEDIUM-DYNAMIC
CHECK PARM: THRESHOLD_LOW(20%),THRESHOLD_MED(40%),THRESHOLD_HIGH(60%)

IWMH103I CPU consumption in SYSSTC service class is 2%. The low threshold of 20% is not
reached. No action is required.

END TIME: 08/28/2024 08:47:20.195800 STATUS: SUCCESSFUL
```

Usage & Invocation (6)

- Example of an exception message running with VERBOSE(NO) which displays up to 10 top CPU consuming address spaces in the SYSSTC service class at the end of the report
  - VERBOSE(YES) would display all address spaces in SYSSTC

```
CHECK(IBMWLM,WLM_SCLASS_SYSSTC)
SYSPLEX: PLEX1 SYSTEM: SYS1
START TIME: 08/28/2024 08:47:20.195675
CHECK DATE: 20240425 CHECK SEVERITY: MEDIUM-DYNAMIC
CHECK PARM: THRESHOLD_LOW(20%),THRESHOLD_MED(40%),THRESHOLD_HIGH(60%)

* Low Severity Exception *

IWMH104I CPU consumption in SYSSTC service class is 21%. The low threshold of 20% is reached.

Explanation:

CHECK(IBMWLM,WLM_SCLASS_SYSSTC) determined that the CPU consumption in service class SYSSTC
has reached one of the threshold levels supplied.

Address spaces in the SYSSTC service class are kept at a very high dispatching priority. Not
all work is appropriate for SYSSTC because, if the work is CPU intensive, it could use a
high amount of processor cycles, which could cause CPU delays for other important work in
the system. Only trusted work that is not going to use a lot of CPU but requires fast CPU
access and absolutely needs a higher dispatch priority than other work is appropriate for
WLM service class SYSSTC.

Refer to the end of this check report for a list of address spaces in the SYSSTC service
class.

System action: The system continues processing.

Operator response: Notify the system programmer.

System programmer response:  Use diagnostic tools (such as the Resource Monitoring Facility)
to help determine the CPU consumption of all address spaces assigned to the SYSSTC service
class. Verify that the address space(s) are appropriate for SYSSTC. If not, consider using
the RESET command to change the service class of the address space or to quiesce it. Also,
update your WLM service definition to assign a service class of lower importance.

Problem Determination: N/A

Source: WLM

Reference Documentation: N/A

Automation: N/A

Check Reason: Monitors CPU consumption of work in service class SYSSTC.

Address spaces in the SYSSTC service class:

Name       ASID   CPU%
BGXOSYS1   0032   9.83
BGXOSYS2   006A   5.59
SDSF       0030   1.59
JES2       002C   1.20
ZFS        0035   0.60
VTAM       0024   0.31
TCPIP      0033   0.30
SDSFAUX    0026   0.20
ZTTX       0022   0.16
AXR        0018   0.10

END TIME: 08/28/2024 08:47:20.195800 STATUS: EXCEPTION-MED
```

Interactions & Dependencies

- None

Upgrade & Coexistence Considerations

- To exploit this solution, all systems in the Plex must be at the new z/OS level: No
- No toleration/coexistence APARs/PTFs

Installation & Configuration

- z/OS 3.2 or APAR OA66312 on z/OS 2.5 or 3.1
- Ensure that IBM Health Checker for z/OS is started
- WLM check *WLM_SCLASS_SYSSTC* is inactive by default
- Activate the check from the SDSF CK panel or use the following command
  - `F HZSPROC,ACTIVATE,CHECK=(IBMWLM,WLM_SCLASS_SYSSTC)`
- You can deactivate the check from the SDSF CK panel or by using following command
  - `F HZSPROC,DEACTIVATE,CHECK=(IBMWLM,WLM_SCLASS_SYSSTC)`

Summary

- A new health check WLM_SCLASS_SYSSTC is provided to detect cases when CPU intensive workload is classified incorrectly to service class SYSSTC
- This proactively helps to ensure that WLM classification rules meet WLMs recommendations for a healthy system – only jobs that require fast CPU access and are not CPU intensive should be classified in SYSSTC
- In case that a threshold is reached IWM104I is issued on the console and a report is available in the SDSF CK panel for the health check

Appendix

- Following publications are updated:

  - SC23-6843-60 IBM Health Checker for z/OS User's Guide
  - SA38-0676-60 z/OS MVS System Messages Volume 9 (IGF - IWM)