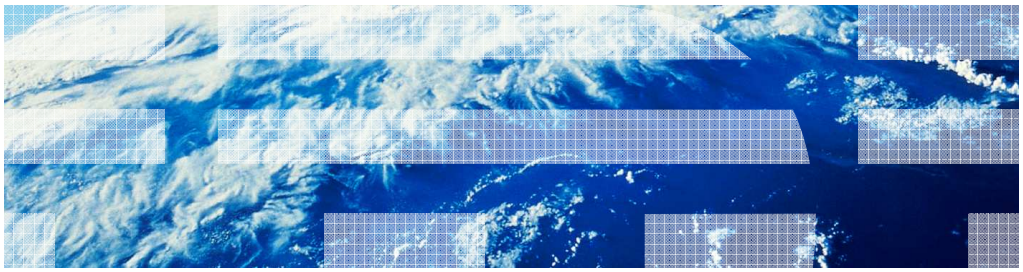
z/OS V1R13

BCP PFA: Damaged or hung address space and damaged or hung system detection based on ENQ request rates



Overview

- **Need** – Improved Availability and Resiliency to further detect damaged or hung address spaces and damaged or hung systems
- **Solutions**
  - PFA_ENQUEUE_REQUEST_RATE Check
    - Detects a damaged address space or damaged system by comparing the number of enqueue requests per CPU second to the rate expected.
- **Benefit / Value**
  - Increased availability and resiliency by detecting abnormal behavior and alerting you before it causes an outage.

New PFA_ENQUEUE_REQUEST_RATE check

- Detects a *damaged address space or damaged system* based on an enqueue request rate that is too high or too low
- Enqueue request rate = Number of enqueues requested / CPU Utilization
- Two categories compared across three time ranges
  - *"Chatty" persistent* address spaces tracked individually
    - Persistent = must have started within an hour after IPL
    - "Chatty" = 20 address spaces having the highest rates in a warm-up period
  - Total system rate
  - 1 hour, 24 hour, and 7 day comparisons
- Ignores first hour after IPL and last hour prior to shutdown

PFA_ENQUEUE_REQUEST_RATE prediction report

- Exception message sent as WTO
- Prediction report and result message available in SDSF (sdsf.ck)
- Prediction report relevant to comparison category causing exception. Examples,
  - All tracked jobs shown for everything OK
  - Only tracked jobs causing exception shown for tracked job exception.
- Example report below when everything is OK (abbreviated list)

```
                Enqueue Request Rate Prediction Report

Last successful model time     :  01/27/2011 11:08:01
Next model time                :  01/27/2011 23:08:01
Model interval                 :  720
Last successful collection time:  01/27/2011 17:41:38
Next collection time           :  01/27/2011 17:56:38
Collection interval            :  15

Enqueue request rate
   at last collection interval      :       83.52
Prediction based on 1 hour of data  :       98.27
Prediction based on 24 hours of data:       85.98
Prediction based on 7 days of data  :      100.22

Top persistent users:

                                          Predicted Enqueue
                       Enqueue               Request Rate
  Job                  Request
  Name     ASID          Rate        1 Hour       24 Hour         7 Day
  _______ ____  ____________  ____________  ____________  ____________
  TRACKED1 001D         58.00         23.88         22.82         35.82
  TRACKED2 0028         11.00         10.34         11.11         12.11
  TRACKED3 0029         11.00         12.43         12.36          8.36
```

Usage and invocation

- PFA is an address space started by “start pfa”
- New PFA exception messages for rates being too high
  - Automation recommended
  - AIRH192E – Tracked job enqueue request rate higher than expected
  - AIRH210E – Total system enqueue request rate higher than expected
- This check can also detect rates that are too low if Runtime Diagnostics is active
  - Must start Runtime Diagnostics = “start hzr”
  - Recommend to start at IPL
  - New PFA exception messages for rates being too low
    - Automation recommended
    - AIRH190E – Tracked job enqueue request rate lower than expected
    - AIRH211E – Total system enqueue request rate lower than expected

Interactions and dependencies

- Software Dependencies
  - Runtime Diagnostics must be running to take advantage of “too low” comparisons
  - start hzr
- Hardware Dependencies
  - None
- Exploiters
  - None

Migration and coexistence considerations

- As in z/OS 1.12, run AIRSHREP.sh directly or use the JCL file provided in SYS1.SAMPLIB(AIRINJCL)
  - If using AIRSHREP.sh directly, you must run it from the pfauser's home directory
  - If using AIRINJCL, you must update it to specify your pfauser's home directory
  - For either case, you must specify the required parameter: new or migrate
    - Use "new" if you are installing for the first time or want to delete data from previous releases
    - Use "migrate" if you want to retain data from previous releases (recommended)
- "Start hzr" to take advantage of "too low" detection with Runtime Diagnostics
- **ACTION:** Increase your allocated DASD. Total space recommended:
  - 300 cylinders primary; 50 cylinders secondary on a 3390 device.

Installation

- See the migration actions on the previous slide for instructions on installation and migration that are new for z/OS 1.13.
- Refer to *z/OS Problem Management* for z/OS 1.13 for detailed installation instructions

Summary

- PFA_ENQUEUE_REQUEST_RATE is a new Predictive Failure Analysis check to detect a damaged or hung address space or system
- With the addition of this enhancement, z/OS 1.13 helps improve your system availability and resiliency by alerting you to system problems before they can cause an outage and impact your businesses!

Appendix - References

- *z/OS Problem Management* for z/OS 1.13 G325-2564
- Two IBM Education Assistant presentations
  - Information on R10 and R11:
    http://publib.boulder.ibm.com/infocenter/ieduasst/stgv1r0/index.jsp?topic=/com.ibm.iea.zos/zos/1.11/Availability/V1R11_PFA/player.html
  - Information on R12:
    http://publib.boulder.ibm.com/infocenter/ieduasst/stgv1r0/index.jsp?topic=/com.ibm.iea.zos/zos/1.12/Availability/V1R12_Availability_PFA_Enhancements/player.html
- **Two *z/OS Hot Topics* articles:**
  - **Issue #20 -- http://publibz.boulder.ibm.com/epubs/pdf/e0z2n191.pdf**
  - **Issue #23 -- http://publibz.boulder.ibm.com/zoslib/pdf/e0z2n1b0_7.26.pdf**
- **Article in *IBM Systems Magazine - Mainframe Edition***
  - http://www.ibmsystemsmagmainframedigital.com/nxtbooks/ibmsystemsmag/mainframe_20101112/index.php#/48

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