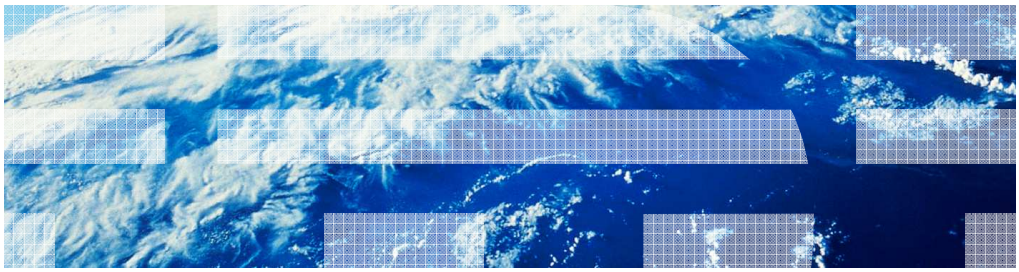
z/OS V1R13

BCP PFA: Detecting hung address spaces or a hung system by using PFA and runtime diagnostics



Session objectives

- Provide information on PFA integration with Runtime Diagnostics to detect hung address spaces or a hung system

Overview

- **Need** – Improved Availability and Resiliency to further detect damaged or hung address spaces and damaged or hung systems
- **Solutions**
  - Detect if certain metrics are too low by using predictive technology along with the results of runtime diagnostics
- **Benefit / Value**
  - Increased availability and resiliency by detecting abnormal behaviour and alerting you before it causes an outage.

PFA integration with runtime diagnostics to detect too low (1 of 3)

- Detects a *damaged or hung address space or system* based on rates being too low
- When PFA detects an abnormally low condition,
  - Runtime Diagnostics is executed
  - If the results of Runtime Diagnostics indicate a problem,
    - the exception is issued
    - the PFA prediction report includes the Runtime Diagnostics output

PFA integration with runtime diagnostics to detect too low (2 of 3)

- "Too low" exception message sent as WTO
- Runtime Diagnostics output included in PFA report
- Prediction report and result message available in SDSF (sdsf.ck)
- Prediction report relevant to comparison category causing exception

```
                Message Arrival Rate Prediction Report
(Heading information intentionally omitted.)

Persistent address spaces with low rates:
                                                Predicted Message
                                                  Arrival Rate
   Job                    Message
   Name     ASID          Arrival Rate       1 Hour       24 Hour        7 Day
   _______  ____  ____________________  ____________  ____________  ____________
   JOBS4    001F                 1.17         23.88         22.82         15.82
   JOBS5    002D                 2.01          8.34         11.11         12.11

Runtime Diagnostics Output:

   Runtime Diagnostics detected a problem in job: JOBS4
     EVENT 06: HIGH - HIGHCPU - SYSTEM: SY1 2009/06/12 - 13:28:46
     ASID CPU RATE: 96% ASID: 0027 JOBNAME: JOBS4
     STEPNAME: DAVIDZ PROCSTEP: DAVIDZ JOBID: STC00042 USERID:
   ++++++++
     JOBSTART: 2009/06/12 - 13:28:35
   Error:
     ADDRESS SPACE USING EXCESSIVE CPU TIME. IT MAY BE LOOPING.
   Action:
     USE YOUR SOFTWARE MONITORS TO INVESTIGATE THE ASID.
   ------------------------------------------------------------------------
   -----
     EVENT 07: HIGH - LOOP - SYSTEM: SY1 2009/06/12 - 13:28:46
     ASID: 0027 JOBNAME: JOBS4 TCB: 004E6850
     STEPNAME: DAVIDZ PROCSTEP: DAVIDZ JOBID: STC00042 USERID:
   ++++++++
     JOBSTART: 2009/06/12 - 13:28:35
   Error:
     ADDRESS SPACE APPEARS TO BE IN A LOOP.
   Action:
     USE YOUR SOFTWARE MONITORS TO INVESTIGATE THE ASID.

   (Additional output intentionally omitted.)
```

PFA integration with runtime diagnostics to detect too low (3 of 3)

- Supported by three checks
  - Message Arrival Rate
  - SMF Arrival Rate
  - Enqueue Request Rate
- Supported by three categories (if supported by the check)
  - **Tracked jobs** – The top, persistent address spaces whose rates were the highest during a warm-up period for the check
    - Runtime Diagnostics executed for tracked jobs that PFA indicated were too low
  - **Other persistent jobs** – The rest of the persistent address spaces on this system
    - Runtime Diagnostics executed for this system
  - **Total system** – All address spaces on this system
    - Runtime Diagnostics executed for this system

Usage and invocation

- PFA is an address space started by “start pfa”
- Dependent on Runtime Diagnostics running = “start hzr”
- Recommend to start both at IPL
- New PFA exception messages
  - Automation recommended
  - PFA Integration with Runtime Diagnostics
    - AIRH190E – Tracked job enqueue request rate lower than expected
    - AIRH211E – Total system enqueue request rate lower than expected
    - AIRH206E – Tracked job message arrival rate lower than expected
    - AIRH207E – Other persistent job message arrival rate lower than expected
    - AIRH153E – Total system message arrival rate lower than expected
    - AIRH208E – Tracked job SMF arrival rate lower than expected
    - AIRH209E – Other persistent job SMF arrival rate lower than expected
    - AIRH175E – Total system message SMF arrival 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

Session summary

- PFA has integrated with Runtime Diagnostics to detect a rate that is too low
  - You must have Runtime Diagnositics started!
- 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

Trademarks, disclaimer, and copyright information

IBM, the IBM logo, ibm.com, and z/OS are trademarks or registered trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of other IBM trademarks is available on the web at "Copyright and trademark information" at http://www.ibm.com/legal/copytrade.shtml

THE INFORMATION CONTAINED IN THIS PRESENTATION IS PROVIDED FOR INFORMATIONAL PURPOSES ONLY. THE INFORMATION CONTAINED IN THIS PRESENTATION IS PROVIDED FOR INFORMATIONAL PURPOSES ONLY. WHILE EFFORTS WERE MADE TO VERIFY THE COMPLETENESS AND ACCURACY OF THE INFORMATION CONTAINED IN THIS PRESENTATION, IT IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. IN ADDITION, THIS INFORMATION IS BASED ON IBM'S CURRENT PRODUCT PLANS AND STRATEGY, WHICH ARE SUBJECT TO CHANGE BY IBM WITHOUT NOTICE. IBM SHALL NOT BE RESPONSIBLE FOR ANY DAMAGES ARISING OUT OF THE USE OF, OR OTHERWISE RELATED TO, THIS PRESENTATION OR ANY OTHER DOCUMENTATION. NOTHING CONTAINED IN THIS PRESENTATION IS INTENDED TO, NOR SHALL HAVE THE EFFECT OF, CREATING ANY WARRANTIES OR REPRESENTATIONS FROM IBM (OR ITS SUPPLIERS OR LICENSORS), OR ALTERING THE TERMS AND CONDITIONS OF ANY AGREEMENT OR LICENSE GOVERNING THE USE OF IBM PRODUCTS OR SOFTWARE.