IBM Education Assistance for z/OS V2R2

Item: Buffer Pool Management
Element/Component: BCP WLM/SRM

Material current as of May 2015

Agenda

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- Overview
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Trademarks

- See url http://www.ibm.com/legal/copytrade.shtml for a list of trademarks.

Presentation Objectives

- Refresh Memory about WLM-managed DB2 Bufferpools
  - Activation
  - Interaction between DB2 and WLM
  - Implementation Aspects
  - Deactivation
- Describe Changes in V2.2

Overview

- The initial implementation of WLM-managed DB2 bufferpools hardly ever shrank a bufferpool
- With z/OS V2R1, a housekeeping function was added to shrink bufferpools when their usage and/or misses slow down
- Problem Statement / Need Addressed
  - The housekeeping function did not consequently consider the importance of the Service Class Periods that were using the bufferpool
  - Also some changes to the interface with DB2 were required

Overview

- Solution
  - With z/OS V2R2, if multiple bufferpools qualify to be shrunk, choose one used by the least important periods first
  - Also consider the fact that DB2 does not necessarily use up the complete size of a bufferpool as recommended by WLM

- Benefit / Value
  - Helps
    - optimizing response times
    - reduce CPU consumption
    - to adjust to changing workloads in real time with no administration effort.

Usage & Invocation

- ALTER BUFFERPOOL AUTOSIZE(YES)
  - DB2 registers bufferpool to WLM
- WLM will recommend to grow the size of the bufferpool when the Performance Index of a Service Class Period is impacted and bufferpool delays are a significant contributor
- WLM will recommend to shrink the size of the bufferpool
  - due to donation to a suffering Service Class Period
    - may suffer storage related delays
  - due to regular housekeeping cycles
- ALTER BUFFERPOOL AUTOSIZE(NO)
  - DB2 de-registers bufferpool from WLM management

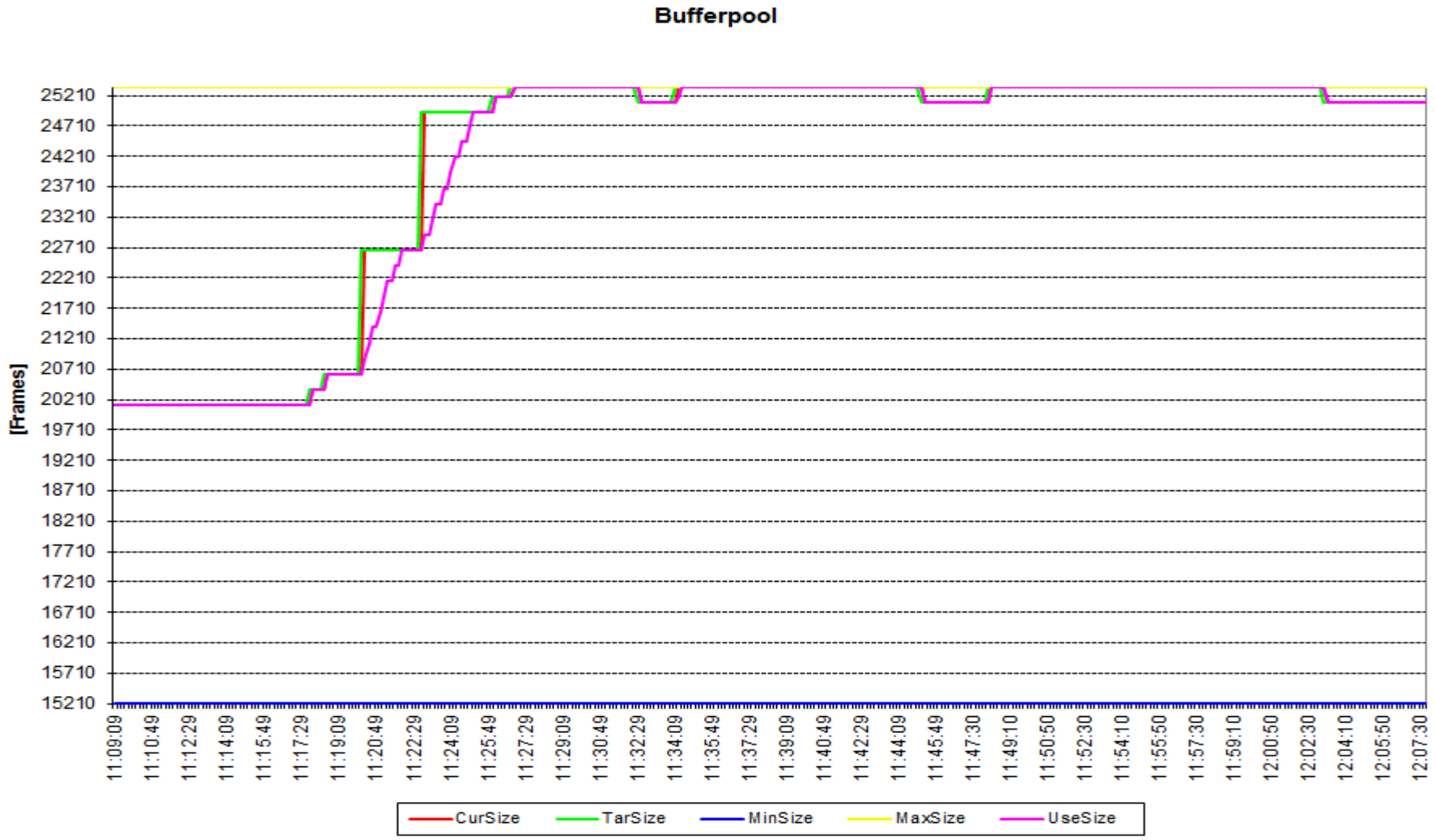
Interactions & Dependencies

- WLM gives recommendation to DB2 about what the size of a bufferpool should be, based on WLM's algorithms
  - grow or shrink the bufferpool
- DB2 decides about how much of that recommended size it will actually use, based on its own algorithms
  - The used (by DB2) size of a bufferpool can be below its recommended (by WLM) size
  - DB2 “getmains” up to the used size, not up to the recommended size

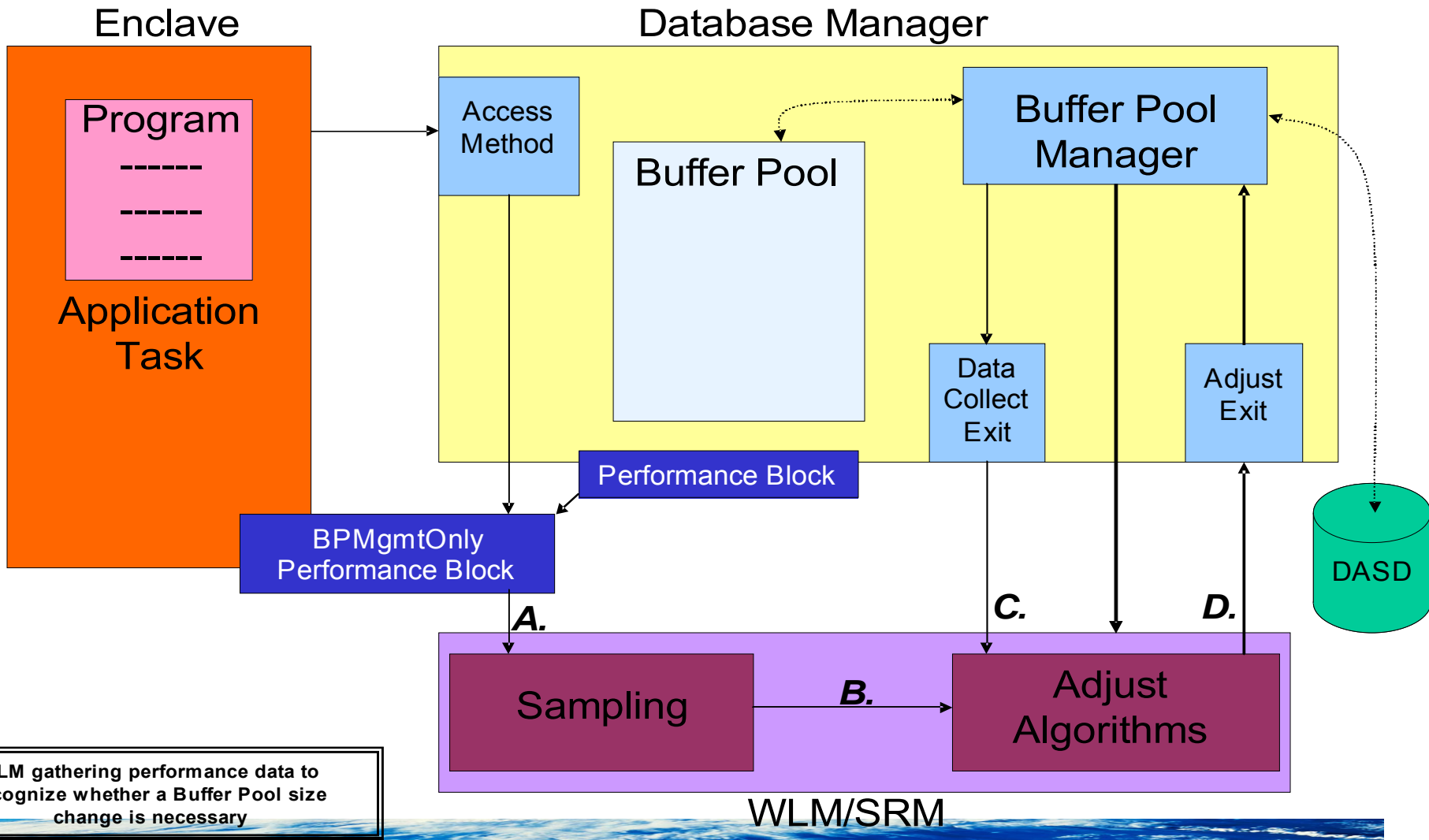
Interactions & Dependencies

- ALTER BUFFERPOOL [VPSIZE(s)] AUTOSIZE(YES)
  - DB2 registers bufferpool to WLM
    - MIN size = 0.75 x VPSIZE
    - MAX size = 1.25 x VPSIZE
    - Initial USED size between MIN size and MAX size
- WLM will grow the size of the bufferpool up to at most MAX size
- WLM will shrink the size of the bufferpool down to at most
  - Initial USED size during regular housekeeping
  - MIN size if storage donation to a suffering Service Class Period is needed when system is storage constraint
- ALTER BUFFERPOOL AUTOSIZE(NO)
  - DB2 de-registers bufferpool from WLM management
    - Size of bufferpool doesn't change and DB2 book keeps the last recommended bufferpool size. Will also be the new VPSIZE for reallocation

Example



Interactions & Dependencies



WLM gathering performance data to recognize whether a Buffer Pool size change is necessary

WLM/SRM Details

- Gathering Delay Samples
  - DB2 sets Performance Block “waiting” to report bufferpool miss while data is read into buffer
  - WLM counts delay samples for “waiting” Performance Block
    - For each Service Class Period up to 5 bufferpools are tracked
      - The bufferpools with the most misses
      - In every PA interval, this set of bufferpools is re-evaluated

WLM/SRM Details

- Bufferpool Hit Ratio
  - DB2 reports current (accepted recommended) size, used size, #references, and #misses
    - WLM calculates hit ratio based on used size
      - Plot used to assess effect of changing size of bufferpool to change in delay samples for PI of Service Class Period
- Current size of bufferpool versus used size
  - When WLM recommends to increase the size of a bufferpool, DB2 accepts the recommended size as new current VPSIZE
    - DB2 does not necessarily use up completely that recommended size
    - The used size of the bufferpool is what DB2 actually has in use
      - it will be equal to or below the current VPSIZE

WLM/SRM Details

- Housekeeping Function in V2R1
  - Initial implementation
    - Oversized bufferpool
    - Dormant bufferpool
  - Bufferpool is checked every minute
    1) Has zero references
    2) Has zero delays
    3) Generates delays for any period(s) that have sufficiently good PI

WLM/SRM Details

- Housekeeping Function in V2R2
  - A bufferpool may be changed at most every five minutes
  - Every ten seconds WLM selects a bufferpool candidate
    1) If has zero references
    2) If has zero or insignificant number of delays
    3) If period(s) having delays from the bufferpool are least important
  - First considers part that is unused by DB2
    - If unused size has not changed for five minutes then give recommendation to decrease by 50% of unused
    - If unused size has not changed for ten minutes then give recommendation to decrease by 100% of unused
    - Else give recommendation to decrease by 1% of maximum size
  - If bufferpool needs to be grown within the next five minutes then increase the check interval by additional five minutes
  - Dormant bufferpool will shrink over time while AUTOSIZE(YES)

Presentation Summary

- This presentation gave an overview of the implementation of WLM-managed DB2 bufferpools
- It described the differences in the function “housekeeping” between z/OS V2R1 and z/OS V2R2