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MQ SMF Buffer Pool Statistics Part 2

Lyn Elkins – elkinsc@us.ibm.com



Agenda

- Write to page set fields
- Read from pageset field
- What write and read together can tell me
- Page use fields
- An overview of buffer pool tuning options

The Buffer Pool SMF information

- There are many fields in the buffer pool data, some are more relevant to tuning the pool than others.
- In this topic I am going to talk about the fields not covered in the first video.
 - QPSTID The ID of the block, x'D70F'
 - · QPSTLL Length of the record
 - QPSTEYEC Eyecatcher, 'QPST'
 - QPSTPOOL Buffer pool number (ranges from 00 99)
 - QPSTNBUF number of 4K pages defined for this pool
 - QPSTCBSL lowest number of 4K pages available during the interval
 - QPSTCBS current number of available buffers
 - QPSTGETP Count of get page (old) requests
 - QPSTGETN Count of get page (new) requests
 - QPSTRIO Read I/O Count
 - QPSTSTW Set Write Intent Count
 - QPSTTPW Count of pages written
 - QPSTWIO Count of DASD Write operations
 - QPSTIMW Synchronous write count
 - QPSTDWT Deferred write threshold met count
 - QPSTDMC Synchronous write threshold met count
 - QPSTSTL Number of buffer steals
 - QPSTSTLA number of hash chain changes during a buffer steal
 - QPSTSOS The number of times the available buffer count is zero
 - QPSTFLAG Flags indicating location (below or above) and fixed

QPSTIMW (IMW)

- Immediate writes to the page set
- Non-zero counts can be from:
 - The buffer pool is getting full as message are being put,
 - If QPSTDMC (DMC the synchronous write threshold) is zero, IMW is the number of times pages were found on the queue waiting for write I/O that had been there for at three checkpoints.
 - Also, when DMC is zero, when the message size is too large for the pages required for the message (as in this example and not documented)

	CSQ4SMFD Sample
Field Name	Value
QPSTID	d70f
QPSTLL	104
QPSTEYEC	QPST
QPSTPOOL	5
QPSTNBUF	1000
QPSTCBSL	49
QPSTCBS	257
QPSTGETP	12
QPSTGETN	1188
QPSTRIO	2
QPSTSTW	1193
QPSTTPW	455
QPSTWIO	35
QPSTIMW	7
QPSTDWT	5
QPSTDMC	0
QPSTSTL	1190
QPSTSTLA	0
QPSTSOS	0
	Buffer pool located
QPSTFLAG	below bar
	Buffer pool backed by
	pageable 4KB pages

QPSTWIO (WIO)

- Write I/O count the number of actual write requests.
- An 'it depends' field the value must be interpreted based on the buffer pool primary use.
- A non-zero count is expected for pools holding long lived messages
- Workload that is responsiveness driven should see 0 to very low numbers in the write requests.

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QPSTIMW	
QPSTDWT	5
QPSTDMC	0
QPSTSTL	1190
QPSTSTLA	0
QPSTSOS	0
	Buffer pool located
QPSTFLAG	below bar
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	pageable 4KB pages

QPSTRIO (RIO)

- Read I/O count when messages are on a pageset and have to be read back into the buffer pool.
- An 'it depends' field a non-zero count may mean the pool is too small or over-used. But it depends on how the pool is used.
- A non-zero count is expected after a queue manager is restarted for pools that contain persistent messages
- A non-zero count is expected for pools holding long lived messages

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QPSTTPW	455
QPSTWIO	35
QPSTIMW	7
QPSTDWT	5
QPSTDMC	0
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QPSTSOS	0
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QPSTRIO & QPSTWIO

- When combined give the total I/O performed during the interval
- When divided by the interval, gives the I/O rate
- If that value is high, adding a pageset to the bufferpool may introduce parallel I/O and increase efficiency
- Also, buffer pools where there is a lot of I/O benefit more from being above the bar and page fixing than other pools!

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QPSTWIO	35
QPSTIMW	7
QPSTDWT	5
QPSTDMC	0
QPSTSTL	1190
QPSTSTLA	0
QPSTSOS	0
	Buffer pool located
QPSTFLAG	below bar
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QPSTSTW (STW)

- Set Write Intent the number of time a buffer that has message data has been flagged to be written.
- If the pool is being used by long lived messages, this is expected to be non-zero.
- In this example, where the message itself exceeded the buffer pools size, this is expected.
- This value may be used with the WIO field to determine I/O efficiency.

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QPSTCBS	257
QPSTGETP	12
QPSTGETN	1188
QPSTRIO	2
QPSTSTW	1193
QPSTIPW	455
QPSTWIO	35
QPSTIMW	7
QPSTDWT	5
QPSTDMC	0
QPSTSTL	1190
QPSTSTLA	0
QPSTSOS	0
	Buffer pool located
QPSTFLAG	below bar
	Buffer pool backed by
	pageable 4KB pages

The Other Fields of interest – used in combination

QPSTGETN (GETN)

The count of new pages requested

QPSTGETP (GETP)

- The count of old pages requested
- If the GETP > > GETN, this can be a sign that messages are being scanned. Scanning is done:
 - When specific matches are being sought and queues are not indexed
 - When there is browse processing
 - Or when message properties are used for selection

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QPSTSTW	1193
QPSTTPW	455
QPSTWIO	35
QPSTIMW	7
QPSTDWT	5
QPSTDMC	0
QPSTSTL	1190
QPSTSTLA	0
QPSTSOS	0
	Buffer pool located
QPSTFLAG	below bar
	Buffer pool backed by
	pageable 4KB pages

QPSTTPW (TPW)

- The total pages written to a page set.
- When RIO >> TPW this can also be a sign that messages are being scanned
 - But these messages have been written to the pageset, so there is more cost

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QPSTTPW	455
QPSTWIO	35
QPSTIMW	7
QPSTDWT	5
QPSTDMC	0
QPSTSTL	1190
QPSTSTLA	0
QPSTSOS	0
	Buffer pool located
QPSTFLAG	below bar
	Buffer pool backed by
	pageable 4KB pages

The Other Fields of interest – used in combination

QPSTSTL (STL)

- The count of when a page was not found and a 'stealable' (available) page had to be used for a read
- An 'it depends' field, if the value is not zero and is for a short-lived message buffer pool tuning may be necessary

QPSTSTLA (STLA)

- The number of times there was contention for stealable pages
- Ideally always zero
- If STLA is more than 20% of the STL count, then buffer pool tuning is necessary

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QPSTGETP	12
QPSTGETN	1188
QPSTRIO	2
QPSTSTW	1193
QPSTTPW	455
QPSTWIO	35
QPSTIMW	7
QPSTDWT	5
QPST DMC	0
QPSTSTL	1190
QPSTSTLA	0
QP STS QS	0
	Buffer pool located
QPSTFLAG	below bar
	Buffer pool backed by
	pageable 4KB pages

Overall buffer pool tuning suggestions

- Buffer pool tuning may include:
 - Making the pool larger
 - Moving the pool above the bar
 - Moving the pool above the bar and page fixing the pool
 - Moving queues to different pools
 - This may include defining new pools and page sets
 - Moving queues to different or new page sets that use the same buffer pool
 - This may include defining the new storage class
- Buffer pool tuning alone has been observed to:
 - Reduce response times to acceptable levels taking multi-second response times to <.25 seconds
 - Reduce CPU substantially for non-persistent messages

That's all for now

- In these two sessions, the fields that are commonly used in tuning were covered.
- Are we done with buffer pools?
 - Probably not because there is always something new to learn!