The Dark Side of Monitoring MQ –
SMF 115 and 116 record reading and interpretation

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Session Agenda

- Shameless Laziness
- Introduce the native audit capabilities of WMQ
- Discuss real-time monitoring of WMQ for z/OS
- Finally, an introduction to the dark arts – a quick view into SMF115 and 116
- Final shameless plug

Shameless Laziness

- This session is light on Auditing and Monitoring because
  - There was already a session (Monday at 3) covering Auditing and Monitoring
- This session immediately follows lunch
  - The presenter is not responsible for injuries that occur:
    - When you start to snore and the person beside you hits you
    - Your head hits the table
    - Or anything else for that matter

WMQ for z/OS and Auditing

- System Management Auditing needs
  - New Objects
  - Changed Objects
  - Updated Objects

WMQ for z/OS and Auditing - Notes

- WMQ V7 introduced command and configuration events for all platforms
- Enabled at the queue manager level

Enabling configuration Events

- Use the DISPLAY QMGR command to show the current configuration event setting
- If the display indicates disabled

- Use the ALTER QMGR command to set configuration events on

```
                    System Command Extension

Type or complete typing a system command, then press Enter.

===) qml1 dis qmgr configev
===) ▮
```

```
RESPONSE=MPX1
 CSQM201I QML1 CSQMDRTC  DIS QMGR DETAILS
 QMNAME(QML1)
 CONFIGEV(DISABLED)
  END QMGR DETAILS
 CSQ9022I QML1 CSQMDRTC ' DIS QMGR' NORMAL COMPLETION
```

```
                    System Command Extension

Type or complete typing a system command, then press Enter.

===) QML1 alter QMGR CONFIGEV(enabled)▮
===)
```

Configuration Events

- Once config events are enabled
  - Changes to the objects are recorded
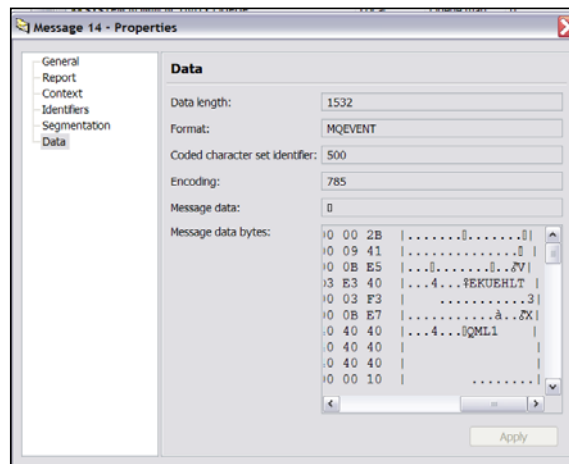   - On z/OS the messages will typically be persistent

Queues

Filter: ADMIN

/ Queue name	Queue type	QSG disposi...	Open input count	Open outp...	Current queue depth
SYSTEM.ADMIN.ACTIVITY.QUEUE	Local	Queue man...	0	0	0
SYSTEM.ADMIN.CHANNEL.EVENT	Local	Queue man...	0	0	0
SYSTEM.ADMIN.COMMAND.EVENT	Local	Queue man...	0	0	0
SYSTEM.ADMIN.COMMAND.QUEUE	Alias	Queue man...			
SYSTEM.ADMIN.CONFIG.EVENT	Local	Queue man...	0	0	14
SYSTEM.ADMIN.PERFM.EVENT	Local	Queue man...	0	0	0
SYSTEM.ADMIN.QMGR.EVENT	Local	Queue man...	0	0	1
SYSTEM.ADMIN.TRACE.ROUTE.QUEUE	Local	Queue man...	0	0	0

Configuration Events

- Messages not 'human readable'

Message 14 - Properties

General
Report
Context
Identifiers
Segmentation
Data

Data

Data length: 1532

Format: MQEVENT

Coded character set identifier: 500

Encoding: 785

Message data:

Message data bytes:

```
)0 00 2B  |.......[].......]|
)0 09 41  |.............[] |
)0 0B E5  |...[].......[]..ðV|
)3 E3 40  |...4...ªEKUEHLT |
)0 03 F3  |      .........3|
)0 0B E7  |...........à..ðX|
,0 40 40  |...4...[]QML1  |
,0 40 40  |              |
,0 40 40  |              |
)0 00 10  |       ........|
```

Apply

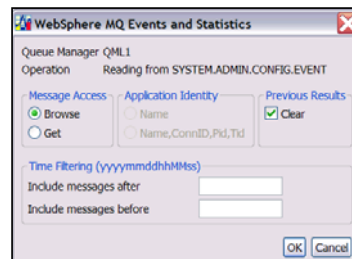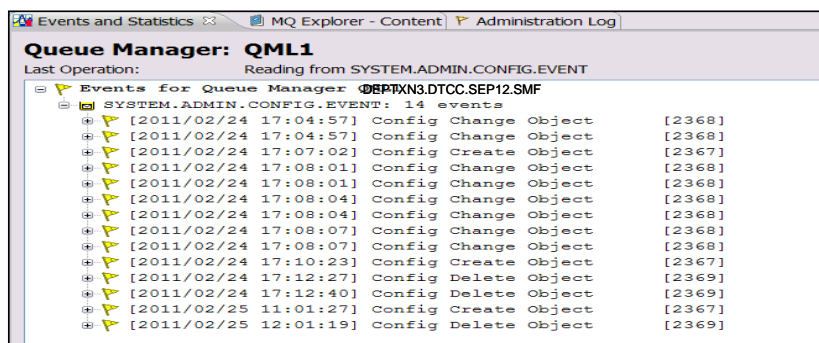## Configuration Events

- They can easily be displayed using MS0P Plug-In
  - Right click on the queue name and select 'Format Event messages
  - Events and Statistics selection panel is used to select the messages to be formatted

---

Configuration Events

- The event messages are configured and can be examined to see the changes that have been made

Configuration Events - Notes

- Note that change messages are in pairs, showing the before and after image. Creation and deletion are single messages.

Configuration Events Before and After

Auditing Configuration Changes

- MS0P is a good place to start
  - Gives you a quick look into changes that have been made
  - Without user action, the configuration events may be lost
- Turn monitoring on the configuration events file
  - If objects change unexpectedly, someone can be notified immediately
- To keep an audit trail
  - Write the event messages to a file
  - Create reports

Real Time Monitoring

- What are you watching today?
  - No one source gives you a complete picture of a queue manager's use and health
  - No one source gives you all the information you may need for problem determination

- How are you watching WMQ?
- Who is watching WMQ?

Real Time Monitoring

- What are you watching today?
  - Channel status
  - Queue depth
  - Queue usage
  - Queue manager and chinit status
- But are you watching?
  - Queue manager storage usage

```
CSQY220I QML1 Queue manager is using 627 MB of local
storage, 1105 MB are free
```

  - RBA of your logs

Real Time Monitoring

- But are you watching?
  - Long running UOWs
    - Log shunting
      - *CSQR026I: Long-running UOW shunted to RBA=rba, URID=urid connection name=name*

      - *CSQR027I: Long-running UOW shunting failed, URID=urid connection name=name*

  - Amount of time messages are on the queues?

Real Time Monitoring

- How are you watching?
  - Automated monitoring tools
    - Tivoli, BMC, RYO, etc.
  - IEBEYEBALL
- Who is watching WMQ?
  - Developers
  - Application owners
  - System administrators
  - Execs?

Real Time Monitoring - Notes

- Some monitoring 'war stories'
  - Perpetual enter key compulsion when doing stress periods
    - We've seen 99% of the transactional traffic on MQ as monitoring requests – hugely impacting other work
  - RBA wrapping, or as it was described 'the unthinkable has happened'
  - Not monitoring Admin queues
  - Not monitoring storage usage
  - Subscription queues

The dark arts – SMF Data

- Unreal time monitoring
- Introduction to SMF115
  - What it can tell you and what it cannot
  - Trend analysis
- Introduction to SMF116 – class 3
  - What it tells you in horrid detail
  - What is doesn't tell you

Introduction to SMF115

- Statistics records for the Queue Manager
- Enabled via:
  - SYSP Macro
  - START Trace command
- Lightweight - two cut per SMF interval per queue manager
- Recommendations:
  - Always gather and examine this data
  - Useful to store for trend analysis
- Contains information on the managers:

  - Buffer manager
  - Log manager
  - Storage manager
  - Message manager

  - Data manager
  - Lock manager
  - CF Manager
  - DB2 Manager

SupportPacs

- SupportPac MP1B
  - Sample programs to print the SMF data
  - Documentation on how to use an interpret the information
- SupportPac MP16
  - The WMQ for z/OS handbook

Buffer Manager

- Often biggest bang for the buck on performance tuning
- For each bufferpool it reports:
  - The number of pages allocated
  - The 'low' point
  - How the pool is used
  - Short on Storage
- What it doesn't tell you:
  - How many pagesets are used by this pool
  - Number of pages written to/read from each pageset
  - Number of pageset expansions
- It does NO good to increase the bufferpools for shared queues

Buffer Manager

```
> 01 Buffs    15000  Low        0  Now     1844  Getp  351632  Getn  198775
  01 Rio     102140  STW   472341  TPW   260049  WIO   129209  IMW    85105
  01 DWT        137  DMC    81686  STL   276198  STLA       4  SOS      413
```

- Bufferpool churn example from a stress test:
- Note the 'low' value of '0' and the SOS value of 413
  - The bufferpool went to short on storage 413 times in a 5 minute interval
  - There were 102,140 reads from the pagesets
  - There were 129,209 writes to the pagesets
  - The async write process was started 137 times
  - The synchronous write process was started 81,686 times!
  - JES log also had repetitions of the following messages

```
CSQP020E QML1 CSQP1RSW Buffer pool 1 is too small
CSQP020E QML1 CSQP3GET Buffer pool 1 is too small
```

Buffer Manager - Notes

```
> 01 Buffs    15000  Low        0  Now     1844  Getp  351632  Getn  198775
  01 Rio     102140  STW   472341  TPW   260049  WIO   129209  IMW    85105
  01 DWT        137  DMC    81686  STL   276198  STLA       4  SOS      413
```

- The information in interpretation is taken from MP1B
- While this example is from a stress test, we have seen similar situations in production environments
- If the bufferpool becomes completely exhausted and nothing can be freed, the queue manager will abend with a '**00D70120**' reason code
- There is no indication of pageset expansions, that information can be obtained from the JES log

```
CSQP017I QML1 CSQPEXT1 EXPANSION STARTED FOR PAGE SET 1
CSQP013I QML1 CSQPEXT1 NEW EXTENT CREATED FOR PAGE
SET 1. NEW EXTENT WILL NOW BE FORMATTED
```

Log Manager

- This is important for customers using a lot of persistent messaging – and those who don't think they are
- Some of the interesting fields include:
  - Checkpoint
    - The numbers are slightly deceiving, the checkpoint count only includes when the LOGLOAD has been hit , not when log switching has occurred
  - Any of the log read fields – indicating work is being backed out
  - Wait for buffers
  - Write force – tasks are suspended until the write completes
- Information not available:
  - Number of log switches
  - Number of log shunts
  - Number of long running UOWs detected

Log Manager

```
Log manager    : QJST
  Write_Wait        0,  Write_Nowait  3818652,  Write_Force     1663,  WTB   179
  Read_Stor         0,  Read_Active         0,  Read_Archive       0,  TVC     0
  BSDS_Reqs       814,  CIs_Created    750066,  BFWR          103576,  ALR     0
  ALW               0,  CIs_Offload    914688,  Checkpoints        0
  WUR               0,  LAMA                0,  LAMS               0
  Write_Susp   101189,  Write_Reqs      41648,  CI_Writes     758876
  Write_Serl        0,  Write_Thrsh      2381,  Buff_Pagein        0
```

- Log Manager Example
  - Note that checkpoints were 0, but there had been more than 20 during the interval caused by log switches
  - WTB – is the wait count for unavailable buffers, and the outbuffer value is at the recommended value

Storage Manager

```
Storage manager : QSST
  Fixed pools   : Created          48,  Deallocated        49
  Fixed segments: Freed             0,  Expanded        1,  Contracted       1
  Varbl pools   : Created          38,  Deallocated        38
  Varbl segments: Freed          6178,  Expanded     6178,  Contracted       0
  Getmains        48,  Freemains          48,  Non-zero RCs       0
  SOS bits         0,  Contractions        0,  Abends        0
```

- Two fields are of interest:
  - SOS bits – QSSTCRIT – which indicates a critical short on storage
  - A sort on storage was detected – QSSTCONT – and storage contractions had to be done.
- Information not available:
  - High and low watermark use, both below and above the bar
  - Storage use by type (security caching, index, etc.)
  - Storage use in the CHIN by clients and channels

Storage Manager - Notes

- In addition to the storage manager statistics, review the JES log for the storage use messages
  - If storage use keeps increasing and the free storage goes to less than 100 MB, the queue manager may need to be stopped and restarted to avoid an abend soon. Investigation should take place to determine why storage is not being freed.

    ```
    CSQY220I QML1 Queue manager is using 627 MB of local
    storage, 1105 MB are free
    ```

  - Information about the structure storage use may be found in the CF activity reports

Message Manager

```
Message manager : QMST
  MQOPENs      215,  MQCLOSEs      216,  MQGETs     129377, MQPUTs      155007
  MQPUT1s        0,  MQINQs        174,  MQSETs          0, close_all        4
```

- The message manager reports the number of API requests that have been made
  - NOT the number of successful requests
- Useful for volume tracking

Data Manager & Lock manager

- The data manager statistics can provide information about the number of read ahead and gets that required real I/O, however these fields are not included in the sample SMF reports
- The lock manager statistics are only of interest to IBM.

DB2 Manager & CF Manager

- Only used when there are shared queues
- The DB2 Manager data:
  - Is used to report on the queue manager interaction with DB2
  - DB2 response time will impact the WMQ response times and should be monitored
  - Should be used in conjunction with DB2 performance reports
- The CF Manager data
  - Is used to report on the interaction with the CF structures
  - Should be used in conjunction with the CF Activity Report

---

DB2 Manager & CF Manager

```
DB2 manager    : Q5ST
  Tasks  : Servers        8,  Active         9,  Conns        0,  Discs        0
           High          14,  Abend          0,  Requeue      0
  Number of deadlock conditions        0
                         Count     Task avg    Task max    DB2 avg    DB2 max   (m/s)
  Reads       :           580          1           2          1          2
  Lists       :           485          4          97          4         97
  SCS Selects :            30          5          33          5         33
  SCS Inserts :           212          8          47          8         47
  SCS Updates :           272          5          49          5         49
  SCS Deletes :           224          6          25          6         25
  SSK Selects :            40          0           2          0          2
```

- In the sample above, the 'High' value represents the high water mark on requests to the DB2 server.
- The SCS fields are for Shared Channel Status table
- The SSK fields are for the Shared Sync Key table

DB2 Manager & CF Manager

```
CF manager      : QEST
  Structure #   0,  Name CSQ_ADMIN  ,  Structure-fulls      0
  Single     168364,  Elapsed time 0000001115116730,  Retries        0
  Multiple     5747,  Elapsed time 0000000257214151,  Retries     1473
  Max entries     708,  Max elements       863
  Structure #   1,  Name APPLS      ,  Structure-fulls      0
  Single     523101,  Elapsed time 000000B7923BCB91,  Retries    11775
  Multiple    14999,  Elapsed time 0000000162517D77,  Retries      280
  Max entries    4997,  Max elements     91409
```

- In the sample above there were no Structure full conditions
- Requests to the CF can be to update a single entry or multiple entries, based on the type of request. They are reported separately in the statistics.
- 'Retries' indicates the number of times a 4K buffer was not sufficient to retrieve the data from the CF and the request had to be retried with a larger (64K) buffer

Trend Analysis

- External to WMQ
- Some monitoring tools have historical capture and trend analysis tools
  - For smaller implementations (<10 production queue managers) keeping spreadsheets may be sufficient
  - For others, look into implementing this component of your monitoring tool if it's not in place

Introduction to SMF116 – Class 3

- The Really Dark Arts

Introduction to SMF116 – class 3

- Also known as the "New" Accounting records
- Heavyweight – multiple records may be cut for each transaction, and at SMF intervals for long running UoWs
  - Turning this on has been known to swamp an SMF environment
  - But you get marvelous information about what is actually happening
  - Often used in tracking down an application problem and in performance tuning
- Enabled like the Statistics records
- Recommendation - Even though they are prolific:
  - At least once a month turn on class 3 accounting for one SMF interval
  - Become familiar with the data and with the patterns of WMQ usage

SMF116 – The header Information

```
z/OS:Q001  MQ QMGR:QML1  Time: 2010255 13:36:19.73  Jobname:LYNE2054  Userid:MQUSER
        ====> New task record found     <==========
== Thread type............> RRS BATCH
== Connection name........> LYNEBTCH
== Operator ID............> MQUSER
== User ID................> MQUSER
== Channel name...........>
== Chl connection.........>
== Correlator ID..........>
== Correlator ID.....(HEX)> 404040404040404040404040
== Context token..........>
== Context token.....(HEX)> 00000000000000000000000000000000
== NID....................>
== NID..............(HEX)> 404040404040404040000000000000000000
== Accounting token.......>
== Accounting token..(HEX)> 0000000000000000000000000000000000000000000000
== UOW identifier.........>                    Fk™0J€
== UOW identifier....(HEX)> 4040404040404040404040404040c69239F0D1200001
```

SMF116 – The header Information

- The Thread type gives you information about the task, in this case it's a batch process. It may also be mover (for channels), CICS and IMS
- Connection name is the jobname
- The channel name will be present when this is a mover thread
- The correlator ID is not the correlation ID
  - If the SMF data is for a CICS transaction, it will contain the transaction ID. The transaction ID for this record is QPUB:
    - == Correlator ID..........>   .®.ÇQPUB.
    - == Correlator ID.....(HEX)> 20AF4B68D8D7E4C20043219C

SMF116 – The Header Information – cont'd

```
== Task token : 12-09-2010 17:30:33.73,  3431D3E0,  342E1AE0
== Interval   : START 12-09-2010 17:30:33.73
== Interval   : END   12-09-2010 17:36:19.73
== Number of queue blocks for this task          4
== Other reqs : Count          4,  Avg elapsed        200,  Avg CPU         13
== Latch      : Max number     19,  Max wait   35788780 mics
 > Latch  7,  Total wait        161 mics, Waits           2, Name DMCISTGC
 > Latch 11,  Total wait       6473 mics, Waits           9, Name DMCSEGAL|SSSCONN
 > Latch 12,  Total wait    2483916 mics, Waits         102, Name DMCNMSPC|XMCHASH
 > Latch 15,  Total wait     166693 mics, Waits          55, Name CMXL1   |BMXL1
 > Latch 16,  Total wait      70987 mics, Waits          78, Name BMXL2   |RMCRMST |RLMARQC
 > Latch 19,  Total wait   35788780 mics, Waits        1586, Name BMXL3   |CFXML2  |SRH1_L19
 > Latch 21,  Total wait   18040644 mics, Waits       10680, Name RLMLWRT
 > Latch 24,  Total wait     225667 mics, Waits          53, Name LMXL1
 > Latch 31,  Total wait          0 mics, Waits           2, Name DPSLTCH
 > Latch 32,  Total wait      28816 mics, Waits          45, Name SMCPHB
 > Address of latch for longest wait: 0000000042C37E80
== Commit     : Count        113,  Avg elapsed      53071,  Avg CPU         18
== Log I/O    : Count        461,  Avg elapsed      18574,  Bytes 331798792,
                Forces       445,  Avg elapsed      14012
== Suspend    : Count        113,  Avg elapsed      53051
== Pages      : New       90409,  old        95577
NTASVER 5
== Task token : 12-09-2010 17:30:33.73,  3431D3E0,  342E1AE0
```

SMF116 – The really interesting header Information

- Task token is the task identifying information
- Since this is a long running task, the interval start and end information may be of interest
- The queue blocks gives you the number of queues that have been accessed
- Then there's the latches………

SMF116 – Latching – The Good, the bad and the …..

```
== Latch      : Max number       19,  Max wait    35788780 mics
> Latch  7,  Total wait        161 mics, Waits           2, Name DMCISTGC
> Latch 11,  Total wait       6473 mics, Waits           9, Name DMCSEGAL |SSSCONN
> Latch 12,  Total wait    2483916 mics, Waits         102, Name DMCNMSPC |XMCHASH
> Latch 15,  Total wait     166693 mics, Waits          55, Name CMXL1    |BMXL1
> Latch 16,  Total wait      70987 mics, Waits          78, Name BMXL2    |RMCRMST |RLMARQC
> Latch 19,  Total wait   35788780 mics, Waits        1586, Name BMXL3    |CFXML2  |SRH1_L19
> Latch 21,  Total wait   18040644 mics, Waits       10680, Name RLMLWRT
> Latch 24,  Total wait     225667 mics, Waits          53, Name LMXL1
> Latch 31,  Total wait          0 mics, Waits           2, Name DPSLTCH
> Latch 32,  Total wait      28816 mics, Waits          45, Name SMCPHB
> Address of latch for longest wait: 0000000042c37E80
```

- Latching is performed to serialize requests within the queue manager
- There is always latching going on
  - But there are times when it gets a bit excessive, and needs to be investigated
  - This is one of those times

SMF116 – Latching – The Good, the bad and the …..Notes

- The 'Max number' is really the latch type that showed the longest wait, in this case latch type 19
- Latch types may be used for multiple purposes
- MP1B has a list of some of the more typical entries, latch 19 is used for serialization to bufferpools
- Latch 21, the second largest wait count, is used when updating log buffers.
- Using these numbers, and looking at the JES message log for the queue manager indicates that during this interval there were numerous log switches and one of the bufferpools expanded
- Further investigation uncovered I/O subsystem issues – the logs and the pagesets were on the same devices for this environment, leading to significant contention

SMF116 – More Header Information

```
== Commit    : Count     113,   Avg elapsed   53071,  Avg CPU        18
== Log I/O   : Count     461,   Avg elapsed   18574,  Bytes 331798792,
              Forces    445,   Avg elapsed   14012
== Suspend   : Count     113,   Avg elapsed   53051
== Pages     : New     90409,  old     95577
WTASVER 5
== Task token : 12-09-2010 17:30:33.73,  3431D3E0,  342E1AE0
```

- The commit count is useful, especially when working with long running tasks
- The 'Pages' values show how many new and old buffer pages have been used during this interval by this task

---

SMF116 – Queue Information

```
Open name LYN.LOGQ.Q11                          Object type:Local Queue
Base name LYN.LOGQ.Q11                          Base type  :Queue
Queue indexed by NONE
First opened 12-09-2010 17:30:34.17
Last closed  12-09-2010 17:36:19.60
Page set ID          63,  Buffer pool        3
Current opens        0,  Total requests   4157
Generated messages :       0
Persistent messages: GETs         0,  PUTs      4155,  PUT1s        0
Put to waiting getter: PUT       0,  PUT1         0
PUTs: Valid   4155,  Max size    35712,  Min size   17856,  Total bytes   139 MB
-MQ call-         N       ET        CT       Susp      LOGW      PSET Epages  skip expir
Open  :           1       40        39        0
Close :           1        5         5        0
Put   :        4155    10948       193     9457       915
-Logging: Total-count  Total-elapsed   Force-count Force-elapsed
 MQPUT          326      3.801852          318     2.852607
Maximum depth encountered       385
```

- This is the first queue used by the task
- Detailed information about the queue's use by this task, including:
  - Pageset and bufferpool
  - Number of valid requests
  - Record size range, you an calculate the average size
  - Total elapsed time and cpu time for the requests
  - Maximum depth

SMF116 – Queue Information

```
Open name LYN.TEST.Q03                              Object type:Local Queue
Base name LYN.TEST.Q03                              Base type  :Queue
Queue indexed by NONE
First opened 12-09-2010 17:30:33.73
Last closed  12-09-2010 17:36:19.60
Page set ID           4, Buffer pool         1
Current opens         0, Total requests      8518
Generated messages :          0
Persistent messages: GETs      8200, PUTs          0, PUT1s          0
Put to waiting getter: PUT         0, PUT1          0
GETs: Valid      8200, Max size      7750, Min size      7750, Total bytes  63550000
GETs: Dest-S      0,  Dest-G     8515,  Brow-S      0, Brow-G       0, Su cessful destructive      8200
Time on queue : Max   26.319674, Min    0.011420, Avg 4294967269.002278
-MQ call-        N        ET        CT      Susp       LOGW      PSET Epages  skip expire
 Open  :         1        71        36        36
 Close :         1         7         7         0
 Get   :      8515      1608        47      1137         0         0   198     0     0
 Inquire:        1        12         9
-Logging: Total-count  Total-elapsed   Force-count Force-elapsed
 MQGET           2       0.002355           2       0.002355
Maximum depth encountered       299
```

SMF116 – Queue Information

- This is the fourth queue used by the task, the 'get' queue
- In addition to the information common to all queues, the following should be noted on the GET queues
  - Number of valid gets as compared to the total gets issued
    - The difference means that a number of gets returned no message, often due to a get wait expiring
  - Time on queue
    - In microseconds – though the average often overflows
  - PSET is the average I/O time for a read from a pageset
  - Epages is the number of empty pages there were scanned during a get
  - Skip is the number of pages with messages that were skipped
  - Expire is the number of expired messages that were skipped

SMF116 Uses

- Channel usage
- Bufferpool/pageset balancing
  - In a high volume request reply scenario if the two queues are on the same pageset, separating them can improve performance
  - When queues have become concentrated in one resource pool
- Preparation for migration to shared queues
  - Min/Max/Average message size and duration on queue
- Application Performance tuning
  - Proper Indexing
  - Elimination of 'hot spots' – reducing contention
- Problem determination

SMF116 – What it does not tell you

- Often a consolidated view is needed
  - How many tasks are concurrently using this set of queues?
  - What tasks are related?
    - Can be determined via the queues accessed, but not easily
- Were security calls made during this task?
- Finally, how can the z/OS information and distributed information be consolidated for a complete view?

The rest of the week ......

	Monday	Tuesday	Wednesday	Thursday	Friday
08:00			More than a buzzword: Extending the reach of your MQ messaging with Web 2.0	Batch, local, remote, and traditional MVS - file processing in Message Broker	Lyn's Story Time - Avoiding the MQ Problems Others have Hit
09:30		WebSphere MQ 101: Introduction to the world's leading messaging provider	The Do's and Don'ts of Queue Manager Performance	So, what else can I do? - MQ API beyond the basics	MQ Project Planning Session
11:00		MQ Publish/Subscribe	The Do's and Don'ts of Message Broker Performance	Diagnosing problems for Message Broker	What's new for the MQ Family and Message Broker
12:15	MQ Freebies! Top 5 SupportPacs	The doctor is in. Hands-on lab and lots of help with the MQ family		Using the WMQ V7 Verbs in CICS Programs	
01:30	Diagnosing problems for MQ	WebSphere Message Broker 101: You are Here	The Dark Side of Monitoring MQ - SMF 115 and 116 record reading and interpretation	Getting your MQ JMS applications running, with or without WAS	
03:00	Keeping your eye on it all - Queue Manager Monitoring & Auditing	The MQ API for dummies - the basics	Under the hood of Message Broker on z/OS - WLM, SMF and more	Message Broker Patterns - Generate applications in an instant	
04:30	Message Broker administration for dummies	All About WebSphere MQ File Transfer Edition	For your eyes only - WebSphere MQ Advanced Message Security	Keeping your MQ service up and running - Queue Manager clustering	
06:00			Free MQ! - MQ Clients and what you can do with them	MQ Q-Box - Open Microphone to ask the experts questions	

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