WebSphere MQ Shared Queueing in a Coupling Facility Environment

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Agenda

- Introduction
- General Overview Shared Queueing
- Recently Reported Issues / FAQs
- Typical Diagnostics
- Summary
Introduction

- Topic (Shared Queues)
- Brief History of Shared Queues
- Evolution of Shared Queues
- Recent improvements
  - Performance
  - Availability
CSQ5PQSG – ADD and REMOVE

- Add a QSG to the DB2 tables.  
  Sample CSQ45AQS → CSQ5PQSG ADD QSG
- Add a queue manager to a QSG.  
  Sample CSQ45AQM → CSQ5PQSG ADD QMGR

- Remove a queue manager from a QSG.  
  Sample CSQ45RQM → CSQ5PQSG REMOVE QMGR (after taking other steps)
- Remove a QSG from the DB2 tables.  
  Sample CSQ45RQS → CSQ5PQSG REMOVE QSG
Disaster Recovery – need to ADD QMGR

- **Errors:**
  - CSQ5010E CSQ5CONN XCF IXCQUERY member error, RC=00000008 reason=00000004
  - CSQV086E QUEUE MANAGER ABNORMAL TERMINATION REASON=00F50017

- At the disaster recovery site, run the ADD QMGR command of the CSQ5PQSG utility for every queue manager in the queue-sharing group.
- See technote 1452734
CSQ5PQSG – MIGRATE, FORCE, VERIFY

- CSQ5PQSG syntax
- MIGRATE DSG or QSG
  - Validates coexistence maintenance
  - Does not actually do migration
  - Need PM58871 for WebSphere MQ V710
- FORCE QMGR
- VERIFY QSG
  - Validates consistency of DB2 information
APARs

- Techdoc 7006625 has links to fix lists for each release
- There is a column to draw attention to High Impact or Pervasive (HIPER) fixes
- A .csv file has information about which fixes are included on each RSU level
What are CSQ45BPL, CSQ45GEX, CSQ45BPK?

- **CSQ45BPL** – Bind DB2 plans for WebSphere MQ
- **CSQ45GEX** – Grant authority to the plans

These are run at installation after MQ maintenance prior to PM60589/PM65422

- **CSQ45BPK** – Bind DB2 packages
  - Added by PM60589 (V710) and PM65422 (V701)
  - See technote 1643097
How do I migrate my QSG?

- Review technote 1299323.
- Apply coexistence fixes
  - Run the updated CSQ45xxx jobs (preferably at a lightly loaded time to avoid DB2 locks)
  - Restart each queue manager at the old release before migrating any of them.
- Do not need an outage of the entire QSG
- Can have a QSG consisting of queue managers at multiple releases
Shared queues in a cluster

- Users in the network see the shared queue as being hosted by each queue manager within the QSG

- The usual cluster workload algorithm is used

- If the MQPUT is done on a member of the QSG, the queue attribute CLWLUSEQ(LOCAL) will force the message directly to the shared queue
Why does DISPLAY SMDSCONN return with CSQM297I?

- **DISPLAY SMDSCONN** only works for connected structures.

- **CSQM297I CSQ1 CSQMDRTC NO SMDSCONN FOUND MATCHING REQUEST CRITERIA**
What are some guidelines for SharedQ's?

- Serializing your applications
- Applications that are not suitable for use with shared queues
- Deciding whether to share non-application queues
- Migrating your existing applications to use shared queues
- Influencing workload distribution with shared queues
- Shared queue recovery
- Shared queues and queue depth events (WebSphere® MQ for z/OS®)
- Planning your coupling facility and offload storage environment
Why does the queue manager Abend with 5C600C511CE?

- The ADMIN structure is full
- Application putting thousands of messages before committing
- Syslog message IXC585E STRUCTURE qsgnameCSQ_ADMIN IN COUPLING FACILITY YYY IS AT OR ABOVE STRUCTURE FULL MONITORING THRESHOLD OF ....
- Increase the size of structure qsgnameCSQ_ADMIN
Why does the MSTR fail with Abend S5C6 00C511C8?

- The ABEND5C6-00C511C8 occurred because WebSphere MQ lost the connection to the Coupling Facility.

- DOC APAR PK34486 – Clarify how WebSphere MQ for z/OS handles coupling facility structure failures and connection failures.
Why is MQRC 2192 MQRC STORAGE MEDIUM FULL returned when writing to a shared queue?

- Technote 1144275
- PQ75276/UQ78066
- APAR OW37576
- PM77094
- Search the WebSphere MQ support page for other possible 2192 fixes
Why is CSQJ104E CSQ1 CSQJR206 RECEIVED ERROR STATUS 00000008 issued?

- CSQJ104E CSQ1 CSQJR206 RECEIVED ERROR STATUS 00000008 FROM LOCATE FOR DSNAME=CSQ1.ARCLOG1...
- The archive log was deleted
- CSQE041E CSQECFBI Structure XXXX backup is more than a day old
Why do I receive an MQRC 2048 when putting a persistent message to a shared queue?

- Ensure that you have Coupling Facility structures defined with RECOVER(YES)
  - Reference Information Center.
How often should I backup CF Structures?

- IBM recommends that you backup your CF structures every hour to minimize the time it takes to restore a CF structure.
  - Reference Information Center.
How do I recover CSQSYSAPPL when it is in a failed state?

- **Ex:** CSQE035E CSQECO\_CONN Structure CSQSYSAPPL in failed state, recovery needed.
- **Issue** `RECOVER CFSTRUCT(CSQSYSAPPL) TYPE(NORMAL)`
- **Issue** `RECOVER CFSTRUCT(CSQSYSAPPL) TYPE(PURGE)`
  - The `TYPE(PURGE)` parameter is restricted. It requires IBM L2 involvement.
  - It is used when no backups are available.
Why won't my application structure reconnect?

- Ex: You see CSQE005I and CSQE006I for application structures and the CSQE006I indicates that the structure is disconnected.

- This can be expected as a result of a BACKUP CFSTRUCT command if there are no applications connecting to the queue manager that uses the queues on the structure in question.

- Reference: Technote 1431563
Why do I receive CSQ5005E, REASON=00F50029?

- There is one or more queue managers in the queue sharing group that has not been started with the toleration PTF(s)

- Reference Technote 1608631
Why are my getting applications not balanced equally across queue managers in the QSG?

- QSGs are not intended for load balancing.

- Putting queue managers have precedence over other queue managers in the QSG when a "list transition notification" is sent from the CF. If it can, it will process the MQGET from a waiting application before the other queue managers are notified of the "list transition notification".

- Reference Information Center.
Why does my queue manager get an ABEND5C6-00C5101A when it starts?

- Multiple queue managers in the QSG are assigned queue-manager ID n.

- This can be caused by a residual queue manager still being in the queue sharing group (QSG) perhaps from a previous configuration.
Why does my queue manager get an ABEND5C6-00C5101A when it starts? Continued...

- Use CSQ5PQSG REMOVE/FORCE QMGR to remove the residual queue manager and then, CSQ5PQSG ADD QMGR to add it back in.

- Use DISPLAY GROUP to show the queue manager ID.

```
CSQ5102I +RTP2 Queue managers in group RLG1  327

+---------------------+-------+-------+----------+---------+--------+--------+
<table>
<thead>
<tr>
<th>Name</th>
<th>Num</th>
<th>Prefix</th>
<th>Status</th>
<th>Ver</th>
<th>DB2</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTP1</td>
<td>1</td>
<td>+RTP1</td>
<td>FAILED</td>
<td>701</td>
<td>DH3C</td>
<td>INACTIVE</td>
</tr>
<tr>
<td>RTP2</td>
<td>2</td>
<td>+RTP2</td>
<td>ACTIVE</td>
<td>701</td>
<td>DH3C</td>
<td>ACTIVE</td>
</tr>
<tr>
<td>RTP3</td>
<td>3</td>
<td>+RTP3</td>
<td>FAILED</td>
<td>701</td>
<td>DH3C</td>
<td>INACTIVE</td>
</tr>
</tbody>
</table>
```
Why can't my CFLEVEL be altered to 5?

- OPMODE must be NEWFUNC not COMPAT
  - All queue managers in the QSG should be V710 or greater

- CSQY334E indicates problem

- Associated with migration from V701 to V710
  - Example OPMODE(NEWFUNC,710)
Why did the CHIN abend 5C6-00E2000B?

- 00E2000B – local storage shortage
  - Build-up of DXWB (DB2 XCF Work Blocks, 4K long)
    - used to queue the requests from XCF to MQ
  - Problem in the sysplex

- Application opening and closing queues
  - MQOO_INPUT_AS_Q_DEF or
  - Keep the queue open for longer
What's the minimum size for application structure?

- Use **CFSizer** to determine the correct size.

- The space has to accommodate both user and system data:
  - WebSphere MQ and CF control data

- Each time the CF level is upgraded, the CFSizer should be used.

- CF decides what the size of the structure is going to be:
  - Structure element/ratio recalculation when `ALLOWAUTOALT(YES)` along with structure resizing is managed by the CF, not by WebSphere MQ.
The documentation required for shared queues

- Collect troubleshooting data for shared queues
  - Technote # 1177414
Can Shared Message Data Sets (SMDS) be used in place of DB2, but using the same QSG name?

- SMDS is not a total replacement for DB2 since WebSphere MQ still uses internal DB2 tables for managing shared objects in a QSG.

- An SMDS data set (VSAM) is an alternative to DB2 for offloading large or small messages from the application structure.

- Switching from DB2 to SMDS can occur while retrieving existing messages.
Can SMDS be used in place of DB2, but using the same QSG name? Continued...

- The queue sharing group needs to be built at the V710 level. OPMODE(NEWFUNC)

- **DEFINE CFSTRUCT** with the OFFLOAD(SMDS|DB2) attribute and offload rules enable message offloading to SMDS or DB2.

- Performance improvements using SMDS for storing and accessing large messages (>63K).

- CF structures need to be at CFLEVEL(5).
How to resolve the message CSQE137E DB2 and CF is out of sync?

- Use CSQUZAP with ARRAYDB2 to ascertain bit setting for LH number. If bit is ON.
  - Use CSQUZAP with DELDB2 to remove the queue from MQ DB2 Table
  - Use CSQUZAP with ZAPSTR to remove the CF entry.
- CSQUZAP is an undocumented program. Use only when IBM Support instructs.
Explain why the **DISPLAY GROUP** command may cause CPU utilization to increase?

- **DISPLAY GROUP** command initiates cleanup for large messages.

- 10 minutes elapse without a cleanup of large messages; signals cleanup initiation.
Attempts to offload small messages to SMDS fail, why?

Messages need to be at least 140 bytes in length before the 3rd offload rule can offload messages to SMDS.
Why does MQ restart with 00C51176?

- Due to unexpected return code from XES (Sysplex Services)
  - CF should be checked
  - PM92897 / IXLEERSP Unexpected Error
  - PM92899 / IXLFORECE Unexpected Error
  - PM92901 / IXLUSYNC Unexpected Error
Why can't I back up my structure?

- CSQE106E Unable to back up structure
  - START SMDSCONN / DISPLAY SMDSCONN
    - OPENMODE – How queue manager opens
    - STATUS – Connection status
    - AVAIL – Data set availability
    - EXPANDST – Data set expansion status

- DISPLAY CFSTATUS TYPE(SMDS)
  - PM82597 DOCUMENTS REASONS
Why does ALTER fail with 00D44004?

- ALTER QL(SHARED.Q) CFSTRUCT(A)
- QSGDISP(SHARED)
  - CFSTRUCT/QSGDISP disallowed
    - Delete and redefine queue
What does MQ do in a QSG failure?

- Queue manager behavior if failure in QSG?
  - What failed? Code levels?
    - DB2 abnormally terminates
    - Queue manager abends with 00C510AB
  - CFCONLOS
  - Number of Queue Manager, LPARS, paths
  - RESET CFSTRUCT ACTION(FAIL)
  - INJERROR
What about CF and structure failures?

- Either structures fail or connectivity is lost
  - VARY PATH OFFLINE
  - CONFIG CHPID OFFLINE
- System Managed Duplexing
- Frequent and regular backups
- ADMIN Structure
- Failure Scenarios?
Summary

- QSGs within a CF provide high availability
- Ensure CFLEVEL is properly set
- SMDS offload outperforms DB2 offload
- DR procedures for QSG require thorough planning
- Take care to properly bind DB2 plans
- Use CFSizer to properly size your structures
- Perform backups in the QSG regularly and often
- Keep maintenance for QMGRs in the QSG current
- Review how offload rules work as documented
Abbreviations (not previously defined)

- CF   Coupling Facility
- DSG  Data Sharing Group
- LH   List Header
- PTF  Program Temporary Fix
- QSG  Queue Sharing Group
- RSU  Recommended Service Upgrade
Additional WebSphere Product Resources


- Join the Global WebSphere Community: [http://www.websphereusergroup.org](http://www.websphereusergroup.org)

- Access key product show-me demos and tutorials by visiting IBM® Education Assistant: [http://www.ibm.com/software/info/education/assistant](http://www.ibm.com/software/info/education/assistant)


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