Connect HotSpot 2016
SQL/MX State of the U
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Welcome
Forward-looking statements
This is a rolling (up to three year) Roadmap and is subject to change without notice.

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Agenda

– SQL/MX 3.3 recap
– Gotchas

– SQL/MX future outlook
– Q&A
SQL/MX 3.3 recap
NonStop SQL/MX 3.3

– Released with L15.02 and J06.19 1H2015
  – Updated with L15.08

– SPRs for J06.19
SQL/MX 3.3 Highlights

– Online-help in mxci
  – Similar to the online-help in SQL/MP for SQLCI
  – Uses a SQL table NONSTOP_SYSTEM_NSK.HELP_TEXT_SCHEMA.HELP_TEXT
  – Installed automatically with new systems; manual installation step for migration (InstallSqlMxHelp)

– SHOWDDL [, privileges ] option
  – Displays the ANSI grants on the objects

– Co-operation with Safeguard
  – SQL/MX will not create on volumes that user has no access to.
  – Safeguard can check for SQLMX usage when deleting a user
  – Safecom: DELETE USER ADMIN.BOB , CHECK-SQLMX-OWNERSHIP

– 64-bit support for SQLMXBUFFER
SQLMXBUFFER
What is it, where is it located, what was changed?
What is the SQLMXBUFFER or SDA?

– Where?
  – Part of DP2 memory

– What?
  – Contains execution plan fragments
  – And session specific data structures

– Also known as
  – Session Data Area (SDA)
  – Part of Executor-in-DP2 (EID)
EID in the execution plan

– Execution plan is executed by multiple processes
  – Master Executor, ESPs, disk processes

– Each of these processes run a fragment of the plan

– Plan fragments are sent to DP2 by the master executor when needed

– Fragments are re-used by DP2 when possible
The change with SQL/MX 3.3

– RVUs J06.19 and L15.02
  – SQLMXBUFFER area was moved to DP2 64-bit memory
  – Size can be up to 2GB per volume

– In previous RVUs shared with DP2 cache
  – Max SDA size limited to 768 MB

– Cache can now use up to 1.4 GB per volume
What determines the size of the SDA

- The number of concurrent sessions that use the volume
  - Each session has its own fragments

- The number of tables or partitions on the volume
  - Each table/partition access requires (buffer) space.

- The functionality of the fragment
  - Column constraint checking
  - Grouping of results in DP2
  - Hashing, joins in DP2

- Multiple unknowns.....
  - Hard to predict the actual size required
Monitoring the SDA

– Similar to DP2 cache, SDA is defined using SCF
  – Need to stop volume to change SDA
– Monitored using SCF STATS DISK command
  – Statistics accumulate since last time reset
  – Search for Failed ID
  – Reset stats requires super.super access

– Indication of issue can be found in MEASURE
  – When messages-sent does not (no longer) match the transaction profile
  – After DP2 takeover, messages-sent to DP2 to send plan fragments

SCF - T9082H01 - (23JUN11) (02MAY11) - 01/27/2015 08:33:43 System \NSBLDP5 (C) 1986 Tandem (C) 2006 Hewlett Packard Development Company, L.P. (Invoking \NSBLDP5.$DATA06.FRANS.SCFCSTM)

1=> STATS DISK $SAS062, SQLMX
STORAGE - Stats DISK \NSBLDP5.$SAS062

SQL/MX Statistics:

<table>
<thead>
<tr>
<th>Session Data bytes</th>
<th>524288 KB</th>
<th>Max Data bytes</th>
<th>524288 KB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Sessions</td>
<td>0</td>
<td>Active Sessions</td>
<td>0</td>
</tr>
<tr>
<td>- 4KB Blocks</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Max</td>
<td>131072</td>
<td>Attempts</td>
<td>103390</td>
</tr>
<tr>
<td>Number</td>
<td>131072</td>
<td>OK</td>
<td>37944</td>
</tr>
<tr>
<td>In Use</td>
<td>0</td>
<td>Failed FST</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Failed ID</td>
<td>65446</td>
</tr>
</tbody>
</table>

2=>ALTER DISK $SAS062, SQLMXBUFFER 800
Gotchas

– Previously SQLMXBUFFER and AUDITTRAILBUFFER shared the same space
  – AUDITTRAILBUFFER has not moved to 64bit memory
  – When SQLMXBUFFER defined > 768 MB, then maximum memory is available for DP2 cache
  – Note: pre-3.3 maximum was 768 MB.
  – See TWP on SQLMXBUFFER at slideshare.net/fjongma

– SQLMXBUFFER contents is not checkpointed to backup
  – After a process takeover SQLMX clients will send plan fragments to ‘new’ DP2
  – Might result in message queue in $RECEIVE for DPs
  – And a msgs-sent queue in the application processes
  – With 2GB space per volume: might lead to memory shortage after processor takeover!
The “cookie-cutter” system configuration
Lesson learned from POC

– **UPSIDE**
  – Easy to configure
  – Primary DPs have their backup in “next” CPU
  – Easy to expand system

– **DOWNSIDE**
  – When CPU fails, one CPU gets hit heavily
  – With SQLMX, Backup SDA needs established
  – We managed to overload ServerNet after a takeover
SQL/MX future candidate features
## HPE NonStop Database Product Plans

### 2015 – Available Now

**SQL/MX**
- Online mxci help
- MXDM support for create/alter database objects, manage data sources
- Safeguard Delete User protection and respect Volume ACLs and Display Object permissions
- BR2 enhancements – schema and table names could differ, no need to pre-create Catalogs for a Restore operation
- Query Plan Quality Improvements
- Executor performance enhancements – 64 bit EID

### Future

**SQL/MX**
- Configurable ESP placement
- Support for External Sequence in Triggers
- Migration features: `TO_TIMESTAMP, LAST_DAY, MONTHS_BETWEEN`
- MXDM – close the gap with NSM/Web
- Improved Table/index maintenance features
- Improved MDAM selection
- Improve resource cleanup for mxcmp with features to terminate unused mxcmp and mxesp processes
- EBCDIC collation of ASCII data
- User Defined Functions
- DDL and DML support for Materialized Views
- Migration features: `TO_DATE`
- Reduce memory footprint of mxcmp

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This is a rolling (up to three year) Statement of Direction and is subject to change without notice.
SQL/MX Future Features
Version interoperability

– Single node by definition all software on same release
SQL/MX Future Features
Version interoperability

– Single node by definition all software on same release
– Upgrade a node to a new version, for example R3.4

\NODEA

Master Exec
R3.4

No need to recompile modules

DP2 EID
R3.4

Data
SQL/MX Future Features
Version interoperability
– Multi-node, different versions may exist, new version supports older requests

No need to recompile modules
SQL/MX Future Features
Version interoperability

– Multi-node, different versions may exist, however, older versions do not understand new rev. requests
SQL/MX future features

Warning: These plans may change

MXDM updates

- MXDM will replace NSM/Web eventually
- Next release nearly closes the gap
- Will allow to create, alter and drop more objects
  - SQL/MP aliases
  - Sequence generators
  - Triggers and views
- Grant/Revoke privileges
- GIVE objects to other users
SQL/MX future features
Warning: These plans may change

Connectivity (MXCS, drivers)
– Assign data source to specific Association Server(s) (MXAOS)
– MXCMP ability to timeout after period of inactivity

– Statement caching for ODBC Linux drivers
  – Similar to T2 and T4 drivers
  – Prepare statements
  – Execdirect statements

– Module File Caching (MFC) for ODBC – OSS, Linux and Unix drivers

– T2 driver support for User, password credentials
  – This is an optional feature
SQL/MX future features
Warning: These plans may change

SQL/MX Manageability changes

– ESPs configured to use certain CPUs only – enables better system sharing between applications
– ESP configurable to terminate after a period of being idle
– UPDATE STATISTICS
  – On EXISTING columns
  – On NECESSARY columns

– Partition Overlay SUPPORT (POS) for Hash-partitioned Indexes
  – (same as currently for hash-partitioned tables)
  – Default is OFF (to remain compatible with older functionality)
SQL/MX future features
Warning: These plans may change

SQL/MX Manageability changes
– MODIFY utility: RECLAIM space option to limit resource consumption of background ORSERV

– MODIFY utility: REORG table or index by ANSI-NAME (all partitions)
  – replacing FUP RELOAD by partition
  – Multiple (configurable) partitions reloaded in parallel (1, n or max # partns concurrently)

– MODIFY utility: REPARTITION for tables and indexes
  – A change from the one-partition method used in prior releases.
  – Less complicated syntax: Define the desired layout and instruct MODIFY to organize as such
  – SHARED ACCESS supported
  – Only one COMMIT phase
  – No need for RECLAIM/RELOAD after repartitioning
  – (•) Requires upgrade of metadata
SQL/MX future features
Warning: These plans may change

SQL Compiler changes

– Optimizer hints
  – In addition to CONTROL statements
  – In addition to Query Shapes

– Influence Access Paths
  – Force or Exclude an index

– Influence Join Types
  – Force or exclude NESTED / HASH / MERGE joins

– Influence cardinality / Selectivity
  – Table cardinality
  – Column selectivity

– Inline CQDs
SQL/MX future features
Warning: These plans may change

SQL/MX other new features

– Compatibility functions (facilitate migrating from other databases)
  – CONVERTTOHEX
  – ISNULL, NULLIF, IFNULL
  – ZEROIFNULL, NULLIFZERO
  – ROUND
  – LAST_DAY, MONTHS_BETWEEN
  – TO_TIMESTAMP

– Access a sequence from a TRIGGER (*)
  – Before an insert, replace null values with value of a sequence
  – After an insert add a new row based on a sequence value
  – (*) Requires upgrade of metadata
Summary

- Good changes were implemented with R3.3
- More to come with new releases
- Migration to new releases will become easier
Thank you
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