



**Hewlett Packard  
Enterprise**

# **Connect HotSpot 2016 SQL/MX State of the U**

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# Welcome

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# 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

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# NonStop SQL/MX 3.3

- Released with L15.02 and J06.19 1H2015
  - Updated with L15.08
- SPRs for J06.19

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# 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



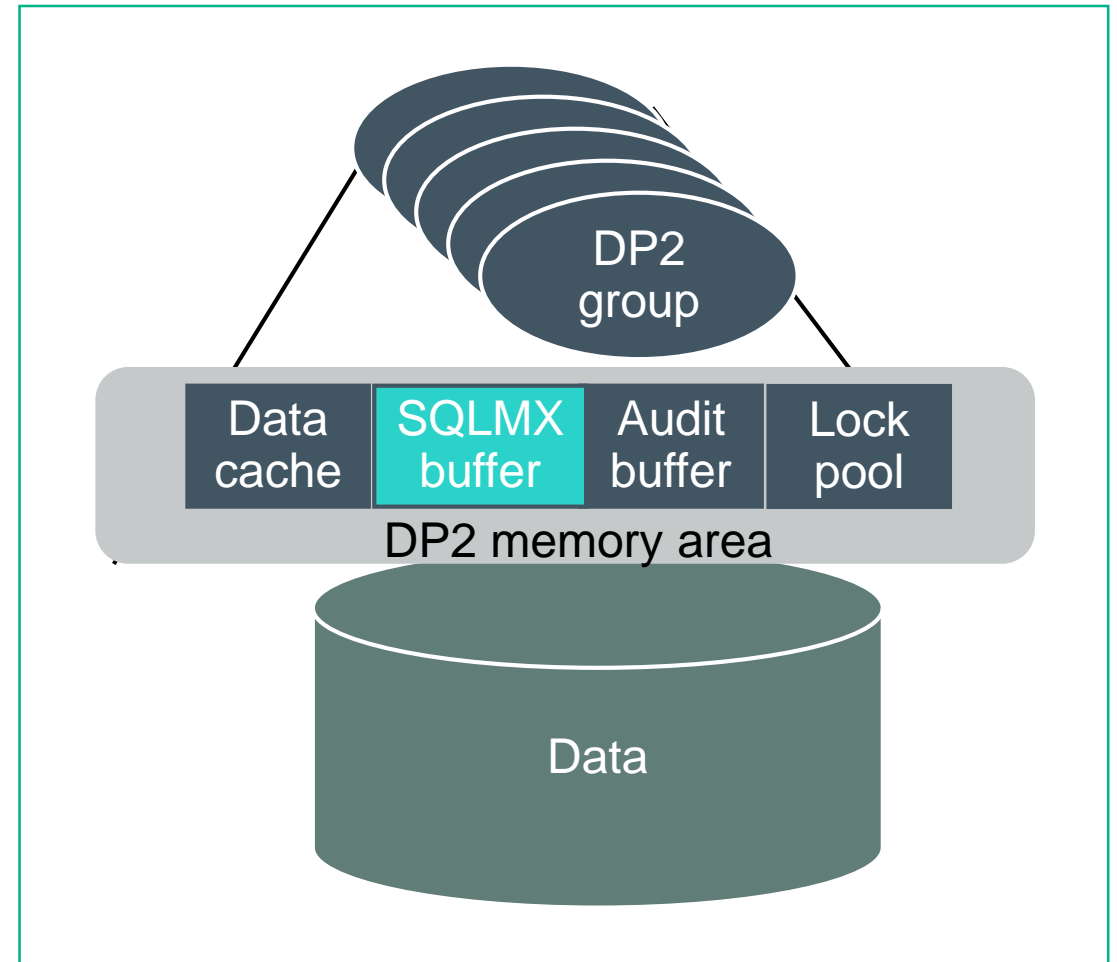
# SQLMXBUFFER

What is it, where is it located, what was changed?



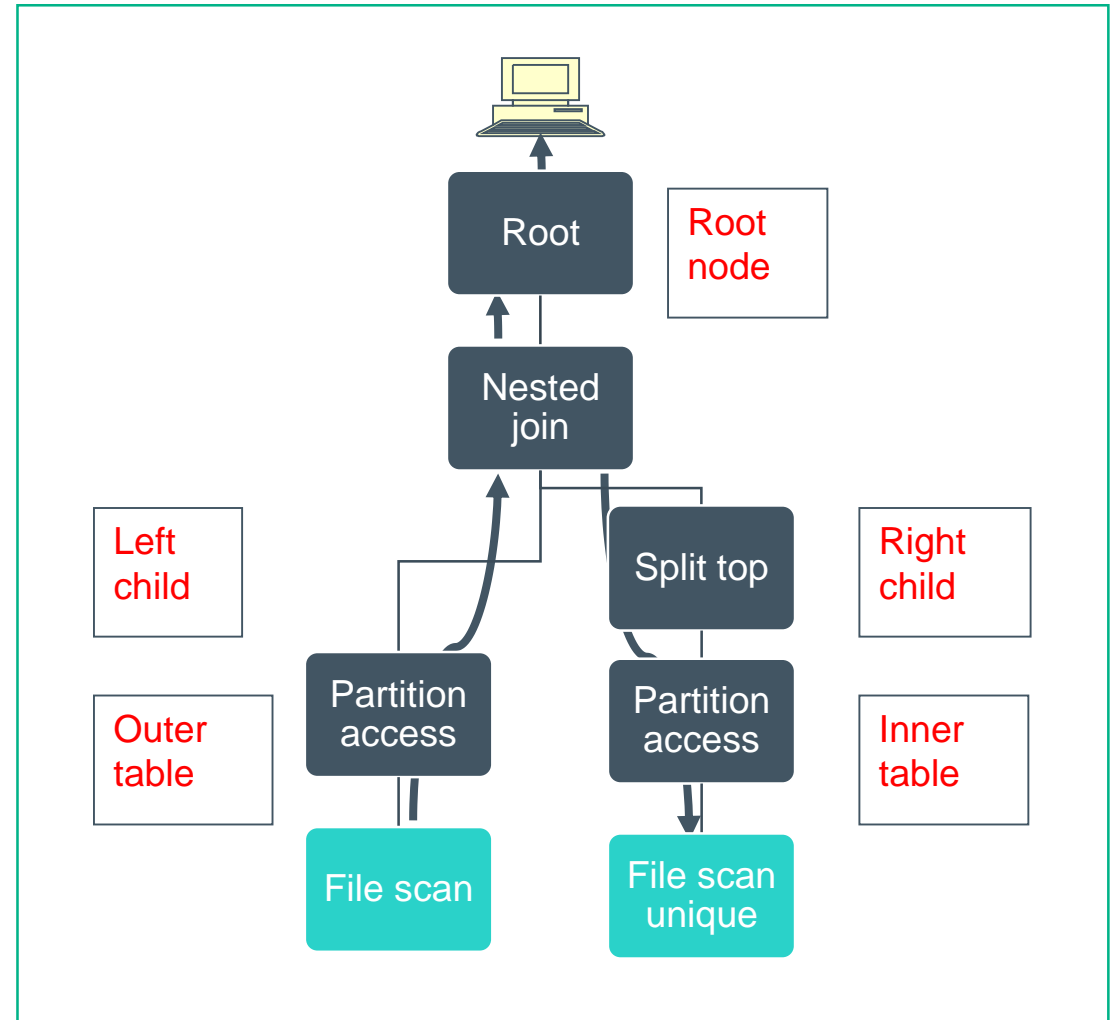
# What is the SQLMXBUFFER or SDA?

- 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)



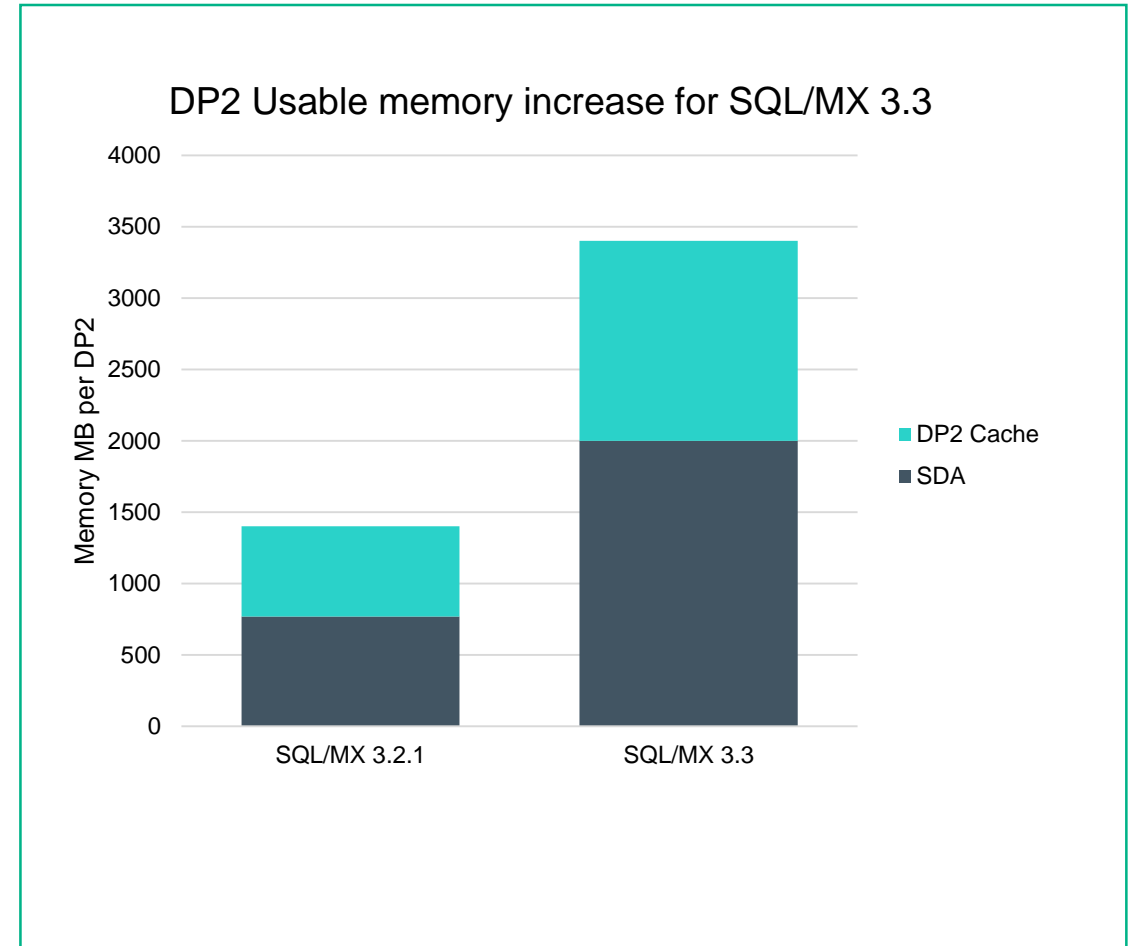
# EID in the execution plan

- 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



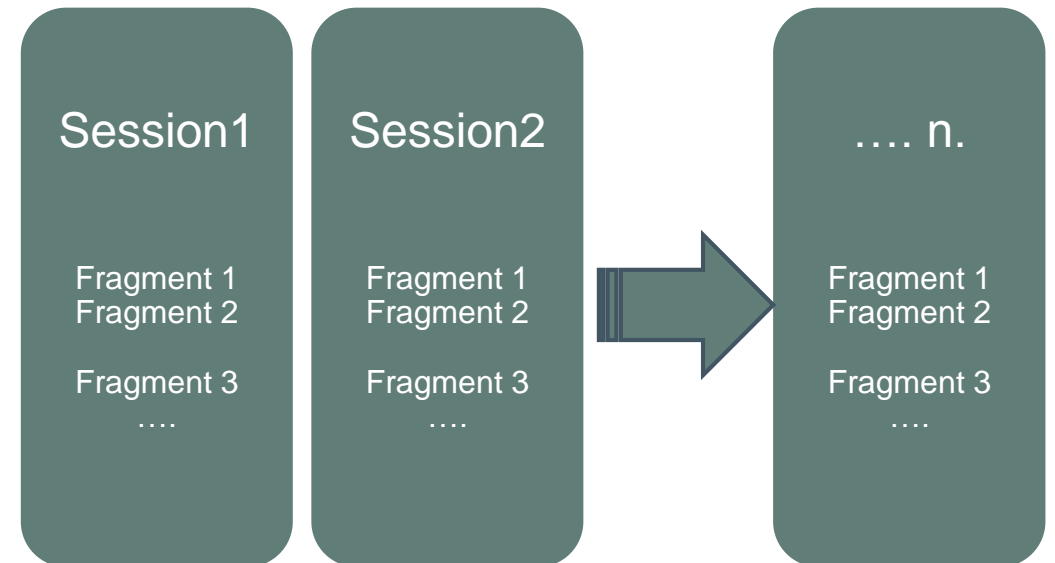
# The change with SQL/MX 3.3

- 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:
  Session Data bytes..... 524288 KB  Max Data bytes... 524288 KB
  Total Sessions..... 0  Active Sessions.. 0
  - 4KB Blocks - - - - -  - Reuse - - - - -
  Max..... 131072  Attempts..... 103390
  Number..... 131072  OK..... 37944
  In Use..... 0  Failed FST..... 0
  Failed ID..... 65446

2->ALTER DISK $$SAS062, SQLMXBUFFER 800
```

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# 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](http://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

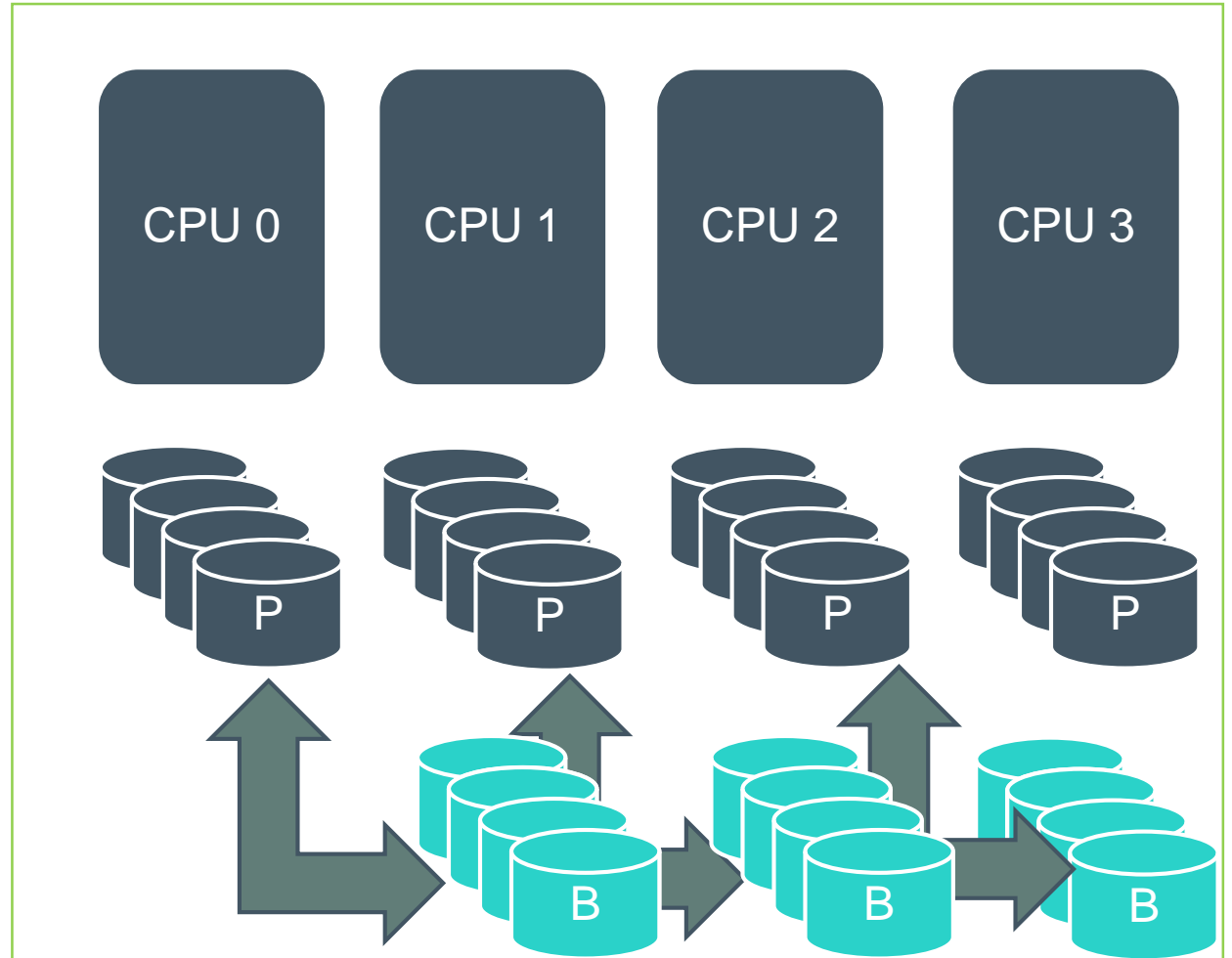
## Lesson learned from POC

### – 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

# SQL/MX Future Features

## Version interoperability

- Single node by definition all software on same release

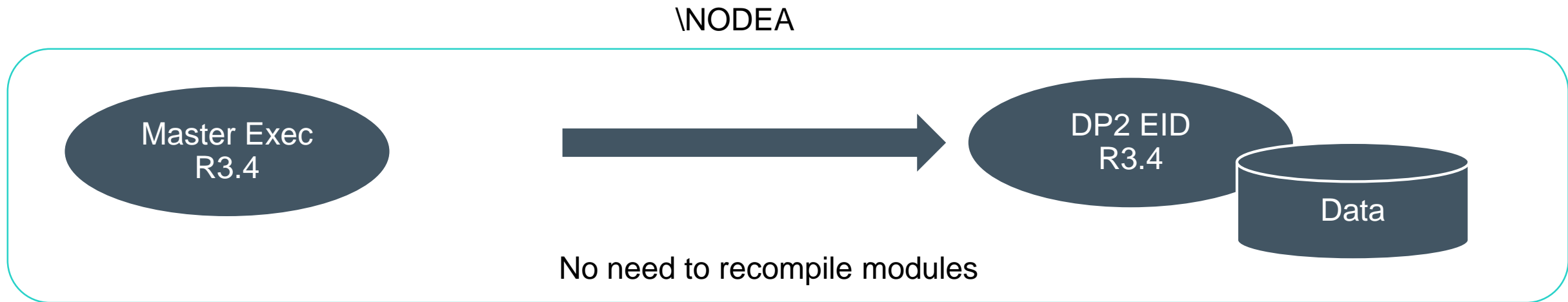


\\NODEA

# SQL/MX Future Features

## Version interoperability

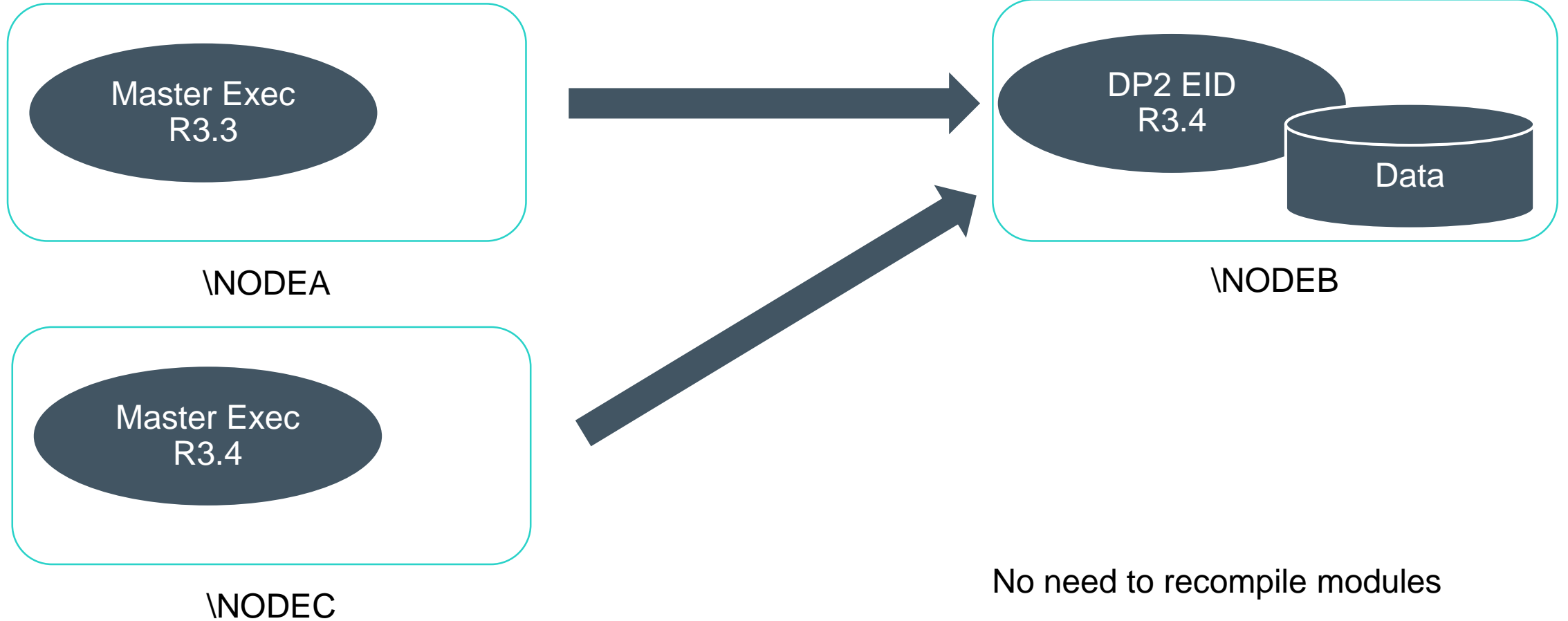
- Single node by definition all software on same release
- Upgrade a node to a new version, for example R3.4



# SQL/MX Future Features

## Version interoperability

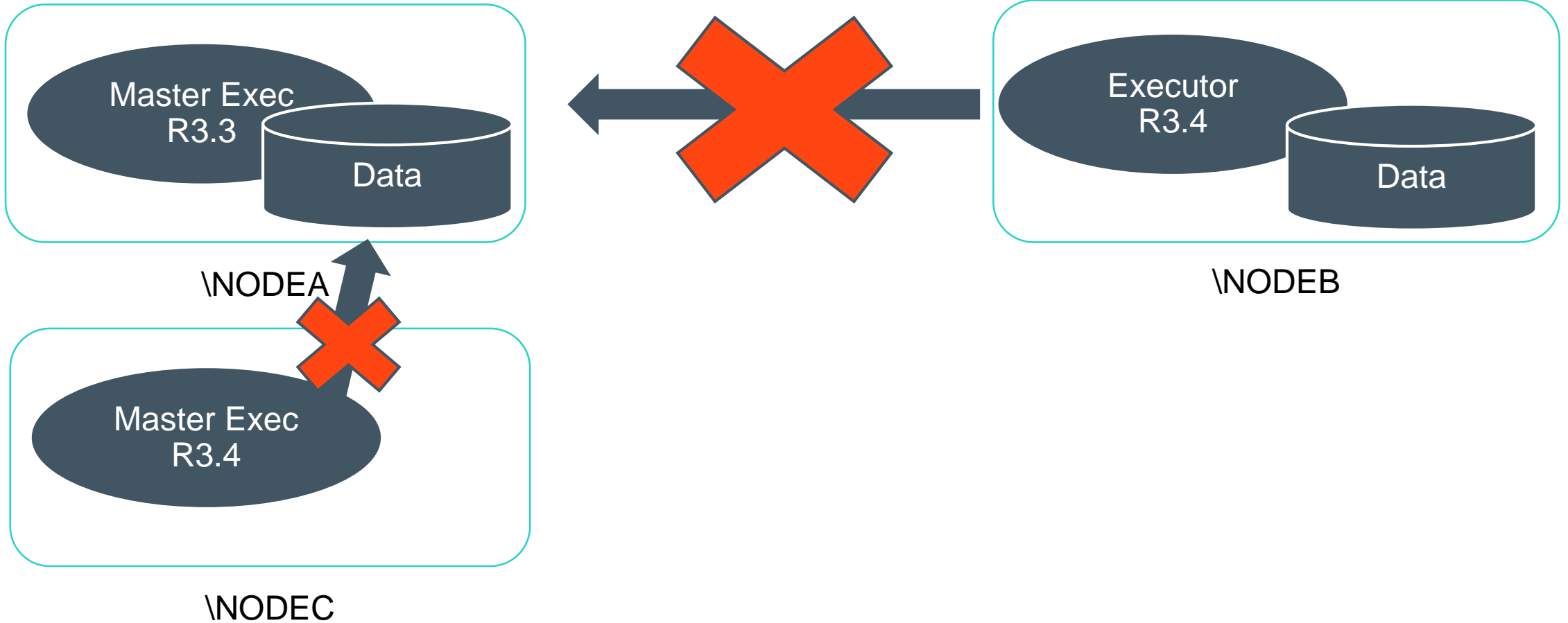
- Multi-node, different versions may exist, new version supports older requests



# SQL/MX Future Features

## Version interoperability

- Multi-node, different versions may exist, however, older versions do not understand new rev. requests



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# 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

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# 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

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# 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)



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# 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

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# 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



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# 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

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**Thank you**

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