data tiering in BW/4HANA and SAP BW on HANA
Update 2017

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CUSTOMER

SAP Run Simple

PBS software

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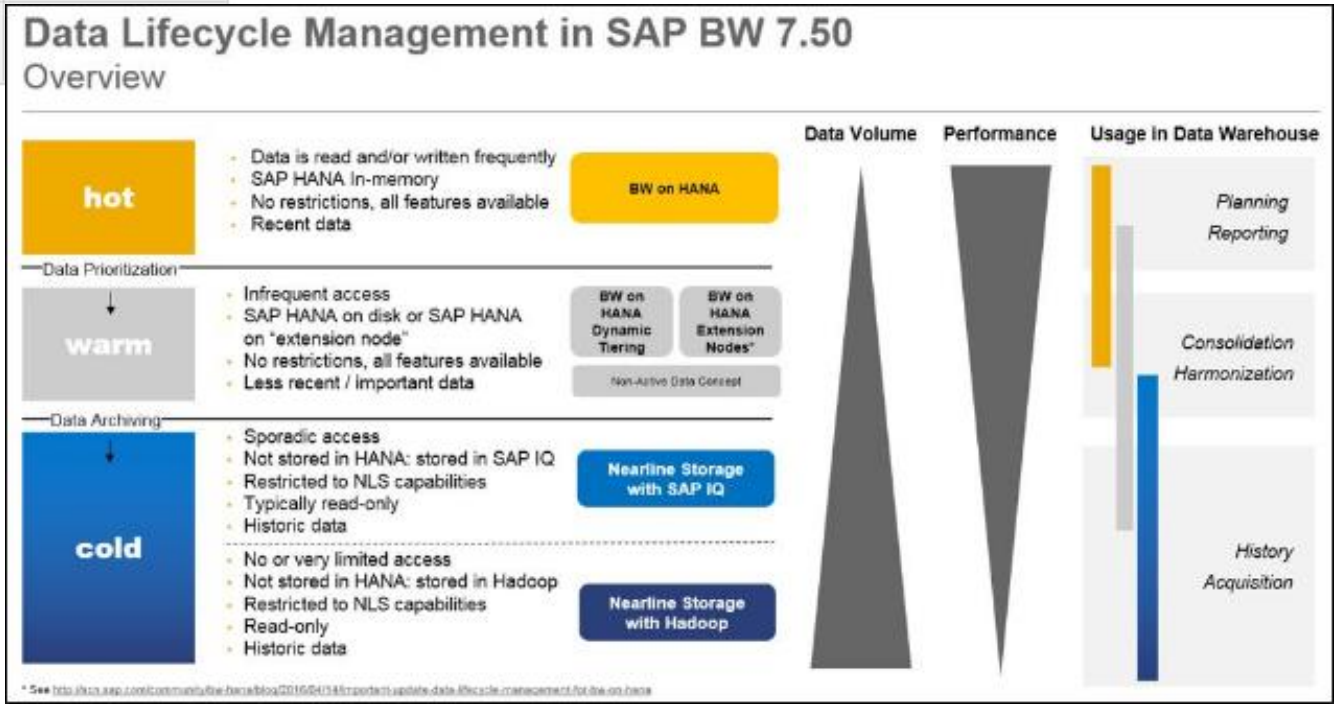
SAP-NLS Community

https://blogs.sap.com/2016/10/12/sap-nls-solution-sap-bw/

Table of Content

Introduction	Overview/Roadmap	SAP Notes	Implementation
NLS Performance	NLS Partnersolutions	Additional Blogs	



Agenda

SAP data tiering Overview

- data tiering Optimization

SAP NLS straggler support

- Details of the Pilot Solution

SAP IQ Updates

- SAP IQ 16.1 Released
- SAP IQ easy DB installation
- Unicode Conversion with the PBS RIQ Interface

Current data tiering and NLS Roadmap

- Details

SAP data tiering Overview

SAP HANA data tiering Technology

Overview

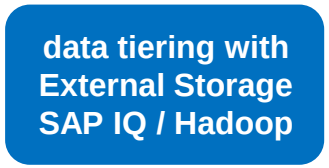
Data Tiering is the assignment of data to various tiers/storage media based upon data type, operational usefulness, performance requirements, frequency of access and security requirements of the data.

"Hot" This tier is used to store mission critical data for real-time processing and real-time analytics.

Data is retained "In-Memory".

"Warm" This tier is used to store data with reduced performance SLAs, which is less frequently accessed.

Data is stored on dedicated "In-Memory" nodes (Extension Nodes) with a relaxed sizing ratio.



"Cold" This tier is used to store voluminous data for sporadic or very limited access.

Data is stored on disk, in columnar structures on SAP IQ or in Hadoop HDFS.

data tiering in BW/4HANA and SAP BW on HANA

Overview

hot

- Data is read and/or written frequently
- SAP HANA In-memory
- No restrictions, all features available
- Recent data

Data Prioritization

warm

- Infrequent access
- SAP HANA Extension Nodes or SAP HANA on disk (for Non-Active)
- No restrictions, all features available
- Less recent / important data

data tiering with Scale-Out*

Non-Active Data Concept

Data Archiving

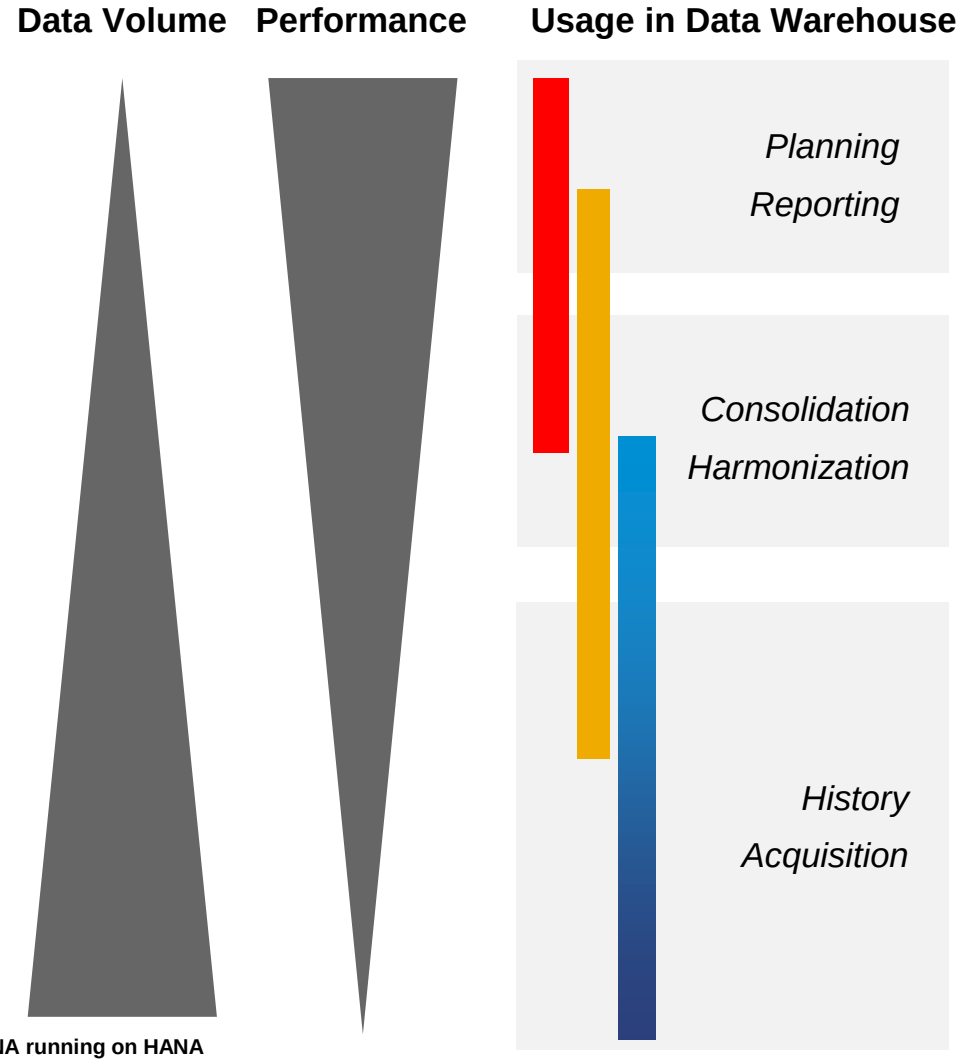
cold

- Sporadic access, typically Read-only
- Not stored in SAP HANA: stored in SAP IQ
- aka Nearline Storage (NLS) with SAP IQ
- Restricted to NLS capabilities
- Historic data

data tiering with External Storage (SAP IQ)

- No or very limited access, Read-only
- Not stored in SAP HANA: stored in Hadoop
- aka Nearline Storage (NLS) with Hadoop
- Restricted to NLS capabilities
- Historic data

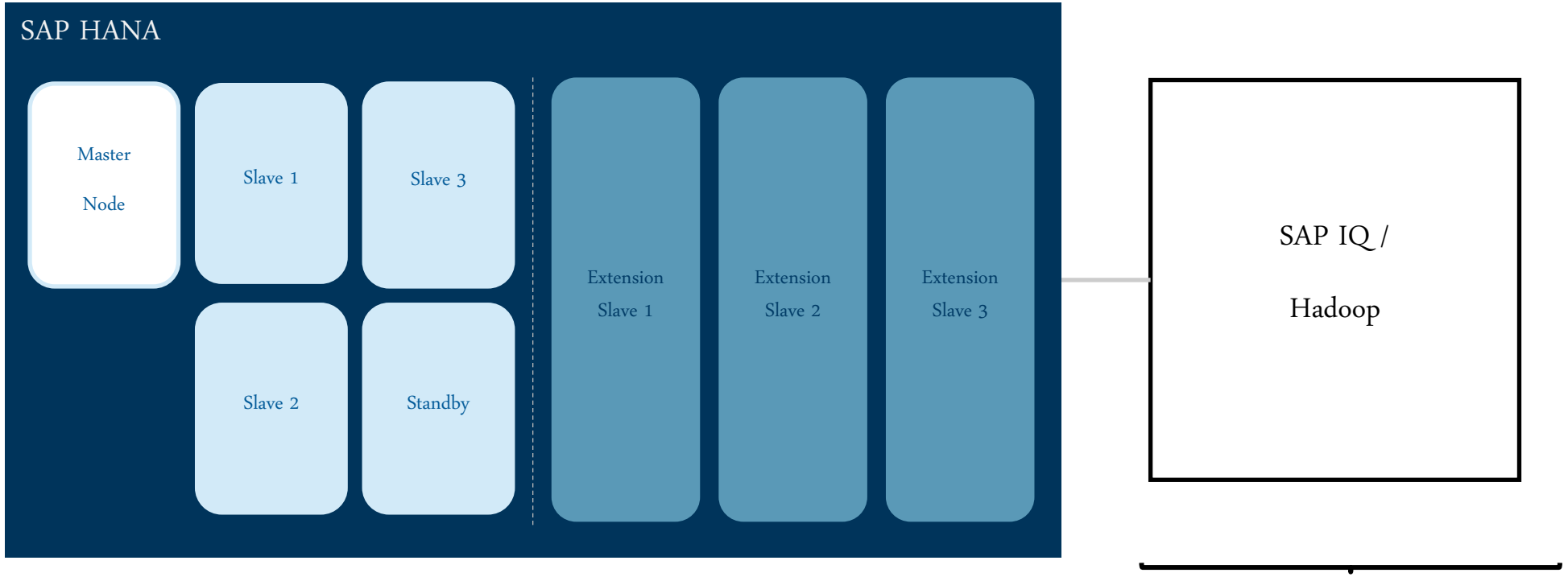
data tiering with External Storage (HADOOP)



*See https://launchpad.support.sap.com/#/notes/2317200. **Please note that data tiering with Scale-Out is not available for BW on HANA or BW/4HANA running on HANA single host systems (Minimum system requirement: 1 master node (hot) and 1 extension node).**

SAP BW/4HANA – Data Lifecycle Management

Scale SAP BW/4HANA using in-built data temperature management



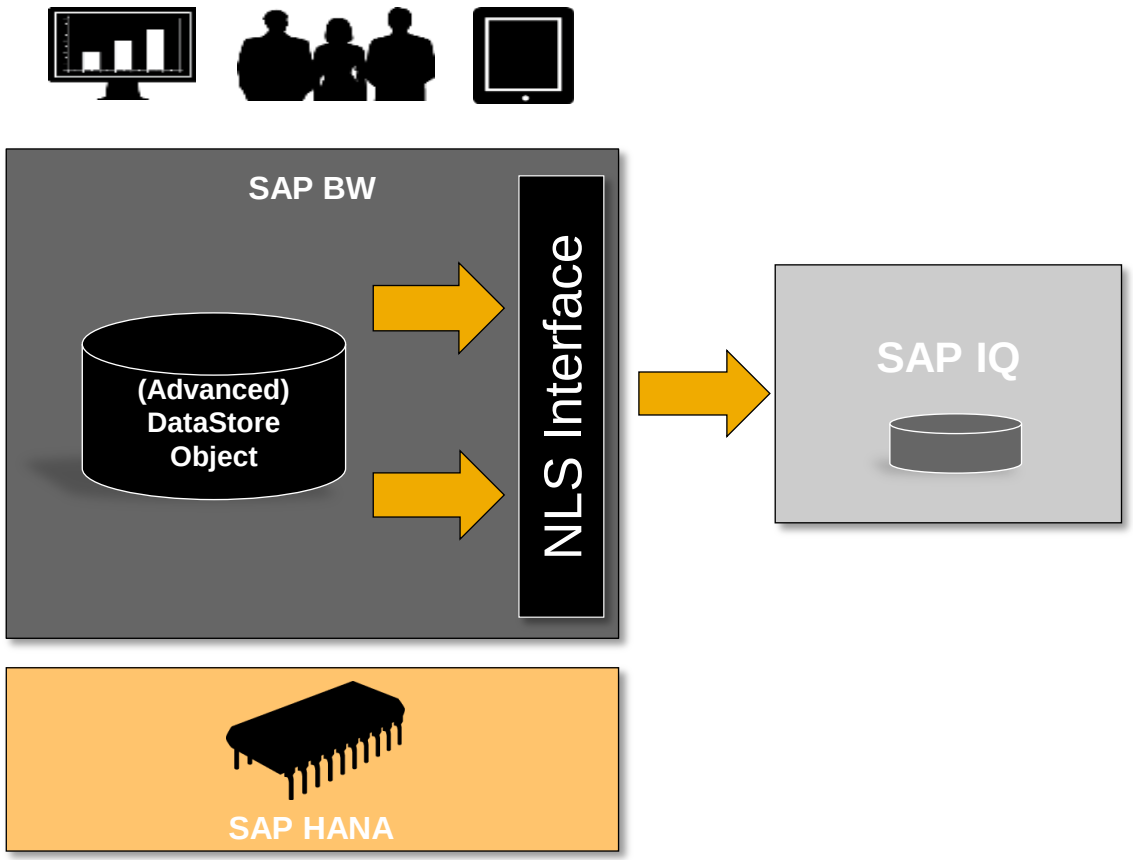
Hot →
SAP HANA in-memory
Default

Warm →
SAP HANA Extension Node
By aDSO or partition

Cold →
Near-line Storage
By data time slice

Nearline Storage (NLS) with SAP IQ

Current status with SAP BW >= 7.50 SP4 on HANA and BW/4HANA >= SP00



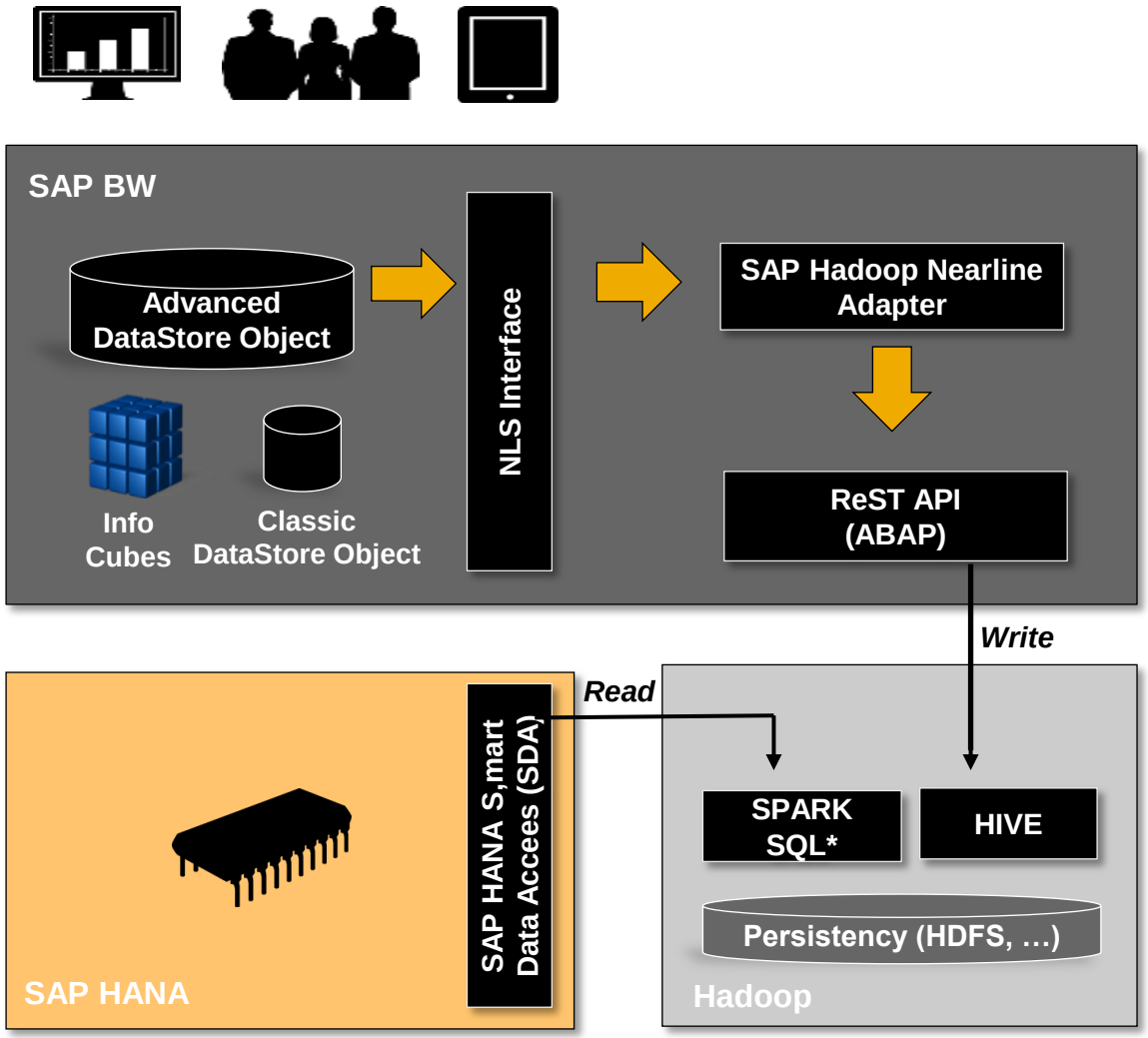
Nearline Storage with SAP IQ

- NLS support for most Advanced DataStore Object types (see above next slide)*
- Reporting value help (F4) can display posted values from near-line storage for Advanced DataStore Objects
- CompositeProvider can use Advanced DataStore Objects with NLS in specific join scenarios
- BW process type to create database statistics for NLS accesses (via Virtual Tables)
- Partner Interface for Nearline Storage on Advanced DataStore Object
- Mass Maintenance Support including Data Archiving Processes of Advanced DataStore Objects

*** < SAP BW 7.50 SP4: See SAP Note 2215265**

Nearline Storage (NLS) with Hadoop

Available since SAP BW 7.50 SP4 on HANA and BW/4HANA SP00

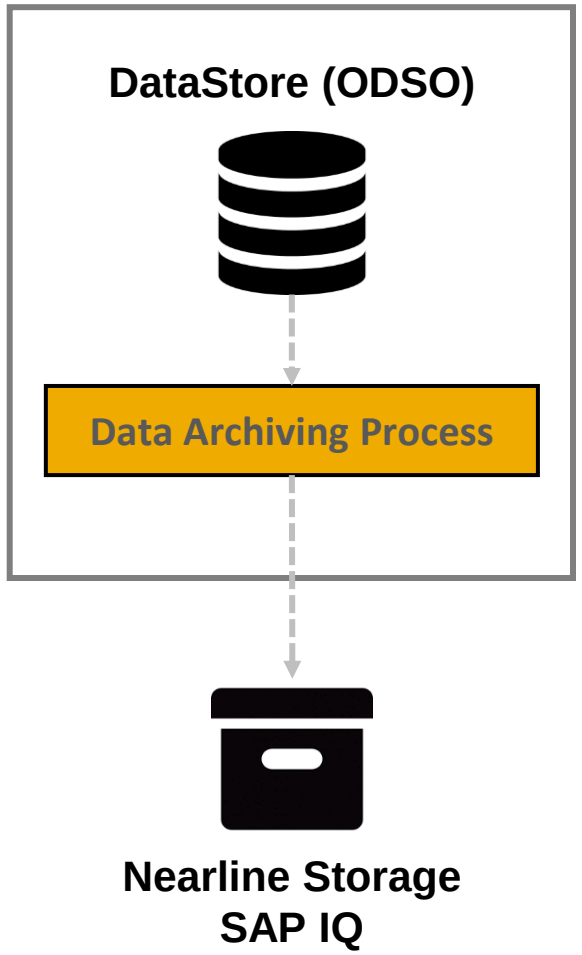


Nearline Storage on Hadoop

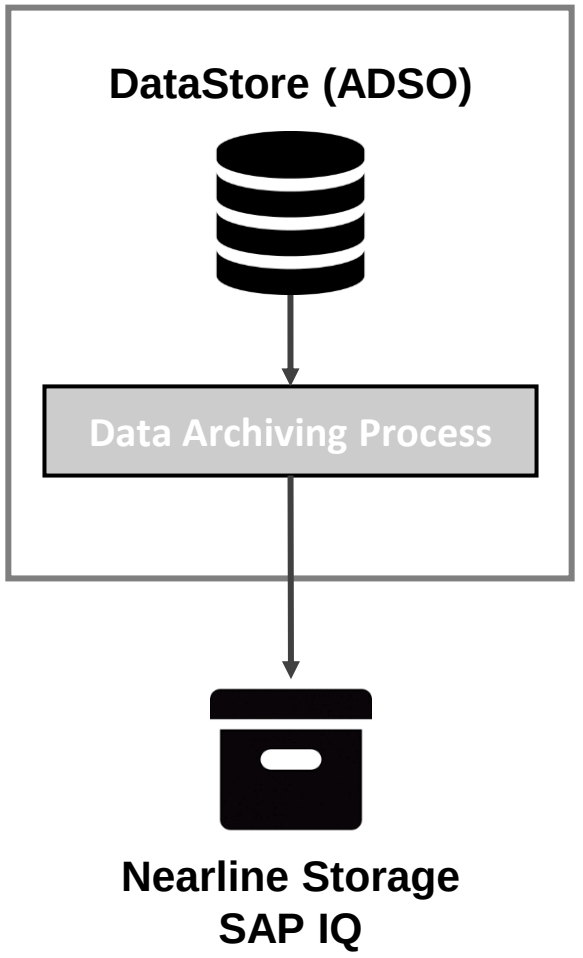
- Available for all NLS supported BW Objects / Object Types (see next slide)
- Available for BW on HANA (query access via HANA SDA) and BW on RDBMS (no query access)
- BW only solution at this time
- **Creation** of Nearline Storage Table Definitions via HIVE
- **Archiving** of Data (file based, default format: ORC) directly to HDFS
- **Restoring** of Data via ReST API or HANA Smart Data Access (SDA)
- **Querying** via HANA Smart Data Access only

For more information see SAP Note 2363218 - Hadoop NLS: Information, Recommendations and Limitations

Konvertierung der Nearline Storage (SAP IQ) Implementation



1. Switch NLS to read-only
2. Convert NLS Request Management
3. Delete DAP
4. Transfer ODSO to ADSO
5. Create new Data Archiving Process
6. Convert NLS Archive (SID -> TSN)



data tiering Optimization (DTO) in BW/4HANA

Overview

- **One concept for hot, warm and cold data based on HANA Technology**
  - data tiering based on Advanced DataStore Object Partitions
    - Same concept for “warm data” (extension nodes) and “cold data” (external storage in IQ or Hadoop)
  - Partition Temperature as local setting (no transport)
  - Using HANA Technology such as SDA, Scale Out and disk storage in SAP IQ

- **Easy and central definition and implementation**
  - Data Temperature defined in Advanced DataStore Object only
  - No additional configuration of Data Archiving Processes

- **Displacement of data as simple and periodic housekeeping activity**
  - Single data tiering optimization job that periodically moves data to defined storages
  - No complex process chain modeling for data archiving

data tiering Optimization (DTO) in BW/4HANA

Positioning

The new, strategic BW/4HANA data tiering Optimization (DTO) approach will offer

- One data tiering approach for hot data (HANA), warm data (data tiering with Extension Nodes) and cold data (External Storage in SAP IQ or Hadoop)
- Central definition of data temperature based on Advanced DataStore Object Partitions
- Displacement of data to defined storage as simple and periodic housekeeping activity (TCO reduction)
- Seamless conversion or co-existence with existing BW NLS IQ / Hadoop approach (because of sharing technical concepts for cold data storage such as locking of archived data ranges)
- **Publication of further technical details with the availability of BW/4HANA SP04 in Q2 2017**

Nearline Storage to SAP IQ and Hadoop are still supported in BW/4HANA and will offer

- Continuity for data archiving scenarios already implemented with BW NLS IQ / Hadoop (protection of past investments) before adopting the new BW/4HANA data tiering Optimization
- Support for advanced data archiving scenarios not in scope of BW/4HANA data tiering Optimization

data tiering Optimization in BW/4HANA

Positioning with the SAP HANA Data Warehouse Foundation (DWF)

SAP HANA Data Lifecycle Management (DLM)

- … can't be used for data tiering requirements in SAP BW on HANA or BW/4HANA
- With SAP BW/4HANA DTO our aim is to combine available HANA Technology that are also used by HANA DLM (such as HANA Smart Data Access or external disk storage in SAP IQ) with specific consistency and modeling complexity requirements from our BW customers (such as consistent reporting on released data load requests and specific Advanced DataStore Object semantics and settings). HANA DLM will for sure continue to play its role in the context of implementing data tiering requirements for native HANA Data Warehouse objects.

SAP HANA Data Distribution Optimizer (DDO)

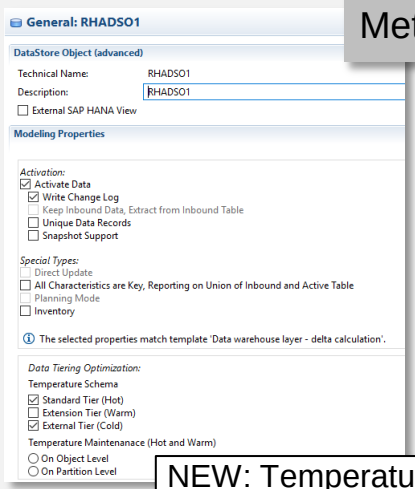
- … can be used in SAP BW on HANA or SAP BW/4HANA also in coexistence with the new data tiering Optimization. Data Movement in SAP BW/4HANA to SAP HANA Extension Nodes (warm data) can happen both ways:
  - DDO for reorganization and optimization projects in HANA Scale Out system landscapes
  - DTO for regular data movements processes for warm data in SAP BW/4HANA

data tiering Optimization (DTO) in BW/4HANA

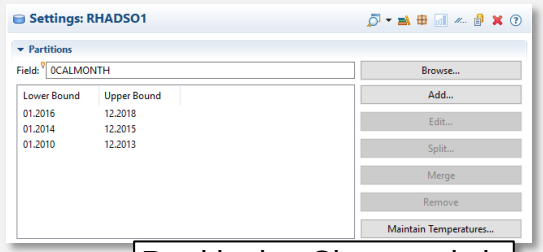
User Interface Perspective

Advanced DataStore Object

Meta Data



NEW: Temperature Schema ①

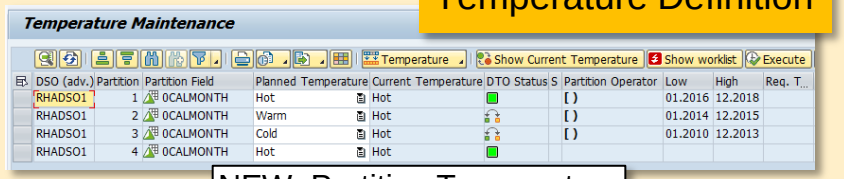


Partitioning Characteristic & Partition Ranges ②

Changes to Partitioning Schema = Remodeling

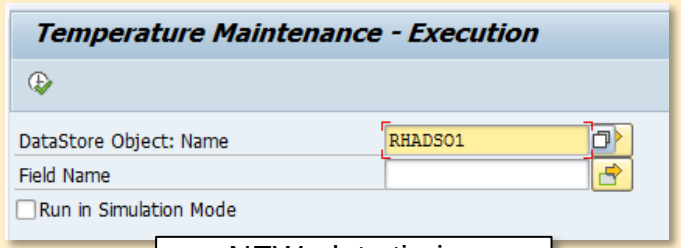
data tiering Optimization

Temperature Definition



NEW: Partition Temperature Maintenance ③

Plan

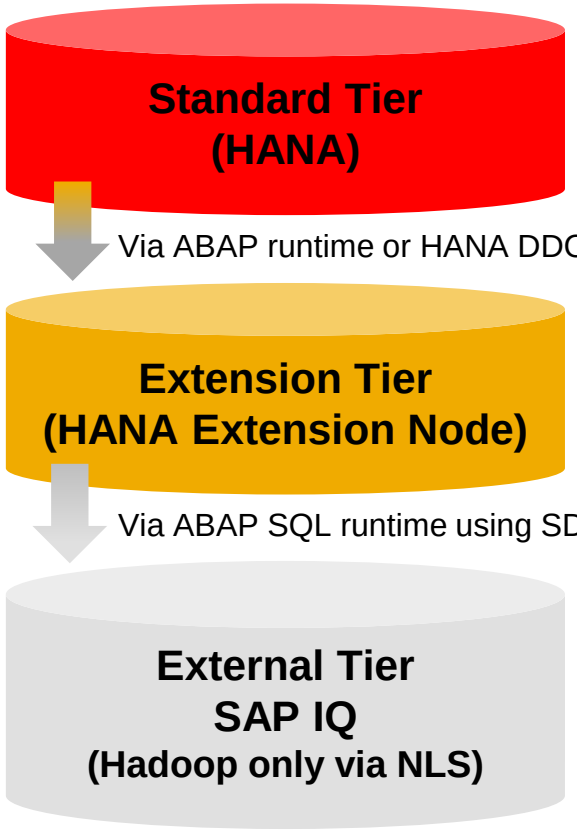


NEW: data tiering Optimization Job ④

Changes to Temperature (only) = data tiering Optimization

Actual

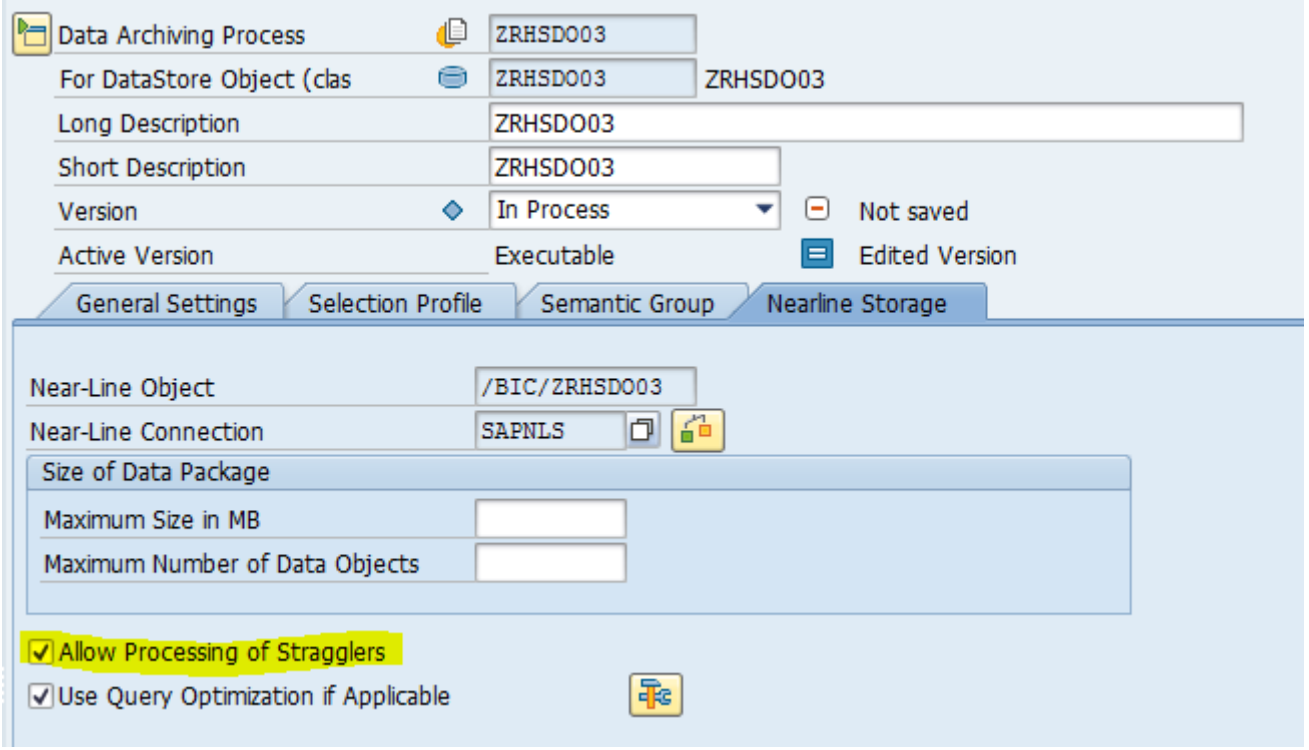
Physical Storage



SAP NLS Straggler Support

1) Activating Exceptional Updates on object level

in Data Archiving Process (DAP) of a Classic DataStore Object

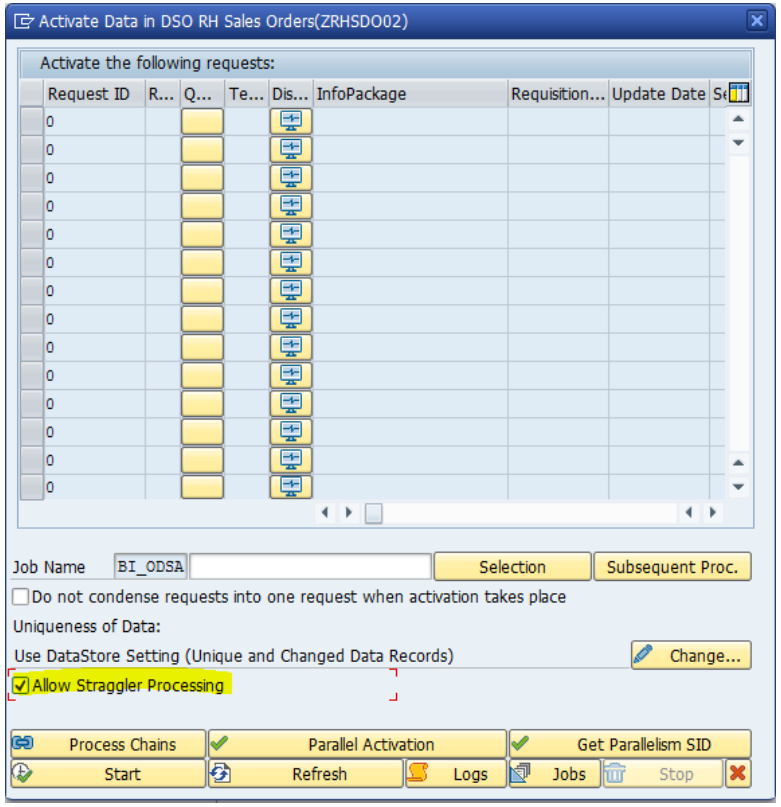


- After activation, the Data Archiving Process and the Activation Process of such Classic DataStore Object allow the processing of exceptional updates (stragglers) in principal.
- This means that the Activation Process can detect and handle exceptional updates (instead of the previous error situation at activation time in case data records violating already archived time slices).

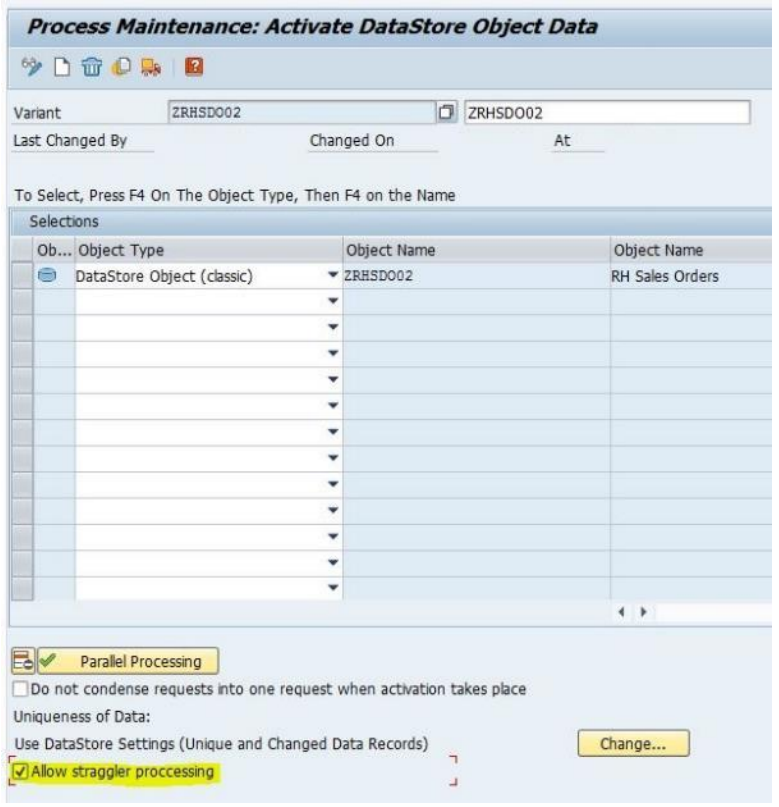
2) Activating Exceptional Updates on process level

in Activation Process Variant of a Classic DataStore Object

Ad Hoc / Manual Activation in RSA1



Process Variant in BW Process Chain

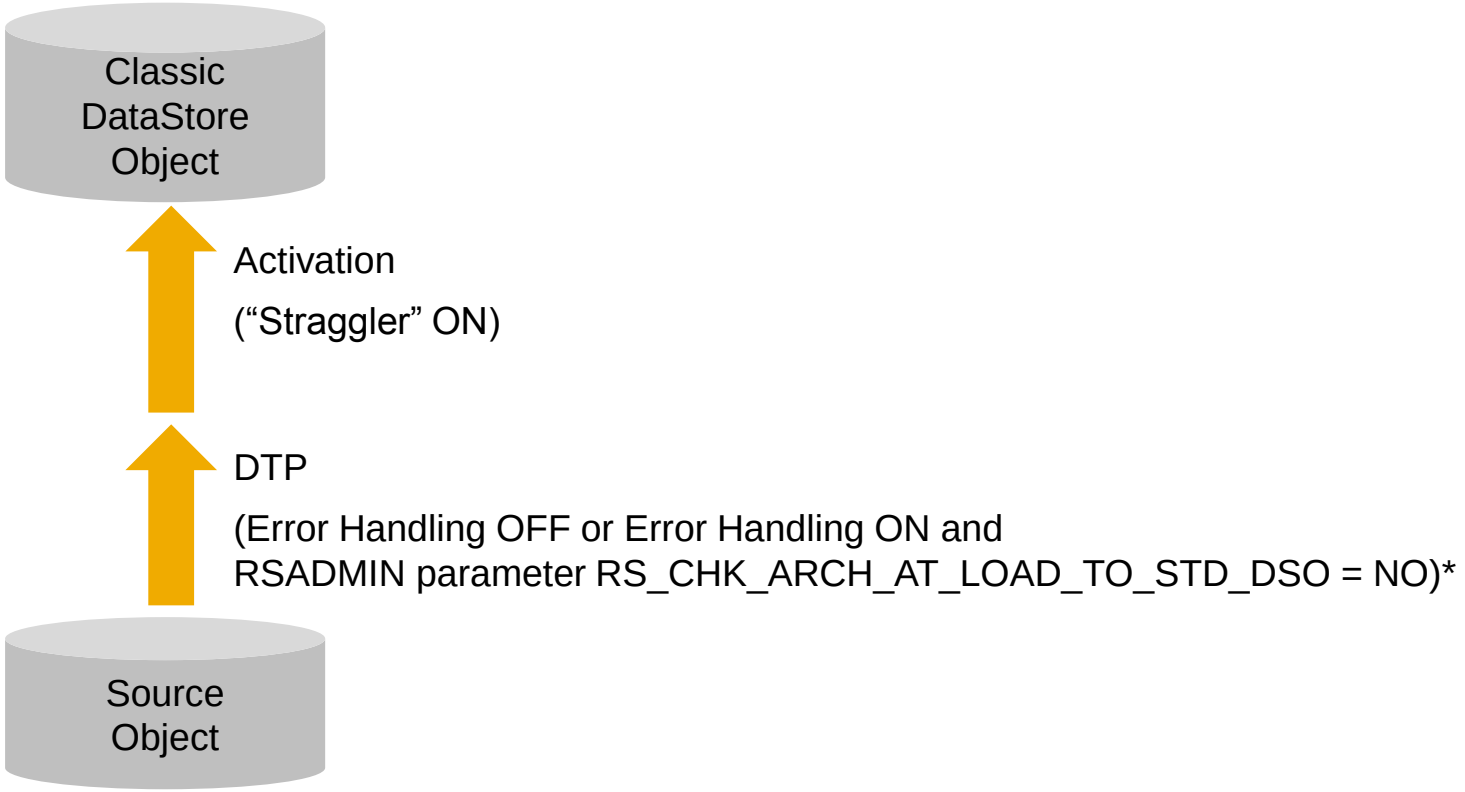


- To allow exceptional updates (straggler) for a given activation request, the user needs to allow exceptional updates in the activation process itself.

Exceptional Updates

Processing Steps

Constant (seamless) processing of exceptional updates



*See SAP Note 1931784 - Archive check during load to DSO

Exceptional Updates

Delta Requests

If an activation request for a Classic DataStore Object allows exceptional updates, then all records that violate the archiving condition of an existing archiving request, are written to a “Delta Request“ that is added to Nearline Store of the given object in SAP IQ. This “Delta Request” is created through an additional activation step comparing the changed records against existing records in the archive.

Change log entries are written in such a way that data targets, that receive data from the Classic DataStore Object can receive complete delta information..

The following support tools exist to administrate exceptional updates:

- Delta Request Monitor (program RSDA_REQUEST_MONITOR)
- Display of data in a SAP NLS IQ nearline table (program RSDA_SYB_SE16)

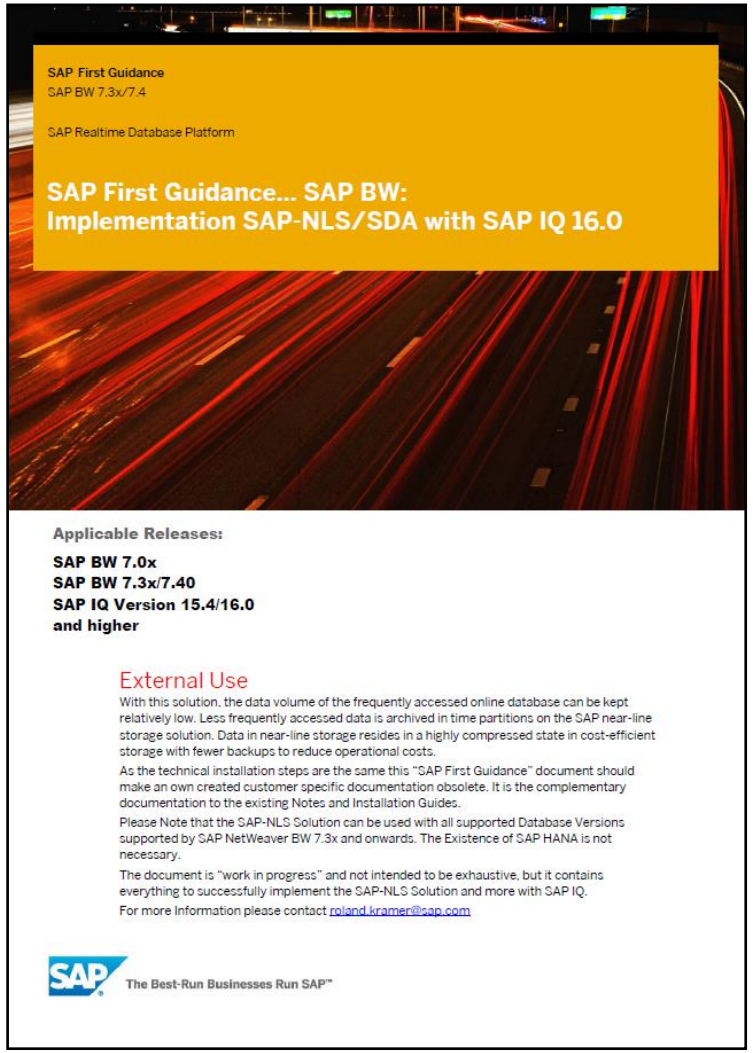
Once a Data Archiving Process allows exceptional updates, it is only possible to remove the exceptional update flag when no valid delta request for the data archiving process exists. However given archiving request and their corresponding delta request can be merged in the Delta Request Monitor. If this is done for all archiving requests of the Data Archiving Process that formerly contained delta requests, exceptional updates can be switched off again.

Note that straggler management might have an impact on SAP NLS IQ query performance with an increasing number of delta requests.

SAP IQ 16.x Updates/Installation

Nearline Storage (NLS) with SAP IQ

Everything you need to know about SAP IQ - SAP First Guidance



1.85	Corrections/additions after SAP-NLS Workshop 09/2014
1.86	Corrections 01/2015, DBACOCKPIT corrections, DT section removed
1.87	Corrections 03/2015, adding load stripping, latest SP08.xx updates
1.88	SAP IQ SSL support, Example SAP IQ DB copy
1.90	IQ 16.0 SP10 updates, Corrections 07/2015
1.91	IQ 16.0 SP08, SP10 updates, Corrections 09/2015
1.92	Update SDA location for IQ, SP08/SP10 updates
1.93	Updates/Corrections 12/2015
1.94	Updates/Corrections 04/2016
1.95	Updates/Corrections 06/2016
1.96	Updates/Corrections 09/2016, Installation Section 15.4 removed
1.97	Updates/Corrections 12/2016
1.98	IQ 16.0 SP11 Updates, 02/2017
2.01	IQ 16.0 SP11, 04/2017
2.10	IQ 16.1 Client/Server Update, SDA corrections, Updates 05/2017

SAP IQ 16.1 is released (Mainstream Support for 16.0 ends March 2018)

SAP Help Portal SAP IQ

What's New in SAP IQ 16.1

Home /

Table of Contents

- What's New in SAP IQ 16.1
- Support Package 01
  - Installation and Update
  - System Administration
  - Security
    - Allow_expired_certs Encryption Option for TLS and HTTPS (New)
    - Database Servers Support Client-Side Certificates (New)
    - Default DBA User and Minimum Password Length (Changed)
    - HTTP/HTTPS Connection Queuing (New)
    - Operating System Certificate Store for Secure Connections (Changed)
    - Parameterization of Statements (Changed)
    - Securing Password Information in the Database (Changed)
    - Stronger Encryption Using OpenSSL (Changed)

Next >

What's New in SAP IQ 16.1

This guide describes new, changed, and deleted functionality in SAP IQ 16.1.

Caution

If you are an experienced SAP IQ user, you may be used to a short three-character password for the DBA user. The default password length in SAP IQ 16.1 has increased to six characters, and a shorter password will now throw an error. See Default DBA User and Minimum Password Length (Changed).

Note

The following image contains links to more information.

Installation and Update
What's new in installation and update in SAP IQ 16.1 SP 01.

System Administration
What's New in system administration in SAP IQ 16.1 SP 01.

Security
What's new in security in SAP IQ 16.1 SP 01.

https://help.sap.com/iq16

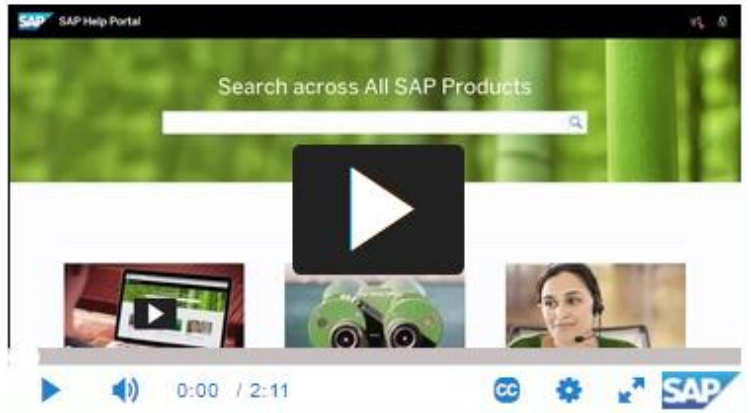
What's New

What's New in SAP IQ 16.1

New, changed, and removed features.

SAP IQ Release Bulletin

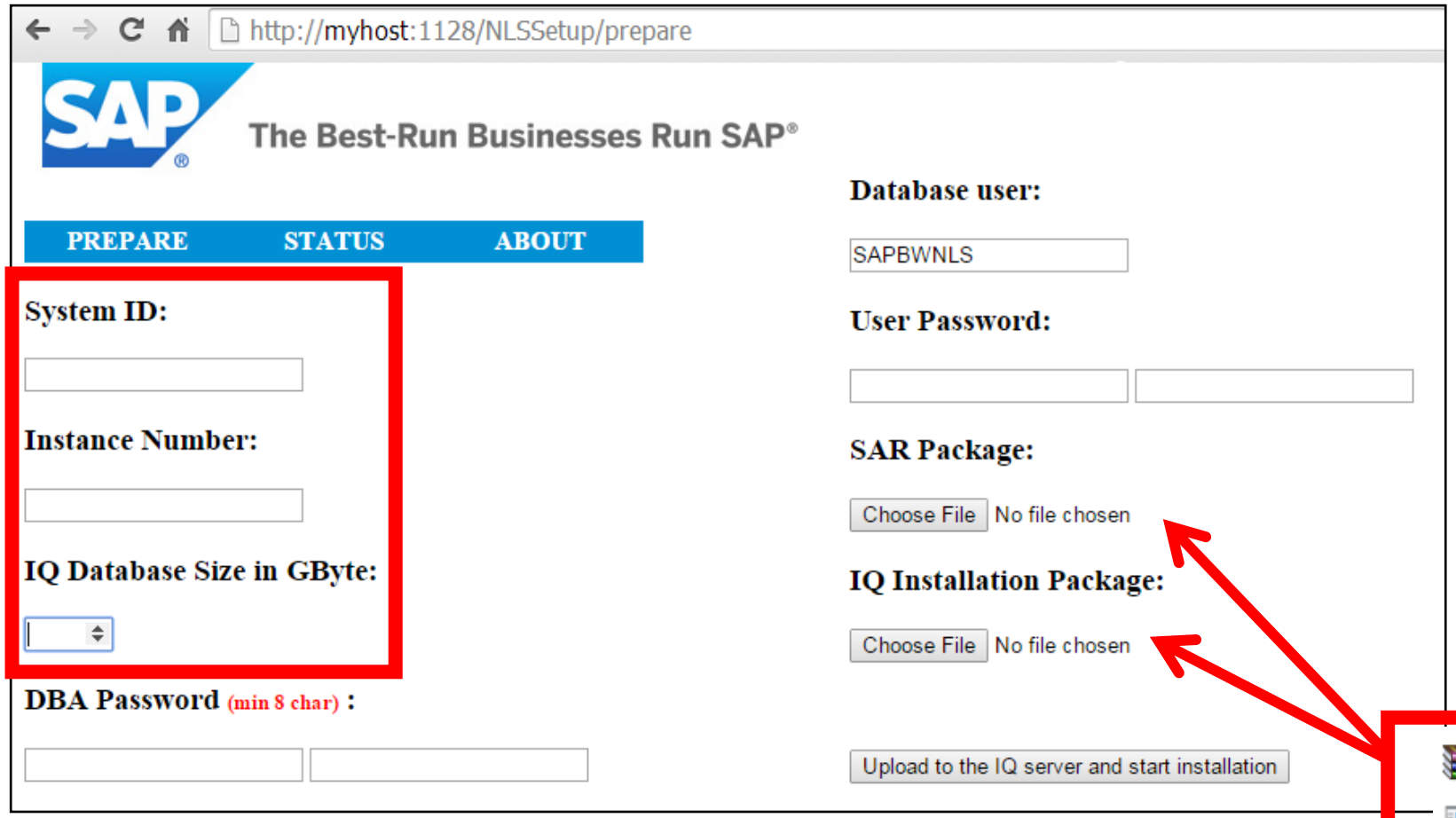
Release bulletin containing the latest information about known issues in SAP IQ.

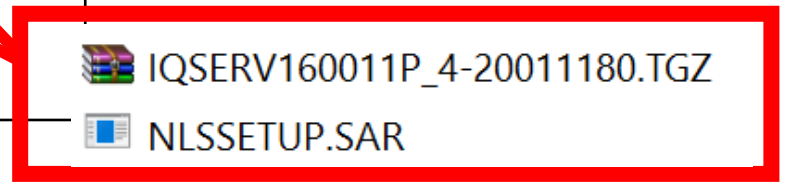


Learn how to search the documentation, filter search results, and add topic feedback using the new SAP Help Portal. Click the expand icon to show this video in full screen mode.

SAP IQ DB Installation using the SAP Host Agent

Complete automatic SAP IQ Database Installation - available on Request *



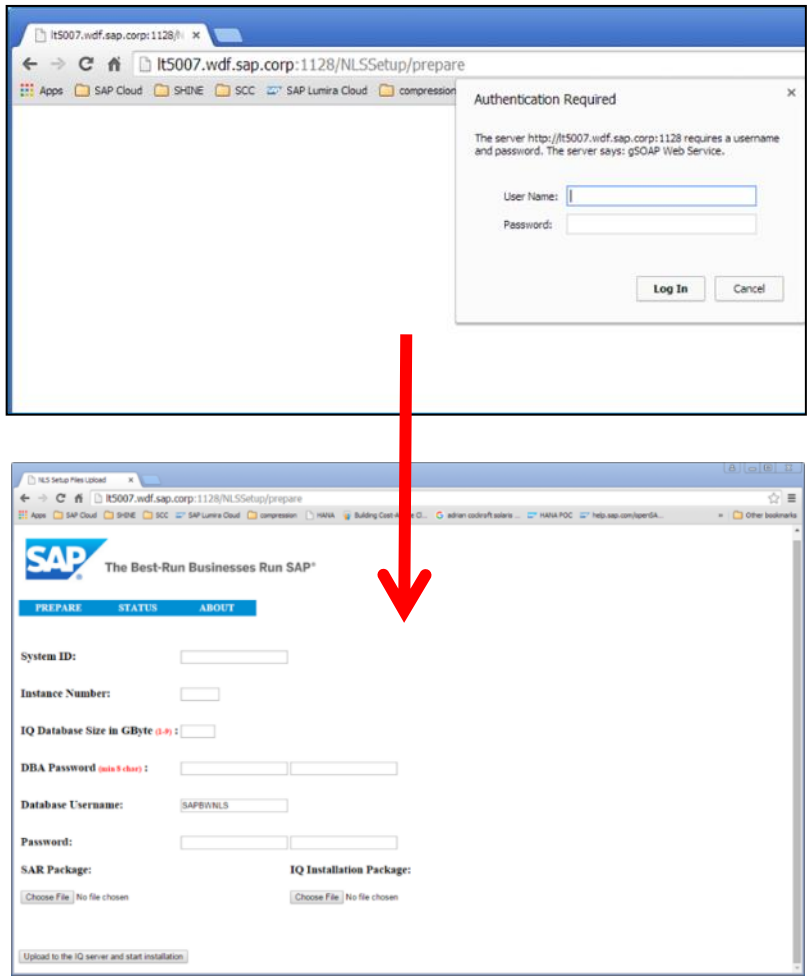


- **Pre Requisites:**
  - Available on SUSE Linux X86 only (so far)
  - Using the SAP Instance Builder for the IQ Database Layout
  - Modified Version of SAPHostAgent 7.21
  - All Versions of SAP IQ SP10/11 possible

*For more Information please contact roland.kramer@sap.com

SAP IQ DB Installation using the SAP Host Agent

http://server.wdf.sap.corp:1128/NLSSetup/prepare



sapadm/admin

HTTP
1128

SAP IQ Binaries

/usr/sap/NLS/

Port: 34238

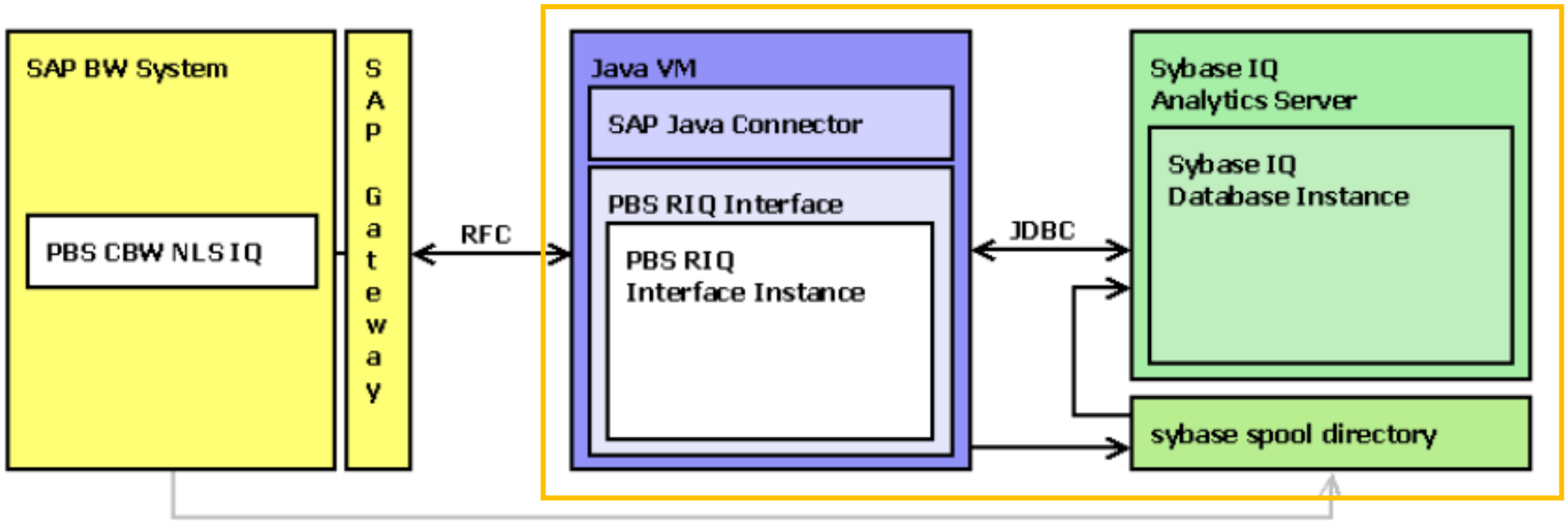
/usr/sap/NLS/SIQ42
/usr/sap/NLS/SYS
/usr/sap/NLS/backup
/usr/sap/NLS/data
/usr/sap/NLS/exe
/usr/sap/NLS/global
/usr/sap/NLS/home
/usr/sap/NLS/profile
/usr/sap/NLS/temp

SAP Host Agent

IQ NLS DB

Setup of the PBS RIQ Interface

this allows a NLS connection from NUC SAP BW to CESU-8 based SAP IQ 16.0



- SAP BW 7.0x, 7.3x non-Unicode, non HANA database
- SAP JCo Driver (2.x)
- PBS RIQ Interface based on SAP JCo (1.1.1.)
- SAP IQ 16.0 SP11.0x

Create the Filesystem and adapt the RIQ Connection Template

Automatically created by the easy SAP IQ Installer

```
/usr/sap/NLS/NLS42
/usr/sap/NLS/SYS
/usr/sap/NLS/backup
/usr/sap/NLS/data
/usr/sap/NLS/exe
/usr/sap/NLS/global
/usr/sap/NLS/home
/usr/sap/NLS/profile
/usr/sap/NLS/temp
```

```
# ------------------------------------------------------------------------------
# Replace all occurrences of <...> with the values of your PBS RIQ Server Instance.
# Must be in the format: -OneParameterPerLine=OneValuePerLine
# ------------------------------------------------------------------------------
#
-SAPSYSTEM=BW
-UNICODE=0
-GWHOST=lt5006.wdf.sap.corp
-GWSERV=sapgw03
-PROGID=PBSRIQ
-DBDIR=/usr/sap/NLS/data
-DBSPOOLDIR=/usr/sap/NLS/spool_data
-DBUSR=PBS<yourSapSystemID>
-DBPWD=<DatabaseUserPassword>
-DBURL00=jdbc:sybase:Tds:127.0.0.1:34238
"instance.cfg" 75L, 4443C written
```

Manually created Directory

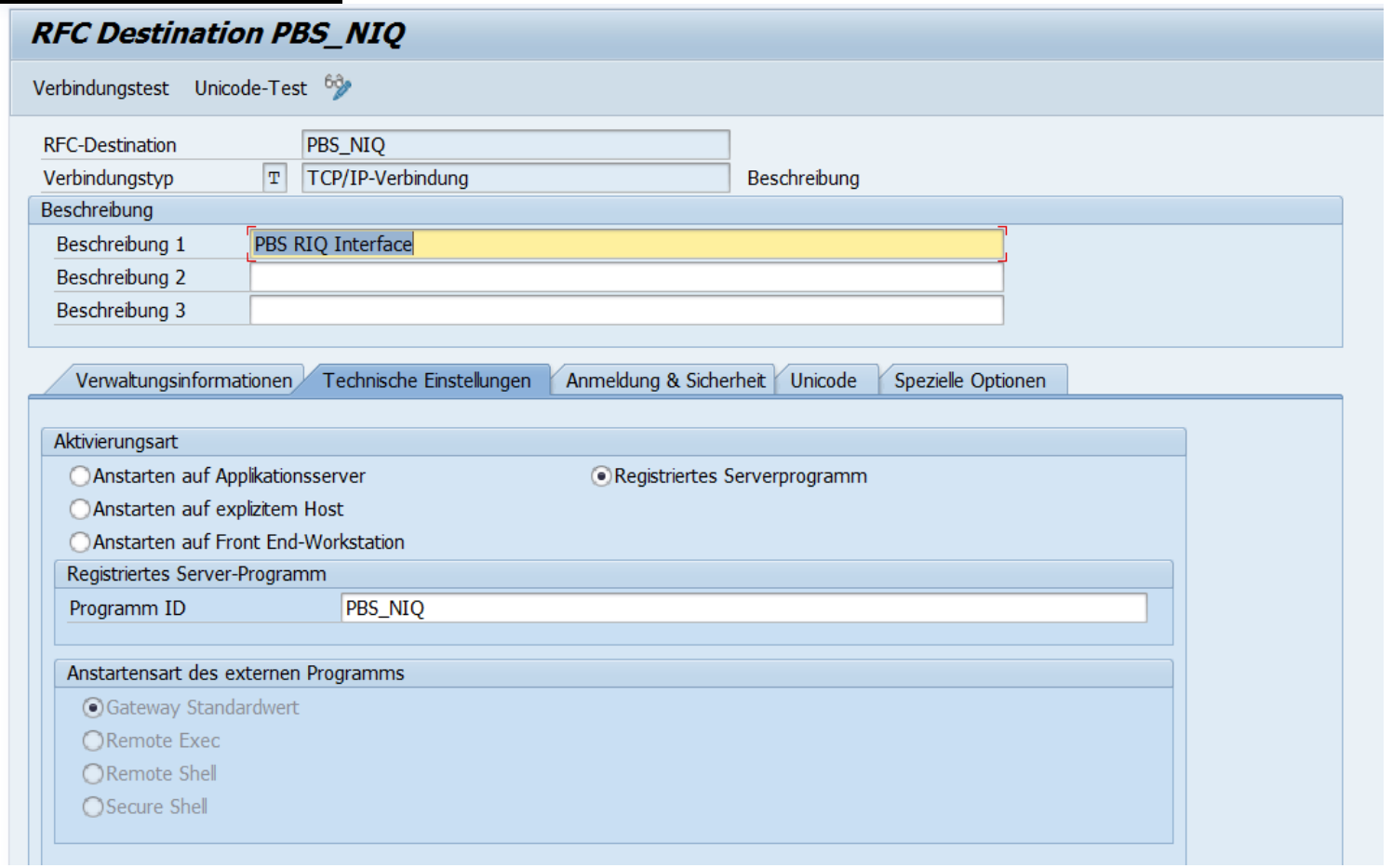
```
/usr/sap/NLS/PBS
/usr/sap/I42/PBS/1.1.1
```

Adapt the RIQ System Profiles

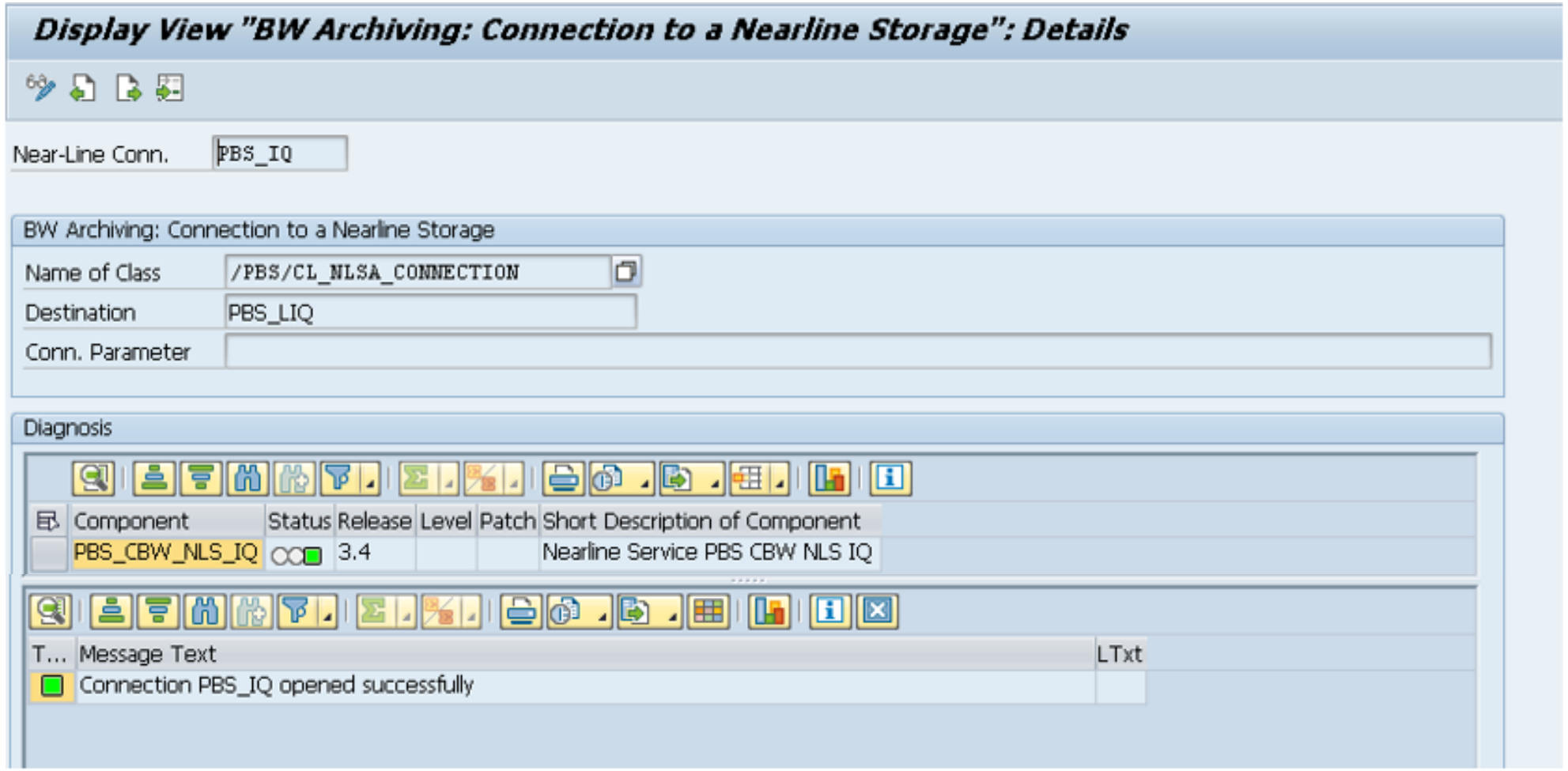
```
/usr/sap/I42/PBS/1.1.1/instance/RIQ/config/instance.cfg
/usr/sap/I42/PBS/1.1.1/instance/RIQ/config/pbstracecfg.xml
```

Start the RIQ Interface and create the RFC connection in SAP BW

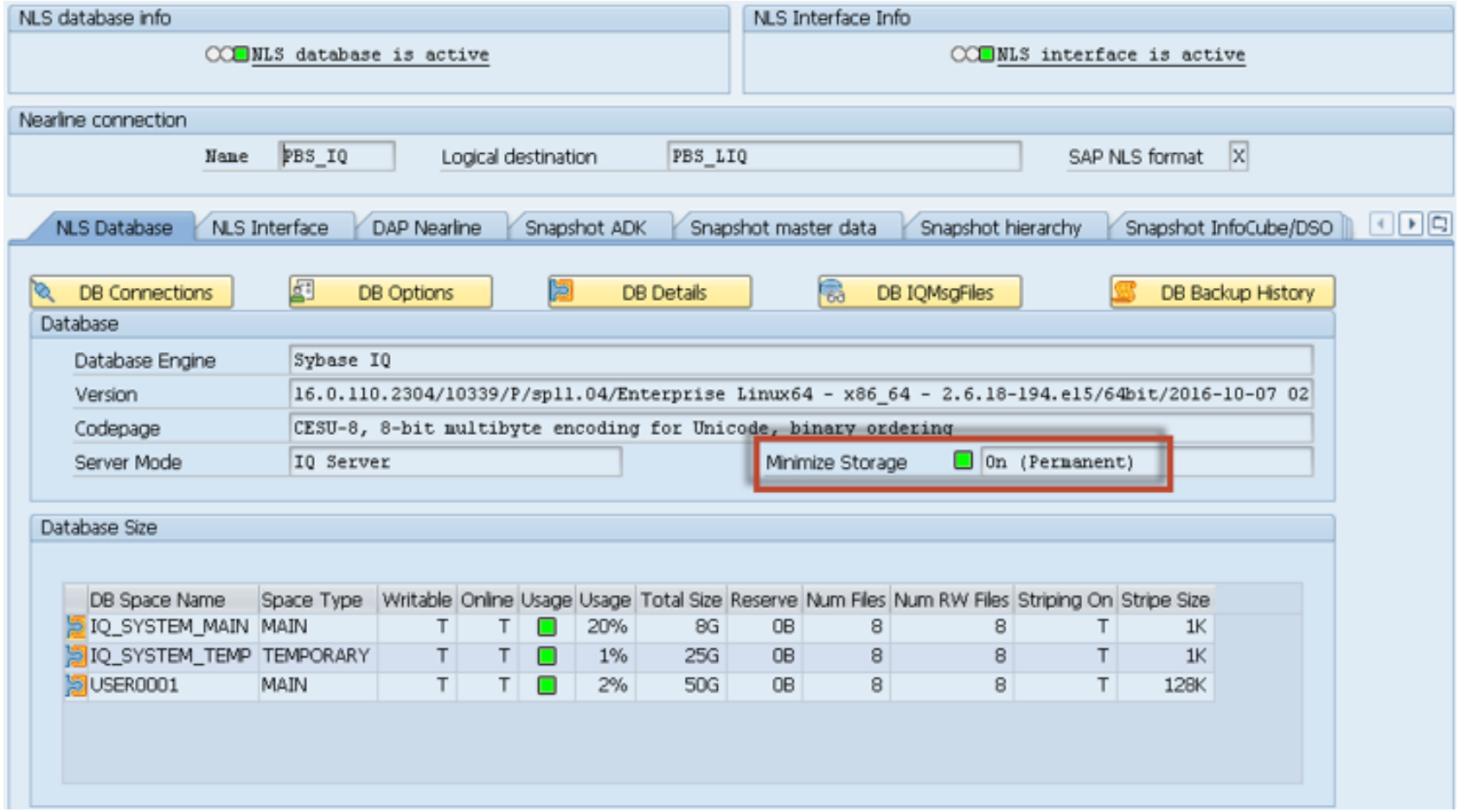
```
niqadm@svsapiqi01:/usr/sap/NIQ/data/database> start_riq

Checking the PBS RIQ Interface environment ...
Checking customized PBS RIQ Interface instances ...

The following PBS RIQ Interface Instance(s) are available:
=========================================================
instance        | status        | PID           | owner
=========================================================
BNK             | not running   | -             | -
---------------------------------------------------------


Enter the name of the instance to start or 'q' to quit the starti
BNK


Starting the PBS RIQ Interface Instance ...


niqadm@svsapiqi01:/usr/sap/NIQ/data/database> nohup: appending ou

niqadm@svsapiqi01:/usr/sap/NIQ/data/database>
```



Create the entry in table rsdanlcon (transaction RSDANLCON)



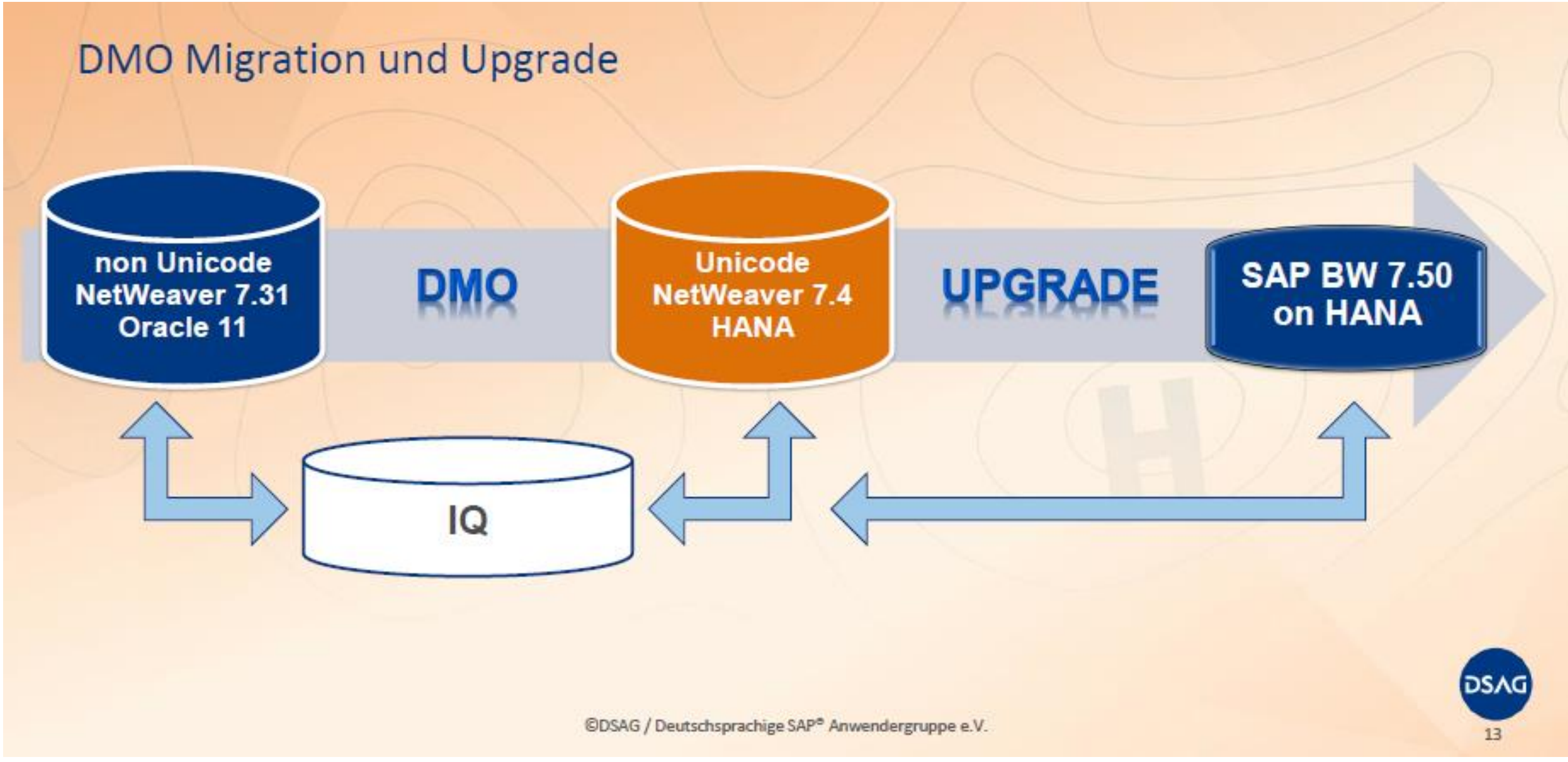
Details of the connected SAP IQ database (tx. /pbs/nlsa_monitor)



Activate the database option “Minimized Storage” for compability

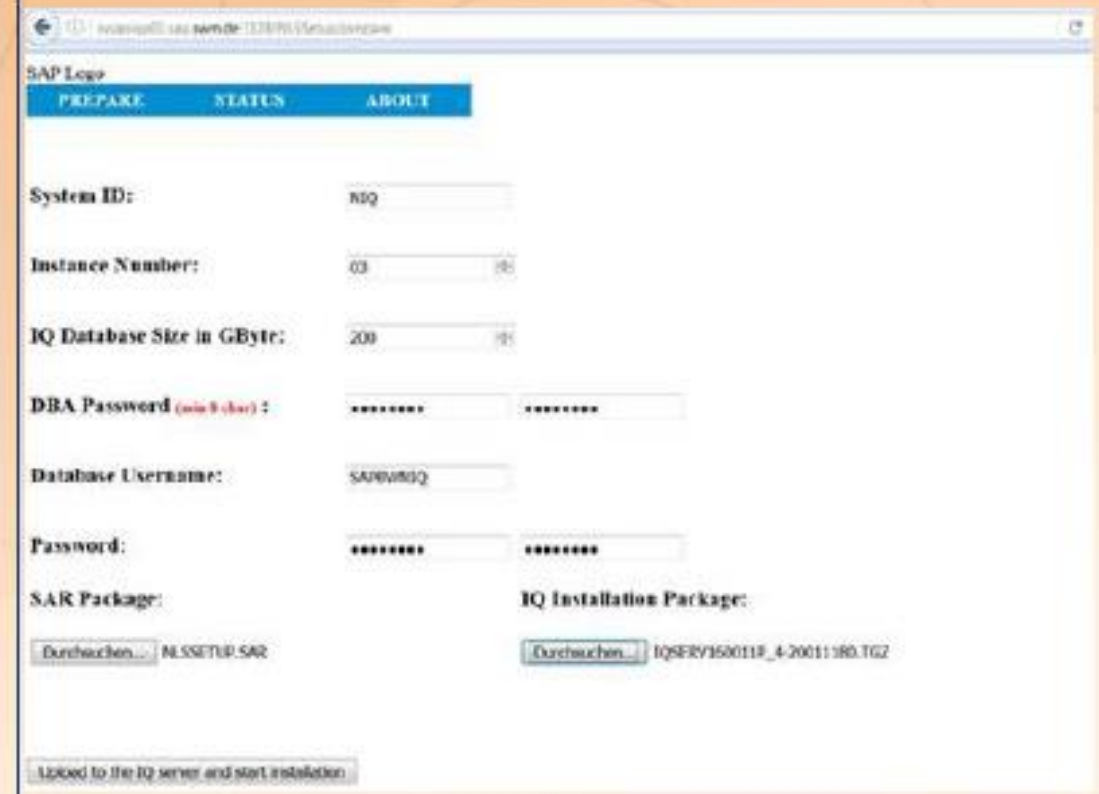
set option public.Minimize_Storage='ON';

SWM (Stadt Werke München – Reference Customer for the Solution)



SWM (Stadt Werke München – Reference Customer for the Solution)

Easy Installer für SAP IQ



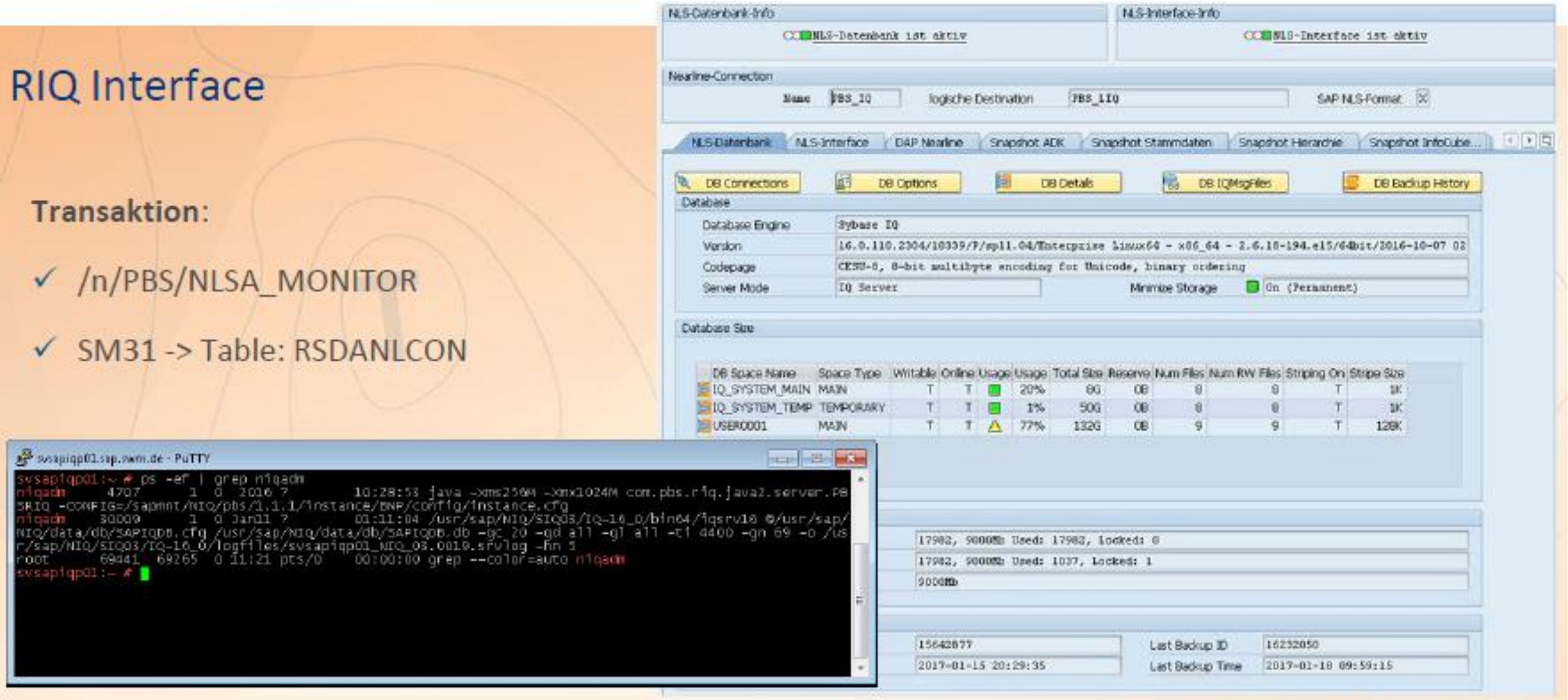
- IQ Installation sehr komfortabel in wenigen Schritten
- SAP Standards werden berücksichtigt
- Parameteranpassungen sind notwendig
- Gute Anleitung

SWM (Stadt Werke München – Reference Customer for the Solution)

RIQ Interface

Transaktion:

- ✓ /n/PBS/NLSA_MONITOR
- ✓ SM31 -> Table: RSDANLCON



SAP NLS Roadmap

data tiering in SAP BW/4HANA and SAP BW

Roadmap for Nearline Storage and SAP BW/4HANA data tiering Optimization (DTO)

Today

BW 7.50 SP04 / SAP BW/4HANA1.0 SP01

Nearline Storage

- Further Enhancements in NLS Support for Advanced DataStore Objects
- Nearline Storage on Hadoop
- Partner Interface for Nearline Storage on Advanced DataStore Object (only BW 7.50 SP04 – no NLS partner support in BW/4HANA)
- DB Space oriented partitioning mode for SAP NLS IQ
- Nearline Storage Data Volume Statistics (incl. ABAP CDS View based reporting)

Mid Term - Planned for Q2 2017

SAP BW/4HANA 1.0 SP04

data tiering Optimization

- Central Partitioning and Temperature Definition for Advanced DataStore Objects
- Support for SAP HANA Extension Nodes (warm storage) and SAP IQ (cold storage)
- Central data tiering Optimization Job for all data movements between Data Tiers
- New SQL based implementation for data movements to external storage
- Integration with ADSO Remodeling

Future Direction*

Conversion Support

- Transfer of Classic DataStore Objects / InfoCubes to Advanced DataStore Object incl. Nearline Store (Q3 2017)
- Support for conversion of Data Archiving Processes (NLS) to BW/4HANA data tiering Optimization

data tiering Optimization

- Archiving of Inventory ADSOs with BW/4 DTO or Nearline Storage
- SAP HANA Vora integration for external storage in Hadoop
- Automation and User Interface Improvements
- Supporting data movement scenarios for cold data (updates to cold data)

***This is the current state of planning and may be changed by SAP at any time**

data tiering in SAP BW/4HANA

Roadmap for SAP BW/4HANA data tiering Optimization (DTO)

Today – Q2 2017

SAP BW/4HANA 1.0 FP04

- Central Partitioning and Temperature Definition for Advanced DataStore Objects (data temperature as system local setting)
- Support for SAP HANA Extension Nodes (warm storage) and SAP IQ (cold storage) in DTO
- Central data tiering Optimization Job for all data movements between Data Tiers
- New SQL based implementation for data movements to external storage
- SAP Nearline Storage with SAP IQ / Hadoop still supported.
- Support for external storage in Hadoop via SAP Nearline Storage only

Mid Term - Planned for Q4 2017

SAP BW/4HANA 1.0 FP07

- Support for external storage in SAP HANA Vora / Hadoop via DTO
- Implementation and Administration Improvements (e.g. Process Chain Integration, Mass Partition Creation)
- Further Performance Optimizations
- Archiving of Inventory ADSOs with BW/4 DTO or Nearline Storage

Conversion Support

- Transfer of Classic DataStore Objects / InfoCubes to Advanced DataStore Object incl. Nearline Store (Q3 2017)
- Support for conversion of Data Archiving Processes (NLS) to BW/4HANA data tiering Optimization

Future Direction* - 2018

- data tiering Optimization Cockpit as Web User Interface
- Advanced Data Movement Automation (rule based, statistics based)
- Supporting updates to cold data (external storage)
- Supporting cold data (external storage) only for Advanced DataStore Objects
- Enhanced SAP HANA Vora Integration
- Support for several external storage destinations

***This is the current state of planning and may be changed by SAP at any time**

Thank you.

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