Automated Tools for SAP HANA® Performance Optimization

Webinar Presenters:

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Agenda

1. Introduction smartShift Technologies
2. SAP HANA Overview
3. SAP HANA Enhancements
4. HANA Code Compatibility
5. HANA Performance Optimization (HPO)
   - ABAP
   - Code Pushdown
6. Q & A

Note: You can also continue the discussion via Twitter @smartShiftTech with **#smartHANA**

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Presenters

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SAP HANA Overview

HANA “Objectives”

- Does not impact transaction processing
- Enables “reporting without fear” by increasing reporting speeds dramatically
- Eliminates SAP as Access Loader
- Keeps processing within SAP and not Excel
- Avoid using old and/or partial data
- Convert batch processes to real-time operations
- Enable new big data processes

HANA Implementation Considerations

- Side-car vs. Primary DB
- Instance Size
  - Memory
  - CPU
- Table Partitioning
- Consider Changes in Query Result Ordering
- Incompatible Native SQL Code
- Unicode Requirement
- On-premise or Cloud Deployment

Why Code Optimization

- Data intensive programming logic in application server
  - Reversal of complete HW/SW abstraction, everything in ABAP
- Change in data architecture forces changes to application structure
  - SELECT * …
  - SORT vs. ORDER BY
  - CHECK within SELECT / END SELECT
- New HANA / NetWeaver framework functionality
  - List Display
  - Code Maintainability

smartScale for HANA Offering

smartScale for HANA will consist of the appropriate components with newly added HANA code optimization rules.

- Analyze
  - SaaS Analysis
- Upgrade & Unicode
  - Unicode Enablement
  - Change Impact Analysis
  - Automated Code Changes
- Develop
  - On-going ABAP Code Remediation
- Management
  - Migration Support
  - Monitor and Manage of Cloud Environment

Benefits for Automated Solution

- Get benefits quickly
- Resource Requirements
- Low Hanging Fruit
- Accuracy
- Repeatability
- Coverage
- Cost

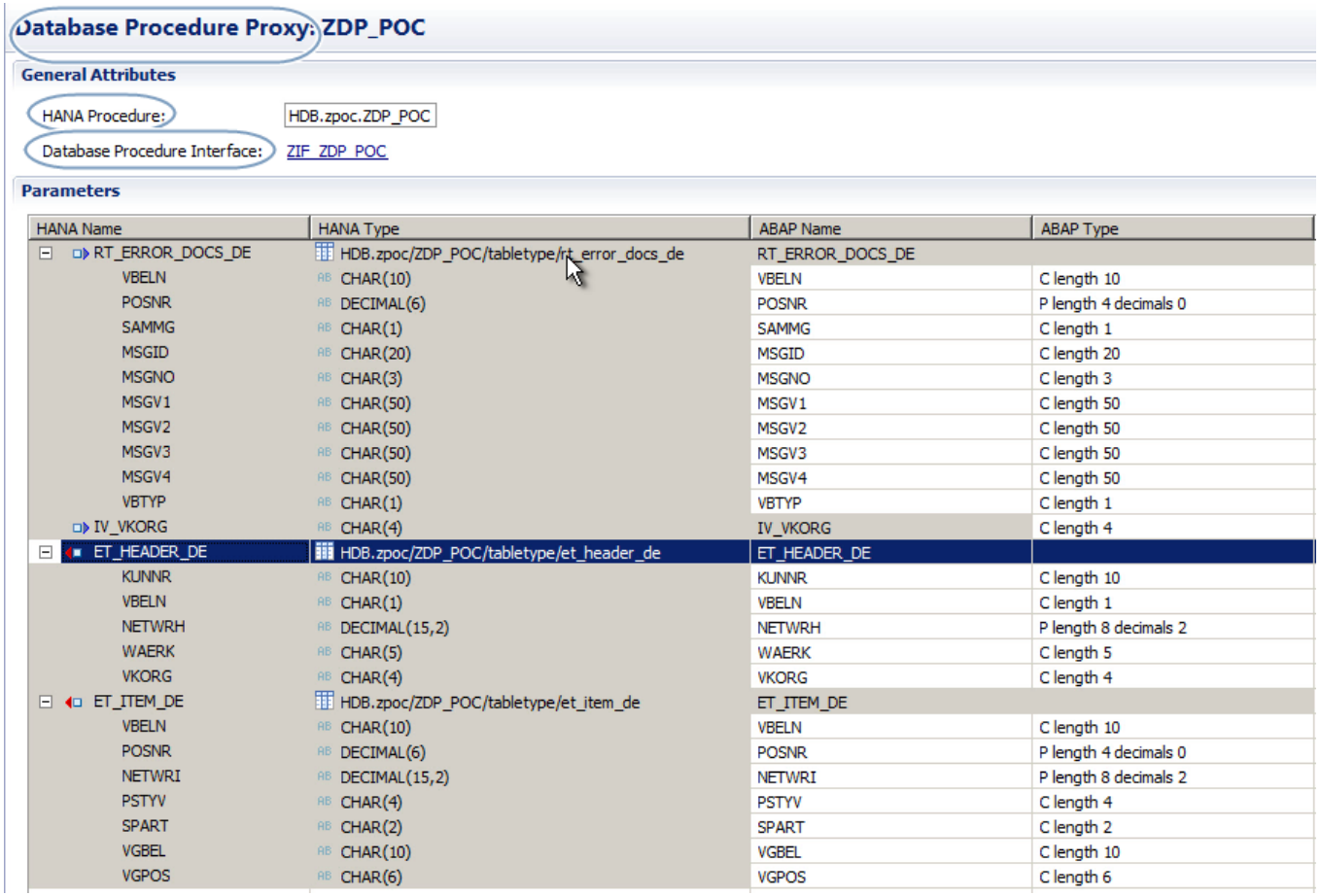
SAP HANA Enhancements

NetWeaver 7.4 ABAP Enhancements

- ABAP Managed Database Procedures (AMDP)
- Integrated Data Access List Grid (IDA-ALV)
- Inline Declarations
- Table Expressions
- New Internal Table Functions
- ABAP Objects (Exporting, Importing and Changing, Partially Implemented Interfaces for Testing)
- Reference Operator
- Value Operator
- Constructor Operator
- Conditional Operators
- Conversion Operators
- Lossless Operator EXACT
- Internal Tables with Empty Keys
- Expressions

Pushing code to DB layer - Step 1

- Define procedure



Database Procedure Proxy: ZDP_POC

General Attributes

HANA Procedure: HDB.zpoc.ZDP_POC

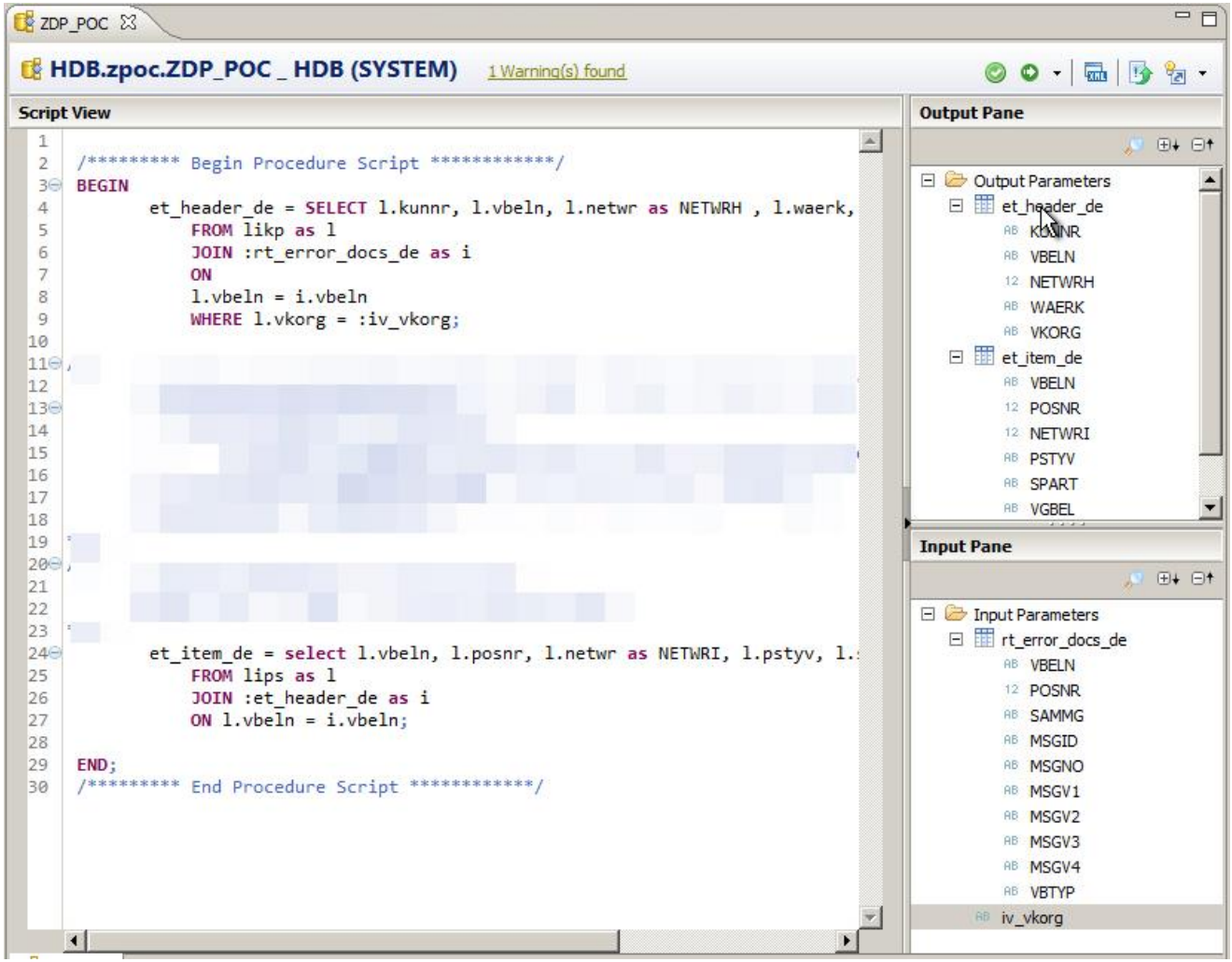
Database Procedure Interface: ZIF_ZDP_POC

Parameters

HANA Name	HANA Type	ABAP Name	ABAP Type
RT_ERROR_DOCS_DE	HDB.zpoc/ZDP_POC/tabletype/rt_error_docs_de	RT_ERROR_DOCS_DE	
VBELN	CHAR(10)	VBELN	C length 10
POSNR	DECIMAL(6)	POSNR	P length 4 decimals 0
SAMMG	CHAR(1)	SAMMG	C length 1
MSGID	CHAR(20)	MSGID	C length 20
MSGNO	CHAR(3)	MSGNO	C length 3
MSGV1	CHAR(50)	MSGV1	C length 50
MSGV2	CHAR(50)	MSGV2	C length 50
MSGV3	CHAR(50)	MSGV3	C length 50
MSGV4	CHAR(50)	MSGV4	C length 50
VBTYP	CHAR(1)	VBTYP	C length 1
IV_VKORG	CHAR(4)	IV_VKORG	C length 4
ET_HEADER_DE	HDB.zpoc/ZDP_POC/tabletype/et_header_de	ET_HEADER_DE	
KUNNR	CHAR(10)	KUNNR	C length 10
VBELN	CHAR(1)	VBELN	C length 1
NETWRH	DECIMAL(15,2)	NETWRH	P length 8 decimals 2
WAERK	CHAR(5)	WAERK	C length 5
VKORG	CHAR(4)	VKORG	C length 4
ET_ITEM_DE	HDB.zpoc/ZDP_POC/tabletype/et_item_de	ET_ITEM_DE	
VBELN	CHAR(10)	VBELN	C length 10
POSNR	DECIMAL(6)	POSNR	P length 4 decimals 0
NETWRI	DECIMAL(15,2)	NETWRI	P length 8 decimals 2
PSTYV	CHAR(4)	PSTYV	C length 4
SPART	CHAR(2)	SPART	C length 2
VGBEL	CHAR(10)	VGBEL	C length 10
VGPOS	CHAR(6)	VGPOS	C length 6

Pushing code to DB layer – Step 2

- SQL script that implements reading from relevant tables



Pushing code to DB layer – Step 3

- Generated interface object, to be used in application logic

```
interface ZIF_ZDP_POC public.

" This interface pool has been generated.
" It contains the type definitions for
" database procedure proxy ZDP_POC
" representing db procedure _SYS_BIC.HDB.zpoc/ZDP_POC

types: begin of rt_error_docs_de,
         vbeln                          type c length 10,
         posnr                          type p length 4 decimals 0,
         sammg                          type c length 1,
         msgid                          type c length 20,
         msgno                          type c length 3,
         msgv1                          type c length 50,
         msgv2                          type c length 50,
         msgv3                          type c length 50,
         msgv4                          type c length 50,
         vbtyp                          type c length 1,
       end of rt_error_docs_de.
types: iv_vkorg                        type c length 4.
types: begin of et_header_de,
         kunnr                          type c length 10,
         vbeln                          type c length 1,
         netwrh                         type p length 8 decimals 2,
         waerk                          type c length 5,
         vkorg                          type c length 4,
       end of et_header_de.
types: begin of et_item_de,
         vbeln                          type c length 10,
         posnr                          type p length 4 decimals 0,
         netwri                         type p length 8 decimals 2,
         pstyv                          type c length 4,
         spart                          type c length 2,
         vgbel                          type c length 10,
         vgpos                          type c length 6,
       end of et_item_de.

endinterface .
```

Pushing code to DB layer - Step 4

- Modify code to use interface / call procedure

```
58    DATA: lt_delivery_data TYPE TABLE OF zv_delivery_data.
59    DATA: ls_delivery_data LIKE LINE OF lt_delivery_data.
60    DATA: ls_item_de LIKE LINE OF rt_item_de.
61
62    DATA: lv_vkorg TYPE zif_zdp_poc=>iv_vkorg VALUE '1000'.
63
64    DATA: ls_error_docs_de LIKE LINE OF rt_error_docs_de.
65    DATA: ls_header_de LIKE LINE OF rt_header_de.
66
67    DATA: lt_error_docs_de_db TYPE STANDARD TABLE OF zif_zdp_poc=>rt_error_docs_de.
68    DATA: ls_error_docs_de_db TYPE zif_zdp_poc=>rt_error_docs_de.
69
70    DATA: ls_header_de_db TYPE zif_zdp_poc=>et_header_de.
71    DATA: lt_header_de_db TYPE STANDARD TABLE OF zif_zdp_poc=>et_header_de.
72
73    DATA: ls_item_de_db TYPE zif_zdp_poc=>et_item_de.
74    DATA: lt_item_de_db TYPE STANDARD TABLE OF zif_zdp_poc=>et_item_de.
75
76  IF NOT rt_error_docs_de[] IS INITIAL.
77
78
79
80
81
82
83
84
85
86
87
88    CALL DATABASE PROCEDURE zdp_poc
89          EXPORTING
90              iv_vkorg = lv_vkorg
91              rt_error_docs_de = lt_error_docs_de_db
92          IMPORTING
93              et_header_de = lt_header_de_db
94              et_item_de = lt_item_de_db
95              .
96    IF sy-subrc <> 0.
97        MESSAGE I034 WITH 'Failure'(015).
98    ELSE.
```

New ABAP language feature!

ABAP Managed Database Procedures (AMDP)

```
CLASS zcl_amdp DEFINITION.
    INTERFACES if_amdp_marker_hdb.
    METHODS: pushdown_code
            IMPORTING VALUE(iv_client) TYPE mandt
            EXPORTING VALUE(et_result) TYPE tt_result.
ENDCLASS.

CLASS zcl_amdp IMPLEMENTATION.
    METHOD pushdown_code BY DATABASE PROCEDURE
            FOR HDB LANGUAGE SQLSCRIPT
            USING snwd_so_i snwd_so_sl snwd_pd.
                    -- SQLScript goes here

    ENDMETHOD.
ENDCLASS.
```

Use of Integrated Data Access List Grid (IDA-ALV)

```
MODULE pbo OUTPUT.
    IF g_custom_container IS INITIAL.
        CREATE OBJECT g_custom_container
            EXPORTING
                container_name = g_container.

*       Instantiate IDA_ALV (ALV with IDA=Integrated Data Access)
        data(lo_alv_display) = cl_salv_gui_table_ida=>create( iv_table_name = 'ZV_DELIVERY_DATA'
                                                              io_gui_container = g_custom_container ).

        data(lo_collector) = new cl_salv_range_tab_collector( ).  "Helper Class
        lo_collector->add_ranges_for_name( iv_name = 'VKORG' it_ranges = o_vkorg[] ).
        lo_collector->get_collected_ranges( IMPORTING et_named_ranges = data(lt_name_range_pairs) ).
        lo_alv_display->set_select_options( it_ranges = lt_name_range_pairs ).


*       Initial Grouping
        lo_alv_display->default_layout( )->set_sort_order( value #( ( field_name = 'VKORG' is_grouped = abap_true )
                                                                    ( field_name = 'SPART' is_grouped = abap_true )
                                                                    ( field_name = 'VBELN' is_grouped = abap_true ) ) ).

    ENDIF.
ENDMODULE.
```

Access a view

Add applicable ranges

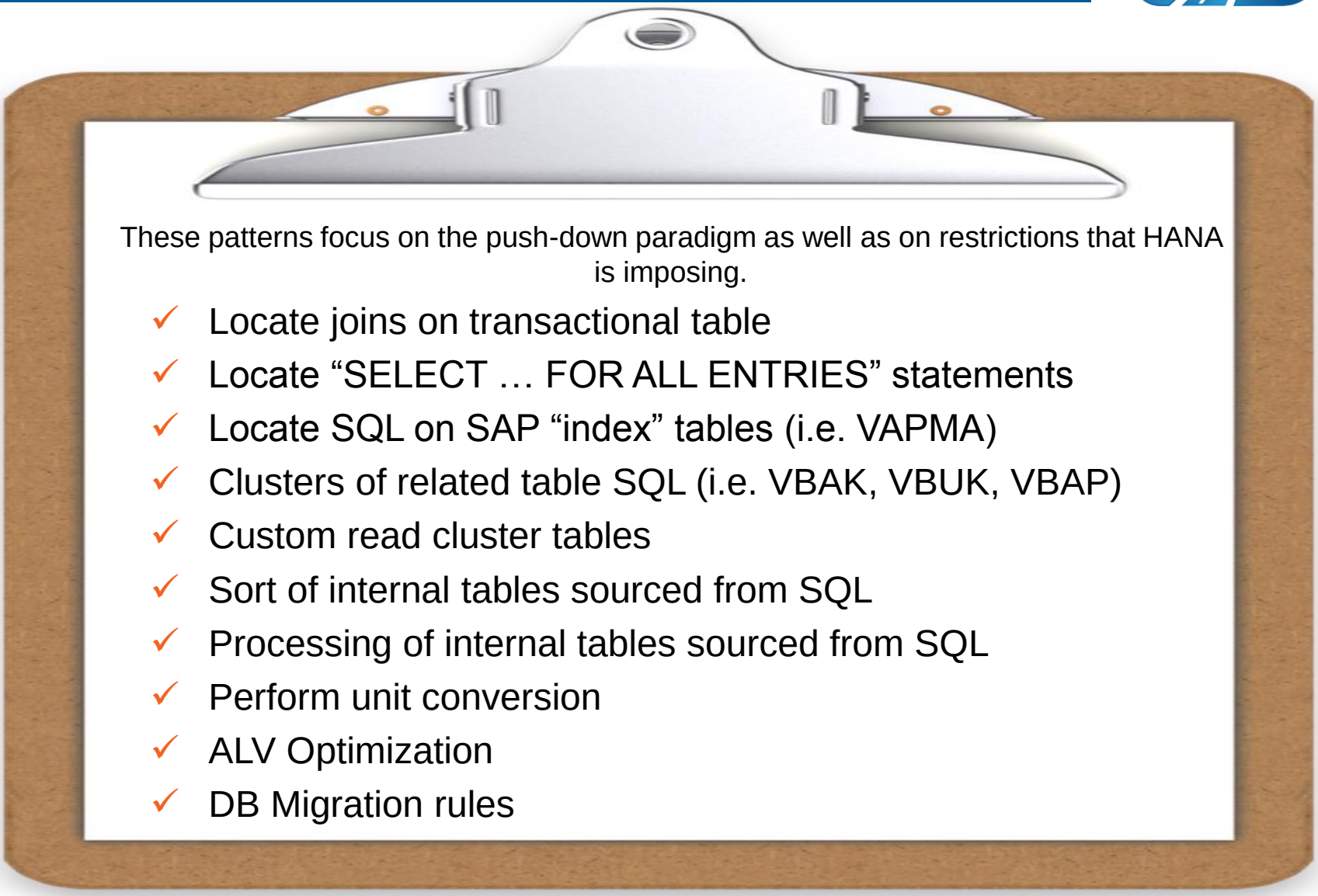
Define sort order

Performance Guidelines and Rules

HANA Optimization Guidelines

- Reduce result set
- Reduce amount of data transfer
- Reduce number of DB round trips
- Index/Query optimization
- Text search for F4 help and type-ahead search
- Avoid native SQL
- Use buffering on application server
- Existing best practices still apply
- Don’t overload HANA server

New HANA Rule Concepts



These patterns focus on the push-down paradigm as well as on restrictions that HANA is imposing.

- ✓ Locate joins on transactional table
- ✓ Locate “SELECT … FOR ALL ENTRIES” statements
- ✓ Locate SQL on SAP “index” tables (i.e. VAPMA)
- ✓ Clusters of related table SQL (i.e. VBAK, VBUK, VBAP)
- ✓ Custom read cluster tables
- ✓ Sort of internal tables sourced from SQL
- ✓ Processing of internal tables sourced from SQL
- ✓ Perform unit conversion
- ✓ ALV Optimization
- ✓ DB Migration rules

Optimized ABAP Code Examples

New HANA Rules

Only a subset of rules are referenced here

- HCC
  - #600 SELECT on former cluster/pool tables
- HPO
  - #601 SELECT with PACKAGE SIZE option
  - #602 SELECT/ENDSELECT are indicators for code optimization
  - #610 HANA Performance Optimization using code push-down
  - #712 SELECT * --> Reduce selected column set
  - #719 SELECT with IF/CHECK
  - #723 OpenSQL modifications inside LOOPS
  - #727 SELECT followed by DELETE ADJACENT DUPLICATES
  - #728 Index Table Access

Rule #600 - SELECT on former cluster/pool tables

- Cluster and Pool tables return data implicitly sorted by the primary key
- In HANA cluster/pool tables are converted into transparent tables – this might changed in future SPs
- Not all cases need adjustment, only where ordering is important
- Customer case (via Code Inspector)
  - 4,500 instances
  - Interestingly there are 1,500 instance where no ordering is specified but the code might rely on order

Rule #600 - SELECT on former cluster/pool tables

- Code Comparison

Rule #712 SELECT * --> Reduce column set

- In row based RDBMS the penalty for not restricting the selected column set is small.
- For column tables in HANA, there are multiple reasons why this becomes important
  - Reduced processing on DB server
  - Reduced data transfer
  - Reduced overhead in result set realization on app server
- Needs the ability to detect access to columns in result set and related data structures.
- Many pit falls and conditions that cannot be easily investigated manually.

Rule #712 SELECT * --> Reduce column set

- Code Comparison

Rule #719 SELECT/LOOP with IF/CHECK

- Checks that filter out data that has been sourced from the DB should be pushed to the DB
- Applies to many constructs
  - SELECT
  - SELECT/ENDSELECT
  - LOOP
  - OPEN CURSOR
- Existing restrictions for OpenSQL must be considered
- HANA benefits
  - Reduced data transfer
  - Reduced overhead in result set realization on app server

Rule #719 SELECT/LOOP with IF/CHECK

- Code Comparison

Rule #723 OpenSQL modifications inside LOOPS

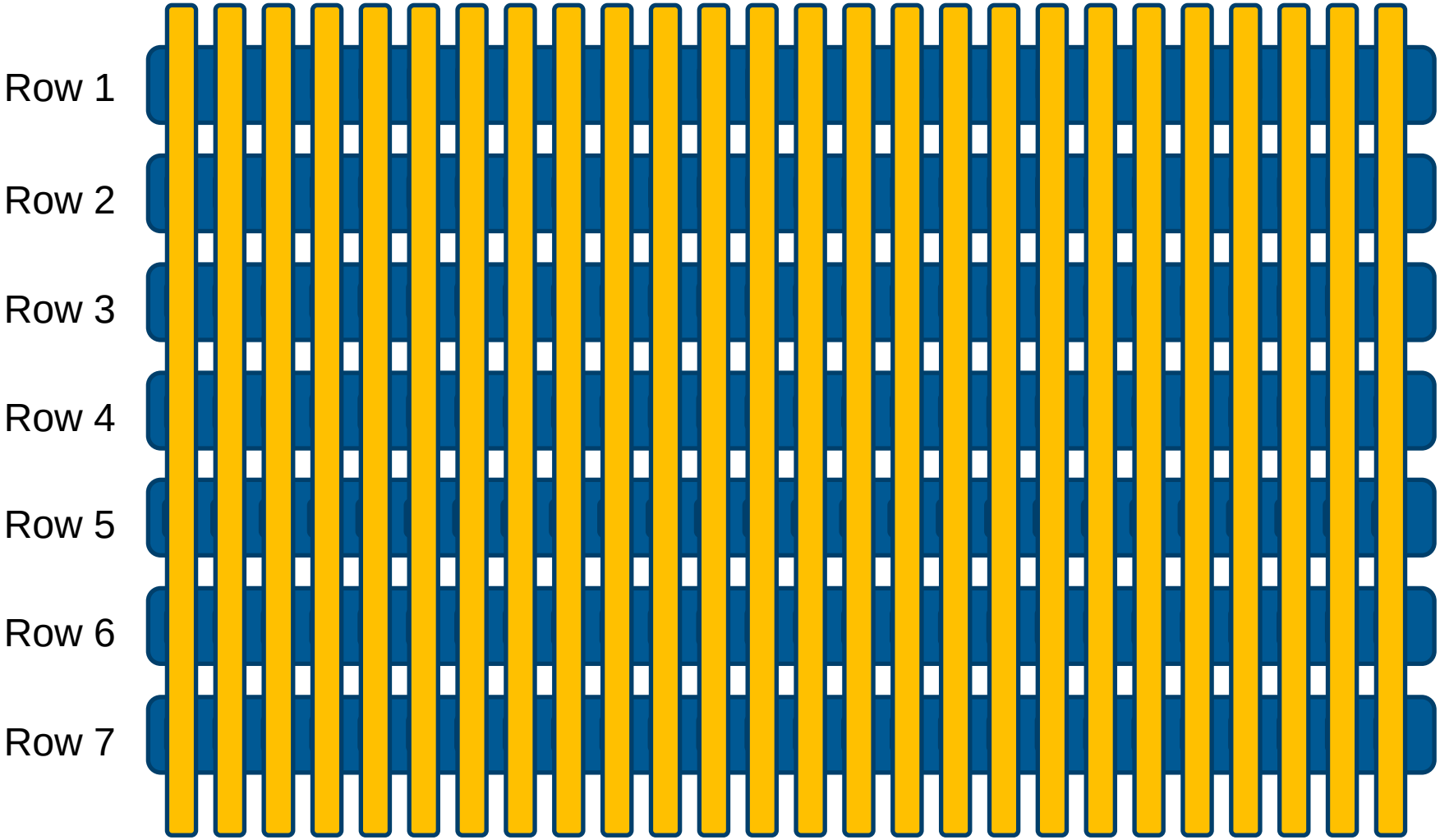
- Data modifications that are done record by record are very expensive in.
- Approach is to gather up the data modifications in the loop and then execute a single OpenSQL statement to perform bulk processing.

Rule #723 OpenSQL modifications inside LOOPS

- Code Comparison

Rule #610 HANA Performance Optimization using code push-down

Column based, parallelized processing in HANA with SQLScript



Rule #610 HANA Performance Optimization using code push-down

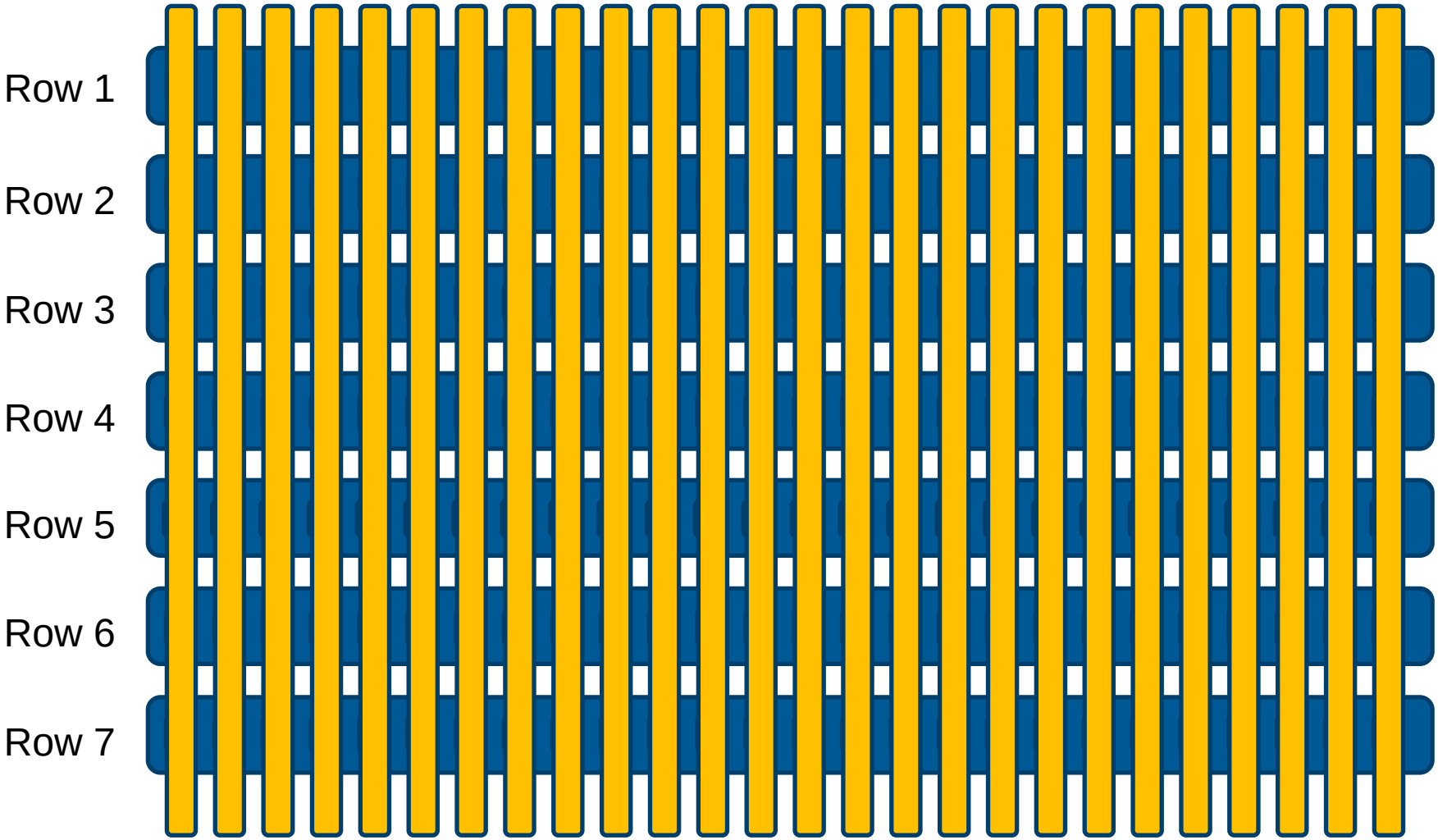
- Large ABAP code segments to be moved to DB
- Funnel use case
  - A lot of data coming in, only small amount of data is the result
- Take advantage of HANA capabilities and strengths
  - Parallization
  - Fast in memory operations
  - Reduce data transfer
- Very resource intensive if attempted manually
- Highest level of difficulty

Rule #610 HANA Performance Optimization using code push-down

- Code Comparison

Rule #610 HANA Performance Optimization using code push-down

Column based, parallelized processing in HANA



smartScale for HANA

Automation is your friend!

Decide your HANA needs, and choose the right tools at the right steps:

- Analyze the scope
- Achieve HANA pre-requisites - Upgrade & Unicode
- Develop new code for HPO
- Manage in the Cloud

Request a Demo

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http://info.smartshifttech.com/demo-automated-abap-code-remediation-tool-by-smartshift