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Agenda

Real-time operational reporting in the context of SAP S/4HANA

Positioning with SAP BW powered by SAP HANA
- Integration-enabling capabilities in SAP BW powered by SAP HANA
- User scenarios
- Possible Architectures

Integration Scenarios

Summary and additional information
Real-time operational reporting in the context of SAP S/4HANA
Combining transactions and analytics on a single in-memory platform

- Decisions and Actions on Old Data
- Multiple Copies of the Data
- ETL and Batch Processing Efforts and Costs

- Instant Insight to Action on Live Data
- One Copy of the Data
- No ETL and Batch Processing
Virtual Data Models

Transactional system, e.g. SAP S/4 HANA

UI's

BI

Application

Virtual Data Model

View

View

View

Database Layer, e.g. SAP HANA

Physical Tables
SAP S/4HANA – designed to reimagine business

**Reimagined business models**
Simplicity to connect to people, devices, and business networks

**SAP S/4HANA**

**Reimagined business processes**
Simplicity to focus on the essential tasks and change business processes

**Reimagined business decisions**
Simplicity to get any insight on any data from anywhere
Today transactions and analytics are handled separately but in reality, business processes are often a sequence of...

- Enter Order
- Check Customer Churn Probability
- Adjust discount percentage
- Analyze yield and scrap of plants
- Send email to all plant managers above/below certain thresholds
- Maintain new employee salary data
- Check updated salary projection for cost centers
The use cases for analytical processes in SAP S/4HANA

Generic SAP BI clients and Analytical Apps
e.g. SAP BusinessObjects Analysis for Office, SAP Lumira/Design Studio, Smart Business cockpits

Built-In Analytics: Hybrid Transactional and Analytical Applications
e.g. SAP Embedded BI or SAP Smart Business cockpits

Extraction to SAP BW*

Read-access for Fact Sheets Search

Virtual Data Model

Specific Analytics Models

Virtual Data Model for Search, operational and analytical processing

Customer Extensions

Application Tables

External Sources / IOT

*This way SAP enables existing BW extractors to also support Simple Finance and other Innovations in SAP S/4HANA
SAP Business Suite real-time analytics architecture (SAP HANA Live)

- No latency
- No data duplication
- Ready-to-use content
- Integration scenarios with SAP BW

HANA Database Layer
Virtual Data Model on Physical Tables

Atomic
Instantaneous
Pre-defined

SAP Business Suite Application

Hybrid Transactional and Analytical Applications
e.g. SAP Smart Business cockpits

Analytical Apps and BI Clients
e.g. SAP BusinessObjects BI
SAP S/4HANA real time analytics architecture

- No latency
- No data duplication
- Ready-to-use content
- Integration scenarios with SAP BW
- Full ABAP Lifecycle Integration
- Supporting ERP authorizations
- Supporting ERP hierarchies
- Part of the general Extensibility concept
- Supporting more business cases (analytics, search, fact sheets, planning, …)

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SAP S/4HANA Analytics + SAP Business Warehouse
Comprehensive operational + historical analytics and planning powered by SAP HANA

All analytics requirements fulfilled with one unified solution
Data Integration Scenarios are possible in multiple hybrid system setups
SAP Business Suite on HANA and SAP S/4HANA – Business Content

Suite on HANA:
- Traditional Business Content can be used (SAP_CONT).
- Traditional Extractors will continue to be used.

S/4HANA
- Short-term, existing extractors will be adapted, covering the scope of S/4HANA.
- Mid-term, the extraction technology will be based on CDS Views.
  -> One technology for EDW and operational reporting.

New HANA-optimized Business Content for BW was and is further planned to be created (using objects like Open ODS, New Composite Provider, …)
Positioning with SAP BW powered by SAP HANA
The Virtual BW – Open ODS Views

Virtual Access

BW Query

SAP BW

Open ODS Layer

Open ODS View

Virtual

Virtual Table

SAP HANA

Smart Data Access

Table/View

Any Source

SAP BW 7.4 SP5
The Virtual BW – Open ODS Views

Virtual Access

BW Query

SAP BW

Open ODS Layer

Open ODS View Virtual

Virtual Table

SAP HANA

Smart Data Access

Any Source

SAP BW 7.4 SP5

Optional switch to persistency

BW-Managed Persistence

BW Query

SAP BW

Open ODS Layer

Open ODS View Virtual

Advanced DSO

Virtual Table

SAP HANA

Table/View

Any Source

SAP BW 7.4 SP8

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The Virtual BW – Open ODS Views and Composite Providers

Virtual Access

- BW Query
  - SAP BW
    - Open ODS Layer
      - Open ODS View Virtual
    - Virtual Table
      - SAP HANA
        - Smart Data Access
          - Any Source
          - Table/View
          - SAP BW 7.4 SP5

Optional switch to persistency

- BW-Managed Persistence
  - BW Query
    - SAP BW
      - Open ODS Layer
        - Open ODS View Virtual
        - Advanced DSO
      - Virtual Table
        - SAP HANA
      - Table/View
        - SAP BW 7.4 SP8

- SAP and non SAP Applications
  - CompositeProvider
    - Combine the data of various applications
      - Model
      - View
      - Table
      - Operational or Real-time Datamart
      - Classical Datawarehouse Schema
      - Prototyping involving Business User

- SAP HANA Schema
  - External Database
  - Hadoop
  - ERP
  - BW

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## Suggested use scenarios for S/4HANA Analytics and SAP BW on HANA (BW)

<table>
<thead>
<tr>
<th>Initial Situation</th>
<th>Suggested Scenarios</th>
</tr>
</thead>
</table>
| **Customer Type 1:** rather simple system landscape: no EDW in place, BW used for operational reporting  
- no data consolidation, no Enterprise Data Warehouse (EDW) in place yet. BW may be used to support operational reporting only  
- And/or: Customer is interested to elaborate new processes possible with S/4HANA Analytics (Built-in BI, cross-system online reports, Smart Business, Analytical Applications etc.) | **S/4HANA Analytics in focus**  
Focus on S/4HANA Analytics for operational reporting  
Suggest to make use of new scenarios, e.g. built-in analytics for hybrid transactional and analytical applications (e.g. SAP Embedded BI or SAP Smart Business Cockpits)  
In case EDW processes are or become valid scenarios, SAP’s strategic solution is SAP BW powered by SAP HANA |
| **Customer Type 2:** more elaborate system landscape including an SAP BW and/or a 3rd party EDW  
- Data consolidation required for analytics  
- Operational reporting currently in BW  
- Customer *not* complaining about performance (data load and query) nor latency issues. | **BW in focus**  
SAP’s strategic solution is SAP BW powered by SAP HANA  
Suggest migration from BW/EDW on AnyDB to BW on HANA for reducing TCO.  
Elaborate S/4HANA Analytics for new scenarios, e.g. built-in analytics for hybrid transactional and analytical applications (e.g. SAP Embedded BI or SAP Smart Business Cockpits) |
How to proceed for customer

EDW-only report/planning scenario

Done w/ BW

Covered by SAP S/4HANA Analytics standard content

Can be covered by Extension of SAP S/4HANA Analytics standard content

New SAP S/4HANA Scenario

New non-SAP Scenario

Existing BW reports (if applicable)

Other reporting requirements

Suitable for real-time operational data?

Feature check

BW  hybrid  S/4HANA Analytics
## Feature/functionality check for mixed cases

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes – 1 point for…</th>
<th>No – 1 point for…</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you have a significant current BW investment?</td>
<td>SAP BW</td>
<td>S/4HANA Analytics</td>
</tr>
<tr>
<td>Do you often consolidate data from multiple sources?</td>
<td>SAP BW</td>
<td>S/4HANA Analytics</td>
</tr>
<tr>
<td>Are you loading data multiple times per day?</td>
<td>S/4HANA Analytics</td>
<td>SAP BW</td>
</tr>
<tr>
<td>Do you load data on document level?</td>
<td>S/4HANA Analytics</td>
<td>SAP BW</td>
</tr>
<tr>
<td>Do you need to cleanse the data before reporting?</td>
<td>SAP BW</td>
<td>S/4HANA Analytics</td>
</tr>
<tr>
<td>Do you need to harmonize and transform the data before reporting?</td>
<td>SAP BW</td>
<td>S/4HANA Analytics</td>
</tr>
<tr>
<td>Do compliance requirements apply?</td>
<td>SAP BW</td>
<td>S/4HANA Analytics</td>
</tr>
<tr>
<td>Do you work with time-dependent master data?</td>
<td>SAP BW</td>
<td>S/4HANA Analytics</td>
</tr>
<tr>
<td>Do you often need to take data “snapshots” to freeze data?</td>
<td>SAP BW</td>
<td>S/4HANA Analytics</td>
</tr>
<tr>
<td>Do you perform long term trend analysis?</td>
<td>SAP BW</td>
<td>S/4HANA Analytics</td>
</tr>
<tr>
<td>Do you need complex calculations beyond + - * /</td>
<td>SAP BW</td>
<td>S/4HANA Analytics</td>
</tr>
<tr>
<td>Do you require planning capabilities</td>
<td>SAP BW</td>
<td>S/4HANA Analytics</td>
</tr>
<tr>
<td>Are you reusing Business Suite authorizations for reporting?</td>
<td>SAP BW</td>
<td>S/4HANA Analytics</td>
</tr>
<tr>
<td>Do you need to integrate data from 3rd party solutions?</td>
<td>SAP BW</td>
<td>S/4HANA Analytics</td>
</tr>
</tbody>
</table>

- **Count the points for SAP BW and S/4HANA Analytics separately**
- **Your preferred option according to your answers is:**

<table>
<thead>
<tr>
<th>Points</th>
<th>SAP BW</th>
<th>S/4HANA Analytics</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-14</td>
<td></td>
<td>Go for S/4HANA Analytics</td>
</tr>
<tr>
<td>0-3</td>
<td></td>
<td>Go for SAP BW</td>
</tr>
<tr>
<td>5-10</td>
<td></td>
<td>Go for the Hybrid Approach</td>
</tr>
</tbody>
</table>

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What are customers doing?

Strategic/analytical reporting  Real-time operational reporting

Customer type 1
Start w/ SAP HANA Data Marts and S/4HANA Analytics

Customer type 2
Keep BW investment and slowly merge to hybrid

SAP solutions
BW  hybrid  SAP S/4HANA Analytics

All of the above SAP solutions are strategic!

Core questions:
Will SAP S/4HANA Analytics support all my reporting requirements?
How can I align this with my EDW strategy and (e.g. non-SAP) data?

SAP’s recommendation: go with S/4HANA Analytics, and use hybrid approach where necessary!
Example 1: SAP BW and S/4HANA side-by-side
Possible Hybrid Scenarios

Example 2: SAP BW and S/4HANA side-by-side

- SAP S/4HANA
- SAP HANA
- SQL-Runtime-Views
- Transact. Tables
- SAP S/4HANA Analytics CDS (VDM)

- BW/OLAP
- HANA optim.
- SAP DWH Data
- Other Datamart
- HANA Tables

- BI Clients and other UI’s
- SAP HANA
- Real-time replication or Data Staging

Data Staging

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Possible Hybrid Scenarios

Example 3: embedded BW*

*limited scope
Possible Hybrid Scenarios

Example 4: S/4HANA and BW with SAP HANA Multitenant Database Containers (MDC)
The 2 Roles of BW – Architecturally

**BW as Data Warehouse**
- Consolidate BW-owned persistence
- Multiple sources (SAP + non-SAP)
- Explicit modeling of semantics, security, storage

⇒ S/4HANA one of many sources

**Embedded BW**
- No BW-owned persistence
- Embedded into single source (like S/4HANA)
- Re-use of application’s semantics, security, storage

⇒ Embedded into S/4HANA
Interoperability between SAP BW Models and SAP HANA Models

**BW Services for HANA Modeler managed schemas & data**

- **HANA models in BW**
  - **Consume HANA models** – treat them as InfoProvider
  - **HANA schema data into BW**
  - **Transfer data into (E)-DW**

- **BW models in HANA Modeler**
  - **Provide InfoProvider views**
  - **BW data in HANA Modeler tables**
  - **Transfer data**
SAP HANA EDW
Integration options

1. Load HANA data to BW models
   - BW DB Connect

2. Read HANA data from BW Models
   - BW CompositeProviders, Open ODS Views

3. Read BW data from HANA Models
   - HANA Model Generation in BW

4. Load BW data to HANA Tables
   - BW Open Hub Service, SAP Data Services

Additionally, HANA Smart Data Access for most options in case of several HANA instances
Integration Scenarios
Scenario A (Modeling via Open ODS):
Transactional and master data via S/4HANA Analytics consumed by BW
(Consumption of SAP S/4HANA Analytics transactional and master data views by Open ODS Views in BW)

Scenario B (Modeling-free only in embedded case):
Transactional data provisioning via S/4HANA Analytics Open CDS View in BEx Query
(Consumption of SAP S/4HANA Analytics Open CDS views in BW via ODP Transient Provider)

Other possible scenario:

• Loading of data into BW using Reuse Layer of S/4HANA Analytics as data source (Extract data from S/4HANA Analytics reuse views into BW)
Consumption of SAP S/4HANA Analytics transactional and master data views by SAP BW

### Integration Scenario A
HANA Smart Data Access & Modeling via Open ODS Views

#### Open Orders

<table>
<thead>
<tr>
<th>Material</th>
<th>Sales Qty last Period</th>
<th>Current Open Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>[-] 200</td>
<td>355 PC</td>
<td>368 PC</td>
</tr>
<tr>
<td>[-] 200/CL_MONITOR_PC</td>
<td>355 PC</td>
<td>368 PC</td>
</tr>
<tr>
<td>GK1</td>
<td>50 PC</td>
<td>100 PC</td>
</tr>
<tr>
<td>Sunny Sunny 01</td>
<td>30 PC</td>
<td>40 PC</td>
</tr>
<tr>
<td>Sunny Xa1</td>
<td>50 PC</td>
<td>46 PC</td>
</tr>
<tr>
<td>Sunny Tetral3</td>
<td>19 PC</td>
<td>26 PC</td>
</tr>
<tr>
<td>Sunny Extreme</td>
<td>31 PC</td>
<td>39 PC</td>
</tr>
<tr>
<td>Flatscreen LE 50 P</td>
<td>1 PC</td>
<td>1 PC</td>
</tr>
<tr>
<td>Flatscreen MS 1460 P</td>
<td>22 PC</td>
<td>26 PC</td>
</tr>
<tr>
<td>Flatscreen LE 64P</td>
<td>9 PC</td>
<td>11 PC</td>
</tr>
<tr>
<td>Flatscreen MS 1575P</td>
<td>7 PC</td>
<td>5 PC</td>
</tr>
<tr>
<td>MAG DX 15F/Fe</td>
<td>3 PC</td>
<td>3 PC</td>
</tr>
<tr>
<td>MAG DX 17F</td>
<td>70 PC</td>
<td>60 PC</td>
</tr>
<tr>
<td>MAG PA/DX 175</td>
<td>9 PC</td>
<td>11 PC</td>
</tr>
<tr>
<td>Test Material</td>
<td>0 PC</td>
<td>0 PC</td>
</tr>
<tr>
<td>[+] Not Assigned Material (s)</td>
<td>99 PC</td>
<td>136 PC</td>
</tr>
</tbody>
</table>
Integration Scenario A
HANA Smart Data Access & Modeling via Open ODS Views

Integrating BW and S/4HANA Analytics across different HANA instances with Open ODS Views and HANA Smart Data Access

Use Cases
- Transactional and master data from S/4HANA Analytics Virtual Data Model consumed by BW Open ODS view
- This scenario is valid for BW and S4/HANA deployed across different HANA instances (prerequisite: HANA SDA configured)

Capabilities
- Real-time (transactional and master) access to S/4HANA OLTP data with the help of Open ODS views consuming S/4HANA Analytics CDS views
- Flexible, agile modeling through Open ODS Views
- Capability to enrich data from S/4HANA Analytics views with BW managed master data (e.g. hierarchies)
- Takes full advantage of BEx reporting capabilities
- Security handled by BW authorization
- Optional: Transactional data from S/4HANA Analytics can be enhanced with data stored in BW DataStore object (e.g. historical data / plan data) by utilizing HANA Composite Provider

Note
- Open ODS Views can be materialized in BW if required, e.g. for snapshot scenarios
Recommendations / Findings for Integration Scenario A: HANA Smart Data Access & Modeling via Open ODS Views

- Prerequisite: HANA Smart Data Access is configured in BW on HANA system and connects to S/4HANA system
- Recommended to implement Open ODS Views based on S/4HANA ABAP CDS interface / reuse views
- Distinguish between transactional and master data (attribute and text) views and create associations accordingly
- Start with the Open ODS Views for master data (attribute and text), then proceed with transactional Open ODS Views
- SAP Client needs to be added to the key of all Open ODS Views and needs to be uniquely filtered
- Use BEx Query on top of Open ODS Views / Composite Provider to take advantage of full set of reporting features:
  - Restricted & calculated key figures
  - BEx variables e.g. hierarchy node variables
  - Exceptions and conditions
  - Currency conversion during report execution
  - Report-to-Report Interface, …
- Open ODS View provides functionality to switch from virtual access to persistence. Generation of data flow with DataSource, DataStore object (Advanced) and BW Transformation (requires SAP BW 7.40 SP 8 or higher)
Integration Scenario A
HANA Smart Data Access & Modeling via Open ODS Views
Step 1 – Create Open ODS View for Master Data

a) In HANA Studio in the BW Modeling perspective select from within your BW Project the InfoArea of interest. Right click on it and select from the context menu “New Open ODS View”.

b) Specify an appropriate technical name & description, define Semantics as “Master Data” and choose Source Type “Virtual table using SAP HANA SDA”.

c) Define Remote Source (S/4HANA system), DB Object Schema and Source System. And select the S/4HANA Open CDS View representing the master data (example: I_CUSTOMER_CDS) as DB Object Name.
As default all output fields of the S/4HANA Open CDS View are assigned as Characteristics for the Open ODS View.

It is mandatory to define the key fields:

- Representative Key Field
- Characteristics (Key): Additional compounded keys, like MANDT
Integration Scenario A
HANA Smart Data Access & Modeling via Open ODS Views
Step 3 – Refine and activate Open ODS View for Master Data

a) You can now further refine your Open ODS View e.g. by:
   - Defining Text Fields as part of the view fields
   - Changing the technical names for the view fields
   - Adding field associations for view fields if applicable, e.g. with other Open ODS Views or BW InfoObjects
   - Setting the view field as authorization relevant
   - Changing the reporting properties such as key / text display

b) When complete, you can activate the Open ODS View.

c) Define Open ODS Views for all Master Data views that you want to associate to your transactional Open ODS View.
Integration Scenario A
HANA Smart Data Access & Modeling via Open ODS Views
Step 4 – Create Open ODS View for Transactional Data

a) Now create an Open ODS View of type “Facts” for the transactional S/4HANA Open CDS View similar like in the previous steps.

b) Characteristics and Key Figures will be automatically assigned to the appropriate structure folders based on the output field definition of the S/4HANA Open CDS View.
Integration Scenario A
HANA Smart Data Access & Modeling via Open ODS Views
Step 5 – Maintain view fields and field associations for Open ODS View

- a) Define the key fields
- b) Define the currency and unit fields
- c) Maintain field associations
e.g. to the previous created master data Open ODS Views
Now you can activate the Open ODS View and you can either reuse it in a CompositeProvider (e.g. combining the information with BW InfoProvider) or implement BEx Queries directly and consume them e.g. in SAP BusinessObjects Analysis, edition for Microsoft Office.

**Note:** Remember to restrict your data by MANDT in all BEx Queries.
## Integration Scenario B
Modeling-free via ODP transient provider (only in embedded case)

Consumption of SAP S/4HANA Analytics CDS views in SAP BW via ODP transient provider

### Sales Order Quantities by Material

<table>
<thead>
<tr>
<th>Material</th>
<th>Sales Order Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>GK1</td>
<td>100 PC</td>
</tr>
<tr>
<td>M-01</td>
<td>40 PC</td>
</tr>
<tr>
<td>M-02</td>
<td>46 PC</td>
</tr>
<tr>
<td>M-03</td>
<td>26 PC</td>
</tr>
<tr>
<td>M-04</td>
<td>39 PC</td>
</tr>
<tr>
<td>M-05</td>
<td>1 PC</td>
</tr>
<tr>
<td>M-06</td>
<td>26 PC</td>
</tr>
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<td>M-07</td>
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<td>M-13</td>
<td>60 PC</td>
</tr>
<tr>
<td>M-14</td>
<td>11 PC</td>
</tr>
<tr>
<td>T-01</td>
<td>0 PC</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>368 PC</strong></td>
</tr>
</tbody>
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From S/4HANA Analytics

From S/4HANA Analytics
Integration Scenario B
Modeling-free via ODP transient provider (only in embedded case)

Consumption of SAP S/4HANA Analytics Open CDS views in BW via ODP transient provider

Use Cases
• To simply display and use S/4HANA Analytics consumption / query views without any further investments
• Mainly to leverage BEx capabilities and valid for embedded BW setup

Capabilities
• All S/4HANA Analytics Open CDS views are automatically exposed as InfoProvider in BEx Query Designer
• Supports BEx variables
• Supports restricted key figures
• Supports exceptions and conditions
• Supports currency conversion
• Supports BW Report-to-Report interface
• Supports S/4HANA Analytics privileges

Not supported (Query not based on BW InfoObjects):
• BW Hierarchies, node variables
• BW analysis authorizations
Recommendations / Findings for Integration Scenario B: Modeling-free via ODP transient provider (only in embedded case)

- All S/4HANA CDS views are automatically exposed as a ODP transient InfoProvider and can be used in the BEx Query Designer to define custom queries
- Quick way to add BW functionality without using BW modeling objects
- It is recommended to implement BEx queries based on S4/HANA Analytics CDS consumption / query views
- Input parameters / variables defined in S/4HANA Analytics CDS view must be defined in the Bex Query as static filter e.g. by a fix value or mandatory variable
- BW analysis authorizations & BW hierarchies are not supported
- BEx Queries created on ODP Transient Provider can be transported through the S/4HANA landscape, as the transient provider is generated with same technical name in all systems
Summary and additional information
Overview: SAP S/4HANA Analytics virtual data models and SAP BW powered by SAP HANA...

- ...complement each other
- ...can cover all analytic use cases on one data source
- ...together provide a comprehensive reporting platform

All described Integration scenarios will be further elaborated in a how-to-guide (publication planned)
Thank you
SAP HANA-optimized Business Content

- New analytics combining capabilities of SAP HANA and SAP NetWeaver BW
- Provides additional analytic solutions for existing BW on HANA customers
- Follows the LSA++ architecture
- Implements mixed scenarios HANA Content + BW Content
- Offers more flexibility in data acquisition and reporting
- Makes use of the consolidated InfoObjects
- Provides higher level of details (line items, …)
- Modeled with classic DataStore Object and MultiProvider