SAP User Groups Knowledge Transfer Webinar

How Big Data and Agility Affect SAP BW4/HANA Architectures

Juergen Haupt, SAP
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SAP BW/4HANA Simplicity and Openness
Modeling features and patterns supporting flexibility and agility

- Logical Data Warehouse
- CDS-based Provisioning
- Real-time Provisioning
- Corporate Memory 2.0 relational Data Lake
- Simple data integration

- Mixed architecture
- Mixed solutions
- Openness BW/4 & SQL

- Virtual solutions
- Dynamic Star Schema
- Snow-flaked Dimensions
- Dimension Satellites
- Outrigger Dimensions
- Reusable Time Dimension

- Incremental solutions
- InfoObjects and top-down modeling
- Fields and bottom-up modeling
- DTO - automated data life-cycle management

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SAP BW/4HANA architecture
Enterprise analytics and the triad of Technology, Architecture and Process

SAP BW/4HANA with SAP HANA enables different valid architectures

- **Vision and Industry**
  - **Process**
  - **Technology**
  - **Architecture**

SAP BW/4HANA with SAP HANA:
- **EDW - simplified/flexible**
- **Agile - DWH/Data Lake**

Innovative technology, adaptive architecture, preserve processes
Innovative technology, disruptive architecture, new processes
SAP BW/4HANA architectures
Overview

<table>
<thead>
<tr>
<th>IT</th>
<th>Business</th>
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<tbody>
<tr>
<td>Big Design Upfront</td>
<td>Sufficient Design Upfront</td>
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<tr>
<td>Top Down</td>
<td>Scrum/ incremental/ evolutionary/ fail early</td>
</tr>
<tr>
<td>Bottom Up/ Top Down</td>
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EDW – Simplified ↔ EDW – Flexible ↔ DWH – Agile ↔ Relational Data Lake / evolutionary DWH

SAP BW/4HANA ↔ SAP HANA
SAP BW/4HANA architectures
Simplified EDW with LSA++
SAP BW/4HANA architectures
EDW – simplified architecture with LSA++

Virtualization/ Virtual Data Marts

Architected Data Mart

Propagation Layer/ Integrated DWH

Open ODS Layer/ Raw DWH

Staging Layer/ Corporate Memory

Source

Service Level

Big Design Upfront
Waterfall
Top-Down
Process
IT driven governance

SAP HANA
SAP BW/4HANA
DTO
ODP
InfoObjects
Data Store Object

Virtual Data Marts

Architecture

EDW
LSA++
Key idea: Consistent, integrated data across the Enterprise designed using SAP BW/4HANA simplification reducing development efforts

- High performance staging and querying
- Virtualization – Less persisted layers
- Powerful semantics modeling
  - Queries / CompositeProviders / Open ODS Views / InfoObjects
  - Simplified models, new degree of flexibility:
    - Dynamic Star Schema, Advanced DSO, unified Time dimension
- IT driven, central governance
  - Waterfall, Top-Down modeling, Big Design Upfront
SAP BW/4HANA Simplicity and Openness
SAP BW/4HANA modeling patterns for agile data warehousing
Persisted InfoProviders define no longer a star schema in BW/4.
A (dynamic) star schema is only defined by a CompositeProvider or an Open ODS View (type fact)
Dimensions are defined via associating master data (InfoObjects or Open ODS Views (type master) with the navigational attributes
CompositeProvider defining a dynamic star schema – associations and navigational attributes

Associate master data (dimensions)
SAP BW/4HANA architectures

Flexible EDW with LSA++
SAP BW/4HANA architectures
EDW – flexible architecture with LSA++

**LSA++**

- Virtualization/ Virtual Data Marts
- Open ODS Layer/ Raw DWH
- Propagation Layer/ Integrated DWH
- Staging Layer/ Corporate Memory
- Source

**Technology**

- Open ODS views
  - SAP HANA
  - SAP BW/4HANA
  - ODP
  - InfoObjects
  - Data Store Object

- Field-modeling

- Service Level

**Process**

- Big Design Upfront
- Waterfall
- Top-Down
- Incremental
- Bottom-up

- IT driven governance

**Mixed Scenarios Architecture**

- EDW
- LDW
- Virtual Data Marts
- LSA++
Key idea: make the EDW more responsive – introduce bottom up modeling while having a consistent, integrated data across the Enterprise as target – designed using SAP BW/4HANA simplification further reducing development efforts

- Bottom up modeling using Open ODS Layer field modeling for fast, low cost solution increments
- Propagation Layer as optional target
- Additional persisted layer only if services are necessary for a solution
- Virtual transformations with mixed scenarios

The stairs of the LSA++ persisted data layer outline the incremental approach supporting a responsive development
SAP BW/4HANA Simplicity and Openness
SAP BW/4HANA modeling patterns for flexible EDW and agile data warehousing
SAP BW/4HANA - InfoObject and field-based modeling
Cross layer modeling - integrating top-down and bottom-up modeling

Scalable modeling with InfoObjects and fields or a mixture of both

BW/4HANA Modeling Options

Top Down modeling
Integration before Function

Bottom-up modeling
Function before Integration

Function modeling
- Queries
- Schemas
- Persisted data, staging

Integration modeling
- Map fields to InfoObjects

InfoObjects

Fields

Persisted data, staging
SAP BW/4HANA - modeling the Open ODS Layer (RAW DWH)
Bottom-up – low-cost

The simple & low cost DWH
- Source driven entities & values
- Bottom-up modeling
- Basic DWH services

Raw DWH Modeling with BW/4HANA
- Persistency modeling with aDSOs
  - transaction, master, text data
  - Fields (InfoObjects possible)
  - DataSource as template

- Dynamic Dimensional modeling with Open ODS Views
  - Assign semantics to aDSOs and fields
  - ODS View type fact (virtual data mart)
  - ODS View type master
  - ODS View type text

- SQL-Modeling with HANA Views on aDSOs possible (Mixed Scenario)

- Virtual Data Marts
  - ODS View type fact
  - CompositeProvider
Recap - Open ODS Views
Modeling raw/ field data with Open ODS Views

- The BW metadata model for field data consists of entities – the Open ODS Views – defining
  - Semantics of sources (fact, master.. data)
  - Semantics of source-fields (characteristic, key figure, …)
  - Associations to other Open ODS Views
  - Associations to InfoObjects

- ODS Views are view constructs on various types of source objects
  - BW aDSOs/ InfoSource/ DataSources
  - DB tables & SQL/ HANA views
  - Virtual tables - HANA Smart Data Access

- The source object of an ODS view can be exchanged
- From a BW-OLAP perspective, ODS Views can be consumed like InfoProviders (facts) or InfoObjects (master data, text)
Example: SAP BW/4HANA PoC – Insurance Industry

Too often, this is seen as the starting point

- Tables with 100's millions rows from legacy system uploaded to SAP BW/4HANA: < week
- Meaningful reporting on raw data (field based models): Couple of days
- Business-standard reporting on raw data with enriched virtual models (associated IOBJ’s): Few days
- Formalized data models (IOBJ based ADSO’s): Several weeks

Real World
Benefits for Business Users

Better BI applications

- Well equipped to support an agile approach to BI
- Shorter time-to-market for new development and fixes
- Openness, or ease of integration, for sources and for consuming applications

The main **contributors** to these benefits in SAP BW/4HANA are the ability to use **Virtual- and Field-based models**, and the ability to use **virtual integration** for a wide variety of sources.
SAP BW/4HANA architectures
Agility and BW/4HANA architecture
Continuous disruptive innovations in analytics area challenge proven best practice like EDW and LSA++:

- **Agile, self-service analytics**
- **Data lake** ideas and vision

Be faster, cheaper, closer to business and customers
Agility derives from the right combination of business practices and technical capability

- **Move to real-time solutions – the death of waiting**
- **Build incrementally**
  - agile data marts underpin agile businesses, resulting in the ability of a business to change faster and more profitably
- **Ensure business ownership – the business must take the lead**
- **Realign IT priorities**
  - IT empowers business peers with self-service tools, platforms and applications
  - reducing and ultimately eliminating the pipeline of data query requests that swamp IT
  - without losing the key values that IT delivers, such as data consistency, security, etc.
Data Lake Concept influencing SAP BW/4HANA architecture
The Data Lake – single store of all enterprise data

Data Lake Concept

A data lake is usually a single store of all enterprise data including raw copies of source system data and transformed data used for tasks such as reporting, visualization, analytics and machine learning.

Idea: load first, understand later
All kind of data
Perceived to be cheap and agile
Hadoop / Relational
In vogue
SAP BW/4HANA architecture
Enterprise analytics and the triad of Technology, Architecture and Process

Increasingly sophisticated and demanding customers are driving businesses to evolve agile, big-data-friendly data warehousing and analytics environments.
SAP BW/4HANA architectures
Agile DWH architecture with LSA++
SAP BW/4HANA architectures
Agile DWH architecture with LSA++

Corporate Memory 2.0 and Open ODS Layer are low cost layers supporting agile development processes on department/project level.

Corporate Memory 2.0

Open ODS Layer

Raw DWH

Virtualization/ Virtual Data Marts

Staging Layer/ Corporate Memory 2.0

Architected Data Mart

Propagation Layer/ Integrated DWH

Source

Service Level

Strong governance

Light governance

Bottom-up incremental

Process Incremental governance

Mixed Scenarios Architecture

Virtual Data Marts

LDW LSA++

Open ODS views

SAP HANA

SAP BW/4HANA

DTO ODP

InfoObjects Data Store Object

Field-modeling

Corporate Memory 2.0
**Key idea:** empower business more and more creating solutions – change processes to an iterative and incremental proceeding saying good-bye to monolithic IT governance – incremental solutions & governance

- Agile SAP BW/4HANA as cheap, reliable platform for integrating field-level data in a single location either
  - 1:1 in the Corporate Memory 2.0 and/ or
  - Transformed in the Open ODS Layer (RAW DWH Layer)

- Mixed scenarios (SAP HANA Calculation Views) on advanced DSOs of the Corporate Memory 2.0 or the Open ODS Layer play an important role

- Capitalize on SAP BW/4HANA authorization-, query-, OLAP-, lifecycle (DTO-), transport-, … - services
SAP BW/4HANA Simplicity and Openness
SAP BW/4HANA modeling patterns for agile data warehousing
SAP BW/4HANA – low cost, fast data provisioning
Corporate Memory 2.0 as part of a Relational Data Lake

**Observations**
- Cover agile/sql analytics requirements
- Reconcile agile and real-time analytics with DWHing
- Different emphasis of low-cost table-level provisioning
  - HANA (real time) data marts
  - DWH-persisted Layers
- Overcome organization/authorization impact with analytics on source systems
- New type of mix scenarios
  - BW/4 as service provider for HANA real-time data marts
    - History services
    - NLS service
- New challenges e.g. delta, Business Content
- Table-level ‘replication’ and view-level extraction – no neither nor
Customer example

Scenario 1: Reporting Virtual

Scenario 2: Staging / Snapshot

Reporting

SAP BW

Business rules

Native Hana

Tech. integration

Cleansing layer (optional)

Acquisition layer

SAP BW

Source

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Legend

- DataSource
- Transformatie
- Advanced DSO
- Graphical Calculation View
- Scripted Calculation View
- Composite Provider
- Query
SAP BW/4HANA architectures
Relational Data Lake architecture capitalizing on SAP BW/4HANA DWH-services
SAP BW/4HANA architectures Integrating Data Lake concepts
Relational Data Lake architecture with SAP BW/4HANA DWH-services

Key ideas

- A relational data lake or a Corporate Memory 2.0 is a single place for structured and semi-structured data of the entire enterprise on SAP HANA (SAP BW/4HANA) with cheap, fast data provisioning
- Minimize DWH/ governance overhead & capitalize on SAP BW/4HANA services
- Teams from departments and IT build incrementally virtual solutions on the relational data lake/ Corporate Memory 2.0 using SAP HANA calculation views, SAP BW/4HANA Open ODS Views, SAP BW/4HANA CompositeProvider, SAP BW/4HANA Queries
- Semi-structured data (JSON) are stored in the SAP Docstore and immediately integrated with structured data e.g. via Open ODS Views
- SAP BW/4HANA offers solution independent services like authorization-, transport-, DTO-, Olap-, query-services
- SAP BW/4HANA offers modeling services like currency conversion, time-handling, value and semantical integration,…
- Additional SAP BW/4HANA DWH persisted data are driven by solution requirements (snapshots, history, stability,..)
Customer case – a Relational Data Lake architecture capitalizing on SAP BW/4HANA
Sources – Provisioning – Relational Data Lake

Initial Sources & provisioning

Business Processes
- HSC: Hydrocarbon Supply Chain
- HTR: Hire to Retire
- OTC: Order to Cash
- PFR: Plan for Reliability
- PTP: Procurement to Pay
- RTR: Record to Report

Database Tables / Advanced DSOs
- Ariba
- CUSTOMTABLES
- ECP
- HCM
- IMOS
- KENEXA
- S4_SLT
- SALESFORCE
- STOP_HISTORY
- SUCCESSFACTORS
- TRACK
- VOYAGER

Initial Content
Customer case – a Relational Data Lake architecture capitalizing on SAP BW/4HANA

Relational Data Lake and Virtual Solutions

Database Tables / Advanced DSOs

- Ariba: 4
- Customtables: 1
- Ecp: 9
- Hcm: 78
- Imos: 21
- Kenexa: 2
- S4_Slt: 868
- Salesforce: 3
- Stop_History: 17
- Successfactors: 135
- Track: 38
- Voyager: 6

Relational Data Lake: Ingestion Layer

Calculation Views

- BW Object: Count
  - Open ODS Views: 793
  - InfoObjects: ~50
  - Advanced DSO: 9
  - Composite Providers: 99
  - Bw queries: 253

Capitalizing on SAP BW/4HANA – examples

- Semantic model richness: master data, key figures/KPIs, query definition,
- OLAP features (e.g. exception aggregation)
- Prepared to easily scale into DW scenarios
- ‘We learned to appreciate InfoObjects’ (stable fundament)
- Common authorization, transports, business model patterns
SAP BW/4HANA integrating native Relational Data Lake on HANA

By 2020, 30% of data lakes will be built on standard relational technology at equal or lower cost than Hadoop.

Rick Greenwald, Research Director

Beyond the Data Warehouse: 
New Data Management for Analytics
SAP BW/4HANA architectures in times of digital transformation
You Can Start "Light" From Either Direction — Lake or Warehouse, Simple Tools or Platform!

Semantic Integration

Accessing the Data Faster/Sooner

Distributed Process

Physical Integration

Bridging Information Silos

Enterprise Data Warehouse

Data Sources

RDBMS

NoSQL

If you already have an enterprise data warehouse, you can extend it.

If you already have a data lake or Hadoop cluster that needs reuse optimization, you can extend it.

Rick Greenwald, Research Director
DECISIONS WITHOUT DOUBT

Confident and superior business decisions are based on fast and easy access to trusted data. SAP Data Warehouse Cloud brings people and information together with revolutionary data management technology.

https://saphanacloudservices.com/data-warehouse-cloud/
Thank you.

Contact information:

juergen.haupt@sap.com