S01 - Getting Started

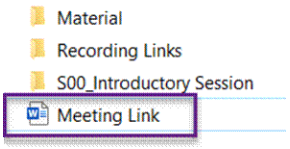
Welcome to BW4HANA Training	
Trainer Bio	
Getting Started	1. OneDrive - Sharing 2. Course Structure 3. Definition of SAP BW and Evolution of SAP BW to BW4HANA 2.0 4. Architecture of SAP BW4H 2.0 5. Difference between HANA & BW4HANA modeling. 6. BW4HANA Licensing 7. The new Eclipse feature and tools to work with BW4H 8. Salient features of SAP HANA as a DB 9. Setting up Eclipse Project. 10. Setting up BW4H Modeling Tools 11. BW4 Cockpit 12. Q & A

OneDrive Sharing

Important Links

The material OneDrive folder has been shared with all of you via a separate email. Please access the folder via that link and bookmark that link.
This folder is your one-stop-shop for accessing the following:

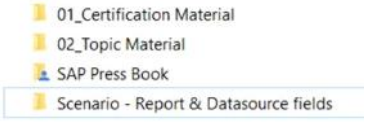
1. Link to join the weekend classes:



This meeting link will remain the same for all the classes. If, due to any reason, the meeting link changed, then it'll be updated in this word document so this will be your reference to get the meeting link for the class.

2. Session-specific material which we'll go through during each class.
These folders will have naming convention as 'S**_<Topic_Covered>' and this will have the class notes both in OneNote and PDF format:

3. Material Folder which contains:
   a. Certification material – this contains material for both full and delta certification
   b. Business Scenario – which will be used as the basis for our exercises.
   c. SAP Press Book on BW4HANA.
   d. Topic specific material such as on ADSOs, CDS Views, Simplification List etc.



4. Recording Links
All the recording links will be updated in a word document in the below folder:

Session #	Description	Date	Link
S00	Introductory Session	23-July-2020	https://youtu.be/7s3EctheNq4
S01	Getting Started	1-Aug-2020	

you can access all the recordings either on the YouTube channel, mentioned in the next point below, or from the individual links in this word document.

5. Certification Practice questionnaire

This contains list of 80 practice questions which'll give you an idea on what type of questions you can expect in the certification.

YouTube Playlist for all the recordings

All recordings will be uploaded on YouTube and access will be granted to you all.
You can access the recording after 1 day. E.g. for class on 1st August' 2020, recording will be available on 2nd August' 2020

YouTube Playlist where all the videos will be uploaded (plz bookmark this link):
https://www.youtube.com/playlist?list=PL55XwhlunOKbbQ0iyqBd5hNFnhwukFgFq

BW4HANA - Training (Batch 2)

Course Structure & Details

Who is this course for?	1. BW consultants with basic knowledge. 2. Seasoned BW consultants looking for upskilling in BW4HANA. 3. Frontend consultants (Functional/Reporting users/BPC/SAC) interested to know the backend infrastructure. 4. Anyone who's interested to know about or start a career in BW (will require additional efforts)
Certifications	

E_BW4HANA200	This is specialist/delta certification which I did. This you can only do if you have BW on HANA certification. BW On HANA (7.3, 7.4, 7.5) https://training.sap.com/certification/e_bw4hana200-sap-certified-application-specialist--sap-bw4hana-20-delta-g/
C_BW4HANA_20 -	This is full certification meaning if you don't have BW on HANA certification then you can take this. This has no pre-requisite. https://training.sap.com/certification/c_bw4hana_20-sap-certified-application-associate---reporting-modeling-and-data-acquisition-with-sap-bw4hana-2x-g/

Server Vendors

Get Trained GT	sruthi.getraind@gmail.com	Best server and Support. SAC Integration.

B4H 2.0 SP4
S4H 1909
ODP
SDA
SAC integrated

Course Modus Operandi

Business Scenario based	▪ Requirement for a custom story from business in SAC. ▪ We'll start with business blueprint of reports and story. ▪ Create Native HANA models using the HANA CVs, Table function and DB Procedures based on SDA virtual tables. ▪ Then create and enhance BW Stnd Datasources. (LO Cockpit) ▪ Create and enhance CDS Views and extractors based on CDS Views. ▪ Creation of custom CDS Views in S4. • Introduction to CDS Views and types of CDS Views. • Main CDS View + Extension CDS View ▪ Activate delta from CDS view based extractors - generic and ODQ-based. ▪ Using ODQ and understand the new subscription based model. ▪ Custom ADSOs, DTPs and Transformations creation in BW. ▪ Staging ADSO based on fields as Corporate memory layer. ▪ Standard ADSO based on InfoObjects in DWH layer. ▪ Custom routines in transformations using AMDP Class and Methods. ▪ Creating OpenODS views for virtual access using SDA. ▪ Creating Composite Provider based on the ADSOs, OpenODS Views and HANA CV using UNION/JOIN. ▪ Using new Composite Provider features such as Aggregation, Projection, SQL filter and Calculated column. ▪ Create Custom BW Query in Eclipse for Sales Hdr and Sales Item. ▪ Creating customer exit variables using Enhancement Spot RSROA_VARIABLES_EXIT_BADI. ▪ Creating HANA Exit variables using RSROA_VARIABLES_HANA_EXIT and AMDP Class and method. ▪ Custom BW process chain creation and monitoring in BW4 Cockpit. Activating streaming process chain feature for near-real time extraction. ▪ Data manipulation using Inbound table - replacement of PSA-based data modifications. ▪ Configuring SAC to BW connectivity using CORS. ▪ Consuming BW Query in SAC and creating SAC Model and Story.
Optional (Based on time availability)	FI new datasource and extraction. Setting up analysis authorizations on ADSOs. Generation of CVs from ADSOs, CompProvs and BW Queries. Inventory Data Flow Streaming process chain OpenHub Migration scenarios

Duration and Timing

1. Course Duration :
   7 weeks (Weekends-only : Saturday | Sunday).
   1st Aug to 13th Sept

2. Course timing

Weekends	Time (EST - Canada)	Time (IST - India)	Time (UTC - UK)	Time (AEDT - Australia)**
Saturday	8:30 AM - 10:30 AM	6:00 PM - 8:00 PM	1:30 PM - 3:30 PM	Saturday (10:30 PM - 12:30 AM)
Sunday	8:30 AM - 10:30 AM	6:00 PM - 8:00 PM	1:30 PM - 3:30 PM	Sunday (10:30 PM - 12:30 AM)

**For Australian timezone, this might be nonviable.

3. Course Duration :
   7 weeks (Weekends-only : Saturday | Sunday).
   Batch starting: 1st August

Software Used	Zoom Meeting. Link will be in the 'Meeting Link' word document.
Recordings	Available to view-only on YouTube Channel (Lifetime Access) BW4HANA - Training - Batch 2

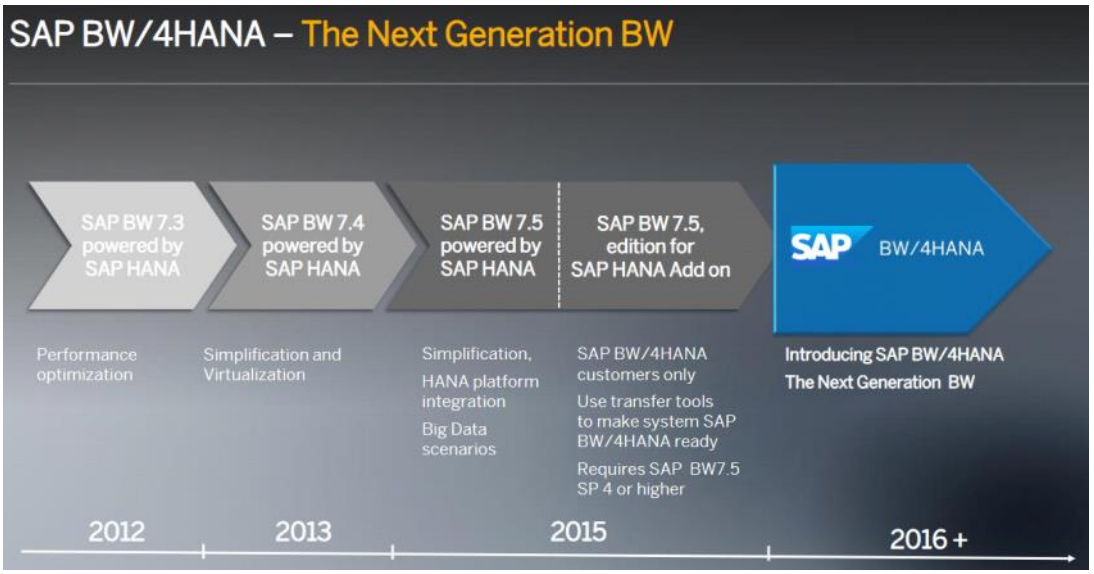
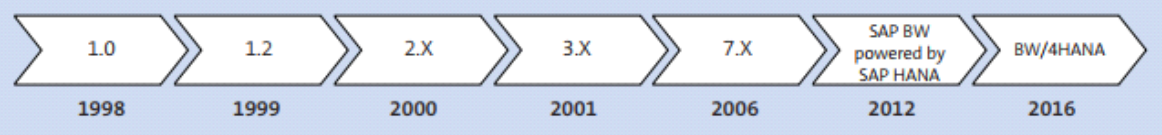
	 Downloadable: No Recording Availability: Next Day
Q & A	30 min before the main session 30 min after the main session.

Topics and Timing

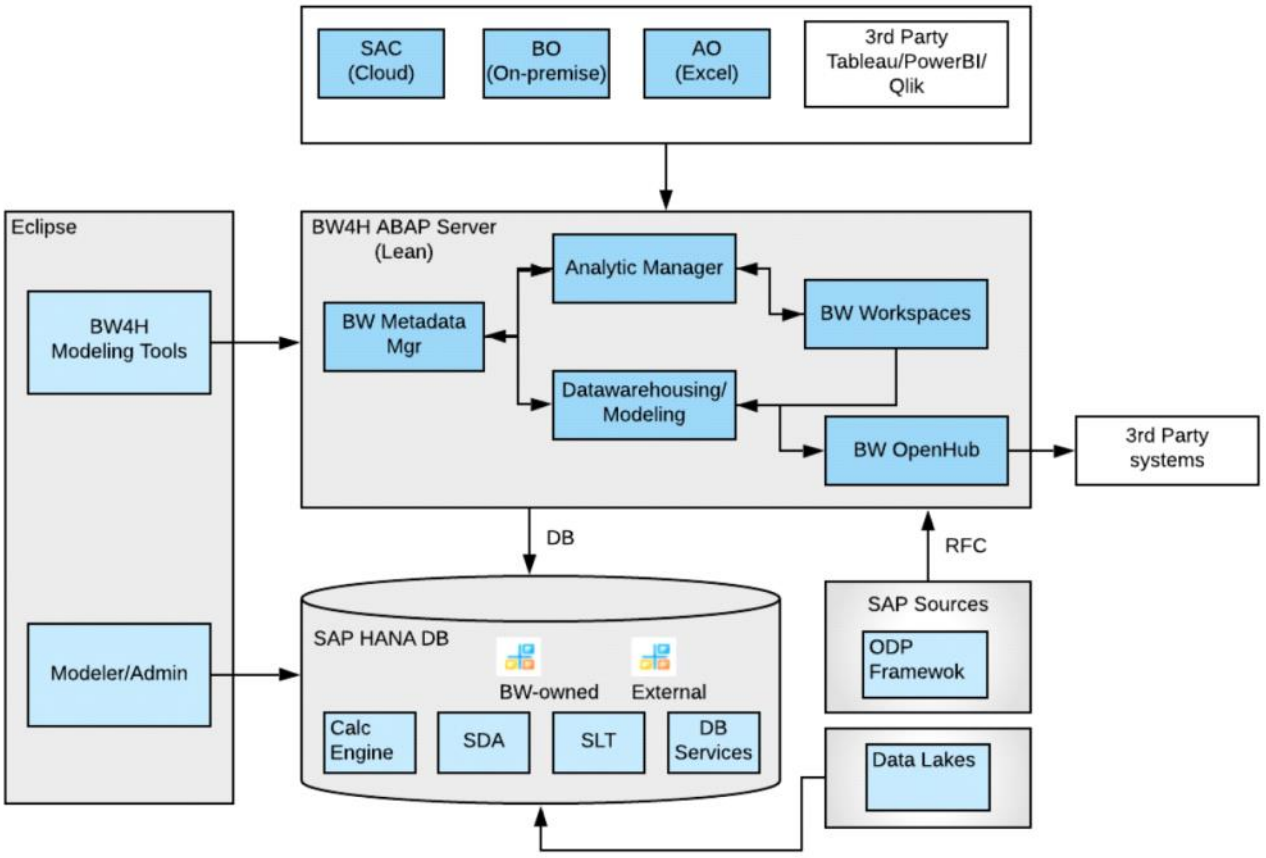
Topic	Description	Date | Time
Getting Started	1. Definition of SAP BW and Evolution of SAP BW to BW4HANA 2.0 2. Architecture of SAP BW4 2.0 3. Difference between HANA & BW4HANA modeling. 4. The new Eclipse feature and tools to work with BW4 5. Salient features of SAP HANA as a DB 6. BW4 Cockpit	1st Aug: 8:30 AM - 10:30 AM
SAP Native HANA Modeling Fundamentals - Part 1	1. HANA Calculation Views 2. HANA Virtual Tables 3. HANA Analytic Privileges 4. HANA DB Procedure 5. HANA XS Jobs - scheduling DB Procedures	2nd Aug: 8:30 AM - 10:30 AM
SAP Native HANA Modeling Fundamentals - Part 2	1. HANA Calculation Views 2. HANA Virtual Tables 3. HANA Analytic Privileges 4. HANA DB Procedure 5. HANA XS Jobs - scheduling DB Procedures	8th Aug: 8:30 AM - 10:30 AM
B4H - Intro, Architecture & LSA++	1. B4H Introduction 2. Old vs New modeling Objects 3. B4H Architecture 4. LSA++ flow 5. New CDS View based Datasources	9th Aug: 8:30 AM - 10:30 AM
Datasources, Enhancements & ODQ - Part 1	1. Scenario Introduction - Report from User 2. LO Cockpit Datasource activation process 3. 2LIS_11_VAHDR Activation 4. 2LIS_11_VAHDR Enhancement 1. Old way 2. New way - RSU5_SAPI_BADI 3. Method 1 - New BADI Implementation for every DS. Method 2 - New method for every DS 5. 2LIS_11_VAITM Activation 6. 2LIS_11_VAITM Enhancement using Method 2	15th Aug: 8:30 AM - 10:30 AM
Datasources, Enhancements & ODQ - Part 2	1. ODP concept 2. ODQs and Delta 3. Delta from stnd datasources - 2LIS_11_VAHDR/ITM 4. CDS View Intro 5. Datasource based on CDS View - Full. 6. Datasource based on CDS View - Delta (Generic w/o ODQs) 7. Datasource based on CDS View - Delta (Generic with ODQs) 8. Enhancing datasource based on CDS views using extension CDS Views.	16th Aug: 8:30 AM - 10:30 AM
Datasources, Enhancements & ODQ - Part 3	1. ODP concept 2. ODQs and Delta 3. Delta from stnd datasources - 2LIS_11_VAHDR/ITM 4. CDS View Intro 5. Datasource based on CDS View - Full. 6. Datasource based on CDS View - Delta (Generic w/o ODQs) 7. Datasource based on CDS View - Delta (Generic with ODQs) 8. Enhancing datasource based on CDS views using extension CDS Views. 9. More on CDS Views	22nd Aug: 8:30 AM - 10:30 AM
B4H - Modeling - Part 1 ADSOs	1. Definition and Positioning 2. Types of ADSOs 3. Mapping to previous versions 4. Details on each type of ADSO 5. Active/Nonactive concept 6. Partitioning and Indexing	23rd Aug: 8:30 AM - 10:30 AM
B4H - Modeling - Part 2 ADSOs & Transformations	1. Transformations in BW4HANA. 2. DTP in BW4HANA 3. Creating LSA++ flow for Header and Item. Header from stnd DS and Item from CDS View DS. 4. Enhance CDS view for item for material type.	29th Aug: 8:30 AM - 10:30 AM

	5. Crate Infosource for Header and Item 6. Create transformation (1st level) 7. Create transformation (2nd level) 8. Create lookups 9. Create formulae 10. Create AMDP based Start routine for removing special characters. 11. Create AMDP based field routine for quantity conversion from sales unit to base unit (0QUANT_B) 12. Create ABAP based end routine to populate update date.(0UPD_DATE) 13. Debug AMDP transformation. 14. Test the overall flow.	
B4H - Modeling - Part 3 OpenODS Views	1. Purpose 2. Usage 3. Types 4. OpenODS view - virtual model using SDA 5. OpenODS view - Generate Data Flow	30th Aug: 8:30 AM - 10:30 AM
B4H - Modeling - Part 4 Composite Providers	1. Purpose 2. Usage 3. UNION & JOIN 4. 2.0 Enhancements 5. Navigation Attribute	5th Sep: 8:30 AM - 10:30 AM
B4H - Reporting - Part 1 BW Query & exit variables	1. BW Query 2. Customer Exit Variables using BADI 3. HANA Exit Variables using AMDP Class and Method 4. Debugging customer exit variables. 5. Debugging HANA exit variables.	6th Sep: 8:30 AM - 10:30 AM
B4H - Reporting - Part 2 B4H - SAC Integration	1. What is SAC (SAP Analytics Cloud) 2. Live vs Import Data connections 3. BW4-SAC Live data connectivity via CORS 4. BW4-SAC features 5. SAC Models and Stories using B4H Queries	12th Sep: 8:30 AM - 10:30 AM
BW4 - Miscellaneous Topics - Part 2	1. Inventory Mgmt 2. Streaming Process Chains 3. Migration Scenarios	13th Sep: 8:30 AM - 10:30 AM
B4H Useful Tcodes	List of handy BW4 tcodes and programs	5th July: 10 AM - 12 Noon
BW4 Interview Questions	List of questions for BW4 interview	5th July: 10 AM - 12 Noon
Resume Preparation Tips	Resume preparation tips	5th July: 10 AM - 12 Noon
B4H Certification Practice Questionnaire	List of 80 questions for practice Useful for certification	

Definition of SAP BW and Evolution of SAP BW to BW4HANA 2.0

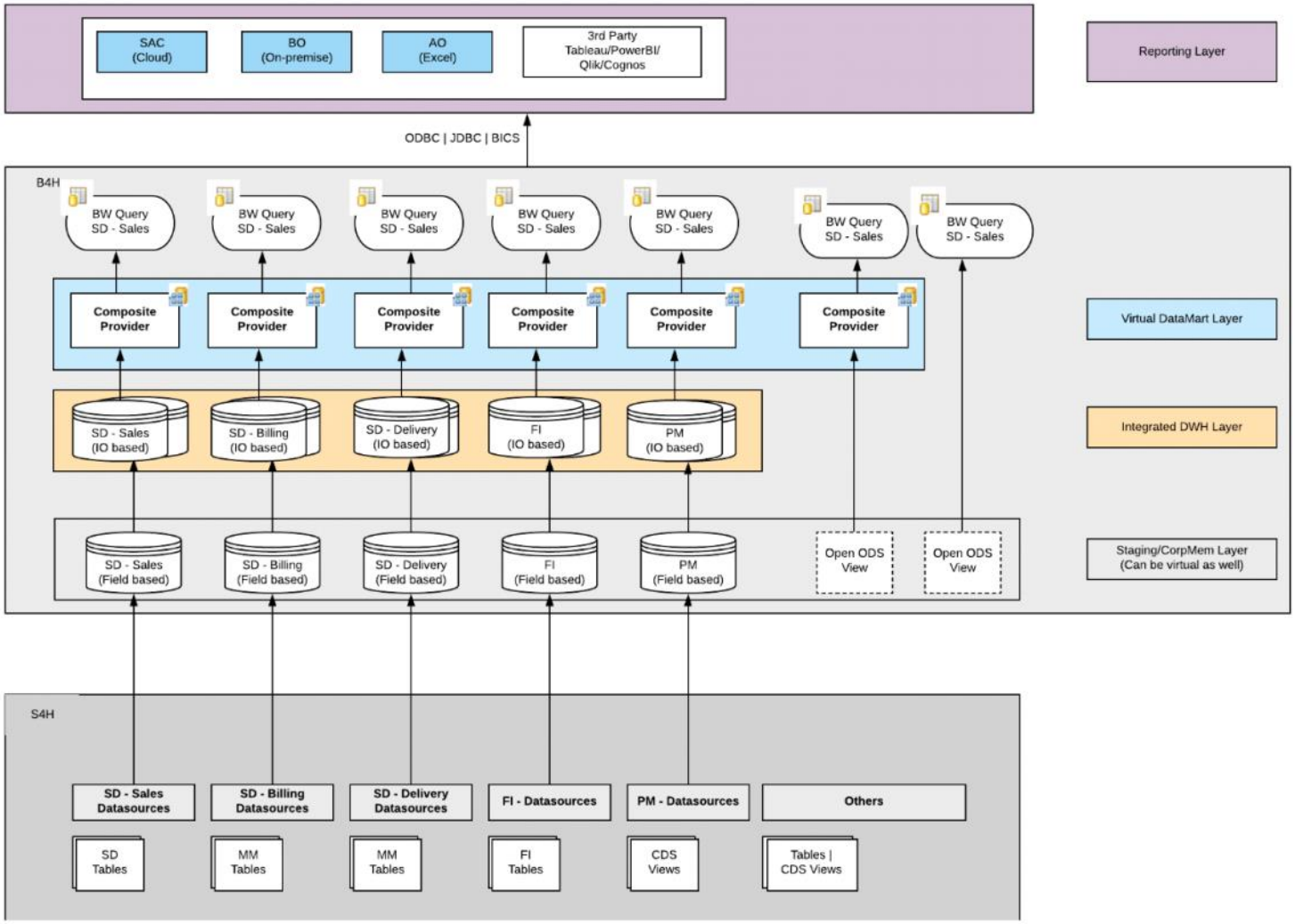
What is BW4HANA	BW4HANA is SAP's proprietary Datawarehousing Software. New Product (version starting from 1.x, 2.x...) DWC - Datawarehouse Cloud 
History of BW	 BW4HANA 2.0 - Feb'25 2019

Architecture of SAP BW4 2.0



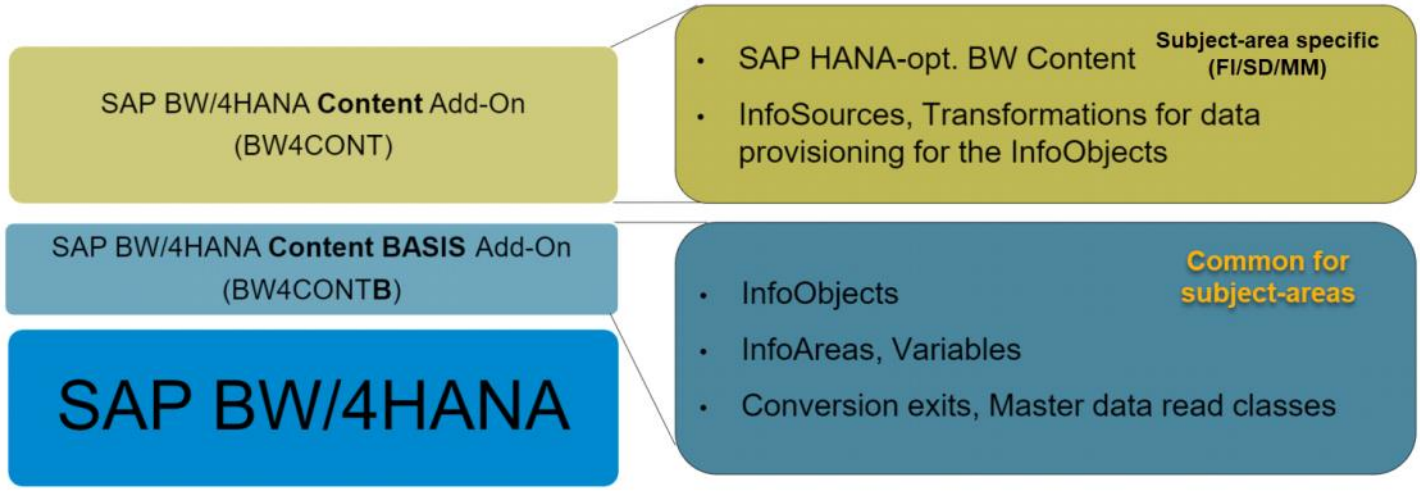
Q	What is the difference between SAP NetWeaver Application Server ABAP (SAP_ABA 750) and the so called "Lean ABAP Application Server" (SAP_ABA 75A)?
A	1. The primary difference is that SAP_ABA 75A/B/C/D includes support for long material numbers (CHAR 40, see SAP Note 2267140). 2. Millions of lines of code for obsolete objects were removed such as old interfaces, EP portal, BSP applications, and the migration workbench. In a nutshell, objects related to JAVA stack are no longer there. Side note: SAP_ABA 75A is also the foundation for SAP S/4HANA.

B4H - Dataflow - LSA++



SAP BW/4HANA Content Add-Ons

SAP BW/4HANA Content consists of 2 Add-Ons:
quarterly delivery of SPs incl. new content

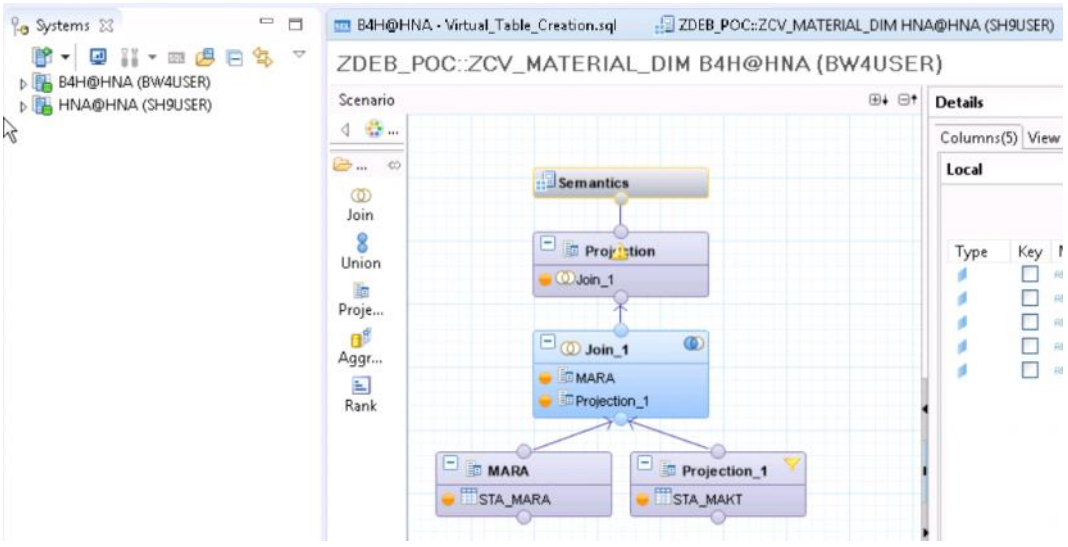
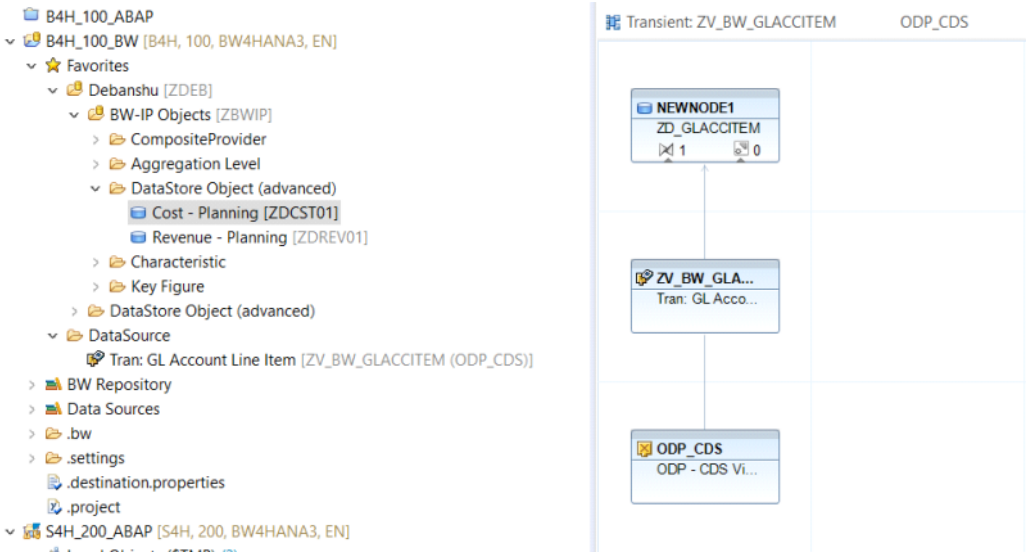


	Customer usage of SAP delivered Business Content	Custom-built Content	Required
Scenario A	BW DataSources	InfoObjects, Open ODS Views, ADSOs, Transformations, CompositeProviders, Variables, Queries	Enable BW DataSources for ODP (SAP Note 2232584) S/4HANA Whitelisted BW DataSources (SAP Note 2500202)
Scenario B	BW DataSources, InfoObjects ‚as is' or ‚as template'	Open ODS Views, ADSOs, Transformations, CompositeProviders, Variables, Queries	In addition: SAP BW/4HANA Content BASIS Add-On (BW4CONTB)
Scenario C	BW DataSources, InfoObjects, ADSOs, Transformations, CompositeProviders, Variables, Queries ‚as is' or ‚as template'	As required	In addition: SAP BW/4HANA Content Add-On (BW4CONT)

Important/Useful BW Tcodes

RSA1	To check process chains and BI Content Activation 1. BI Activation 2. Transports 3. Administration
BW4WEB	To launch BW4 Cockpit

Difference between HANA & BW4HANA modeling.

HANA Modeling	• Done in HANA DB • DB Schemas and Tables • DB Packages • Calculation Views • DB Procedures • DB Table Functions 
BW4H Modeling	

BW/4HANA Licensing

1st choose HANA DB Size
License - Runtime (REB, REAB) | Full Use (Stnd | Enterprise)

-> BW/4HANA is licensed in blocks of 64 GB. You can expect, the more, the cheaper.

-> For HANA there are 2 Options:

--> HANA REAB (only BW/4HANA application)

--> HANA full use Enterprise Edition

There are possibly additional licensing fees for Cold Storage (NLS/DTO).

SAP HANA. The following options are going to be covered:

- *SAP HANA Runtime Edition*
- *SAP HANA Full Use Edition*
- *SAP HANA Active/Active (Read Enabled)*
- *SAP HANA Express Edition*
- *SAP Cloud Platform, SAP HANA Service*

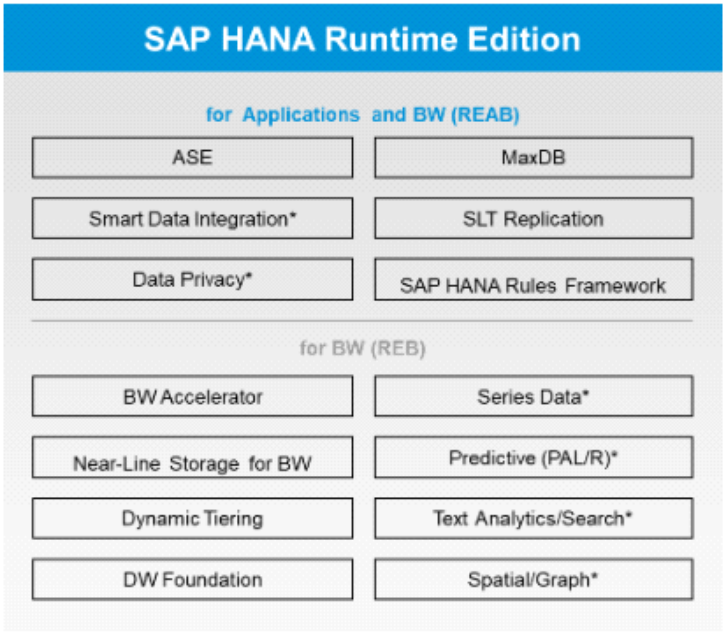
SAP HANA Runtime Edition

SAP HANA Runtime Edition is limited to a runtime environment for SAP Applications. An SAP Application is any application that includes a **NetWeaver Application Server**, e.g. SAP Business Warehouse (BW), SAP BW/4HANA, SAP Business Suite, SAP S/4HANA and other related products.

SAP offers two options with SAP HANA Runtime Edition:

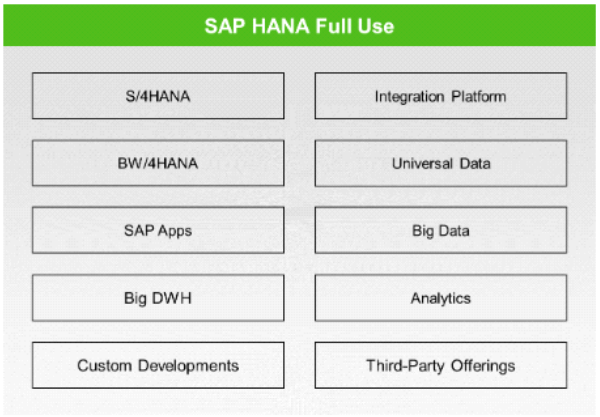
- SAP HANA Runtime Edition for SAP BW (HANA REB)
- SAP HANA Runtime Edition for Apps and SAP BW (HANA REAB), which includes all capabilities from REB, plus other SAP Apps.

The picture below shows the available features of both for these options.



SAP HANA Full Use Edition

SAP HANA Full Use Edition offers an unrestricted platform for any combination of SAP, non-SAP, custom, third-party, and hybrid applications.

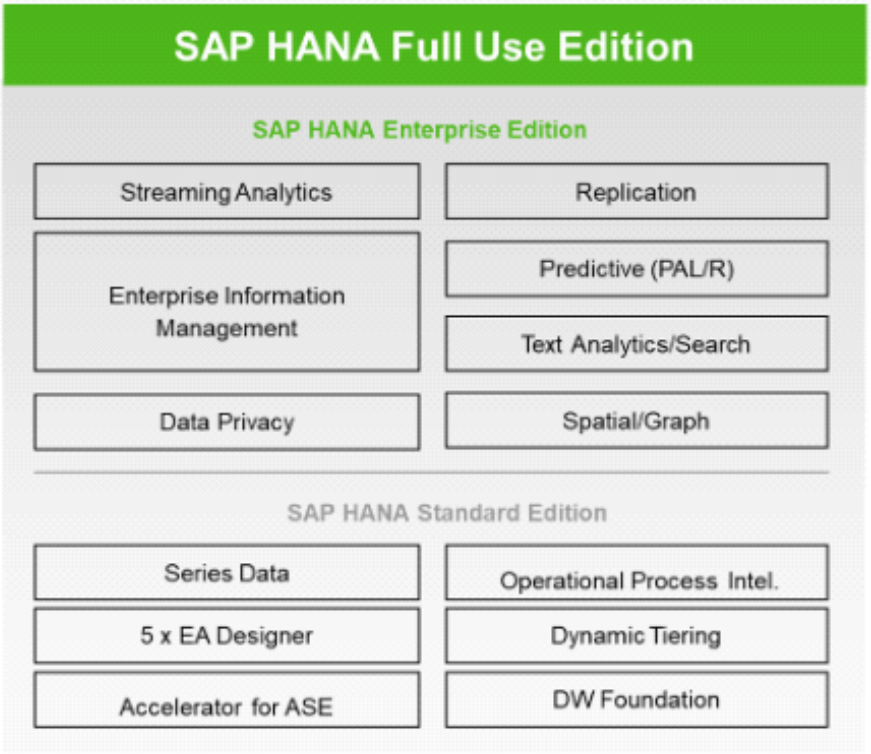


With SAP HANA Full Use Edition there are **no limitations** on data modeling, administration, creation of custom structures, and use of advanced engines via HANA Web IDE, HANA Studio (IDEs used to develop artifacts on a HANA server) or other applications. There are no limitations on loading and exporting of SAP & non-SAP data directly into and out of SAP HANA.

With the Full Use Edition it is possible to read data both from the application and database layers. **You can consume the data of the SAP HANA system whichever way you need it.**

SAP offers two versions of the SAP HANA Full Use Edition:

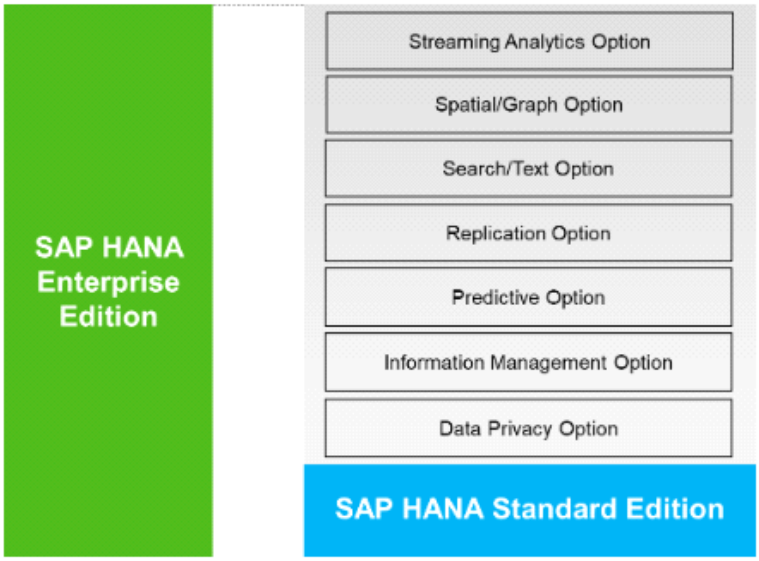
- SAP HANA Standard Edition
- SAP HANA Enterprise Edition (includes all capabilities from the Standard Edition). The picture below shows the available features for both editions.



It is also possible to acquire the Standard Edition and just add the services you need for your business. Here are the available options:

- **Data Privacy Option**, for enhanced protection of sensitive and confidential data (e.g. Data Masking);
- **Information Management Option**, for data integration, data quality management, and information stewardship;
- **Predictive Option,** for Predictive Analytics Library access, R engine, and TensorFlow integration for advanced analytics;
- **Replication Option,** for replicating data from any supported source system to the SAP HANA database;
- **Search/Text Option,** for search, text analysis, and text-mining functionality for you to gain real insights from unstructured textual data;
- **Spatial/Graph Option,** for advanced spatial and graph analytics capabilities;
- **Streaming Analytics Option,** for processing streams of events and messages in real time, allowing some or all of the data to be captured in the SAP HANA database and/or Hadoop.

Basically, if you license all available options on top of your SAP HANA Standard Edition, your SAP HANA system will have the same capabilities as the SAP HANA Enterprise Edition.



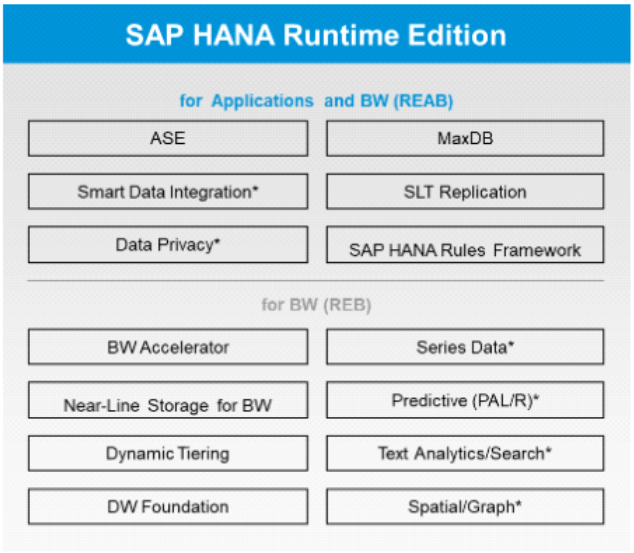
SAP HANA Runtime Edition vs Full Use Edition

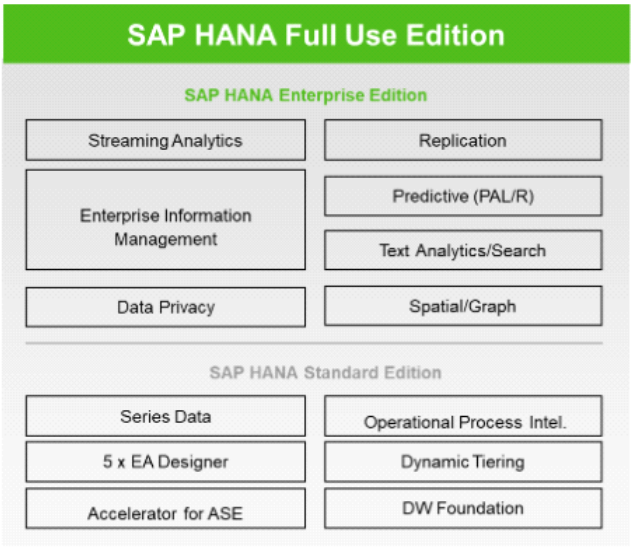
Conceptually speaking SAP HANA Runtime Edition offers a limited platform, centralized only for SAP applications and SAP HANA Full Use Edition offers an unrestricted platform for all systems and distributed data in modern, hybrid environments.

The picture below provides an overview of the biggest technical differences between these two editions. For SAP HANA Runtime Edition we've included restricted (Δ) and not available (X) capabilities.

	Runtime	Full Use
Work at database level	✗	✓
Create tables directly in SAP HANA (physical & virtual)	✗	✓
Direct loading into SAP HANA tables	△	✓
Data export at database level	✗	✓
Data export via views	✗	✓
Use of SAP AFL functions	△	✓
Use of partner AFL functions	✗	✓
No differentiation between data call and application call	✗	✓
Use of XSA server for customer developments	✗	✓

In terms of functions and features, the picture below compares the difference between the two available editions.





To sum up, the decision of choosing which edition is best for you depends on whether you want to leverage SAP Applications, or you want to use the full power of the SAP HANA platform.

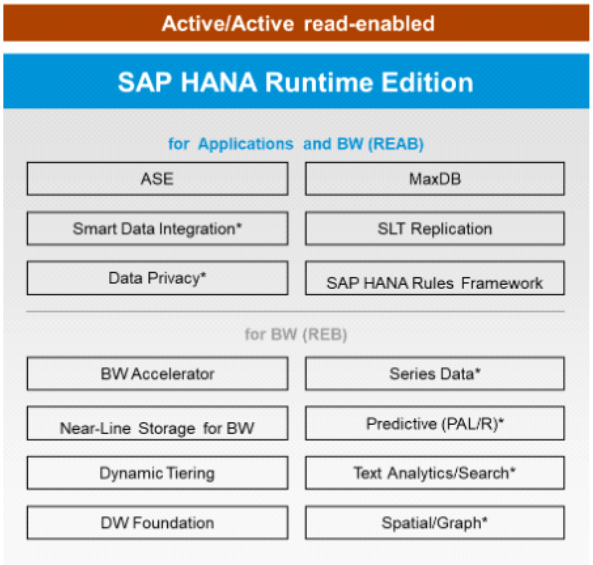
SAP HANA Active/Active (Read Enabled)

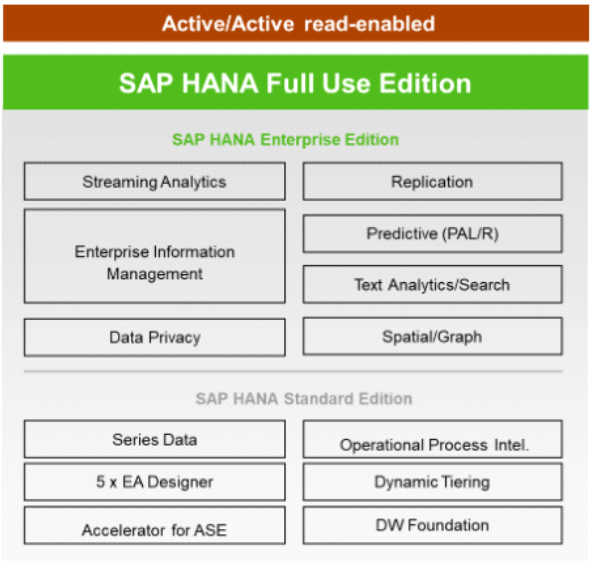
SAP HANA Active/Active (Read Enabled) is a solution that targets resiliency and better performance of your SAP HANA productive environment. With this option you can offload intensive read operations to the secondary system, freeing up more computational power to be used on the primary system for read and write operations.

As data is continuously being replicated from the primary to the secondary system using either synchronous or asynchronous communication protocols, you can leverage the secondary system to offset read-intensive workloads from the primary system. With SAP HANA Active/Active (Read Enabled) you can gain usage rights to access secondary system for productive read-enabled operation, the utilization of the underlying hardware can be increased because the workloads can be much more balanced, which also improves the performance of the operations on the primary system. Latency can also be reduced as read intensive users can now be located next to the secondary data center and there is no impact on your Recovery Time Objective (RTO) and Recovery Point Objective (RPO).

Without SAP HANA Active/Active (Read Enabled), the secondary system can't be used for any operation, which means it's only idle capacity for High Availability and Disaster Recovery purposes.

This option can either be used by SAP HANA Runtime and Full Use Editions as you can check below. Only SAP HANA 2.0 works with this option.





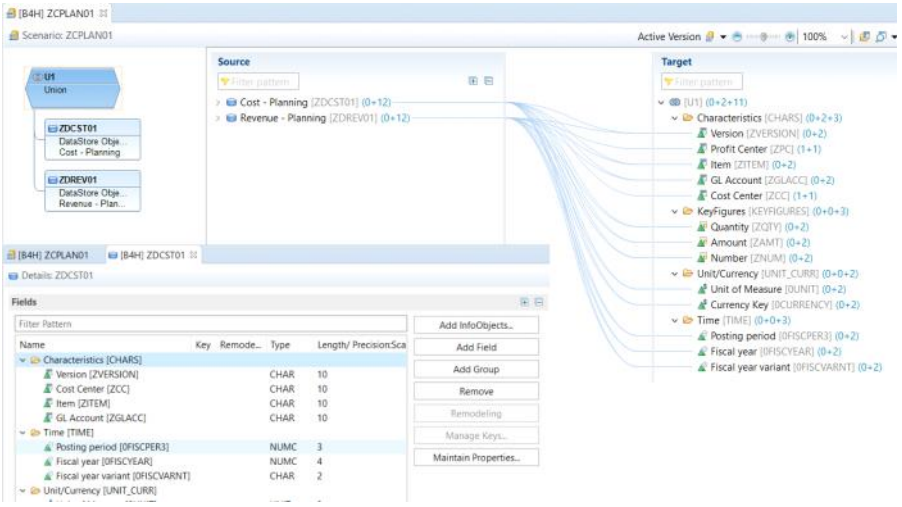
The tools to work with BW4

Tools

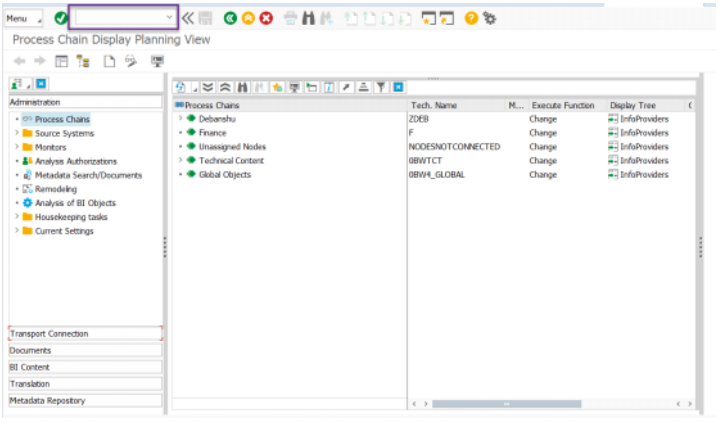
Tool	Tasks
BW Modeling Tools in Eclipse	Data modeling by defining and editing objects, in particular InfoProviders Data Acquisition Definition of analytical queries as the basis for data analysis
SAP BW/4HANA Cockpit	Administrative and operational tasks, such as defining and monitoring process chains or InfoProvider administration
Data Warehousing Workbench	Administrative and operational tasks, such as content activation and transporting SAP BW/4HANA objects

Eclipse

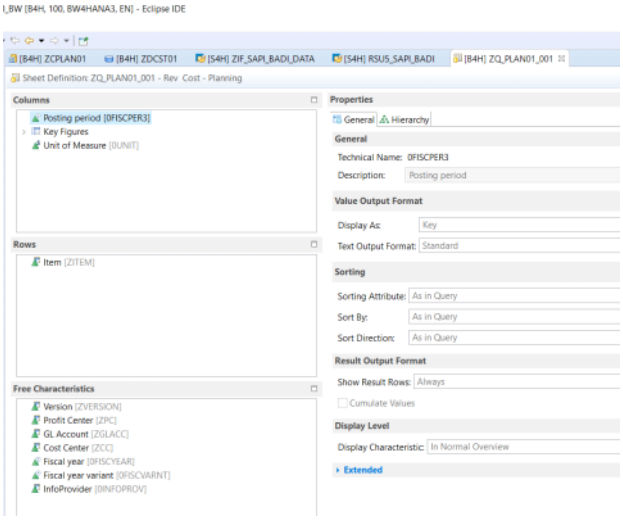
- Completely Eclipse-based Modeling for BW4HANA Infoproviders.



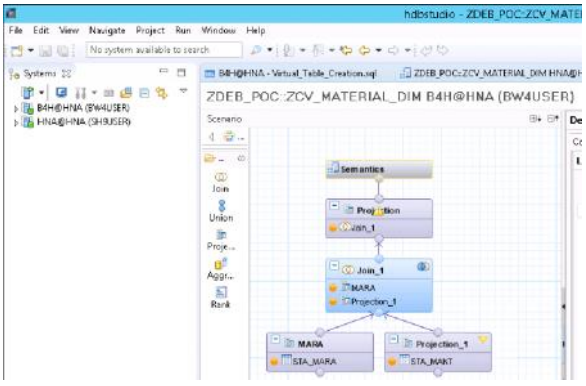
- Tcode based navigation within Eclipse wherever necessary.



- Eclipse based BW Query creation.

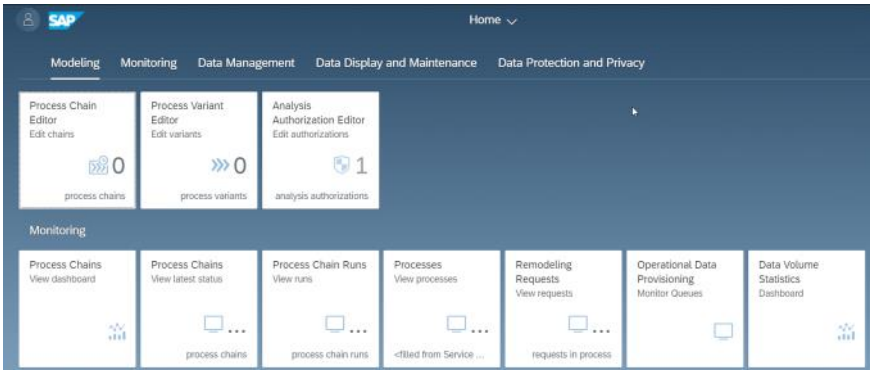


- Native HANA Modeling:
  https://access.getraind.com/#/client/MTM4AGMAbXlzcWw=



BW4 Cockpit

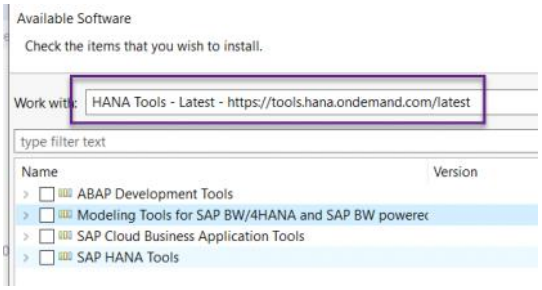
- BW4 Cockpit based modeling, data maintenance and monitoring.



Difference between HANA Studio and Eclipse

- HANA Studio
  is a plugin so if you install HANA Studio, you'll get bundle:
  Eclipse + HANA Studio Plugin

- Eclipse
  Only Eclipse. Need to install the plugins manually:

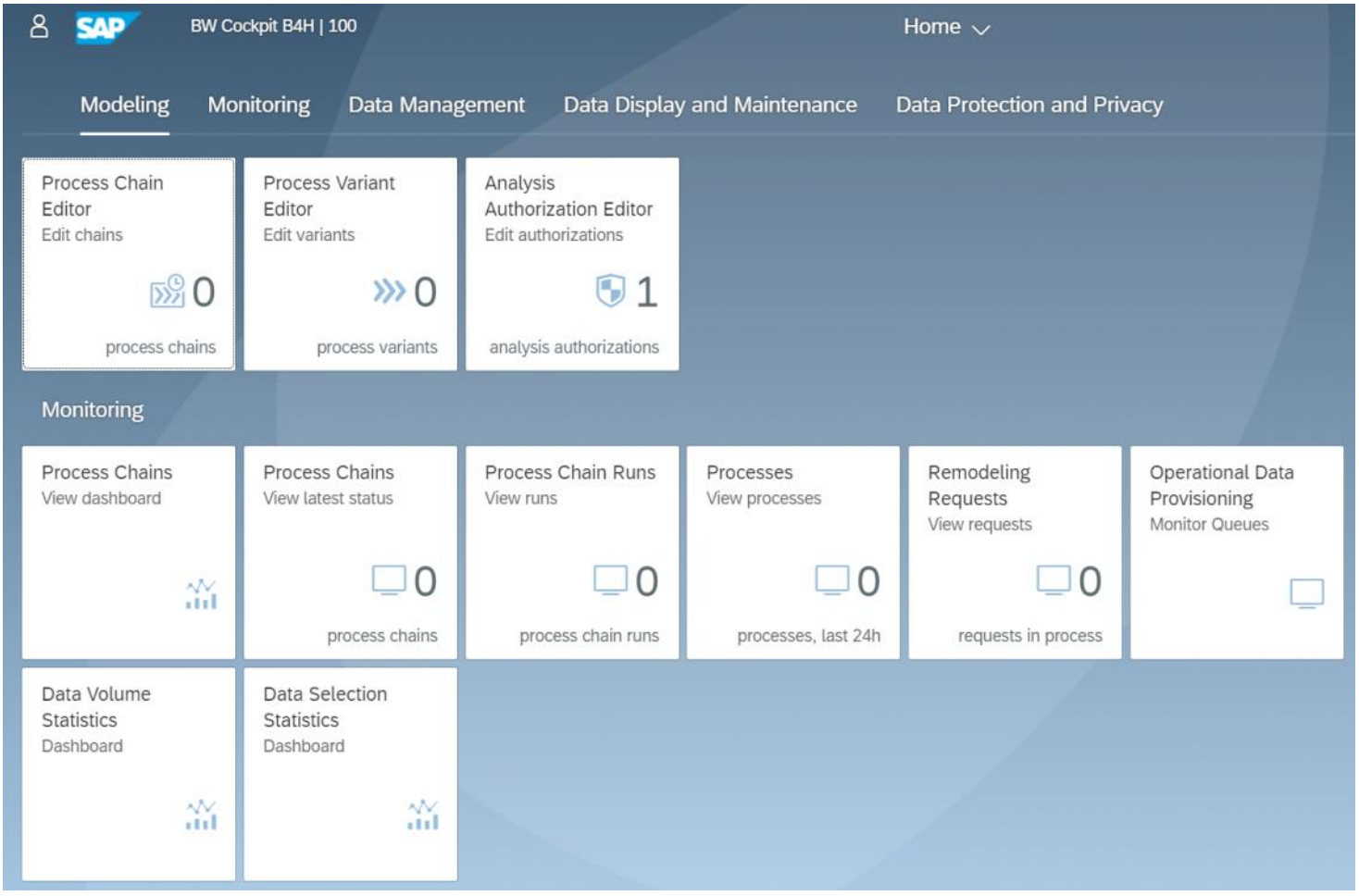


BW4H - Eclipse Shortcut

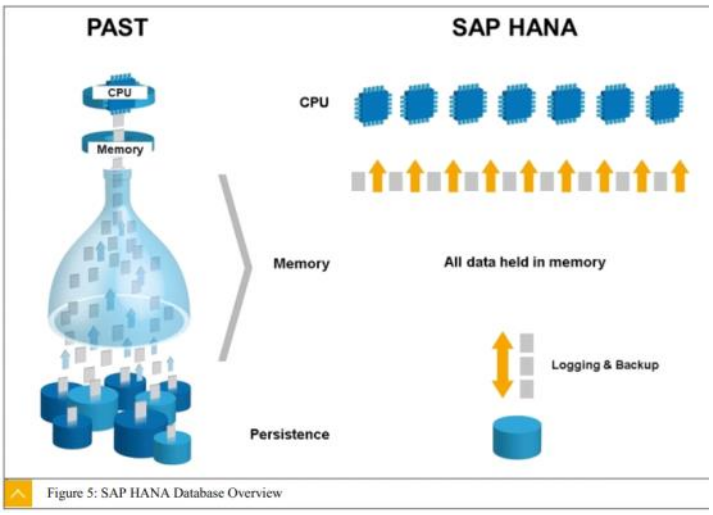
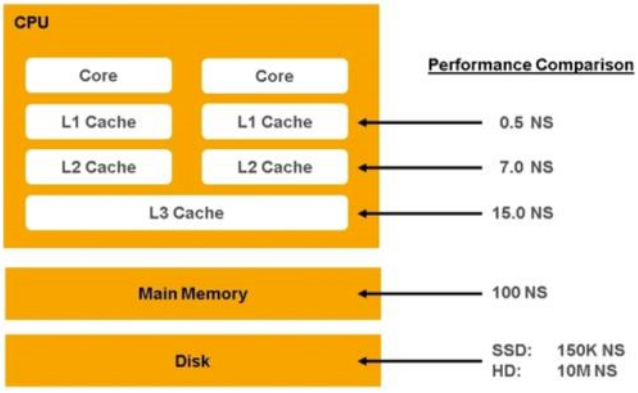
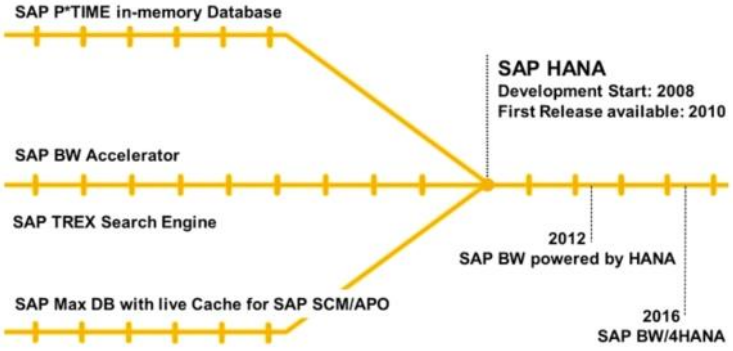
Operations	Shortcuts
Open SAP GUI	Ctrl+6
Create a new object	Ctrl+N
Activate an object	Ctrl+F3
Validate an Object	Ctrl+F2
Maximize\Restore tab	Ctrl+M
Search\Find object	Ctrl+H
Open Resource	Ctrl+Shift+R
Open an Object	Ctrl+Shift+D
Toggle tab	Ctrl+F7
Toggle perspective	Ctrl+F8
Toggle between Open objects	Ctrl+E
Move across open objects	Alt+(→ or ←)
Close current Object	Ctrl+(F4 or W)
Close all open objects	Ctrl+Shift+(F4 or W)
Get Where used list	Ctrl+F5
Undo	Ctrl+Z
Redo	Ctrl+Y
Quick Access	Ctrl+3
Open views	Alt+Shift+Q
Show error logs	Alt+Shift+Q+L
Refresh data preview	Ctrl+Shift+P

You can get the list of available shortcuts in eclipse using the command Ctrl+Shift+L.

BW4 Cockpit


BW Cockpit B4H | 100
Home
Modeling
Monitoring
Data Management
Data Display and Maintenance
Data Protection and Privacy
Process Chain Editor
Edit chains
0
process chains
Process Variant Editor
Edit variants
0
process variants
Analysis Authorization Editor
Edit authorizations
1
analysis authorizations
Monitoring
Process Chains
View dashboard
Process Chains
View latest status
0
process chains
Process Chain Runs
View runs
0
process chain runs
Processes
View processes
0
processes, last 24h
Remodeling Requests
View requests
0
requests in process
Operational Data Provisioning
Monitor Queues
Data Volume Statistics
Dashboard
Data Selection Statistics
Dashboard

Salient features of SAP HANA as a DB

Evolution of SAP HANA	Evolution of SAP HANA Landscapes  Figure 5: SAP HANA Database Overview In SAP HANA, you can store data and retrieve it in response to structured queries. Unlike traditional databases, SAP HANA does this by accessing main memory and not disk, yielding much faster data retrieval times. This means that all relevant data for an application is held in memory and the application reads and writes directly to the memory only. Changes to in-memory data are logged in real time in the same way as traditional databases. At recurrent so-called save points , all new changes are written back to the persistence layer asynchronously. As a result, in a case of failure, the system can be restarted to any point in time without loss of data. 
Evolution of HANA & BW4HANA	 • **SAP S/4HANA** SAP's strategic ERP solution Available since 02/2015 • **SAP BW/4HANA** SAP's strategic Data Warehousing solution Available since 09/2016

Options for SAP BW/4HANA

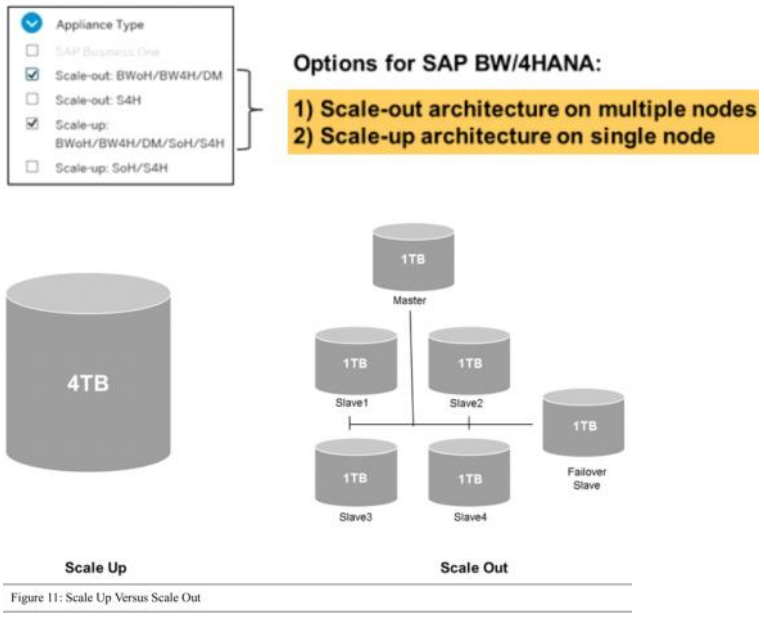


Figure 11: Scale Up Versus Scale Out

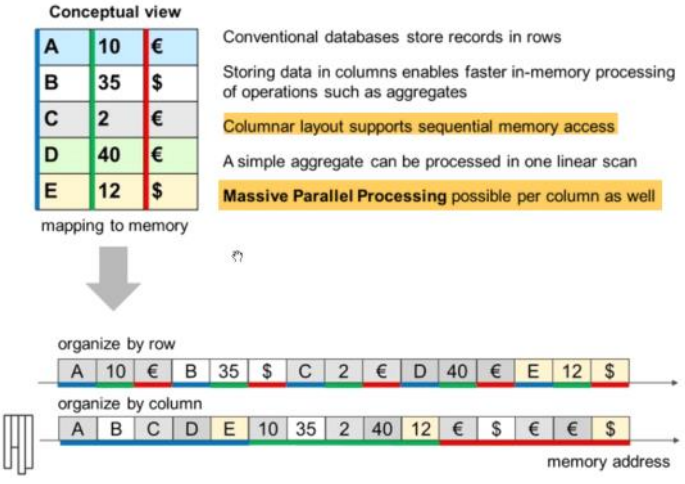
Recommended: Scale-up for BW.

Main concepts of SAP HANA DB

The three main concepts of the SAP HANA database are as follows:

1. **Column Store and Row Store**
2. **Compression of the Column Store**
3. **Insert only on Delta & Delta Merge of the Column Store**

Column and Row Store:



Row Vs Column Store:

Row-based store:

- Mainly distinct values in the source database

  → Leads to low compression rate
- All the columns of the table are relevant.
- No aggregation or search required
- Table has a minor number of records

  → Some system tables are stored in the row-store

Column-based store:

- Large number of rows, where column based operations will be processed
- Large number of columns
- Very good suitability for analytical applications (read access)

If you want to report on line items only, that is, on all the columns of a single record of a table, then the row store is more suitable. This is because reconstructing the complete row is one of the most expensive operations for a column-based table. Typical examples are customizing tables or log tables.

If, in a table, you want to store huge amounts of data that should be aggregated and analyzed, then column-based storage is more suitable. Columnar table layouts enable fast column scans because they can sequentially scan the memory, allowing, for example, on-the-fly calculations of aggregates. All tables of BW data models (all tables of the /BIC/-namespace) are managed in this way.

- When an SAP system is migrated to SAP HANA, the SAP tables are automatically migrated into the storage type that is best suited. This logic is defined by SAP.
- The vast majority (>90%) of all tables is held in the Column Store.
- Tables of SAP BW/4HANA data models (e.g., /BIC/ A*, P*) are all in the column store.
- This information can be accessed in SAP HANA Studio (*Catalog > Open Definition > Runtime Information*) or via the ABAP Data Dictionary of SAP BW/4HANA in the technical settings of each table (tr. *SE13*).

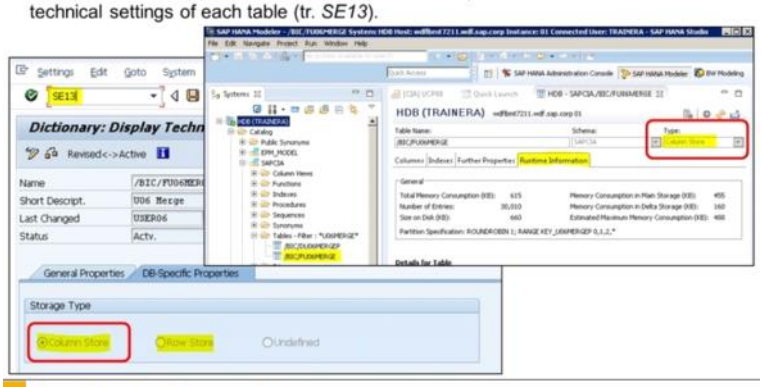


Figure 15: Column and Row Store Tables in SAP Systems

Note:

The actual ratio of column store versus row store in your individual system can be derived from following tables: SYS.CS_TABLES_ or SYS.RS_TABLES_.

For example, in SAP HANA studio, SELECT COUNT(*) FROM "SYS"."CS_TABLES_" versus SELECT COUNT(*) FROM "SYS"."RS_TABLES_" (requires read-authorization to database schema SYS).

Example:

```
SELECT 'COLUMN TABLES', COUNT(DISTINCT("TABLE_NAME"))
FROM SYS.M_CS_TABLES

UNION

SELECT 'ROW TABLES', COUNT(DISTINCT("TABLE_NAME"))
FROM SYS.M_RS_TABLES
```

	'COLUMN TABLES'	COUNT(DISTINCT (TABLE_NAME))
1	COLUMN TABLES	29,766
2	ROW TABLES	1,897

Compression of Column Store:

Column Store Compression

- SAP HANA manages column store tables with an own dictionary
- This dictionaly uses data-driven fixed-length bit encodings

→ Operations are processed directly on compressed data using integers

→ More data is managed in cache, access to main memory is reduced

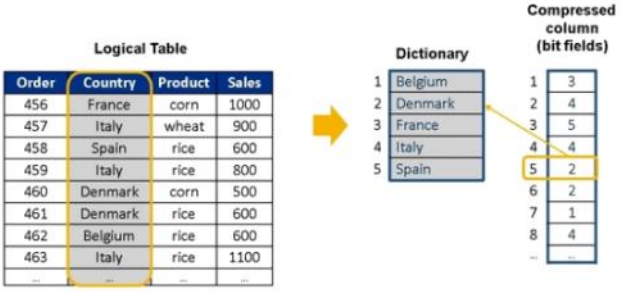
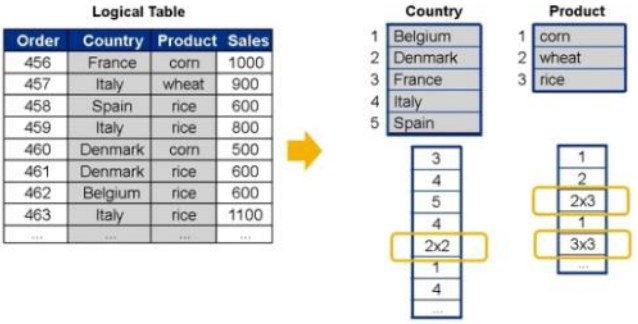


Figure 16: Compression of Column Store Tables 1/2

- Columns of SAP HANA Column Store are sorted normally

→ Option to compress these repeated values in column memory even more

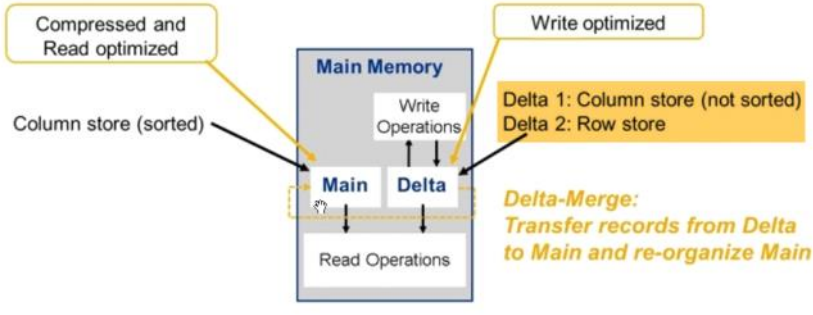
→ More data can be processed in cache



Insert only on Delta and Delta Merge of the Column Store

SAP HANA Column Store tables:
Storage Separation in Main and Delta Storage

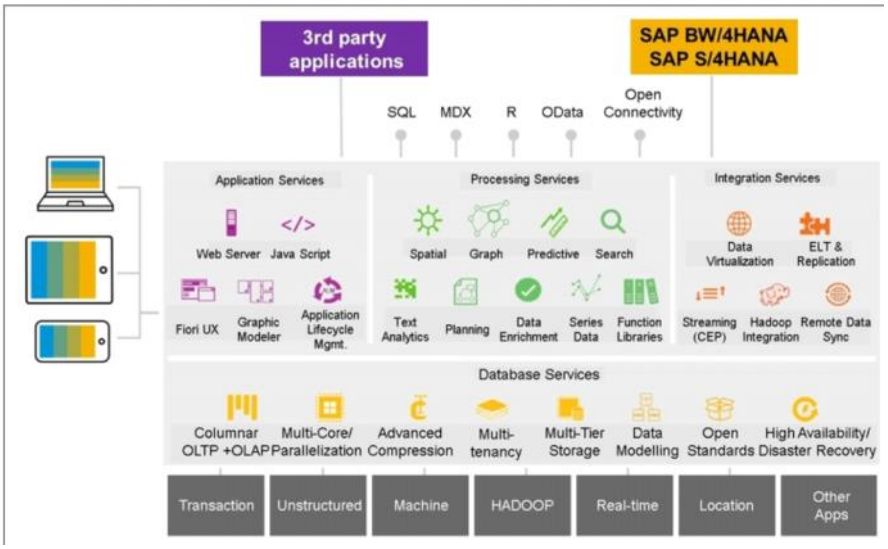
→ Enables **high compression** and **high write performance** at the same time



Read operations
- from **both** main & delta storage

Write operations
- **Only** in **delta storage**
- The update is performed by **inserting**

→ **Completely transparent for the BW/4HANA application, i.e. read operations always provide correct results**

If the delta reaches a certain size, it merges back into the main store and the complete dictionary is sorted.

SAP HANA as Platform	SAP HANA as an Application Platform