

EIM201

Architecture and Technology in SAP HANA

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The SAP logo is located in the bottom left corner of the slide. It consists of the letters 'SAP' in a bold, white, sans-serif font, set against a blue rectangular background that is slightly tilted to the right.

Disclaimer

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EIM201 - Agenda

SAP HANA Architecture & Technology

- Get architectural insights
- Understand technology implications

SAP HANA Scenarios and Use Cases

- Understand SAP HANA scenarios
- Differentiate SAP HANA editions
- Integrate SAP HANA into your landscape

Having data is not enough!

Do you have real-time business insights?



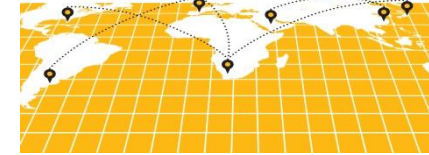
Customer Insights

- Which customers & channels are more profitable?
- Which customer profiles are suitable for loyalty rewards?
- How dynamic is your customer segmentation strategy?



Product/Service Insights

- How are products/services doing vs. their competition?
- Track complaints from call centers & social data in real-time?
- Where else is this part used in my company?

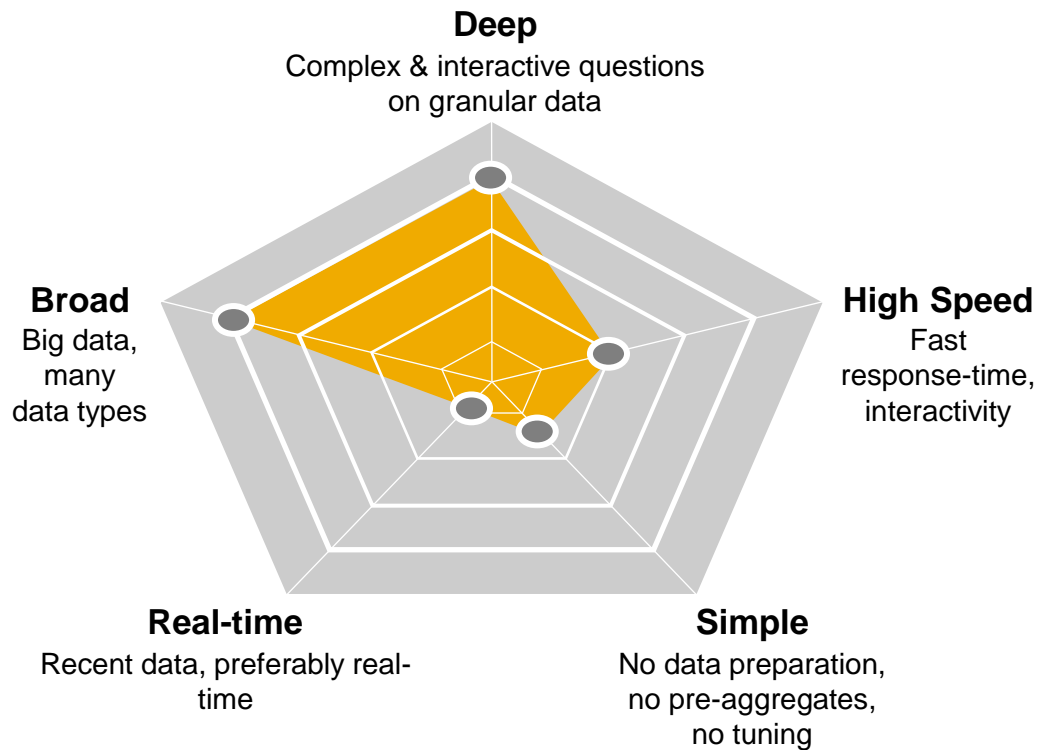


Operations Insight

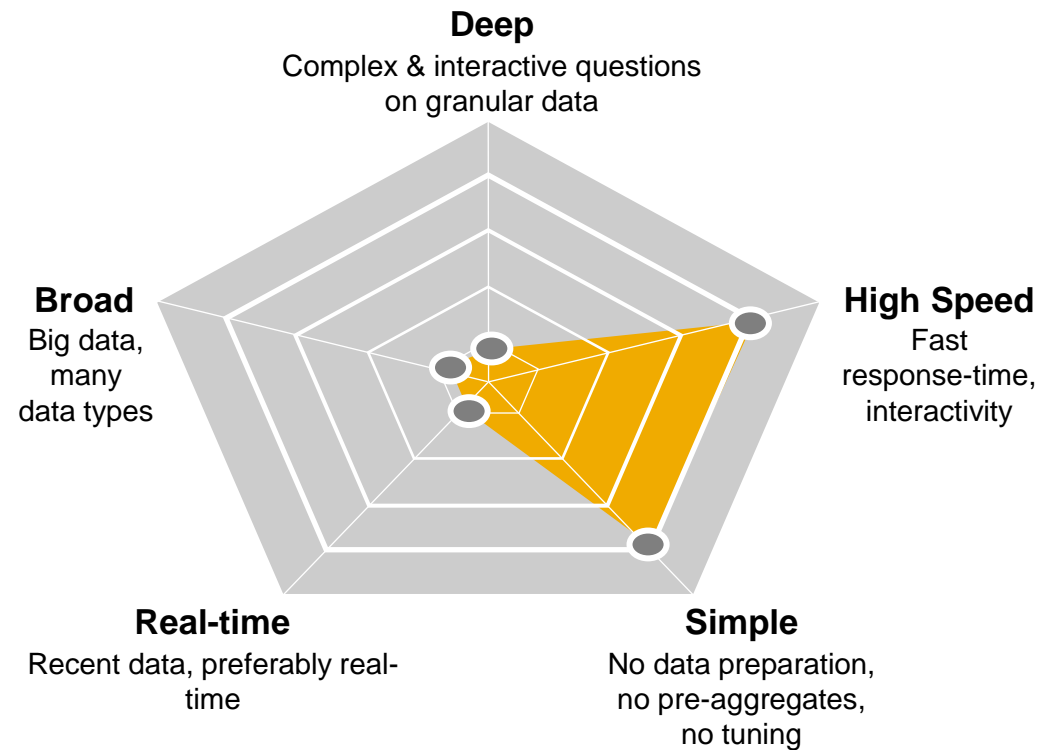
- How can you predict supply chain disruptions ahead?
- How do suppliers rank by cost, quality and timeliness?
- How is my “on-time/in full” delivery rate by customer?

Need a breakthrough technology

Today's technology requires tradeoff

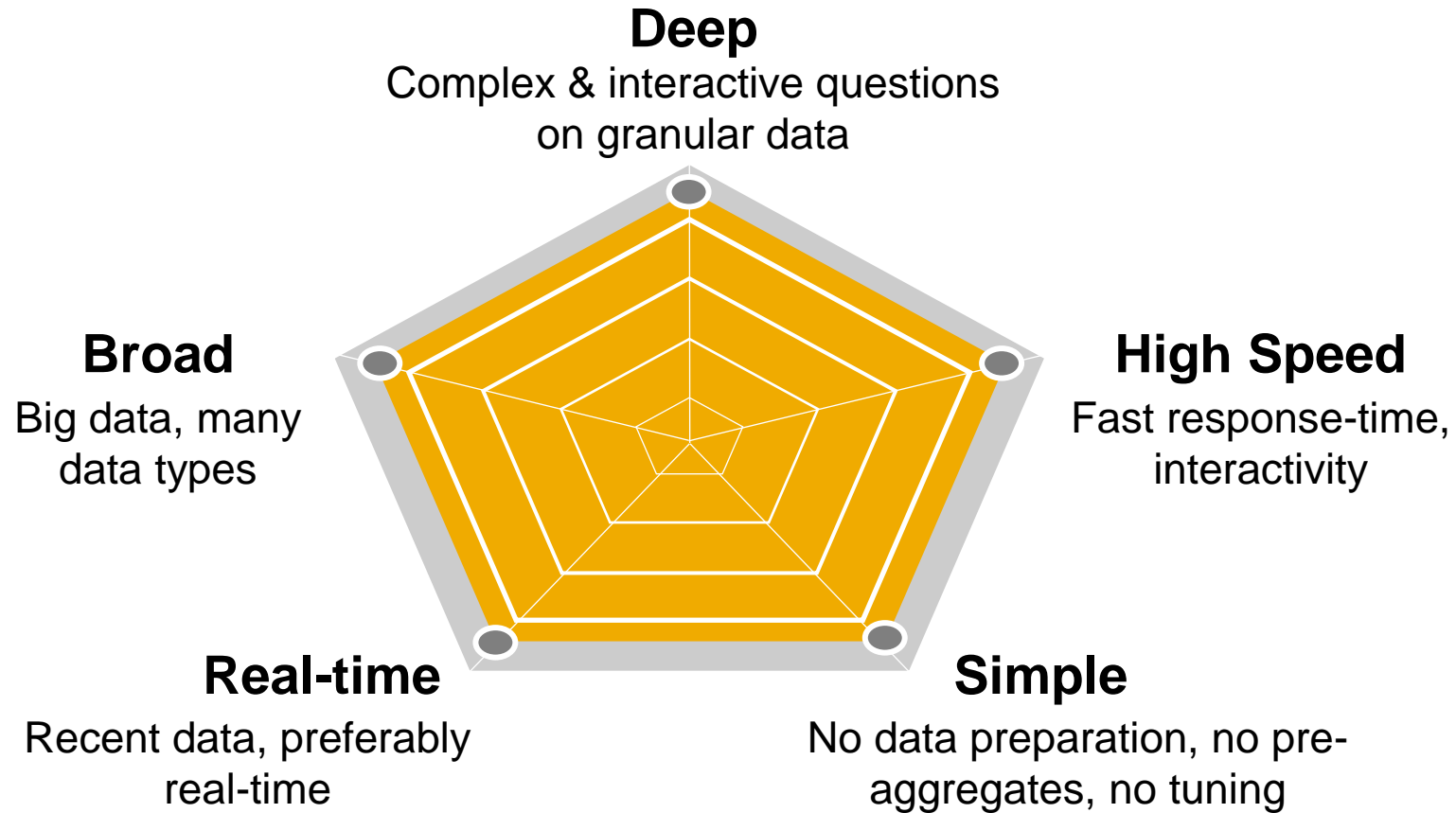


OR



SAP HANA does it all!

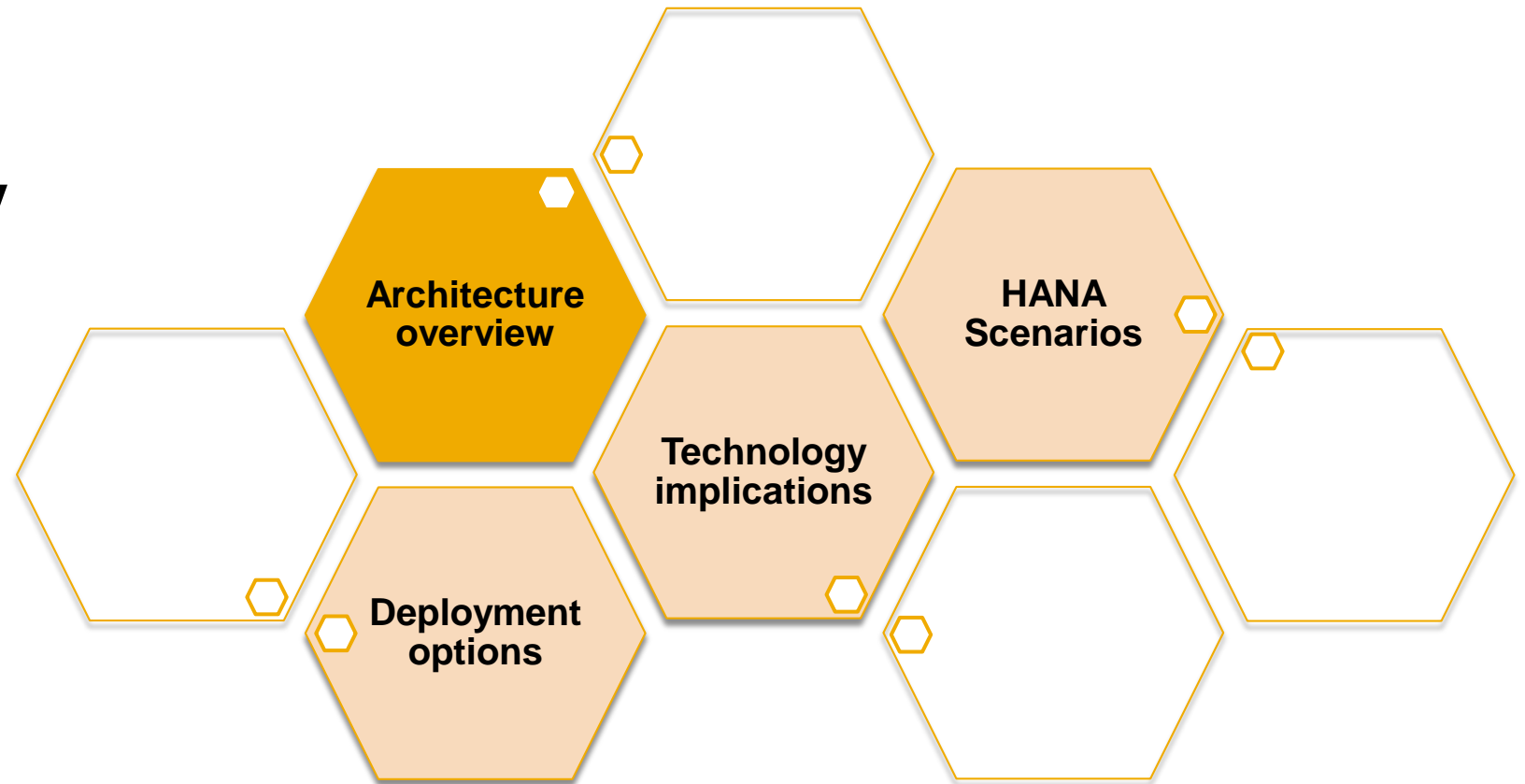
Delivering across 5 dimensions of modern decision-processing





SAP HANA

Architecture & Technology

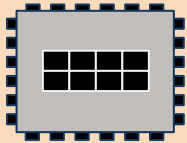


What is In-Memory computing?

Orchestrating technology innovations

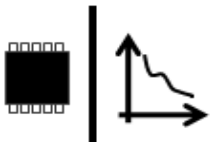
Dramatically improved hardware economics and technology innovations in software have made it possible for SAP to deliver on its vision of the Real-Time Enterprise with in-memory business applications

HW Technology Innovations



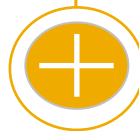
Multi-Core Architecture
(8 CPU x 10 Cores per blade)

Massive parallel scaling with many blades

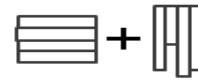


64bit address space – 1TB in current servers

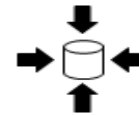
Dramatic decline in price/performance



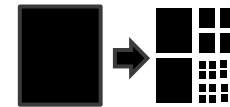
SAP SW Technology Innovations



Row and Column Store



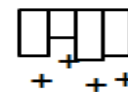
Compression



Partitioning



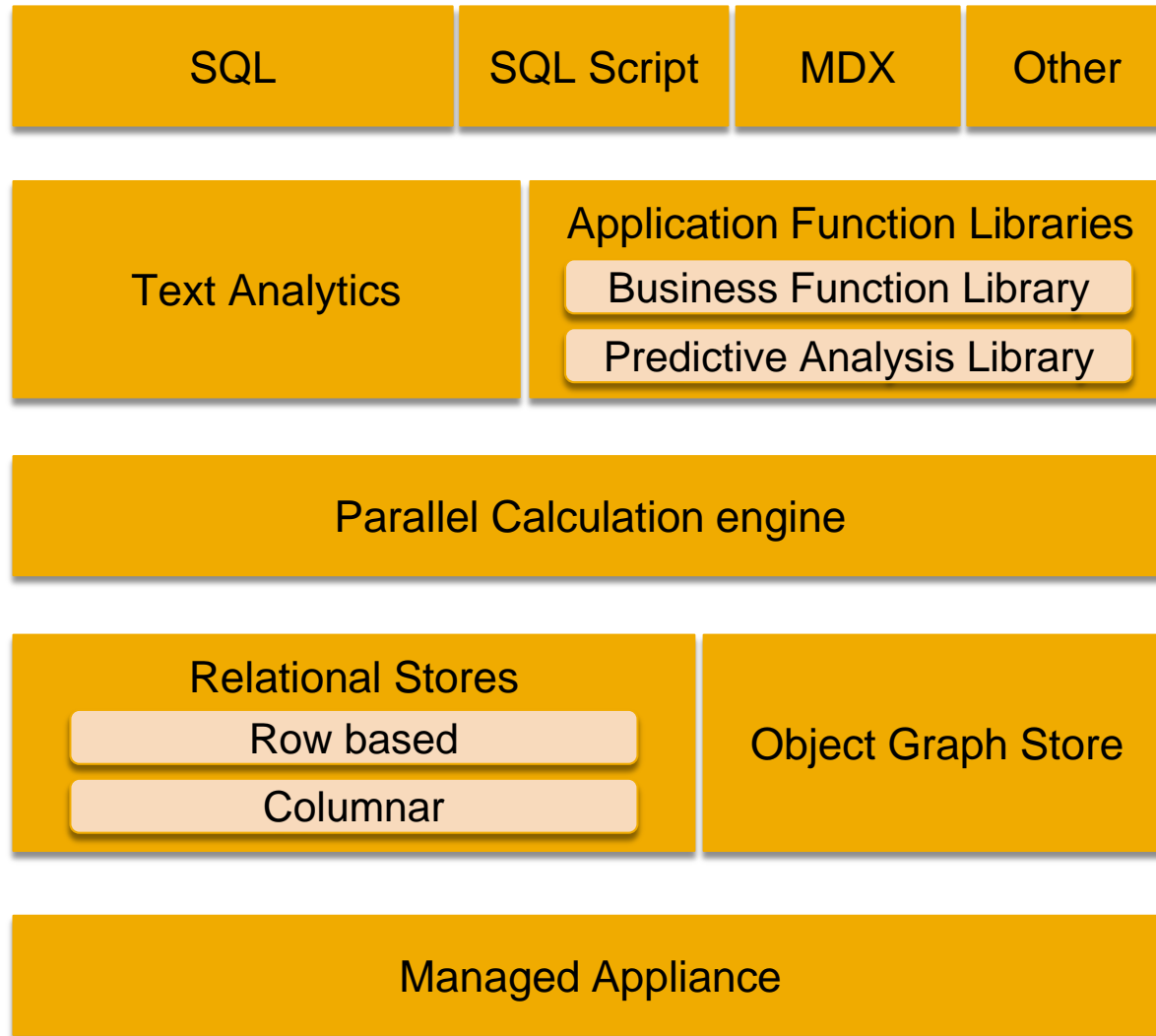
No Aggregate Tables



Insert Only on Delta

SAP HANA

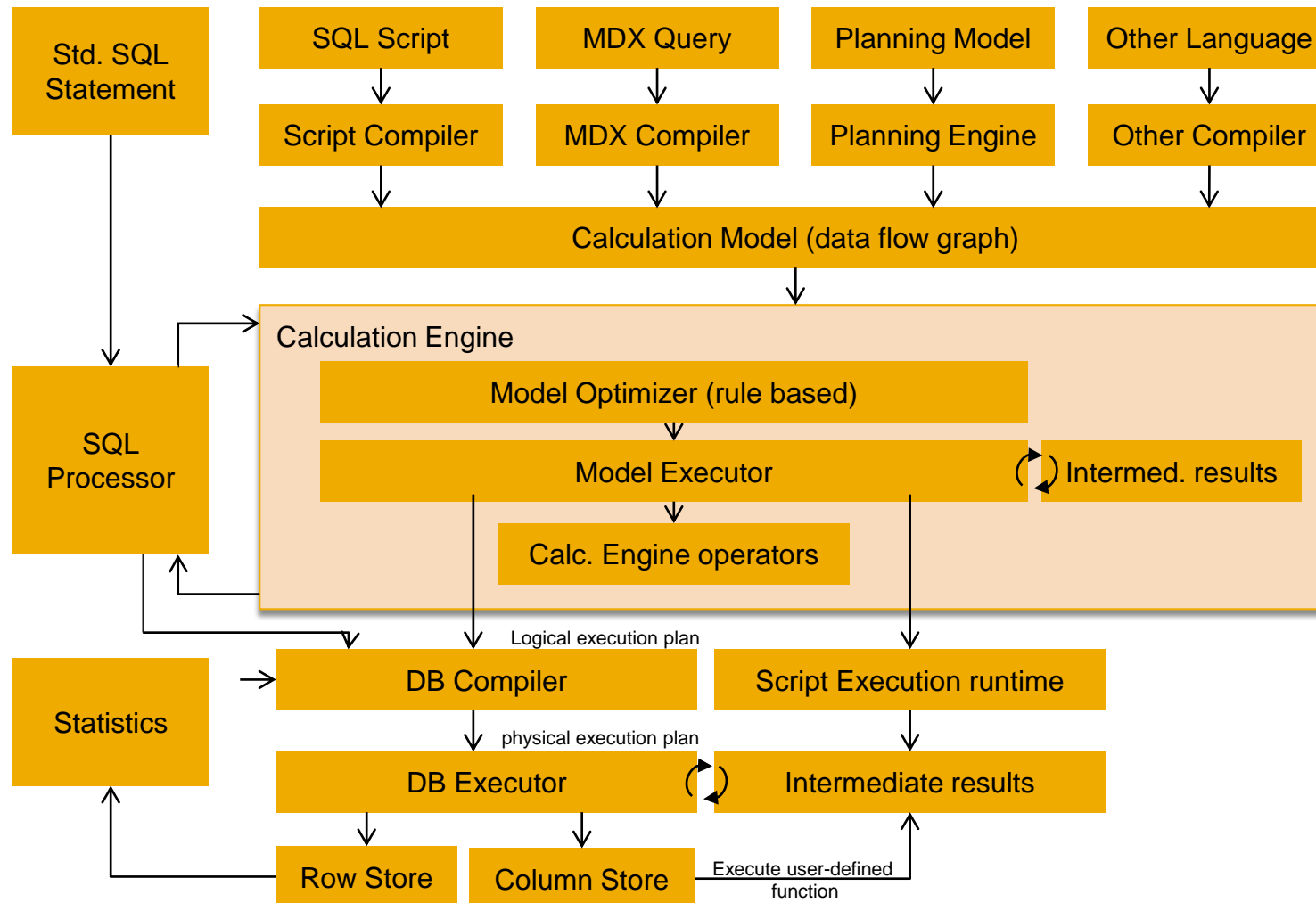
Software component view



- **Analytical and Special interfaces**
- **Application logic extensions**
- **Parallel data flow computing model**
- **Multiple in-memory stores**
- **Appliance Packaging**

SAP HANA

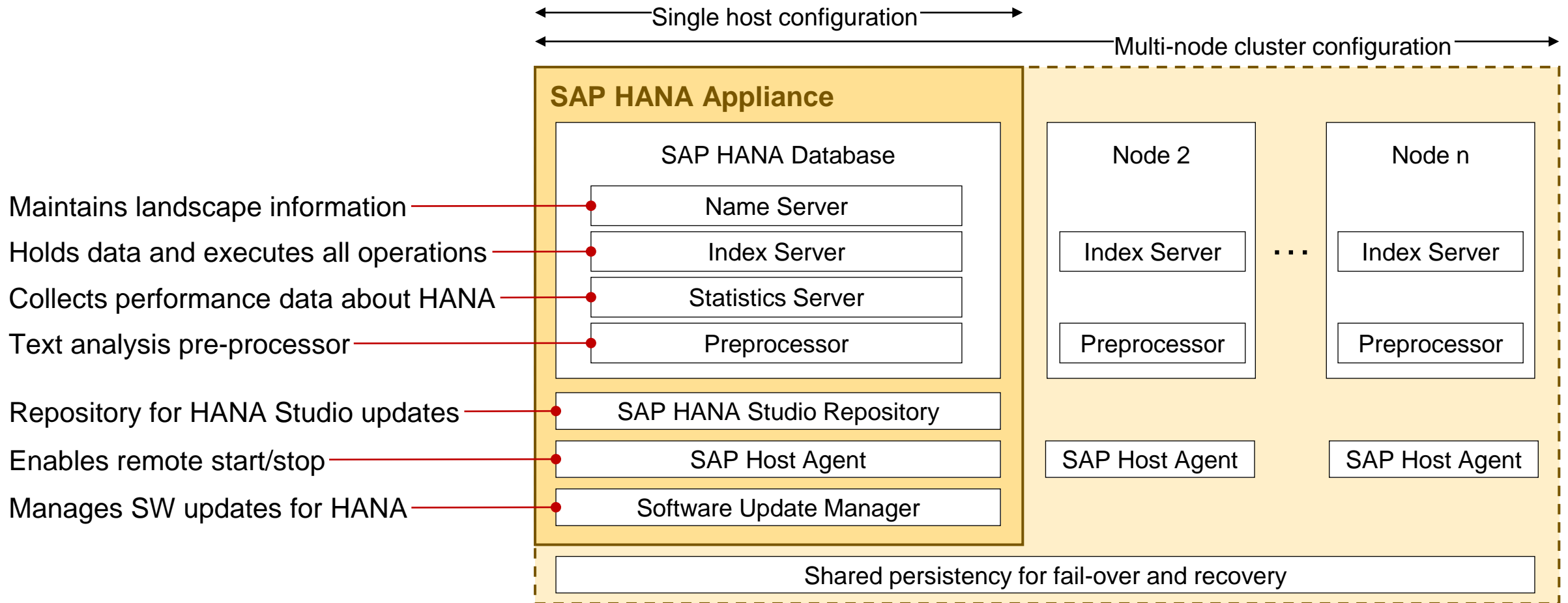
Runtime execution



- Domain specific **programming languages/models** that interacts with SAP HANA
- **Calculation model:** Directed acyclic graph; arrows representing data flows and nodes that represent operation
- **Calculation engine:** Breaks up a model into operations that can be processed in parallel (model optimizer).
- **Database optimizer:** Determines the best plan for accessing row or column stores, leveraging cost-based optimizations and database statistics.

SAP HANA

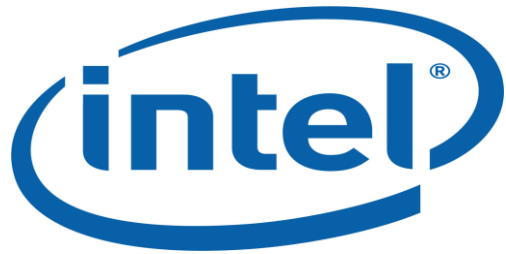
Deployment view



SAP HANA

Appliance software packaging

SAP HANA Technology Partners



SAP HANA Hardware Partners



SAP HANA Product Flavors

SAP HANA Platform Edition

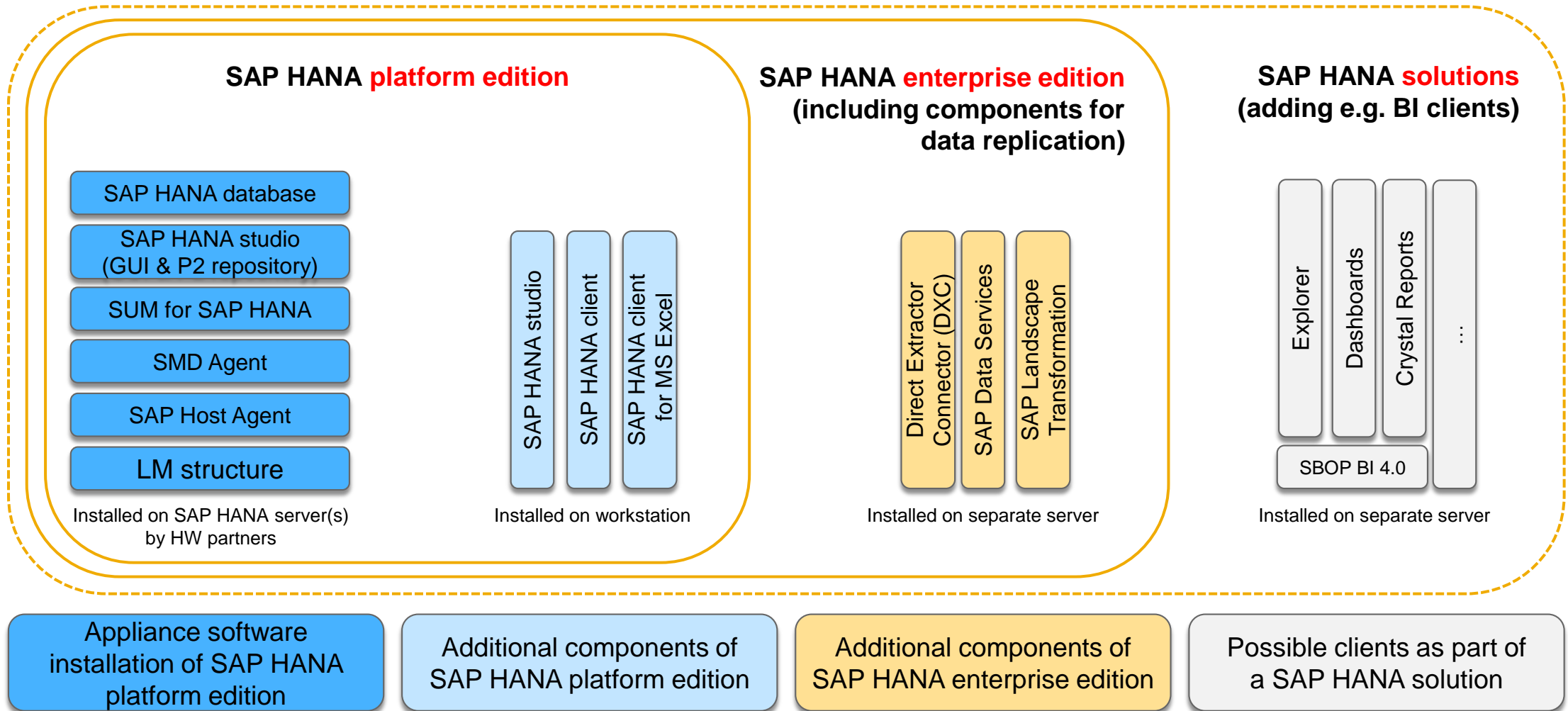
SAP HANA Enterprise Edition
- incl data provisioning (SLT)

SAP HANA for BW
- BW database only



SAP HANA editions

The different flavors of SAP HANA product offering



Bill of material

SAP HANA platform/enterprise edition

SAP HANA appliance software components

	pre-Installed by vendor	optional install by customer	Platform Edition	Enterprise Edition
SAP HANA database <i>Core In-Memory Computing technology engine</i>	■		■	■
SAP HANA studio <i>GUI for Administration , Modeling and Lifecycle Management of SAP HANA</i>	■		■	■
SAP HANA studio repository <i>Eclipse Update repository to distribute Studio updates in a landscape</i>	■		■	■
SAP Host Agent 7.20 Enables LM remote services like start/stop and Solution Manager integration	■		■	■
SAP Solution Manager Diagnostics Agent 7.30 <i>Provides monitoring data into SAP Solution Manager</i>	■		■	■
Software Update Manager for SAP HANA <i>Allows download and implementation of SAP HANA updates from with SAP HANA studio</i>	■		■	■
LM Structure <i>Machine readable product description, stored in file system</i>	■		■	■
SAP HANA UI for Information Access Toolkit for search and text capabilities inside SAP HANA		■	■	■
SAP HANA Direct Extractor Connector <i>Delivery Unit for Data acquisition from SAP Business Content DataSource Extractors</i>		■		■

Bill of material

SAP HANA platform/enterprise edition

SAP HANA peripheral components

	Platform Edition	Enterprise Edition
SAP HANA client <i>Provides standardized interfaces for programming against SAP HANA</i>	■	■
SAP HANA studio <i>GUI for Administration , Modeling and Lifecycle Management of SAP HANA</i>	■	■
SAP HANA studio repository <i>Eclipse Update repository to distribute Studio updates in a landscape</i>	■	■
SAP HANA client package for MS Excel <i>Optimizes SAP HANA client package for use with Microsoft Excel</i>	■	■
SAP HANA information composer <i>Web based front-end for end-users</i>	■	■
LT Rep Server (7.20ext Kernel) <i>Supports SAP and non-SAP source systems to load data into SAP HANA</i>		■
LT Replication Add-on <i>To be installed on source system</i>		■
SAP Data Services <i>ETL Tool for loading data into SAP HANA</i>		■

Bill of material

SAP HANA enterprise extended edition

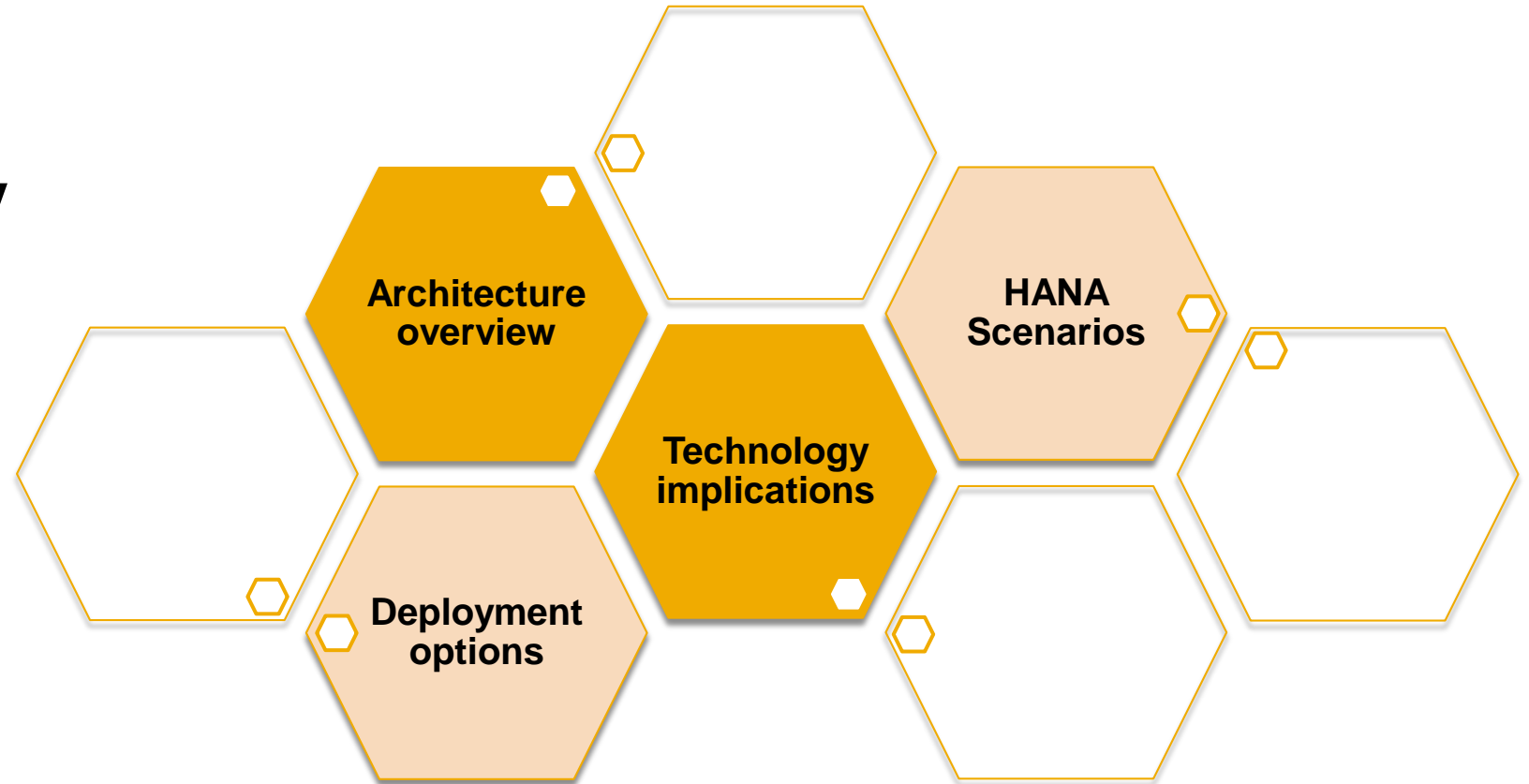
SAP HANA Enterprise (ext.) components

	optional install on appliance	optional install peripheral	Enterprise Ext. Edition
Sybase Replication Server 15 <i>To be installed on HANA server</i>	■		■
SAP HANA load controller <i>Supports Sybase Replication Server loading process</i>	■		■
Sybase Adaptive Server Engine (ASE) 15.5 <i>May be used as repository for DS installation</i>		■	■
Sybase Replication Server Agent 15 <i>To be installed on source system</i>		■	■



SAP HANA

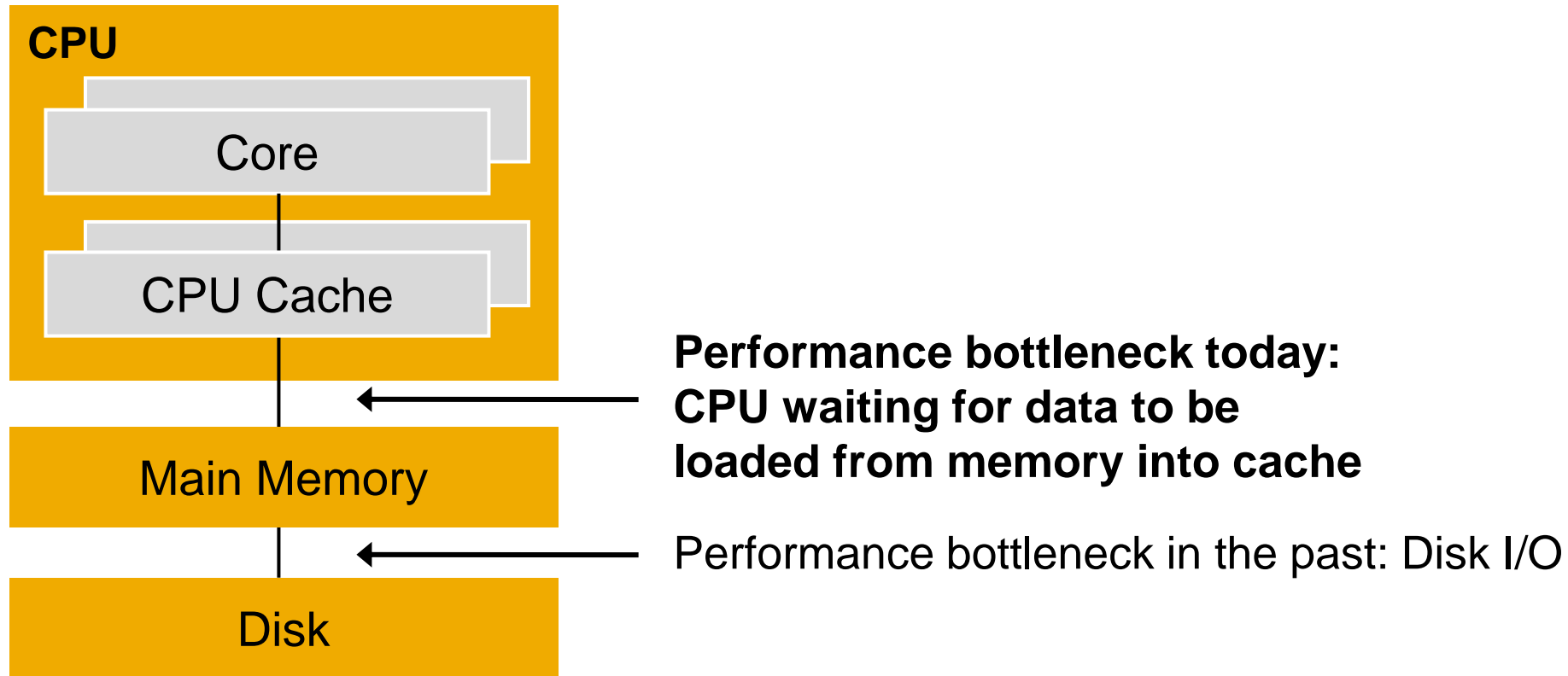
Architecture & Technology



In-Memory computing

Use cache-conscious data-structures and algorithms

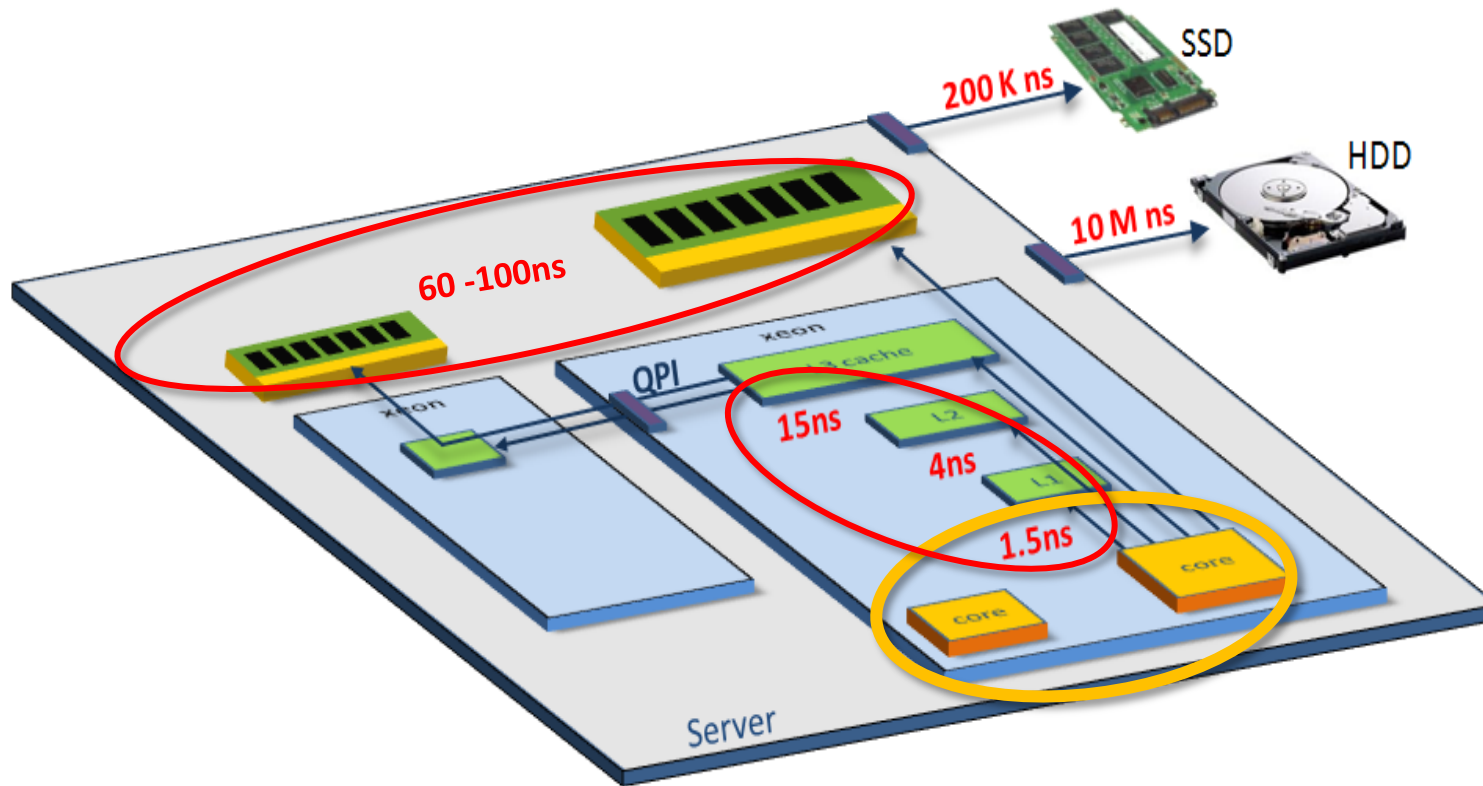
Programming against a new scarce resource...



... requires cache-conscious data-structures and algorithms.

In-Memory computing

Challenges of In-memory Computing

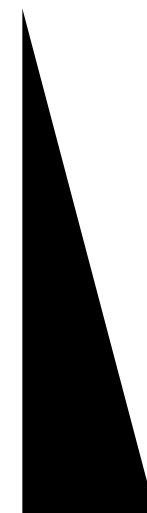
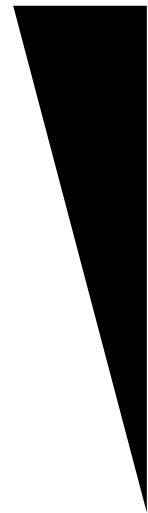


- **Challenge 1: Parallelism!**
Take advantage of tens, hundreds of cores
- **Challenge 2: Data locality!**
 - Yes, DRAM is 100,000 times faster than disk...
 - But DRAM access is still 4-60 times slower than on-chip caches

In-Memory computing

Delegation of data intense operations to the in-memory computing

Today's applications execute many data intense operations in the application layer



High performance apps delegate data intense operations to the in-memory computing

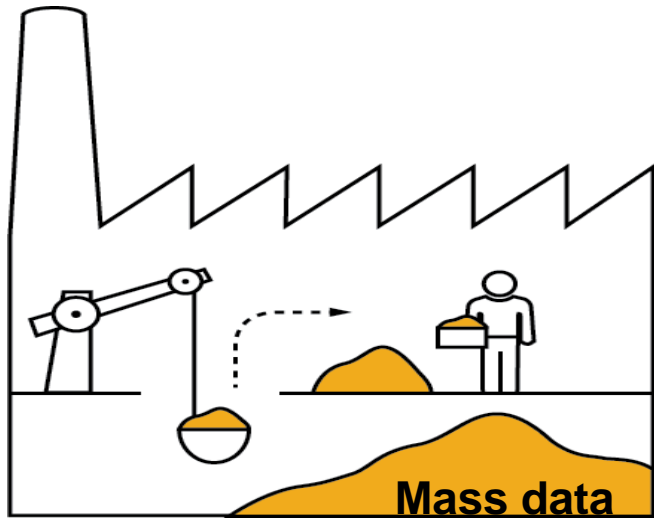
In-Memory Computing Imperative:

Avoid movement of detailed data
Calculate first, then move results

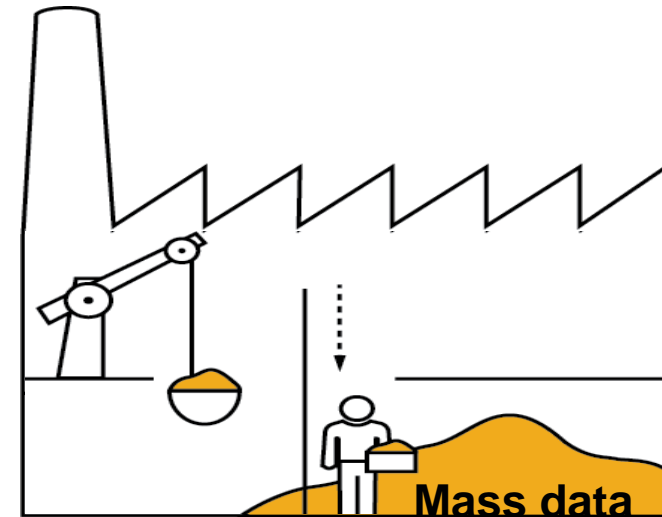
In-Memory computing

Delegation of data intense operations to the in-memory computing

Traditional



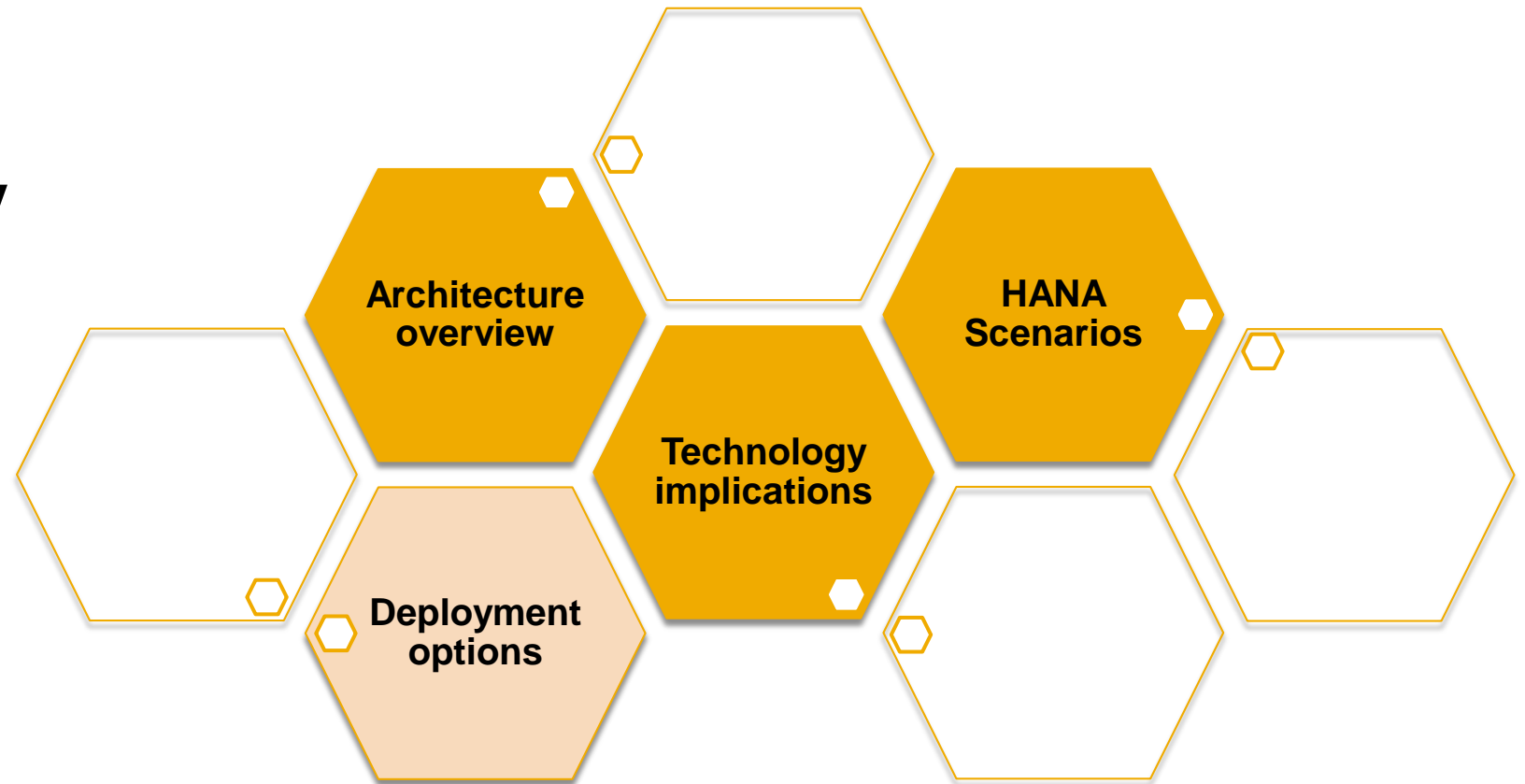
In-Memory Computing



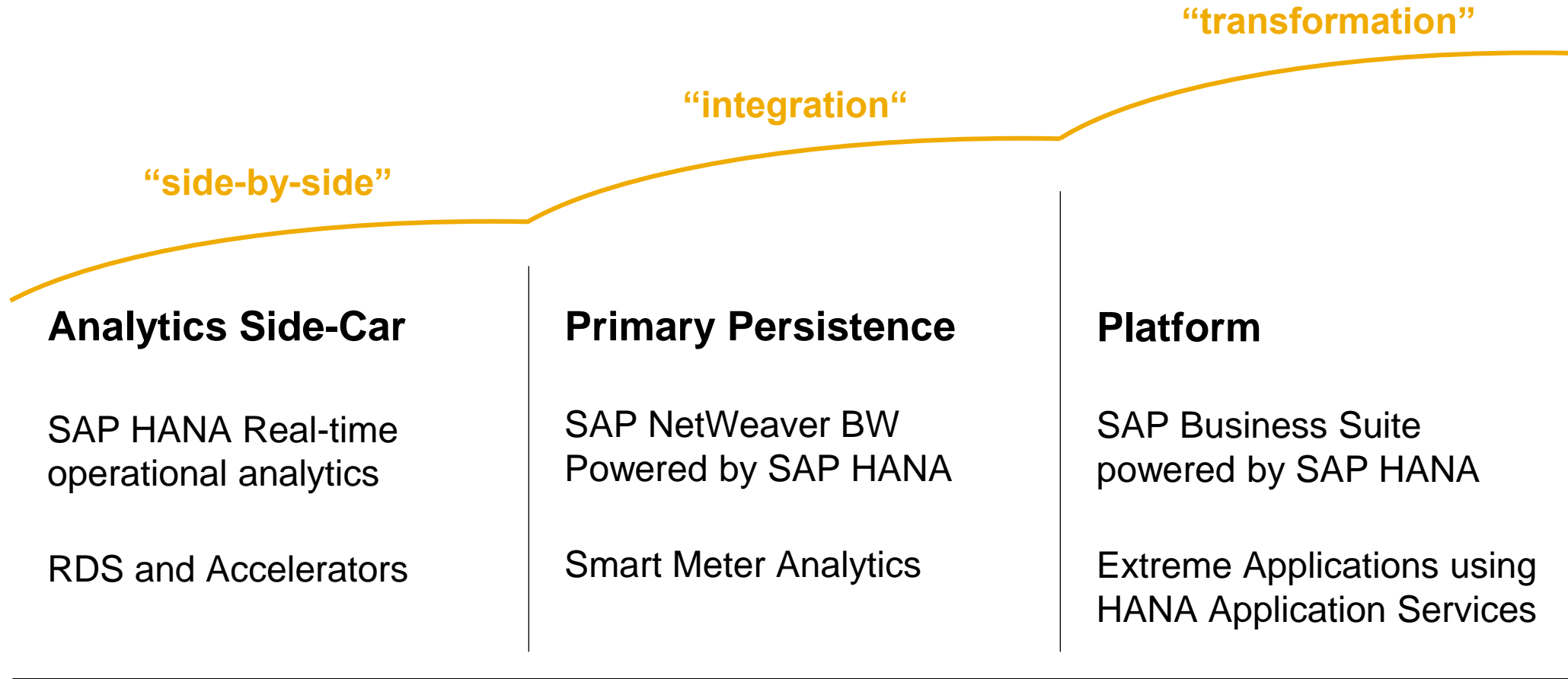


SAP HANA

Architecture & Technology

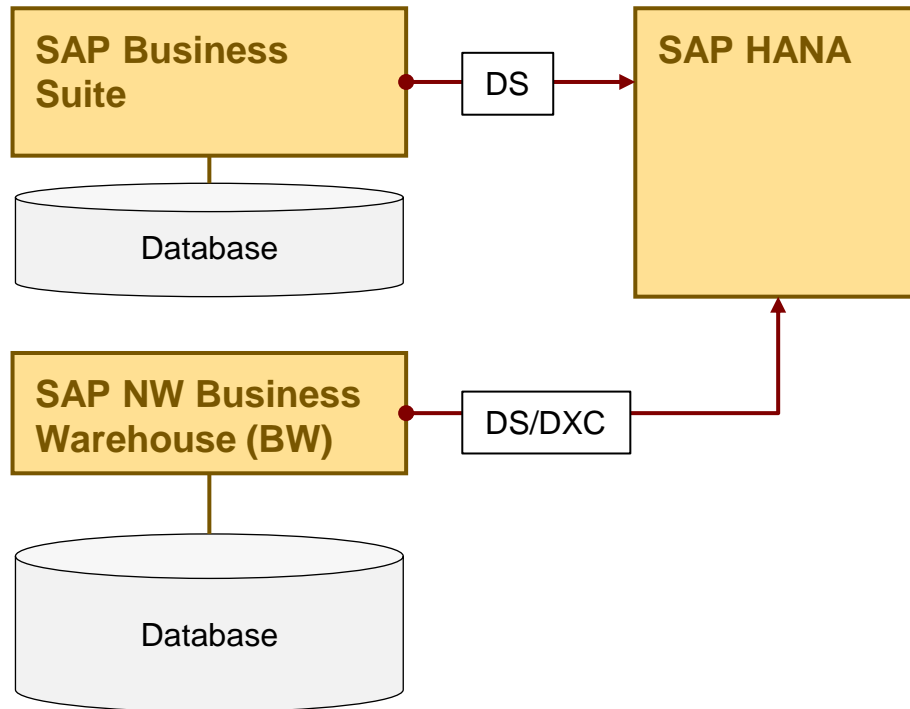


SAP In-Memory Strategy



Side-by-side scenarios

Agile data marts



Agile Data Marts

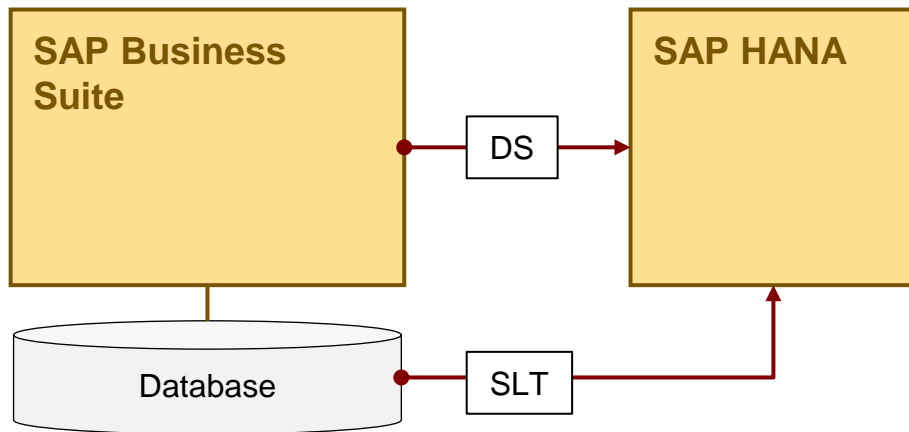
- Based on analytic data models (dimensional)
- Data has been transformed, in favor of the business problem at hand
- Typically contains no time critical data and therefore utilize traditional ETL

Core Value Proposition SAP HANA

- More flexibility compared to EDW environment

Side-by-side scenarios

Operational data marts



Operational Data Marts

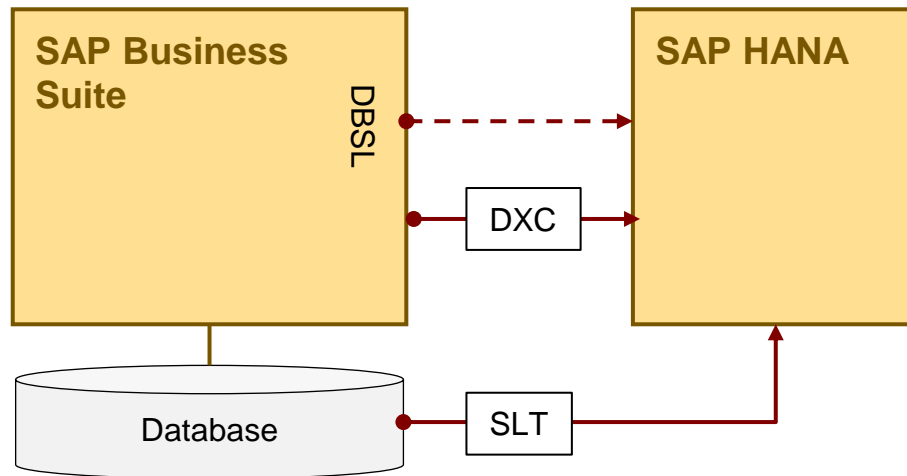
- Views calculate results for reports in real time on the actual operational data
- No transformation during load step (only selection of relevant data if applicable)
- Real-time replication of time critical data (SLT)

Core Value Proposition SAP HANA

- Real-time reporting on operational data

Side-by-side scenarios

SAP HANA based accelerators



HANA Accelerators

- Turnkey solution to accelerate
 - Standard ABAP reports
 - Business processes in SAP ERP
- Flexible reporting using SAP BusinessObjects BI Clients
- Examples: CO/PA, FIN, Material Ledger

Core Value Proposition SAP HANA

- Turnkey accelerator for SAP ERP customers

DXC: Direct Extractor Connector; SLT: SAP Landscape Transformation Replication Server; DBSL: Database Shared Library

SAP CO/PA Accelerator – Customer Experience

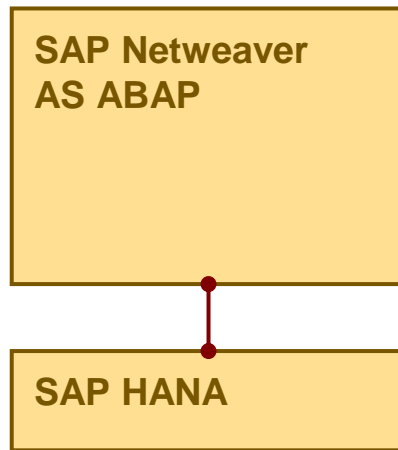
SAP CO/PA Accelerator	ERP w/o HANA	ERP with HANA	Acceleration factor vs. ERP
EBIT with commodity sales – initial report	280 sec	7 sec (DB 2,8 sec)*	40
EBIT with commodity sales – drilldown by alphacode	620 sec	5 sec (DB 2,9 sec)*	124
Cost allocation – initial report	45 sec	5 sec (DB 3,4 sec)*	9
Cost allocation – drilldown by sending cost center	260 sec	7 sec (DB 3,3 sec)*	37

- Additional drilldowns are now possible e.g. by customer and article (not feasible before)
- Drilldown performance not dependent on availability of suitable aggregation level, selection always on line item level from In-Memory Database
- Existing ERP reports are accelerated with no changes to report definitions

*DB measurements show the selection runtime on HANA. Non-DB time is likely to decrease if the application server runs on production hardware.

Integration scenarios

SAP HANA as primary persistence



SAP Netweaver BW, powered by SAP HANA SAP Business Suite, powered by SAP HANA *

- SAP HANA Database becomes primary persistence of ABAP application server
- All Objects and BW loading procedures are accelerated by in-memory technology
- High modeling flexibility

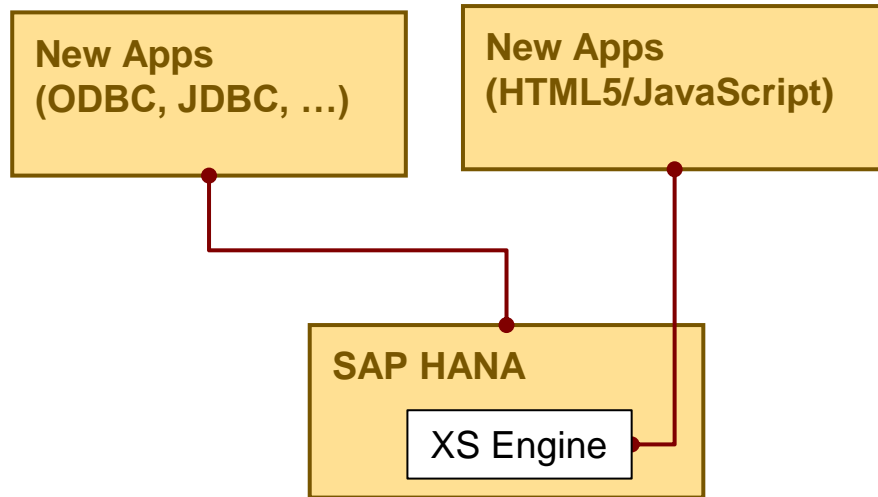
Core Value Proposition SAP HANA

- Speed and simplification for SAP NW BW / Business Suite

*) planned; BW: Business Warehouse

Transformation scenarios

SAP HANA as platform



Next Generation HANA Apps

- Netweaver AS ABAP leveraging HANA
- iOS apps running against HANA
- Java applications running against HANA

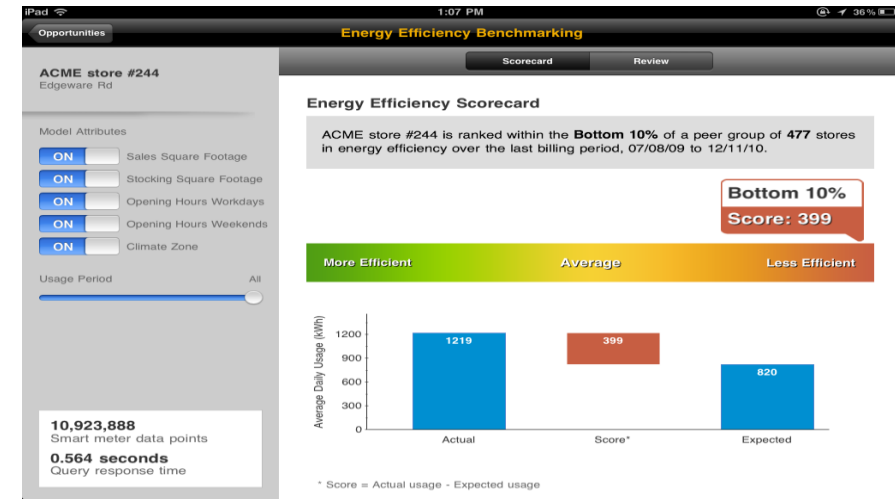
Core Value Proposition SAP HANA

- Simplification: lean code – mean apps

Transformation – Mobile Apps powered by SAP HANA

SAP Smart Meter Analytics

SAP Smart Meter Analytics provides a platform to analyze massive amounts of smart meter data in real time to give businesses and households insights into their actual energy spending patterns.



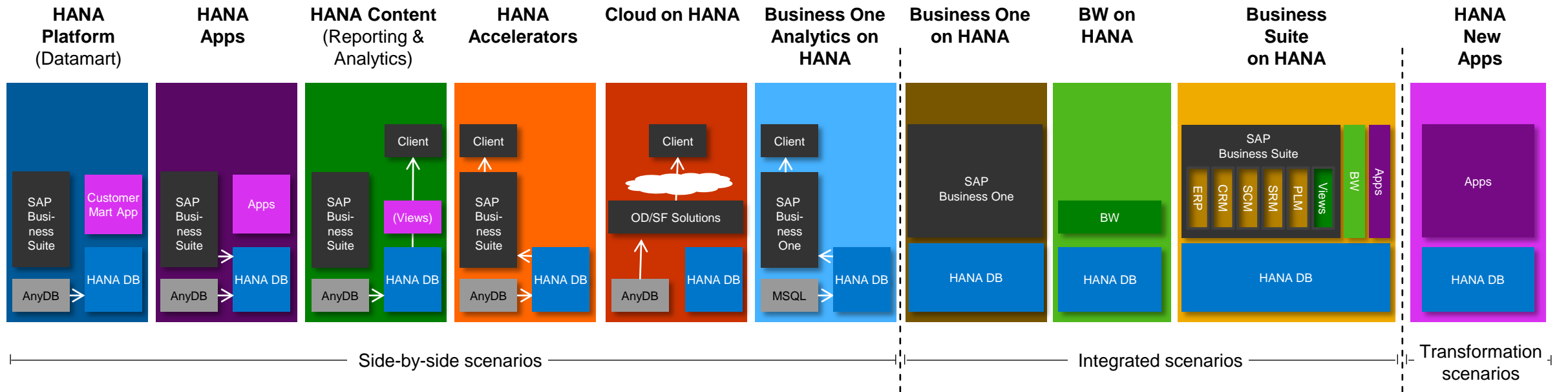
Moneywise (Prototype)

Moneywise is an iPad app that helps department heads understand instantly where and why money is being spent and supports informed spend decisions on the go.



SAP HANA

An ideal platform for real-time business

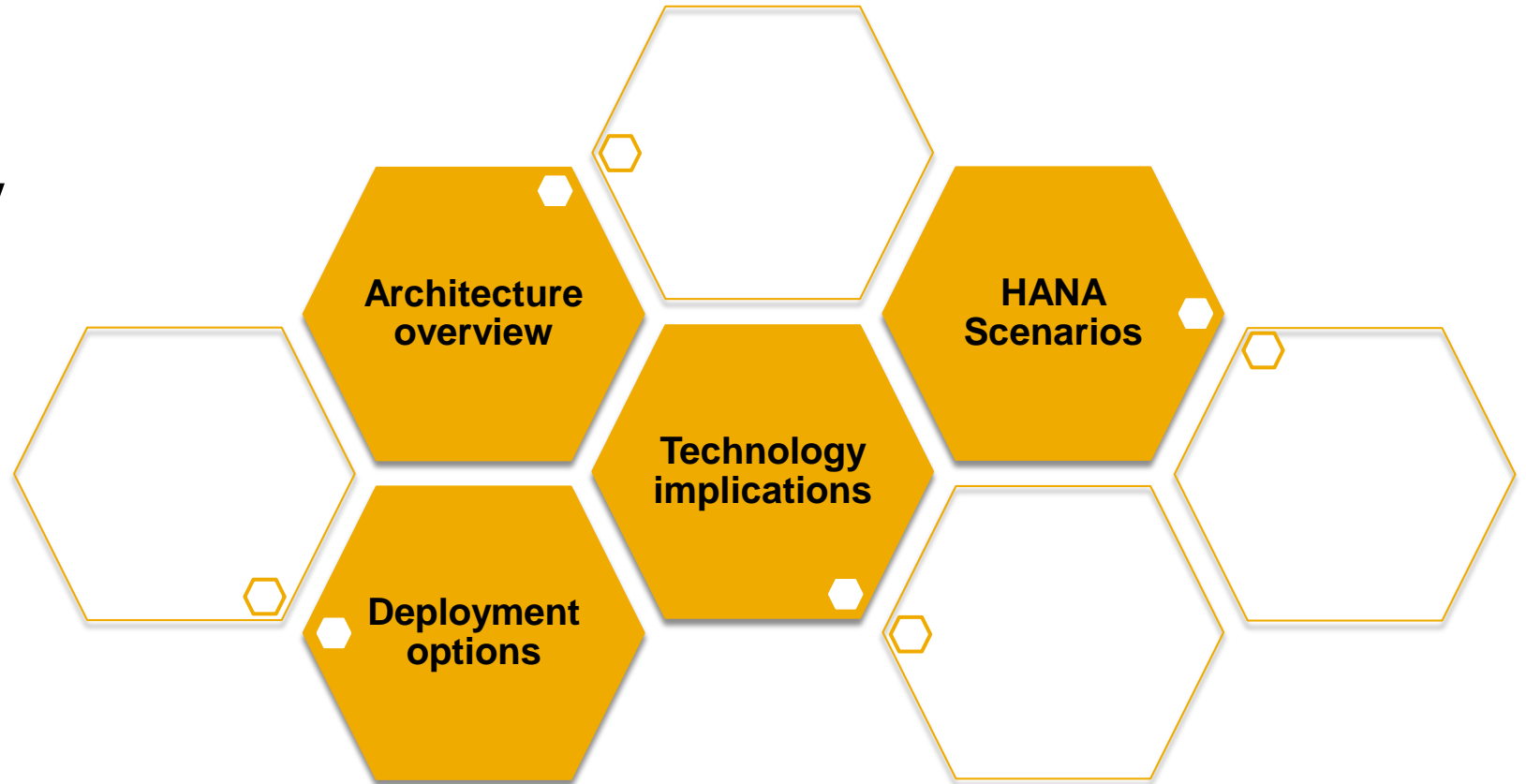


OD: On Demand; SF: SuccessFactor



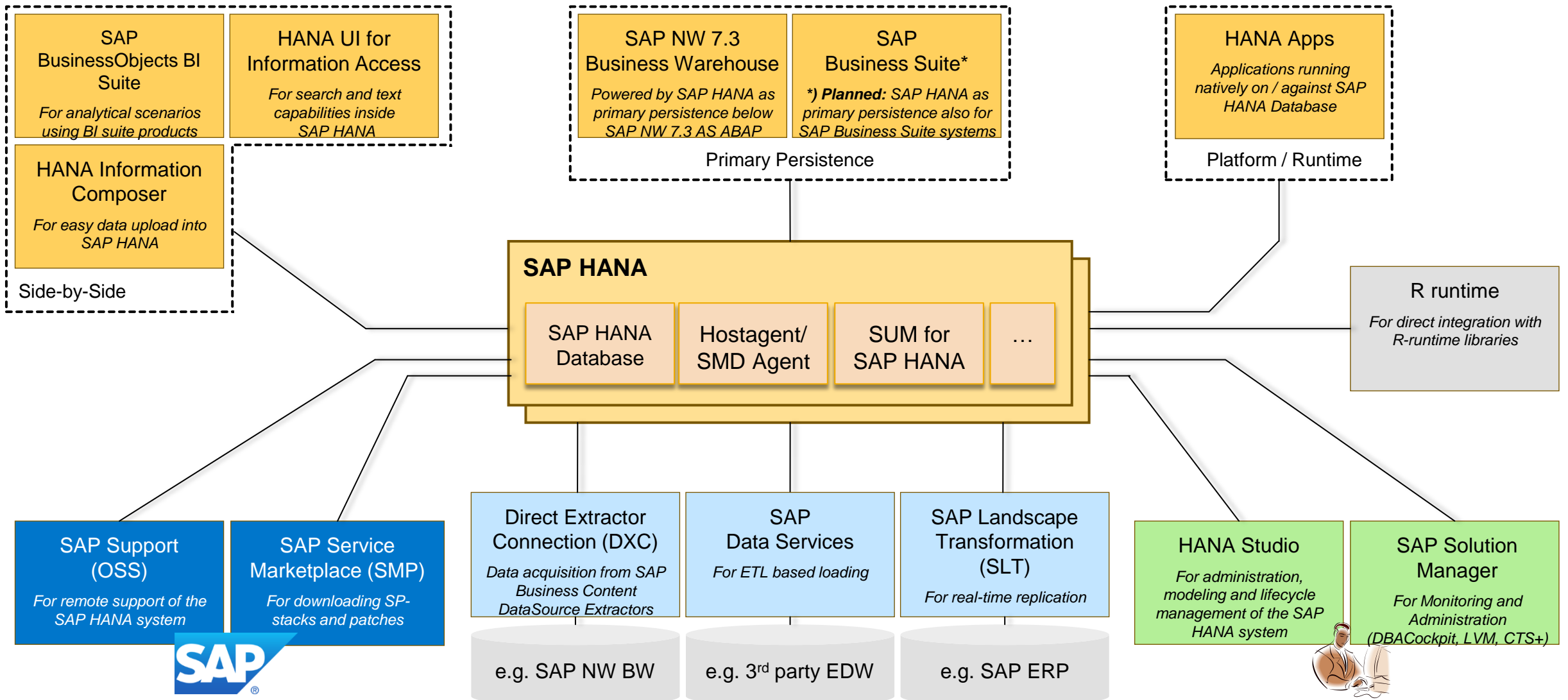
SAP HANA

Architecture & Technology



SAP HANA system landscape

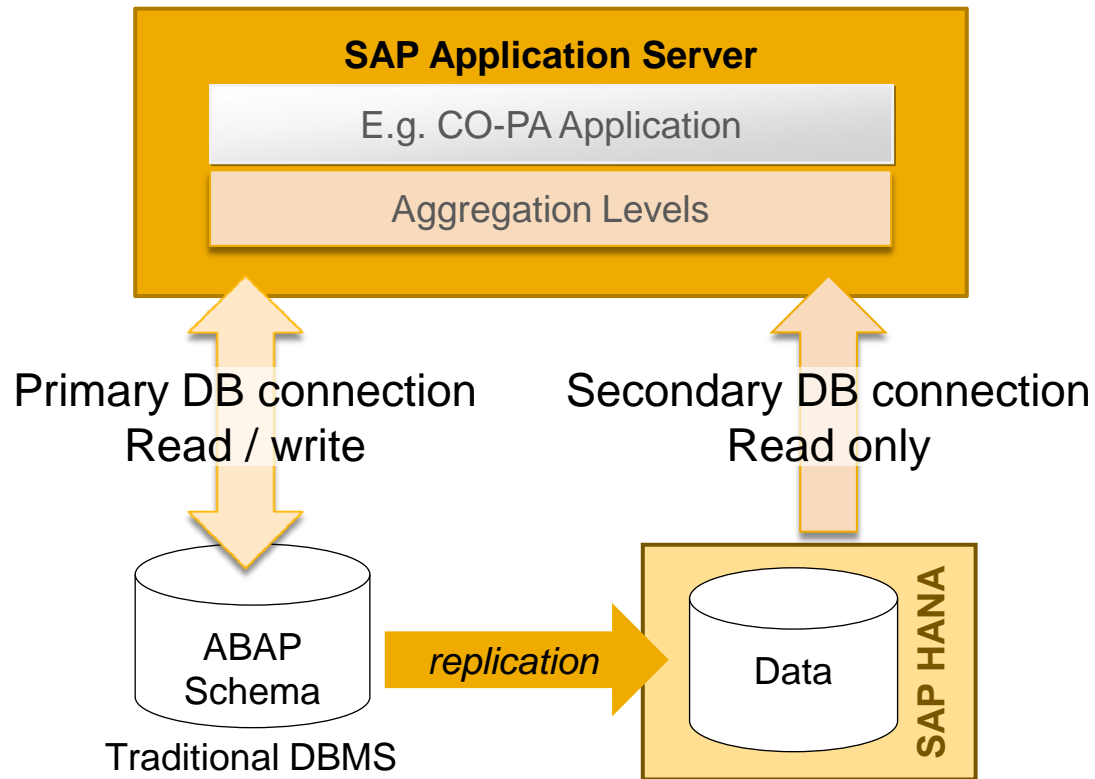
Connectivity overview



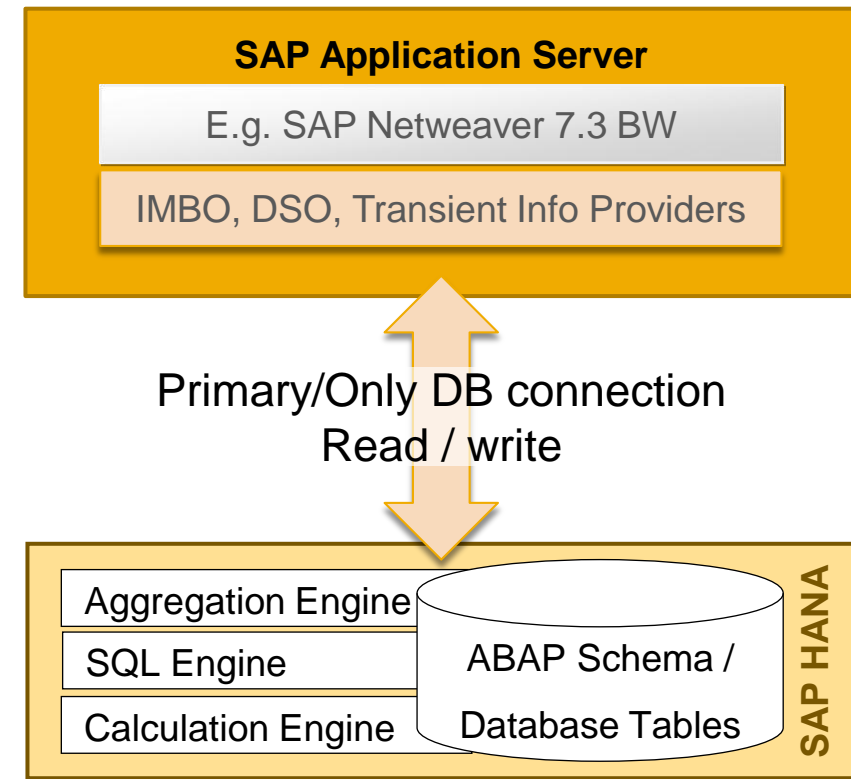
Example landscapes

ABAP based scenarios, powered by SAP HANA

HANA as Accelerator (secondary DB)



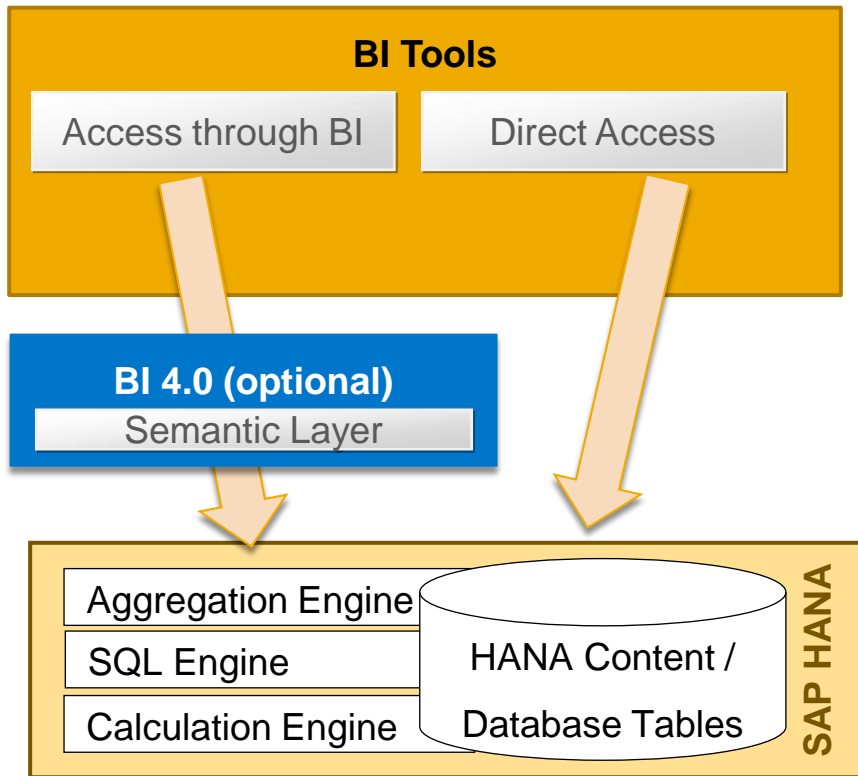
HANA as primary Database (for AS ABAP)



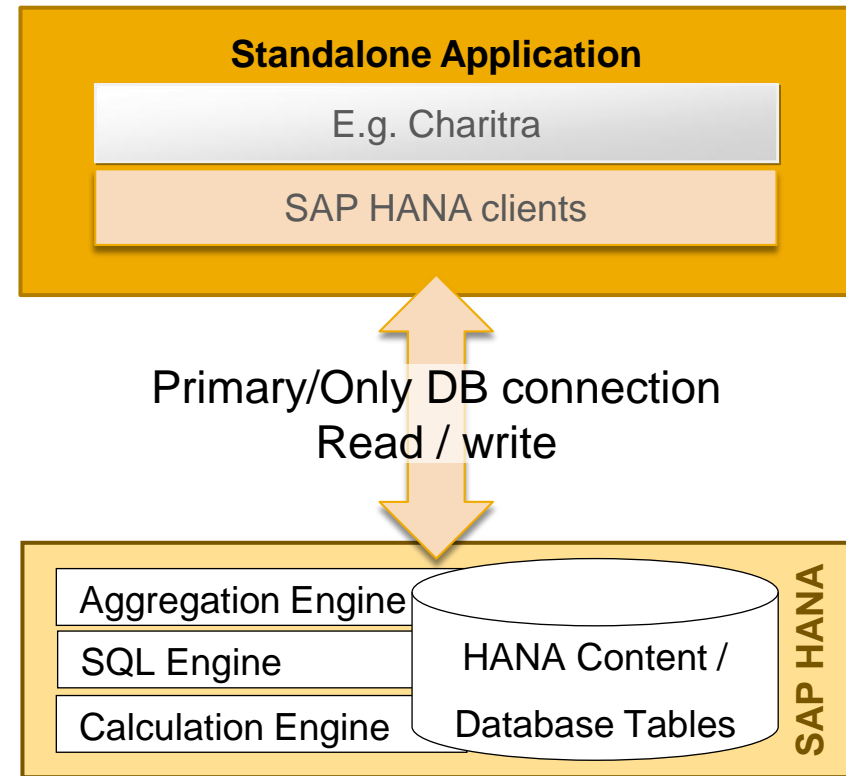
Example landscapes

Non-ABAP scenarios, powered by SAP HANA

Data Marts with SAP HANA



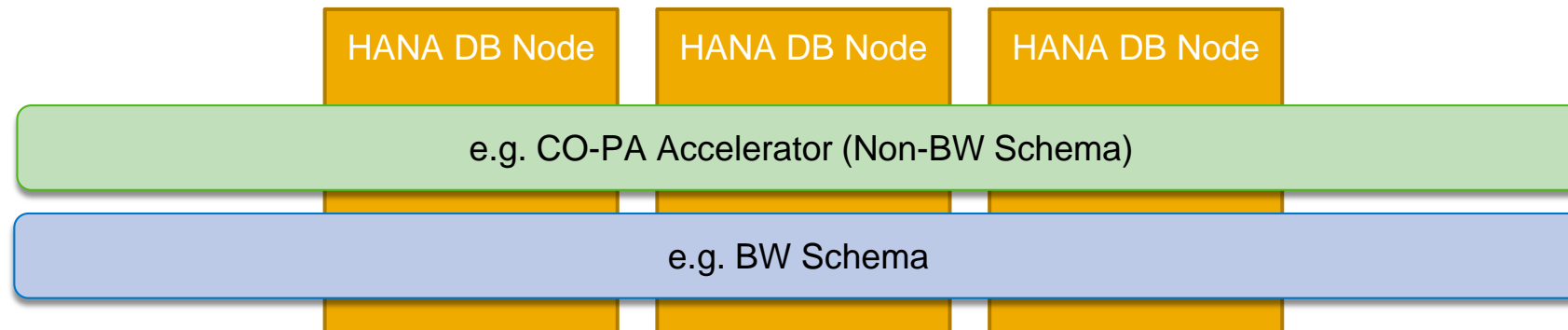
HANA Apps



Landscapes consolidation options

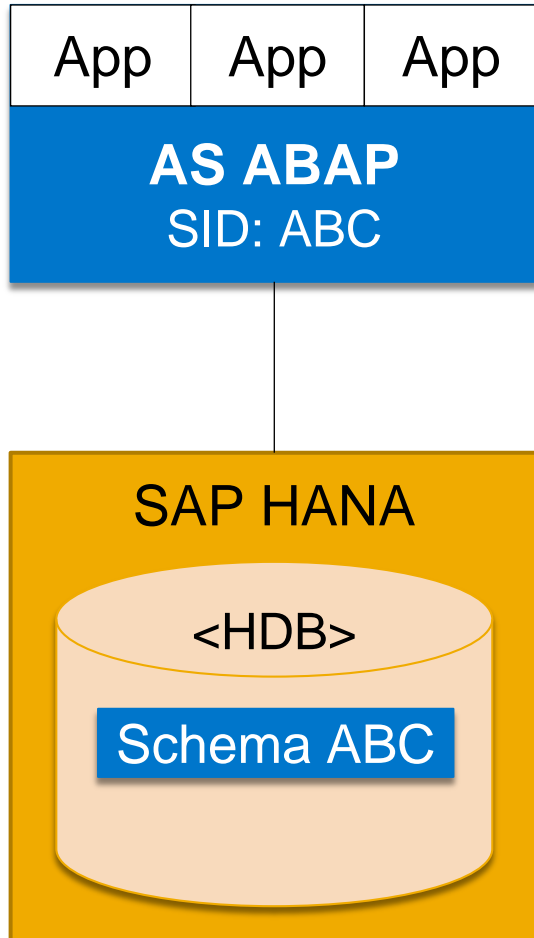
Support for multiple applications on SAP HANA (MCOD)

- SAP **generally does not** support the deployment of multiple applications (or scenarios) within a single SAP HANA system in a production environment
- SAP **does support** running **certain application** types together in one production SAP HANA system. This “White List” of applications which can run together with other applications on one productive SAP HANA system is maintained in **SAP Note 1661202**



SAP HANA “classic” scenario

1x SAP HANA database, 1x application, 1x schema



Implications/Remarks:

- Dedicated Scenario Ownership
- Independent Lifecycle Management (SP, revisions, backups ...)
- Common setup for productive system landscapes

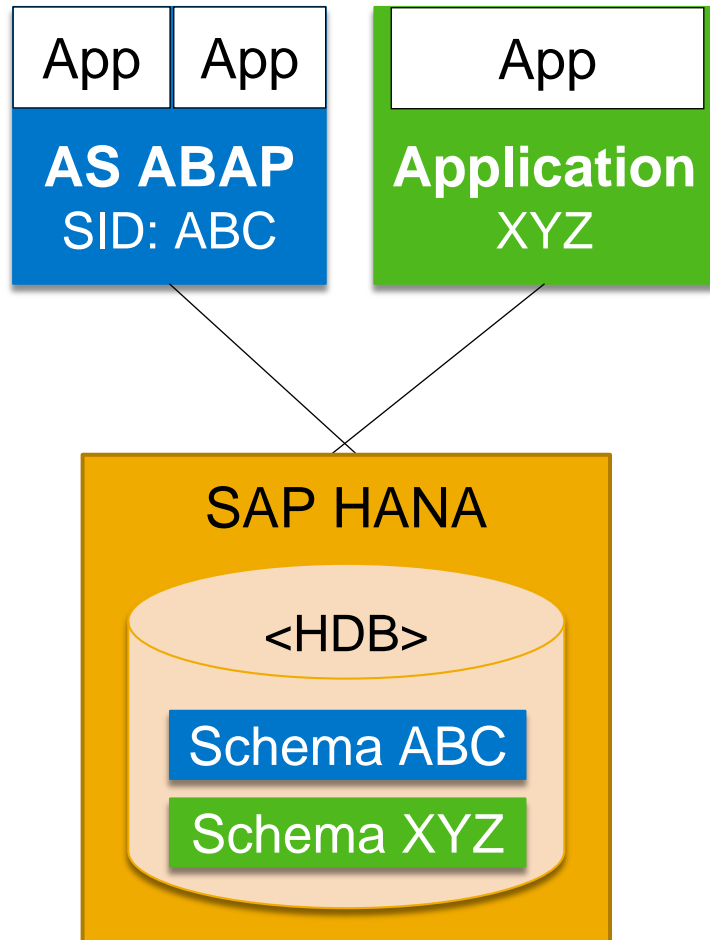
Examples:

- Production NW 7.3 BW, powered by SAP HANA
- Production Business Suite / ERP, powered by SAP HANA *

* planned

SAP HANA “MCOD” scenario

1x SAP HANA database, n- applications and schemas



Implications/Remarks:

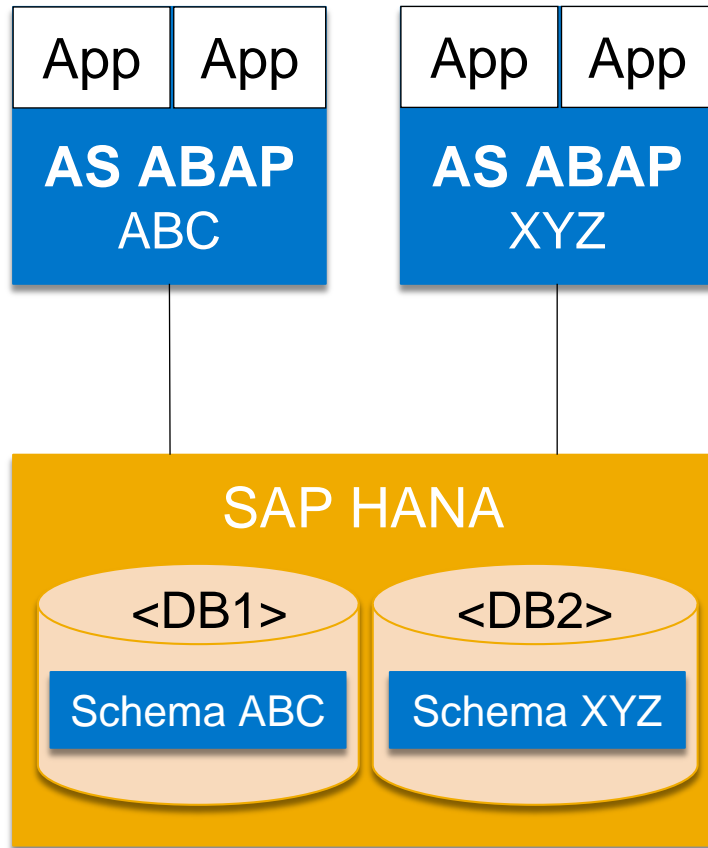
- Lower TCO / hardware usage
- Applications reside in same database installation
- SAP generally does not support the deployment of multiple applications (MCOD), besides explicit listed scenarios within SAP Note [1661202](#) (Support for multiple applications on SAP HANA)

Examples:

- SAP NW 7.3 BW together with Business Suite Accelerators
- Smaller customer projects & POCs

SAP HANA “MCOS” scenario

n- SAP HANA databases, applications and schemas



Implications/Remarks:

- Lower system provisioning costs for non-production systems
- Individual lifecycle for the individual databases
- No CPU/Memory resource management
- SAP does support running multiple SAP HANA databases only for non-production (DEV, QA, test, etc.) SAP HANA appliances, as stated in SAP Note [1681092](#) (Multiple SAP HANA databases on a SAP HANA appliance) for more details

Examples:

- Combine Dev / Q / Demo - Systems in one physical SAP HANA

SAP HANA

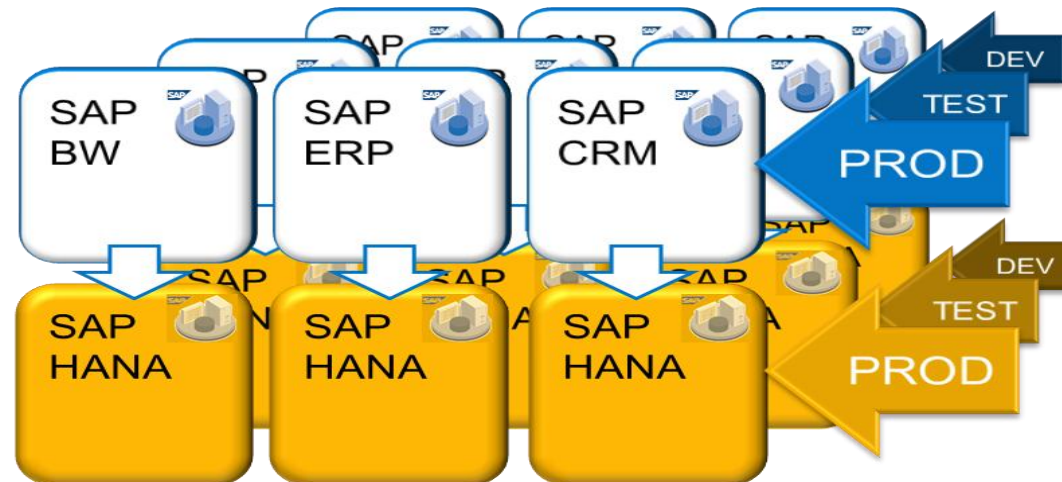
The unified data platform for all SAP apps

Available Now

- One DB platform for SAP applications
- Unified OLAP and OLTP scenarios
- **Each scenario has still an own SAP HANA system**

Future Vision *

- **One DB platform for the whole landscape**
- Logical databases per SAP application
- Providing elastic resource management to...
 - ...maximize performance
 - ...reduce overall costs



* planned



Thank You!

Contact information:

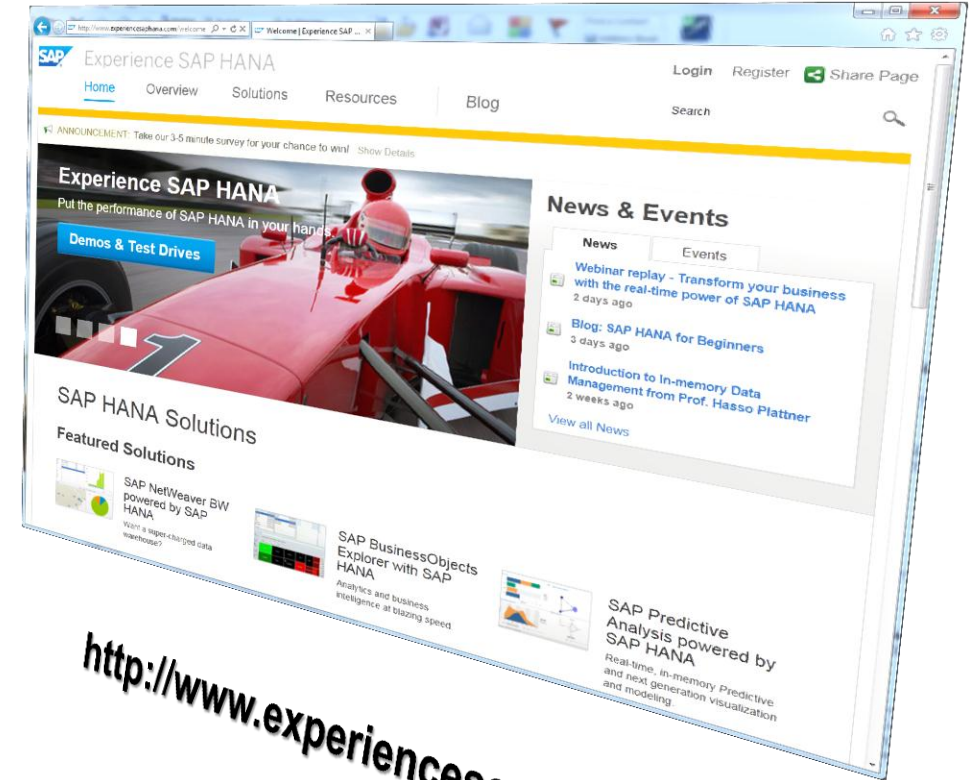
Arne Arnold, MSc, PMP ®

Product Management SAP HANA

TIP In-Memory Platform

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<http://www.experiencesaphana.com/>

Further Information

Related Workshop/Lectures at SAP TechED 2012

ALM105	SAP HANA – Operations, High Availability, and Data Center Readiness	Lecture (1h)
ALM161	SAP HANA operations – Basics	Hands-On Workshop (2hr)
ALM360	SAP HANA operations – Advanced	Hands-On Workshop (2hr)
EIM106	SAP HANA – Data Provisioning for Replication with SAP and Non-SAP Applications	Lecture (1h)
EIM109	Search-Based Applications on Unstructured Content in SAP HANA	Lecture (1h)
EIM160	Landscape Transformation Replication Server – Real-Time Data Integration into SAP HANA	Lecture (2h)
EIM163	Loading Data in Batch Mode into SAP HANA with Data Services and Connections	Lecture (2h)
EIM204	Applications Powered by SAP HANA	Lecture (2h)
SIS201	All You Need to Know About Security with SAP HANA	Lecture (1h)
TEC105	SAP HANA Database for SAP Business Suite	Lecture (1h)

Further Information

SAP Public Web

<http://www.sap.com/hana>

<http://experiencesaphana.com/>

<http://scn.sap.com/community/hana-in-memory>

SAP Education and Certification Opportunities

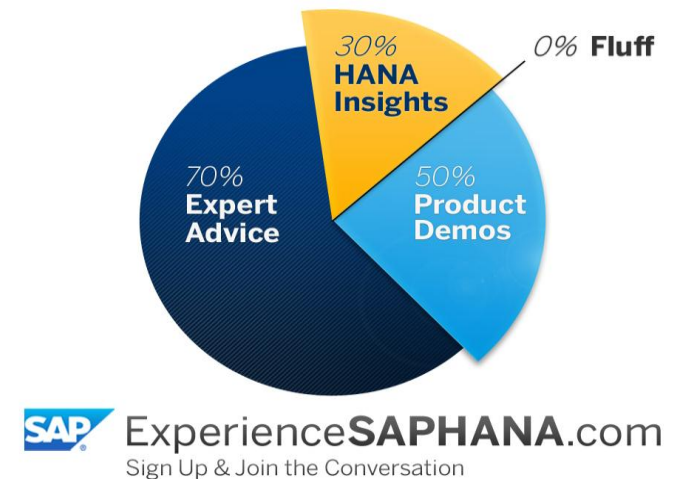
<https://training.sap.com/de/en/curriculum/hana-sap-hana>

<https://training.sap.com/bundles/product/sap-hana>

<http://www.sap.com/education>

Watch SAP TechEd Online

<http://www.sapteched.com/online>





Feedback

Please complete your session evaluation for this Session [EIM201](#).

Thanks for attending this SAP TechEd session.



SAP's technology innovations and solutions

Important building blocks for a sustainable IT



IT Challenges Today

- IT budgets stayed flat or have been reduced
- IT complexity increased due to additional business needs
- Energy a rising cost element for years
- More and more public pressure for greener ICT

SAP's Technology Innovations and Solutions ...



... help to reduce IT energy consumption, minimize e-waste and foster dematerialization



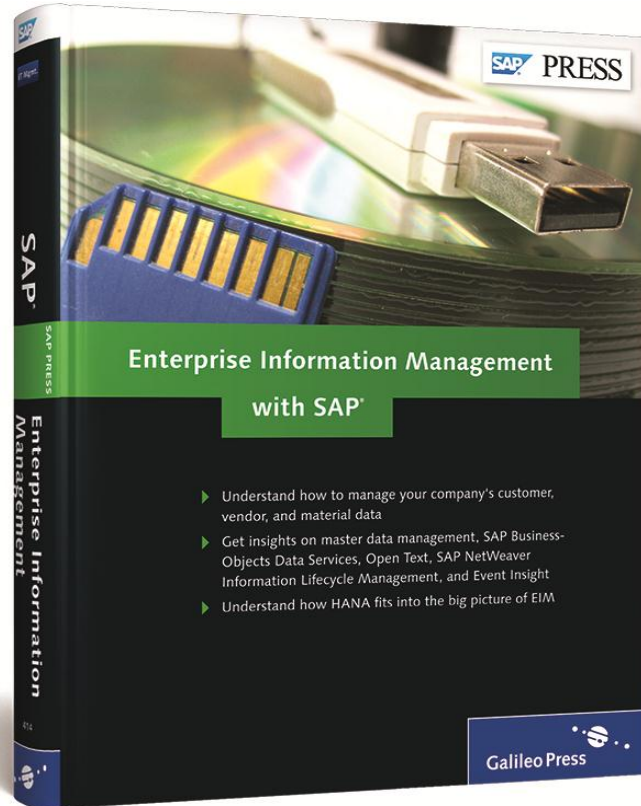
... stand for simplification and overall execution excellence



... ensure end to end business processes availability and management

More about
Sustainable IT
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Enterprise Information Management with SAP



- Understand the big picture of SAP's enterprise information management offerings
- Explore step-by-step instructions for working with SAP Data Services
- Learn how to perform the most important tasks in SAP Information Steward, SAP Netweaver Information Lifecycle Management, SAP Master Data Governance, and SAP Extended Content Management
- All royalties donated to Doctors Without Borders

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The BW on SAP HANA cookbook

The Cookbook provides an overview and consolidates guides and notes relevant to moving BW to SAP HANA in one location.

It was created together with customers and has features to take notes and ask questions within context.

The screenshot displays the SAP BW on SAP HANA cookbook interface. At the top, the SAP logo and the tagline "The Best-Run Businesses Run SAP" are visible. Navigation options include "Bookmarks", "Login", and a search bar. The main navigation bar features "BW on SAP HANA", "Deploying BW on HANA" (highlighted), "Operating HANA with BW", and "Modeling BW Data". Below this, a progress bar shows "PREPARATION", "INSTALLATION" (highlighted), and "POST-INSTALLATION". The "Export Database Instance" section is active, showing a list of tasks: "Run SAPinst installer", "Perform Export Preparation (optional)", "Table Splitting Preparation (optional)", and "Export Database Instance" (highlighted). A step-by-step guide is visible, starting with "1 Begin Database Instance Export" and "2 Enter Profile Directory for source system".

<https://cookbook.experiencesaphana.com>

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Operating SAP HANA within your datacenter

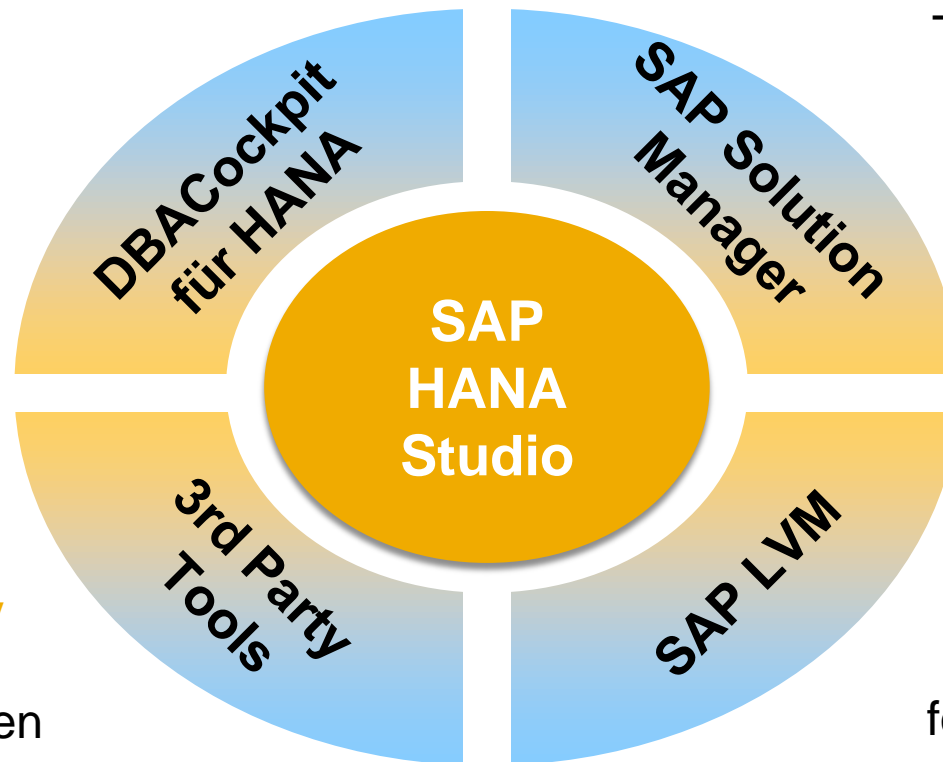
Managing SAP HANA – When to use which tool?

The **SAP HANA Studio** is the primary tool for administration & monitoring of SAP HANA

Integrated into **DBACockpit**, the SAP HANA database can be generally monitored and administered like any other database from within AS ABAP

Integration of SAP HANA specifics into **common 3rd –party monitoring and backup tools** currently being worked out between SAP and its partners.

** Virtualization of SAP HANA not supported*



The **SAP Solution Manager** can be used for basic administration and monitoring of HANA systems within existing SAP landscapes

SAP HANA also integrates with the **SAP Netweaver Landscape Virtualization Management (LVM)** for operation of larger/complex SAP landscapes (start/stop & dependencies, etc.)*

Operating SAP HANA within your datacenter

Available tools for administrating and monitoring SAP HANA

- **SAP HANA studio**

- Stand-alone tool, available for Windows and Linux operating systems
- Provides **advanced administration** and **monitoring** features
- Currently the only tool which supports database-recovery (from DB backup)
- Contains further functionality for modeling, lifecycle management and user management

- **SAP Solution Manager**

- Is available as of SAP Solution Manager 7.1 SP04 and following releases
- Provides **basic administration** and **monitoring** features for SAP HANA systems within existing SAP system landscapes through enablement of DBA Cockpit *, Solution Manager Diagnostics (SMD), System Landscape Directory (SLD) and Maintenance Optimizer (MOPZ) **
- Is used by SAP support for early problem analysis

- **SAP Netweaver Landscape Virtualization Management (LVM)**

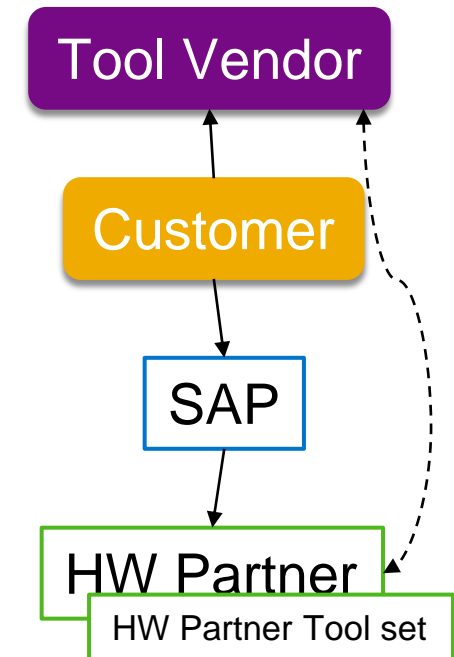
- Is available as add-on for of SAP Netweaver 7.3
- Provides **operation** capabilities for SAP HANA systems within larger/complex landscapes
- Can be used by customer for start/stop, taking into account system dependency, etc.

**) DBA Cockpit also available as part of SAP NW 7.3 BW, SP05; ** As of SAP Solution Manager 7.1 SP05*

Operating SAP HANA within your datacenter

Fulfilling IT compliance (IT policies) for data centers

- **Data Center compliance usually defines a collection of topics to be addressed:**
 - Managing, Monitoring and Backup & Restore
 - Central user management with IDM
 - Anti Virus software usage obligation
 - OS security patches, firewalls
 - etc.
- **SAP tolerates any tools required to be installed on the SAP HANA system, needed to comply with these policies, while following restrictions apply:**
 - Neither SAP nor the hardware vendor is offering support for tools which are not official part of the SAP HANA bill of material (BOM)
 - In addition to SAP, also the hardware vendor has to state that they are tolerating the installation and operation of the compliance-related software in question
 - The Customer agrees to stop these tools upon request, in case of a support issue to reproduce the problem



Operating SAP HANA within your datacenter

HANA content transport capabilities

In context of Data Marts:

- 2-step integration into CTS+ (“lose coupling”):
 - Manual preparation (server-side export)
 - Automated transport and deployment in target system via CTS+
- Potential for ABAP-based new applications (HPAs)
 - TLOGO-based transport
 - Encapsulating SAP HANA content in ABAP objects
(allows transport SAP HANA content with application code through standard CTS mechanisms)

In context of SAP NW 7.3 BW, powered by SAP HANA

- Leverage existing transport functionality

