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ASUG & BOUG
Pittsburgh, PA

SAP HANA

March 12, 2012

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Agenda

- » Product Vision
- » Market Positioning
- » Architecture Overview
- » HANA and the SAP Landscape
- » CTI HANA Expertise and Center of Excellence

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HANA PRODUCT VISION

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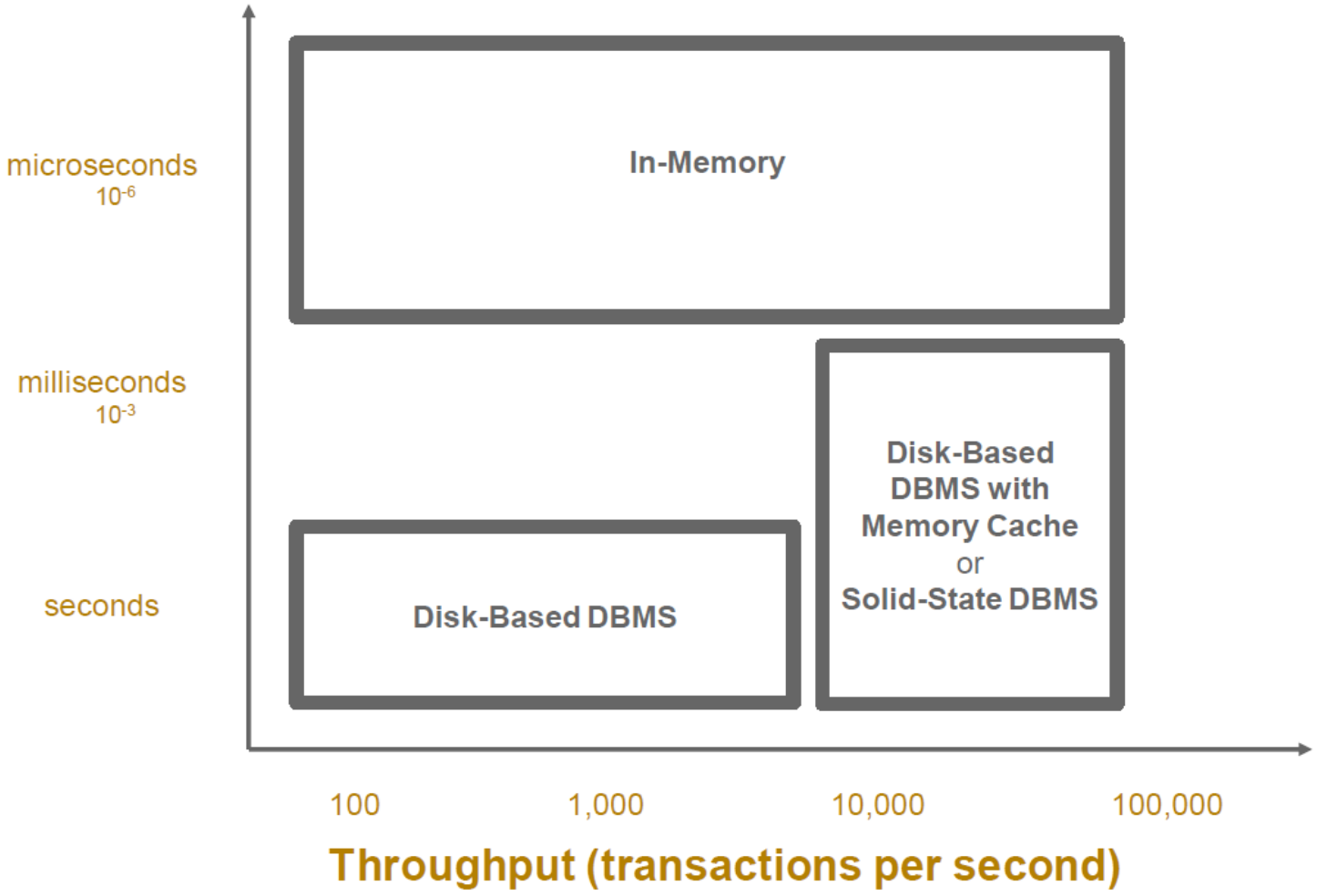
HANA Architectural Principles



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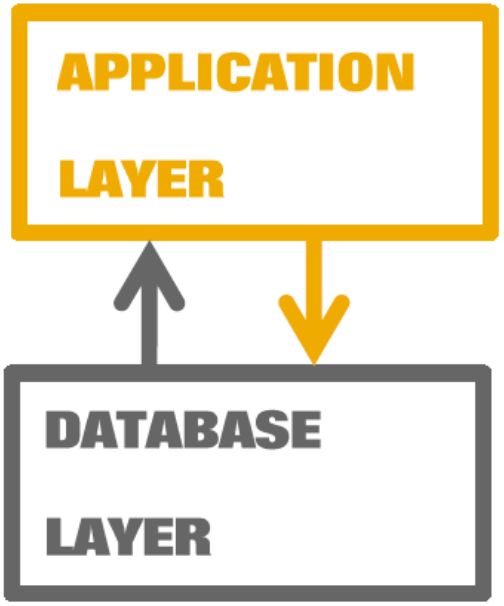
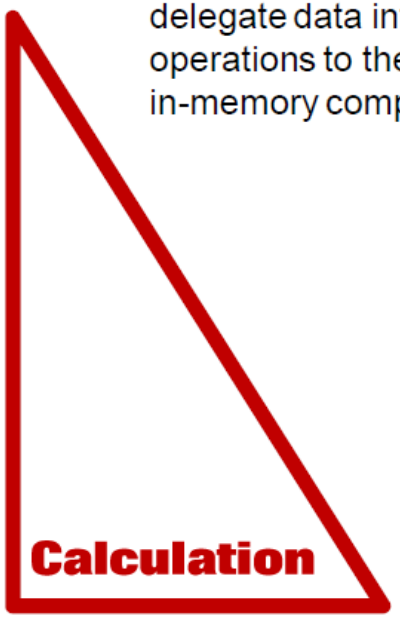
HANA Architectural Principles

Classical Approach



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

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



Future Approach

→ **MOVE** calculations into database

→ Only transfer **RESULTS**

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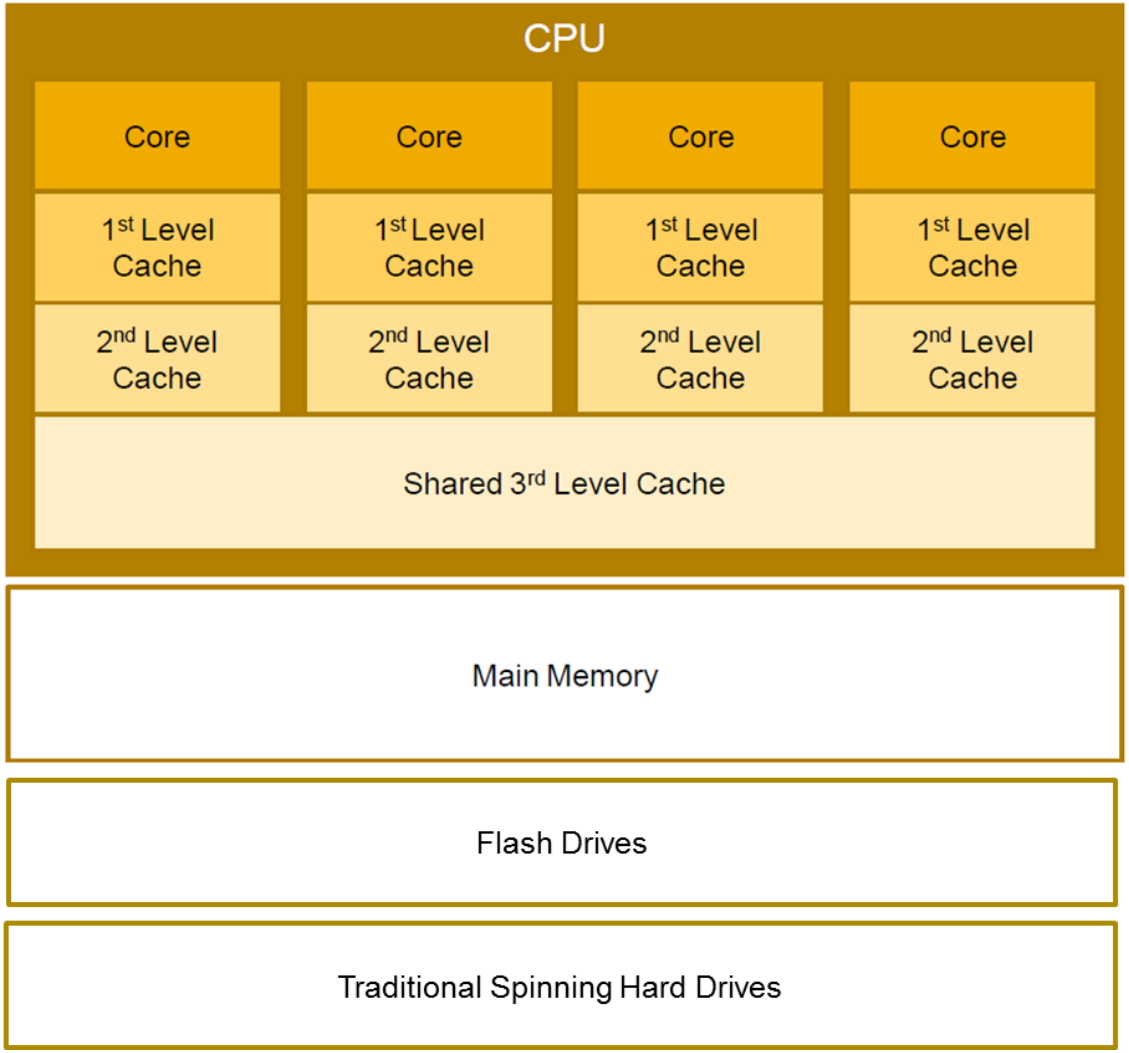
Latency comparison chart



Size	Latency
64KB	1-2 cycles
256KB	6-20 cycles
8MB	30-60 cycles
Several GBs up to TBs	100-400 cycles
Several TBs	5,000 cycles
Several TBs	10,000,000 cycles

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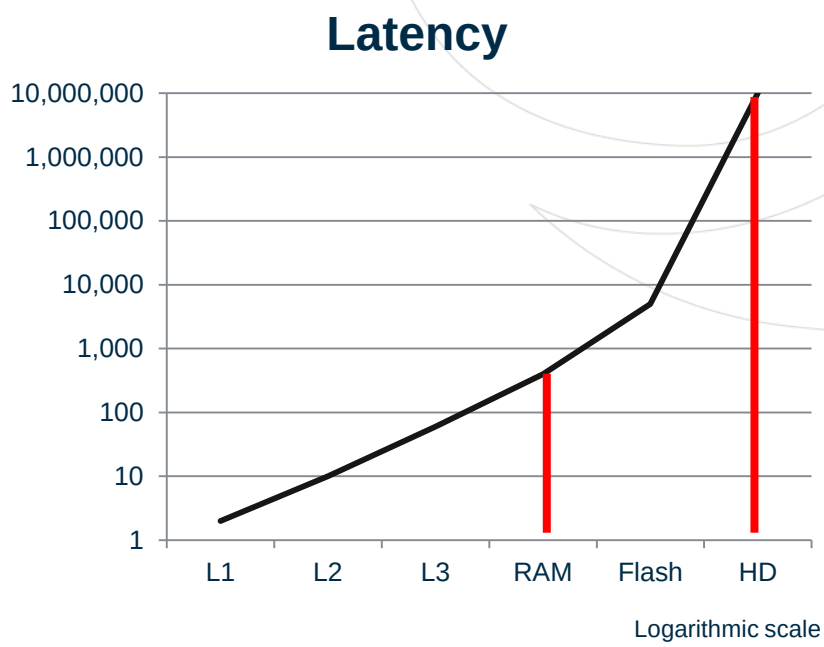
Disk vs. RAM

RAM is 25,000x faster than HD



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In-memory databases are not new

Products

Product name	License	Description
Adaptive Server Enterprise (ASE) 15.5	Proprietary	enterprise database from Sybase)[5]
Apache Derby	Apache License 2.0	Java RDBMS
Altibase	Proprietary	has in-memory and disk table; HYBRID DBMS
BlackRay	GNU General Public Licence (GPLv2) and BSD License	
CSQL	GNU General Public Licence or proprietary	
Datablitz	Proprietary	DBMS
Eloquera	Proprietary	In-memory, In-memory:persist modes
EXASolution	Proprietary	relational database management system from EXASOL)[6], in-memory query processing, massively parallel data processing, column by column storage
eXtremeDB	commercial product	DBMS, also check out its open source PERST dbms.
Finances Without Problems	commercial product	primarily in-memory database with hybrid features
FleetDB	MIT	NOSQL db with Writing to an append-only log to provide durability.
H2	Mozilla Public License or Eclipse Public License	has a memory-only mode
HSQLDB	BSD license	has a memory-only mode
IBM TM1	Proprietary	in-memory BI and data analysis
InfoZoom	Proprietary	in-memory BI and data analysis
KDB	Proprietary	DBMS, also supports disk based data
#liveDB	Open Source	Prevalence engine
membase	Apache License	NoSQL, hybrid
Mercury	Proprietary	object oriented, in-memory data management with persistency support, in-built compiler, hosts application server on same machine; developed by staila technologies, an ETHZ spinoff [7]
MicroStrategy		in-memory BI for MicroStrategy 9
MonetDB	MonetDB License	
MySQL	GNU General Public License or proprietary	has a cluster server which uses a main-memory storage engine
Oracle Berkeley DB	Sleepycat License	can be configured to run in memory only
Panorama		for Windows and Macintosh, both single user and server versions
ParAccel	Proprietary	in-memory, columnar, relational, ACID-compliant; disk-based mode as well
Polyhedra IMDB	Proprietary	relational, supports High-Availability; acquired in 2001 by ENEA
QlikView		BI-tool developed by QlikTech
RDM Embedded	Proprietary	including hybrid
RDM Server	Proprietary	including hybrid
Redis	BSD	NoSQL
solidDB by IBM		including hybrid, HSB-based HA, Shared memory, embedded, XA, etc.
SAP HANA database	Proprietary	Database engine of the SAP In-Memory Appliance (SAP HANA) produced by SAP AG
SQLite	Public domain	hybrid, RAM and disk dbs can be used together
Starcounter		in-memory object relational dbms
Tarantool	BSD	NoSQL, extendable with Lua stored procedures
TimesTen by Oracle		in memory only or as a cache for Oracle Database
Vertipaq	Proprietary	Microsoft PowerPivot and Microsoft Analysis Services in-memory BI engine
VoltDB	GNU General Public License v3	in-memory
TREX		search engine in the SAP NetWeaver integrated technology platform produced by SAP AG
Xcelerix by Frontex		commercial product
WX2 by Kognitio		commercial product
Xeround		commercial product, database as a service, in-memory infrastructure with MySQL front-end

Source: Wikipedia

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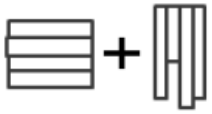
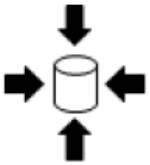
What else?



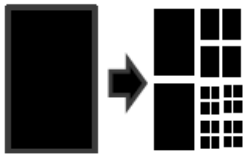
In-Memory
Row and Column Store

Column = Fast Queries



Compression

5 – 20x

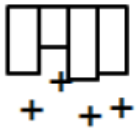


Partitioning
In-Database Computing

Analyze Large Data Sets
Complex Computations

No Aggregate Tables

Flexible Modeling
No Data Duplication



Real-Time Replication
Insert Only on Delta

Fast Data Loads

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Column store

conceptual view

A	10	€
B	35	$
C	2	€
D	40	€
E	12	$

mapping to memory

organize by row

A	10	€	B	35	$	C	2	€	D	40	€	E	12	$

organize by column

A	B	C	D	E	10	35	2	40	12	€	$	€	€	$

memory address

Columnar data store benefits

- Higher performance for column operations
- Compression
- Less indexing overhead
- Parallelization

Can be joined with row-based data

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MARKET CONDITIONS

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Is the time right for in-memory?

Tablets

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Gartner

“SAP application infrastructure and architecture strategy, dubbed HANA Architecture, combines cloud and in-memory technologies in a progressive, and potentially disruptive, vision.”

“SAP's vision will force mega vendor competitors to respond by clearly and openly articulating their cloud and in-memory computing strategies.”

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IDC

Expected Business Benefits of In-Memory Technology

Q. What would you expect to be the greatest business and IT benefits of such in-memory technology for your organization or business unit?

IDC Views on In-Memory Computing	Business Benefits	(% of respondents)
More planning iterations, scenarios, and variables can be taken into account when planning. Adjustments can be made as actual performance is updated.	Improve planning accuracy	37.3
More granular data is available for analysis, with the system performing aggregation when requested.	Reduction in time spent by business staff on data preparation, cleansing, aggregation	35.6
Speed of analysis leads to quicker insight. It enables embedding of analytics within key business processes.	Reduction in analysis turnaround time	33.5
In-memory technology removes the barrier to investigating and finding meaning in organizational performance data.	Ability to analyze more granular data rather than pre-aggregated information	32.7
Applications combine benefits of in-memory technology with business context through an interactive interface.	More flexible and more interactive user interface	29.4
Speed of analysis enables more scenarios to be done in a given day than with traditional planning solutions.	Ability to run through more planning or scenarios	29.0
Users are free to perform ad hoc queries not limited by predefined data sets.	Answers to questions we could never ask before	27.6
Speed of analysis means business users can question assumptions, re-evaluate potential outcomes, and repeat with rapidity.	Increase frequency of re-evaluation of analytic models, plans, forecasts	26.6

n = 1,002

Source: IDC's SAP HANA Market Assessment, August 2011

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The competition

VS.

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ARCHITECTURE OVERVIEW

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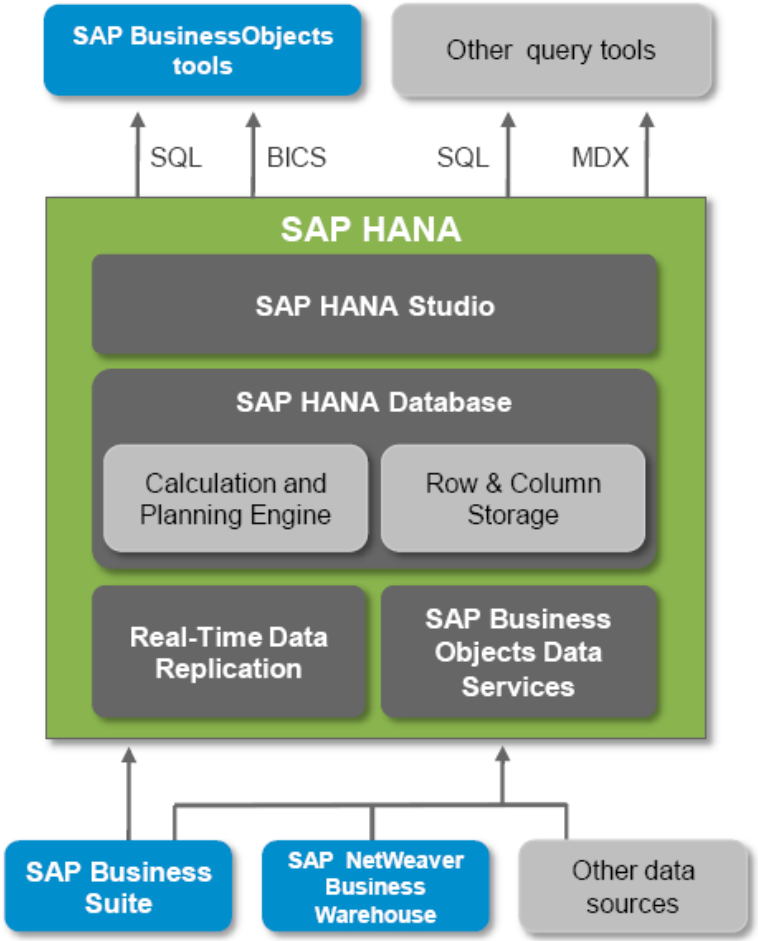
Simple Architecture Diagram



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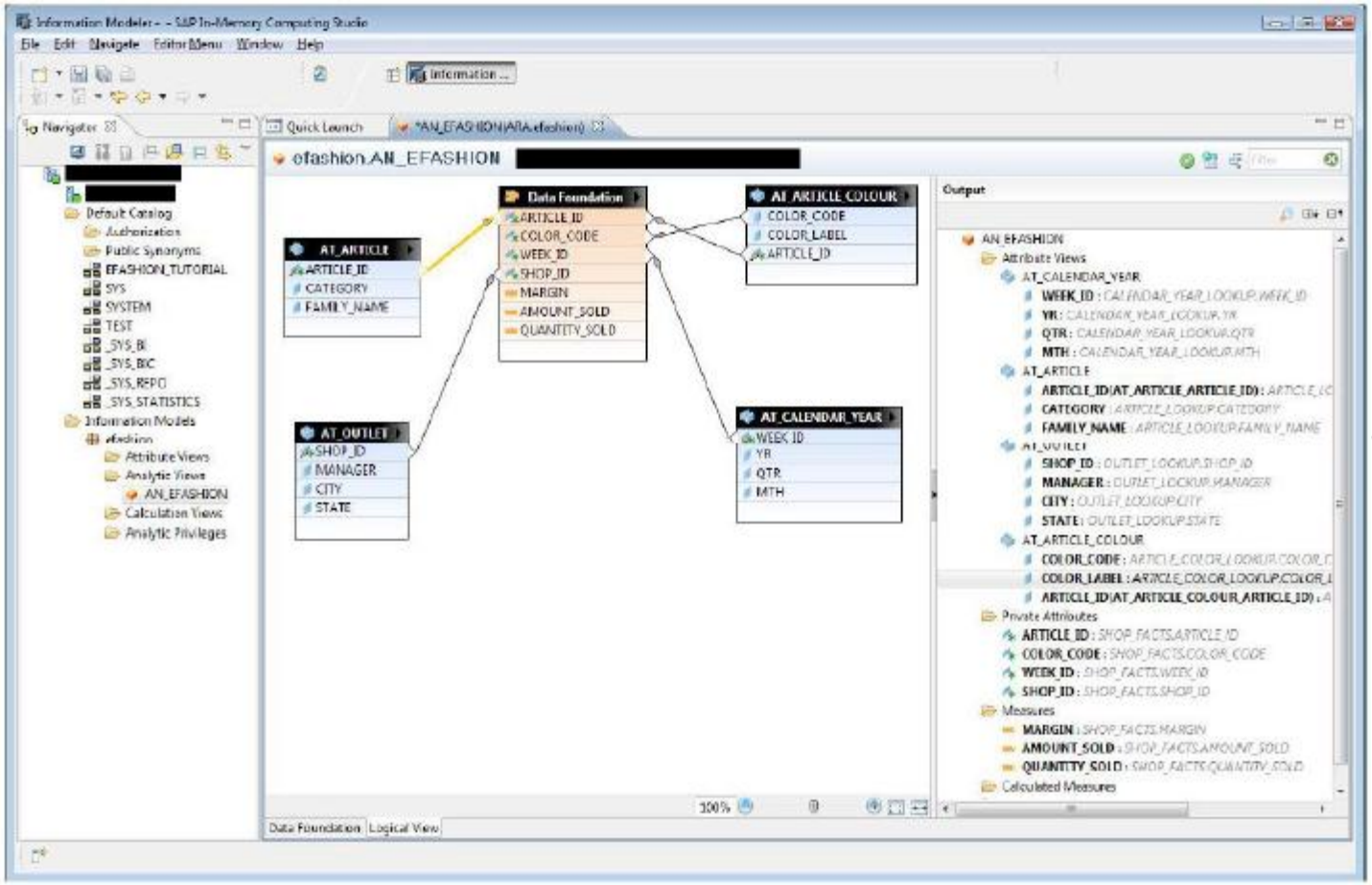
HANA Studio



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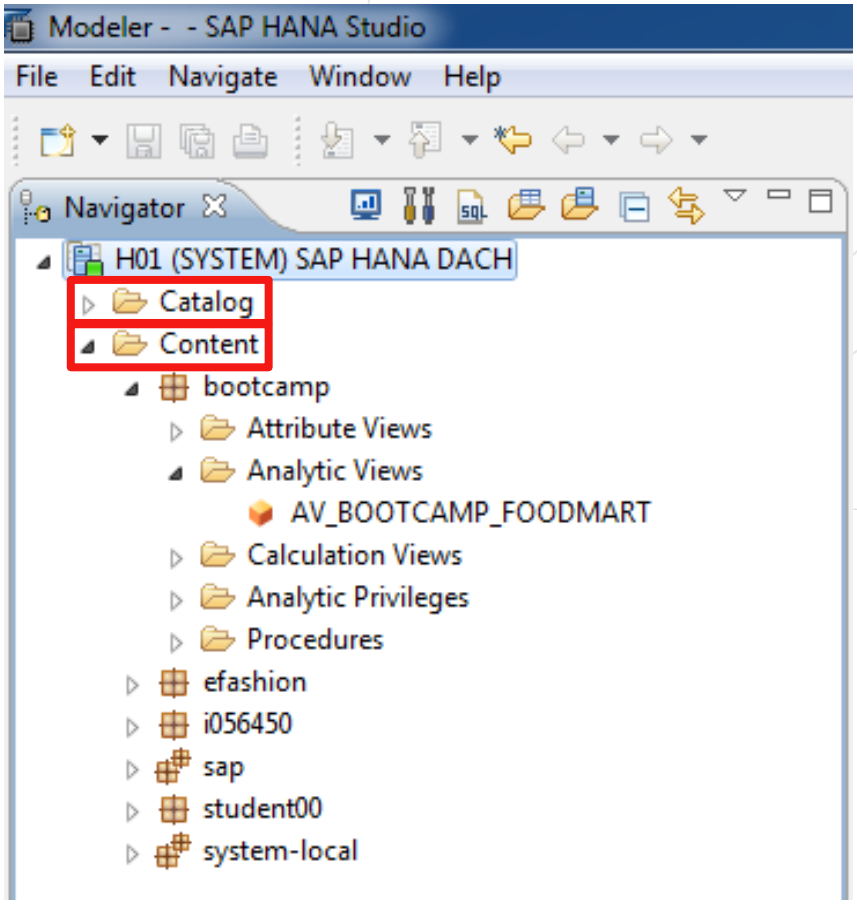
Simple Object Model

Catalog vs. Content



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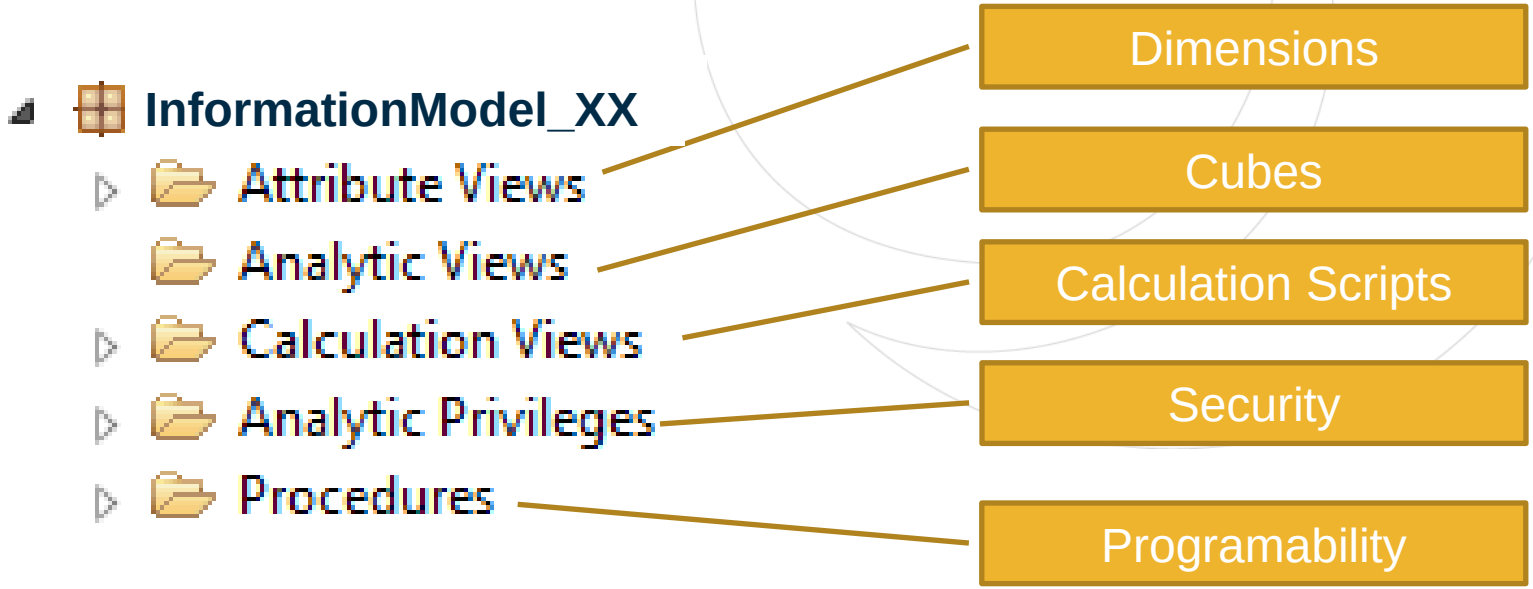
Simple Object Model

Content



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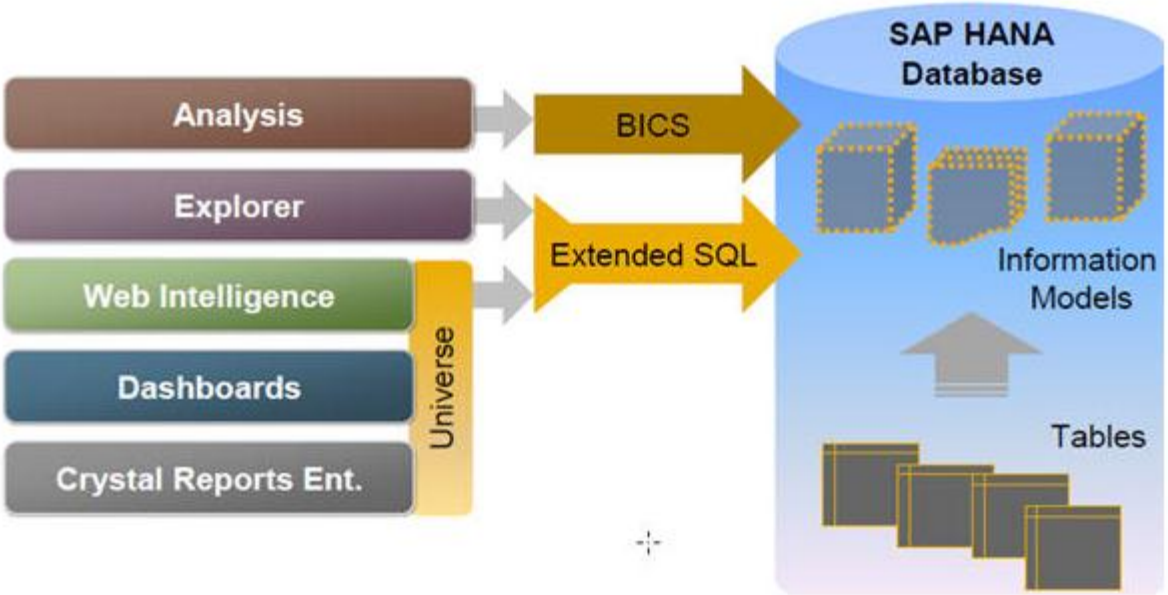
HANA and BusinessObjects



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HANA AND THE SAP LANDSCAPE

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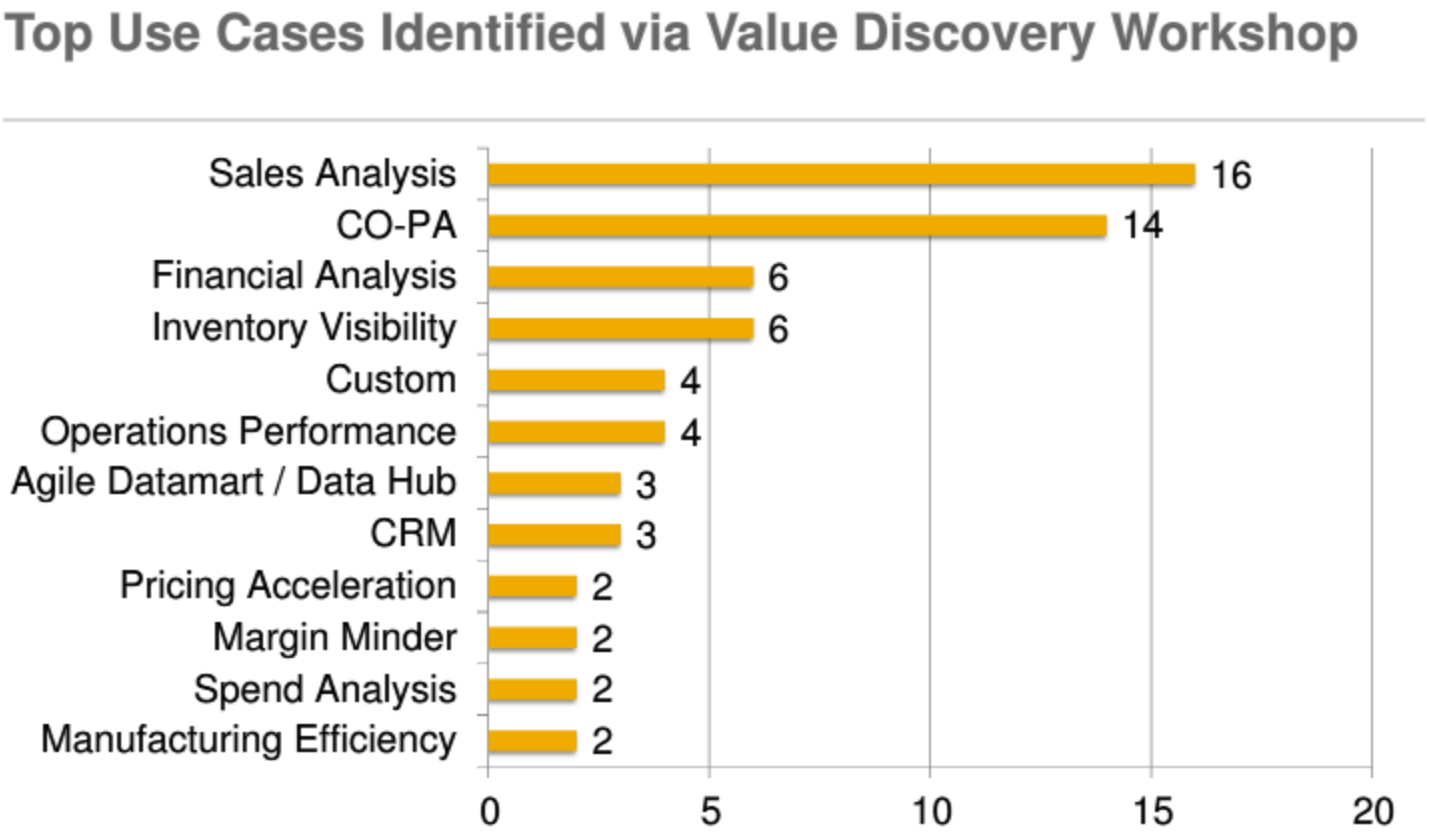
The need for performance



Customer are looking for fast & flexible information access

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SAP BW and HANA

14,000 SAP NetWeaver BW customers

	"Renovation" SAP HANA 1.0 Generally Available	"Innovation" Mid-Term (Plan)	"Transformation" Longer-Term (Plan)
	In-Memory Analytics	Intended Next-Gen Applications	Intended One Store for Data and Analytics
Capabilities	▪ SAP HANA real-time operational analytics ▪ Complete SAP BusinessObjects Business Intelligence (BI) suite 4.0 runs on SAP HANA	▪ SAP NetWeaver BW fully running on SAP HANA ▪ SAP HANA platform for in-memory apps ▪ SAP Business Suite runs on SAP HANA ▪ Further optimization of SAP BusinessObjects BI suite for SAP HANA ▪ Industry and LoB Analytic Apps	▪ SAP HANA only persistence layer for SAP Business Suite ▪ SAP Business Suite optimized for in-memory computing
Benefits	▪ Flexible real time analysis of operations at non-aggregated level	▪ Real-Time operational planning and simulation capabilities: link to execution ▪ Primary persistence and optimized for SAP NetWeaver BW	▪ Reduced landscape complexity ▪ Value chain transformation

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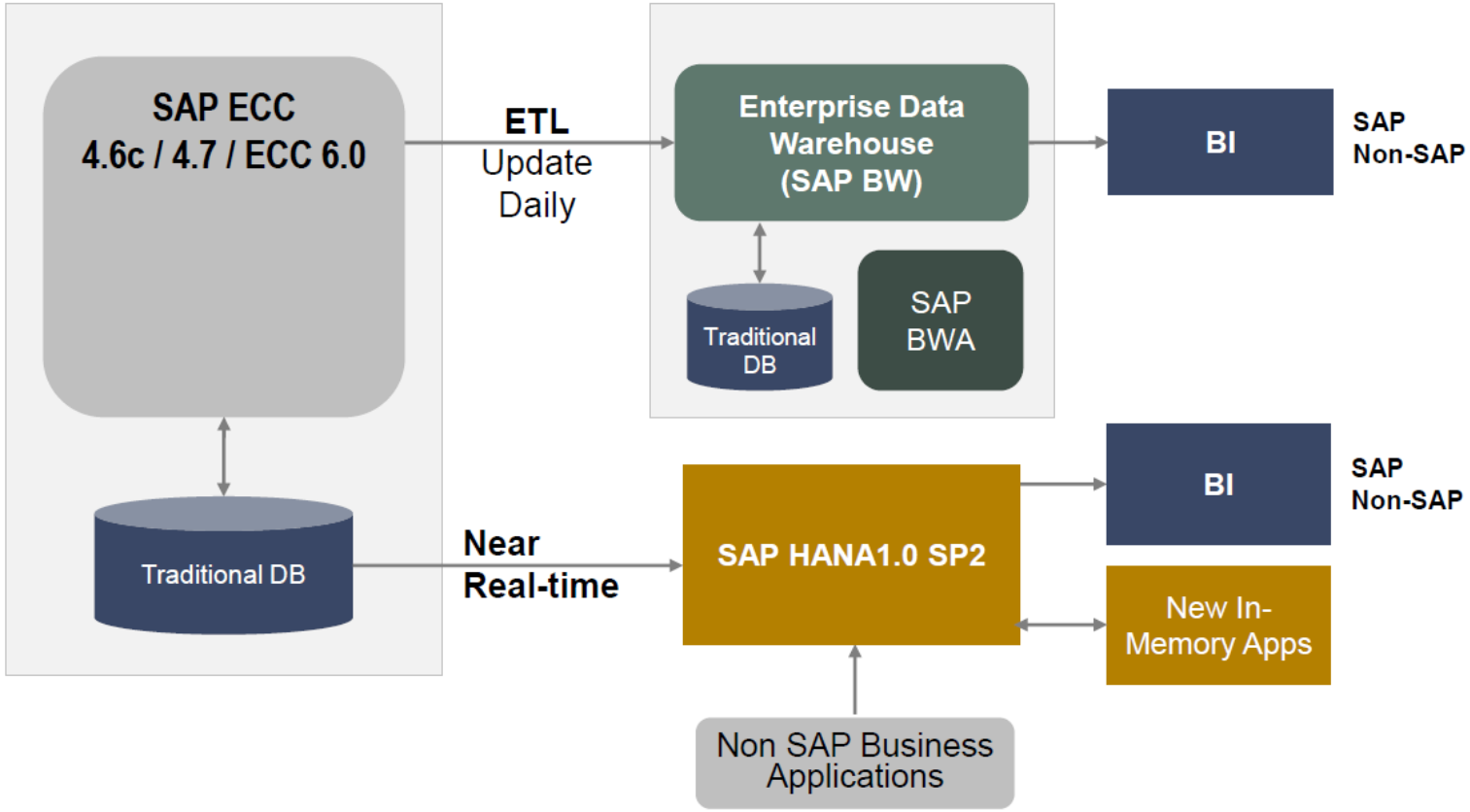
1. Renovation



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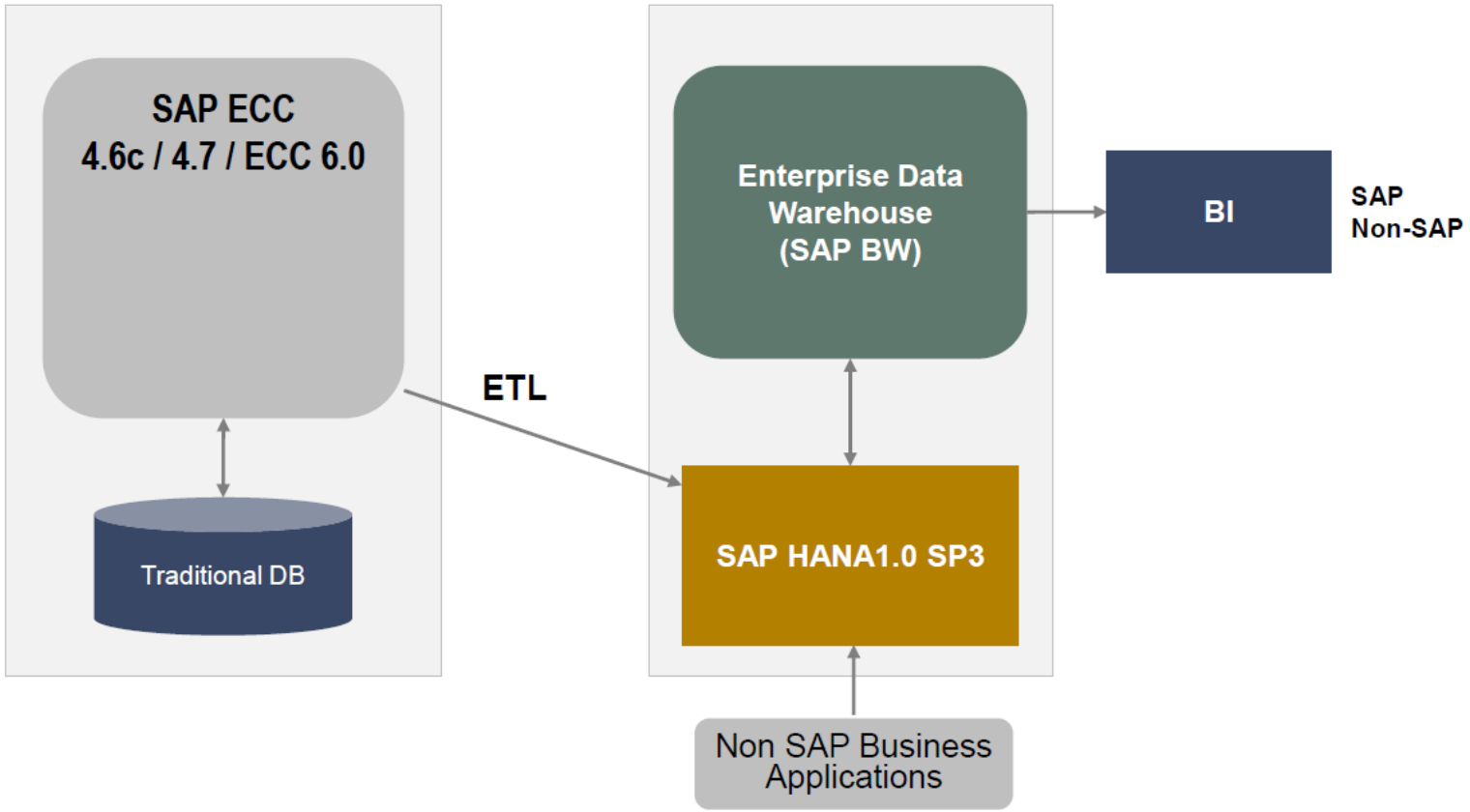
2. Innovation



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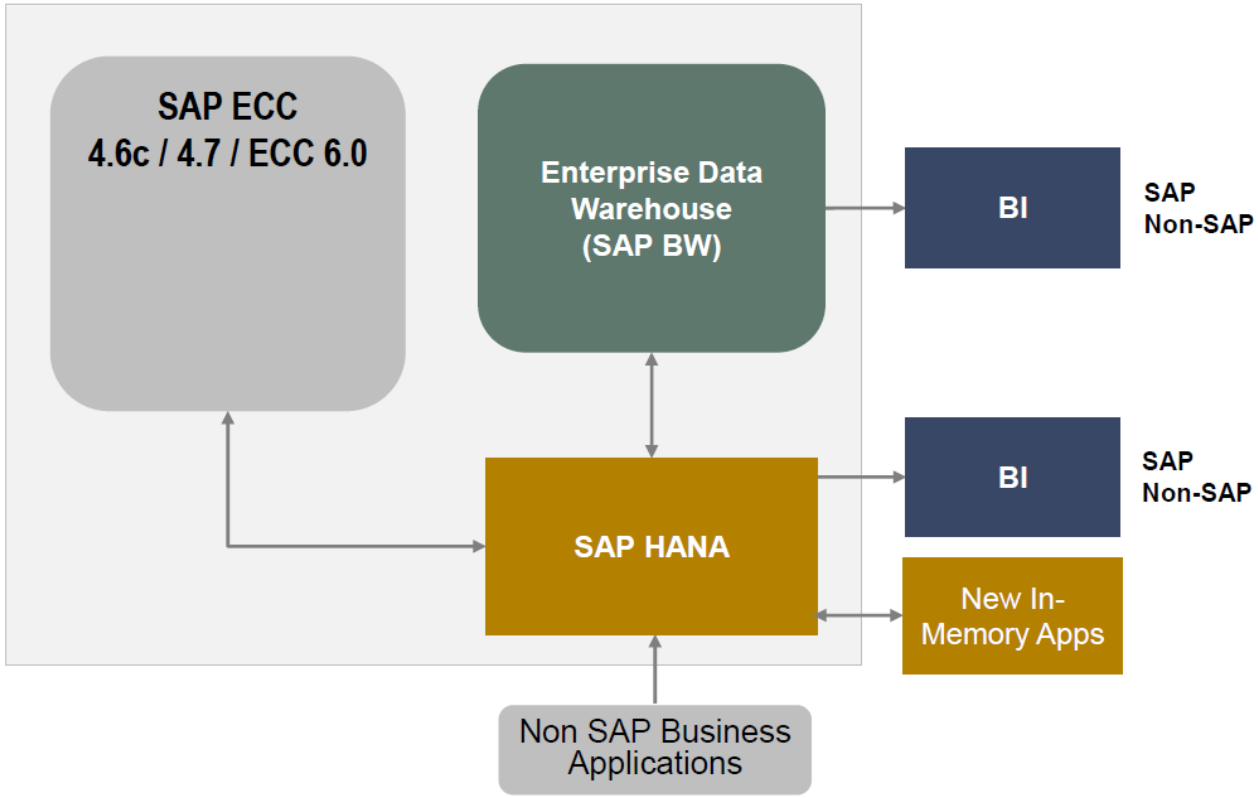
3. Transformation



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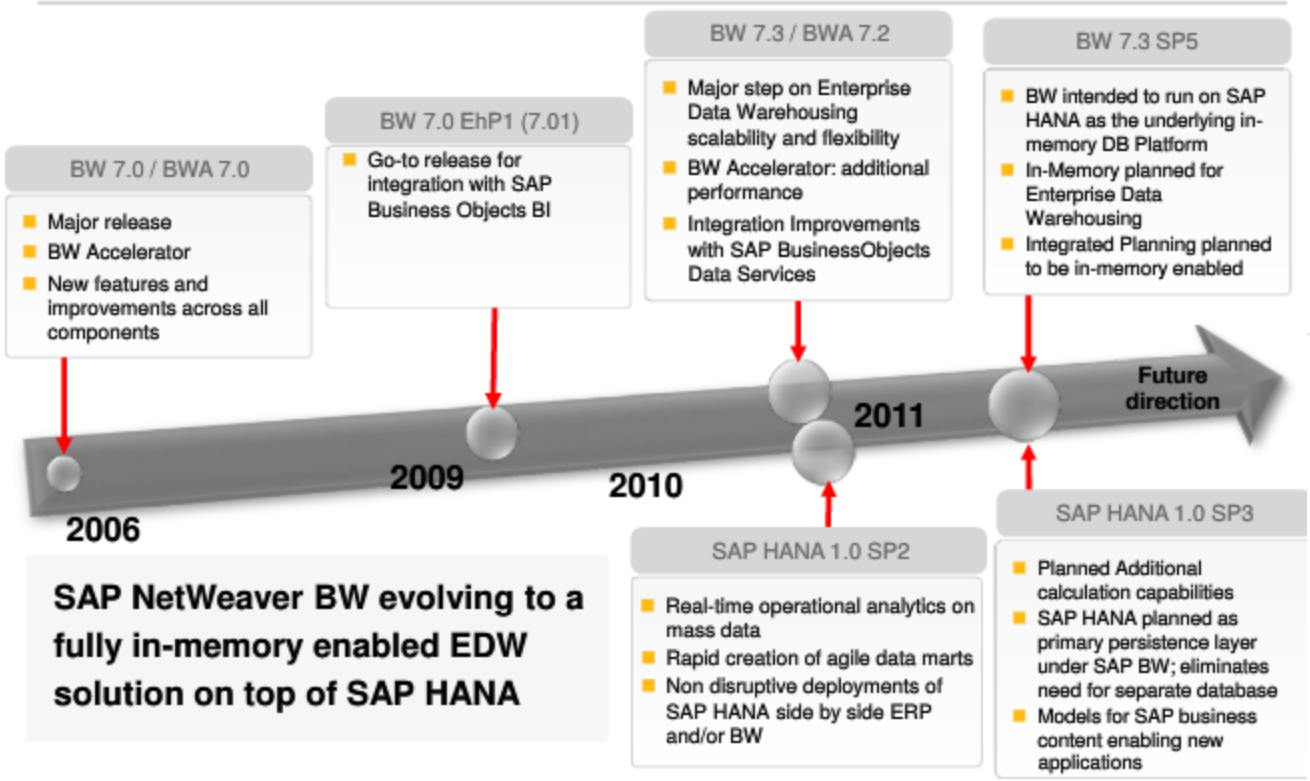
SAP BW and HANA

Planned Road Map SAP HANA & SAP NetWeaver BW



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CTI HANA EXPERTISE

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Partnership Approach

Sure, everyone talks about partnership. At ARI, it's not only real, it's the only

Advanced Technology

If it has to do with fleet operations, you can be sure ARI has explored, refined

Global Services

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- Driving Tips to Protect Light-Duty Fleets This Winter

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Business challenges

- **RAPID GROWTH. Technology, People and Process were not keeping up. Data Volumes & Demand for Faster Analysis growing faster than anyone could keep up.**
- **DATA INTEGRATION is a service they offer their clients. In fact, they pride themselves in never having to say "no" to a client and took on many challenging clients always finding a way to get it done. However, they previously lacked solid, formal knowledge of traditional DW methodologies (ie. Kimball et al.) and had no true DW.**
- **CREATING / MAINTAINING / SUPPORTING End CLIENT FACING BI APPS ARI is all about using Technology to serve and win more Clients. They POC'ed BO Explorer and wanted to "send to" Explorer more than 2.0 million rows of data (Explorer vanilla limitation) and the oppty for HANA was born.**

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ARI use case for HANA

- »"Operational Data Store"
- » Provide "larger" data foundation for their important client facing BO explorer use cases.
- » Provide business analysis capabilities against data sets and query sizes there were previously deemed unable to run.

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CTI HANA Center of Excellence

- » Product Demonstrations
- » Immediate Access to a Test Environment
- » Proof of Business Value Exercises
- » Comparative Benchmark Analysis
- » Hardware Sizing and Recommendations
- » Software License Recommendations

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Your next steps

- Continue to educate yourself on HANA
- Contact CTI for our “Pragmatic Approach to Big Data” presentation and roadshow
- When you have new initiatives from your Business side that historically have been tough to deal with in terms of data volume, data integration? And/Or a need for near real time analytics (think HANA & our CTI HANA COE!)