Technology and Architecture Considerations Retail Case Study including SAP HANA

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Internal

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Agenda

1 Technical Architecture Modelling

2 Introduce SAP HANA Platform

3 Architecture Case Study

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1 **Technical Architecture Modelling**

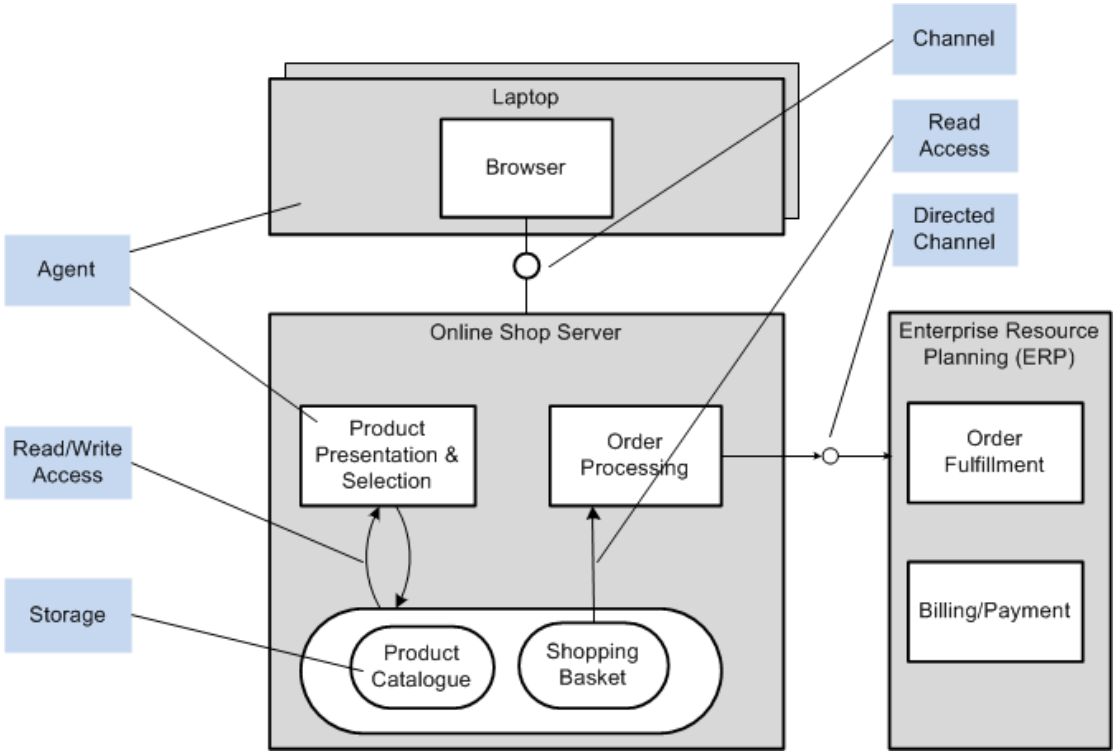
Methods to exchange the knowledge about software-intensive systems.

2 **Introduce SAP HANA Platform**

3 **Architecture Case Study**

Technical Architecture Model – Simplified Block Diagram

Snapshot view of a system on instance level



Agent: *Who does something?*
- perform operations
- read and write data
- communicate with other agents

Storage: *Where is the data?*
- are passive
- hold data that is accessed by agents
- arrows indicate direction of data flow

Channel: *What data and which requests do agents exchange?*)
- used by agents to communicate with each other
- arrows indicate the direction of data flow

See: http://www.fmc-modeling.org/home

Agenda

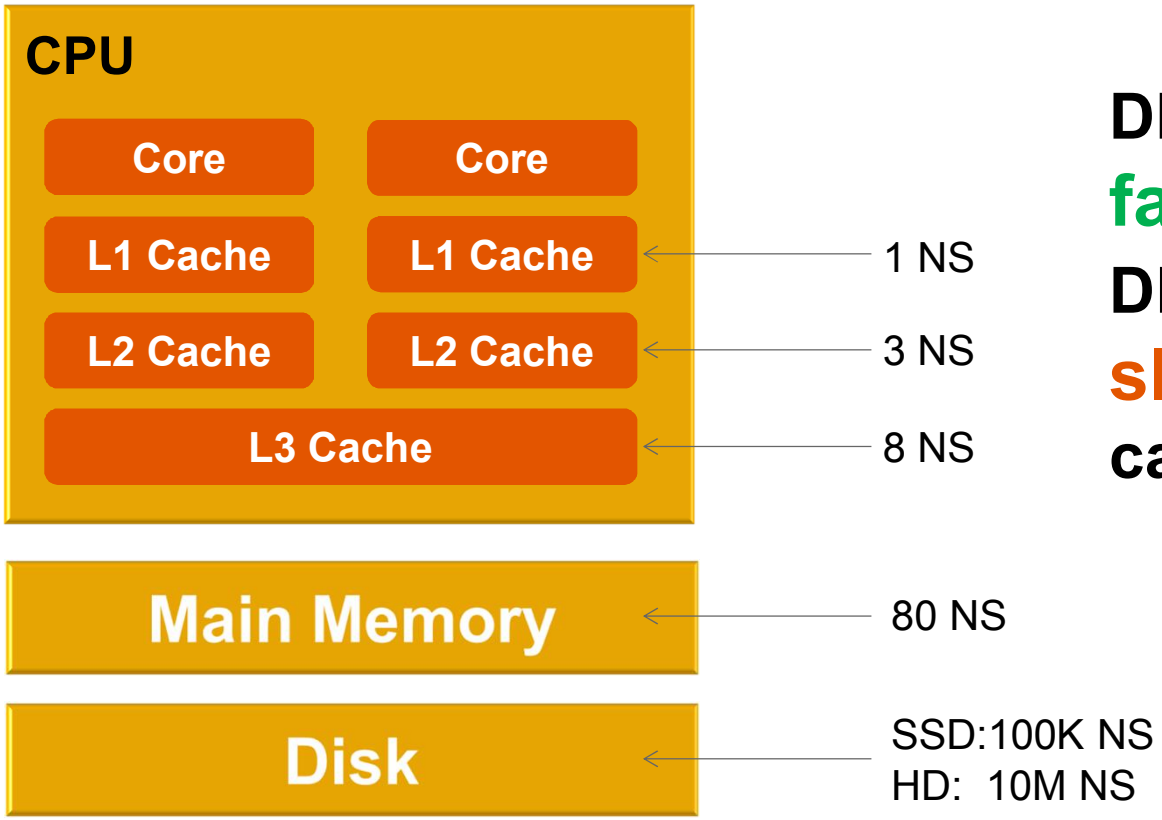
1 Technical Architecture Modelling

2 **Introduce SAP HANA Platform**

SAP HANA is a modern, in-memory database and platform that is deployable on-premise or in the cloud.

3 Architecture Case Study

In-Memory Computing



DRAM is 125,000 x faster than disk, but DRAM is still 10-80 x slower than on-chip caches

DRAM Price/GB

Year	Price/GB
2013	$5.50
2010	$12.37
2005	$189
2000	$1,107
1995	$30,875
1990	$103,880
1985	$859,375
1980	$6,328,125

Source: http://www.statisticbrain.com/average-historic-price-of-ram/

Row store versus Column store

- Traditional RDBMS – Row store
  - Faster to select all columns for a single record

Table

Country	Product	Sales
US	Alpha	3.000
US	Beta	1.250
JP	Alpha	700
UK	Alpha	450

Row Store

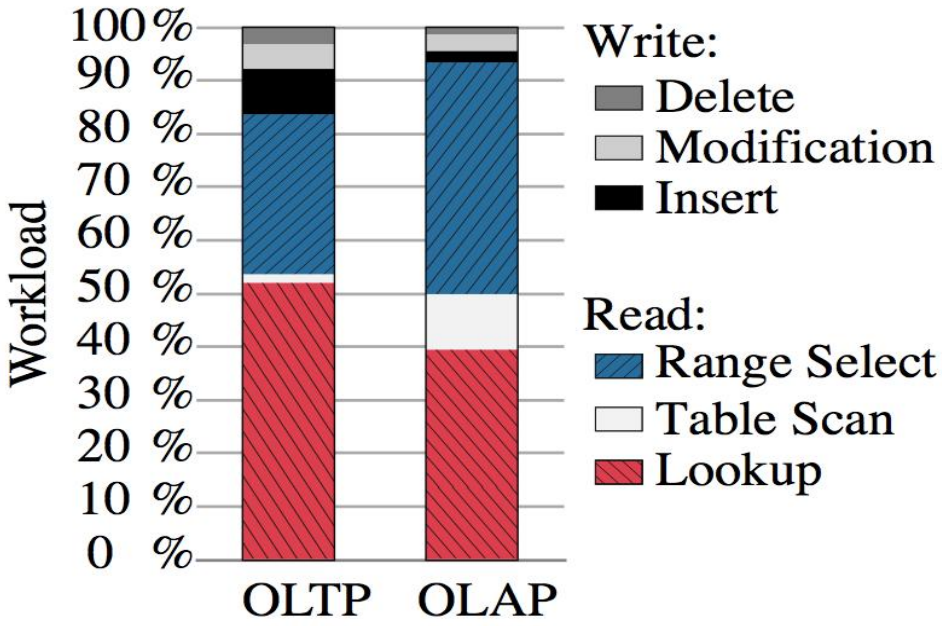
Row 1	US
	Alpha
	3.000
Row 2	US
	Beta
	1.250
Row 3	JP
	Alpha
	700
Row 4	UK
	Alpha
	450

Column Store

Country	US
	US
	JP
	UK
Product	Alpha
	Beta
	Alpha
	Alpha
Sales	3.000
	1.250
	700
	450

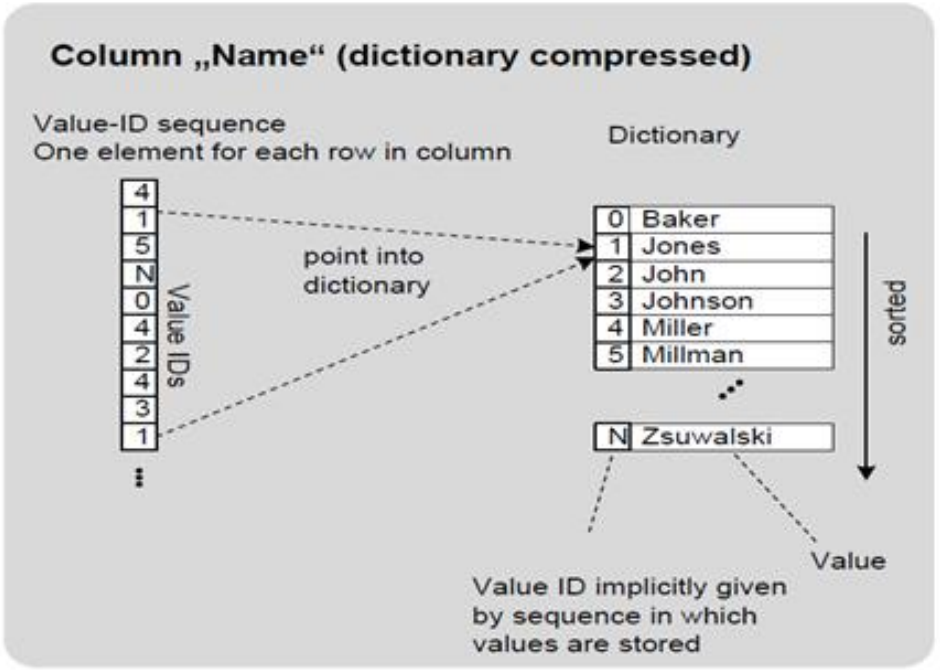
- Column store
  - Naturally leads to (Direct access) compression via Dictionary encoding.
    - Each column is split into a dictionary & an attribute vector.
  - Faster when working on a set of columns (which is the typical use case for most business applications).

Transactional (OLTP) vs Analytical (OLAP) – Access Pattern



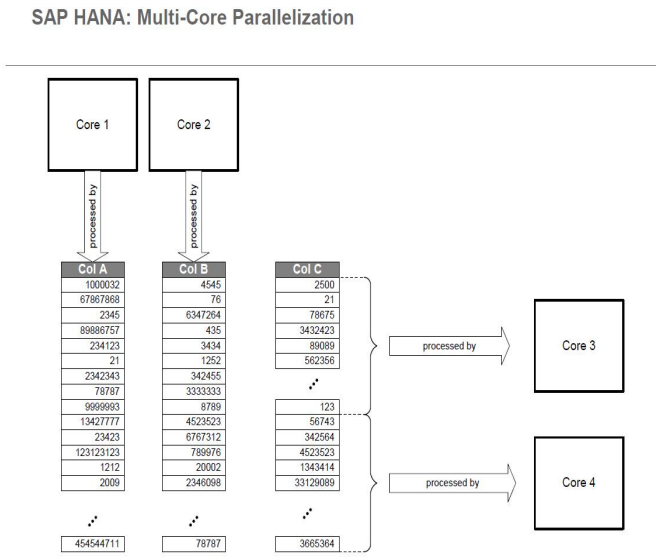
Read dominates – so Column-store is better but only in-memory as we cannot be going/shouldn't go to disk for every column

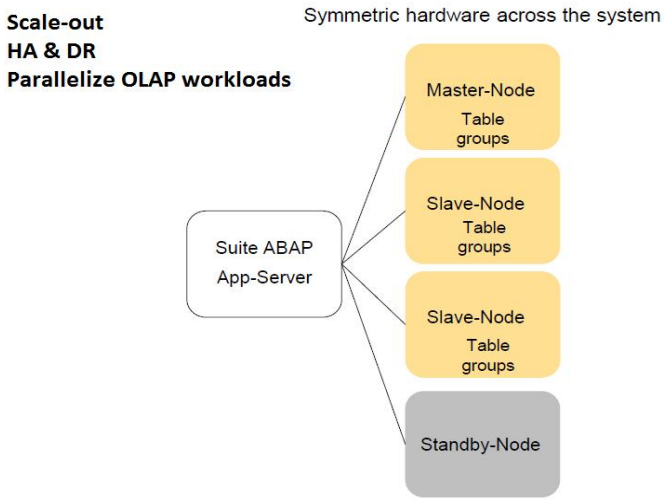
SAP HANA: Dictionary Compression



- **A Dictionary and an Attribute vector to hold them all**
  - Dictionary – one set - of all unique values.
  - Attribute vector – A list of indices into the dictionary.
  - No explicit compression or decompression.
  - Allows direct access.
  - Speeds up processing with integers – at the processor level.

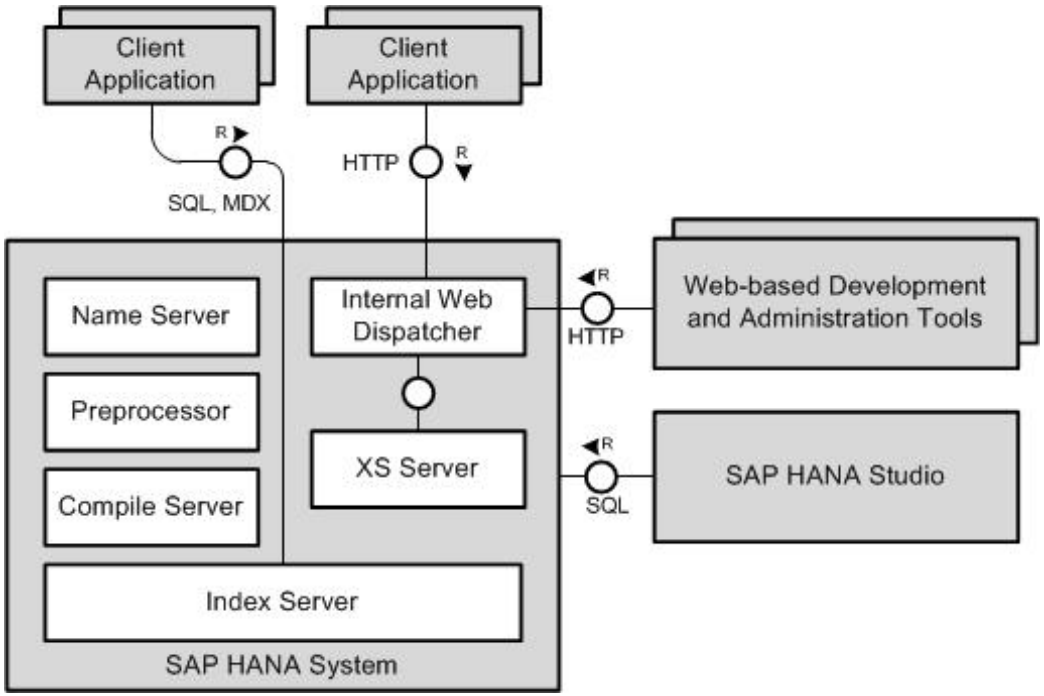
Scalability & Parallelization





- **Scale-up – Use multiple cores in a single CPU for parallelization.**
  - Cache-aware Data structures & parallel algorithms.
- **Scale-out – HANA follows "Shared-Nothing" approach**
  - Core idea: High availability and Disaster recovery.
  - Needs application knowledge – more administrative overhead.
  - OLAP applications benefit the most. Challenging for OLTP or hybrid setups.

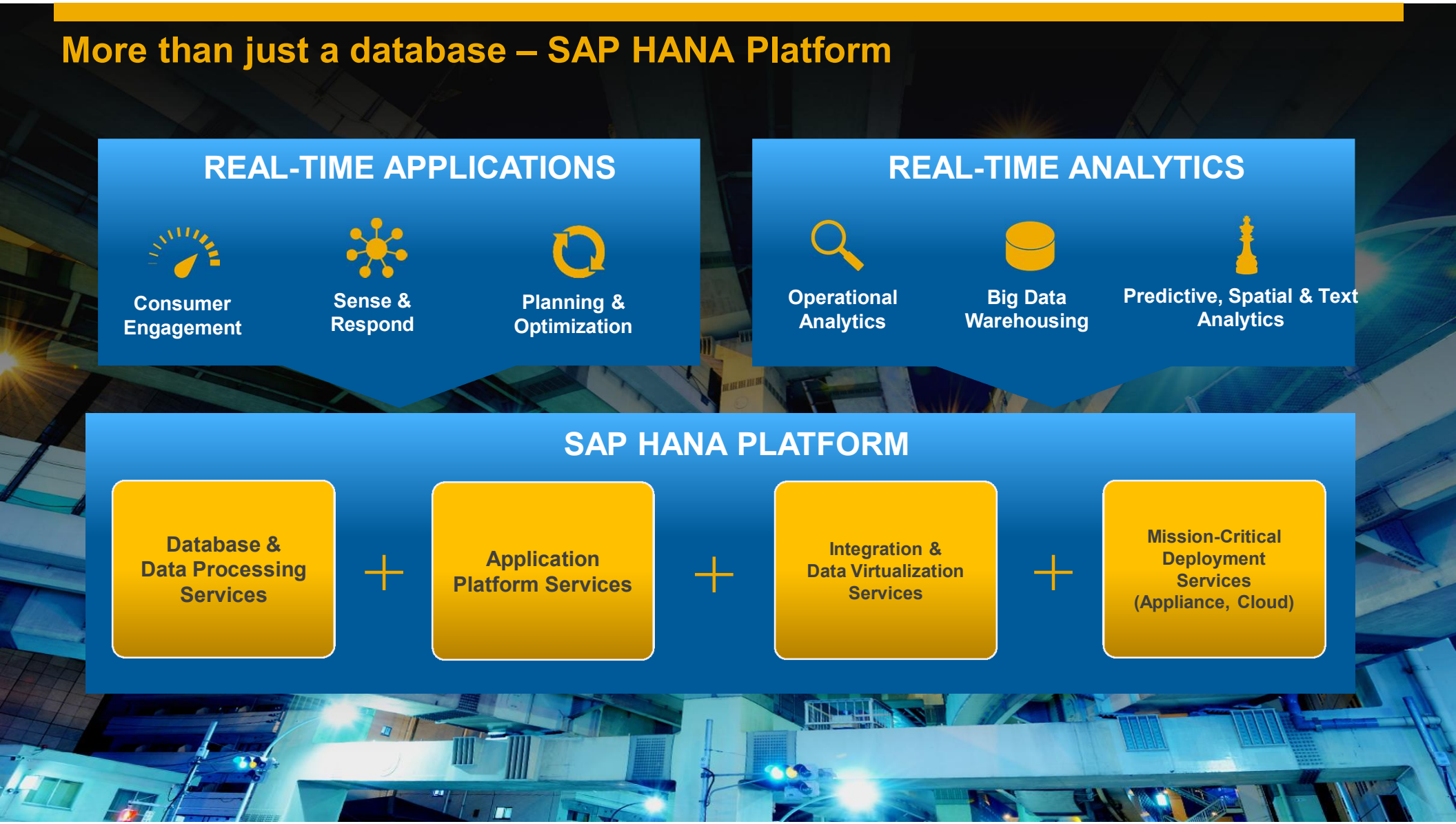
Overview of SAP HANA Architecture



- **Index Server**
  - actual data stores
  - engines for processing the data
- **Preprocessor**
  - used by the Index Server to analyze text data and
  - extract the information on which the text search capabilities are based.
- **Name Server**
  - owns the information about the topology of the SAP HANA system
- **SAP HANA XS**
  - SAP HANA Extended Application Services
  - provides applications and application developers access to the SAP HANA database
  - Offers a consumption model exposed via HTTP
  - host system services that are part of the SAP HANA database, for example: search services and a built-in Web server that provides access to static content.
- **Compile server**
  - compilation of stored procedures and programs, for example SQLScript procedures

Source: http://help.sap.com/hana/SAP_HANA_Administration_Guide_en.pdf

More than just a database – SAP HANA Platform



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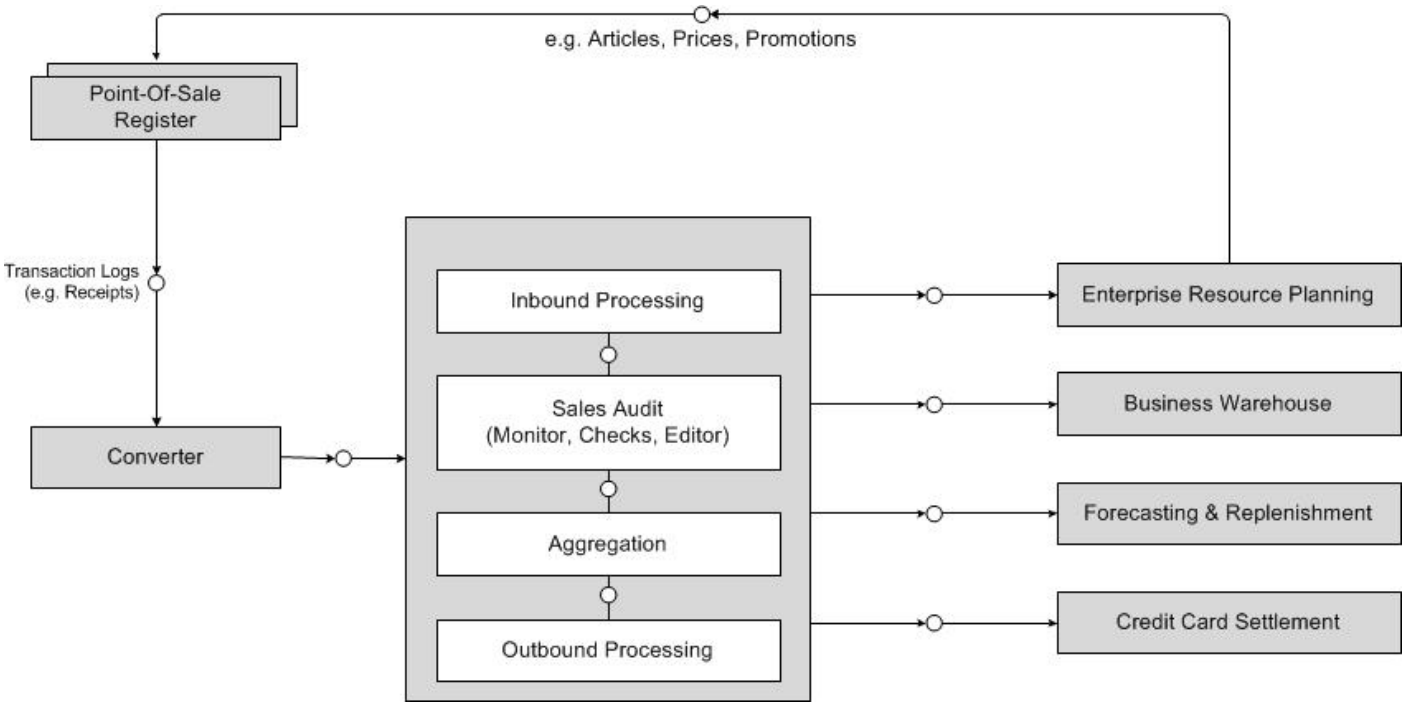
2 Introduce SAP HANA Platform

3 **Architecture Case Study**

SAP Customer Activity Repository (SAP CAR) is a foundation that

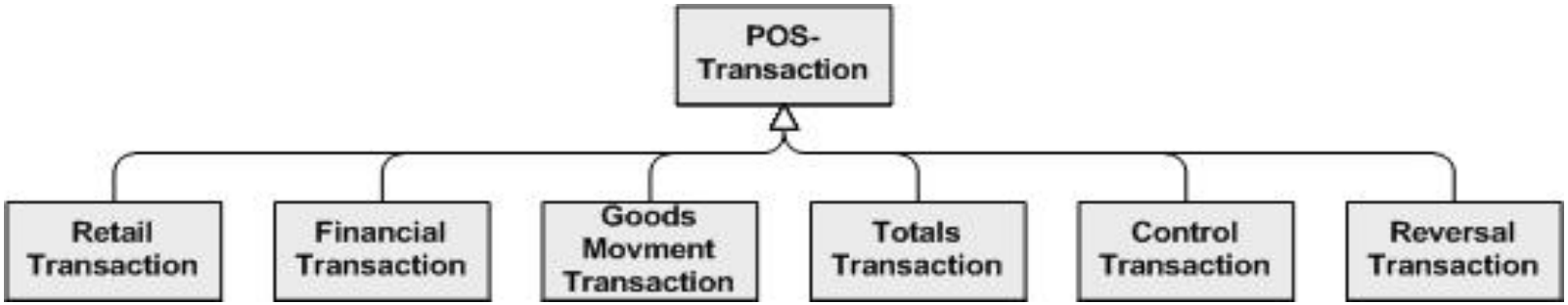
- **collects transactional data that were previously spread over multiple independent applications in diverse formats**
- **provides a common foundation and a harmonized multichannel transaction data model for all consuming applications.**

SAP Point-Of-Sale Data Management

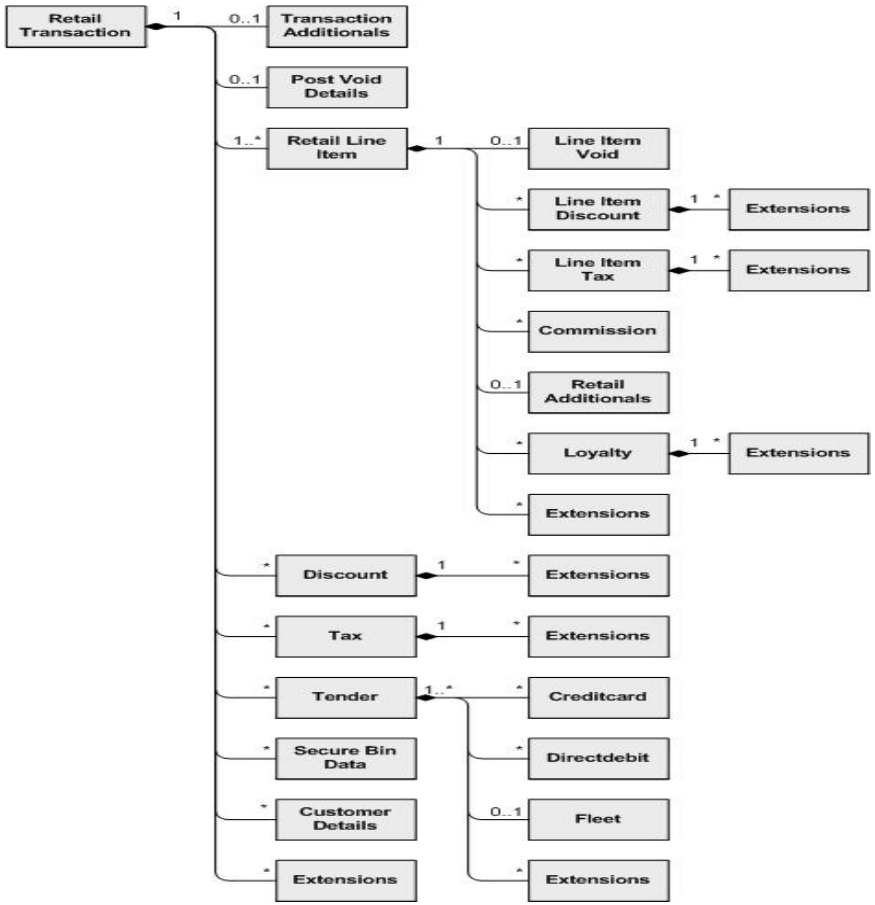


See: http://help.sap.com/posdm

SAP Transaction LOG (Point-of-Sale) Overview



SAP Transaction LOG – Retail Transaction



Customer Activity Repository (CAR) on HANA
Vision

To attract and retain today's shopper, retailers must deeply know their behavior real-time across channels. A differentiating consumer and demand data platform with seamless on-top analytical solutions is required by retailers.

Retail Data Challenges

- Volume keeps growing
- More granular detail required for transaction log analysis
- Data is not available soon enough for analysis due to data replication latency
- No data visibility across multiple sales channels

SAP's Approach

Provide a real-time, granular high-performing multichannel data foundation

Combine with real-time sales analytics applications and predictive capabilities

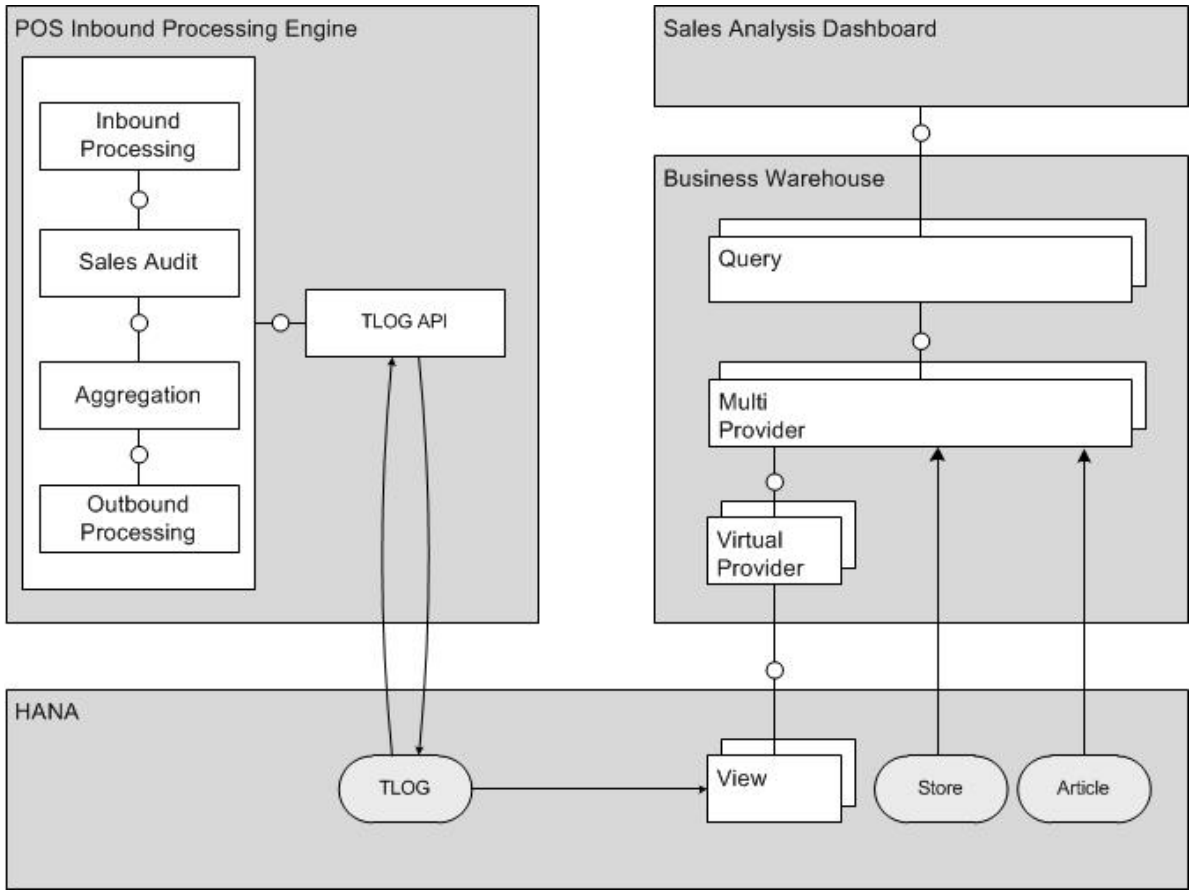
Close the loop to optimize business processes for supply chain and shopper experience

Business Benefits

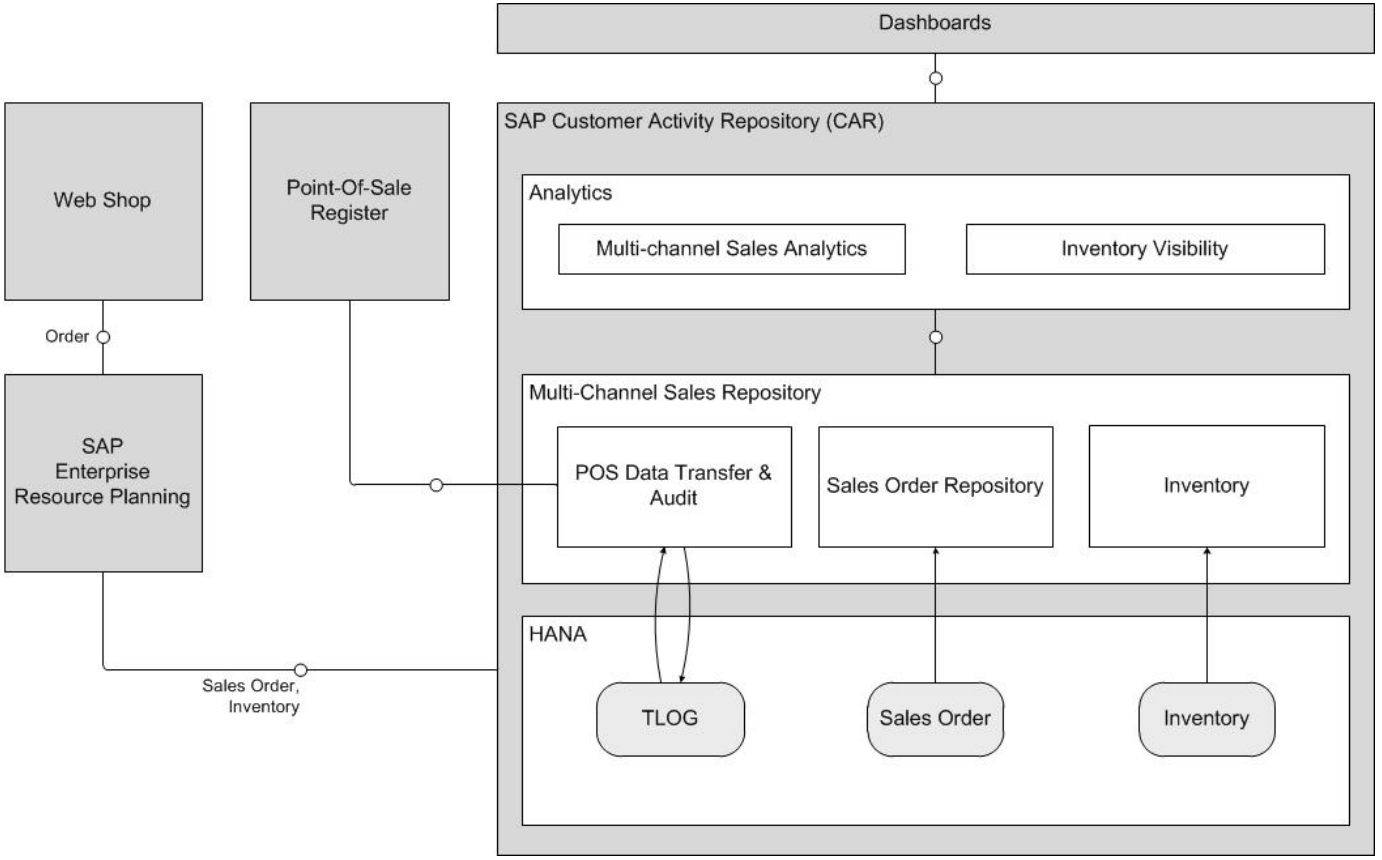
Increase sales, profitability, shopper experience and customer satisfaction by

- Detailed multichannel real-time customer insight
- Faster response to changing demand
- Consistent multichannel processes
- Support new business processes based on real-time insight like precision retailing
- Real-time data availability ensures low cost add-hoc queries

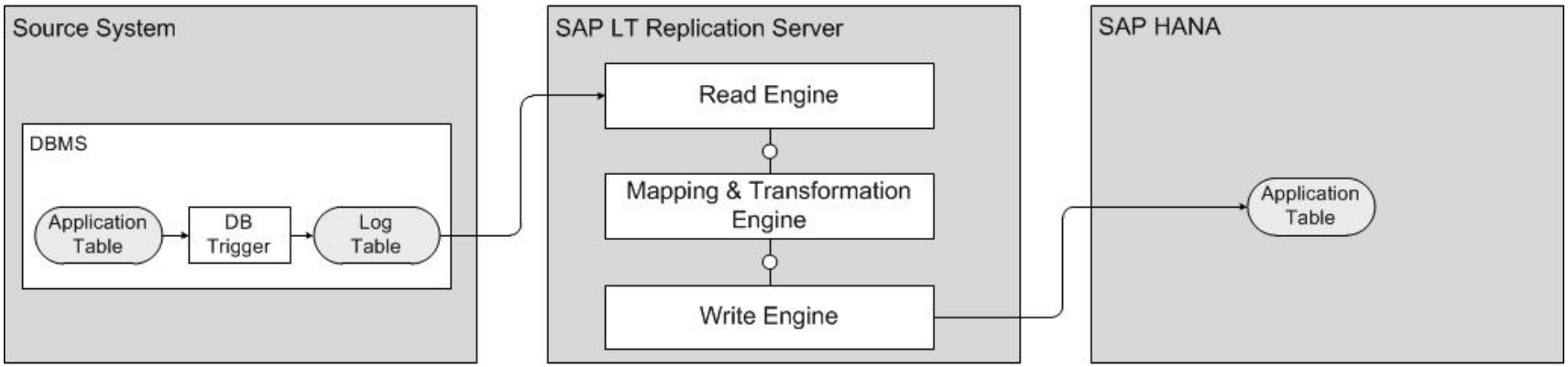
SAP Point-Of-Sale Data Management on HANA



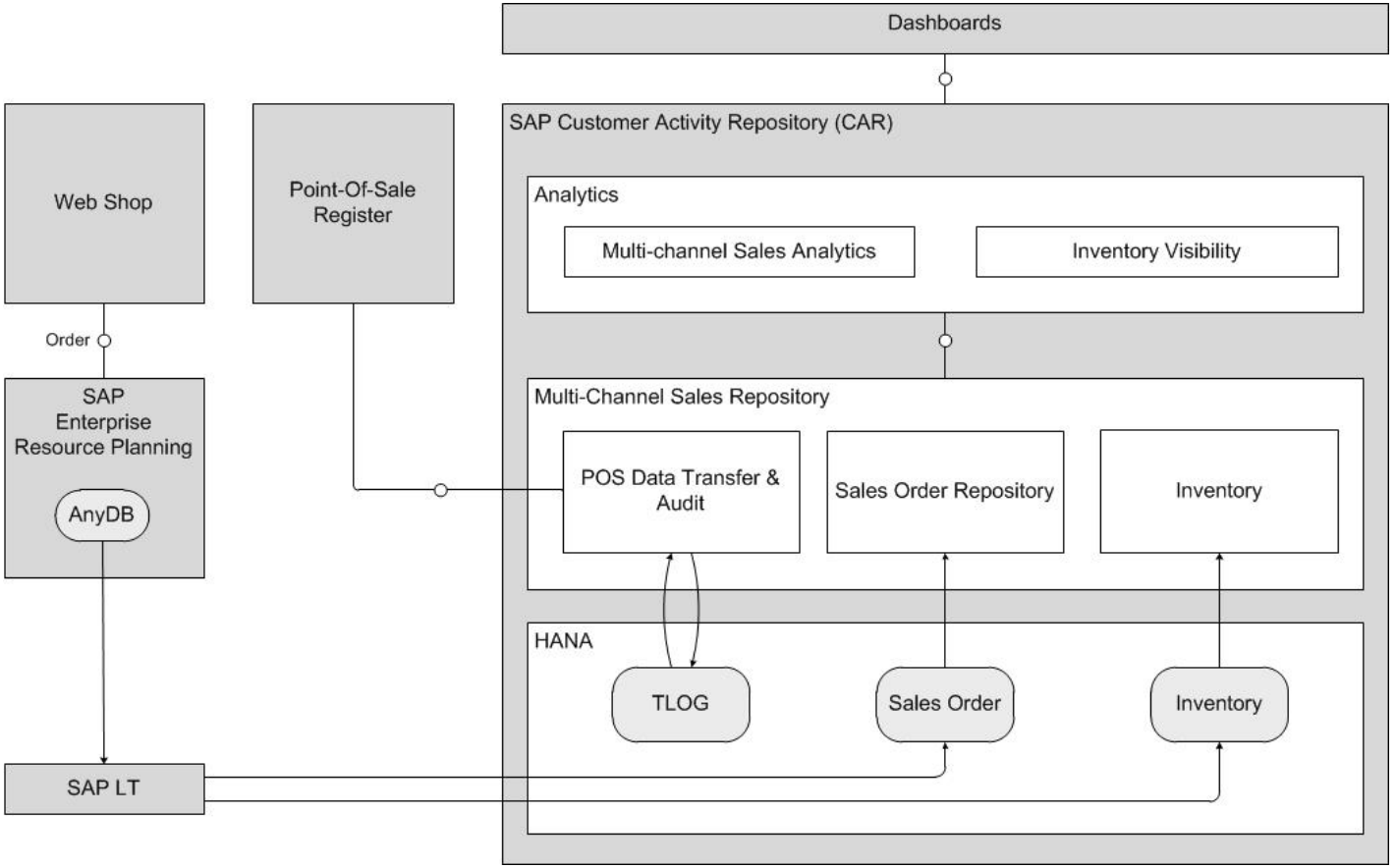
Idea: Include Sales Orders to support Multi Channel Sales Analytics



SAP Landscape Transformation (SAP LT) Replication



SAP CAR including Multi Channel Sales



Demand Management

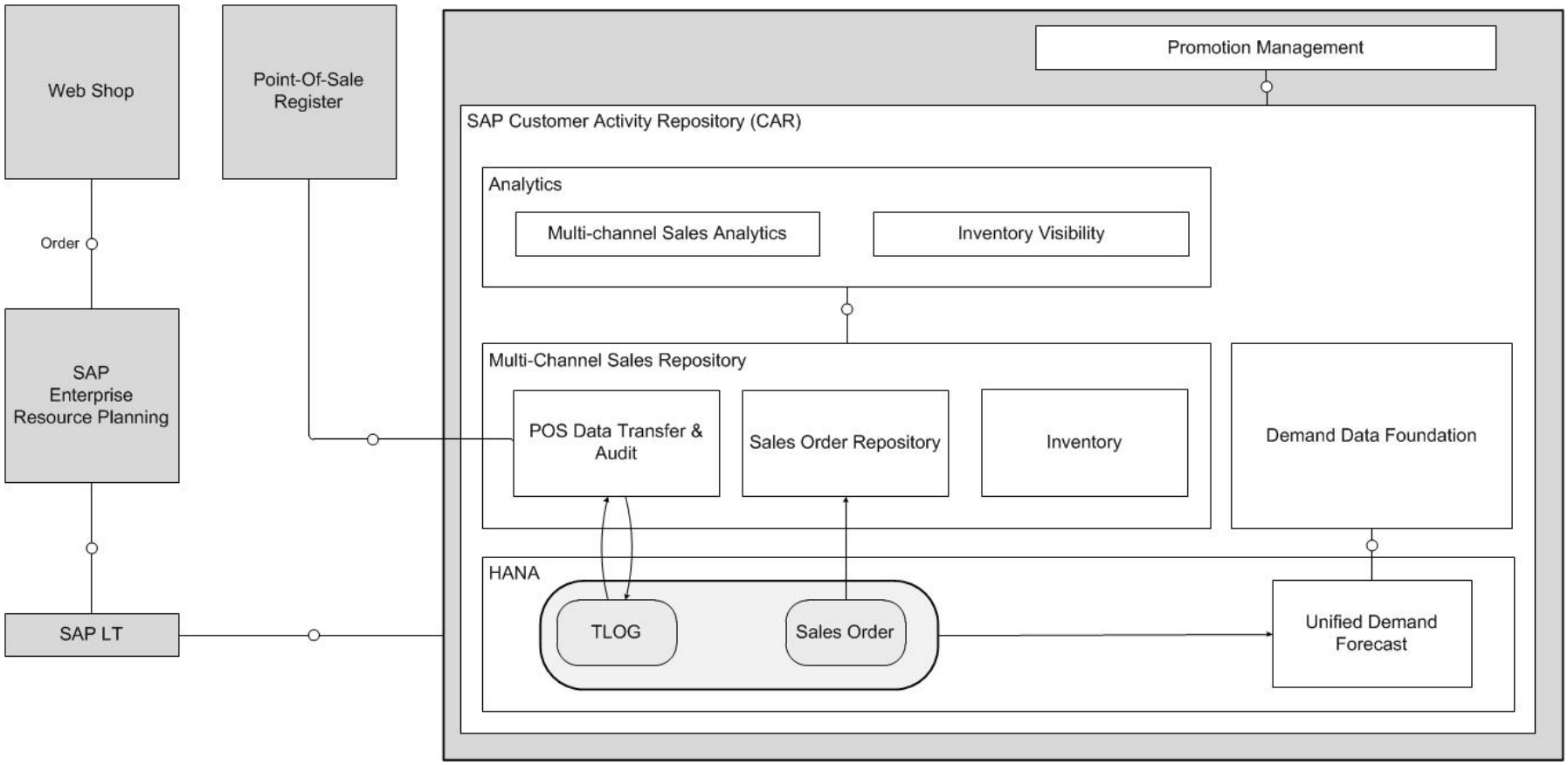
Demand Modeling

The demand model describes the historical sales behavior of a particular product in a particular location with regard to several aspects, such as price elasticity, seasonality, or promotional offers of different kinds.

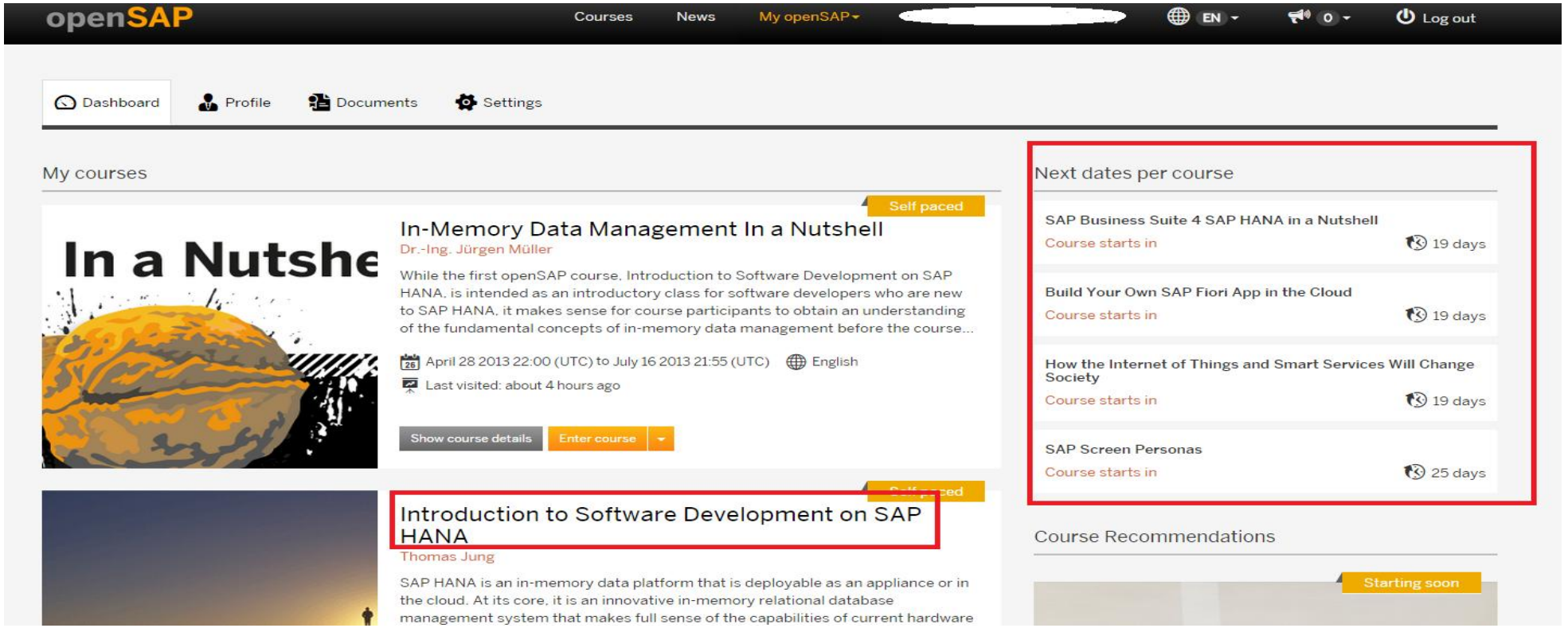
Demand Forecasting

The demand forecast provides an estimation how a particular product will sell in a particular location in the future, respecting future price changes, seasonal effects, and promotional offers.

SAP CAR including Forecasting Capabilities
Demand Data Foundation/Unified Demand Forecasting



Are you interested in HANA?
http://open.sap.com



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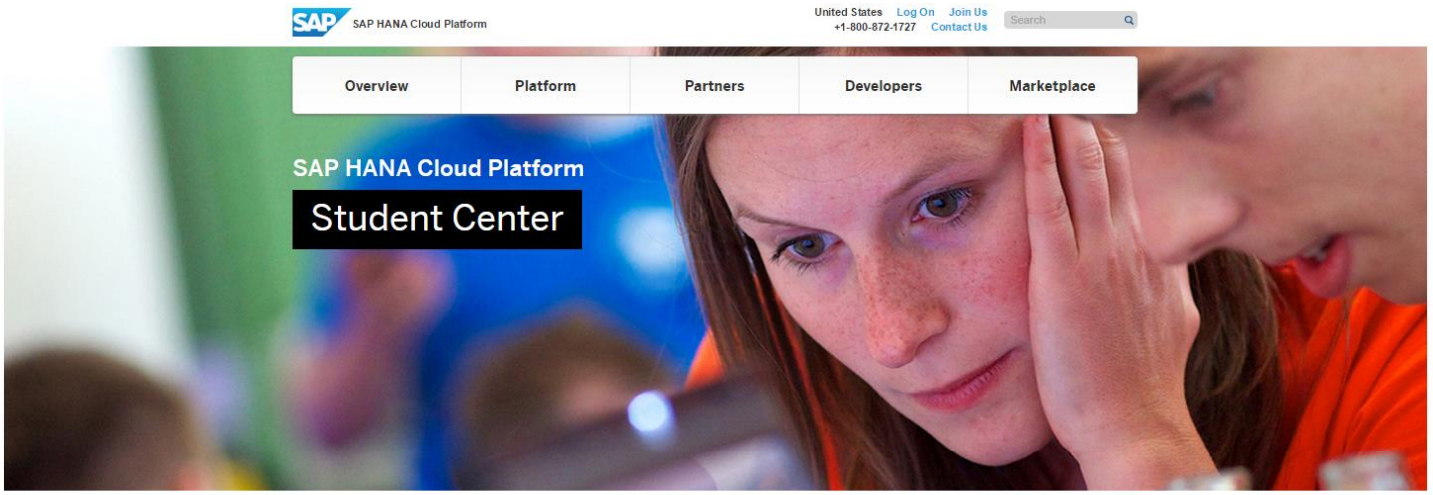

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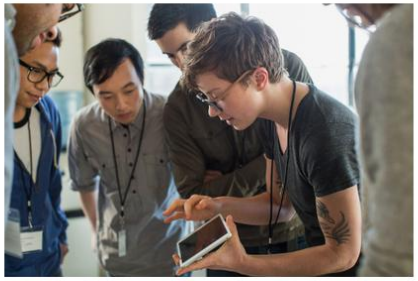

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