SAP HANA internal training – Session 1

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A Larsen & Toubro Group Company

SAP HANA Overview

What is SAP HANA

- SAP HANA is a flexible, data-source-agnostic appliance that enables customers to analyze large volumes of data in real-time, avoiding the need to materialize transformations.

- SAP HANA appliance software is a hardware and software combination that integrates a number of SAP components.

- The SAP HANA database is a hybrid in-memory database that combines row-based, column-based, and object-based database technology. It is optimized to exploit the parallel processing capabilities of modern multi-core CPU architectures.

Leverage every opportunity from any device

SAP HANA
Database and Application Development Platform

Database | Analytics Processing | App Development
Data Access | Administration | Security
Flexible Deployment options | Open

Process any data
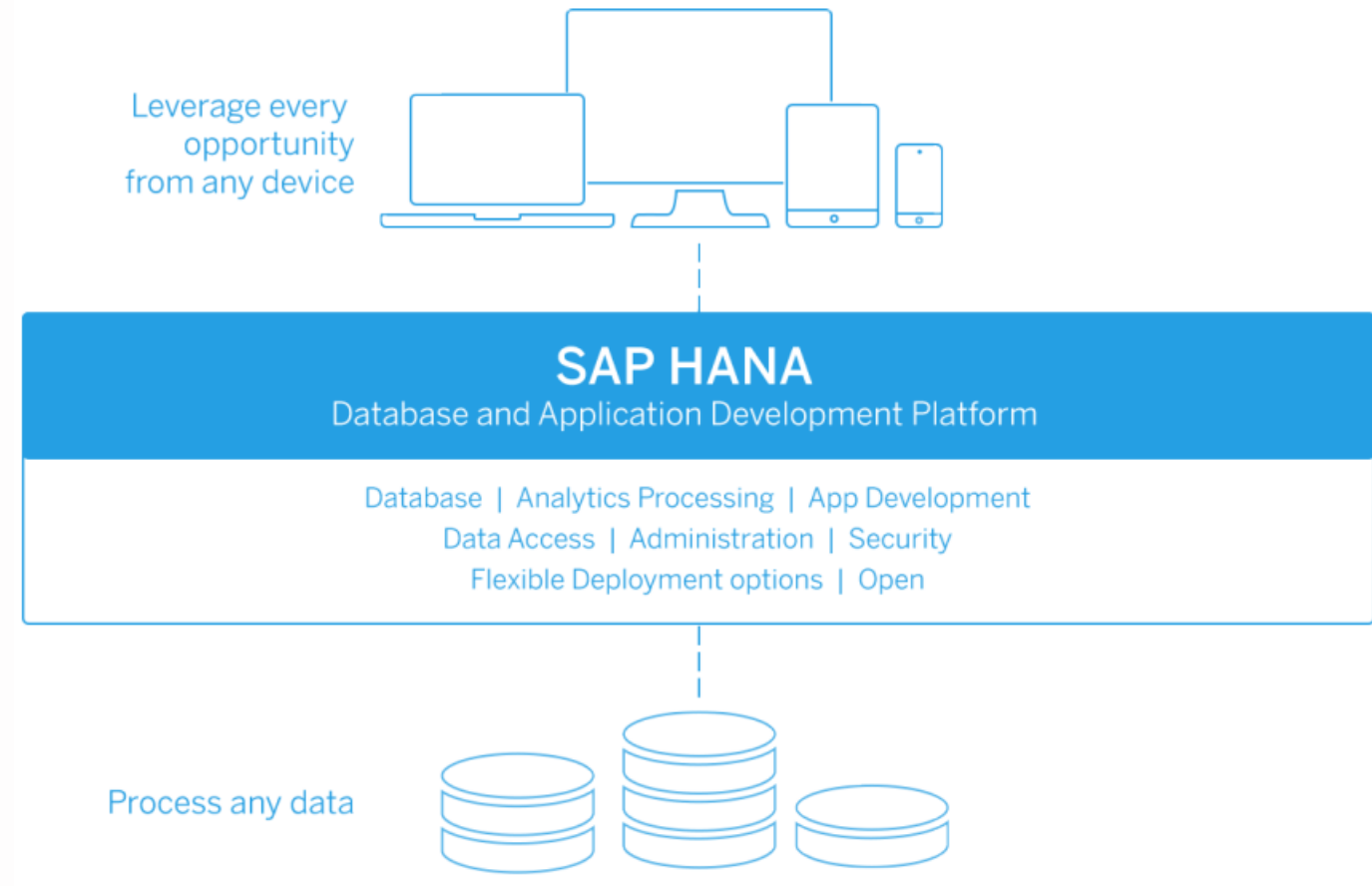
SAP HANA Overview

What makes HANA special -1

In-Memory Database - HANA runs on multi-core CPUs with fast communication between processor cores, and containing terabytes of main memory. With SAP HANA, all data is available in main memory, which avoids the performance penalty of disk I/O.

- Either disk or solid-state drives are still required for permanent persistency in the event of a power failure or some other catastrophe. This does not slow down performance, however, because the required backup operations to disk can take place asynchronously as a background task.
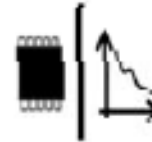
HW Technology Innovations

Multi-Core Architecture
(8 x 8core CPU per blade)

Massive parallel scaling with many blades

One blade ~$50.000 = 1 Enterprise Class Server
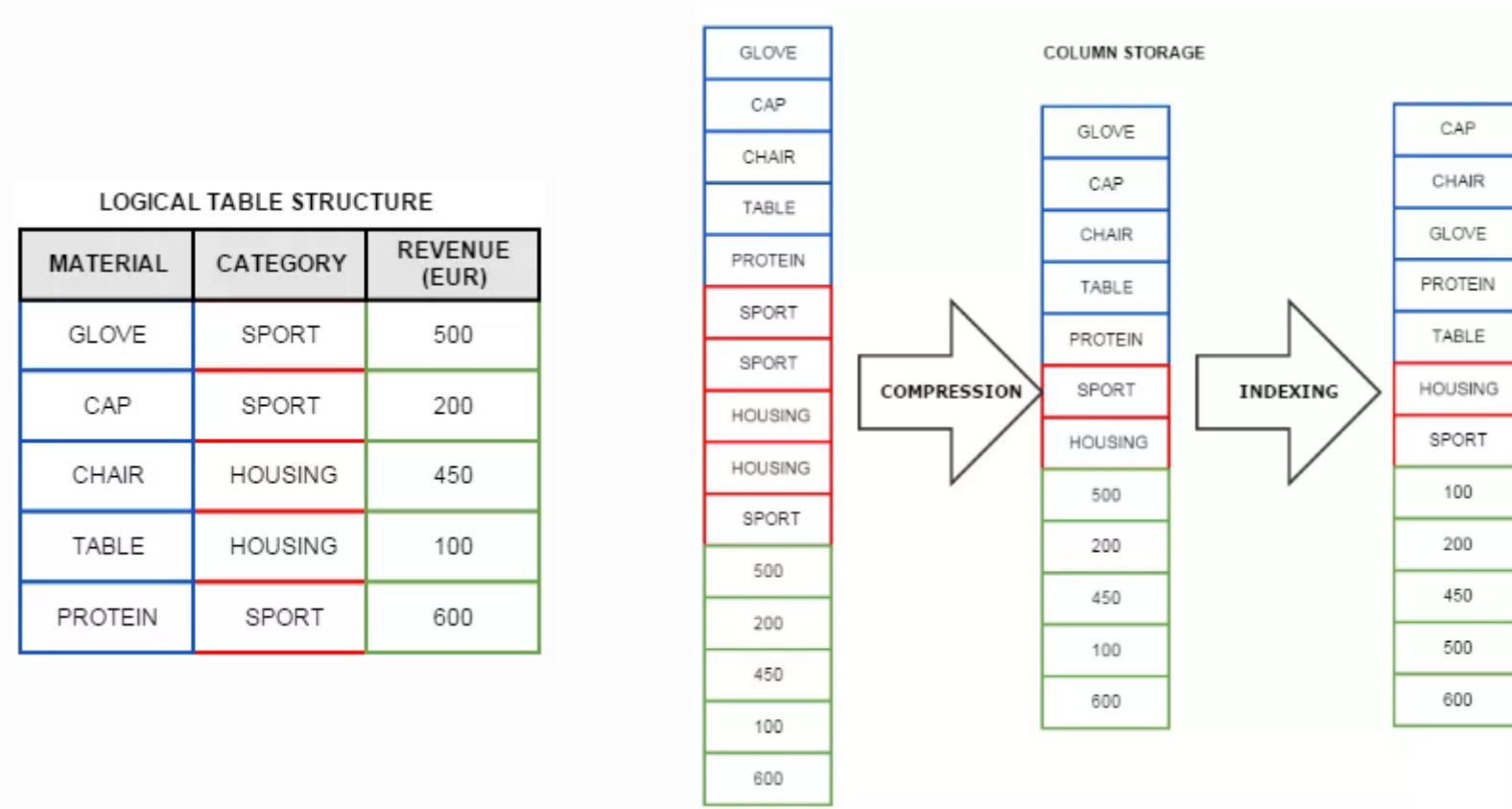
64bit address space – 2TB in current servers

100GB/s data throughput

Dramatic decline in price/performance

SAP HANA Overview

Columnar Data Storage- in column storage the entries of a column are stored in contiguous memory locations. SAP HANA supports both, but is particularly optimized for column-order storage.

SAP HANA Overview

What makes HANA special -3

Parallel Processing - HANA was designed to perform its basic calculations, such as analytic joins, scans and aggregations in parallel. Often it uses hundreds of cores at the same time, fully utilizing the available computing resources of distributed systems.
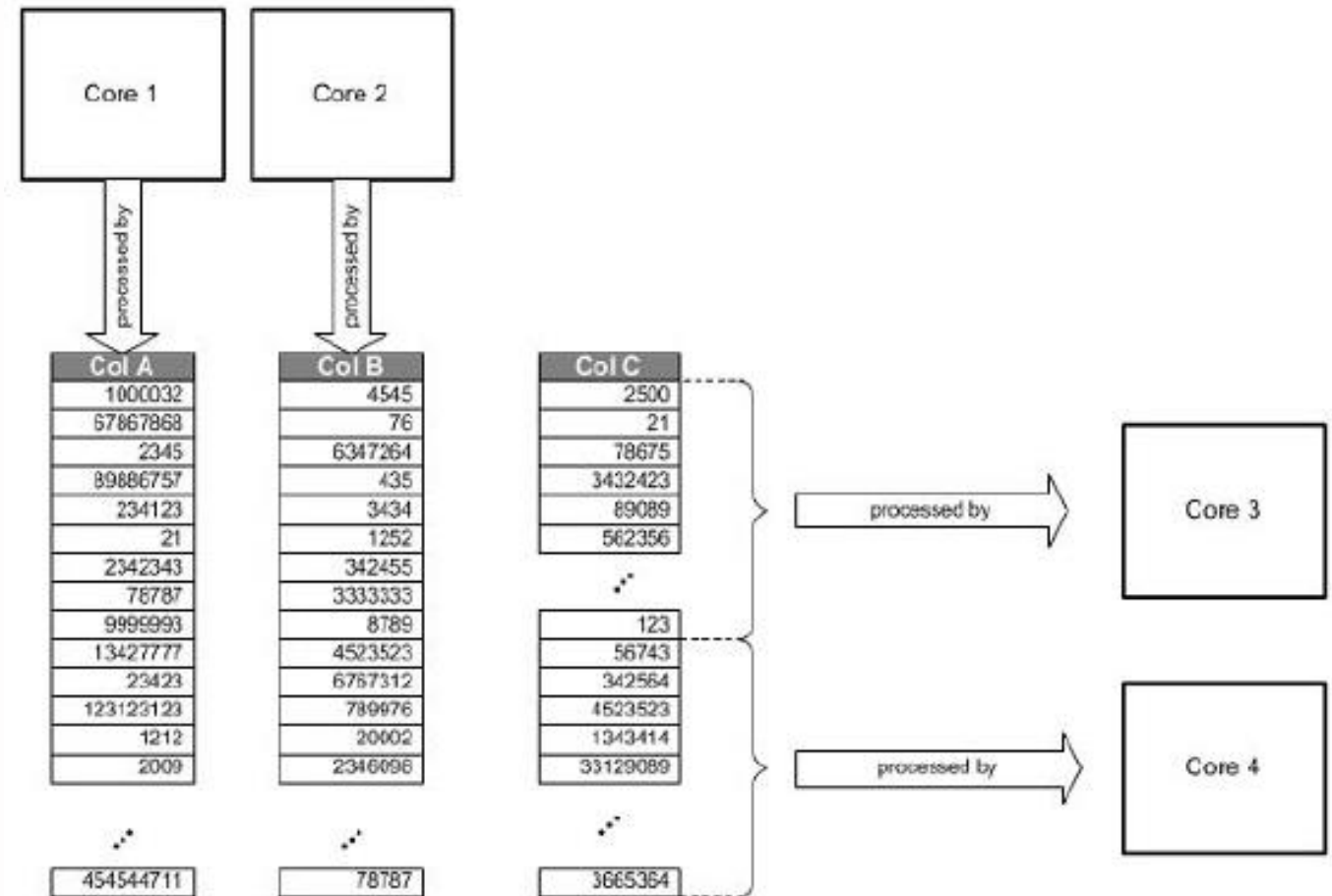
SAP HANA Overview

HANA 1.0 SPS releases and related notes:

SPS Number	Release Date	SAP Note
SPS 00 (First Version)	October 4th 2010	1514967
SPS 01	June 18th 2011	1603794
SPS 02	July 2011	1600147
SPS 03	October 2011	1642937
SPS 04	April 2012	1703675
SPS 05	October 2012	1771591
SPS 06	April 2013	1848976
SPS 07	December 2013	1921675
SPS 08	April 2014	2004651
SPS 09	October 2014	2075266
SPS 10	June 2015	2165826
SPS 11	November 2015	2227464

HANA 2.0 SPS releases and release notes

SPS Number	Release Date	SAP Note
SPS 00	November 2016	2380229
SPS 01	April 2017	2404375

*SAP HANA 1.0 SPS 12 released in May 2016 – release note-2298750

SAP HANA Architecture

Architecture

- An SAP HANA database consists of multiple servers, for example, name server, index server, preprocessor server, and so on.
- The most important server is the index server. It contains the actual data stores and the engines for processing the data and runs in every tenant database.
- Only the system database runs the name server. The name server contains landscape information about the system as a whole, including which tenant databases exist.
- Servers, such as the compile server and the preprocessor server, do not persist data and run on the system database to serve all tenant databases.
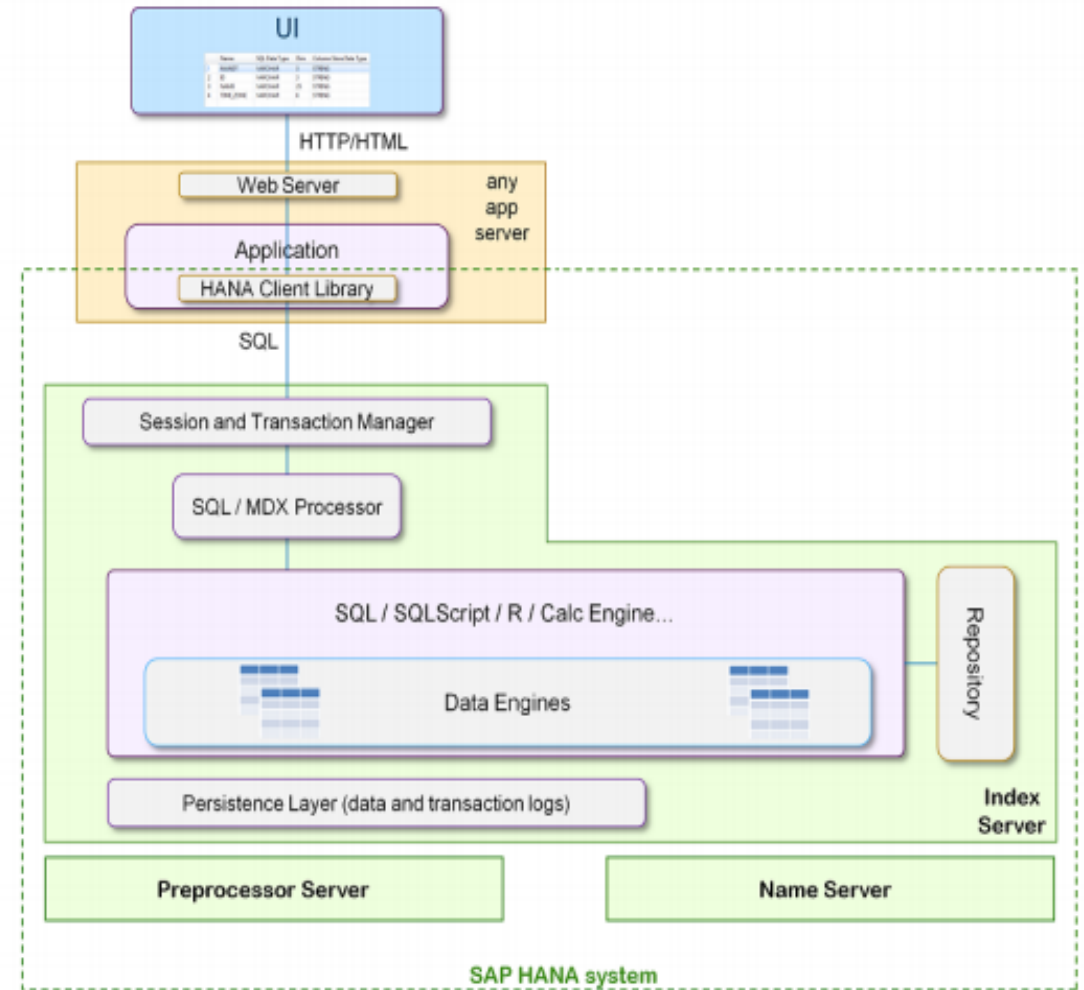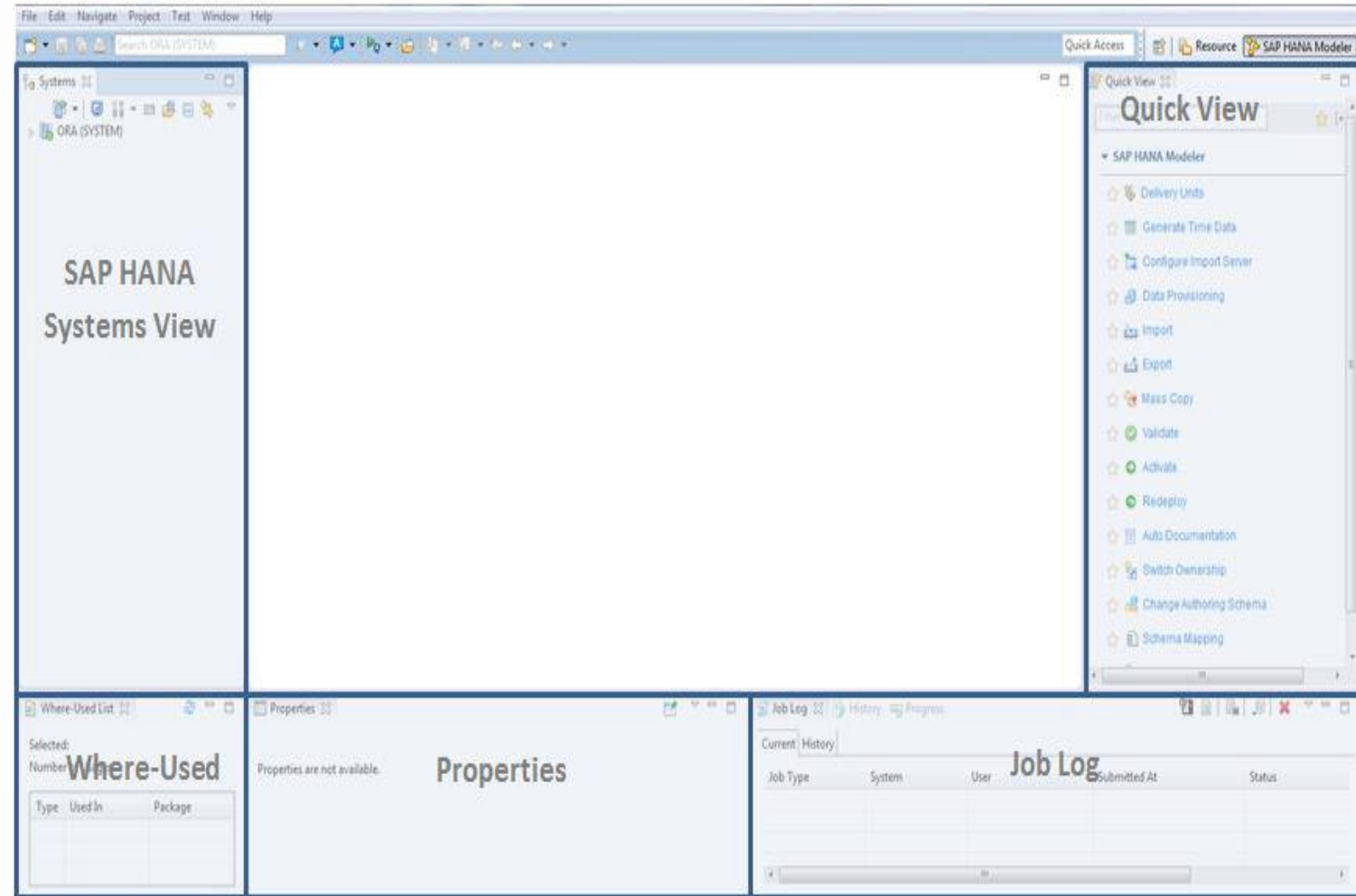
SAP HANA Studio – Modeler perspective

The SAP HANA studio is an Eclipse-based development and administration tool for working with SAP HANA, including creating projects, creating development objects, and deploying them to SAP HANA.
There are several key Eclipse perspectives that you will use while developing:

- Modeler: Used for creating various types of views and analytical privileges.
- SAP HANA Development: Used for programming applications.
- Debug: Used to debug code, such as server-side JavaScript or SQLScript.
- Administration: Used to monitor the system and change settings.

The SAP HANA Modeler perspective helps you create various types of information views, which defines your analytic model

HANA Content objects & Packages
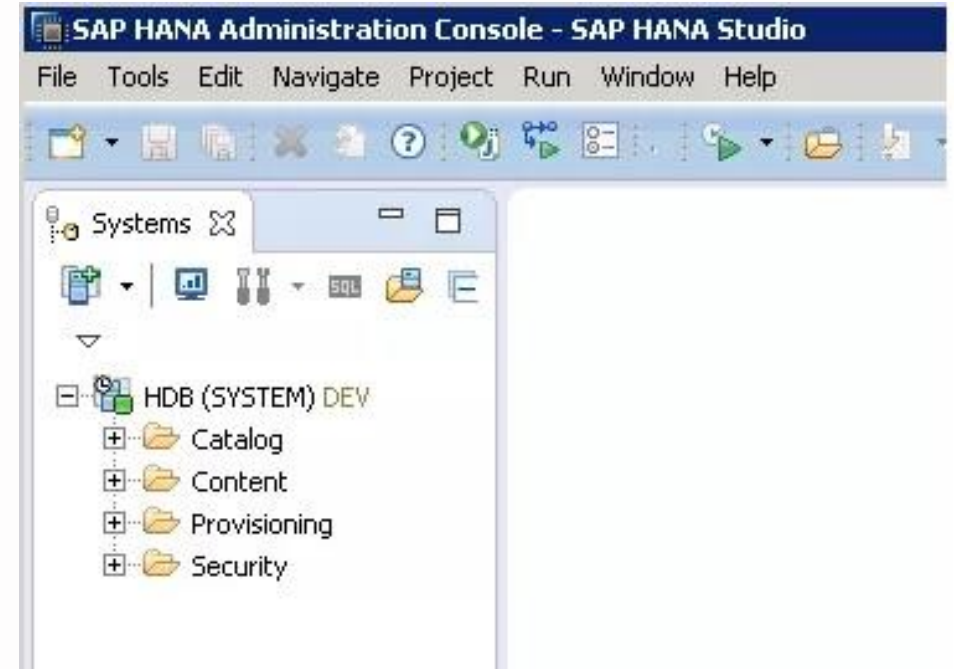
Content Objects

Once we add the HANA system in the Modeler or development perspective of HANA studio, we see a following structure in systems tab:

Catalog: This is where all the source metadata (Tables, views etc.) is grouped under. Here you can do data previews on source system tables that have been replicated or available as virtual tables in case of SDA.

Content: This is where all your HANA development takes place. The HANA models that you create go under here.

Provisioning: This is mostly used for Smart data access. All the source systems connected via SDA will have their tables displayed.

**Security:** This is mostly for security to maintain users and roles.

HANA Content objects & Packages

Content Objects

- All the information views are created under the content folder. It shall organize all the design time objects like –
  - Attribute Views, Analytic Views, Calculation Views, Procedures, Analytic Privileges, Decision Tables etc.

- Once these objects are activated, corresponding runtime objects are created under catalog folder by HANA.

| View	Description
Information Model	Extension to a HANA database that defines calculations at the database layer. Information Model views include Attribute, Analytic, and Calculation views. HANA Information Models are not available to a database user until they are exposed in the database through SAP HANA Studio. When Information Model views are exposed, they become Column views.
Column	Database representation of an Information Model view that is read-only and cannot be edited.
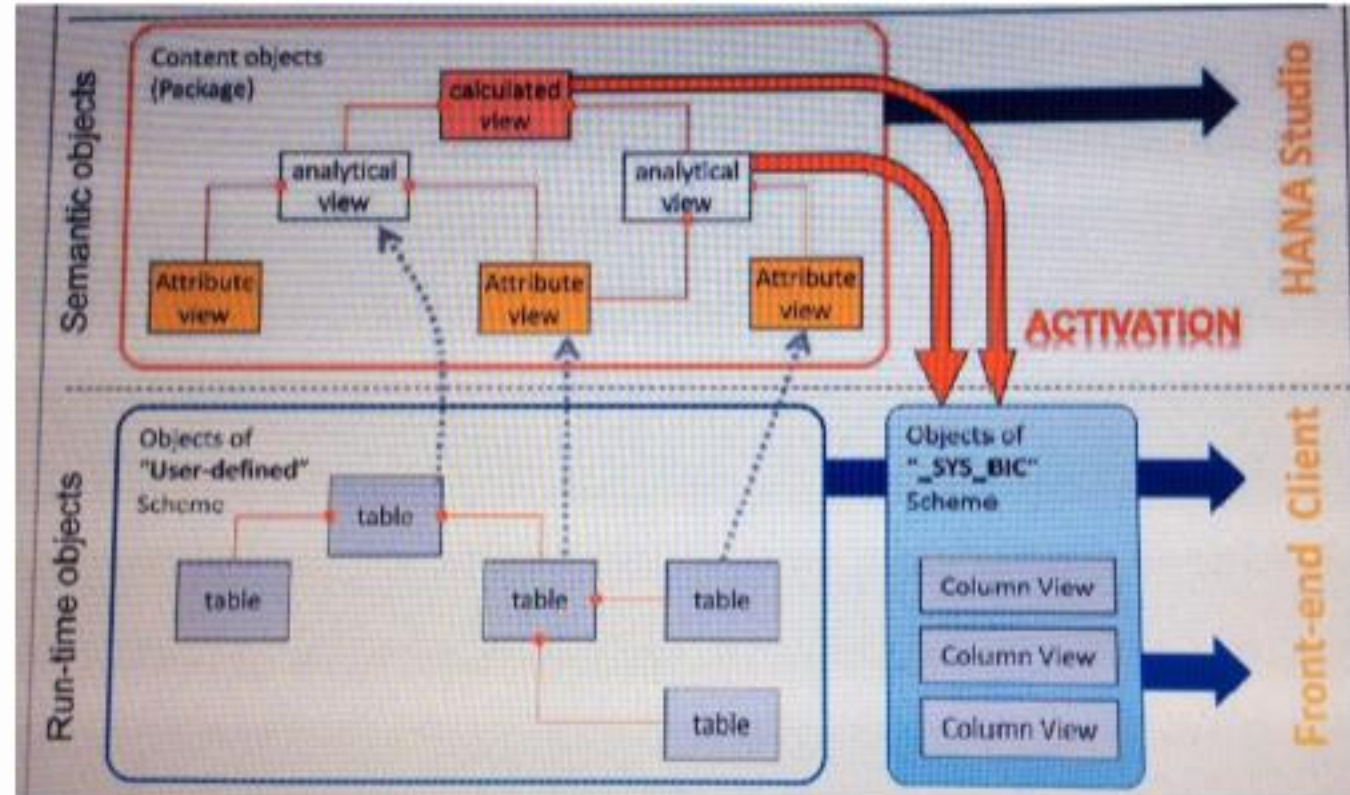
HANA Content objects & Packages

- Schema – HANA database contain a catalog that describes the various elements in the system. The catalog divides the database into sub-databases known as schema. A database schema enables you to logically group together objects such as tables, views, and stored procedures. Without a defined schema, you cannot write to the catalog.

- Packages – In SAP HANA, a package typically consists of a collection of repository objects, which can be transported between systems. Multiple packages can be combined in a delivery unit (DU). An SAP HANA package specifies a namespace in which the repository objects exist. Every repository object is assigned to a package, and each package must be assigned to a specific delivery unit.
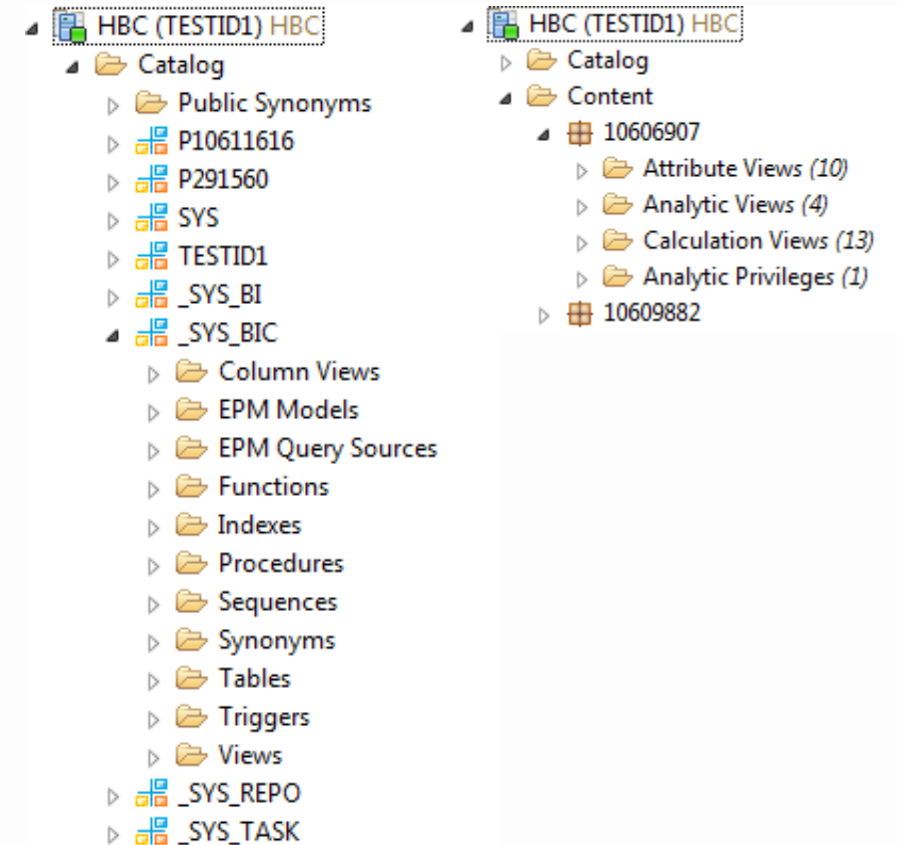
Calculation View - Graphical

- Graphical Calculation View is the SAP's recommended data model and it covers most of the development needs for reporting.

- SAP HANA Calculation View are of two types –
  - SAP HANA Graphical Calculation View
  - SAP HANA Script-based Calculation View

- Technical Specifications:
  - Supports Complex Calculations
  - Supports Client handling, language, currency conversion
  - Supports Union, Projection, Aggregation, Rank, etc.
  - Supports Hierarchies for consumption in BI Reporting tools
  - Supports consumption in ABAP as External View
  - Supports execution in Column Engine as well as SQL engine

- Functional Specifications:
  - Supports both OLTP and OLAP models
  - Support for seamless integration of data from different functional modules like FI, SD, HR etc.
  - Supports drilldown
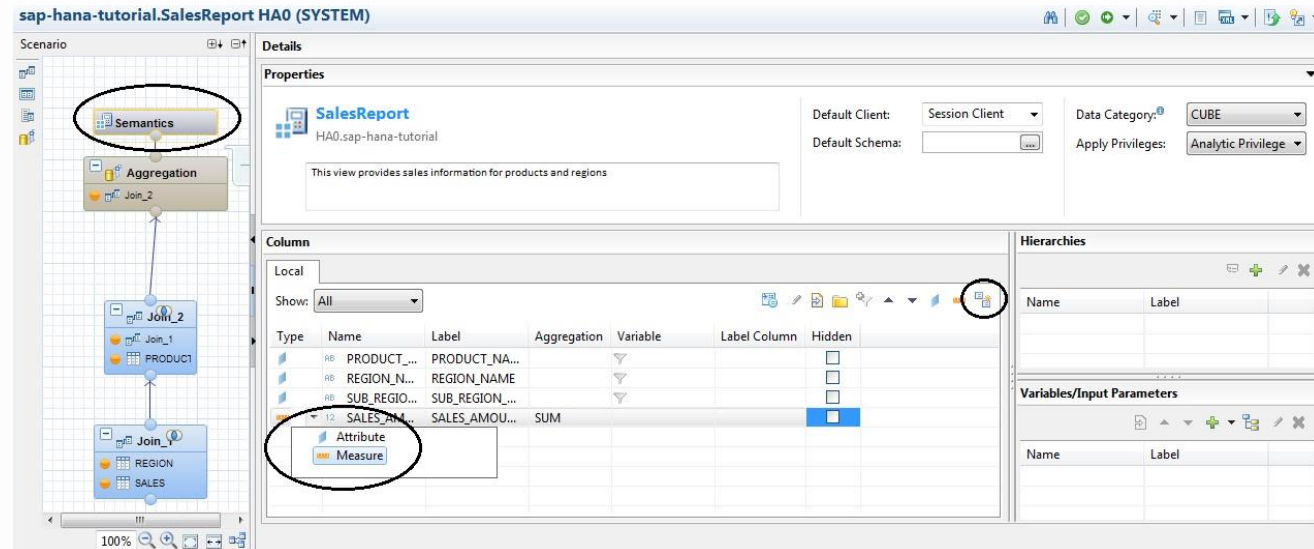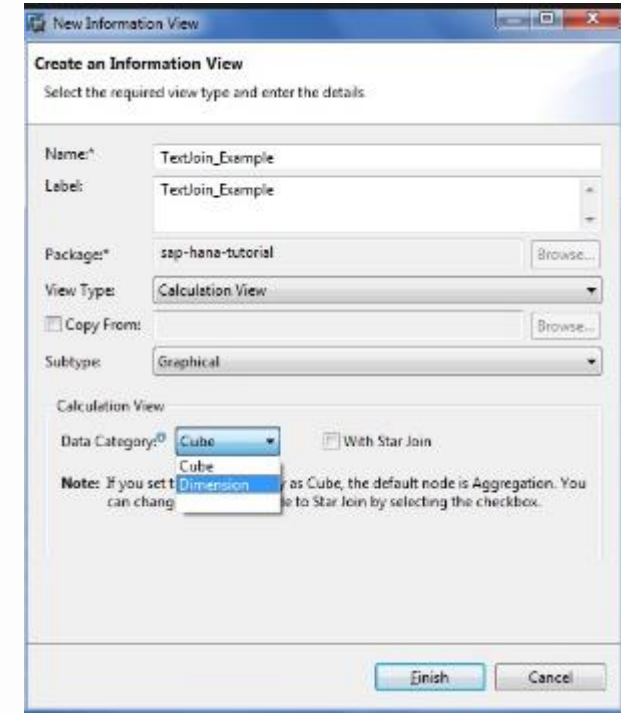
Calculation View – Graphical Contd..

- SAP HANA Graphical Calculation Views are of 3 data category types:

  - <u>CUBE Type (Must Contain at least one measure/keyfigure)</u> - Calculation views with data categories as Cube are visible to the reporting tools and supports data analysis with multidimensional reporting. Aggregation is the default node.

  - <u>Dimension Type (Should not contain any measure/keyfigure)</u> - Calculation views with data categories as Dimension are not visible to the reporting tools and does not support data analysis. However, they can be used as data sources in other calculation views, which have data category as Cube. Projection is the default node.

  - <Blank> - Calculation views with data categories as <blank>, or if the calculation views are not classified as cube or dimension, then they are not visible to the reporting tools and do not support multidimensional reporting. . However, they can be used as data sources in other calculation views, which have data category as Cube. Projection is the default node.

- All type of HANA views like attribute views, analytical views and calculation views can be consumed as data source in Calculation Views.

- Calculation views also support direct consumption of database tables

- **Demo:**

Microsoft Word
Document

Calculation View – Graphical : Dimension

Dimension type Calculation view

- Graphical Calculation View of type "Dimension" is analogues to BW Master Data

- It is an optimized substitute for Attribute Views

- Dimension type views do not support measure

- These are typically used to model Master Data objects

- These views always have "Projection" node as default node

Calculation View – Graphical : Cube

Cube type Calculation view

- Graphical Calculation View of type "Cube" is analogues to BW Transaction Data

- It is an optimized substitute for Analytical Views

- Cube type calculation views support both attributes and measures.

These are typically used to model all transaction Data from all the domains

   like Sales, Purchasing, Inventory, Finance, HR and so on

These views always have "Aggregation" node as default node

- Cube type Calculation Views further support 2 modelling approaches:
  - Standard Projection based modelling
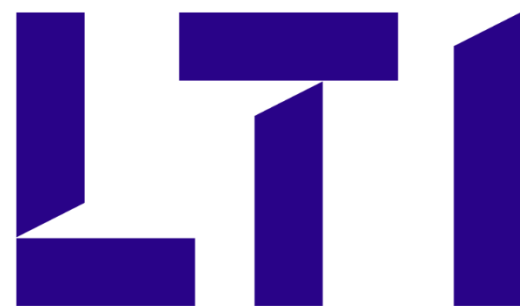 - Star Join Based modelling (Similar to BW Infocubes)

Reference, Further resources

- **SAP HANA Developer Guide**
- **SAP HANA modelling guide**
- **http://help.sap.com**

LTI

Let's Solve