DMM 163 – Introduction to Data Modeling in SAP HANA

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SAP TECHED

Speakers

Las Vegas, Oct 19 - 23

- Christoph Morgen
- Tobias Niekamp

Barcelona, Nov 10 - 12

- Sebastian Grass
- Yves Augustin

Agenda

Data Modeling with SAP HANA Overview

- SAP HANA Information Models

Hands-On Exercises Overview

- Workshop Scenario
- Section 1 – Designing basic Calculation Views
- Section 2 – Designing Calculation Views for multidimensional scenarios
- Section 3 – Designing Advanced Calculation Views (Optional)
- Section 4 – Performance Analysis of Calculation View Queries (Optional)

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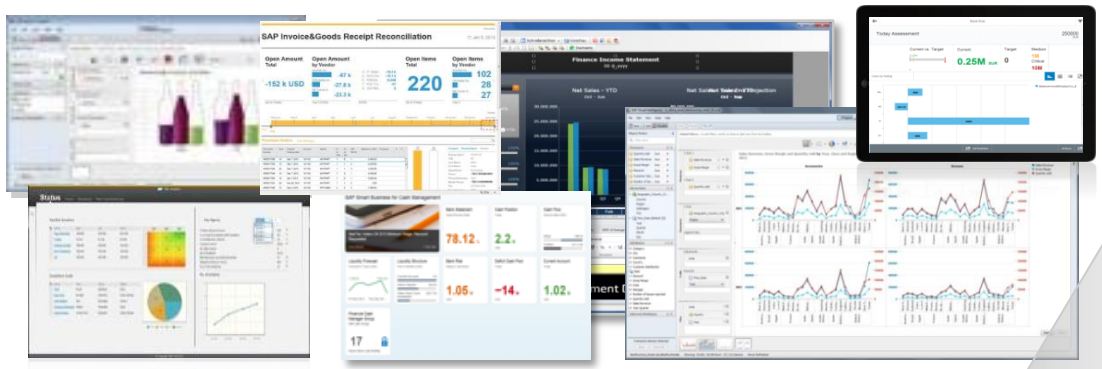
Data Modeling with SAP HANA

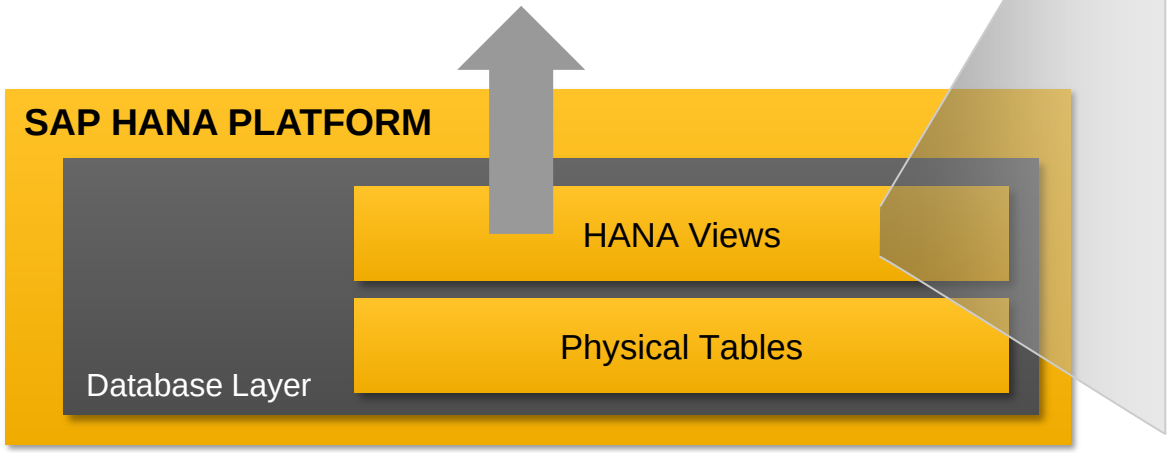
Overview SAP HANA Information Views

SAP HANA View Modeling – Overview

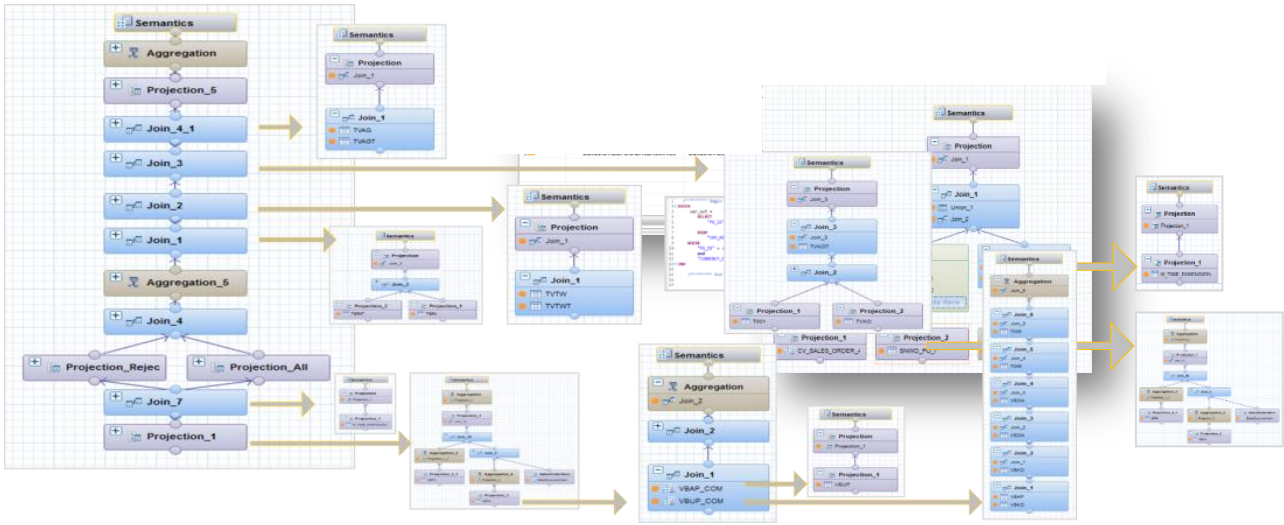
Virtual Data Modeling as a key SAP HANA concept



Operational Reporting | Applications | Analytics

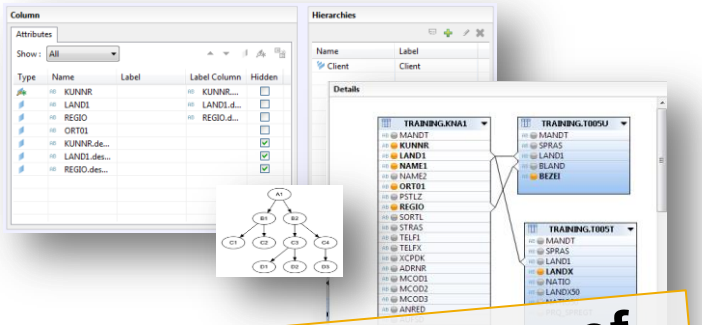


Virtual Data Flow Models



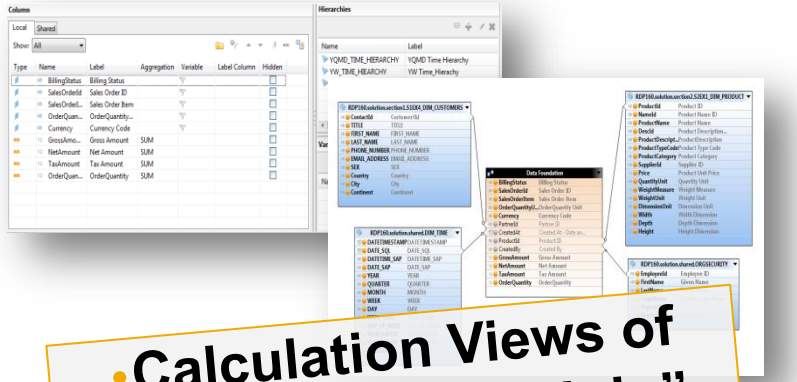
- No persistent Aggregations | single atomic copy of data
- In-Memory Engines | Performance
- Multidimensional Reporting Models
- Enterprise Applications Virtual Data Models

Flavors of SAP HANA View Modeling Approaches



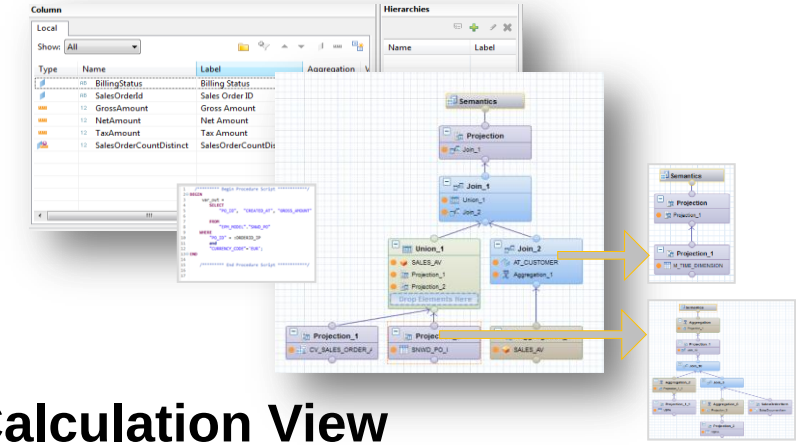
Calculation Views of type "Dimension"

- Compose a dimensional view with a series of attributes derived from a collection of tables e.g. Master Data Views
- Highly re-used and shared in Analytic- and Calculation Views
- Used to build Hierarchies
- Hierarchies are key elements in use with Analytic View for multi-dimensional reporting



Calculation Views of type "CUBE/StarJoin"

- Combines Fact-Tables with Attribute-Views to Star-Schema- or OLAP Cube-like objects for multidimensional reporting.
- Stores no aggregates and mass-aggregates on the fly
- Hierarchies are key for multi-dimensional access (navigation, filtering, slicing and aggregation)



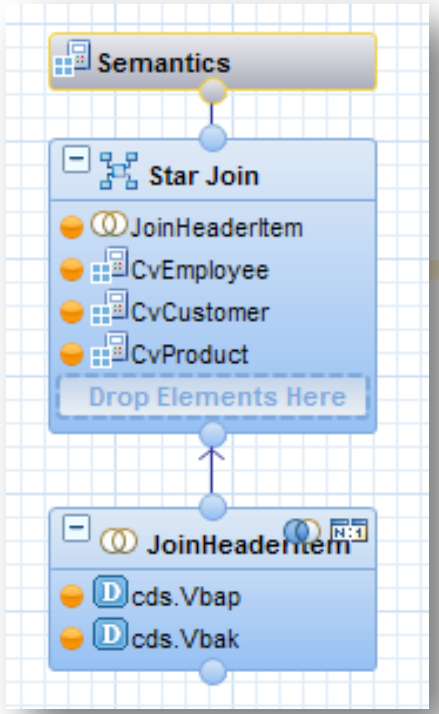
Calculation View

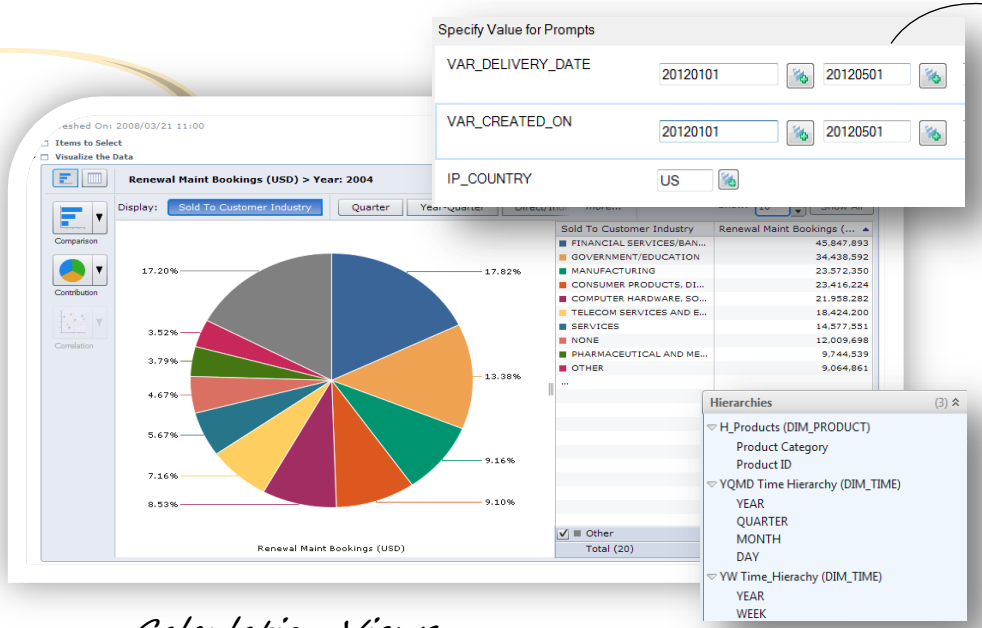
- Great flexibility for advanced use
- Approach to model custom scenarios like
  - Combined use of Multiple-Fact Tables/Analytics Views
  - Build Models on Normalized Data
  - Re-Use and stack views
  - Make use of custom scripted views

SAP HANA View Modeling – Overview

Virtual Data Models for Multidimensional Scenarios

Calculation Views are usually build upon other Calculation Views and Column Tables

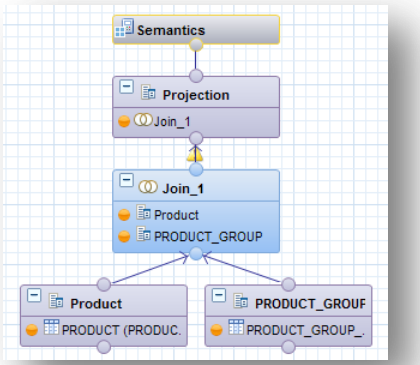




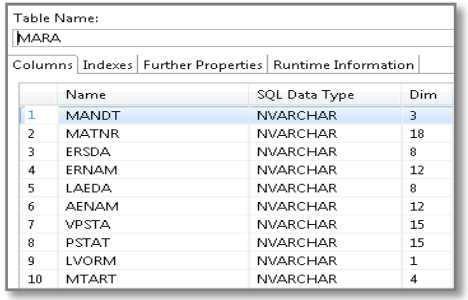
Reporting Tools can usually directly consume Calculation Views.

Multidimensional Tools support Hierarchies for Navigation, Filtering and Aggregation and HANA Prompts (Variables & Input Parameters) for efficient Pre-Filtering of Data.

Calculation Views



Column table

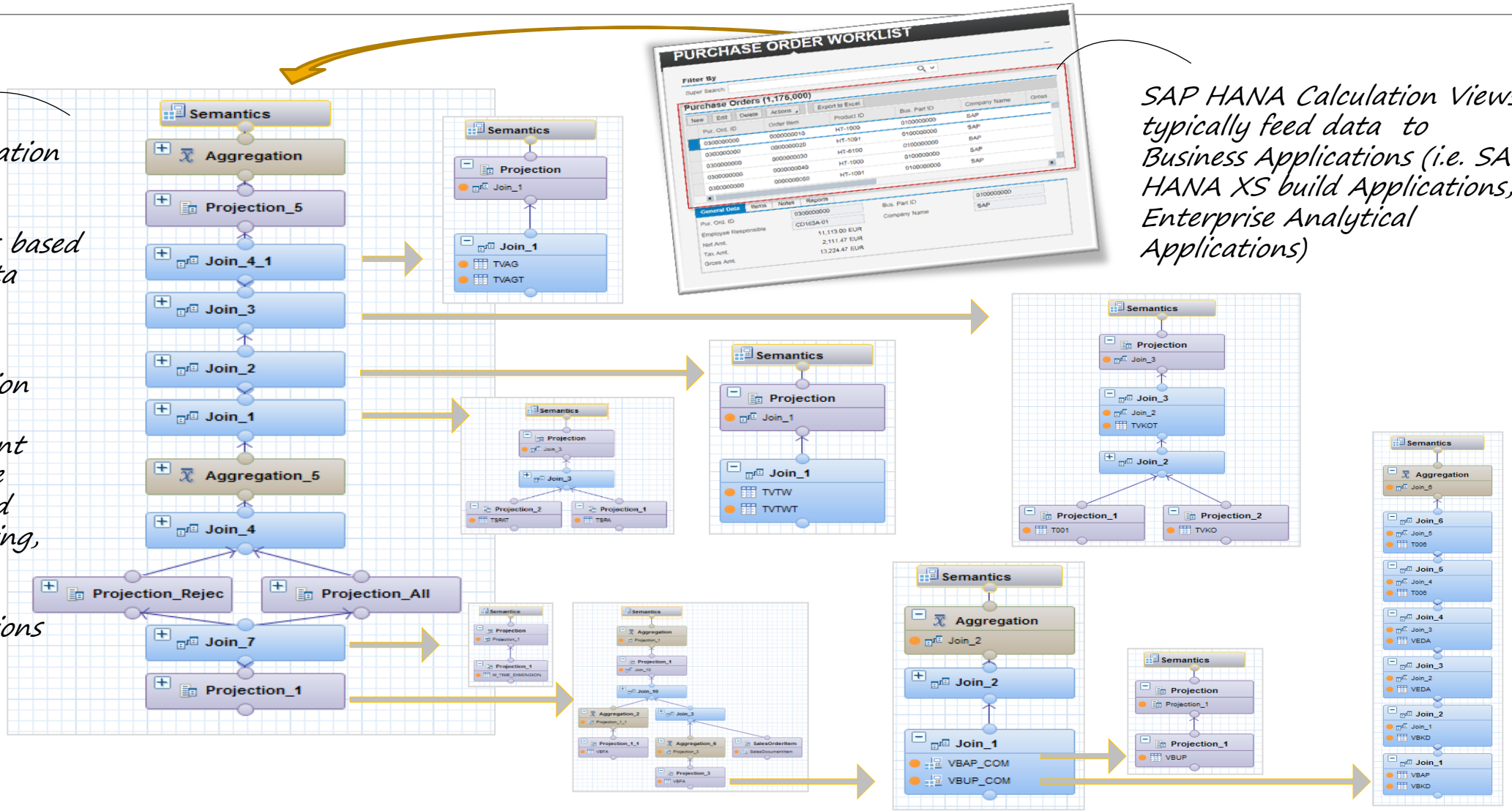


SAP HANA View Modeling – Overview

Virtual Data Models for Normalized Data Model Scenarios

SAP HANA Calculation Views provide the means to model sophisticate views based on normalized data structures.

Complex Calculation Views demand a more explicit intent and control of the modeled set-based data flow, i.e. slicing, aggregation and filtering of sets as input to joins, unions etc.

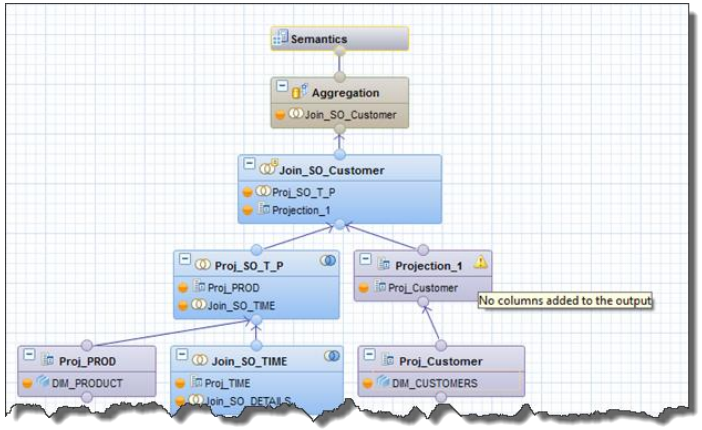


SAP HANA Calculation Views typically feed data to Business Applications (i.e. SAP HANA XS build Applications, Enterprise Analytical Applications)

SAP HANA Modeling – Graphical Editors

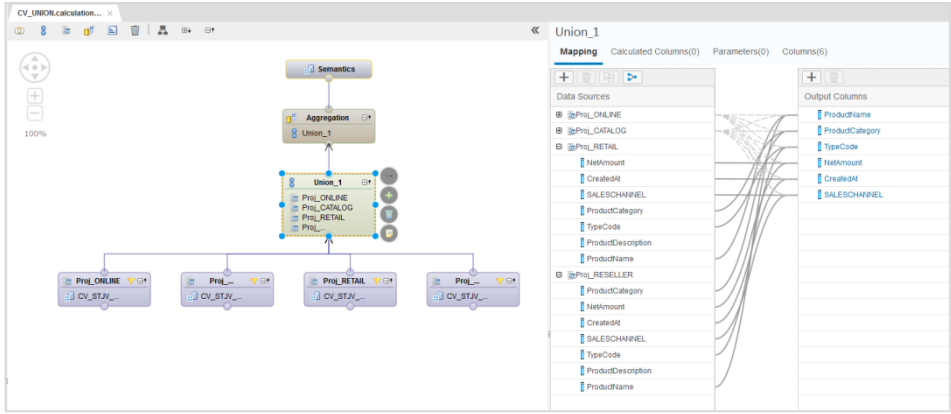
Eclipse-based IDE & Web-based Development Workbench

SAP HANA Studio



- **Modeler Eclipse-perspective**
  Systems view: Supports basic Modeling artifacts.
  (no support for functions, roles, CDS objects, repository)
- **Development Eclipse-perspective**
  Project/Navigator/Repository view: Support all design-time artifacts and repository functionality.

SAP HANA Web-based Development Workbench



Browser-based graphical View Editor
Browser → http://hana-server:port/sap/hana/ide/editor/

- No Analytic- and Attribute-view Modeling support
- Supports Calculation Models (table functions, roles, procedures, script based calc-models, analytical privileges etc.)
- SQL Editor support, Catalog, Security, Admin, etc.

Note: Web-based editors are future/mid-term innovation platform for SAP HANA development tools, however currently not yet feature complete (SAP HANA SPS10).

Hands-On Exercises Overview

Workshop Scenario

Section 1 – Designing basic Calculation Views

Section 2 – Designing Calculation Views for multidimensional scenarios

Section 3 – Designing Advanced Calculation Views (Optional)

Section 4 – Performance Analysis of Calculation View Queries (Optional)

Exercises Scenario

The Enterprise Procurement Data Model

Primary Entities:

- Sales Orders
- Deliveries

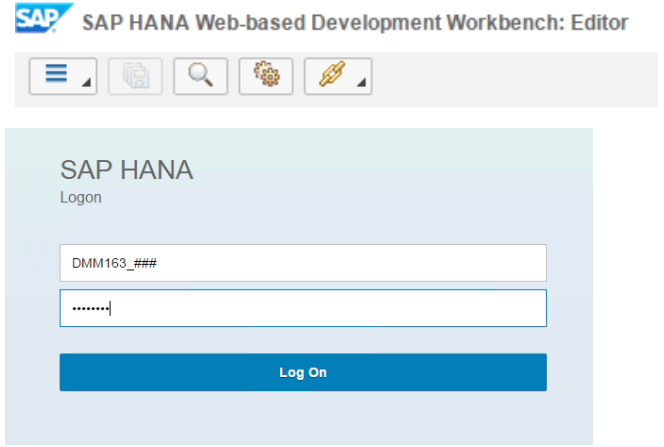
Supporting Entities:

- Products
- Address
- Business Partner

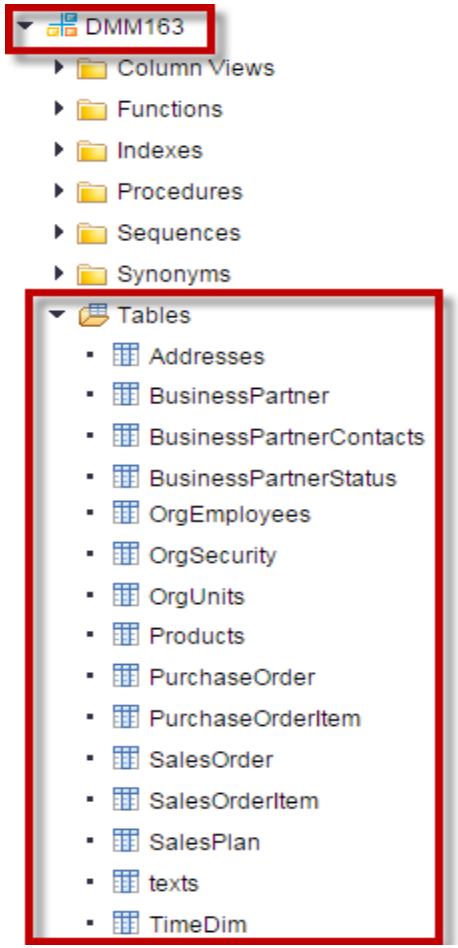
Solution Content:

System Information:

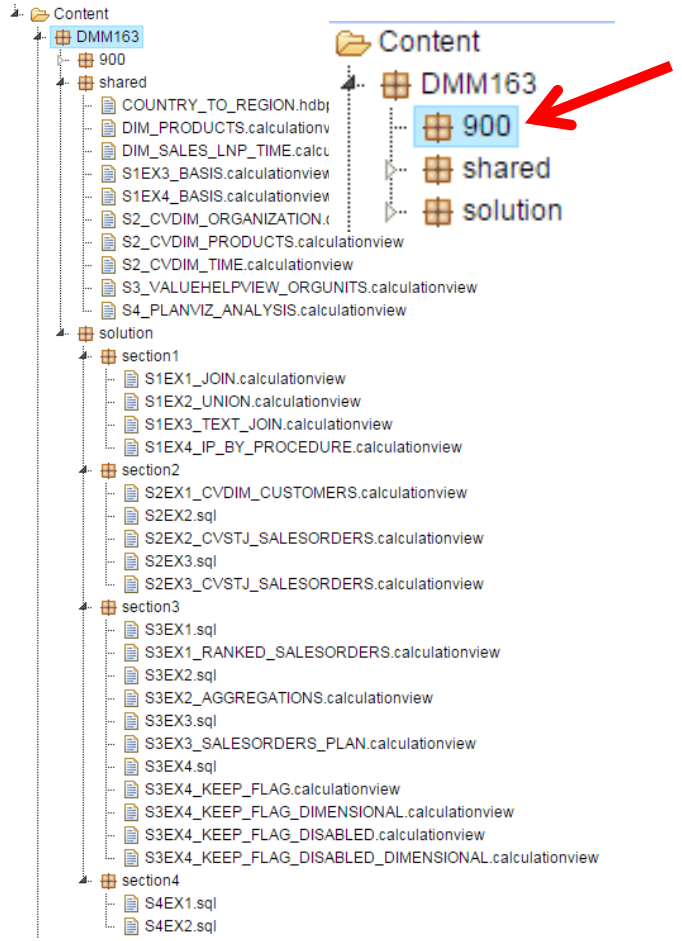
http://lt5071.wdf.sap.corp:8030/sap/hana/ide



Exercise Data:



Exercise work area location:

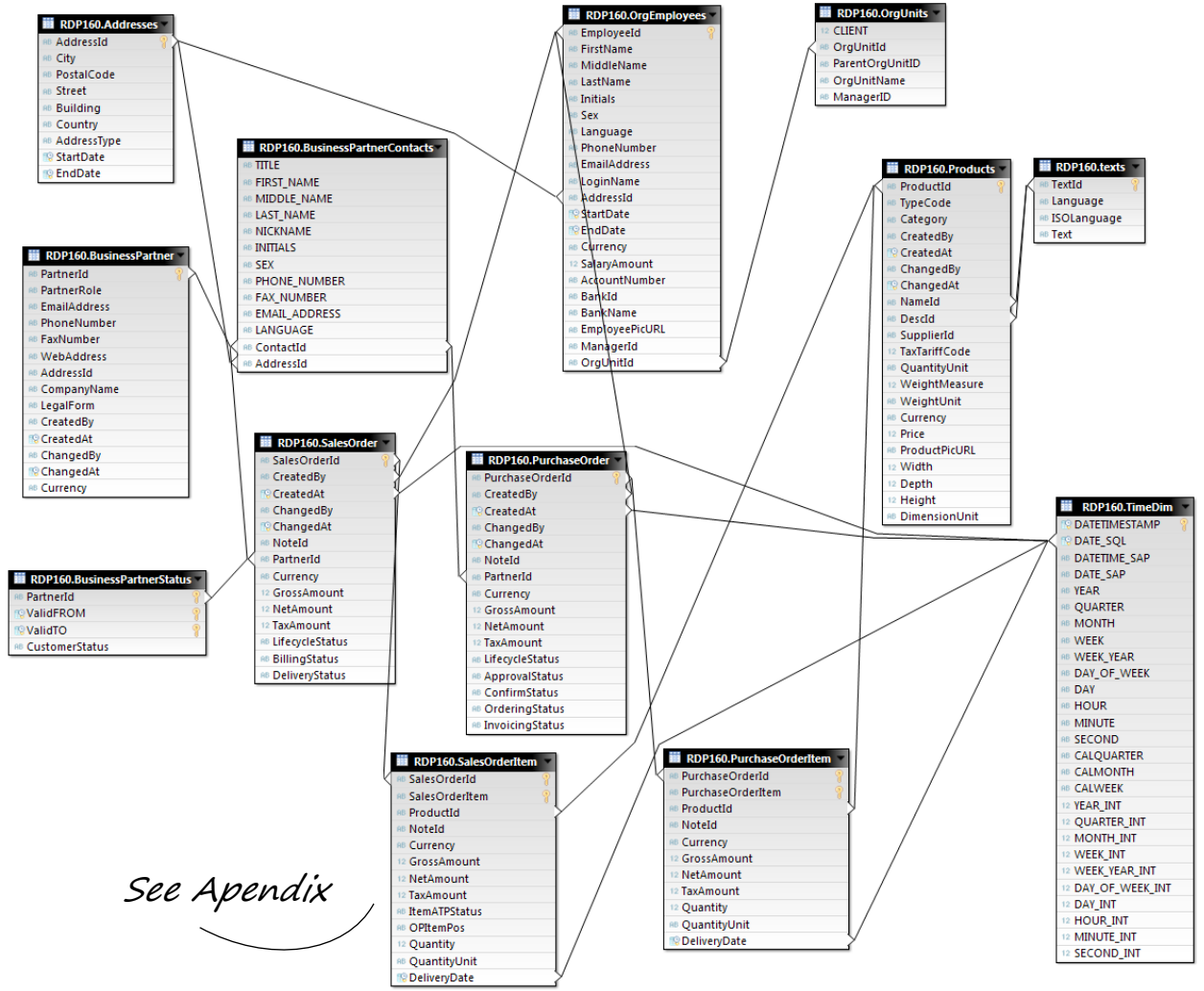


Exercises Scenario
The Enterprise Procurement Data Model

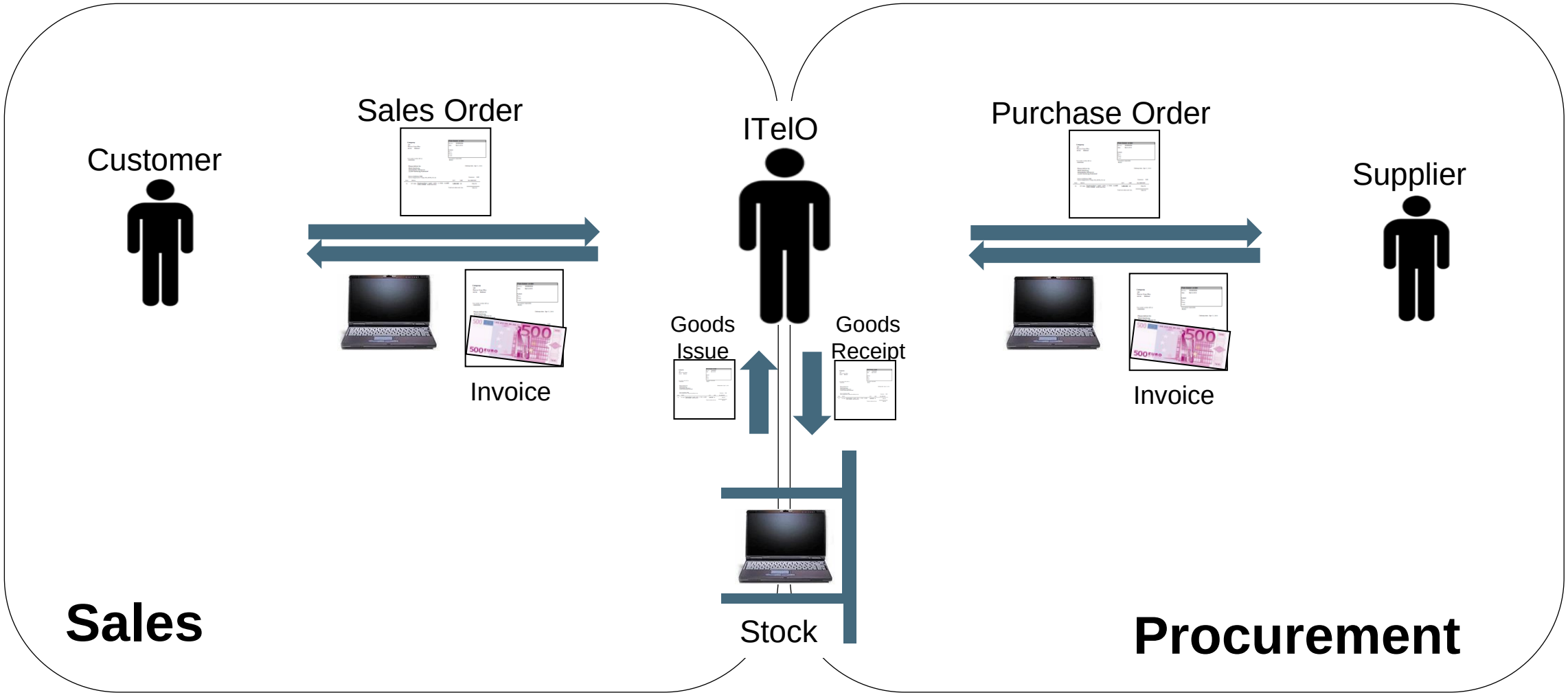
Two Primary Entities:
- Sales Orders
- Purchase Orders

Supporting Entities:
- Employees
- Partners (Customers, Suppliers)
- Addresses
- Texts
- Products

Infrastructure Entities
- Currency Rates
- Unit of Measures



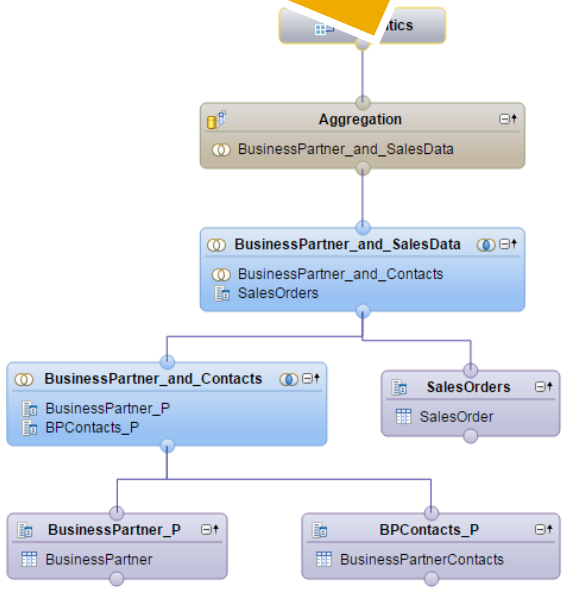
Exercises Scenario
The Enterprise Procurement Data Model



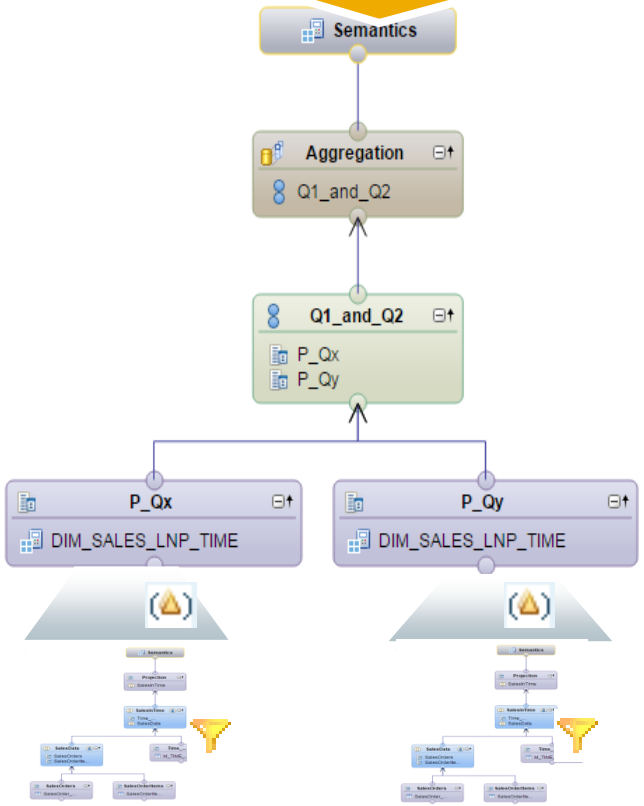
Exercises Section 1

Designing Basic Calculation Views Scenarios

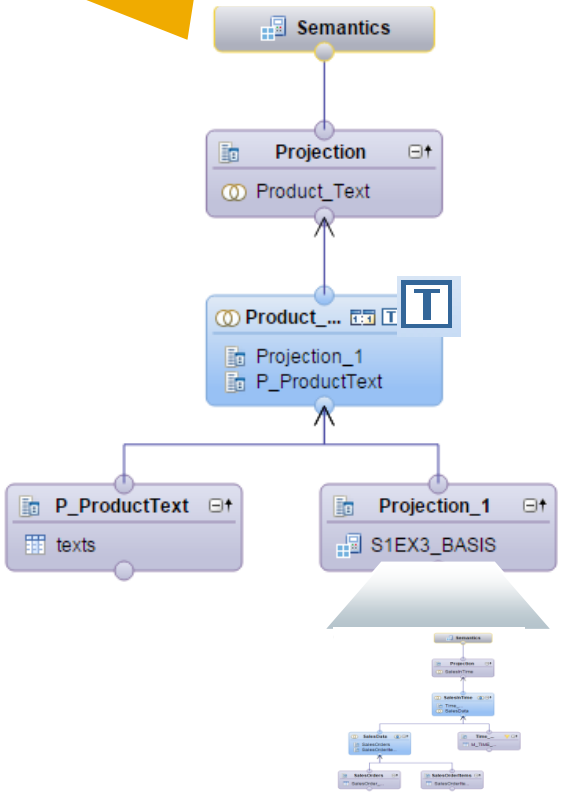
1.1 Building basic Calculation Views
(using Joins, Projections, etc)



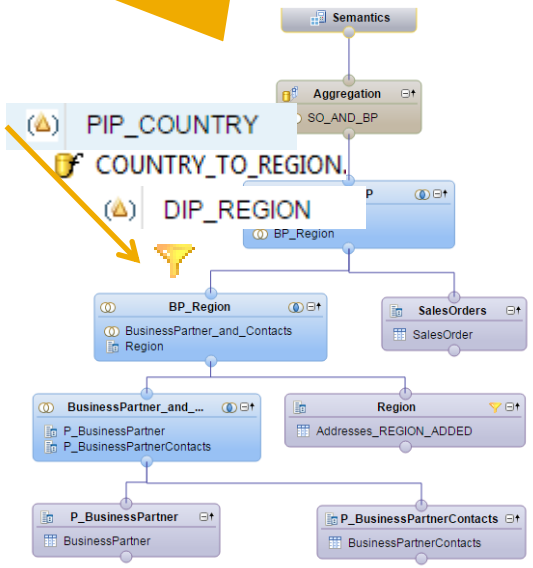
1.2 Union multiple source data sets in Calc. Views
(incl. Parameter passing)



1.3 Leveraging text lookups in Calculation Views



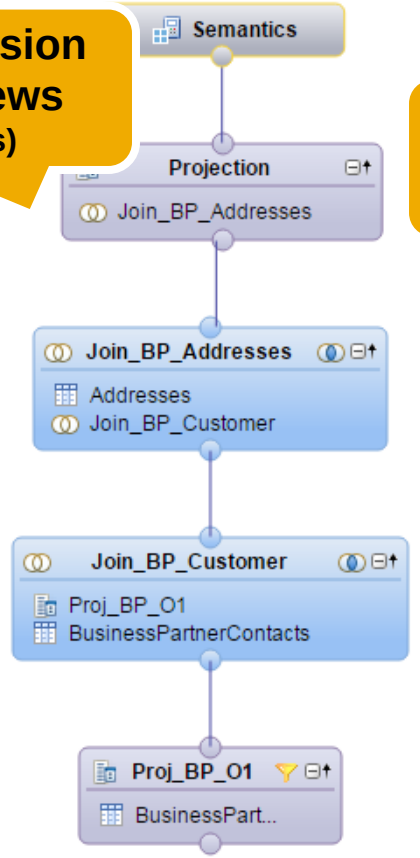
1.4 Using derived parameters in Calculation Views



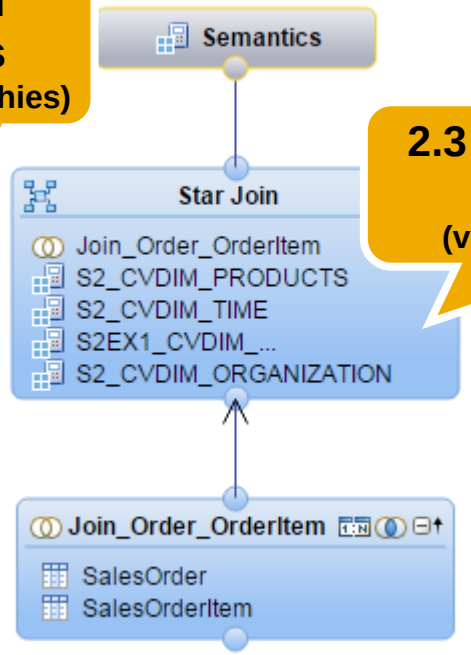
Exercises Section 2

Designing Calculation Views for Multidimensional Scenarios

2.1 Build Dimension Calculation Views
(incl. Hierarchies)



2.2 Build StarJoin Calculation Views
(multiple Dimens. & Hierarchies)

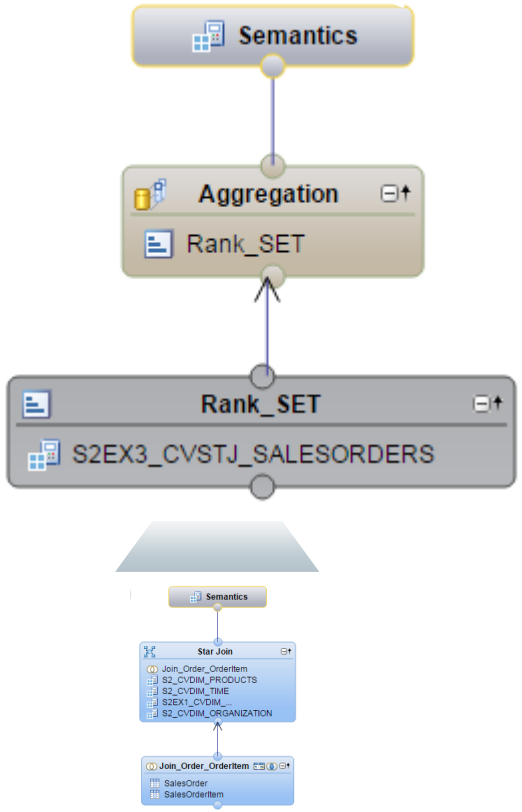


2.3 Enhance a StarJoin Calculation View
(var. calculated Measures)

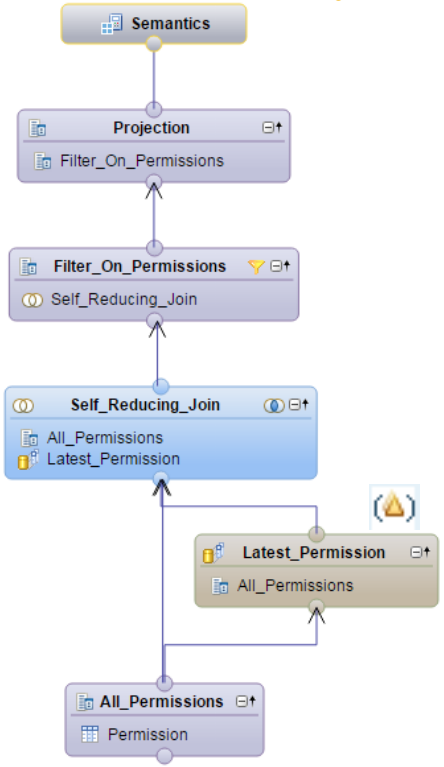
Exercises Section 3

Designing advanced Calculation Views Scenarios

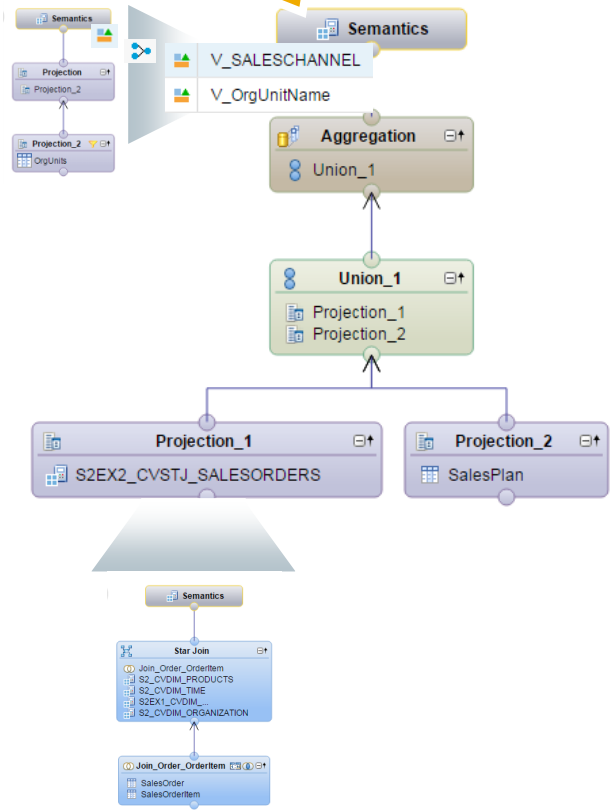
3.1 Leveraging Ranked Sets in Calculation Views



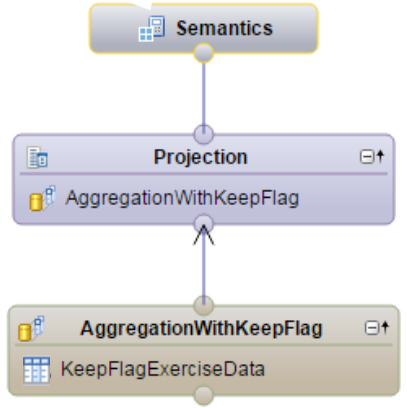
3.2 Using different measure aggregation functions in Calculation Views



3.3 Using Value-help Views and dependent variables



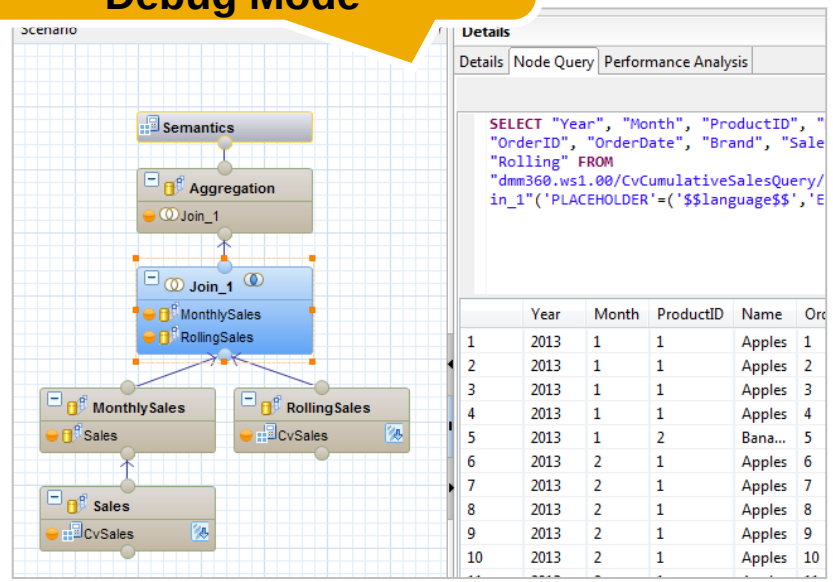
3.4 Controlling Aggregation levels in Calculation Views



Exercises Section 4

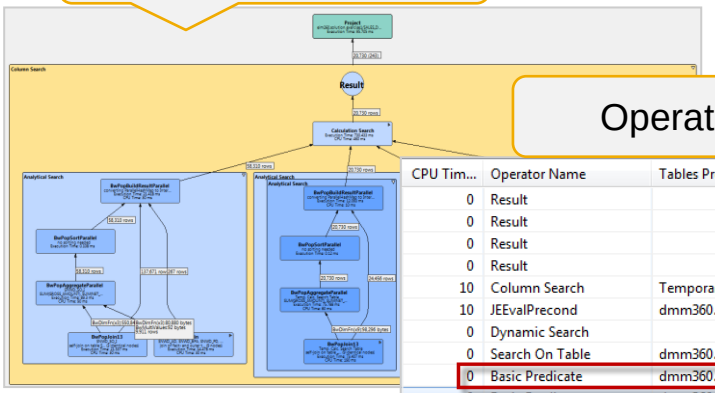
Performance Analysis of Calculation View Queries

4.1 Performance Analysis using the Calculation View Debug Mode



4.2 Performance Analysis using the Plan Visualization Tools

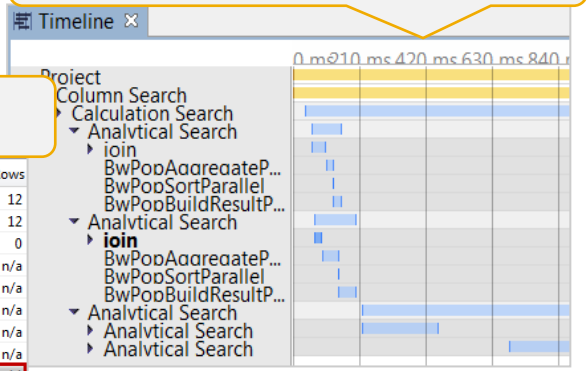
Visualize Plan



Operator list

CPU Tim...	Operator Name	Tables Process...	Input Rows
0	Result		12
0	Result		12
0	Result		0
0	Result		n/a
10	Column Search	Temporary Ta...	n/a
10	JEEvalPrecond	dmm360.db::c...	n/a
0	Dynamic Search		n/a
0	Search On Table	dmm360.db::c...	n/a
0	Basic Predicate	dmm360.db::c...	14
0	Basic Predicate	dmm360.db::c...	n/a
0	Search On Delta 1	dmm360.db::c...	n/a
0	Search On Delta 1	dmm360.db::c...	n/a
0	JEDistinctAttribute	dmm360.db::c...	12
0	JEAggregate	dmm360.db::c...	12
0	Result Assembly	Temporary Ta...	n/a

Timeline – root cause analysis



Explain Plan

OPERATOR_...	OPERATOR_DETAILS	EXECUTION...	TABLE_TYPE	TABLE_SIZE	OUTPUT...
ROW SEARCH	rdp361.solution.exercise5/SALESORDER_RAN...	ROW	?	?	45
WINDOW	WINDOW FUNC: DENSE_RANK() SORTING: ...	ROW	?	?	45
WINDOW	WINDOW FUNC: DENSE_RANK() SORTING: S...	ROW	?	?	45
COLUMN SE...	rdp361.solution.exercise5/SALESORDER_RAN...	COLUMN	?	?	45
AGGREGATI...	GROUPING: rdp361.solution.exercise5/SALES...	COLUMN	?	?	45
COLUMN ...	FILTER CONDITION: rdp361.solution.exercise...	COLUMN	OLAP VIEW	117,600	18,816

Exercises Hints

tbd

tbd

Hands-On Time.

Now it’s your time! Good Luck!

SAP HANA View Modeling – Best Practices

General Performance Guidelines

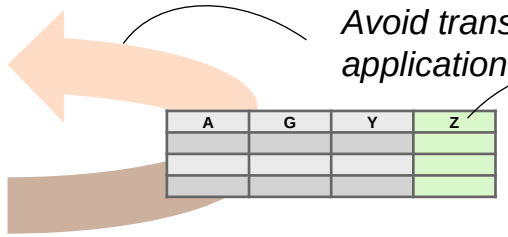
Client

Calculation Views

Procedures / Functions

Column

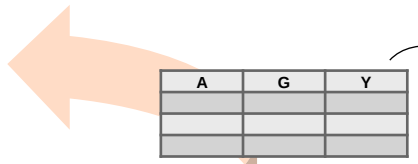
Store



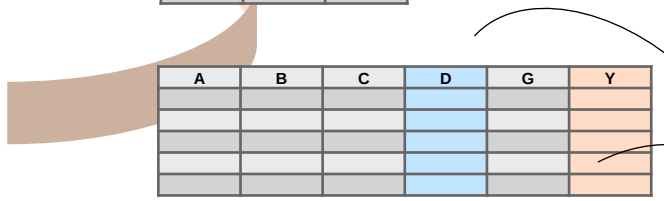
Avoid transfer data of large result sets between the HANA DB and client application

Do calculation after aggregation

Avoid Complex expressions, instead push down into model



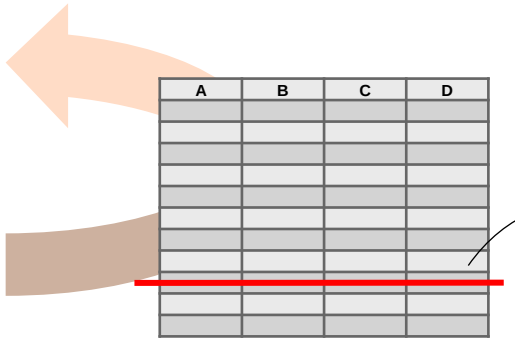
Aggregate data records (e.g using GROUP BY, reducing Columns)



Join on Key Columns or Indexed Columns

Avoid calculations before aggregation on line item level

Replace sequential cursor looping with set processing



Filter data amount as early as possible in the lower layers (CONSTRAINTS, WHERE Clause, Analytical Privileges..)

Overview New Approaches

Key new approaches

- Calculation View Modeling
  - Calculation views-Star-join instead of Analytical/Attribute
- SQL-Script Integration
  - Table functions as data sources (instead of scripted-models)
- Analytic Privileges
  - Support for SQL based analytic privileges
- Hierarchies
  - SQL enablement & Time Dependent hierarchies
- Data Sources
  - CDS entities, MultiDB tables
- Web-based Editor

Specific recent enhancements

- Column lineage analysis
- Comment & Model Deprecation
- Copy & Replace Nodes!
- Multilanguage-label support in Views
- Performance Analysis / Debugger enhancements
- Support Labels/Descriptions in value help dialogs

General enhancements

- Implicit SQL Execution - Model unfolding

DMM208 – New and Best Practices for Data Modeling with SAP HANA, Lecture | see also SAP TECHED | Online

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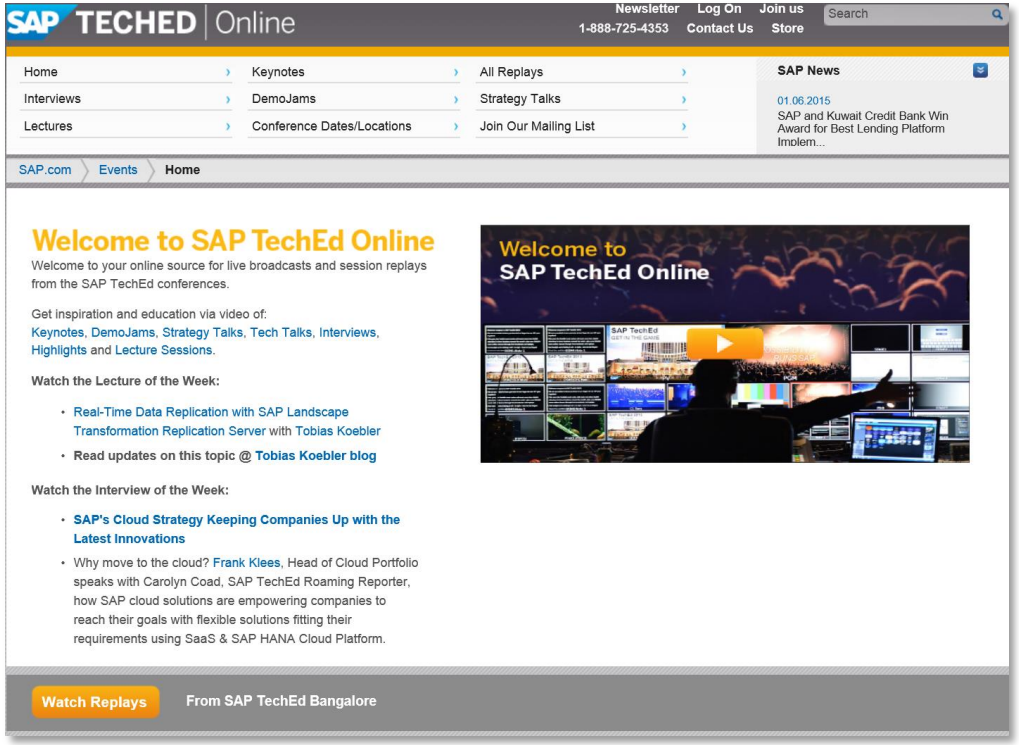

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Further Information

Related SAP TechEd sessions:

DMM360 – Advanced Data Modeling in SAP HANA, Hands-On Workshop

DMM208 – New and Best Practices for Data Modeling with SAP HANA, Lecture | see also SAP TECHED Online

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www.sap.com www.saphana.com

What's new in SAP HANA (incl. SAP HANA View Modeling)

https://blogs.saphana.com/2014/10/21/what-is-new-in-sap-hana-sps-09/ https://blogs.saphana.com/2015/06/16/new-sap-hana-sps10/

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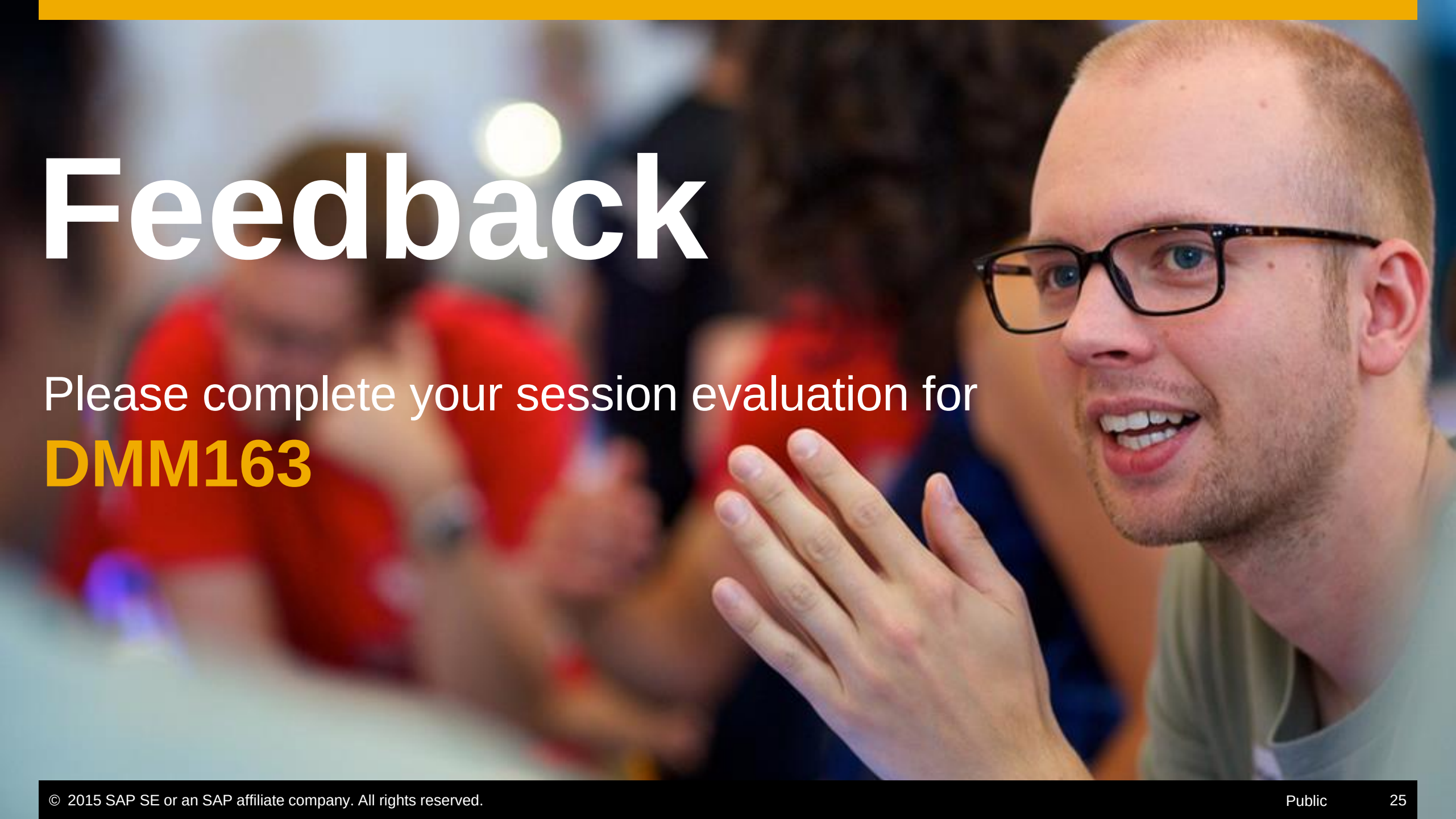

Thank you!

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