Week 3 Unit 1: **Recent Open SQL Enhancements – Part 1**

SAP

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Recent Open SQL Enhancements – Part 1
Outline

Content

- Enterprise Procurement Model
- Reminder: What is Open SQL?
- Open SQL evolution
- Open SQL enhancements
  - Syntax
  - SELECT list

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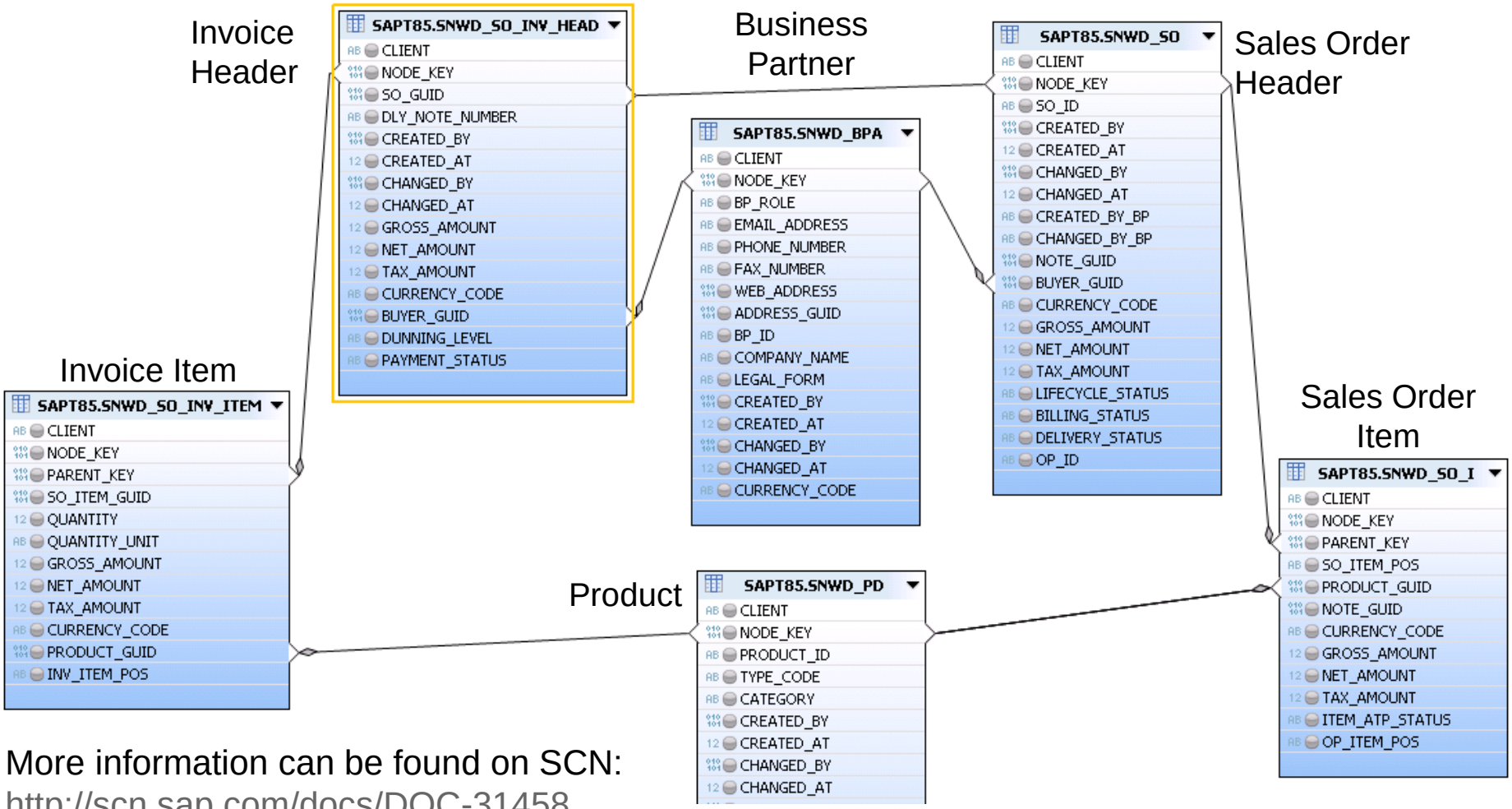
Recent Open SQL Enhancements – Part 1

Enterprise Procurement Model (EPM)



More information can be found on SCN:
http://scn.sap.com/docs/DOC-31458

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Recent Open SQL Enhancements – Part 1

Migration to SAP HANA

1. Detect

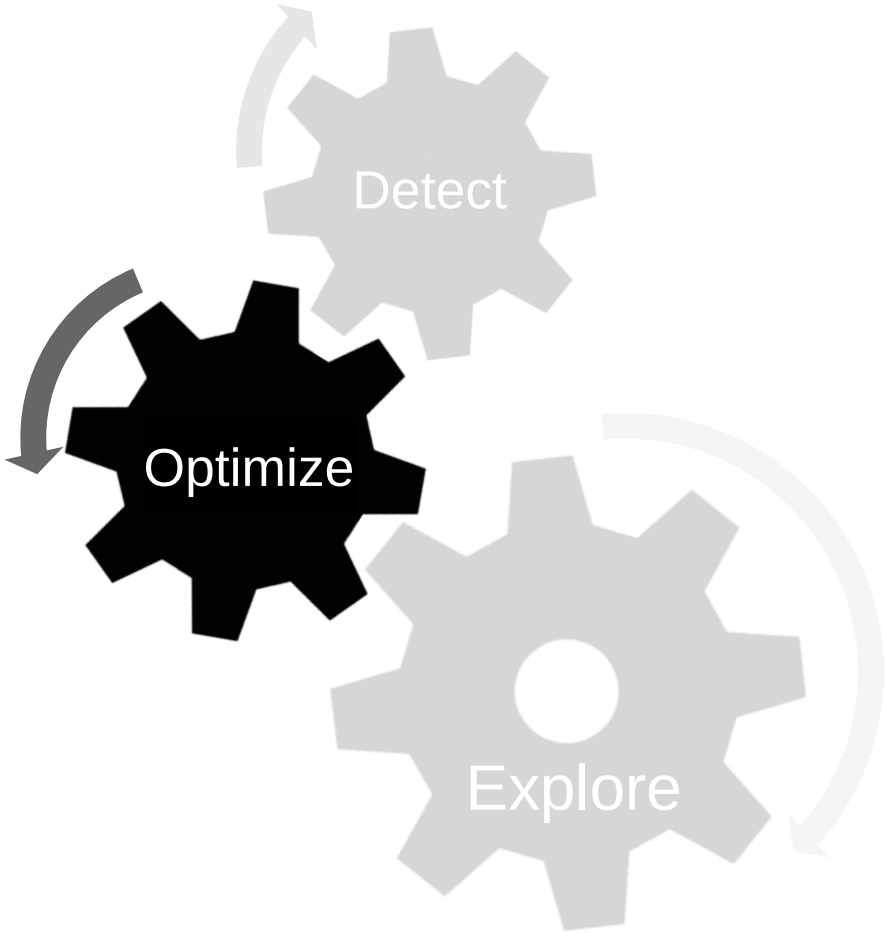
- Functional correctness
- Performance optimization potential

2. Optimize

- Database-oriented programming

3. Explore

- Use SAP HANA-specific features
- Rethink & innovate



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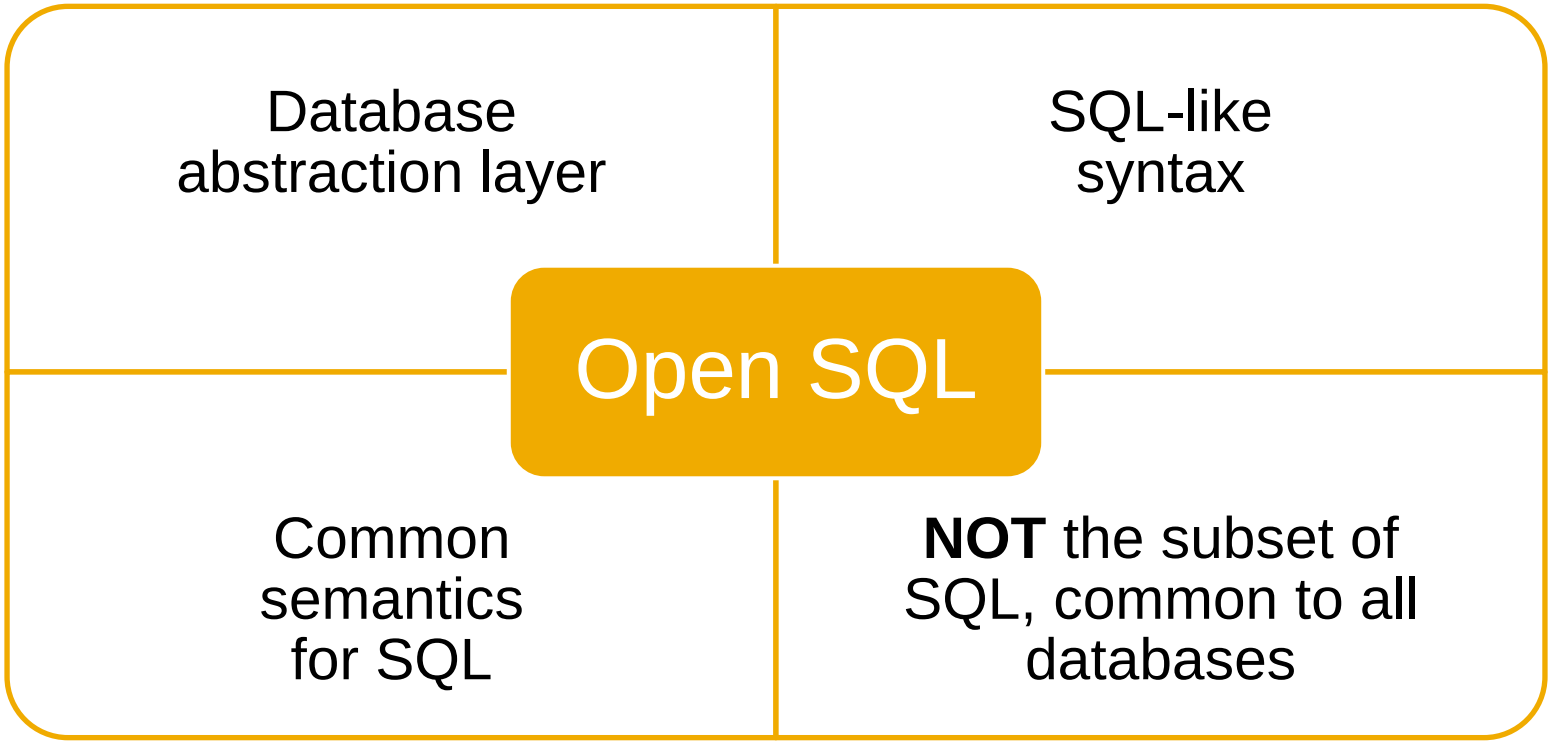
Recent Open SQL Enhancements – Part 1

Reminder: What Is Open SQL?



Open SQL is the only DB **abstraction layer** that defines a **common semantic** for all SAP-supported databases!

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Recent Open SQL Enhancements – Part 1

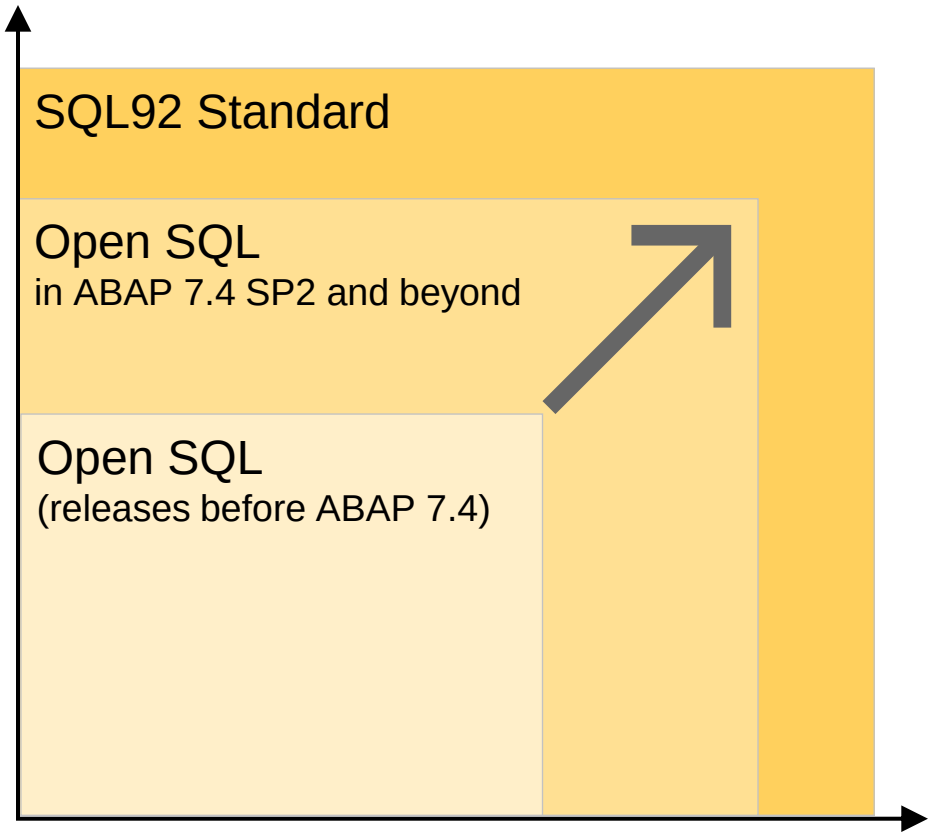
Open SQL in ABAP 7.4 SP2 and Beyond

Open SQL aspires to

- enable the application of the Code-to-Data paradigm
- provide (more) standard SQL features
- enable the consumption of SAP HANA-specific features

Introduction of new features

Reduction of existing limitations



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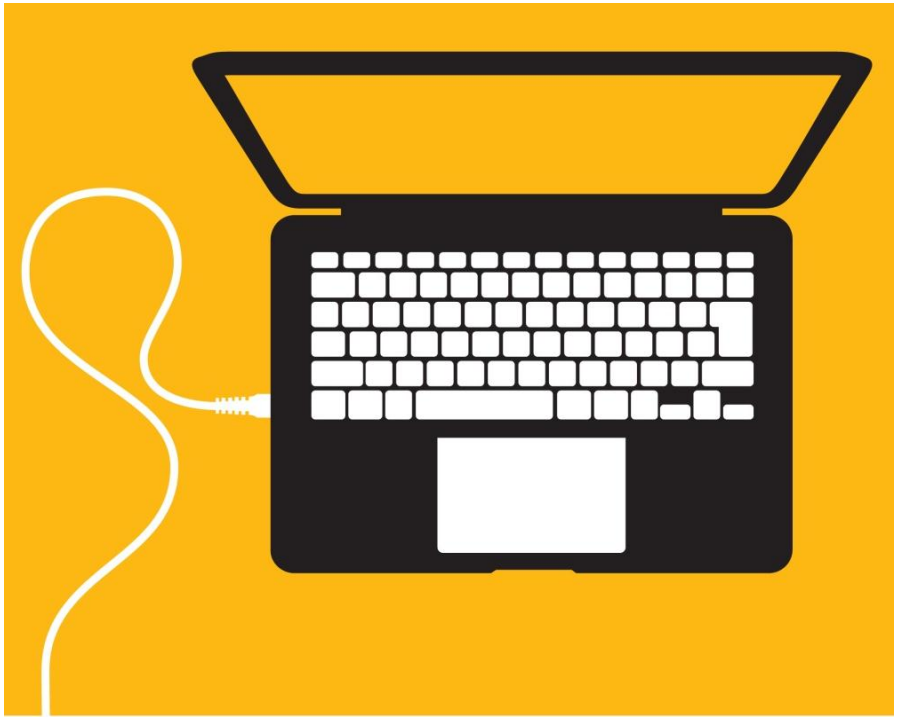
Recent Open SQL Enhancements – Part 1

Open SQL: Demo

Open SQL enhancements

- Syntax enhancements:
  - Escaping of host variables
  - Comma-separated select list
- SELECT list enhancements:
  - Aggregation functions
  - Literals
  - Arithmetical expressions



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Recent Open SQL Enhancements – Part 1

What's New in Open SQL?

Additional Material

New Open SQL Syntax

- Escaping of host variables
- Comma separated element list

```
SELECT so_id,
       currency_code,
       gross_amount
  FROM snwd_so
  INTO TABLE @DATA(lt_result).
```

Target Type Inference

New SELECT List Features

- Aggregation functions
- Literal values (next slide)
- Arithmetic expressions (next slide)
- String expression (next slide)

```
SELECT bp_id,
       company_name,
       so~currency_code,
       SUM( so~gross_amount )
          AS total_gross_amount
  FROM snwd_so AS so
  INNER JOIN snwd_bpa AS bpa
          ON so~buyer_guid = bpa~node_key
  INTO TABLE @DATA(lt_result)
  GROUP BY bp_id, company_name,
           so~currency_code.
```

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Recent Open SQL Enhancements – Part 1

Literal Values & Generic Existence Check

Additional Material

Literal Values

- Can now be used in the SELECT list
- Allow for a generic implementation of an existence check

```
SELECT so~so_id,
       'X' AS literal_x,
       42 AS literal_42
   FROM snwd_so AS so
   INTO TABLE @DATA(lt_result).
```

```
DATA lv_exists TYPE abap_bool
               VALUE abap_false.

SELECT SINGLE @abap_true
  FROM snwd_so
  INTO @lv_exists.

IF lv_exists = abap_true.
  "do some awesome application logic
ELSE.
  "no sales order exists
ENDIF.
```

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Recent Open SQL Enhancements – Part 1
Expressions

Additional Material

Arithmetic Expressions

- **+, -, *, DIV, MOD, ABS, FLOOR, CEIL**
- **Remember:** Open SQL defines a semantic for these expressions common to all supported databases
- Refer to the ABAP documentation to see which expression is valid for which types

```
DATA lv_discount TYPE p LENGTH 1 DECIMALS 1
                 VALUE '0.8'.

SELECT ( 1 + 1 ) AS two,
       ( @lv_discount * gross_amount )
           AS red_gross_amount,
       CEIL( gross_amount )
           AS ceiled_gross_amount
  FROM snwd_so
  INTO TABLE @DATA(lt_result).
```

String Expressions

- Concatenate character columns with the && operator

```
SELECT company_name
    && ' (' && legal_form && ')'
  FROM snwd_bpa
  INTO TABLE @DATA(lt_result).
```

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Recent Open SQL Enhancements – Part 1

What's Next?

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Week 3 Unit 2: **Recent Open SQL Enhancements – Part 2**

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Recent Open SQL Enhancements – Part 2
Outline

Content

- Open SQL enhancements
  - SELECT list (cont.)
  - GROUP BY and HAVING clauses
  - JOIN statements
  - Client handling
- More information

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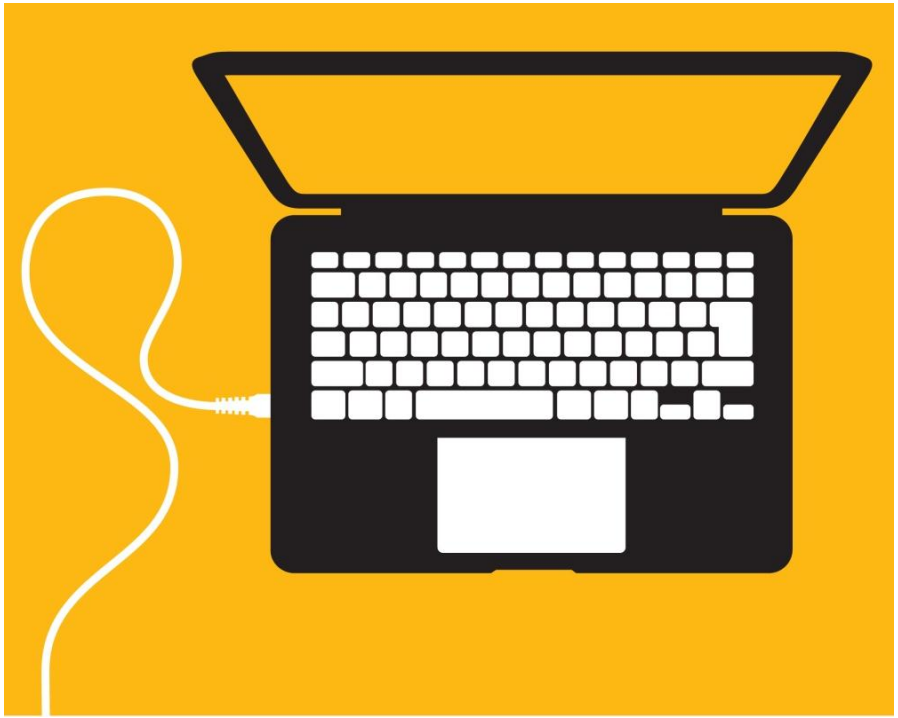
Recent Open SQL Enhancements – Part 2

Open SQL: Demo

Open SQL enhancements

- SELECT list enhancements:
  - Conditional expressions
- Expressions in
  - GROUP BY clause
  - HAVING clause
- JOIN statements
- Client handling



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Recent Open SQL Enhancements – Part 2

Conditional Expressions

Additional Material

CASE Expression

```
"simple case
SELECT so_id,
       CASE delivery_status
         WHEN ' ' THEN 'OPEN'
         WHEN 'D' THEN 'DELIVERED'
         ELSE delivery_status
       END AS delivery_status_long
  FROM snwd_so
  INTO TABLE @DATA(lt_simple_case).

"searched case
SELECT so_id,
      CASE
        WHEN gross_amount > 1000
          THEN 'High volume sales order'
        ELSE ' '
      END AS volumn_order
   FROM snwd_so
   INTO TABLE @DATA(lt_searched_case).
```

COALESCE Expression

```
SELECT so_id,
       so~gross_amount
             AS so_amount,
       inv_head~gross_amount
             AS inv_amount,
       "potential invoice amount
       COALESCE( inv_head~gross_amount,
                 so~gross_amount )
             AS expected_amount
  FROM snwd_so AS so
  LEFT OUTER JOIN
       snwd_so_inv_head AS inv_head
    ON inv_head~so_guid = so~node_key
  INTO TABLE @DATA(lt_result).
```

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Recent Open SQL Enhancements – Part 2

Expressions in GROUP BY & HAVING Clauses

Additional Material

GROUP BY Clause

```
SELECT bp_id,
       company_name,
       so~currency_code,
       SUM( so~gross_amount )
         AS total_amount,
       CASE
         WHEN so~gross_amount < 1000
           THEN 'X'
         ELSE ' '
       END AS low_volume_flag,
       COUNT( * ) AS cnt_orders
 FROM snwd_so AS so
 INNER JOIN snwd_bpa AS bpa
 ON bpa~node_key = so~buyer_guid
 INTO TABLE @DATA(lt_result)
 GROUP BY
   bp_id, company_name,
   so~currency_code,
   CASE
     WHEN so~gross_amount < 1000
       THEN 'X'
       ELSE ' '
     END
  ORDER BY company_name.
```

HAVING Clause

```
SELECT bp_id,
       company_name,
       so~currency_code,
       SUM( so~gross_amount )
        AS total_amount
   FROM snwd_so AS so
   INNER JOIN snwd_bpa AS bpa
   ON bpa~node_key = so~buyer_guid
   INTO TABLE @DATA(lt_result)
   WHERE so~delivery_status = ' '
   GROUP BY
     bp_id,
     company_name,
     so~currency_code
   HAVING SUM( so~gross_amount ) > 10000000.
```

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Recent Open SQL Enhancements – Part 2

Support for JOIN Statements

Additional Material

Enhancements

- Now available: **RIGHT OUTER JOIN**
- Enhanced **bracketing** in JOIN expressions
- New functionality in **ON** conditions of JOIN statements like:
  - **Necessary requirement** of a field of the right table in the ON condition is dropped
  - Operators like **BETWEEN** or "**>**" can be used for comparisons
  - Possibility to use **fields of the right table** in the **WHERE** clause of LEFT OUTER JOINs
- Restriction of **maximum number of tables** in JOINs has been increased to 50

```
SELECT
    so_id,
    bp_id,
    gross_amount
 FROM snwd_so AS so
 RIGHT OUTER JOIN snwd_bpa AS bpa
   ON so~buyer_guid = bpa~node_key
  AND so~gross_amount > 100000
 INTO TABLE @DATA(lt_result).
```

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Recent Open SQL Enhancements – Part 2

Automatic Client Handling

Additional Material

Automatic Client Handling

- Well known Open SQL client handling
- Client handling can be overruled with **USING CLIENT**
- Simplified/improved client handling in JOINs

```
SELECT
  bp_id,
  company_name,
  so~currency_code,
  so~gross_amount
FROM snwd_so AS so
INNER JOIN snwd_bpa AS bpa
  ON so~buyer_guid = bpa~node_key
  USING CLIENT '111'
INTO TABLE @DATA(lt_result).
```

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Recent Open SQL Enhancements – Part 2

More Information

More information about recent Open SQL enhancements:

- Help Portal (http://help.sap.com/nw74): What‘s New – Release Notes for Support Package 05 & 08
- SCN blog: http://scn.sap.com/community/abap/blog/2014/02/06/abap-news-for-release-740-sp05

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Recent Open SQL Enhancements – Part 2

What’s Next?

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Week 3 Unit 3: **Core Data Services: What's in It for You?**

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Core Data Services: What's in It for You?

Outline

Content

- Introduction to Core Data Services (CDS)
- Core Data Services in ABAP
- Consumption of CDS views
- CDS vs. Open SQL

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Core Data Services: What's in It for You?

Migration to SAP HANA

1. Detect

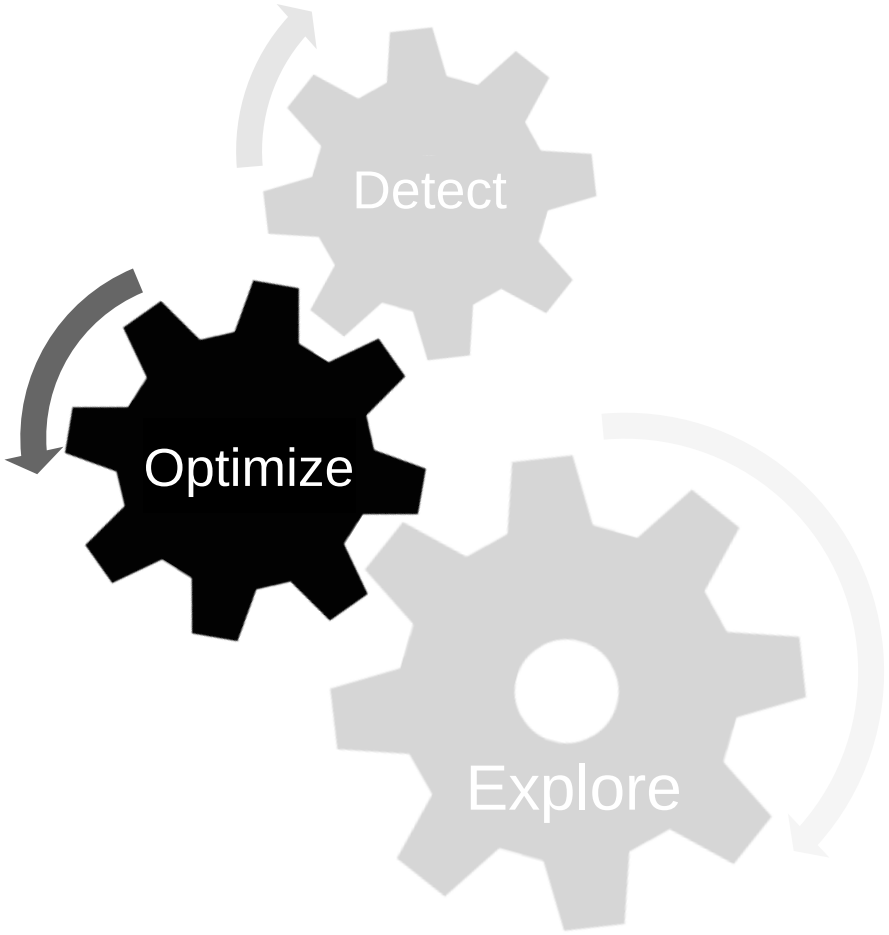
- Functional correctness
- Performance optimization potential

2. Optimize

- Database-oriented programming

3. Explore

- Use SAP HANA-specific features
- Rethink & innovate



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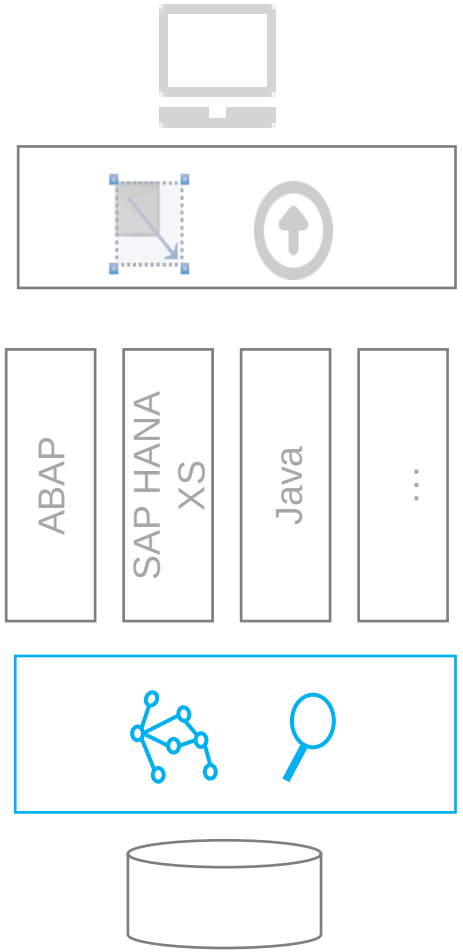
Core Data Services: What's in It for You?

Introduction to Core Data Services (CDS)

Core Data Services

- Next generation of data definition and access for database-centric applications
- Optimized application programming model for all domains (transactional, analytical,…)
- Technically an extension to SQL:
  - Expressions
  - Domain-specific metadata
  - Associations
- CDS includes
  - Data Definition Language (**DDL**)
  - Query language (**QL**)
  - Data Manipulation Language (**DML**)
  - Data control language (**DCL**)



User Interface

UI Abstractions

Application Programming

Core Data Services

Database

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Core Data Services: What's in It for You?

Core Data Services in ABAP

Code-to-Data paradigm

- Supported through extended view functionality

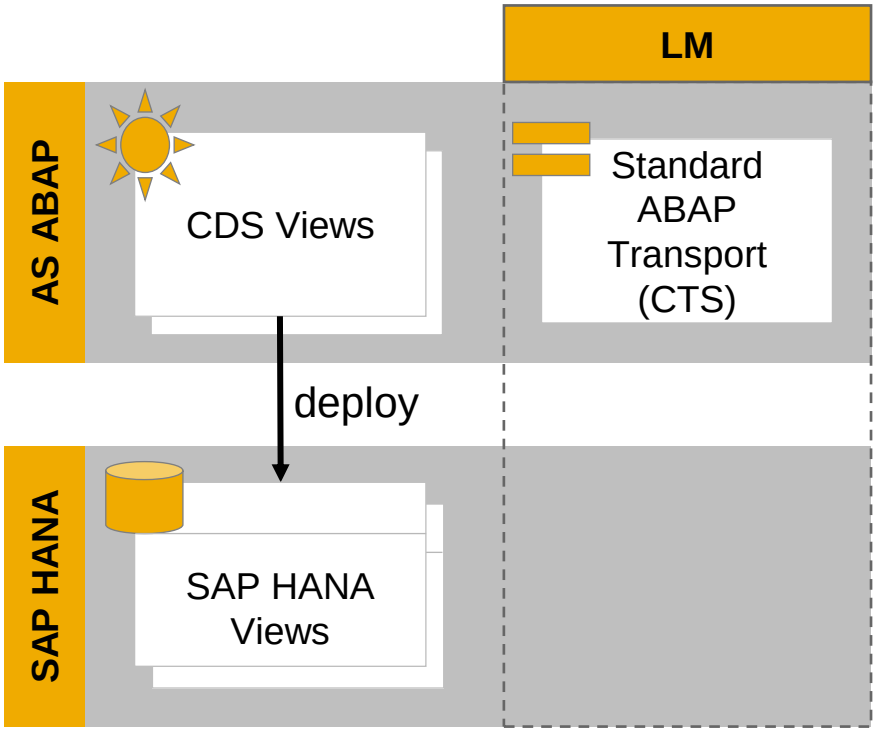
Definition of semantically rich data models in the ABAP Dictionary

- ABAP ‘view entities’ in DDL source objects (`R3TR DDLS`)

Fully integrated into the ABAP infrastructure

- Consistent lifecycle management with all other ABAP artifacts

Consumption via Open SQL on view entities



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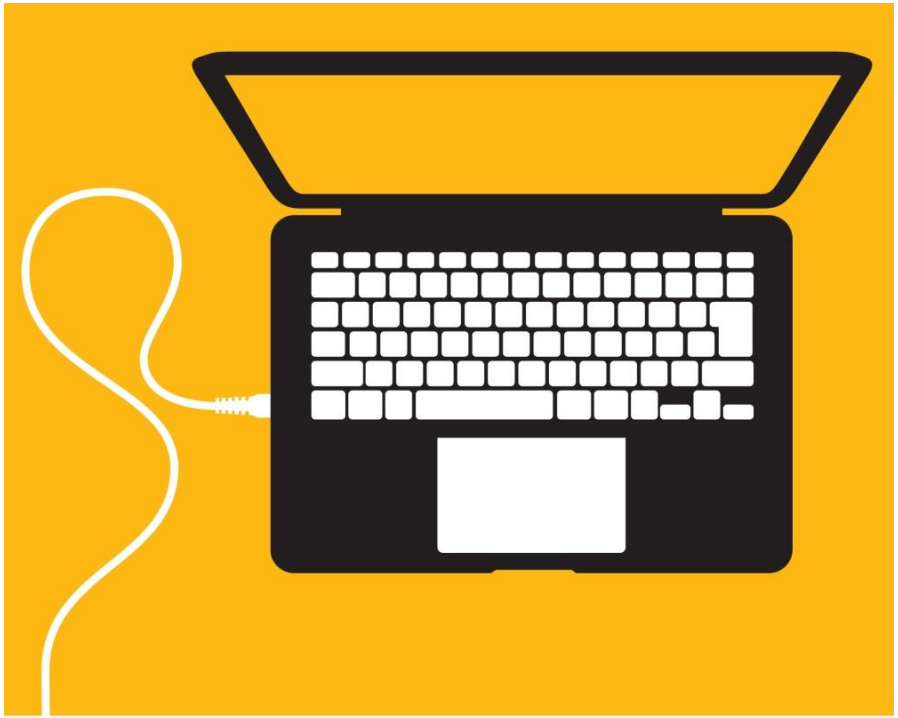
Core Data Services: What's in It for You?

Core Data Services: Demo

ABAP CDS View Demo

- Advanced View Definition in ABAP
- Data Preview
- Open SQL Consumption



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Core Data Services: What's in It for You?

Simple CDS View & Open SQL Consumption

Additional Material

Definition & Consumption of an ABAP CDS View

- Definition in an ABAP DDL Source (R3TR DDLS)
- Definition only possible with ABAP Development Tools in Eclipse (**not** via transaction SE11)
- Consumption via
  - Open SQL
  - Data Preview (context menu in ADT)
  - SAP List Viewer
  - SAP NetWeaver Gateway (OData Model)
  - …

```
@AbapCatalog.sqlViewName:'ZDDLS_CDS_00'
define view zcdsv_simple as
  select from snwd_so
{
  key so_id as order_id,
  currency_code,
  gross_amount
}
```

```
DATA lt_cds TYPE
        STANDARD TABLE OF zcdsv_simple.

SELECT *
  FROM zcdsv_simple
  INTO TABLE @lt_cds.
```

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Core Data Services: What's in It for You?

CDS Views vs. Open SQL

~~Competitors?~~

Not at all!

Use "plain" Open SQL if you

- … only need the query **"once"**, that is, in the coding (which might still be executed several times)
- … need features only available in Open SQL like `FOR ALL ENTRIES`

Use CDS views if you

- … have a real **re-use** case (same argument as for "old" dictionary views)
- … need features currently only available in DDL sources like `UNION`, `UNION ALL`, and so on
- … want to use features you will learn about in the upcoming units

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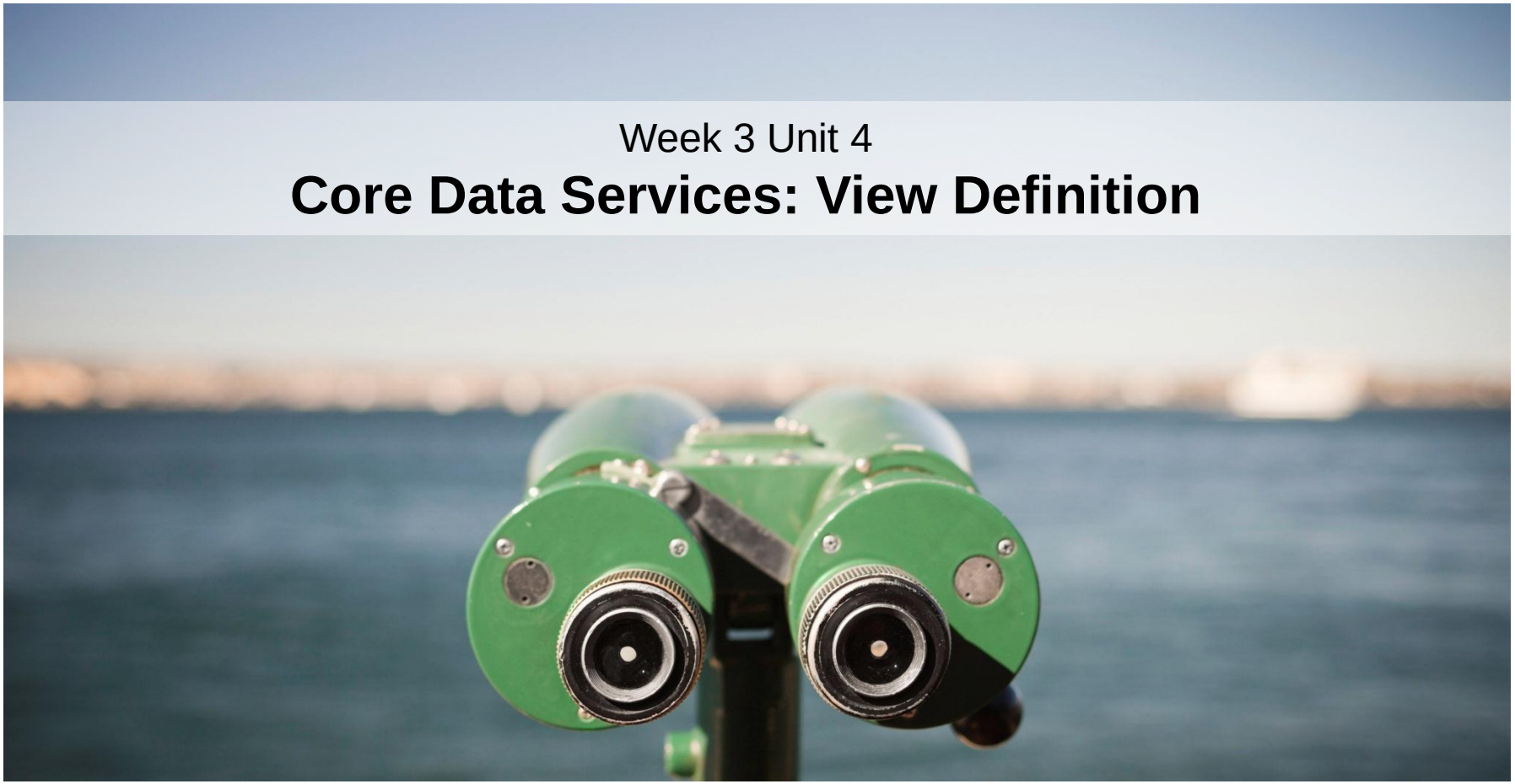
Core Data Services: What's in It for You?

What’s Next?



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Week 3 Unit 4: **Core Data Services: View Definition**

Core Data Services: View Definition
Outline

Content

- CDS View Definition Features
  - Projection List
  - Alias
- View-on-View Concept
- CDS View Extensions
- CDS Views with Input Parameters

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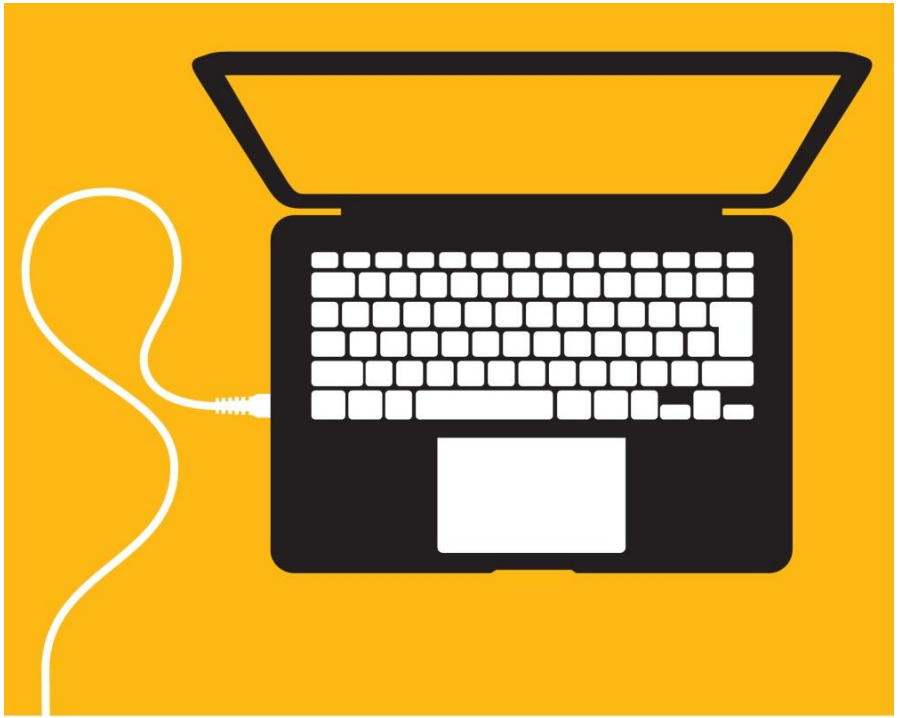
Core Data Services: View Definition

Demo

CDS View Definition Features

- Projection List:
  - Client Dependency
  - Semantic Information (Key)
  - Aliases
  - Aggregation
  - Literals
  - Arithmetic Expressions
  - Conditional Expressions
- GROUP BY & HAVING Clauses
- View-on-View Example
- CDS View Extensions
- CDS View with Input Parameters



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Core Data Services: View Definition

Projection List (1)

Additional Material

ABAP CDS View: Projection List

- Client-dependent view; no explicit client field necessary
- Semantic information (key field)
- Aliases
- Literal values:
  - C-sequence literals (Max length: 1333)
  - Signed integer literals (4-Byte)
- Aggregation functions:
  - **MIN**, **MAX**, **COUNT**, **AVG**, **SUM**
  - Alias required for function results

```
@AbapCatalog.sqlViewName: 'ZDDLS_CDS_10'
define view zcdsv_aggregations as select
 from snwd_so as so
 inner join snwd_bpa as bpa
         on so.buyer_guid = bpa.node_key
{
  key so_id as customer_id,
  bpa.company_name,
  'Literal' as string_literal,
  42        as integer_literal,
  so.currency_code,
  sum( so.gross_amount ) as
total_gross_amount
}
group by
    bpa.bp_id,
    bpa.company_name,
    so.currency_code
having sum( so.gross_amount ) > 1000
```

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Core Data Services: View Definition

Projection List (2)

Additional Material

ABAP CDS View: Projection List

- Arithmetic expression:
  - Supported operators: +, - , * and unary –
  - Complex expressions and bracketing of sub-expressions possible
- Type casting:
  - Different operand types supported: Literal, column, path expression, build-in function, arithmetic expression
  - Various data types in ABAP namespace supported
  - Result length determined at activation time
  - No nesting of CAST expressions

Alias names required for resulting columns

```
@AbapCatalog.sqlViewName: 'ZDDLS_CDS_11'
define view zcdsv_arithmetics
as select from snwd_so as so
inner join snwd_bpa as bpa
  on so.buyer_guid = bpa.node_key
{
  key bpa.bp_id as customer_id,
  bpa.company_name,
  so.currency_code,
  ( so.gross_amount - so.net_amount )
    as tax_amount,
  0.85 * cast( so.gross_amount as
abap.fltp )
    as reduced_gross_amount
}
```

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Core Data Services: View Definition

Projection List (3)

Additional Material

Conditional Expressions

- Available CASE constructs
  - Simple CASE
  - Searched CASE
- CASE constructs can be nested “CASE-in-CASE“
- Coalesce expression
  - Syntax short form for a CASE expression with two arguments
  - Returns the first argument if the value is not NULL, otherwise the second argument is returned

```
@AbapCatalog.sqlViewName: 'ZDDLS_CDS_12'
define view zcdsv_cond_exp
as select from snwd_so as so
left outer join snwd_so_inv_head as inv_head
  on so.node_key = inv_head.so_guid
{
  key so.so_id,
 so.currency_code,
 so.gross_amount,
 case delivery_status
       when ' ' then 'OPEN'
       when 'D' then 'DELIVERED'
       else delivery_status
 end as delivery_status_long,

 case
   when so.gross_amount > 1000
     then 'High Volume Sales Order'
   else ' '
 end as high_volumne_text,

 coalesce( inv_head.payment_status,
           'Not yet invoiced') as payment_status
}
```

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Core Data Services: View Definition

View-Concept

Additional Material

View-on-View

- View can have other views as data basis
- No restriction on the number of layers

```
@AbapCatalog.sqlViewName: 'ZDDLS_CDS_13A'
define view zcdsv_base as select
from snwd_so as so
{
 key so.so_id as order_id,
 so.buyer_guid,
 so.currency_code,
 so.gross_amount
}
```

```
@AbapCatalog.sqlViewName: 'ZDDLS_CDS_13B'
define view zcdsv_view_on_view as select
from zcdsv_base
inner join snwd_bpa as bpa
  on bpa.node_key = zcdsv_base.buyer_guid
{
 key bpa.bp_id,
 bpa.company_name,
 zcdsv_base.currency_code,
 zcdsv_base.gross_amount
}
```

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Core Data Services: View Definition

CDS View Extensions

Additional Material

Extend existing/delivered CDS view with:

- Table column
- Arithmetic & CASE expressions
- Literals

Extension “technique”:

- Append to base view

Not allowed on views including:

- Grouping – for example, aggregation
- UNION (ALL) statements

```
@AbapCatalog.sqlViewName: 'ZDDLS_CDS_13A'
define view zcdsv_base as select
from snwd_so as so
{
 key so.so_id as order_id,
 so.buyer_guid,
 so.currency_code,
 so.gross_amount
}
```

```
@AbapCatalog.sqlViewAppendName: 'ZDDLS_CDS_13C'
extend view zcdsv_base with
zcdsv_customer_extension
{
  so.delivery_status,
  so.billing_status,
  so.created_at,
  so.created_by
}
```

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Core Data Services: View Definition

CDS View with Input Parameters

Additional Material

CDS Views with Input Parameters

- Comma-separated list of scalar input parameters and corresponding type
- Supported parameter types:
  - Predefined data type like abap.char(char_len)
  - Name of a data element
- Parameter can be used in
  - the projection list as element or in arithmetic expressions
  - expressions in WHERE or HAVING clauses
  - expression in ON conditions of JOIN statements
  - …

```
@AbapCatalog.sqlViewName: 'ZDDLS_CDS_14A'
define view zcdsv_with_input_parameters
  with parameters customer_name : abap.char(80)
as select
from snwd_so as so
join snwd_bpa as bpa
  on bpa.node_key = so.buyer_guid
{
  key so.so_id as order_id,
  $parameters.customer_name as
param_customer_name,

  case
   when bpa.company_name =
$parameters.customer_name
    then 'Found it!'
   else  'Not found'
  end as found_customer
}
where bpa.company_name = parameters.customer_name
```

Not supported on all databases
→ DBSYS-dependent feature

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Core Data Services: View Definition

CDS View with Input Parameters: Consumption (1)

Additional Material

Consumption in a CDS view

- Provide (mandatory) input parameter(s)

```
@AbapCatalog.sqlViewName: 'ZDDLS_CDS_14B'
define view zcdsv_consume_param_view as select from
zcdsv with input parameters( customer_name : 'SAP' ) as vwp
{
   vwp.param_customer_name
}
```

```
@AbapCatalog.sqlViewName: 'ZDDLS_CDS_14A'
define view zcdsv with input parameters
 with parameters customer_name : abap.char(80)
as select
from snwd_so as so
join snwd_bpa as bpa
  on bpa.node_key = so.buyer_guid
{
  key so.so_id as order_id,
  $parameters.customer_name as param_customer_name,

  case
    when bpa.company_name = $parameters.customer_name
     then 'Found it!'
    else  'Not found'
  end as found_customer
}
where bpa.company_name = $parameters.customer_name
```

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Core Data Services: View Definition

CDS View with Input Parameters: Consumption (2)

Additional Material

Consumption via Open SQL

- Check if the feature is supported
- Provide (mandatory) input parameter(s)
- Suppress syntax warning using the pragma
- Provide a “fallback“ implementation / some error handling

```
REPORT zr_cds_01_consumption_vwp.

DATA lv_cust_name TYPE c LENGTH 80 VALUE 'SAP'.

"awesome application logic

DATA(lv_feature_supported) =
 cl_abap_dbfeatures=>use_features(
  EXPORTING
   requested_features  =
    VALUE #( ( cl_abap_dbfeatures=>views_with_parameters ) )
 ).


IF lv_feature_supported = abap_true.
  SELECT *
  FROM zcdsv_with_input_parameters( customer_name = 'SAP' )
  INTO TABLE @DATA(lt_result)
  ##DB_FEATURE_MODE[VIEWS_WITH_PARAMETERS].
ELSE.
  "do some alternative coding here
ENDIF.

"even more awesome application logic
cl_demo_output=>display_data( lt_result ).
```

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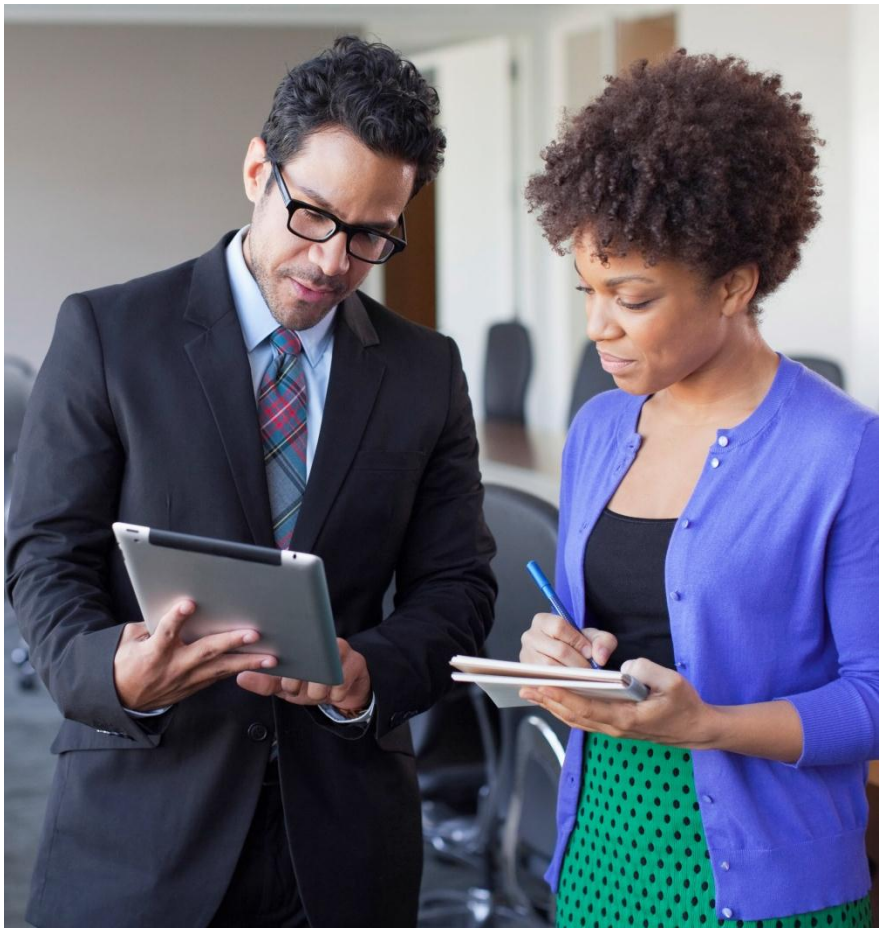
Core Data Services: View Definition
Conclusion

Key takeaways: CDS views…

- offer a rich set of features to follow the Code-to-Data paradigm
- can have other views as a data basis (View-on-View concept)
- can be extended
- can have scalar input parameters (DBSYS-dependent feature)



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Core Data Services: View Definition

What's Next?

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Week 3 Unit 5: **Core Data Services: Associations**

Core Data Services: Associations
Outline

Content

- CDS Views: UNION and JOIN Support
- CDS Associations:
  - Definition
  - Consumption
- Association Types
  - Ad-Hoc Association
  - Exposed Association
- Filtered Associations
- Advantages of Associations

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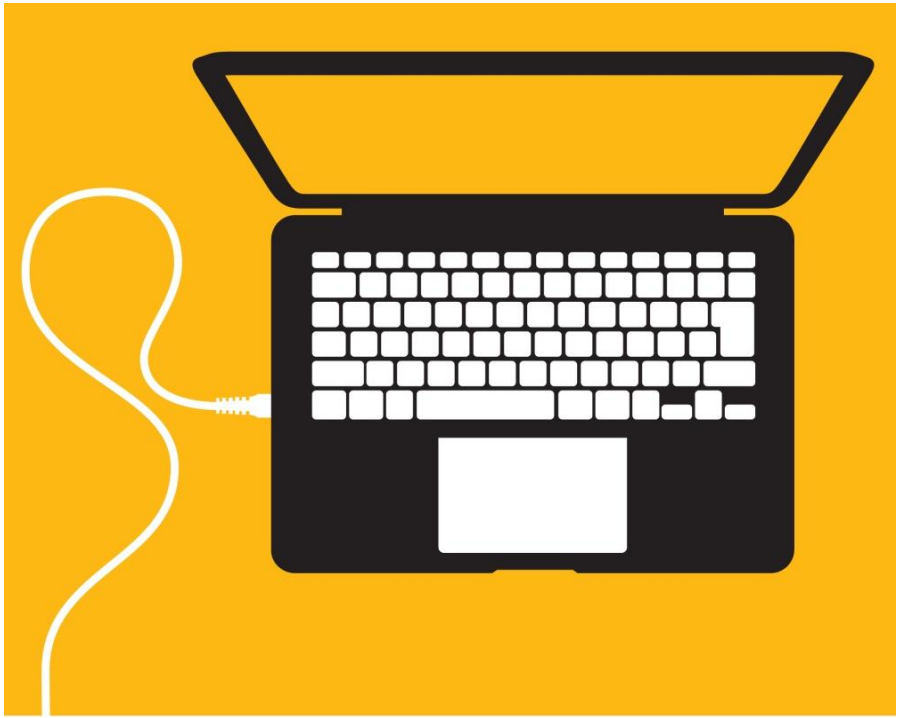
Core Data Services: Associations

CDS View Definition: Demo

CDS View Definition Features

- UNION (ALL)
- JOIN



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Core Data Services: Associations

UNION & UNION ALL Statements

Additional Material

- Concatenation of different queries using **UNION (ALL)** construct
- Select lists of the different queries must
  - have the same number of columns
  - contain compatible types
- **UNION** implies a distinct semantic
- **UNION ALL** does not remove duplicates, so it does not imply the distinct semantic
- Do not mix **UNION** & **UNION ALL** in a CDS View

```
@AbapCatalog.sqlViewName: 'ZDDLS_CDS_20'
define view zcdsv_union as
select from snwd_so as so
  inner join snwd_bpa as bpa
     on so.buyer_guid = bpa.node_key
 {
    key bpa.bp_id,
    bpa.company_name,
    sum( gross_amount ) as total_gross_amount,
    'small' as category
 }
group by bpa.bp_id, bpa.company_name
having sum( gross_amount ) < 10000000

union all

select from snwd_so as so
  inner join snwd_bpa as bpa
     on so.buyer_guid = bpa.node_key
 {
   key bpa.bp_id,
   bpa.company_name,
   sum( gross_amount ) as total_gross_amount,
   'large' as category
 }
group by bpa.bp_id, bpa.company_name
having sum( gross_amount ) >= 10000000
```

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Core Data Services: Associations

JOIN Statements

Additional Material

- Supported join types:
  - **INNER** join
  - **LEFT OUTER** join
  - **RIGHT OUTER** join
- Complex join operations using (…) are supported
- Arbitrary on-conditions (including >, >=, <, <=, like between, and, or, not)

```
@AbapCatalog.sqlViewName: 'ZDDLS_CDS_21'
define view zcdsv_join as
    select from snwd_so as so
    inner join snwd_bpa as bpa
        on so.buyer_guid = bpa.node_key
    left outer join snwd_so_inv_head as
inv_head on so.node_key = inv_head.so_guid
 {
    key so.so_id,
    bpa.company_name,
    so.delivery_status,
    inv_head.payment_status
 }
```

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Core Data Services: Associations
Concept

CDS Associations

- Definition of relationships between entities
- Association definition contains
  - Target entity
  - Cardinality […] (optional)
  - Alias name (optional)
  - ON condition representing the JOIN

Associations replace JOINs with simple path expressions

- Usage of aliases improves readability / model understanding
- Path expressions support
  - simplified consumption
  - easy refactoring of ON conditions

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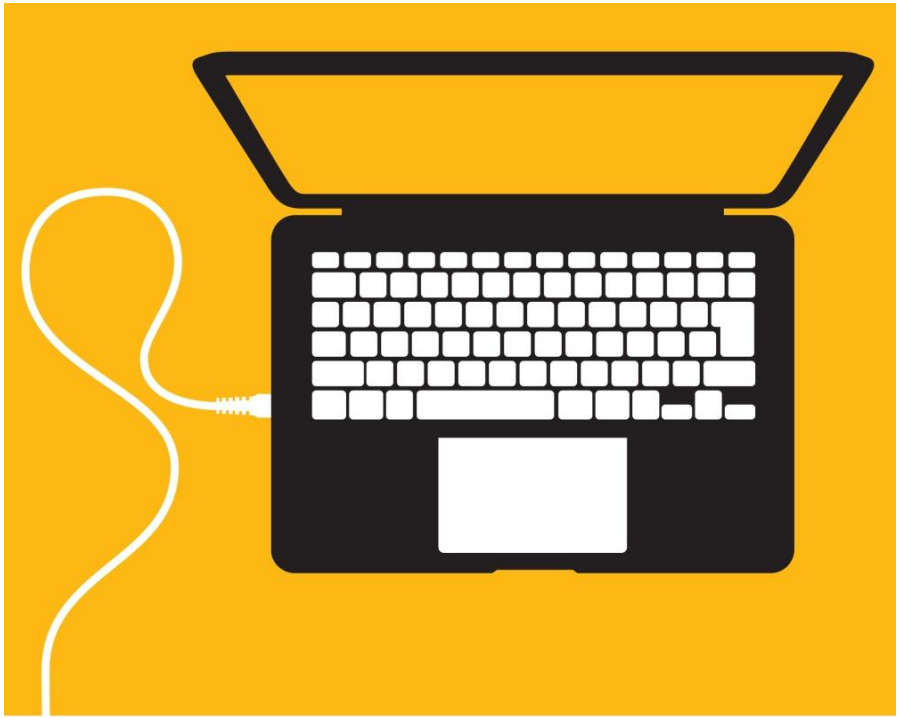
Core Data Services: Associations

Demo

CDS View with Associations

- CDS Association
  - Ad-Hoc Association
  - Exposed Association
- Consumption of an Association
  - Projection List
  - FROM Clause
  - Arithmetic Expressions
  - WHERE and HAVING Clauses
  - …
- Path Expression
  - Filter Conditions



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Core Data Services: Associations

Simple Association

Additional Material

- Definition of associations within a CDS view
- Consumption of the association, for example in the projection list or in the WHERE clause
- Consumption of the association in an aggregation, the GROUP BY, and the HAVING clause

```
@AbapCatalog.sqlViewName: 'ZDDLS_CDS_30'
define view zcdsv_simple_assoc_examples as
    select from snwd_so as so
association [1] to snwd_bpa as business_partners
        on so.buyer_guid =
business_partners.node_key
association [0..1] to snwd_so_inv_head as
invoice_headers
        on so.node_key = invoice_headers.so_guid
 {
    key so.so_id as order_id,
    so.delivery_status,
    invoice_headers.payment_status,
    invoice_headers.currency_code,
    sum( invoice_headers.gross_amount )
      as total_gross_amount
 }
 where business_partners.company_name = 'SAP'
 group by so.so_id,
          so.delivery_status,
          invoice_headers.payment_status,
          invoice_headers.currency_code
 having sum( invoice_headers.gross_amount ) > 3000
```

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Core Data Services: Associations

Association Types

Additional Material

Ad Hoc Associations

- Association definition and usage in the same CDS view

  → Association consumption constitutes a JOIN

Exposed Association

- Association definition, exposure of association, and exposure of fields used in the ON condition
  Consumption of association, for example in a view on the view
  → Exposure does not automatically lead to a JOIN: “JOINs on demand”

```
@AbapCatalog.sqlViewName: 'ZDDLS_CDS_31A'
define view zcdsv_assoc_types as
    select from snwd_so as so
association [1] to snwd_bpa as business_partners
         on so.buyer_guid = $projection.buyer_guid
association [0..1] to snwd_so_inv_head as
invoice_headers
         on so.buyer_guid = invoice_headers.so_guid
 {
    key so.so_id as order_id,
    so.delivery_status,
    -- ad hoc association
    invoice_headers.payment_status,

    --exposed association
    -- field used in the ON condition
    so.buyer_guid,
    -- exposing association business_partners
    business_partners
 }
```

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Core Data Services: Associations

Filtered Associations

Additional Material

Filtered Association

- Base view: Definition of an association with a “to-n” cardinality
- Filter expression given in squared brackets
- Explicit cardinality of applied filter condition

```
@AbapCatalog.sqlViewName: 'ZDDLS_CDS_32A'
define view zcdsv_filter_example_base as
  select from snwd_so_inv_head as invoice_header
  association[1..*] to snwd_so_inv_item as invoice_items
   on $projection.header_guid = invoice_items.parent_key
 {
   invoice_header.so_guid  as order_guid,
   invoice_header.node_key as header_guid,
   invoice_items
 }
```

```
@AbapCatalog.sqlViewName: 'ZDDLS_CDS_32B'
define view zcdsv_filter_example_vov as
    select from snwd_so as so
association [1] to snwd_bpa as business_partners
        on so.buyer_guid = business_partners.node_key
association [0..1] to zcdsv_filter_example_base as invoice_headers
        on so.node_key = invoice_headers.order_guid
 {
    key so.so_id as order_id,

    -- value 01 means customer
    business_partners[ bp_role = '01' ].company_name as customer_name,

    -- filter 1..n association on first position
    invoice_headers.invoice_items[1: inv_item_pos =
'0000000010'].currency_code,
    invoice_headers.invoice_items[1: inv_item_pos =
'0000000010'].gross_amount
 }
 where invoice_headers.header_guid is not null
```

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Core Data Services: Associations

Advanced Example for Filtered Associations

Additional Material

Filtered Association

- First view defines a normalized view on the EPM text table
- Second view defines an association between the product table and the text information encoded in the first view
- Third view consumes the association, filtering the language to the given input parameter value or a default value

```
@AbapCatalog.sqlViewName: 'ZDDLS_CDS_33A'
define view zcdsv_adv_filter_example_base
as select from snwd_texts
{
  parent_key as product_text_guid,
  language,
  text
}
```

```
@AbapCatalog.sqlViewName: 'ZDDLS_CDS_33B'
define view zcdsv_adv_filter_example_l1
as select from snwd_pd as pd
association [1..*] to zcdsv_adv_filter_example_base as texts
  on texts.product_text_guid = $projection.text_guid
{
 key pd.product_id,
 pd.desc_guid as text_guid,
 texts
}
```

```
@AbapCatalog.sqlViewName: 'ZDDLS_CDS_33C'
define view zcdsv_adv_filter_example_l2
with parameters lang : abap.lang
as select from zcdsv_adv_filter_example_l1 as product
{
  $parameters.lang as langu_filter_param,
  coalesce (
            product.texts[1: language = $parameters.lang ].text,
            product.texts[1: language = 'E'              ].text
          ) as product_description
}
```

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Core Data Services: Associations

Advantages of Associations

Why would you use associations?

- Easy model consumption
  - Path expressions
  - Filter expressions
- Small(er) re-use views
- “JOINs on demand”:
  JOINs are only generated if the corresponding association is consumed

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Core Data Services: Associations

What's Next?

Week 4 Unit 1

Native SAP HANA Usage in ABAP

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