

SAP Blogs

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Transparent Table	SALES002	Active
Short Description	Performance tests	
Attributes	Delivery and Maintenance	Fields
Input Help/Check		
Currency/Quantity Fields		
Srch Help		
Predefined Type		
Field	Key	Initi...
CALYEAR	✓	✓
CALMONTH2	✓	✓
SALESREP	✓	✓
CUSTOMER	✓	✓
AMOUNT	□	□
Data element	Data Type	Length
NUMC	4	0
NUMC	2	0
CHAR	2	0
CHAR	3	0
DEC	22	2
Short Description		

ABAP DEVELOPMENT

Data Filtration Options And Performance Analysis In ABAP CDS Views



By Admin

On Jan 15, 2021

Hi! In the post I would like to consider important topic of filtering data in ABAP CDS views.



e to thank Sergey Shablykin for close collaboration. Without his participation, knowledge and experience the post would not have

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1. Parameters in all level of ABAP CDS views
2. Variables in consumption level ABAP CDS views
3. Authorisations with DCL views

1. Parameters

Syntax of using parameters is considered in SAP documentation. In the table below there are pros and cons of parameters functionality.

Pros (+)	Cons (-)
With help of @Environment.systemField annotation they could be filled by values of standard system variables. See SAP documentation	Only single
Manual transfer of parameters from consumption to basic level of CDS view guarantee logic push-down and performing filtration at bottom level	Only mandatory, optional are not possible

In my opinion current limitations strongly restrict area of parameters usage. Parameters are suitable for transferring to logic some numeric values used in calculations of key figures or may be to split complex logic at different scenarios. Usually I try to write a default value and to hide parameter so business user couldn't see it.

2. Variables

Syntax of using parameters is considered in SAP documentation. In the table below there are pros and cons of parameters functionality.

Pros (+)	Cons (-)
✓ Verv flexible settings. similar to BEx variables	Not obvious transferring of values to bottom level



Support multiple selections	
Could use derivations	
Could work with hierarchies	

Of course you notice that I write only one limitation in right part of table.

All other part of the post will deal with eliminating of the single limitation and answering a performance question:

Will filtration by variables in ABAP CDS views be pushed down to the most bottom level?

This question used to appear very often in case of S/4HANA and (its part) Embedded Analytics promotion. Nowadays if you have S/4HANA the main stream is not to create “old” ALV reports or develop all analytical reports in separate SAP BW system. You could use embedded analytics and create reports directly in S/4HANA based on ABAP CDS views.

3. Authorizations with DCL views

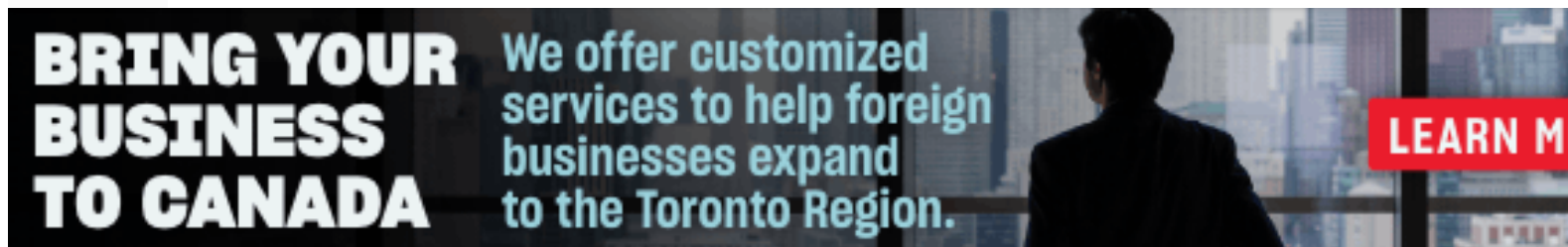
They are not considered here, for more information see post.

Checking performance of CDS view with variables

The following model was used for testing.

1. Sales Model Tables

1.1. Table of sales transactions. It contains time characteristics, sales manager, customer and amount. Number of records is 133 848.



Transparent Table	SALES002	Active
Short Description	Performance tests	
Attributes	Delivery and Maintenance	Fields
Input Help/Check		
Currency/Quantity Fields		
<div> </div>		
<div> </div>		
Field	Key	Initi...
DATA element	Data Type	Length
Decim...	Short Description	
CALYEAR	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
NUMC	4	0
CALMONTH2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
NUMC	2	0
SALESREP	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
CHAR	2	0
CUSTOMER	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
CHAR	3	0
AMOUNT	<input type="checkbox"/>	<input type="checkbox"/>
DEC	22	2

Data Browser: Table SALES002 Select Entries 133.848					
<div> </div>					
CALYEAR	CALMONT...	SALESREP	CUSTOMER	AMOUNT	
2010	1 10	10		10,00	
2010	1 10	11		10,00	
2010	1 10	12		10,00	
2010	1 10	B1		10,00	
2010	1 10	B2		10,00	
2010	1 10	B3		10,00	
2010	1 10	B4		10,00	
2010	1 10	B5		10,00	
2010	1 10	B6		10,00	
2010	1 10	B7		10,00	
2010	1 10	B8		10,00	
2010	1 10	B9		10,00	
2010	1 10	BA		10,00	
2010	1 10	C1		10,00	
2010	1 10	C2		10,00	

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Transparent Table

SALESREP

Active

Short Description

Sales rep

Attributes

Delivery and Maintenance

Fields

Input Help/Check

Currency/Quantity Fields

Srch Help

Predefined Type

Field	Key	Initi...	Data element	Data Type	Length	Decim...	Short Description
SALESREP	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		CHAR	2	0	
SPRAS	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		LANG	1	0	
TEXT	<input type="checkbox"/>	<input type="checkbox"/>		CHAR	100	0	
SRGROUP	<input type="checkbox"/>	<input type="checkbox"/>		CHAR	1	0	

Data Browser: Table SALESREP Select Entries				9
<div> <div> </div> </div>				
SALESREP	SPRAS	TEXT	SRGROUP	
A1	D	A1 GERMANY	1	
A1	E	A1 SR	1	
A2	E	A2 SR	1	
A3	E	A3 SR	1	
A4	E	A4 SR	2	
A5	E	A5 SR	2	
A6	E	A6 SR	2	
A7	E	A7 SR	2	
A8	E	A8 SR	3	

2. ABAP CDS views

2.1. Sales data transactional view:



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```
@AbapCatalog.sqlViewName: 'XV_IT_SALESREP' @AbapCatalog.compiler.compareFilter: true @AccessControl.authorizationCheck: #CHECK
@EndUserText.label: 'Salesrep' @VDM: { viewType: #BASIC } @ObjectModel: { dataCategory: #TEXT } define view XVITSALESREP as
select from salesrep { @ObjectModel.text: { element: [ 'text' ] } key salesrep, @Semantics: { language: true } key spras, @Semantics: { text: true } text }
```

2.3. Sales managers dimension view:

```
@AbapCatalog.sqlViewName: 'XV_IA_SALESREP' @AbapCatalog.compiler.compareFilter: true @AccessControl.authorizationCheck: #NOT_REQUIRED
@EndUserText.label: 'Salesrep' @VDM: { viewType: #BASIC } @Analytics: { dataCategory: #DIMENSION } @ObjectModel: { representativeKey: 'salesrep' }
define view XVIASALESREP as select from salesrep association[0..*] to XVITSALESREP on salesrep.salesrep = XVITSALESREP.salesrep { @ObjectModel: { text: { association: 'XVITSALESREP' } } key salesrep, srgroup, XVITSALESREP }
```

2.4. Sales cube view:

```
@AbapCatalog.sqlViewName: 'XV_C_Sales' @AbapCatalog.compiler.compareFilter: true @Analytics: { dataCategory: #CUBE } @AccessControl.authorizationCheck: #NOT_REQUIRED
@EndUserText.label: 'Performance test' @VDM.viewType: #COMPOSITE define view XVCSales as select from XV_I_Sales association [0..1] to XVIASALESREP on XV_I_Sales.salesrep = XVIASALESREP.salesrep { @ObjectModel: { foreignKey: { association: 'XVIASALESREP' } } key salesrep, key customer, key calyear, key calmonth2, key XVIASALESREP.srgroup as srgroup1, @DefaultAggregation: #SUM amount, XVIASALESREP }
```

2.5. Sales analytical query view with variables:

```
@AbapCatalog.sqlViewName: 'XV_Q_Sales' @AbapCatalog.compiler.compareFilter: true @AccessControl.authorizationCheck: #NOT_REQUIRED
@EndUserText.label: 'Performance test QUERY' @VDM: { viewType: #CONSUMPTION } @Analytics: { query: true } define view XVQSALES as select from XVCSales { //xv_c_sales @AnalyticsDetails: { query: { axis: #FREE, display: #KEY_TEXT } } // @Consumption: { filter: { selectionType: #RANGE, multipleSelections: true, mandatory: false, hidden: false } } salesrep, @AnalyticsDetails: { query: { axis: #ROWS } } @Consumption: { filter: { selectionType: #RANGE, multipleSelections: true, mandatory: false, hidden: false } } }
```

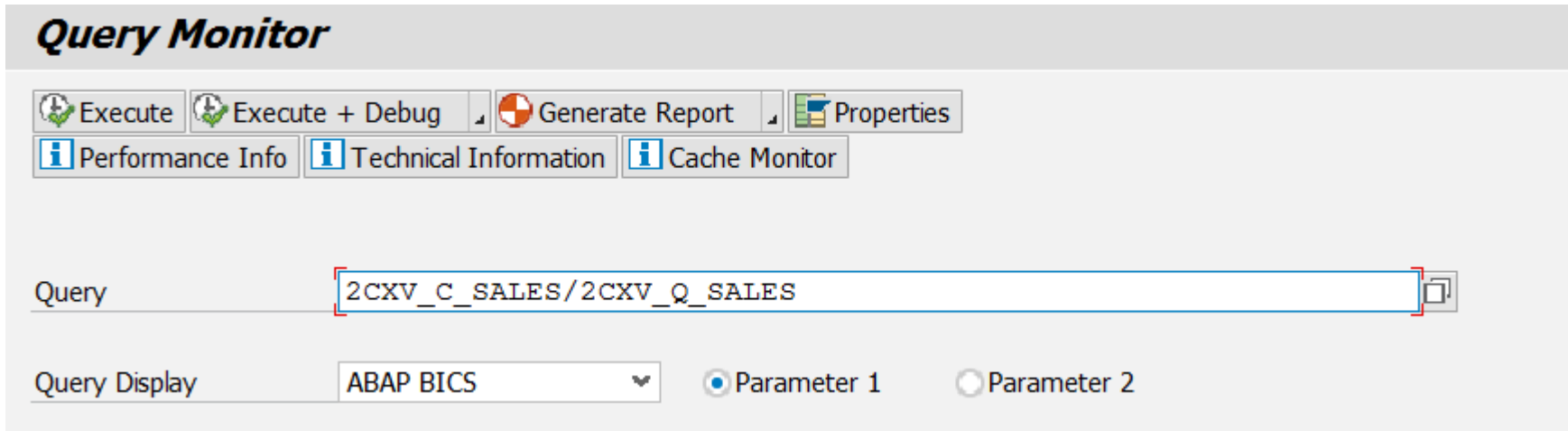
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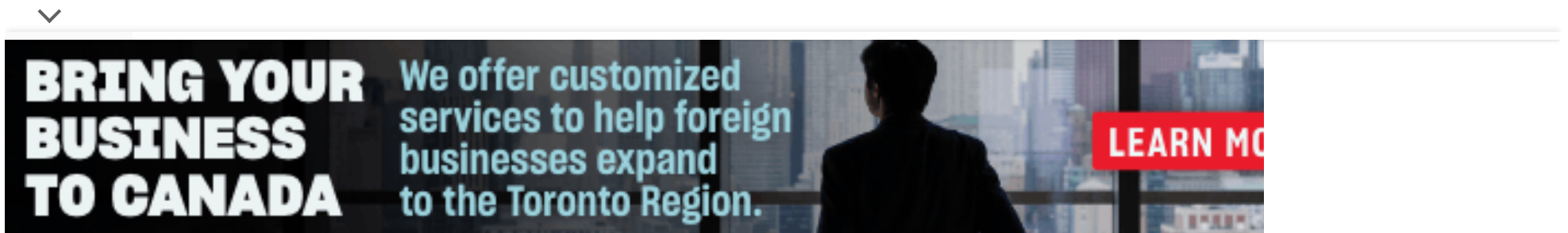
3. Launch query in RSRT

3.1. Enter analytical query



The screenshot shows the 'Query Monitor' window. At the top, there are buttons for 'Execute', 'Execute + Debug', 'Generate Report', and 'Properties'. Below these are tabs for 'Performance Info', 'Technical Information', and 'Cache Monitor'. The 'Query' input field contains the text '2CXV_C_SALES/2CXV_Q_SALES'. Below the input field, there is a 'Query Display' section with a dropdown menu set to 'ABAP BICS' and two radio buttons for 'Parameter 1' (selected) and 'Parameter 2'.

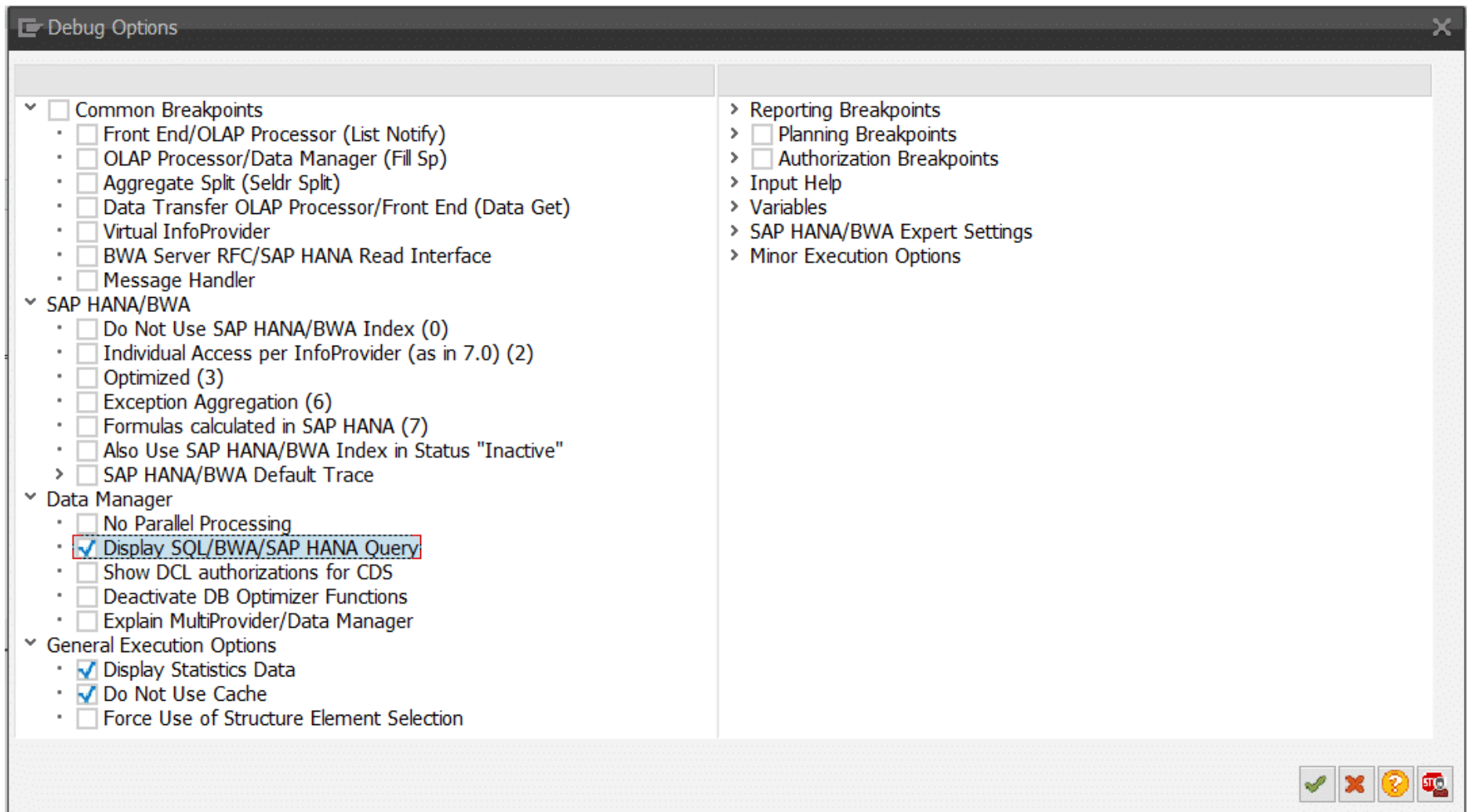
3.2. Execute with following debug options for analysis performance and generated SQL from application server side of view.



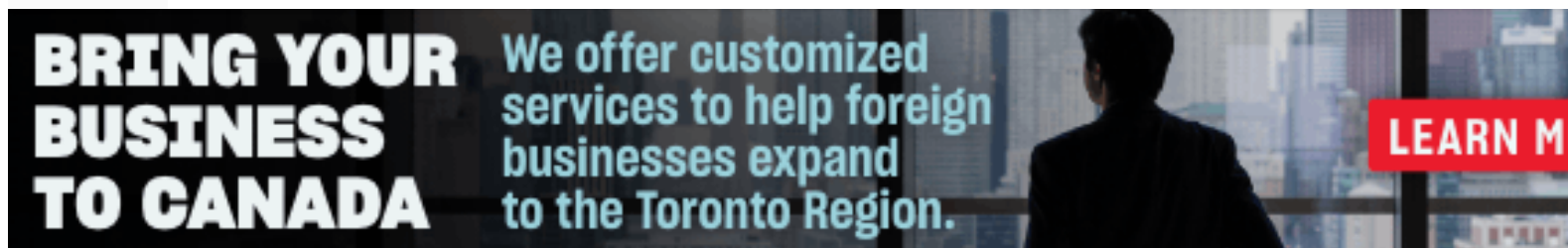
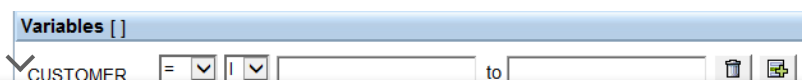
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3.3. Enter variables. Restrict year and sales group to analyse where and how filtration will be transferred and executed.



3.4. Get resulted sql statement and find restrictions in where clause.

```
/* Statement Preview (might be truncated) */ SELECT A1~CALYEAR AS K____256 , A1~CALMONTH2 AS K____255 , A1~CUSTOMER AS K____257 , COUNT( * ) AS Z____151_SUM , SUM( A1~AMOUNT ) AS Z____259_SUM FROM XVCSALES AS A1 WHERE ( ( ( ( A1~CALYEAR = '2016' ) ) AND ( ( A1~SRGROUP1 = '1' ) ) ) ) GROUP BY A1~CALYEAR ,A1~CALMONTH2 ,A1~CUSTOMER ORDER BY K____255 , K____256 , K____257 %_HINTS 'NO_RESULT_CACHE'
```

3.5. Result data set is filtered by year, sales group and aggregated by sales managers (they are in free part of a query). Initial view:



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DP_1 2CXV_Q_SALES

Initial State

Information on Query

Static Filter

Dynamic Filter

Variable Values

Navigation Pane

Row Characteristics

CUSTOMER

CALYEAR

CALMONTH2

Column Characteristics

Key Figures

Free Characteristics

SALESREP

SRGROUP1

Query Performance test QUERY Up-to-Dateness of Data: 22.09.2017 12:50:20 CET

Variables Refresh Swap Axes Documents Conditions Exceptions Bookmark

CUSTOMER	CALYEAR	Key Figures	AMOUNT
10	2016	CALMONTH2 1	40,00
		2	40,00
		3	40,00
		4	40,00
		5	40,00
		6	40,00
		7	40,00
		8	40,00
		9	40,00
		10	40,00
		11	40,00
		12	40,00
11	2016	1	40,00
		2	40,00
		3	40,00
		4	40,00
		5	40,00
		6	40,00
		7	40,00
		8	40,00
		9	40,00
		10	40,00
		11	40,00
		12	40,00
12	2016	1	40,00

Row 1 - 25 / 936

Column 1 - 1 / 1

RSRT BICS

Only 2016 as expected:

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DP_1 2CXV_Q_SALES

Initial State

Information on Query

Static Filter

Dynamic Filter

Variable Values

Navigation Pane

Row Characteristics

CALYEAR

Column Characteristics

Key Figures

Free Characteristics

SALESREP

SRGROUP1

CUSTOMER

CALMONTH2

Query Performance test QUERY **Up-to-Dateness of Data:** 22.09.2017 12:50:20 CET

Variables Refresh Swap Axes Documents Conditions Exceptions Bookmark

Key Figures AMOUNT

CALYEAR

2016 37.440,00

Row 1 - 1 / 1

Column 1 - 1 / 1

RSRT BICS

Only sales group 1 and sales managers of this group (see master data in paragraph 1.2).

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DP_1 2CXV_Q_SALES

Initial State

Information on Query

Static Filter

Dynamic Filter

Variable Values

Navigation Pane

Row Characteristics

SRGROUP1

SALESREP

Column Characteristics

Key Figures

Free Characteristics

CUSTOMER

CALMONTH2

CALYEAR

Query Performance test QUERY

Up-to-Dateness of Data: 22.09.2017 12:50:20 CET

Variables Refresh Swap Axes Documents Conditions Exceptions Bookmark

Key Figures

SRGROUP1	SALESREP	AMOUNT
1	A1	18.720,00
	A2	9.360,00
	A3	9.360,00

Row 1 - 3 / 3

Column 1 - 1 / 1

RSRT BICS

Please note, that texts are shown in english as expected (you could find more information about time-dependent attributes and language-dependent texts in blog). In master data table we have 1 test record in german with sales group A1.

Query Monitor



```
SELECT SALESREP AS KEY_0001, TEXT AS TXTLG FROM XV_IT_SALESREP WHERE SPRAS = 'E' GROUP BY SALESREP, TEXT
```

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Event...	Event Text	Counter	Event Counter
9010	Total DBTRANS	936	1
9011	Total DBSEL	3.744	1

4. HANA SQL Trace

To understand how exactly filtration and aggregation from 133 848 to 936 records performed we need to analyse HANA SQL Trace.

4.1. Switch on SQL Trace on at *Administration – Trace Configuration – SQL Trace*.

Overview
Landscape
Alerts
Performance
Volumes
Configuration
System Information
Diagnosis Files
Trace Configuration

Database Trace

Configuration: **Default**

If the database trace is configured, the traces for the trace components of the system (for example, INDEXSERVER and NAMESERVER) are written to files named <servicename>_<host>.<port_number>.<3_digit_file_counter>.trc. Some of these traces are always activated by default.

SQL Trace

Status: **Inactive**

If the SQL trace is active, the database calls for the specified database, or application users are traced. The trace data is stored in files starting with sqltrace_<host>.<port_number>.<3_digit_file_counter>.py.

User-Specific Trace

Configuration: **Not Specified**

If the user trace is configured, the traces for the trace components for a specific database or application user (for example, INDEXSERVER and NAMESERVER) are written to files named <servicename>_<host>.<port_number>.<context>.trc.

Performance Trace

Status: **Inactive**

If the performance trace is running, the system performance is traced. The trace data is saved to the file specified.

End-to-End Traces

The predefined end-to-end traces are used by applications to record the steps through all the available trace components (INDEXSERVER and NAMESERVER for example) in a configuration. When an end-to-end trace is used, the traces for the trace components are written to files named <servicename>_<host>.<port_number>.<end-to-end-trace_name>.trc.

Expensive Statements Trace

Status: **Inactive**

If the expensive statements trace is active, all statements that last longer than the specified threshold are traced. You can analyze the results on the Performance tab under Expensive Statements Trace.

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```
EXPLAIN PLAN FOR SELECT "CALYEAR" "K____256" , "CALMONTH2" "K____255" , "CUSTOMER" "K____257" , COUNT(*) "Z____151_SUM" , SUM  
( "AMOUNT" ) "Z____259_SUM" FROM /* Entity name: XVCSALES */ "XV_C_SALES" "A1" WHERE "CALYEAR" = ? AND "SRGROUP1" = ? GROUP B  
Y "CALYEAR" , "CALMONTH2" , "CUSTOMER" ORDER BY "K____255" , "K____256" , "K____257" WITH HINT(RESULT_LAG ('hana_long'))
```

Enter for CALYEAR and SRGROUP1 values 2016 and 1 accordingly.

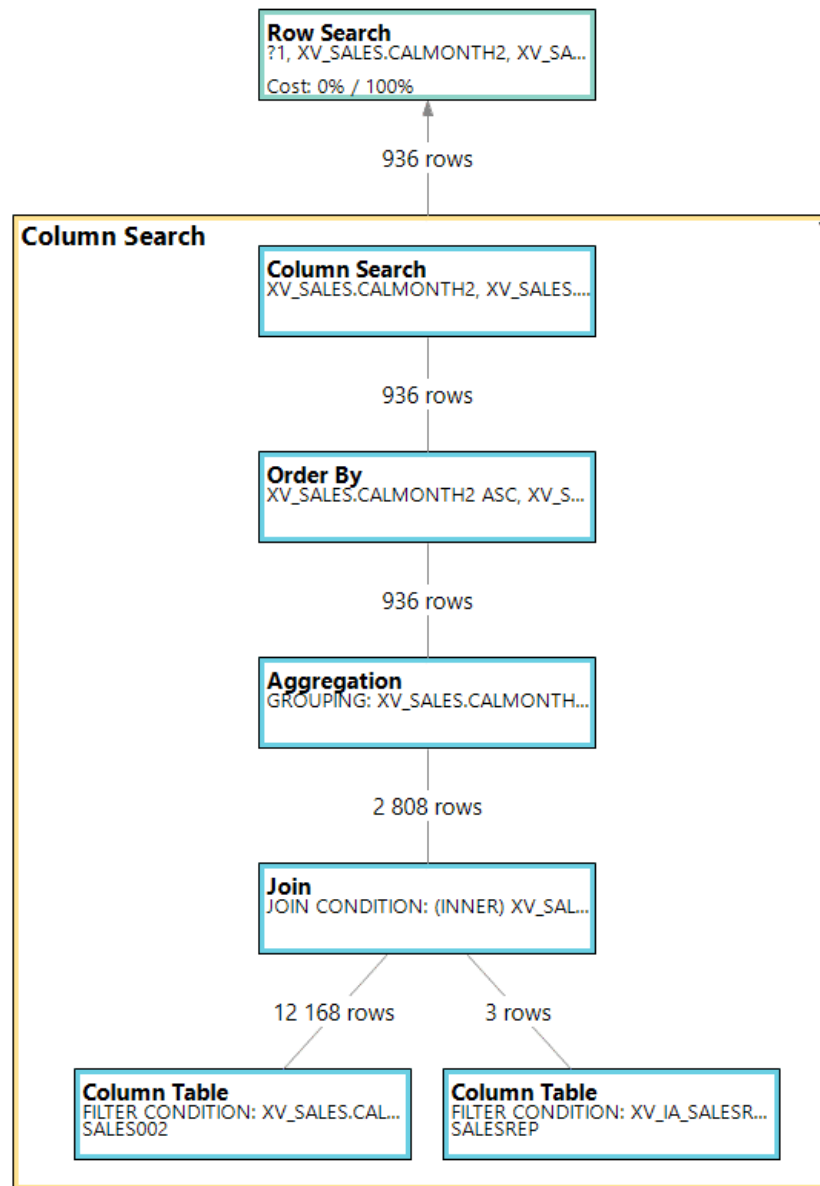


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4.4. Execution plan graph and table format



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SQL Result

EXPLAIN PLAN FOR
SELECT "CALYEAR" "K_256" ,
"CALMONTH2" "K_255" ,
"CUSTOMER" "K_257" ,

	OPERATOR_NAME	OPERATOR_DETAILS	OPERATOR_PROPERTIES	EXECUTION_ENGINE	DATABASE_NAME	SCHEMA_NAME	TABLE_NAME	TABLE_TYPE	TABLE_SIZE	OUTPUT_SIZE	SUBTREE_COST
1	ROW SEARCH	?1, XV_SALES.CALMONTH2, XV_SALES.CUSTOMER, COUNT(*), SUM(XV_S...	LATE MATERIALIZATION	ROW	T02	?	?	?	?	936	0,006281786947621169
2	COLUMN SEARCH	XV_SALES.CALMONTH2, XV_SALES.CUSTOMER, COUNT(*), SUM(XV_SAL...	(LATE MATERIALIZATION)	COLUMN	T02	?	?	?	?	936	0,002439405391621169
3	ORDER BY	XV_SALES.CALMONTH2 ASC, XV_SALES.CUSTOMER ASC		COLUMN		?	?	?	?	936	0,0021741326643484...
4	AGGREGATION	GROUPING: XV_SALES.CALMONTH2, XV_SALES.CUSTOMER, AGGREGATI...		COLUMN		?	?	?	?	936	0,002063898636548367
5	JOIN	JOIN CONDITION: (INNER) XV_SALES.SALESREP = XV_IA_SALESREP.SALE...		COLUMN		?	?	?	?	2 808	0,0011684441287878...
6	COLUMN T...	FILTER CONDITION: XV_SALES.CALYEAR = :1		COLUMN	T02	SAPBW4	SALES002	COLUMN ...	133 848	12 168	?
7	COLUMN T...	FILTER CONDITION: XV_IA_SALESREP.SRGROUP1 = :2		COLUMN	T02	SAPBW4	SALESREP	COLUMN ...	9	3	?

We have 2 filtering conditions by year and by sales group. In the Execution Plan we see that filtration performed at bottom level in HANA DB.

Result

We considered main filtration options in ABAP CDS views and got an answer for the primary question:

Filtration by variables in ABAP CDS views is pushed down to the most bottom level!

Thank you for attention!

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