



CUSTOMER

# **How to optimize performance for on-premise SAP BW and BW4/HANA Live connectivity**

## SAP Analytics Cloud Best Practices

# TABLE OF CONTENTS

1.	UPDATE HISTORY .....	3
2.	DESIGN RECOMMENDATIONS FOR STORY BUILDING.....	4
2.1	Use “Efficient” Queries.....	4
2.2	Use either story filter OR input-enabled variables .....	5
2.3	Set read mode M for variable prompt dialog .....	6
2.4	Avoid Restricted Key Figures in SAP Analytics Cloud remote models.....	7
2.5	Avoid page filters with cascading effect .....	8
2.6	Create slim story pages.....	9
3.	RECOMMENDATIONS FOR ADMINISTRATORS.....	10
3.1	Enable HTTP2.....	10
3.2	Enable parallel execution of queries .....	11
3.3	Implementing SAP Notes .....	11
4.	OUTLOOK: PLANNED SAP ANALYTICS CLOUD PERFORMANCE IMPROVEMENTS .....	12
4.1	Reduction of Metadata calls .....	12
4.2	Smart Query.....	12
5.	LINKS TO KNOW.....	13

CUSTOMER

## 1. UPDATE HISTORY

Authors	Version	Date	Comments
SAP	1.0	2019/02/12	Initial version
SAP	1.0	2019/04/02	General Update for customer release

This document describes the main factors that influence performance in SAP Analytics Cloud stories based on SAP BW and SAP BW4/HANA Live connections, and best practices to handle performance issues.

**Note this document will refer to SAP BW and SAP BW4/HANA and will be used interchangeably unless otherwise noted.**

The goal is to:

1. Avoid performance problems as much as possible by knowing upfront design rules that should be considered when building a story.
2. Tackle performance problems if they occur.

CUSTOMER

## 2. DESIGN RECOMMENDATIONS FOR STORY BUILDING

### 2.1 Use “Efficient” Queries

To avoid huge meta data calls it is recommended to use BW (or BW4/HANA) queries which contains exclusively reporting relevant dimensions and measures. Rather create specific queries for each widget than taking generic one-query-fits-all approaches.

#### Recommendation:

1. In BW Modeling Tools, reduce the number of dimensions in the query section “Free Characteristics”.
2. In BW Modeling Tools, set key figures which are not relevant for initial state to “hidden can be shown” to avoid calculation time, or even to “hidden”, if feasible, to avoid additional metadata information to be provided.

The screenshot displays the 'Sheet Definition: PM\_SALES - Sales Analysis' interface. The 'Columns' pane shows three key figures: '[0D\_NW\_NETV] Net Value in statistics currency (SAP NW Demo)', '[0D\_NW\_OORQT] Open order quantity in base unit (SAP NW Demo)', and '[0D\_NW\_OORV] Open order net value in statistics currency (SAP NW Demo)'. The 'Rows' pane shows two dimensions: '[0D\_NW\_REGIO] Region (SAP NW Demo)' and '[0D\_NW\_PROD\_0D\_NW\_PRDCT] Product Category (SAP NW Demo)'. The 'Free' pane lists various dimensions, including '[0D\_NW\_CODE] Company code (SAP NW Demo)', '[0D\_NW\_CODE\_0D\_NW\_CNTRY] Country (SAP NW Demo)', '[0D\_NW\_CHAN] Distribution Channel (SAP NW Demo)', '[0D\_NW\_PLANT] Plant (SAP NW Demo)', '[0D\_NW\_PROD] Product (SAP NW Demo)', '[0D\_NW\_SORG] Sales Organization (SAP NW Demo)', '[0D\_NW\_SOLD] Sold-to Party (SAP NW Demo)', and '[0D\_NW\_CNTRY] Country (SAP NW Demo)'. The 'Properties' pane is open to the 'Display' tab, where the 'Hide' property is set to 'Hide (Can Be Shown)', 'Highlight' is set to 'Always Hide', and 'Number of Decimal Places' is set to 'Hide (Can Be Shown)'. The 'Selection Details' pane shows the selected key figure '[0D\_NW\_NETV] Net Value in statistics currency (SAP NW Demo)'.

## CUSTOMER

**Example:** Performance measurement (measures taken in Wave 2019.07)

The scenario covers a story in SAP Analytics Cloud which contains three widgets (one table and two charts) using one same BW query for all three visualizations. At most two dimensions are drill downed by the rows, 100 dimensions are put in the free characteristics area of the query and potentially available for further navigation by the end user. The result set is 10.000 records from SAP BW backend.

The following table shows the performance improvement (CPU and overall time) by removing the 100 free characteristics from the query.

	With free chars	Without free chars	Performance Improvement
End to End Time	7361ms	5537 ms	25%
Client CPU Time	5891ms	4469 ms	22 %

In addition to that, the http response size is reduced by one fourth.

## 2.2 Use either story filter OR input-enabled variables

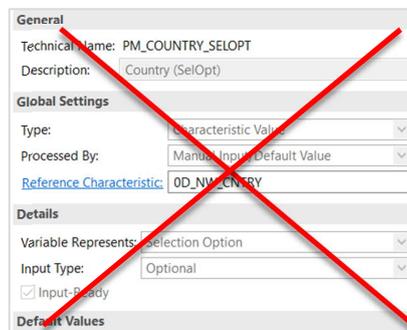
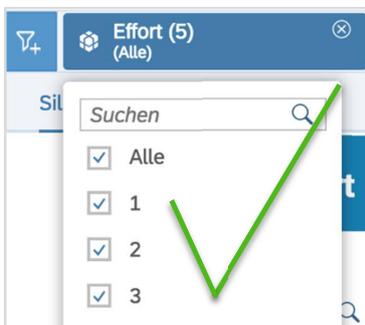
Input ready variables in BW queries lead to at least one additional backend call to submit the variable entries before getting the query result. In case that the user selects a variable entry via value help in the variable screen, an additional value help backend call is executed, which affects the query performance in a considerable manner. At the same time, the use of variable prompts reduces the query result set in advance, implicates less loading time of the query and optimizes the query performance as well.

Therefore, it is recommended to either move all variables to SAP Analytics Cloud story or page filter OR every restriction needs to be done by input ready variables (variable submit).

### Recommendation:

Avoid queries with variables processed by Manual Input/Default Value, assumed the reporting requirement is still fulfilled.

Or, even better, use story or page filter in SAP Analytics Cloud stories



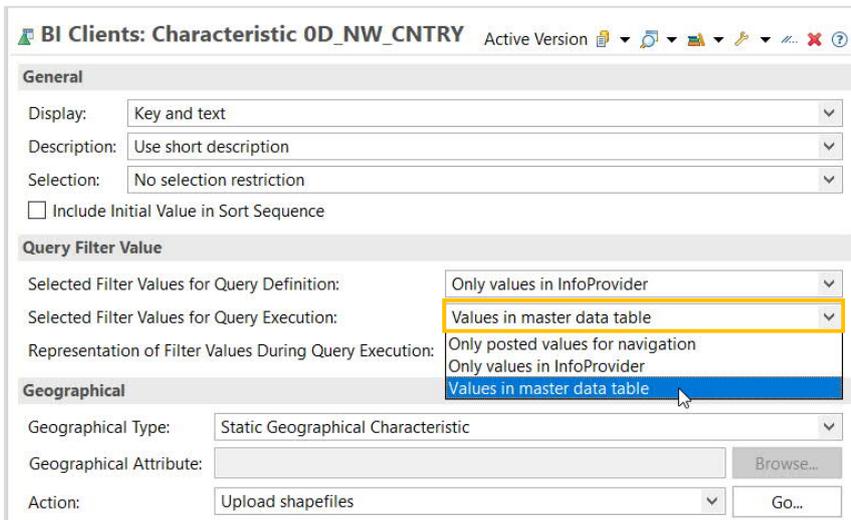
CUSTOMER

### 2.3 Set read mode M for variable prompt dialog

Depending on the design of the InfoProvider used, a very long runtime may occur when executing an input help in read mode "Only Values in InfoProvider" (read mode D). Long runtimes with the same cause can also occur for the variable screen if the read mode "Only Posted Values for Navigation" (read mode Q) is used. Read mode Q is not available for the variable screen. Instead, read mode "Only Values in InfoProvider" (read mode D) is used for the variable screen in this case. If read mode D has a long runtime, a significant runtime gain can usually be achieved by using "Values in Master Data Table" (read mode M). For more details please see [SAP Note 2245483](#).

#### Recommendation:

Check the read mode for query filter value in the definition of the characteristic itself and change the setting to "Values in master data table".



## CUSTOMER

### NOTE:

The setting can be also done on the level of the query in BW Modeling Tools. Please note that overwriting the backend setting within the BW query does not affect the read mode of the filter values in the variable screen (value help).

The screenshot shows the 'Properties' dialog box in SAP BW Modeling Tools. The 'General' tab is active. The 'Filter Value Selection' dropdown menu is open, displaying the following options: 'Values in Master Data Table' (highlighted with a yellow box), 'Only Values in InfoProvider', 'Values in Master Data Table' (highlighted with a blue box), 'Characteristic Relationships', and 'Only Posted Values for Navigation'. Other settings visible include: Technical Name: 0D\_NW\_CNTRY, Description: Country (SAP NW Demo), Display As: Key and Text, Text Output Format: Standard, Sorting Attribute: As in Query, Sort By: As in Query, Sort Direction: As in Query, Show Result Rows: Always, Cumulate Values: unchecked, Display Characteristic: In Normal Overview, Access Type for Result Values: Posted Values, and Refresh Variables: (empty).

## 2.4 Avoid Restricted Key Figures in SAP Analytics Cloud remote models

Restricted Key Figures which are created based on SAP Analytics Cloud remote models lead to an additional query generated in SAP BW backend.

### Recommendation:

Whenever possible, a Restricted Key Figures should be created in the BW Modeling Tools instead of SAP Analytics Cloud.

CUSTOMER

## 2.5 Avoid page filters with cascading effect

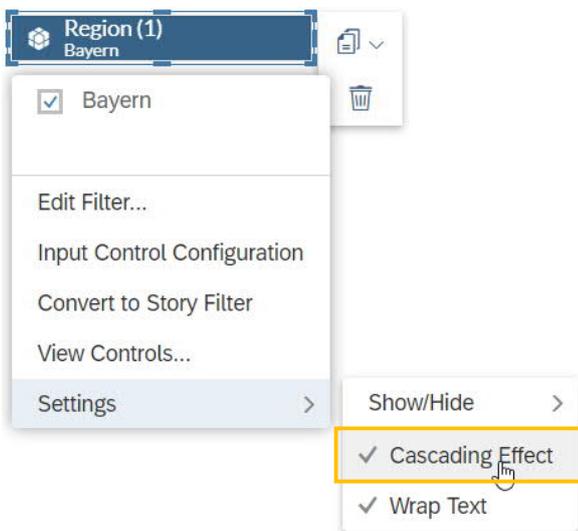
Story filter changes affect other story filters in the same story and page filters on any pages in the story. This cascading effect leads to additional backend calls to narrow the result set of the values for filtering.

For example, two-page filters Country and Region are inserted to the story, and the Country filter value is changed from All to Germany, then the Region filter is automatically updated to show only regions within Germany.

Be aware of the cascading effect when using multiple filters and do not overuse this behavior.

### Recommendation:

To improve performance, it is recommended to turn off the cascading effect in the settings for the filter or input control.



CUSTOMER

## 2.6 Create slim story pages

Every widget, e.g. crosstab, numeric point diagram, chart or filter creates a dedicated query instance and sends several backend calls (metadata call, variable submit call and result set call) to the SAP BW system to fulfill the result, navigation and filtering of the data.

The complexity of the backend calls depends on the complexity of the data provider (e.g. Composite Provider with a lot of underlying data targets), as well as on the number of free characteristics designed in the BW query (See 2.1) and the number of restricted measures (See 2.4).

In any case, reducing the number of widgets causes less backend calls and achieves a beneficial effect on performance.

### Recommendation:

Keep the story page simple and reduce the number of visualizations and filters on a story page whenever possible. Less widgets means less backend calls and, hence, less page loading time.

CUSTOMER

### 3. RECOMMENDATIONS FOR ADMINISTRATORS

#### 3.1 Enable HTTP2

If the query execution time takes 3-5 sec or longer and multiple widgets are part of a story, browser connections would likely be stalled (previously under HTTP version 1.1) during story loading. Especially when there are multiple widgets on one page. A performance gain of **20-30 %** is to be expected by utilizing networking protocol HTTP version 2.

#### Recommendation:

Enable HTTP2 in SAP BW backend, for details see official documentation:

<https://help.sap.com/viewer/683d6a1797a34730a6e005d1e8de6f22/1709%20000/en-US/c7b46000a76445f489e86f4c5814c7e8.html>

See also the related SAP blog entry:

<https://blogs.sap.com/2016/10/19/connectivity-news-abap-7.51/>

#### NOTE:

SAP Analytics Cloud only supports the networking protocol HTTP2 when using a direct connection type to a live data source. HTTP/2 does not work with reverse proxy. For detailed information about supported browsers see: <https://caniuse.com/#feat=http2>

See the Note in the following help article for further information: [Live Data Connections to SAP BW and SAP BW/4HANA](#).

CUSTOMER

### 3.2 Enable parallel execution of queries

Having multiple widgets in a story with long running queries may cause extensive BW processing time since SAP BW can only do sequential processing inside one session (default setting).

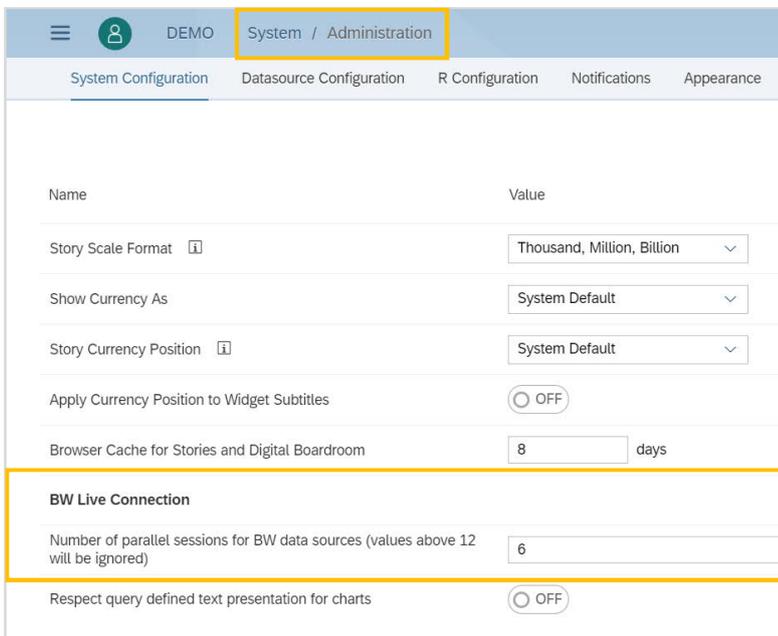
Enabling the toggle `BW_PARALLEL_QUERIES` will permit parallel query processing inside BW by creating multiple sessions, which can then be processed simultaneously. On leaving the story or closing the browser tab these extra sessions will also be closed.

By Default, the system is configured to use 0 BW parallel sessions (meaning no additional http sessions), but the system administrator can configure to higher number of sessions depending on his/her SAP BW landscape. This configuration is available under `SYSTEM > ADMINISTRATION`.

Be aware, that this feature is mainly useful for long running queries. If the story does not have such extreme queries, the overhead of fetching a fresh session for each configured connection is an unnecessary overhead.

#### Recommendation:

To avoid the backend becoming the bottleneck configure the maximum number of shared connections. Use the Parallel execution of Queries setting in SAP Analytics Cloud to make sure the BW server can process the SAP Analytics Cloud sent requests in parallel.



#### NOTE:

The max. amount of parallel session is opened per story. If user has two stories opened the amount of parallel sessions to the backend are multiplied by 2.

Higher values on the parallel queries setting in SAP Analytics Cloud will increase the load on the BW server. Please see that the server is configured to handle this load. It may therefore be necessary to increase `icm/max_conn` as well as other parameters, please refer to the documentation linked in [chapter 3.1](#).

### 3.3 Implementing SAP Notes

Review collective note [2541557 - Support further SAP Analytics Cloud BW features below NW BW 7.50 SP16, BW/4 2.0 SP4 or S/4HANA 1909](#).

CUSTOMER

#### **4. OUTLOOK: PLANNED SAP ANALYTICS CLOUD PERFORMANCE IMPROVEMENTS**

##### **4.1 Reduction of Metadata calls**

To request only the metadata which are needed for the initial report state is in progress.

##### **4.2 Smart Query**

Reduction of backend calls due to summarizing the calls in SAP Analytics Cloud.

CUSTOMER

## 5. LINKS TO KNOW

- [2541557 - Support further SAP Analytics Cloud BW features](#)
- [SAP Analytics Cloud Support Matrix for Live Connectivity to SAP NetWeaver BW](#)
- [Live Connection via CORS](#)

[www.sap.com/contactsap](http://www.sap.com/contactsap)

© 2019 SAP SE or an SAP affiliate company. All rights reserved.

No part of this publication may be reproduced or transmitted in any form or for any purpose without the express permission of SAP SE or an SAP affiliate company.

The information contained herein may be changed without prior notice. Some software products marketed by SAP SE and its distributors contain proprietary software components of other software vendors. National product specifications may vary.

These materials are provided by SAP SE or an SAP affiliate company for informational purposes only, without representation or warranty of any kind, and SAP or its affiliated companies shall not be liable for errors or omissions with respect to the materials. The only warranties for SAP or SAP affiliate company products and services are those that are set forth in the express warranty statements accompanying such products and services, if any. Nothing herein should be construed as constituting an additional warranty.

In particular, SAP SE or its affiliated companies have no obligation to pursue any course of business outlined in this document or any related presentation, or to develop or release any functionality mentioned therein. This document, or any related presentation, and SAP SE's or its affiliated companies' strategy and possible future developments, products, and/or platform directions and functionality are all subject to change and may be changed by SAP SE or its affiliated companies at any time for any reason without notice. The information in this document is not a commitment, promise, or legal obligation to deliver any material, code, or functionality. All forward-looking statements are subject to various risks and uncertainties that could cause actual results to differ materially from expectations. Readers are cautioned not to place undue reliance on these forward-looking statements, and they should not be relied upon in making purchasing decisions.

SAP and other SAP products and services mentioned herein as well as their respective logos are trademarks or registered trademarks of SAP SE (or an SAP affiliate company) in Germany and other countries. All other product and service names mentioned are the trademarks of their respective companies. See [www.sap.com/copyright](http://www.sap.com/copyright) for additional trademark information and notices.