Migration (Brownfield) Sizing

SAP HANA

Performance & Scalability, SAP
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Agenda

Sizing introduction and basics

Migration Sizing SAP HANA
Performance requirements: Sizing
Sizing-relevant KPIs (Key Performance Indicators)

- From a customer perspective, **sizing is the translation of business requirements** (business throughput and user concurrency requirements) into hardware requirements.

- From an SAP development standpoint, sizing refers to the **creation of a sizing model** for the product functionality with a **reasonable number of input parameters** and assumptions. The goal is to define a sizing guidance for each SAP application.

- The sizing procedure helps customers determine the resources (**CPU, memory, data growth on disk, disk I/O and frontend network**) required by an application within the customer's business context. For on-premise applications the sizing procedure is publicly available.

- **Sizing is not configuration**: Actual system configuration is a task performed by the hardware vendor or the Infrastructure as a Service Provider who must ensure the system landscape meets the hardware requirements determined by sizing.
## SAP HANA Sizing KPIs

<table>
<thead>
<tr>
<th>KPI</th>
<th>Description</th>
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</table>
| **Memory**   | - Memory sizing is determined by the data footprint in SAP HANA (business and meta data in column and row store)  
- Memory is also used by other components (e.g. SAP HANA caches) and for processing of requests  
- Compared to anyDB, more CPU power is required to fully benefit from the parallel processing capabilities of SAP HANA for optimal response times  
- Disk is required for data persistence and for logging data  
- Sufficient I/O performance required to enable processes to run with acceptable data throughput and storage system latency  
- Network sizing typically focuses on the bandwidth and is described in gigabits per second (gbps)  
- Different sizing approach: SAP HANA sizing vs. sizing of traditional DB  
- Memory is the leading driver for SAP HANA sizing  
- Massive parallelization in analytical scenarios will have an influence on **Response Times**; hence CPU requirement will get more important for analytical scenarios  
- **Mixed transactional and analytic workloads** now possible with SAP HANA but compete for shared resources |

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Memory: Leading Driver for SAP HANA Sizing

- The main driver for memory sizing is the table data of the planned SAP HANA system.
- Most tables are located in the highly compressed column store of SAP HANA.
- For working memory (or work space or temporary memory) of the database and temporary calculations, almost the same size as for table data is required additionally.
- A SAP HANA database includes further memory areas, such as code, stack, caches, operating system, and other system files. These areas are typically small compared to a typical database.
Agenda

Sizing introduction and basics

Migration Sizing SAP HANA
SAP HANA Sizing - Overview

**Sizing Type**

**Definition**

**Greenfield**
A new SAP application, which did not exist before

**Brownfield (system conversion)**
The SAP application exists on anyDB, anyOS, maybe in a backlevel release

**Sizing Verification**
After the system runs on SAP HANA, check whether the capacity estimation was right
SAP HANA Sizing

Customer Interested in SAP HANA

New SAP HANA system (Greenfield Sizing)

Use SAP HANA Quick Sizer
(www.sap.com/sizing)

Existing SAP system migrated to SAP HANA (Migration Sizing)

Use Migration Reports/Procedure
(Notes: 1872170, 1793345, 2296290)

Find deployment options:
Connect with hardware vendor and check for configuration

Certified and Supported SAP HANA® Hardware Directory

Link:
Migration Sizing

Existing NW ABAP system to be migrated to SAP HANA

Methodology and result
- Sizing report (note 1872170) which runs on the "legacy" (anyDB, anyOS) ABAP system to determine the required HANA RAM and disk on the new HANA-based solution
- Potential areas for housekeeping, cleanup and archiving
- Report /SDF/HDB_SIZING (Modification 77) contains enhancement for persistent memory sizing
- CPU sizing: Recommendation is to use the method as described in SAP Note 1793345

SAP Notes 1872170; 1793345

Methodology and result
- Sizing report (note 229690) which runs on the source BW ABAP system to determine the required HANA RAM and disk
- Potential areas for housekeeping, cleanup and archiving
- In addition, a HANA CPU requirement assessment is included
- Persistent Memory configurations are taken into account

SAP S/4HANA

SAP BW/4HANA

SAP Note 2296290
SAP S/4HANA Sizing Report
Sizing Report for SAP S/4HANA

3 possible brownfield sizing scenario:

- Any ABAP systems on non-HANA databases => Suite on HANA
- ECC => S/4HANA (or S/4HANA Finance)
- Suite on HANA => S/4HANA (or S/4HANA Finance)

All 3 scenarios are covered by the Sizing Report.

Same formula for memory sizing in all scenario: Data Size * 2 + 50GB + 20%(Paged Objects)
Sizing Report for Brownfield Sizing

ABAP Report /SDF/HDB_SIZING
- Described in SAP Note 1872170 – Suite on HANA sizing report

Scope
- Runs on SAP_BASIS 620 and higher
- Is suitable for sizing of all Business Suite products (ECC, CRM, SCM, SRM, etc.)
- Not suitable for BW (Refer to SAP Note 2296290 – New Sizing Report for SAP BW/4HANA)

Functionality
- Considers SAP S/4HANA data model changes in FI, SD, MM, ML, etc.
- Estimates the maximum memory consumption of the database when migrated to SAP HANA
- Is independent of the source database provider and Unicode encoding
- Considers compression of legacy database
- Considers distribution of tables to row and column store
- Considers differences for secondary indexes
- Does Persistent Memory sizing and Memory usage reduction estimation with data aging for technical objects
Sizing Scenarios

The current version of the report is also valid for sizing of HANA 1.0 and 2.0. Below you can see the choice of sizing scenario available to the user. The selection-screen will be different depending on the system where the report is executed.

1872170 – Suite on HANA sizing report
How to Run the Report

Selection screen on anyDB:

- For a sizing of the entire database leave the “list of tables fields empty”
- Maximum of 100,000 records read per tables is representative enough for a full database sizing
- Use higher sample size if you are sizing only a subset of tables. (I.e. For VDM, HPAs sizing)
- If you already know of specific table distribution between stores, specify it in the “Changes to standard stores distributions”
Algorithm of Sizing Report /SDF/HDB_SIZING

1. **The total number of entries of each tables** is read from the database statistics.

2. **A random sample of data is read** from every tables in the system.

3. Out of this sample, the report calculates the **average number of bytes per column**.

4. Out of the average size per column and the total record count, the **uncompressed size of a column is calculated**.

5. To the uncompressed size **an average compression factor is applied** to get the estimated size in HANA.

Example: A typical column “mandt” has type c and values such as ‘100’, ‘000’, ‘066’. The report will calculate an average size of 6 bytes for this column.

Example: Column “mandt” has an average size of 6 bytes and the tables has 100 records. Total uncompressed size of the column is 600 bytes.

The size estimation for keys (primary, secondary keys, etc.) is more complex (and more accurate) but uses the same metrics (avg. size per column and record count).
Results of Sizing Report /SDF/HDB_SIZING

The sizing report includes the sizing projections, based on the actual table sizes in the legacy system as well as an estimation of how much the memory footprint can be reduced using functionalities that HANA will enable.

<table>
<thead>
<tr>
<th>SIZING RESULTS IN GB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on the selected table(s), the anticipated maximum requirement are</td>
</tr>
<tr>
<td>for S/4HANA:</td>
</tr>
<tr>
<td>- Memory requirement for the initial installation 1,688,2</td>
</tr>
<tr>
<td>- Net data size on disk for the initial installation 889,0</td>
</tr>
<tr>
<td>- Estimated memory requirement after data clean-up 1,190,3</td>
</tr>
<tr>
<td>- Estimated net data size on disk after data clean-up 724,2</td>
</tr>
<tr>
<td>Other possible additional memory requirement:</td>
</tr>
<tr>
<td>- during the transition to S/4 HANA (See FAQ) 34,2</td>
</tr>
<tr>
<td>- for an upgrade shadow instance 124,7</td>
</tr>
</tbody>
</table>
Analyzing the Result - Data Tiering and Sizing report

PMEM and Data Aging sizing are done by the Sizing Report
Analyzing the Result

What is referred as “work space” by the report includes:

- Row store memory fragmentation
- Columns created in the column store by the join engine
- Space required for delta stores
- Space required for merge operations
- Tables not considered by the report (Tables existing in the database but not in the ABAP dictionary)
- Space required for query execution (ex: Translation tables, temporary tables…)
- Result cache

The fixed size of 50GB includes

- Space required for the metadata catalog, nameserver, statistics server…
- Space required for SQL Cursor caches
- Space required for statistics

This multiplication by 2 is larger than what you could observe in a brand new HANA installation. It is closer to what is observed in a SoH system that has been productive for some time already.
How to Interpret the Results of the SAP S/4HANA Sizing Report

- Column store and row store estimations have good enough accuracy (10-20%). Still, do not forget it is an estimation.
- Work Space (temporary memory) estimation uses a simple formula (data size in memory) * 2. Based on experiences, if the work space is bigger than 3TB, it might be oversized.
- Always check the top tables. Very often, you will find basis tables with deletion/archiving potential such as idoc, workflow, application log tables, etc. See SAP Note 706478 – “Preventing Basis tables from increasing considerably” for more details.
- The total estimated memory requirement given by the report should not be considered as the final memory sizing result. Take into account that:
  – Not all the server physical memory will be available to HANA (OS and other processes are run too).
  – There should be enough space left for future data growth or functional extension
- The sizing report takes a snapshot. Any growth between that date and the go-live date should be considered.
Memory Sizing Report News (cont.)

- The report is now available in the SAP S/4HANA Readiness Check which will be available free to anyone who has an SAP maintenance agreement (an S-user account)
SAP BW/4HANA Sizing Report
Mission statement

Provide an easy to use, source database independent tool to predict resource requirements for a BW system on a SAP HANA database.

The sizing report /SDF/HANA_BW_SIZING is a convenient method to estimate the memory requirements of a BW system after migration to SAP HANA. Major advantages of the ABAP report:

▪ Easy to deploy and use – no DB administrator required
▪ Independent of source database specific compression and data representation
▪ Considers user defined future growth and leverages BW semantic information

The report requires ST-PI 2008_1_7xx SP12 or ST-PI 740 SP1 and SAP NetWeaver BW 7.0 SP 4 or higher. Updated versions can be obtained from SAP Note 2296290.

Important note for DB2 on iSeries (AS/400): Please implement SAP Note 1677958!
SAP BW/4HANA Sizing Report: Behind the Scenes

Report analyses each database table found in ABAP dictionary:
- Reads subset of records (size depends on total number of records)
- Calculates ABAP size for fixed length columns
- Calculates average length of columns with variable size
- Records count taken from DB statistics (REFRESH upfront if required!)
- \( \Rightarrow \) total table size in ABAP

AnyDB: Table type specific compression factors are applied to estimate HANA size from ABAP size

HANA: HANA table size is taken directly from system view M_xS_TABLES

\( \Rightarrow \) Total HANA data footprint
SAP BW/4HANA Sizing Report: Limitations / Assumptions

Growth model: constant growth over N years, small share of growth also goes to system data

DB sizing only, no application server sizing information

CPU Requirements assessment based on available OLAP statistics – often not available over sufficient time in the past (month end / year end closing, etc.)

Only when executed on AnyDB:

- Table type specific compression factors (empirically measured)
- Sample sizes large enough to get average length of variable size columns
- Unbalanced data distribution (few distinct values, sparse fill grade of columns) can lead to lower precision in size estimation for individual tables!
SAP HANA CPU Requirements Assessment

- Introduced with version 2.5 of sizing report/Tailored Datacenter Integration (TDI) Phase 5
- **This is not a CPU sizing!**
- Configuration space for SAP HANA hardware opened up to allow for more flexibility in combining memory and CPU resources by introducing **CPU Requirements classes**
- SAP BW/4HANA sizing report enhanced by analysis process looking at historical OLAP statistics
- Customers running this analysis need to comply with side conditions listed in SAP note 2502280 and confirm this explicitly on the selection screen:
SAP HANA CPU Requirements Assessment: Results

Recommended CPU power now part of sizing results (only if compliance was confirmed)

Results can be any of:

- **CLASS L (100% CPU Req.):**
  SAPS close to the CPU power of a machine with standard configuration

- **CLASS M (50% CPU Req.):**
  Half of SAPS for CLASS L

- **CLASS S (25% CPU Req.):**
  Half of SAPS for CLASS M
SAP BW/4HANA Sizing Report: Final Remarks

Report is constantly maintained (bug fixes, new features) and distributed through updates on SAP note 2296290

Please ask customers to always check for the newest version of this SAP note to get the latest and greatest report version

Please check report documentation attached to SAP note for FAQs
Further Migration Scenarios
Migration Sizing Part 2/2

Existing NW Java system to be migrated to SAP HANA

Existing Non-NW-based system to be migrated to SAP HANA

Expert Sizing
Sizing Guidelines

HANA native

- Analysis of Legacy system
- SAP Note 1514966
- Request a sizing service

SAP S/4HANA

- Analysis of Legacy system
- SAP HANA version of Quick Sizer
Sizing Verification
Sizing Verification

Existing SAP HANA System

- SAP Business Suite powered by HANA & SAP S/4HANA
  - SAP Note 1872170

- Industry Solutions powered by SAP HANA
  - Early Watch Alert

- SAP NW BW powered by HANA & BW/4HANA
  - SAP Note 2296290

- Non-NW products on SAP HANA
  - SAP Note 1969700
  - SAP Note 1698281
Deployment Options

- New SAP HANA system (Greenfield Sizing)
- Existing SAP system migrated to SAP HANA (Migration Sizing)
- Use SAP HANA Quick Sizer (www.sap.com/sizing)
- Use Migration Reports/Procedure
  (Notes: 1972170, 1793345, 2299290)

Find deployment options:
Connect with hardware vendor and check for configuration

Certified and Supported SAP HANA Hardware Directory
Deployment Options

- **Infrastructure as a Service (IaaS)** – 1380654 - SAP support in IaaS environments

- **Virtualization** – 1788665 - SAP HANA Support for virtualized / partitioned (multi-tenant) environments

- **Physical server** – Certified and supported SAP HANA directory
**Agenda**

Sizing introduction and basics

Migration Sizing SAP HANA

Additional Resources
Additional Resources
Sizing information and tools - Sources of published sizing documentation

www.sap.com/sizing
- Access to Quick Sizer
- Access to sizing guidelines, for example, SAP HANA accelerators

SAP Support Portal
- SAP Note 1872170 – SAP S/4HANA memory sizing
- SAP Note 1793345 – Sizing for Suite on HANA
- SAP Note 2296290 - New Sizing Report for BW/4HANA
- SAP Note 1969700 - SQL Statement Collection for SAP HANA
- SAP Note 1698281 - Assess the memory consumption of a SAP HANA System
- SAP Note 1514966 – SAP HANA: Sizing SAP In-Memory Database
- SAP Note 2779240 - Workload-based sizing for virtualized environments
- SAP Note 2815376 - Greenfield sizing for SAP S/4HANA embedded analytics
- SAP Note 2813738 - Brownfield sizing for SAP S/4HANA embedded analytics
- SAP Note 1380654 - SAP support in IaaS environments
- SAP Note 2786237 - Sizing SAP HANA with Persistent Memory

SAP HANA Quick Sizer (for greenfield sizing)
YouTube Video
Thank you.

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