SAP System Performance Survival Guide

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1. GENERAL INFORMATION

The SV-PERF component is mainly responsible for generic performance issue across SAP landscape (focus on ERP system but not including BOBJ, GRC, EIM, EPM etc).
This Survival Guide introduce general basic transactions that can be used for troubleshooting performance issue, workload analysis, performance analysis tools and other topics related to performance optimization.

Following SAP Notes should be reviewed before start troubleshooting general performance issue:

➢ 2399769 - General Performance: Troubleshooting Questions
➢ 2430134 - decision tree - How to Determine Which Component a Performance Issue Belongs to

2. INITIAL SYSTEM ANALYSIS

Before undertaking Performance Analysis of an SAP System, System and Kernel Release Information should always be verified.

2.1 System status Check

The Host data and Database data could be checked from the main screen.

Click the 'Component' button to view the SAP release and Support Package Level

Click the 'Other kernel info' button to view the Kernel information

2.2 SM51 Overview

All Active Servers are listed and the individual processes running on is highlighted.

Please be aware that as of SAP NetWeaver 740 with SAP_BASIS 740 and Kernel 7.4. using the **standalone enqueue server** for deployments with more than 1 instance is a must/prerequisite.

SAP strongly recommends using the standalone enqueue server as the better solution. The standalone enqueue server offers better performance and better scalability for large systems (two or more dialog instances). It is already the standard for all new installations and mandatory for high availability setups. In future releases, it will become mandatory for all systems.

See the following SAP Notes for further information about ASCS.

> 2119669 - How to split the ASCS from Primary Application Server (PAS)
> 2073500 - FAQ: Splitting off ASCS from PAS

Below wiki page has more information about SAP Enqueue Server.
https://wiki.scn.sap.com/wiki/x/p4CuG

3. KEY PERFORMANCE ANALYSIS TRANSACTIONS

Outlined below are the key transactions to use when analysing general system performance:

Transaction Code	Description
SM51	To Check the number of Servers and processes running on each server
SM50	To Monitor load on SAP Work Processes for each individual instance
SM66	Global Work Process Overview, can be used to check current system activity/load
ST03	Workload Monitor
ST04/DBACOCKPIT	DBACOCKPIT
ST06	Operating System Monitor
ST02	SAP Buffer Summary
ST22	ABAP Runtime Errors
SMLG	Maintain/ View Logon Groups
ST12	Single Transaction Analysis/ ABAP & SQL Trace Tool
STAD	Single Statistics records
SE38	Run reports/ programs
SE16	Table Analysis/ Number of Entries
ST11	Developer Error log files
AL11	SAP Directories
SM04/AL08	User List
RZ12	RFC Server Group Maintenance
RZ03/RZ04	Operation Modes Maintenance
SM12	Lock Entry List
SM13	Update Reqests
ST10	Table Call Statistics

See the following SAP Notes for further information:

➢ 948066 - Performance Analysis: Transactions to use

The following section contains an introduction to the key transactions and how/why you would use them.

3.1 SM50 overview

In SM50,the running status of work processes can be checked. More details of single work process can be found by double click the individual work processes row.

Please see following notes for further information:

> 2430181 - decision tree - How To Analyze Work Process Performance Issues.

Below wiki page has more information about Work Processes configuration and Best Practices.

https://wiki.scn.sap.com/wiki/x/OgDPG

SAP Help portal:

https://help.sap.com/viewer/3364beced9d145a5ad185c89a1e04658/7.3.16/en-US/c43a6a50505211d189550000e829fbbd.html

3.2 STAD

For every transaction step executed in the SAP system, a record with statistical information is generated and saved in files on the application servers(DIR_DATA). This statistical information includes response times, memory requirements, database accesses, etc.

Using the stat/maxfiles parameter, you can configure a maximum of 99 statistics files so that the single record statistics are held for a longer period of time. By Default this is set to 48

Within STAD you can restrict the search by date, user, timeframe, transaction.

For individual analyses DB table access statistics need to be activated. Set the value of variable STAT/TABREC to 10. It can be activated online and no restart of an instance is necessary. You can do this via transaction ST03 -> Online Parameters -> Dialog step statistics.

You should activate the parameter only temporarily because, otherwise, performance problems and memory problems may occur in the statistics collector

STAD:Initial Selection Screen
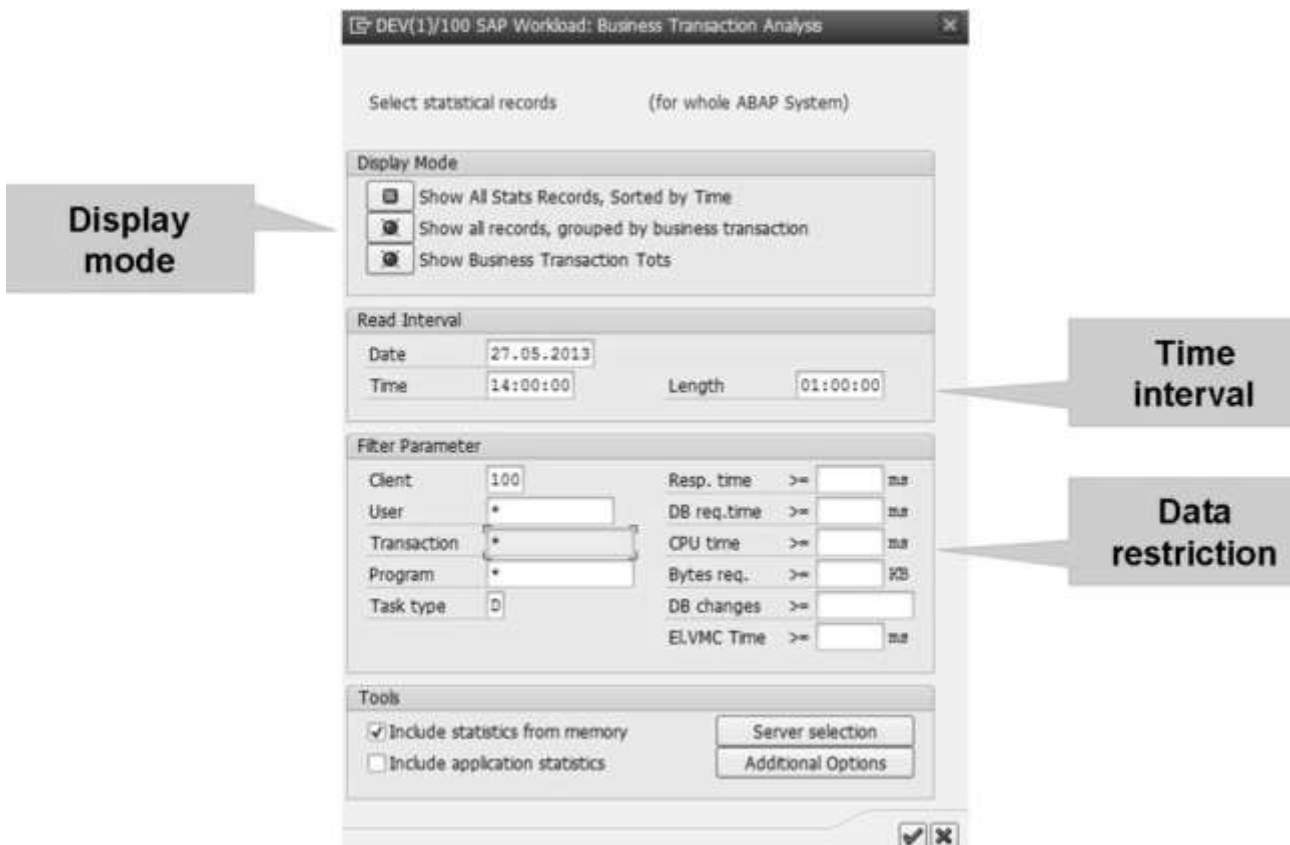
STAD is an extremely powerful tool for performance analysis. It can allow a deeper dive into exactly what was happening on the system at a given time.

3.3 Workload Monitor ST03 Overview

ST03/ST03N is the central workload monitoring tool for SAP system. All statistics records are aggregated into ST03/ST03N by the performance collector background job SAP_COLLECTOR_FOR_PERFMONITOR (Program RSCOLL00) based on the statistics files used in STAD.

Please see following SAP notes for ST03/ST03N data collecting issue

> 2369736 - No workload data in ST03N / ST03
> 888095 - ST03/ST03N gets popup "No system load data available".

The workload Monitor/ ST03 should always be viewed in Expert Mode. Response times can be viewed for the entire system 'Total' or for each individual server.
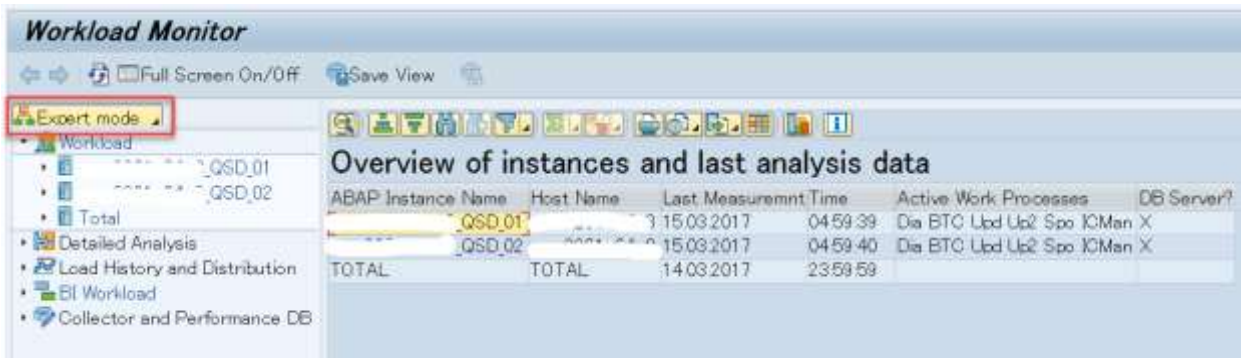
The view of workload statistics can be manipulated depending on the focus off your analysis.
For example:

Detailed Analysis ->Last Minutes Load
Load History and Distribution ->Load History
Analysis Views ->Transaction Profile
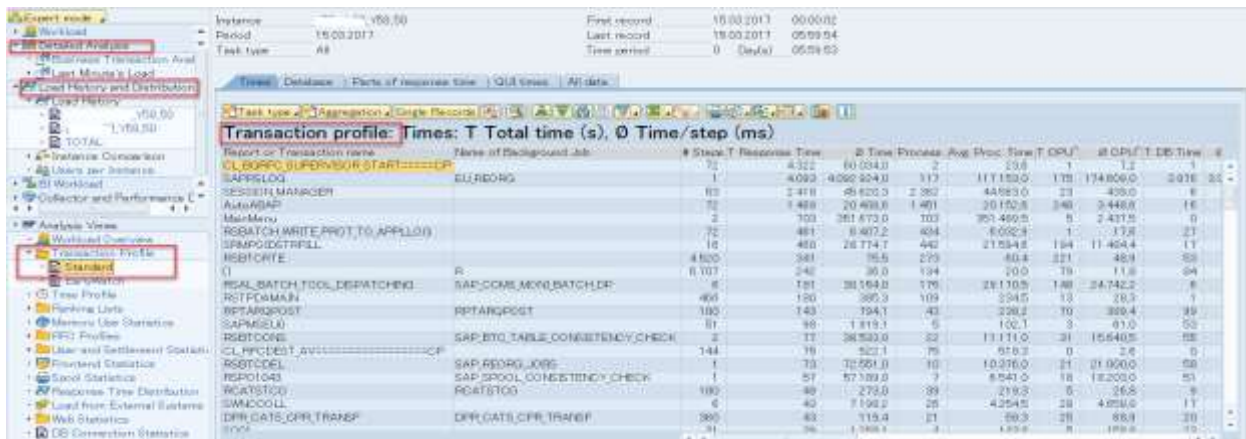
You can find more information about Workload Monitor from following help portal:

https://help.sap.com/viewer/984899fe989d4efab0409b818433f892/7.5.6/en-US/2db8be3befaefc75e10000000a114084.html

3.4 ST02 Overview

Buffer usage Overview
- ➢ The status of the different buffers of the SAP instance

Buffer	HitRatio %	Alloc. KB	Freesp. KB	% Free Sp.	Dir. Size	FreeDirEnt	% Free Dir	Swaps	DB Accs
Nametab (NTAB)								0	
Table definition	99,72	33.611	1		100.000			41.442	294.293
Field definition	99,58	127.812	4.204	3,50	100.000	75.765	75,77	146.162	173.100
Short NTAB	99,79	6.125	567	18,90	25.000	16.221	72,88	22.401	29.781
Initial records	67,20	13.125	3.576	35,76	25.000	10.039	40,16	95.828	111.034
								0	
program	98,54	900.000	1.180	0,14	225.000	206.766	91,90	466.443	1.468.290
CUA	99,33	30.000	1.740	7,17	15.000	13.538	90,25	49.560	14.183
Screen	98,97	35.063	3.869	10,04	5.000	2.954	59,88	0	24.874
Calendar	100,00	488	299	62,55	200	110	55,00	0	90
OTR	84,34	8.192	5.375	91,23	6.000	5.144	85,73	0	
								0	
Tables								0	
Generic Key	98,73	117.188	4.941	4,58	40.000	13.039	32,60	887	6.790.780
Single record	75,87	60.000	16.305	27,27	800	575	71,88	1.979	11.806.030
								0	
Export/import	97,19	60.000	9.171	15,06	15.000			90.812	
Exp./ Imp. SHM	79,83	4.096	3.264	98,08	2.000	1.997	99,85	0	

SAP memory usage
- ➢ Information on the memory usage of the SAP instance

SAP Memory	Curr.Use %	CurUse[KB]	MaxUse[KB]	In Mem[KB]	OnDisk[KB]	SAPCurCach	HitRatio %
Roll area	2,86	7.490	16.640	262.144	0	IDs	98,50
Page area	5,66	14.848	220.312	131.072	131.072	Statement	97,00
Extended memory	15,44	1.294.336	5.734.400	8.384.512	0		0,00
Heap memory		0	3.230.909	0	0		0,00

- ➢ Fields explanation in ST02

Field	Explanation
HITRATIO	Hit ratio of the buffer. The definition of the SAP buffer hit ratio is identical to that given in the chapter on database buffers.
ALLOCATED	Memory space allocated to the respective buffer. Every SAP buffer is normally characterized by two parameters: the size of the buffer and the maximum number of buffered entries.
FREE SPACE	Currently unoccupied memory space in the buffer.
DIR. ENTRIES	Maximum number of entries in the buffer.
FREE DIRECTORY ENTRIES	Difference between the current number of objects stored in the buffer and the maximum possible number of objects.
SWAPS	Number of buffer objects displaced from the buffer.
DATABASE ACCESSES	Number of database accesses (which is also the number of data transfers from the database into the buffer).

Field	Explanation
CURRENT USE	Amount of memory currently used in the memory area, given in KB and %.
MAX. USE	Maximum amount of this memory area that has been used, in KB, since the SAP instance was started (also known as the high water mark).
IN MEMORY	Amount of main memory allocated to this area at system startup. For the ROLL AREA and the PAGING AREA, this space corresponds to the SAP ROLL BUFFER and SAP PAGING BUFFER.
ON DISK	For the ROLL AREA and the PAGING AREA, SAP roll and paging files are created on the hard drive of the application server. The size of these files is indicated here.

Key Buffers

- ➢ The Nametab buffer contains data derived from tables DDNTT (table definitions) and DDNTF (field descriptions), stored in four individual buffer areas. These four buffers are also known as the Repository buffer or the ABAP Dictionary buffer. The NTAB buffers should reach qualities near 99.5%, or even higher after some days of intense work on the SAP system. If the quality of these buffers falls below 95% (aside from right after system startup), you should try to identify reasons for this decrease in hit ratio. Problems with the hit ratio of these very performance-critical buffers should be avoided! The Initial record layouts buffer might show lower hit ratios, especially if the SAP instance had not been used intensively since startup.

➢ Program Buffer (Program Execution Area - PXA) The program buffer is used for storing ABAP program loads before they are executed within individual work processes. It is also known as the ABAP buffer. When a program is requested by a work process, and its load is already located in the program execution area (in short PXA: the technical name for the program buffer), the access time is minimized.

➢ Generic Table Buffer: This buffer stores, according to the settings in the ABAP Dictionary (for example, see transaction SE13), a range of records with their field values. The generic table buffer can also store all the entries (records) in a table. This is known as resident (or full) buffering. For client-dependent tables, this buffering is restricted to all data of one client. If data of several clients is accessed from within the same SAP instance, then this data will be buffered separately within the table buffer, separated by the client key. The quality of the generic key buffer should be greater than 95% and can be up to 99%. This buffer is also known as the generic key table buffer or the generic buffer.

➢ Single Record Table Buffer: The Single Record Table Buffer stores single table entries, that is, one record with its field values. It is also known as the Partial Table Buffer or the Single Record Buffer. Because it stores single table entries, it is slowly filled and its hit ratio is expectedly lower than for other buffers. The hit ratio for the single record buffer is only of concern if there are swaps occuring. Otherwise, this buffer is not critical for performance.

➢ Exp./Imp. SHM: The Export/Import-Shared-Memory-(ESM)-buffer contains data put there by the using the ABAP statement EXPORT TO SHARED MEMORY. This buffer became available, as the OTR buffer, with SAP Web AS 6.10. This buffer might become a performance bottleneck when you see heavy swapping activity for this buffer. If you see no swaps, the buffer is perfect.

When monitoring SAP buffers, consider the following guidelines:

➢ The hit ratio for SAP buffers should generally be 98% or higher. (Excep-tion: For the program buffer, the single-record buffer, and the export/import buffer, lower hit ratios are acceptable.)
➢ There should be no swaps (displacements) in the buffers of a produc-tion system. If there are swaps, the buffer size or the maximum num-ber of entries should be increased. Here again, the exception is the program buffer, for which approximately 10,000 swaps per day rep-resents an acceptable number of buffer displacements.
➢ To help avoid subsequent displacements, ensure that each buffer has sufficient memory (indicated as Free Space) and free entries (indicated as Free Directory Entries).

Related SAP Notes:

➢ 1011158 - Table buffering on a SAP instance
➢ 47239 - Behavior of the table buffers
➢ 2085980 -New features in memory management as of Kernel Release 7.40

Wiki Page:

SAP Memory Management System
https://wiki.scn.sap.com/wiki/x/uICuG

Analyzing Buffer and Swaps
https://wiki.scn.sap.com/wiki/x/TYqZGg

Please see more detail information for SAP Buffers in following SAP Help Portal:

https://help.sap.com/viewer/3364beced9d145a5ad185c89a1e04658/7.3.15/en-US/c43a6dbb505211d189550000e829fbbd.html

3.5 Operating System Monitor ST06/ST06n/OS07n

Operating System Monitor ST06/ST06n/OS07n provide the following functions to analyze the bottleneck for CPU, Memory, file system, LAN, etc.
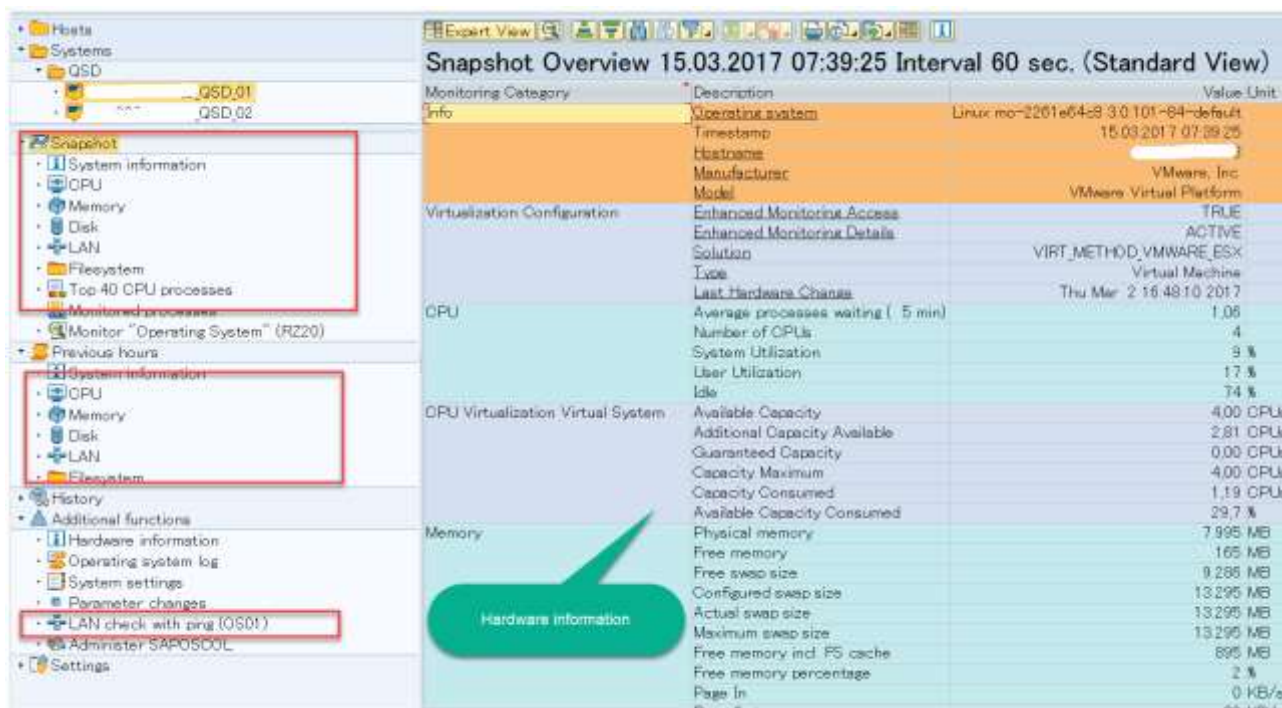
If analysis is taking place on a virtualized environment, it is critical that enhanced monitoring functions are activated as per the SAP Notes highlighted below:

- 994025 - Virtualized OS environments in the operating system monitor
- 536954 - OS data in a cluster environment for OS07
- 1084019 - OS07N: New operating system monitor
- 2067546 - ST06/OS07N: Overview note
- 2031893 - Virtualization monitoring with saposcol on Oracle Solaris
- 1571179 - System shows high IO-Wait in ST06

The CPU utilization for a non-virtualised environment will always sum up to 100%. **User utilization** should not exceed a value of 50 to 60%. **System utilization** should be below 20% and **Idle time** should be above 20%. An idle time below 20% will lead to CPU bottleneck situations.

IO Wait time is considered a subset of idle time. It can't be concluded that a high IO wait time indicates a disk-level issue. IO Wait time includes block IO, raw IO, or Virtual Memory operations such as paging/swapping. It does not include time spent on tape IO or terminal IO.

3.5.1 Memory

- **Physical memory** This number gives the size of the RAM of the server.

- **Swap size: Configured swap size:** This is the sum of physical RAM and swap/page space. This sum is also known as **virtual memory** in SAP systems.

- **Swap size: Maximum swap size** This figure gives the amount of configured swap/page space.

- **Page:** The swap/paging activity on OS level per hour should not be higher than one-fourth the size of the physical RAM for Page in activity on Windows OS, or one-fifth the size of the physical RAM for Swap Out activity UNIX OS. Otherwise, you will observe a decrease in SAP system performance caused by heavy CPU and I/O utilization.

Related SAP Notes:

- ➢ 2442188 - decision tree - Analyzing and Configuring Memory to Increase Performance
- ➢ 1121904 - SAP on AIX: Recommendations for paging space
- ➢ 103747 - Performance: Parameter recommendations as of Release 4.0

SAP Help Portal:
Operating System Monitor
https://help.sap.com/viewer/3364beced9d145a5ad185c89a1e04658/7.3.16/en-US/55b5b93b5bb3493fe10000000a114084.html

3.5.2 LAN check by PING

In the operating system monitor (Transaction ST06), select Other Functions • LAN Check by Ping or call the transaction code:OS01.

Initial Screen:

Please see the following note for further information

- ➢ 2443079 - Network performance analysis - LAN check by PING (OS01)

3.6 ST22 Overview

➢ Shows ABAP Program Terminations

Goto -> Overview, provides a sorted view of the ABAP Dumps relevant to a certain Date, User, Client etc. sortng the Dumps by the different types of errors. The most concerning dumps are those related to Memory, SYSTEM_CORE_DUMP, TIME_OUT errors.

Please see following notes for further information

➢ 2162346 - SYSTEM_CORE_DUMP : How to analyze it

4 WORKLOAD ANALYSIS

The following figure shows the compositions of Response time.
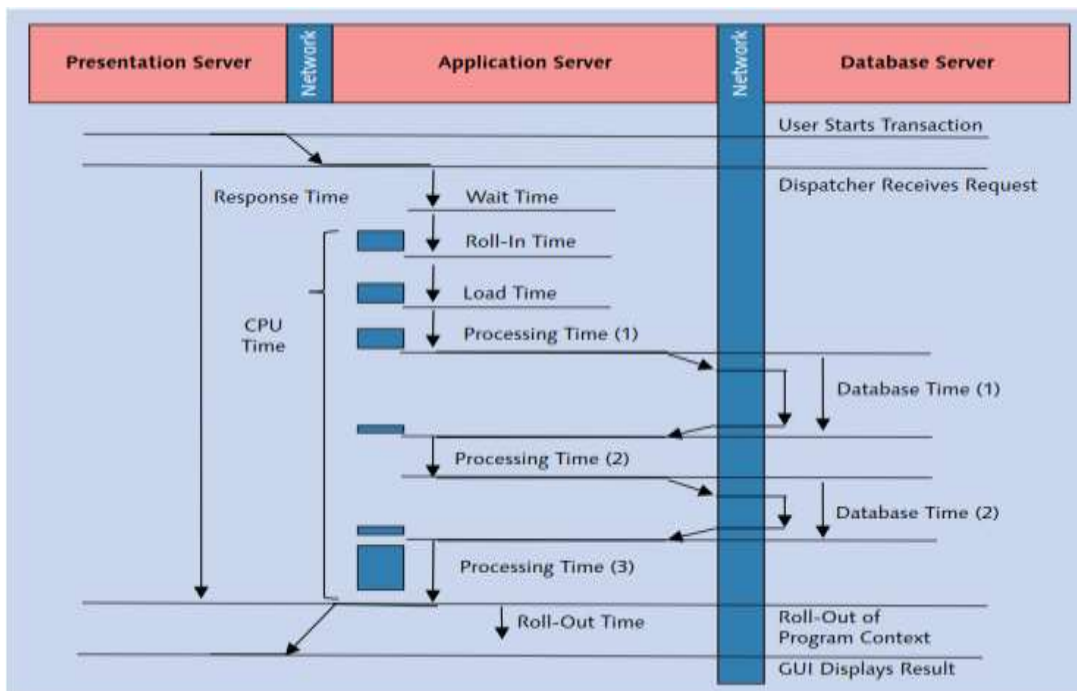
The following SAP Notes provide information about how response time is measured and contains information about the term in general.

➢ 8963 - Definition of SAP response time/processing time/CPU time
➢ 1063061 - Information about response time in STAD/ST03

Guideline values when analysing Average response time/Dialog step are outlined below.

➢ Wait Time < 10% of total response time (<50ms)
➢ Roll In/Out < 20ms
➢ Roll Wait time < 200ms
➢ Load and Generate < 50ms
➢ Processing time < 2 * CPU
➢ Enqueue time <5ms
➢ DB Time < 40% (Response time – Wait time)
➢ GUI time <200ms

Please be aware these are only guideline figures, and are **NOT a definitive indication of a performance issue.**

The following section contains an introduction to the key components of response time and the general guide of troubleshooting.

4.1 High Wait time

The dispatcher of the SAP instance receives the incoming request and stores it in the request queue of the appropriate work process type. While the dispatcher is looking for a free work process, wait time is accumulated. Wait time ends, when the request is being forwarded to a free work process of the required type. Wait time is the first component of the overall dialog response time.

➢ Check the number of Dialog work processes in SM50 or TU02 'rdisp/wp_no_dia'

➢ Check for long running processes consuming a high number of Work Processes

➢ Check for Work processes in PRIV Mode, this can indicate insufficient extended memory

➢ Is high wait time the Root cause of the poor performance or a symptom of another issue

➢ Activate the /SDF/MON to analyze the running status of work porcesses

4.2 High Roll Wait time

In general roll wait time measures external communications and this could be GUI communication or RFC communication.
A way to check if the problem is in GUI communication or if is RFC communication is checking the GUI time and frontend network time. If you find high times then the problem is most likely to be related with GUI communication.
If not then RFC communication should be investigated.
Review SAP note 364625 that explains you GUI time and fronted time, and also provides details of how to review these times on a system.

Related SAP Notes:

➢ 2426336 - Performance analysis of external RFC server programs (registered program)

Please see the detail information about GUI time analysis in section ' High GUI Time '.

4.3 High load and generate time

Load and Generate time is the amount of the time taken by work process to copy and generate or to load and generate abap code and screens for the User request. The load and generator time is high the problem is the buffer sizes is too small (TP program or buffers and CUA buffers).

➢ Check in ST02, verify if the program buffer is sized sufficiently
➢ Up to 10,000 swaps per day is acceptable for the Program Buffer.
➢ HitRatio% and % Freespace should always be considered when analysing Buffer Size
➢ Always ensure sufficient main memory is available before making buffer increases and that all changes are tested before promoting to a production environment.

Buffer	HitRatio %	Alloc. KB	Freesp. KB	% Free Sp.	Dir. Size	FreeDirEnt	% Free Dir	Swaps	DB Accs
Nametab (NTAB)								0	
Table definition	99,61	33.611	2.306	8,20	100.000	8.199	8,20	0	123.848
Field definition	99,71	127.812	30.641	25,53	100.000	81.544	81,54	46.827	66.423
Short NTAB	99,75	6.125	1.355	45,17	25.000	19.030	76,12	17.494	23.699
Initial records	49,10	13.125	3.709	37,09	25.000	8.393	33,57	32.020	48.744
								0	
program	97,52	900.000	1.169	0,14	225.000	204.255	90,78	99.743	365.775
CUA	99,13	30.000	2.573	10,61	15.000	13.594	90,63	0	5.448
Screen	98,23	39.063	19.577	50,78	5.000	4.263	85,26	0	8.465
Calendar	100,00	488	299	62,55	200	110	55,00	0	90
OTR	77,32	8.192	5.784	98,17	6.000	5.795	96,58	0	
								0	
Tables								0	
Generic Key	94,57	117.188	4.741	4,39	40.000	12.163	30,41	469	5.053.963
Single record	67,37	60.000	2.002	3,35	800	736	92,00	1.531	9.487.344
								0	
Export/import	95,13	60.000	26.562	48,97	15.000	6.702	44,68	0	
Exp./ Imp. SHM	80,06	4.096	3.268	98,20	2.000	1.997	99,85	0	

Related SAP Note:

➢ 1230076 - Generation of ABAP loads: Tips for the analysis

4.4 High Enqueue time

Enqueue time is used to request and set SAP locks by making use of the enqueue
work process. Typically, this component of the dialog response time is rather small, usually less than 5 ms.

Related SAP Notes

➢ 97760 - Enqueue: Performance and resource consumption
➢ 2252679 - How to analyze an enqueue lock problem.
➢ 2126913 - ENQU: The enqueue log
➢ 2013043 - Performance Problems with Enqueue Work Process
➢ 2019532 - Performance of integrated enqueue server

Wiki Page:

Enqueue Performance : Analysis
https://wiki.scn.sap.com/wiki/x/ihfRGg

4.5 High Processing time

Check Operating System Monitor for a CPU Bottleneck

➢ 994025 - Virtualized OS environments in the operating system monitor

➢ 1084019 - OS07N: New operating system monitor

4.5 High Database time

If data is read from the database server or changed in the database, these actions are indicated as database time (Av. DB Time). Database time is measured from the moment the database request is sent to the database server and runs until the moment the data is returned to the application server.

➢ Check for expensive SQL causing high load on the system

➢ Check I/O performance stats

➢ Consult the SAP Notes outlined under the DBACOCKPIT section, depending on the Database Release and Version

4.6 High GUI Time

Analysis should focus on Front End: Front-End Ping (Network Check), Front-End Hardware, High Volume of Data Transferred, Many Roundtrips. If you discover that the GUI time is high despite a relatively small volume of data, this can be for two reasons: there may be a hardware bottleneck on the presentation server or a network bottleneck. Often, the simplest way to analyze this further is to filter out the users who typically experience these problems from the single-record statistics.

High GUI Time, can sometimes be the result of a non-optimally configured SAP Easy Access Menu. Check for high GUI Times associated with the transaction SESSION_MANAGER, if high times are identified it is a good idea to run the report 'EASY_ACCESS_NUMBER_OF_NODES' via SE38. This report identifies the number of menu nodes configured per user. A high number of menu nodes increases GUI time and reduces performance.

When using SAP Easy Access Menu:
Menu should not contain more than 1000 entries (For comparison: The complete SAP menu contains 70,000 entries). The Tree is loaded to the user context at a glance. A high number of menu entries leads to high memory consumption on the application server and to long response times for the menu.

Related SAP Notes

➢ 2428353 - How to analyze high GUI time on SAP systems
➢ 851012 - SAPGUI: Performance trace - technical details
➢ 305363 - Create frontend trace file
➢ 500235 - Network Diagnosis with NIPING
➢ 203617 - 'High memory consumption with Easy Access menu'
➢ 357693 - 'Redundancy avoidance in Easy Access'

5. NETWORK PERFORMANCE ANALYSIS

This section will be introducing the troubleshooting guide and analysis tools when network performance is not optimal.
However network issue regarding to hardware/port/router/switch configurations are beyond the scope of support. Customer needs to consult their IT/Network team or vendor on further.

5.1 Typical Network Performance issue

The network peroformance should be diagnosed when the following symptoms occur.
Be aware these are only typical symptoms, are **NOT a definitive indication of a network performance issue.**

High Roll-wait/GUI time showed in workload statistics(ST03/STAD)
High response time in lan check by ping
High response time when performing RFC calls
Communication issue between SAP instance and Database instance

Network issues generally focus on problems with transmitting large data volumes or the speed at which the data is communicated. This can occur due to the following:

> ➢ Hardware issues

This can be wide ranging and can involve port issues (where the cable is connected), a router error (connects different networks), or a switch error (connects different devices).

> ➢ Poorly sized infrastructure

A network typically consists of multiple switches, routers and cables. For high volumes of data, the cables need to have available "bandwidth" to efficiently transfer the data. For example, a cable with a bandwidth of 1Mb/s (known as Ethernet) will allow less data transfer than a 100Mb/s cable (known as fast Ethernet).

5.2 Useful tools to identify network issues

5.2.1 NIPING

SAP NIPING Program can be used to diagnose the network or measure network metrics between any two machines running SAP software, for example between:

• Frontend PC and application server
• Two application servers, perhaps belonging to different SAP systems
• Application server and database server or live cache server
• RFC server or client programs and application server

The NIPING result can be used to measure throughput and roundtrip time and perform stability test for lan or wan used. Detailed information can be found in following SAP note.

> ➢ 500235 - Network Diagnosis with NIPING

5.2.2 Httpwatch

HttpWatch is a third-party browser plugin which can be used to trace the HTTP/HTTPS traffic between the browser and server triggered by each action you take within a web application. It can be downloaded via http://www.httpwatch.com/download/.
This tool can be used to capture trace file for scenarios which having performance issue and get *.hwl files for further analysis.

> ➢ 1697063 - HttpWatch - Performance Analysis
> ➢ 1558903 - How To Trace a Portal Scenario Using HttpWatch

5.2.3 Other tools could be used

- ➤ TRACERT (WINDOWS) / TRACEROUTE (UNIX)
- ➤ NETSTAT
- ➤ NSLOOKUP
- ➤ IPCONFIG (WINDOWS)

Related SAP Notes:

- ➤ 1100926 - FAQ: Network Performance
- ➤ 578118 - Long response times on the SAP GUI
- ➤ 545136 - FAQ: Test tools for RFC connection
- ➤ 1139596 - SAP GUI: Connection to partner 'sapserver:sapdp00' broken

6 DATABASE RELATED PERFORMANCE ANALYSIS

6.1 DBACOCKPIT

The DBA Cockpit is a platform-independent tool that you can use to monitor and administer your database. It provides a graphical user interface (GUI) for all actions and covers all aspects of handling a database system landscape. You can run the DBA Cockpit locally on an SAP NetWeaver-based system by calling the DBACOCKPIT transaction.

> ➢ Universal to all Databases
> ➢ Analysis depends on the Database Version and Release
> ➢ Database Configuration and layout can be checked
> ➢ SQL Cache can be analysed for most expensive SQL
> ➢ A HTTP Connection is necessary to access the Web-Dynpro DBACOCKPIT, for some customers this is the only option to access the dbacockpit
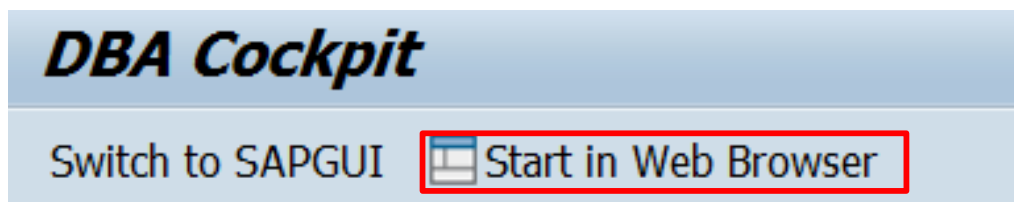
Related SAP Note:
> ➢ 2125429 - Performance Troubleshooting Guide - DBACockpit [VIDEO]

Please see more detail information about Database Monitor in following SAP Help portal:

https://help.sap.com/viewer/3364beced9d145a5ad185c89a1e04658/7.3.15/en-US/4f41a11e252a2b93e10000000a42189e.html

6.2 Related SAP notes and Wiki pages

Listed below are the SAP Notes, Wiki pages relevant to performance on each of the supported Databases.

6.2.1 Oracle

Related SAP Notes:

> ➢ 1171650 - Automated Oracle DB parameter check
> ➢ 1431798 - Oracle 11.2.0: Database Parameter Settings
> ➢ 1888485 - Database Parameter for 12.1.0.2
> ➢ 618868 - FAQ: Oracle performance

Wiki page:

Oracle
https://wiki.scn.sap.com/wiki/display/ORA/Oracle

Tuning Oracle
https://wiki.scn.sap.com/wiki/display/ORA/Tuning+Oracle

6.2.2 DB2 UDB for LINUX, UNIX and Windows

Related SAP Notes:

- 899322 - DB6: DB2 9.1 Standard Parameter Settings
- 1086130 - DB6: DB2 9.5 Standard Parameter Settings
- 1329179 - DB6: DB2 9.7 Standard Parameter Settings
- 1692571 - DB6: DB2 10.1 Standard Parameter Settings
- 1851832 - DB6: DB2 10.5 Standard Parameter Settings
- 2303771 - DB6: DB2 11.1 Standard Parameter Settings

Wiki page

SAP on DB2 for Linux, UNIX, and Windows
https://wiki.scn.sap.com/wiki/display/db2

Performance
https://wiki.scn.sap.com/wiki/display/DB2/Performance

6.2.3 SAP Sybase ASE

Related SAP Notes:

- 2087323 - SYB: Important solved problems for SAP Applications running on SAP ASE
- 2162183 - Frequently asked questions on SAP ASE for Business Suite
- 2371160 - FAQ: BW archiving to SAP IQ performance considerations

Wiki Page:

SAP ASE HOME
https://wiki.scn.sap.com/wiki/display/SYBASE

ASE Performance and Tuning
https://wiki.scn.sap.com/wiki/display/SYBASE/ASE+Performance+and+Tuning
Microsoft SQL Server

6.2.4 SQL Server

Related SAP Notes:

- 521750 - FAQ: SQL Server 2000 I/O performance
- 987961 - FAQ: SQL Server I/O performance
- 1152848 - FAQ: SQL Server Wait Events
- 555223 - FAQ: Microsoft SQL Server in NetWeaver based systems

Wiki Page

SAP on SQL Server
https://wiki.scn.sap.com/wiki/display/SAPSQL/SAP+on+SQL+Server

Performance
https://wiki.scn.sap.com/wiki/display/SAPSQL/Performance

6.2.5 SAP HANA

Related SAP Notes:

- 2000002 - FAQ: SAP HANA SQL Optimization
- 1999930 - FAQ: SAP HANA I/O Analysis
- 2000000 - FAQ: SAP HANA Performance Optimization
- 1732157 - Collecting diagnosis information for SAP HANA [VIDEO]
- 1999998 - FAQ: SAP HANA Lock Analysis
- 1813020 - How to generate a runtime dump on SAP HANA

Wiki Page
SAP HANA and In-Memory Computing
https://wiki.scn.sap.com/wiki/display/SAPHANA

SAP HANA Troubleshooting and Performance Analysis Guide
https://help.sap.com/viewer/bed8c14f9f024763b0777aa72b5436f6/2.0.00/en-US

6.2.6 Max DB

Related SAP Notes:

- 725489 - SAP MaxDB performance analysis tools
- 819641 - FAQ: SAP MaxDB performance
- 819324 - FAQ: SAP MaxDB SQL optimization
- 2056680 - SAP MaxDB runtime analysis: Restore data backup
- 1357553 - MaxDB / liveCache Performance on HP-UX

Wiki Page:

SAP MaxDB
https://wiki.scn.sap.com/wiki/display/MaxDB

Tuning SAP MaxDB
https://wiki.scn.sap.com/wiki/display/MaxDB/Tuning+SAP+MaxDB

7 OTHER USEFUL PERFORMANCE ANALYSIS TOOLS

There are a number of SAP and external Tools which can be used to enhance performance analysis. Each of these tools are discussed in detail as below:

7.1 Singal Transaction Analysis ST12 Trace

➢ An ST12 Trace should be collected when analysing performance issues for a specific transaction/ report or User.
➢ It is necessary to have a valid reproducible example, which can be executed and traced.
➢ ST12 combines ABAP and performance (SQL) trace into one transaction, with major functional enhancements especially for the ABAP trace part. In a joint switch on/off with the performance trace, ST12 allows to activate the ABAP trace for another user. See SAP Note 2436955. ST12 can also be used for tracing workprocess, program/transaction or a user. At a click of a button you can view the SQL and ABAP trace information.
➢ ST12 should be used in conjunction with STAD Records to gain a true insight into performance issues and identify a root cause to increased runtimes and poor performance.
➢ SAP Notes:

  ➢ 2436955 - Step by step instructions on how to use ST12 trace for analysis
  ➢ 755977 - ST12 "ABAP Trace for SAP EarlyWatch/GoingLive"
  ➢ 2424394 - Using HTTP trace and ABAP trace to diagnose slow response on customer portal

7.2 System Status Aanlysis

7.2.1 Snapshot monitoring (/SDF/MON)

The tool allows for the collection of data on CPU Utilization ,Memory Management, Database Performance, WorkProcess Utilization, Workload, STAD, RFC etc. The information linked with each of the above areas is stored in the database for further usage.
 The data can be collected for predefined periods of time and for a set frequency of seconds STAD: Used to check response time of programs/transactions and provides various levels of detail which can be tailored.

Related SAP Note:

➢ 2383809 - How to use the SDF/MON tool to analyse performance issues

7.2.2 Sapcontrol

With sapcontrol (process name on Windows sapcontrol.exe) you can call the functions of the Web service interface from the command field. sapcontrol -h shows the syntax and the available options.
You can find information for developers about using SAPControl Web services in SDN at: http://www.sdn.sap.com/irj/scn/index?rid=/library/uuid/60e24f7b-1ba1-2b10-c0a0-e514b855624b&overridelayout=true

7.2.3 DPMON Dispatcher Monitor

Related SAP Note:

➢ 42074 - Using the R/3 dispatcher monitor 'dpmon'

Wiki Page:
DPMON Dispatcher Monitor
https://wiki.scn.sap.com/wiki/x/uIsdGQ

7.2.4 Kernel Snapshot

The snapshops in the ABAP server aim to display important information about the current situation of the server.

Wiki Page:

Snapshots in the SAP System
https://wiki.scn.sap.com/wiki/x/Q4hIGQ

7.2.5 Report RSBDCOS0

Report RSBDCOS0 enable you to execute the OS commands from SAP GUI level.

Related SAP Note:

> ➢ 2443193 - Report RSBDCOS0 - Execute OS command from SAP GUI

7.2.6 SAPSTACK

Sapstack is a standalone program for determining the C call stack for all threads of a proces.

> ➢ 112 - Trace and error information in the "dev_" files
> ➢ 1964673 - C-Call stack analysis

7.3 Other Analysis Tools

> ➢ End-to-End Trace (E2E)
>   Please see the help portal for End-to-End Trace:
>
>   https://help.sap.com/viewer/59cde384ffee4b01a8936f77c8806456/2.1.12/en-US/407d1be2b33145deb78b1c01ca18167f.html

> ➢ RSMEMORY report
>   Rlelated SAP Note:
>
>   > ➢ 177226 - Documentation rsmemory

8 SERVICE PROCESS

Following scenarios can consider using SAP services:

➢ Performance analysis shows general performance issues across the system where there is no specific pattern or single root cause to the performance issues identified.

➢ The system has recently undergone many changes and no SAP Service has been delivered to verify system performance and configuration following these changes.

➢ The overall system configuration and parameter settings are requested to be checked
It can be avery time-consuming task to verify system configuration and check all parameters via customer incident.

Please be awear that it is important to check whether services have recently been delivered or scheduled, before additional services are implemented for your systems.

The following SAP services are closely related to the performance analysis.

SAP EarlyWatch Check
SAP EarlyWatch Alert
SAP GoingLive Check
SAP OS/DB Migration Check
SAP Remote Performance Optimization

Related SAP Notes

➢ 91488 - SAP Support Services - Central preparatory note

The following help portal has more detail information about the SAP service.

https://support.sap.com/support-programs-services/services.html