

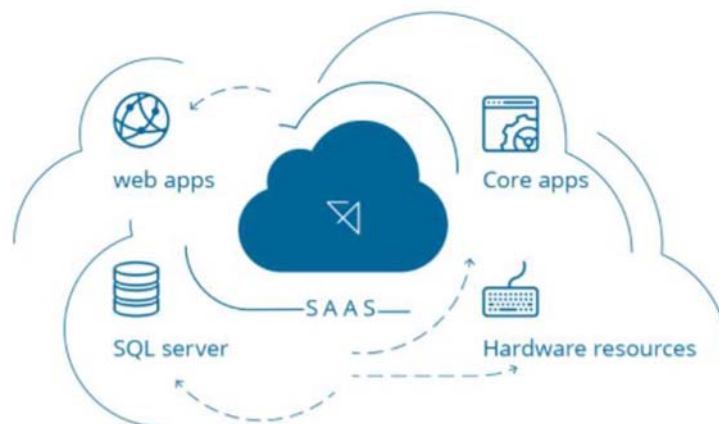
AimBetter

Smooth Database Operation

This report summarizes the conclusions of the database, applications and infrastructure (hardware and operating systems) survey performed over a one-week period at XXXXXXXXXXXX Co., Ltd.

The survey was conducted using the AimBetter system which performs in-depth, real-time monitoring and analysis of the above-mentioned components.

AimBetter is a unique cloud-based solution that enables organizations to identify and address any performance and/or code related issues even before they become critical and impair usability or cause system failures.



The solution combines propriety intelligence modules that are based on years of expert experience and is being used by over 700 businesses and organizations around the world.

Executive Summary

The following is a brief summary of the critical issues that have been detected and require immediate actions:

1. SQL Server Setting
 - a. Overly inflated Log Files with high growth rate
 - b. No correlation between the number of TempDB files and the number of cores (processors)
 - c. Insufficient SQL server memory
 - d. Unoptimized utilization of available disk space
 - e. Data Files (MDFs) and Log Files (LDFs) are on the same disk
 - f. Outdated and unsupported SQL version
2. Too many low performance executions which indicate indexing issues
3. High disk usage with potential damage to the server performance
4. Lack of proper backups which could result in inability to recover from system failures
5. Abnormally high number of blocking queries (there are approximately 70 locks on average per day which block up to 14 users at a time)
6. Low execution performance of many queries (we have counted 100 different queries that waste almost one hour per day)

In order to resolve the issues that were detected, we will need to start addressing the most critical issues first and deal with the rest as part of a yearly maintenance contract (to be discussed in the second stage). We will need to work on your server and database using a reliable VPN connection with administrative rights for a duration of 20 hours (distributed over one week). This will allow us to get familiar with your system and provide the basis for the yearly maintenance contract Service Level Agreement (SLA).

A fully detailed quotation will be provided upon request.

Performance

Findings – High Pagefile Usage (32GB of paging file!)

Implications – There is not enough memory space in order for the operating system to perform its current daily operations

Required Actions –

1. Identifying the main processes that Pagefile requires
2. Setting limitations on SQL memory usage for the benefit of the operating system
3. Increasing the memory at the machine level

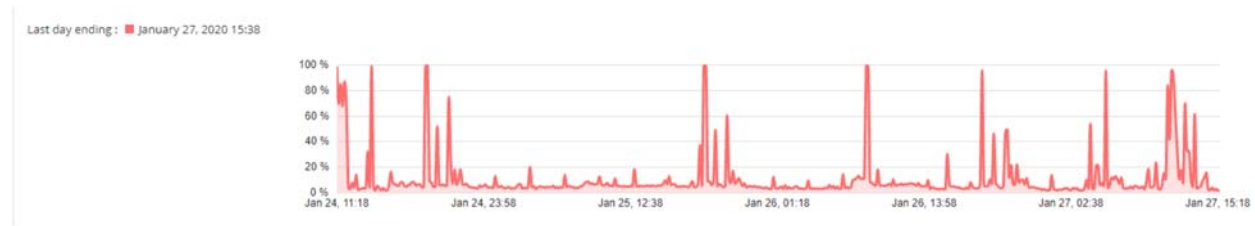
* For more information, please go to: <https://www.aimbetter.com/host-pagefile-use/>

Findings – High Disk Usage

Implications – Direct damage to server performance

Required Actions –

1. Identifying the cause(s) of the high usage
2. Providing a root treatment



MSSQL

Findings – Current SQL version is not up to date and not supported by Microsoft

Implications – No available updates in various areas (i.e. information security, debugging etc.)

Required Actions – MSSQL version update

Findings – Lack of server backups

Implications – Inability to recover in cases of system failure (high data loss risk!)

Required Actions – Create a complete backup plan (full backup inc. log) on the server and route the backups to a network path in order to maintain high survivability

Server	27-01-2020 14:42	14:52	15:02	15:12	15:22	15:32
sapserver	Page file usage Log backup (.trn) Full Backup (.bak)					
Start Time	End Time	Component	Description	Value		
27-01-2020 15:17:00	27-01-2020 15:42:00	sapserver - DB (TSR_DW2)	SQL BACKUP : Last Log backup Before More info	Not Found		
27-01-2020 15:17:00	27-01-2020 15:42:00	sapserver - DB (TSR_DW)	SQL BACKUP : Last Log backup Before More info	Not Found		
27-01-2020 15:17:00	27-01-2020 15:42:00	sapserver - DB (TSR_PROJECTS_UAT)	SQL BACKUP : Last FULL backup Before More info	Not Found		
27-01-2020 15:17:00	27-01-2020 15:42:00	sapserver - DB (TSR_DW)	SQL BACKUP : Last FULL backup Before More info	Not Found		
27-01-2020 15:17:00	27-01-2020 15:42:00	sapserver - DB (TSR_DW2)	SQL BACKUP : Last FULL backup Before More info	Not Found		

Findings – There is no correlation between the number of TempDB files and the number of cores (processors)

Implications – Impairment of SQL optimal work capability

Required Actions – Match the number of TempDB files to the number of cores

*One TempDB in comparison to 8 cores

Findings – There is a difference in the size of the Log/Data Files used and its actual size

Implications – Unnecessary utilization of drive space

Required Actions –

1. Decrease the size of the Log File
2. Check the growth rate setting of the Log/Data Files

Status...	Instance	Database	Recovery	Full Backup	Log Backup	Memory	Size	Data Growth	Log Growth	Unused data Space
	sapserver	B1f	simple			3,296 MB	<ul style="list-style-type: none"> Data 3631 Log 61 	3,631 MB	61 MB	3,278 MB
	sapserver	tempdb	simple			808 MB	<ul style="list-style-type: none"> Data 1404 Log 28 	1,404 MB	28 MB	1,291 MB

Findings – SQL Server memory is not limited

Implications – Unoptimized memory partition between SQL and the operating system can compromise server performance

Required Actions – Setting optimal memory allocation between SQL and the operating system

Findings – Log Files Growth

Implications –

1. Lack of Log Files maintenance can cause these files to grow significantly and clog up drive space and/or cause system failures

2. A decrease in work performance of the database

Required Actions –

1. Manually clean and shrink the inflated Log Files
2. Create an automatic program to clean up bloated Log Files on the server

Stat...	Instance	Database	Compatibility	Recovery...	Full Backup	Log Backup...	Memory	Size	Data Growth	Log Growth
	sapserver	TSR_PROJECTS	100 (SQL Server 2008)	full	26-01-2020 ...	26-01-2020 ...	51 MB	Data: 285 Log: 1585	285 MB	1,585 MB
	sapserver	TSR_PROJECTS2...	100 (SQL Server 2008)	full	26-01-2020 ...		3 MB	Data: 302 Log: 1585	302 MB	1,585 MB
	sapserver	TSR_PROJECTS_...	100 (SQL Server 2008)	full	26-01-2020 ...		102 MB	Data: 387 Log: 1585	387 MB	1,585 MB

Findings – Backups are made to a local route

Implications – Low survivability and possible data loss (in hacking/encrypting modes)

Required Actions – Reroute the backups to network path

Instance	Backup Type	Database	Backup Devices	Backup Path	Backup Size	Backup Time	Backup Start Time	Backup End Time
sapserver	Full	TIME	local	F:\Backup Database TIME...	50.483MB	25sec	26-01-2020 20:00:08	26-01-2020 20:00:10
sapserver	Full	TSR_PROJECTS	local	F:\Backup Database TSR P...	299.209MB	65sec	26-01-2020 20:00:02	26-01-2020 20:00:08
sapserver	Full	SBOdemoGB	local	F:\Backup Database(SBO...	151.253MB	25sec	26-01-2020 19:01:08	26-01-2020 19:01:10

Findings – Data Files (MDFs) and Log Files (LDFs) are located on the same drive

Implications – Unoptimized SQL work performance (SQL reads LDFs in sequential order, while MDFs are read randomly. Since currently there are no disks that know how to work effectively in both configurations at the same time, it is recommended to separate the drives of these two types of files.)

Required Actions – Separating Data, Log and TempDB files to different drives

Statu...	Instance	Database	Compatibility	Recovery	Full Backup	Log Backup...	Memory	Size	Data Growth	Log Growth	Data Drive	Log Drive
	sapserver	B1:if	100 (SQL Server 2008)	simple			3,296 MB	Data: 3631 Log: 61	3,631 MB	61 MB	E	E
	sapserver	master	100 (SQL Server 2008)	simple			1 MB	Data: 4 Log: 1	4 MB	1 MB	E	E

Queries

Findings – High number of blocking queries

Implications – Impaired user experience (users are repeatedly blocked and unable to perform their tasks until the block has been terminated)

Required Actions –

1. Analysis of the blocking queries
2. Identifying the blocking factors and providing a thorough solution

Session	Runtime	Duration	Max. Duration with blocks	Blocks	Note	Client	Instance	DB	App	Command	Status	Open tran	Wait Resource	Last Wait
sa - (84)	29-01-2020 12:13:16	00:00:00	00:05:18	18		DCOFFICER01	sapserver	TSR_DB	Data Transfer Work...	AWAITING C...	sleeping	1		Miscellan...
sa - (87)	29-01-2020 12:12:15	00:01:01				TSRWHPCG...	sapserver	TSR_DB	SAP Business One	SELECT	suspended	0	KEY: B:7205...	
sa - (139)	29-01-2020 12:09:07	00:04:09				TSRPURPCG...	sapserver	TSR_DB	SAP Business One	SELECT	suspended	1	KEY: B:7205...	
sa - (157)	29-01-2020 12:08:59	00:04:17				TSRACPC0010	sapserver	TSR_DB	SAP Business One	SELECT	suspended	0	KEY: B:7205...	
sa - (199)	29-01-2020 12:08:47	00:04:29				TSRACPC0017	sapserver	TSR_DB	SAP Business One	SELECT	suspended	1	KEY: B:7205...	

SQL Last Execute

```
(@P1: WWAHCH(16))
SELECT TO -
FROM [dbo].[ONCT] TO WITH (UNLOCK)
WHERE TO.[AcctCode] = (@P1)
ORDER BY TO.[AcctCode]
```

Runtime	29-01-2020 12:13:16	Duration	00:00:00
Threads	1	Blocked By	0
Last Wait	MISCELLANEOUS	Client	DCOFFICER01
Instance	sapserver	DB	TSR_DB
App	Data Transfer Workbench for SAP Business One		
Session	sa - (84)		

Findings – Database is not indexed

Implications – Performance degradation (Indexes help MSSQL retrieve data from its tables. Using indexes saves valuable time and makes search processes much more efficient. If no index is defined for a table, queries will cause a change to all the records in it (Table Scan) until the records that meet the search conditions are found. If an appropriate index is defined for a table, searches will run faster because the reference to the database will cause the database search engine to be indexed first, then go to the appropriate records)

Required Actions – Create a program that will improve performance using indexes based on system recommendations (The system displays queries that have an index recommendation which can improve performance by more than 70%)

Session	Runtime	Duration	Max. Duration with blocks	Blocks	Note	Client	Instance	DB	App	Command	Status	Open tran	Wait Resource	Last Wait
sa - (98)	24-01-2020 11:45:23	00:00:07	00:00:07	0		TSRACPC0009	sapsver	TSR_DB	SAP Business One	SELECT	suspended	0		Paralleliz...
sa - (98)	24-01-2020 11:45:40	00:00:05	00:00:05	0		TSRACPC0009	sapsver	TSR_DB	SAP Business One	SELECT	suspended	0		Paralleliz...
sa - (90)	27-01-2020 13:19:07	00:00:03	00:00:03	0		TSRACPC0008	sapsver	TSR_DB	SAP Business One	SELECT	running	0		CPU
sa - (98)	24-01-2020 11:38:12	00:00:03	00:00:03	0		TSRACPC0009	sapsver	TSR_DB	SAP Business One	SELECT	suspended	0		Paralleliz...
sa - (118)	24-01-2020 11:30:27	00:00:03	00:00:03	0		TSRACPC0017	sapsver	TSR_DB	SAP Business One	SELECT	suspended	0		Paralleliz...

SQL Last Execute

```

(
    @#1 DATETIME2
    ,@#2 DATETIME2
    ,@#3 DATETIME2
    ,@#4 NVARCHAR(21)
)
SELECT COUNT('A')
FROM [dbo].[J0T1] TO
WHERE TO.[RefDate] >= (@#1)
AND TO.[RefDate] <= (@#2)
AND (
    TO.[RefDate] <= (@#3)
    OR TO.[TransType] <= (@#4)
)
    
```

Runtime: 24-01-2020 11:45:23
 Duration: 00:00:07
 Threads: 11
 Blocked By: 0
 Last Wait: CXPACKET
 Client: TSRACPC0009
 Instance: sapsver
 DB: TSR_DB
 App: SAP Business One
 Session: sa - (98)
 Note: Index recommendation
 Hash Match

Findings – A large number of queries that run with less than optimal plan

Implications – Performance Degradation

Required Actions –

1. Check index maintenance and statistics on the server
2. Examine change plans for these queries

Session	Runtime	Duration	Max. Duration with blocks	Blocks	Note	Client	Instance	DB	App	Command	Status	Open tran	Wait Resource	Last Wait
sa - (103)	25-01-2020 19:10:26	00:01:39	00:01:39	0		SAPSERVER	sapsver	master	Microsoft SQL Serve...	RESTORE H...	suspended	0		DB Maint...
sa - (104)	25-01-2020 19:02:29	00:01:26	00:01:26	0		SAPSERVER	sapsver	master	Microsoft SQL Serve...	RESTORE H...	suspended	0		DB Maint...
sa - (82)	24-01-2020 19:08:29	00:01:01	00:01:01	0		SAPSERVER	sapsver	master	Microsoft SQL Serve...	RESTORE H...	suspended	0		DB Maint...
sa - (72)	24-01-2020 14:17:53	00:00:22	00:00:22	0		TSRACPC0014	sapsver	TSR_DB	SAP Business One	SELECT	suspended	0	8:1515295	I/O Comp
sa - (72)	24-01-2020 14:18:18	00:00:17	00:00:17	0		TSRACPC0014	sapsver	TSR_DB	SAP Business One	SELECT	running	0		CPU

SQL Last Execute

```

DECLARE @backupSetId AS INT
SELECT @backupSetId = position
FROM msdb..backupset
WHERE database_name = N'TSR_SALE'
AND backup_set_id = (
    SELECT max(backup_set_id)
    FROM msdb..backupset
    WHERE database_name = N'TSR_SALE'
)

IF @backupSetId IS NULL
BEGIN
    RAISERROR (
        N'Verify failed. Backup information for database ''TSR_SALE'' not found.'
        ,16
        ,1
    )
END

RESTORE VERIFYONLY
FROM DISK = N'F:\Backup Database TSR_SALE\TSR_SALE\TSR_SALE_backup_2020_01_26_000010_1563238.bak'
WITH FILE = @backupSetId
,NOREWIND
,NOREKIND
    
```

Runtime: 25-01-2020 19:10:26
 Duration: 00:01:39
 Threads: 2
 Blocked By: 0
 Last Wait: BACKUPTHREAD
 Client: SAPSERVER
 Instance: sapsver
 DB: master
 App: Microsoft SQL Server Management Studio
 Session: sa - (103)
 Client Process: /Server "SAPSERVER": /SQL "Maintenance Plans/Database Backup TSR_SALE"/set "Package/Outputplan_1.Disable=false"
 Note: Clustered index Scan

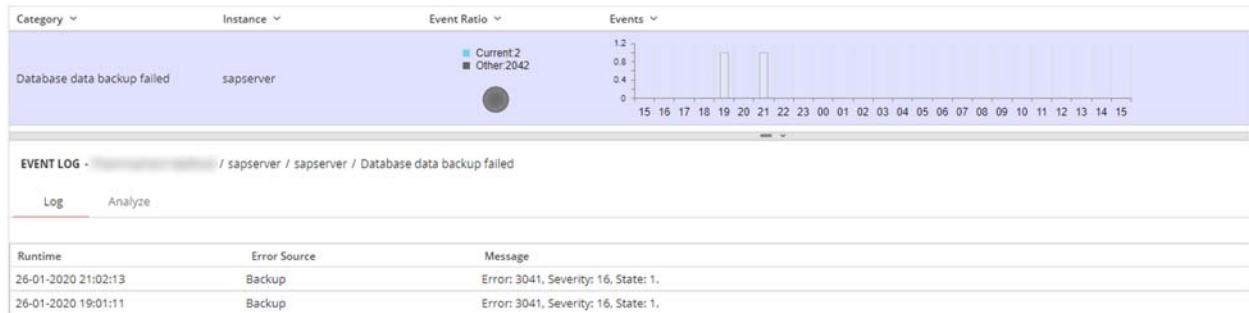
Event Log

Findings – Database backup failures

Implication – Data loss in case of system failure

Required Actions –

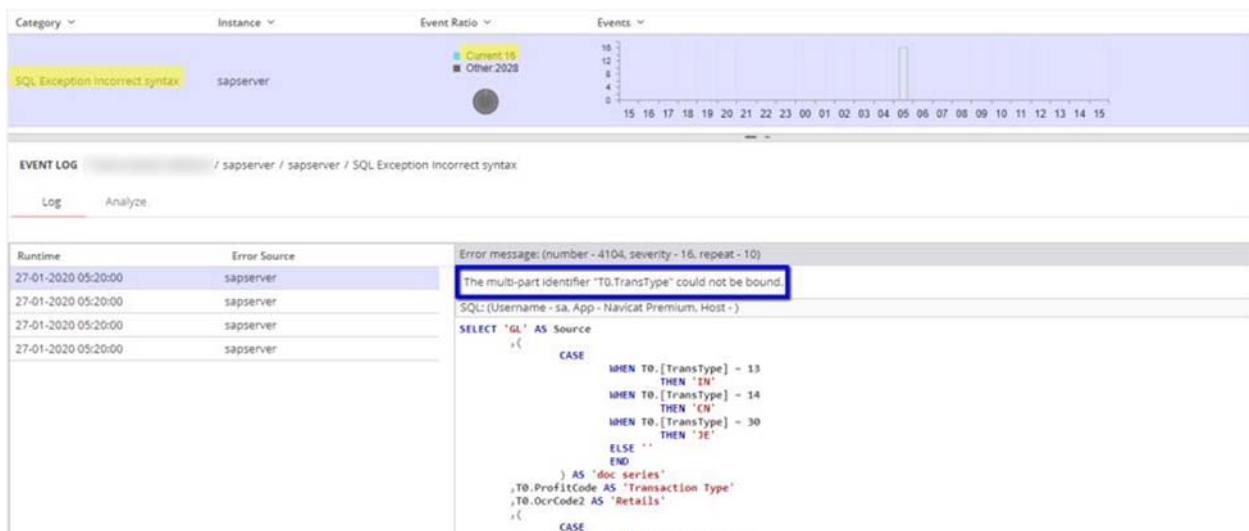
1. Identifying the cause(s) of backup failures
2. Creating and implementing a full pledge backup plan



Findings – Incorrect syntax (SQL Exceptions due to code errors)

Implications – Queries run failures

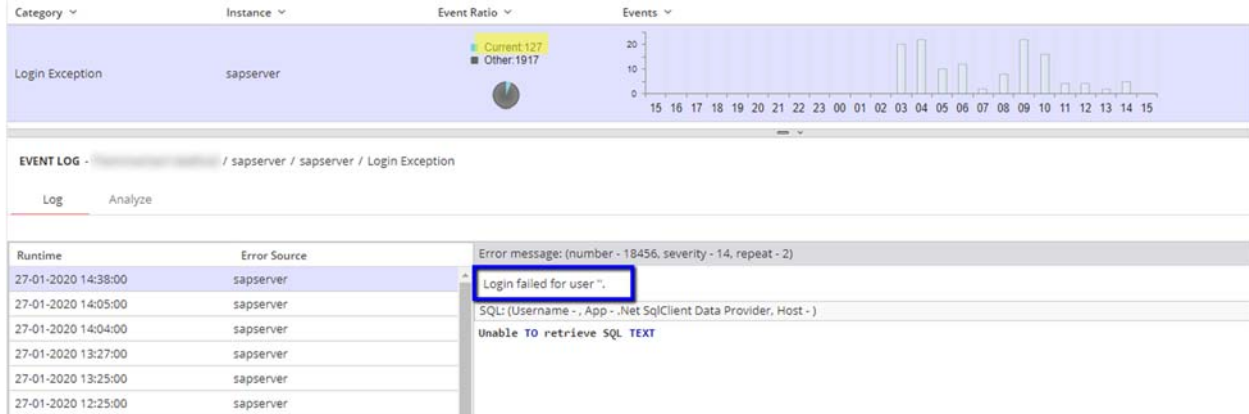
Required Actions – Identifying and correcting incorrect syntax



Findings – Login exceptions

Implications – Failures to connect to database (disabled users)

Required Actions – Identifying the root cause of such failures



Findings – Duplicate key exceptions (failure to insert a value into a table due to primary key violations)

Implications – Loss of data (information is not stored in the database)

Required Actions – Identifying the cause(s) of such exceptions

