SQL Server

Evaluation Report

Created By: SQL Server Team
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Database Evaluation Overview

Program Goals

- Assess risks and evaluate health of the SQL Server environment.
- Identify key areas where the environment deviates from Microsoft best practices and configuration guidance.
- Establish assessment results that can generate a remediation plan used to complete improvements to the health of the environment and to resolve or mitigate risks.

Program Phases

- Environmental Assessment: The SQL Server Team collects data from the environment focusing on key known areas.
- Analysis and Reporting: The SQL Server Team analyzes the results to compare against best practices, identify risks and health related problems, and prepares a findings report.
- Remediation Planning: Once problems and risks have been discovered, a full remediation action plan should be established to assist in the effort to remediate and stabilize the environment.

Server Details

Host Name :	DESKTOP-FVFO8GL
SQL Instance Name :	SQL2016N
SQL Version :	Microsoft SQL Server 2016 (RTM) Express Edition (64-bit)
SQL Product Level :	RTM

Scorecard

The scorecards for the Evaluation Report are provided below. These show the state of the system with respect to health(current issues) and risk(potential for future issues).

Issue Severity Levels
Critical
High
Medium
Low
No Issues

The following legend will be used throughout the rest of this document:


Indicates that there are no issues in this item


Indicates that there are issues in this item

Consolidated Scorecard

This scorecard gives an executive level summary of the issues discovered.

SQL Server Instance	
Installation	
SQL Server Software Installation Drive	✓
SQL Server Version and Service Pack	✓
Configuration	
Max Degree Of Parallelism	✓
Memory	✓
Enable Traceflag 2371, 1117 and 1118	✓
Default Index Fill Factor	✓
Security	
Server Authentication	✓
SQL Server Network Port	✓

SQL Server Database	
Implemetation	
SQL *.MDF, *.NDF and *.LDF Log File Placement	✗
Configuration Options	
Recovery Model	✗
Compatibility Level	✗
Is RCSI Enabled (Read Committed Snapshot Isolation)	✗
Do All Tables have Clustered Indexes	✗
Database Auto Growth	✗
Auto Create Statistics	✗
Auto Shrink	✗
Auto Update Statistics	✗
Maintenance	
Daily Index Rebuild	✗
Daily Database Full Backup	✗
Security	
Blank SQL 'SA' Password	✗
Blank Server Administrator	✗
Domain Accounts used for SQL Services	✗

SQL Server

Issue: SQL Server Instance Installation Directory			
Issue Type	Installation	**Issue Severity**	High
Problem			
By default, SQL Server's instance binary files are installed on the system drive. This is a recipe for disaster because if the system drives out of space or currupt then the SQL Server instance will stop.			
Recommendation			
The recommendation is to installing the latest updates on the SQL server.			
Why			
After this change, you'll have less reliability risk, and your SQL Server instance is safe in case of disaster.			
Reference 1			
https://support.microsoft.com/en-nz/kb/2527041			
Reference 2			

Issue: SQL Server Network Port			
Issue Type	Security	**Issue Severity**	High
Problem			
This is the most common port allowed through the firewall. It applies to routine connections to the default installation of the Database Engine, or a named instance that is the only instance running on the computer.			
Recommendation			
The recommendation is to change the default SQL port.			
Why			
Firewall systems help prevent unauthorized access to computer resources. If a firewall is turned on but not correctly configured, allow attempts to connect to SQL Server on default port.			
Reference 1			
https://msdn.microsoft.com/en-nz/library/ms177440.aspx			
Reference 2			

Issue: Default index fill factor			
Issue Type	Configuration	**Issue Severity**	Low
Problem			
The fill-factor option is provided for fine-tuning index data storage and performance. When an index is created or rebuilt, the fill-factor value determines the percentage of space on each leaf-level page to be filled with data, reserving the remainder on each page as free space for future growth.Fillfactor can be a useful tool to help performance, but it's often a performance killer if you use it incorrectly.			
Recommendation			
The recommendation is to set the fill-factor value in percentage from 1 to 100, and the server-wide default is 0 which means that the leaf-level pages are filled to capacity.			

Why
The fill factor option determines the percentage of space on each leaf-level page to be filled with data, reserving the remainder on each page as free space for future growth. The idea is that an appropriate fill factor should reduce page splits whilst maintaining performance and using space efficiently.
Reference 1
https://msdn.microsoft.com/en-us/library/ms177459.aspx
Reference 2

Issue: Trace flag 1117			
Issue Type	Configuration	**Issue Severity**	Low
Problem			
The trace flag 1118 is commonly used to assist in TEMPDB scalability by avoiding SGAM and other allocation contention points.			
Recommendation			
The recommendation is to enable trace flags.			
Why			
Enabling TraceFlags can help SQL server to handle a certain data load more accurate. Trace flag 1117 is enabled, then when SQL Server has to perform auto-grow of a data file, it auto-grows all of the files at the same time.			
Reference 1			
https://technet.microsoft.com/en-us/library/ms188396(v=sql.105).aspx			
Reference 2			

Issue: Trace flag 1118			
Issue Type	Configuration	**Issue Severity**	Low
Problem			
Trace flag 1117 changes the behavior of file growth: if one data file in a filegroup grows, it forces other files in that filegroup to ALSO grow.			
Recommendation			
The recommendation is to enable trace flags.			
Why			
Enabling TraceFlags can help SQL server to handle a certain data load more accurate. Trace flag 1118 forces uniform extent allocations of the Tempdb datafiles instead of mixed page allocations.			
Reference 1			
https://technet.microsoft.com/en-us/library/ms188396(v=sql.105).aspx			
Reference 2			

Issue: Trace flag 2371			
Issue Type	Configuration	**Issue Severity**	Low
Problem			

2371 - Trace flag 2371 that you can use to control when the query optimizer generates autostats on a table. when a table becomes very large, the old threshold (a fixed rate – 20% of rows changed) may be too high and the Autostat process may not be triggered frequently enough. This could lead to potential performance problems.
Recommendation
The recommendation is to enable trace flags.
Why
Enabling TraceFlags can help SQL server to handle a certain data load more accurate. Trace flag 1118 forces uniform extent allocations of the Tempdb datafiles instead of mixed page allocations. When trace flag 1117 is enabled, then when SQL Server has to perform auto-grow of a data file, it auto-grows all of the files at the same time.
Reference 1
https://technet.microsoft.com/en-us/library/ms188396(v=sql.105).aspx
Reference 2

Issue: Max Degree Of Parallelism			
Issue Type	Configuration	**Issue Severity**	Medium
Problem			
The Max Degree of Parallelism is a server wide configuration that by			
Recommendation			
The recommendation is to set the max degree of parallelism.			
Why			
When SQL Server runs on a computer with more than one processor or CPU, it detects the best degree of parallelism, that is the number of processors employed to run a single statement, for each query that has a parallel execution plan. You can use the max degree of parallelism option to limit the number of processors to use for parallel plan execution and to prevent run-away queries from impacting SQL Server performance by using all available CPUs.			
Reference 1			
https://msdn.microsoft.com/en-us/library/ms189094.aspx			
Reference 2			

Issue: Server authentication			
Issue Type	Security	**Issue Severity**	Medium
Problem			
The sa account is a well-known SQL Server account and it is often targeted by malicious users. Do not enable the sa account unless your application requires it. It is very important that you use a strong password for the sa login.			
Recommendation			
The recommendation is to set it to Windows Authentication.			
Why			

When a user connects through a Windows user account, SQL Server validates the account name and password using the Windows principal token in the operating system. This means that the user identity is confirmed by Windows. SQL Server does not ask for the password, and does not perform the identity validation. Windows Authentication is the default authentication mode, and is much more secure than SQL Server Authentication. Windows Authentication uses Kerberos security protocol, provides password policy enforcement with regard to complexity validation for strong passwords, provides support for account lockout, and supports password expiration. A connection made using Windows Authentication is sometimes called a trusted connection, because SQL Server trusts the credentials provided by Windows. By using Windows Authentication, Windows groups can be created at the domain level, and a login can be created on SQL Server for the entire group. Managing access from at the domain level can simplify account administration.
Reference 1
https://msdn.microsoft.com/en-nz/library/ms188670.aspx
Reference 2
https://msdn.microsoft.com/en-us/library/ms144284.aspx

Issue: SQL Server Version and Service Pack			
Issue Type	Installation	**Issue Severity**	High
Problem			
The SQL server is running on service pack version which is unsupported			
Recommendation			
The recommendation is to install the latest updates on the SQL server.			
Why			
A service pack comprises a collection of updates, fixes or enhancements to a software program delivered in the form of a single installable package.			
Reference 1			
https://support.microsoft.com/en-nz/kb/2527041			
Reference 2			
https://support.microsoft.com/en-nz/kb/2755533			

Issue: Memory - Max Memory			
Issue Type	Configuration	**Issue Severity**	Medium
Problem			
By default, SQL Server's max memory is 2147483647 – a heck of a lot more than you actually have. SQL Server will just keep using more and more memory until there's none left on the system. If the operating system has no memory available, it will start using the page file instead of RAM. Using the page file in place of memory will result in poor system performance – operations that should be fast and in memory will read and write to disk constantly.			
Recommendation			
The recommendation is to set min server memory and max server memory to span a range of memory values.			
Why			

Use min server memory to guarantee a minimum amount of memory available to the SQL Server Memory Manager for an instance of SQL Server. SQL Server will not immediately allocate the amount of memory specified in min server memory on startup. However, after memory usage has reached this value due to client load, SQL Server cannot free memory unless the value of min server memory is reduced.
Reference 1
https://msdn.microsoft.com/en-us/library/ms178067.aspx
Reference 2

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