Database Health Check

(Top findings and Next step)

Microsoft SQL Server

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Introdution

This report will list the top findings based on the "Database Health Check Configuration and Settings" and "Database Health Check Performance and Trending" reports.
The findings listed, is a summary of the key findings, that Itadel regards, as the most important and gives the most value concerning system health, performance and reliability.

Therefore, all finding are not listed in this report, only the one that gives the highest value to implement.

Please run through the "Database Health Check Configuration and Settings" and "Database Health Check Performance and Trending" reports to get the full findings overview.

In other words, the report will give you, a solid next step action plan, on where to best put in resources and Concentrate effort, to the most out of the performance optimization of the system.

The review is based on data collected in the time period between 2019-25-03 and 2019-10-04.

Relevant OS and SQL Server performance counters.

This section refers to the following sections in the 'Database Health Check Performance and Trending' report.

- Performance counters

Some counters show values deviating best practice.

- **Page Life Expectancy** is average around 500-1500, in working hours(8.00-16.00) which is at little bit low, should at best be above 4050 (54 GB /4 * 300 = 4050) This indicates that the SQL server in general might be under slight memory pressure.
- Buffer Cache Hit Ratio has multiple threshold breaches, where the ratio is below a hit rate of 90-95%.
  This indicates that the SQL server in those periods suffered from memory pressure.
- **Avg. disk sec/read;D:** has multiple threshold breaches, where the response time is more than 10-15 ms. This indicates that the SQL server in those periods suffered from degraded disk response. I notice that the response time seem to have been better after the 8/4-2019. Could be an effect of the performance measures already implemented on the system.
- **Avg. disk sec/write;D:** has multiple threshold breaches, where the response time is more than 10-15 ms. This indicates that the SQL server in those periods suffered from degraded disk response. Again, I notice that the response time seem to have been better after the 8/4-2019. Could be an effect of the performance measures already implemented on the system.

- **Batch request/sec.** is average around 2000, in working hours. I notice that the batch request/sec has increased to around 3000, after the 8/4-2019. This tells me that the SQL server has processed more transaction after the 8/4 -2019. Again, could be an effect of the performance measures already implemented on the system.

Query Performance

This section refers to the following sections in the 'Database Health Check Performance and Trending' report.

- Query Performance
- Missing Indexes
- Indexes Not used
- Blocking Queries
- Blocked Queries
- Wait Types

Some issues have been registered.

- **Missing Indexes:** I only see a few high value missing indexes. Again, this could be an effect of the performance measures already implemented on the system.
- **Indexes NOT used:** I see multiple indexes that has not been used since the last SQL Server restart.
- **Query Performance:** The NOLOCK query hint is used extensively.
- **Blocked/Blocking Queries:** I See Multiple blocked queries.

Top wait types are related to parallel query execution and IO.

- **PAGEIOLATCH_SH:** Occurs when a task is waiting on a latch for a buffer that is in an I/O request. The latch request is in Shared mode. Long waits may indicate problems with the disk subsystem.
  I noticed that the PAGEIOLATCH_SH has decreased from an avg. value of 50-60 to an avg. value of 5-7, after the 8/4 -2019. Again, this could be an effect of the performance measures already implemented on the system.

- **CXPACKET:** Occurs when trying to synchronize the query processor exchange iterator. You may consider lowering the degree of parallelism if contention on this wait type becomes a problem.
  I noticed that the CXPACKET has decreased from an avg. value of 50-60 to an avg. value of 5-7, after the 8/4 -2019. Again, this could be an effect of the performance measures already implemented on the system.

It is recommended to consider looking into changing the 'cost threshold for parallelism' value, this might bring down the CXPACKET waits. CXPACKET waits are not a "bad" thing as just tells us that queries are being run in parallelism.

It is also recommended to look into the query design and look into if implementing any of the missing indexes, should be beneficial. Furthermore, it is recommended to look into using the SQL server feature called "READ COMMITTED SNAPSHOT" or ALLOW_SNAPSHOT_ISOLATION" instead of the NOLOCK query hint, this will give you the

no-lock feature without the dirty reads your suffering from, thus mitigating the user issue with missing or duplicated data.

As I already see improvements in wait times, seemingly due to the performance measures already implemented on the system, it tell me we I on the right path in mitigating the performance issues on the system.

Database settings and information

This section refers to the following sections in the 'Database Health Check Configuration and Settings' report

- File configuration
- Informational
- Query Plans
- Performance
- Reliability

There are several issues regarding the above. Only the key finding will be addressed here. A full explanations and comments can be found in 'Database Health Check Configuration and Settings' report.

Key Findings:

- File growth set to percent
- High VLF Count
- File growth set to 1MB
- TempDB Unevenly Sized Data Files Page Verification Not Optimal
- Active Tables Without Clustered Indexes
- cost threshold for parallelism
- Deadlocks Happening Daily
- Unsupported Build of SQL Server

Database resource usage and trend

This section refers to the following sections in the 'Database Health Check Configuration and Settings' report

- Database resource consumption overview
- Database CPU consumption
- Database Memory consumption
- Database information

The SQL Servers databases in the environment does not from capacity and trending prospective have any concerning issues.

- Database resource consumption overview: There are 3 databases that have more read activity than M3ABC123

Database IO response time and trend

This section refers to the following sections in the 'Database Health Check Configuration and Settings' report

- Database IO response overview

In general, the SQL Servers databases response time is ok, but some database has some issues.

Notes:

- The database files M3ABC123-datafile17 and M3ABC123-datafile4 has a high avg read latency compared, to the other datafiles in the M3ABC123 database. This could be a symptom of the load being unevenly distributed.

It is recommended to keep an eye on this trend.

SQL Agent Job information and trend

This section refers to the 'Database Health Check Performance and Trending' report.

- SQL Job Information.

The SQL agent performance related jobs are executing without incident.

Summary and next step

The key findings, which would give the most value, to proceed with.

1. Query performance

- Find 'bad' or poor performing queries and optimize them.
- Investigate if the missing indexes can mitigate the performance issues.
  If not, we need to get feedback from the application users, regarding which queries/loads that to the users are performing poorly.
- Investigate the blocked queries and see if they can be mitigated.
- Look into implementing "READ COMMITTED SNAPSHOT" or - ALLOW_SNAPSHOT_ISOLATION" instead of the NOLOCK query hint.
  This will mitigate the user issue with missing or duplicated data and deadlocks.

2. SQL server version

- Upgrade the SQL Server to the newest version, as the running version is out of support with Microsoft. Benefits of upgrading to a newer version of SQL Server are in general, more stability, performance, Microsoft support and enhanced features.

3. SQL Server configuration and setting

- Run through the 'Database Health Check Configuration and Settings' report and correct the setting according to the Best practice recommendation.

4. Memory

- The SQL server seems to be experiencing some memory pressure, so it recommended to upgrade memory and SQL version.

5. SQL server design

- Implement a new SQL solution where you can run the BI load against a readonly mirror/AG cluster.

Itadel can help with the full implementation, help partially or be a trusted adviser, with the above.