# How To Be The DBA When You Don't Have A DBA

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# About Me

Microsoft Certified Trainer (MCT)

MCSE: Data Management and Analytics

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1999-2013: “Webmaster“, Programmer, Developer

2014+: SQL Server Database Administrator

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# What Are We Going To Learn?

- SQL Server Settings
- Database Configurations
- Database Maintenance
- Server Maintenance & Monitoring

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# SQL Server Settings

# SQL Server Settings

## Configuration Options:

Consider enabling the following options:

- Backup Compression Default (MSDN)
- Backup Checksum Default (MSDN)
  - Checks data pages for corruption
  - Not a full corruption check
- Optimize For Ad Hoc Workloads (MSDN)
  - Helps to relieve memory pressure by not allowing the plan cache to become filled with compiled plans that are not reused

# SQL Server Settings

## Configuration Options:

Max Server Memory

- How much memory does SQL Server need?
  - Set by default to over 2 Petabytes
  - But Windows likes memory too
  - So does SSIS, SSRS, SSAS, Full Text Search, and some In-Memory OLTP operations
  - SQL Server Crashes When Hitting 80 Percent RAM Usage

# SQL Server Settings

## Configuration Options:

Max Server Memory

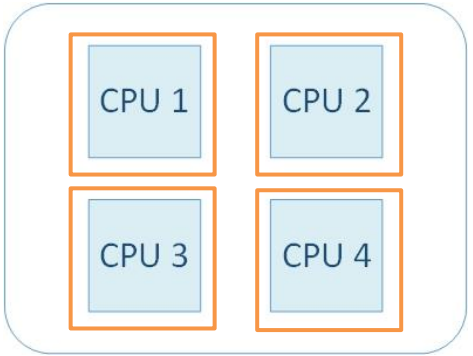
- What should you set it to?
  - Recommended to limit Max Server Memory so that memory is available for other operations
    - SQLskills: How much memory does my SQL Server actually need? (provides calculation)
    - Glenn Berry: Suggested Max Memory Settings for SQL Server 2005/2008 (provides good starting estimates)

# SQL Server Settings

## Configuration Options:

Maximum Degree of Parallelism (MAXDOP)

- What is Parallelism?
  - For expensive queries, multiple threads are used to gather the data quicker
  - By default SQL Server can create as many parallel threads as there are processors



# SQL Server Settings

## Configuration Options:

MAXDOP

- MAXDOP limits the number of processors that are used in parallel plans (MSDN)
- What should my MAXDOP be?
  - Default value for MAXDOP is 0 (Unlimited)
  - Less than 8 logical processors: Keep MAXDOP at or below # of logical processors (MSDN Guidelines for MAXDOP)
  - MSSQLTips: What MAXDOP setting should be used for SQL Server

# SQL Server Settings

## Configuration Options:

Cost Threshold for Parallelism (MSDN)

- Determines whether or not a query will go parallel
- The number of seconds that the query optimizer has determined a statement will take
- Default is 5 seconds (set by Nick's machine)
- Recommended to set higher so smaller queries won't consume multiple threads
- Grant Fritchey: Why You Should Change the Cost Threshold for Parallelism

# SQL Server Settings

## Configuration Options:

Cost Threshold for Parallelism

- What should my Cost Threshold for Parallelism be?
  - It depends, every environment will be different
  - Start at 25-50, and tune from there
  - Goal is to allow larger queries to work in parallel, and minimize the number of smaller queries that do
- SQLskills: Tuning 'cost threshold for parallelism' from the Plan Cache (Query to search the plan cache for existing parallel plans and see the cost associations)

# SQL Server Settings

## Configuration Options:

```
EXEC sp_configure 'Show Advanced Options', 1
RECONFIGURE

EXEC sp_configure 'backup checksum default';
EXEC sp_configure 'backup compression default';
EXEC sp_configure 'cost threshold for parallelism';
EXEC sp_configure 'max degree of parallelism';
EXEC sp_configure 'max server memory';
EXEC sp_configure 'optimize for ad hoc workloads';
```

# Database Configurations

# Database Configurations

## Compatibility Level

- Sets database features to be compatible with the specified version of SQL Server (MSDN)

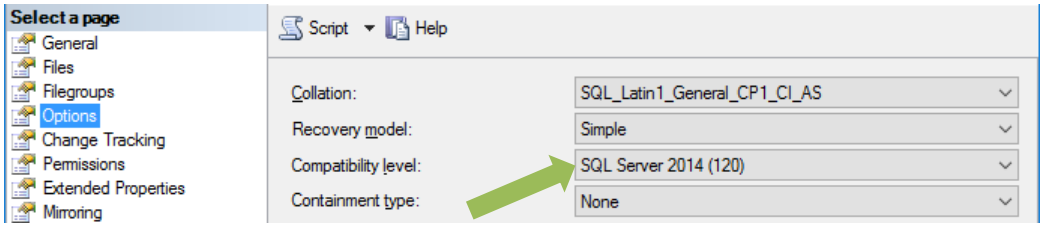
Cardinality Estimator Change

| Product | Compatibility Level |
|---|---|
| SQL Server 2019 | 150 |
| SQL Server 2017 | 140 |
| SQL Server 2016 | 130 |
| SQL Server 2014 | 120 |
| SQL Server 2012 | 110 |
| SQL Server 2008 | 100 |
| SQL Server 2005 | 90 |
| SQL Server 2000 | 80 |

# Database Configurations

## Compatibility Level

- How do I find my database's Compatibility Level?
  - Query the built in sys.databases view
  - SSMS > Right click database > Properties > Options



# Database Configurations

## Files & Sizes

- Do not use the default auto-growth settings
  - **Auto-growth** *should* be enabled
    - Default settings of 1MB and 10% are too low
  - Set auto-growth defaults to something more appropriate to your workload; consider pre-sizing files to prevent auto-growths
    - Paul Randal: Choosing Default Sizes for Your Data and Log Files
  - **Auto-shrink** *should not* be enabled for a database
    - Thomas LaRock: When To Use Auto Shrink (*Never, that's when*.)

# Database Configurations

## Data & Log Files

- DO NOT shrink a database's **data** file
  - Causes massive fragmentation
  - Should not be part of regular maintenance
  - SQLskills: Why you should not shrink your data files
  - Brent Ozar: Stop Shrinking Your Database Files. Seriously. Now.

# Database Configurations

## Data & Log Files

- Only shrink **log** files if:
  - Log has grown out of control
  - To remove excessive VLF fragmentation
    - MSSQL Tips: How to determine SQL Server database transaction log usage
    - SQLskills: Transaction Log VLFs – too many or too few?
- How can I find database file growth settings?
  - SQL Scripts: Find Data And Log File Information

# Database Maintenance

# Database Maintenance

Backups

- The frequency of your backup determines the potential data loss if you have to recover from backup
  - Set a Recovery Point Objective (RPO) and let it dictate your backup schedule
  - RPO = the amount of data you are willing to lose
- Don't forget to backup the System databases!
  - What if you have to reinstall everything? (Agent Jobs? Logins? Permissions?)

# Database Maintenance

## Backups

- Types of backups:
  - **Full** - contains all the data in a specific database
  - **Differential** - contains only the data that has changed since the last full backup
  - **Log** - based on the latest full backup, includes all transactions since previous log backup
  - **Full Copy_Only** - A special-use backup that is independent of the regular sequence of backups; used for Ad-hoc backups
  - MSDN Backup Overview

# Database Maintenance

## Recovery – Are Your Backups Valid?

- Restore your backups regularly!
  - *"If you don't test your backups, you don't have backups, you just have files"* – Thomas LaRock
- Be ready for a crisis
  - Know how long it takes to get your hands on the backup
  - Know how long it takes to restore the database and log files
  - Have your restore scripts tested and ready to go
    - Don't rely on a wizard in a crisis
    - Don't wait until disaster to start Googling

# Database Maintenance

## Database Integrity Checks

- DBCC CHECKDB (MSDN)
  - Run regularly for corruption check
  - Possibly run as part of your backup process
  - Resource intensive! May need to restore the backup on another server and then run DBCC CHECKDB
  - MSSQL Tips: SQL Server DBCC CHECKDB Overview
- How often should you run it?
  - How much data can you afford to lose?

# Database Maintenance

## Index Maintenance

- Indexes become fragmented
  - Fragmented Clustered Index = Fragmented Table
  - Fragmented Nonclustered Index = Slower Queries
- Regular index maintenance is required to keep query performance at optimum levels
- SQL Scripts: How To Find Index Fragmentation

# Database Maintenance

## Index Maintenance

- Duplicate indexes and unused indexes can hurt!
  - Wasted storage, wasted memory, and bloated backups
  - Can interfere with INSERT, UPDATE, & DELETE operations
- Regular index reviews are recommended to ensure only valuable indexes are supported and maintained
  - Brent Ozar's sp_BlitzIndex
  - SQL Scripts: How To Find Index Usage
  - GitHub: SQL Server Metrics Pack

# Database Maintenance

Backups, Corruption, Indexes….

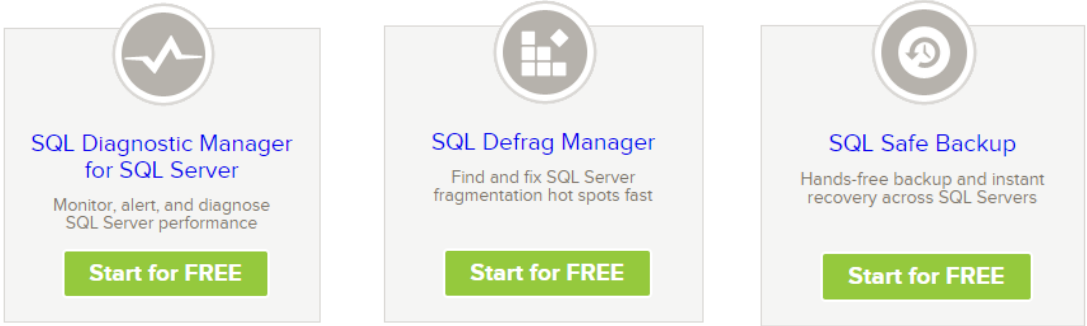
- That’s a lot of stuff to keep check on!
- It will take forever for me to integrate this maintenance into my SQL Servers!
- Is there something that can handle this stuff for me?

# Database Maintenance

## Maintenance Solutions

- Ola Hallengren's Maintenance Solution
  - Backups (with CHECKSUM, VERIFY, COMPRESSION)
  - Integrity Checks
  - Index and Statistics Maintenance
  - https://ola.hallengren.com
- Installation defaults to Master database
  - May want to create a "DBA" database instead

# Database Monitoring & Maintenance




# Thanks!

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