A Beginner's Guide to Becoming a Performance Tuner

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SentryOne™

Andy Yun

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- SQL Server DBA & DB Developer
- Chicago Suburban User Group Chapter Leader
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- Working with SQL Server since 2001
- Speaking since Early 2014
- Microsoft MVP (2017-2018)

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https://www.github.com/sqlbek/

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Wide World Out There

"Performance Tuning"

What do you think that phrase entails?

Knowledge of… what?

What do I need to learn?

Today's Agenda

Administrative Practices

T-SQL Practices

https://www.github.com/sqlbek

100-200 Level Session

Will be introducing many intermediate & advanced topics

Survey session – will not be in-depth

Administrative Practices

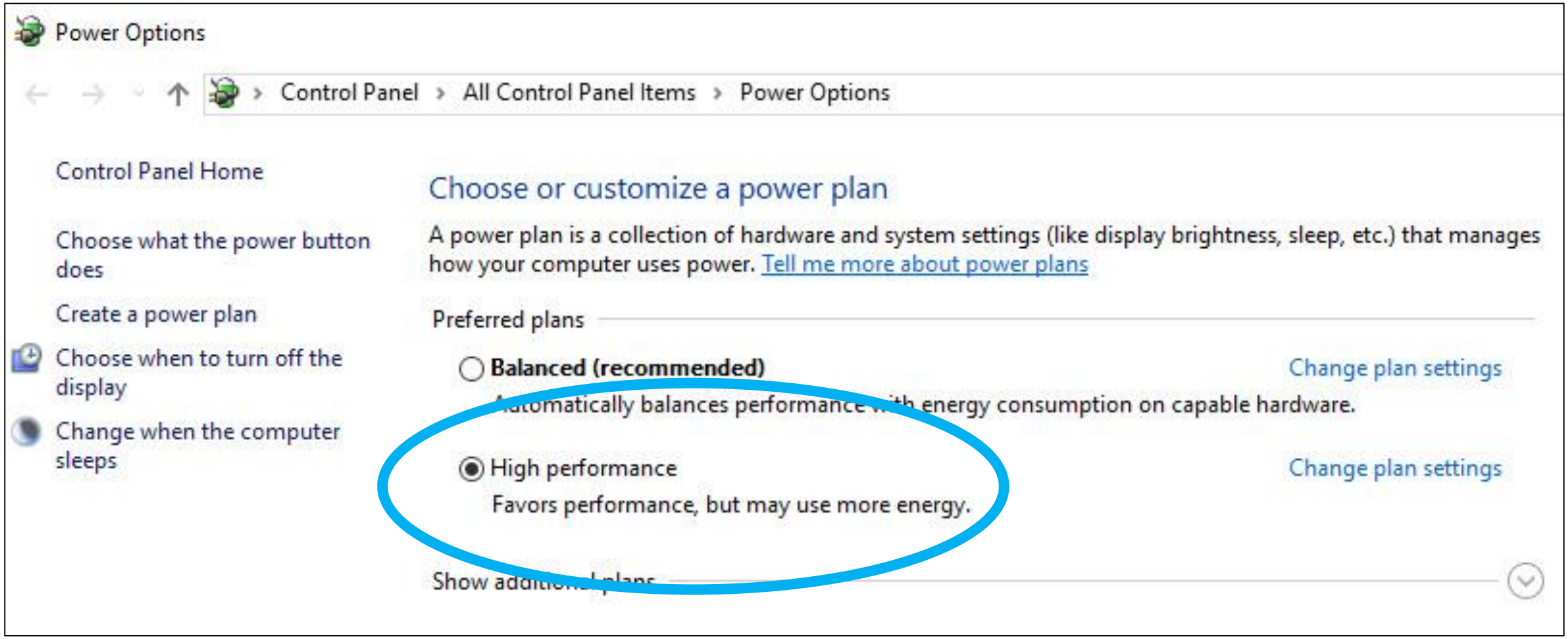
#1 – All The Power

Windows Server - Power Plan

Wrong Setting Throttles CPU

Microsoft Default Makes Me Sad…

#1 – High Performance – Always!



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#1 – Power to the Shell

Learn More:

dbatools.io: Test-DbaPowerPlan & Set-DbaPowerPlan

- https://docs.dbatools.io/#Test-DbaPowerPlan
- https://docs.dbatools.io/#Set-DbaPowerPlan

- https://www.sqlskills.com/blogs/glenn/windows-power-plan-effects-on-newer-intel-processors/

#2 – Change Those Defaults

1. TempDB – # of files
2. Max Memory – not “infinity”
3. Autogrowth

#2 – Autogrowth

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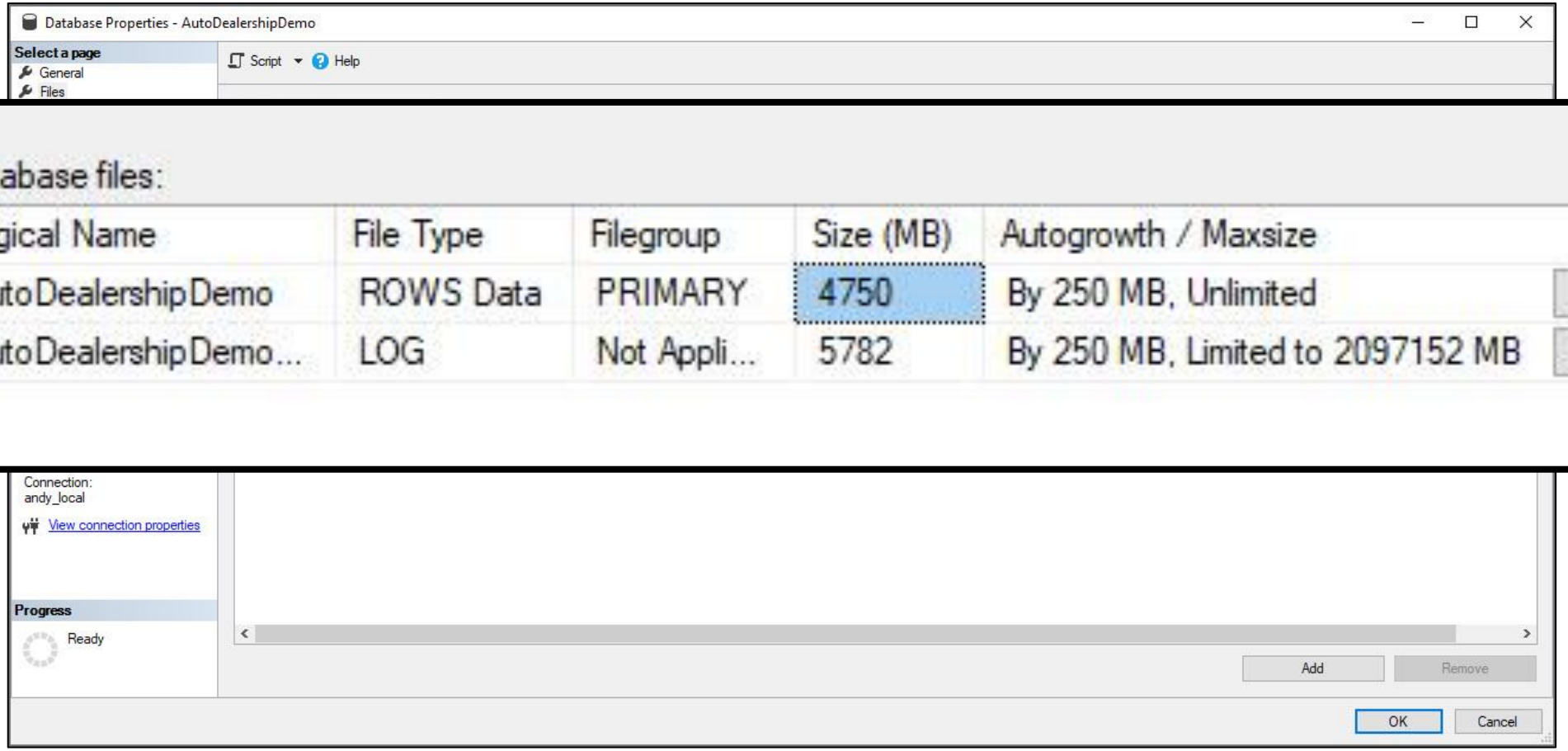
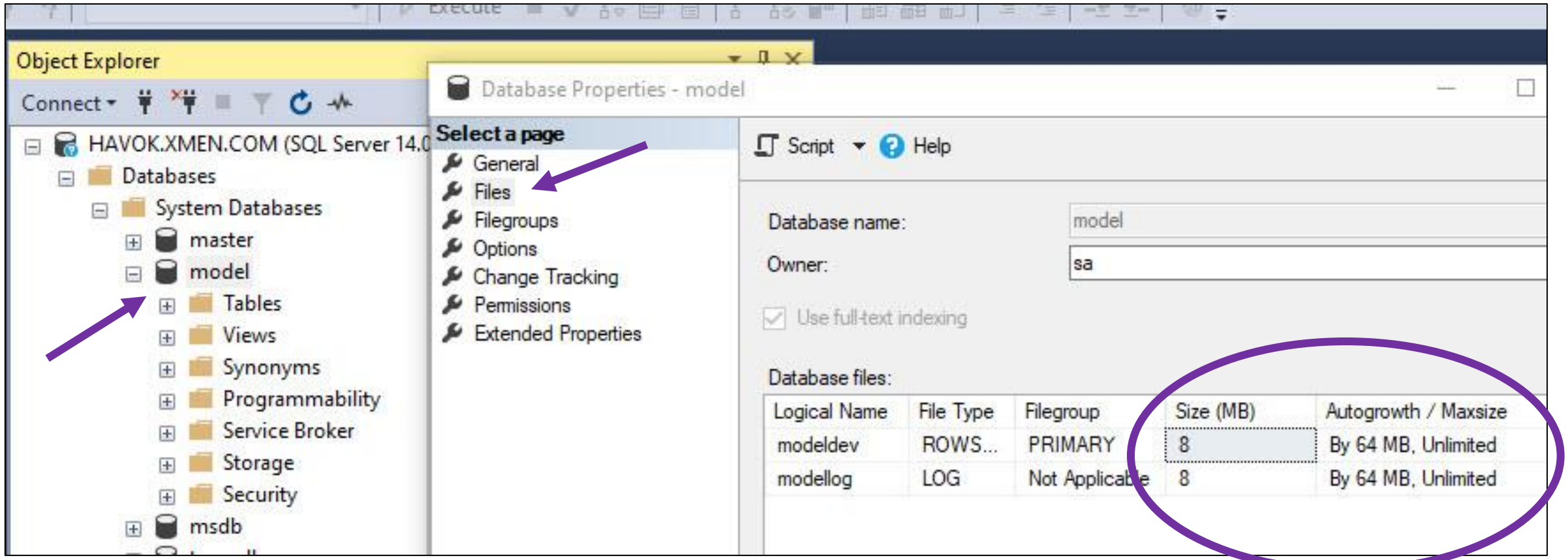
#2 – Change Me


Database Properties - AutoDealershipDemo
Select a page
General
Files
Script
Help
Database files:
Logical Name
File Type
Filegroup
Size (MB)
Autogrowth / Maxsize
AutoDealershipDemo
ROWS Data
PRIMARY
4750
By 250 MB, Unlimited
AutoDealershipDemo...
LOG
Not Appli...
5782
By 250 MB, Limited to 2097152 MB
Connection:
andy_local
View connection properties
Progress
Ready
Add
Remove
OK
Cancel

#2 – Model After Me



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#2 – AutoGrowth Recap

Learn More:

- https://www.sqlskills.com/blogs/paul/importance-of-data-file-size-management/
- https://www.sqlskills.com/blogs/paul/importance-of-proper-transaction-log-size-management/
- https://sqlperformance.com/2014/12/io-subsystem/proactive-sql-server-health-checks-1

BONUS: https://www.sqlskills.com/blogs/paul/why-you-should-not-shrink-your-data-files/

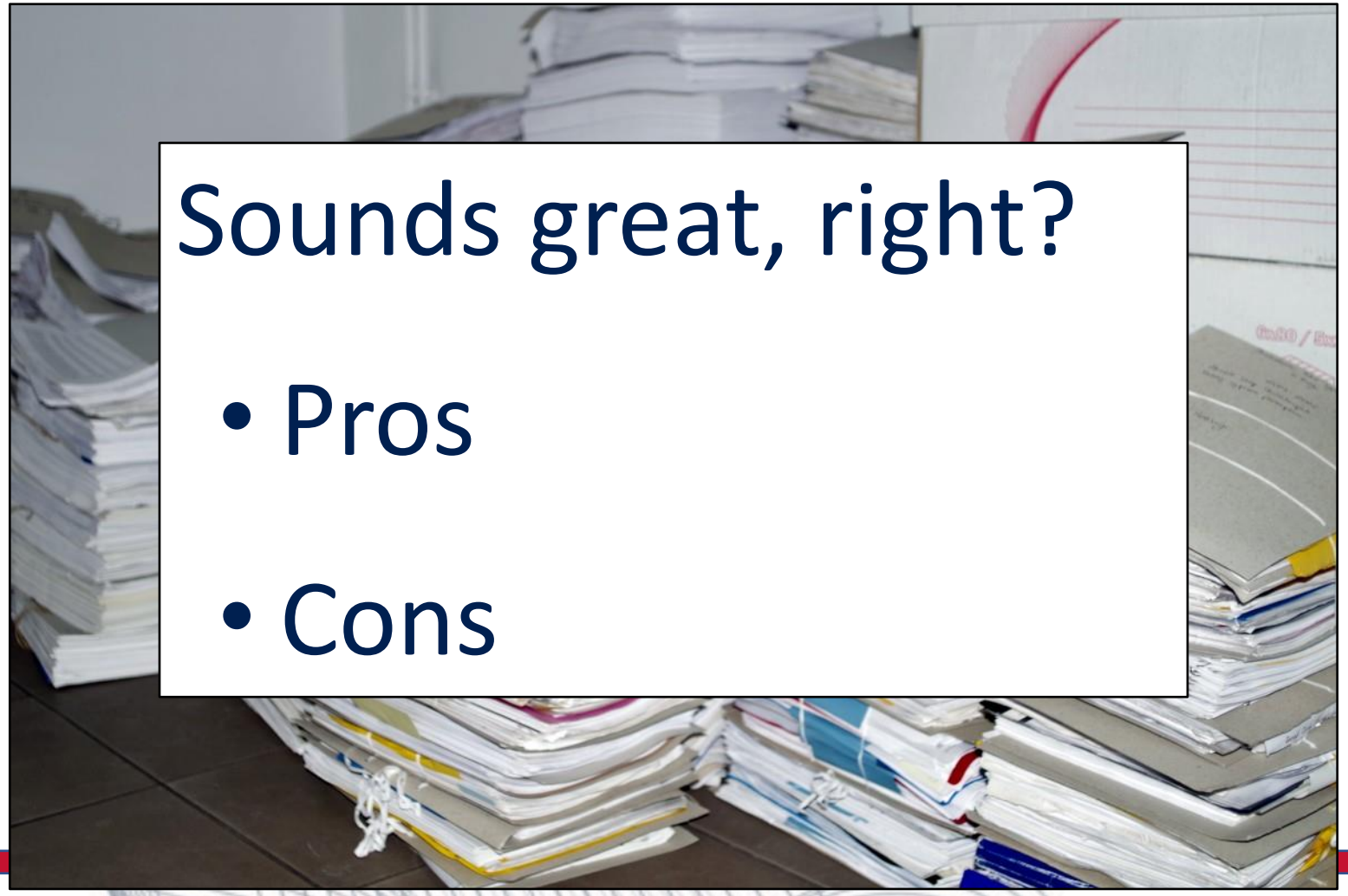
#3 –Parallelism

Controlled via two SQL Server settings:

- MAXDOP - # of cores
- Cost Threshold for Parallelism – minimum execution plan cost to consider parallelism

Don’t Fear Parallelism

#3 – How Does It Work?



Sounds great, right?

- Pros
- Cons

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#3 – Change Me

```
71  -- Check sys.configurations
72  SELECT
73      name, value, value_in_use
74  FROM sys.configurations
75  WHERE name IN ('cost                                    'max degree of parallelism');
76  GO
```

DEMO

150 %

Results | Messages

	name	value	value_in_use
1	cost threshold for parallelism	5	5
2	max degree of parallelism	0	0

#3 – Cost Threshold for Parallelism Recap

Learn More:

- https://www.sqlskills.com/blogs/jonathan/tuning-cost-threshold-for-parallelism-from-the-plan-cache/
- https://docs.microsoft.com/en-us/sql/database-engine/configure-windows/configure-the-cost-threshold-for-parallelism-server-configuration-option?view=sql-server-2017
- https://www.brentozar.com/archive/2017/03/why-cost-threshold-for-parallelism-shouldnt-be-set-to-5/

#3 – MAXDOP Recap

Learn More:

- https://www.sqlskills.com/blogs/paul/maxdop-configuration-survey-results/
- https://docs.microsoft.com/en-us/sql/database-engine/configure-windows/configure-the-max-degree-of-parallelism-server-configuration-option?view=sql-server-2017

BONUS: https://blogs.vmware.com/apps/2018/09/sql-server-on-vmware-august-2018.html

Recap

1. Power Plan
2. SQL Server Defaults
3. Parallelism

T-SQL Practices

#4 – Large Queries

Ever see a query where… ?

Tried to write a query that does everything?

Get X, SUM(Y), Count of Z…

#4 – Languages Matter

Procedural/Imperative - HOW

- Defines HOW to do something
- What you tell it to do, it will do

Declarative - WHAT

- Defines WHAT you would like to happen
- The HOW is left up to the language parser

#4 – Follow The Recipe

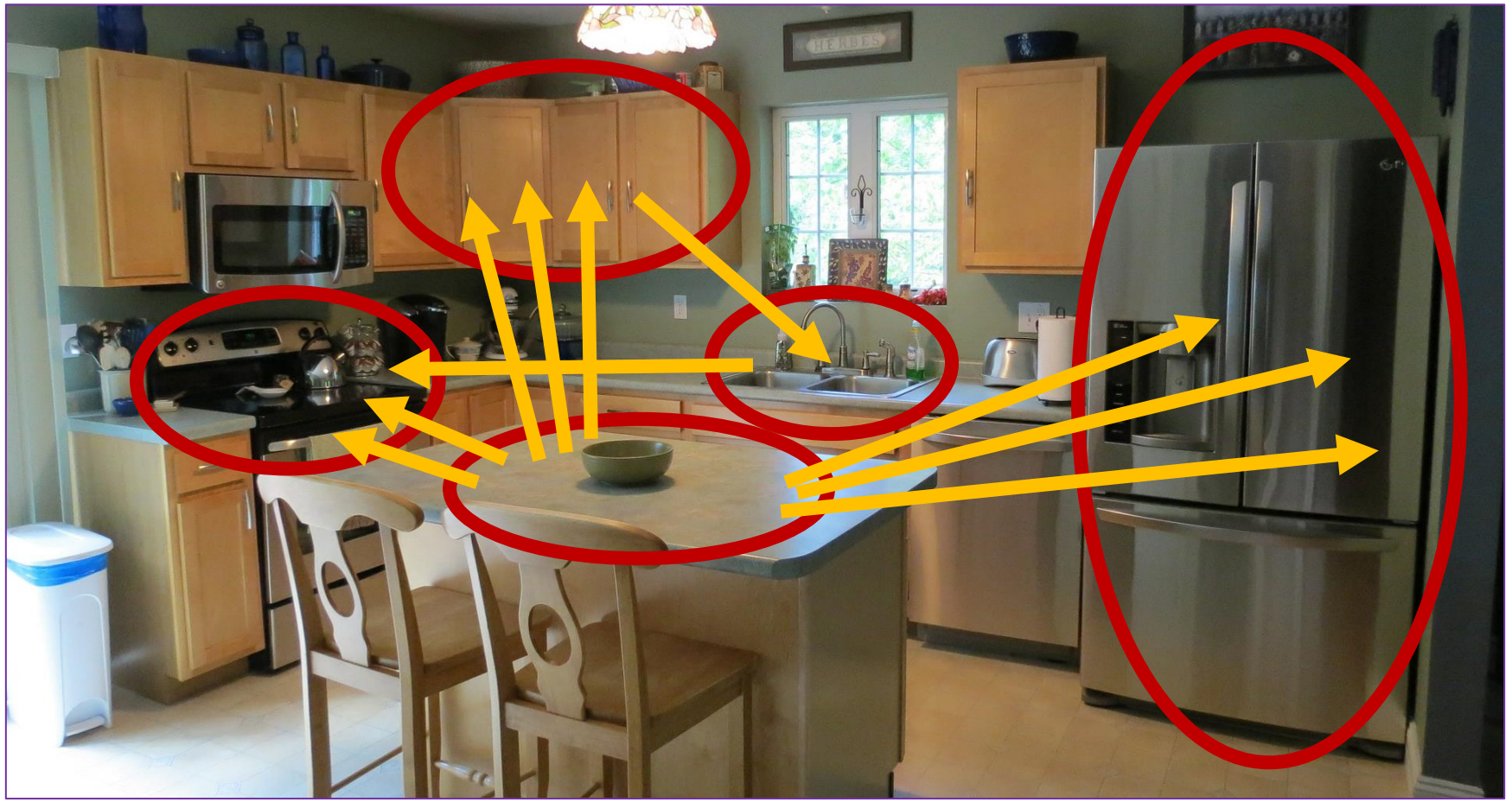
Ingredients:

- 1 cup dry spaghetti
- 1 16oz jar tomato sauce
- 1 1lb ground beef
- 1 1/2 small onion
- 1 16oz box mushrooms
- 3 garlic cloves
- 1 tbsp dried oregano
- 1 tbsp dried basil
- Salt & pepper

Steps:

1. Retrieve onion, & mushrooms from fridge.
2. Retrieve chef knife, cutting board from cabinet.
3. Retrieve garlic, oregano, basil, & tomato sauce from pantry.
4. Chop onion & mushrooms.
5. Retrieve saute pan from cabinet.
6. Saute garlic & onion. Remove & set aside.
7. Saute mushrooms. Remove & set aside.
8. Retrieve ground beef from fridge.
9. Brown beef.
10. Return garlic, onion, & mushrooms to saute pan with ground beef.
11. Add tomato sauce, salt & pepper, reduce to simmer, & cover.
12. Wait 15 minutes, stirring occasionally.
13. Retrieve spaghetti & salt from pantry.
14. Measure desired amount of spaghetti.
15. Retrieve stock pot from cabinet.
16. Fill stock pot with 6 qt. water from sink.
17. Add 2 tbsp salt to stock pot & bring water to boil on stove.
18. Add spaghetti to boiling water.
19. Wait 10 minutes.
20. Drain water from stock pot.
21. Combine pasta with sauce & serve.

#4 – Procedural: Follow The Directions



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#4 – Declarative: Doing It My Way

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Ingredients:

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Steps:

1. Retrieve oni… fridge.
2. Retrieve che… cabinet.
3. Retrieve garl… tomato sauc…
4. Chop onion …
5. Retrieve sau…
6. Saute garlic … aside.
7. Saute mushr… aside.
8. Retrieve gro…
9. Brown beef.
10. Return garlic, onion, & mushrooms to saute pan with ground beef.

…. Add tomato sauce, salt & pepper, reduce to simmer, & cover.
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#4 – How to Solve?

Consoliate and/or Break It Up

Temp Tables are y

- But Beware Table variables

DEMO

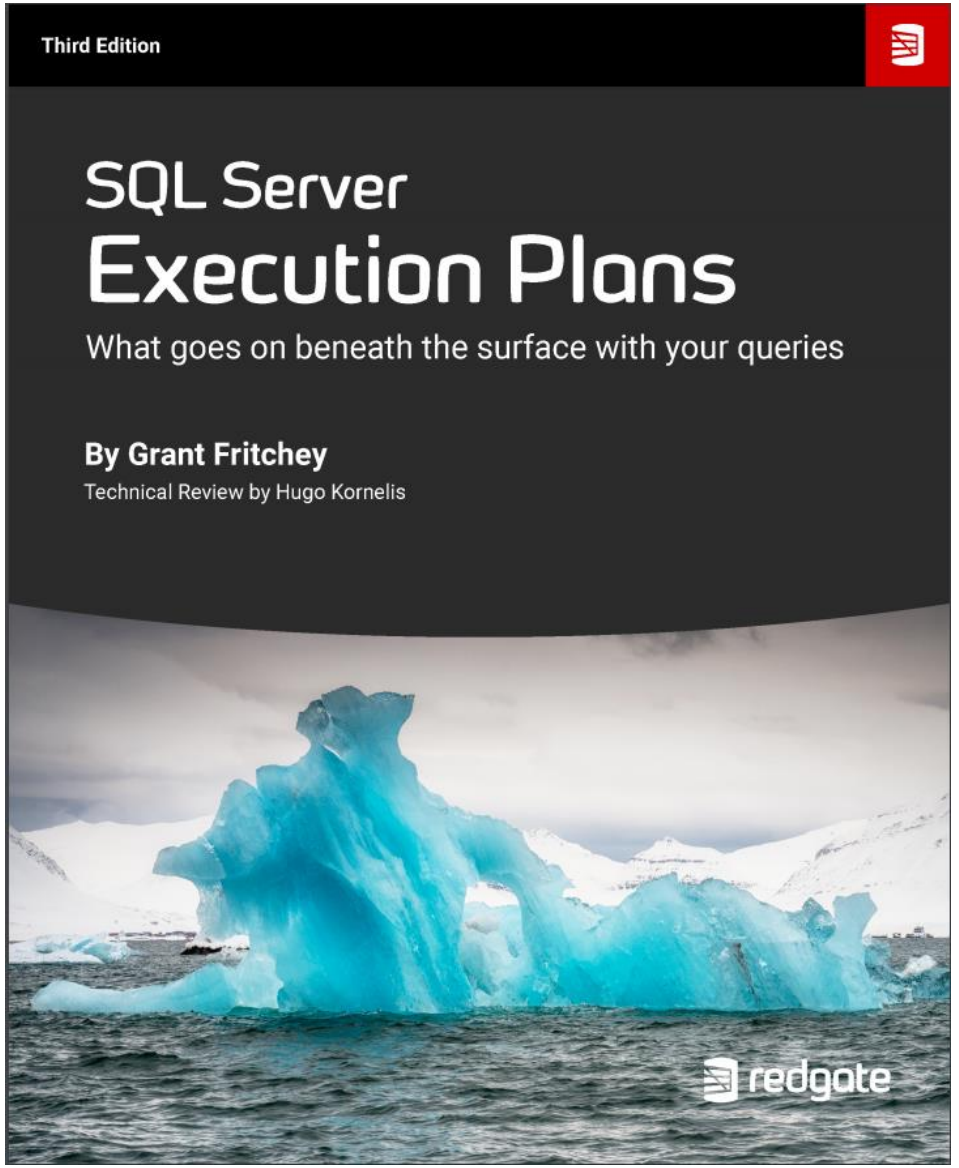
#4 – Large Query Recap

Learn More:

- https://erikdarlingdata.com/2019/07/stop-writing-big-queries/
- https://michaeljswart.com/2014/01/sql-simplicity-methods/

- eBook by Grant Fritchey

  https://www.red-gate.com/simple-talk/books/sql-server-execution-plans-third-edition-by-grant-fritchey/



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#5 – Key Lookups (& Indexes)

Cookbook

- Table of Contents
- Index (1 or more)
  - Alphabetical Recipe
  - Meal Course
  - Cuisine
  - Ingredient

#5 – Look It Up

Andy's Awesome Cheeseburger: Page 16

- Bacon, Cheddar, W[illegible]

DEMO

Roasted Chicken [illegible]

- Butter, Rosemary, Thyme, Garlic

Romantic Spaghetti: Page 62

- Parmesan, Romano, Lemon Zest

#5 – Key Lookups Recap

Learn More:

- https://sqlespresso.com/2019/04/03/whats-a-key-lookup/
- https://www.sqlskills.com/blogs/jonathan/finding-key-lookups-inside-the-plan-cache/
- https://sqlperformance.com/2016/05/sql-indexes/rid-lookup-faster-key-lookup

BONUS: Plan Explorer Index Analysis
https://www.sentryone.com/blog/devonleannwilson/t-sql-tuesday-101

#6 – TempDB Spills

I Need Some Space

Memory Grants

DEMO

#6 – TempDB Spills Recap

Learn More:

- https://erikdarlingdata.com/2019/07/spills-week-when-sort-spills-might-not-matter/
- https://sqlperformance.com/2019/06/sql-memory/troubleshooting-variable-memory-grants

BONUS: Advanced https://sqlperformance.com/2016/09/sql-plan/sort-spills-level-15000

#6 – TempDB Spills Recap

Learn More:

- https://www.sqlskills.com/blogs/kimberly/understanding-tempdb-table-variables-v-temp-tables-and-improving-throughput-for-tempdb/

#7 – Code Re-Use

Functions

- Scalar
- Inline Table Va
- Multi-Statement Table Valued

DEMO

Views

#7 – Code Re-Use

Learn More:

- https://sqlbits.com/Sessions/Event16/Performance_Pitfalls_of_Code_Reuse
- http://blog.wayneSheffield.com/wayne/archive/2012/02/comparing-inline-and-multistatement-table-valued-functions/
- https://sqlperformance.com/2015/06/sql-server-2016/sys-dm-exec-function-stats
- https://sqlperformance.com/2017/08/t-sql-queries/multi-statement-tvfs-dynamics-crm

Session Recap

1. Power Plan
2. SQL Server Defaults
3. Parallelism
4. Large Queries
5. Key Lookups
6. TempDB Spills
7. Code Re-Use

Feeling Overwhelmed?

Twitter - #sqlhelp

SQL Slack Community – sqlslack.com

SQL Server Central forums

DBA Stack Exchange

Reddit – /r/SQLServer

Thank you!

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