

PERFORMANCE TUNING GETTING BIG BANG FOR YOUR BUCK

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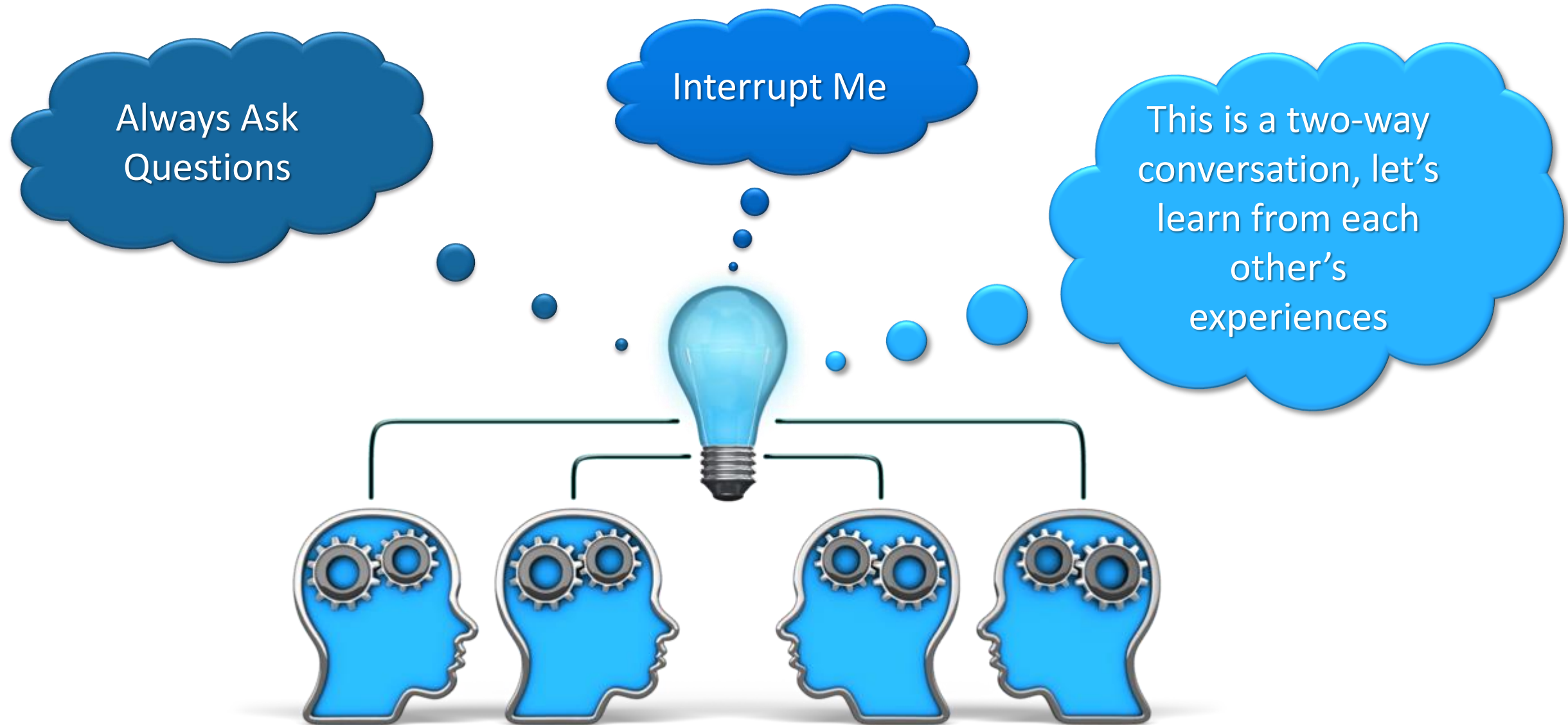


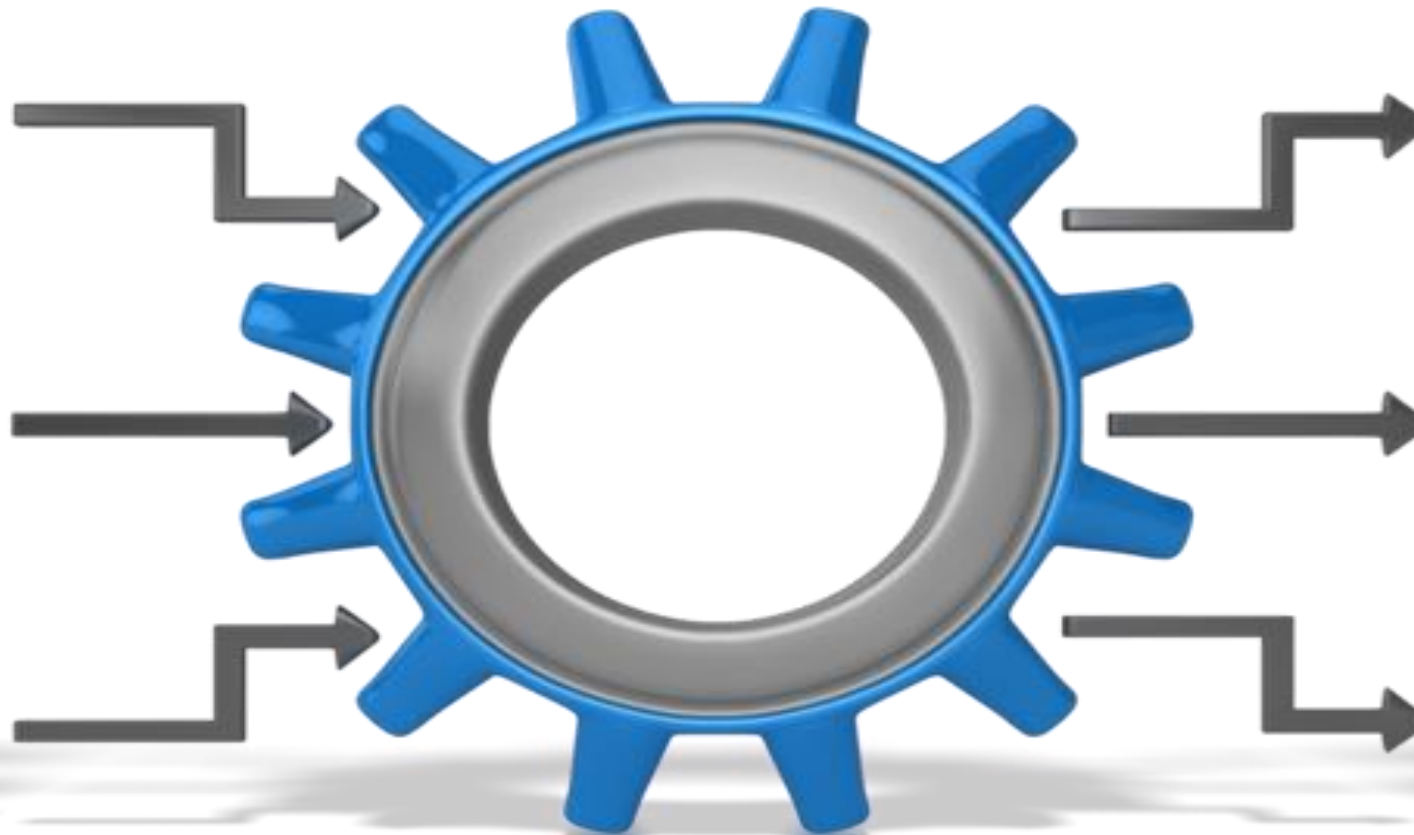
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PRESENTATION RULES



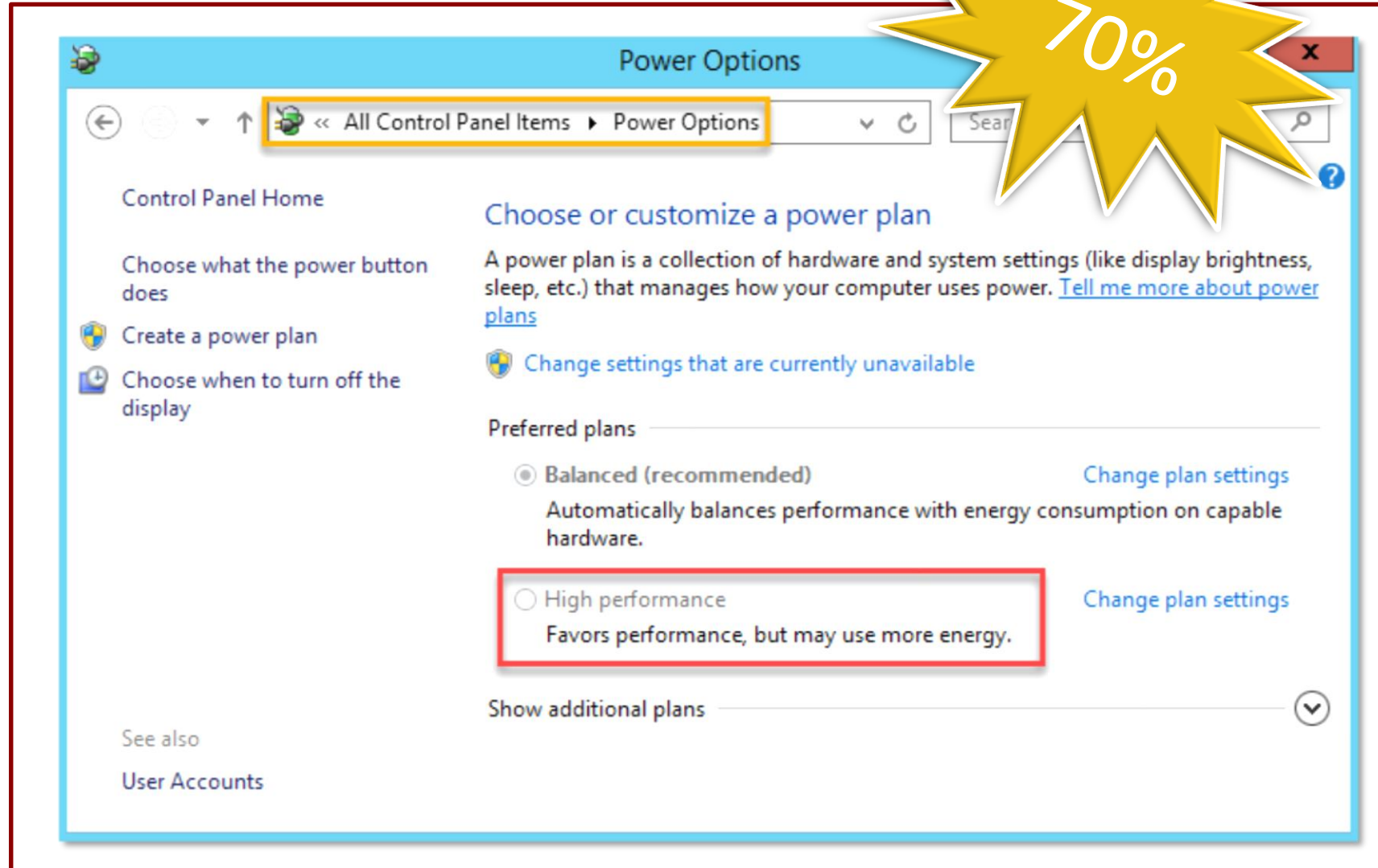


BEST PRACTICES

Start with the basics

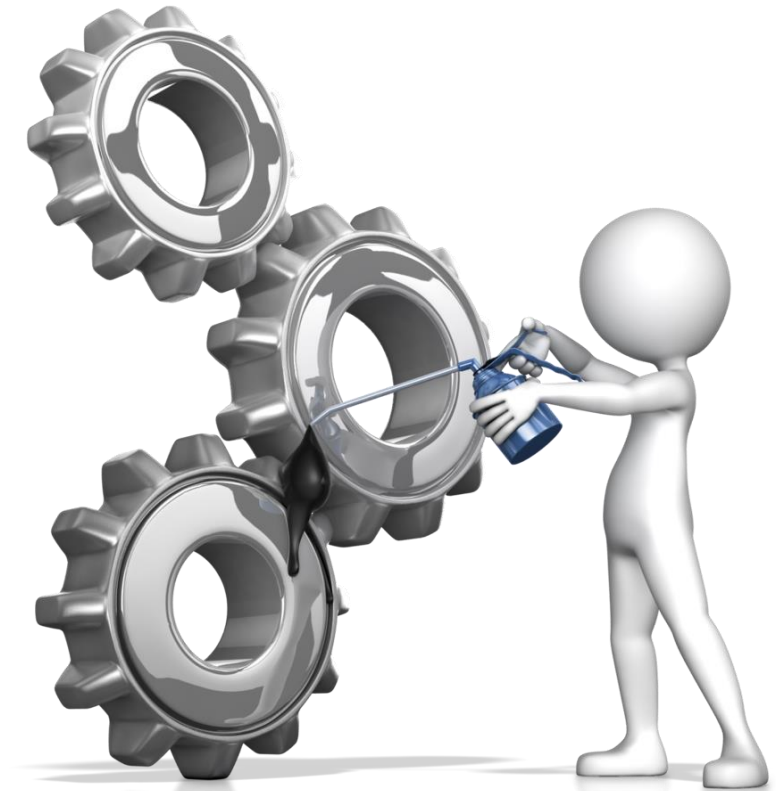
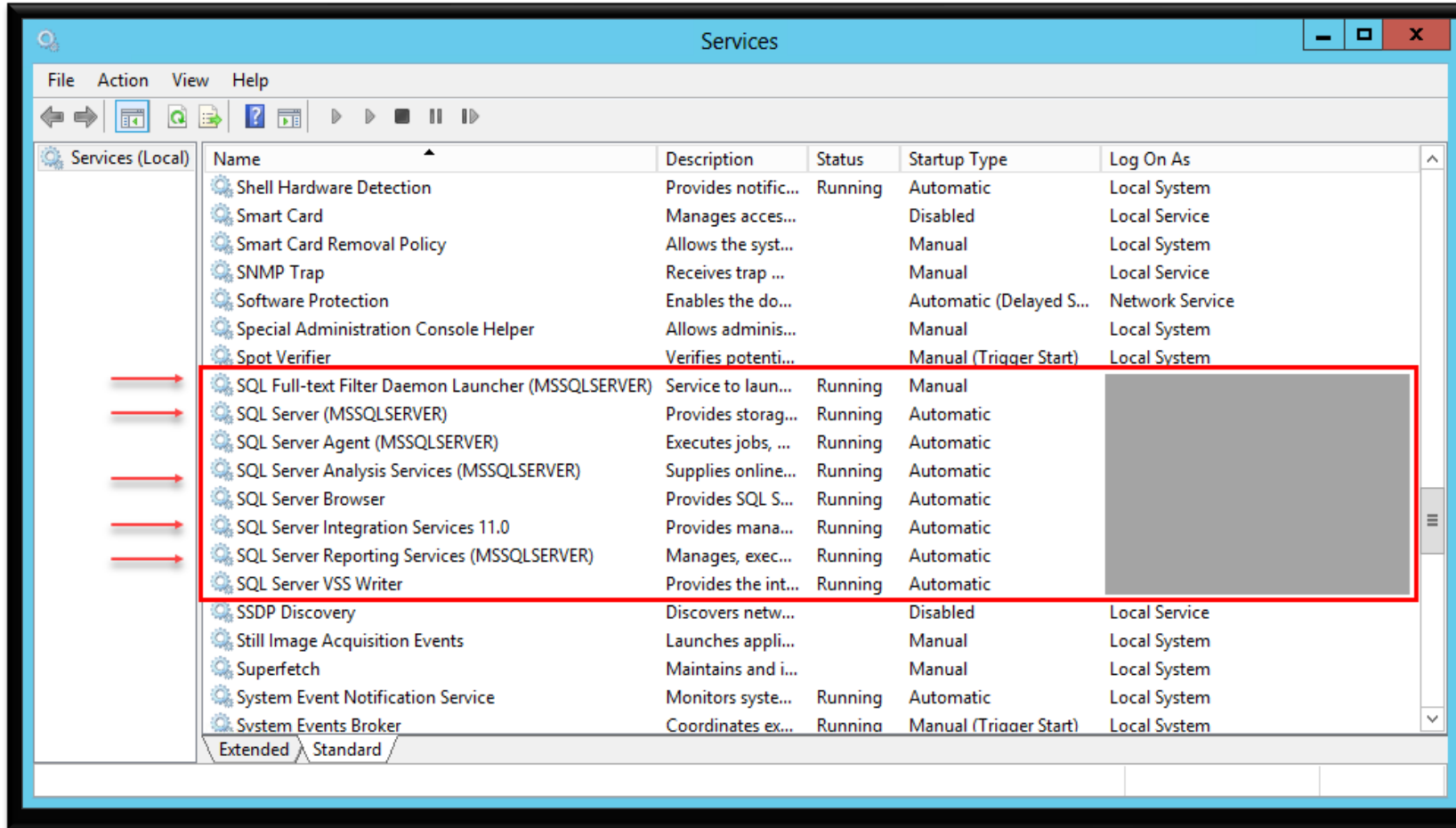
POWER PLAN

Windows Control Panel Power Options



SERVICES

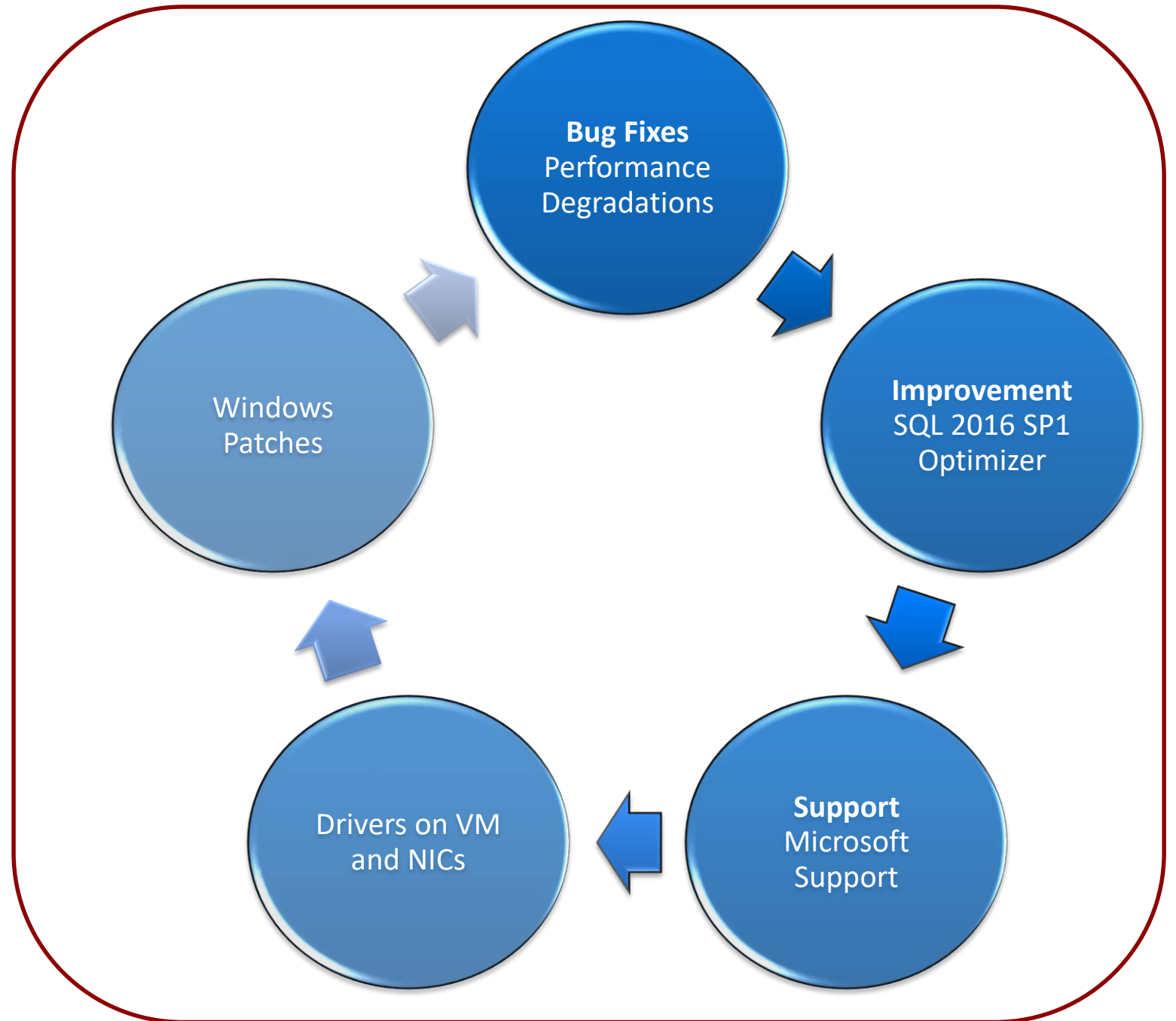
Why are you running this?



PATCHING

Build List

<https://sqlserverbuilds.blogspot.com/>



MEMORY

Proper configuration is vital

Min and Max Memory

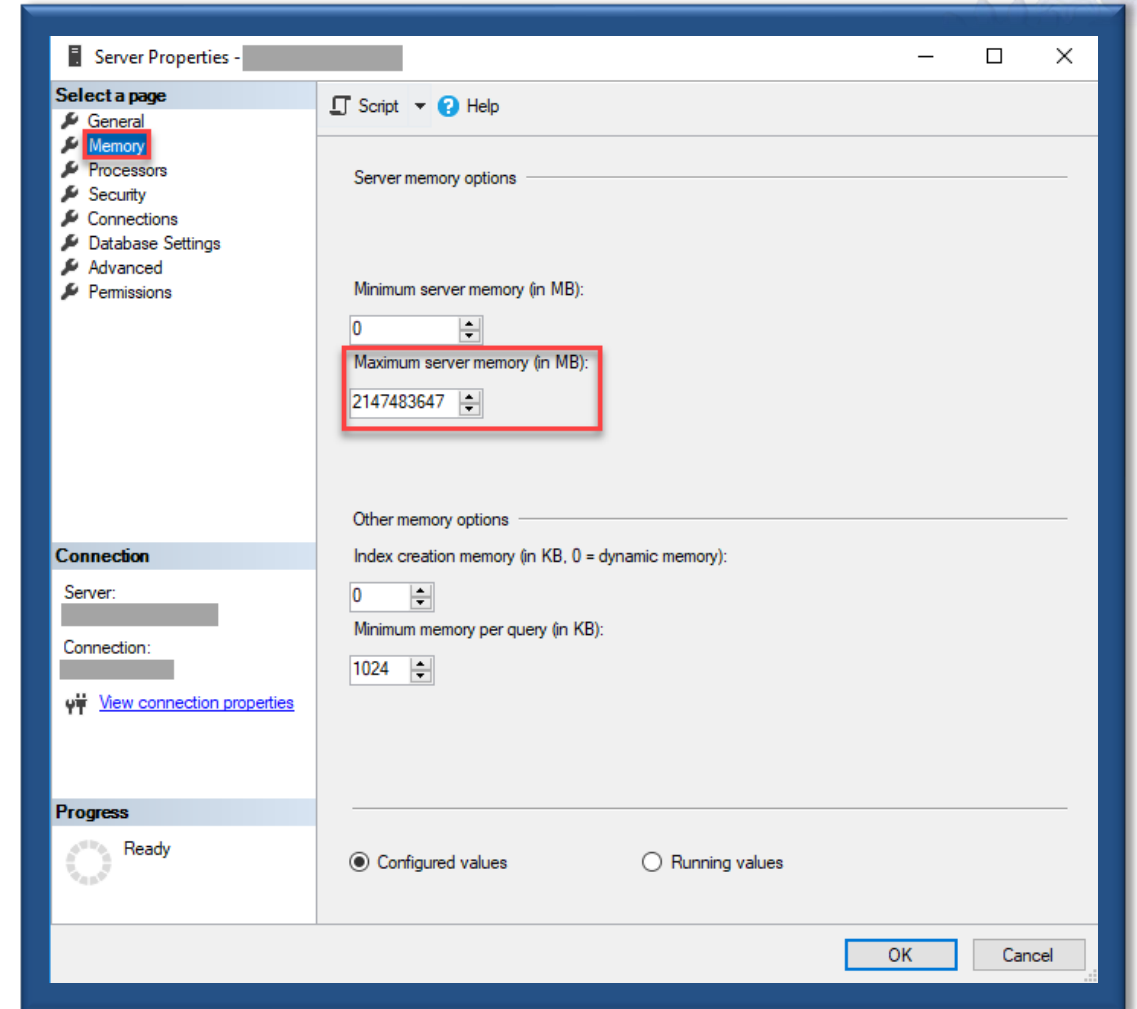
Multiple Instances

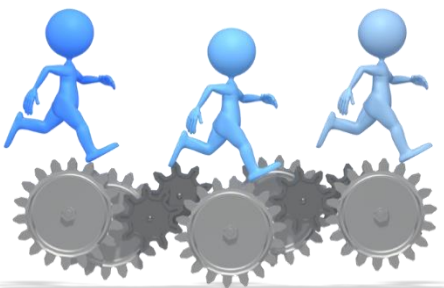
Extra Services SSRS, SSIS, SSAS

Lock Pages in Memory *

Set Memory Reservation for
Your VM on the Host

Don't over allocate!





TEMPDB

Everything Uses TEMPDB - Make sure you don't ignore it.

Database Properties - tempdb

Select a page: General, Files, Filegroups, Options, Change Tracking, Permissions, Extended Properties

Script Help

Database name: tempdb

Owner: sa

☒ Use full-text indexing

Database files:

Logical Name	File Type	Filegroup	Initial Size (MB)	Autogrowth / Maxsize	Path
tempdev	ROWS Data	PRIMARY	8	By 64 MB, Unlimited	C:\Program Files\Microsoft SQL Server\...
temp2	ROWS Data	PRIMARY	8	By 64 MB, Unlimited	C:\Program Files\Microsoft SQL Server\...
temp3	ROWS Data	PRIMARY	8	By 64 MB, Unlimited	C:\Program Files\Microsoft SQL Server\...
temp4	ROWS Data	PRIMARY	8	By 64 MB, Unlimited	C:\Program Files\Microsoft SQL Server\...
templog	LOG	Not Applicable	8	By 64 MB, Unlimited	C:\Program Files\Microsoft SQL Server\...

Connection: Server: Connection: View connection properties

Progress: Ready

Add Remove OK Cancel

Pin to High
Performing Disk

Multiple Files
1 file per CPU core
up to 8 files

Trace flag
1118/1117
Pre 2016

Heavy Contention
in Metadata fixed
2016 CU 8 and
2017 CU 5

Trace Flag 2453
allows table
variables to trigger
recompile

MAKE FRIENDS WITH NETWORK & STORAGE ADMINS

Their baby might be ugly



VIRTUAL ENVIRONMENTS

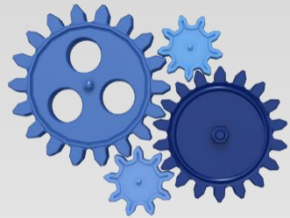
Over Provisioned Hosts



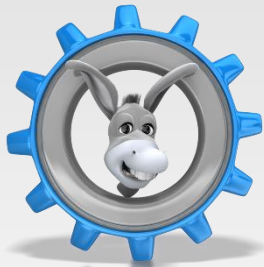
Too Many VMs on One Host



What Happens on One VM Now
Affects Another



VM Over/Under CPU Allocation



Thin Provisioning



COMPRESSION

More data in memory – It's the GOLDEN EGG!

Row/Page Compression -
More Data In **MEMORY**

Saves Space on **Disk**

Backup Compression: Less
Data in **STORAGE**

Costs **CPU speed**, but
worth it

ALLOW SNAPSHOT ISOLATION & READ COMMITTED SNAPSHOT ISOLATION (RCSI)



Ta-dah!

READERS CANT BLOCK WRITERS
AND
WRITERS CANT BLOCK READERS

ions for each
ntained in tempdb.
**Default Isolation Level
in Azure SQL DB**



RCSI option

Allows access to versioned rows under the default READ COMMITTED isolation level.
If set to OFF, you must explicitly set the level for each session in order to access versioned rows



STATISTICS

This is the magic sauce that helps the optimizer.

Maintain

Keep These Up To Date!

Updates

Sync vs Async

Defaulted in
SQL 2016

Large Table

Trace Flag 2371

Missing Stats

Did You Know You Can Make Your Own?



PARALLELISM

CAUTION: Using too many cores = more overhead to put things back together

MAX Degree of Parallelism (MaxDop)

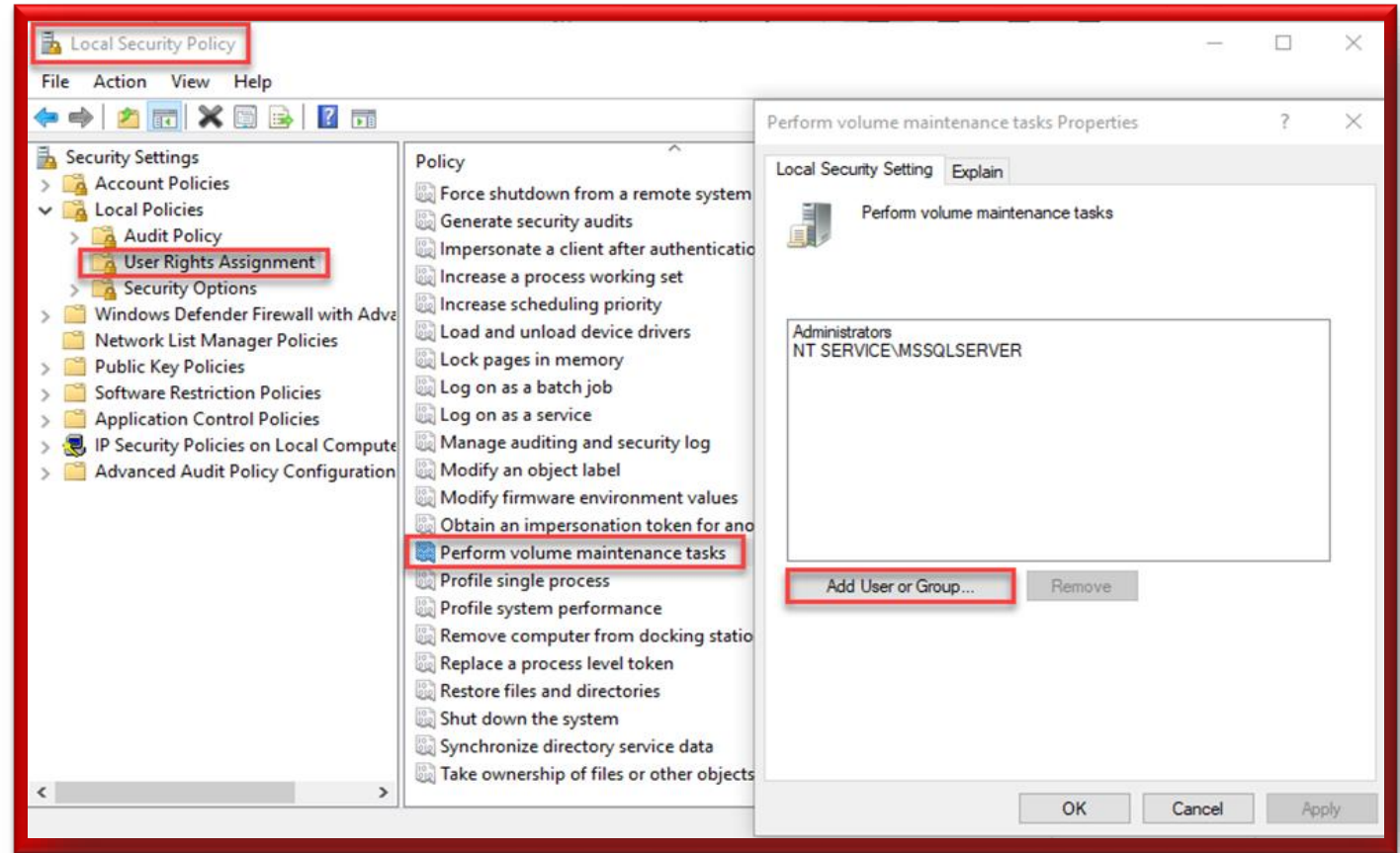
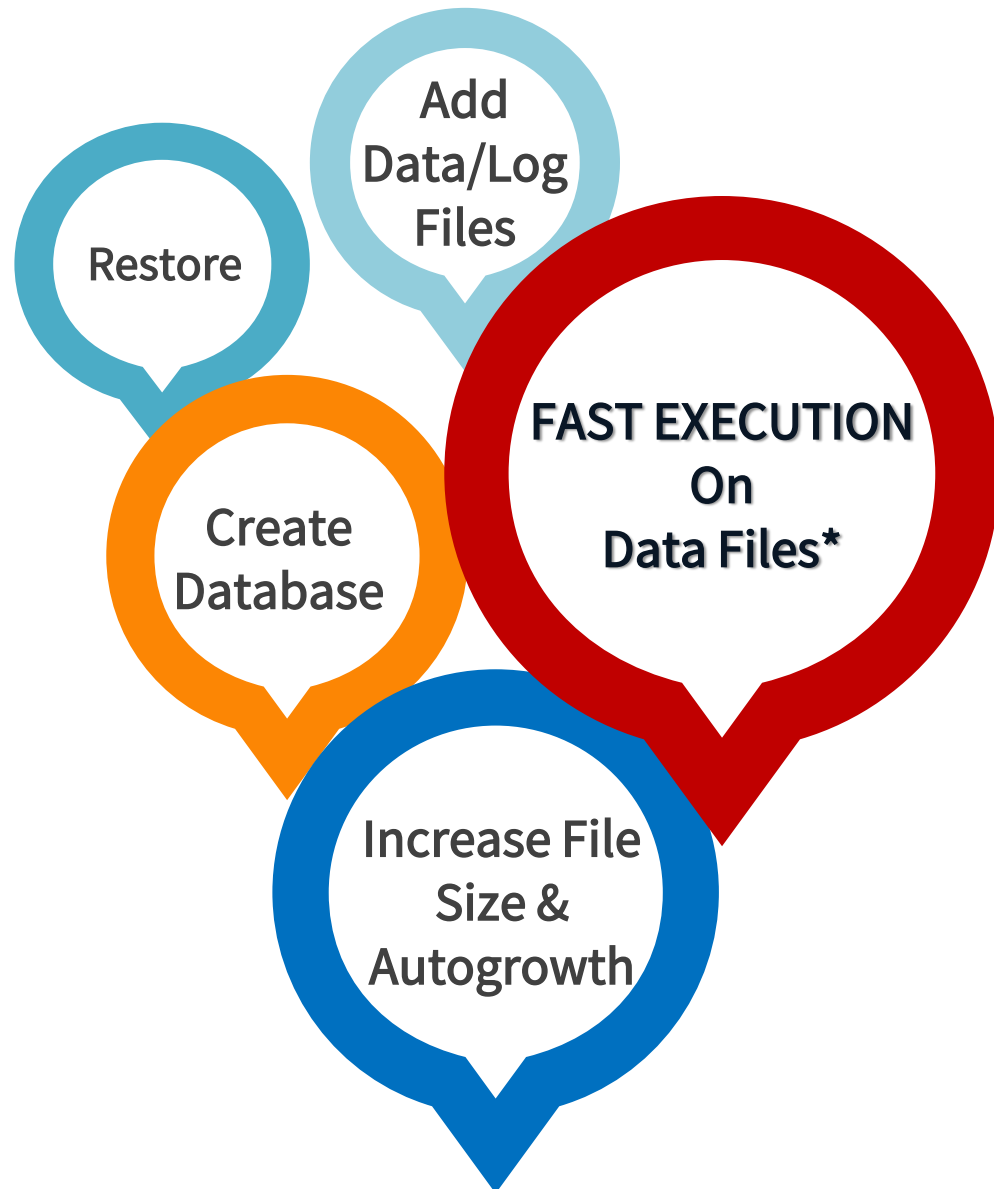
<p>≥ 8 maxdop 8 or lower</p>	<p>< 8 logical processors match number of logical processors or lower</p>
<p>Can specify maxdop for individual statements as query hint</p>	<p>CAUTION Changes Flushes Procedure Cache</p>

Cost Threshold for Parallelism (CTfP)

<p>"Cost" over this value qualifies for multiple processors to execute</p>	<p>Process Count defined by MaxDop</p>
<p>Good Start is 35-50 *Keeps small queries single threaded</p>	<p>Watch for CXPACKET Waits too many then adjust CTfP higher *</p>

INSTANT FILE INITIALIZATION (IFI)

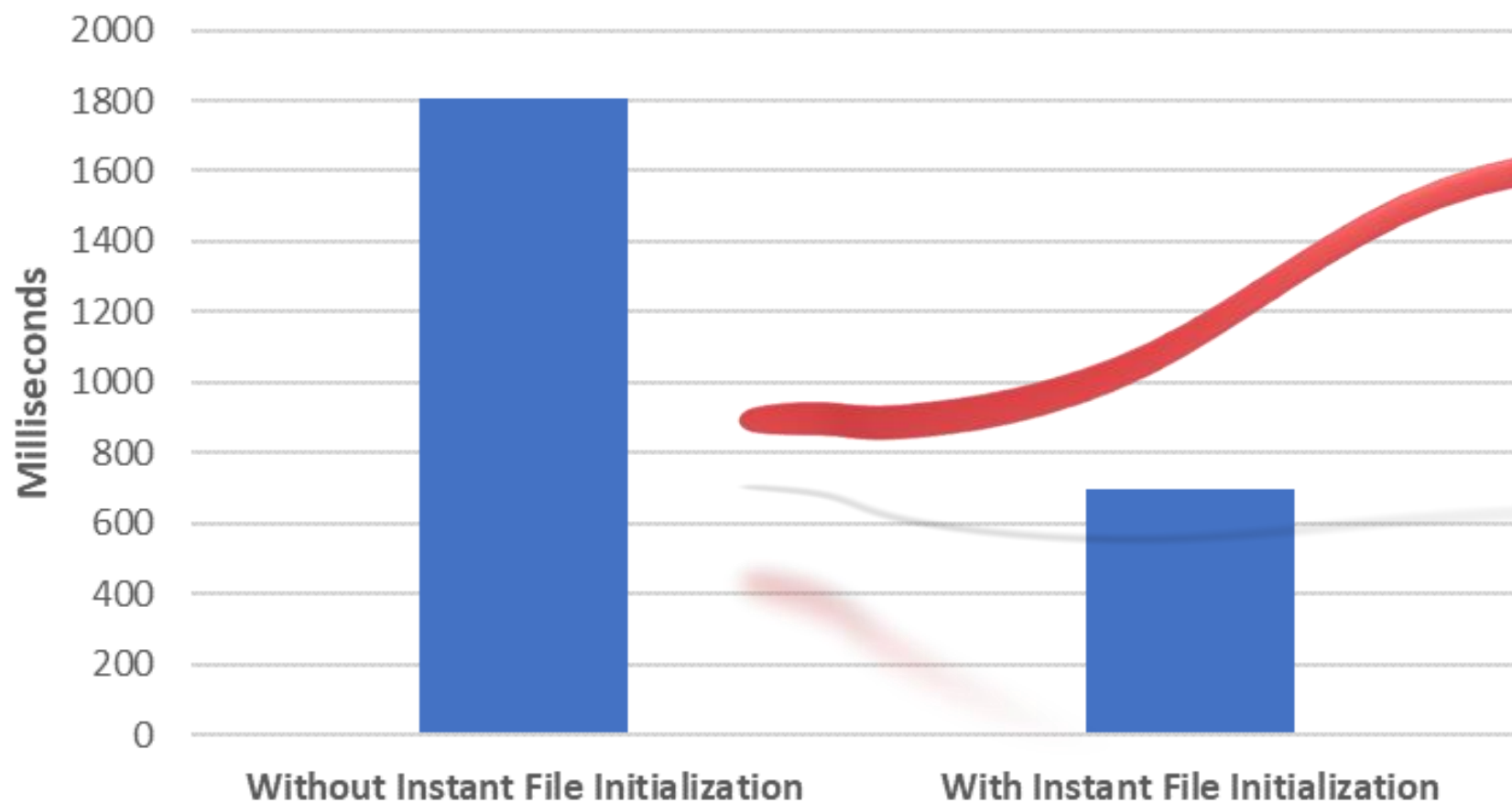
Initialized instantaneously to avoid zeroing operations / Reclaims used disk space



SQL Server service account **Perform Volume Maintenance Tasks** security policy in windows. Use AD Group Policy to grant this to service accounts in your domain

WINNING RESULTS

Create 5GB DB IFI Comparison

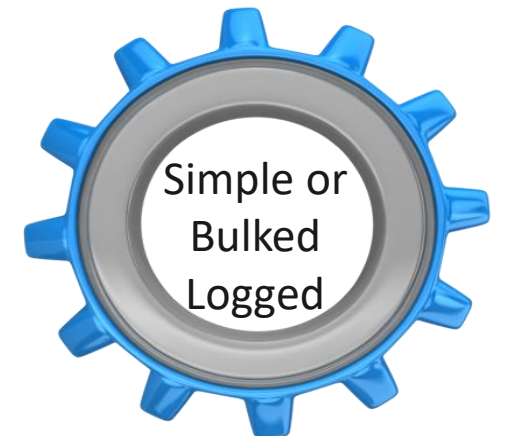
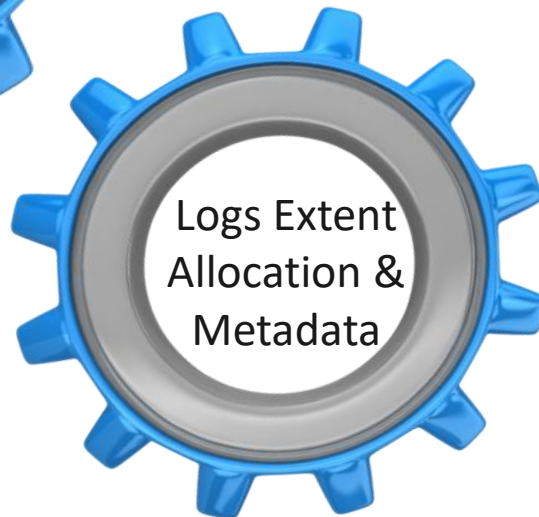
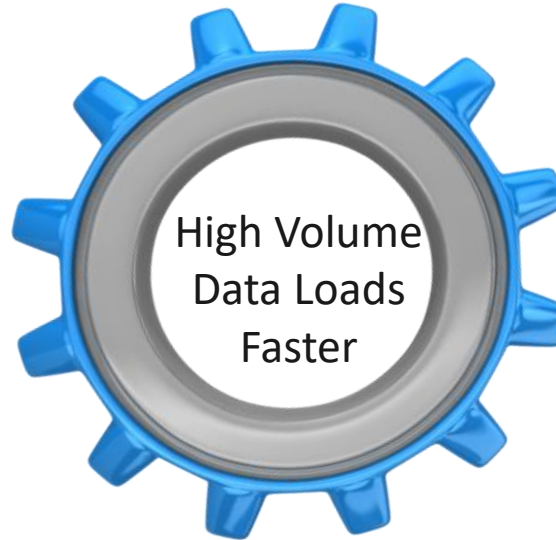
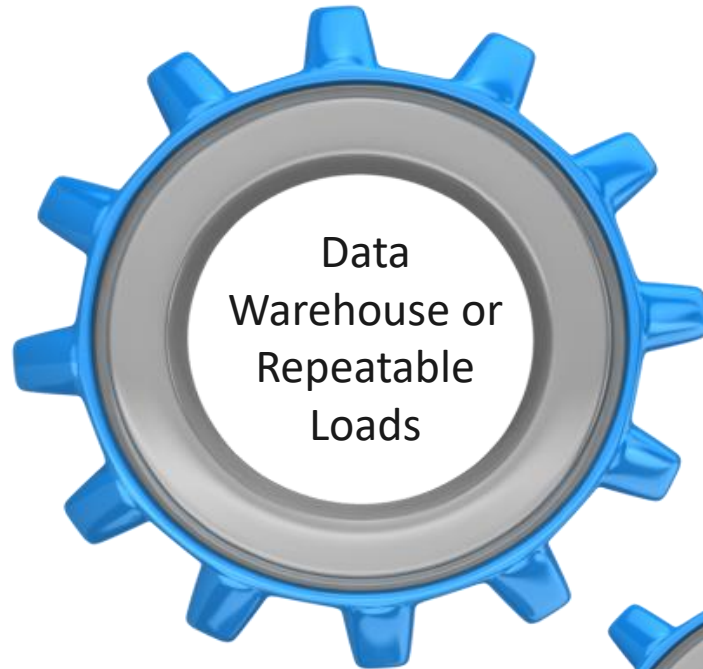


Trace Flag 610
SQL Server
2008 – 2014

MINIMAL LOGGING

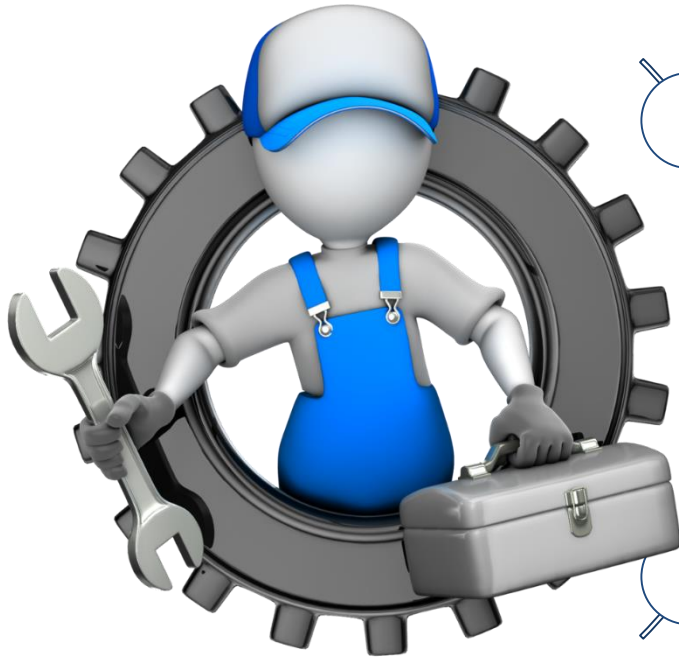
*2016 Defaulted Bulk Logged

- SELECT INTO
- INSERT SELECT
- CREATE INDEX
- MERGE



VIRTUAL LOG FILES

Performance boost on startup, insert/update/delete & backup/restore operations.



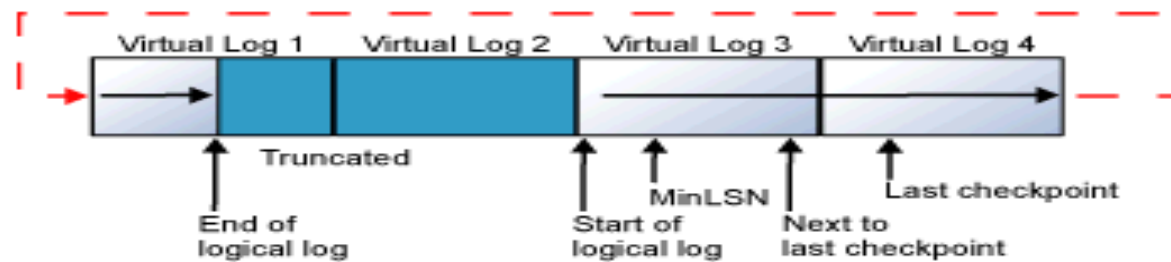
A large number of VLFs can slow things down.

VLF counts under 100 ideally

Shrink files to two VLFs

Grow in chunks back to the current size

DBCC LOG INFO or sys.dm_db_log_stats (2016 SP2)



INDEXES

These are not set it and forget it

**Remove Un-Used
Indexes**



Wasted Write Disk IO
Disable then Delete

Find Missing Indexes



Wasted Read IO
Avoid Duplicates

Covering Indexes

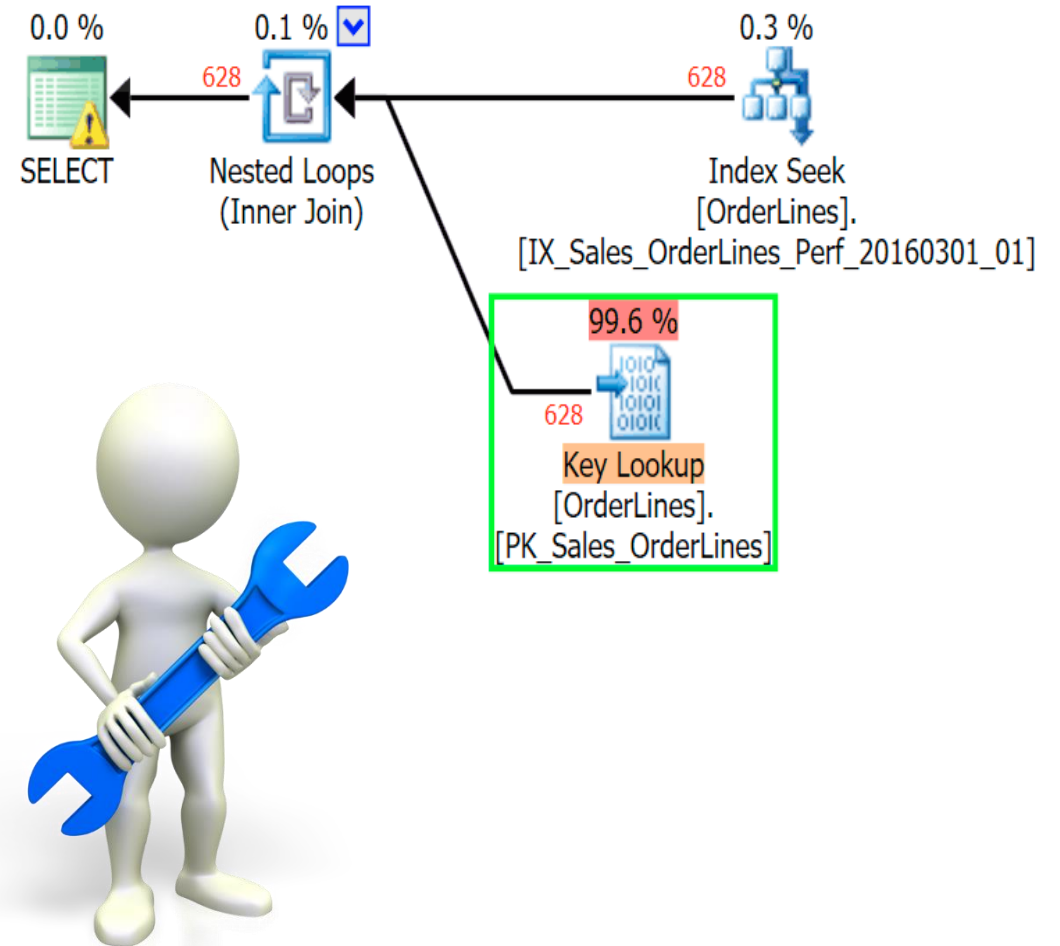


Consolidate Indexes
Specific Query Tuning – Key
Lookups

EXECUTION PLANS

Easy things to look at

Index Needs	More Granular Review
	Missing Includes
	Scans
Sorts	Does the data need to be sorted?
	Can it be done elsewhere?
Key Lookups	Extra Reads
	Easily Avoided in Most Cases
Spills	Spills to TempDB
	Forced to go to Disk



Contact Information



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Accelerate your platform.

Optimize licensing.

Reduce your IT footprint.

Pay off technical debt.

Unburden your environment.