

Your Performance Tuning Checklist

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Denny Cherry and Associates
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SQLEspresso



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Data Saturday VA Beach Organizer



Your Barista For SQL Knowledge!



She, Her



/sqlpresso



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Presentation Rules

Always Ask Questions

Interrupt me

This is a two-way conversation
let's learn from each other's
experiences




BEST PRACTICES

YOUR CHECK LIST STARTS HERE

POWER PLAN

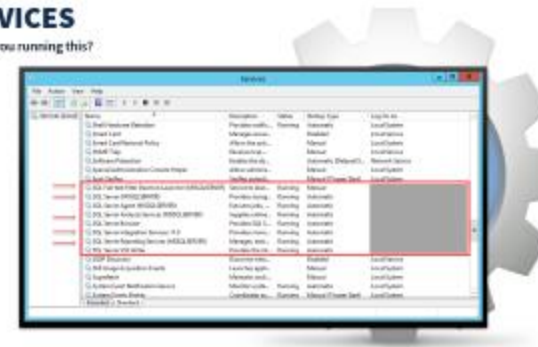
Windows Control Panel Power Options



70%

SERVICES

Why are you running this?



PATCHING

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

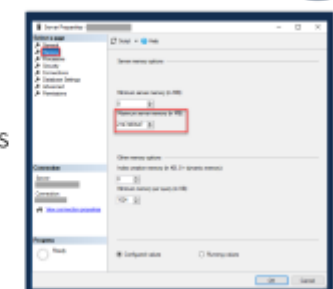
- Bug Fixes
- Performance Degradations
- Improvement
SQL 2016 SP1 Optimizer
- Support
Microsoft Support
- Other
Drivers on VM and NICs
Windows Patches



MEMORY

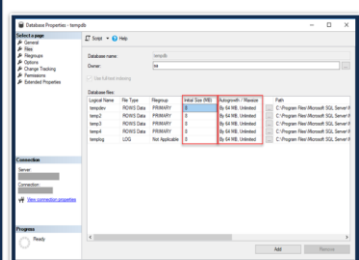
Proper configuration is vital

- Min and Max Memory
- Multiple Instances
- Extra Services SSRS, SSIS, SSAS
- Lock Pages in Memory *
- Set Memory Reservation for Your VM on the Host



TEMPDB

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



- 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

PARALLELISM

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

MAX Degree of Parallelism (MaxDop)	Cost Threshold for Parallelism (CTFP)
2019 PROMPTS FOR THIS IN INSTALL NOW	
<= 8 maxdop 8 or lower	<= 8 logical processors match number of logical processors or lower
Can specify maxdop for individual statements as query hint	"Cost" over this value qualifies for multiple processors to execute
CAUTION: Changes Flushes Procedure Cache	Process Count defined by MaxDop
	Good Start is 35-50 *Keeps small queries single threaded
	Watch for CDPACKET Waits too many then adjust CTFP higher *

INSTANT FILE INITIALIZATION (IFI)

Initialized instantaneously to avoid zeroing operations / Reclaims used disk space

- Restore
- Add Data/Log Files
- Increase File Size & Autogrowth
- Create Database



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

ALLOW SNAPSHOT ISOLATION & READ COMMITTED SNAPSHOT ISOLATION

BLOCKING
READERS CAN'T BLOCK WRITERS CAN'T BLOCK READERS

YES

Snapshot Isolation

Is updated row versions for each transaction are maintained in tempdb.

RCSI Option

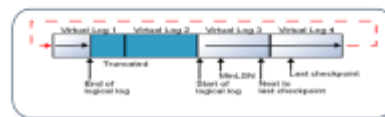
Allows access to versioned rows under the default READ COMMITTED isolation level.

If set to OFF, you must explicitly set the level for each session in order to access versioned rows

VIRTUAL LOG FILES

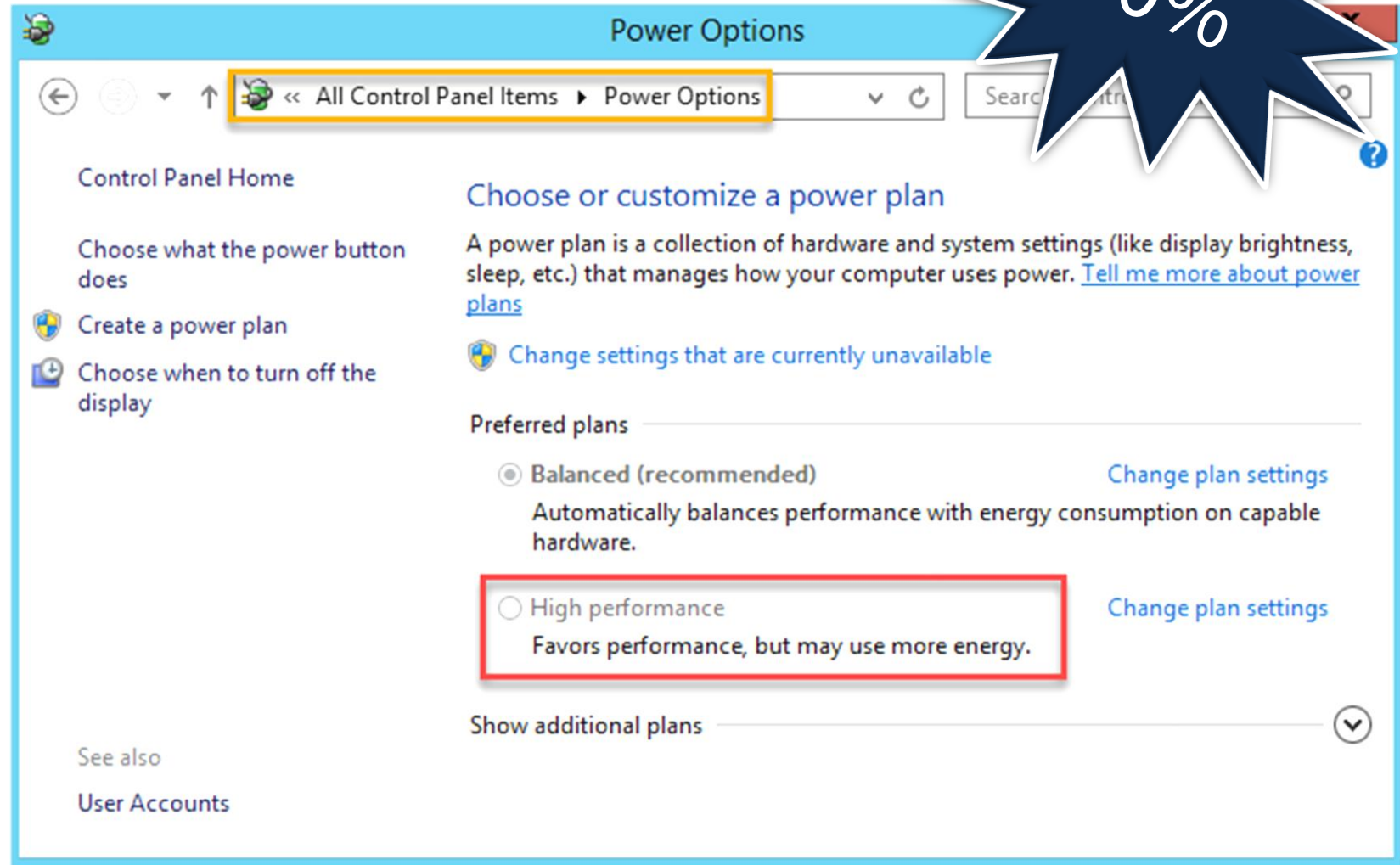
Performance boost on startup, insert/update/delete & backup/restore operations.

A large number of VLFs can slow things down.
VLF counts under 300 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)



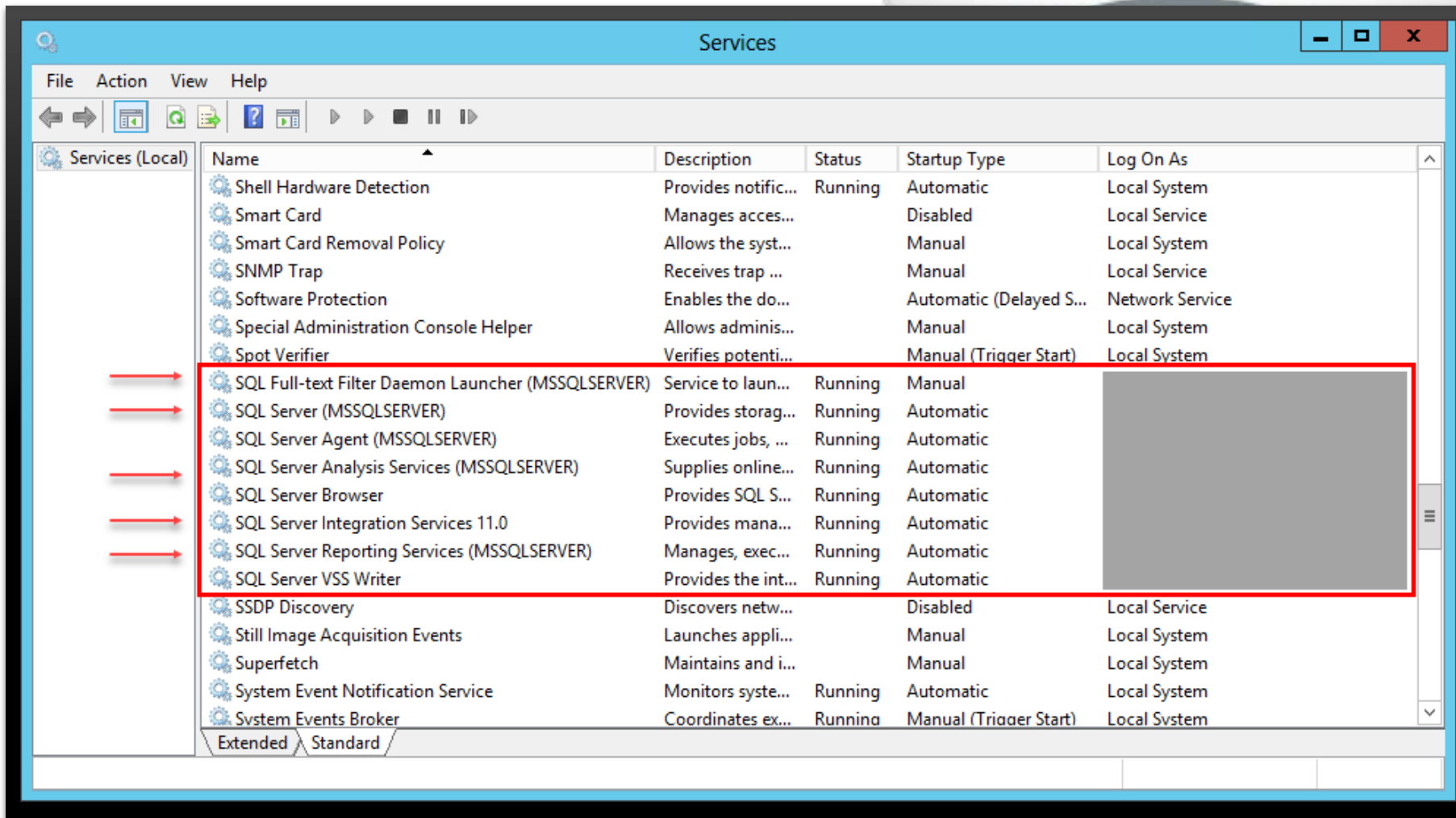
POWER PLAN

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Bug Fixes

Performance Degradations

Improvement

SQL 2016 SP1 Optimizer

Support

Microsoft Support

Other

Drivers on VM and NICs

Windows Patches



MEMORY

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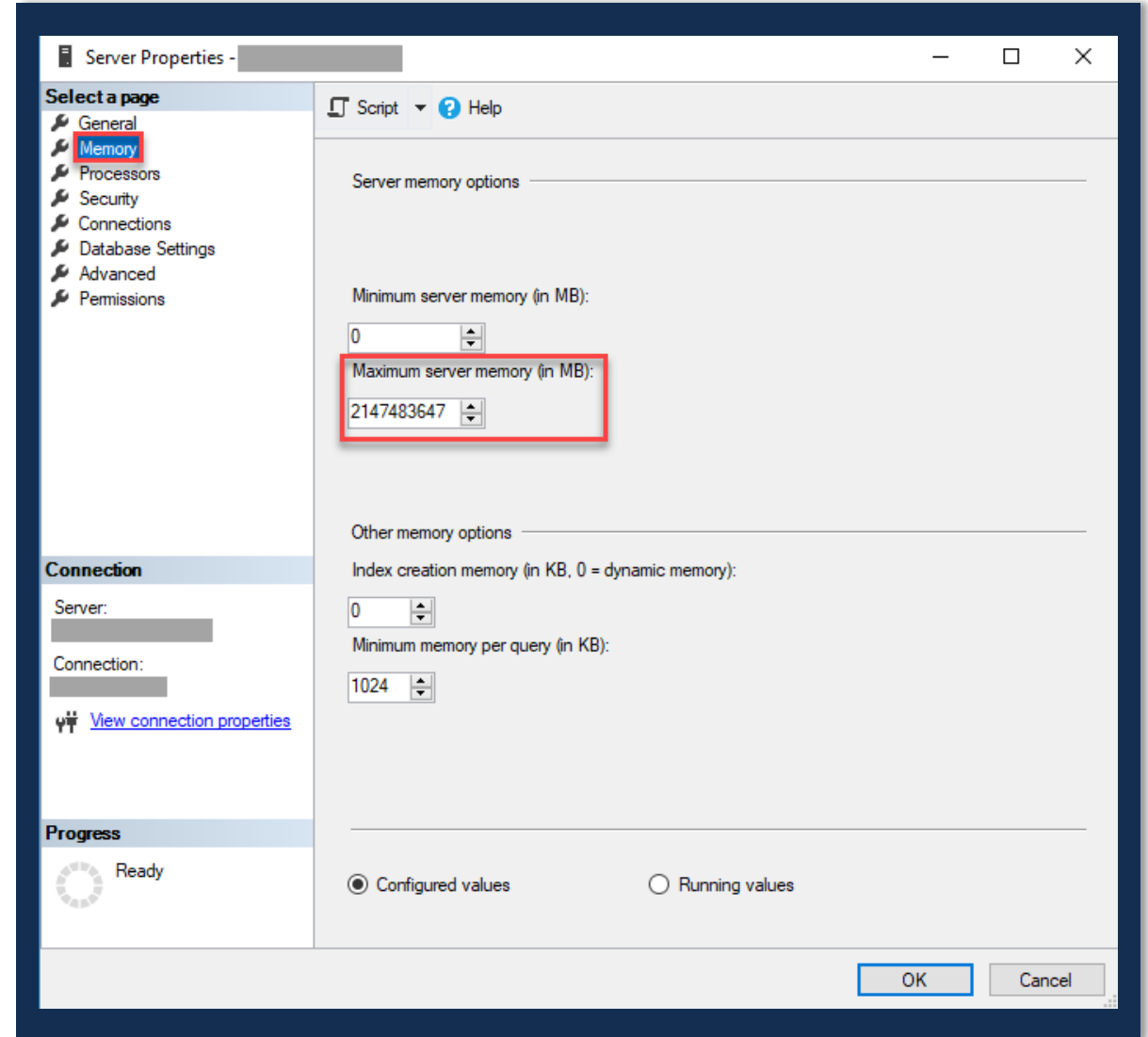
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Multiple Instances

Extra Services SSRS, SSIS, SSAS

Lock Pages in Memory *

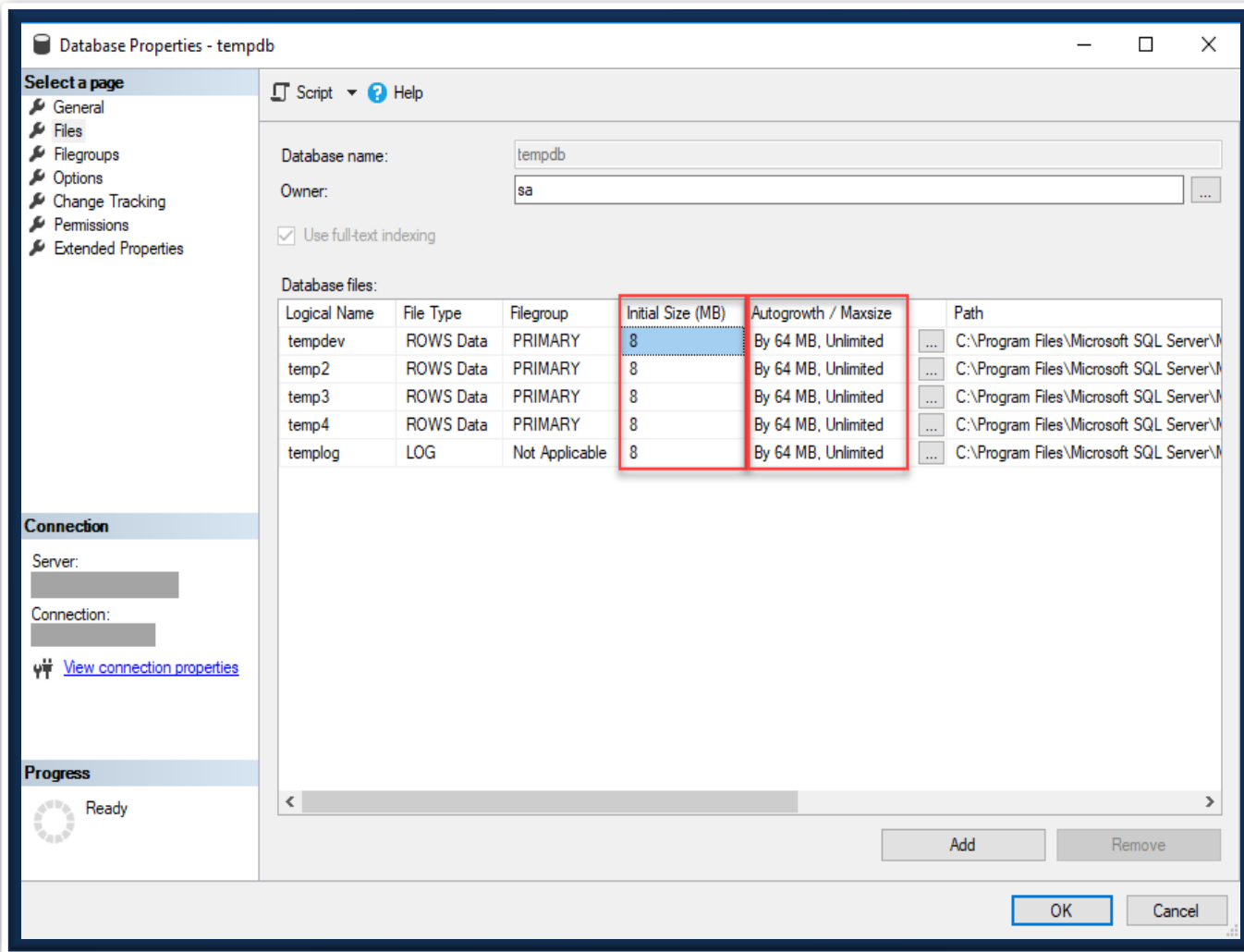
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up to 8 files

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1118/1117
Pre 2016

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in Metadata fixed
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allows table
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maxdop 8 or lower

<8 logical processors match number of logical processors or lower

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CAUTION
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Cost Threshold for Parallelism (CTfP)

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Restore



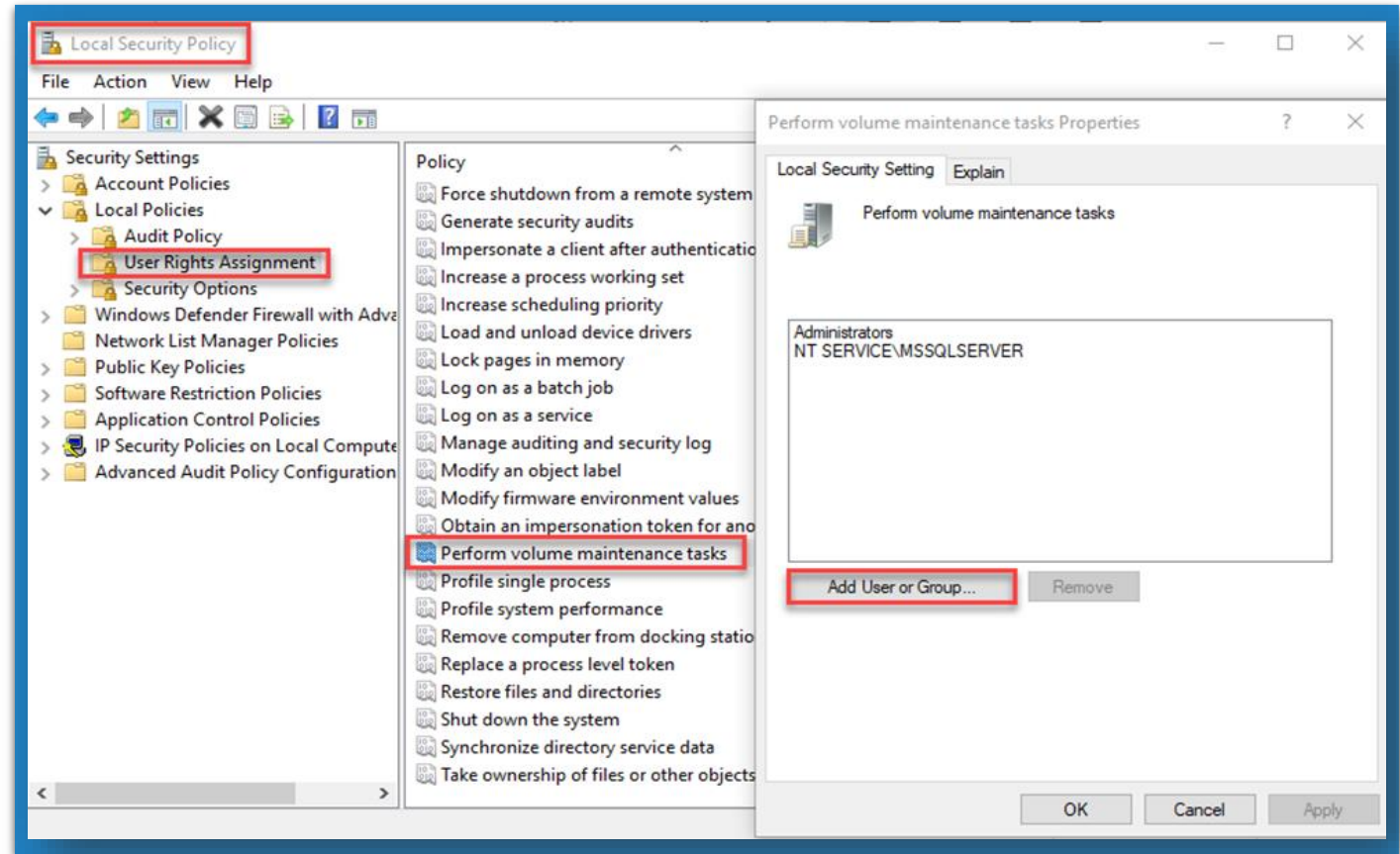
Add Data/Log Files



Increase File Size &
Autogrowth



Create Database



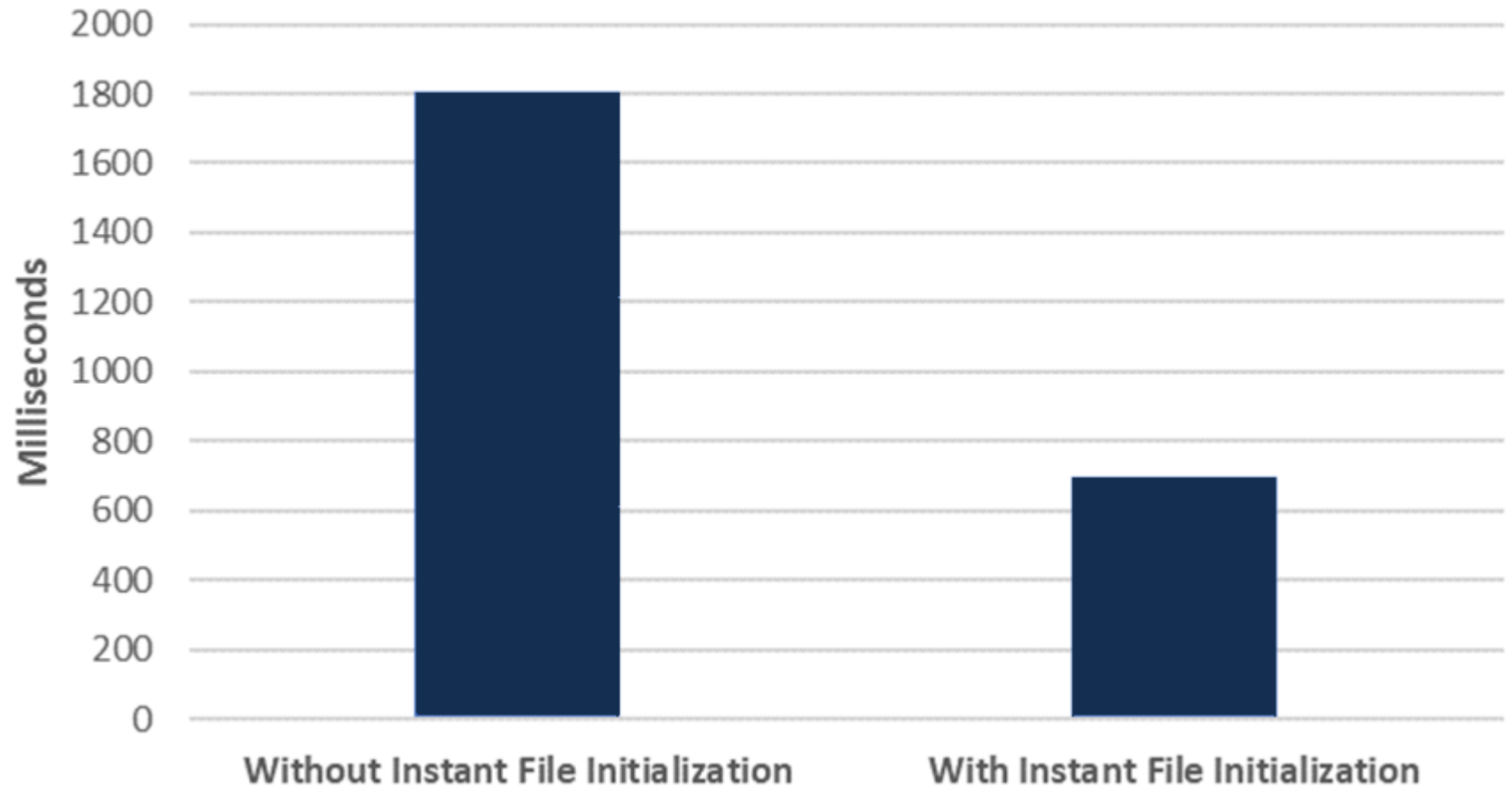
SQL Server service account **Perform Volume Maintenance Tasks** security policy in windows. Use AD Group Policy to grant this to service accounts in your domain

WINNING RESULTS



TURN IFI
ON

Create 5GB DB IFI Comparison



ALLOW SNAPSHOT ISOLATION & READ COMMITTED SNAPSHOT ISOLATION

Ta-dah!
Definitely Not Blocking
Azure SQL DB
WRITERS CAN'T BLOCK READERS



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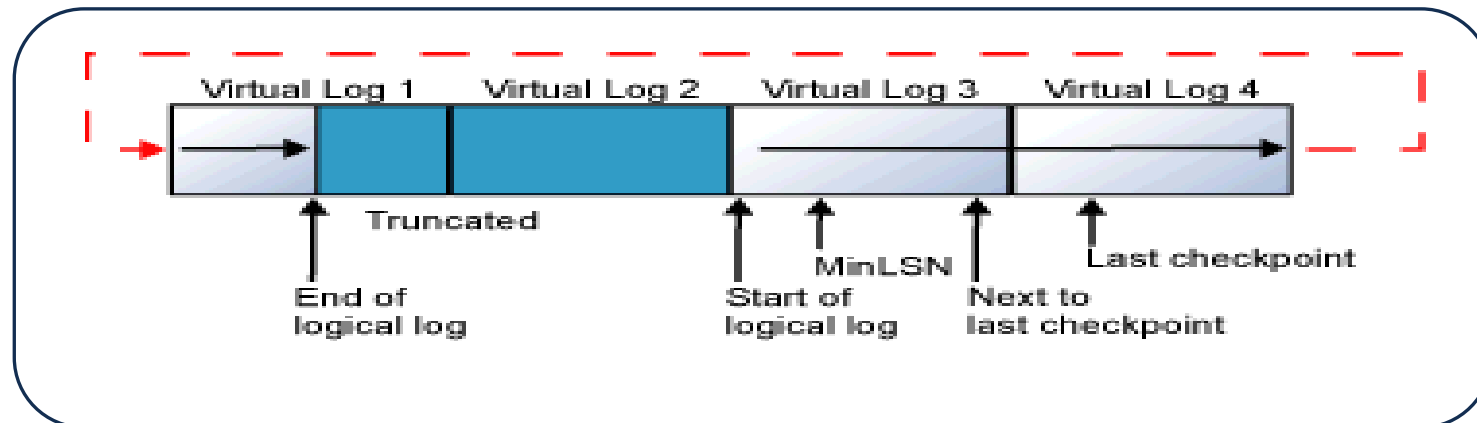
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UGLY BABIES

MAKE FRIENDS WITH NETWORK & STORAGE ADMINS

Their baby might be
UGLY





VIRTUAL ENVIRONMENTS

OVER PROVISIONED VMs & HOST

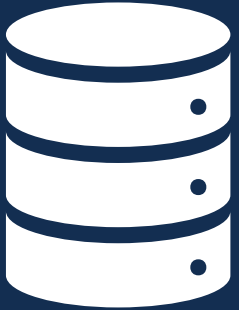
Too Many VMs on One Host

What Happens on One VM
Now Affects Another

VM Over/Under CPU Allocation

Watch [SOS_Scheduler_Yields](#) &
[CPU Ready Time](#)

Thin Provisioning



UGLY BABY
EXHIBT A

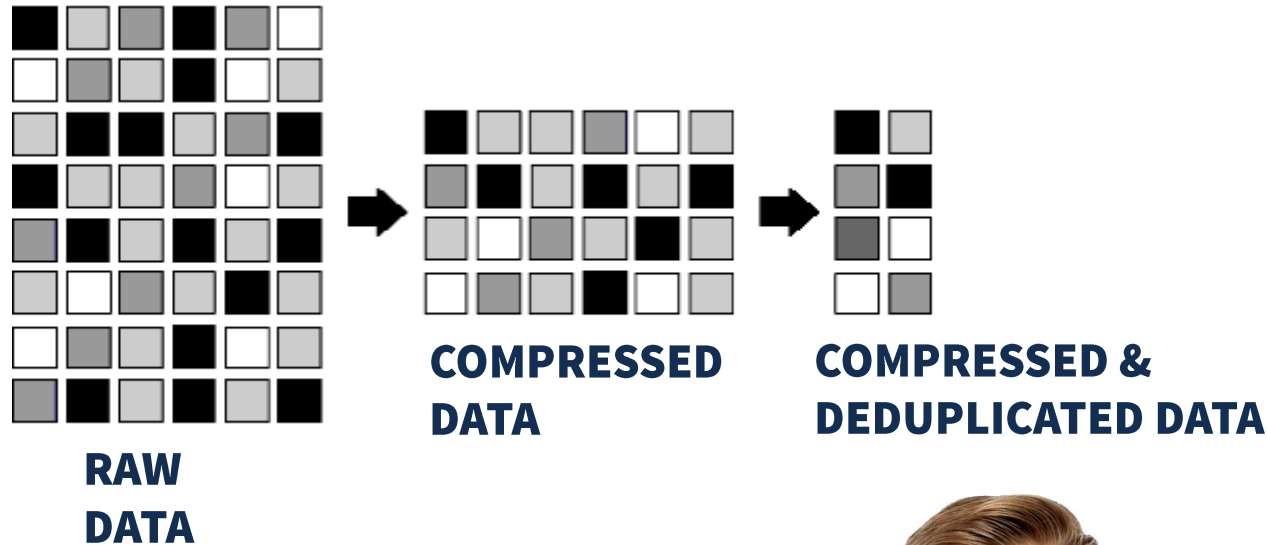




COMPRESSION

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



QUERY OPTIMIZER

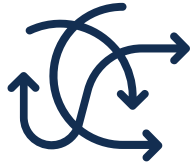
STATISTICS

This is the magic sauce that helps the optimizer



Maintain

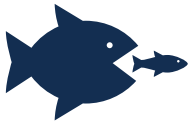
Keep These Up To Date!



Updates

Sync vs Async

Defaulted in
SQL 2016



Large Table

Trace Flag 2371



Missing
Stats

Did You Know You Can Make Your Own?

INDEXES

These are not set it and forget it



**Remove
UN-Used
Indexes**

Wasted Disk IO
Disable then
Delete



**Find Missing
Indexes**

Wasted Read IO
Avoid Duplicates
Don't Just ADD



Covering Indexes

Consolidate Indexes
Specific Tuning

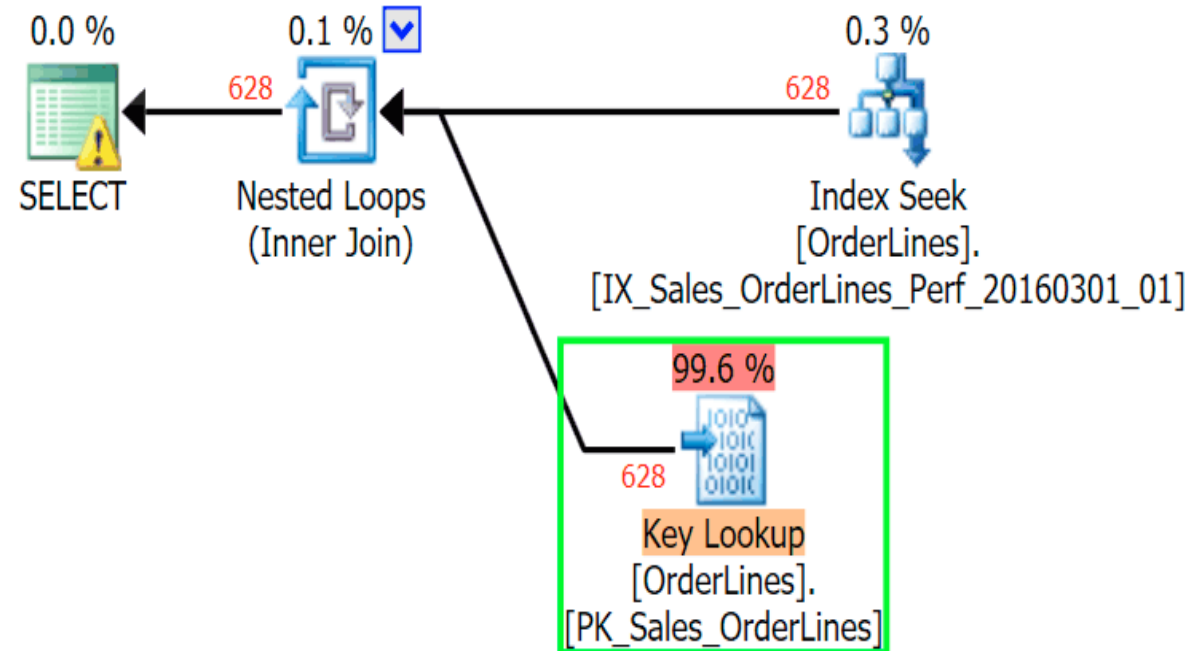
(Key Lookup)

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 Lookup**
 - Extra Reads
 - Easily Avoided in Most Cases
- Spills**
 - Spills to TempDB
 - Forced to go to Disk



Now go back
and do the
check list

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/in/sqlespresso



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& Associates Consulting

Your Data, Our Expertise
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