

Periodic Maintenance



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SQL SERVER DBA

@Kevin3NF



Overview



Health checks / Server inventory

Security reviews

Database inventory

Performance reviews

Demo

- Performance monitoring



Health Checks / Server Inventory



Health Check Consideration s

How to run a health / server check

- Manual
- sp_Blitz
- sp_configure

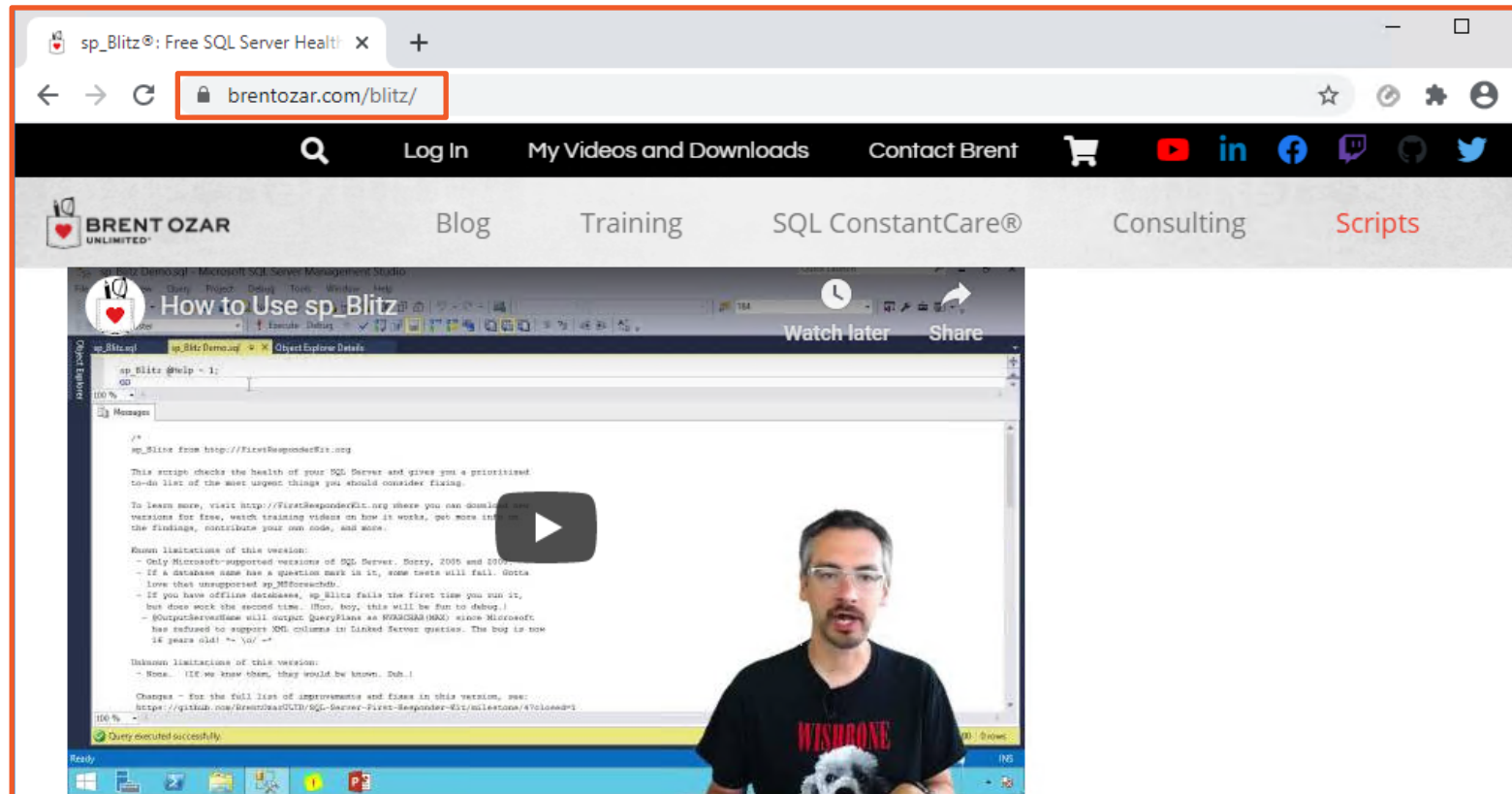
Frequency

Logging

- How
- Why



Sp_Blitz



Download it in **our free First Responder Kit.**

Common sp_Blitz parameters

@CheckUserDatabaseObjects = 0 – turns off database checks like heaps and triggers. This makes sp_Blitz run way faster on systems with hundreds of databases.

@OutputServerName, @OutputDatabaseName, @OutputSchemaName, @OutputTableName – you can write sp_Blitz's results to a central server for easier reporting, or just to a DBA utilities database on the same server.



Sp_Blitz

Object Explorer

Connect

PS1\SQL2019 (SQL Server 15.0.2000)

Databases

- System Databases
- Database Snapshots
- DBA
- dbatools-testrestore-Adven
- dbatools-testrestore-WideW
- StackOverflow

Security

Server Objects

Replication

PolyBase

Always On High Availability

Management

Integration Services Catalogs

SQL Server Agent

XEvent Profiler

SQLQuery1.sql - PS...(PS1\Kevin3NF (69))* sp_Blitz.sql - PS1\S...(PS1\Kevin3NF (68))

sp_Blitz

100 %

Results Messages

	Priority	FindingsGroup	Finding	DatabaseName
1	0	sp_Blitz Jul 12 2020 12:00AM	SQL Server First Responder Kit	NULL
2	1	Backup	Backups Not Performed Recently	DBA
3	1	Backup	Backups Not Performed Recently	dbatools-testrestore-AdventureWorks2016
4	1	Backup	Backups Not Performed Recently	dbatools-testrestore-WideWorldImporters
5	1	Backup	Backups Not Performed Recently	StackOverflow
6	1	Reliability	Last good DBCC CHECKDB over 2 weeks old	DBA
7	10	Performance	DBCC SHRINK% Ran Recently	NULL
8	10	Reliability	Server restarted in last 24 hours	NULL
9	50	DBCC Events	Overall Events	NULL
10	50	Reliability	Remote DAC Disabled	NULL
11	100	Performance	Fill Factor Changed	StackOverflow
12	100	Performance	Repetitive Steps In Maintenance Plans	NULL
13	100	Performance	The partitioned database dbatools-testrestore-Wi...	dbatools-testrestore-WideWorldImporters
14	150	Performance	Inactive Tables Without Clustered Indexes	dbatools-testrestore-AdventureWorks2016
15	150	Performance	Inactive Tables Without Clustered Indexes	dbatools-testrestore-WideWorldImporters
16	150	Performance	Stats Updated Asynchronously	dbatools-testrestore-WideWorldImporters
17	150	Performance	Triggers on Tables	dbatools-testrestore-AdventureWorks2016



Health Check Consideration s

How to run a health / server check

- Manual
- sp_Blitz
- sp_configure

Frequency

Logging

- How
- Why



sp_configure

The screenshot shows the SQL Server Enterprise Manager interface. On the left, the Object Explorer displays the server hierarchy for 'PS1\SQL2019 (SQL Server 15.0.2000.5 - F)'. The right pane shows a SQL query window with the following script:

```
-- Turn on advanced options
exec sp_configure 'Show advanced options',1
Reconfigure

-- Get all configuration items
exec sp_configure

-- Turn advanced options back off
exec sp_configure 'Show advanced options',0
Reconfigure
```

Below the query window, the 'Results' tab displays a table with 6 columns: 'name', 'minimum', 'maximum', 'config_value', and 'run_value'. The table contains 16 rows of configuration data.

	name	minimum	maximum	config_value	run_value
1	access check cache bucket count	0	65536	0	0
2	access check cache quota	0	2147483647	0	0
3	Ad Hoc Distributed Queries	0	1	0	0
4	ADR cleaner retry timeout (min)	0	32767	0	0
5	ADR Preallocation Factor	0	32767	0	0
6	affinity I/O mask	-2147483648	2147483647	0	0
7	affinity mask	-2147483648	2147483647	0	0
8	affinity64 I/O mask	-2147483648	2147483647	0	0
9	affinity64 mask	-2147483648	2147483647	0	0
10	Agent XPs	0	1	1	1
11	allow filesystem enumeration	0	1	1	1
12	allow polybase export	0	1	0	0
13	allow updates	0	1	0	0
14	automatic soft-NUMA disabled	0	1	0	0
15	backup checksum default	0	1	0	0
16	backup compression default	0	1	1	1



Health Check Consideration S

How to run a health / server check

- sp_Blitz
- sp_configure
- Manual

Frequency

Logging

- What
- Why
- How



Security Reviews



SQL Server Roles to Check

The following table shows the fixed server-level roles and their capabilities.

Fixed server-level role	Description
sysadmin	Members of the sysadmin fixed server role can perform <u>any activity</u> in the server.
serveradmin	Members of the serveradmin fixed server role can change server-wide configuration options and shut down the server.
securityadmin	<p>Members of the securityadmin fixed server role manage logins and their properties. They can GRANT, DENY, and REVOKE server-level permissions. They can also GRANT, DENY, and REVOKE database-level permissions if they have access to a database. Additionally, they can reset passwords for SQL Server logins.</p> <p>IMPORTANT: The ability to grant access to the Database Engine and to configure user permissions allows the security admin to assign most server permissions.</p> <p>The securityadmin role should be treated as equivalent to the sysadmin role.</p>



Checking for Incorrect Role Assignment -

Manual

The screenshot displays the SQL Server Enterprise Manager interface. On the left, the Object Explorer shows the 'Server Roles' folder expanded, with 'sysadmin' highlighted by a red rectangle. An orange arrow points from this rectangle to the 'Members' tab of the 'Server Role Properties - sysadmin' window on the right. The 'Members' tab shows a list of role members, with 'Ima_Developer' selected and highlighted in blue.

Object Explorer

- PS1\SQL2019 (SQL Server 15.0.2000.5 - F)
- Databases
 - System Databases
 - Database Snapshots
 - DBA
 - StackOverflow
- Security
 - Logins
 - Server Roles
 - bulkadmin
 - dbcreator
 - diskadmin
 - processadmin
 - public
 - securityadmin
 - serveradmin
 - setupadmin
 - sysadmin**
 - Credentials
 - Cryptographic Providers

Server Role Properties - sysadmin

Ready

Select a page

- Members

Script | Help

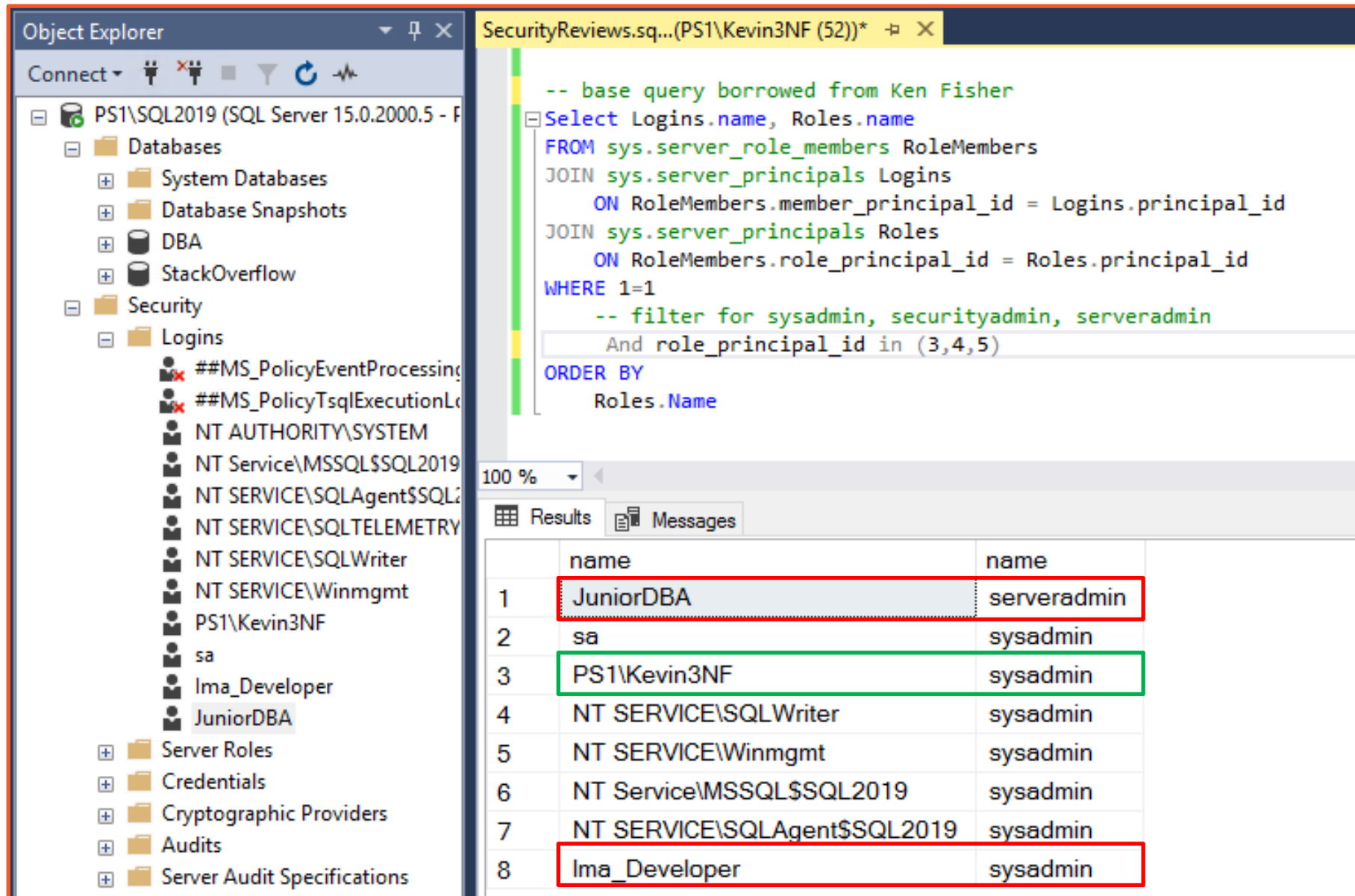
Server role name: sysadmin

Members of this role:

Role Members	
sa	
PS1\Kevin3NF	
NT SERVICE\SQLWriter	
NT SERVICE\Winmgmt	
NT Service\MSSQL\$SQL2019	
NT SERVICE\SQLAgent\$SQL2019	
Ima_Developer	



Checking for Incorrect Role Assignment – T-



The screenshot displays the SQL Server Enterprise Manager interface. On the left, the Object Explorer shows the 'Logins' folder expanded under 'Security'. The right pane shows a SQL query window with a query that filters for specific roles. Below the query, the 'Results' tab shows a table with two columns: 'name' and 'name'. The table lists eight entries, with some highlighted by red and green boxes.

```
-- base query borrowed from Ken Fisher
Select Logins.name, Roles.name
FROM sys.server_role_members RoleMembers
JOIN sys.server_principals Logins
  ON RoleMembers.member_principal_id = Logins.principal_id
JOIN sys.server_principals Roles
  ON RoleMembers.role_principal_id = Roles.principal_id
WHERE 1=1
      -- filter for sysadmin, securityadmin, serveradmin
      And role_principal_id in (3,4,5)
ORDER BY
  Roles.Name
```

	name	name
1	JuniorDBA	serveradmin
2	sa	sysadmin
3	PS1\Kevin3NF	sysadmin
4	NT SERVICE\SQLWriter	sysadmin
5	NT SERVICE\Winmgmt	sysadmin
6	NT Service\MSSQL\$SQL2019	sysadmin
7	NT SERVICE\SQLAgent\$SQL2019	sysadmin
8	Ima_Developer	sysadmin



Database Inventory



Database Properties – Manual

The screenshot shows the SQL Server Enterprise Manager interface. On the left, the 'Object Explorer' pane displays the server hierarchy for 'PS1\SQL2019 (SQL Server 15.0.2000.5 - F)'. The 'StackOverflow' database is highlighted with a red box. The main pane shows the 'Database Properties - StackOverflow' dialog box, with the 'Options' tab selected. The 'Automatic' section is expanded, showing a table of database options. The 'Auto Close' option is highlighted with a red box.

Object Explorer

- PS1\SQL2019 (SQL Server 15.0.2000.5 - F)
 - Databases
 - System Databases
 - Database Snapshots
 - DRA
 - StackOverflow**
 - Security
 - Logins
 - Server Roles
 - Credentials
 - Cryptographic Providers
 - Audits
 - Server Audit Specifications
 - Server Objects
 - Replication
 - PolyBase
 - Always On High Availability
 - Management
 - Integration Services Catalogs
 - SQL Server Agent
 - XEvent Profiler

Database Properties - StackOverflow

Select a page: General, Files, Filegroups, **Options**, Change Tracking, Permissions, Extended Properties, Mirroring, Transaction Log Shipping, Query Store

Collation: SQL_Latin1_General_CP1_CI_AS
Recovery model: Full
Compatibility level: SQL Server 2008 (100)
Containment type: None

Other options:

Automatic	
Auto Close	False
Auto Create Incremental Statistics	False
Auto Create Statistics	True
Auto Shrink	False
Auto Update Statistics	True
Auto Update Statistics Asynchronously	False

Containment	
Default Fulltext Language LCID	1033
Default Language	English
Nested Triggers Enabled	True
Transform Noise Words	False
Two Digit Year Cutoff	2049

Cursor	
Close Cursor on Commit Enabled	False
Default Cursor	GLOBAL

Database Scoped Configurations	
Legacy Cardinality Estimation	OFF
Legacy Cardinality Estimation For Secondary	PRIMARY
Max DOP	0

Auto Close

Server: PS1\SQL2019
Connection: PS1\Kevin3NF
[View connection properties](#)

Progress: Ready

OK Cancel



Database Properties - T-SQL

Object Explorer

Connect

sys.databases

Columns

- name (sysname(nvarchar(128)), null)
- database_id (int, not null)
- source_database_id (int, null)
- owner_sid (varbinary(85), null)
- create_date (datetime, not null)
- compatibility_level (tinyint, not null)
- collation_name (sysname(nvarchar(128)))
- user_access (tinyint, null)
- user_access_desc (nvarchar(60), null)
- is_read_only (bit, null)
- is_auto_close_on (bit, not null)
- is_auto_shrink_on (bit, null)

SQLQuery5.sql - PS...(PS1\Kevin3NF (69))*

```
Select [name]
From master.sys.databases
```

100 %

Results Messages

	name	database_id	create_date	compat...	is_read_only	is_auto_close_on	is_auto_shrink_on	state_desc
1	master	1	2003-04-08 09:13:36.390	150	0	0	0	ONLINE
2	tempdb	2	2020-07-26 17:36:09.857	150	0	0	0	ONLINE
3	model	3	2003-04-08 09:13:36.390	150	0	0	0	ONLINE
4	msdb	4	2019-09-24 14:21:42.270	150	0	0	0	ONLINE
5	StackOverflow	5	2020-07-16 20:43:40.733	100	0	0	0	ONLINE
6	DBA	6	2020-06-26 17:05:34.417	150	0	0	0	ONLINE

Master.sys.Databases

Master.sys.sysdatabases



Performance Reviews



Index Info

Missing indexes

Index usage / unused

sp_BlitzIndex

Duplicate index query



Missing Indexes

```
--Missing Indexes
SELECT
    db_name(mid.database_id) as [dbname],
    Right(Mid.statement, (PATINDEX('%.%', (reverse(mid.statement))))-1) as [table],
    migs.avg_total_user_cost * (migs.avg_user_impact / 100.0) * (migs.user_seeks + migs.user_scans)
    as [improvement_measure],
    migs.user_seeks, migs.last_user_seek, migs.avg_total_user_cost, migs.avg_user_impact,
    mid.database_id
    , 'CREATE INDEX [missing_index_' + CONVERT (varchar, mig.index_group_handle) + '_' + CONVERT (v
    + '_' + LEFT (PARSENAME(mid.statement, 1), 32) + ']'
    + ' ON ' + mid.statement
    + ' (' + ISNULL (mid.equality_columns, '')
    + CASE WHEN mid.equality_columns IS NOT NULL AND mid.inequality_columns IS NOT NULL THEN ',' E
    + ISNULL (mid.inequality_columns, '')
    + ')'
    + ISNULL (' INCLUDE (' + mid.included_columns + ')', '') AS create_index_statement
FROM sys.dm_db_missing_index_groups mig
    INNER JOIN sys.dm_db_missing_index_group_stats migs ON migs.group_handle = mig.index_group_han
    INNER JOIN sys.dm_db_missing_index_details mid ON mig.index_handle = mid.index_handle
WHERE 1=1
    and migs.user_seeks > 100
ORDER BY migs.avg_total_user_cost * migs.avg_user_impact * (migs.user_seeks + migs.user_scans) DES
```

Results		Messages				
dbname	table	improvement_measure	user_seeks	last_user_seek	avg_total_user_cost	avg_user_impact
sigma	[PropertyRegistrations]	3047945.01641318	1990145	2020-07-28 08:56:47.787	1.60100258040583	95.66
	[PropertyRegistrations]	230892.181144044	152180	2020-07-22 10:46:45.580	1.58623187334862	95.65
	jh [Apartments]	117404.341941506	78948	2020-07-13 19:24:38.267	9.9140651180951	15
jh	[RegistrationUpdates]	54616.4514746059	1622	2020-07-23 12:14:30.433	260.621425764383	12.92
	[Apartments]	45957.3946306588	38094	2020-07-28 07:23:42.483	4.15720474752368	29.02
	[MovingNotes]	33090.7002098362	11518	2020-07-28 08:32:53.923	2.89029717546782	99.4
	[MovingInformation]	22392.6175969003	7706	2020-07-28 08:32:36.060	4.1889402376197	69.37
sigma	[MovingInformation]	22135.7471641	7559	2020-07-28 08:32:36.060	4.18342319734281	70

Unused Indexes

SQLQuery2.sql - (lo...m01\kevin.hill (63)) * 15_Unused_Indexes.S...1\kevin.hill (124)) * 14_

```
SELECT TOP 50
    i.name AS IndexName
    , dm_ius.user_seeks AS UserSeek
    , dm_ius.user_scans AS UserScans
    , dm_ius.user_updates AS UserUpdates
    , p.TableRows
    , p.TableRows * dm_ius.user_updates as [Impact]
FROM sys.dm_db_index_usage_stats dm_ius
INNER JOIN sys.indexes i ON i.index_id = dm_ius.index_id
    AND dm_ius.OBJECT_ID = i.OBJECT_ID
INNER JOIN sys.objects o ON dm_ius.OBJECT_ID = o.OBJECT_ID
INNER JOIN sys.schemas s ON o.schema_id = s.schema_id
INNER JOIN (SELECT SUM(p.rows) TableRows, p.index_id, p.OBJECT_ID
            FROM sys.partitions p
            GROUP BY p.index_id, p.OBJECT_ID) p
    ON p.index_id = dm_ius.index_id AND dm_ius.OBJECT_ID = p.OBJECT_ID
WHERE
    OBJECTPROPERTY(dm_ius.OBJECT_ID, 'IsUserTable') = 1
    AND dm_ius.database_id = DB_ID()
    AND i.is_unique_constraint = 0
ORDER BY
    dm_ius.user_seeks
    , dm_ius.user_scans
    , p.TableRows * dm_ius.user_updates DESC
```

100 %

Results Messages

	IndexName	UserSeek	UserScans	UserUpdates	TableRows	Impact
7	PK_PhoneNoSubscrib...	0	0	1518	131348	199386264
8	_cta_index_PhoneSu...	0	0	1518	131348	199386264
9	IX_UserPhoneCalls_in...	0	0	1	11267378	11267378
10	IX_UserPhoneCalls_c...	0	0	1	11267378	11267378
11	NULL	0	0	10	365284	3652840
12	NULL	0	0	16	1658	26528
13	PK11	0	0	17	971	16507



sp_BlitzIndex

exec DBA..sp_BlitzIndex @DatabaseName = , @TableName =													
100 %													
Results Messages													
Details: db_schema.table.index(indexid) Definition: [Property] ColumnName {datatype maxbytes} Secret Columns Usage Stats													
1	Database as of 2020-07-28 09:17 (sp_Blitz...				http://FirstResponderKit.org				From Your Community Volunteers				
2	dbo.PropertyRegistrations.Unknown (0)				[HEAP]				[RID]				
3	dbo.PropertyRegistrations.CK_PropertyRegistratio...				[2 KEYS] RegID {int }, isRegistered {bit } [5 INCLUD...				[1 KEY] [RID]				
Reads: 5,147,365 (78 scan 5,147,287 lookup) Writes:546,471													
Reads: 5,693,809 (5,693,786 seek 23 scan) Writes:546,471													
<													
Finding Estimated Benefit Missing Index Request Estimated Impact													
1	Missing index.].[dbo].[PropertyRegistrations] Est. Bene...				EQUALITY: [RegID], [isRegistered] INCLUDES: [AInl...				1,990,590 uses; Impact: 95.7%; Avg query cost: 1.6010		
	Column Name	Found In	Type	Computed?	Length (max bytes)	Prec	Scale	Nullable?	Identity?	Replicated?	Sparse?	Filestream?	
1	AInID	1	int		4	10	0						
2	RegID	1	int		4	10	0						
3	LocatorID	0	int		4	10	0						
4	clientFirstname	1	varchar (31)		31	0	0						
5	clientLastname	1	varchar (31)		31	0	0						
6	propertyRegistrationType	1	int		4	10	0						
7	registrationRequested	0	datetime		8	23	3						
8	isRegistered	1	bit		1	1	0						
9	registeredAt	1	datetime		8	23	3	yes					

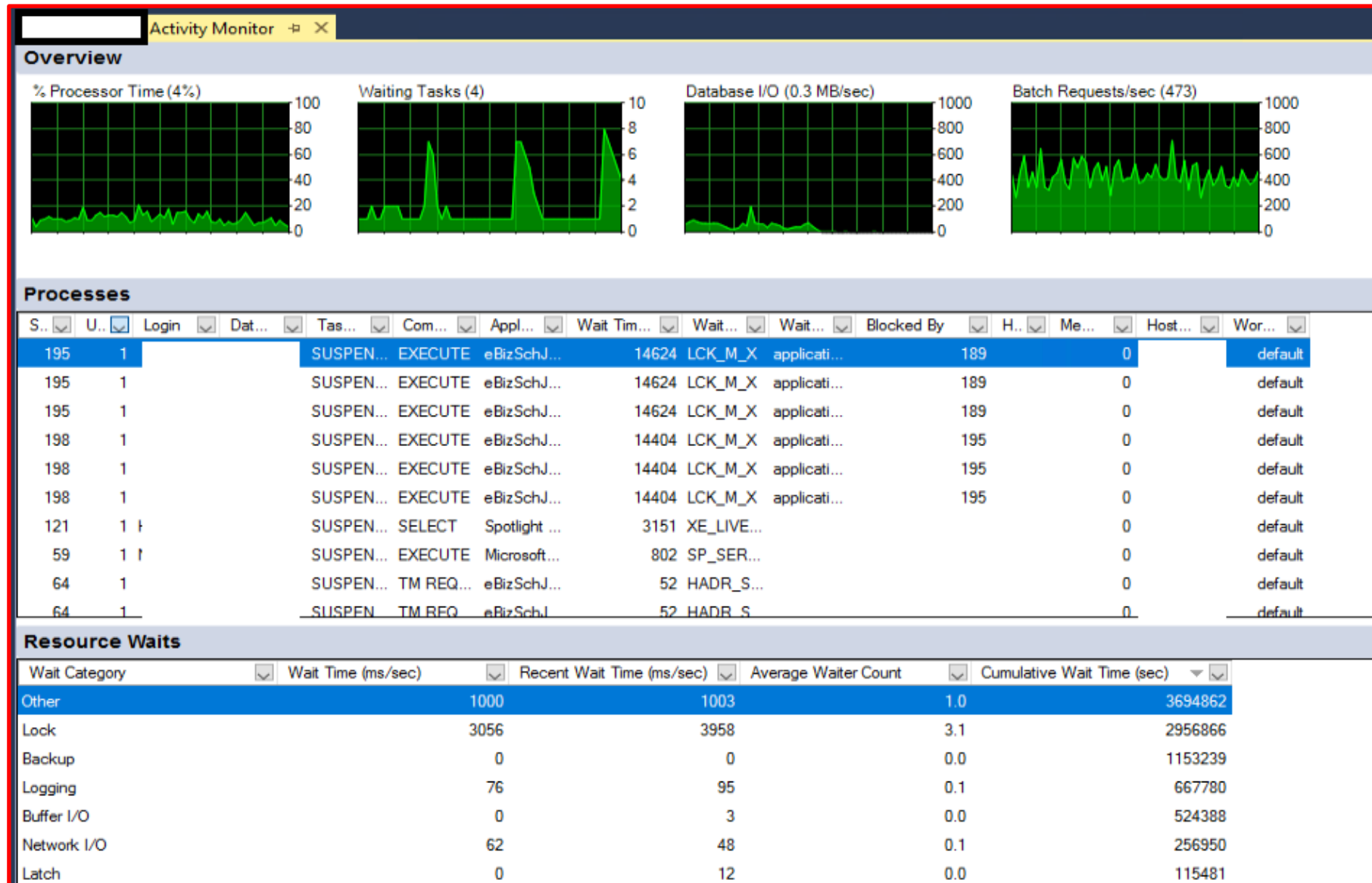


Query
Performance

Activity Monitor
Sp_WhoIsActive



Activity Monitor



Sp_WhoIsActive

SQLQuery1.sql - USD...er (HQ\khill (126))*

sp_whoisactive

100 %

Results Messages

	database_name	dd hh:mm:ss.mss	session_id	sql_text	wait_info	CPU	blocking_session_id	reads	writes	physical_reads
1	master	38 05:33:45.000	59	<?query -- sp_server_diagnostics --?>	(248ms)SP_SERVER_DIAGNOSTICS_SLEEP	0	NULL	0	0	0
2	master	27 09:48:26.000	121	<?query -- SELECT type_data FROM sys.fn_MSxte_read ...	(2209ms)XE_LIVE_TARGET_TVF	2,028,804	NULL	0	0	0
3	master	00 00:01:43.997	87	<?query -- RESTORE VERIFYONLY FROM DISK = N'\\1...	(29429ms)BACKUPTHREAD	1,601	NULL	16,797	28	675,323
4	Reporting	00 00:01:41.504	125	<?query -- SELECT DISTINCT TOP (@orderCount) o.O...	NULL	NULL	NULL	NULL	NULL	NULL
5	Reporting	00 00:01:40.660	150	<?query -- CREATE PROCEDURE [CustomerEligibility]f...	NULL	NULL	NULL	NULL	NULL	NULL
6	Reporting	00 00:00:01.087	108	<?query -- SELECT o.OrderID , @JobGU...	NULL	NULL	NULL	NULL	NULL	NULL
7	Reporting	00 00:00:00.284	238	<?query -- INSERT INTO @resultTable SELECT r...	NULL	NULL	NULL	NULL	NULL	NULL



Resource Utilization

```
SELECT
    a.object_name
    ,a.counter_name
    --,a.cnt_value
    ,(a.cnt_value * 1.0 / b.cnt_value) * 100.0 as BufferCacheHitRatio
FROM sys.dm_os_performance_counters a
JOIN (SELECT cnt_value,OBJECT_NAME
      FROM sys.dm_os_performance_counters
      WHERE counter_name Like 'Buffer cache hit ratio base%'
      AND OBJECT_NAME Like '%Buffer Manager%') b ON a.OBJECT_NAME = b.OBJECT_NAME
WHERE 1=1
      AND a.counter_name Like 'Buffer cache hit ratio%'
      AND a.OBJECT_NAME Like '%Buffer Manager%'
      AND counter_name not like '%Buffer Cache Hit Ratio Base%'
```

	object_name	counter_name	instance_name	cnt_value	cnt_type
1	SQLServer:Buffer Manager	Page life expectancy		762	65792

	object_name	counter_name	BufferCacheHitRatio
1	SQLServer:Buffer Manager	Buffer cache hit ratio	99.8561013046815

	Sample_Time	SQLServer_CPU_Utilization	Other_Process_CPU_Utilization	Total_CPU_Utilization
1	2020-07-28 14:42:26.657	8	4	12
2	2020-07-28 14:41:26.530	15	4	19
3	2020-07-28 14:40:26.400	11	4	15
4	2020-07-28 14:39:26.253	13	4	17
5	2020-07-28 14:38:26.127	11	4	15
6	2020-07-28 14:37:26.023	22	4	26
7	2020-07-28 14:36:25.880	16	5	21
8	2020-07-28 14:35:25.780	8	3	11
9	2020-07-28 14:34:25.643	8	5	13
10	2020-07-28 14:33:25.490	13	4	17
11	2020-07-28 14:32:25.347	9	4	13
12	2020-07-28 14:31:25.243	19	4	23
13	2020-07-28 14:30:25.083	9	4	13



Sp_BlitzCache

SQLQuery6.sql - PS...(PS1\Kevin3NF (71))* - X SQLQuery5.sql - PS...(PS1\Kevin3NF (69))*											
sp_BlitzCache @ExpertMode = 1, @SkipAnalysis = 1, @SortOrder = 'Avg Duration', @Top = 15											
100 %											
Results Messages											
	Database	Cost	Query Text	Query Type		# Executions	Executions / Minute	Total CPU (ms)	Avg CPU (ms)	Total Duration (ms)	Avg Duration (ms)
1	DBA	NULL	CREATE PROCEDURE [dbo].[IndexOp...	Procedure or Fun...		3	0	741544	247181	23067213	7689071
2	DBA	NULL	CREATE PROCEDURE [dbo].[Comma...	Procedure or Fun...		8	0	709185	88648	12184663	1523082
3	DBA	NULL	CREATE PROCEDURE [dbo].[Databas...	Procedure or Fun...		25	0	17996868	719874	32210053	1288402
4	StackOverflow	NULL	INSERT INTO dbo.Posts ([AcceptedA...	Statement		1	0	21771	21771	281415	281415
5	DBA	NULL	CREATE PROCEDURE [dbo].[Comma...	Procedure or Fun...		163	0	18008382	110480	32347920	198453
6	DBA	NULL	SELECT @ParamFragmentationLevel ...	Statement		57	0	31596	554	10880816	190891
7	DBA	NULL	CREATE PROCEDURE [dbo].[Databas...	Procedure or Fun...		3	0	12608	4202	142482	47494
8	StackOverflow	NULL	INSERT INTO [dbo].[Users] ([AboutM...	Statement		1	0	602	602	13001	13001
9	StackOverflow	NULL	INSERT INTO dbo.Posts ([AcceptedA...	Statement		691	1	331285	479	4078653	5902
10	StackOverflow	NULL	SELECT SCHEMA_NAME(sp.schema_...	Statement		1	0	104	104	299	299
11	StackOverflow	NULL	SELECT db_id() as database_id, ...	Statement		3	0	280	93	710	236
12	DBA	NULL	SELECT SCHEMA_NAME(sp.schema_...	Statement		4	0	380	95	738	184
13	StackOverflow	NULL	SELECT SCHEMA_NAME(udf.schema...	Statement		1	0	40	40	117	117
14	DBA	NULL	INSERT INTO @tmpIndexesStatistics (...	Statement		6	0	511	85	575	95
15	DBA	NULL	INSERT INTO ##BlitzCacheProcs (SPI...	Statement		1	0	89	89	90	90



Demo



Performance monitoring

- Activity monitor
- Sp_WhoIsActive



Summary



What did we learn?

- Server inventories
- Security monitoring
- Database inventories
- Performance monitoring
- Activity monitor vs. `sp_whoisactive`

