

# Daily Maintenance

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**Kevin Hill**

SQL SERVER DBA

@Kevin3NF



# SQL Server Backups

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# Backup

“A copy of data that can be used to restore *and recover* the data after a failure.”

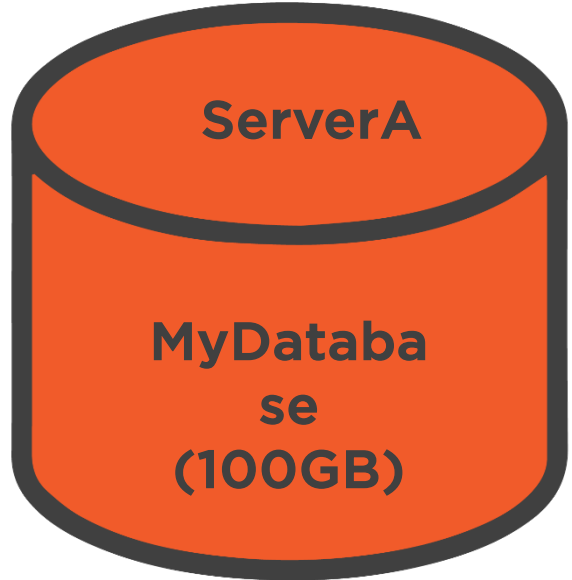
-- [docs.Microsoft.com](https://docs.microsoft.com) (emphasis mine)



Ensuring proper backups is  
a critical part of the DBA's  
job.



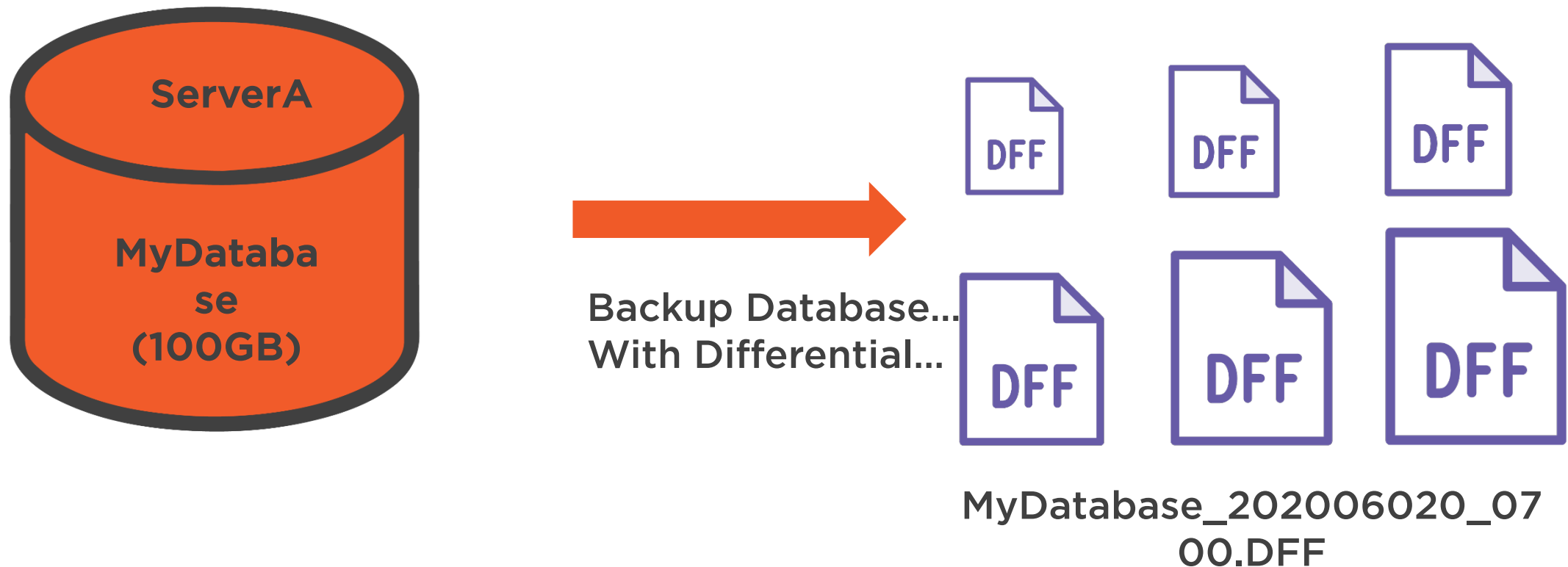
Full Backup: A copy of every non-empty page in the database



Backup Database... MyDatabase\_202006019\_070  
0.BAK  
(5GB when compressed)



Differential Backup – A copy of every data page that has changed since the last full backup.



Log Backup – a copy of everything in the Transaction Log since the last full backup – or – since the last log backup



MyDatabase\_Log.LDF



Sunday



Monday



Tuesday



Wednesday



Thursday



Friday



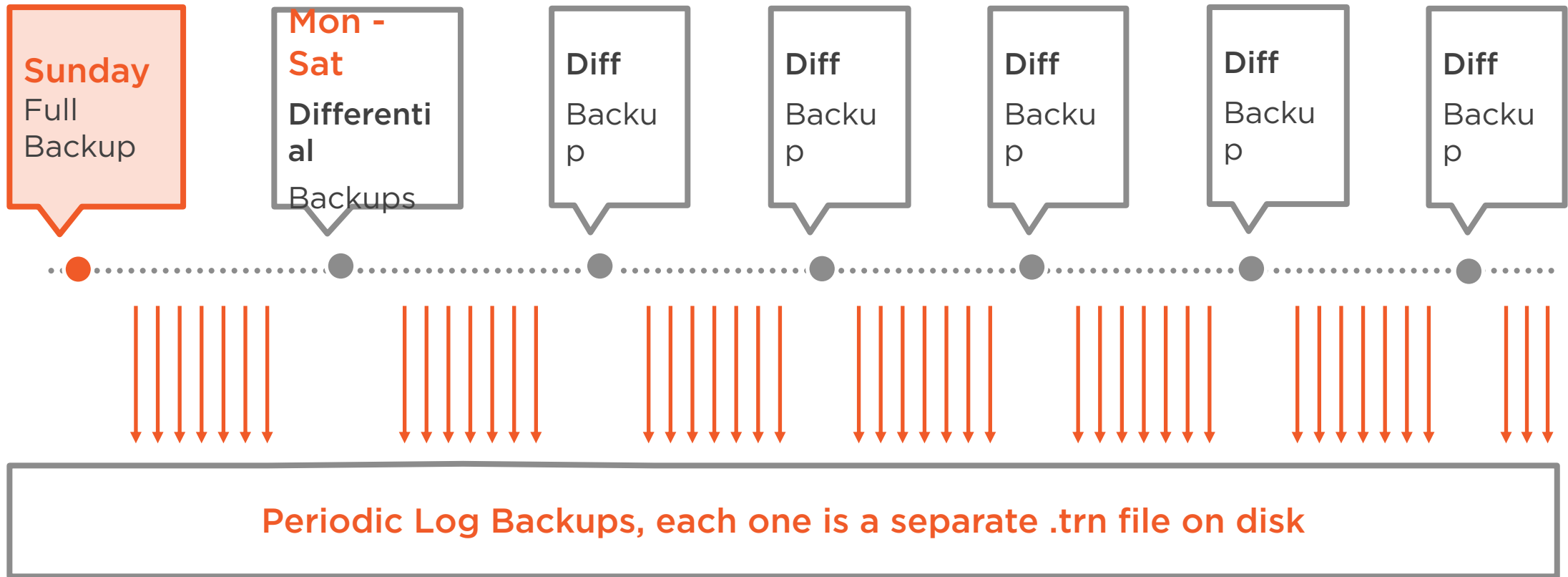
Saturday



MyDatabase\_20200620\_07  
00.TRN



# One Week Backup Timeline





# Recovery Models

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# Recovery Model

“A *recovery model* is a database property that controls how transactions are logged, whether the transaction log requires (and allows) backing up, and what kinds of restore operations are available”

-- [docs.microsoft.com](https://docs.microsoft.com)



## Recovery Models

### Full

- Every transaction is logged



# Database Properties

Database Properties - StackOverflow

Select a page

- General
- Files**
- Filegroups
- Options
- Change Tracking
- Permissions
- Extended Properties
- Mirroring
- Transaction Log Shipping
- Query Store

Script Help

Database name: StackOverflow

Owner: sa

☒ Use full-text indexing

Database files:

Logical Name	File Type	Filegroup	Size (MB)	Autogrowth / Maxsize	Path	File Name
StackOverflow	ROWS Data	PRIMARY	40000	By 1024 MB, Unlimited	D:\Data	StackOverflow.mdf
StackOverflow2	ROWS Data	Secondary	16384	By 1024 MB, Unlimited	D:\Data	StackOverflow2.ndf
StackOverflow_log	LOG	Not Applicable	1044	By 1024 MB, Limited to 2097152 MB	D:\Data	StackOverflow_log.ldf



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# Database Properties

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## Recovery Models

### Full

- Every transaction is logged

### Simple

- Transactions are logged short term

### Bulk-Logged

- Bulk Import operations are minimally logged



# More Backup Concepts

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# RPO and RTO

## **RPO - Recovery Point Objective**

**The amount of data loss that is acceptable in the event of a disaster.**

## **RTO - Recovery Time Objective**

**The amount of time a system can be down during a disaster.**



# Backup Scheduling

**Time of day**

**Frequency**



# Backup Locations

**Local Drive**

**File share / UNC**

**Cloud Storage**

**Tape**



# Backup Retention Considerations

**Restore Speed**

**Legal / SLA**

**Hot, Warm, or  
Cold?**



Backup  
Consideration  
s for  
Advanced  
Features

**Replication**

**Availability Groups**

**Failover Cluster Instances**



# Server Checks

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# Daily Checks

**Backup History**



# Backup History

Object Explorer Details

Back Forward Search

KBH-PRECISION\SQL2016 (SQL Server 13.0.1601.5 - KBH-PRECISION\Kevin)\Databases

Name	Name	Recovery Model	Last Backup Date	Last Log Backup Date
KBH-PRECISION\SQL2016	System Databases			
KBH-PRECISION\SQL2016	Database Snapshots			
DBA	DBA	Simple	5/29/2020 7:49 AM	
SQLWATCH	SQLWATCH	Simple	5/29/2020 7:49 AM	
StackOverflow	StackOverflow	Full	6/14/2020 8:36 AM	6/1/2020 2:03 PM
VLF1	VLF1	Full	5/29/2020 7:49 AM	6/1/2020 2:13 PM
VLF2	VLF2	Full	5/29/2020 7:49 AM	6/1/2020 2:03 PM
XE_demo	XE_demo	Full	5/29/2020 7:49 AM	6/1/2020 2:03 PM

## Object Explorer Details

backupHistory.sql...ECISION\Kevin (60) Object Explorer Details

```
USE msdb;
GO
SELECT
    [backup_start_date],
    [database_name],
    [type],
    [backup_size]/1024/1024/1024 as [backup size (GB)],
    [compressed_backup_size]/1024/1024/1024 as [Compressed backup size (GB)],
    [physical_device_name] as [Backup location]
FROM msdb..backupset
    join msdb..backupmediafamily bmf
    on backupset.media_set_id = bmf.media_set_id
WHERE 1=1
    --and type = 'D'
ORDER BY
    backup_start_date DESC
```

## Sample T-SQL Code





# Daily Checks

**Backup History**

**Job History**



# Job History

Agent Job Activity:

Name ^	Enabled	Status	Last Run Outcome	Last Run
CommandLog Cleanup	yes	Idle	Succeeded	6/28/2020 12:01:00 AM
DatabaseBackup - SYSTEM_DATABASES - FULL	yes	Idle	Succeeded	7/3/2020 12:05:00 AM
DatabaseBackup - USER_DATABASES - DIFF	yes	Idle	Succeeded	7/3/2020 12:15:00 AM
DatabaseBackup - USER_DATABASES - FULL	yes	Idle	Succeeded	6/28/2020 12:15:00 AM
DatabaseBackup - USER_DATABASES - LOG	yes	Idle	Succeeded	7/3/2020 5:00:00 PM
DatabaseIntegrityCheck - SYSTEM_DATABASES	yes	Idle	Succeeded	7/2/2020 11:00:00 PM
DatabaseIntegrityCheck - USER_DATABASES	no	Idle	Canceled	6/27/2020 11:00:00 PM
IndexOptimize - USER_DATABASES	yes	Idle	Succeeded	7/2/2020 10:00:00 PM
Insert Data	yes	Idle	Succeeded	7/3/2020 7:45:00 PM
Output File Cleanup	yes	Idle	Succeeded	7/3/2020 12:00:00 AM
sp_delete_backuphistory	yes	Idle	Succeeded	7/3/2020 12:00:00 AM
sp_purge_jobhistory	yes	Idle	Succeeded	7/3/2020 12:00:00 AM
syspolicy_purge_history	yes	Idle	Succeeded	7/3/2020 2:00:00 AM
WhoIsActive_Logging	yes	Idle	Succeeded	7/3/2020 7:49:00 PM

Job Activity Monitor

SQLQuery9.sql - PS...(PS1\Kevin3NF (56))\* X SQLQuery8.sql - P

```
Select
    j.[name],
    jh.step_name,
    run_status,
    run_date,
    run_time,
    run_duration,
    [server]
From [msdb].[dbo].[sysjobhistory] jh
join [msdb].[dbo].[sysjobs] j
on jh.job_id = j.job_id
Where 1=1
    and run_status not in (1,4)
    and run_date > 20171110 -- Change date
    and [step_name] <> '(Job outcome)'
    -- and run_time > 60000
Order by
    run_date desc,
    run_time desc
```

Sample T-SQL Code



# Daily Checks

**Backup History**

**Job History**

**SQL ErrorLog**



# SQL Server ERRORLOG

Log File Viewer - PS1\SQL2019

Select logs

- ☒ SQL Server
  - ☒ Current - 6/27/2020 4:42:00 PM
  - ☐ Archive #1 - 6/27/2020 4:33:00 PM
  - ☐ Archive #2 - 6/15/2020 2:00:00 AM
  - ☐ Archive #3 - 6/14/2020 12:16:00 AM
  - ☐ Archive #4 - 6/14/2020 12:02:00 AM
  - ☐ Archive #5 - 6/4/2020 12:01:00 AM
  - ☐ Archive #6 - 6/3/2020 1:07:00 PM
- ☐ SQL Server Agent
- ☐ Database Mail
- ☐ Windows NT

Status

Last Refresh: 6/27/2020 7:39:11 PM

Filter: None

[View filter settings](#)

Progress

☒ Done (80 records).

Log file summary: No filter applied

Date	Source	Message
6/27/2020 7:00:04 PM	Backup	Log was backed up. Database: StackOverflow, creation date(time): 2020/06/14(18:23:36), first LSN: 4595:2202:1, last LSN: 4595:10965:1, r
6/27/2020 6:00:03 PM	Backup	Log was backed up. Database: StackOverflow, creation date(time): 2020/06/14(18:23:36), first LSN: 4594:123878:1, last LSN: 4595:2202:1,
6/27/2020 5:00:05 PM	Backup	Log was backed up. Database: StackOverflow, creation date(time): 2020/06/14(18:23:36), first LSN: 4594:118198:1, last LSN: 4594:123878
6/27/2020 4:46:32 PM	spid52	Using 'xpstar.dll' version '2019.150.2000' to execute extended stored procedure 'xp_regread'. This is an informational message only; no user ac
6/27/2020 4:46:32 PM	spid52	Attempting to load library 'xpstar.dll' into memory. This is an informational message only. No user action is required.
6/27/2020 4:46:30 PM	spid53	Using 'xpstar.dll' version '2019.150.2000' to execute extended stored procedure 'xp_qv'. This is an informational message only; no user action
6/27/2020 4:46:30 PM	spid53	Attempting to load library 'xpstar.dll' into memory. This is an informational message only. No user action is required.
6/27/2020 4:46:29 PM	spid51	Using 'xplog70.dll' version '2019.150.2000' to execute extended stored procedure 'xp_msver'. This is an informational message only; no user action
6/27/2020 4:46:29 PM	spid51	Attempting to load library 'xplog70.dll' into memory. This is an informational message only. No user action is required.
6/27/2020 4:42:52 PM	Server	Software Usage Metrics is enabled.
6/27/2020 4:42:39 PM	spid10s	Recovery is complete. This is an informational message only. No user action is required.
6/27/2020 4:42:39 PM	spid42s	Service Broker manager has started.
6/27/2020 4:42:39 PM	spid42s	The Database Mirroring endpoint is in disabled or stopped state.
6/27/2020 4:42:39 PM	spid42s	The Service Broker endpoint is in disabled or stopped state.
6/27/2020 4:42:39 PM	spid11s	The tempdb database has 2 data file(s).
6/27/2020 4:42:39 PM	spid43s	CHECKDB for database 'StackOverflow' finished without errors on 2020-06-26 23:00:46.367 (local time). This is an informational message only
6/27/2020 4:42:39 PM	spid11s	Starting up database tempdb.
6/27/2020 4:42:38 PM	spid42s	CHECKDB for database 'msdb' finished without errors on 2020-06-26 23:01:11.620 (local time). This is an informational message only; no user
6/27/2020 4:42:38 PM	spid10s	Parallel redo is shutdown for database 'StackOverflow' with worker pool size [2].
6/27/2020 4:42:38 PM	spid10s	Recovery completed for database StackOverflow (database ID 5) in 2 second(s) (analysis 117 ms, redo 0 ms, undo 239 ms [system undo 0 ms
6/27/2020 4:42:38 PM	spid44s	CHECKDB for database 'DBA' finished without errors on 2020-06-26 23:00:14.660 (local time). This is an informational message only; no user a
6/27/2020 4:42:37 PM	spid43s	Parallel redo is started for database 'StackOverflow' with worker pool size [2].

Selected row details:

Date 6/27/2020 4:46:29 PM

Log SQL Server (Current - 6/27/2020 4:42:00 PM)

Source spid51

Message

Close

# Daily Checks

**Backup History**

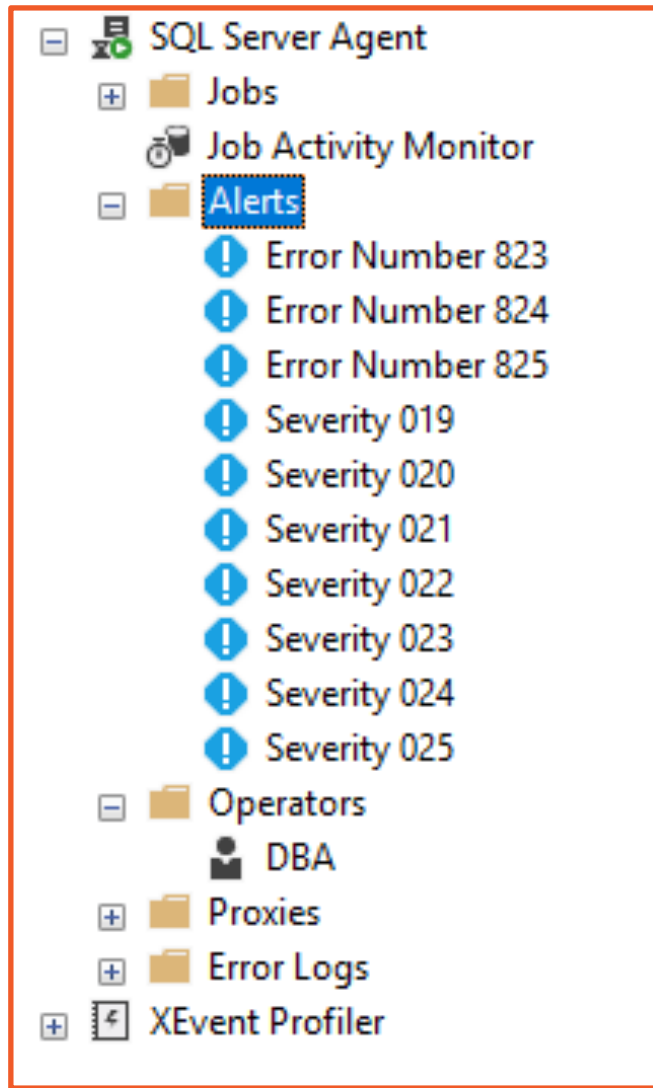
**Job History**

**SQL ErrorLog**

**Alerts**



# Alerts



Alerts and  
Operator

```
SQLQuery2.sql - KB...CISION\Kevin (60))*  SQLQuery1.sql - KB...CISION\Kevin (
SELECT
    [name],
    [event_id],
    [severity],
    [last_occurrence_date]
FROM
    msdb..sysalerts
WHERE 1=1
    and [last_occurrence_date] > getdate()-7
```

Sample T-SQL Code



# Daily Checks

**Backup History**

**Job History**

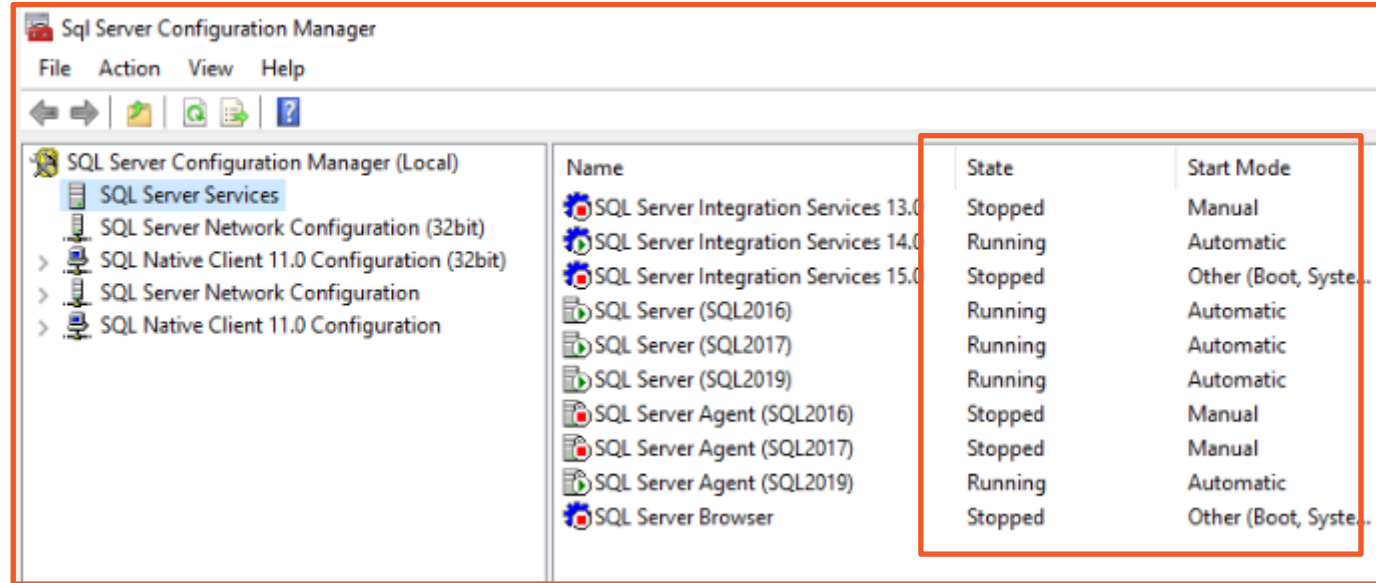
**SQL ErrorLog**

**Alerts**

**SQL Services**



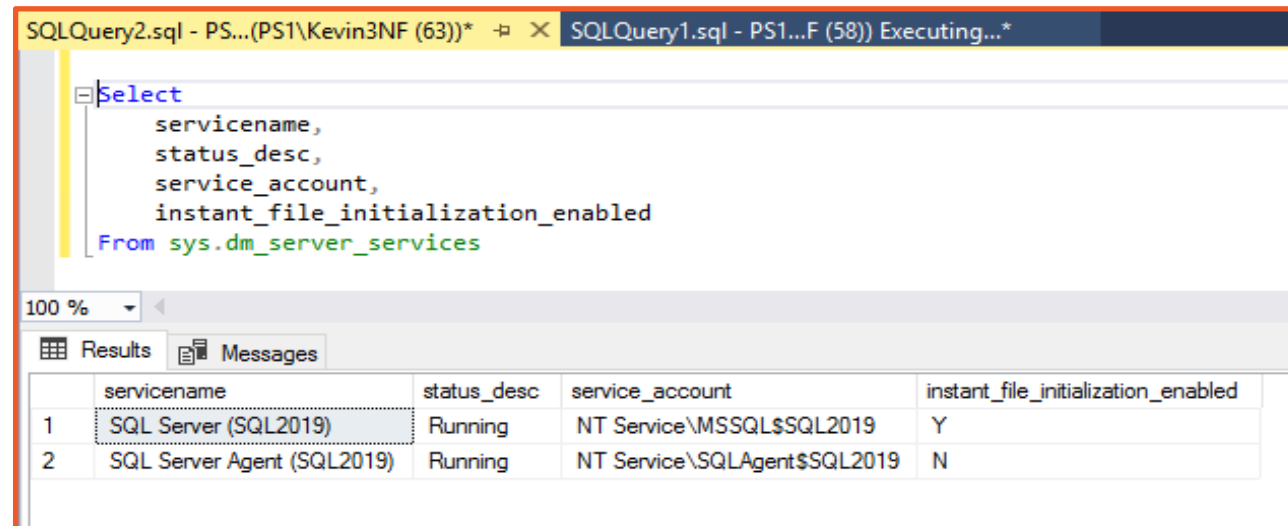
# SQL Server Services



The screenshot shows the SQL Server Configuration Manager interface. The left pane displays the tree structure with 'SQL Server Services' selected. The right pane shows a list of services with their names, states, and start modes. A red box highlights the right pane.

Name	State	Start Mode
SQL Server Integration Services 13.0	Stopped	Manual
SQL Server Integration Services 14.0	Running	Automatic
SQL Server Integration Services 15.0	Stopped	Other (Boot, System, or Standby)
SQL Server (SQL2016)	Running	Automatic
SQL Server (SQL2017)	Running	Automatic
SQL Server (SQL2019)	Running	Automatic
SQL Server Agent (SQL2016)	Stopped	Manual
SQL Server Agent (SQL2017)	Stopped	Manual
SQL Server Agent (SQL2019)	Running	Automatic
SQL Server Browser	Stopped	Other (Boot, System, or Standby)

Configuration Manager



The screenshot shows a SQL Server Enterprise Manager window with a T-SQL query executed. The query selects service details from the sys.dm\_server\_services dynamic management view. The results pane shows two rows of data.

```
select  
    servicename,  
    status_desc,  
    service_account,  
    instant_file_initialization_enabled  
from sys.dm_server_services
```

	servicename	status_desc	service_account	instant_file_initialization_enabled
1	SQL Server (SQL2019)	Running	NT Service\MSSQL\$SQL2019	Y
2	SQL Server Agent (SQL2019)	Running	NT Service\SQLAgent\$SQL2019	N

Sample T-SQL Code



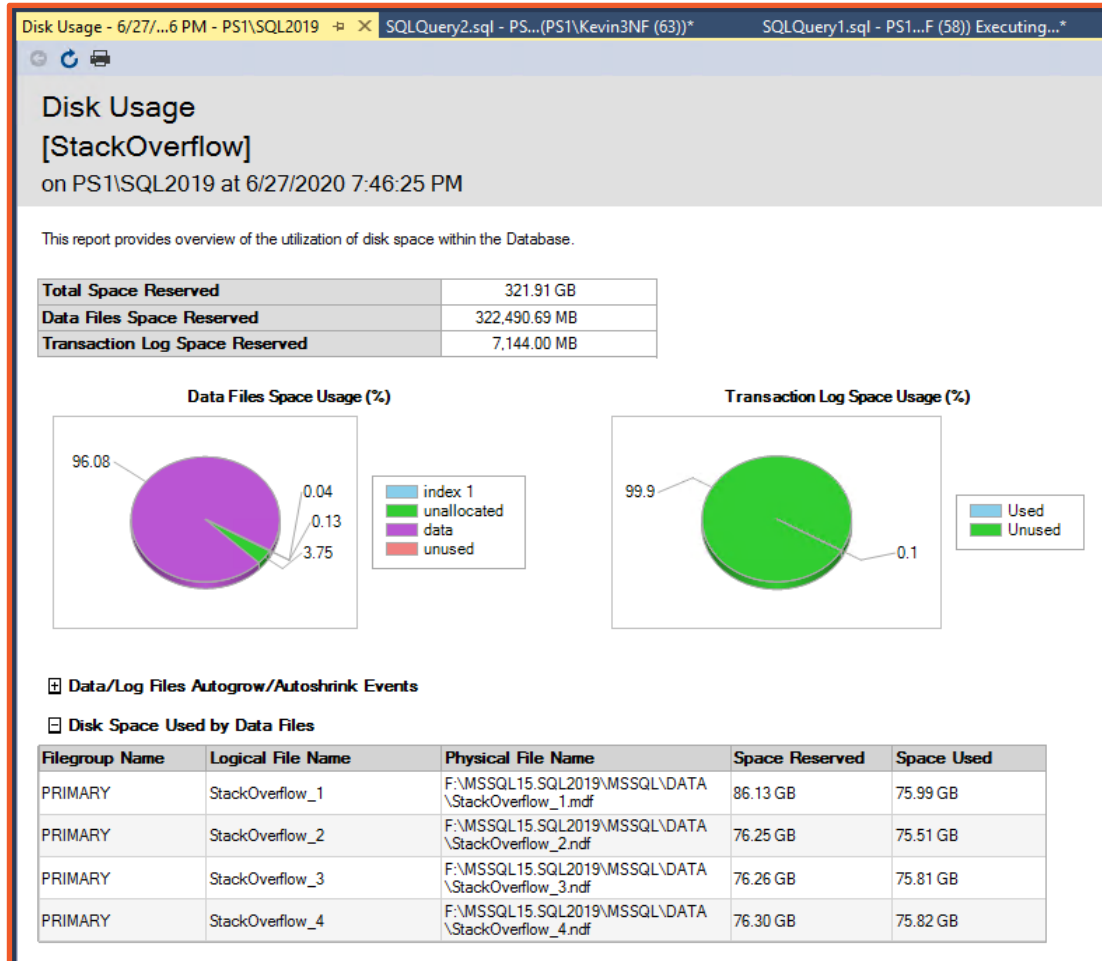


# More Daily Checks

**Drive Space / DB Space Used**



# Drive Space



Disk Usage Report

```
SELECT
    RTRIM(name),
    groupid,
    filename,
    CAST(size/128.0 AS DECIMAL(10,2)),
    CAST(FILEPROPERTY(name, 'SpaceUsed')/128.0 AS DECIMAL(10,2)),
    CAST([maxsize]/128.0 AS DECIMAL(10,2)),
    CAST(size/128.0-(FILEPROPERTY(name, 'SpaceUsed')/128.0) AS DECIMAL(10,2)),
    CAST((CAST(FILEPROPERTY(name, 'SpaceUsed')/128.0
        AS DECIMAL(10,2))/CAST(size/128.0
        AS DECIMAL(10,2))*100 AS DECIMAL(10,2))
FROM sysfiles
```

Sample T-SQL Code



# More Daily Checks

**Drive Space / DB Space Used**

**Long Running Jobs**



# Long Running Jobs

Agent Job Activity:

Name ^	Enabled	Status	Last Run Outcome	Last Run
CommandLog Cleanup	yes	Idle	Succeeded	6/28/2020 12:01:00 AM
DatabaseBackup - SYSTEM_DATABASES - FULL	yes	Idle	Succeeded	7/3/2020 12:05:00 AM
DatabaseBackup - USER_DATABASES - DIFF	yes	Idle	Succeeded	7/3/2020 12:15:00 AM
DatabaseBackup - USER_DATABASES - FULL	yes	Idle	Succeeded	6/28/2020 12:15:00 AM
DatabaseBackup - USER_DATABASES - LOG	yes	Idle	Succeeded	7/3/2020 5:00:00 PM
DatabaseIntegrityCheck - SYSTEM_DATABASES	yes	Idle	Succeeded	7/2/2020 11:00:00 PM
DatabaseIntegrityCheck - USER_DATABASES	no	Idle	Canceled	6/27/2020 11:00:00 PM
IndexOptimize - USER_DATABASES	yes	Idle	Succeeded	7/2/2020 10:00:00 PM
Insert Data	yes	Idle	Succeeded	7/3/2020 7:45:00 PM
Output File Cleanup	yes	Idle	Succeeded	7/3/2020 12:00:00 AM
sp_delete_backuphistory	yes	Idle	Succeeded	7/3/2020 12:00:00 AM
sp_purge_jobhistory	yes	Idle	Succeeded	7/3/2020 12:00:00 AM
syspolicy_purge_history	yes	Idle	Succeeded	7/3/2020 2:00:00 AM
WholsActive_Logging	yes	Idle	Succeeded	7/3/2020 7:49:00 PM

Job Activity Monitor

```
Job_History.sql - K...ECISION\Kevin (54))* - X
-- Currently running jobs
Select j.[name], jh.step_name, run_date, run_time
From [msdb].[dbo].[sysjobhistory] jh
    join [msdb].[dbo].[sysjobs] j
    on jh.job_id = j.job_id
Where 1=1
    and run_status = 4
Order by
    run_date desc,
    run_time desc
```

Sample T-SQL Code



# More Daily Checks


**Drive Space / DB Space Used**


**Long Running Jobs**


**Availability Group Dashboard**



# Availability Group Dashboard



 ☐ Reporting: hosted by [redacted] SQL5 (Replica role: Primary)


Last updated: 7/4/2020 2:37:04 PM  
Auto refresh: on 



Availability group state:  Healthy  
Primary instance: [redacted] SQL5  
Failover mode: Automatic  
Cluster state: ClusterSQL01 (Normal Quorum)  
Cluster type: Windows Server Failover Cluster

[Start Failover Wizard](#)  
[View Always On Health Events](#)  
[View Cluster Quorum Information](#)  
[Collect Latency Data](#)

Availability replica: [Add/Remove Columns](#)

	Name	Role	Availability Mode	Failover Mode	Seeding Mode	Synchronization State	Issues
	[redacted] SQL3	Secondary	Synchronous commit	Automatic	Automatic	Synchronized	
	[redacted] SQL5	Primary	Synchronous commit	Automatic	Automatic	Synchronized	

Group by ▾ [Add/Remove Columns](#) 

Name	Replica	Synchronization State	Failover Readiness	Last Sent Time	Last Redone Time
USDC1ENSQL3					
	[redacted] Reporting [redacted] SQL3	Synchronized	No Data Loss	7/4/2020 2:37:04 PM	7/4/2020 2:37:03 PM
USDC1ENSQL5					
	[redacted] Reporting [redacted] SQL5	Synchronized	No Data Loss		

Much of this information comes from: sys.dm\_hadr\_database\_replica\_states



# More Daily Checks

**Drive Space / DB Space Used**

**Long Running Jobs**

**Availability Group Dashboard**

**Replication Latency**













# Replication Latency

Replication Monitor

Last refresh: 7/4/20

PublicationsSubscription Watch ListAgents

Show Transactional Subscriptions▼Show: All subscriptions

	Status	Publication ▲	Performance	Latency	Last Synchronization	
	Running		Large	Excellent	00:00:03	7/4/2020 3:52:03 PM
	Running		Medium	Excellent	00:00:03	7/4/2020 3:52:08 PM
	Running		Small_1	Excellent	00:00:04	7/4/2020 3:52:14 PM
	Running		Small_2	Excellent	00:00:03	7/4/2020 3:52:09 PM
	Running		Small_3	Excellent	00:00:06	7/4/2020 3:52:07 PM
	Running		Small_4	Excellent	00:00:03	7/4/2020 3:52:09 PM
	Running		Small_5	Excellent	00:00:06	7/4/2020 3:52:06 PM
	Running		Small_6	Excellent	00:00:02	7/4/2020 3:52:18 PM
	Running		Small_7	Excellent	00:00:05	7/4/2020 3:52:05 PM





Demo



## SQL Server Maintenance Plans

- Full backup
- Differential backup
- Log backup



# Summary



## Backup types

- Full
- Differential
- Log

## Server Checks

- Backups
- Jobs - failed and long running
- SQL Errorlog
- AG/Replication latency
- Database file usage

