

Operating System Best Practices for SQL Server

- 1- Format the disk containing MDF, NDF, LDF (also tempdb files) with 64K. You can monitor file system and allocation unit size with diskpart commands. Also you can format disk with diskpart commands.

```
DISKPART> list volume
```

Volume ###	Ltr	Label	Fs	Type	Size	Status	Info
Volume 0	C	Windows	NTFS	Partition	218 GB	Healthy	Boot
Volume 1		Windows RE	NTFS	Partition	980 MB	Healthy	
Volume 2	D	Recovery Im	NTFS	Partition	18 GB	Healthy	
Volume 3		SYSTEM	FAT32	Partition	360 MB	Healthy	System
Volume 4	E	Elements	NTFS	Partition	1862 GB	Healthy	
Volume 5	F	Seagate Exp	NTFS	Partition	1863 GB	Healthy	
Volume 6	G	Expansion D	NTFS	Partition	298 GB	Healthy	

```
DISKPART> select volume 5
```

```
Volume 5 is the selected volume.
```

```
DISKPART> filesystem
```

```
Current File System
```

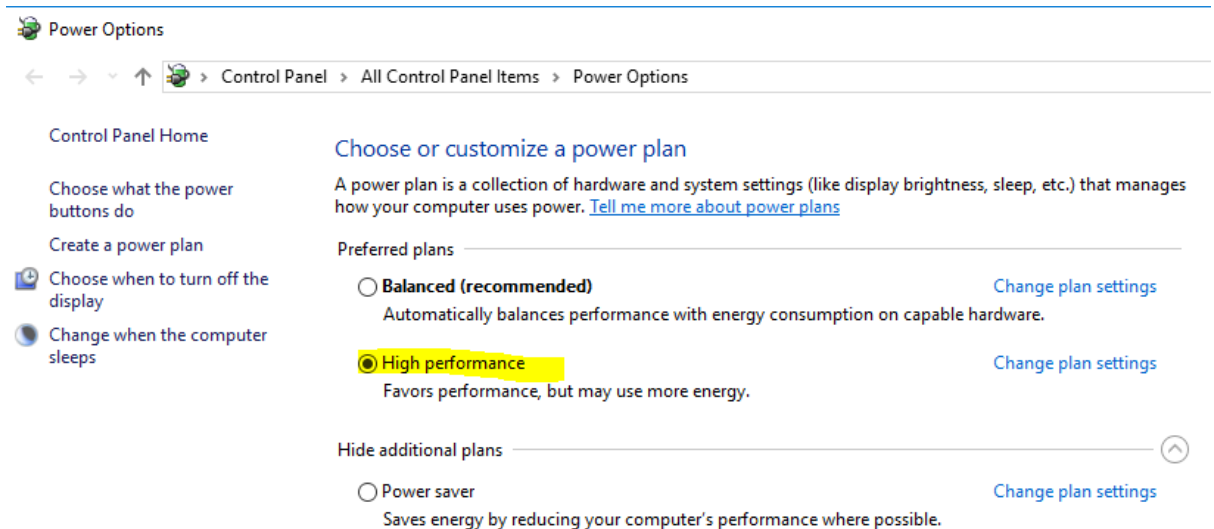
```
Type : NTFS
Allocation Unit Size : 64K
Flags : 00000000
```

Format command is like this:

```
DISKPART> format fs=ntfs unit=64K label=DATA
```

Also you can use GUI. Right-Click and select format.

- 2- Set power options to high performance. This adjustment will be increasing cpu performance.



It also recommends that the Enhanced Power Saving Mode setting there be marked "**OS Control**" or "**Disabled**" if you can access your physical server's BIOS.

- 3- Turn on Instant File Initialization. When SQL Server needs to allocate space for specific operations such as **database creation, log or data file insertion into an existing database, enlarged data/log files** (including auto grow operations), and **restore a database or file group**, SQL Server first fills the space it needs with zeros. In most cases, it is unnecessary to write **zero** across the disk space before using this space. It might cause performance loss.

How to activate Instant File Initialization?

1-run secpol.msc (local security policy)

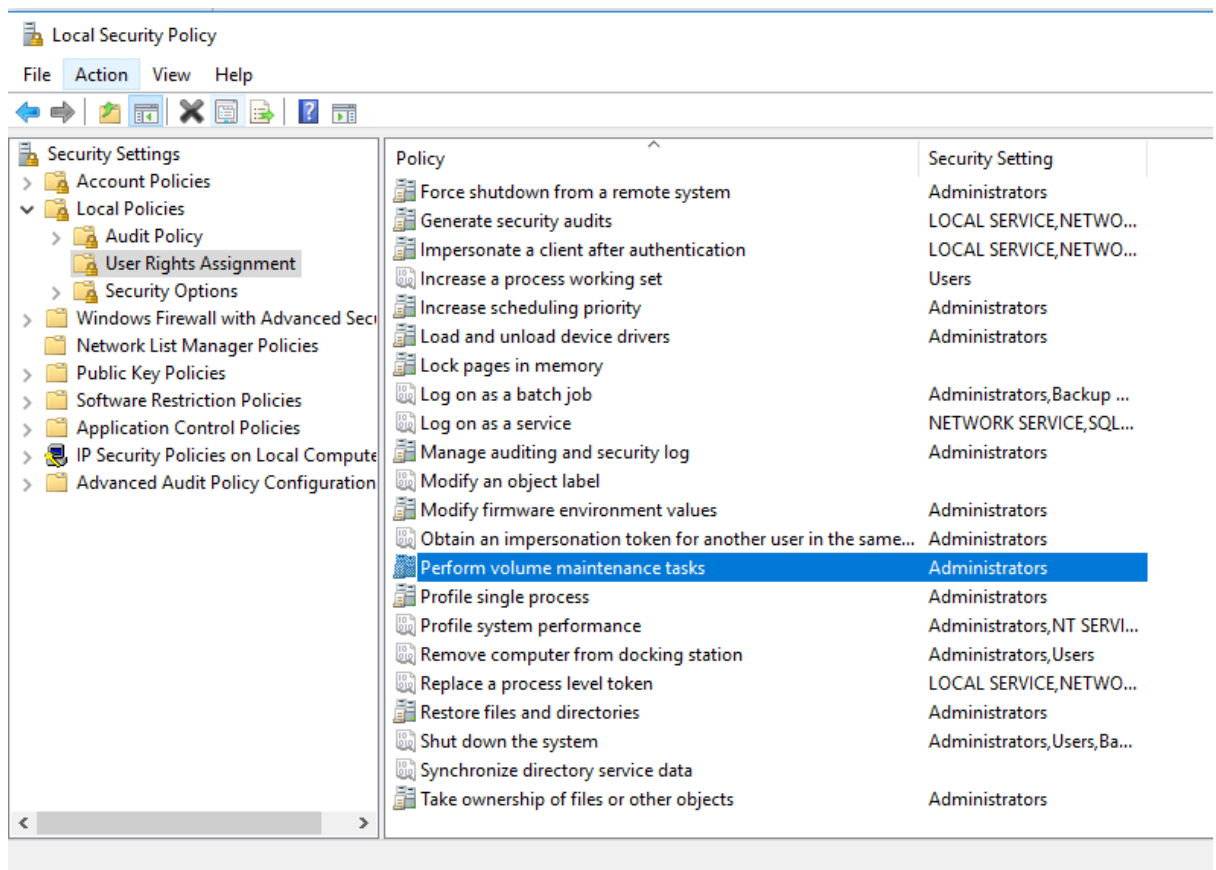
2-expand local policies folder

3-click on user rights assignment

4-There is **Perform volume maintenance tasks** on the right-hand side.

5-Add sql server service account to Perform Volume Maintenance Tasks property.

6-Finally you must restart sql server service.



How to Check Status of Instant File Initialization?

You can use `sys.dm_server_services` dmview. Only one of the two options can be found in the column : Y or N.

```
SELECT servicename,
       service_account,
       instant_file_initialization_enabled
FROM sys.dm_server_services
WHERE servicename LIKE 'SQL Server (%)'
```

Results		Messages	
	servicename	service_account	instant_file_initialization_enabled
1	SQL Server (MSSQLSERVER)	NT Service\MSSQLSERVER	N

Let's create a large database and observe the effect of Instant File Initialization.

Create database script:

```
use master
go

CREATE DATABASE [IFI_Sample]
  CONTAINMENT = NONE
  ON PRIMARY
( NAME = N'IFI_Sample', FILENAME = N'E:\database\data\IFI_Sample.mdf' , SIZE
= 102400000KB , FILEGROWTH = 65536KB )
LOG ON
( NAME = N'IFI_Sample_log', FILENAME = N'E:\database\log\IFI_Sample_log.ldf'
, SIZE = 20480000KB , FILEGROWTH = 65536KB )

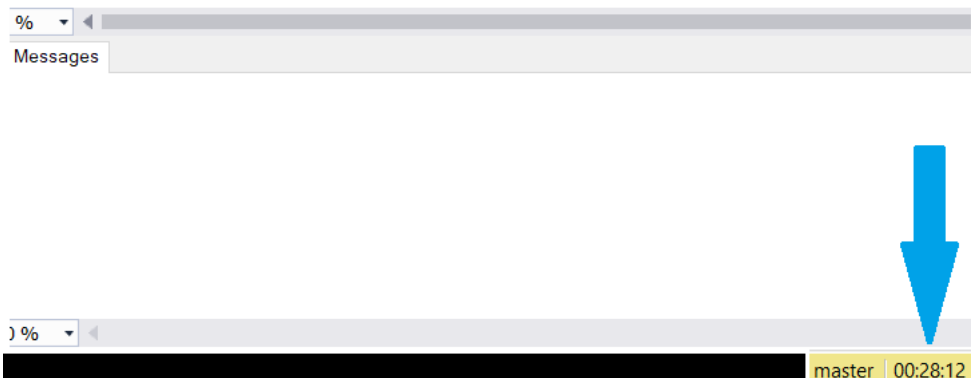
GO
```

a- Instant File Initialization wasn't enabled.

```
use master
go

CREATE DATABASE [IFI_Sample]
  CONTAINMENT = NONE
  ON PRIMARY
( NAME = N'IFI_Sample',
  FILENAME = N'E:\database\data\IFI_Sample.mdf' ,
  SIZE = 102400000KB , FILEGROWTH = 65536KB )
LOG ON
( NAME = N'IFI_Sample_log',
  FILENAME = N'E:\database\log\IFI_Sample_log.ldf' ,
  SIZE = 20480000KB , FILEGROWTH = 65536KB )

GO
```



It took 28 minutes.

b- Instant File Initialization was enabled.

```
use master
go

CREATE DATABASE [IFI_Sample]
CONTAINMENT = NONE
ON PRIMARY
( NAME = N'IFI_Sample',
  FILENAME = N'E:\database\data\IFI_Sample.mdf' ,
  SIZE = 102400000KB , FILEGROWTH = 65536KB )
LOG ON
( NAME = N'IFI_Sample_log',
  FILENAME = N'E:\database\log\IFI_Sample_log.ldf' ,
  SIZE = 204800000KB , FILEGROWTH = 65536KB )
GO
```

0 %


Messages

Commands completed successfully.

Completion time: 2019-12-24T23:57:50.0016419+03:00

10 %

master 00:06:28



It took 6 minutes. Almost 5 times.

As you can see, Instant File Initialization is a successful process to activate. You can also try in enlarged data / log files, log or data file insertion into an existing database and restore operations.

- 4- Enable Lock Pages in memory. If we do this, the memory that SQL Server has is not returned to the windows operating system. When the SQL Server service account is granted the necessary authorization on Windows, the sql server does not return the memory it received from the windows to the buffer pool.

How to activate Lock Pages in memory?

1-run secpol.msc (local security policy)

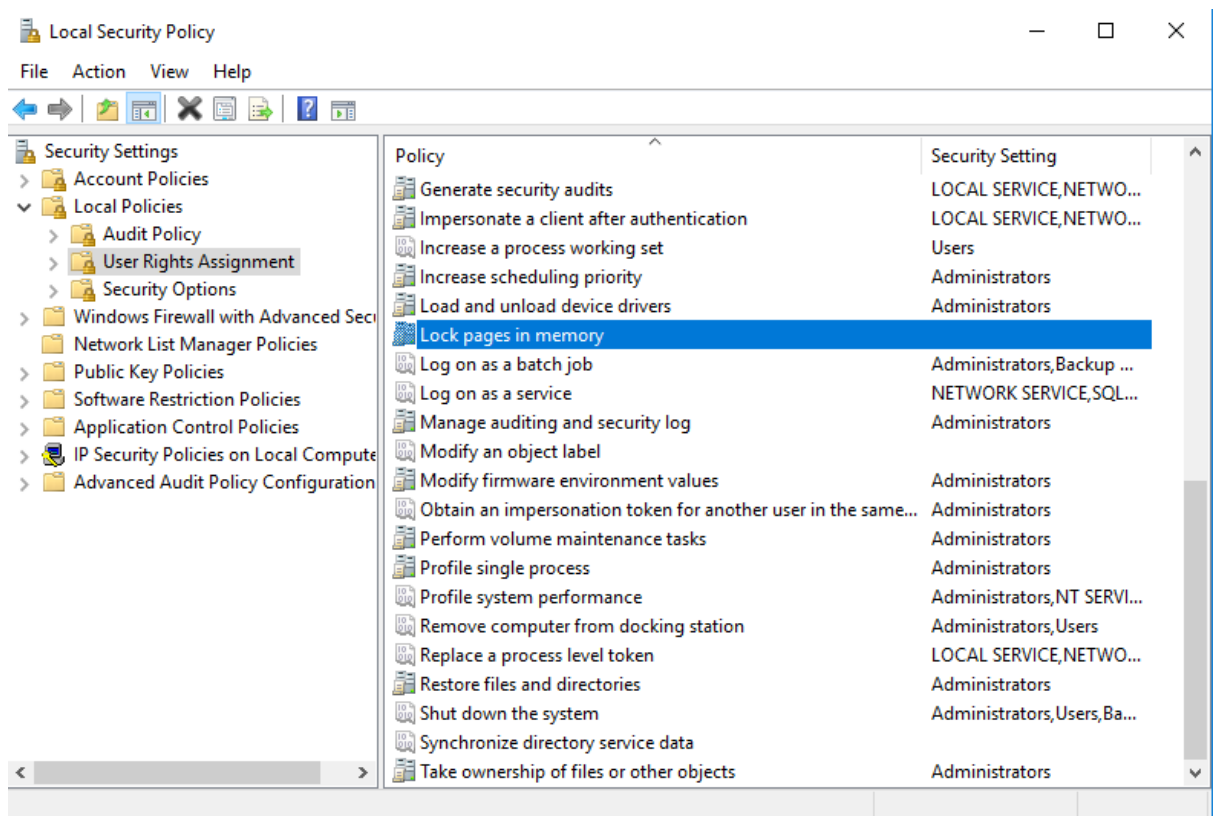
2-expand local policies folder

3-click on user rights assignment

4-There is **Lock pages in memory** on the right-hand side.

5-Double-click and add sql server service account to Lock pages in memory property.

6-Finally you must restart sql server service.



When setting up lock pages memory, you have to leave the required amount of ram to Windows Server.

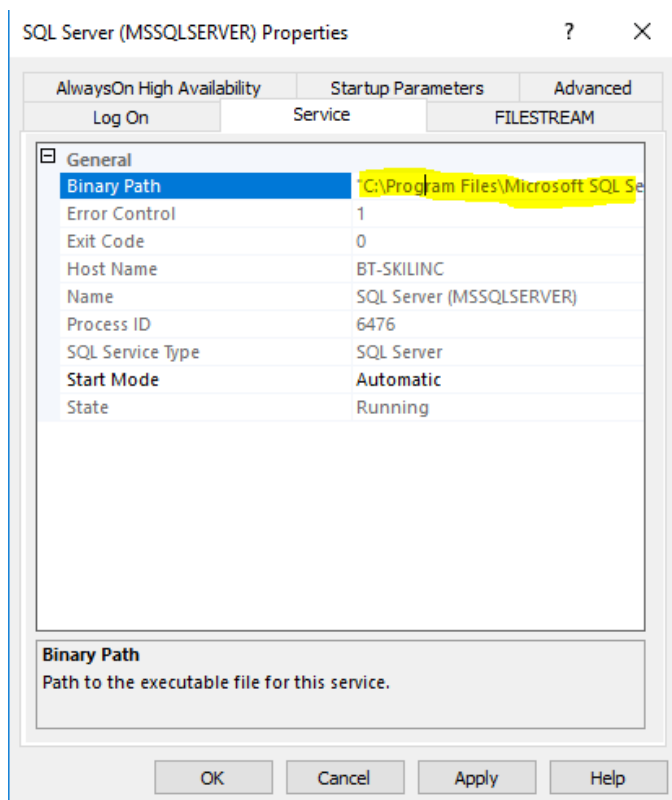
5- Exclude SQL Server files and folders on your antivirus programs. It is recommended that the following files be excluded from all antivirus scans:

- SQL Server data files (.mdf, .ndf, .ldf)
- SQL Server backup files (.bak and .trn)
- Full-text catalog files
- Trace files (.trc)
- SQL Audit files
- SQL query files (typical extension is .sql)
- FileStream data files (SQL 2008 and later versions)
- The directory that holds Analysis Services data
- The directory that holds Analysis Services temporary files used during processing
- Analysis Services backup files

And it is recommended to exclude the following list of processes from antivirus scans:

- SQLServr .exe
- ReportingServicesService .exe
- MSMDsrv .exe

You can find out the path of Sql Server Services binary from Sql Server Configuration Manager.



Also you can use `sys.dm_server_services` dmview SQL Server, Full-Text, SQL Server Launchpad service (SQL Server 2017+), and SQL Server Agent services binary path in the current instance of SQL Server.

You can find out which files must be excluded from the site below:

<https://support.microsoft.com/en-us/help/309422/choosing-antivirus-software-for-computers-that-run-sql-server>

Sources:

<https://blogs.msdn.microsoft.com/docast/2018/02/01/operating-system-best-practice-configurations-for-sql-server/>

<https://www.veritabani.gen.tr/2016/09/19/instant-file-initialization/>

[https://docs.microsoft.com/en-us/previous-versions/sql/sql-server-2005/administrator/cc966412\(v=technet.10\)?redirectedfrom=MSDN](https://docs.microsoft.com/en-us/previous-versions/sql/sql-server-2005/administrator/cc966412(v=technet.10)?redirectedfrom=MSDN)

<https://support.microsoft.com/en-us/help/309422/choosing-antivirus-software-for-computers-that-run-sql-server>

<https://docs.microsoft.com/en-us/sql/relational-databases/system-dynamic-management-views/sys-dm-server-services-transact-sql?view=sql-server-ver15>