

Diagnosing Hardware and Storage Configuration Issues



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Module Overview



Hardware and storage configuration queries

Best-practice hardware and storage configuration



Hardware Information

Processor core counts

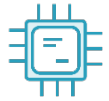
Memory information

NUMA nodes and soft NUMA

SQL Server memory model



Hardware Information



Provides great overview of processor and memory configuration



Helps you understand what type of basic environment you are running on



SQL Server 2017 added several new columns of useful information



This information is applicable for both VMs and bare physical machines



Don't be deceived by the Virtual Machine Type column!



Demo



Hardware information



System Manufacturer and BIOS Date

**Identifies make
and model
of server**

**Identifies whether
you have a
virtual machine**

**Shows BIOS date
for physical
machines**



System Manufacturer and BIOS Date



Knowing manufacturer and model number of your server is very useful



Lets you understand its age, performance, and total capacity



Also determines whether you are running in a virtual machine or not



BIOS release date shows if the machine has been properly maintained



Demo



System manufacturer and BIOS date



Processor Description

Identifies the exact
processor model

Extremely important
for performance and
licensing purposes

Works for both
physical machines and
virtual machines

You can find more
detailed information
about your CPU online



Processor Description



This is extremely important information to understand



Helps you understand the age and relative performance and scalability of the processor



Lets you determine the memory capacity of the system



Lets you determine the generation of PCIe support from the processor



Demo



Processor description



SQL Server NUMA Information

**NUMA is
Non-uniform
Memory Access**

**NUMA is more
scalable than SMP
in multi-socket
machines**

**NUMA gives
better memory
performance**



SQL Server NUMA Information



This shows you the number of NUMA nodes in the system



Helps you determine whether NUMA has been disabled in the BIOS/UEFI



Shows number of schedulers per NUMA node and if they are balanced



Very useful to know for both virtual machines and physical machines



Demo



SQL Server NUMA information



Memory-optimized Checkpoint Mode

Standard or
high-end machine,
based on memory
size and core
counts

Measures recovery
speed of
In-Memory OLTP
checkpoint file

Controls
memory-optimized
checkpoint mode
usage



Memory-optimized Checkpoint Mode



Use of memory-optimized checkpoint mode chosen during startup



This lets you use large checkpoint mode for In-Memory OLTP files



You must enable global trace flag 9912 to enable large checkpoint mode



You should test performance with and without trace flag 9912



Demo



Memory-optimized checkpoint mode



System Memory and BPE Configuration

System memory amount
is a good indicator of the
size of the system

Is Lock Pages In Memory
enabled?

System memory state is
an indicator of external
memory pressure

Buffer Pool Extension can be
used from SQL Server 2014



System Memory and BPE Configuration



Provides total and available memory at the operating-system level



System Memory State shows whether the OS is under memory pressure



Determines whether buffer pool extension (BPE) is enabled



Indicates location and size of BPE cache file



BPE can help performance with some workloads and types of base storage



Demo



System memory and BPE configuration



Fixed Drives and Volume Information

**Returns info on
all fixed drives
visible to OS**

**Returns size and
free space for all
LUNs that have
SQL database files**

**Useful for
capacity and
performance
reasons**



Fixed Drives and Volume Information



Fixed drives shows available space on all logical drives visible to the operating system



Volume information shows the total size and available space for all logical drives that have SQL Server database files



Helps you detect when you are running low on disk space



Being low on disk space can affect performance with some types of storage



Demo



Fixed drives and volume information



What We Covered



Hardware and storage configuration queries

Best-practice hardware and storage configuration

