Testing and Benchmarking Storage Subsystems

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Module Summary

- Various methods to test and benchmark the storage subsystem
- Microsoft DiskSpd
- CrystalDiskMark
- Storage vendor tools
- Using SQL Server to test storage performance

Microsoft DiskSpd

New tool that replaces SQLIO

Does not require or use SQL Server for its testing

Provides very detailed test data

Can use command prompt or PowerShell to run tests

Demo

Using Microsoft DiskSpd to test storage

CrystalDiskMark

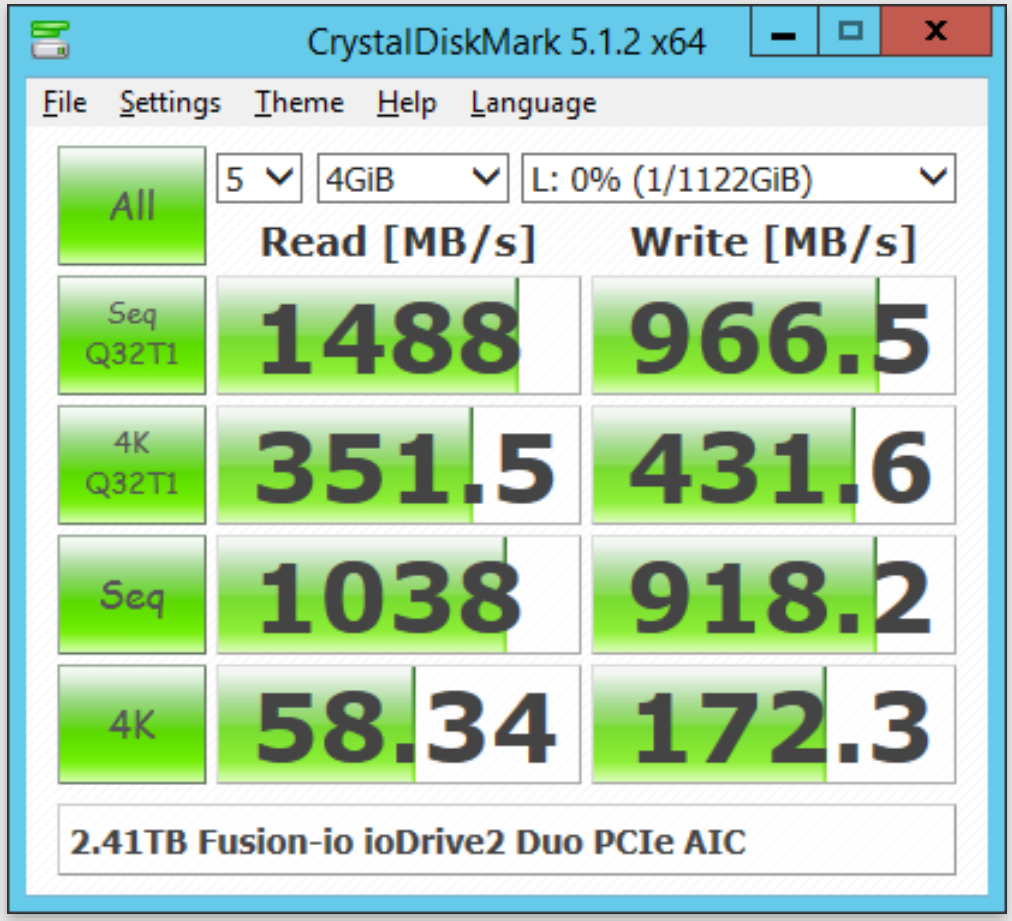
Test each logical drive before installing SQL Server, if possible

Make sure to test with a large test file size

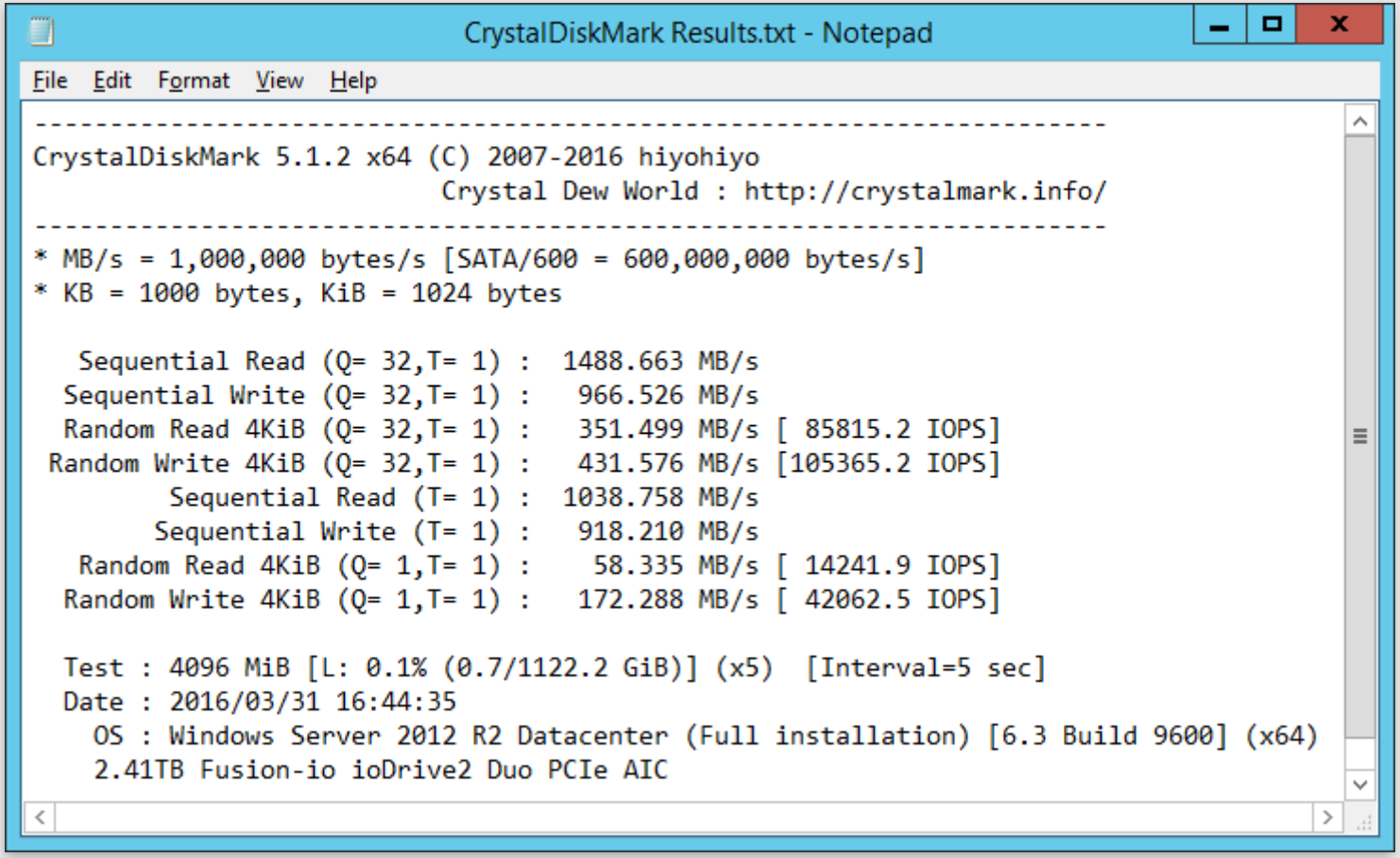
Make sure to select at least five test runs for the test

CrystalDiskMark does not work with mount points

CrystalDiskMark Graphical Results



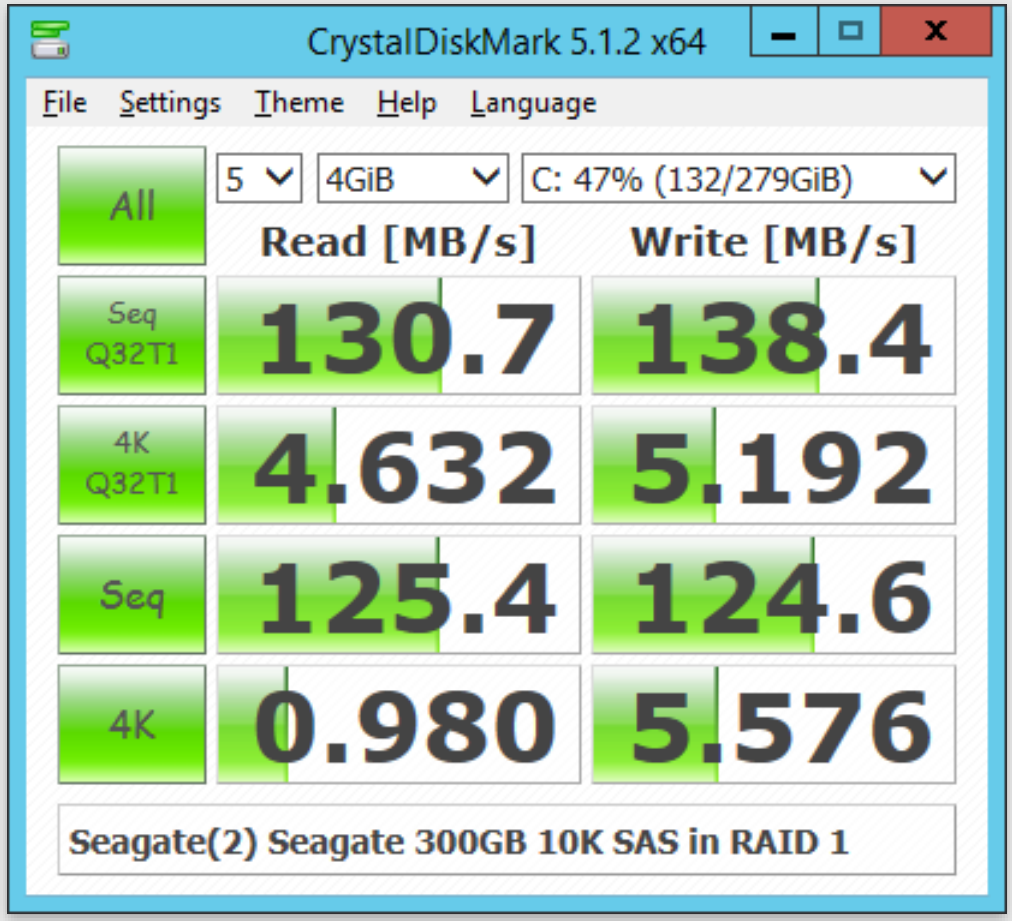
CrystalDiskMark Text Results


CrystalDiskMark Results.txt - Notepad

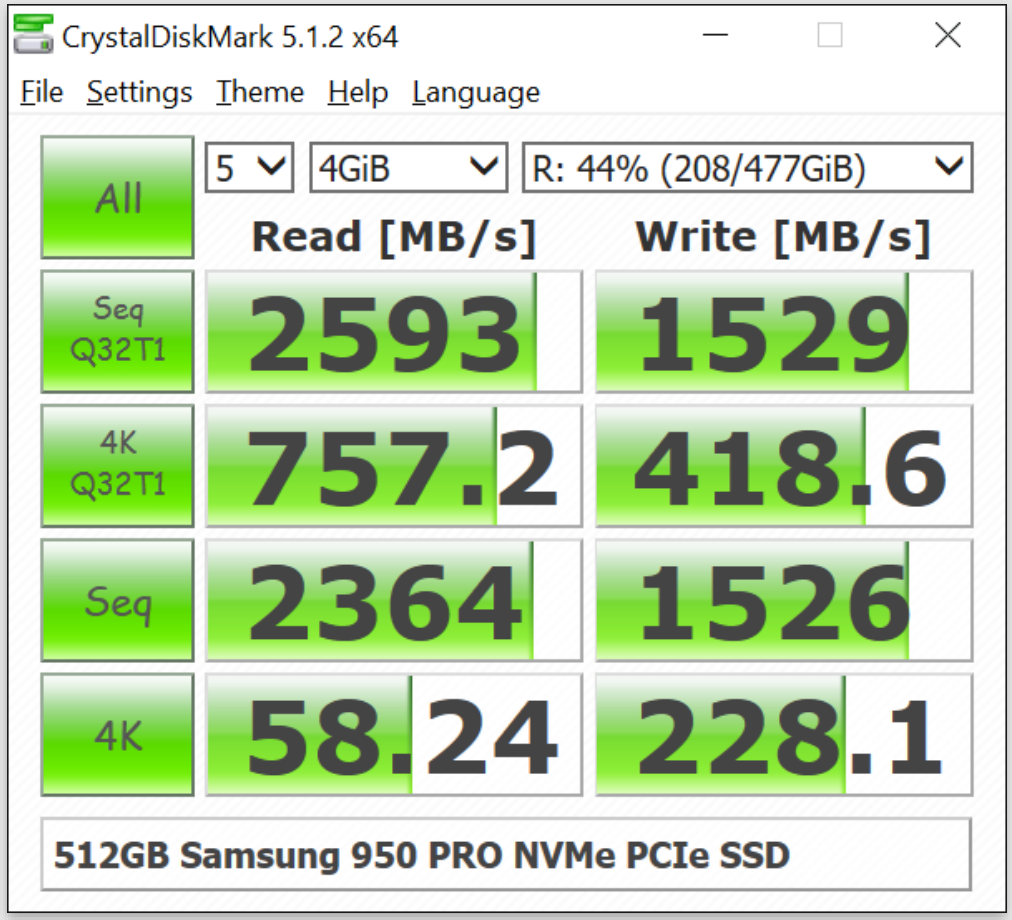
File Edit Format View Help

```
------------------------------------------------------------------------------
CrystalDiskMark 5.1.2 x64 (C) 2007-2016 hiyohiyo
                           Crystal Dew World : http://crystalmark.info/
------------------------------------------------------------------------------
* MB/s = 1,000,000 bytes/s [SATA/600 = 600,000,000 bytes/s]
* KB = 1000 bytes, KiB = 1024 bytes

   Sequential Read (Q= 32,T= 1) :  1488.663 MB/s
  Sequential Write (Q= 32,T= 1) :   966.526 MB/s
  Random Read 4KiB (Q= 32,T= 1) :   351.499 MB/s [ 85815.2 IOPS]
 Random Write 4KiB (Q= 32,T= 1) :   431.576 MB/s [105365.2 IOPS]
         Sequential Read (T= 1) :  1038.758 MB/s
        Sequential Write (T= 1) :   918.210 MB/s
   Random Read 4KiB (Q= 1,T= 1) :    58.335 MB/s [ 14241.9 IOPS]
  Random Write 4KiB (Q= 1,T= 1) :   172.288 MB/s [ 42062.5 IOPS]

  Test : 4096 MiB [L: 0.1% (0.7/1122.2 GiB)] (x5)  [Interval=5 sec]
  Date : 2016/03/31 16:44:35
    OS : Windows Server 2012 R2 Datacenter (Full installation) [6.3 Build 9600] (x64)
    2.41TB Fusion-io ioDrive2 Duo PCIe AIC
```

Example: Poor Performance from Logical Drive



Example: Good Performance from Logical Drive



Demo

Using CrystalDiskMark to test storage

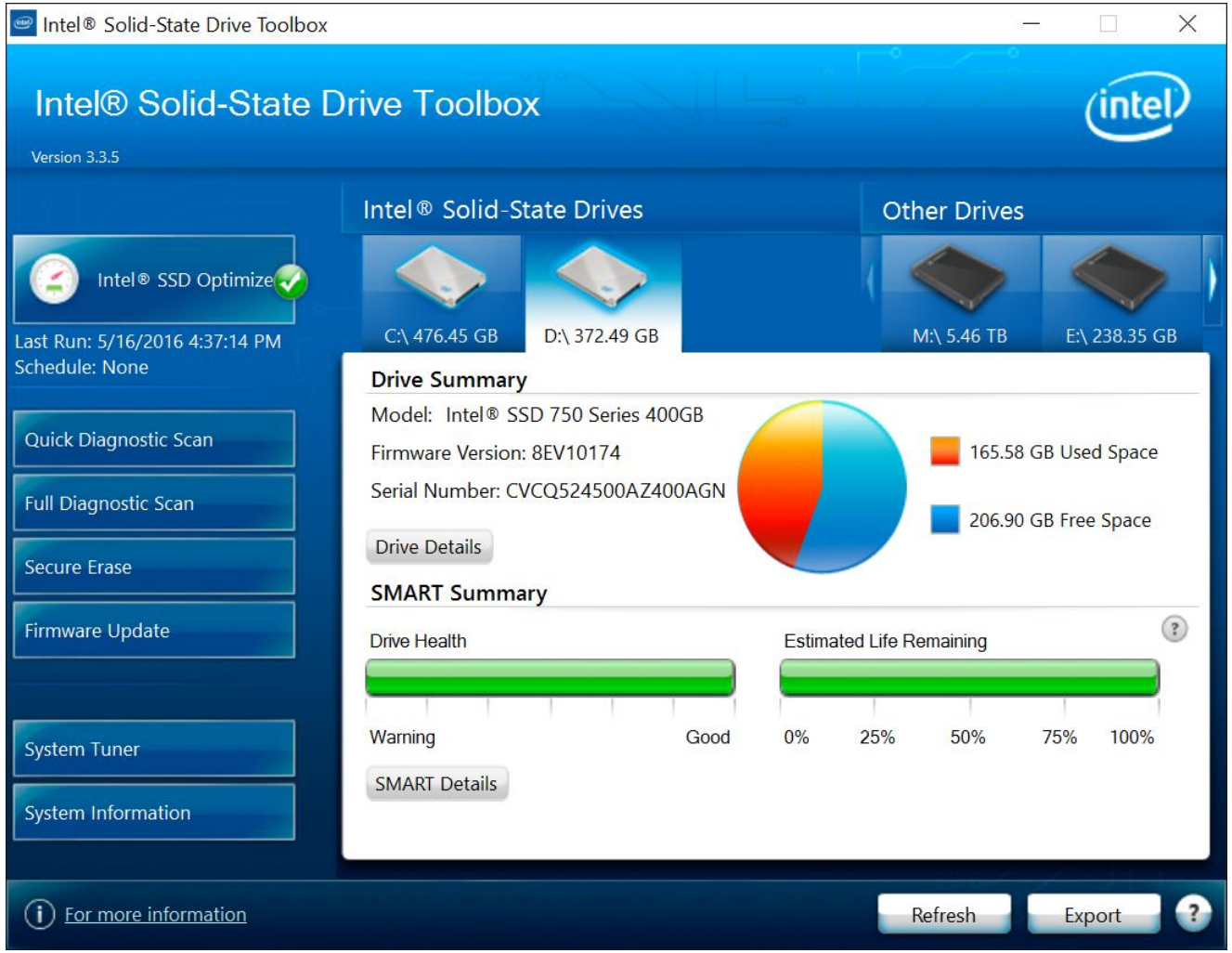
Storage Vendor Tools

Storage vendors have useful tools that can be used for management and performance testing

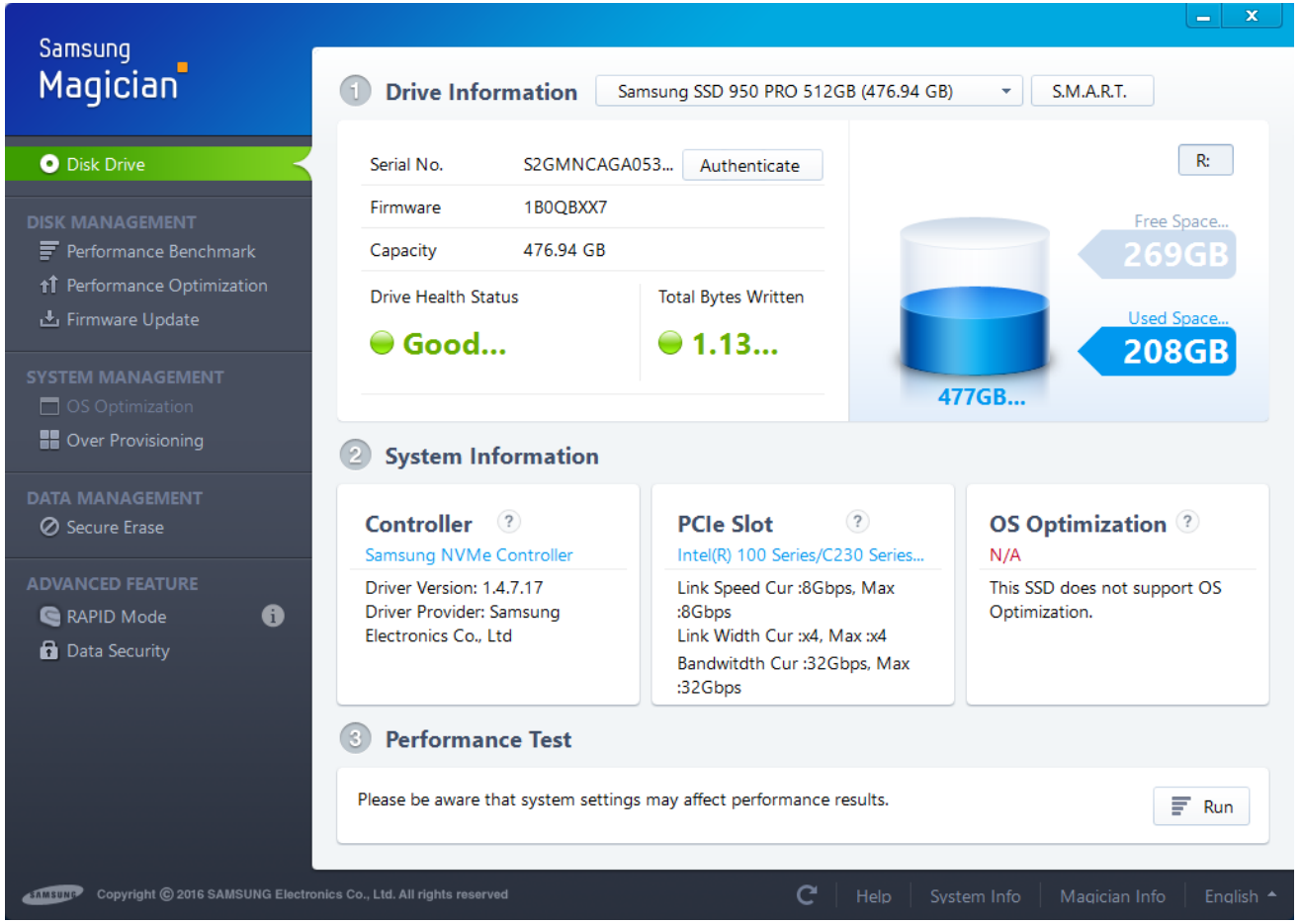
Intel Solid-State Drive Toolbox

Samsung Magician

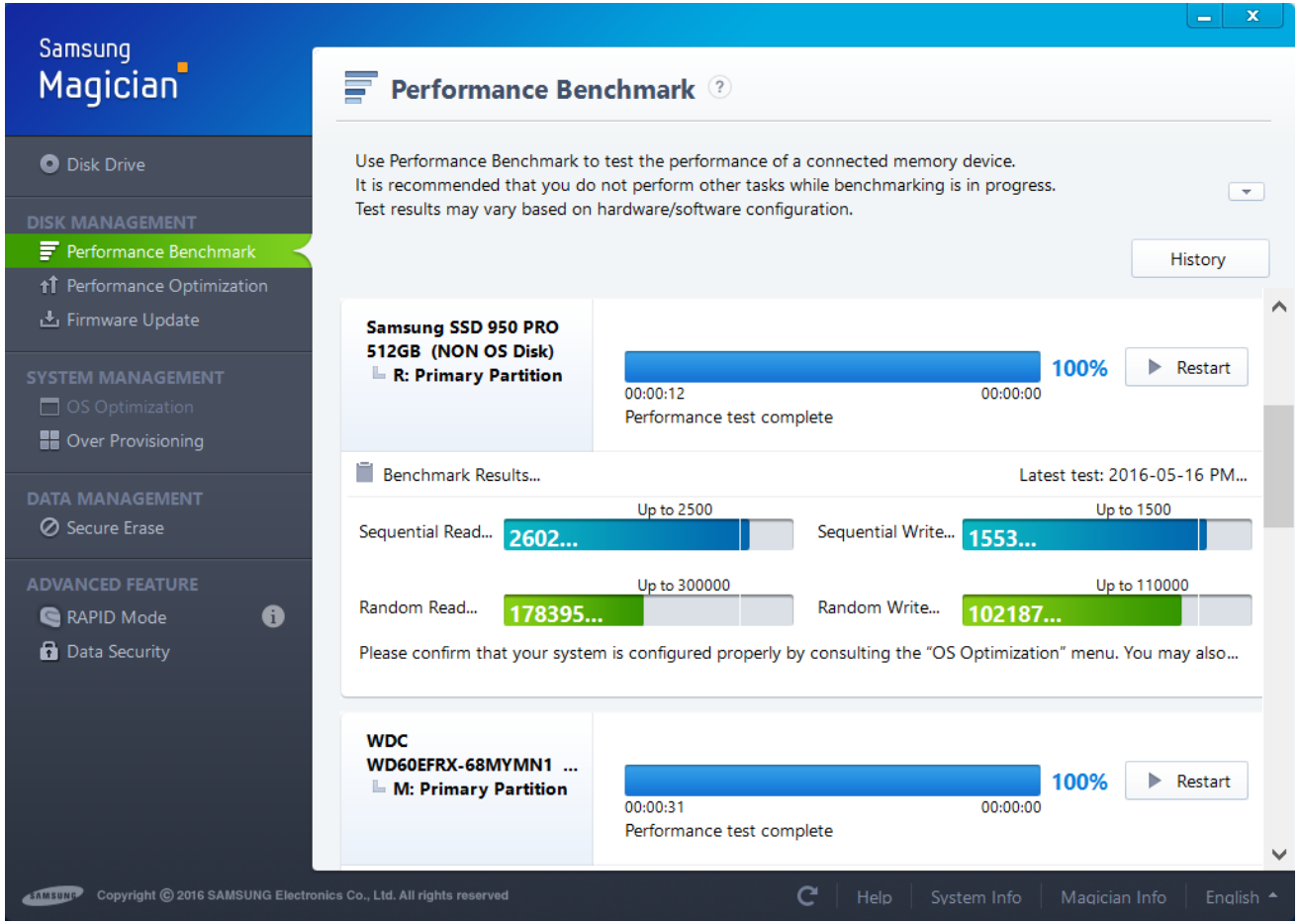
Intel Solid-State Drive Toolbox can be used to check drive health and update firmware



Samsung Magician can be used to check drive health and update firmware



Samsung Magician can also be used to run a disk performance benchmark



Demo

Using vendor tools to test storage

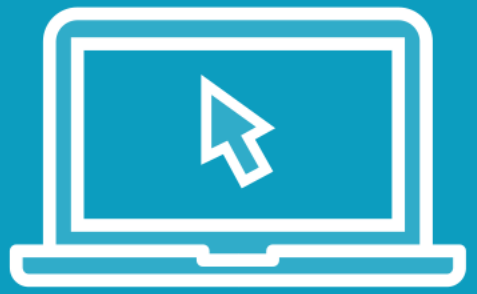
Storage Admins May Not Accept Benchmarks

They may claim that it is just a synthetic benchmark that is not the same as an actual SQL Server workload

Run some easy SQL Server queries or tests to measure storage subsystem performance

This type of data is harder to dispute

Demo



Using SQL Server to test storage

What We Covered

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