INCREASING PERFORMANCE ON THE LENOVO THINKSTATION C30 WITH MSATA DRIVES

Lenovo® ThinkStation® C30 with mSATA SSD upgrade

61.5% faster shutdown

50.7% quicker boot time

versus Lenovo ThinkStation C30 with standard SATA hard drive

lenovo. FOR THOSE WHO DO.

High-end workstations such as the Lenovo ThinkStation C30 offer peak performance for your most demanding applications. Even if your chosen workstation delivers great performance with its base configuration, there are still cost-effective ways to improve performance. By adding an mSATA solid-state drive (SSD) to your new workstation alongside the traditional SATA hard-disk drive (HDD) that comes standard, you can enable your system to perform basic tasks even faster.

In the Principled Technologies labs, we looked at the impact that adding an mSATA drive to a Lenovo ThinkStation C30 workstation has on performance. We measured how long it took the system to shut down and to boot up using only a traditional HDD and with an additional advanced mSATA SSD. We found that adding a faster mSATA drive made shutdown times 61.5 percent faster and boot times 50.7 percent faster than with only a standard SATA HDD.

Our results show that just by adding an extra, faster drive when you purchase your Lenovo ThinkStation C30, you can increase performance over the base configuration, which can both improve user experience and increase worker productivity.

INCREASE PERFORMANCE BY ADDING FASTER DRIVES

Though your workstation can get the job done, you should consider upgrading key hardware within the system to increase performance. Adding a faster mSATA SSD to the base configuration can dramatically increase performance for only a small additional investment, while letting you enjoy the capacity of the SATA HDD that remains.

We tested the shutdown and boot performance of a Lenovo ThinkStation C30 configured two ways: 1) with the operating system (OS) running on the standard SATA HDD and 2) keeping the SATA HDD but adding an mSATA SSD and moving the OS to it. We used the Windows Assessment and Deployment Kit (ADK), a Microsoft tool that helps evaluate systems on several criteria, to test boot and shutdown performance. For more information about Windows ADK, visit http://www.microsoft.com/en-us/download/details.aspx?id=28997.

Adding an mSATA SSD to the Lenovo ThinkStation C30 vastly improved the boot and shutdown times for the system. As Figure 1 shows, the ThinkStation C30 configuration with the mSATA SSD shut down in only 6.2 seconds -- 61.5 percent faster than the 16.0 seconds it took the same system with only a SATA HDD.
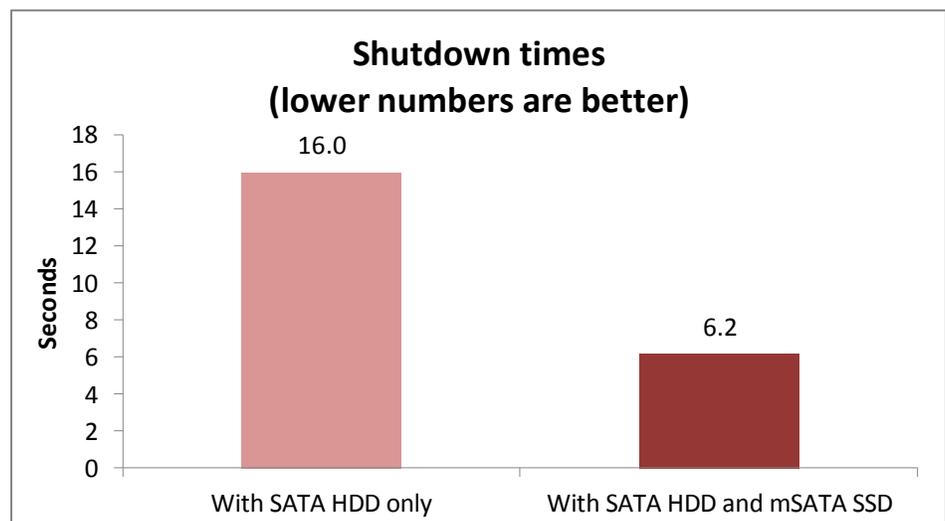
Figure 1: When we added an mSATA SSD, the Lenovo ThinkStation C30 shut down 61.5 percent faster than when it used only a SATA HDD.

Figure 2 compares the boot times for the Lenovo ThinkStation C30 using a base SATA HDD configuration and when we added a faster mSATA SSD. The mSATA SSD configuration booted in just 23.1 seconds -- 50.7 percent faster than the 46.9 seconds it took the ThinkStation C30 using only the traditional HDD.

**Boot times
(lower numbers are better)**

Figure 2: When we added an mSATA SSD, the Lenovo ThinkStation C30 booted 50.7 percent faster than when it used only a SATA HDD.

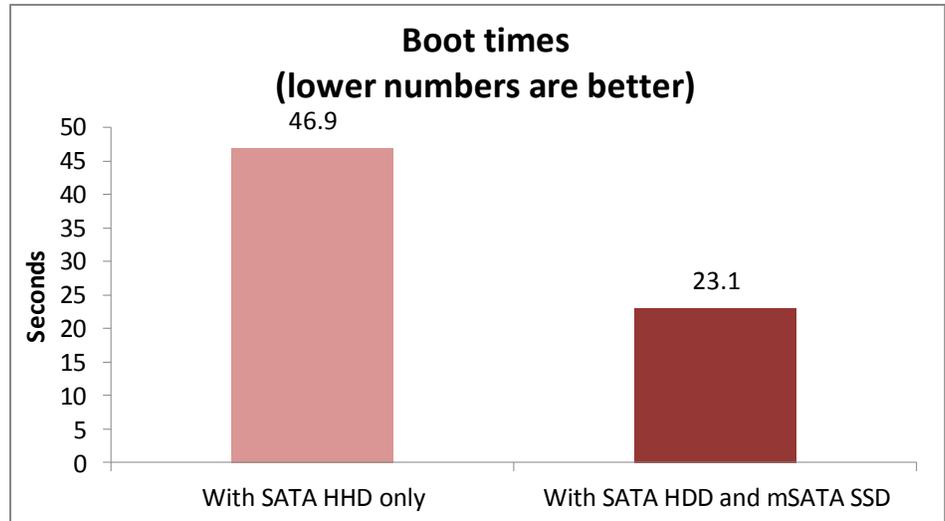|	Seconds
With SATA HHD only	46.9
With SATA HDD and mSATA SSD	23.1

Figure 3 details the results of our boot and shutdown time tests. We ran each test three times and report the median result.

	Lenovo ThinkStation C30 with SATA HDD only	Lenovo ThinkStation C30 with SATA HDD and mSATA SSD	Percent win when adding mSATA SSD
Shutdown duration (sec)	16.0	6.2	61.5%
Total boot duration (sec)	46.9	23.1	50.7%

Figure 3: Test results for the shutdown and boot time tests. Lower numbers are better.

IN CONCLUSION

Maximizing the performance of your workstation through cost-effective drive additions can help you get the most out of your system. In our tests, we found that the Lenovo ThinkStation C30 booted 50.7 percent faster and shut down 61.5 percent faster when we added an mSATA SSD to a base configuration with a SATA HDD. These results show that adding an mSATA SSD to your new workstation is a great strategy to help maximize the performance of your Lenovo ThinkStation C30.

APPENDIX A – SYSTEM CONFIGURATION INFORMATION

Figure 4 provides detailed configuration information for the test system.

System	Lenovo ThinkStation C30
General	
Number of processor packages	2
Number of cores per processor	4
Number of hardware threads per core	1
Total number of system threads	8
System power management policy	ThinkCentre Default
Processor power-saving option	EIST
CPU	
Vendor	Intel®
Name	Xeon®
Model number	E5-2603
Stepping	M1
Socket type	LGA2011
Bus/Core Ratio	18
Core frequency (GHz)	1.80
Intel QuickPath Interconnect Speed	6.4 GT/s
L1 cache	256 KB (32 KB + 32 KB per core)
L2 cache	1 MB (256 KB per core)
L3 cache	10 MB (shared)
Platform	
Vendor	Lenovo
Motherboard chipset	Intel C602
BIOS name and version	Lenovo A1KT39AUS (08/10/2012)
Memory module(s)	
Vendor and model number	Micron MT9JSF25672PZ-1G6M1FE
Type	PC3-12800
Speed (MHz)	1,600
Speed running in the system (MHz)	1,600
Timing/Latency (tCL-tRCD-tRP-tRASmin)	7-7-7-19
Size (MB)	2,048
Number of memory module(s)	4
Total amount of system RAM (GB)	8
Chip organization (single-sided/double-sided)	Double-sided
Channel (single/dual/quad)	Quad
Drives	
Drive #1 –SATA drive tests	
Vendor and model number	Seagate ST500DM002-1BD14
Size (GB)	500
Buffer size (MB)	16
RPM	7,200

System	Lenovo ThinkStation C30
Type	SATA 6.0Gb/s
Controller	Intel C600 Series Chipset SATA RAID Controller
Driver	Intel 3.2.0.1126 (06/20/2012)
Drive #2 – mSATA drive tests	
Vendor and model number	Samsung® MZMPC128 m-SATA
Size (GB)	128
Type	SATA 6.0Gb/s
Controller	Intel C600 Series Chipset SATA RAID Controller
Driver	Intel 3.2.0.1126 (06/20/2012)
Operating system	
Name	Microsoft® Windows® 7 Professional x64
Build number	7601
Service Pack	1
File system	NTFS
Kernel	ACPI x64-based PC
Language	English
Microsoft DirectX version	11
Graphics	
Vendor and model number	NVIDIA® Quadro® 600
Type	Discrete
Chipset	Quadro 600
BIOS version	70.8.7c.0.1
Total available graphics memory (MB)	4,839
Dedicated video memory (MB)	1,024
System video memory (MB)	0
Shared system memory (MB)	3,815
Resolution	1,280 x 1,024
Driver	NVIDIA 8.17.12.7642 (12/10/2011)
Sound card/subsystem	
Vendor and model number	Realtek High Definition Audio
Driver	Realtek 6.0.1.6581 (02/29/2012)
Ethernet #1	
Vendor and model number	Intel 82579LM Gigabit
Driver	Intel 11.15.16.0 (01/11/2012)
Optical drive(s)	
Vendor and model number	LG DH40N
Type	DVD-ROM
USB ports	
Number	12
Type	10 x USB 2.0, 2 x USB 3.0
Other	Serial port

System	Lenovo ThinkStation C30
Monitor	
Type	ViewSonic® VG730m
Screen size (inches)	17
Refresh rate (Hz)	60

Figure 4: Configuration information for the test system.

APPENDIX B - HOW WE TESTED

Installing the OS on the mSATA SSD

1. Create recovery disks using the Lenovo Recovery Disk utility.
2. Power down the workstation, and disconnect the power.
3. Disconnect the SATA HDD.
4. Insert the mSATA SSD into the mPCIe slot on the motherboard.
5. Reconnect the power, boot to the recovery disks, and install the factory image onto the mSATA SSD.
6. Verify the mSATA SSD is the first boot option in the BIOS.
7. Power down the workstation, and disconnect the power.
8. Reconnect the SATA HDD.

Windows ADK Boot Performance Assessment (Full Boot) test

1. Boot the system and bring up an administrative command prompt:
   a. Select Windows Start orb.
   b. Type `cmd` and right-click on cmd.exe.
   c. Select Run as administrator.
2. Type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`
3. Do not interact with the system until the command exits.
4. After the command exits wait 5 minutes before running the test.
5. Launch the Windows Assessment Console by clicking Windows Start orb→All Programs→Windows Kits→Windows ADK→Windows Assessment Console.
6. Select Run Individual Assessments and click Boot Performance Assessment (Full Boot).
7. Click Run.
8. Record the results.
9. Shut down the computer.
10. Repeat steps 1-9 twice.

ABOUT PRINCIPLED TECHNOLOGIES

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Our founders, Mark L. Van Name and Bill Catchings, have worked together in technology assessment for over 20 years. As journalists, they published over a thousand articles on a wide array of technology subjects. They created and led the Ziff-Davis Benchmark Operation, which developed such industry-standard benchmarks as Ziff Davis Media's Winstone and WebBench. They founded and led eTesting Labs, and after the acquisition of that company by Lionbridge Technologies were the head and CTO of VeriTest.