



SSD Optimization in Windows* 7

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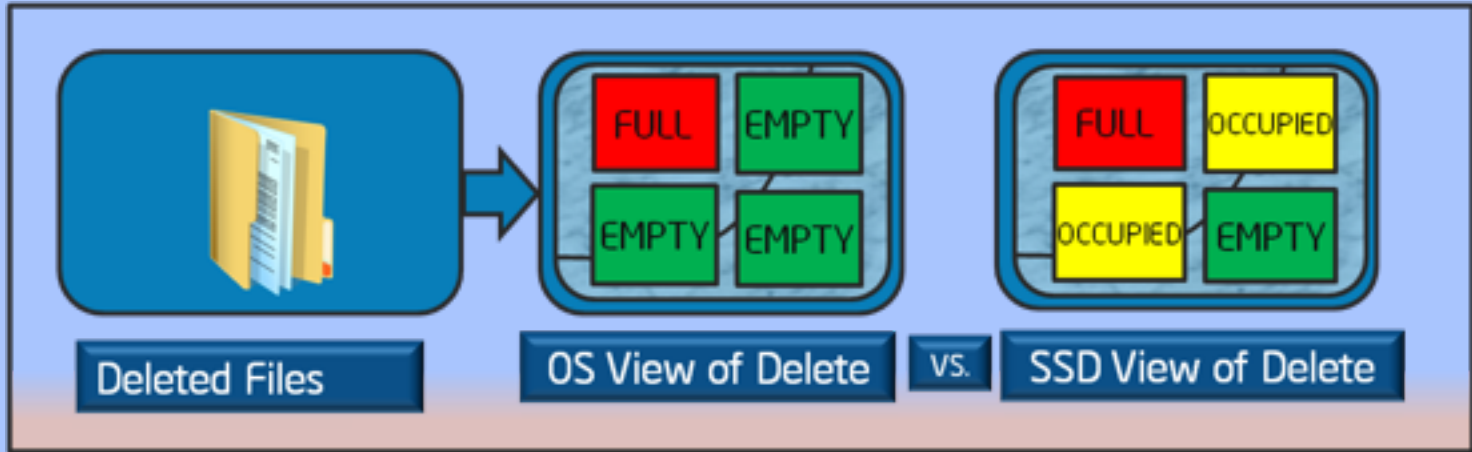
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What's in Windows* 7

Windows 7 features for Solid-State Drives (SSDs):

- Trim
- Windows* Experience Index Assessment
- Windows* Disk Defragmenter
- Advanced Host Controller Interface (AHCI)
 - Native Command Queuing (NCQ)
 - Link Power Management (LPM)

Before Trim

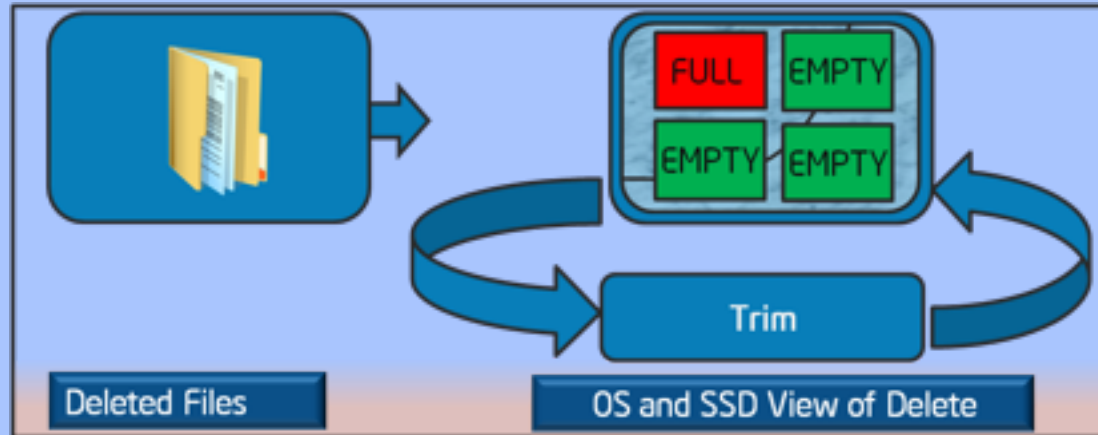


- “Dirty” drive
- Unnecessary controller management

Trim

- Data Set Management command attribute
 - AT Attachment (ATA) ACS-2 Specification - www.t13.org*
- Enablement
 - Device
 - Host: OS/Storage Driver
 - Vendor-specific tools
- Works natively with Windows* 7 and Microsoft* Advanced Host Controller Interface (MSAHCI) or Intel® Rapid Storage Technology version 9.6 or later

With Trim



- “Clean” drive
- Drive and operating system in sync
- Drive manages data optimally



Windows* Experience Index – Disk Test

- Executes tool called WinSAT (Windows System Assessment Tool)
- Disk test runs a series of tests to assess the ability of the storage device to handle various I/O workloads
- A disk score of 6.5+
 - Indicates an SSD with good random performance
 - **Disables unnecessary prefetching activities like SuperFetch* and ReadyBoot**

Windows* Disk Defragmenter

- For Hard Disk Drives, contiguously arranges fragmented files for most efficient access; not necessary with Solid-State Drives
- Automatically disabled when:
 - Device does not have a seek penalty as reported by IOCTL_STORAGE_QUERY_PROPERTY:StorageDeviceSeekPenaltyProperty.
 - Device is a dynamic or a child Virtual Hard Disk (VHD)
 - **For ATA devices, when the Identify Device command indicates non-rotating media**
 - WinSAT random read rate > 8 MB/s



Advanced Host Controller Interface (AHCI)

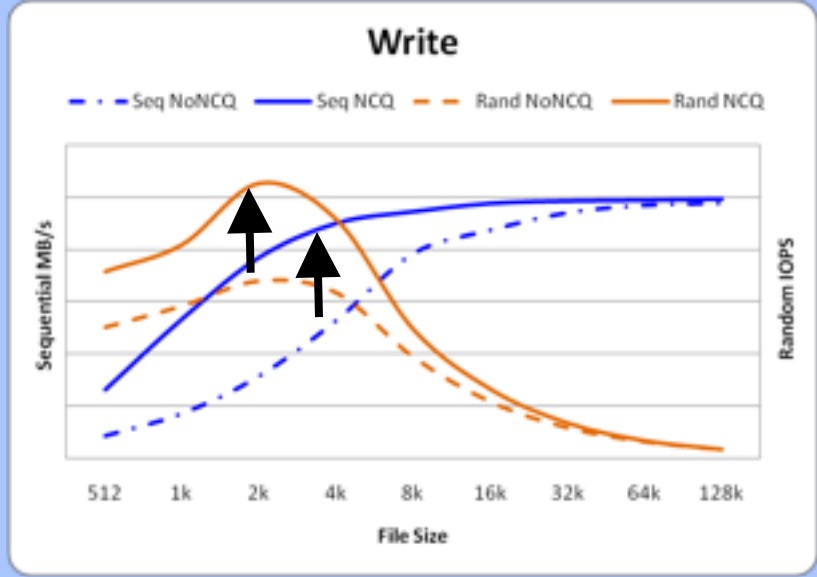
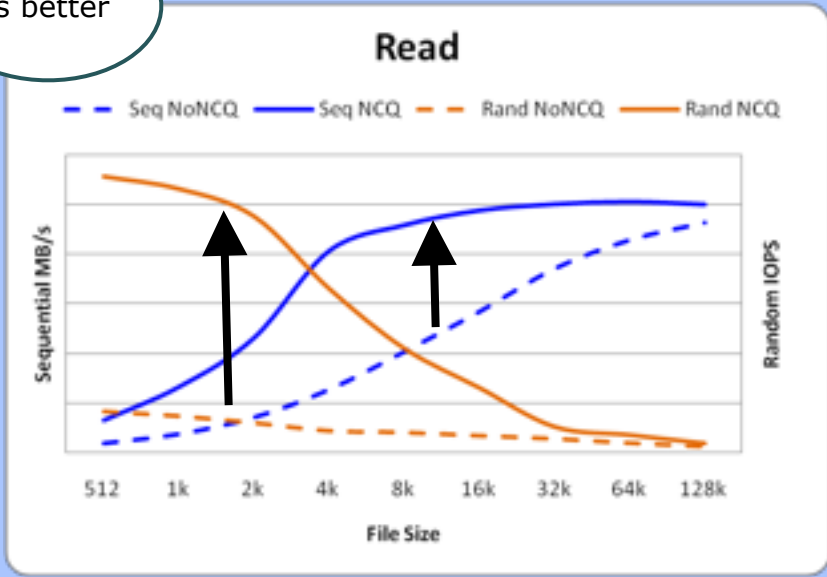
- AHCI is the SATA programming interface
- Windows* 7 – default at install w/ BIOS enablement
- Allows key functions for optimal SSD performance including:
 - Native Command Queuing (NCQ)
 - Link Power Management (LPM)

Native Command Queuing (NCQ)

Allows drive to process more commands in parallel – improving performance

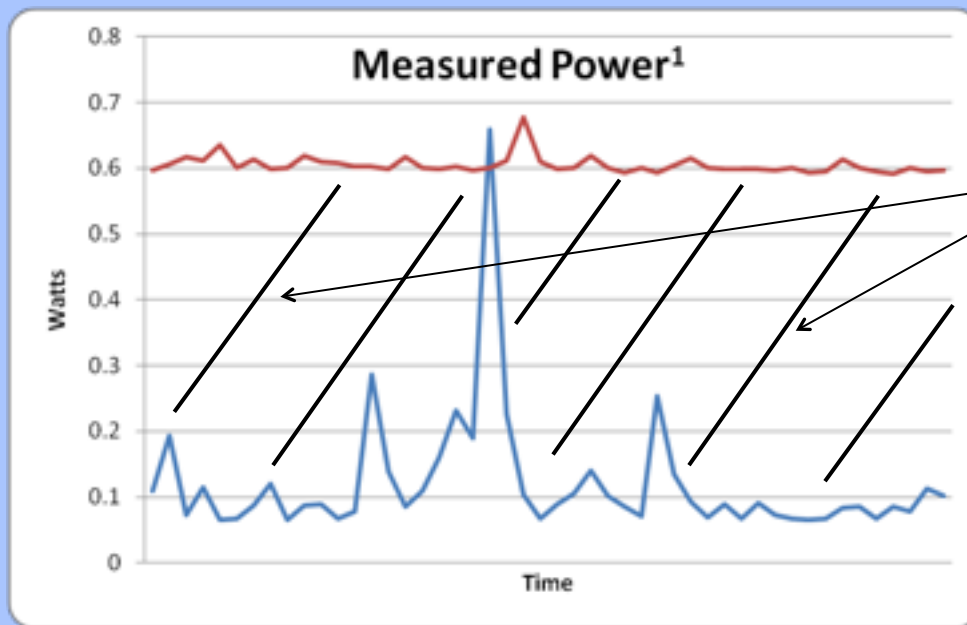
Higher is better

NCQ Benefit



Link Power Management (LPM)

- Set LPM with Device Initiated Power Management (DIPM) for lowest power consumption
- Enables SSDs to save significant energy



¹ Measured using MobileMark* 2007 as workload



Default DIPM Support

- Default Support

Summary

Windows* 7 optimizations increase performance and power efficiency for the Solid-State Drive

- Trim
- Windows* Experience Index – Disk Test
- Disk Defragmenter
- AHCI
 - NCQ
 - LPM



Thank You!



Backup

Enabling DIPM

- Check device support – Identify Device info (word 78)
- Host support
 - MSAHCI:
“powercfg -qh scheme_current sub_disk”
More on powercfg can be searched at: [http://
technet.microsoft.com/](http://technet.microsoft.com/)
 - Intel® Rapid Storage Technology
(RST) 9.6 and earlier:
`HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\ iastor
\Parameters\PortX`
*where PortX indicates one of the possible SATA port numbers
(Ex. Port0, Port1). Set LPM and DIPM value name to 1.*