For Data Centers

TRIM

One of the most powerful technologies for SSD performance

Application note

TRIM

1. What is TRIM and how does it work?

Due to the characteristics of the NAND flash, data can only be written to an empty page in NAND and garbage collection (GC) secures free (empty) blocks for writing.

The TRIM command from the operating system (OS) notifies the solid-state drive (SSD) controller of "invalid data" on the SSD when a corresponding file/data is deleted in the OS. When the TRIM command is executed, the SSD marks the data in the trimmed sectors as invalid, eliminating unnecessary operations when creating free blocks (GC) later on.

2. Why is TRIM important?

GC is usually executed as a background operation, but under 24/7 operating applications, such as a server/data center, it's difficult to make time for GC, resulting in performance degradation.

TRIM helps make GC more efficient by preparing invalid data for deletion. Therefore, it's very important to make sure the system environment supports TRIM to avoid a drop in performance.

3. How do I deploy TRIM technology?

As it requires OS support, not all users will be able to use native TRIM functionality. On PCs, TRIM is supported in Windows® 7 or later. On Macs®, TRIM is only supported for Apple's® original equipment manufacturer (OEM) SSDs and is not supported for Samsung's (or any other manufacturers') aftermarket SSDs. Users of older Windows operating systems (Windows XP®, Windows Vista®) may use Magician's built-in "Performance Optimization" feature to manually pass the TRIM command to the SSD on demand (or by way of a user-specified schedule).

In a client PC application, TRIM can be executed when the OS and SSD support TRIM technology. In a server application, however, system configuration is more complicated, such as various OS, kernels, file systems, Host Bus Adapter (HBA) cards, etc. So there are more steps to go through from the host to the SSD device for the TRIM commands and all these steps should support TRIM*.
(*However, TRIM might not function correctly under the RAID configuration.)

Below is a table containing OS TRIM-supporting information, but this table cannot cover every OS. Therefore, users need to check OS and HBA card manufacturers for detailed information.

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Operating system	TRIM Support
Windows XP, Vista	No
Windows 7, 8	Yes
Windows Server® 2008 R2	Yes
Linux® 2.6.33	Yes/No (Not all file systems support TRIM)
OpenSolaris	Yes
FreeBSD® 8.1	Only for low-level device erasing (Zeroing all LBAs)
FreeBSD 8.3 & 9.0	Yes/No (Not all file systems support TRIM) (UFS : Yes/ZFS : No)
DragonFly BSD	Yes
Mac OS X® Snow Leopard v10.6.8	Pre-installed SSD drives only
Mac OS X Lion v10.7	Pre-installed SSD drives only

4. Samsung SSDs for data centers are

Basically, Samsung SSDs for data centers support the TRIM command to help improve its performance under any TRIM-supporting system environment.

Samsung SSD for data center	TRIM support
845DC PRO	Yes
845DC EVO	Yes

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