Adaptec maxCache Plus
Optimizing the Structure of Server Storage

Adaptec maxCache Plus, available with Series 8Q/8ZQ RAID adapters, includes caching and tiering to provide the most optimized server storage solution in the market.

The ability to assign different categories of data to different types of storage media is essential for enhancing storage performance while reducing overall storage costs. Available with Adaptec Series 8Q/8ZQ adapters, maxCache Plus offers both caching and tiering to optimize performance and maximize storage device lifecycles and investments.

The maxCache Legacy

First-generation maxCache allowed solid state drives (SSDs) to be configured as cache, and stored the most frequently-accessed data in the cache pool. This "hot" data is read from cache instead of from the hard disk drives (HDDs), thus improving application performance. The next generation of maxCache introduced fully redundant write caching support, advancing the performance capabilities of SSD caching to a broader set of application workloads. Third-generation maxCache added Optimized Disk Utilization (ODU), which allows SSDs to be partitioned into both a cache pool plus a storage device that can be used as an OS boot drive or to store other data that requires fast, low-latency access.
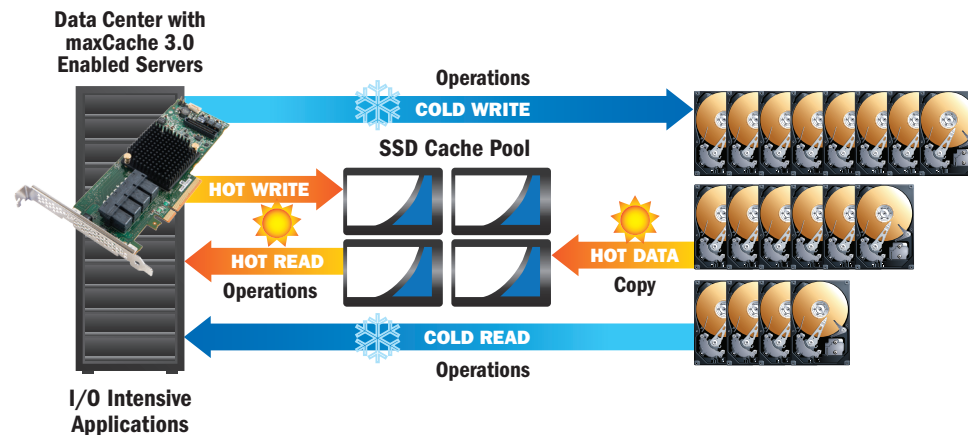

Figure I: Adaptec maxCache 3.0 SSD Caching

The New Generation of maxCache

Adaptec maxCache Plus, bundled with Series 8Q/8ZQ adapters, adds tiering functionality that provides virtualized pools of storage using any block level storage device. With the ability to tier their storage, IT managers, system integrators, and ISVs can garner the fastest performance and best overall value from their storage assets, and fully exploit the capabilities of the newest 12Gb/s devices.
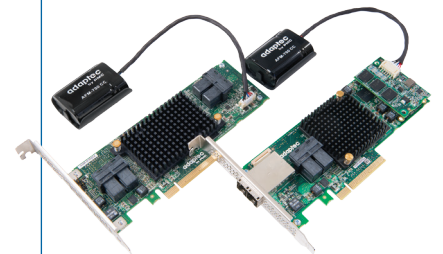
Highlights

- Ideal for I/O intensive storage applications, NAS, online transaction processing servers (OLTP), web 2.0, and cloud computing applications.

- Caching + Tiering to accelerate application performance and reduce overall storage costs.

- New Tiering functionality provides virtualized pools of storage using any block level storage device.

- SSD Caching supports read/redundant-write caching capabilities.

- Bundled with Adaptec Series 8Q/8ZQ RAID adapters.
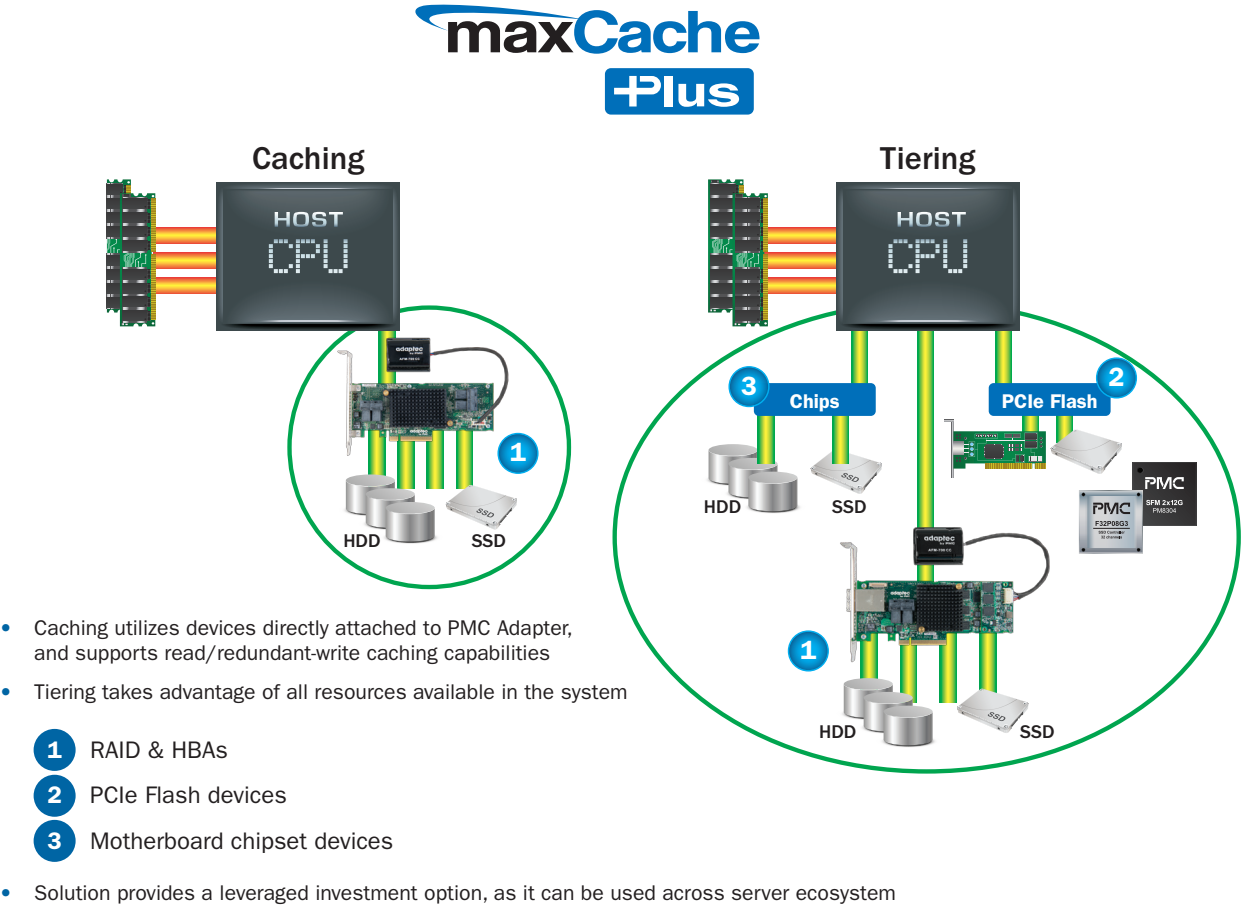
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Figure 2: New generation maxCache Plus

- Caching utilizes devices directly attached to PMC Adapter, and supports read/redundant-write caching capabilities

- Tiering takes advantage of all resources available in the system

  1 RAID & HBAs

  2 PCIe Flash devices

  3 Motherboard chipset devices

- Solution provides a leveraged investment option, as it can be used across server ecosystem

The maxCache Plus Advantage

Adaptec maxCache Plus comes with caching functionality built into the adapter firmware. The tiering functionality is packaged as an operating system-level "filter" driver and is comprised of Volume Manager and Policy Engine.

- Volume Manager, the mechanics behind the operation, manages the I/O to and from the tiered volume and routes the I/O to the correct tier group. It provides an efficient mechanism for maintaining a tier value mapping table in persistent storage for all the tiered sources to achieve the best overall performance.

- Policy Engine is the intelligence of the solution and decides where to place the managed data. It gathers the statistical information from the I/O engine to determine access frequency of the data. In order to make decisions on data priority, the Policy Engine divides all data into 2 queues: "cold" and "hot." (See Figure 3). "Cold" data (blue path) is placed on the slowest storage media, typically SAS or SATA HDDs. "Hot" data (red path) is placed on the fastest storage media, allowing for the most expeditious access. Policy Engine continuously analyzes each of the entries and updates the data location based on use patterns.

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Figure 3 below, provides examples of the mapping hierarchy for both a single and dual Tier (Virtual Volume).
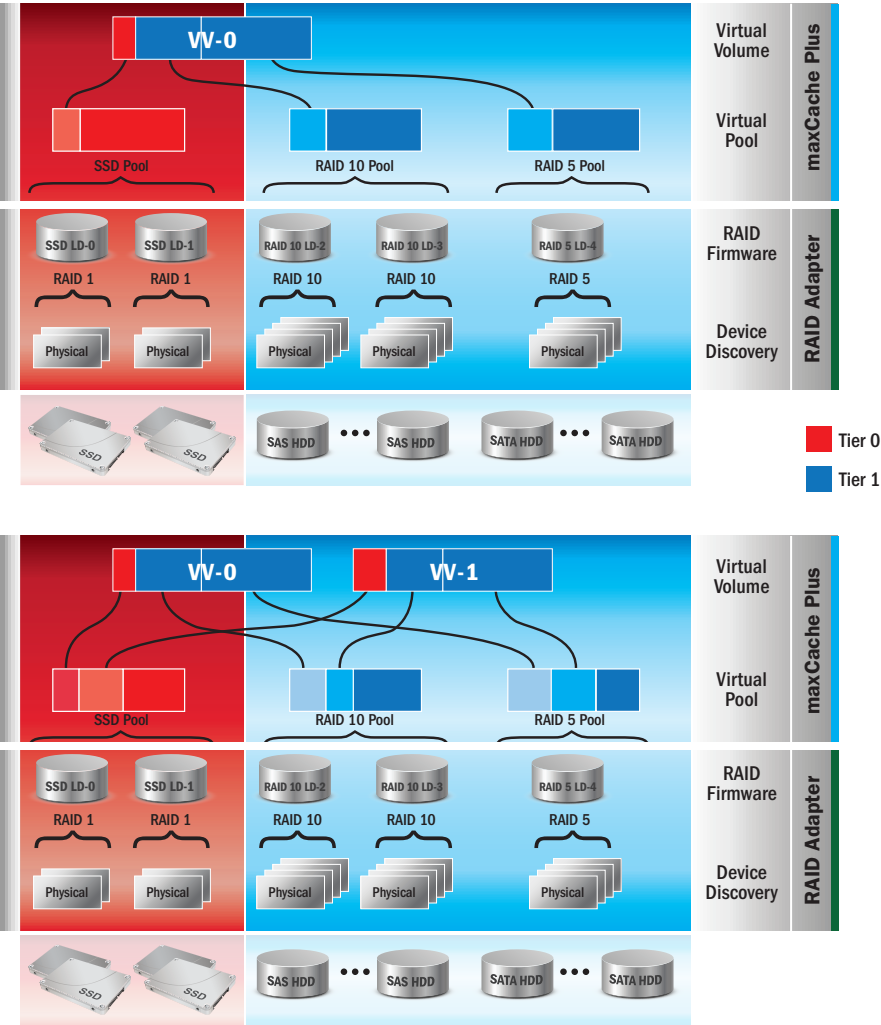

Figure 3: Single & Dual Virtual Volume Mapping

Definitions:

Tier Level: A tier comprises a collection of media (memory, SSD, RAID 10, RAID 5, raw disk) having distinctive performance characteristics. In maxCache Plus Tier-0 is assigned to the highest performing media pool.

Virtual Pool: Grouping of media with similar performance characteristics. Based on the underlying media performance characteristics, a pool will be assigned a "Tier" level.

Ex: A pool of SSDs will be assigned Tier-0 while a pool of HDD will be assigned Tier-1.

Virtual Volume: Virtual volume is the volume exposed by the maxCache Plus driver. Types of Virtual Volumes:

- **Tiered** – Volume created using two or more pools of different Tier levels. The uppermost tier will be used for storing the hot data. The amount of capacity allocated from each pool is set during volume creation.

  Ex: If a volume is created using Tier-0 and Tier-1 then Tier-0 will be used for storing the hot data.

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- **Cached** – Volume created using two pools of different Tier levels. The uppermost tier will be used as a caching media. Caching can be Read, Write-through or Write-back.

  Ex: If a volume is created using Tier-0 and Tier-1 then Tier-0 will be used as the caching media.

- **Cached-LD** – Volume created using an existing logical device and a pool with performance characteristics better than the logical device. The capacity from the pool will be used as a caching media. Caching can be Read, Write-through or Write-back. Cached-LD allows users to add caching to an existing logical device without wiping out the user data.

- **Pass-through** – By default all underlying storage (Logical or raw devices) discovered by maxCache Plus driver are exposed as pass-through volumes to the OS.

Conclusion

Adaptec maxCache Plus offers both SSD caching plus a new tiering solution designed to provide virtualized pools of storage to accelerate application performance and reduce overall storage costs. Series 8ZQ products with maxCache Plus give users the flexibility to decide which application accelerator best fits their needs.

maxCache Plus	Caching	Tiering
Why to buy?	Series 8Q/8ZQ RAID adapters support both SAS and SATA devices and offer maxCache Plus for enhanced storage structuring, increased IOPS and lower latency. Ideal for I/O intensive storage applications, NAS, online transaction processing servers (OLTP), web 2.0, and cloud computing applications.	
Customer Need	Defined application, capacity, and performance needs.	Flexibility in storage structure, components, and capacity.
Accelerator Engine	RAID processor	Host CPU
Operating Systems	Microsoft Windows, Red Hat Linux, SUSE Linux, Fedora, Debian Linux, Ubuntu Linux, Sun Solaris, FreeBSD, VMware ESX. The latest drivers are available at **www.adaptec.com/support.**	Microsoft Windows, Red Hat Linux and SUSE Linux. The latest drivers are available at **www.adaptec.com/support.**
Storage Pools	Configure SSD caching pool in R0, R1, RAID1E, RAID5.	Configure Tiered Drive through pooling of logical storage capacity.
Storage Capacity	Supports up to 8 SSDs with up to 2TB of SSD cache.	Supports 2 storage pools (tiered drives) up to 128TB.