Choosing the Best Storage Controller for Your Hosting Business

Adaptec Unified Serial (SATA/SAS) RAID Controllers Are the Preferred Choice

For any hosting business, margin is a key factor in profitability. Choosing the right RAID controller can solve two key issues that affect your bottom line:

1) Keeping infrastructure costs low

2) Optimizing operational costs

Keeping infrastructure costs low means getting the most storage capacity from the smallest amount of equipment possible. The high-capacity disks that seem like the obvious answer to this challenge, in fact, are only part of the solution. A much more important role is played by the RAID controller, which determines the maximum capacity that can be attached to a single system, whether you can start with less-than-maximum capacity, how easily capacity can be expanded, and how much training your IT team will require.

Optimizing operational costs means choosing well-designed system components. Again, your choice of RAID controller will have a key impact on your operational costs. On a day-to-day basis, what will the cost of provisioning new users and IT hours spent managing the system add or subtract from your bottom line? While there is no such thing as a 100% bulletproof storage solution, it's obvious that the less often your storage goes down and the more quickly you can recover data, the less it will cost you.

Together, minimizing infrastructure costs and reducing ongoing operational costs provide a sure means of increasing profits. The rest of this white paper is dedicated to detailing the key RAID controller factors that can help you achieve this goal.

> *Optimizing infrastructure and operational costs provides a sure means of increasing profits.*

Key #1: Keeping Infrastructure Costs Low

At the heart of any hosting business is a massive amount of storage.

Infrastructure costs have a material impact on the cost of delivering service to customers. Minimizing infrastructure costs plays a key role in the ability to deliver service at a level that maximizes both customer satisfaction and operating profitability.

Standardization

One way to do this is to standardize on specific vendors, so there is no need to retrain your technical staff as equipment is added and compatibility is ensured. Depending on your business model, a RAID vendor with a wide range of offerings can be key to optimizing infrastructure.

> *A RAID vendor with a wide range of offerings can be key to optimizing your infrastructure.*

Managing Expansion

All hosting companies require some level of equipment that grows as the customer base and the needs of existing customers expand. At its most basic, this means purchasing a new server, network cards and storage controllers.

In a server-hosting environment this might also mean being able to offer different types of configurations and server sizes from 4 disks to 24 disks and JBOD expansions, without complicating the internal infrastructure. It also means answering some key questions. Do you need RAID protection and if so, what kind? Does your business support 10Gb/s network connections? Can your business run on Serial ATA (SATA) drives with their higher capacity and lower reliability or do some of your customers require the maximum reliability of Serial Attached SCSI (SAS) drives?

ISPs must answer similar questions when setting up a new web server. The difference is that, while large customers may require a discrete server, virtualization allows a number of smaller, lower-capacity customers to be cost-effectively combined on a single server. So, while discrete servers may be sized to customer needs using well-established guidelines, highly virtualized servers need more flexibility in areas such as disk capacity and I/O performance to handle the vagaries involved in supporting multiple customers simultaneously.

Application hosting is similar to the ISP model in that adding a new customer presents the choice of adding a new server or simply integrating them into an existing server.

One of the most important considerations in keeping infrastructure costs low is the storage controller. In the end, your choice of controller will determine the performance, flexibility, and scalability you can achieve from the servers in your infrastructure.

> *Your choice of controller will determine the performance, flexibility, and scalability you can achieve.*

Performance

Performance is another important infrastructure consideration. The most cost-effective way to provide the performance to satisfy customers is to purchase the maximum performance you can afford whenever you add new equipment.

- *The most cost-effective way to provide the performance to satisfy customers is to purchase the maximum performance you can afford.*

This allows you to deploy more users or more capacity on a single server (potentially via virtualization) and reduces the frequency of needing to add new devices.

Flexibility

Flexibility is the ability to make the most of any investment. How adaptive is your storage? Can you plug in different kinds of disks? Can you repurpose your storage without having to reconfigure everything or shut down access?

Selecting a controller that is qualified against a large number of drive and storage enclosures is also a strong advantage since your organization will likely need to optimize costs and switch between disk drive vendors multiple times during the lifetime of your product. Being assured of product compatibility without having to use your own precious resources for massive qualification and compatibility tests will add directly to your bottom line.

- *Being assured of product compatibility without having to use your own resources for qualification will add directly to your bottom line.*

Scalability

Scalability provides a cost-effective solution to the one challenge you know you will have: that your customers' capacity needs will grow. Highly scalable systems let you add capacity without having to add a completely new server or other storage system or even turn off your existing systems to add new disks.

- *Highly scalable systems let you add capacity without having to add a new server.*

Adaptec Unified Serial Controllers are the Preferred Choice for Keeping Infrastructure Costs Low

Whether you choose to use SATA disks, SAS disks or both in your storage infrastructure, Unified Serial™ controllers offer the maximum performance, flexibility and scalability available today.

- *Unified Serial™ controllers offer the maximum standardization, performance, flexibility and scalability available today.*

Performance numbers in the Unified Serial controller category exceed 250,000 I/O operations per second and 1.2GB/s. Only Unified Serial controllers offer the flexibility to connect to SATA disks or SAS disks or both in the same storage system. This allows you to easily migrate storage from SATA to SAS just by swapping disks, if customer needs change. Unified Serial controllers are available in port counts from 4 to 24, with a mix of internal and external ports, and offer scalability up to 128 devices per controller. Plus, they have been tested with over 300 SATA and SAS devices to ensure the utmost in compatibility.

Key #2: Optimizing Operational Costs

Capital equipment costs are dwarfed by operational expenses.

One of the largest ongoing operational expenses in the hosting business is the cost of the staff that is responsible for operating the servers day in and day out. With its ability to simplify or complicate regular and extraordinary tasks, your choice of storage controller has a direct impact on these operational costs.

Provisioning New Users

One of the most critical issues in a hosting business is the addition of new users to your service. In most cases this is the first experience that your customer will have with your product and it is critical that you bring them online quickly and without error. In most cases this means automation.

The best storage controllers help this process by making it simple to provision new storage and giving your operations team the tools that give them the choice on how to perform that task.

- *The best storage controllers make it simple to provision new storage.*

Your team might prefer script-driven provisioning that uses a command line interface (CLI) or software developers kit (SDK) to integrate the task into the existing processes. Or, they might prefer a more graphical process handled from a central location.

Monitoring

Once users have been added to your service, you can maximize their contribution to your revenue by minimizing your expenses in servicing their account. This means that you don't want to have to spend any operational resources monitoring normal behavior or detecting infrastructure problems.

Again, the best storage controllers offer a choice of management methods, so your team can select the best method for your business.

- *The best storage controllers offer a choice of management methods and simplify monitoring and upgrades.*

For example, if your operations staff is responsible for particular components in the infrastructure, you may have a storage-specific staff that would benefit from being able to monitor ALL of your storage from a single, graphical console. Alternatively, your staff may be fully integrated, in which case CLI and SDK options allow monitoring to be integrated into your existing service-monitoring tools.

To be truly effective, you also need a centralized tool that simplifies upgrades, allowing you to upgrade every component in your system without having to physically touch the device. Imagine the difference between upgrading 10,000 devices automatically or doing it manually on a 1-by-1 basis.

How do your systems let you know when something goes wrong? Email alerts and SNMP traps tell your staff when there is something wrong, eliminating the burden of continually and

manually searching for problems. Email alerts and SNMP traps are even more useful when they are combined with SMART monitoring, which predicts drive failures, allowing you to solve the problem before it becomes a issue.

This foreknowledge allows true optimization. You can pre-plan for failures, buying parts more affordably in bulk and scheduling maintenance operations, rather than having to deal with each problem in "emergency mode" as it occurs.

Reliability

Another thing to consider is what happens when a failure that you can't prevent occurs from a natural event, a long-term power outage or some other outside cause that the system can't anticipate. Restoring data from tapes or backup is at best extremely expensive and time-consuming.

As a result, reliability should be among your key criteria for selecting a controller. But choosing a controller designed to minimize downtime, even in a 24/7 environment, is just the start.

Beyond reliability, RAID is your best protection.

> *RAID is your best protection from data loss.*

Data stored in RAID configurations can be immediately recovered and moved back into the production environment. RAID arrays can be established directly on the storage server, on a separate machine, or even as an offsite repository that remains on the network for easy data transfer.

This is where hardware RAID can provide an advantage. In a typical storage environment hardware RAID protection is often deployed, whether it is a Windows, UNIX or Linux environment. Hardware minimizes impact on performance with the inclusion of a chip on the controller board and enables a wider range of RAID choices, typically RAID 0, 1, 5, 6, 10, 50, and 60.

> *Hardware minimizes impact on performance.*

However, in the hosting industry, a number of operators prefer to combine a software RAID controller with the RAID protection included in Linux. Software RAID typically offers RAID 0, 1 and 10 and relies on the motherboard for its processing power.

In making the decision between hardware and software RAID solutions there are many factors to consider. Obviously the initial cost is one; software RAID included with the operating system certainly has a lower up-front cost than a hardware RAID solution, but in a hosting business this may not necessarily be the best factor on which to base a decision.

The key to operational efficiency when using RAID is finding the right balance between protection and capacity.

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RAID 1, for example, provides extreme protection by mirroring all data on a second set of disks. However, it also requires that half the storage capacity be set aside for this backup. RAID 5 has long been the standard compromise, since it stripes the backup data across all the disks in the array, requires only one disk be set aside for protection and can withstand the loss of one disk without losing data.

For hosting applications where data protection is crucial, RAID 6 provides practically bullet-proof RAID. Similar to RAID 5, it stripes data across all the disks in the array, requires only two disks be set aside for protection and can withstand the loss of two disks without losing data. That's twice the protection of RAID 5. This protects you from a second disk failing while repairing or replacing a failed disk. It can even allow you to defer fixing a single failed drive until you are doing a bulk operation, such as a regular scheduled maintenance cycle; another way to optimize your use of costly operations resources.

Hot spares further simplify recovery from disk failures, providing a spare disk that can be brought into service immediately, without physically installing a new disk. While this may not be appropriate for your bulk service applications, it can result in a significant operational cost reduction in more critical situations, since it provides for immediate problem correction without requiring costly operator interventions. Typically, when the failed disk is eventually replaced, the new disk becomes the hot spare. However, for maximum convenience, some controllers include utilities that copy data back from the original hot spare to the replaced drive, so the hot spare is always the same disk.

Adaptec Unified Serial Controllers are the Preferred Choice for Optimizing Operational Costs

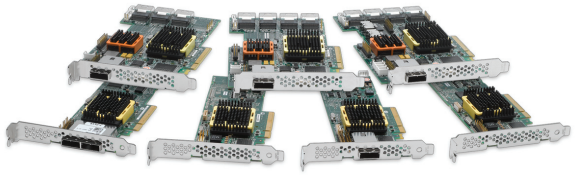
The Adaptec Storage Manager™ (ASM) included with every Adaptec Unified Serial Controller makes provisioning automatic and simplifies management no matter how much storage you have, whether you want to use the centralized graphical utility or use the CL or SDK options to integrate with your existing monitoring tools. Integrated SMART monitoring minimizes the cost and headache of problem solving.

Adaptec Unified Serial Controllers let you choose models with hardware RAID with support for UNIX, Windows, and Linux. Hardware RAID models offer the highest reliability, the broadest choice of RAID levels including RAID 5 and RAID 6, RAID Level Migration for easily changing RAID levels as needs change, and Copyback Hot Spare. It all adds up to operational optimization and ease.

Adaptec RAID Series 5 (SATA/SAS)

The Adaptec Series 5 family of SATA & SAS RAID controllers is a good example of one family of Unified Serial storage controllers that are ideal for practically any hosting solution.

The Adaptec Series 5 family of RAID controllers is ideal for practically any hosting solution.



They combine industry-leading performance with the industry's largest range of port counts, the broadest choice of RAID levels, support for SATA and SAS disks, qualification of over 300 different drive and enclosure models and a choice of management options.

The dual core RAID on Chip (ROC) CPU, DDR2 533MHz write cache and an x8 PCI express host interface add up to performance that has been tested at 250,000 IOPs and keeps pace with expanding customer requirements.

Choose from space-saving MD2 low-profile models with:

- 4 internal ports
- 8 internal ports
- 8 external ports
- 8 ports (4 internal and 4 external ports)

For additional scalability, particularly on those servers where you are making extensive use of virtualization, choose half-length, full-height models with:

- 16 ports (12 internal and 4 external ports)
- 20 ports (16 internal and 4 external ports)
- 28 ports (24 internal and 4 external ports)

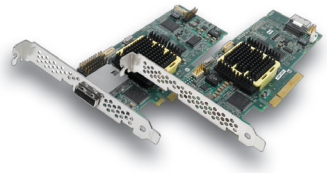
These controllers combine hardware RAID with the Adaptec RAID Code (ARC) to offer the maximum RAID protection, including RAID levels 0, 1, 1E, 5, 5EE, 6, 10, 50, 60 and JBOD.

- RAID Level Migration allows the RAID level on data to be migrated to a different level without taking the system offline.
- Copyback Hot Spare ensures that when a failed drive has been replaced, data is automatically copied from the hot spare back to the restored drive, allowing the hot spare to stay in the same place.
- Online Capacity Expansion allows capacity to be expanded without powering down the server
- Support for array sizes up to 512TB provides support for the latest high-capacity disk drives.

Adaptec RAID Series 2 (SATA/SAS)

The Adaptec Series 2 SATA & SAS RAID controllers offer the industry's best reliability and performance in its price class.

The Adaptec Series 2 family of RAID controllers offer the industry's best reliability and performance in its price class.



Choose from space-saving MD2 low-profile models with:

- 4 internal ports
- 4 external ports

They combine the entry-level price point and RAID 0, 1, and 10 of software RAID controllers with the reliability of hardware RAID. They offer support for SATA and SAS disks and maximum scalability. Like all Adaptec RAID controllers, they are also embedded with Linux open-source drivers and invulnerable to viruses.

Series 2 controllers feature a similar dual core RAID on Chip (ROC) CPU, 128MB of DDR2 write cache and an x8 PCI express host interface deliver performance that's unmatched in its class.

Ease of management is an additional benefit of choosing any Adaptec RAID controller since the same options apply across the entire product family. CLI and SDK options let you integrate management into existing host-management systems. However, the real management advantage is the simple, centralized management of the Adaptec Storage Manager™. No matter how large the hosting facility becomes, it can be remotely scaled and configured and the RAID arrays monitored through secure, encrypted communications from a central location such as your network operations center.

All products offer the SMART disk failure prediction and email alerts and SNMP traps that let you know of potential issues before they affect your system.

With so much minimizing operational costs, increased profitability, long-term investment protection riding on your choice, you can't afford to choose the wrong storage controller.

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