

# Setting-up RAID Arrays for Windows Small Business Server (SBS)

Windows Small Business Server (SBS) is an extremely popular complete operating system for small to medium business. It contains most applications that these businesses need in a package that is simple to install and manage. This bulletin concentrates on the storage needs of SBS, in particular creating the correct RAID arrays to get the best performance and flexibility from your system. SBS components and applications have a variety of data characteristics that generally fall into two categories — database-type data and general-purpose data. All the data storage related to the operating system (Windows Server), Exchange and SQL has database characteristics – many small read and writes to the underlying disks in a random manner – making RAID processor horsepower and speed primary requirements. The storage related to general-purpose data (Word, Excel, Powerpoint, customer information) – categorized as file-based storage data – has characteristics that make capacity a primary requirement.

The challenge is to build a disk structure good for both database and general-purpose data, with their very different demands, that most efficiently optimizes available disk capacity.

## Some Basic Considerations

**RAID choices** fall into two general types: non-parity and parity.

With its good write speeds, especially for small data writes, non-parity RAID is well-suited to operating systems and databases. Non-parity RAID can be defined as RAID 1 (mirror) or RAID 10 (stripe of mirrors). However, non-parity RAID types require up to 50% of disk capacity for data protection – not a high disk capacity utilization model.

Parity is good for most read and write types, but performance suffers when writing small amounts of data (such as database and

operating system writes). Parity RAID can be defined as RAID 5 (distributed parity capable of surviving single disk failures), RAID 6 (distributed parity capable of surviving 2 disk failures). RAID 5 is the most economical RAID. Three drives in a RAID 5 array yield two drives worth of capacity.

**Hard drive choices** also fall into two types: Serial ATA (SATA) and Serial Attached SCSI (SAS). SATA drives are economical, fairly reliable, and have a large capacity. They are single-tasking devices with fairly slow response times that are great for streaming but don't provide the optimal performance for database applications. SAS drives are smaller, more expensive and much faster. With multi-tasking ability and fast response times, they are excellent for database and operating system work.

**RAID controllers** provide the ability to survive drive failures without losing data and allow a system administrator to create different performance sections within one system. Controllers designed only for SATA drives limit scalability to the number of drives that can be directly attached and limit performance to SATA speeds. Unified Serial® (SATA/SAS) controllers, including Adaptec RAID controllers, connect to both SATA and SAS disks, increasing your flexibility in building a system by supporting scalability up to 256 SATA/SAS devices.

## Building RAID Arrays for SBS Using Containers

Adaptec RAID controllers offer a unique feature allowing arrays to be created from a portion of the disk (whatever size portion you want to use), called a “container”. They also allow more than one container to exist on each physical drive. Since a RAID array can be made up of small containers on different hard drives, it is possible to create different RAID types on the same set of disks.

## Summary

SBS data characteristics: 1) OS & database, 2) general-purpose

Hard drive choices fall into two types: 1) SATA, 2) SAS

Adaptec Unified Serial® RAID controllers support both SATA & SAS drives and offer maximum scalability

Adaptec containers allow for different RAID types to exist on the same set of disks

The SBS Challenge: meet data protection, capacity & performance requirements of both database & general-purpose data

One Solution: use multiple RAID arrays across multiple drives

- RAID 10 array for the OS
- RAID 10 array for Exchange & SQL
- RAID 5 for general-purpose data

Best Solution: combine various RAID types and disk types in one system

- SAS drives with RAID 1 or RAID 10 array for the OS
- SAS drives with RAID 1 or RAID 10 array for database
- SATA drives with RAID 5 or RAID 6 for general file serving

## Adaptec SATA and SAS HBA Family 1045, 1405

For example, with four 500GB hard drives in a 1U server, you could create a RAID 10 of 50GB capacity across all four hard drives. This would use only 25GB from each of the hard drives, leaving the rest of the drive space to be used to create other RAID arrays of the same or different types, and allowing users to configure the array structure to best balance performance, reliability, and capacity.

### The Cost Challenge

Typical SBS users need maximum capacity and view SBS as a cost-effective solution. Therefore, they often choose the lower-cost SATA drives. Though the more expensive SAS drives are the ideal match to database applications, choosing the correct RAID array will help offset some of the SATA drive performance disadvantages. For database applications, it is best to run a non-parity RAID 1 or RAID 10 array – depending on the number of drives in the array. However, because RAID 1 and RAID 10 consume 50% of total disk space, using SATA drives with RAID 1 or RAID 10 is not optimal for general-purpose data storage.

### One Solution

Using the example of a server with four 500GB hard drives, the following scenario would be an ideal implementation for an SBS system:

- 1 x 50GB RAID 10 array for the Operating System
- 1 x 100GB RAID 10 array for Exchange and SQL
- 1 x 1.2TB RAID 5 for general data

Both the OS and database applications reside on a non-parity RAID array (RAID 10). This provides the best disk performance that can be achieved with 4 disks while retaining data safety.

The data volume resides in a large RAID 5 array. This provides good performance for general file serving, while maximizing the capacity of the remaining space on the drives.

An implementation like this offers the best of both worlds – high-speed, non-parity RAID arrays for the OS and database data, and a large parity array for general file-serving data.

*Note: This container feature is available with Adaptec Series 2, Series 5 and Series 3 RAID controllers.*

### Scalability

The solution above allows you to start with just the capacity you require, without paying for disks that won't be used immediately. You can add drives to a system at any time, and expand the RAID arrays on your existing drives to incorporate the new drives. RAID 10, RAID 1, RAID 5 and RAID 6 especially are ideal candidates for adding drives and increasing the size of the system.

The time this takes depends on the size of the disks, but it doesn't mean much downtime. Once the disks are added to the system then it can be restarted and this expansion process completed in the background, maximizing user productivity and minimizing planned system downtime.

### The Best Solution

The ideal implementation of SBS combines various RAID types (parity and non-parity) and disk types (SATA and SAS drives) in one system. Unified Serial RAID controllers are essential in this ideal solution, allowing the flexibility to install both SATA and SAS drives within one system, attached to one controller. In this ideal implementation, the fast-responding SAS drives have two non-parity arrays – one for the OS and another for the database portion of SBS – while the large capacity, cost-effective SATA drives are used in a RAID 5 or RAID 6 array to create a large space for general file-serving duties.

The most cost-sensitive SBS implementation would install SATA drives only, pairing the correct RAID type with the proper application to partially offset the performance delta between SATA and SAS drives. With a SATA-only installation, a RAID controller that allows more than one RAID type to be installed on any physical drive improves the scalability and flexibility of the solution. Adaptec RAID controllers offer this unique capability to create more than one RAID type on any physical drive, providing SBS users the freedom to mix and match drive and RAID types to best meet their individual needs.



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