Server RAID Configuration

Lately, when I look at the specifications of new mainboards and their configuration, seeing SATA RAID or ATA RAID on the board comes as no surprise. Many of the manufacturers are now offering their own flavour of the RAID implementation, e.g. Gigabyte's GigaRAID or VIA's V-RAID.

Most of us though are missing out on a performance gain that is sitting right under our noses. Given how often manufacturers change socket formats, an upgrade can often cost you a new mainboard, processor and RAM. But you could potentially get a significant boost by simply moving to RAID 0 / Striping.

This article details two RAID (Redundant Array of Independent/Inexpensive Disks) configurations across two sets of disks. It is designed to assist someone in configuring their RAID to work with Microsoft Windows XP. Linux is an entirely different story, and even offers software RAID (which I have used in the past). Hardware used:

- Gigabyte GA-8I945P Pro mainboard

- Intel D 2.66GHz dual core processor, 533FSB

- 2x 512MB DDRII 667 Corsair memory sticks

- 2x Western Digital SATAII 320GB 16MB cache

- 2x Seagate Barracuda ATA 7200.7 120GB 8MB cache

- 1.44MB Floppy disk drive

Sofware used:

- Intel RAID drivers

- Gigabyte GigaRAID drivers

- Windows XP Home

- SiSoft Sandra Professional for benchmarking RAID 0 / Striping

This writes "stripes" of data alternatively to each disk. This halves the number of writes and doubles the space. For example, if you wanted to write 1MB, this is broken into whatever size blocks you choose, usually 128KB then the blocks are written out across the disks, along with parity. So when you think RAID 0 think, fast.

Because it's writing half the data to each disk, it then presents the logical volume as a single large disk.

RAID 0 Pros

- Very fast

- Doubles your container size

- Chipsets can offer RAID 0+1, but need 4 disks. Array is their Striped and mirroredRAID 0 Cons

- No redundacy with only 2 disks RAID 1 / Mirroring

This simply duplicates the writes of one disk to another disk. In the event of a disk failure in either the master or slave, then the remaining operational disk becomes the new master. This only protects you against a physical disk failure, not a software whoops.

RAID 1 Pros

- Physical redudancy

RAID 1 Cons

- Slave disk only ever useful in event of failure

- Performance only equal to a standard disk speed

It makes the most sense to use disks of a similar size and performance. Otherwise, the array will always run at the speed of the slowest disk.

The mainboard I have supports TWO, that's right two forms of RAID.

The first is the native Intel chipset SATA RAID. Intel has been placing SATA RAID support onto their chipsets since the 865. If you have an Intel based chipset, and it's an 865/9xx series chipset then you're likely to have RAID support for SATA. Goto Intel for their full details on their RAID storage implementations.

The second RAID device on the mainboard is provided by Gigabyte and is their GigaRAID. It's designed to support ATA, aka older non Serial ATA hard disks. The board has two green IDE/ATA connector slots and can operate in standard IDE mode or in RAID mode.

Getting Started

To even install RAID onto a system you'll need

- A mainboard with either SATA/ATA RAID support

- At least two hard disks in the desired RAID choice (SATA/ATA)

- A floppy drive or a mapping that supports A: access

- Your RAID chipset driver disk

Without these, turn back now. Otherwise you have two choices: image your current hard disk or perform a fresh install. Either way, you'll need the floppy drive and driver disk.

Order of Precedence

Basically I suggest you

- Validate your mainboard supports RAID

- Make sure you can locate your drivers

- BACKUP YOUR DATA

- REALLY!! I mean that last one, make sure you've backed everything up

- Shutdown, configure physically, configure logically, reinstall/restore

Locating Drivers

To locate your SATA/ATA RAID drivers, I suggest you rumage through that old motherboard box you know you have lurking somewhere.

If however you've been particularily efficient and done away with the box/disks then you should visit your manufacturers website.

Of course, this is not necessary if you intend to install the Intel SATA RAID as you can simply visit Intel's RAID guide and select "Download Intel Application Accelerator RAID Edition" from the menu on the left. Then choose your Operating System and you're away.

Otherwise, if you've found the drivers disc in the meantime, you simply need to locate the SATA directory on that disk. Often it's under drivers and can sometimes be wrapped in a executable.

The outcome though is usually a number of small driver files accompanied by a txtsetup.oem file in the root of the floppy disk.

This is important! There MUST be a txtsetup.oem in the root of the floppy drive, otherwise you can't load the drivers.

I can't help you with the backing up of your data. But recently I did use the Microsoft Backup tool to grab everything I needed and was quite pleased with it. By default it's not installed, nor even mentioned on XP Home, but I assure you it is there.

Installing MS Backup for XP Home

- Find your XP Home CD

- Under :\VALUEADD\MSFT\NTBACKUP

- You'll find NTBACKUP.MSI

- Right click and select INSTALL

Run through the install Wizard, then run the app to backup your data.

Configuration

You can't combine SATA & ATA disks together to form a RAID array. Each disk type is contained within the bounds of its own controller.

However, my mainboard did support a third option for the ATA RAID. This was called JBOD (Just a Bunch Of Disks), and was simply a means of presenting a set of disks as a single logical volume. This offers no performance gains (slow as the slowest disk), nor any redundancy. It is useful if you want to have a larger single volume to store your files in.

Configuring Hardware

Configuring hardware for an SATA setup requires no additional steps, as each SATA channel is a discrete connection to a disk.

ATA hardware configuration however is the usual master/slave/cable select options. I suggest that if like me, you are using an ATA RAID configuration with two disks, you place each disk as the master on their own channel. This is the best configuration for IO performance. This is done by either placing the jumper on the disks master set pins, or by ensuring that the end of the cable is placed on the disk, not the second connector. Configuring BIOS

Ensure your RAID device is set to RAID in the BIOS. Press your BIOS entry key duing POST (usually Delete / F2) and often under Integrated Peripherals/Advanced you'll find the SATA/ATA device mode settings. Make sure that your choice of controller is set to RAID or sometimes this is known as ENHANCED mode.

"Save & Exit" from your BIOS if you've made changes. Once the machine reboots, you should now see the RAID controller software loading after the initial POST.

You must press a key combination to enter the configuration tool. For the Intel SATA controller is was CTRL-I for the GigaRAID it was CTRL-G.
Now you can define your RAID array logical volume.

This is where you decide what RAID type you want, size of blocks and number of disks. Once you create this new container, all your data on the disks will be destroyed (well the FAT will effectively be wiped, but you could recover with a sector scan). I accepted the defaults for block sizes.

Either configuration SATA/ATA was similar in how it worked. Conclusion

Obviously if you're looking to have the ultimate in performance you go for RAID 0 / Striping. If you're after reliability and resilience then use RAID 1 / Mirroring.

And if you can afford four disks of the same type, then the ultimate would be RAID 0+1, where you've Striped two disks, and they are then Mirrored.

Striping clearly works best with the SATA disks, as the performance gain for the ATA disks wasn't that great. In fact even with Striping on the ATA disks, they still didn't perform as well as a single SATA II disk (no surprise there).

When Striped, the SATA II disks produced a 90% performance gain, whereas the ATA disks only produced a mere 12.5%

I will see if I can rattle up some SATA disks to validate if the performance gain of 90% holds true for SATA(I/II) disks in general.

Finally I am running two of my ATA 120GB disks Striped. This has given me a small performance gain, but the benefit of a much larger container (223GB).