TRIMM INDUSTRIES

ENGINEERING MEMO 1047

To: SCSI RAID Working Group
From: Gary M. Watson, ADA Project Manager
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Subj: RAID Issues From Trimm's Perspective

- **Purpose of RAID Working Group**

I get the feeling from reading the minutes of the WG meetings that your focus is rather narrow, in that you seem to only be talking about SCSI to SCSI RAID controllers, e.g., the Digi-Data and NCR approaches. I can understand why these pop into mind as the most obvious devices to discuss, but as a percentage of SCSI based RAID solutions in the field, they may well be on the decline in favor of software drivers for standard SCSI host adaptors, e.g., CorelRAID, Integra, 1776, Chantal, Veritas, etc. Is the WG planning to address these approaches? I, for one, think it should. There is a third approach that may also be on the rise, that is, embedded RAID host adaptors, such as Mylex and DPT. These devices in particular could stand a little less vendor uniqueness in them.

- **Integral RAID Drivers**

Long term, I see most of the common operating systems offering software based RAID solutions as part of their standard offerings. This reduces user support headaches when the operating systems are updated. Someone told me that Windows NT will have native RAID support right out of the chute. I don't know what effect this will have on the business of the SCSI-to-SCSI RAID people, but it can't be too good. They will likely have to content themselves with providing RAID to older platforms that do not have native RAID support, have no place to plug in additional host adaptors (like Apple Mac, some Sun systems), or whose RAID solutions are decidedly inferior. From a performance standpoint, it appears that the native RAID solutions are on a par performance-wise with the SCSI-to-SCSI solutions, yet they usually cost little more per megabyte than ordinary, non-redundant disk subsystems.

• **Hot Swap Electronic Issues**

One of the key advantages of RAID technology in the context of multi-user computers or file servers is that with the use of hot swappable disk drives, power supplies, and fans, the system can remain "available" even during servicing. However, as far as I can see, the SCSI spec is silent on the topic of inserting or removing disk drives on a live and active SCSI bus. Quite a number of people do it, and with proper design it seems to work, but it would set a lot of minds at ease if the SCSI committee could "bless" the concept and establish design and/or testing criteria. Or, alternately, condemn the idea and offer a workable bus isolation circuit that could be economically implemented. Also, perhaps specify the power up and down behavior of a peripheral's SCSI bus transceivers (e.g. it can't spuriously assert a bus signal.)

• **Enclosure Statuses and Controls**

There are more types of failures in a RAID system than just disk drives. Power supplies can fail. Redundant load sharing boards can report a problem. Fan stall detectors can indicate a potential thermal problem, and cabinet thermistors can detect an actual thermal problem (such as loss of air conditioning.) Further, there are indicators on a disk enclosure that theoretically could be used by the RAID driver to indicate which disk module has failed and needs to be swapped, and our company plans to offer mechanical interlocks on our enclosures that the remote system can use to prevent or allow a module's removal. Presently we plan to allow these controls through a RS-232C serial port, but they could be controlled via some sort of SCSI model as well. Preferably, one SCSI target ID would control all cabinets of disk drives if there happened to be more than one.

• **Other Random Topics**

I would like to see the RAID WG think about redundant spindle sync for RAID 3 arrays, as without it their performance can suffer to the point that the array is useless, and this must also have hot swap capability. I would also like to see the WG include IPI in its discussions, at least in general terms. Can you hot swap IPI?

I may try to attend the May 17 meeting if my schedule permits.

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