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Storage Devices: Where and What Kind?

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Mass storage is a complex issue; the question is, "Mass storage where and what kind?" It can be at the local workstation, and either kept private, or shared out across a peer-to-peer local network. It can be part of a dedicated server system. It can be removable or fixed.

Some obvious items to consider:

Zip drives, from Iomega, have held pride of place in the small-removable category for a long time. Imation (a 3M spinoff) is out to give Iomega's superb marketing team a technology challenge with its superdisk. 120mb superdisks cost less (especially in 10-packs), are smaller and seem a bit more rugged. Superdisk drives ("superdrives") can manage both 120mb superdisks and standard 1.44 3.5 inch floppies. Best of all, Imation is not the only source for either drives or disks; e. g., Mitsubishi is making a range of superdrives in different sizes and with different interfaces for different applications. Some computer manufacturers are including the dual-capability superdrives in lieu of 3.5 inch floppy drives, as a way to differentiate their products. I use my superdrive with my CTX notebook computer when I am in the office.

This is simpler than either pulling the battery and putting in the floppy drive, or connecting the floppy externally, and gives me broad access across the LAN. The superdrive I have connects through the parallel port. Like similar connect-through-the-parallel-port storage devices, the connection looks like a SCSI connection to Win95/98; if you like the superdrive concept, but use SCSI at the station where you are connecting this, get a SCSI superdrive, as the parallel port version did not work on SCSI-equipped systems, in our tests. The version we have gives limited portability (it is too big to be carried all the time), and its metal case (thankfully, not grape-colored…) makes for seemingly greater reliability when I do take it into the field.

What about removable hard disk systems? My favorite of a couple years back, the Avatar Shark 250, never seemed to go anywhere. Now the company itself seems to have disappeared, presumably a victim of Asian financial woes (its parent was Bangkok-based). The remaining contenders are Iomega's one- and two-gigabyte Jazz drives and Syquest's one-gig SparQ and one-point-five gig SyJet. Both product lines offer lots of storage at comparable prices (they pace each other; as I write, Syquest appears more aggressively priced than Iomega).

Truly permanent storage is still the preserve of CD-R. A read-write variation is also around, and the prices are about the same - about US$350-US$450 for the drive. CD-R media run as little as US$2.50 in single-disk quantities. I have stuck pretty much to CD-R; for me this is an archival medium (the minimum rated lifetime is 25 years if you don't scratch the disk) and rewriting is not useful. I have used drives from both Hewlett-Packard and Olympus (the former with a tray, the latter using a caddy), connecting to the Intergraph TD225 through an Adaptec SCSI adapter. Both have performed flawlessly. Although I have seen parallel-port versions of the Hewlett-Packard SureStore CD-R drive, I am skeptical that it could sustain transfer speeds needed for reliably writing data.

All of these storage devices are adjuncts to main system storage, merely. Main storage, whether at the desktop or on the network, is generally permanent, and it is huge, and it is cheap. E. g., quantity-one retail prices for 11.5gb hard disks are around US$350. For most people, that is more hard disk capacity than their computers can address as a contiguous whole.

There are some problems with these drives, in my view. First, inevitably these big, cheap hard disks are EIDE, not SCSI devices. But SCSI has proven a generally better technology for moving data around (it was, after all, a development of the same Shugarts who made hard disks popular). SCSI is, put simply, faster than EIDE in most cases, and appears to be more able in a multitasking environment. Still, if your system uses EIDE, big cheap hard disks are a great solution for local storage.

Second, integrating these disks is not without an element of adventure. This is particularly true, should the idea be to upgrade a boot drive (not just to add a secondary drive on one or another IDE channel). Again, SCSI usually makes this easier (and there are some developments coming from Adaptec and Seagate, according to those companies, which should enhance that ease of use). Say perhaps, a good backup is not an option when integrating a major upgrade of this kind.

Finally, even in a nice peer-to-peer network, storing stuff all over is just sloppy. Big disks are good things in graphics workstations, especially if they host 3D or animation (like, walk-throughs) or really large application suites. But there needs to be a "data-central" for shared information, if nothing else.

There are options: Since data-serving is generally not processor-intensive, that same machine can be a print server, or even host a proxy server for the Internet. So, buy a new box, or upgrade an old box, with a big hard disk; this doesn't have to be a heavy-hitting system, so last year's Pentium is plenty good enough (a 486-based system might do as well).

Another option, from Meridian Data, Inc., is a hard disk in a black box, the company's Snap!Server. Available with capacity from four to twelve gigabytes, according to the company's literature, these cost between US$1,000. and US$1,800. - on the pricey side, given the capacity. But these are plug-and-play devices. Give 'em some juice and plug in a connection to the Ethernet hub; the system more or less configures itself, apparently. Administration chores are done via web-browser interface. This is strictly a file-server device; there is no capacity for other kinds of communication in the unit, which is small (say, half the size of a really small desktop computer). The advantage is ease and speed of deployment; where labor costs are a greater concern than the capital cost of the device, Meridian's

Snap!Server merits consideration.
The "grown up" version of what Meridian offers comes from companies such as Boxhill. Generally, one goes to a company like Boxhill to secure a custom-built disk array, matching the special characteristics of the - usually large - network of stations. Boxhill will configure its various solutions with anywhere from four gigabytes to two-plus terabytes of accessible hard disk capacity, with a full range of advanced RAID features to guarantee maximum reliability.

Lots of companies offer RAIDs. The local storefront guy can buy an

off-the-shelf RAID controller package, stick it in a box with a simple motherboard, four swap-able drives of suitable size and maybe a tape drive. These will be more or less reliable, depending on the savvy the system builder has in this special, rather arcane area. That is not what Boxhill is selling. Boxhill's only business is building mass-storage and backup systems. The company has several general categories of connectivity - via fiber, SCSI and so on. The company has a variety of storage devices they can hook in through these connections. Being canny systems engineers, the Boxhill team takes advantage of hardware features early and effectively; for example, the company claims to have been the first to implement RAID using onboard capabilities in Seagate Barracuda drives, reducing the overall cost of advanced RAID systems.

The result is a custom-fit storage solution; Boxhill quotes only a per-megabyte figure (around US40¢, tops), which is not particularly helpful in judging potential costs. On the other hand, the kinds of subsystems Boxhill builds are for systems where the normal practice would include soliciting a fairly detailed proposal.

As a rule of thumb, I suggest the following for graphics-oriented shops, with between six and twelve seats: Locate a lot of storage at each station, to accommodate complex design needs. Locate about three times that amount of storage at the network server, with archive and backup services alongside. This has proven practical and effective (not always efficient). Larger installations become sufficiently variable that a rule-of-thumb approach is perhaps less than wise.