

Buy a **BETTER** **DRIVE**

By Kris Fong

➔ **Need more room for your data? We help you steer through your storage options.**



Photography by Peter Belanger
Illustrations by Tyson Smith

Macs come with hard drives that have a vast amount of free space on them, but once you add applications, buy (or make) digital music and videos, and move photos from your camera to your computer, your Mac may tell you that “your startup disk is almost full.” But you don’t need to rely solely on your Mac’s built-in drive to store your files. To give yourself more storage space for your data, invest in an external storage device. In addition to giving you more space, an external storage device can help you better organize your files. And if you want to perform data backups with Mac OS X’s Time Machine, an external storage device is a must-have.

You have myriad storage choices—external hard drives, desktop RAIDs, optical disc burners, solid-state drives, flash drives, and network-attached storage. Depending on your situation and your file types, some storage devices will serve you better than others.

In this buyer’s guide we provide insight into storage media and technologies, and help you determine which solution is best for you—so you can unleash your inner pack rat.

External Desktop Hard Drives: Mass Storage and Speed

A hard drive contains spinning platters with magnetic surfaces, and mechanical arms with heads that read and write data on those platters. The hard drive in your Mac is often referred to as an *internal* hard drive. An *external* hard drive is a hard drive, packaged in a case, that connects to your Mac via USB 2.0, FireWire 400, FireWire 800, or eSATA.

External desktop hard drives are great because they offer the best combination of features. They're relatively affordable, and their prices drop regularly; you can buy a 1TB USB-only external hard drive for less than \$200. External hard drives have faster data-transfer speeds than DVDs or CDs; they're easy to use (with most external hard drives, all you have to do is plug the device into the proper port); you can disconnect them from one computer and attach them to another; and they come in a variety of sizes and forms.

However, there's always the possibility—albeit small—that a drive's read-write head will come into contact with a platter, causing a failure. And hard drives have varying life spans—some last a few months, while others can last longer than a decade. But most drives come with limited warranties that last between one and five years. (There's a good chance that by the time the warranty expires, you'll be ready to upgrade.)

Overall, if you're looking for a quick and painless way to give yourself massive amounts of storage for your music, photos, videos, or system backups, an external hard drive is hard to beat.

Shopping Tips

You can find external hard drives labeled as Mac-compatible, or you can use Disk Utility (/Applications/Utilities), which comes with OS X, to reformat Windows-formatted drives. Here are some shopping tips to keep in mind.

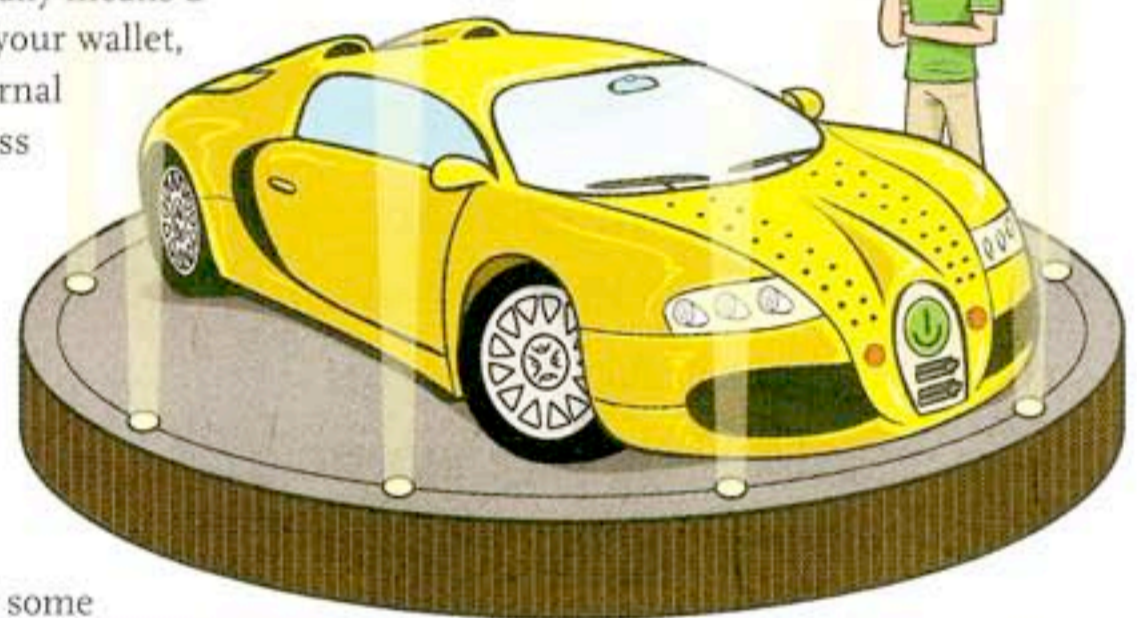
Capacity Capacities range from 160GB to 2TB. If you have lots of media or graphics files, more is better. More capacity usually means a bigger bite out of your wallet, but some 1TB external hard drives cost less than \$200.

Connectivity You'll use USB 2.0, FireWire 400, or FireWire 800 to connect to your Mac. Many drives feature multiple ports, but some

offer only one (usually either USB or FireWire 400).

Although USB 2.0 (480 Mbps) has a faster transfer speed than FireWire 400 (400 Mbps), hard drives rely on sustained throughput; and in this respect, FireWire comes out faster—especially with large files. With FireWire, you can boot up your FireWire-equipped Mac from the drive, as well as daisy-chain the drive to other FireWire devices. FireWire 800 (786 Mbps) is faster than USB 2.0 and FireWire 400, but it may not be available on some Macs.

USB is a must if you're sharing the drive between Macs and PCs, and it's your only option if your Mac doesn't have FireWire.



External Desktop Hard Drive Suggestions

OWC Mercury Elite-AL Pro Quad Interface 1TB With USB 2.0, FireWire 400, FireWire 800, and eSATA connectivity ports, as well as bundled software, this drive mimics the look of a Mac Pro (★★★★; \$210; macworld.com/3294).

Seagate FreeAgent Desk for Mac 1TB This aluminum-encased 7,200-rpm drive (pictured right) sports USB 2.0 and FireWire 800, and it comes with a FireWire 800-to-FireWire 400 adapter cable (★★★★; \$190; macworld.com/4167).

Western Digital My Book Studio Edition 1TB This silver 7,200-rpm drive packs port versatility, automated backup software, an antitheft port, and more (★★★★; \$200; macworld.com/3295).



Many high-capacity drives offer eSATA (external Serial ATA), which, at 1.5 or 3 gigabits per second (Gbps)—depending on which version of Serial ATA is implemented—is faster than FireWire 800. MacBook Pro users can add eSATA by using an ExpressCard/34 expansion card; these cards range in price from \$19, for OWC's eSATA SATA I/II ExpressCard/34 Adapter (eshop.macsales.com), to as much as \$300, for Sonnet's Tempo SATA Pro ExpressCard/34 (www.sonnettech.com). Mac Pro users can add eSATA with an eSATA PCI, PCIe, or PCI-X expansion card; prices for these cards range from \$55, for CalDigit's FASTA-2e 2 port PCI-e SATA 3G Host Adapter (www.caldigit.com), to \$180, for cards like Addonics' 4 Port eSATA PCI-E 8x Controller (www.addonics.com). Mac Pro users can alternatively tap into the two unused SATA ports on the motherboard, using Newer Technology's \$25 eSATA Extender Cable (★★★★; macworld.com/4383).

Speed The faster a hard drive's platters spin, the better the drive's performance. The standard rate for desktop computers is 7,200 rpm (rotations per minute), which is plenty fast for most users. Most Mac notebooks feature 5,400-rpm drives. If your tasks include recording audio, working with video, or gaming—tasks that require constant drive access—and you currently have a slower drive, a 7,200-rpm external drive will provide better performance.

Mac Pro users who do professional-level audio or video production might consider a 10,000- to 15,000-rpm drive, for optimal performance. These high-performance drives usually offer less storage capacity and require a SCSI connection, so you'll need to either install a SCSI card like Apple's \$199 Dual Channel Ultra320 SCSI PCI-X Card (macworld.com/4446) or Atto's \$295 ExpressPCI UL4S (www.attotech.com/ultra4s.html) to support the connection, or consider a RAID instead (as described in the next section). Check out Fantom Drives' SCSI Ultra320 300GB 10,000-rpm external hard drive

(\$660; macworld.com/4447); Avid's Pro Tools users may consider a Seagate Cheetah 15K.5 Ultra320 SCSI 300GB Hard Drive (street price is between \$500 and \$600; macworld.com/4449) installed in a SCSI enclosure.

Added Features Almost all USB and FireWire external hard drives are compatible with Mac OS X 10.5's (Leopard's) Time Machine, as long as the

drive is HFS+ formatted. Some drives include extras such as bundled software, one-touch backups, and software encryption. And keep in mind that external hard drives are common targets of theft: if the drive will be publicly exposed—say, at work—find one with an antitheft port that you can use to tether the drive to your desk, and consider using encryption.

Portable Hard Drives: Take Your Data with You



Portable hard drives are smaller and easier to tote around than typical external desktop drives. Some, like Buffalo's **500GB MiniStation TurboUSB** (★★★★; \$150; macworld.com/4382), feature case designs that reduce impact shock.

Some drives are *bus-powered*, which means that they draw power from a FireWire or USB connection on your laptop, with no power adapter required. That's fine for MacBooks and MacBook Pros, but some iBooks and PowerBooks do not supply enough USB bus power, so you'll have to either use a special cable that connects the hard drive to two USB ports or use the drive's power adapter.

There's always the chance that you'll lose your hard drive, so it's wise to secure your data. **Data Locker** (www.lockerdrive.com) offers portable USB 2.0 hard drives (160GB to 320GB, starting at \$160) that feature hardware encryption options and a numeric touch screen where you enter a PIN to unlock the drive.

There's also third-party software, like **TrueCrypt** (payment requested; www.truecrypt.org), that encrypts content on just about any external drive. Though it's not as secure as hardware-based encryption, software encryption can stop all but the savviest hackers from accessing sensitive data.

Portable Hard Drive Suggestions

G-Technology G-Drive Mini 500GB This drive (pictured below) packs a 5,400-rpm (\$399) or 7,200-rpm (\$529) disk, includes a protective leather case, and provides bus-powered FireWire 400 and 800 ports and a non-bus-powered USB port (★★★★; macworld.com/3949).

LaCie Rugged All-Terrain Hard Drive This durable drive's orange rubber life preserver and internal nubbins protect against shocks and slips. It has bus-powered FireWire 400 and 800 ports, as well as USB ports (★★★★; \$130 [250GB]; macworld.com/2290).

Rocstor Rocbit 2B This 100GB, durable, non-bus-powered USB and FireWire 800 drive offers hardware encryption and a Secure Key port, and it's available in a 5,400- or a 7,200-rpm version (★★★★; \$230 [7,200 rpm]; macworld.com/1443).



RAID: Spacious and Speedy

For heavy-duty storage needs, a RAID (Redundant Array of Independent Disks) is the most cost-effective solution, though it can be a major hassle to set up. A RAID is two or more hard drives linked together to function as a single storage device, providing greater capacity, better performance, and automated backups (depending on how it's configured).

RAIDs come in different *levels*. In a *striped* array (RAID level 0), multiple drives work in parallel for the best possible speed and provide a combined storage capacity; however, RAID level 0 has no backup protection—you'll lose all your data if one disk fails. A *mirrored* array (RAID level 1) provides fast read times (it reads multiple drives at once) and real-time backup; it writes the same data across all disks simultaneously, so if one goes down, nothing is lost. But your total capacity is half the amount of the total capacity of all the

drives. (For example, a pair of 500GB drives gives you only 500GB of total storage.) RAID level 5 uses *parity* (which provides data redundancy and better storage capabilities than RAID 1's plain mirroring), splitting data across three or more disks, so if one goes down, your files are re-created from the remaining disks.

Shopping Tips

Here are a few things to consider when you're shopping for a desktop RAID. (For instructions on setting up a RAID in a Mac Pro, visit macworld.com/4384.)

Drive Enclosure Do-it-yourselfers will find enclosures with at least two empty drive bays. An enclosure that supports *hot swapping* lets you replace a drive without powering down.

You can also choose to buy a configured desktop RAID with preinstalled drives. You'll find double-drive arrays that offer up to 3TB of storage (they're generally RAID 0 or RAID 1). These

Desktop RAID Suggestions

Data Robotics Drobo This device (pictured left) lets you mix and match as many as four 3.5-inch SATA/SATA II hard drives of any capacity and speed. Drobo automatically reconfigures and rebuilds your disks (●●●●; \$499; macworld.com/3931).

G-Technology G-RAID3 This two-disk RAID 0 features an aluminum enclosure that mimics the Mac Pro's look (\$499 [2TB] or \$699 [3TB]; www.g-technology.com).

LaCie Big Disk Extreme+ Triple With FireWire 400, FireWire 800, and USB, this prefab RAID 0 gives video pros performance and affordable mass storage (\$239 [1TB] or \$420 [2TB]; www.lacie.com).

RAIDs often use cases that don't allow for convenient drive swaps.

Connectivity Desktop RAID offers one or a combination of the usual connectivity options: USB 2.0, FireWire 400, FireWire 800, and eSATA. Since performance is usually the motivation for setting up a RAID, steer toward FireWire (FireWire 800, if your Mac supports it); consider getting an eSATA RAID and adding a port to your Mac Pro with an eSATA PCI, PCIe, or PCI-X card; or use an ExpressCard with a MacBook Pro.

Flash Drives: Storage in a Stick

Tiny and easy to use (and lose), flash drives rely on memory chips to store data, and they can withstand the abuse that comes with being transported.

But their size also makes them tempting to thieves. Some flash drives offer hardware-based encryption or software that encrypts data (hardware encryption is more secure).

Flash drives come in capacities that range from 1GB to 64GB.

Flash Drive Suggestions



Lexar JumpDrive Secure II Plus This slick stick has a capacity LCD meter and Secure II software to encrypt data (\$15 to \$90 [1GB to 16GB]; www.lexar.com).

SanDisk Cruzer Enterprise This flash drive for Macs (pictured above) with hardware-based 256-bit encryption has customized options and multiple security tiers (starting at \$75 [1GB to 8GB]; www.sandisk-enterprise.com).



Internal Hard Drive: Upgrading Options

If you have a Mac Pro, a Power Mac G5, or a Power Mac G4 or G3 with unoccupied drive bays, you can install an additional internal hard drive instead of upgrading your main one—it's easy and takes only a few minutes.

But for the iMac, the Mac mini, or old Mac laptops, replacing the internal hard drive with a drive that has more capacity can be a difficult and warranty-voiding feat. There are service providers that can do upgrades for you, such as Tech-Restore (www.techrestore.com), which provides several PowerBook and iBook hard-drive upgrade services ranging in price from \$149 to \$229. (The Apple Store won't do upgrade installations, but it will replace damaged parts with equivalent replacements.)

Regardless of which type of Mac you have, if you decide to replace your current internal hard drive, you'll need to copy all your current hard drive's files onto another drive before you do the switcheroo. You can use an external desktop

hard drive, use a second Mac in FireWire target disk mode, or burn DVDs. To ensure that nothing slips through the cracks (like your e-mail archive, bookmarks, and fonts), consider using drive-cloning software such as Bombich Software's Carbon Copy Cloner (★★★★; payment requested; macworld.com/3156) or Shirt Pocket's SuperDuper (★★★★; \$28; macworld.com/2325), which easily and thoroughly duplicate your hard drive's contents.

If you upgraded your Mac's internal hard drive, what are you going to do with your old drive? You can easily (and inexpensively) convert it into an external hard drive. All you need is an enclosure to house an ATA/IDE or SATA 2.5- or 3.5-inch internal hard drive. OWC (www.macsales.com) and TigerDirect.com are good sources for enclosures, and Newegg.com

has particularly good deals. Look for one with a cooling fan or a heat-dissipating design for better drive longevity. Another option is to use a dock, like NewerTech's Voyager Q (\$100; www.newertech.com). It lets you insert an internal hard drive into its dock and use it as an external drive.

Shopping Tips

Here's what to look for in purchasing an internal hard drive.

Drive Compatibility Get a hard drive that matches the physical dimensions and connection interface of your Mac. MacBooks, MacBook Pros, and Mac minis use a 2.5-inch SATA drive, while PowerBooks and iBooks use a 2.5-inch



ATA/IDE drive—SATA and ATA interfaces are *not* interchangeable. Likewise, recent Apple desktops (the Intel iMac, Mac Pro, iMac G5, and Power Mac G5) use a 3.5-inch SATA drive (the Mac Pro uses a SATA II drive), while older desktops (the iMac G3 and G4, and the Power Mac G3 and G4) use a 3.5-inch ATA/IDE drive. Online retailers such as OWC provide Web guides that list storage options by Mac model.

Capacity Internal 3.5-inch hard drives have capacities of up to 2TB, while 2.5-inch drives provide up to 500GB. Later G4s, all G5s, and all Intel Macs can accommodate any drive capacity, but the iMac G3, Power Mac G3 (blue and white), and early Power Mac G4 have a limit of 128GB.

Speed If you're happy with your Mac's drive performance, stick with the same disk speed, but if you have a notebook and work with audio or video, consider getting a faster, 7,200-rpm drive.

Internal Hard Drive Suggestions

Here are a couple of internal hard drives to look at if you want to upgrade or add a drive to a Mac Pro or a Power Mac.

Seagate Barracuda 7200.11 1.5TB For people who need mass storage, this 3.5-inch 7,200-rpm drive (pictured right) delivers a whopping 1.5TB of storage at a really nice price (\$130; www.seagate.com).

Western Digital Scorpio Black For notebook owners, this 2.5-inch 7,200-rpm drive will provide a nice bump in performance and 320GB of storage (\$150 [320GB]; www.wdc.com).



Optical Storage: Affordable Archives

Optical disc drives use a laser to read and write (or *burn*) data onto optical discs, of which

CDs and DVDs are the most common. A standard CD holds 650MB to 800MB of data, a standard DVD holds up to 4.7GB, and a dual-layer DVD holds up to 8.5GB. Storing stuff on CDs and DVDs is the least-expensive storage solution; discs cost less than 50 cents each, and you can buy them in large quantities at once.

CDs and DVDs aren't as fast as hard drives, and their limited capacity per disc make them best for storing files you want to hang onto but don't need to access every day. You can use CDs or DVDs to store old photos and files, as well as videos and music you rarely use but want to keep around.

An external optical drive is an affordable and attractive upgrade to a Mac with a Combo drive (a CD burner that can read but not write to DVD) or a single-layer DVD burner.

Shopping Tips

In the market for a new optical drive? Here are things to consider.

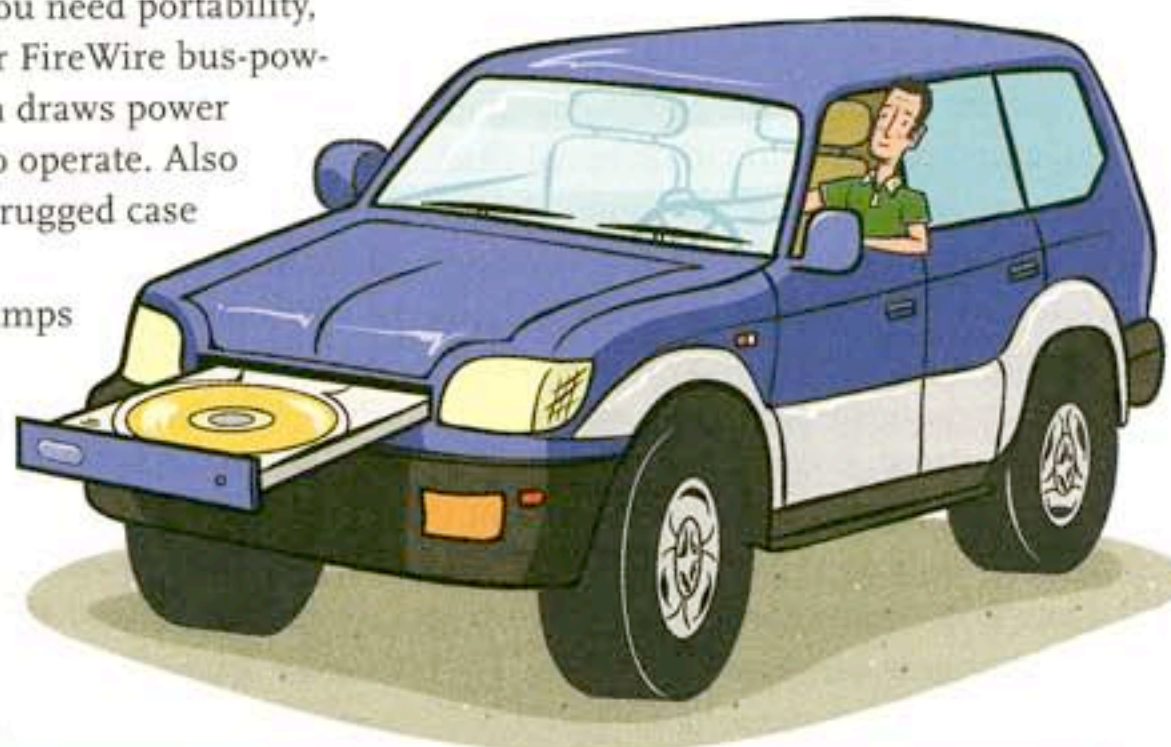
Supported Media Look for drives that offer dual-layer support. You'll notice that there are different optical-disc formats, like CD±R, DVD±R, DVD±R DL; most new optical burners are compatible with all formats.

Write Speed Don't like waiting? Look for a drive with fast write speeds. While the difference between 32× and the fastest, 52× CD-R write speed is about a minute, the speed of larger-capacity DVD±R and DVD±R DL media is more significant. It takes about 15 minutes to burn a full DVD±R with a 4× write-speed drive, about 8 minutes with

an 8× writer, and under 3 minutes with the fastest 22× writer. For DVD±R DL discs, most drives offer up to 8× write speeds. Also, use discs that are compatible with a drive's speed ratings.

Portability If you need portability, look for a USB or FireWire bus-powered drive, which draws power from your Mac to operate. Also look for a small, rugged case design that can withstand the bumps that come with being stashed in a bag. (Note that portable drives often sacrifice write speed for their willowy figures.)

LightScribe Built into many optical drives, LightScribe (developed by Hewlett-Packard and licensed to other optical drive manufacturers) is a technology that laser-etches monochromatic graphics and text onto specially coated LightScribe discs. If you want professional-looking discs, look for a LightScribe burner—it can be a nice alternative to labeling discs with a Sharpie pen. However, the etching is prone to fading, and the time it takes to etch your design can far exceed the disc-write time. (If you don't commit to labeling discs somehow, though, it'll be needle-in-a-haystack time when you need to find files.)



Optical Drive Suggestions

LaCie d2 DVD±RW with LightScribe With 20× DVD, 8× dual-layer DVD, and 48× CD write speeds, this FireWire 400 writer also offers LightScribe and Roxio's Toast disc-burning software (★★★★; \$120; macworld.com/3900).

LaCie Portable DVD±RW with LightScribe, Design by Sam Hecht This skinny, highly portable USB drive (pictured here) offers bus power and support for dual-layer DVDs (★★★★; \$99; macworld.com/3878).

LG GE20LU10 This USB drive features 20× DVD, 12× dual-layer DVD, and 48× CD write speeds and LightScribe (\$100; macworld.com/4448).



What about Blu-ray?



➔ It delivered a resounding TKO to HD DVD in the high-definition-format bout, but Blu-ray writers have yet to appear on any Mac computer as standard equipment or even as a customization option, and there is no sign from

Apple that anything is coming soon.

Steve Jobs has long been a supporter of Blu-ray and Apple is listed as a member of the Blu-ray Disc Association Board of Directors, but at an Apple event back in October 2008, Jobs said that the issue is with Blu-ray licensing. “Blu-ray is a bag of hurt,” said Jobs. “I don’t mean from a consumer point of view—it’s great to watch movies—but the licensing is so complex. We’re waiting until things settle down and Blu-ray takes off in the marketplace before we burden our customers with the cost of the licensing and the cost of the drives.”

Things may be settling down. Panasonic, Phillips, and Sony announced last February that they are working with other Blu-ray patent holders on a process that would allow manufacturers to procure one license that covers all the necessary patents for Blu-ray Disc (BD), DVD, and CD. That’s a dramatic change from the current licensing process, which requires a manufacturer to obtain a license from each format’s patent holders. The new licensing program would also bring down the cost of licensing fees, lessening the cost burden on Apple’s customers.

Does this mean Blu-ray writers will be available in new Mac computers soon? Apple doesn’t comment on future products, but if licensing is the major issue, as Jobs said last year, then these changes in the Blu-ray licensing process are steps toward making that “bag of hurt” a lot less painful.

Fortunately, you don’t have to wait for Apple in order to get a Blu-ray writer for your Mac. There are other sources. And Blu-ray discs aren’t just for playing Hollywood movies—they can store a vast amount of data (25GB on a single-layer BD and 50GB on a dual-layer disc), and they can showcase your own HD video creations, too.

If a burner is what you seek, you’ll find internal and external Blu-ray recordable drives that support Blu-ray, DVD, and CD burning; however, they’re pricey and discs are relatively expensive. For Mac Pros (you can fit an internal drive into the second 5.25-inch bay of the Mac Pro tower, if it’s not already occupied) and Power Macs, the internal MCE **6x Blu-ray Recordable Drive** (\$499; www.mcetech.com) offers 6x Blu-ray writing. FastMac’s **Blu-ray 4x** (\$580; www.fastmac.com) has a SATA port if you prefer a faster connection. External drives include LaCie’s **d2 Blu-ray Drive** (\$450; www.lacie.com) and OWC’s **Mercury Pro Blu-Ray** (\$450; [\[macsales.com\]\(http://www.macsales.com\)\). For people who need portability, the Amex **Portable Super Multi Drive** \(\\$469\) offers 2x BD-R \(single and dual-layer\), bus-powered USB 2.0 connectivity, and DVD/DVD-RAM/CD burning in a slim case.](http://www</p></div><div data-bbox=)

While burning files to a Blu-ray disc requires nothing more than Mac OS, you need third-party software to create a video Blu-ray disc. Roxio’s **Toast 10 Titanium** with the High-Def/Blu-ray Disc Plug-in (\$100 plus \$20 for the plug-in; www.roxio.com) lets you author HD video content onto Blu-ray—or even onto standard DVD-Rs (no Blu-ray burner required)—for playback on Blu-ray or HD DVD set-top players. Adobe Premiere Pro CS4 (★★★★; \$799; macworld.com/4182) might not have Final Cut Pro’s clout, but it does come with **Encore CS4** software for Blu-ray video production—something Apple’s DVD Studio Pro 4 doesn’t support. (Note that there currently is no Mac software that plays video from a Blu-ray disc, another hurdle that needs to be overcome before Blu-ray writers become standard equipment on new Macs.)

HD Video Alternatives

There are other ways to showcase your HD videos on an HDTV. You can use the aforementioned Toast to author an HD movie onto a standard DVD+/-R for playback on any Blu-ray or HD DVD set-top player. Or you can use one of the following HD playback devices.

You can stream HD video from a Mac (through iTunes) over the Apple TV’s wireless 802.11n connection for video playback on a connected HDTV. Or sync the **Apple TV** (★★★★; \$229 [40GB], \$329 [160GB]; macworld.com/3454) with your Mac over iTunes, and copy your video to the Apple TV for HDTV playback at home. The iTunes Store also sells HD movies, so you can buy your favorite films and use the Apple TV to watch them on your HDTV.

Got a USB hard drive? House your HD movie on it, connect Western Digital’s **WD TV HD Media Player** (pictured below; \$130; www.wdc.com) between the drive and an HDTV, and use the included remote to navigate to and play back video (or other media files) at up to 1,080p resolution. Although designed to work with Western Digital’s My Passport hard-drive line, the company says that the WD TV should work with other USB storage devices. The WD TV also features audio and photo playback. You can’t play protected audio or video from the iTunes Store, however.



Network Storage: Shared Storage Space

Network storage allows multiple computers to access a dedicated file-sharing and -storage volume. It lets you offload or back up files from multiple computers, centralize your iTunes and iPhoto collection for sharing, and access communal files from multiple computers. If you have a wireless network, you can easily expand access to additional wireless-equipped computers. Introducing networked storage can be as simple as attaching an external desktop hard drive to your AirPort Extreme.

determining which of the following situations you fit into.

If you have a wireless network anchored by an Apple AirPort Extreme (★★★★; \$179; macworld.com/3109), you can connect just about any USB 2.0 external desktop hard drive to the base station for storage and file sharing. All Macs and PCs on your AirPort network will see the connected drive as an AirPort Disk, for which you can use AirPort software to set up account access, password protection, and read/write file permissions. If your network includes Macs and PCs, you'll need to

Introducing networked storage can be as simple as attaching an external desktop hard drive to your AirPort Extreme.

Of course, with so many cooks in your storage kitchen, there is an increased chance that someone could accidentally delete or overwrite files, or that a virus-infected PC could spread its ills to your shared storage volume and, ultimately, other computers. And playing network cop by setting up file access and troubleshooting can be time-consuming and difficult. But for small office/home office use, several easy-to-configure storage options exist; find yours by

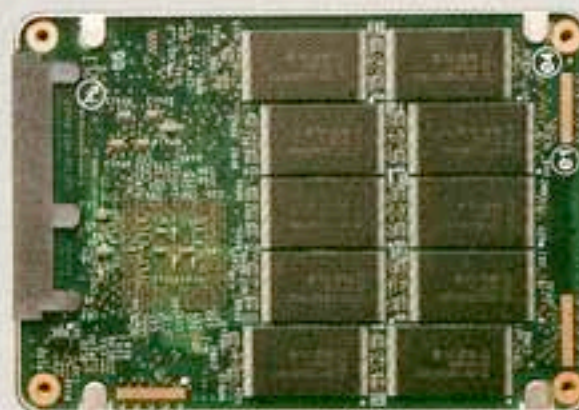
format your drive as FAT32 so the PCs can use the drive.

If you don't have a wireless network but want one, consider Apple's Time Capsule (★★★★; \$299; macworld.com/3992), which combines the speedy 802.11n Wi-Fi base station capabilities of an AirPort Extreme with the mass storage capabilities of an external hard drive. Additionally, the Time Capsule is Time Machine-compatible, so all OS X 10.5 users on your network can take advantage of automated backups without having to connect a drive.

Another alternative is to combine a Time Capsule, an AirPort Extreme AirPort Disk, and Apple's MobileMe so you can remotely access the hard drive's files over the Internet as easily as you would access files on a regular hard drive.



Solid-State Drives: The Future of Storage



Hard drives are a storage fixture in the computing industry, but their moving parts, heat production, and potential for failure aren't ideal for on-the-go types. Enter the solid-state drive (SSD)—a sturdier alternative that has been around since the 1970s but just started appearing in laptops in 2007, and is now available in Mac laptops.

An SSD uses solid-state memory. The exterior of the mechanism mimics the look of an internal hard drive, as it's designed to be a drop-in replacement. Because they have no moving parts, SSDs are more reliable, draw less power, and can access data faster than hard drives, although their write speeds are generally slower.

As with any new product, prices for solid-state drives are steep compared with hard drives; Apple charges an extra \$500 to \$600 for a 128GB SSD upgrade in a MacBook, MacBook Pro, or MacBook Air.

Current prices for a 2.5-inch SSD fluctuate wildly and are often based on drive performance. They range from \$100, for a 32GB Transcend **TS32GSSD25-M SSD** (www.transcendusa.com), to \$800, for a 250GB (the current highest capacity) OCZ Technology **Core Series V2 SSD** (www.ocztechnology.com) or a 160GB Intel **X25-M SSD** (www.intel.com), and up to \$2,000, for a blazingly fast, enterprise-level 128GB **MemoRight GT SSD** (www.memoright.com). But prices are dropping; at press time, we found quite a few 128GB SSDs for under \$500 online.

Network-Attached Storage: No-Nonsense File Server

A network-attached storage (NAS) drive is a dedicated storage device that uses its own operating system and software to provide centralized storage and file sharing over a computer network. Think of it like a file server, except it doesn't need a dedicated computer that's attached to the network. A NAS drive has an Ethernet connection, and you plug it directly into your network router.

NAS prices have come down to almost standard external hard-drive levels, so if you've thought about sharing one hard drive among multiple Macs or buying an external drive for each, a NAS drive may be more convenient and cost-effective.

An alternative to adding a NAS drive is to use Addonics's NAS Adapter (\$55;

www.addonics.com) with a USB external hard drive. The adapter has a USB port on one end for your hard drive, and an Ethernet port on the other end for connecting a cable between the adapter and the router.

Shopping Tips

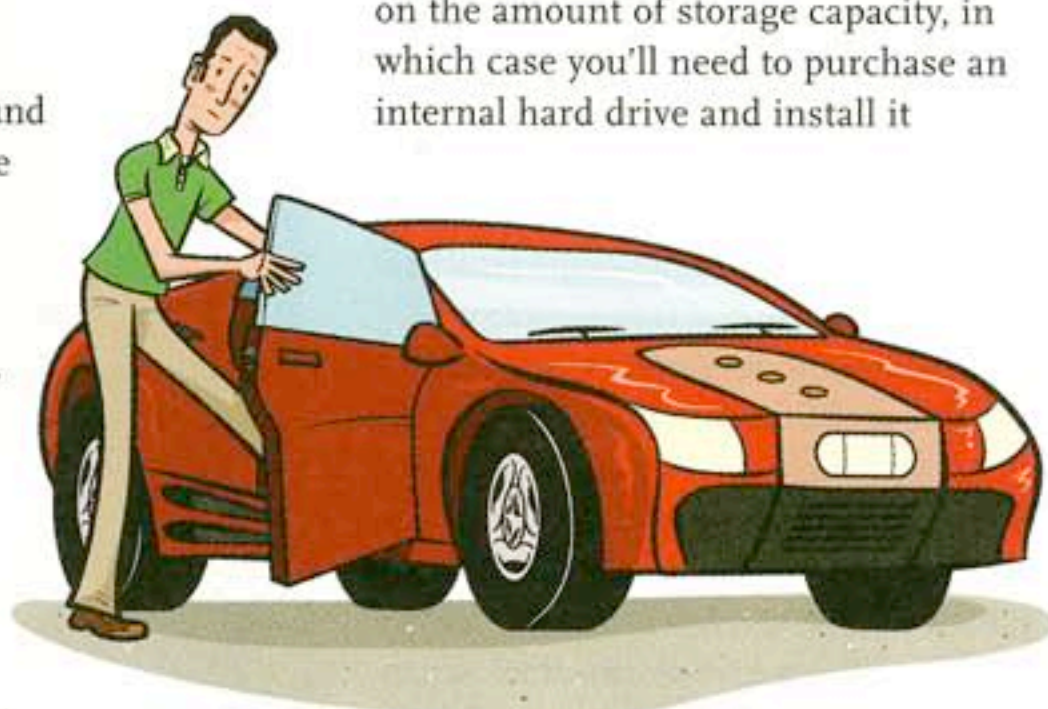
When shopping around for NAS, consider the following factors.

Mac Compatibility

Not all NAS drives play nice with Macs. In the NAS world, SMB (Server Message Block), a Windows file-sharing protocol, dominates. Macs can use it, but due to

some file-naming restrictions, you may have to rename some files. Macs use AFP (Apple Filing Protocol) for file sharing, so look for NAS drives that support it—some support Bonjour (OS X's built-in networking protocol for local network devices), too. To make configuration easier, most NAS drives come with software or a Web browser-based wizard that will walk you through the process, but some setups can be tricky—especially if the device doesn't support AFP.

Drive Facility NAS devices have either a preinstalled hard drive or an empty enclosure that lets you decide on the amount of storage capacity, in which case you'll need to purchase an internal hard drive and install it



NAS Suggestions

LaCie Ethernet Disk Mini This affordable NAS drive (pictured left) offers AFP, mass storage, media server functionality, remote access, backup software, and storage expansion through USB. It's also easy to set up and features LaCie's d2 case designed by Neil Poulton (\$170 [500GB], \$210 [1TB]; www.lacie.com).

Netgear ReadyNAS Duo It may be pricey, but this NAS drive features an extra drive bay so that you can install another hard disk for mirroring data. The drive also offers AFP, remote access, media server functionality, and a BitTorrent client (\$400 [500GB], \$680 [1TB]; www.netgear.com).

NewerTech MiniStack NAS Sporting a Mac mini-like look, this portable 7,200-rpm NAS drive is easy to set up, and it offers AFP, ProSoft backup software, Time Machine compatibility, a security slot, and media server functionality (\$138 [160GB], \$280 [750GB]; www.newertech.com).

yourself (going this route could save you some money, however).

Extra Features Many NAS drives offer additional benefits. If you want to offload your music, movies, and photos onto a centralized server and stream content to multiple computers, look for NAS drives with media server functionality (many support iTunes streaming). If you want to back up files, look for a drive that provides backup capability through software, a USB port to connect an external hard drive, or RAID support (only a few support Time Machine, which requires a Mac-only HFS+ formatted drive). If you want to access the drive remotely, look for a model that offers access over the Internet or FTP. ❌

Writer, music composer, photographer, and pack rat **Kris Fong** has archived tens of thousands of files. Now if she could only remember what's stored where...