



SECTION II

THE
DIGITAL
DARKROOM

Photographed and written by Jay Kinghorn



WELCOME TO THE DIGITAL DARKROOM

Photography has always been a technical art. Shutter speeds, apertures, development times, darkroom chemistry, and print contrast ratios have always challenged traditional photographers. Digital photography is no different. The tools found in Adobe Photoshop, Adobe Photoshop Lightroom, and Apple Aperture help a skilled photographer guide a viewer's eye through a photo, establishing resting areas for the viewer's gaze to linger and infusing a photo with depth and vibrancy.

As is true with all technologies, digital photography will continue to grow and change. New tools will emerge, making digital photography easier and more powerful. To get the most out of your digital photography, you should learn how to use these new tools to capture your vision, organize your work, and create compelling prints to share with others.

Car Trails on Trail Ridge Road. Olympus E-500, 7–14mm lens, 1/10 second at f18, ISO 100



Until this point, this book has concentrated on capturing a brilliant digital negative. Now let's turn our attention to distilling the content in that digital image through a series of adjustments, then preparing it for print or the Web, and finally archiving the image for posterity.

NEW TOOLS, SAME CHALLENGES

Since we wrote the first edition of this book, tools for processing, managing, sharing, refining, and printing your digital photos have become both more powerful and easier to use. Although the essential tool for photographers working in the digital darkroom continues to be Adobe Photoshop, it is no longer the only tool at your disposal. New image processing programs such as Apple Aperture and Adobe Photoshop Lightroom provide a unique suite of tools to help photographers organize, correct, and print digital photos. These applications complement Photoshop's specialty in exercising complete control over specific areas in a photo with tools designed to help photographers work faster and more efficiently.

In this chapter, I'll discuss the differences between applications such as Photoshop, Aperture, and Lightroom to help you decide which programs are right for you. In addition, I'll discuss the differences between shooting in the camera raw and JPEG formats and why this decision, made before you even shoot your pictures, has a profound impact on the quality of your photos.

This chapter is designed to be an introduction to the digital darkroom and provides an overview to the components that help you download, store, correct, print, and archive your photos. These steps, from image capture to print, can be summarized in a single word: workflow.

BUILDING YOUR WORKFLOW

For most of Photoshop's life, the application was designed to give you complete control over editing pixels, the basic building blocks of digital photos, in a single digital file, traditionally a scan of a film negative or slide. This system served photographers well because only a small percentage of the hundreds or thousands of photos in a photographer's collection were ever scanned into a digital format.

The invention of digital cameras changed everything. Instead of having a handful of digital photos to manage and correct, a photographer now has thousands or tens of thousands of digital photos to cull through, correct, and store. This change requires an entirely new approach to the process of handling digital photographs, one that focuses less on the individual photo and more on the processes involved in taking large numbers of photos from the camera to final print. These processes are your digital workflow. While your workflow will differ slightly from that of another photographer, several workflow stages are common to all photographers. In this book we'll address each stage of the process in detail to help you tailor your workflow for the best

image quality and greatest efficiency. To begin this journey, let's take a bird's-eye view of each stage of a digital photography workflow to see how they fit together.

Stages of a Photography Workflow

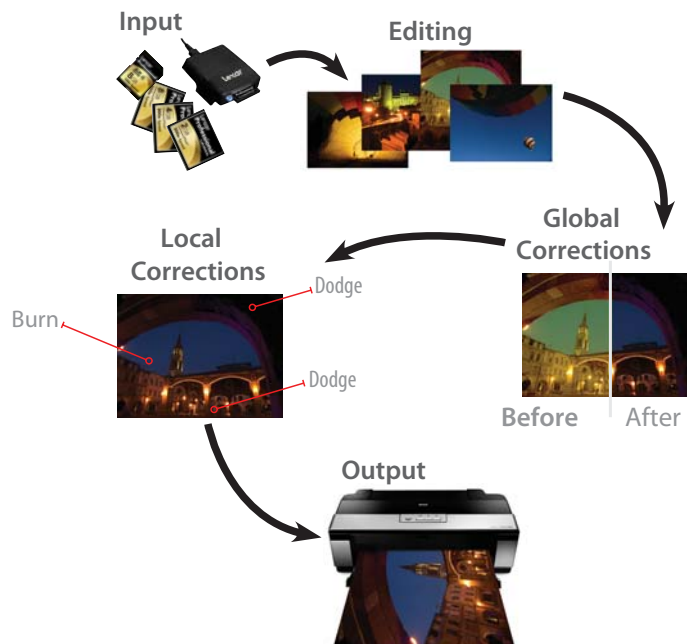
Your workflow is unique to you. Like a fingerprint or signature, no two workflows are exactly alike. Because we all approach challenges such as organization, backup, and even image correction in slightly different ways, one specific workflow does not fit everyone. For that reason, this book is designed to help you develop a workflow that best suits your individual needs, instead of prescribing a workflow for you to copy exactly.

As unique as workflows are, they all share at least five major stages in the process:

1. **Input** The process of copying photos from your camera's memory card to your computer. As simple as this seems, several important steps are often overlooked in this process. We'll cover the input stage in greater detail in Chapter 12.
2. **Editing** How do you select the best photos in a shoot? What do you do with the rest of the images that aren't necessarily bad photos, but don't represent your best work? Strategies for quickly editing your photo shoot along with answers to these questions and more are covered in Chapter 13.
3. **Global corrections** Refers to a change applied to the entire image. For example, a correction to a photo's overall color balance is a global correction. Global

corrections form the bulk of your image processing duties and are covered in detail in Chapter 14.

4. **Local corrections** Adjustments applied to specific areas of a photograph—brightening a person's face, for example. Most local corrections emulate advanced techniques from the wet darkroom and combine them with the power and control that Photoshop offers. Learning how to master local corrections gives you a high degree of nuanced control over how your photos appear onscreen and in print. These intermediate to advanced techniques are covered in Chapters 15 and 16.



The five stages of a digital photography workflow

- 5. Output** While the print is still the gold standard for photographic reproduction, it is by no means the only game in town. Websites, mobile devices, and multimedia hybrids offer exciting new avenues for displaying and sharing your photos. With any output medium, it is essential that your photos meet the technical requirements of the output device; otherwise, the results will be disappointing. The output-based Chapters 17, 18, and 19 all focus on helping you achieve the best results, whether you're printing to a wide-format inkjet printer or preparing a photo for inclusion in a multimedia production.

These five stages are built around maximizing quality while minimizing time spent organizing, correcting, and managing your photos. A cornerstone of an effective digital workflow is shooting in your camera's raw format.

THE IMPORTANCE OF SHOOTING RAW

The most significant change that has occurred in digital photography in recent years is the

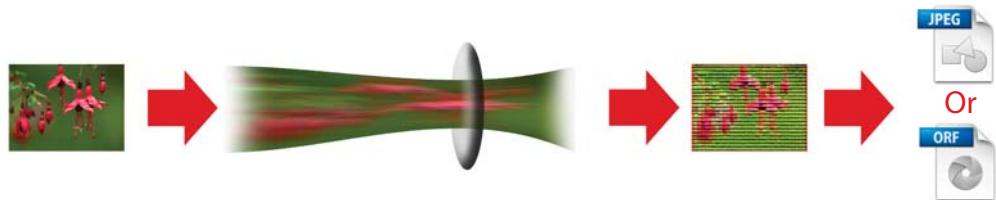
rapid adoption of a camera raw workflow. Whether you are new to camera raw or an experienced veteran, it is beneficial to understand just how fundamentally different raw files are from their JPEG counterparts.

What Is a Raw File?

A camera raw file, or raw file as it is commonly called, is the unprocessed information stored by your camera immediately after the light reaching your camera's sensor is converted to a digital signal. All digital photographs begin their lives as raw files, but depending on your camera model and your on-camera settings, this raw information may be processed in-camera and stored on your camera's memory card as a JPEG. If you are photographing in raw mode, your camera will not perform any processing on the photo; instead, it will store all of the digitized information to your memory card in its raw state.

Why Is Raw Important?

Shooting in raw is important for three major reasons:



Once the light is digitized by the camera's sensor, your photo is stored in either a raw or JPEG format depending on the camera's settings.

- It provides the full range of unprocessed information, just as your camera's sensor captured it. This gives you more latitude to fine-tune highlights and shadows, contrast, and color. JPEG files are processed in-camera with preset color, contrast, and sharpness settings. This limits the range of corrections you can perform in Lightroom and Photoshop.
- It is easier to batch-correct multiple raw files at once, greatly improving the speed of your workflow.
- And here's the clincher: When you make corrections to a raw file, your adjustments are completely nondestructive. Short of moving your photo to the trash bin, you cannot ruin a raw file. Changes made to a JPEG file can be permanent, and a JPEG photo can lose quality by being saved repeatedly.

These three points illustrate why shooting in raw gives you a better experience in the digital darkroom—but perhaps the most important reason for *Perfect Digital Photography* readers is that processing raw files is easier and more intuitive than processing JPEG files. The adjustment controls are simpler and more logically arranged, and, to reiterate a point, the changes you make to a raw file are never permanent, making it easy to experiment with tools available in the raw processing software without fear that you will damage or lessen photo quality.

What If My Camera Doesn't Shoot Raw Files?

Most digital SLR cameras, and an increasing number of point-and-shoot cameras, can shoot in raw. If you don't see the option in your camera's menu, you can check to determine whether your camera offers a raw option by reading your owner's manual or viewing the technical specifications.

If your camera isn't set up to create raw files, don't worry. Photoshop CS3 and CS4, Lightroom, and Aperture all allow you to adjust JPEG photos as though they were raw. Since JPEG photos are already processed, you won't have the same degree of flexibility you would have with raw files, but you will still be able to perform common corrections and make beautiful prints from your photos.

For the tutorials in this book, we're assuming you are shooting in raw mode. For a refresher on setting up your camera to shoot in raw, please visit Chapter 3. As we go deeper into the correction process, the differences between raw and JPEG will become clearer. You'll see why raw is the format of choice for an effective digital photography workflow.

WHAT TOOLS DO I NEED? BUILDING YOUR DIGITAL DARKROOM

In a traditional wet darkroom, you would expect to find enlargers, chemicals for development, wash and rinse basins, and an array of papers for printing. Since pixels have replaced negatives, you might find the following items in the digital darkroom.

Hardware

Camera

Digital images are most often captured with a digital camera or created by scanning a piece of film. Photographers wanting the most control over their images will use a digital SLR (DSLR) with interchangeable lenses. For the tutorials in this book, you can use a DSLR, point-and-shoot, or film camera.



Image courtesy Olympus Imaging America

Memory Cards

Most digital photos are temporarily stored on CompactFlash (CF), Extreme Digital (XD), or Secure Digital (SD) cards until they are transferred to your computer. Photographers working in a studio environment will often shoot in tethered mode, where the camera is connected directly to the computer and photos are automatically stored on the computer's hard drive instead of the camera's CF card.



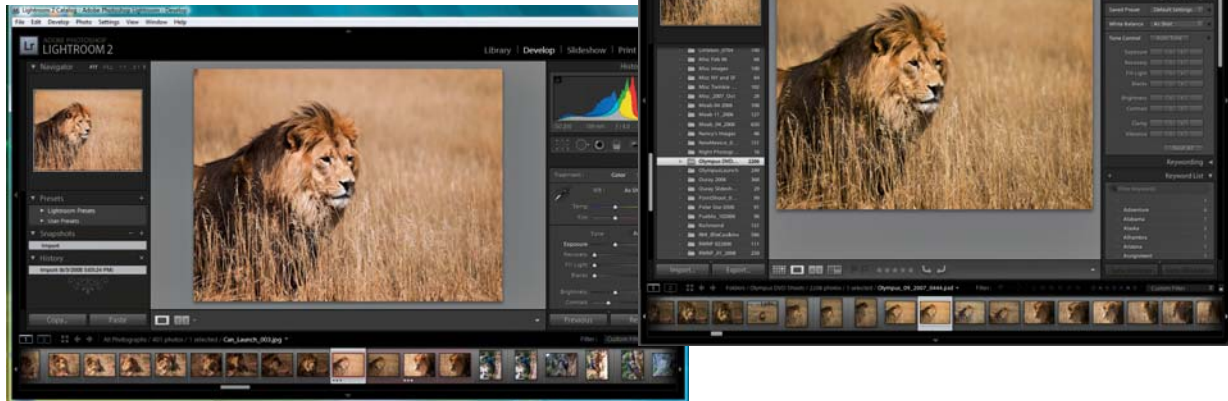
Tip When downloading photos from your camera, it is easier and safer to use a card reader instead of connecting your camera directly to the computer.



Computer

Technology evolves at a blistering pace. Many pros suggest buying the fastest processor you can afford and loading up the computer with as much RAM as it can hold. This is sage advice.

Both the Windows and Macintosh operating systems are appropriate for digital photographers. Each system offers slight advantages and disadvantages when compared to the other, but the core applications such as Photoshop and Lightroom are virtually identical when running on Windows and Mac computers. I recommend that you use whatever platform you are most comfortable with.



Hard Drives

Your photo library will take up more space than you can imagine. Although I don't recommend buying a bunch of hard drives now, you should consider your future storage needs before purchasing any new hard drive. Most important, you need to have enough space on a separate hard drive to back up your entire image library. I'll help you develop a bombproof backup strategy in the next chapter.



Image courtesy WiebeTech

Monitor

Your monitor is your primary means of judging your photos. Because of this, you should get the best one you can afford. Otherwise, you could find yourself limited by a poor-quality monitor when it comes to fine corrections and printmaking. I strongly recommend that you spend as much money as you possibly can on your monitor. It is an investment that pays for itself quickly when you begin making prints. The better quality your monitor, the fewer prints will be ruined by inaccurate color. In fact, it is more important that you have a high-quality monitor than a fast computer.



Monitor image courtesy
EIZO Nanao Corporation

Shopping for a monitor can be daunting. Few reviews specifically address the needs of serious photographers. Of all the product specifications, only a few impact a monitor's effectiveness in the digital darkroom. The rapid pace of development makes it impossible to offer concrete recommendations; however, the higher end Dell and Samsung monitors are

both good values, Apple and LaCie monitors are a step up in both price and performance, while EIZO and the top-of-the-line HP DreamColor displays are currently leading the pack. The following information may help you in reading reviews and product specifications to sort through the jargon and find a monitor that is right for you.



For a current list of monitor recommendations for digital photography visit [www](http://www.perfectdigitalphotography.com/monitors.php)

[.perfectdigitalphotography.com/monitors.php](http://www.perfectdigitalphotography.com/monitors.php).

Monitor Type

Photographers are likely to encounter three types of monitors: CRT, LCD, and LED. You can think of these monitor types as the past, the present, and the future.

CRT (cathode ray tube) monitors are virtually extinct, having been surpassed by the LCD monitors in common use today. While CRT offered a few advantages for viewing photographs, few, if any, manufacturers continue to produce CRT monitors. The last remaining CRTs are approaching the end of their usable life and will give way to new LCD and LED monitors.

Odds are the monitor with which you perform most of your photographic corrections is an LCD (liquid crystal display). While LCD monitors are widespread and used in all types of professional workflows, some inherent limitations in the technology will make the LCD's dominance short-lived. First, an LCD display is illuminated from a single light source, making it difficult to maintain consistent

brightness and color in all areas of the monitor. Second, LCD monitors cannot be calibrated as accurately as CRT or LED monitors because they have only a single light source instead of separate light sources controlling the intensity of red, green, and blue information, as is found with CRT and LED.

LED (light-emitting diode) monitors hold great promise for digital photographers. These monitors deliver accurate color more evenly across the screen and can be calibrated to tighter tolerances than LCD monitors. For these reasons, LED monitors, which are already beginning to appear in laptops and professional-level displays, will quickly overtake LCD as the technology of choice for high-quality monitors.

Making the Most of Your Monitor

Unfortunately, with monitors, you tend to get what you pay for. Spending the extra money to get a professional-quality monitor will usually pay dividends over the life of the display. That said, if you're suffering from sticker shock, here are a few tips to make the most of your investment.

First, buy small. Big monitors are in vogue right now, but the quality of a large monitor is often inferior to that of a smaller one. For most of my career, I've worked on a single 19-inch monitor and it has served me well. When I upgraded from my original system, I invested in a professional-quality 19-inch and purchased an inexpensive 19-inch to store my palettes and other documents. Buying the highest quality display will more

than pay for itself over the display's life—in saved ink and paper, not to mention the hair pulling you avoid when prints actually match your monitor.

Second, lower the brightness. Most monitors have an expected life of around three years. Keeping your monitor at full brightness often cuts the life of a monitor in half and causes problems when you're trying to match color in photos between your monitor and your prints. Lowering the brightness of the monitor not only saves you money in print costs by improving screen-to-print accuracy, but it will extend the life of your monitor.

Finally, carefully weigh your needs before you buy. If you're a photography enthusiast who predominantly shares photos online, you don't need a super high-quality monitor. If you are a fine-art photographer who does a lot of printing and is very discerning of tone and color, you will save money in the long run by investing in the highest quality monitor you can afford. I've spent a lot of time consoling frustrated photographers who keep striving for better print quality but are limited by their monitors.

What About Laptops?

While laptops can, and often are, used for digital photography, the displays used in laptops aren't as accurate as their desktop brethren. If you are currently using your laptop for performing corrections, and it's working for you, I encourage you to continue to do so. If, however, you get to a point where you can't seem to get the color right in your prints, you may be asking for more than your laptop can deliver, and it may be time to add a desktop monitor to the mix.

Monitor Calibration Package

No serious digital photographer should be without a software and hardware package dedicated to calibrating and profiling your monitor. A well-calibrated monitor is an accurate monitor that will save you a tremendous amount of ink, paper, and frustration when making prints. My favorite monitor calibration packages come from X-Rite, basIColor, and ColorEyes.

A detailed tutorial on calibrating and proofing monitors is included in Chapter 18.



Image courtesy X-Rite Inc.

Output

Viewing images on the screen is nice, but it is difficult to hang a monitor on the wall or send your laptop to a friend as a gift. The output stage of the workflow is still commonly geared toward printmaking, but multimedia uses of

photography are increasing by the day. We'll cover printing in great detail in Chapter 18 and will explore multimedia in Chapter 19. For now, it's worth looking at two common printing methods available to help you round out your digital darkroom.

Inkjet Printers

You probably have a photo-quality inkjet printer sitting on your desk or stationed in your studio. Printers that print only letter-sized photos are fine for general photo printing duties, but serious photographers will want to take advantage of the superior archive life, print quality, and variety of paper types supported in 13×19-inch and larger format printers.



Image courtesy Epson America, Inc.

Digital Photo Lab

The digital darkroom extends well beyond the walls of your home or office. Professional photo labs offer medium- to high-quality prints made on photographic paper from digital files. Printers such as the Fuji Frontier, a common printer found in minilabs, or the Océ

LightJet use lasers to expose photosensitive paper to light. Because they do not require the same chemistry used for traditional color printing, these prints have a good archival life and a brilliant color palette, and they make high-quality prints. Many online printing services use a photographic printer such as the Fuji Frontier to make inexpensive prints from photos you've uploaded to their website.

Lighting

Believe it or not, the lighting and the color of the walls in your workroom has a profound impact on your ability to perform color and tone corrections accurately and match your prints to your monitor. We'll go into greater detail on room lighting in Chapter 18, but suffice it to say if your print colors don't look right, try moving the print to a north-facing window to see if the color improves.

Software

The computer, monitor, and printer all serve as a support system for your software, which performs most of the actual work involved in image correction. As digital photography has grown in sophistication, specialized programs have been developed to address specific needs. Considering the myriad applications geared toward digital photographers can be a bit overwhelming. To help clarify your choices, in this section, we'll discuss the different types of digital photo applications and how they are used in a photo workflow.

Adobe Photoshop is synonymous with correcting, processing, and adjusting images. While Photoshop is still the best pixel editor on the planet, several other software applications can help you edit and manage files or quickly process a shoot. These applications typically fall into one of four main categories: file browsers, asset managers, raw processing applications, or all-in-one workflow solutions.

File Browsers

File browsing software allows you to view the contents of a single folder very quickly. This makes file browsers an excellent choice for your initial edit or for managing a small image library. File browsers offer only limited help in managing a large image library as they can only view the contents of one folder at a time. The most popular file browsers are Adobe Bridge and Photo Mechanic.

Adobe Bridge (Included with Adobe Photoshop CS and Later)

Adobe Bridge has evolved into a central file management application for all of the applications in the Adobe Creative Suite. Within Adobe Bridge, you can sort, keyword, and edit your photos, or preview a folder of project files including page layouts, Flash animations, HTML documents, and video clips. This versatility is advantageous for working across applications, but it can become



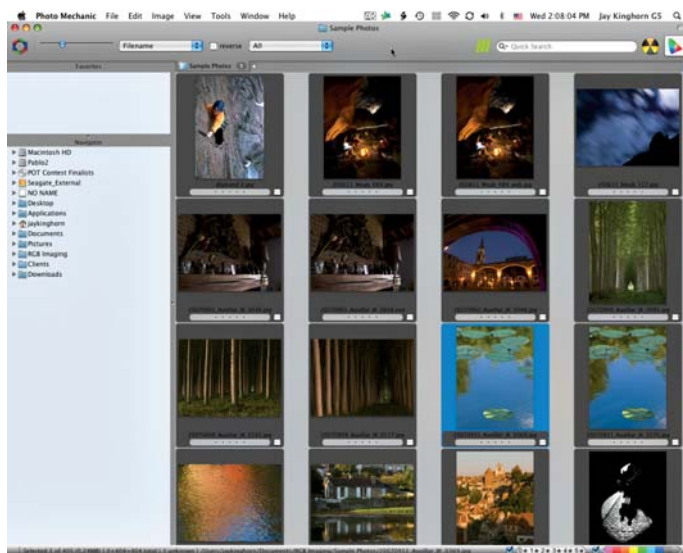
cumbersome for photographers who need only the ability to download, edit, and organize photos quickly.

Photo Mechanic

Photo Mechanic has long been the file browser of choice for newspaper photographers and photojournalists who measure deadlines in minutes instead of hours or days. Photo Mechanic is a specialized tool for downloading images, applying descriptive metadata to photos, and selecting the best images from the shoot. While not as versatile as Adobe Bridge, Photo Mechanic is the tool of choice when speed is an absolute necessity.

Asset Management

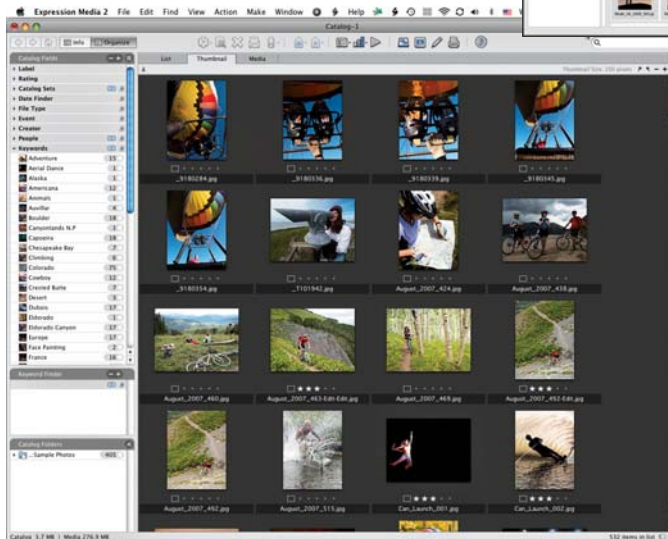
Asset managers help you create a visual database of your photo library, allowing you to view all your photos in one location, even if they reside in different folders or hard drives. The searching capabilities within asset management applications are superior to those found in file browsers. For example, a quick keyword search for "beach" might bring up photos from your trip to Hawaii in 2005, plus a visit to Big Sur, California, last year, plus a host of individual photos from your trip to Ireland this year. Asset management software is essential for managing a large image library, because it helps you catalog, search, and find photos very quickly. Two of the most popular asset management applications are Microsoft Expression Media and Extensis Portfolio.





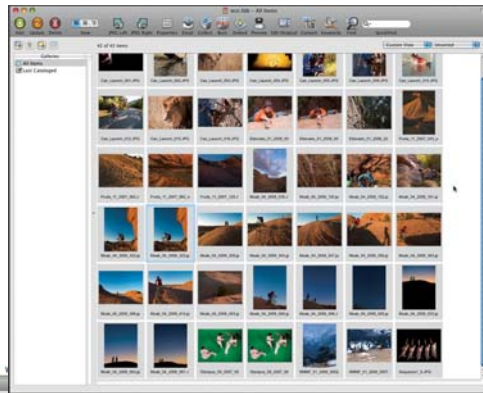
Microsoft Expression Media

Called iView MediaPro before Microsoft purchased iView Multimedia, Expression Media is a longtime favorite of photographers for managing medium-sized image libraries and sharing photo catalogs with multiple users in a network environment. Expression Media has the shortest learning curve of the asset management applications.



Extensis Portfolio

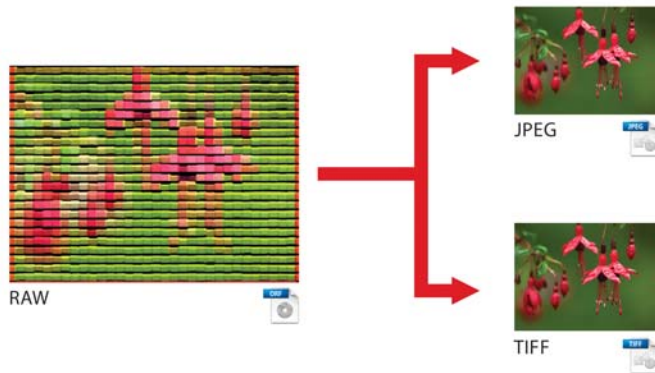
The most robust of the file-management options described here, Extensis Portfolio is best suited for smaller stock or advertising agencies needing to store and access files on a network. The single-user version of Extensis Portfolio contains most of the key features found in the server-based package at a much lower cost, making it an excellent choice for photographers who need to catalog 50,000 to 100,000 photos.



Raw Processing Software

Before you can share or print your camera raw files, they are decoded through a process called *demosaicing*, which is done by raw processing software that turns your original raw files into more versatile file formats such as JPEGs and TIFFs. Before you buy, be sure that the

raw processing software can read the raw file formats generated by your camera.

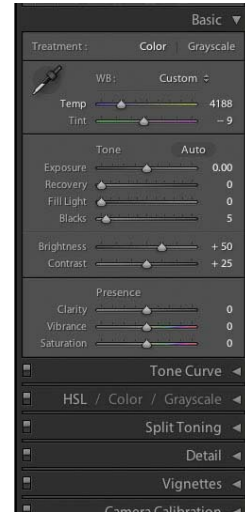


Raw processing software is used to create JPEG and TIFF versions of your camera raw files.

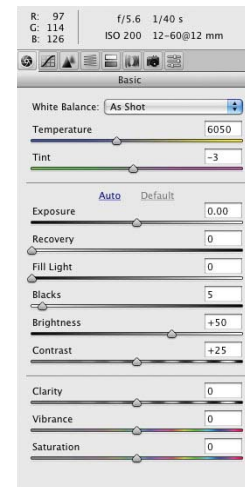
Adobe Camera Raw (Included in Adobe Photoshop and Lightroom)

Far and away the most popular raw processing application, Adobe Camera Raw is used by more than 90 percent of professionals at the time of this writing. This dominance is well deserved: Adobe Camera Raw provides a high degree of control over the color, contrast, and tone in your photos while its integration with Photoshop and Lightroom makes for an effective, efficient workflow.

Adobe Camera Raw can be used with both Adobe Photoshop and Lightroom. While the display of the interface's controls differs slightly between the two programs, the underlying programming and functionality is identical, making it easy to transfer photos between Lightroom and Photoshop.



The user interface of Adobe Camera Raw in Lightroom



The user interface of Adobe Camera Raw in Photoshop

Capture One

Although Adobe Camera Raw is the 800-pound gorilla in the photography world, Capture One from Phase One is an excellent

program and provides a superb suite of tools for correcting and processing raw files. Some photographers prefer the look they get from Capture One over other raw processing applications.

All-In-One Workflow Solutions

All-in-one workflow applications such as Adobe Photoshop Lightroom and Apple Aperture are the future of the digital workflow. They dramatically streamline the process of editing a shoot, selecting your favorite images for processing, performing tone and color corrections, printing, and managing your image archives. Sounds like a lot to ask of a single application, doesn't it? Fortunately, these applications have been designed with your needs in mind. They focus on fulfilling the core needs of digital photographers, leaving the specific, selective corrections to Photoshop.

Apple Aperture

Aperture (Mac OS X only) is Apple's all-in-one workflow solution that offers a compelling set of tools for editing, optimizing, and sharing photos. Aperture excels in its flexibility in editing and selecting photos with a Light Table interface that is reminiscent of editing slides on a traditional light table, but improved for the digital age. Aperture also provides excellent built-in image backup features and a wide variety of different output options, from calendars to linen-bound books and slideshows to sophisticated web galleries.



Adobe Photoshop Lightroom

With every new release, Adobe Photoshop adds more features that meet the needs of professional videographers, web designers,

graphic designers, illustrators, and scientists. While these features offer tremendous benefits to those users, it makes the application more complex and more difficult to learn for digital photographers.

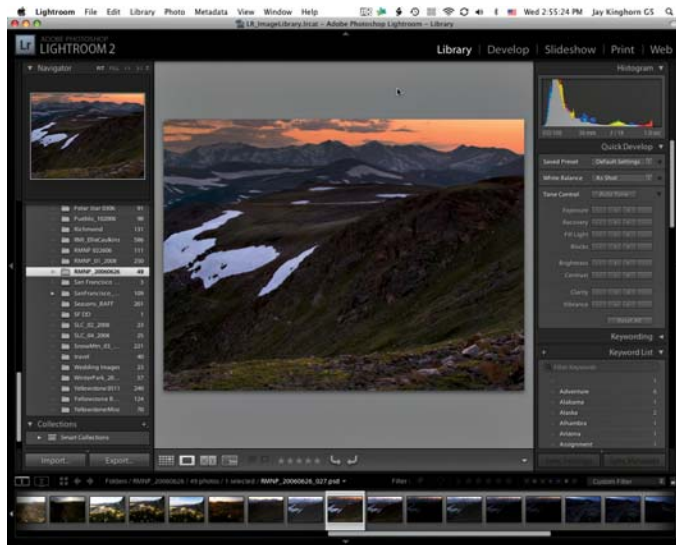
Lightroom is designed to be the bread-and-butter application for digital photographers who need to process a whole shoot of images very quickly. Perhaps the best way to think of Lightroom is as a “hybrid application.” Adobe took the very best features found in file browsers and asset managers, combined them with Adobe Camera Raw for image processing, and added printing and web gallery creation to round out the tool set.

While you still need to jump into Photoshop to perform intensive compositing or image adjustments, Lightroom makes this an infrequent occurrence instead of the norm.

Software Featured in This Book

Since it is impossible to cover all of these applications in a single volume, I'll be demonstrating the workflow I believe is most effective for those of you reading this book. After extensive testing and development of my own workflow and my client's workflows, I believe the best solution right now for digital photographers is to use Adobe Lightroom as their primary image management, editing, and image correction software, combined with Adobe Photoshop for specific, localized image adjustments and refinements. This is the software that is featured in this book.

Whether you are using Lightroom, Bridge/Photoshop, Aperture, or other software applications, you should understand the underlying concepts behind the tools you use. This helps you become more agile and adaptable in your workflow, because the only thing certain in digital photography is change.

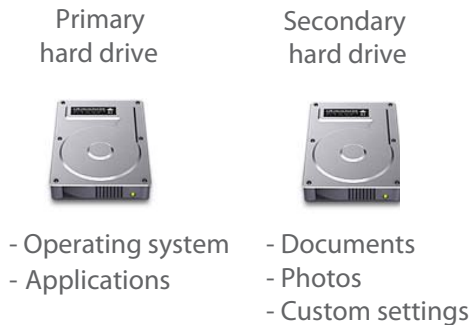


ORGANIZING YOUR PHOTO LIBRARY

Before you begin performing image corrections, making prints, and creating dazzling web galleries, you should take some time to organize your photos into a centralized image library. Why? First, to make photos easier to find when you need them. Second, and perhaps more important, to make it easier to safely back up and protect your photos in case of a hard drive failure, system upgrade, or catastrophe.

Separate your image library from the rest of the files on your computer. If you're working on a desktop computer, this means

purchasing and installing a second internal hard drive in your computer. If a laptop is your primary editing computer, I recommend buying a second external hard drive to serve as your photo storage location.



This separation makes it easier to perform normal system maintenance or upgrade to a new computer with a minimal amount of hassle. Of course, you will need to have an effective backup strategy in case the hard drive containing your images fails. After all, the question is not if a hard drive will fail, but when. For this reason, it's critically important that you have a backup plan that accounts for many different contingencies—from the more common challenges such as a hard drive crash, to the more catastrophic crises such as the theft of computer equipment, a fire, or a flood. Various backup strategies are covered next.

First, you need to continue creating your image library. After you've configured your computer for optimal results, you need to begin building a system of folders and subfolders to contain all the photos in your image library. Most photographers create

a folder on their hard drive titled “Image Library,” and then create a new folder for each photo shoot. Adding the date and a descriptive title makes it easier to find a specific folder of files quickly. The folder structure also creates manageable file sizes for backing up to CD/DVD, supplemental hard drive, or online sites, which, conveniently enough, is the subject of the very next section.



Backup Strategies

Effective backup strategies can range from simple and inexpensive, such as burning a DVD of your shoot and storing it at a friend's house, all the way to a complex, expensive, and automated system that automatically backs up your photos to an offsite server. You'll want to select a system that meets your budget, matches the size and value of your image library, and is easy to use. Here I'll begin with simple, inexpensive methods and progress to more expensive backup strategies, highlighting the pros and cons of each.



You can find more information on backup strategies, software, and hardware products at www.perfectdigitalphotography.com/backup-archiving.php.

CD/DVD

Backing up to optical media, such as CDs and DVDs, is inexpensive, reliable, and effective. These small discs can easily be stored in an archival box at a friend's house or another offsite location, making them great options for storing backups of your most valuable photos.



Tips for making the most reliable CD/DVD backups can be found at www.perfectdigitalphotography.com.

The biggest disadvantage of using CD/DVDs is that they are relatively slow to read from and even slower to write to, and they aren't very flexible—you can't add a file to an already burned disc.

Hard Drives

Because of the disadvantages associated with burning files to CD/DVD, most photographers have switched to storing photo collections entirely on hard drives. Hard drives are becoming significantly less expensive, while increasing in capacity. However, the primary disadvantage of hard drives is that they fail. And when they fail, they often fail spectacularly, taking all of the photos with them. For that reason, you should never, ever, store your photo collection on only one hard drive.

It is essential that you have some system of copying files between multiple hard drives. This can be done manually, which is the most cumbersome, or automatically using a software backup system or by using a RAID system.

RAID

A RAID (Redundant Array of Inexpensive Disks) system is a series of separate hard drives connected to one another through a software system or hardware enclosure to appear as and function like a single drive on your computer.

Desktop RAID Solutions

Several manufacturers offer inexpensive desktop RAID solutions. The initial cost of purchasing a RAID system is higher than purchasing external hard drives, but the overall cost of ownership combined with the peace of mind and ease of use makes these desktop RAID systems very attractive to photographers with medium- to large-size image libraries.



Image courtesy, WiebeTech

Web Storage

While external hard drives and desktop RAID solutions offer inexpensive, redundant backups of your image library, they don't provide protection against a catastrophic loss

such as fire, flood, or theft. For these reasons, you may want to store your prized photos in a web-based storage system. By renting space on someone else's server system, you are well protected against hard drive failure or the loss of your computer system. Web-based storage is the most secure, but it is also the most difficult to use and the most expensive option. For that reason, I recommend storing a limited subset of your best photos online.

Following are a few of the most common web-based storage systems:

- **Jungle Disk** www.jungledisk.com
- **Box.net** www.box.net
- **.Mac** www.apple.com/mobileme
- **Window's Live SkyDrive**
<http://skydrive.live.com/>
- **Mozy** www.Mozy.com

Backup Software

Whether you plan to back up to a CD/DVD, hard drive, or web-based system, it helps to let a software program take care of the details; it can remind you when a backup needs to be made and back up only the files that have recently changed.

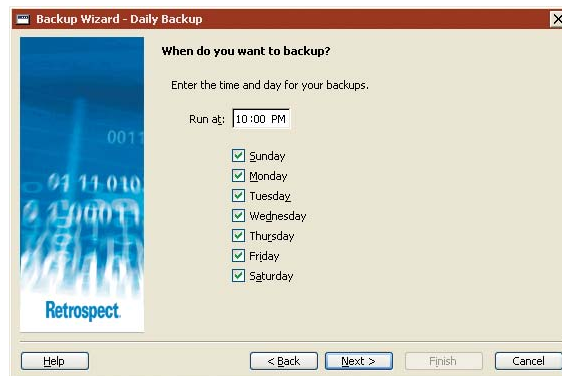
Eric Ullman, Director of Product Management for EMC Retrospect, is an expert in backup strategies and amateur photographer. He offers three "Laws of Backup" that you can use to test the efficacy of your backup systems:

- *Back up everything. Sooner or later you'll wish you had.* "Hard drives are so

inexpensive right now that it makes sense to back up everything on your computer. If you back up only bits and pieces, when it comes time to restore your data you'll often find that you're missing key settings, color profiles, or other files you need to work effectively. These missing pieces are often very time-consuming to re-create from scratch."

- *Automate your backups.* "It's too easy to forget to manually back up your files. Instead, let the software take care of remembering to begin your backup. The computer never forgets."
- *Get a copy out of the building.* "This is the most important of the three. Getting some backup of any kind offsite and updating it regularly protects against a catastrophic loss."

The most popular professional-level backup software for both Mac and Windows is Retrospect, though dozens of products on the market will suit almost any budget or backup need. For more information on Retrospect for the Mac and Windows, check out www.emcinsignia.com/products/smb/retroformac/.



HOW TO: FINDING BALANCE IN THE DIGITAL DARKROOM

Every art form has a handful of simple rules that create the fundamental essence of the craft. Visual artists, photographers, painters, and illustrators strike a balance between light and dark. In music, the quiet passages allow the listener's ear to relax, giving more force to the louder passages.

With so many options available to photographers to adjust, refine, and manipulate photos, often the most difficult artistic decision is to know when to stop. It helps to think of your photos as a combination of separate elements that are blended in just the right amounts to bring out the best qualities in your photos. What are the elements in a digital photo?

- **Tone** Our eyes are accustomed to seeing snow as white, not gray. The tires on our cars are dark, not light. A photograph should generally reflect how we see the world. The tone of an image is like a picture's skeleton, giving shape and form to the picture. Tone also sets the mood of a photograph. Dark tones are somber, mysterious, and sinister, while lighter tones are open, airy, and pure.
- **Color** Our perception and emotional reaction to color is a fascinating subject encompassing

physiology, evolution, psychology, and even culture. The complex relationship humans have with colors gives photographers great power to infuse photos with emotion by manipulating the appearance of colors. Warm colors such as orange and red make a photo inviting and comfortable, while cool colors such as blues and cyans make viewers feel cold and distant. Heavily saturated colors feel saccharine or sticky-sweet. Desaturated colors provide a sense of melancholy or longing.



- **Contrast** The difference between tones, the contrast, makes details appear sharper and images more vibrant. In Lightroom and Photoshop, you can add contrast globally to all parts in the image to add extra presence to a photo. Or you can add contrast locally to key areas in the photo, causing the viewer's gaze to linger a little longer in a specific spot. Understanding the effect contrast has in a photo is key to successful imagemaking.
- **Focus** Imagine two photographs: The first is an expansive landscape taken from a high point in the desert. As you look at it, your eye roams from the

scraggly sage in the foreground across the rolling mesas and sandstone buttes and travels across the horizon along a bank of puffy, white clouds. The second image is an intimate portrait of a pair of emerald eyes taken with a long lens. Your gaze is riveted on those captivating eyes. Focus is a powerful ingredient in a digital photograph. As you learned earlier, you can control the depth of field in a photograph by your choice of lenses and your aperture setting. In Photoshop, you can refine the depth of field even further by selectively sharpening and blurring key elements in your composition.

