Introduction and Installation of Mac OS X

From the moment you see Mac OS X, you know that it's different from any other computer operating system on the planet, including earlier iterations of Mac OS. Nothing else looks quite like it. Yet, use it a bit and you'll see that there is familiarity about its operation. Apple has made great efforts to ensure that Macintosh users as well as Windows users can leverage their previous OS skill sets. But what sets Mac OS X apart from its predecessors and its competition is the total sum of its parts.

This chapter provides an overview of the core technologies that comprise Mac OS X. Knowing the core technologies can help you master the overall operation of this world-class operating system. We conclude this chapter by examining the system requirements of Mac OS X and its installation.

What Is Mac OS X?

Mac OS X is Apple's answer to the quest for a modern operating system. It combines the power and stability of Unix with the simplicity of Macintosh. In 1996, after continual failed attempts to develop its own next-generation operating system, Apple management looked outside the company and acquired NeXT Software, Inc. NeXT's OS at the time was called OpenStep. It had all the features that Apple desired in a modern OS: protected memory, preemptive multitasking, multithreading, and symmetric multiprocessing. With OpenStep as the foundation, Apple initially designated the code name Rhapsody for its new OS, but as the project matured, it was renamed to Mac OS X, keeping in line with the progression of Apple's existing system

software monikers. Apple has enjoyed phenomenal success with Mac OS X, which has been adopted by over 5 million users and Apple is now generally considered the largest vendor of Unix-based systems on the planet.

Mac OS 10.4 is another evolutionary step in the OS X product line. Apple claims it has over 150 enhancements. One of the more significant enhancements, though most likely unperceivable to most users, is that the OS has been further enhanced to run on the IBM PowerPC 970 processor, which is the heart of Apple's G5 64-bit computer. But Mac OS 10.4 is still not a true 64-bit OS; rather, it's what's referred to as a *hybrid OS*. This means that, although Mac OS 10.4 has been optimized to take advantage of the 64-bit data paths of the G5 processor and is capable of utilizing up to 8GB of physical memory and native double-precision (64-bit) arithmetic, while still allowing 32-bit applications to run. When an application is 64-bit optimized, it can access a whopping 16 exabytes of virtual memory. An exabyte is equivalent to 1,024 petabytes, and a petabyte is equivalent to 1,024 terabytes — that's a lot of memory!

Core Technologies of Mac OS X

The most important thing to know about Mac OS X is that it is based on open standards. This is because at the heart of OS X is Unix, which has played a major role in the development of the Internet. Because Unix is so Internet-centric, OS X can be integrated in virtually any computing environment. In fact, the X in Mac OS X represents the X in Unix. But fear not; although Mac OS X is a Unix operating system, its operation does not require the mastery of complex Unix command syntax. As Apple publicizes, the command line is there for those who would like to use it, but it isn't required for day-to-day operations. You can make as much or as little use of it as you want.

If OS X were compared to an automobile, we would see a similarity in that both are composed of many parts. All these parts have very distinct functions, and yet all make up a greater whole. Metaphorically speaking, the intention of Apple was to design a vehicle akin to a Formula 1 racing car. When the engineers at Apple set out to build OS X, they pulled together world-class technologies in an effort to build the most advanced consumer operating system the world has ever seen. Let's take a closer look at these parts.

Darwin

The foundation of OS X is Darwin, which is an open-source community/Apple joint effort. Though Darwin is a complete OS in and of itself, the primary objective of the Darwin project was to build an industrial-strength Unix-based operating system core that would provide greater stability and performance compared to all existing iterations of the Mac OS. Reviewing Darwin in detail is beyond the scope of this book. Instead, we review some of Darwin's more marketed features.

Mach microkernel

At the center of Darwin is the Mach microkernel based on FreeBSD 5.x, the foundation that provides basic services for all other parts of the operating system. Mach was developed at Carnegie-Mellon University, and it has a closely tied history with BSD Unix (Berkeley Software Distribution). It is Mach that gives OS X the features of protected memory architecture, preemptive multitasking, and symmetric multiprocessing.

Protected memory

Protected memory isolates applications in their own individual memory workspaces. When an application crashes, the program can be terminated without having a negative effect on other running applications or requiring a restart of the computer.

Advance memory management

Advance memory management automatically manages physical RAM and virtual memory dynamically as needed. Virtual memory uses hard disk space in lieu of physical RAM. Information that would normally sit in RAM, but is not currently needed, is transferred to the hard disk to free up physical RAM for the demands of data/applications that need it. This alleviates out-of-memory conditions and eliminates the need, experienced by users of previous Macintosh desktop operating systems, of having to manually adjust memory allocations.

Preemptive multitasking

Mac OS X, like all Mac OS versions since System 7, allows more than one application to be open and operating at the same time. This capability is known as *multitasking.* Prior to OS X, the Mac OS employed a version of multitasking referred to as *cooperative multitasking.* In cooperative multitasking, applications sometimes seemed unresponsive, because the system software could not efficiently manage the concurrent demands of multiple running programs. Mac OS X remedies this by implementing *preemptive* multitasking. Preemptive multitasking prioritizes processor tasks by order of importance. This more efficient method of managing processor tasks allows the computer to remain responsive, even during the most processor-intensive tasks.

Symmetric multiprocessing

Symmetric multiprocessing (SMP) provides support for multiprocessor Macintosh computer systems. This allows applications to take advantage of two or more processors by assigning applications to specific processors or by splitting parts of applications, known as *threads,* between multiple processors simultaneously. By contrast, Mac OS 9 uses one processor for the majority of its tasks and programs need to be explicitly written to take advantage of multiprocessor Macs. These programs are limited to a few graphics and scientific applications. Mac OS 10.4 is further optimized to take advantage of SMP by employing a technique known as *optimized kernel resource locking.* Optimized kernel resource locking provides superior SMP performance by allowing multiple CPUs access to different portions of the kernel simultaneously.

Graphics technologies in Mac OS X

When it comes to graphics, Mac OS X is one of the most powerful operating systems on the planet. To achieve this power, Mac OS X employs several standards-based technologies that are best-of-class. These technologies include Quartz, OpenGL, and QuickTime. Over the past couple of years, some of the greatest strides in hardware performance have come in the form of video hardware. Mac OS X 10.4 has been optimized to take advantage of this new breed of high performance video hardware. Designated as Core Image, this software optimization improves performance by reducing floating-point unit (FPU) CPU utilization by offloading it to the Graphic Processing Unit (GPU) of the video hardware. Not all video cards are Core Image–capable, but it's safe to assume that if your Mac has shipped within the last year, it will be either fully or partially Core Image compliant, because Core Video is a scaling technology dependent upon hardware capabilities. For a complete list of Core Image–compliant video cards, visit www.apple.com.

Quartz

Quartz is a powerful two-dimensional (2-D) graphics-rendering system. It has built-in support for the Portable Document Format (PDF), on-the-fly rendering, compositing, and antialiasing. It supports multiple font formats, including TrueType, PostScript Type 1, and OpenType. Quartz supports Apple's ColorSync color-management technology, allowing for consistent and accurate color in the print/graphics environment.

OpenGL

Open Graphics Library (OpenGL) started out as a technology initiative by Silicon Graphics, Inc., a manufacturer of high-end graphics workstations. It has since become an industry standard for three-dimensional (3-D) graphics rendering. It provides a standard graphics application programming interface (API) by which software and hardware manufacturers can build 3-D applications and hardware across multiple platforms on a common standard. OpenGL is very prevalent in gaming, computer-aided design (CAD), professional 3-D animation/modeling, and graphic design.

QuickTime

QuickTime is Apple's cross-platform multimedia authoring and distribution engine. It's both a file format and a suite of applications. QuickTime has been around since 1991 and has matured into a very powerful technology. It supports over 50 media file formats encompassing audio, video, and still images. Some examples of these file formats include AIFF, AVI, JPEG, MIDI, MP3, MPEG-1, PICT, and TIFF. QuickTime has support for real-time video streaming, allowing viewers to tune in to live or prerecorded content on demand.

Aqua

Though Aqua is not a graphics technology in Mac OS X, it is its graphical user interface (GUI). Appearance-wise, it is a dramatic departure from OS 9's Platinum inter-face, although it retains certain common elements. This allows for greater familiarity for legacy Macintosh operators, thus making the transition to OS X a more intuitive experience.

Mac OS X's application environments

Application environments allow Mac OS X to run its modern OS-enabled applications while simultaneously supporting legacy Mac OS software. An application environment consists of various system resources, components, and services that allow an application to function. Mac OS X has five application environments: Cocoa, Carbon, Java, BSD, and Classic.

Cocoa

Cocoa applications are specifically developed for Mac OS X. Cocoa applications are incompatible with older Macintosh operating systems and, therefore, will not run on Mac OS 9. Cocoa applications take advantage of all of Mac OS X's modern OS features, such as advance memory management, preemptive multitasking, symmetric multiprocessing, and the Aqua interface. Apple evangelizes Cocoa for its modern object-oriented programming techniques and rapid application development tools, which make application development significantly faster and easier than for Carbon. Some examples of Cocoa applications are OS X's Mail and Preview applications as well as Netopia's Timbuktu for Mac OS X.

Carbon

The greatest advantage of the Carbon application environment is that developers can build applications that run in either Mac OS 9 or OS X. When running within OS X, Carbon applications take advantage of most of OS X's modern OS features, including the Aqua interface. In order for Carbon applications to run within Mac OS 9, the CarbonLib library must be present within the `Extensions` folder within the Mac OS 9 `System` folder. Some examples of Carbon applications are AppleWorks 6.1, Acrobat Reader 5.0, and Quicken 2003. Ironically, some Carbon applications do not run under Mac OS 9. The most prominent is Microsoft's Office Version X for Mac.

Java

The Mac OS X Java environment is Java 2 Standard Edition–compliant. It can run both Java applications and applets. The key advantage of Java development is that Java applications can run on any platform that contains a cross-compatible Java Virtual Machine.

BSD

The BSD application environment usually deals with command-line executable shell scripts. A shell script is similar to an MS-DOS batch file in that they're both text files that contain a sequence of commands. Interestingly enough, shell scripts do not necessarily have to be executed from the command line. Shell scripts can be implemented within Cocoa applications, allowing them to be executed from the GUI.

Classic

Classic provides OS X with the ability to run a full version of Mac OS 9 in a protected memory space. This compatibility environment enables the user to run most Macintosh

legacy software that has not been updated to run natively in OS X. Just as in OS 9, if you have more than one Classic application open at the same time, other Classic applications that are working in the background may bog each other down. That's because, just like in Mac OS 9, Classic applications share the Classic environment by using cooperative multitasking.

Additionally, Classic applications do not benefit from protected memory, at least not from each other. This lack of protected memory means that if one Classic application fails, it may make other Classic programs that are open fail as well (or make them unreliable). But, thanks to Darwin, in the event that an offending program within Classic causes the application environment to crash, the Mach microkernel safely terminates the process without negative consequences for other native OS X applications that are running. Conversely, a problem in a Mac OS X application does not affect the Classic environment or any Classic applications. When a Classic program fails, Apple states that you need to restart the entire Classic environment and all the Classic programs you were using.

> **Note**
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> According to Apple, the Classic application environment will function with a minimum installation of Mac OS 9.1. However, Apple strongly recommends that Mac OS 9 be upgraded to its latest iteration, which at the time of this writing is Mac OS 9.2.2. If not, you will minimally need to update the Mac OS 9 Startup Disk control panel. This update is located on the Mac OS X Installer Disc 1 CD in a folder titled `Utilities`. This update provides the ability to select a Mac OS X system folder as a valid startup OS. Also, if you intend to use QuickTime within Classic, you'll need to update it to Version 6.0.3.

Packages and bundles

A *package,* sometimes referred to as a *bundle,* is a single-icon, point-and-click representation of an application. Just like previous Classic applications, Mac OS X's Carbon and Cocoa applications can be comprised of multiple subordinate files and resources. In the GUI, all these subordinate pieces are neatly wrapped up into a representation of a single executable file for the end user. To view the contents of an application package, simply hold down the Control key while highlighting the Carbon or Cocoa application icon. You're then provided the option to show the package's contents. For illustration purposes, Figure 1-1 depicts the contents of Internet Explorer for Mac OS X.

Frameworks

Mac OS X frameworks are analogous to Mac OS 9 shared libraries in that they both contain dynamically loading code shared by multiple applications. Frameworks alleviate the need for applications that contain common code to individually load that code for each instance of those applications running simultaneously. Mac OS 9's shared libraries can be found within the `Extensions` folder inside the `System` folder. Examples of shared libraries are AppleScript and CarbonLib.

Figure 1-1: Internet Explorer's package contents

Installation Considerations for Mac OS X

Now that we have reviewed the core technologies of Mac OS X, let's focus on its installation process. Although Mac OS X has a very structured installation process, several variations of installation are available. The user's needs dictate the appropriate installation strategy. However, before any Mac OS X implementation can take place, it is necessary to evaluate the target computer to see whether it meets Apple's official hardware requirements.

Hardware requirements of OS 10.4

Apple's minimum hardware requirements for Mac OS 10.4 is a factory-shipped NewWorld Architecture G3 Macintosh CPU with 128MB of RAM, 2GB of available hard drive space (3.5GB with Developers Tools), a DVD drive, a built-in FireWire port, and an Apple-supplied video option. In Mac OS 10.4, Apple has dropped support for beige hardware, PowerBooks that do not have built-in USB ports, and iBooks and iMacs that don't have built-in FireWire ports. The Apple factory-shipped video display cards/options are IXMicro, ATI, and nVidia. As for third-party hardware, Apple states that OS X natively supports many third-party hardware devices, although some devices may require additional driver updates from their respective manufacturers to utilize a product's full feature set. Also, if the Classic environment is used, Mac OS 9.2.*x* requires another 320MB of hard drive space and another 64MB of RAM.

Note   A SCSI chain that works with Mac OS 9 may not work with Mac OS X. AppleCare Knowledge Base article 106147 states that OS X is less tolerant to improper SCSI termination than OS 9. Additionally, if a hard disk of greater capacity than 8GB is installed in a Revision A, B, C, or D iMac, Mac OS X must be installed within the first 8GB of the primary hard disk.

Qualified Mac models

Mac OS X can be installed on the following models if they have enough RAM and disk space:

✦ Power Mac G5 (all)

✦ Power Mac G4 (all)

✦ Power Mac G4 cube

✦ Power Mac G3 (Blue & White only)

✦ PowerBook G4

✦ PowerBook G3 (must include built-in USB and FireWire ports)

✦ iMac (must include built-in USB and FireWire ports)

✦ iBook (must include built-in USB and FireWire ports)

Preparing for the installation of OS X

After you've deemed that the target hardware meets OS X's minimum hardware requirements, you need to verify that the target computer's firmware is up to date. *Firmware* is programming that tells a computer's hardware how to behave. Starting with the iMac, Macintosh computers have used a firmware-upgradeable hardware design. This design element is a component of what is referred to as NewWorld Architecture. The Power Mac's firmware is contained in a programmable (flashable) read-only memory (PROM). This programmable firmware approach enables Apple to fix technical issues via patches and upgrades like any other software. As a result, this innovation allows Apple to achieve greater hardware stability and overall improved system performance. Using a utility referred to as a Flash-ROM updater, firmware can be upgraded (sometimes referred to as *revved*). The Mac OS 10.4 installer alerts you if your system's firmware is out of date. You can also determine your system's firmware by running Apple System Profiler. Apple's latest firmware may be included on the Mac OS X Install DVD. It can also be obtained either through Mac OS 9's built-in Software Update mechanism or from `www.info.apple.com/support/downloads.html`.

Note All system firmware updaters released to date by Apple prior to the G5 are available via Mac OS 9 applications only. Updating a system's firmware using the Classic application environment in lieu of booting directly from Mac OS 9 is not recommended.

Installation strategies for OS X

OS X has three installation strategies, each with its own advantages and disadvantages. Common to all three strategies is the requirement that the install partition needs to be formatted as an Extended (HFS+) or a Unix File System (UFS) volume. An HFS+-formatted volume's single biggest advantage is that it is *case preserving.* All Macintosh

desktop operating systems to date have used file systems that have been dependent on case-preserving formatted volumes (this includes the old HFS format as well).

The opposite of the case-preserving format is the case-sensitive format. With the case-sensitive format, it is possible to have multiple files named identically in the same location/folder/directory. The only thing that would differentiate the files to the naked eye is the varied use of uppercase and lowercase characters. For example, you may have individual files named DOG, DoG, Dog, dOg, doG, dOG, and dog located in the same folder.

As mentioned previously, OS X also supports another format referred to as the Unix File System (UFS), although it isn't the preferred format because it doesn't support AirPort networking and is case-sensitive. In addition, UFS volumes don't show up when booted from Mac OS 9, their volume names cannot be customized, and, in order to run the Classic application environment, Mac OS 9 and its applications must be installed on a separate HFS+ formatted volume. Apple states that "a UFS format may be desired for developing Unix-based applications *within* OS X," and you should not choose this format unless you specifically need it. Apple also states that the UFS format should not be used if your Mac OS X installation destination is a G3 Blue & White. Finally, bootable UFS volumes can be made via the Mac OS X installer only, not via Disk Utility.

Single partition

A single-partition installation combines OS X and OS 9 on the same partition/logical volume. Its primary advantage is that it's the quickest and easiest of the Mac OS X installation strategies. Another advantage of the single-partition installation is that Mac OS X can be installed on top of an existing Mac OS 9–prepared hard drive on Mac OS 9 booting computers. The default installation that Apple ships from the factory is a single-partition install.

Separate partitions

A separate-partition installation installs OS X and OS 9 on two separate partitions on the same hard drive or on two entirely separate hard disks. The main advantage of the separate partition strategy is that it provides a safety net in the event that the OS X portion becomes damaged. By separating OS 9 and OS X, you can easily erase and reinstall the OS X portion while preserving the OS 9 portion. This modular approach was initially Apple's recommended strategy for OS X installation prior to shipping OS X–preinstalled Macs.

The separate-partitions strategy is the most cautious way to migrate from Mac OS 9 to OS X, although it does require the greatest effort. To set up a separate-partitions system, you need to back up all data on your existing hard disk and reformat it into two partitions using the Disk Utility application included on the Mac OS X Install Disc 1 CD.

An alternate way to build a separate-partitions system is to install a second hard drive, if your Mac has built-in support for it. If your Mac does not have built-in

support for this, it may be possible to install a second hard drive by means of a third-party OS X–compatible SCSI or IDE PCI host adapter card. Never take for granted that you have the latest firmware for your third-party or Apple-supplied SCSI or IDE PCI host adapter card. You should always check with the manufacturer's Web site. Lastly, installation of OS X on USB or FireWire hard drives and on removable media is unsupported.

Note Article 106220 in the AppleCare Knowledge Base, states that if multiple versions of OS X are installed on the same Mac, the computer may be unable to select a desired startup system folder.

Mac OS X only

A Mac OS X–only installation is identical to a single-partition installation, with the exception that this install strategy does not include an OS 9 installation. Although you only have to deal with one operating system, you face some limitations. Not only is the Classic environment gone, but also some system functionality from OS 9 is still missing from OS X. In addition, some troubleshooting and administration tasks are better suited to OS 9 than to OS X.

Tip You can install Mac OS 9 separately, after OS X has been installed. If, after you install OS X only, you change your mind and decide that you want to use the Classic application environment, you will need to do as follows. If your system can boot OS 9, first, run the Mac OS 9 Installer that came with your Macintosh, and select the Clean Installation option. This will not harm any existing data on you hard disk. After the installation is complete, you'll want to boot your system selecting your newly installed Mac OS 9 `System` folder and run the Software Update control panel in order to acquire any recent OS 9 updates. For those systems that can't boot Mac OS 9, you'll need to use the Software Restore media that shipped with your pre-installed Mac OS X computer. Any Mac OS 9 updates will need to be downloaded from the Apple Software Updates Web site and installed manually.

Gathering setup information

Regardless of whether you're upgrading from Mac OS 9 or Mac OS X, if you want your computer to use the same Internet and network settings before you install Mac OS X on it, you need to make a note of your system's current preferences. Depending upon how you connect to the Internet, one or more of the following settings may need to be recorded. In Mac OS 9, the settings are located in the AppleTalk, File Sharing, TCP/IP, Remote Access, Modem, and Internet control panels. In Mac OS X, the settings are located in the Internet, Network, and Sharing Preference panes as well as in the Internet Connect application. In addition, you may need to get the settings for your e-mail account from your e-mail reader application.

Hard drive backup

To back up today's large hard drives, you need some type of storage device that can accommodate the capacity of your backup. These devices can include, but are not limited to, another internal IDE or SCSI hard drive, a FireWire or USB hard drive, a tape drive, or a recordable optical or magnetic media drive. You *can* back up to a Finder-accessible volume by simply dragging the desired contents to the destination disk — but using a dedicated backup utility, such as Retrospect from Dantz Development, is more reliable, because it can verify the successful outcome of a backup. Another benefit of Retrospect is that it can compress the contents of a backup, increasing overall storage efficiency, requiring less backup media. Finally, depending upon the type of backup being implemented, Retrospect can also provide a search catalog that simplifies the task of locating and restoring specific contents from a backup.

Preparing the destination volume

After you've backed up, you're ready to prepare your intended destination volume for Mac OS X installation, employing one of the installation strategies previously described. To do so, you need to use the Disk Utility application located on the Mac OS X Install DVD. Disk Utility is covered in Chapter 18. Otherwise, you simply need to update your hard disk's existing driver.

A *driver* is a piece of software that enables an operating system to interface or control a hardware device. In general, the operation of driver software requires no action from the end user. All hard drives use driver software. It is imperative that the hard disk driver is compatible with the Mac OS version in use or problems will result. Updating driver software is a quick process and generally doesn't adversely affect drive contents. Though for safety's sake remember to back up before updating your hard disk's driver.

If you elect to use the single-partition strategy with a preexisting installation of Mac OS 9 on an Apple factory-supplied hard drive, the Mac OS X Installer updates the driver for you. If you're not installing on an Apple-branded hard disk, and third-party formatting software was used to prepare it, you need to investigate if the formatting software is Mac OS X–compatible. If not, you need to use formatting software that is compatible. Typically, an initialization is required, but some third-party formatting software can update and overwrite an existing driver without the need of an initialization.

Running the Mac OS X installer

After the destination volume is prepared, you're ready to run the Mac OS X Installer application, but before doing so, make sure to have your computer plugged in if you're installing on a portable system. You don't want your iBook or PowerBook

going to sleep in the middle of an installation. At the time of this writing, the Mac OS 10.4 installer is contained on one DVD, though it's expected that CD media will be an available option by special request when the Tiger is released. To install OS X, you're required to boot from the Mac OS X Install DVD. You can achieve this in the following four manners:

✦ Boot the Macintosh while holding down the C key.

✦ Use the Startup Manager. To activate the Startup Manager, hold down the Option key at startup. You're then presented with a graphical interface that enables you to select it as a startup disk.

✦ Select the Mac OS X Install DVD by using either Mac OS 9's Startup Disk control panel or Mac OS X's Startup Disk Preference pane.

✦ You can boot from a Mac OS X Install DVD by inserting the CD while running either OS 9 or OS X and locating and double-clicking the Install Mac OS X application that requires the authorization of an administrator's account.

Figure 1-2 shows the Restart button in the Install Mac OS X window. When the computer starts from the Mac OS X Install DVD, the Installer program starts automatically and presents a series of screens that ask you to make certain choices as described in the following text.

Figure 1-2: The Restart button in the Install Mac OS X program restarts the computer with the Mac OS X Install DVD to begin installation.

Select Language

The Mac OS X installer supports installations for many languages. Select the appropriate language for the remainder of the installation process and click the Continue button.

Introduction

The Introduction screen is a welcome screen that acts as a prelude to the rest of the installation process. No action is required except for clicking the Continue button.

Read Me

The Read Me screen presents the same contents that can be found in the Read Before You Install document on the Mac OS X Install DVD. Skipping this document is tempting, but the information provided may be important, so you should at least skim it. After reading the information, click the Continue button.

License

The License screen presents you with OS X's Software Licensing Agreement. The license agreement is filled with legalese, but you may want to look through it so that you know what you're agreeing to. For example, one provision states that you may only install the software on one computer at a time. You must click the Continue button, and a second confirmation screen appears in the form of a dialog sheet, requesting you to click Agree before you can continue with the installation process.

Tip Apple's lawyers think that the License Agreement is important, so they provide the convenience of a pop-up menu where you can choose to view it in a language other than English.

Select Destination

The Select Destination screen enables you to choose the destination volume for your Mac OS X installation. Click the Options button and a sheet appears, providing the choices to Upgrade Mac OS X, Archive and Install, and Erase and Install. Here's what those options mean:

✦ **Install Mac OS X/Upgrade Mac OS X:** Dependent upon whether a previous installation of Mac OS X exists, the first option appears as Install Mac OS X or Upgrade Mac OS X. Install Mac OS X installs Mac OS X for the first time of a specified volume, where as upgrade Mac OS X, upgrades an existing installation of Mac OS X, while preserving current applications, fonts, and preferences.

✦ **Archive and Install:** Moves existing System files to a folder named `Previous System` and then installs a fresh copy of Mac OS X. On the surface, it looks similar to the Mac OS 9 Installer's Clean Install option. Though similar to Mac OS 9, after a system folder has been designated as previous, it can't be used as a valid startup OS. The Preserve Users and Network Settings is a suboption under Archive and Install, which facilitates the preservation of user accounts and home folders and network settings.

✦ **Erase and Install:** Provides a clean slate. As with the Disk Utility, it erases your hard disk. *Be warned:* When installing OS X on a preexisting installation of OS 9, do not select the option to erase and format the disk from within the OS X installer. Doing this erases the existing Mac OS 9 installation as well as all your user applications and documents. The Erase and Install option also

allows you to choose your disk format: MAC OS Extended (Journaled) or Unix File System. Selecting the journaling option may help protect the data on your hard disk from unforeseen failures such as system freezing or power outages. The downsides are that it slightly slows down hard disk performance and may be incompatible with some disk utilities. As of this writing, to recover data on a hard disk that employs journaling, you will need to do so from the command line, which is covered in the Apple Knowledge Base Article 107248.

Tip   According to Apple Knowledge Base Article 106442, if there is a sole ATA/IDE hard drive in your Mac, and the Select a Destination screen does not display an available hard disk to install to, you need to verify that the intended target ATA/IDE drive is configured as a master drive on the bus.

After making your selections, click the Continue button.

Installation Types

The Installation Types screen provides two choices for installation types. The choices are Easy Install and Custom Install. By default, the Mac OS X installer starts with Easy Install which is comprised of the packages Essential System Software, Additional Applications, Print Drivers, Additional Speech Voices Fonts, X11, and Language Translations. Upon closer inspection of the Custom Install options, you'll see that there are even more granular selections for Additional Applications, Printer Drivers, Fonts, and language selections. Wise use of these selections can eliminate superfluous software from you Mac OS 10.4 install. After choosing your Install type and making your selections, click the Install button; if you go the route of Easy Install, this button will instead be labeled Continue.

Installing

The OS X installer will now begin to verify the condition of your installation disk and will be depicted as such in a drop-down dialog sheet. This process can be skipped by clicking the Skip button. When the disk has been verified or skipped, the installer will commence the actual OS install, which will last about an hour, give-or-take, depending upon your installation type and selections. For the most part, this is an automated process that leaves you the time-honored task of progress-bar watching.

Stopping the Mac OS X Installer

Until you click the Install button to get the installation process under way, you can stop installation by choosing Installer ➪ Quit Installer. If you do this, the installer displays a dialog box that asks you to confirm that you really want to stop installation. Click the Restart button in this dialog box to have installation stop and your computer restart. When you hear your computer's startup chime, hold down the Option key to select a valid startup disk other than the Mac OS X Install DVD. You can also eject the Mac OS X Install DVD, by depressing the mouse button during restart.

Finish Up

At this point, the installer performs several optimization and cleanup tasks to complete the installation process.

Using the Setup Assistant

After the Mac OS X install process has been completed, the computer automatically reboots. Next, Mac OS X's Setup Assistant automatically launches and you'll hear some snazzy music as well as see some flashy graphics. You will also be audibly prompted if you would like to use Voice Over interface technology throughout the rest of the Setup Assistant process. When this is over, you'll be presented the setup assistants welcome screen, which, depending upon your selections, will guide you through the process transferring user accounts from another system or volume, procuring an Apple ID for purchasing Apple products and services online, registering your OS software, setting up your first user account, and connecting to the Internet.

Welcome

The Welcome screen is where you select the country or region in which the Macintosh will be used. To see selections beyond the default countries click on the box adjacent to the Show All label, located under the selection widow. If you wait about 30 seconds, a sheet appears stating in easy-to-see large text if you require the use of Mac OS X's VoiceOver, Apple's Spoken Interface, to audibly guide you through the setup assistant process. After making your selection, click the Continue button.

Do You Already Have a Mac?

The Do You Already Have a Mac? screen allows for the migration of user accounts from another local volume that contains a previous Mac OS X install, or from another FireWire-capable Mac OS X system via target mode, aside from these two options, there is also a selection not to transfer anything. Transferring accounts from one system or volume to another does not affect the contents of the source. As a matter of fact, the transfer of accounts can be performed after a Setup Assistant had been executed and a system is configured, by rerunning the Setup Assistant located in the `Utilities` folder inside of the `Applications` folder. When transferring an account from one volume or system to the next, the following things will be migrated: Network settings, User accounts (including preferences and e-mail), Documents, and Applications. Apple notes that some applications may not transfer properly, thus requiring a reinstallation and in order to play transferred songs purchased from the iTunes Music Store, you'll need to de-authorize your old system and authorize your new one. To transfer information from one Mac OS X system to another via FireWire, you'll obviously need a standard FireWire cable and your Mac must be capable of FireWire Target Disk mode, which, incidentally, the Blue & White is not.

Personalize Your Settings

The Personalize Your Settings screen is where you select the keyboard layout that is appropriate for the country or region in which the Macintosh will be used. You

can change the preference later, after you're into the computer. Make your language selection and click the Continue button. If you don't see your language, click on the box adjacent to the Show All label, located under the selection widow.

Your Apple ID

Eerily, reminiscent of Microsoft's Passport, an Apple ID lets you make one-click purchases from the iTunes Music, iPhoto, and the Apple Store. If you already possess a .Mac membership, use that as your Apple ID, otherwise have the Setup Assistant create one for you, or skip the process entirely. If you do elect to create an Apple ID, you'll also be provided a 60-day trial membership to .Mac. .Mac is a combination of software and online tools that can enhance your "Internet experience," while using your Mac. After making your selections, click the Continue button. (For more details on .Mac, see Chapter 18.)

Registration Information

This is the product registration that is automatically sent to Apple when you connect the Mac to the Internet. You cannot leave anything blank except the e-mail address and the company or school. You skip this screen by pressing ⌘+Q, which takes you directly to the Create Your Account screen and automatically configures your network settings for DHCP. You're also reminded to register your product. Otherwise, after completing the Registration Information screen, click the Continue button.

A Few More Questions

This screen is composed of a demographic survey, asking whether you use the computer at home, school, business, and so on; what you do; and whether you want Apple and other companies to contact you. After making your selections, click the Continue button.

Create Your Account

After you've submitted the necessary registration information, you'll need to set up your user account. Chapter 15 reviews user accounts in detail, but for now suffice it to say that the information you provide will be necessary to perform administrative functions within Mac OS X. When creating your account, you'll need to specify both a Name and a Short Name. A Short Name is exactly what it sounds like — a short name. It alleviates the need for typing your whole name. You'll appreciate your short name when user authentication is requested by certain applications or during certain administrative functions within OS X.

A Short Name is automatically generated when you tab from the Name field to the Short Name field. But don't worry — it can be changed. A short name is all lowercase, has a maximum of eight characters, and cannot contain any spaces or the following characters: < > ' " * { } [ ] ( ) ^ ! \ # | & $? ~.

Make sure to pick a Short Name you like, because it can't be changed after the fact. After you've chosen your short name, you'll need to provide a password. Although OS X will accept more than eight characters for this field, it only checks the first eight. The last entry field allows you to provide yourself an optional password hint if desired. Finally, you'll need to select a picture that serves as an iconic representation of your user account. After making your selections, click the Continue button.

Get Internet Ready

The Get Internet Ready portion of the Setup Assistant provides the option to config- ure your Mac for Internet access. This screen gives you the choice of setting up trial Internet service with EarthLink, setting up Mac OS X to use your existing Internet service, or not setting up for the Internet at this time. If you choose to set up for your existing Internet service, the Assistant asks for the following information:

✦ **How you connect:** Connect by telephone modem, cable modem, DSL modem, local network (Ethernet), or local network (AirPort wireless).

✦ **Your Internet selection:** These details vary depending on your connection method. Use the information gathered earlier from before you installed Mac OS X to help you here.

Get .Mac

Next, the Setup Assistant offers to set up a .Mac account for you. Some of the features a .Mac account provides include an e-mail address, a personal Web site, and storage space on the Internet. You can create a .Mac trial account on the spot, enter a member name and password for an existing .Mac account, or skip the process entirely. After making your selection, click the Continue button.

Now you're ready to connect

After dealing with .Mac, the Assistant advises that it's ready to send your registration and configure your computer. Click Continue. The Assistant connects with Apple to send your registration information. You can cancel the connection and stop sending the registration information by quickly clicking the Cancel button.

Set Up Mail

By default, the Set Up Mail portion of the Setup Assistant uses your .Mac account information for e-mail client configuration. If you don't want to use .Mac as your e-mail service provider, you can manually enter the account information for an alternate e-mail service, or you can skip the process altogether. Whatever your choice is, after you've configured it, click the Continue button to move to the next screen.

Select Time Zone

The Select Time Zone screen allows you to specify the time zone the computer will be operating in. Clicking your geographic location or typing the name of the closest city where the computer will be located accomplishes this. After making your selection, click the Continue button.

Set the Date and Time

The Set the Date and Time screen lets you to set your computer's clock and calendar. When you're done, click the Continue button.

Thank You

Upon successful registration of the computer, you'll be greeted with the Thank You screen informing you of such and urging you to enjoy your computer and the Internet. If by chance your registration information was not successfully sent to Apple, you'll be prompted with an additional screen stating Don't Forget to Register; just click the Done button at the bottom to move on.

Running Software Update

Finding that the installers provided by manufacturers of media in hand do not contain the most recent version of a product is not uncommon. Usually, software updates can be obtained via a manufacturer's Web site. Apple simplifies this process by automating the update process upon initial OS X startup. If by some chance this does not occur, the process can be manually activated via the Software Update preference panel. (This is reviewed in detail in Chapter 21.) Figure 1-3 shows OS X's Software Update preference panel, an excellent tool for obtaining the latest updates for Mac OS X.

As you can see, building an OS X box is not a difficult task. Taking the time to evaluate your installation considerations and applying the appropriate OS X installation strategy goes a long way toward ensuring a smooth migration from a previous Mac OS version.

Figure 1-3: No installation is complete without checking for product updates.

Summary

Mac OS X is a Unix operating system. It is built upon open standards, providing preemptive multitasking, symmetric multiprocessing, protected memory, and advanced memory management, as well as world-class graphics capabilities. Though it may be complex in design on the inside, on the surface, it retains its world-class usability and appearance that customers expect of the Mac OS.

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