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# Installing and Working With the Copland Developer Release: Tools Edition

**Preliminary**

Developer Press  
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Apple Computer, Inc.  
1 Infinite Loop  
Cupertino, CA 95014  
408-996-1010

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CHAPTER 1

Apple's developer release strategy for Copland is to provide phased delivery of prerelease software to targeted developers and customers. As key pieces of the system become stable and meet Apple's criteria, these pieces will be combined in developer releases. The Copland Developer Release: Tools Edition is the initial developer release of Copland system software.

Each developer release is targeted for particular types of developers to allow them to begin early development on Copland. Hardware and software support is clearly defined at every release to help focus this development.

## Audience and Goal for This Release

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This release is intended for tools developers only.

Apple's goal for this release is to assist you in adopting your software development tools to produce simple applications that can launch, open a document, and quit under Copland.

## Development Focus for This Release

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Porting your development environment to Copland is *not* the goal of this release. That will be a goal of a later release.

Instead, the focus of this release is to enable you to create code that runs under Copland using tools on a computer running System 7.5. Depending on the type of software development tools you create, we want to help you to

- compile simple applications using your compiler and the interface files provided with this release
- create code fragments using your linker and the libraries provided with this release
- create simple applications using your existing System 7–based frameworks and the interface files provided with this release
- create resources using your resource tools and resource templates provided with this release

- adapt your debugging tools to debug the applications created with this release

## How to Give Us Your Feedback

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Please tell us how we can assist you with your product development. We want your tools to produce working code for Copland—and we want System 7 applications based on your frameworks to run under Copland—as quickly as possible. From our perspective, making your tools work with Copland is a prerequisite to helping other developers create products for Copland.

Please give us your candid feedback about this release and how it suits your needs. Send us your general comments via e-mail at AppleLink address COPLAND or Internet address [copland@applelink.apple.com](mailto:copland@applelink.apple.com). To report bugs you encounter with this release, please follow the instructions provided in *How to Report a Bug*, which is located in the Developer Documentation folder on the Copland DR-Tools CD.

For comments on how we can improve our documentation for Copland, send us e-mail at AppleLink address DPFEEDBACK or Internet address [dpfeedback@applelink.apple.com](mailto:dpfeedback@applelink.apple.com).

## Qualified System Software

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For this release, Apple is providing a development version of Copland system software. For debugging purposes, this version offers symbolic information used with the Power Mac Debugger. This version also offers additional error checking.

The interface files and libraries in this release are available only so that you can begin adapting your compilers, linkers, debuggers, frameworks, resource editors, and other software development tools for Copland. You should not rely on the programming interfaces in this release for any software development.

In subsequent developer releases, programming interfaces for portions of Copland will be under strict change control. These interfaces will be qualified

as “frozen” so that you can begin using them confident that their definitions and basic functionality won’t change during your product development.

**IMPORTANT**

For this release, no portions of Copland are yet under strict change control; that is, all of its programming interfaces are subject to change. ▲

## Qualified Software Development Tools

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To assist you with your product development, Apple provides the following software development tools for this release:

- MrC compiler
- MPW
- Power Mac Debugger

These tools are available in the Developer Tools folder on the Copland DR-Tools CD.

We hope that soon we will be able to include your development product in this list of qualified tools.

## Compatibility With System 7 Applications

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Consistent with Copland’s goals for System 7 application compatibility, this release runs some mainstream, PowerPC-native applications, and you may find some of your software products run on this release with varying levels of functionality.

Note that printing is not supported in this release of Copland. Also be aware that 68K emulation is minimal in this release.

**IMPORTANT**

It is *not* a goal to have your development tool or environment running under this release of Copland. However, we would like to hear about any compatibility issues you anticipate facing when moving your product to later releases of Copland. ▲

## Qualified Hardware

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To support early Copland development, Apple is providing early developer releases on a limited number of hardware platforms. Apple will continue to add hardware support in subsequent developer releases.

### Computer Requirements

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Developing and testing software for this release requires two computers: one computer to run this release of Copland, and a debugging computer to run System 7.5 and your development tools. These computers must be connected at their modem ports by a serial cable.

To support debugging features, a computer running this release requires 16 MB of memory.

**Note**

8 MB of memory is the target for running Copland when it ships to customers. However, to support your development efforts, 16 MB is necessary to run this early release of Copland. ◆

You can use any of the following computers to run this release of Copland:

- Power Macintosh 6100/60 and 6100/66
- Power Macintosh 7100/66 and 7100/80
- Power Macintosh 8100/80 and 8100/100

**IMPORTANT**

This release of Copland will *not* run on the Power Macintosh 8100/110. ▲

This release supports only Apple keyboards and mouse devices. However, note that the “soft” Caps Lock key feature of the AppleDesign Keyboard makes it difficult to work with this release of Copland.

For the debugging computer, you can use any Mac-compatible computer capable of running the Power Mac Debugger, version 2.0 or later. This computer does not have to be PowerPC based; any Mac-compatible computer with 7 MB of free RAM should be sufficient.

## Video Device Requirements

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This release supports only the built-in, DRAM-based video devices—at all available resolutions using up to 256 colors—supplied with these qualified computers. However, using a 14-inch or 17-inch color monitor with 256 colors at 640 x 480 resolution is recommended.

### Note

To attach one of the recommended monitors to a qualified computer, you may need to use the Power Macintosh Display Adapter, part number M2681LL/A. ◆

## Storage Requirements

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A computer running the Copland Developer Release: Tools Edition must have at least two hard drives, or a single hard drive partitioned to support at least two volumes. One volume must contain a special version of System 7.5 for initially starting the computer; another volume must contain this release of Copland. The volume containing this release of Copland must be on a SCSI hard drive that is at least 100 MB in size.

### IMPORTANT

This release of Copland supports only SCSI hard drives; that is, this release supports no other types of mass storage devices, such as floppy disk drives, CD ROM drives, or Syquest cartridges. ▲

**▲ WARNING**

Do not store important data on the disk containing the Copland Developer Release: Tools Edition, because disk corruption is common when using this early release. Moreover, future developer releases will likely require you to reinitialize the entire disk before installing them. ▲

## Installation

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This section describes how to setup a two-computer development system for this release.

### Installing the System Software

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For the computer running this release of Copland, you need two at least two hard drives, or one hard drive partitioned into at least two volumes. One volume must contain a version of System 7.5 necessary for initial system startup; another volume will contain this release of Copland.

1. Attach a CD-ROM drive and either a hard drive with at least two partitions or two or more hard drives to any Mac-compatible computer. (You can use the disk tools contained in the Utilities folder on the Copland DR-Tools CD to partition and initialize hard drives.)

**▲ WARNING**

Do not store important data on any disk attached to the computer running this release of Copland, because disk corruption is common when using this early release. ▲

2. Start up the Mac-compatible computer, and load the Copland DR-Tools CD into the CD-ROM drive.
3. If you have partitioned a drive to contain a System 7.5 startup volume and one or more volumes for this release of Copland, ensure that the first partition on the disk contains the System 7.5 startup volume.
4. Open the existing System Folder at the root level of the System 7.5 startup volume. If a System Folder doesn't exist, use the software in the folder System 7.5 Install on the Copland DR-Tools CD to install one (along with necessary system software), and then open the System Folder.

5. Open the folder Boot Volume: System Folder on the CD, select all of its contents displayed in the window, and copy them into the System Folder window of the System 7.5 volume. (On the CD, the Boot Volume folder is located in the folder Copland Software: Debug Version.)
6. Make sure that you copied the file ModernOSLoader and the folder ModernOS into the top level of the System Folder of the System 7.5 startup volume (this is at the same level as the Extensions folder). (If you dragged the contents onto the System Folder icon on the System 7.5 startup volume, for example, ModernOSLoader is copied into the Extensions folder, where it doesn't belong.)
7. In the System Folder of the System 7.5 startup volume, rename the System file to oldSystem. Move a new System file to the top level of this folder according to the following rules:
  - If you will be running Copland on a 6100/66, 7100/80, or 8100/100 Power Macintosh computer, move the System file located in the folder System Folder: System Folder: SpeedBump (on the System 7.5 startup volume).
  - If you will be running Copland on any other Copland-qualified computer, move the System file located in the folder System Folder: System Folder: System7.5 (on the System 7.5 startup volume).
8. If you had previously installed System 7.5.1 on the System 7.5 startup volume, remove the System 7.5 Update file from the System Folder.
9. Create an empty file called No Copland Mount at the root level of the System 7.5 startup volume. It is important that you create a file—not a folder—with this name. You can use the Simple Text application, located in the Utilities folder of the CD, to create this file.
10. Copy the No Copland Mount file to the root level of every other connected volume *except the one on which you will install this release of Copland*.

**IMPORTANT**

The No Copland Mount file, when placed at the root level of a volume, keeps this release of Copland from mounting (and possibly corrupting) that volume. ▲

11. Copy the Disk First Aid application from the Utilities folder on the CD to the Startup Items folder inside the System Folder of the System 7.5 startup volume. Making Disk First Aid a startup item is necessary because, after

installing Copland onto your other volume, you should verify and, if necessary, repair that volume at every restart.

**Note**

Here, and in the rest of these instructions, you can use any comparable disk utility in place of Disk First Aid. ♦

12. Install any other software that you need onto the System 7.5 startup volume. However, do *not* install the file System 7.5 Update into the System Folder, or else this release of Copland will not boot.
13. To install this release of Copland, open the folder Copland Software: Debug version: Copland Volume on the CD, select all of the contents displayed in the window, and copy them into a second volume. This volume must be located on a SCSI hard drive. Be sure you copy the contents of the window instead of the folder icon, because this release of Copland expects the contents of the folder, not the folder itself, to be at the root level of the volume.

## Setting Up the Copland Computer

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1. Attach the hard drives (or the single SCSI hard drive partitioned into volumes) onto a computer qualified to support this release of Copland.
2. Attach a serial cable to the modem port of this computer.
3. Attach the other end of the serial cable to the modem port of the debugging computer.
4. Ensure that the display screen for the Copland computer is connected to the computer's onboard, DRAM-based video interface.

## Setting Up and Starting the Debugging Computer

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1. Install the Power Mac Debugger onto the debugging computer. This product is located on the Copland DR-Tools CD in the folder Developer Tools: Debuggers, and it allows you to view and modify variables and to view

PowerPC assembly code, 68K assembly code, the stack, the PowerPC registers, and—if you have the correct .xSYM file—source code.

**Note**

You do not need to install the Power Mac Debugger control panel or extensions on the Copland computer; the necessary “nubs” are already built into the release. ♦

2. Start the debugging computer and launch the debugger.
3. When the debugger starts, answer the dialog box to set the debugger to debug the remote machine and to use the modem port. (You can instruct the debugger to always use this settings by using the Target Preferences command in the Edit menu.)
4. When the debugger starts, it asks you “Open which symbolics file?” If you have the .xSYM file for the code you are debugging, you can select it now to view source code. Otherwise, you can click Cancel and still do assembly-language debugging.
5. If you don’t want the debugger to stop for each debug string, you can use the Stop for DebugStrs command in the Extras menu. (When the command doesn’t have a check next to it, the debugger won’t stop for debug strings.)

## Starting This Release of Copland

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1. Start the connected debugging computer, and launch the Power Mac Debugger.
2. Press down the Caps Lock key on the Copland computer. This is necessary to boot this release of Copland.
3. Turn on the Copland computer. System 7.5 will start up briefly, and then this release of Copland boots.

**Note**

To enter the Power Mac Debugger on the debugging computer during Copland startup, hold down the Option key on the Copland computer until this release of Copland has finished booting. To force a debugger break, press Command-Shift-6 any time this release of Copland is running. ♦

4. To force a debugger break into the microkernel, simultaneously press the Command and power-on keys on the Copland computer.
5. When you are finished working with this release of Copland, never restart it without using a disk utility to check its volume. See the next section for instructions on restarting this release of Copland.

## Restarting This Release of Copland

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1. Unset the Caps Lock key by pressing it again so that it's not in its down, locked position.
2. Hold down the Command and Control keys and press the power key. This causes the computer to restart in System 7.5.
3. Run Disk First Aid to check the volume containing this release of Copland. If Disk First Aid reports any corruption, allow it to repair the volume. If Disk First Aid reports that it cannot repair the volume, reformat the volume and reinstall this release of Copland as described in "Installing the System Software."
4. To restart this release of Copland, you can either
  - press down the Caps Lock key and choose Restart from the Special menu, in which case System 7.5 starts up, and then this release of Copland boots; or
  - choose Shutdown from the Special menu. This shuts down the Copland computer. To start this release of Copland again, follow the instructions in the preceding section, "Starting This Release of Copland."

## Documentation Included With This Release

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In the Developer Documentation folder on the Copland DR-Tools CD, Apple provides information that will assist your tools development efforts.

The top level of the Developer Documentation folder contains the following files:

- **Glossary of Copland Terminology.** This Acrobat file contains the document “Glossary of Copland Terminology,” which defines many of the terms used throughout Copland developer documentation. Note, however, that the terms defined in this glossary are preliminary and subject to change.
- **How to Report a Bug.** This describes how to inform Apple of problems you encounter with this release of Copland.
- **Developing With Copland and API Usability.** These two documents will help you in planning to incorporate Copland features into your software product.

The Developer Documentation folder also contains several folders, each of which contains more Copland documentation. The Toolbox folder contains the following files:

- **The Copland Toolbox.** This Acrobat file contains the two-chapter book *The Copland Toolbox*. The first chapter introduces the event-handling model and human interface elements supported by the Copland Toolbox, and it describes the programming concepts necessary to use the Toolbox in applications. This will help you plan frameworks and tools that take full advantage of Copland’s Toolbox features. The second chapter compares the System 7 Toolbox with the equivalent Copland managers and capabilities, and this chapter includes information on backward compatibility with System 7 applications and requirements for Copland-savvy applications. This is especially useful for helping you adapt your existing System 7-based frameworks to work in Copland.
- **Software Extensibility.** This Acrobat file contains the document “Software Extensibility and the System Object Model (SOM),” which describes where and why Copland uses SOM classes, dynamically linked libraries, and other mechanisms to support extension and modification of system software, and how you can use these to add extensibility to your own software.

The Operating System folder contains the following files:

- **Intro to Kernel and OS Services.** This Acrobat file contains the document “Introduction to Kernel and Operating System Services,” which provides conceptual information about how and when to use services provided by the microkernel and related portions of the Copland operating system. This document will help you plan frameworks and tools that take full advantage of Copland’s operating-system features.
- **Microkernel White Paper.** Containing the document “Microkernel White Paper,” this file gives a conceptual overview of the Copland microkernel. This document discusses tasks, hardware and software interrupts, and privileged software execution; it describes address space management, including such topics as areas and memory reservations; and it describes messaging, such as how to use message objects, how to send and receive them, and how reply or cancel them. This version of the “Microkernel White Paper” differs only slightly from that delivered at the 1995 Worldwide Developer’s Conference.
- **Patch Manager.** The document “Patch Manager” contained in this Acrobat files describes the new Copland mechanism for patching the Mac OS. This will help you plan how to create patch-type system extensions for your development environment and to produce code that creates or uses extensions that patch Copland. The Patch Manager defines an application programming interface (API) that enables software to patch the system in a consistent, more easily supported manner. This is the only documentation provided for this release of Copland that describes an application programming interface. Note, however, that as with the rest of this release, all of the Patch Manager’s programming interfaces are subject to change.
- **I/O Architecture.** This Acrobat file contains the document “About the Copland I/O Architecture,” which provides an overview of the architecture and features of Copland’s new I/O system. This document will help you with any driver development that you might be planning for Copland, and will help you design or adapt software that writes to or otherwise directly manipulates devices. This document is identical to the chapter supplied in the *Copland Technical Overview* delivered at the 1995 Worldwide Developer’s Conference.
- **About the Copland File System.** This Acrobat file contains the document “About the Copland File System,” which introduces the features of the new file system available with Copland. It describes the various components of the file system, including the File Manager, the Navigation Services API, and

the file systems API. This document also describes how to get your program ready to use the new File Manager.

Finally, the Documentation for MPW folder contains information describing the Macintosh Programmer's Workshop.

## Training Resources From Apple Computer

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Apple Developer University will offer the following courses to interested Copland developers. (For information about course schedules and fees, see the *Developer University Course Schedule*, which you can obtain by contacting the Developer University registrar at 408-974-4897.)

- **Copland System Overview.** This one-day course, aimed primarily at a nontechnical audience, provides a high-level overview of the main components of Copland and their interrelationships.
- **Programmer's Overview to Copland.** This one-day course provides a high-level overview of Copland from the developer's perspective.
- **Copland Drivers.** This three- to four-day class follows the evolution of drivers from PCI to Copland and provides the basics, as well as detail for some I/O families, about writing device drivers for Copland.
- **Programming With Copland.** This five-day programming course provides orientation and practical experience using the programming interfaces for the Toolbox, Appearance Manager, File Manager, and other critical pieces of system software.

**C H A P T E R 1**

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