Appendix E

TROUBLESHOOTING HARDWARE / SOFTWARE ISSUES

Ordinarily, installation of Proof is a straightforward process, and once installed, Proof runs without difficulty. However, on rare occasion hardware/software issues arise that make installation of Proof difficult, or even impossible in very rare instances. The appendix describes some of the problems we have seen and approaches for dealing with them.

DirectDraw

Operating System Support

Proof is built on top of Microsoft's DirectDraw technology. Therefore, before you can run Proof, you must have DirectDraw installed on your computer. This should only a problem for those remaining few of you who are still running Windows 95 or a version of Windows NT4 earlier than Service Pack 3. Neither Windows 95 nor the early versions of NT4 came with built-in DirectDraw capabilities. As of this writing, DirectDraw for Windows 95 is still available for downloading from www.microsoft.com. You cannot download DirectDraw for NT4 as a separate package, because DirectDraw is integrated into NT4. If you're running an early version of NT4, you should upgrade to Service Pack 6 or higher.

Should I install the latest version of DirectDraw?

In short, probably not. Proof makes very conservative use of DirectDraw, so it doesn't require the latest and greatest version. DirectDraw has been very stable over the past 3-4 years, so if you're experiencing problems and are running a version of DirectDraw that's no more than 3 years old, DirectDraw is probably not the cause of the problem.

Testing DirectDraw

There are two ways in which you can test your computer's version of DirectDraw. Wolverine provides a utility, named ddtest.exe, which is installed in Program Files\Wolverine\P4. This utility is automatically invoked during the installation of Proof, but can also be run as a stand-alone program. The utility provides step-by-step feedback as it probes DirectDraw.

The second way in which you can test DirectDraw is to use Microsoft's dxdiag.exe. This program may or may not be installed on your computer. If not, you can download it from Microsoft. This program displays a wealth of information, the most useful of which is the list of supported video modes and screen resolutions.

Video Drivers

The number one cause of difficulties with Proof is the use of outdated video drivers.

Nine times out of ten, Proof installation problems are solved by upgrading video drivers. The likelihood of out-of-date video drivers is fairly high under Windows 95 and NT4, since most video hardware vendors are no longer very motivated to commit resources for supporting long since superseded operating systems.

Video drivers are often available for download from web sites belonging manufacturers of either (1) your computer, or (2) your video hardware. You should be aware of the regrettable fact that "latest" does not always mean "best." If you're having problems that are not resolved by installing the latest available video drivers, you should talk to a knowledgeable human being, to get a recommendation of what driver install for use with DirectDraw

Video Memory

Proof maintains two screen images at all times, the one that's currently being displayed, and a second, hidden image that's being updated. Since Proof requires one byte of video memory per pixel, the *minimum* amount of video memory required for a given screen resolution is 2 x screen width x screen height. For example, 1280 x 1024 resolution requires 2 x 1280 x 1024 = 2560K of video memory.

Why do we say *minimum* amount of video memory, rather than stating an absolute requirement? The answer lies in the fact that video drivers do strange things with video memory allocation. For example, a video hardware manufacturer may, in its relentless optimization of high-end, 3-D graphics features choose to treat Proof-style direct access of video memory as a "legacy" feature and make only a limited amount of video memory available for such purposes. In addition, the amount of video memory available to Proof may depend on the your computer's desktop color mode. These issues are described in the section that follows.

256-Color Modes

Proof runs only in 256-color (8-bit) modes. Proof uses highly optimized Intel MMX instructions to manipulate screen pixels. Proof's pixel manipulation code has deeply embedded dependence on 8-bit pixels. Thus, there is no hope of "quickly" changing Proof to exploit 16-bit ("High-Color") or 32-bit ("True-Color") video modes.

Some hardware no longer supports 256-color modes. If this is the case with your video hardware, Proof simply will not run on your computer. In such cases, the ddtest utility will complain that no usable 256-color mode can be found on your computer. You can verify that your computer supports 256-color modes by right clicking on your desktop, clicking **Properties**, clicking on the **Settings** tab of the dialog box that appears, and clicking on the **Colors** drop-down list. This list will usually show entries for 256-color, 16-bit High-Color, and 32-bit True-Color modes. If there's no 256-color mode in the list, you're probably out of luck. However, on very rare occasion, we have seen instances in which 256-color mode was not available as a desktop resolution, but *was* available for DirectDraw applications. The only way you could ascertain this in advance of running Proof or ddtest would be to run Microsoft's dxdiag utility.

It is possible to run your desktop using color modes other than 256-color; however, there are two consequences of doing so. First, when you initiate execution of Proof, the transition into 256-color mode may be a bit jarring, depending on hardware/software implementation. This is a relatively minor annoyance that you may have to live with. Second, and of much greater significance, desktop color mode may affect the amount of video memory that's available to Proof. If you're experiencing problems with less video memory being available than you would expect, you should experiment with different desktop color modes. For example, if your computer has 8MB of video memory, but Proof and/or ddtest claim that only 1.5MB is available, you definitely should experiment with different desktop modes

The relationship between desktop color mode and video memory available to Proof is sometimes counterintuitive. For example, you would think that running with a 256-color desktop would make more video memory available to Proof than would running in 32-bit True-Color, since 32-bit color consumes more resources than does 8-bit color. We have seen many instances in which exactly the opposite is true.

Incompatible Software

As of this writing, there are two applications known to be incompatible with Proof, Microsoft's NetMeeting, and Netopia's Timbuktu. When either of these programs runs, it locks up exclusive control of the screen in such a way that DirectDraw applications such as Proof cannot gain control of the screen.

In the event Proof has difficulty "coming up," it will ask you if you'd like to search for other running applications known to conflict with Proof.

Docking Stations

If you're using a docking station with your laptop computer, beware that video hardware characteristics may differ depending on whether your computer is plugged into the docking station. If you're having difficulty running Proof on a laptop, and you are using a docking station, be sure to try all experiments with and without the laptop plugged into the docking station.