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# Mac OS X for Astronomy

Francesco Pierfederici, Norbert Pirzkal, Richard N. Hook

*ESO/ST-ECF Karl-Schwarzschild-Str. 2 D-85748 Garching Germany*

**Abstract.** Mac OS X is the new Unix based version of the Macintosh operating system. It combines a high performance DisplayPDF user interface with a standard BSD UNIX subsystem and provides users with simultaneous access to a broad range of applications which were not previously available on a single system such as Microsoft Office and Adobe Photoshop, as well as legacy X11-based scientific tools and packages like IRAF, SuperMongo, MIDAS, etc. The combination of a modern GUI layered on top of a familiar UNIX environment paves the way for new, more flexible and powerful astronomical tools to be developed while assuring compatibility with already existing, older programs. In this paper, we outline the strengths of the Mac OS X platform in a scientific environment, astronomy in particular, and point to the numerous astronomical software packages available for this platform; most notably the Scisoft collection which we have compiled.

## 1. Introduction

With their new UNIX based operating system, PowerPC based computers from Apple have become the latest computer platform to become attractive for astronomy. Using more than one operating system has become the norm in astronomy today where UNIX is used to get the work done (thanks to its robustness and value as a number crunching machine), and Windows applications are used to communicate results with others (and read administrative e-mails containing MS Word attachments). This has meant having to use more than one computer or running Windows under emulation under Linux. Neither of these two solutions is particularly efficient. While being a bona fide BSD UNIX operating system, Mac OS X manages to bridge an important gap by allowing users to use standard Unix applications such as IRAF, SuperMongo, and LaTeX side by side with "industry standard" applications such as MS Word, MS Powerpoint, and Adobe Photoshop. At the same time, Mac OS X offers ease of installation, use and configuration, making it an ideal operating system for both personal workstations and laptops.

## 2. Scisoft

Scisoft is a project within the European Southern Observatory (ESO) to provide a collection of astronomical software utilities, mostly public domain tools devel-

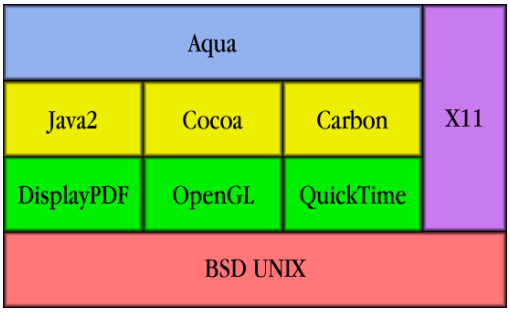


Figure 1. Mac OS X has a layered structure based on standard BSD UNIX. Modern services like DisplayPDF are build on top of the low level UNIX layer. At the very top there is a modern and graphically rich user interface (Aqua).

oped outside ESO, in a uniform way at all four ESO sites and to external users. Major data-analysis packages (e.g., IRAF/STSDAS, ESO-MIDAS and IDL) are included as well as many smaller utilities (`http://www.eso.org/scisoft`).

Noting the popularity of the other versions of Scisoft and the growing acceptance of Apple computers in astronomical environments, we, at the Space Telescope European Coordinating Facility (ST-ECF), decided to come up with something similar for Mac OS X. The outcome of this project is the first public preview release of Scisoft for Mac OS X. Most major Scisoft software packages have been successfully ported to the Macintosh. While the majority of them still require X11, a couple of notable exceptions (GNUPlot and PGPlot) now have a native Aqua interface. Interestingly enough, a Mac OS X native port results in increased functionality being gained for free. The obvious example is the ability to produce PDF output natively. The Mac version of Scisoft comes with a user friendly and hands-free installer. No special pre/post installation setup is required, other than installing X11.

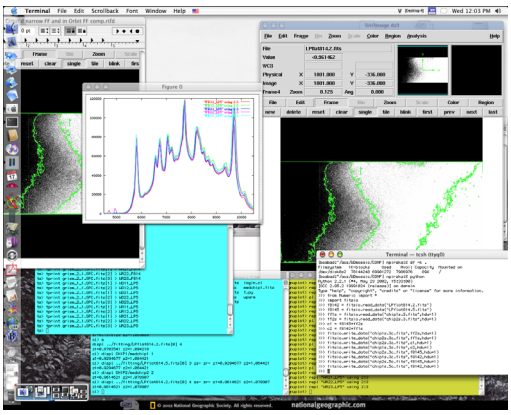

Figure 2. X11 based IRAF and DS9 running side by side with the Aqua version of GNUPlot on Mac OS X.

Future versions of Scisoft for Mac OS X will, resources permitting, feature more Aqua ports of astronomical packages which will not require the X11 environment. In addition, the Fink project is bringing the full world of UNIX Open Source software to Mac OS X (`http://fink.sf.net`).

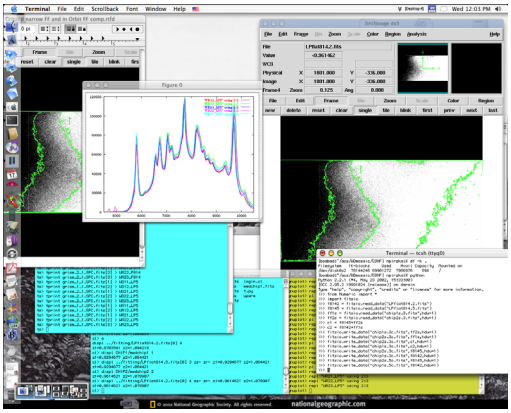

Figure 3. Aqua in action: double buffering of on-screen graphics, per-pixel transparency and alpha channel, full anti-aliasing on top of hardware accelerated DisplayPDF provide a responsive and rich User Interface.

## 3. Advanced Graphics

Mac OS X is based on hardware accelerated DisplayPDF (Quartz). This means a quick and responsive User Interface together with a device-independent and resolution-independent rendering of anti-aliased text, raster and vector graphics. Quartz technologies offer, thanks to the PDF engine, a tight integration with print services (what you see really is what you get). In particular, every Mac OS X application that is able to print can generate PDF output. Other features include: automatic color management (via ColorSync), system-wide support for all the major font formats (TrueType, Type 1 and OpenType), system-wide support for Roman and non Roman languages, use of industry standard PCI and AGP video cards, out-of-the-box support for all the major input/output devices, hardware accelerated OpenGL, compatibility with X11 applications (with use of XFree86), and cut and paste from between Aqua and X11 applications.

## 4. Productivity

Perhaps the biggest advantages of modern Macs are the ease of installation, use, customization and administration of their OS and the high quality of their hardware. This offers, finally, something surprisingly close to a hassle-free operating system, most of the time.

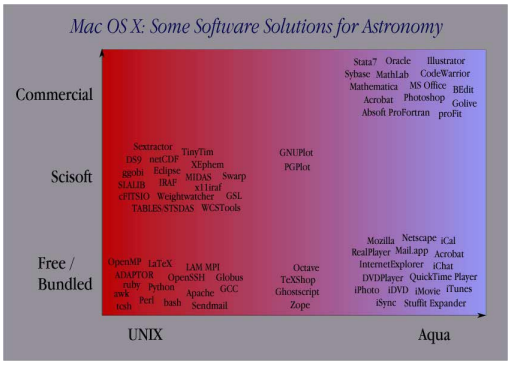


Figure 4. Thousands of applications are already available for Mac OS X, ranging from free Open Source tools to commercial packages. The Fink project and Scisoft for Mac OS X are among the most active groups porting legacy UNIX software to the Mac.

## 5. Closing Remarks

The Scisoft for Mac OS X[1] home page, at the time of writing (end of October 2002), includes the following software packages: cFITSIO 2.420, DS9 2.1, eclipse 4.3.0, GNUplot 3.8h.0, ggobi, gsl 1.0, IRAF 2.12.1 with TABLES/STSDAS 3.0, etc., ESO-Midas 02SEPpl0.9, netCDF 3.5.0, pgplot 5.2.2, Python 2.2.1 with Numeric, PIL, etc., SExtractor 2.2.2, Tiny Tim 6.0, slalib 1.6, SWarp 1.36, WeightWatcher 1.3, WCSTools 3.1.2, X11IRAF 1.3, and XEphem 3.5.2.

[1] `http://www.stecf.org/macosxscisoft/`