MacOS X as UNIX

How to use MacOS X for your uni degree and not go insane.

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Topics Covered

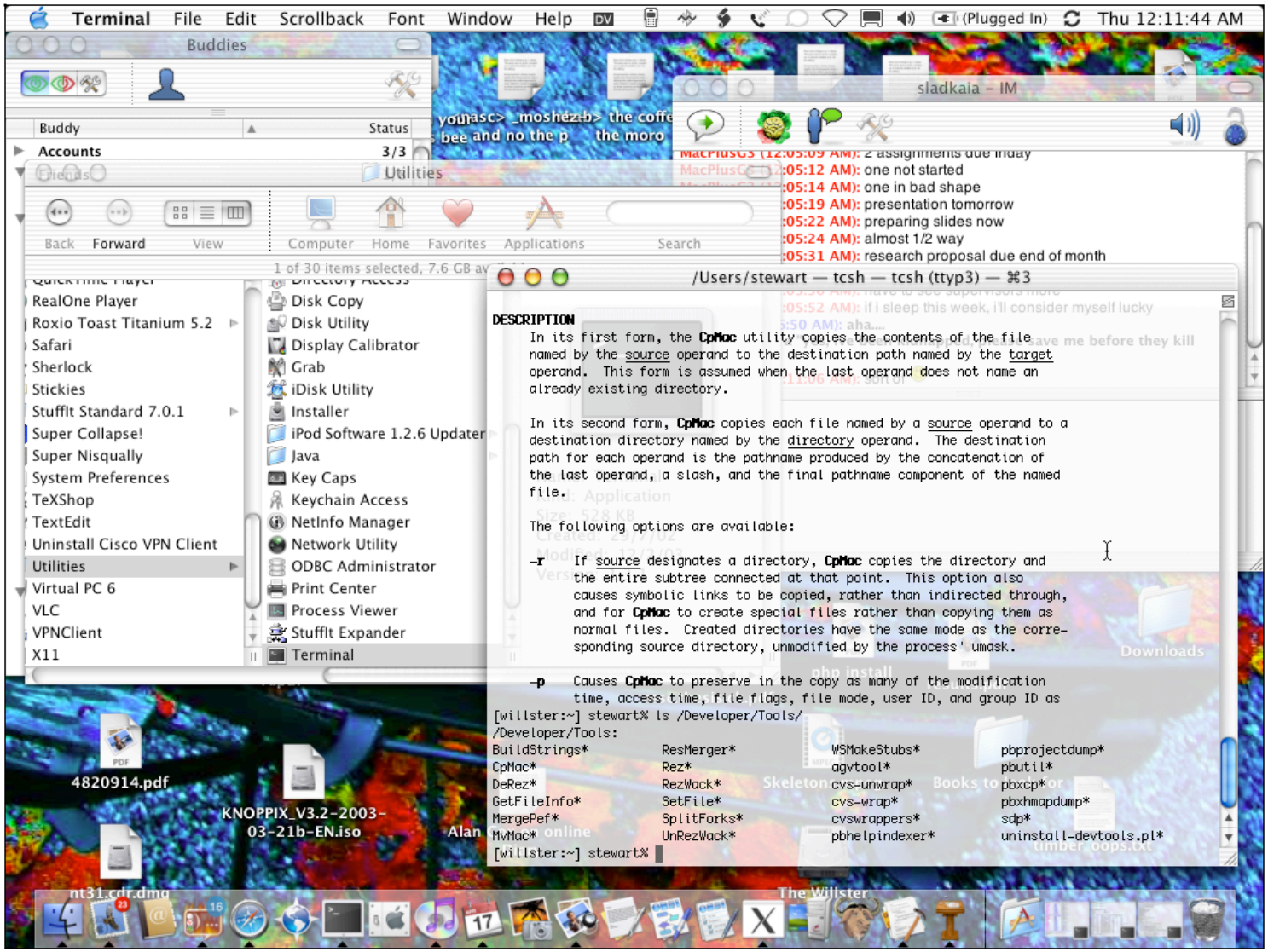
- Included UNIX Software
- Apple Developer Tools
- Apple X11
- MacOS X UNIX Oddities
- Adding UNIX software with DarwinPorts
- Adding UNIX software with FINK

The UNIX Environment

- Full set of command line tools from FreeBSD 4.4
- Libraries and headers (e.g. APIs)
- FreeBSD derived kernel components
- MacOS X a familiar (and popular) place for UNIX applications

Included UNIX Software

- /Applications/Utilities/Terminal.app
  - Get Terminals on a Mac!
  - Has cool things like translucency!
  - Initially dumps you into tcsh


Terminal File Edit Scrollback Font Window Help (Plugged In) Thu 12:11:44 AM
Buddies
Buddy Status
Accounts 3/3
Utilities
Back Forward View Computer Home Favorites Applications Search
1 of 30 items selected, 7.6 GB av
RealOne Player
Roxio Toast Titanium 5.2
Safari
Sherlock
Stickies
StuffIt Standard 7.0.1
Super Collapse!
Super Nisqually
System Preferences
TeXShop
TextEdit
Uninstall Cisco VPN Client
Utilities
Virtual PC 6
VLC
VPNClient
X11
Disk Copy
Disk Utility
Display Calibrator
Grab
iDisk Utility
Installer
iPod Software 1.2.6 Updater
Java
Key Caps
Keychain Access
NetInfo Manager
Network Utility
ODBC Administrator
Print Center
Process Viewer
StuffIt Expander
Terminal
sladkaia - IM
:05:12 AM): one not started
:05:14 AM): one in bad shape
:05:19 AM): presentation tomorrow
:05:22 AM): preparing slides now
:05:24 AM): almost 1/2 way
:05:31 AM): research proposal due end of month
/Users/stewart — tcsh — tcsh (ttyp3) — ⌘3
DESCRIPTION
In its first form, the CpMac utility copies the contents of the file named by the source operand to the destination path named by the target operand. This form is assumed when the last operand does not name an already existing directory.
In its second form, CpMac copies each file named by a source operand to a destination directory named by the directory operand. The destination path for each operand is the pathname produced by the concatenation of the last operand, a slash, and the final pathname component of the named file.
The following options are available:
-r If source designates a directory, CpMac copies the directory and the entire subtree connected at that point. This option also causes symbolic links to be copied, rather than indirected through, and for CpMac to create special files rather than copying them as normal files. Created directories have the same mode as the corresponding source directory, unmodified by the process' umask.
-p Causes CpMac to preserve in the copy as many of the modification time, access time, file flags, file mode, user ID, and group ID as
[willster:~] stewart% ls /Developer/Tools/
/Developer/Tools:
BuildStrings* ResMerger* WSMakeStubs* pbprojectdump*
CpMac* Rez* agvtool* pbutil*
DeRez* RezWack* cvs-unwrap* pbxcp*
GetFileInfo* SetFile* cvs-wrap* pbxhmapdump*
MergePef* SplitForks* cvswrappers* sdp*
MvMac* UnRezWack* pbhelpindexer* uninstall-devtools.pl*
[willster:~] stewart%
4820914.pdf
KNOPPIX_V3.2-2003-03-21b-EN.iso
nt31.cdr.dmg
Downloads
The Willster

Included UNIX Software

- emacs, vi, cat, man, tar etc are included
  - Software like gcc isn't included by default
- You can also log directly into a console
  - use '>console' as your username

Apple Developer Tools

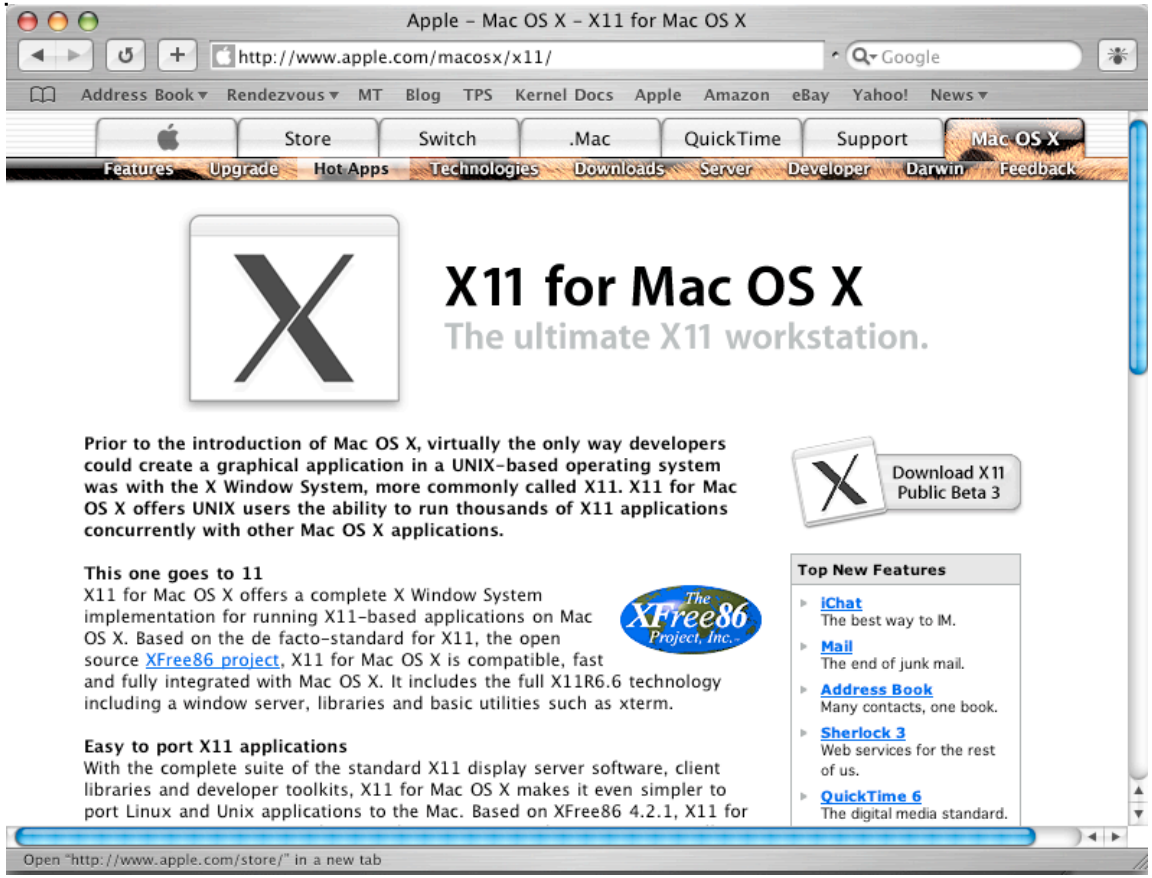
- You will need them
- Free download from Apple
  - or you can ask somebody to burn you a CD
- Contains software like: GCC, flex, bison, Project Builder, Interface Builder

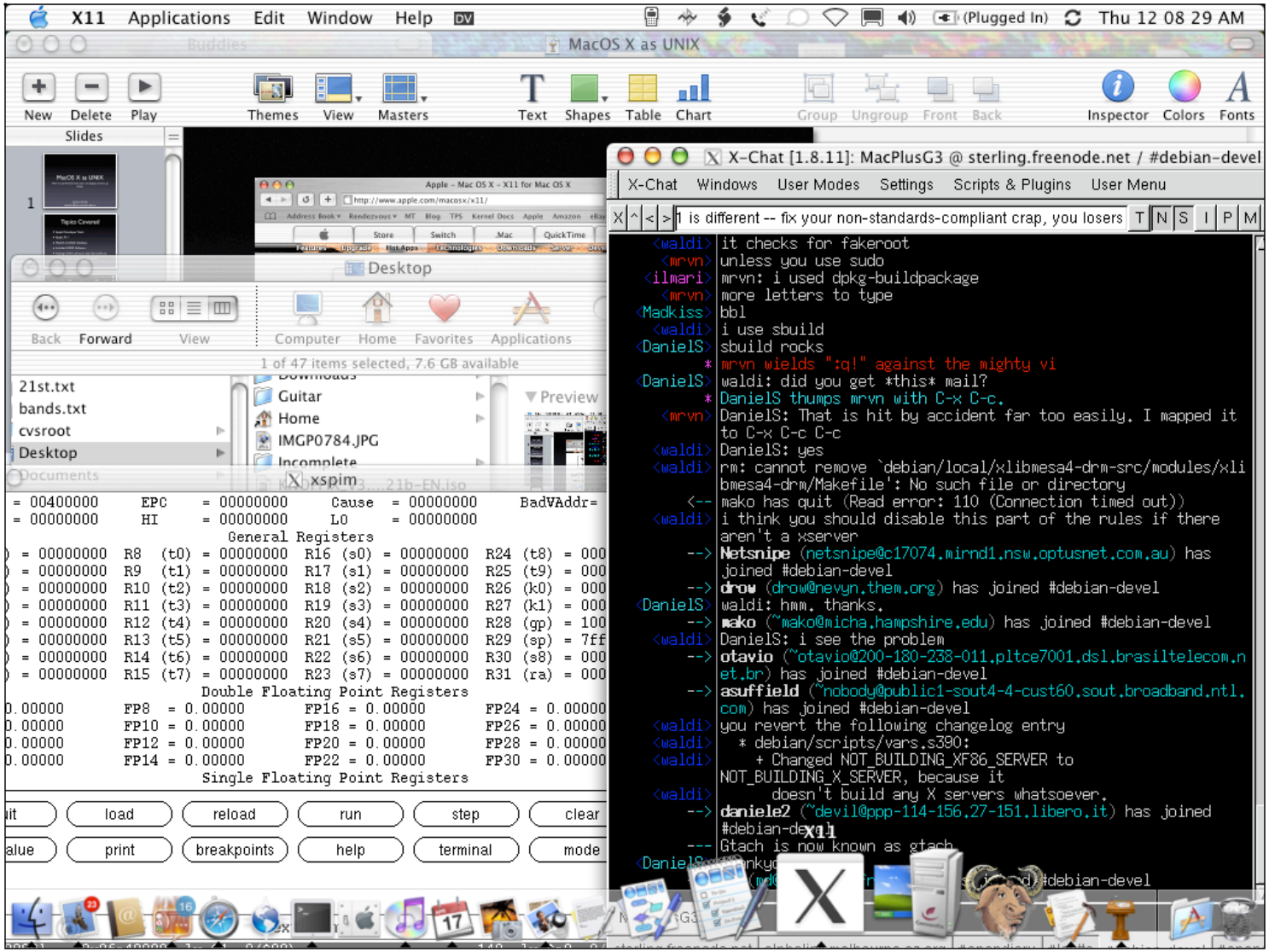
Developer Tools (cont)

- Installed in /Developer and in 'normal' UNIX locations (/usr etc)
- GCC 2.95 and 3.1
  - gcc 3.1 is default, use gcc2 for GCC 2.95
- Project Builder can be used to develop command line programs too, but it doesn't use Makefiles

X11

- The UNIX graphical system
  - XFree86 is the de-facto standard
- Apple's X11 is a double-clickable, rootless XFree86
  - X-Windows applications appear alongside your MacOS X applications!
  - Just open /Applications/X11.app


Apple – Mac OS X – X11 for Mac OS X
http://www.apple.com/macosx/x11/
Google
Address Book
Rendezvous
MT
Blog
TPS
Kernel Docs
Apple
Amazon
eBay
Yahoo!
News
Store
Switch
.Mac
QuickTime
Support
Mac OS X
Features
Upgrade
Hot Apps
Technologies
Downloads
Server
Developer
Darwin
Feedback
X11 for Mac OS X
The ultimate X11 workstation.
Prior to the introduction of Mac OS X, virtually the only way developers could create a graphical application in a UNIX-based operating system was with the X Window System, more commonly called X11. X11 for Mac OS X offers UNIX users the ability to run thousands of X11 applications concurrently with other Mac OS X applications.
Download X11 Public Beta 3
This one goes to 11
X11 for Mac OS X offers a complete X Window System implementation for running X11-based applications on Mac OS X. Based on the de facto-standard for X11, the open source XFree86 project, X11 for Mac OS X is compatible, fast and fully integrated with Mac OS X. It includes the full X11R6.6 technology including a window server, libraries and basic utilities such as xterm.
The XFree86 Project, Inc.
Easy to port X11 applications
With the complete suite of the standard X11 display server software, client libraries and developer toolkits, X11 for Mac OS X makes it even simpler to port Linux and Unix applications to the Mac. Based on XFree86 4.2.1, X11 for
Top New Features
iChat
The best way to IM.
Mail
The end of junk mail.
Address Book
Many contacts, one book.
Sherlock 3
Web services for the rest of us.
QuickTime 6
The digital media standard.
Open "http://www.apple.com/store/" in a new tab


X11 Applications Edit Window Help
(Plugged In) Thu 12 08 29 AM
MacOS X as UNIX
New Delete Play Themes View Masters Text Shapes Table Chart Group Ungroup Front Back Inspector Colors Fonts
Slides
Desktop
Back Forward View Computer Home Favorites Applications
1 of 47 items selected, 7.6 GB available
21st.txt
bands.txt
cvsroot
Desktop
Guitar
Home
IMGP0784.JPG
Incomplete
Preview
xspim
= 00400000 EPC = 00000000 Cause = 00000000 BadVAddr=
= 00000000 HI = 00000000 LO = 00000000
General Registers
R8 (t0) = 00000000 R16 (s0) = 00000000 R24 (t8) = 000
R9 (t1) = 00000000 R17 (s1) = 00000000 R25 (t9) = 000
R10 (t2) = 00000000 R18 (s2) = 00000000 R26 (k0) = 000
R11 (t3) = 00000000 R19 (s3) = 00000000 R27 (k1) = 000
R12 (t4) = 00000000 R20 (s4) = 00000000 R28 (gp) = 100
R13 (t5) = 00000000 R21 (s5) = 00000000 R29 (sp) = 7ff
R14 (t6) = 00000000 R22 (s6) = 00000000 R30 (s8) = 000
R15 (t7) = 00000000 R23 (s7) = 00000000 R31 (ra) = 000
Double Floating Point Registers
FP8 = 0.00000 FP16 = 0.00000 FP24 = 0.00000
FP10 = 0.00000 FP18 = 0.00000 FP26 = 0.00000
FP12 = 0.00000 FP20 = 0.00000 FP28 = 0.00000
FP14 = 0.00000 FP22 = 0.00000 FP30 = 0.00000
Single Floating Point Registers
load reload run step clear
print breakpoints help terminal mode
X-Chat [1.8.11]: MacPlusG3 @ sterling.freenode.net / #debian-devel
X-Chat Windows User Modes Settings Scripts & Plugins User Menu
1 is different -- fix your non-standards-compliant crap, you losers
<waldi> it checks for fakeroot
<mrvn> unless you use sudo
<ilmari> mrvn: i used dpkg-buildpackage
<mrvn> more letters to type
<Madkiss> bbl
<waldi> i use sbuild
<DanielS> sbuild rocks
* mrvn wields ":q!" against the mighty vi
<DanielS> waldi: did you get *this* mail?
* DanielS thumps mrvn with C-x C-c.
<mrvn> DanielS: That is hit by accident far too easily. I mapped it to C-x C-c C-c
<waldi> DanielS: yes
<waldi> rm: cannot remove `debian/local/xlibmesa4-drm-src/modules/xlibmesa4-drm/Makefile': No such file or directory
<-- mako has quit (Read error: 110 (Connection timed out))
<waldi> i think you should disable this part of the rules if there aren't a xserver
--> Netsnipe (netsnipe@c17074.mirnd1.nsw.optusnet.com.au) has joined #debian-devel
--> drow (drow@nevyn.them.org) has joined #debian-devel
<DanielS> waldi: hmm, thanks.
--> mako (~mako@micha.hampshire.edu) has joined #debian-devel
<waldi> DanielS: i see the problem
--> otavio (~otavio@200-180-238-011.pltce7001.dsl.brasiltelecom.net.br) has joined #debian-devel
--> asuffield (~nobody@public1-sout4-4-cust60.sout.broadband.ntl.com) has joined #debian-devel
<waldi> you revert the following changelog entry
<waldi> * debian/scripts/vars.s390:
<waldi> + Changed NOT_BUILDING_XF86_SERVER to NOT_BUILDING_X_SERVER, because it
doesn't build any X servers whatsoever.
--> daniele2 (~devil@ppp-114-156.27-151.libero.it) has joined #debian-devel
--- Gtach is now known as gtach
X11
#debian-devel

MacOS X UNIX Oddities

Got Root?

- MacOS X ships with the root user disabled
- You can enable it via NetInfo
- I recommend against it.
- Use sudo!
- **sudo ls**
  - prompts you for your password (if you are an Administrator)
  - runs ls with root privileges

Filesystem

- Case respecting, not case sensitive
  - Makefile, makefile, MAKEFILE, MaKeFiLe are all the same file on MacOS X
  - The are all **different** files on a conventional UNIX.
- Things are stored in slightly different places...

Filesystem Layout

- /Applications/
  - Your MacOS X applications
- /Users/
  - The equivalent of /home/ on UNIX
- /Developer/
  - Apple Developer Tools

Filesystem Layout...

- What you **can't** see in the Finder:
  - /private/
    - Where /etc/, /tmp/ and /var are stored
    - these are symlinked to /private/*
  - /usr/
    - Where your pre-installed UNIX software is stored

Filesystem Layout...

- /mach, /mach.sym, /mach_kernel
  - Your Kernel
- /usr/local/
  - Your UNIX programs (shared, messy)
- Plus, you have things scattered around in the traditional MacOS way.

Resource Forks

- Are **not** copied or viewed with regular unix utilites
  - i.e. cp, rsync, vi etc will **NOT** work with resource forks or other HFS+ metadata
  - you can access resource forks from UNIX apps!
    - vi /System Folder/System/rsrc

Dealing with Resource forks

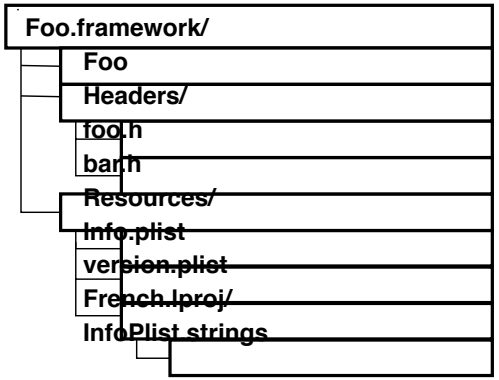
- rsync_hfs
  - rsync for HFS+ metadata systems
- ditto
- CpMac, MvMac etc (look in /Developer/Tools/)

Compiler

- The MacOS X compiler **is** GCC
- Most normal options will work
- **-faltivec** enables AltiVec types and built-in functions
- Mach-O binary format
  - **very** different to others, no GNU binutils

Frameworks

- Consist of: a dylib, headers and resources
- The way you link/include various Libraries under MacOS X



Using Frameworks

- **#include <Foo/foo.h>** to compile
- **-framework Foo** to link
- Most are in /System/Library/Frameworks
- **-F*path*** to add a place to find frameworks
  - Affects both compiler and linker
  - /usr/include has normal UNIX headers

Administration issues

- Configuration and resource files
  - OpenDirectory for system preferences
    - ‘flat’ files can be ignored!
      - (e.g. /etc/passwd et al)
  - CF/NSPreferences for user preferences
  - NetInfo: useful and different

Administration Issues

- System Startup
  - /System/Library/StartupItems
  - composed of an executable and a plist
  - Not the /etc/rc you may be used to
- Apache, Samba
  - Configuration files are where you'd expect

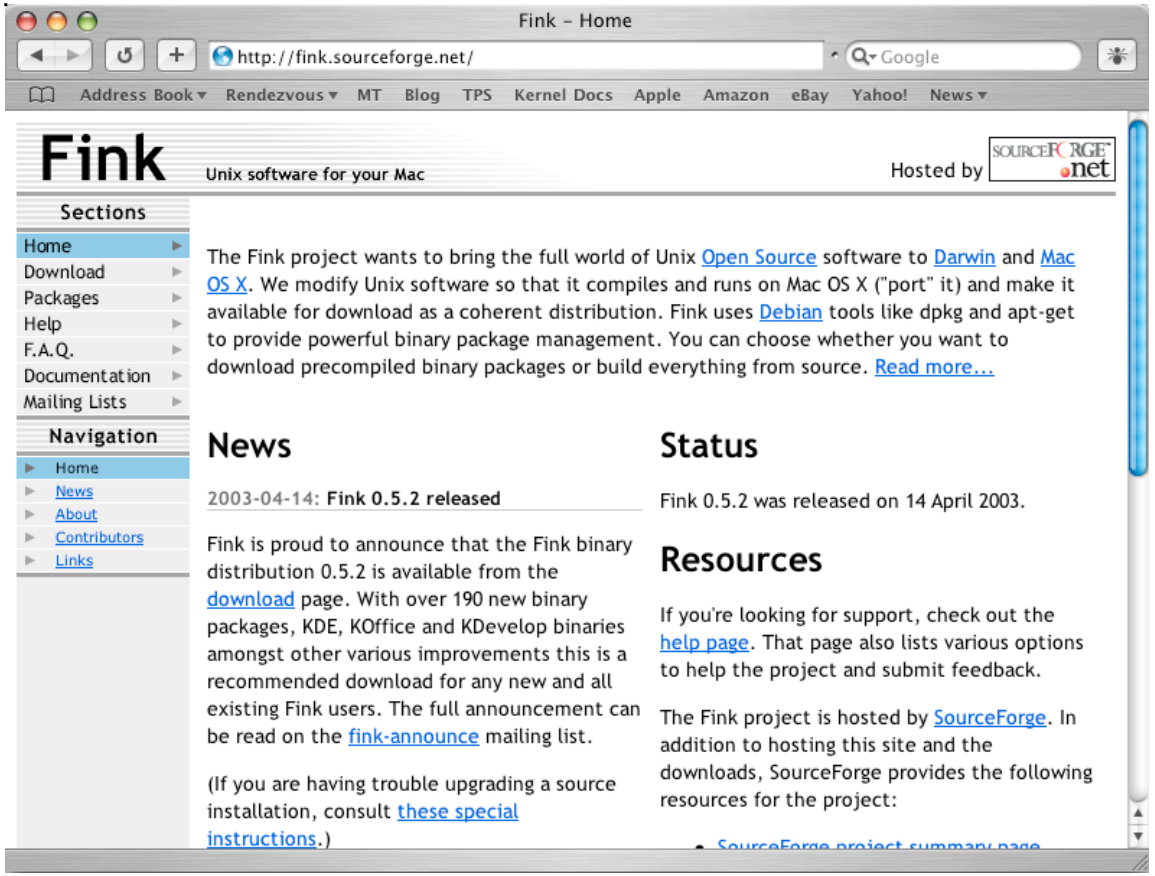
Getting more UNIX

Adding UNIX Software

- I want something that isn't installed by default. How do I install it?
- DarwinPorts, Fink or manually (usually from source)
- Some programs (such as Emacs) now have a native MacOS X interface

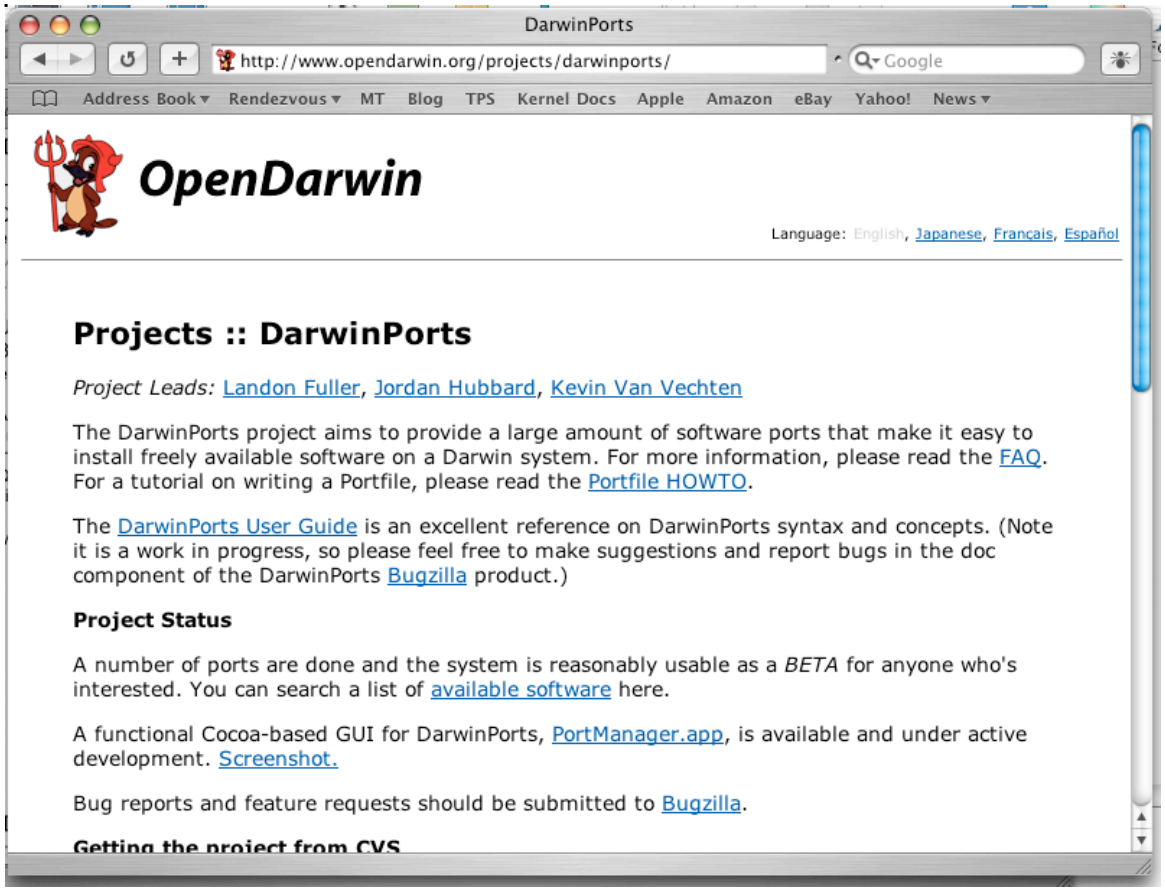
Fink

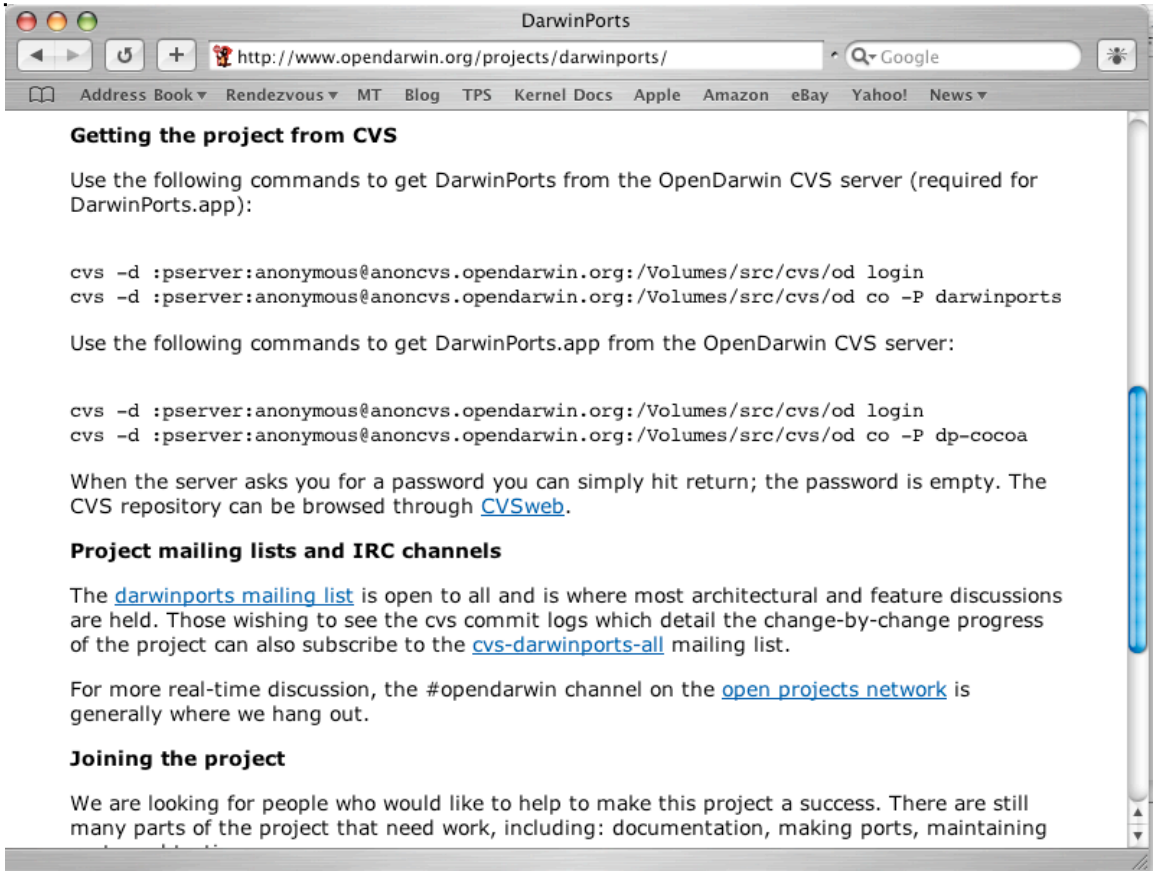
- http://fink.sourceforge.net
- Been around a while
- lots of packages
- Compiles from source, automatically
- Occasionally have pre-built binaries


Fink – Home
http://fink.sourceforge.net/
Google
Address Book
Rendezvous
MT
Blog
TPS
Kernel Docs
Apple
Amazon
eBay
Yahoo!
News
Fink
Unix software for your Mac
Hosted by
SOURCEFORGE net
Sections
Home
Download
Packages
Help
F.A.Q.
Documentation
Mailing Lists
Navigation
Home
News
About
Contributors
Links
The Fink project wants to bring the full world of Unix Open Source software to Darwin and Mac OS X. We modify Unix software so that it compiles and runs on Mac OS X ("port" it) and make it available for download as a coherent distribution. Fink uses Debian tools like dpkg and apt-get to provide powerful binary package management. You can choose whether you want to download precompiled binary packages or build everything from source. Read more...
News
2003-04-14: Fink 0.5.2 released
Fink is proud to announce that the Fink binary distribution 0.5.2 is available from the download page. With over 190 new binary packages, KDE, KOffice and KDevelop binaries amongst other various improvements this is a recommended download for any new and all existing Fink users. The full announcement can be read on the fink-announce mailing list.
(If you are having trouble upgrading a source installation, consult these special instructions.)
Status
Fink 0.5.2 was released on 14 April 2003.
Resources
If you're looking for support, check out the help page. That page also lists various options to help the project and submit feedback.
The Fink project is hosted by SourceForge. In addition to hosting this site and the downloads, SourceForge provides the following resources for the project:

DarwinPorts

- Ports architecture similar to that of FreeBSD
- http://www.opendarwin.org/projects/darwinports/
- Project Leads: Landon Fuller, Jordan Hubbard, Keven Van Vechten
- My Favourite, leaded by Apple employees, I'm involved


DarwinPorts
http://www.opendarwin.org/projects/darwinports/
Google
Address Book
Rendezvous
MT
Blog
TPS
Kernel Docs
Apple
Amazon
eBay
Yahoo!
News
OpenDarwin
Language: English, Japanese, Français, Español
Projects :: DarwinPorts
Project Leads: Landon Fuller, Jordan Hubbard, Kevin Van Vechten
The DarwinPorts project aims to provide a large amount of software ports that make it easy to install freely available software on a Darwin system. For more information, please read the FAQ. For a tutorial on writing a Portfile, please read the Portfile HOWTO.
The DarwinPorts User Guide is an excellent reference on DarwinPorts syntax and concepts. (Note it is a work in progress, so please feel free to make suggestions and report bugs in the doc component of the DarwinPorts Bugzilla product.)
Project Status
A number of ports are done and the system is reasonably usable as a BETA for anyone who's interested. You can search a list of available software here.
A functional Cocoa-based GUI for DarwinPorts, PortManager.app, is available and under active development. Screenshot.
Bug reports and feature requests should be submitted to Bugzilla.
Getting the project from CVS

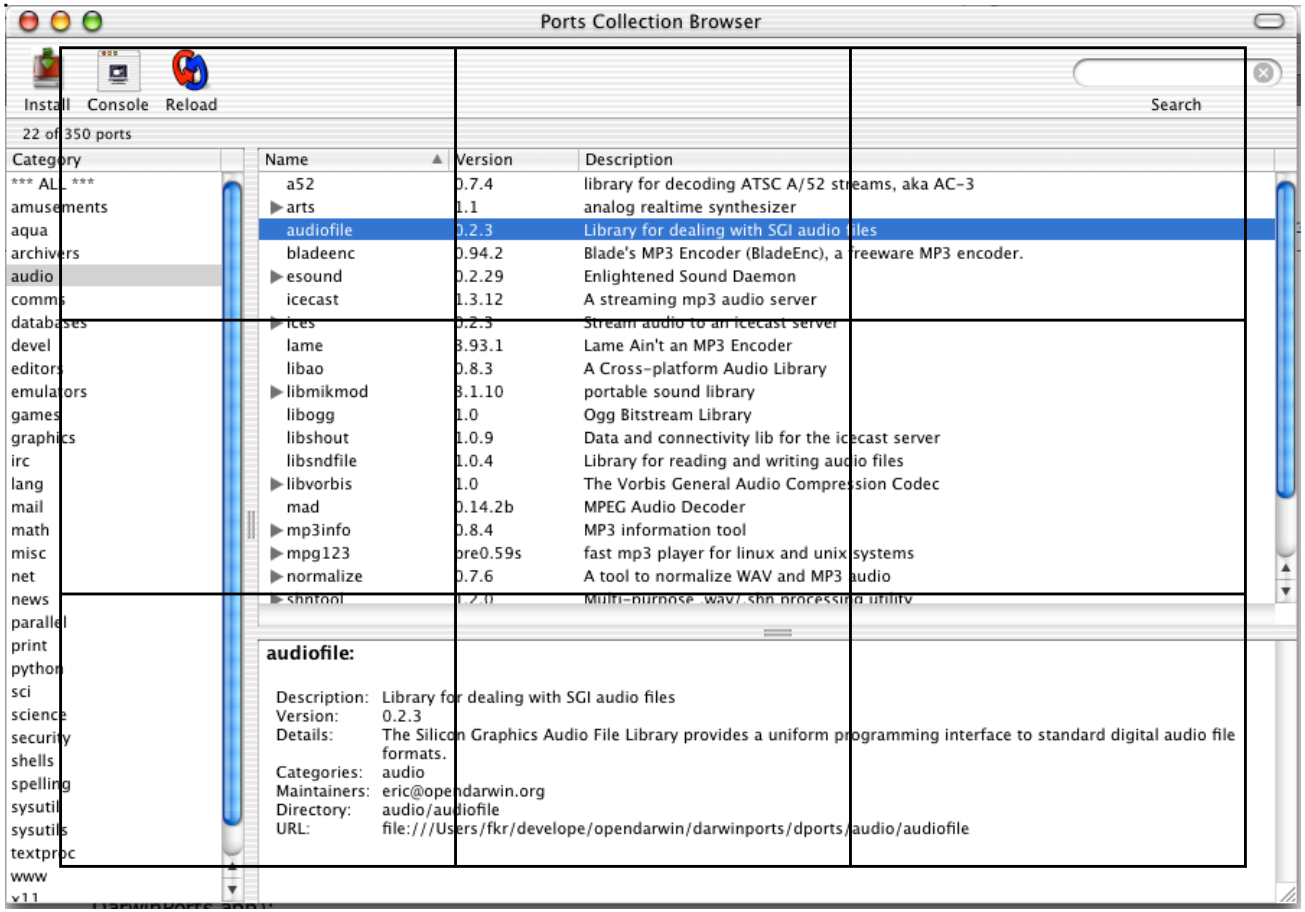

DarwinPorts
http://www.opendarwin.org/projects/darwinports/
Google
Address Book
Rendezvous
MT
Blog
TPS
Kernel Docs
Apple
Amazon
eBay
Yahoo!
News
Getting the project from CVS
Use the following commands to get DarwinPorts from the OpenDarwin CVS server (required for DarwinPorts.app):
cvs -d :pserver:anonymous@anoncvs.opendarwin.org:/Volumes/src/cvs/od login
cvs -d :pserver:anonymous@anoncvs.opendarwin.org:/Volumes/src/cvs/od co -P darwinports
Use the following commands to get DarwinPorts.app from the OpenDarwin CVS server:
cvs -d :pserver:anonymous@anoncvs.opendarwin.org:/Volumes/src/cvs/od login
cvs -d :pserver:anonymous@anoncvs.opendarwin.org:/Volumes/src/cvs/od co -P dp-cocoa
When the server asks you for a password you can simply hit return; the password is empty. The CVS repository can be browsed through CVSweb.
Project mailing lists and IRC channels
The darwinports mailing list is open to all and is where most architectural and feature discussions are held. Those wishing to see the cvs commit logs which detail the change-by-change progress of the project can also subscribe to the cvs-darwinports-all mailing list.
For more real-time discussion, the #opendarwin channel on the open projects network is generally where we hang out.
Joining the project
We are looking for people who would like to help to make this project a success. There are still many parts of the project that need work, including: documentation, making ports, maintaining

Using DarwinPorts

- There is a graphical application!
- The command line interface works well too!
- **port search** *criteria*
- **sudo port install** *port*
- **sudo port install** *port +variant*

Updating

- Use CVS to get a current list
  - cvs -q -z9 update -d


Ports Collection Browser
Install
Console
Reload
Search
22 of 350 ports
Category
*** ALL ***
amusements
aqua
archivers
audio
comms
databases
devel
editors
emulators
games
graphics
irc
lang
mail
math
misc
net
news
parallel
print
python
sci
science
security
shells
spelling
sysutil
sysutils
textproc
www
x11
Name
Version
Description
a52
0.7.4
library for decoding ATSC A/52 streams, aka AC-3
arts
1.1
analog realtime synthesizer
audiofile
0.2.3
Library for dealing with SGI audio files
bladeenc
0.94.2
Blade's MP3 Encoder (BladeEnc), a freeware MP3 encoder.
esound
0.2.29
Enlightened Sound Daemon
icecast
1.3.12
A streaming mp3 audio server
lame
3.93.1
Lame Ain't an MP3 Encoder
libao
0.8.3
A Cross-platform Audio Library
libmikmod
3.1.10
portable sound library
libogg
1.0
Ogg Bitstream Library
libshout
1.0.9
Data and connectivity lib for the icecast server
libsndfile
1.0.4
Library for reading and writing audio files
libvorbis
1.0
The Vorbis General Audio Compression Codec
mad
0.14.2b
MPEG Audio Decoder
mp3info
0.8.4
MP3 information tool
mpg123
pre0.59s
fast mp3 player for linux and unix systems
normalize
0.7.6
A tool to normalize WAV and MP3 audio
audiofile:
Description: Library for dealing with SGI audio files
Version: 0.2.3
Details: The Silicon Graphics Audio File Library provides a uniform programming interface to standard digital audio file formats.
Categories: audio
Maintainers: eric@opendarwin.org
Directory: audio/audiofile
URL: file:///Users/fkr/develope/opendarwin/darwinports/dports/audio/audiofile

DarwinPorts

- Installs software into /opt/local
- Installation is a little tricky at the moment (you do actually have to follow instructions)
- In constant development (updates available near-instantly via CVS)
- Can make binary packages installable by Apple's Installer.app
- WebDAV server
  - http://packages.opendarwin.org

Demo

Little Cool Things

- open *item*
  - Do what the Finder would have done
- osascript
  - AppleScript from the command line!
- disktool, diskutil
  - Do things with disks

The End!

- Slides will be up on
  - http://www.flamingspork.com
- Contact Me at
  - sesmith@csse.monash.edu.au