

Welcome

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# Introduction to Open Source at Apple

Ernest Prabhakar

Open Source  
Product Manager

# Open Source

- The next stage in software evolution



# Roadmap

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## **Introduction to Open Source at Apple:**

Room A1  
Mon., 2:30pm

Overview of Open Source philosophy, projects, and infrastructure

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## **Darwin OS—Developing With Darwin:**

Room A1  
Mon., 4:00pm

How to get started doing cool stuff with Darwin OS code





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# Open Source Philosophy

# What Is Open Source?

## A New Term for an Old Tradition

- The process of widespread collaborative development long used by the Internet
- Open Source licenses must support:
  - Publishing source code
  - Easy distribution of derivative works
  - Simple, broad licensing
- Embodied in the “Open Source Definition”
  - Maintained by the Open Source Initiative
  - Bridging commercial and free developers



# Historic Roots

- Berkeley Computer Systems Research Group
  - The BSD License
  - Berkeley Standard Distribution
  - BSD 4.4 Lite (FreeBSD, NetBSD, OpenBSD)
- The GNU Project
  - The GNU Public License (GPL)
  - GCC, GNU Emacs by Richard Stallman
  - Linux by Linus Torvalds
  - MkLinux by Apple Computer



# Open Source Works!

Most of the Internet Is Run Using this Stuff

- UNIX Operating Systems
- TCP/IP networking protocols
- Apache HTTP server
- Sendmail SMTP server
- GNU Emacs configurable text editor
- Perl scripting language



# Apple Public Source License

- State-of-the-art Open Source License
  - Halfway between BSD and GNU licenses
  - Simple and straightforward (only 4 pages)
- Key characteristics include
  - Can distribute, port, or use however you want
  - Modifications to our code must be published
  - May freely combine with your own code
  - Also includes limited patent rights

*Recently updated to address developer concerns!*



# Value for You

- Learn more about the system
  - Used by Sassafras to add AppleTalk support!
  - Great for computer science classes!
- Find, trace, and fix bugs more easily
- Participate in the development of Mac OS X
  - Add new functionality
  - Customize for special purposes



# Value for Customers

- Superior system software products
  - Quality
  - Performance
  - Feature Set
  - Platform support
- Large customers can customize their environment
  - Major research universities (e.g., MIT)
  - Publishing and media corporations



# Darwin a Success!

## Building the Future of Macintosh Development

- Three projects!
  - March 16th: Darwin OS
  - April 12th: Darwin Streaming Server
  - May 10th: OpenPlay
- Widespread interest
  - 22,000 developers registered
  - 185,000 downloads of Darwin source code components



# A Big Deal

## Shaking up the Industry. Again.

- Apple is the first major computer company or operating system vendor to:
  - Publish source to its core OS technologies
  - Base its system software strategy around Open Source development
- And we did something that:
  - Conformed to the Open Source Definition
  - Was endorsed by major community figures





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# OpenPlay

Christopher De Salvo  
Sr. Software Engineer

# OpenPlay

- Cross-platform networking library
- Used in Bungie Software's Myth: The Fallen Lords
- Currently building for Mac OS and Windows 95/98
- Completely abstracts Open Transport and Winsock



# OpenPlay (Cont.)

- Provides both datagram and stream-based communication
- Plug-in architecture makes it easy to support new transport protocols
  - Plug-ins provide UI for addressing endpoints on that protocol
  - Endpoints can be addressed either programmatically or via built-in UI

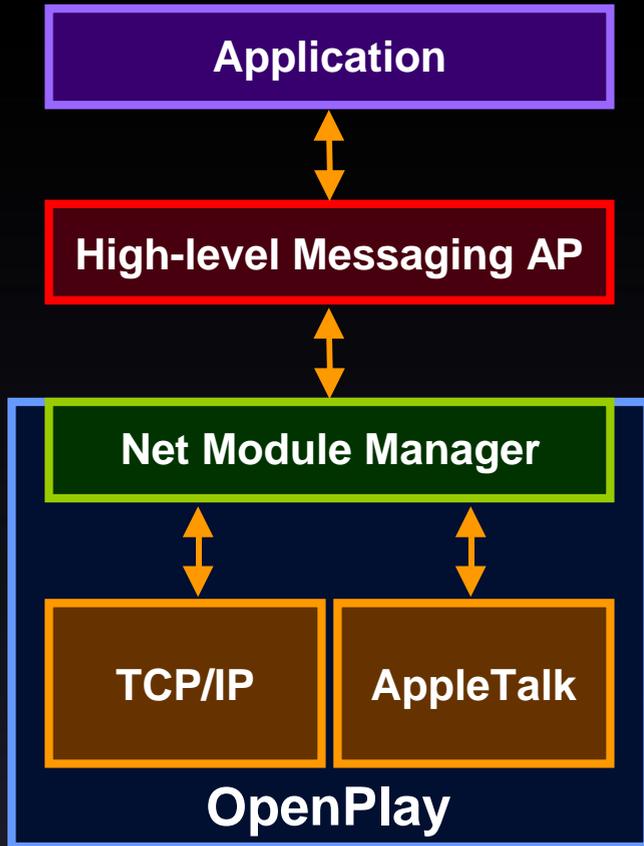


# Who Would Want This?

- Anyone wanting to write network code that is completely platform neutral
  - Peer-Peer: multi-platform, multi-player games
  - Client-Server: Unix-based lobby service with multi-platform clients



# Organization



- The Net Module Manager loads and links to the protocol plug-ins
- It then brokers messages between the application and the appropriate transport plug-in
- The application never has to know how the data are being delivered



# Steps to Porting

- Net Module Manager code is very simple
  - Scans the modules folder for plug-ins
  - Dynamically loads and binds to them
- Protocol plug-ins are very platform specific
  - Fortunately, they're pretty small
  - Complete code for TCP/IP and AppleTalk plug-ins is already there



# Where To Take It?

- Port to as many client and server platforms as possible
- Build more and more on top of it:
  - Lobby services
  - Messaging protocols (such as NetSprocket/DirectPlay)





# Darwin Streaming Server

Denis Serenyi  
Senior Software Engineer

# Key Features

- Serves hinted QuickTime movie files  
(1,000 concurrent connections, 250 concurrent unique movies)
- Reflects live broadcasts  
(1,000 concurrent connections)
- Module API



# IETF Protocols

- RTSP (Real-time Streaming Protocol)
  - The control protocol
- RTP (Real-time Transport Protocol)
  - The transport protocol
- RTCP (Real-time Control Protocol)
  - The back-channel



# Portability

- Compatibility classes
  - OS
  - OSFile
  - OSThread
  - OSMutex
  - Socket
- Event Queue
- Atomic Lib



# The Future

- The module API will evolve
- More modules
  - Statistics monitoring
  - Server farm management
  - Ad insertion
  - URL rewriters
  - Etc.





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# Darwin OS

Brett Halle

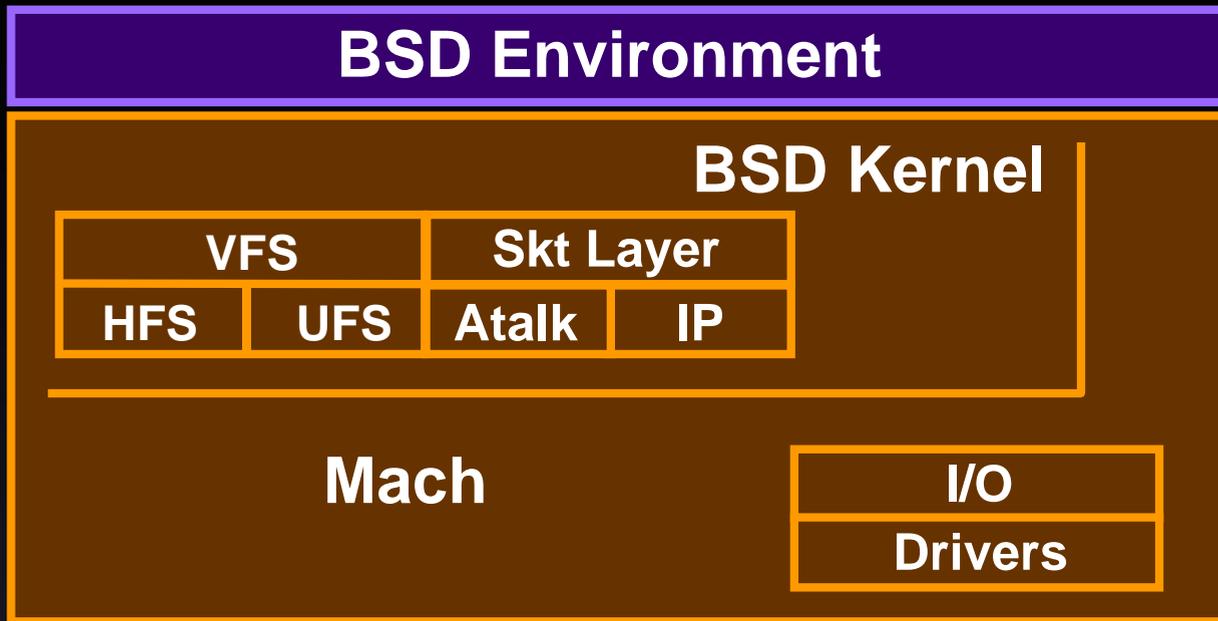
Manager,  
Core OS Engineering

# Darwin OS

- Same Core OS as Mac OS X Server
  - Mach, BSD, HFS+, AppleTalk, NetInfo
- Released March 16
  - Over 180,000 downloads
- Numerous development efforts under way
  - NetInfo ported to Linux



# Darwin OS



# Roadmap

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**Darwin OS—Developing  
With Darwin**

Room A1  
**Today, 4:00pm**

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**Core OS Overview**

Room A1  
**Tue., 1:00pm**

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**Mac OS X Kernel**

Room A1  
**Wed., 9:00am**

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**Mac OS X BSD Support**

Room A1  
**Thur., 10:15am**



# Roadmap

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**IOKit**

Room A1  
**Thur., 1:00pm**

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**Mac OS X N & C**

Room A2  
**Fri., 9:00am**

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**Mac OS X File System**

Room A1  
**Fri., 2:15pm**



# Infrastructure

- Web site (hosted on Mac OS X Server!)
  - [www.publicsource.apple.com](http://www.publicsource.apple.com)
- Registration
- Project source bundles
- Modification form
- Mailing lists
  - [www.lists.apple.com](http://www.lists.apple.com)



# Infrastructure

- Coming soon . . .
  - CVS source management
  - Bug tracking
- How can you get involved?
  - Download the source
  - Be visible
    - Use the mailing lists
    - Submit modifications



# Panelists

- Ernest Prabhakar, Public Source License
- Chris De Salvo, OpenPlay
- Denis Serenyi, Darwin Streaming Server
- Brett Halle, Darwin OS
- Wilfredo Sanchez, Darwin OS
- Klee Dienes, Darwin OS
- Creed Erickson, Darwin OS





Think different.<sup>TM</sup>



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