

Welcome

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Carbon on Mac OS X

John Iarocci

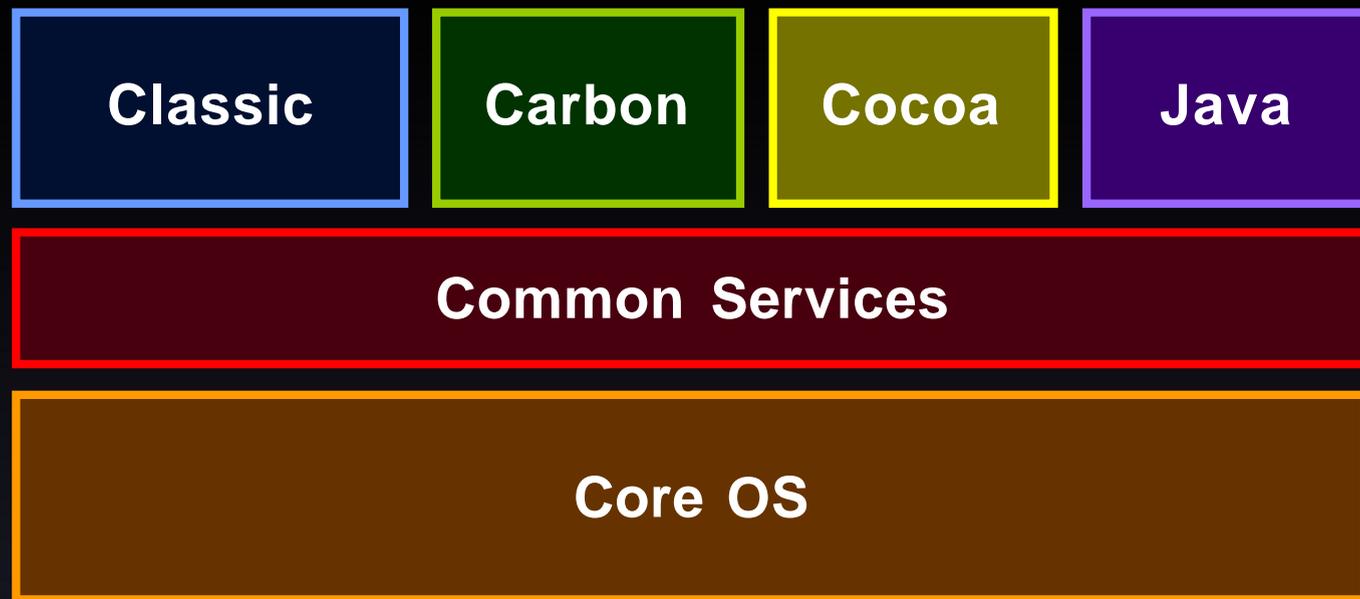
Manager, Carbon Team

What's in This session?

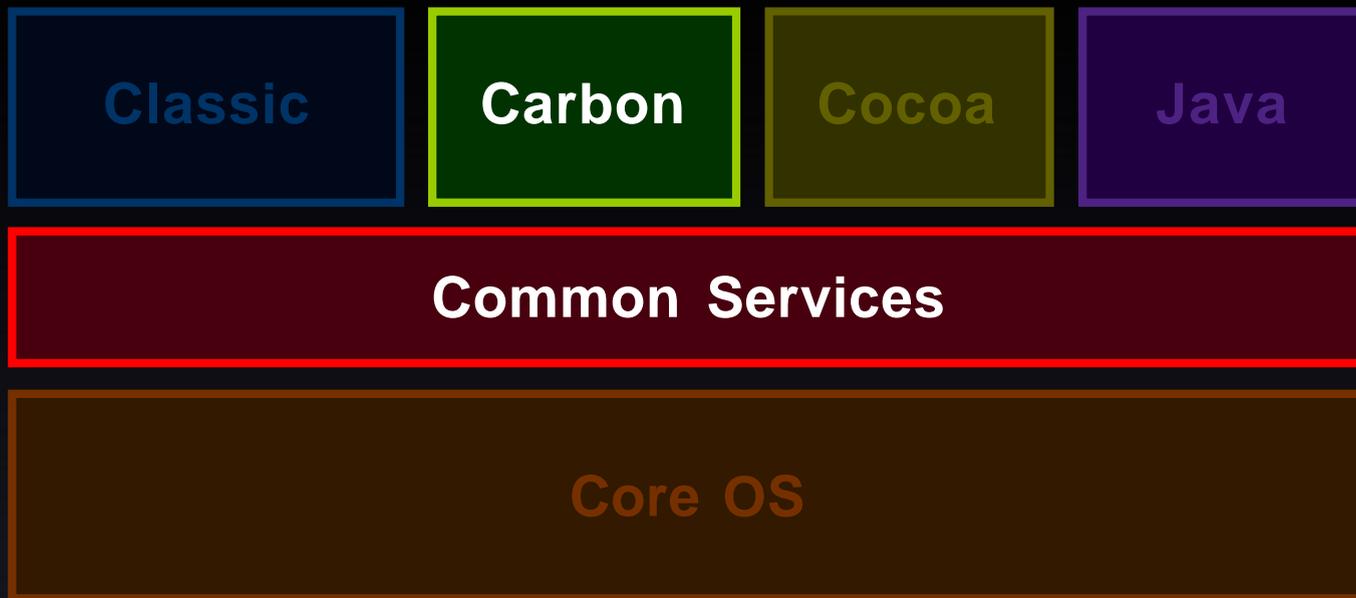
- Carbon Technologies on Mac OS X
- Development on Mac OS X



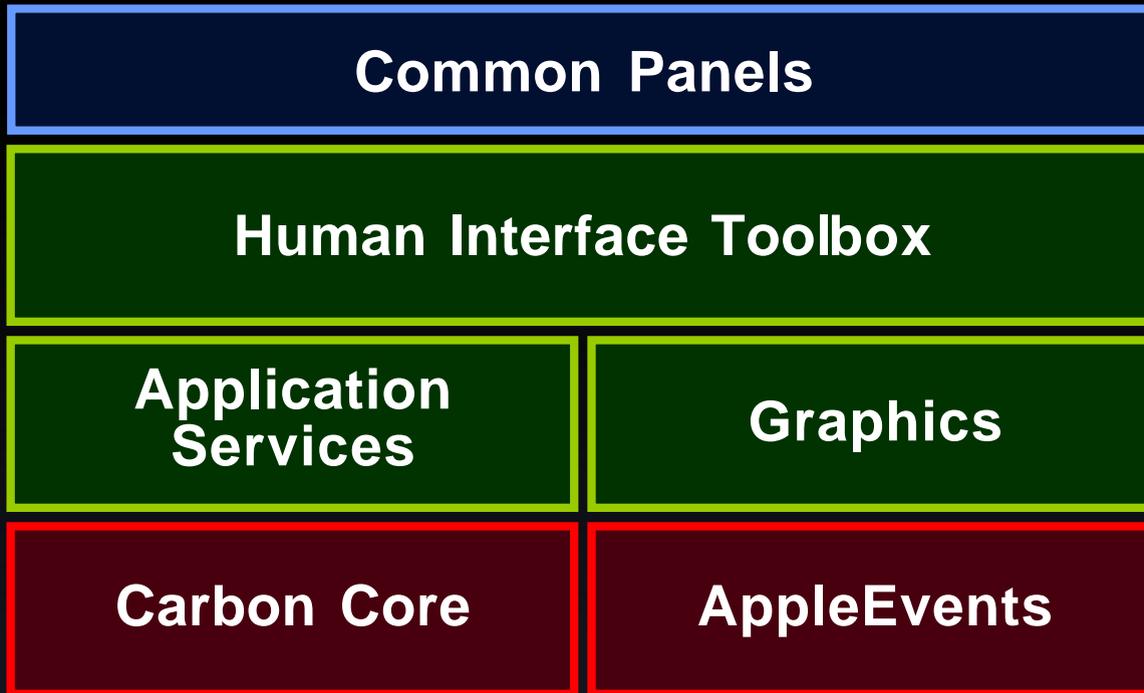
Mac OS X Architecture



Mac OS X Architecture



Carbon Architecture



Runtime on OS X

- Developer Preview release supports both TOC and GOT Runtimes
- TOC Runtime
 - Pointer to TVectors
 - Data offsets determined at runtime
- GOT Runtime
 - Pointer to code
 - Data offsets fixed at link time



Code Loading

- Two code loaders supported on OS X
 - Both have similar features
- CFM and Dynamic loader (dyld):
 - PE shared libraries
 - Mach-o shared libraries (dylibs)



Comparing CFM & dyld

- Two-level namespace
 - Important for plug-ins
- Link-time
 - Dummy libraries vs. everything
- Run-time
 - Lazy-initialization is a “good thing”



Mixed Mode

- There's no 68k, why is there Mixed Mode?
- Required
 - To switch between runtimes
 - To enable single-binary CFM app

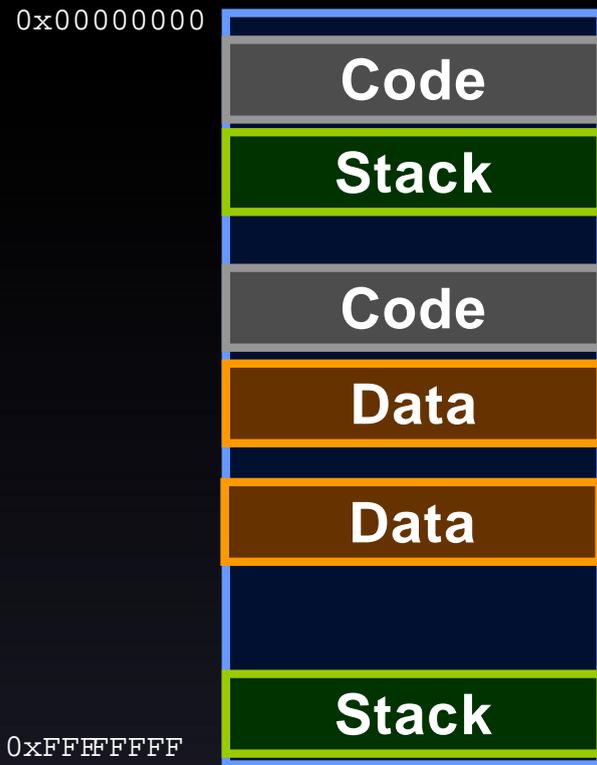


Code Sample

```
void SillyCompletionRoutine()  
{  
    ioUPP = NewIOCompletionUPP(myCompletionRoutine);  
    .  
    .  
    .  
    InvokeIOCompletionUPP(ioUPP );  
    .  
    .  
    .  
    DisposeIOCompletionUPP(ioUPP);  
}
```



Memory Model



- Code and read-only data is shared
- Every thread gets a stack with guard pages
- Page zero (LowMem) not accessible
- 4 GB address space



Memory Management

- Test at runtime for sparse VM
 - `gestaltMemoryMapSparse`
- Runtime behavior of Memory Manager
 - Zones are no longer supported
 - Purging
 - Purge procs are not called on X
 - Relocation
 - Only when `SetHandleSize` is called



File Manager on OS X

- Support for UFS, NFS, & SMB (Samba)
- Async I/O doesn't run at interrupt level
- New HFS extensions fully supported in Carbon
- Working directories and device access not supported



Threading with Carbon

- Thread Manager
 - Cooperative scheduling only
- MultiProcessing API
- All threading layered on pthreads
 - Shared libraries can assume pthreads
- A simple Carbon app is single-threaded



Thread-safe Services

- MultiProcessing APIs
- File Manager
- Open Transport
- BSD services:
 - malloc()
 - POSIX file APIs
 - Sockets



AppleEvents

- Available outside of Carbon
 - Few APIs are Carbon-only
- AEDescs are opaque
- Standard AppleEvents used in all Application environments
 - ‘oapp’, ‘odoc’, ‘pdoc’, ‘quit’
 - Basis for AppleScript



Extension Replacement

- Carbon
 - Background-only applications using AppleEvents
- OS X
 - IOKit driver (see “I/O Kit: Mac OS X’s Driver Model”)
 - File system plug-ins



Carbon Porting Strategy

- Carbon on OS X Development
 - LiteCarbonLib on OS 8.x
 - 3 choices on OS X
 - CFM app on X
 - Cross compile with Metrowerks IDE
 - Natively built with ProjectBuilder



Not in Developer Preview of OS X

- QuickTime
- Sound Manager
- Speech Manager
- Display Manager
- AppleScript
- ColorSync
- Text Services Mgr
- Text Encoding



Development Choices

- CFM-based or Mach-o based application
- Development Tools
 - ProjectBuilder—Mach-o based application
 - Metrowerks IDE—CFM or Mach-o based application
- Debuggers
 - ProjectBuilder and gdb
 - Metrowerks Debugger (via gdb)



CFM-based Application

- Build with Mac OS 8.x tools
- Link against LiteCarbonLib on OS 8.x
- Transfer application to OS X
- Debug
 - Metrowerks Debugger (and gdb)
 - ProjectBuilder (and gdb)



Mach-o Application (Cross Compiled)

- Cross compile with Metrowerks IDE
 - Use Mach-o compiler and linker plug-ins
- Debug with ProjectBuilder and gdb



Mach-o Application (Natively Compiled)

- Build with ProjectBuilder
 - Use egcs compiler
- Debug with ProjectBuilder and gdb



Development Setup

- Single Machine
 - Cross-compiling
 - Native building
- Two machine
 - Remote debugging
 - Telnet session



Summary

- Lots of development choices
- Start Carbonizing today!
 - Begin on OS 8.x
 - Try your app on OS X



Related Sessions

117 Mac OS X Kernel

Hall A1
Wed., 9:00am

108 Core Foundation Overview

Hall 2
Wed., 1:00pm

**109 HLTB: Carbon Changes
and Additions**

Hall 2
Fri., 10:15am

**110 HLTB: The Carbon
Event Model**

Hall 2
Fri., 1:00pm

111 Core Foundation Plug-ins

Hall A1
Fri., 4:00pm



Related Sessions (Pt. 2)

105-R Carbon Overview

Hall C
Fri., 9:00am

107-R Carbon on Mac OS 8

Hall C
Fri., 1:00pm

**121 ProjectBuilder for Mac OS
X**

Hall A1
Thur., 2:30pm

122 Dev. Tools for Mac OS X

Hall A1
Thu., 4:00pm

610 Open Transport in Carbon

Hall A2
Fri., 10:15pm





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Q&A



Think different.TM



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