

Music 120: Introduction to Audio/Multimedia App. Programming

Week #5 - 10/23/2006, Part I
CCRMA, Department of Music
Stanford University

Last Week...

- IDE (briefly)
- VST Plug-in (also briefly)

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Today...

- HW1 review
- VST SDK: Xcode projects
- GUI programming with Cocoa
- Objective-C
- Demo: GUI-based Stk app.
 - Xcode / Interface Builder / StkX
- Assignment #2

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Cocoa

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Cocoa Is Many Things

- It's a runtime environment
 - Dynamic dispatch is fundamental
- It's a user interface framework
 - Events, views, buttons, sliders and so on
- It's a development framework
 - A collection of reusable and extendable objects

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Using Cocoa

- GUI (Graphical User Interface) applications
- Command-line tools
- Plug-ins
- Even device drivers!

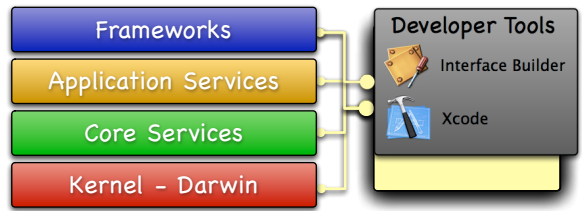
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Cocoa Applications



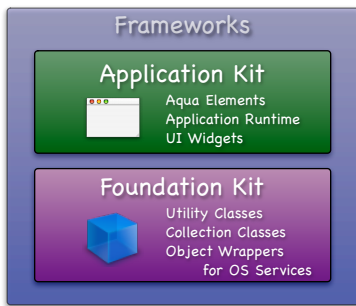
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Mac OS X Architecture



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Cocoa Architecture



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GUI Programming with Cocoa

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Basic Tools

- Xcode
 - coding
 - building
 - debugging
- Interface Builder
 - user-interface design
 - basic connections between objects



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Xcode

- “Wizard” helps you create new projects
 - no *Harry Potter* this
- Best to stick with Xcode-defaults in new projects for now
 - except StkX
- Don’t let the complexity overwhelm you

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Xcode (cont'd)

- Programming in 4 easy(?) steps!
 - Edit your code
 - Specify how your code is compiled and linked
 - Build and run your code
 - Debug your code

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Interface Builder

- Lays out and connects user-interface elements
 - Target/action
 - Outlets
 - Bindings
- Edits *nib* files
 - A nib file a collection of archived objects (your user interface) stored on disk

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Objective-C

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Objective-C

- A very simple language, but some new syntax
- Strict superset of C
- Single inheritance
 - classes inherit from one and only one superclass
- Dynamic runtime

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Why ObjC?

- Exposure to other languages is always good
- A language focused on simplicity and the elegance of OO design
- Concepts in Objective C are applicable to any other OOP language

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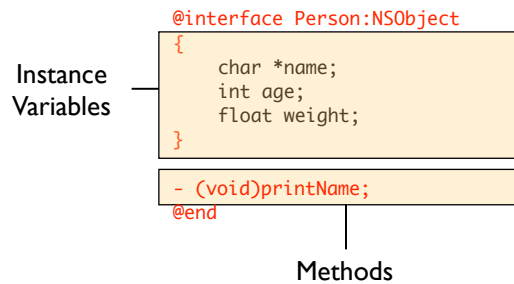
Class Interfaces (C)

```
typedef struct
{
    char *name;
    int age;
    float weight;
} Person;

void printName(Person *person);
```

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Class Interfaces (ObjC)



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Implementations (C)

```
void printName(Person *person)
{
    printf ("Name: %s\n", person->name);
}
```

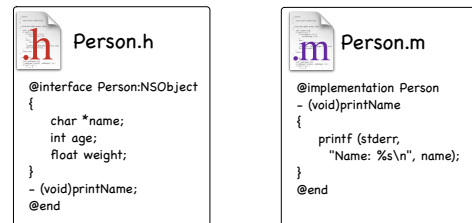
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Implementations (ObjC)

```
@implementation Person
- (void)printName
{
    printf ("Name: %s\n", name);
}
@end
```

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ObjC Files



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Messaging Syntax

- Calling a method called "doSomething"

C Function: doSomething(anObject);

C++ or Java: anObject.doSomething();

ObjC: [anObject doSomething];

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Messaging Syntax

- Calling a method "divide" with arguments

C Function: divide(arg1, arg2);

C++ or Java: obj.divide(arg1, arg2);

ObjC: [obj divide:arg1 by:arg2];
- (float)divide:(float)arg1 by:(float)arg2;

Selector: divide:by:

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String Constants

- In C constant strings are
 - “simple”
- In ObjC, constant strings are
 - @“just as simple”
- Constant strings are NSString instances

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More ObjC Info?

- Cocoa Programming for Mac OS X (Ch. 3)
 - by Aaron Hillegass
- ADC document
 - <http://developer.apple.com/documentation/Cocoa/Conceptual/ObjectiveC>

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Demo!

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More Cocoa...?

- CS193E
 - taught by Apple engineers
- Cocoa Programming for Mac OS X (Ch. 3)
 - by Aaron Hillegass
- ADC document
 - <http://developer.apple.com/documentation/Cocoa/>

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Assignment #2

Due 11/17/06

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Truth of A2

- VST plug-ins:
 - start from templates
 - add more features step by step
- GUI-based applications:
 - extend your A1 by add some GUI
 - communication between UI and functions
- For both:
 - experience with IDE

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