Building iPhone Applications with Flash CS5

Mike Chambers
Principal Product Manager
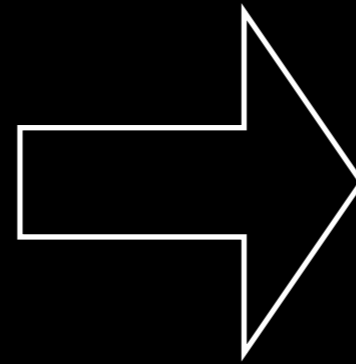Developer Relations
Flash Platform

What did Adobe announce at Max?

2

Flash Pro CS5

Adobe Flash CS5 will include support for creating stand-alone apps for the Apple iPhone
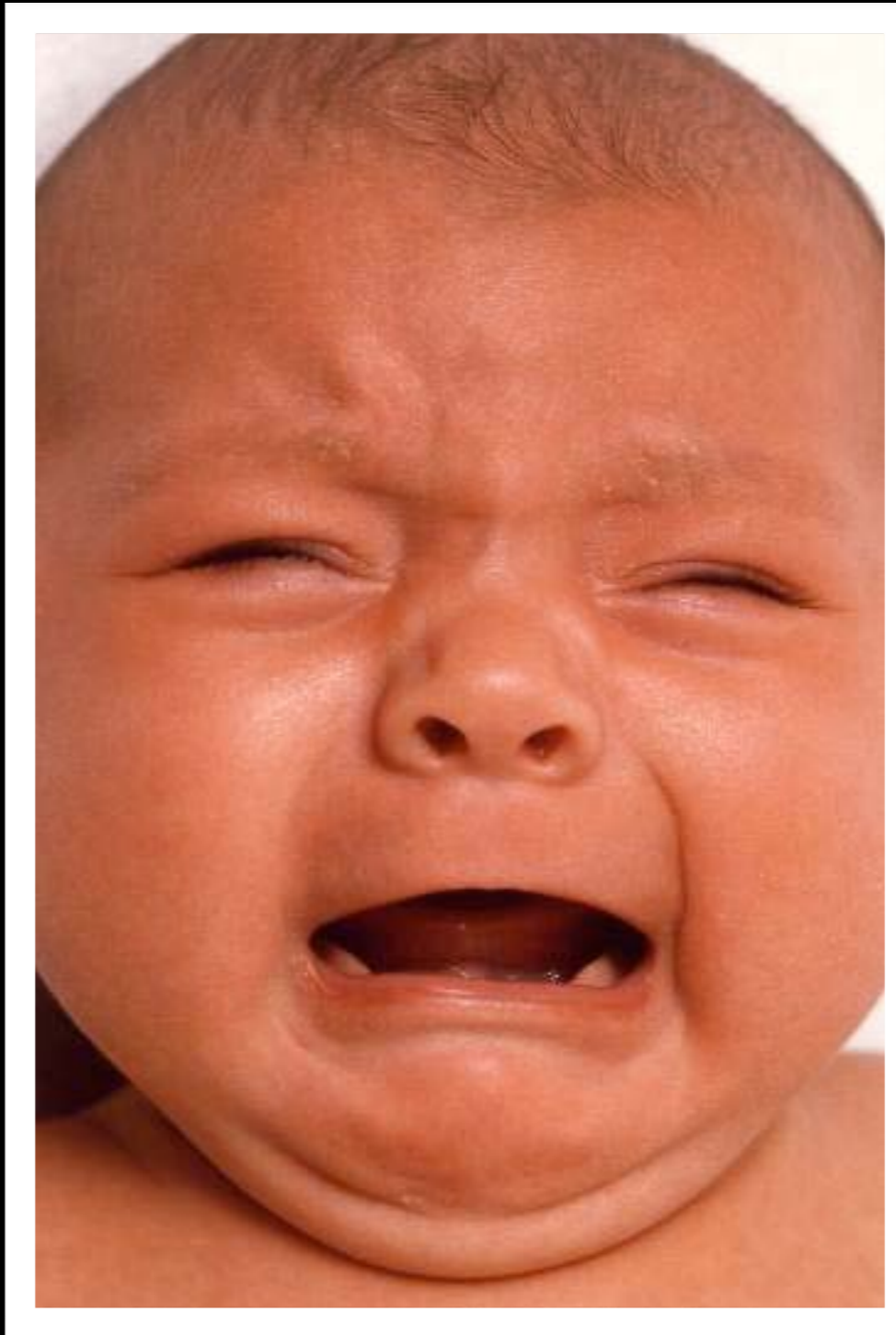
Flash Player 10.1

Smartphone enabled

Multitouch, accelerometer, screen orientation

Optimized memory, power, hardware acceleration

RAW Microphone Access

Global Error Handler

Did not announce Flash Player for Safari
Mobile on iPhone

WORD ZEN

Play Game >

High Scores >

How To Play >

Settings >

Round: 1 / 3   Score: 350

T I E

K I T E

_ _ _ _ _ _

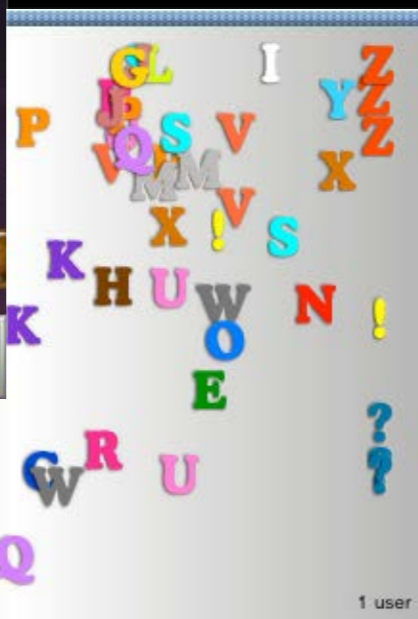C W I K T E

❌   Enter   ↻

How does it work?

LLVM

Low Level Virtual Machine

Open source compiler infrastructure designed for optimizing programs written in arbitrary programming languages

Capable of generating machine code for various targets including x86 and ARM processors

Used in Alchemy

.AIR vs .APP

.air

.swf | code | Flash Assets

app:/assets

app.xml

Runtime

.app

ARM exe | .swf | Flash Assets

Library

app:/assets

Info.plist
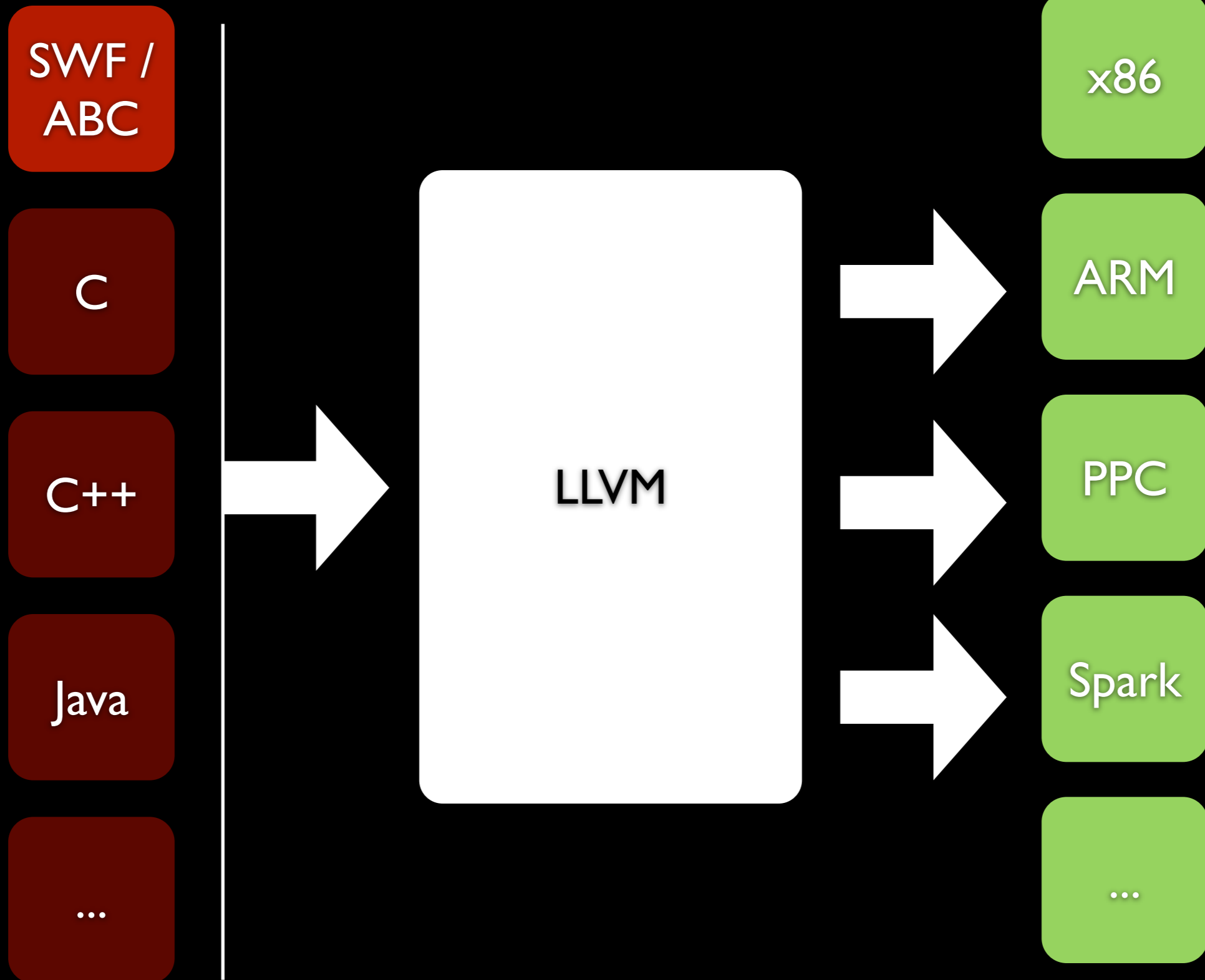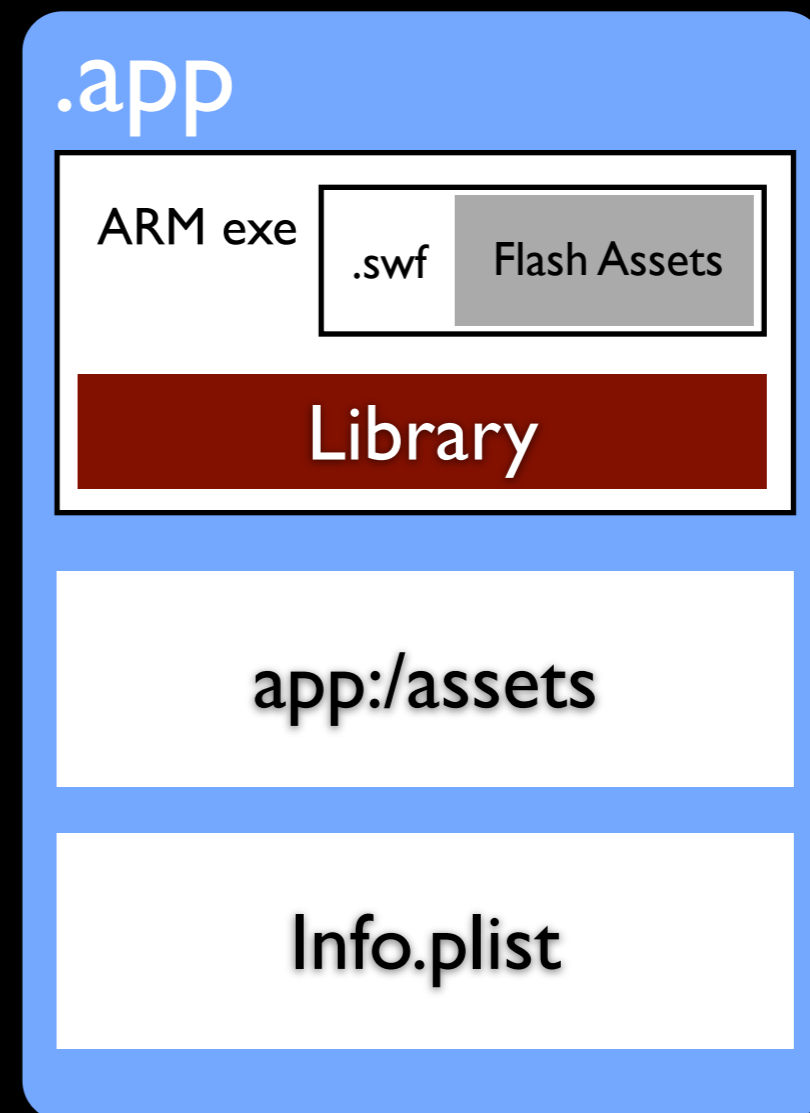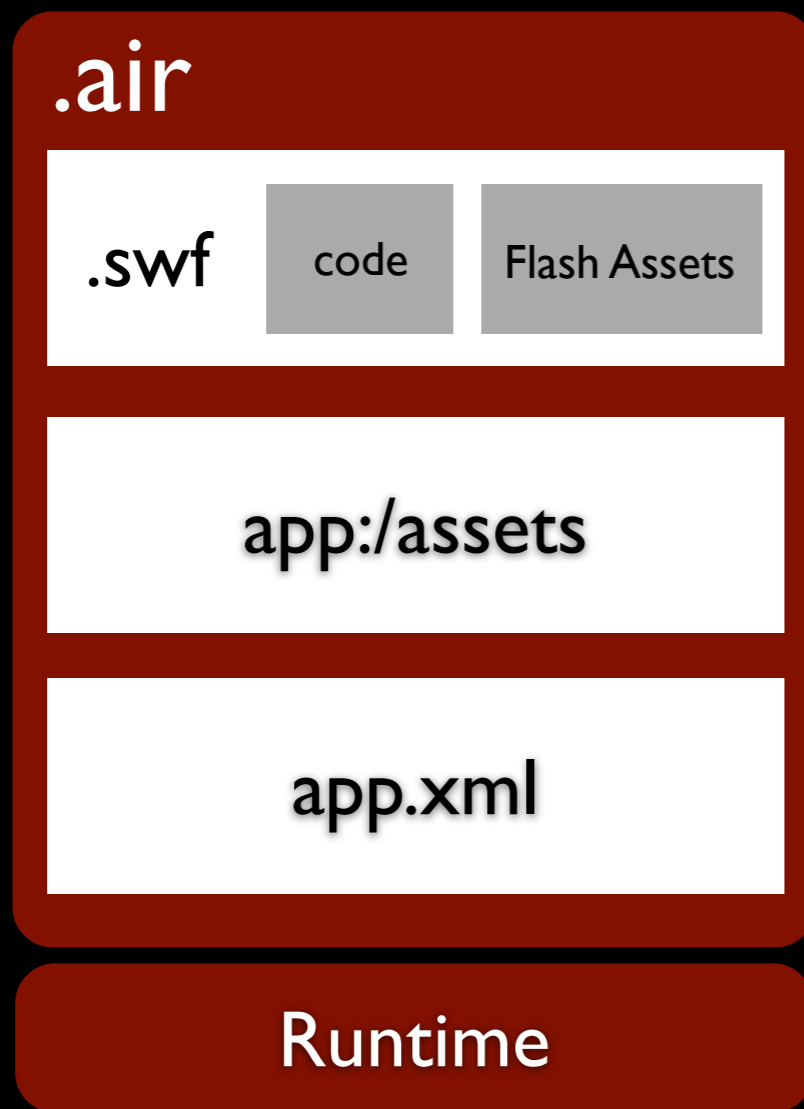
Develop | Publish | Package | Deploy

Certificate

SWF

app.xml

app:/resources

ADT

.ipa

Flash Pro CS5
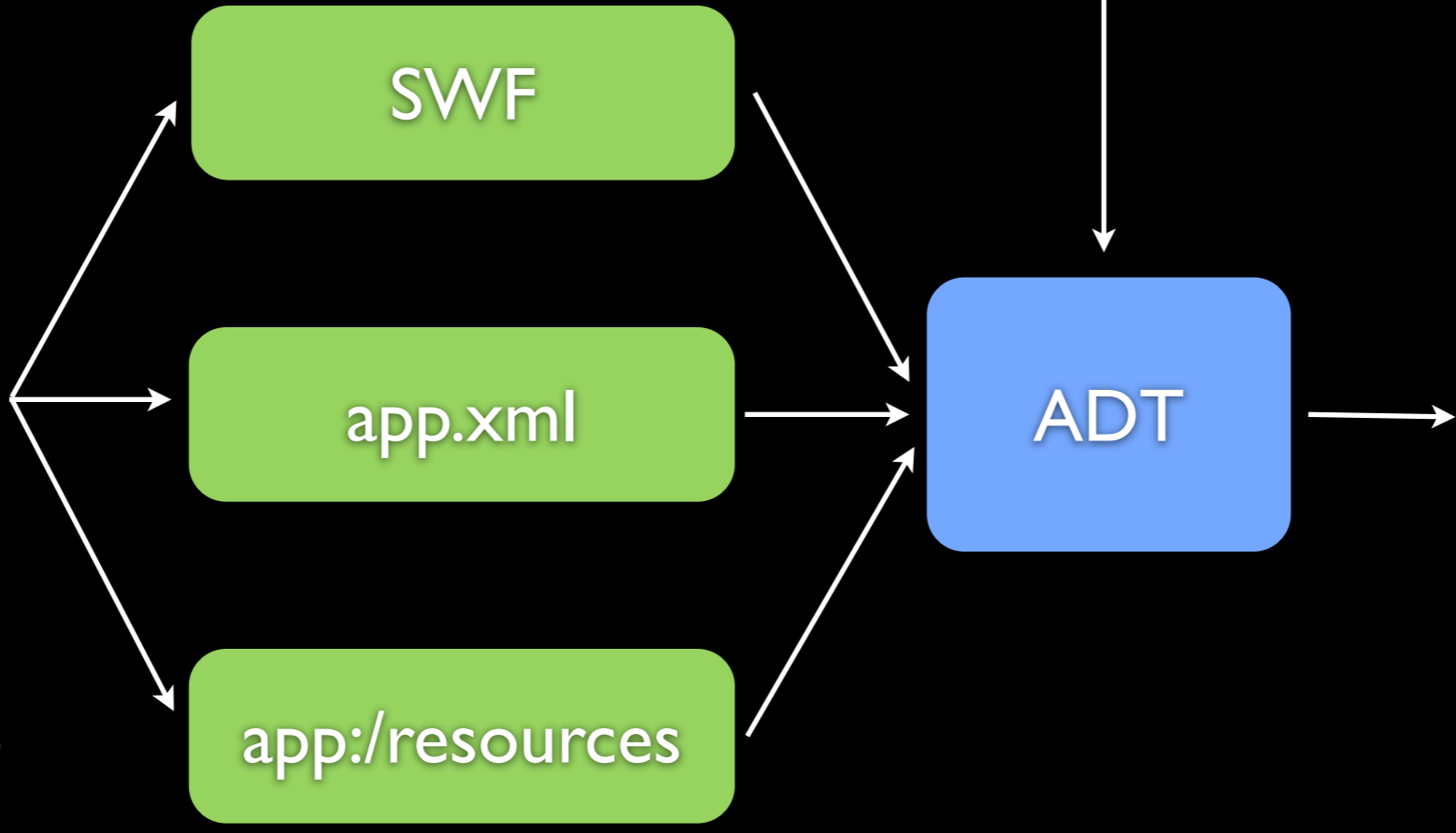
AOT Compilation

- Ahead of Time (AOT) compilation

- iPhone License Restricts interpreters

  - Cant JIT code

  - No Interpreter

- Compiles ABC bytecode from SWF

- LLVM Base compile toolchain

ADT

SWF → AOT → **.app**
app.xml → .plist gen
resource →

Certificate

.app
"swf.exe"
info.plist
app:/resources

Sign / Package

.ipa
Signed .app

AOT Compilation

Flash CS5
- AS3
- AS3
- SWC
- timeline
- assets

.swf
- ABC1
- ABC2
- timeline
- assets

AOT
- ABC Compiler
- LLVM Bytecode
- LLVM Codegen

Flash Runtime Library

swf.exe

swf
- ABC1 SHA1
- ABC1 SHA2
- timeline
- assets

ARM

Flash Runtime Library
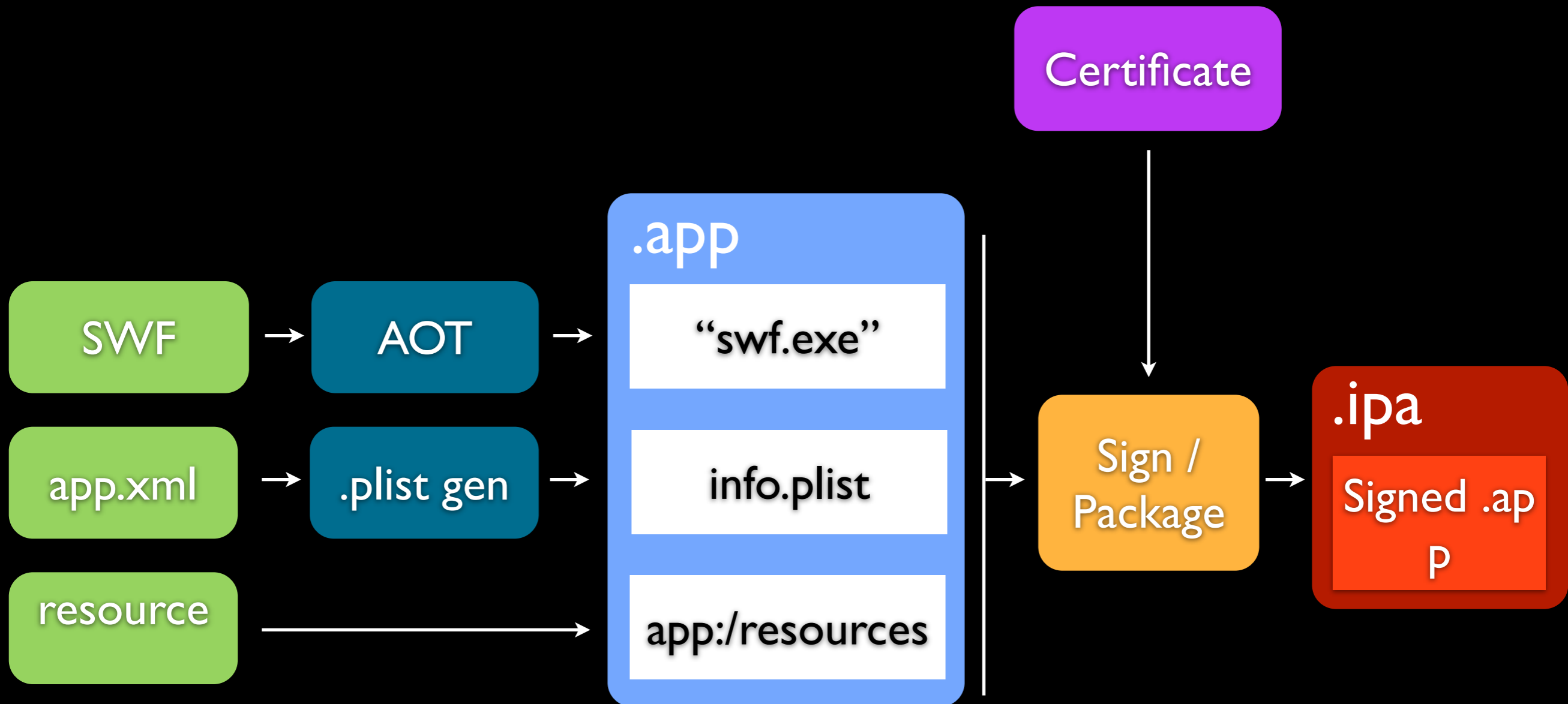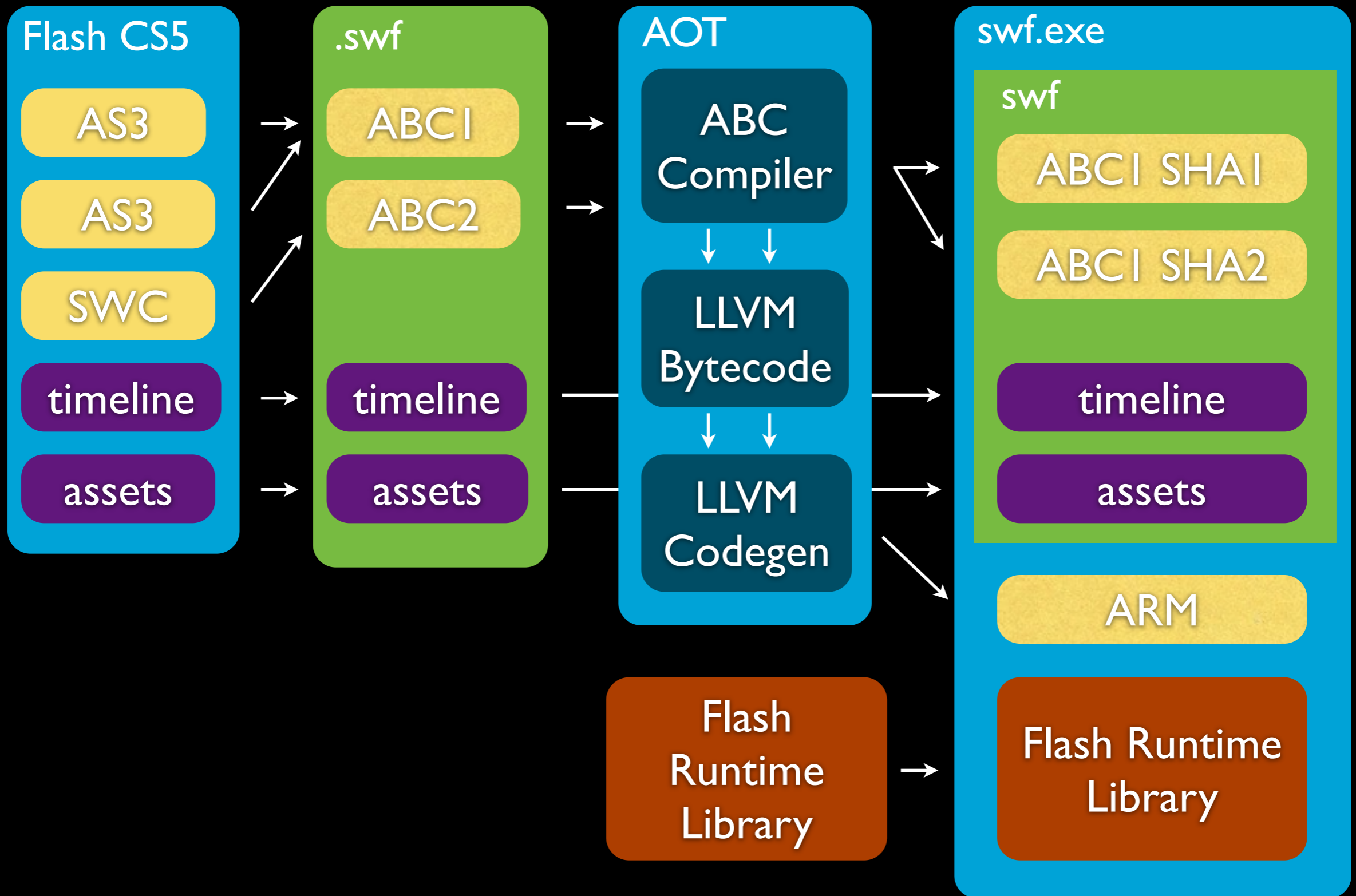
Developing Content

APIs

Flash Player 10.1

Adobe AIR 2.0

New APIs

- MultiTouch

- Screen Orientation

- MediaLibrary

- Accelerometer

- Geo-location

- Cut / Copy / Paste

- Native TextInput

- tel:, mailto:, maps:, video:

NEW!

Do not reply on...

- Keyboard events outside of textfields
- Rollover Hover
- ActionScript 1 or 2
- Loading a SWF with ActionScript
- LocalConnection
- PixelBender
- H.264 and Speex codecs
- Microphone / Video Camera access

Development Workflow

Flash CS5

SWF

Test

Test and Deploy

Desktop

.ipa

iTunes

Device

Developer Connection

Dev Centers   ADC on iTunes   Support   Search ADC

iPhone Dev Center

Hi, **Guest** | Register | Log In

Log in to get the most out of the iPhone Dev Center.   Log in

The iPhone Dev Center provides access to technical resources and information to assist you in developing with the latest technologies in iPhone OS. Log in with your Registered iPhone Developer Apple ID and password, or sign-up as a free Registered iPhone Developer today.

Developing for iPhone OS 3.1   Search iPhone Reference Library

Technical Documentation

Getting Started Documents
Developers new to iPhone OS can read about the tools, frameworks, development best-practices, and design methods for creating innovative world-class iPhone applications.
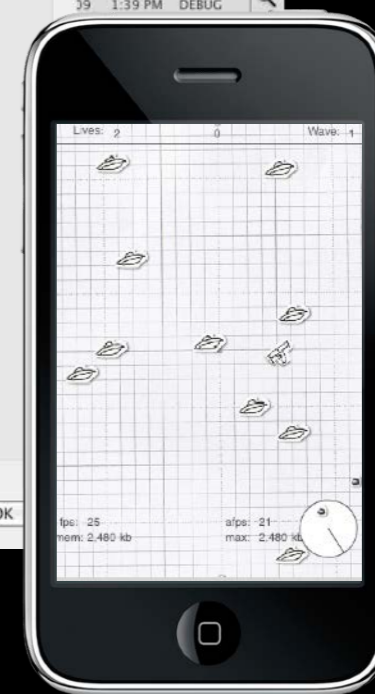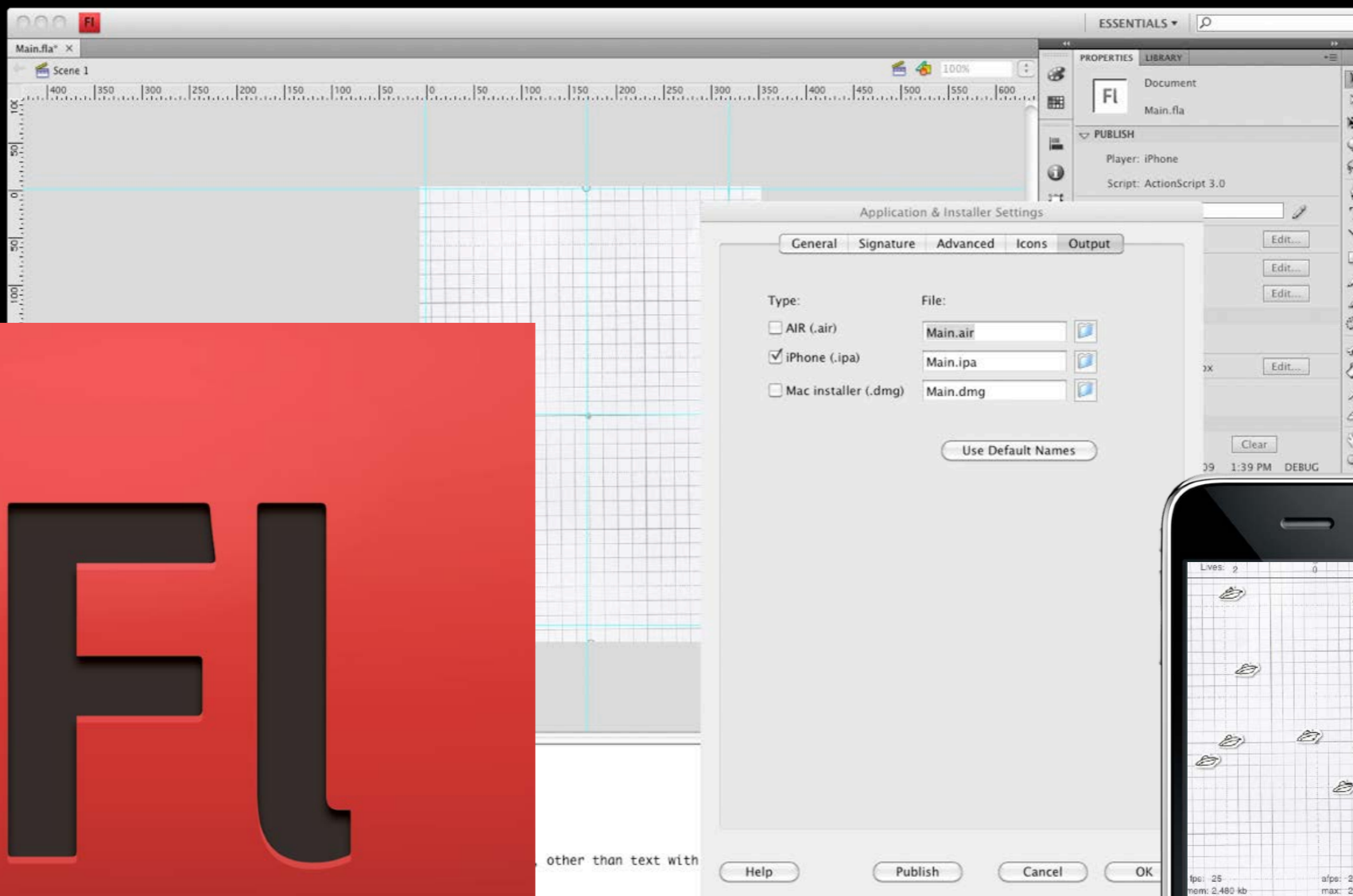
iPhone Reference Library
Explore a collection of in-depth technical documentation, sample code, guides, and articles for iPhone development categorized by topic and frameworks.

Featured Content

▪ **iPhone Application Programming Guide**

▪ **iPhone Development Guide**

▪ **iPhone Human Interface Guidelines**

▪ **Your First iPhone Application**

▪ **Learning Objective-C: A Primer**

iPhone Developer Program

App Store Resource Center
Find details on everything from how to prepare for submitting an app to managing an app once it's been posted. Log in ▸

News and Announcements
Check out this regularly updated section for a range of information including tips on submitting apps , turnaround time for app review, and more. Log in ▸

Join the iPhone Developer Program
The iPhone Developer Program offers a complete process for developing and distributing iPhone or iPod touch applications. Learn More ▸

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Download iPhone SDK 3.1.2
Registered iPhone Developers can download iPhone SDK 3.1.2, which includes the Xcode IDE, iPhone

Getting Started Videos
Watch Apple experts discuss everything from getting started with iPhone SDK, to the tools and
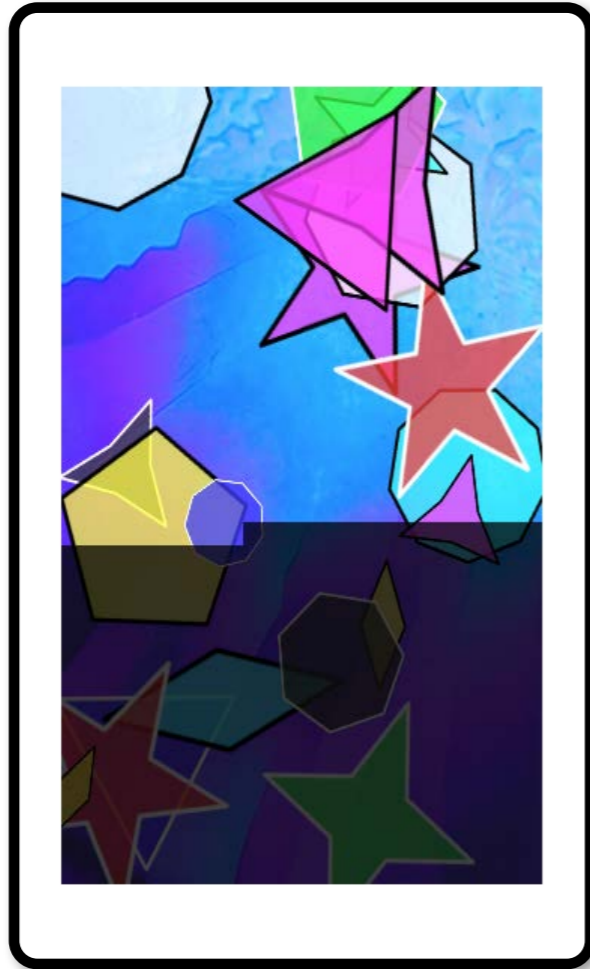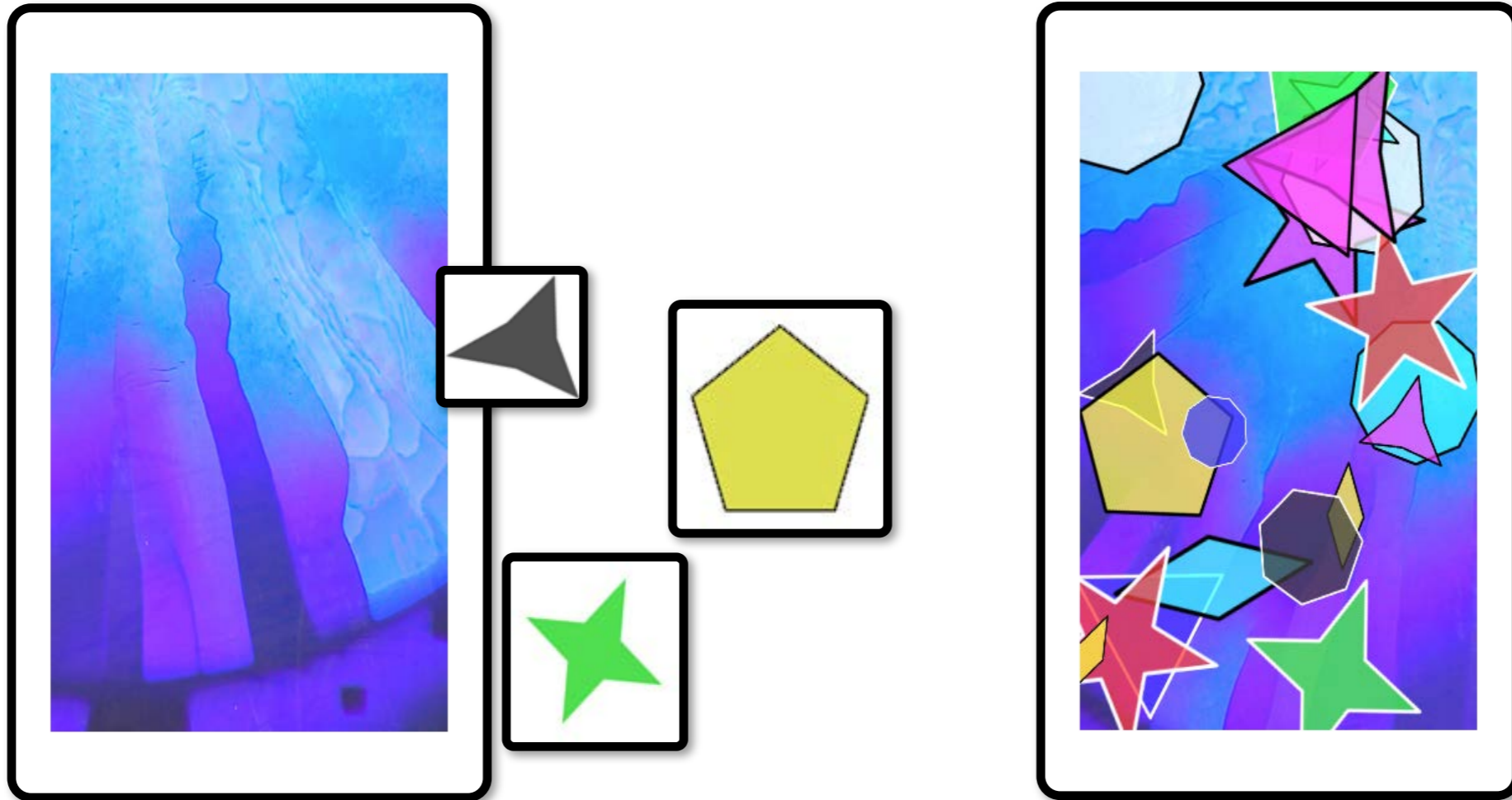
Rendering

- Current Apps in iTunes store use Software Rendering

- Adding Support for GPU Composition

Software Rendering

GPU Compositing

GPU Pipeline with Cached Surfaces

Flash renderer (RAM)

Textures (GPU)

Using GPU Composition

- cacheAsBitmap:Boolean

- cacheAsSurface:Boolean

- Using 2.5D Apis

  - Such as setting z property

NEW!

What can you do to be ready?

Screen Size   UI Interactions   Performance

!=

Screen Size

320px

480px

Fullscreen	320x480
With Status Bar	320x460 480x300

Fonts

American Typewriter	Hello World
American Typewriter Condensed	Hello World
Arial	Hello World
Arial Rounded MT Bold	**Hello World**
Courier New	Hello World
Georgia	Hello World
Helvetic	Hello World
Marker Felt	Hello World
Times New Roman	Hello World
Trebuchet MS	Hello World
Verdana	Hello World
Zapfino	*Hello World*

- Helvetica is default
- Use device fonts for input fields

Primary input is via Finger

7 mm

44 px

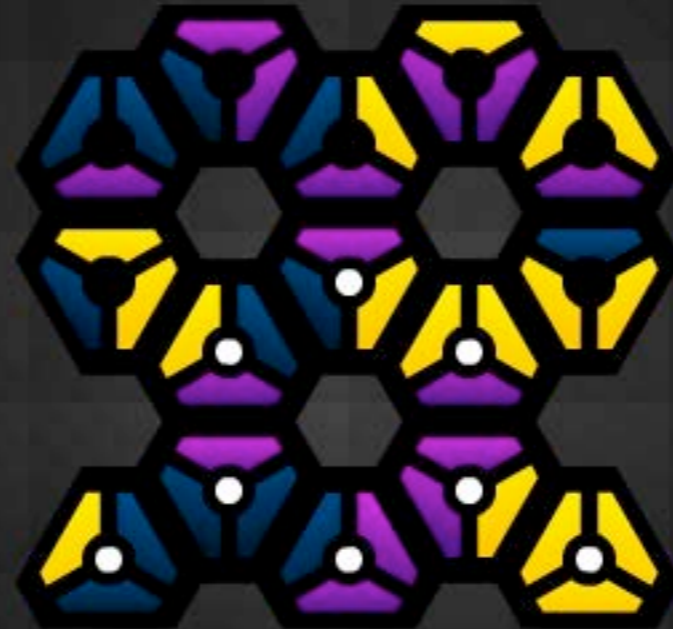- Less accurate than mouse
- Create larger hit area
- No modifier keys

- Remember Finger obscures screen

TIME 00:41   14 MOVES

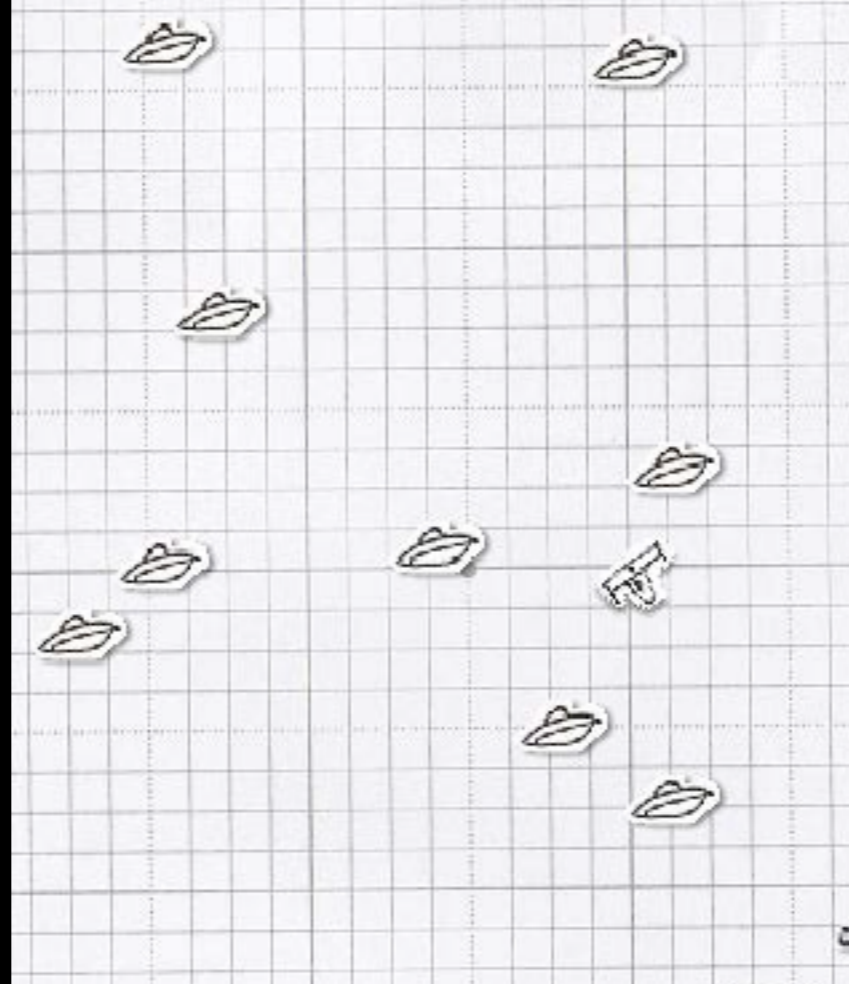LEVEL 4

Text Input

undo

Magnifying glass

cut/copy/paste

Designing Flash Applications for the iPhone

Arno Gourdol

http://bit.ly/arnoiphone

Apple Mobile Human Interface Guidelines

http://bit.ly/mobilehig

Code Optimizations

- Most will improve performance / memory usage on desktop

- Some AOT specific

Test and Profile Code

Profile External Application

AS3 Performance Testing Harness
Grant Skinner
bit.ly/as3performance

```
========================================================================
performancetests.GraphicsTests (5 iterations)
Testing different approaches for drawing.
------------------------------------------------------------------------
method.................................................ttl ms...avg ms
tare [2]                                                   0      0.00
drawPath                                                 104     20.80
drawPathShort                                            107     21.40
fullPath                                                 142     28.40
reference                                                103     20.60
shortReference                                           105     21.00
withGraphics                                             939    187.80
------------------------------------------------------------------------


========================================================================
performancetests.Functions (5 iterations)
Testing impact of function COs.
------------------------------------------------------------------------
method.................................................ttl ms...avg ms
tare [3]                                                   3      0.60
anonymous                                                707    141.40
anonymousRef                                              92     18.40
method                                                    30      6.00
reference                                                 80     16.00
------------------------------------------------------------------------
```

Reuse Instances

- Reuse object instances

- Memory Allocation very expensive

- Reduces Garbage collection

- Reduces CPU / Initialization costs

```
private function doSomething():void
{
    for(var i:int = 0; i < 100; i++)
    {
        var p:Point = new Point();
        p.x = 5;
        p.y = i * 5

        checkPoint(p);
    }
}
```

```
private function doSomething():void
{
    var p:Point = new Point();
    for(var i:int = 0; i < 100; i++)
    {
        p.x = 5;
        p.y = i * 5

        checkPoint(p);
    }
}
```

Clean Up

- Clean up unneeded event handlers

- Remove unneeded Timer events and ENTER_FRAME handlers

Event Dispatching

- Can be very expensive

- Requires several memory allocations

- Consider using callbacks in CPU intensive areas

```
private function doSomething():void
{
    //...
    dispatchEvent(new Event("done"));
}

private function doSomethingBetter(callback:Function):void
{
    //...
    callback();
}
```

Mouse Events

- Can disable with
  - mouseEnabled
  - mouseChildren
- Don't use MouseEvent.MOUSE_MOVE
  - Check Mouse position at interval

```
private function init():void
{
    addEventListener(Event.ENTER_FRAME, onEnterFrame);
}

private  function onEnterFrame(e:Event):void
{
    if(mouseX < 0 || mouseY < 0)
    {
        //do something
    }
}
```

Can listen for MOUSE_UP
MOUSE_DOWN events to toggle

Function Calls (AOT)

- Arguments are passed on the stack
  - Reduce number of arguments
- AS3 Functions marked as "final" can be inlined
- Deep recursion can overflow stack
  - Out of memory will terminate app

Adobe is also working on a number of ActionScript 3 performance improvements for both JIT and AOT compiled content.

More info in the future.

Designing and Developing for the Multiscreen web

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Baby Crying
http://www.flickr.com/photos/bbaunach/1055569383/