INTRODUCTION TO RIA

(Based on Flash Technology)

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What is RIA?

R.I.A. = Rich Internet Application.

*Rich Internet applications (RIAs) are **web applications** that have some of the characteristics of desktop applications, typically delivered by way of an Ajax framework, proprietary web browser plug-ins, advanced javascript compiler technology, or independently via sandboxes or virtual machines.*
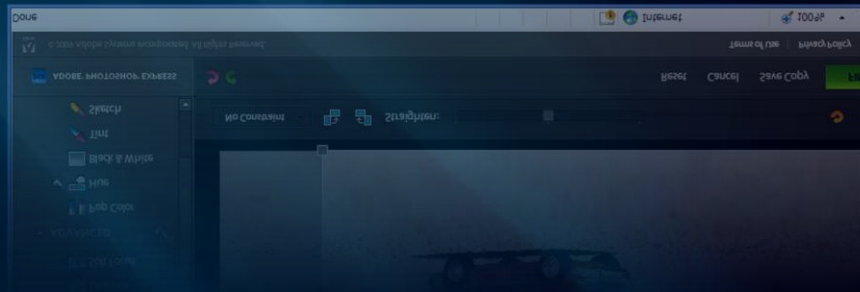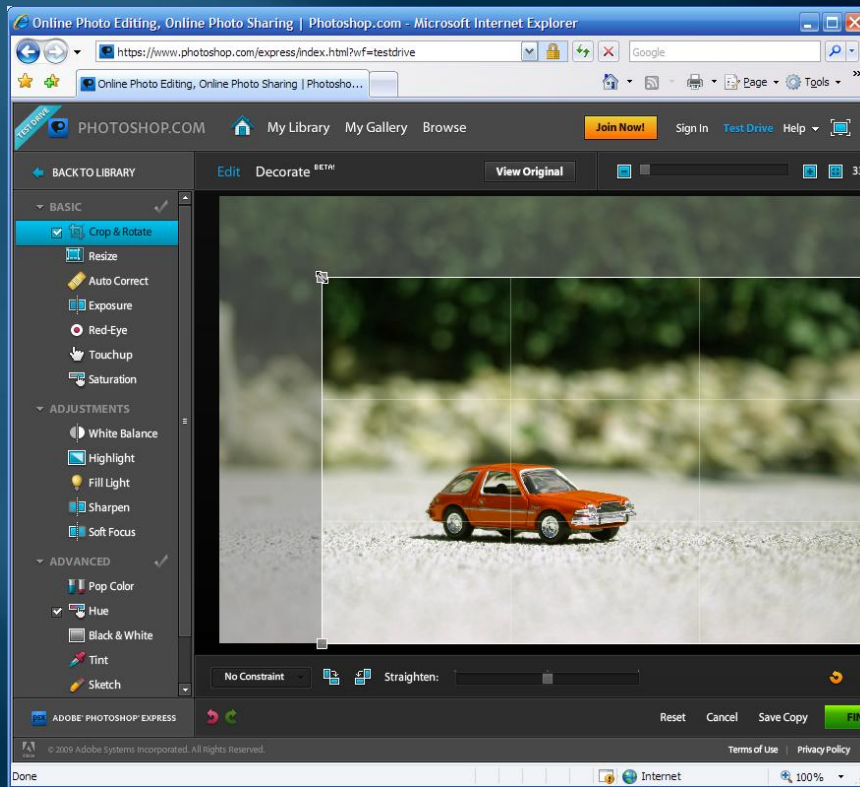
Wikipedia

I

Introduction.

- Video/Photo sharing & playback
- Music mix, DJ software
- 3d applications
- Webgames
- WebOS
- B2C
- Augmented Reality (AR) applications

Web Photoshop
(www.photoshop.com)

Based on Flash(Flex)

RIA frameworks

Adobe AIR (codename:Apollo)
Microsoft Silverlight
Javascript + DHTML + XMLHttp + Opensource libs
Sun JavaFX

RIA platforms

PC
Mac
Winmobile
Iphone
Android
Mobiln
Flashlite

Ajax

Flash Platform

Flash is no longer just an animation software.

*Adobe Flash … is **a multimedia platform** created by Macromedia and currently developed and distributed by Adobe Systems.*

Wikipedia

II

Flash & AIR

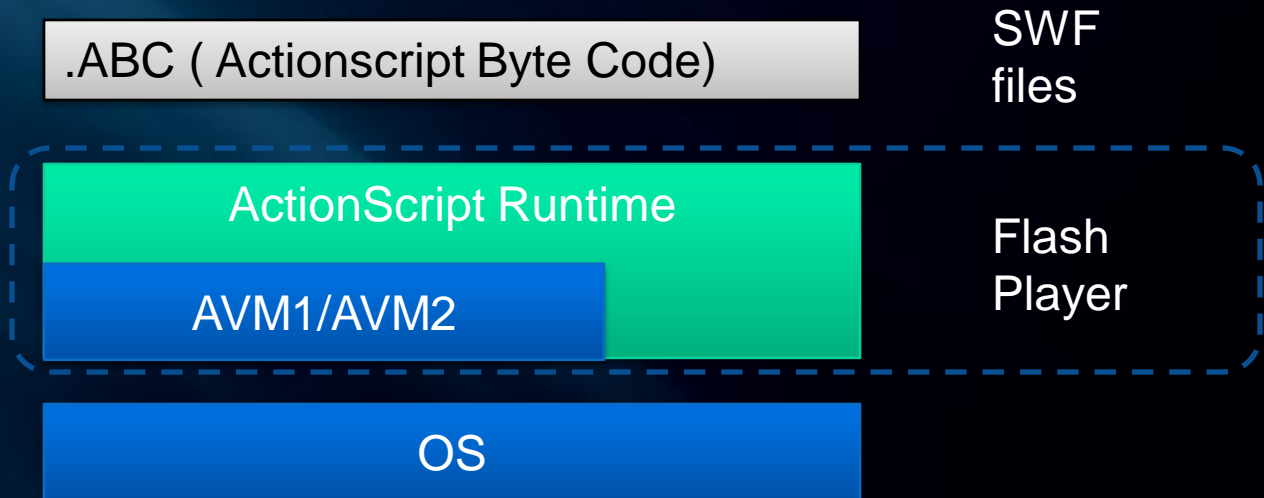Flash Player (VM & runtime)
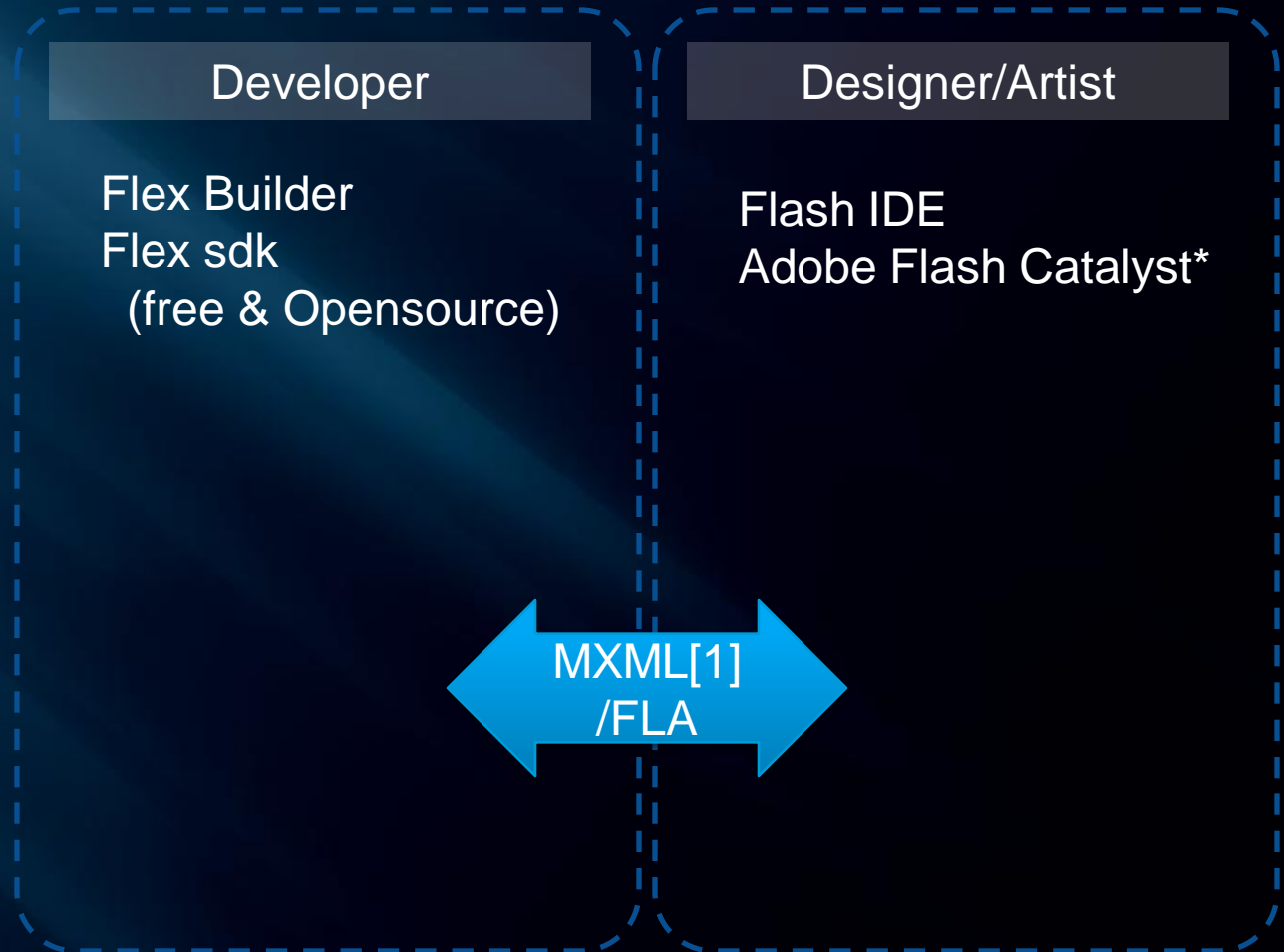ActionSctipt 1/2/3
Opensource Libs
Tools & IDEs (Flex, FlashIDE, …)
Arts & Media (vector graph, sounds, video …)

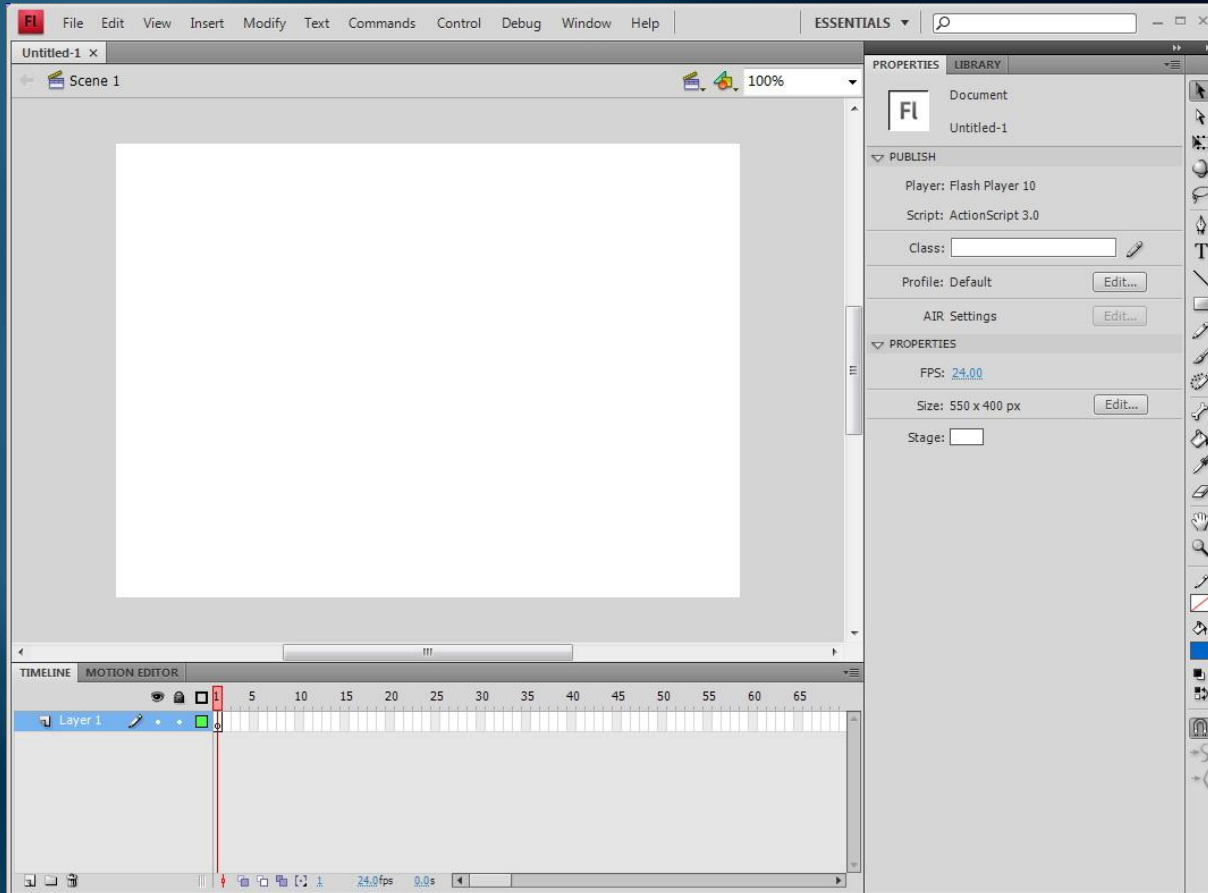Current Version : 10

Flash Framework

.ABC (Actionscript Byte Code)

SWF files

ActionScript Runtime

AVM1/AVM2

Flash Player

OS

Flash for different people

Developer	Designer/Artist
Flex Builder Flex sdk (free & Opensource)	Flash IDE Adobe Flash Catalyst*

MXML[1] /FLA

* http://labs.adobe.com/technologies/flashcatalyst/
[1] http://en.wikipedia.org/wiki/MXML

Flash CS4 snapshot

A.k.a. Flash IDE

For artists/designers

Timeline based

Flex Builder3 snapshot

Based on Eclipse

For software developers

Code based
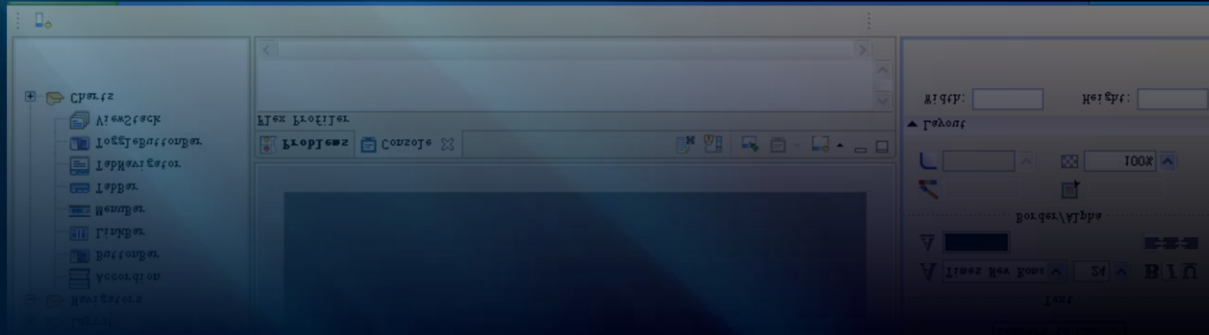
Flash's evolution *

Version	Milestone
Alpha (FutureSplash Animator)	Vector graphics & Timeline support
Macromedia Flash 3	MovieClip element
Macromedia Flash 4	Variable support &Advanced ActionScript
Macromedia Flash 5	ActionScript 1.0 XML support
Macromedia Flash MX 2004 (7)	ActionScript 2.0 (OO) UIControls
Adobe Flash CS3 (9)	ActionScript 3.0 (OO) Better performance by AVM2
Adobe Flash CS4 (10)	Inverse kinematics Basic 3D manipulation Object-based animation

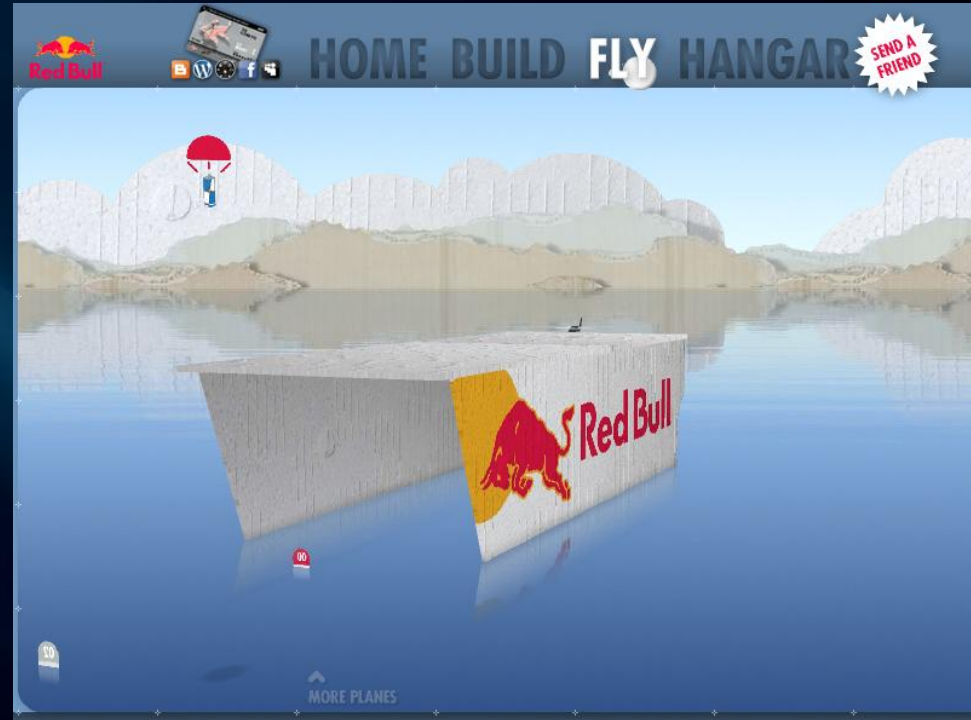* A complete list is available at http://en.wikipedia.org/wiki/Adobe_Flash#History

New features 3d Rendering

Flash 10 supports simple 3d Projection manipulation

3d model with HDR* rendering[1]   Online 3d game based on PaperVision engine[2]

* High dynamic range imaging(HDR): http://en.wikipedia.org/wiki/High_dynamic_range_imaging
[1] hdr-away3d: http://www.derschmale.com/demo/hdr/away3d/hdr-away3d.html
[2] http://www.redbull.com/flightlab/

New features Pixel Blender[1]

The Adobe® Pixel Bender™ technology delivers a common image and video processing infrastructure which provides automatic runtime optimization on heterogeneous hardware. You can use the Pixel Bender kernel language to implement image processing algorithms (filters or effects) in a hardware-independent manner.
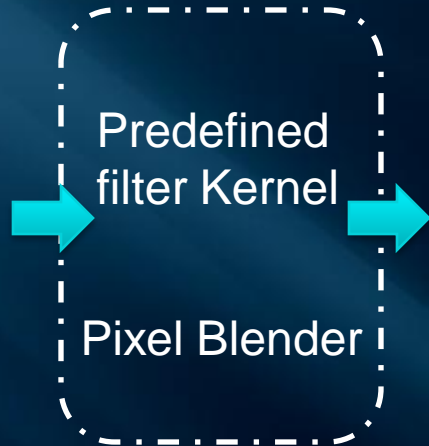
Adobe

*The syntax is based on GLSL[2], and a Pixel Bender program is **analogous to an OpenGL fragment shader**.*

Wikipedia

[1] Pixel Blender Toolkit: http://labs.adobe.com/technologies/pixelbender/
[2] OpenGL Shading Language: http://en.wikipedia.org/wiki/GLSL

New features Pixel Blender *

Predefined filter Kernel
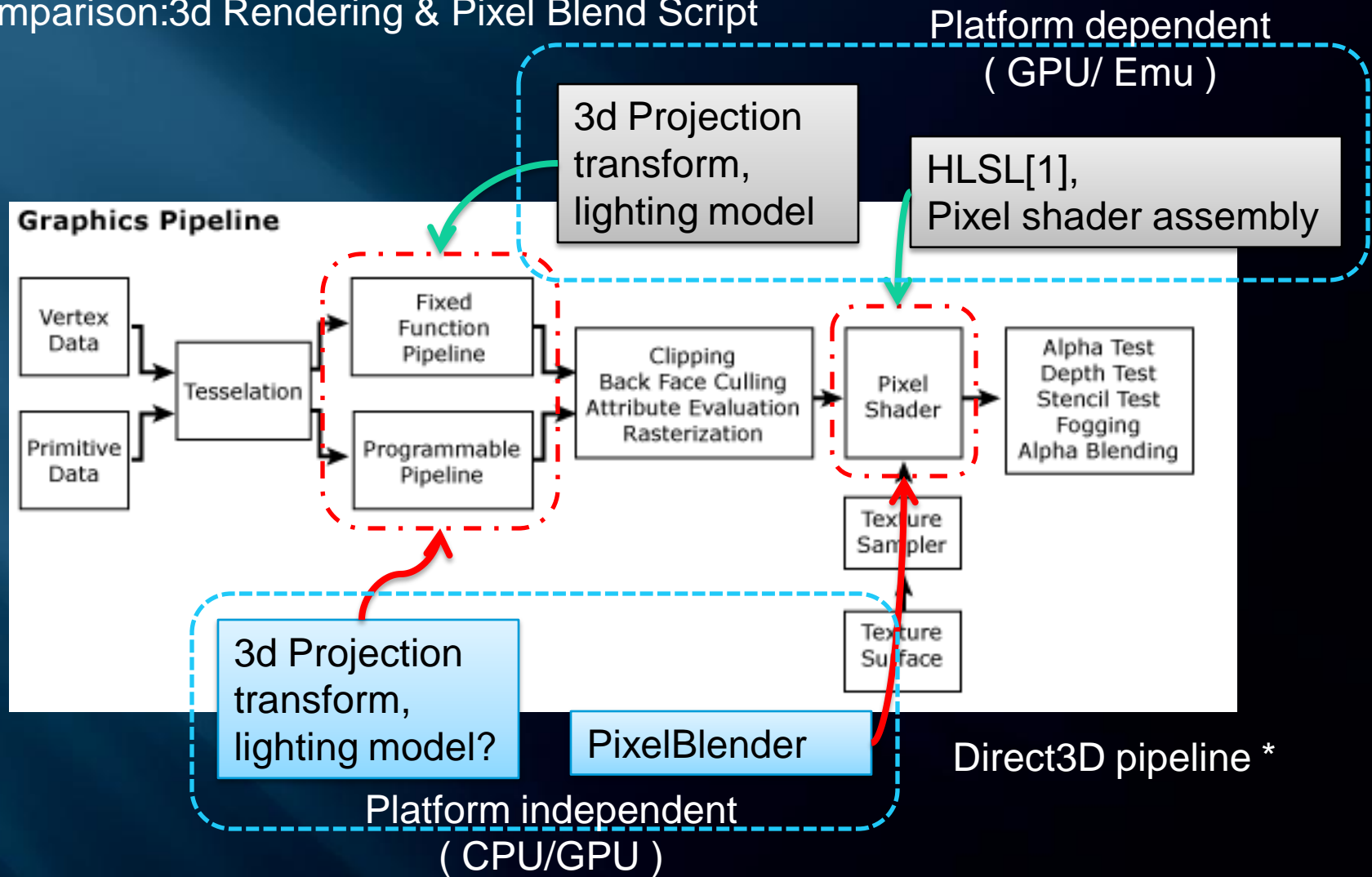
Pixel Blender

```
<languageVersion : 1.0;>
kernel ChannelScramblerFilter
< namespace : "com.adobe.example"; vendor : "Adobe Systems Inc.";
version : 1; description : "Changes the color channel order from
rgba to gbra."; >
{
input image4 inputImage;
output pixel4 outPixel;
void evaluatePixel()
{
 pixel4 samplePixel = sampleNearest( inputImage, outCoord() );
 outPixel = samplePixel.gbra;
}
}
```

* Pictures and a more detailed description: http://www.adobe.com/devnet/flex/articles/pixel_bender_basics_flex_air.html

A comparison:3d Rendering & Pixel Blend Script

Platform dependent
(GPU/ Emu)

3d Projection transform, lighting model

HLSL[1], Pixel shader assembly

Graphics Pipeline

Vertex Data

Primitive Data

Tesselation

Fixed Function Pipeline

Programmable Pipeline

Clipping
Back Face Culling
Attribute Evaluation
Rasterization

Pixel Shader

Alpha Test
Depth Test
Stencil Test
Fogging
Alpha Blending

Texture Sampler

Texture Surface

3d Projection transform, lighting model?

PixelBlender

Direct3D pipeline *

Platform independent
(CPU/GPU)

* DirectX 8.1 Programmer's Reference, Microsoft
[1] HLSL: high level shader language: http://en.wikipedia.org/wiki/High_Level_Shader_Language

Adobe Integrated Runtime (AIR)

Adobe AIR is a cross-platform runtime environment for building rich Internet applications, using Adobe Flash, Adobe Flex, HTML, or Ajax, that can be deployed as a desktop application.
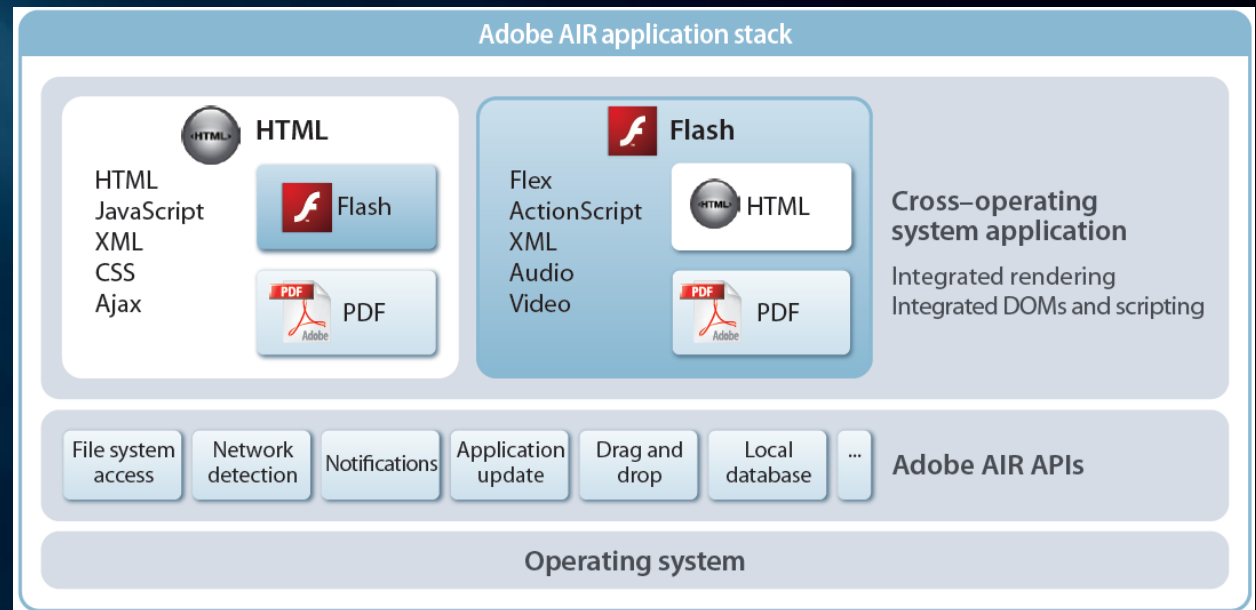
Wikipedia

III

Flash for developers

Enabling offline operation, out of browser, invoking OS functions.
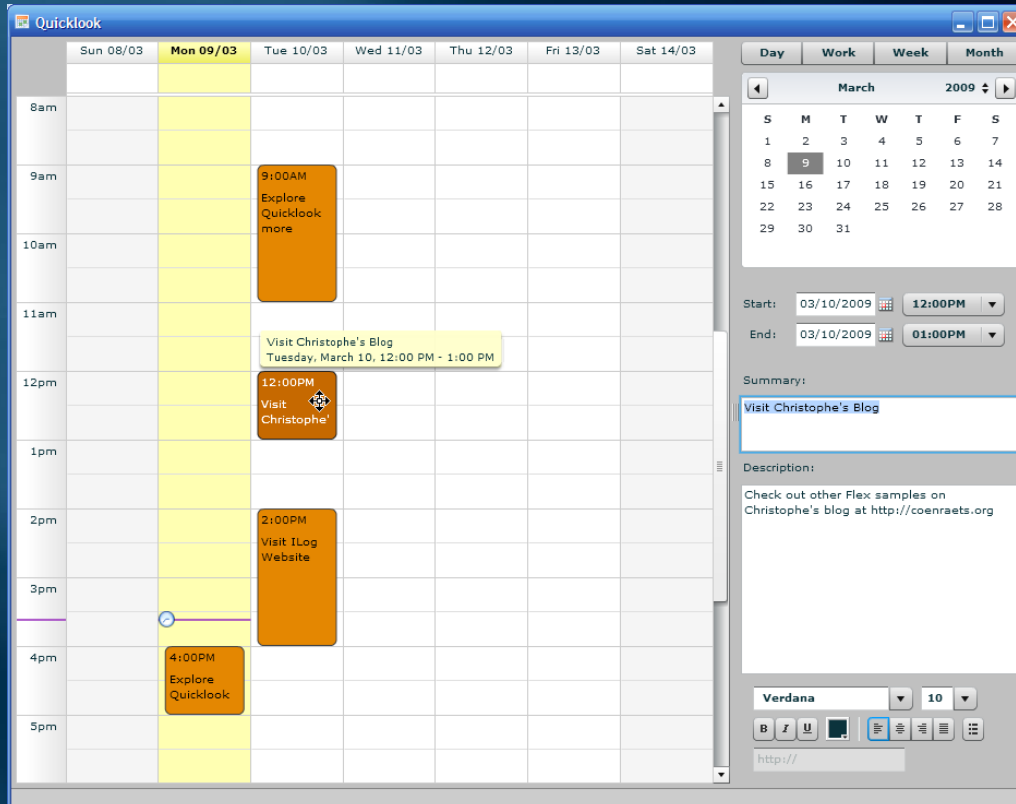
Adobe Integrated Runtime (AIR)

The Adobe AIR architecture*

* Flex Builder 3 datasheet: http://www.adobe.com/products/flex/pdfs/fb3_datasheet.pdf

AIR application sample:

Quicklook

http://www.adobe.com/devnet/air/flex/samples.html#quicklook

ActionScript

A scripting language based on ECMAScript*.

3 versions, 2 Vms:

AVM1

AS 1.0
AS 2.0

AVM2

AS 3.0

AVM2 is much faster than AVM1.

Code belong to the two different VM models cannot communicate directly.

ActionScript samples

```
AS 1.0

function MyClass()     //constructor
{

};


MyClass.prototype = new MovieClip(); //extends

MyClass.prototype.method1 = function()     //methods
{
    var myVal = 0;     // none-type
    this.newMethod2 = function() //dynamic language
    {

    }
};
```

More flexible. Similar to Javascript.

ActionScript samples

```
AS 2.0

class com.example.MyClass extends MovieClip
{
 public function MyMethod() :Void
 {
      var MyVal:Number = 0.1f;


 }
}
```
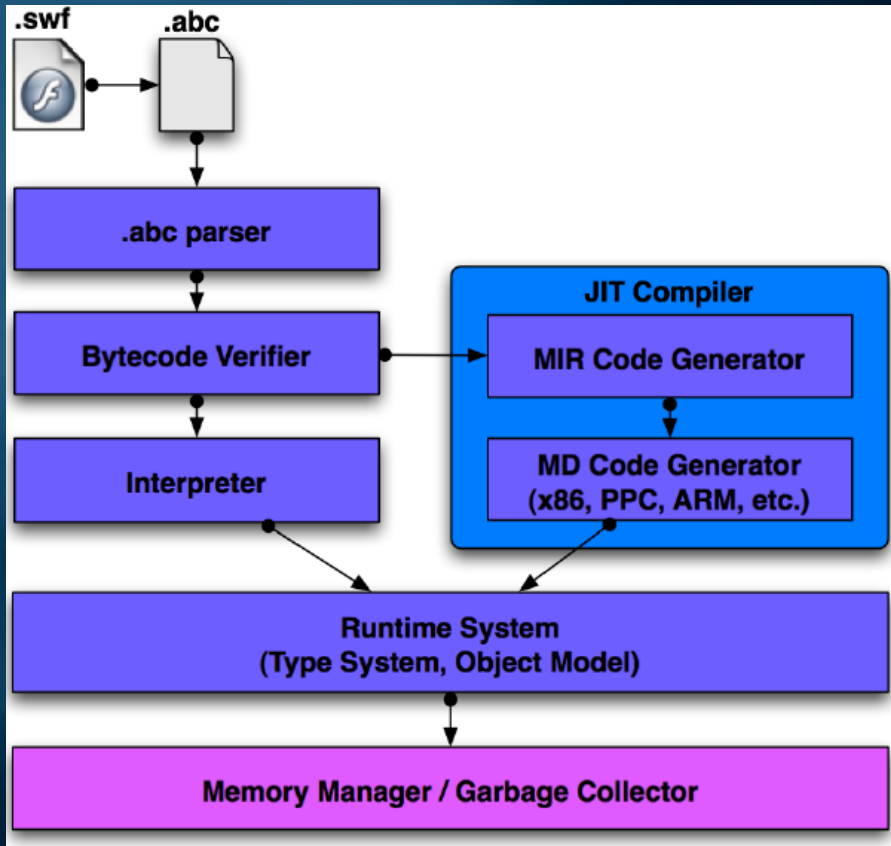
OO-based, compatible with AS1.0
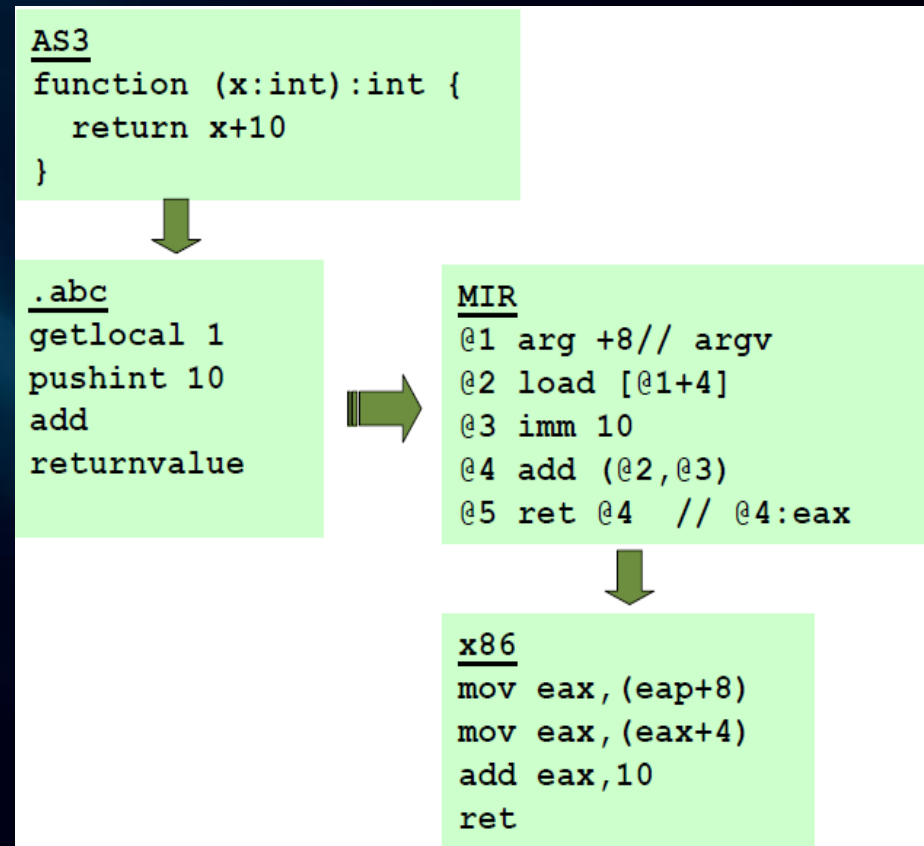
ActionScript samples

```
AS 3.0

package com.example
{
import flash.display.*;
class MyClass extends MovieClip
{
 public function MyMethod() :void
 {
        var MyVal:uint = 0xFF;
 }
}
}
```

With Type Annotations, incompatible with AS1/2

AS3.0 & AVM2

AVM2 architecture*

AS -> .abc -> MIR -> Jit code*

* Gary Grossman, *ActionScript 3.0 and AVM2:Performance Tuning*, Adobe

AS3.0 Runtimes

Display & UI

```
flash.display
{
sprite, shape,
textfield, movieclip,
Shape3D, …
}

flash.controls{
button, window, …
}

flash.filters { ..
```

Data & Network

```
flash.net
{
URLRequest, XMLSocket,
TcpSocket, SOAP, …
}

flash.xml{
XMLDoc
}
```

Multimedia

```
fl.video{
FLV playback, video
capture, camera
support, …
}

flash.media{
SoundCapture,
SoundMixer, …
}
```

AS3.0 runtime reference: http://help.adobe.com/en_US/AS3LCR/Flash_10.0/

Opensource Flash

http://labs.adobe.com/

http://osflash.org/

http://www.libspark.org/

Opensource Flash : SWF format specification

SWF FILE FORMAT SPECIFICATION (VERSION 10)

http://www.adobe.com/devnet/swf

VIDEO FILE FORMAT SPECIFICATION (VERSION 10)
http://www.adobe.com/devnet/flv

Opensource Flash : the OpenScreen Project*

* http://www.openscreenproject.org/

Opensource Flash : Tools

Flash Develop 3

http://www.flashdevelop.org/

Flex SDK 3/4

http://www.adobe.com/products/flex/flexdownloads/index.html

FlashDevelop + FlexSDK

Opensource Flash : Libs

Project List

You can freely use the library and source code which are open. Plea

AS3

- swfassist
  - The ActionScript? library to create the SWF binary
- AS3Unit
  - The Unit test framework that can write by POJO like JUnit4
- ASUnit
  - A simple Unit test framework like JUnit3.8
- ASReflect
  - The utility to do the reflection at ActionScript?3 efficiently
- AOContainer
  - Lightway container to achieve the DI (Dependency Injection)
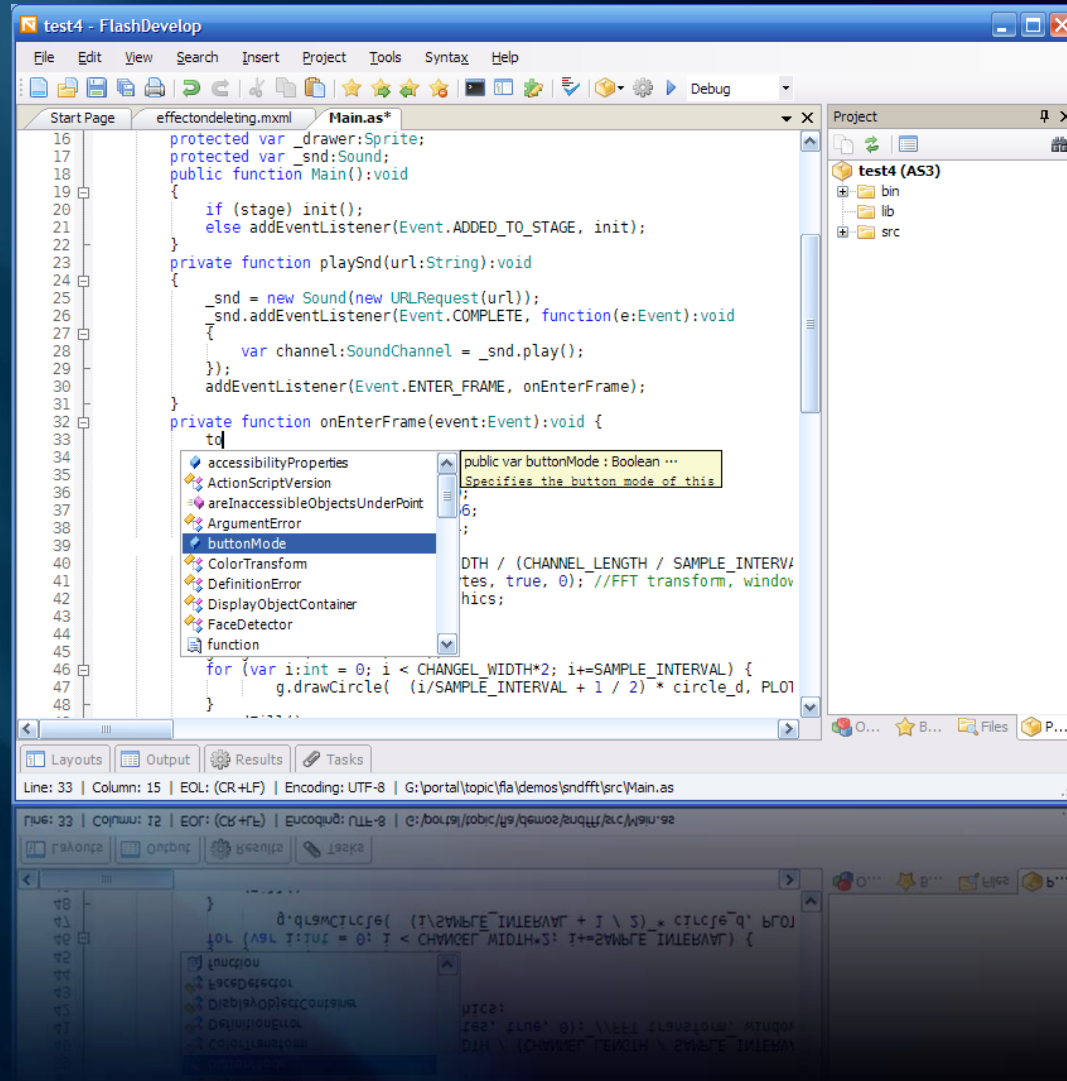
PaperVision3D

TweenLite

FLartoolkits

Etc……

* http://www.openscreenproject.org/

Flartoolkit + Papervision3d

Flartoolkit is a Augmented Reality (AR)* framework port from C++ artoolkit[1].

IV

Demos

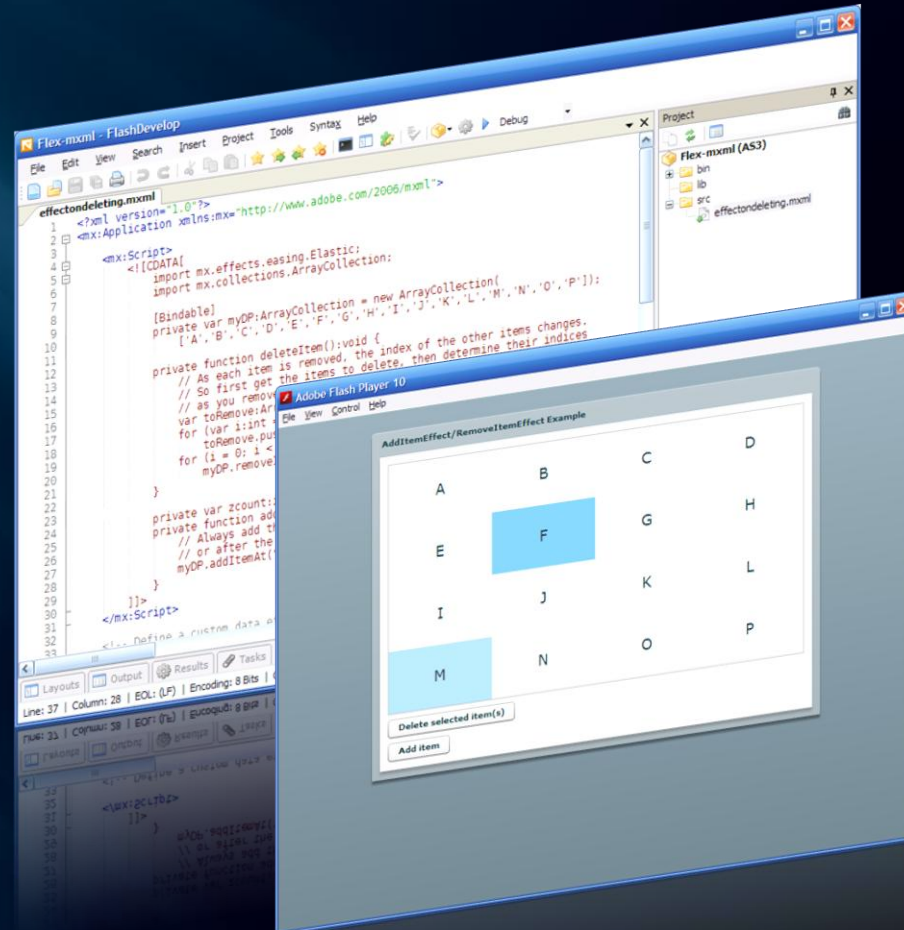TAKE THAT, ERIC SINGER.

http://www.squidder.com/flardrums/
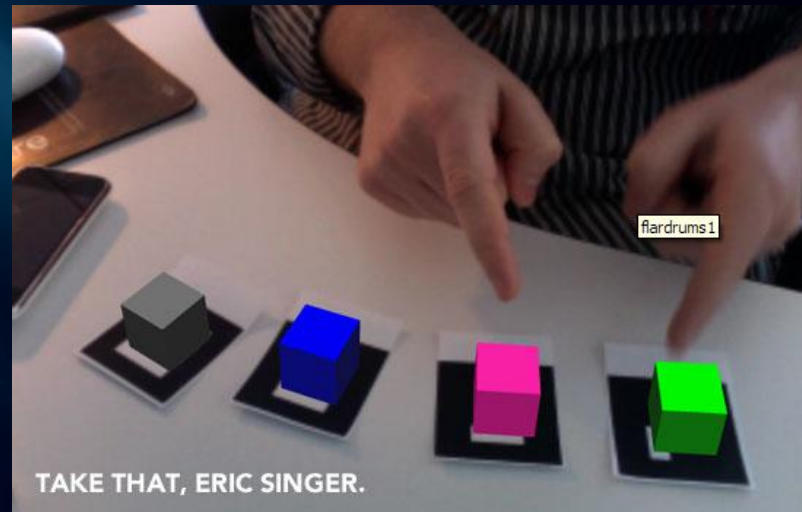
* Augmented Reality: http://en.wikipedia.org/wiki/Augmented_reality
[1] Artoolkit algorithm description: http://www.hitl.washington.edu/artoolkit/documentation/vision.htm

Flex sdk + MXML

IV

Demos

Flex sdk + FD, one by one
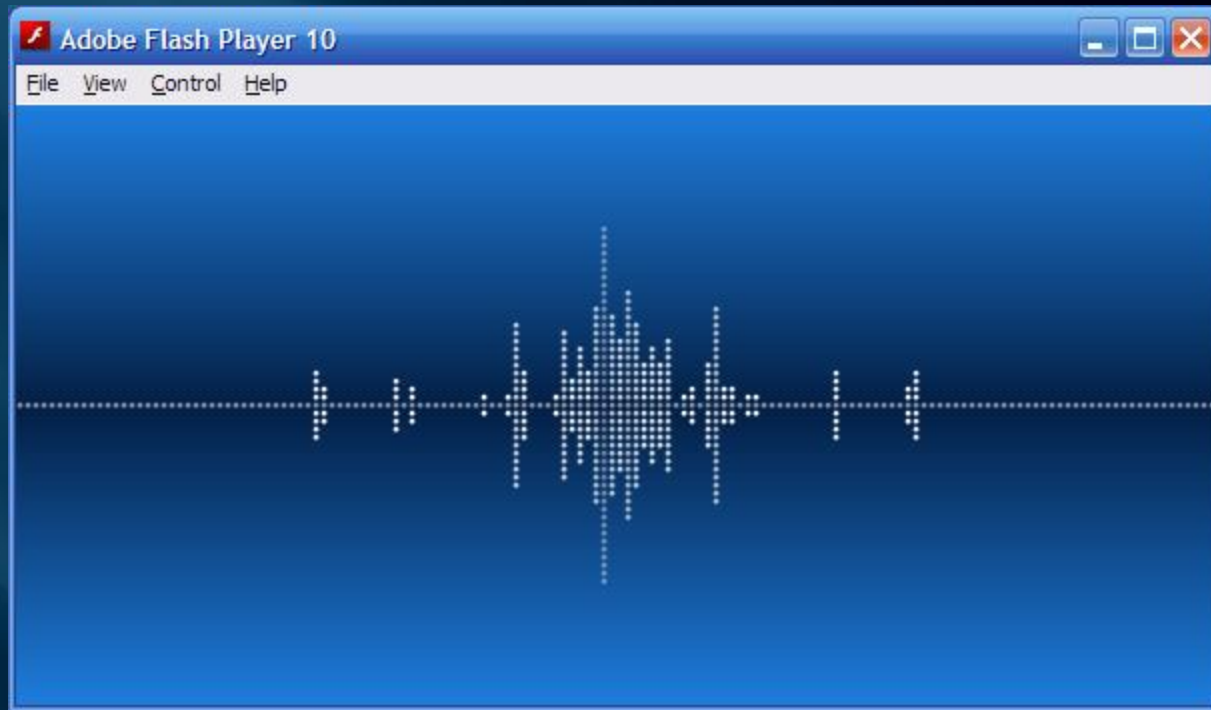
Build a sound visualization effect with 100 lines of code

demos/sndfft/bin/Sndeffect.swf

Flex sdk + FD, one by one

Build a sound visualization effect with 100 lines of code
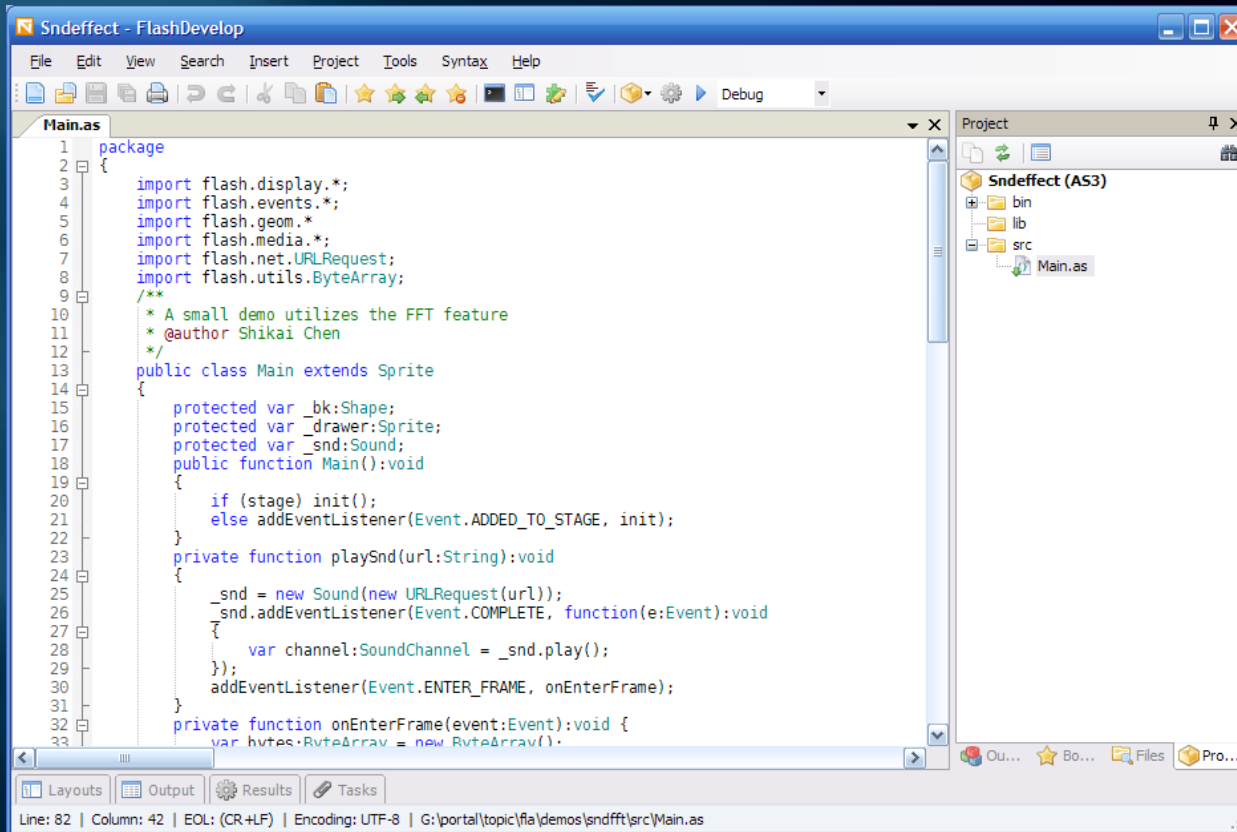
demos/sndfft/bin/Sndeffect.swf

Flex sdk + FD, one by one

Compile & run a face detection demo (based on haarcascade classifier*)

Sourcecode: http://www.squidder.com/2009/02/26/realtime-face-detection-in-flash/

demos/facedetection/bin/test4.swf

* haarcascade classifier: http://www.opencv.org.cn/index.php/特征检测专题

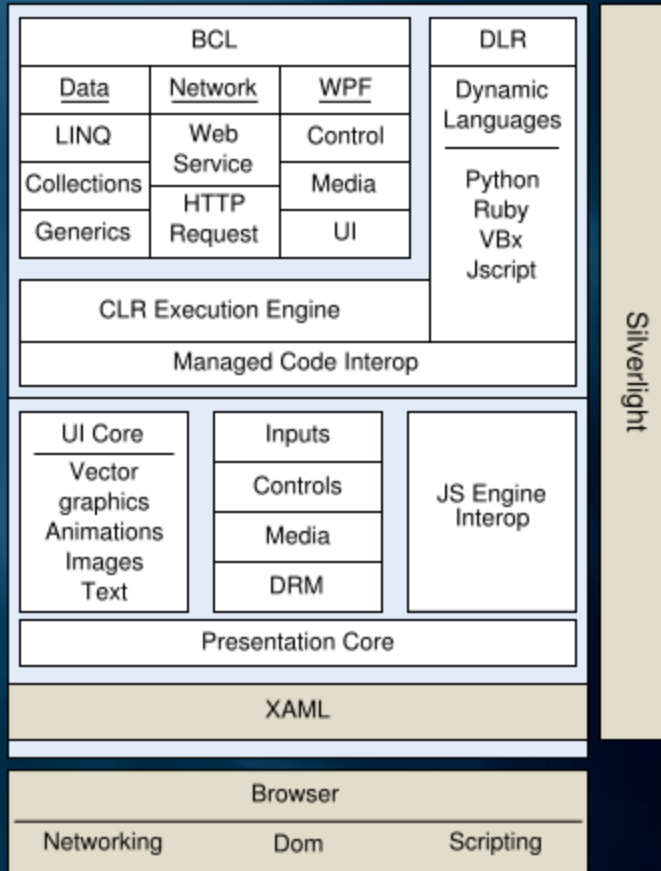# Q&A

Appendix: About Silverlight

Current Version: 2.0

Based on AXML and .net 3.0 (SL 2)
Textual content can be indexed by Search
Engines.

Silverlight 2.0

Microsoft Silverlight stack

.net framework 3.0
Multiple programming languages:
   C#, VB.net, Jscript, Ruby, …
Code is compiled into the .net assembly
A subset of WPF UI model
Includes Deep Zoom* technology

* Deep Zoom: http://en.wikipedia.org/wiki/Deep_Zoom
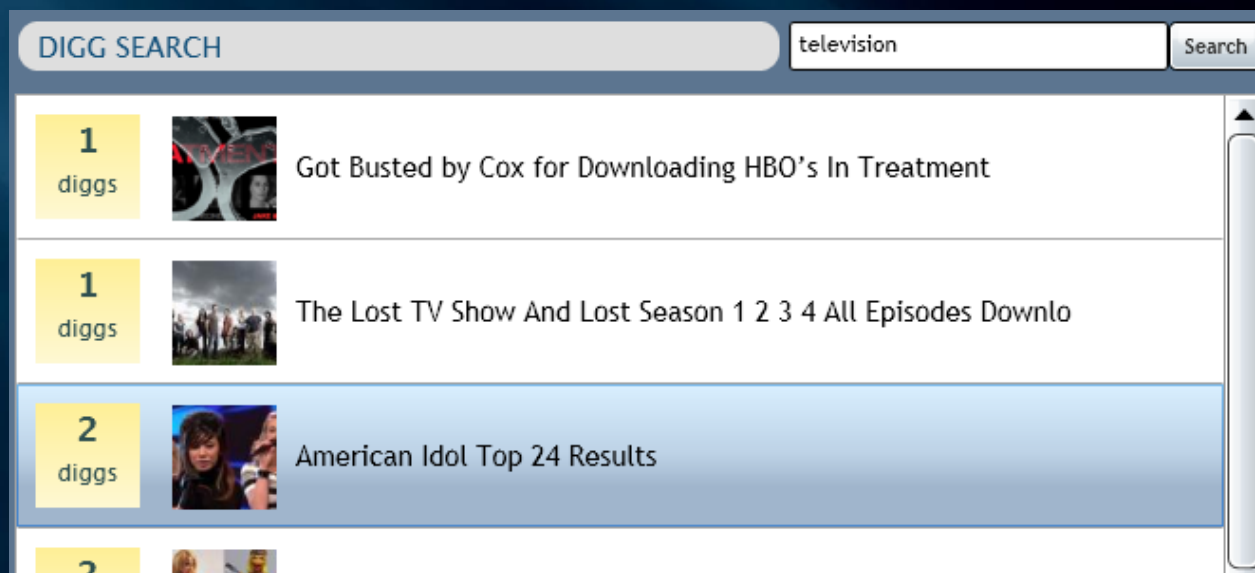
AIR vs Silverlight

	AIR(Flash)	Silverlight
Languages	AS1/2/3, JS	CLR & etc…
Source	MXML/Fla	XAML
Platforms	Win32, Linux, MacOS, WinCE, FlashLite	Win32, Linux*, MacOS, WinCE
SDKs	FlashIDE/Flex /Thirdparty	VisualStudio2008+ Expression Blender
Tool chains	PS/AI/Fr/…	Expression Blender
Runtime Env.	FlashPlugin FlashPlayer Air framework	Silverlight Plugin
Search Engine support	No	Yes
Multithread	No	Yes

AIR vs Silverlight : UI design

Default UI look&feel of Flex

Default UI look&feel of SL

AIR vs Silverlight : Runtime size

1.7MB Flash Player Win Binary Size
4MB+ Silverlight Player Win Binary Size
4MB+ Flash Player MACOSX Binary Size
14MB Adobe AIR Runtime Size
18.5MB Silverlight Player MACOSX Binary Size

Thanks