

Intro to Flash Player 10

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New Features

- Pixel Bender / Shader support
- Foundational 3D support
- Drawing API 2.0
- Improved FileReference
- Dynamic sound capabilities
- Vectors (typed arrays)
- Low-level text support

New Features

Presentation Focus

- Pixel Bender / Shader support
- Foundational 3D support
- Drawing API 2.0
- Improved FileReference
- Dynamic sound capabilities
- Vectors (typed arrays)
- Low-level text support

Getting Started

- Grab a recent Flex SDK build (2008.05.15 or later)
- Add the SDK to Flex Builder 'sdks' directory
- In Flex Builder, create a new ActionScript project
- Click the 'Configure Flex SDKs...' link

Getting Started

- Add a listing for the new SDK
- Target the SDK for your project
- In the build path window, toggle to 'Library path' tab
- Remove the 'playerglobal.swc' listing under the SDK

Getting Started

- Click the 'Add SWC' button and browse to the new SDK
- Browse to 'frameworks/libs/player/10/' and select 'playerglobal.swc'
- Once added, click the toggle-arrow next to 'playerglobal.swc'

Getting Started

- Double-click 'Link Type' and set it to 'External'
- Finish setting up your new project

Publishing

- Make sure HTML wrapper requires FP 10.0.0
- Open SWF in hex editor; 4th byte should be '0A'

Code Assist

- Works for all new classes
- Pre-existing classes with changes have issues

Vector

- Typed Array
- Significantly better performance than Array
- Format: `Vector.<Type>`

Vector

- `var verticies:Vector.<Number> = new Vector.<Number>();`
- `verticies.push(0, 0, 100, 0, 0, 100);`
- `var verticies:Vector.<Number> = Vector.<Number>([0, 0, 100, 0, 0, 100]);`
- `var verticies:Vector.<Number> = new Vector.<Number>(6);`

Graphics API 2.0

- drawPath
- drawGraphicsData
- drawTriangles

Graphics API 2.0

drawGraphicsData

- fills - GraphicsSolidFill, GraphicsGradientFill, GraphicsBitmapFill, GraphicsShaderFill
- strokes - GraphicsStroke
- paths - GraphicsPath, GraphicsPathCommand

Graphics API 2.0

drawGraphicsData

- `var graphicsData:Vector.<IGraphicsData> = new Vector.<IGraphicsData>();`
- `graphicsData.push(fill, path);`
- `graphics.drawGraphicsData(graphicsData);`

Foundational 3D Support Basics

- DisplayObjects now have a Z axis (z, rotationZ, etc)
- Right-handed coords, flipped 180 around X axis
- DisplayObject.transform.matrix3D
- DisplayObject.transform.perspectiveProjection
- z does not trump depth

Foundational 3D Support

PerspectiveProjection

- Projection matrix
- Use 'fieldOfView' to set focalLength
- $\text{focalLength} = \text{centerY} / \text{Math.tan}((\text{fieldOfView} * (\text{Math.PI} / 180)) * 0.5);$

Foundational 3D Support Homogeneous Coordinates

- For affine transformations; projective space
- Represented as (x, y, w) or (x, y, z, w)
- w is a scalar
- Applied as $(x * w, y * w)$

Foundational 3D Support

Homogeneous Coordinates

- Vector3D has x , y , z , and w
- UV coords refer to w as t in Flash (u , v , t)
- $w = \text{focalLength} / (\text{focalLength} + z)$;

Foundational 3D Support

3D Utilities

- `Utils3D.pointTowards`
- `Utils3D.projectVector`
- `Utils3D.projectVectors`
- `Utils3D.projectVectors(projection.toMatrix3D(), vertices3D, vertices2D, uvData);`

Foundational 3D Support

Graphics.drawTriangles

- New in Drawing API 2.0
- Better performance and improved texture quality

Foundational 3D Support

Graphics.drawTriangles

- `plane.graphics.beginBitmapFill(texture.bitmapData);`
- `plane.graphics.drawTriangles(vertices, indices, uvData, TriangleCulling.POSITIVE);`
- `plane.graphics.endFill();`

Foundational 3D Support Graphics.drawTriangles

- Culling increases performance by drawing only what is visible to the camera
- Culling uses sign of dot product of camera (view plane) vector and surface normal of triangle
- Culling can be NONE, POSITIVE, or NEGATIVE

Pixel Bender

- 2D pixel shader language
- Similar to HLSL and GLSL, but only fragment (aka pixel) shading
- Easy to create custom filters (kernels) for Adobe products

Pixel Bender

Flash Player Limitations

- ShaderModel 3.0 targeted for Photoshop, After Effects
- ShaderModel 2.0 targeted for Flash Player
- Needed to support wider range of hardware
- May target ShaderModel 3.0 for FP 11

Pixel Bender Shaders In Flash

- Can be used as:
 - Fill - `Graphics.beginShaderFill`
 - Filter - `ShaderFilter` with `BitmapData.applyFilter` or `DisplayObject.filters`
 - Blend mode - `DisplayObject.blendShader`
 - Generic number crunching - `ShaderJob`

Pixel Bender Shaders In Flash

- Can be loaded externally or embedded
- `[Embed(source="../../../assets/filters/MyFilter.pbj", mimeType="application/octet-stream")]`
`protected var MyFilter:Class;`

Pixel Bender Shaders In Flash

- `var shader:Shader = new Shader(new MyFilter());`
- `shader.data.myInput.input`
- `shader.data.myParameter.value`

Pixel Bender

Generic Number Crunching

- Useful for complex calculations; i.e. audio effect filter
- Use ShaderJob
- Processes shader on different thread than ActionScript
- Dramatically faster than optimized ActionScript

Pixel Bender

Generic Number Crunching

- ShaderJob dispatches an event when the shader has completed
- Set Pixel Bender kernel input to image1
- Set Pixel Bender kernel output to pixel3 or pixel4
- NOTE: output should be pixel1 or pixel2, but a current limitation in Pixel Bender Toolkit prevents this

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More FP10 info at:
www.boostworthy.com/blog