

Autodesk® FBX® SDK

Animation



Video

<ftp://sparks:Sparks2012@87.106.97.50/>

or directly:

IP address: 87.106.97.50

- User name: *sparks*
- Password: *Sparks2012*
- *FBX_SDK_webcast* folder contains the video and handouts from yesterday

Exercise – Unit 4

- Create a cube
- Create materials for each side of the cube
- OPTIONAL: Create a sphere
- OPTIONAL: add a texture to the sphere
- Export the scene to ASCII FBX format (nothing new to do here)
- Open FBX file in ASCII text editor and review files contents

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FBX SDK Webcast Agenda

- Day / Hour 1 – Welcome to FBX SDK
- Day / Hour 2 – SDK Object Model
- Day / Hour 3 – Scenes Import/Export
- Day / Hour 4 – Geometry
- **Day / Hour 5 – Animation**

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Animation

- Time
- Animation Classes
- Animation Data Structures
- Animating a Node
- Storing Animation in a Vertex Cache

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Time

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Time

- FbxTime
 - An FBX unit of time is = $1/46,186,158,000$ of one second
 - Used to represent a “moment”
- FbxTimeSpan
 - Used for Time intervals

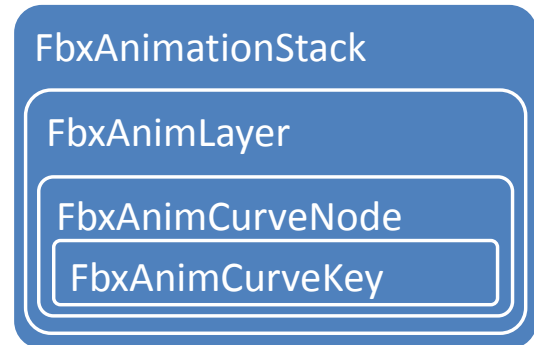


Animation Classes



Animation Layout

1. [FbxAnimStack](#)
2. [FbxAnimLayer](#)
3. [FbxAnimCurveNode](#)
4. [FbxAnimCurve](#)
5. [FbxAnimCurveKey](#)

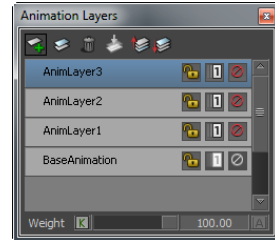


FbxAnimStack

- equivalent to one “take” of animation
- The Animation stack is a collection of animation layers
- The Fbx document can have one or more animation stacks
- The "stack" terminology comes from the fact that the object contains 1 to n animation layers that are evaluated according to their blending modes to produce a resulting animation for a given attribute

FbxAnimLayer

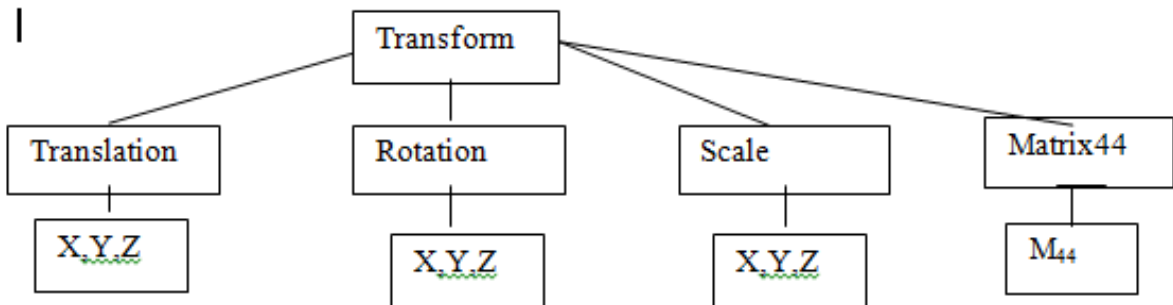
- The animation layer is a collection of animation curve nodes
 - stores a variable number of [FbxAnimCurveNode](#)
 - provides different states flags
 - animatable weight
 - blending mode flag



FbxAnimCurveNode

- composite of animation curves
- connection point for animation curves and properties
- Can be composited (IsComposite())

FbxAnimCurve



FbxAnimCurve

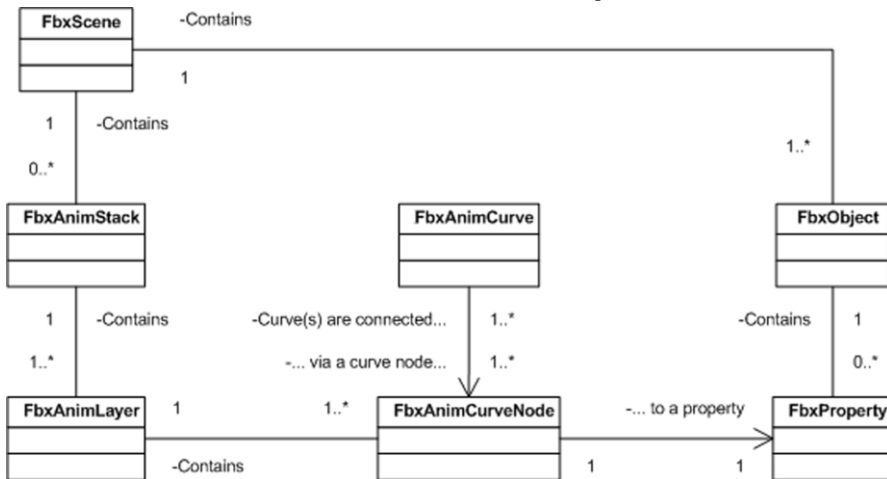
- defined by a collection of [FbxAnimCurveKey](#)s and indicating how a value changes over time
- often called a function curve or Fcurve
- affects how an animatable attribute of an FBX object varies with time
- can be connected to many curve nodes
 - one animation curve can animate many properties of many FBX objects

FbxAnimCurveKey

- Key is defined by time and a value
- tangents that control how the animation curve enters and exits the key

Animation Data Structure

Animation relationships



Deeper Examination of Anim Layers

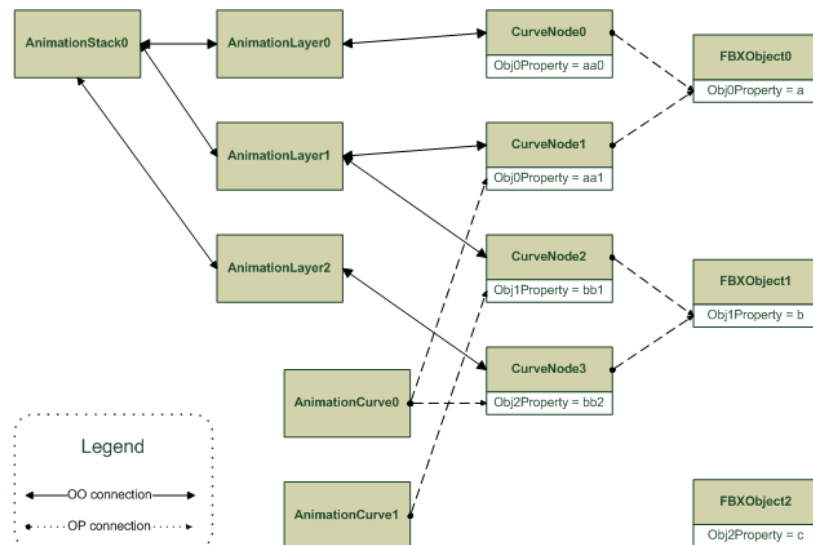
Animation Layers

- Can be used to “blend” animation
 - For example, smooth transition for walking to running sequence
- need multiple animation layers
 - walk-run example, you would need two animation layers
 - Layer0 containing the animation curve nodes for the walking animation
 - Layer1 containing the animation curve nodes for the running animation.

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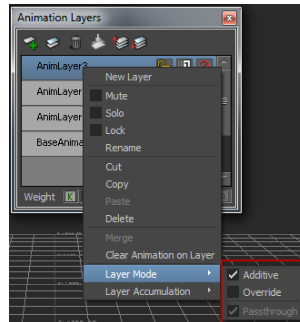
Animation Layer Example



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Blend Modes



Blend Modes – Additive Mode

- The animation layer “adds” its animation to layers that precede it in the animation stack and that affect the same FBX properties.
- For example, if AnimLayerA and AnimLayerB both contain curve nodes that control the X translation of an FBX node, the resulting X translation is the sum of the X translation values from both layers.

Blend Modes – Override Mode

- The animation layer overrides the animation of any layer that contains curve nodes that control the same FBX properties and that precedes it in the animation stack.
- For example: AnimLayerA and AnimLayerB are both in Override mode. The X translation value for an FBX object on AnimLayerA is 10, and on AnimLayerB X translation has a value of 15. In the resulting animation, the FBX object will have a translateX value of 15.

Blend Modes – Override-Passthrough mode

- If AnimLayerC is in Override mode, the layer is always completely opaque, blocking all animation from curve nodes in preceding layers that affect FBX properties that are also affected by AnimationLayer3.
- When the layer is in Override-Passthrough mode, you control the opacity of the layer by animating its Weight value.

Bypassing the blend mode

- For some data types, you may not want one layer to “blend” with another layer
 - For example booleans
- Use “blend mode bypass” flag to toggle
 - Get/SetBlendModeBypass
 - Takes EFbxType

Animating a Node

Evaluating Animation

- [FbxAnimEvaluator](#)
 - use when you need to evaluate the animation in a scene
 - creates a [FbxAnimEvalClassic](#) object

```
FbxAnimEvaluator* mySceneEvaluator = MyScene->GetEvaluator();
```

Animating a Node

- Minimal:
 - One animation stack
 - One animation layer
 - One animation curve

Storing Animation in a Vertex Cache

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Storing Animation in a Vertex Cache

- geometries can be deformed using skinning, shapes, or **vertex caches**
 - a way to store directly the vertex animations inside a **cache file**
- **No need for evaluation engine**
- **Streaming data from a file (low memory requirements)**

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Let's walk through the Animation Sample

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Additional Resources

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Compatibility Charts

- <http://usa.autodesk.com/adsk/servlet/index?siteID=123112&id=14376272>
 - 3ds Max
 - Maya
 - MotionBuilder
 - Mudbox
 - Softimage

Continued Learning

- <http://www.autodesk.com/developfbx>
 - Developer Center for FBX SDK
- Autodesk Developer Network – Sparks Program
- Around the Corner (**New Blog**)
 - <http://around-the-corner.typepad.com/>

Exercise

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