Autodesk® FBX® SDK

Welcome to FBX SDK

FBX SDK Webcast Agenda

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

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Welcome!

- What is FBX Technology?
- Why use the FBX SDK?
- The FBX SDK Structure
- Learning and Support

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What is FBX Technology?

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What is FBX?

- An extensive Binary/ASCII format that supports the storing, conversion and transportation of 3D scenes as well as 2D data, audio and video
- A set of I/O plug-ins for host applications
- A file converter
- An independent viewer, embedded in QuickTime
- A free SDK to access and convert 3D elements, available on Windows / Linux / Mac OS

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FBX SDK

- C++ software development kit (SDK)
  - Has Python support through wrappers
  - See "**Scripting with Python FBX**" in docs for details
- lets YOU create plug-ins, converters, and other applications that use Autodesk FBX technology
- through programming and customization, you have the power of creating and consuming content that other industry standard apps are using

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What can I do with the FBX technology?

- "The Workflow Enabler"
  - Common / Unified file format
  - Convert / Exchange common 3D concepts that are expressed differently between applications
- Real-time animation evaluation tool
  - can unify results across applications
- Data exchange for middleware solvers

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Where FBX Fits in the Production Pipeline

- Content Developers
  - Sharing scene assets (interoperability)
  - Storing scene assets
  - Processing animation
  - Packaging models (for sale or sharing)

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Where FBX Fits in the Production Pipeline

- Designers
  - save models, metadata, and other assets in a common file format
  - Autodesk applications with direct support
  - Via SDK, other applications and customization

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FBX and Autodesk

- 3ds Max
- 3ds Max Design
- Maya
- MotionBuilder
- Mudbox
- Flame, Flint, Inferno, Smoke
- Softimage
- Revit
- AutoCAD
- Many 3rd parties are also using it!

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Why use the FBX SDK?

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The Three Levels of Interoperability

1. Perfect Compatibility
2. Data (Interpolated) Compatibility
3. Emulated Compatibility

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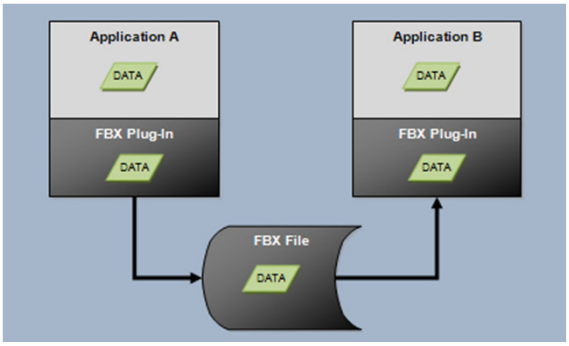
Perfect compatibility

- Data passed from a source application is recognized by the destination application, yielding identical results.



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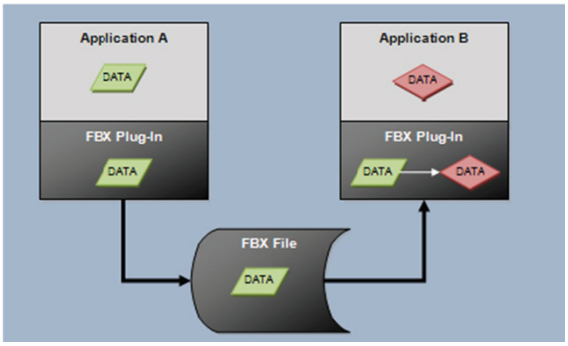
Data (Interpolated) Compatibility

- Two applications do not use identical algorithms to achieve certain functionality.
- Data passed between the applications is converted or interpolated to yield results that are functionally equivalent.



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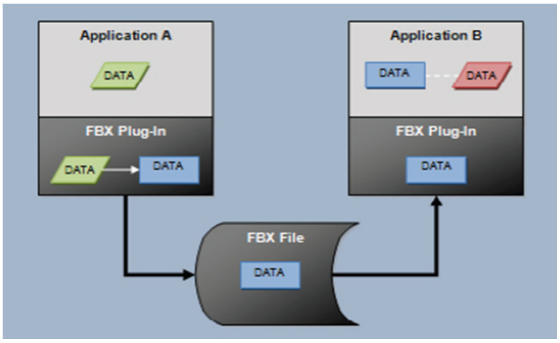
Emulated Compatibility

- Two applications have completely different capabilities.
- Baked data transfers visual fidelity.
- The ability to manipulate and edit baked data is limited.



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Anatomy of an FBX Application

Application

FBX Plug-in

FBX SDK

FBX Plug-in is responsible for:

- Interfaces between FBX SDK scene graph and host application scene graph
- Commands the FBX SDK to
  - Import/Export scenes
  - Apply data manipulation and conversion
- Implements application specific data manipulation

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Example

Application

FBX Plug-in

FBX SDK

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The FBX SDK Structure

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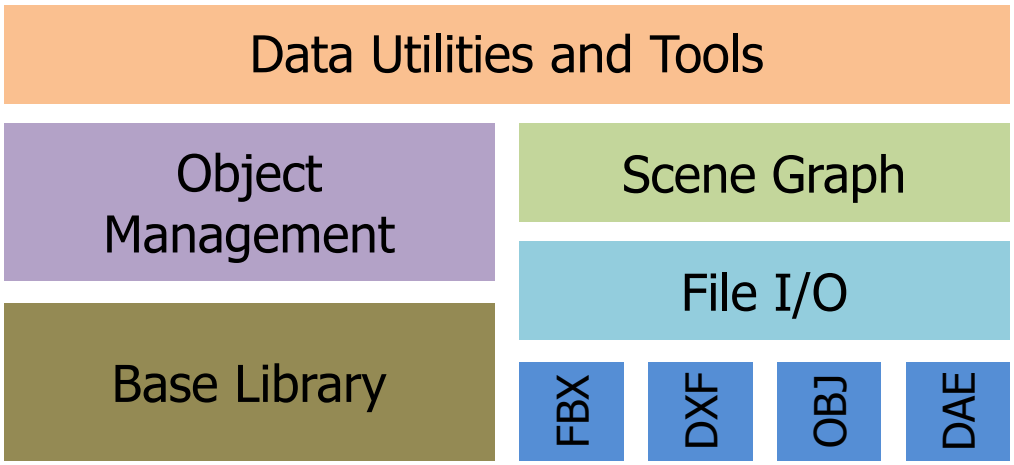
FBX SDK Structure



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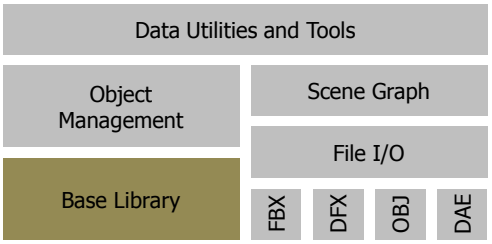
Base Library



Located in files such as:

- core/arch/fbxtypes.h
- core/base/fbxarray.h
- core/base/fbxstring.h
- core/math/fbxmatrix.h
- core/sync/fbxthread.h

- Architecture definition
- Debugging tools
- Memory allocator override
- Types definition
- Utility classes such as Array, BitSet, File, Folder, Map, String, Time, TimeCode, etc.
- Mathematic classes such as Vector, Matrix, Quaternion, etc.
- Synchronization classes such as Mutex, Thread, Clock Timing, Atomic Operations, etc.

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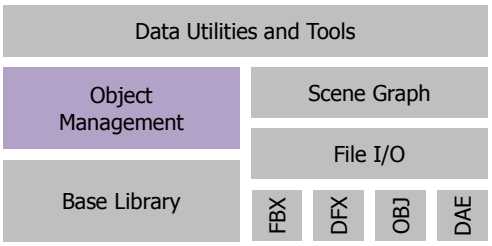
Object Management



Located in files such as:

- core/fbxmanager.h
- core/fbxobject.h
- core/fbxproperty.h
- core/fbxplug.h
- core/fbxevent.h

- Manager is the entry point
- Object instancing and destruction
- Object searching
- Garbage collection upon manager destruction
- Objects can have:
  - Bi-Directional connections to each other to express relation
  - Static typed properties
  - Dynamic properties
- Object properties can also use connection mechanisms

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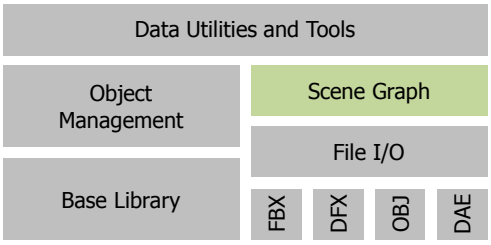
Scene Graph



Located in files such as:

- scene/fbxdocument.h
- scene/animation/fbxanimcurve.h
- scene/geometry/fbxmesh.h
- scene/constraint/fbxcharacter.h
- scene/shading/fbxsurfacematerial.h

- Central part of the SDK
- Describe the elements of a scene
- Instancing is represented using connection mechanics
- Animation data modifying elements over time
- Animation evaluation state is cached for real-time performance
- Multiple scenes are allowed to co-exist, but connections between their elements are forbidden

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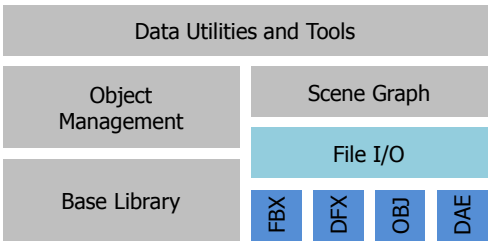
File In/Out



Located in files such as:

- fileio/fbximporter.h
- fileio/fbxexporter.h
- fileio/fbx/fbxreaderfbx7.h
- fileio/fbx/fbxwriterfbx7.h
- fileio/collada/fbxreadercollada14.h

- Bridge between SDK scene graph and files
- The SDK itself knows how to read and write
  - FBX Binary/ASCII (.fbx)
  - AutoCAD (.dxf)
  - Wavefront OBJ (.obj)
  - Collada (.dae)
  - 3D Studio (.3ds) *read-only*
- Users can extend the SDK with their own file format reader and writer

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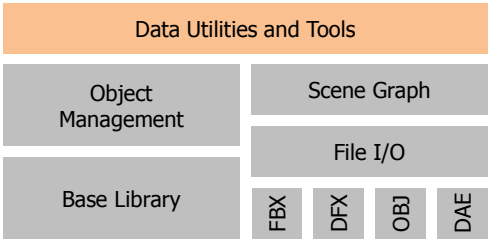
Data Utilities and Tools



Located in files such as:

- utils/fbxgeometryconverter.h
- utils/fbxmanipulators.h
- utils/fbxmaterialconverter.h
- utils/fbxrenamingstrategy.h
- utils/fbxusernotification.h

- Conversion routines
- Animation processing
  - Pivots conversion
  - Animation curve filters
- Tesselation
  - Mesh
  - NURBS
  - Patch
- Material processing
  - Split mesh per material
- Name handling
- Camera manipulators

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Platform Requirements

- 32-bit and 64-bit
- Windows
  - XP (SP2+)
  - Vista (but why? hahaha)
  - Windows 7
- Linux (need GCC version 4.0.2 and above)
- Mac OS (Versions 10.4 and above, with Intel processors)
- [optional] Python 2.6 or Python 3.1
  - See "**Scripting with Python FBX**" in docs for details

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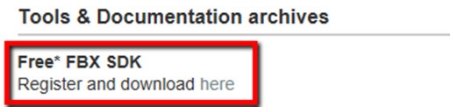
Download and Installation

- http://www.autodesk.com/developfbx



- Download and install the version(s) you need
  - compiler and OS specific
  - each comes with both static and dynamic libraries

Download and Installation

- Directory Structure

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Learning and Support

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Documentation

- Online
  - can optionally be downloaded
- FBX SDK Programmer's Guide
- C++ Reference
  - No specific reference for Python
  - See "**Scripting with Python FBX**" in docs for details

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Naming Conventions

- 'Fbx' - Most FBX SDK class names
- 'p' - Parameters passed to a member functions
  - Examples: pWriteFileFormat, pScene, pFilename
- 'l' - Local variables
  - Examples: lWriteFileFormat, lScene, lFilename
- 'g' - Global variables
  - Examples: gStart, gStop, gCurrentTime
- 'm' - Member data (member variables)
  - Examples: mDescription, mImportname, mSelect

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Other Resources

- http://www.autodesk.com/developfbx
  - Developer Center for FBX SDK
  - Includes blogs, forums, etc.
- Email: fbxsdk@autodesk.com
- Autodesk Developer Network – Sparks Program

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Tips / Tricks

- Samples
  - .\FbxSdk\2013.1\samples
- Tips / Tricks
  - Project Settings
  - Environment variables
  - Symbol locations

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Reporting Issues

- Let us know about FBX SDK defects / wish list items:
  - Log defects here:
    - http://www.autodesk.com/fbx-bugreport
  - Log software wish list items here:
    - http://www.autodesk.com/fbx-sug

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Exercise

- Install and configure SDK
- Make sure your compiler is working with the samples
  - Build the samples
- Review the online documentation
- email: kevin.vandecar@autodesk.com

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