# Autodesk MotionBuilder 2013
## Programming in MotionBuilder || Focusing on Python

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Module 4

# Elements and Properties in the Scene

*Module 4*

# Module's Agenda

- Elements in the Scene
  - Creating New Elements
  - Working with Existing Elements
  - Removing Elements
- Properties of Scene Elements
- Assignment

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# FBModel Class

- – Derives from FBBox, which is the base class of any animatable element in the scene.
- – Define an object's transformation data:
  - Translation, Rotation and Scaling properties (local only)
  - GetVector() and SetVector() functions (local and global).
  - transformation matrix with GetMatrix() and SetMatrix()
- – Parent and Children attribute properties let you traverse the model's hierarchy
- – Access to animation/keyframe data is through AnimationNode (FBAnimationNode)
- – Defines a wide variety of properties

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# Model Properties

| Property | Description |
|---|---|
| FBModel.Geometry | A geometric object to be rendered at the model's position in the scene |
| FBModel.Materials | A list of materials (FBMaterial) to be applied to the model's geometry |
| FBModel.Textures | A list of textures (FBTexture) to be applied to the model's geometry |
| FBModel.Shaders | A list of shaders (FBShader) to be applied to the model's geometry |
| FBModel.ShadingMode | An enumeration value (FBModelShadingMode) used to control the model's shading mode |
| FBModel.LookAt | An FBModel object to look at in the scene. Useful for pointing cameras and spotlights |
| FBModel.UpVector | An FBModel object indicating the up vector of the current model. Useful for orienting a camera |
| FBModel.Show | A boolean value (True, False) indicating whether or not the viewer should show the object according to its visibility value (FBModel.Visibility). |
| FBModel.Pickable | A boolean value (True, False) indicating whether or not the model can be picked in the viewer. |
| FBModel.RotationOrder | An enumeration value (FBModelRotationOrder) used to specify the rotation order of the model |

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# FBModel Derived Classes

It is the parent of several specialized types:

- Cameras (FBCamera)
- Lights (FBLight)
- Cubes (FBModelCube)
- Markers (FBModelMarker)
- Nulls (FBModulNull)
- Optical (FBModelOptical)
- 3D Path (FBModedPath3D)
- Plane (FBModelPlane)
- Model Root (FBModelRoot)
- Skeletons (FBModelSkeleton)

# Creating New Elements

- Creating elements using corresponding class constructor
- Global function:
  - FBCreateObject( str pGroupName, str pEntryName, str pName, pData = None, int nth = o)
  - Create objects that are not officially exposed to python

# Working with Existing Elements

- FBSystem
  - A singleton class exposes many system properties.
  - contains references to MotionBuilder scene
- FBScene
  - A list of all the scene elements
  - One only instance of FBScene available at any given time

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# Working with Existing Elements

- FBModel ➜ FBBox➜ FBComponent
- FBComponent : base entity class
  - Define common object characteristics, including creation and destruction methods
  - Provide a scheme for property management
  - FBSystem().Scene.Components
- Determine if an object is of a certain type
  FBPlug.Is( int  pTypeId )
  pTypeId: FBClassName_TypeInfo()

# Working with Existing Elements

- Scene Graph
  - A parent/child hierarchy of scene elements
  - FBModel.Parent, FBModel.Children
  - FBScene.RootModel
    - when an instance of FBModel is created, it is automatically added as a child to the root model

# Working with Existing Elements

- Namespace management
  - FBNamespace
    - Facilitate the use of namespaces among scene elements
  - FBScene:
    - FBScene.Namespaces
    - Namespace related functions:
      - NamespaceGetContentList()
      - NamespaceSelectContent()
      - NamespaceDeleteContent()
      - Etc...

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# Working with Existing Elements

- Global functions in fbsystem.h
- Access to Objects/Models
  - FBFindObjectsByName()
    FBFindObjectByFullName()
  - FBFindModelByLabelName()
    FBFindModelByName (deprecated)
    FBFindModelsOfType()
- Selection
  - FBGetSelectedModels()

# Removing Elements

- Global function:
  - FBDeleteObjectsByName()
- There are two options for deleting items in the scene FBDelete and FBDestroy:
  - FBDelete: deletes the wrapper (instance) and the object
  - FBDestroy: only deletes the wrapper (instance)

# Assignment

- Create a script for each of these element types:

- 3D Curve
- Camera
- Cube
- Handle
- Light
- Marker

- Note
- Null
- Optical
- Plane
- Skeleton
- Root

- Some will be very straight forward other's you will need to make the objects show up, ensure the properties are set the same as the Asset Browser > Templates > Elements

- Play around with the functions we introduced to find objects, select them, change their properties or delete them