

Autodesk Maya  
modeling, animation, scripting  
and C++ programming  
2016-17

[lionel.reveret@inria.fr](mailto:lionel.reveret@inria.fr)

Cours ENSIMAG, Ingénierie de l'Animation 3D

# Maya animation

- Key-frame animation
  - Attributes are function of time
- Reactive animation
  - Attributes are function of other attributes
- Deformers
  - Non-linear modification of shape and space
- Physical animation
  - Attributes are driven by laws of dynamics ( $F=ma$ )

# Key-frame animation Practical

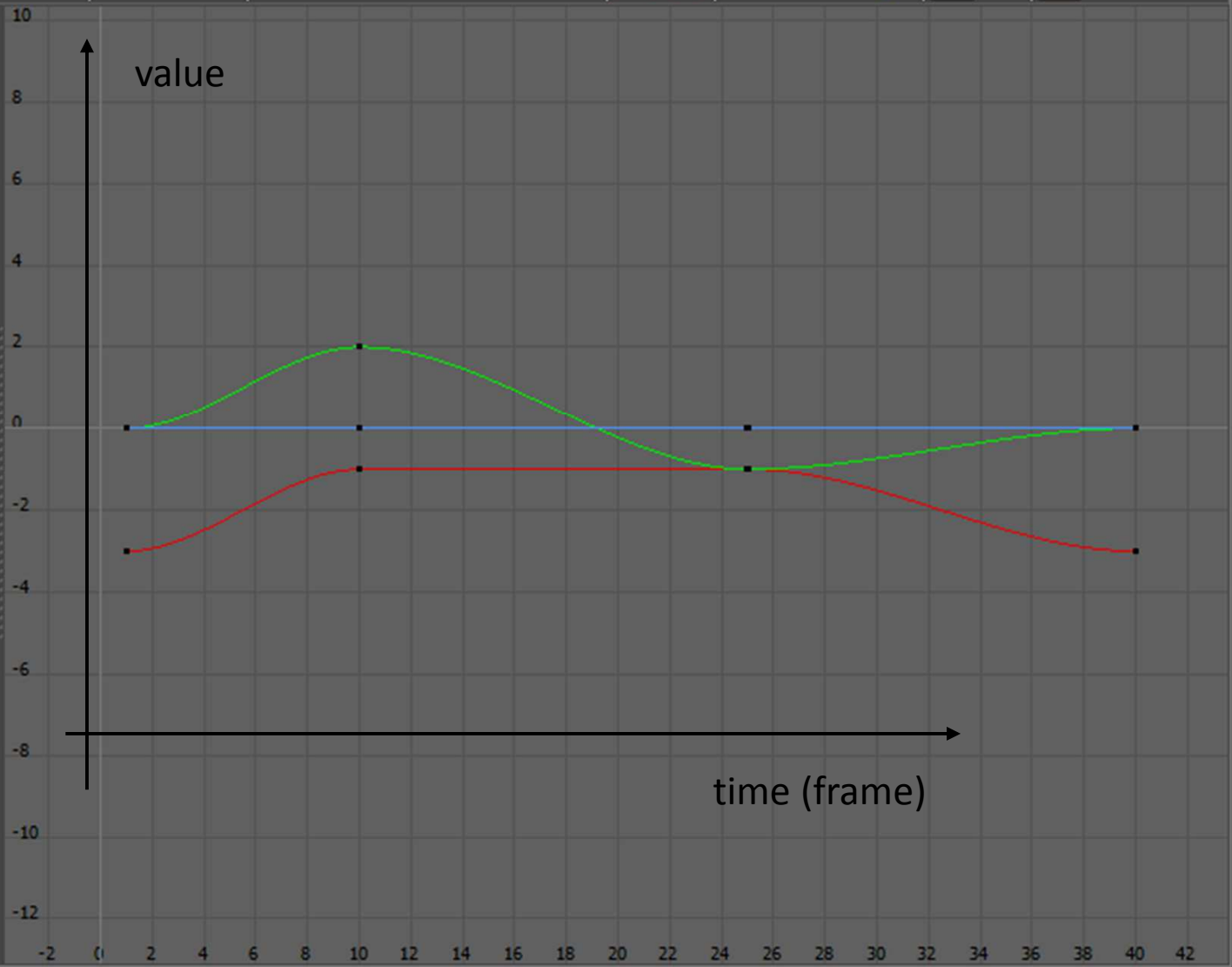
- Select an object to animate
- Press the 'S' key to set an animation key
- Choose another time using the time slider
- Edit an attribute of the object to animate (move, rotate, scale...)
- Press the 'S' key to set an other animation key
- Playback using the play button
  - set frame rate to 24fps in the preferences  
(button at the bottom right corner next to a key icon).
- Visualize/Edit animation curves in the Graph Editor

# Graph Editor

Edit View Select Curves Keys Tangents List Show Help

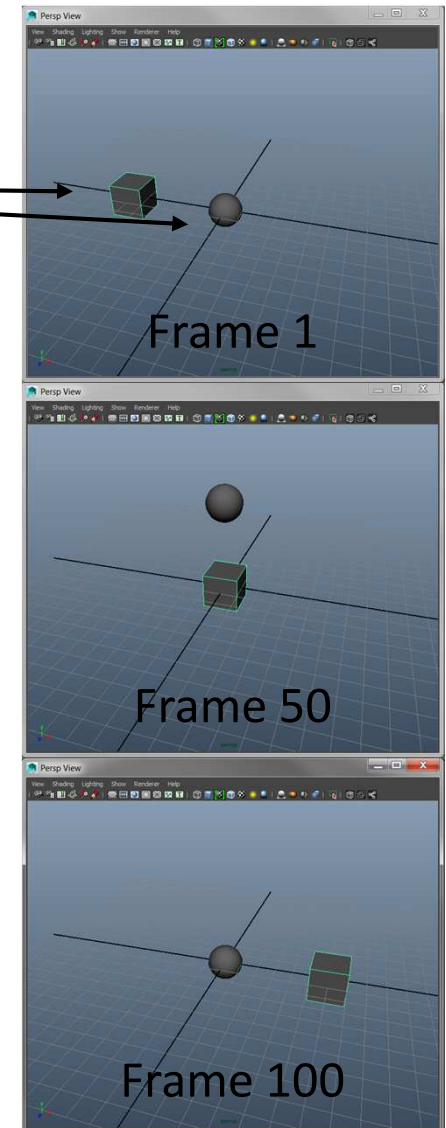


- ⊖ ⊕ pSphere 1
  - ✓ Visibility
  - ✓ Translate X
  - ✓ Translate Y
  - ✓ Translate Z
  - ✓ Rotate X
  - ✓ Rotate Y
  - ✓ Rotate Z
  - ✓ Scale X
  - ✓ Scale Y
  - ✓ Scale Z



# Reactive animation Practical

- Driven-key animation
  - *Create a polycube and a polysphere*
  - *Animate > Set Driven Key > Set...*
  - *Set the x value of the cube as Driver*
  - *Set the y value of the sphere as Driven*
  - *Create 3 keys at 3 different frames respecting the positions given in the pictures following the same order*
  - *Visualize/Edit the animation curves in the Graph Editor*
    - *cube.x is function of sphere.y instead of function of time*

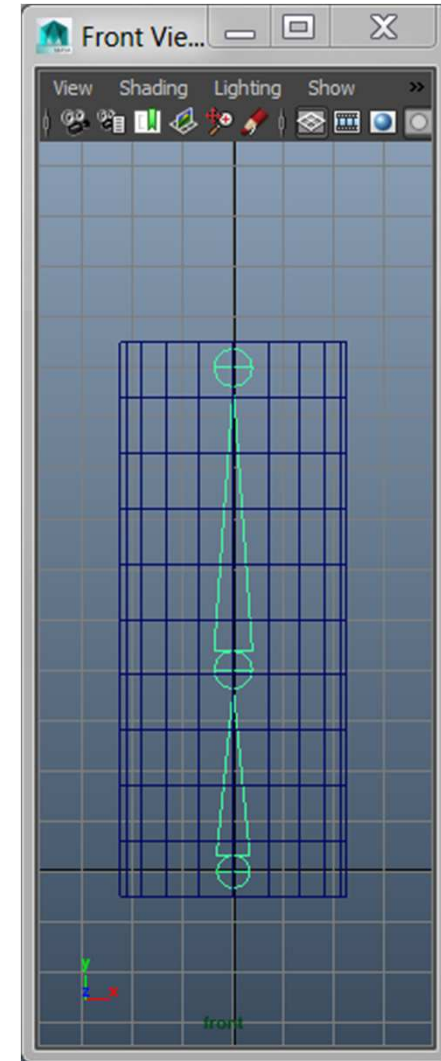


# Deformers

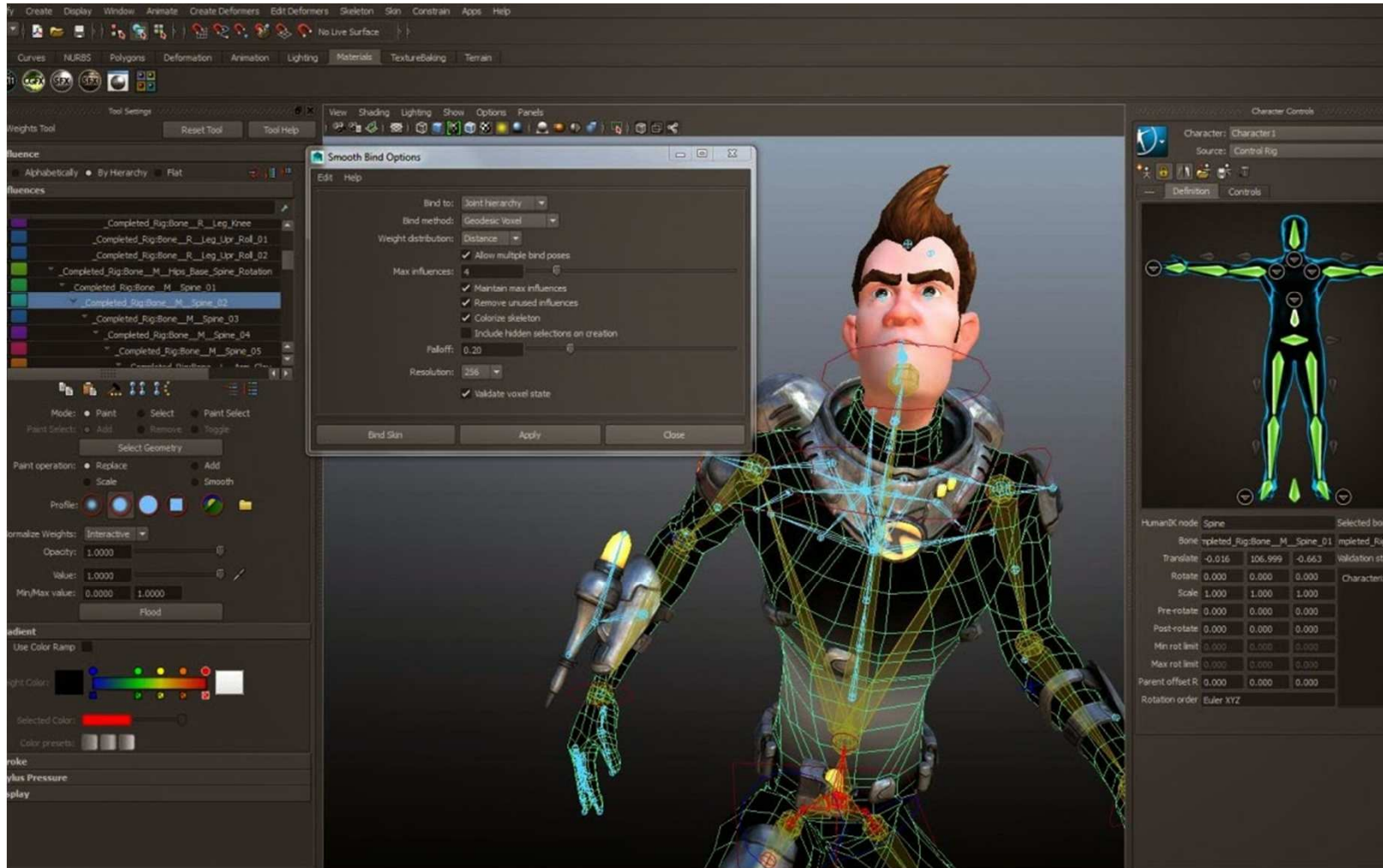
- Nonlinear tools
  - Shape: bend, twist, etc.. (*Create Deformers > Nonlinear*)
  - Space: lattice, wrap, etc..
- Vertices morphing
  - Blend shapes
    - typically for facial animation
- Clusters (ex: SkinCluster for LBS skeletal animation)
  - Weights can be edited by “painting”

# Character animation Practical

- Create a skeleton (Skeleton > Joint Tool)
  - Don't forget to use an orthogonal view, things get projected on the grid in perspective view
  - Press "Enter" to end a chain
  - To create a hierarchy (tree) use the Parent command
- Create a polygon shape around your skeleton with a good resolution (at least 500 vertices)
- Select the shape and the root of the skeleton
- Use "Skin > Smooth Bind" to bind the skin
  - Play with the skeleton, it should control the shape
- Control a chain of 2 bones (leg) with an IK handle
  - "Skeleton > IK Handle Tool"



# Character exemple





# Physical animation

- Specialized menu : *Dynamics*
- Rigid bodies
  - Motion (inertia,  $F=ma$ )
  - Collision (contact forces)
- Non-rigid bodies
  - Clothes (mass-spring system)
  - Fluids (particles system, Navier-Stokes)

# Physical animation Practical

- Create a scene with a floor
- Create some inclined surfaces in the air
- Create a ball at the top that will fall/roll on the different surfaces and eventually on the floor by the end
- Unselect everything and create a gravity field
  - Fields menu
- Ball => Create Active Rigid Body
  - (Soft/Rigid bodies menu)
- Planes => Create Passive Rigid Body
  - (Soft/Rigid bodies menu)
- Bake simulation => set keyframes
  - *“Edit > Keys > Bake Simulation”*
- *Playback*

