Autodesk Maya
modeling, animation, scripting
and C++ programming
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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
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*