Animation with Maya

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Basic concepts

• Key-frame animation
  – any attribute is a function of time

• Reactive animation
  – attribute is a function of another attribute

• Deformers
  – Non-linear modification of shape and space

• Physical animation
  – attribute is driven by laws of dynamics ($f=ma$)
Key-frame animation

1. Set time (position time slider)
2. Edit attribute (move, rotate, etc)
3. Set key (‘s’ key)
4. Playback
5. Visualize/edit curves with Graph Editor
   - value and tangents
Attribut
Reactive animation

• Driven-key animation
  \((Animate>Set \text{ Driven Key})\)
  
  – Ex: the cube “avoids” the sphere
  
  – Sphere is the “driver”
  
  – Cube is the “driven”
Deformers

• Nonlinear tools
  – Shape: bend, twist, etc\textit{ (Deform$>$Nonlinear)}
  – Space: lattice, wrap, etc

• Vertices morphing
  – Blend shapes
    • typically for facial animation
  – Clusters
    • weights can be edited by “painting”
Character animation

- Create a skeleton
  
  *(Skeleton > Joint Tool)*
  
  - Create joints chain (end chain with return)
  - Create a hierarchy (click on parent joint)

- Bind a skin
  
  *(Skin > Bind Skin > Smooth Bind)*
  
  - “Shape” of the character

- Control with IK handle
  
  *(Skeleton > IK Handle Tool)*
  
  - Higher level of control
Character example
Physical animation

• Specialized menu: *Dynamics*

• Rigid bodies
  – Motion (inertia, \( \mathbf{f} = m \mathbf{a} \))
  – Collision (contact forces)

• Non-rigid bodies
  – Clothes (mass-spring system)
  – Fluids (particles system, Navier-Stokes)
Physical animation

Simple example

1. Create a scene

2. Create gravity field
   *(Fields menu)*

3. Ball => set to Active Rigid bodies
4. Planes => set to Passive Rigid bodies
   *(Soft/Rigid bodies menu)*

5. Bind field and Active Rigid body
   *(Window>Relationships Editors>Dynamic)*

6. Bake simulation => set keyframes
   *(Edit>Keys>Bake Simulation)*