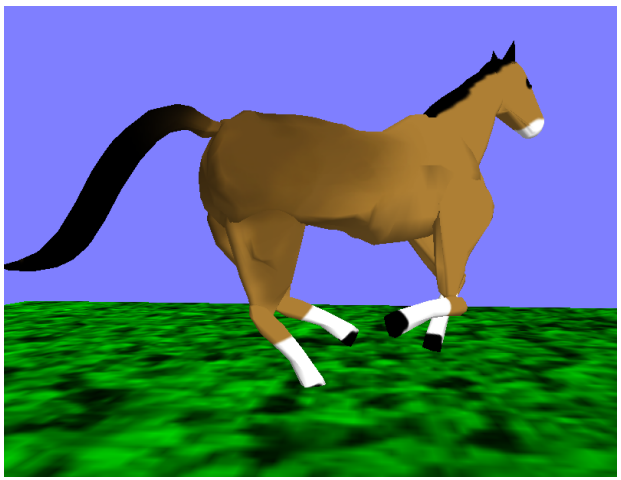
Skeleton animation - bridging Maya and OpenGL

DH2640-Graphics and Interaction Programming



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June 16., 2010

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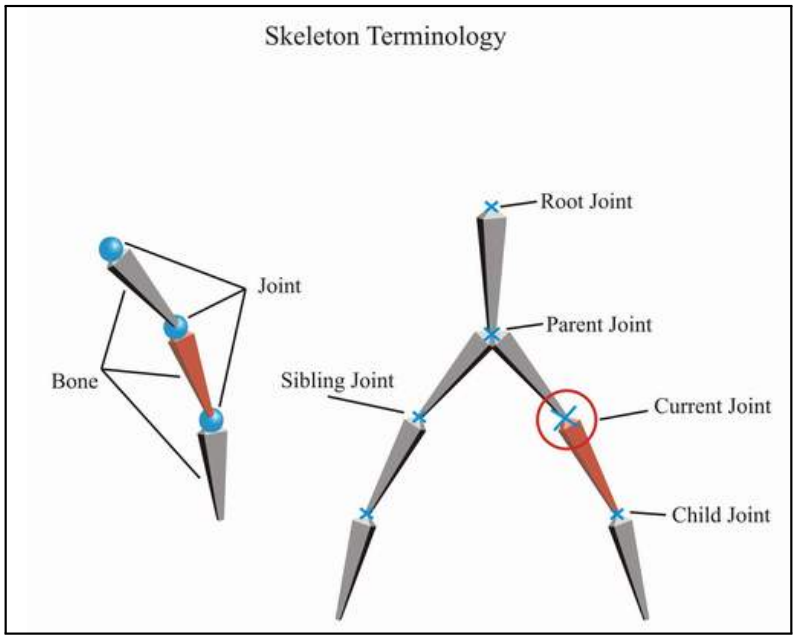
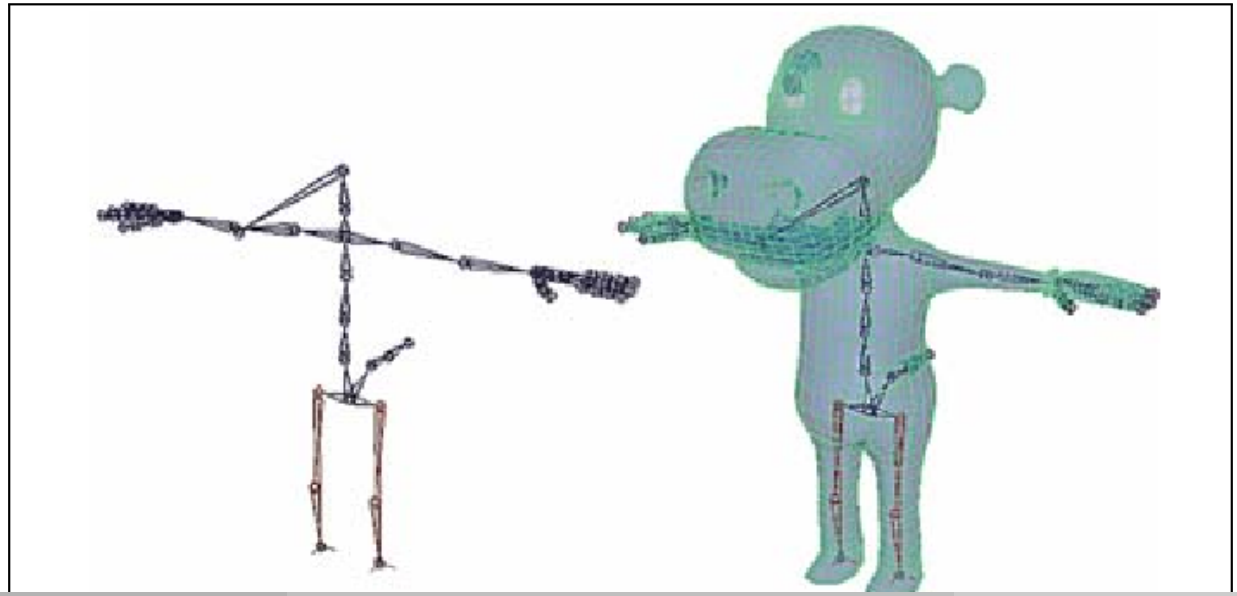




Representation of a joint

```
class Joint {
    Joint father;
    Joint[] children;
    Point3 relative_position;
    Point3 relative_scale;
    Point4 relative_rotation;
}
```

$\Rightarrow$ Compute the relative matrix of the joint (4x4)

$\Rightarrow$ Compute the absolute matrix of the joint

$absolute = father.absolute \times relative$ (4x4)

** Demo **

Contents

Importing data from Maya

Maya : a 3D modeller.
Export objects according to the RTG format.
C++ RTG parser, written by Gustav.

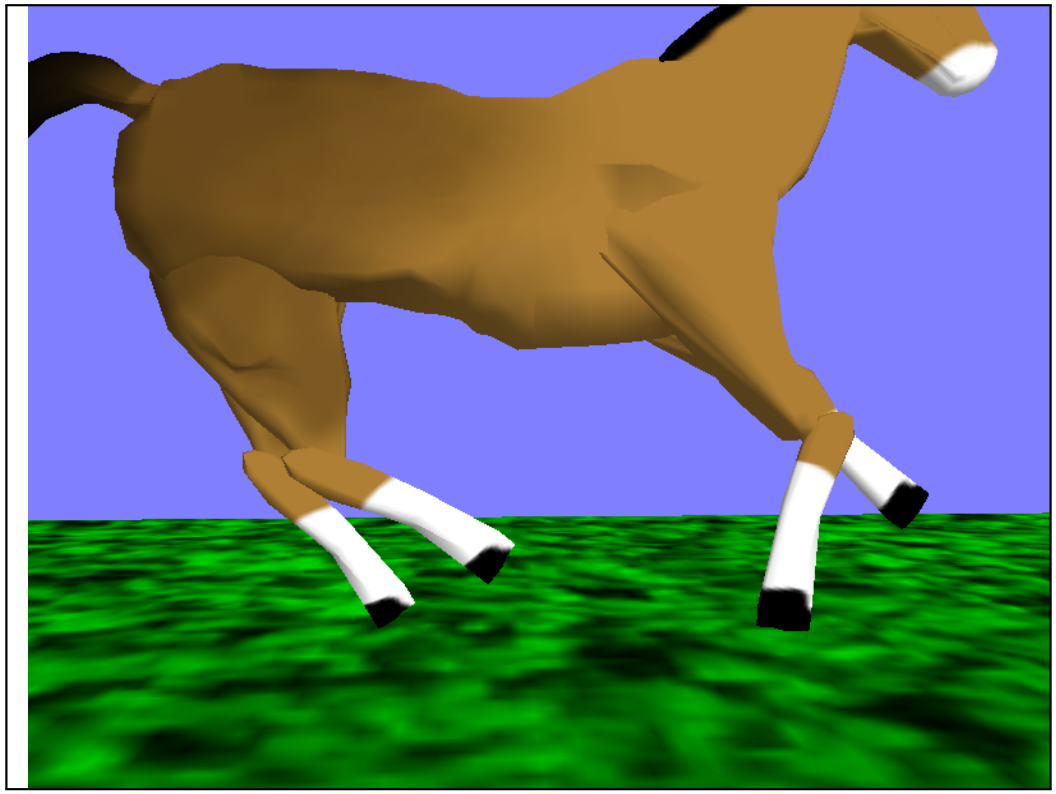
Contents

Slicing the RTG mesh

Idea : bind an RTG object to each joint

Demo

Problem : joints not perfect



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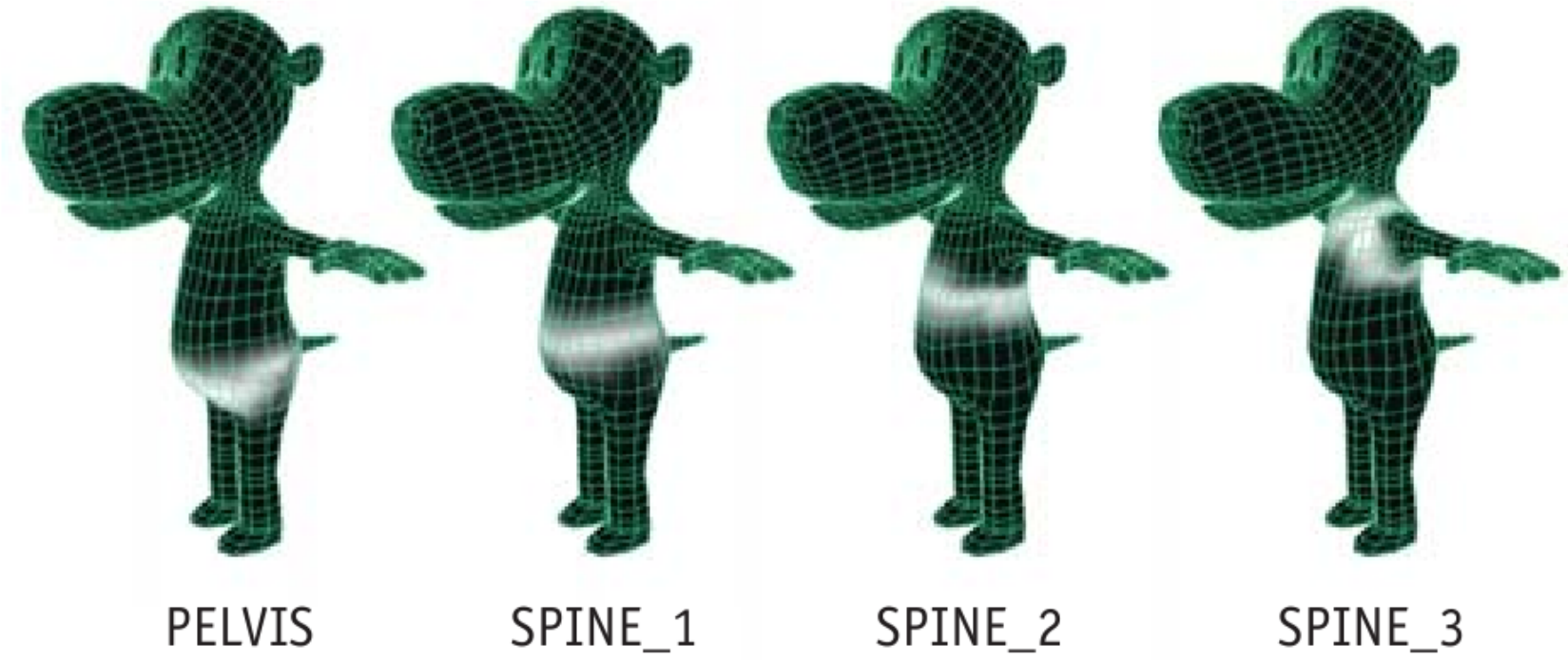
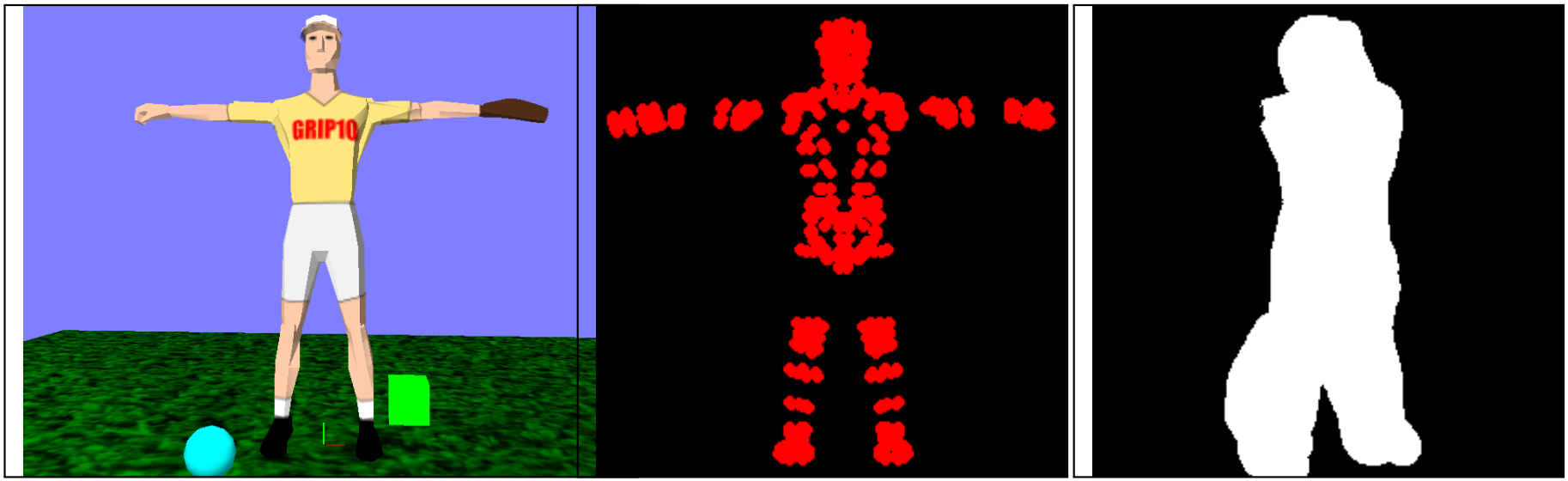
Maya weight maps



Smooth Bind weighting for a simple character. The gray areas are where the weighting overlaps.

Improvement : one-piece RTG + deformation

Export the weight maps from Maya as images.



How to deform the mesh ?

1. **Reference poses** (= bind poses) for the mesh and the skeleton : compute the matrix $INVERSE \stackrel{DEF}{=} absolute^{-1}$ (constant 4x4)
2. **At a random pose**, for each joint : $finale = absolute \times INVERSE$ (4x4)
3. position of $p(x, y, z)$:

$$\tilde{p} = \frac{\sum_{b \in bones} weight(p, b) \times finale_b \times (x, y, z, 1)}{\sum_{b \in bones} weight(p, b)}$$

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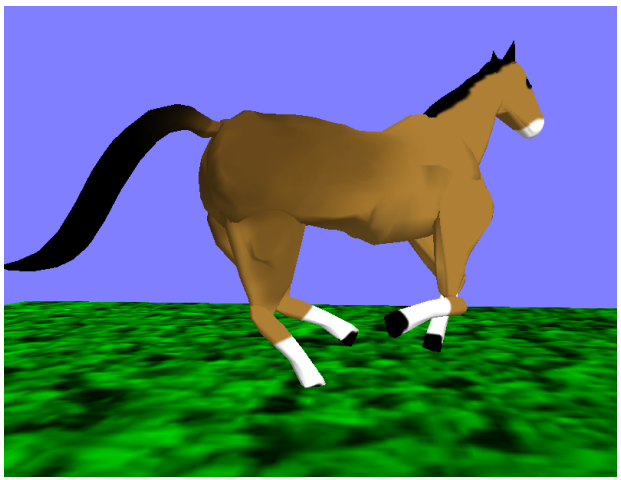

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