Geometry Modelling and Scene Graph

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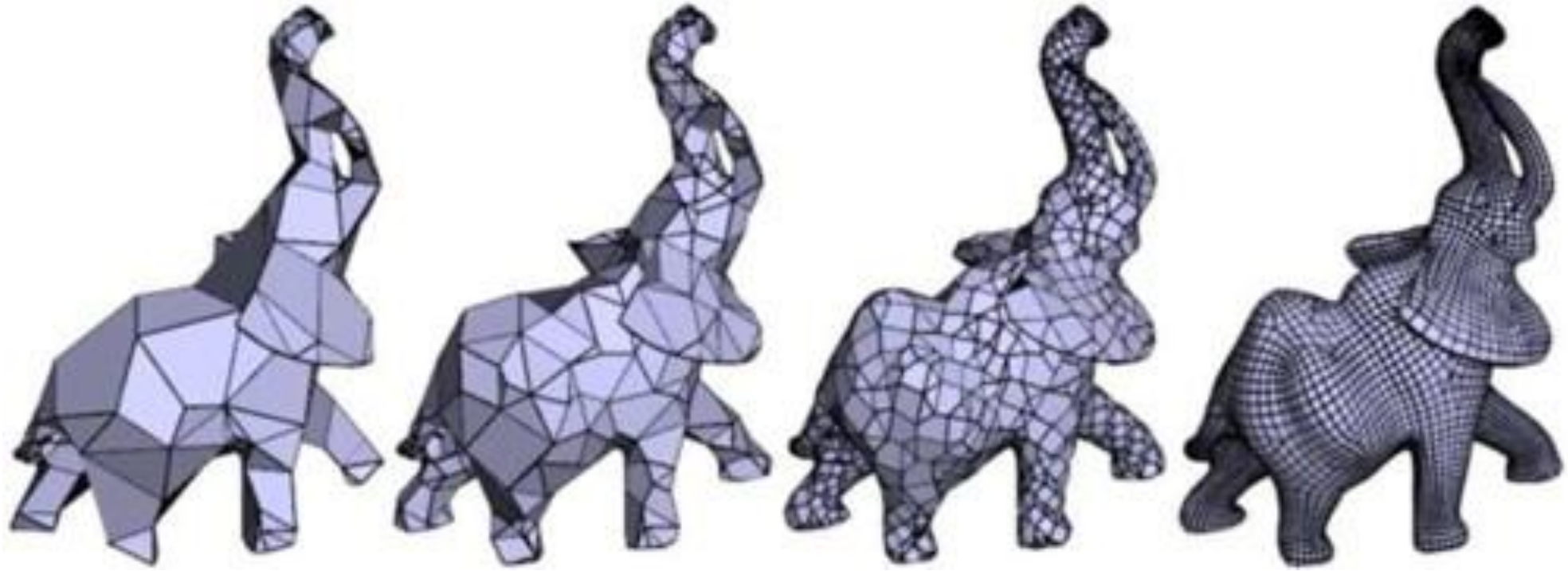
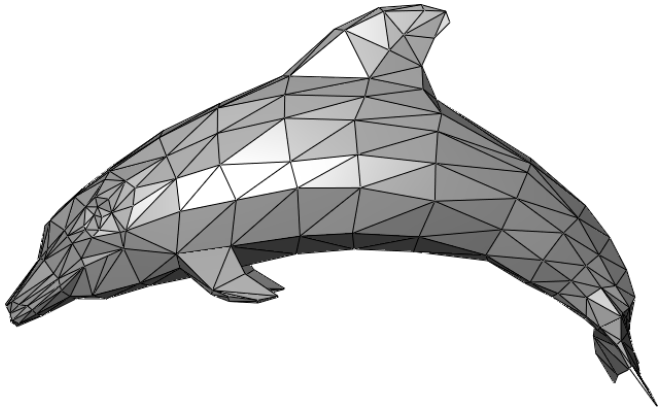
Polygon Mesh

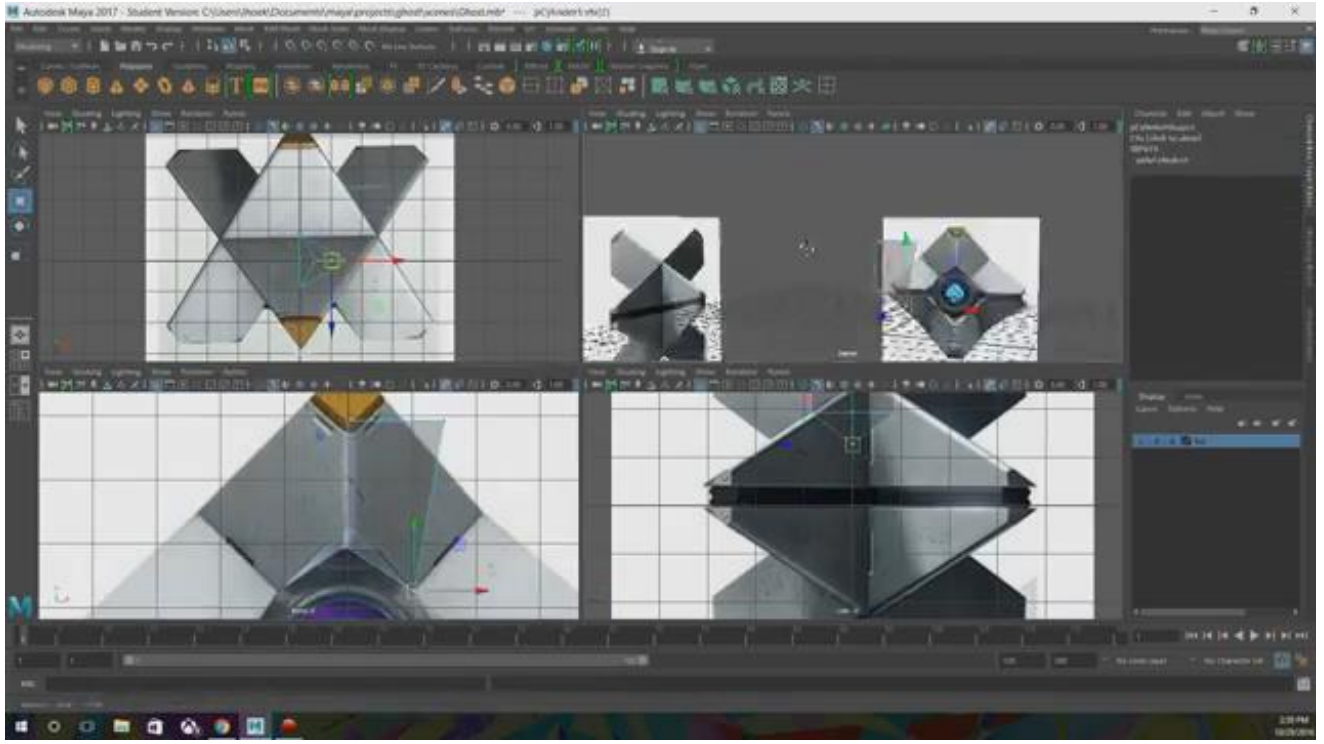
- The collection of vertices to define the shape of a 3D object



3D Modelling

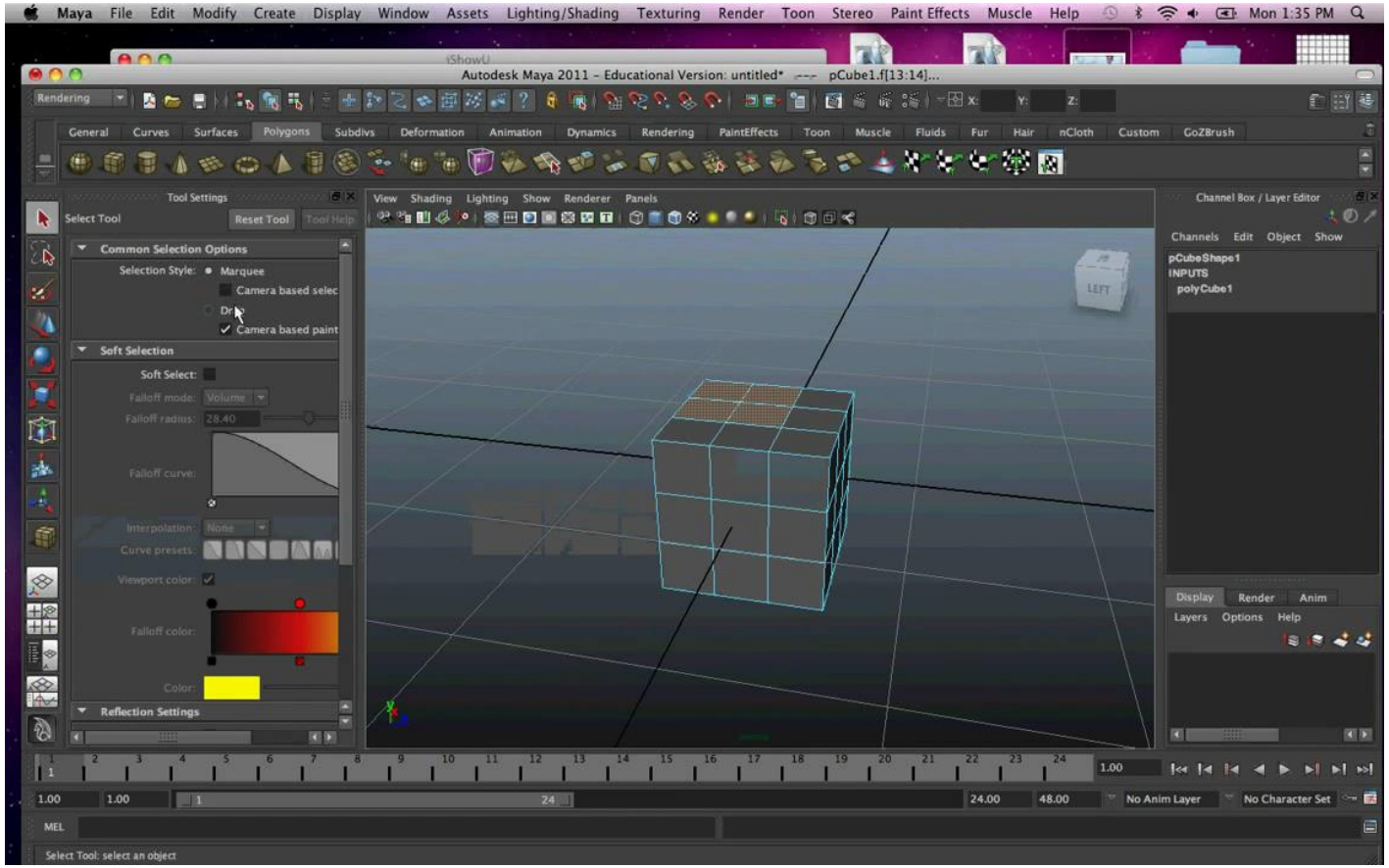
- The process to create a polygon mesh
  - Polygon modelling
  - Curve modelling
  - Digital sculpting
  - 3D Scanning





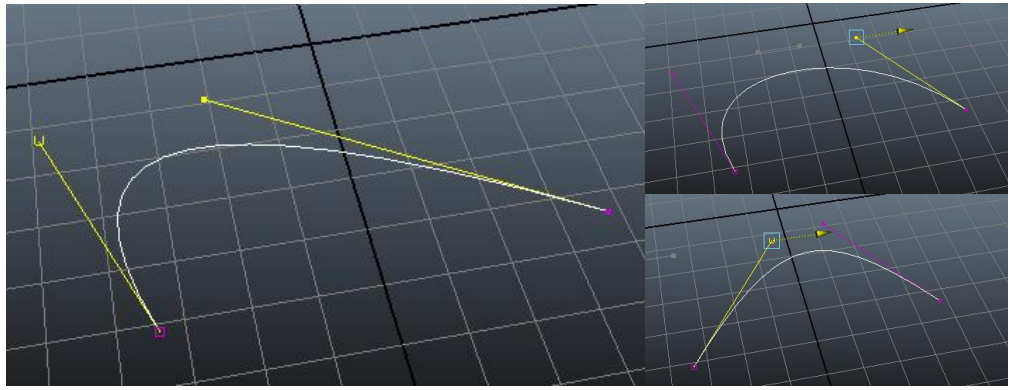
Polygon Modelling

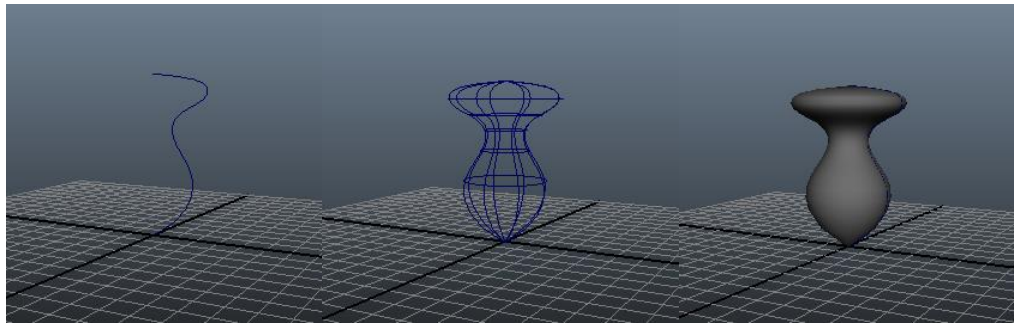
- Defining a mesh based on the vertex positions
- Typically used in real-time graphics applications



Curve Modelling

- More advanced modelling using curves to define a mesh
  - Mesh is still in a vertex format, but the design process is done using control curves
- Used mostly in offline 3D modelling package e.g. Maya



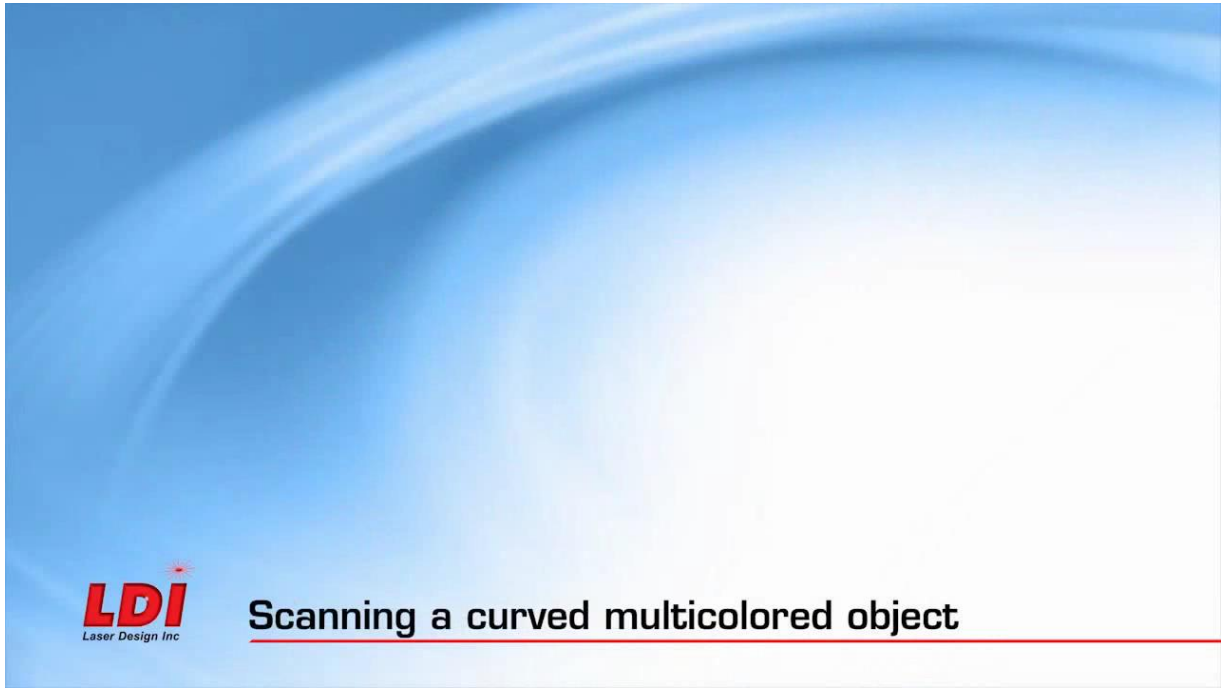


Digital Sculpting

- Using tablets or 3D inputs to sculpt 3D structures
- E.g. ZBrush

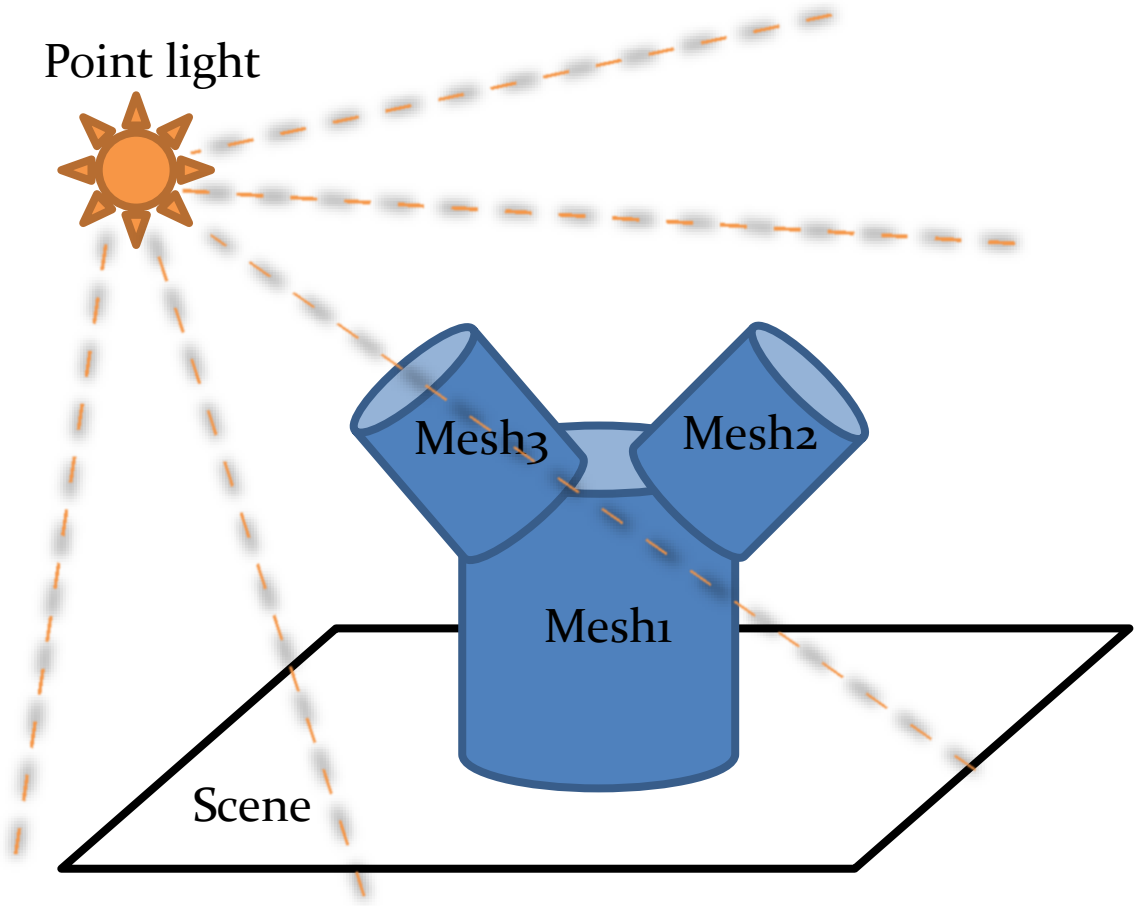
3D Scanning

- 3D scanner can detect distance based on light / infrared
- Creating polygon mesh based on the volume pixel scanned from a 3D scanner



The Scene Graph

- https://en.wikipedia.org/wiki/Scene_graph
- Scene
  - Point light
  - Mesh1
    - Mesh2
    - Mesh3

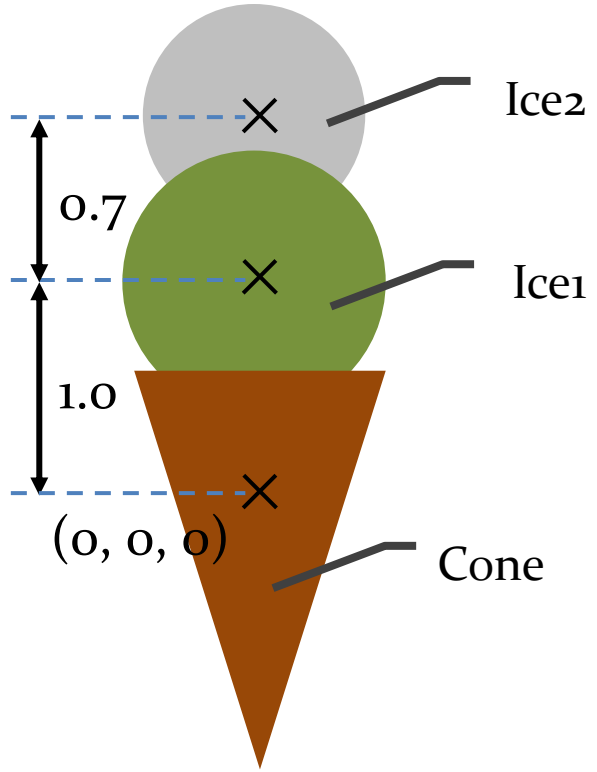


Working with the Scene Graph

- Examples
  - scene.add(mesh1)
  - mesh1.add(mesh2);
  - mesh1.add(mesh3);
- Note that the following two statements are equivalent
  - mesh2.parent = mesh1;
  - mesh1.add(meshe2);

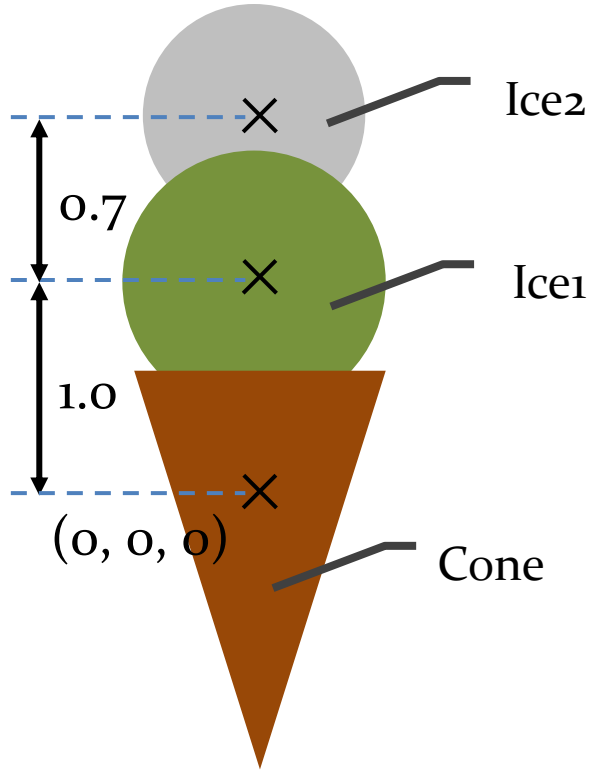
Relative Geometry with Parent/Children

- meshIce1.parent = meshCone;
- meshIce2.parent = meshIce1;
- meshCone.y = 0.0;
- meshIce1.y = 1.0;
- meshIce2.y = 0.7;
- Important: A child treats the position of its parent as (0, 0, 0)



Absolute Geometry without Parent/Children

- meshCone.y = 0.0;
- meshIce1.y = 1.0;
- meshIce2.y = 1.7;



The End

Any Questions?