The display pipeline

Computer Graphics 1, Fall 2003
Lecture 3
Chapter 1.8, 7.1

The fast forward version

The order may vary somewhat

• Modelling, create objects (this is not really a part of the pipeline)
• Transformations, move, scale, rotate…
• View transformation, put yourself in the origin of the world
• Clipping, cut away things outside the view volume
• Hidden surface removal • We do not see through things…
• Light and illumination, shadows perhaps
• Projection 3D to 2D
• Rasterization, put things onto our digital screen
  Texture, shading, image based HSR...

To draw images

• To write the right numbers at the right places in this large array (the screen buffer)
• This is often done by a function called write_pixel(x,y,color)
  • or (if possible) by directly writing in the array buffer[y][x]=color;

Triangles

• Using write_pixel, we can draw lines and we can draw polygons
• Tessellation:
  • cutting polygons into smaller polygons
• In fact, we need solely triangles
• Triangularisation:
  • cutting polygons into triangles
• Triangles are always flat, which is a nice property
Object in World
- We put our triangles together to form objects
- We put the objects in a 3D world
- We use a camera model to view the world

Transformations, etc.
- We use transformations to move around in the world, as well as to move objects around in the world
- We add light to get a nice 3D effect
- We remove things we cannot see

Fixing some more
- We may speedup things using maps of different types, e.g. textures
- Starting from polygons, it is tedious to build a world. We need modelling tools. Splines and fractals are two such tools

Visualization