CG

an almost factual account of the history of computer graphics

a long long time ago …

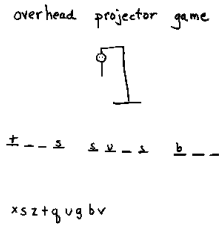
before buzz …

before quake …

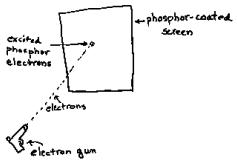
before microsloth windows …

before most of you were born …

the world existed without computer graphics



inspiration



excited phosphor demo

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instant replay

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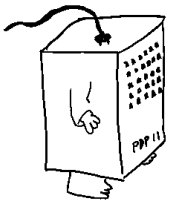
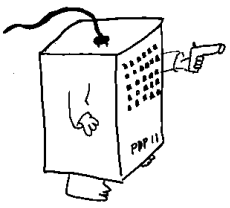
moving electron beam demo

an even less moving
moving electron beam demo

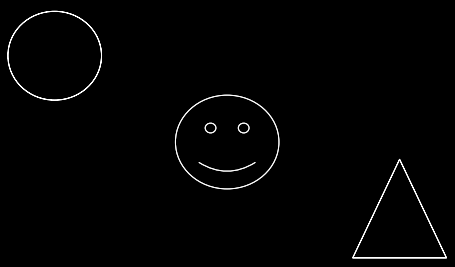
society would reap huge benefits …

but that is a different story

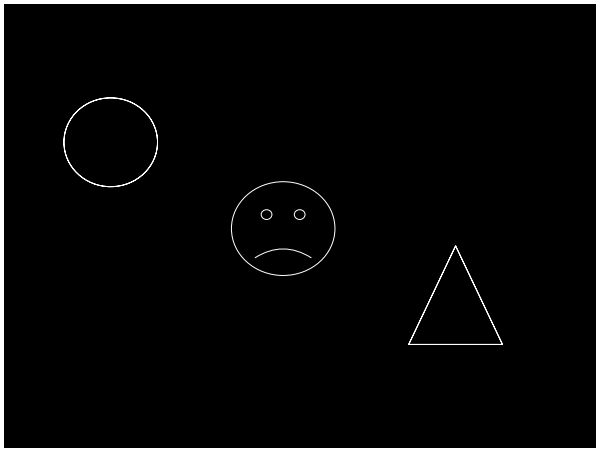




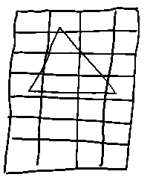
a fast draw

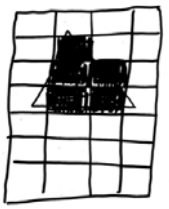


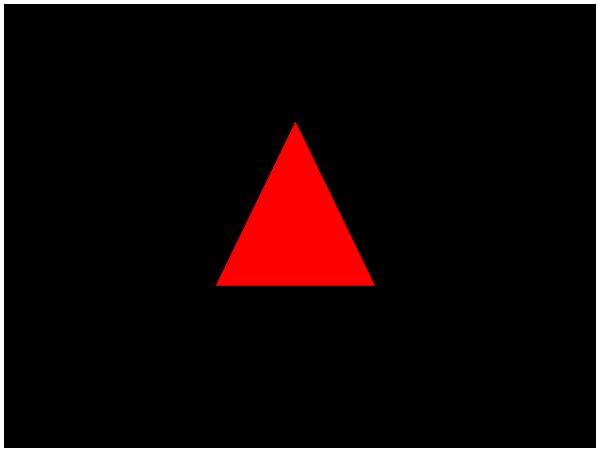
filled triangle



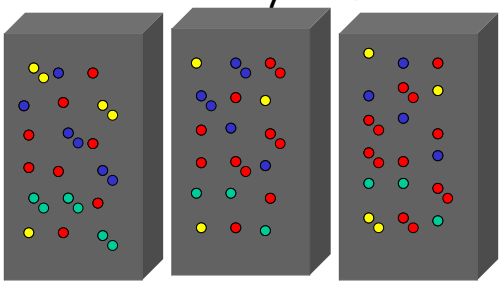
but wait … there were lessons to be learned



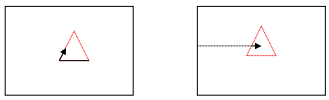




and it only took

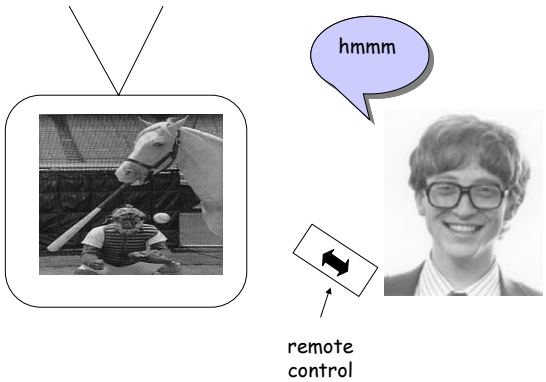


vector vs. raster graphics

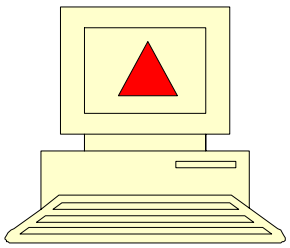


meanwhile

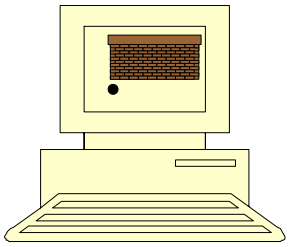
back in cambridge



and a few years later…



and more



meanwhile

back in hollywood

digital compositing

blend parts from different digital images to create a new image

more famous composites

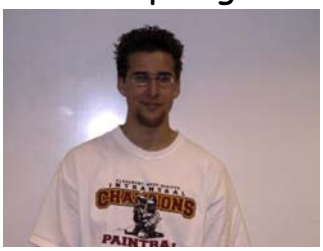
and more

another technique: warping

morphing

transform one image
into another by
compositing and warping
across time

morphing



cs155 fall 2004

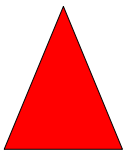
computer graphics

2D image processing (synthesis)

meanwhile

back in utah

the lowly triangle



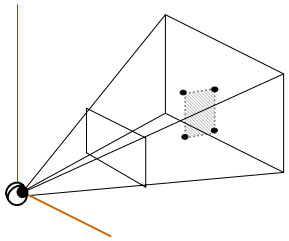
triangle mesh

triangle mesh

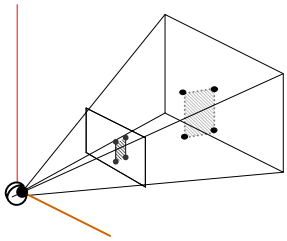
stanford michaelangelo project

the graphics pipeline

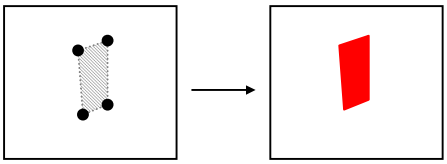
pipeline: build scene



pipeline: project



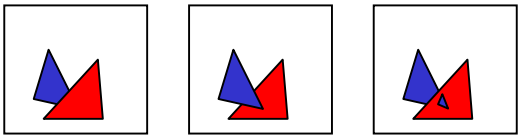
pipeline: scan convert



vertices in view plane

frame buffer

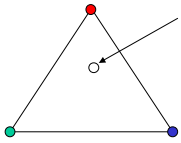
hidden surface removal



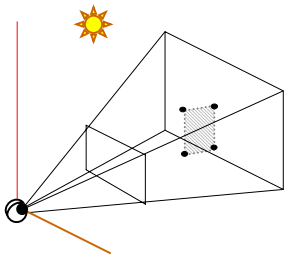
which is right?

shading

what is color here?



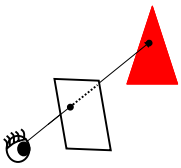
local illumination



the holy grail

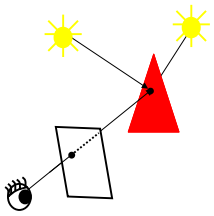
photo-realism

ray tracing



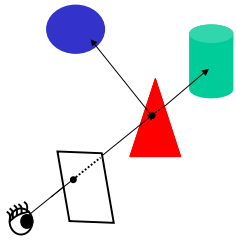
- cast ray through pixel into scene
- find intersection point (if any) that is closest to eye
- compute luminance at intersection

luminance



- direct illumination from light sources
  - reflection off surface
  - transmission through surface
  - subject to occlusions

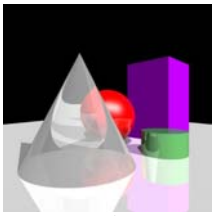
luminance



- direct illumination
- inter-object specular reflection

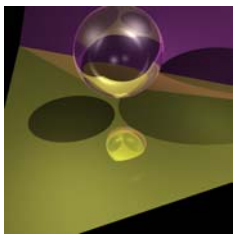
ray tracing

```
<scene>
  <cone material="glass">
  <sphere color="red">
  <box color="purple">
  <floor material="marble">
</scene>
```



peter henry

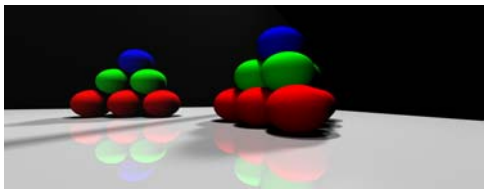
ray tracing



andrew mcdonnell

drew levin

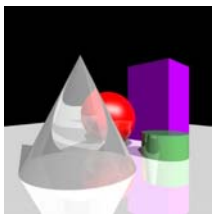
ray tracing



jason wither

semi-local illumination

what is wrong with this picture?



peter henry

diffuse reflections

the holy grail

photo-realism

radiosity

computer graphics

1. image processing
2. rendering

polygon mesh

surface modeling

computer graphics

1. image processing
2. rendering
3. modeling
4. animation

computer graphics

1. image processing
2. rendering
3. modeling
4. animation

CS155: Computer Graphics

CS157: Computer Animation

a CS157 film

CS155 Prerequisites

- Linear algebra
- C++ programming
- Algorithms & data structures

warning

this class is a lot of work!! drop it now if

- you have a heavy load this semester
- you haven't had the prerequisites
- you aren't a capable programmer

P.S. this class is also a lot of fun!

basic course requirement

you cannot blow off any assignment

to pass the class you must submit a solution for each project that successfully implements at least 50% of the assigned features.

course info

www.cs.hmc.edu/courses/*year*/*semester*/cs155