STEVENS INSTITUTE of TECHNOLOGY
Schaefer School of Engineering & Science

Week 01:
Defining Computer Graphics

CS-537: Interactive Computer Graphics
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For academic use only.

Some materials from the companion slides of Angel and Shreiner, “Interactive Computer Graphics, A Top-Down Approach with WebGL.”

Computer Graphics

- Computer Graphics deals with all the aspects of creating images with a computer:
  - Hardware
  - Software
  - Applications
- Example Image on the right
  - Where did this image come from?
  - What hardware and software did we use to produce it?

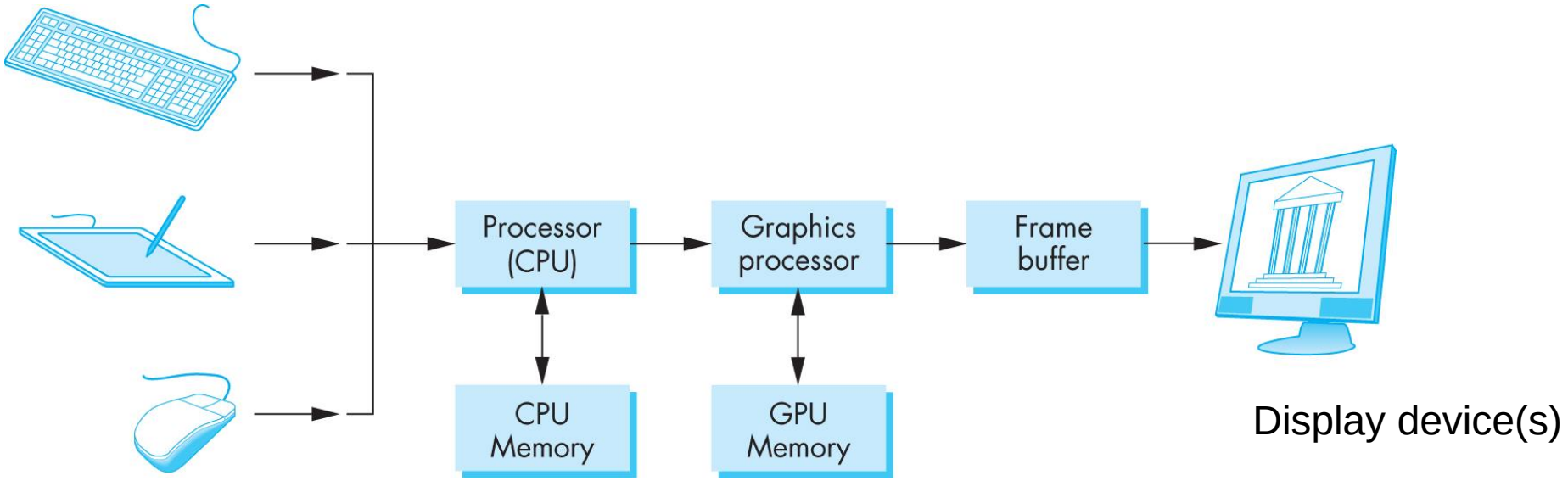
Avengers Endgame (2019)

Preliminary Answers

- Application: The character is an artist's rendition to be shown in the movie
- Software: Autodesk Maya for modeling and V-Ray for rendering
  - Modeling: authoring the 3D content
  - Rendering: synthesizing the 2D image from the 3D model
  - Initial V-Ray renderer prototypes were developed using a programming library that was the ancestor of the one we'll learn in this class
- Hardware: computer with graphics card used for both modeling and rendering

Image: Angel and Shreiner

Basic Graphics System



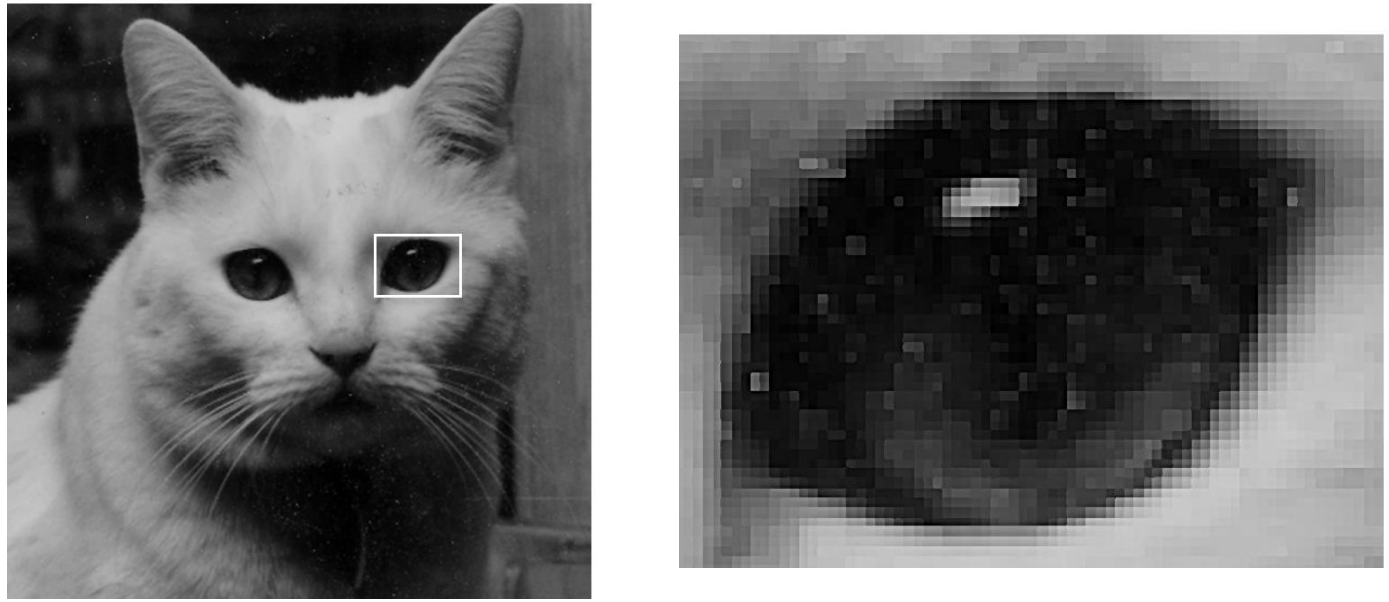
Input devices

Central Processing Unit & Graphics Processing Unit

Image formed in frame buffer

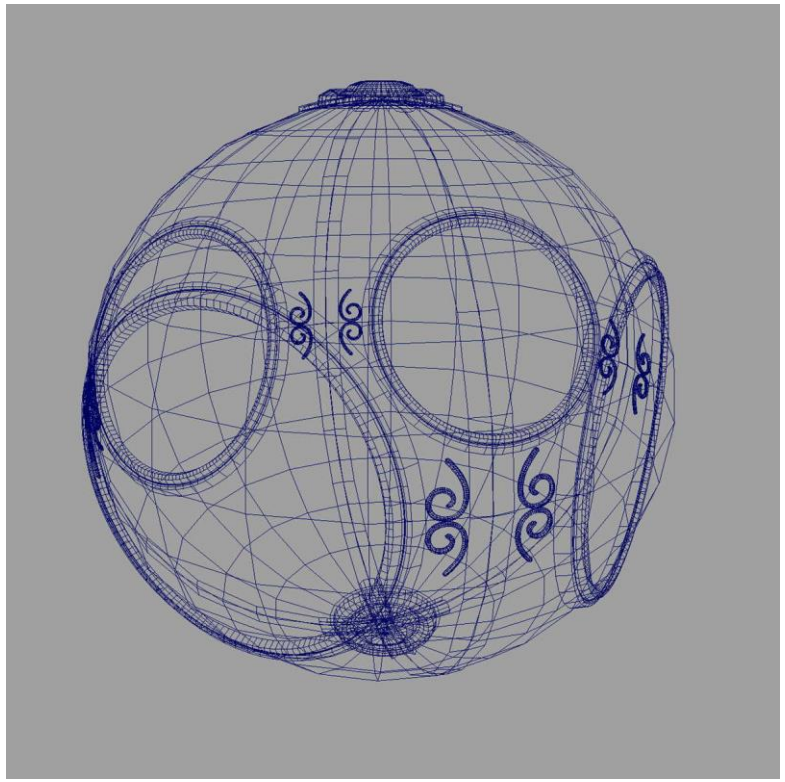
Raster Graphics

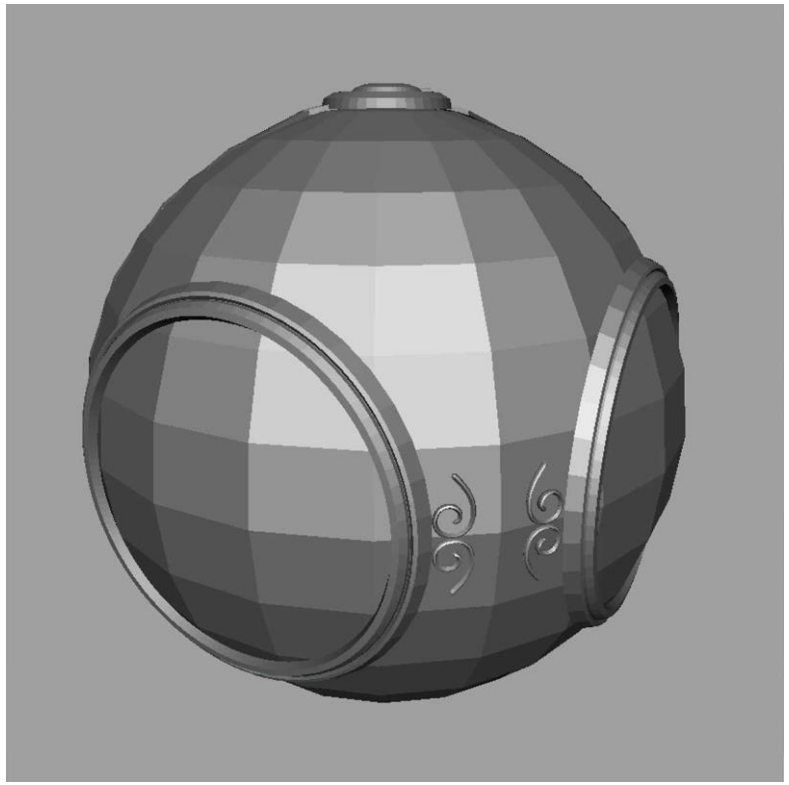
- Whether through a computer graphics pipeline or digital photography, an image is produced as an array (the *raster*) of picture elements (*pixels*) in the *frame buffer.*
- *Frame buffer* is where final pixels / image data are stored in memory for display.
- The close-up inset view to the right below shows the individual pixel elements.



Raster Graphics (II)

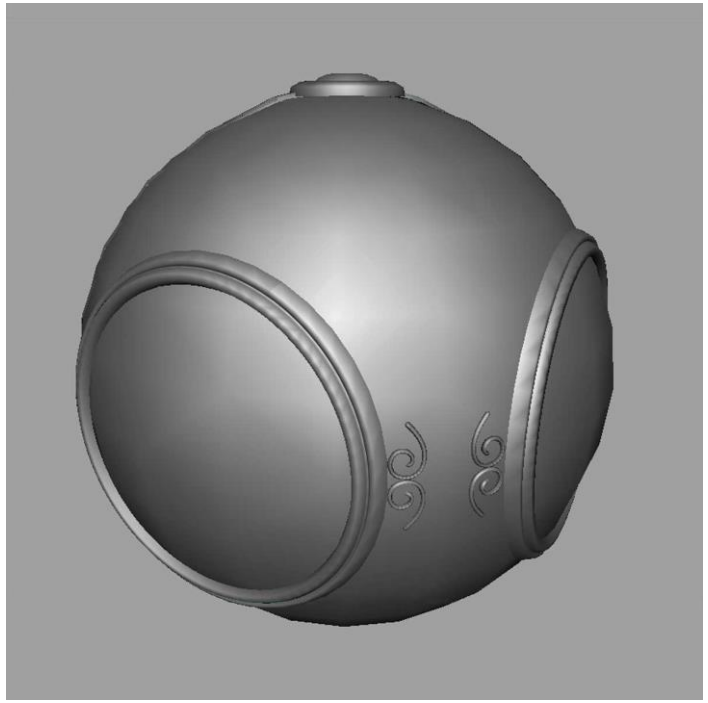
- Raster graphics allows us to go from lines and wireframe representations (left) to filled polygons (right)





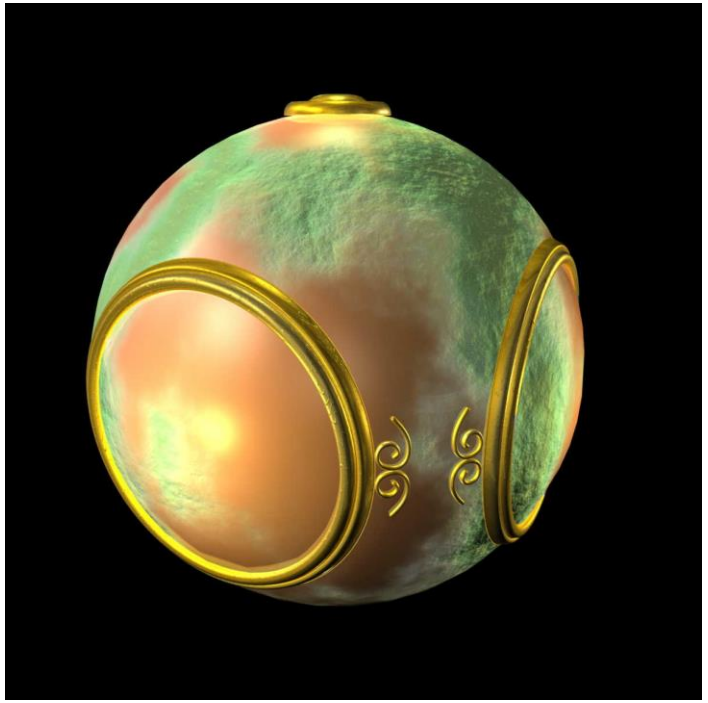
Raster Graphics (III)

- We'll learn about modeling objects and rendering techniques to improve realism.
- These can be implemented in a web browser!



smooth shading

environment mapping



bump mapping