Computer Graphics
-Introduction

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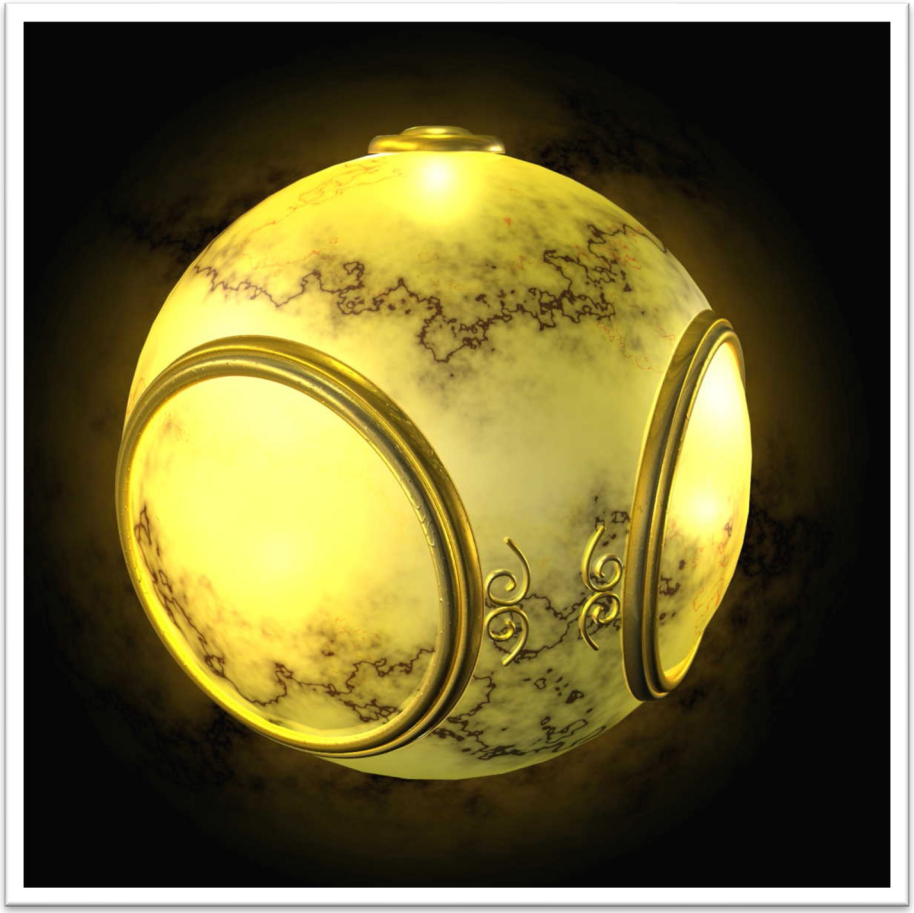
What is computer graphics?

- Computer graphics deals with all aspects of creating images with a computer
  - Hardware
  - Software
  - Applications
- It is a core technology in various fields such as
  - Digital photography
  - Film
  - Video games
  - Cell phone and computer display

Example

- What hardware/software did we need to produce it?

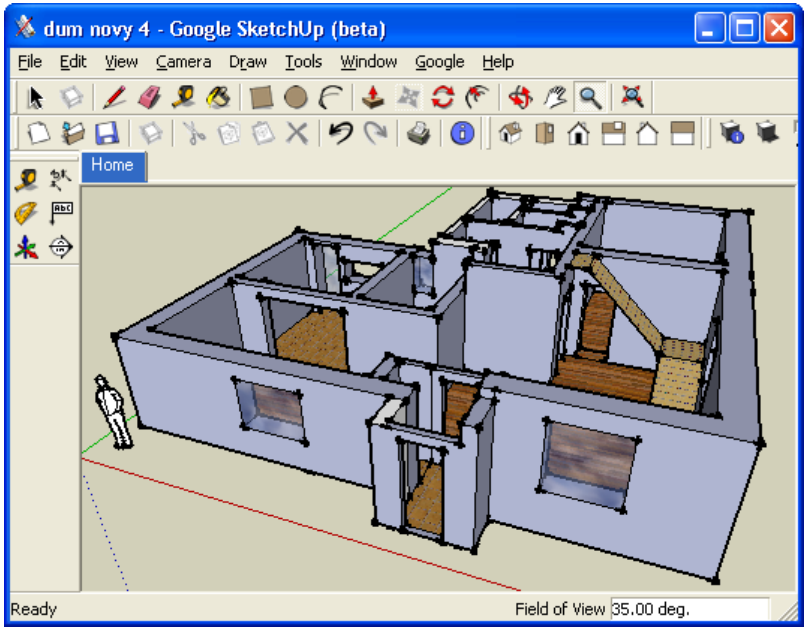


Software: Maya for modeling and rendering but Maya is built on top of OpenGL

Hardware: PC with graphics card for modeling and rendering

Entertainment

Design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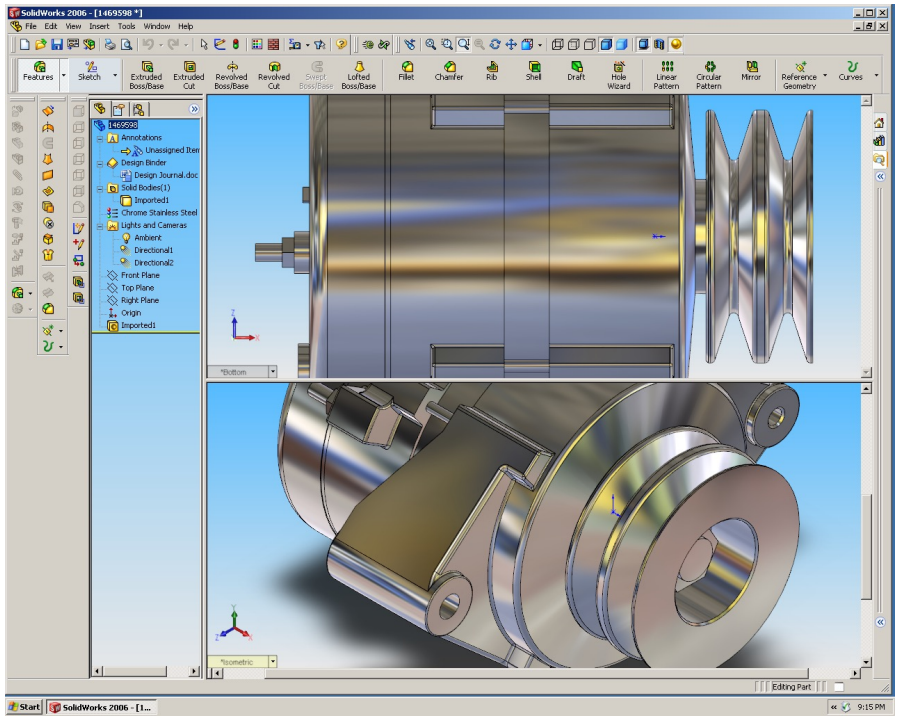
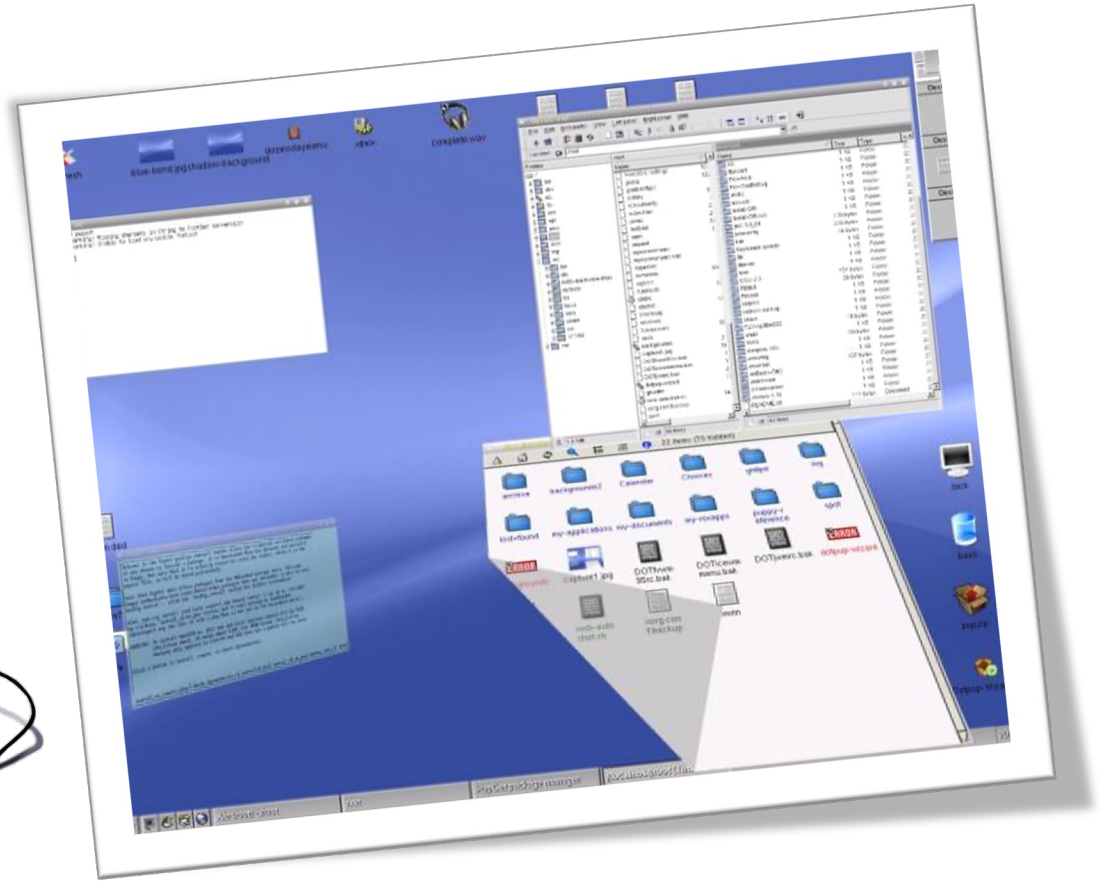
File Edit View Camera Draw Tools Window Google Help
Home
Ready
Field of View 35.00 deg.

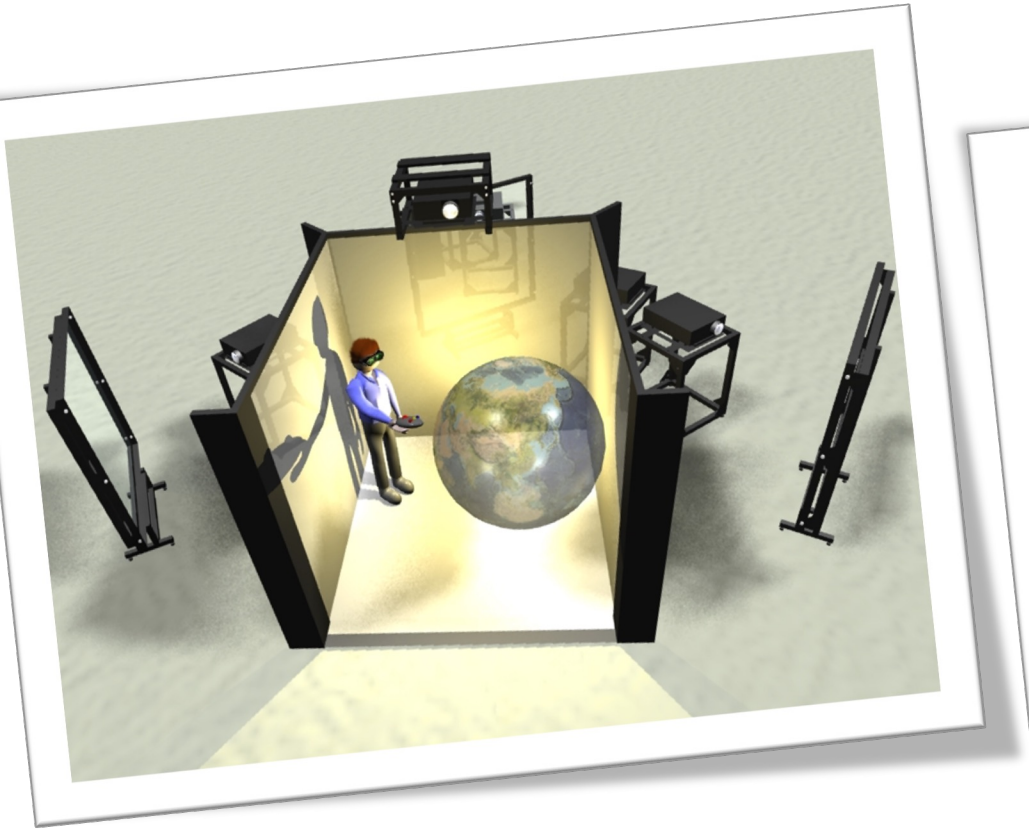

SolidWorks 2006 - [1469598 *]
File Edit View Insert Tools Window Help
Features
Sketch
Editing Part

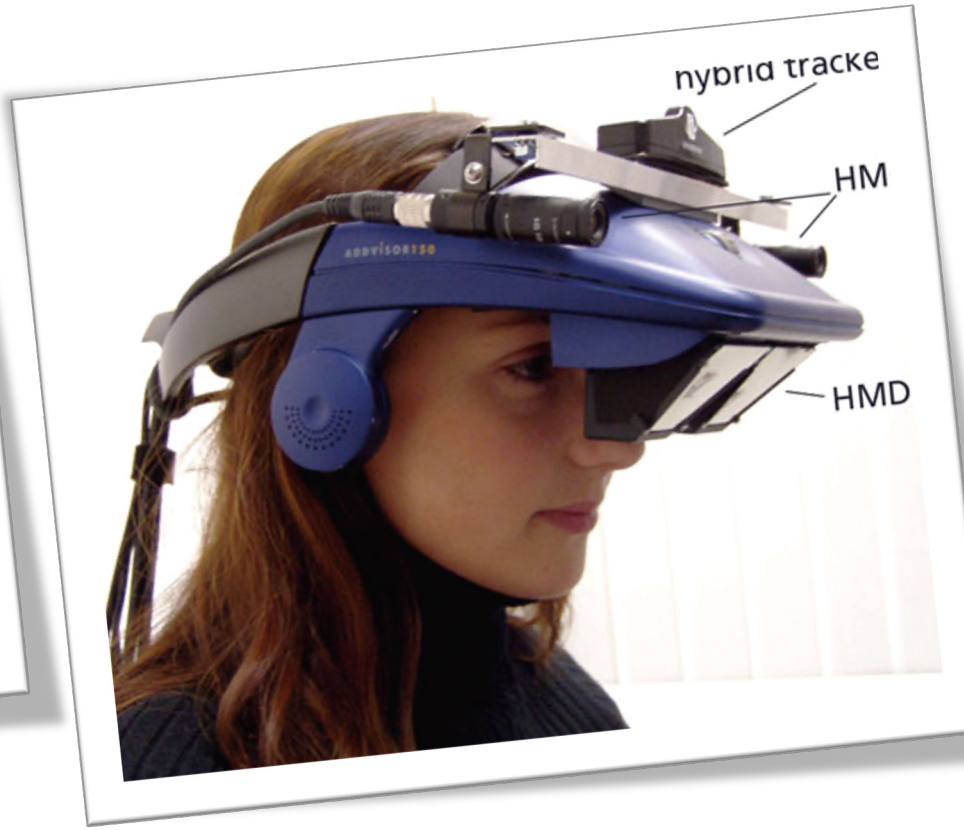
Digital Photography

User Interfaces

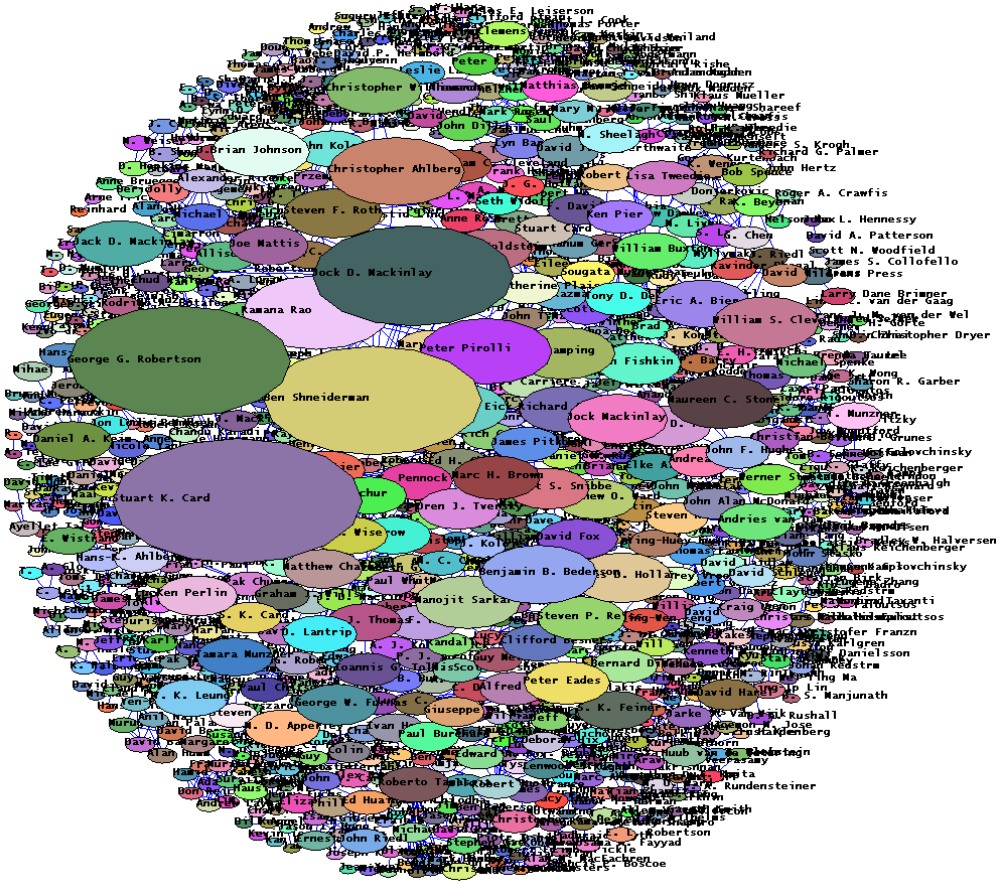


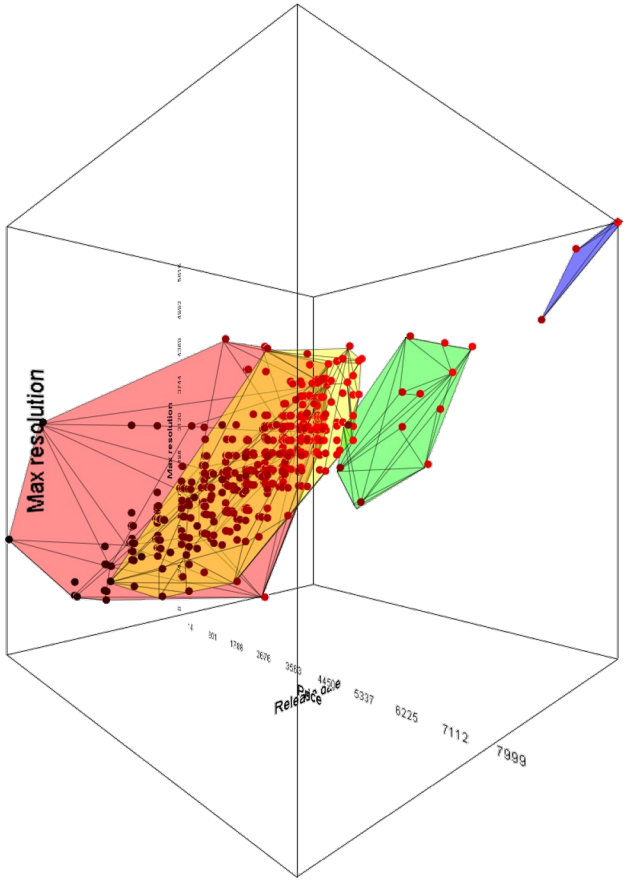
Virtual Reality





Data Visualization





Basic graphics system

Input devices

Output device

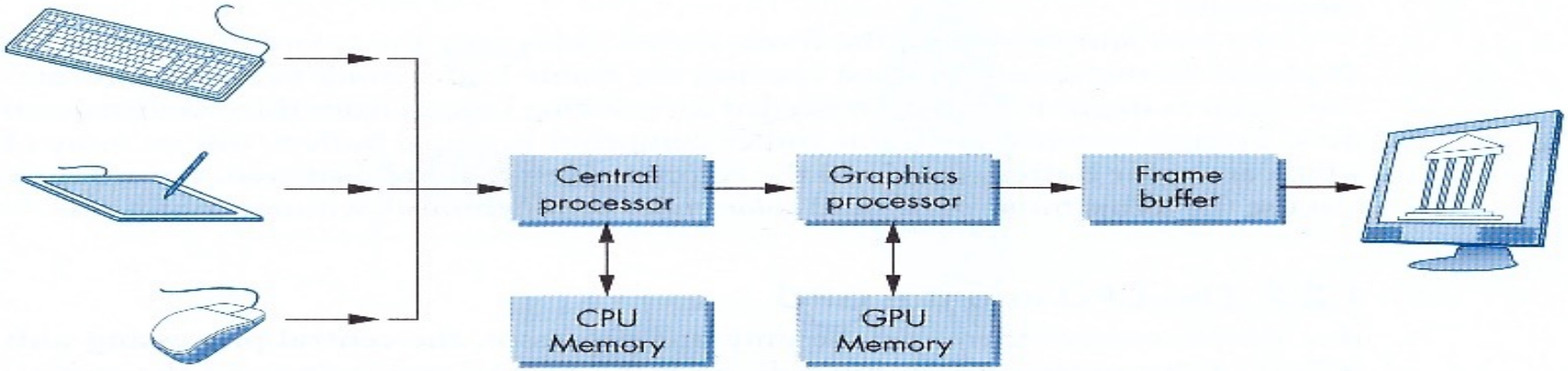


FIGURE 1.1 A graphics system.

Computing power needed for computer graphics

© Pixar

On 1995 computer hardware, the average frame of Toy Story took two hours to render.

Computing power needed for computer graphics

© Pixar

A decade later on 2005 hardware, the average Cars frame took how many hours to render?

15 hours, despite a 300x overall increase in computing power.

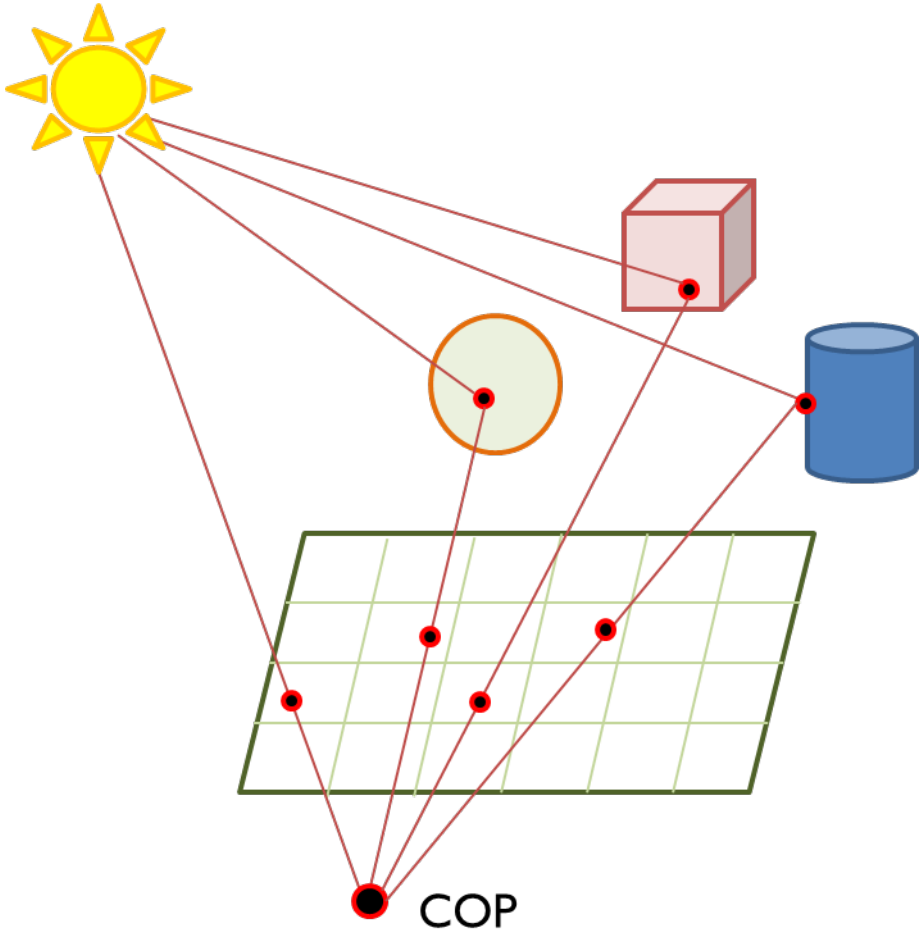
Computing power needed for computer graphics

Fifty effects artists and lighting artists worked together on the technology to create "one single shot" in which Elsa builds her ice palace. Its complexity required 30 hours to render each frame, with 4,000 computers rendering one frame at a time

Why so many computing time?

Elements of Image Formation

- Objects
- Viewer
- Light source(s)



- What if we have many objects and light sources?