CS148: Introduction to Computer Graphics and Imaging

Drawing

Today's Outline

Graphics machines (hardware)

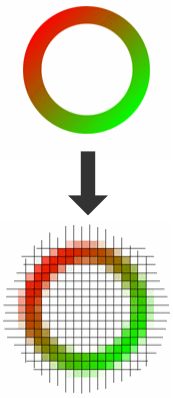
The OpenGL graphics pipeline

Raster coordinate systems

OpenGL Introduction

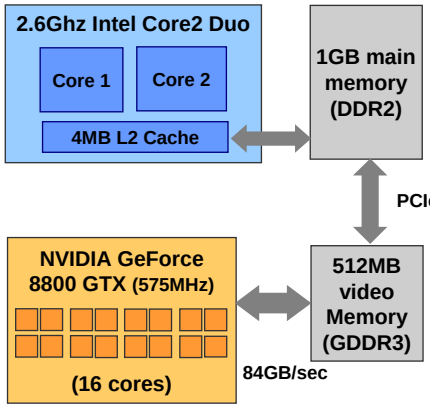
- OpenGL Primitives
- Demos / Code

shapes, lines, points
images, text



Colored pixels
on screen

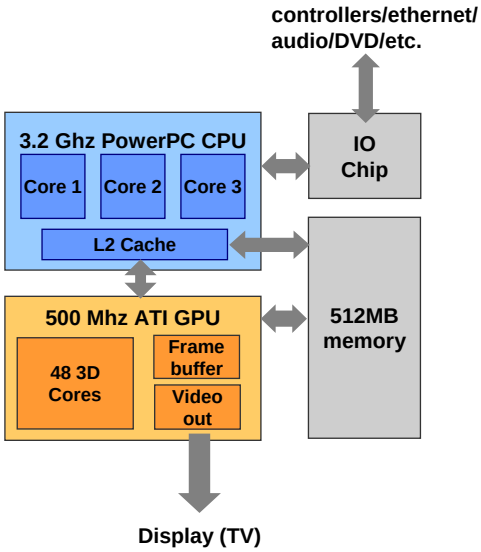
Modern PC



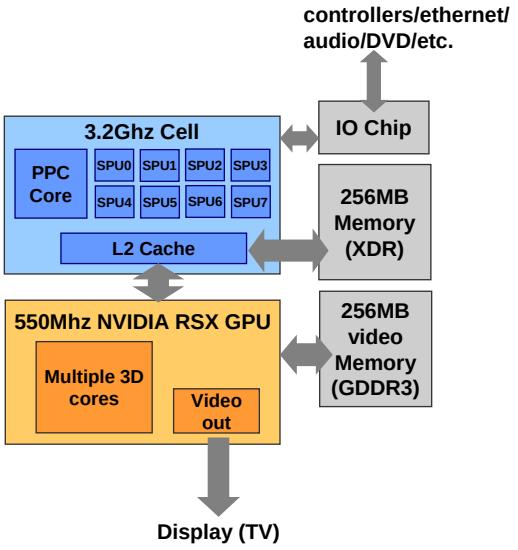
System board (Intel D975)

NVIDIA 8800GTX

Game Machines – Xbox 360

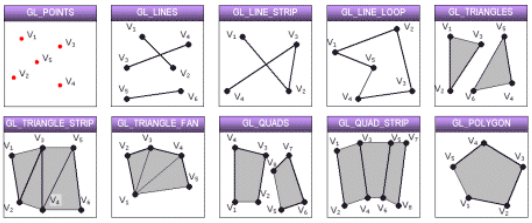


Game Machines – PS3

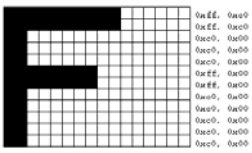


OpenGL Drawing Primitives

Geometric Shapes

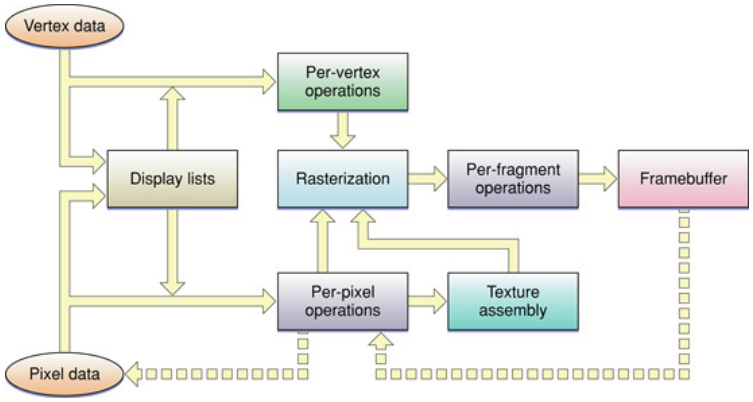


Bitmaps

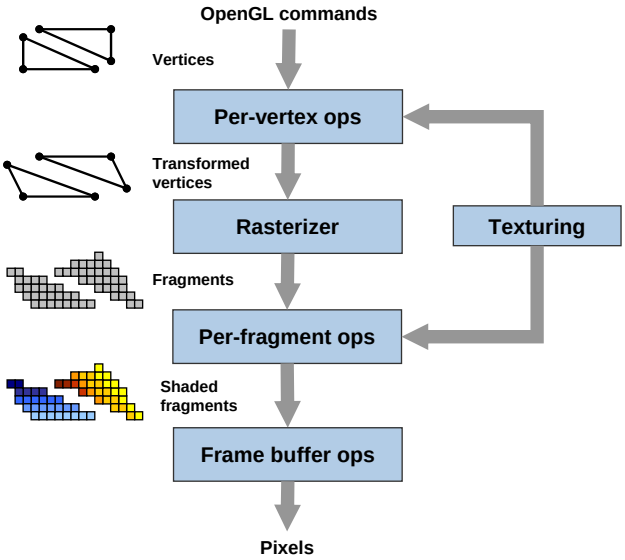


Images

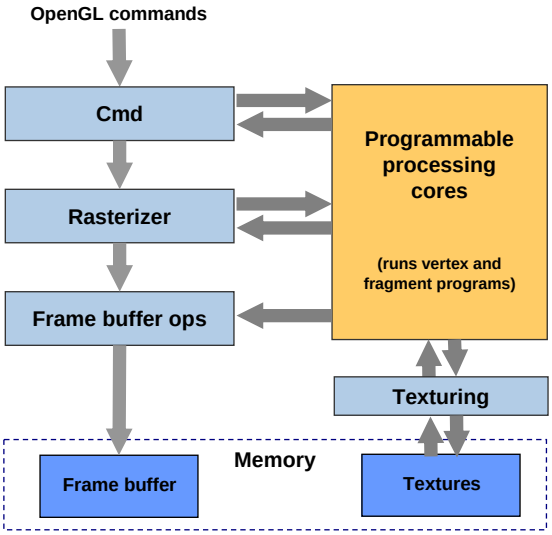
OpenGL Pipeline



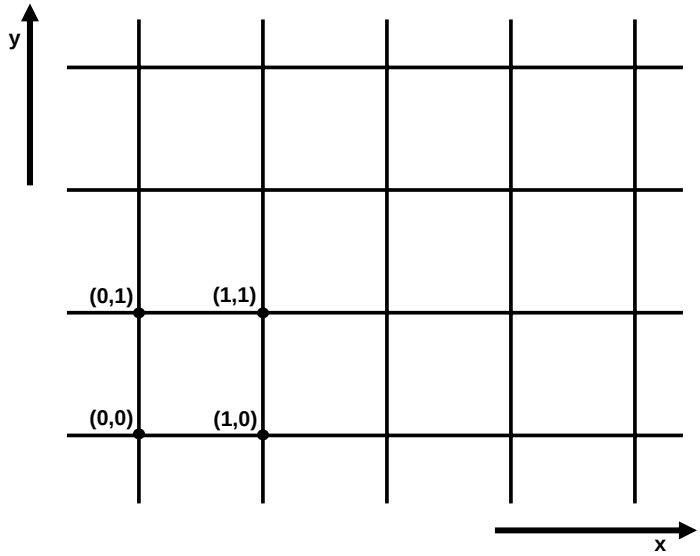
Simplified Pipeline



Modern hardware pipeline

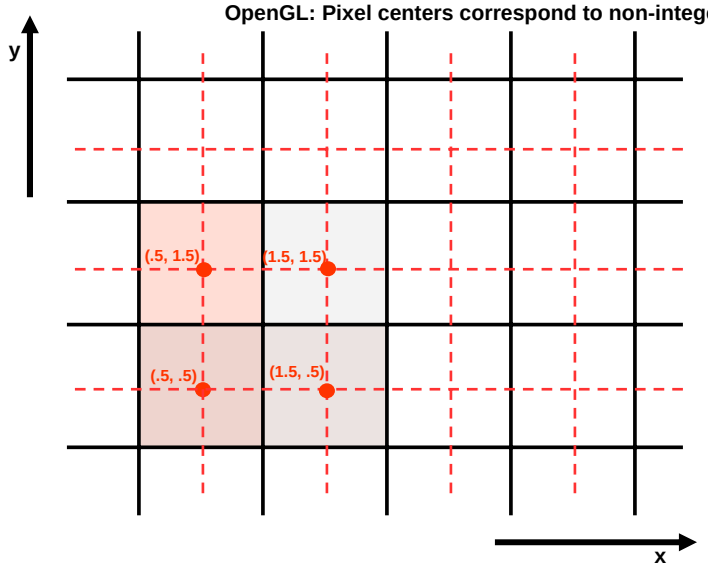


Thinking About Coordinates



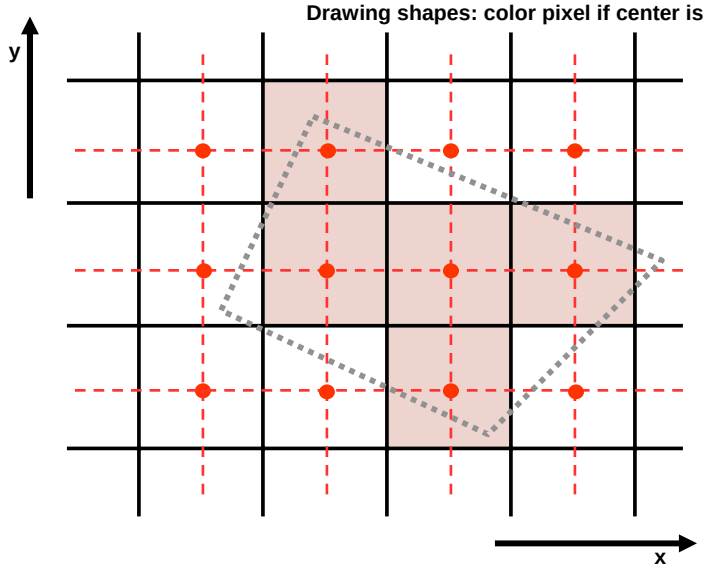
Pixel Coordinates

OpenGL: Pixel centers correspond to non-integer coordinates



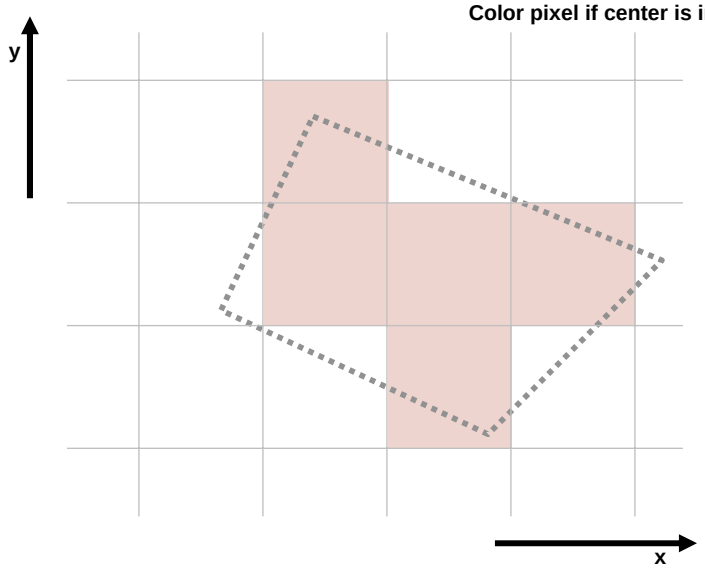
Pixel Coordinates

Drawing shapes: color pixel if center is inside shape

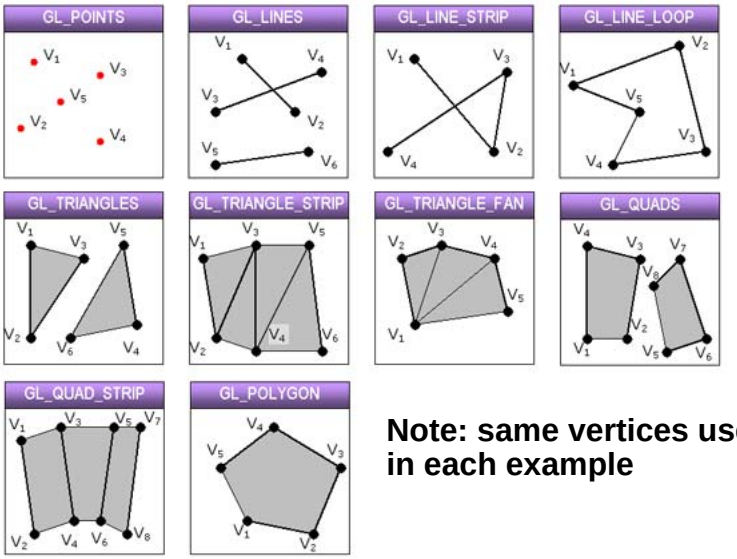


Pixel Coordinates

Color pixel if center is inside shape



OpenGL Shape Primitives



Note: same vertices used in each example

Summary

Graphics systems produce pixels from input primitives

OpenGL primitives

- Shapes (points, lines, triangles, quads, etc.)
- Bitmaps
- Images

Shape primitives specified via list of vertex positions (positions given in coord space, not pixels)

Learn correspondence between coordinates and pixels

Demos: use simple GL commands and use GLUT for windowing/interaction