

Computer Graphics & OpenGL

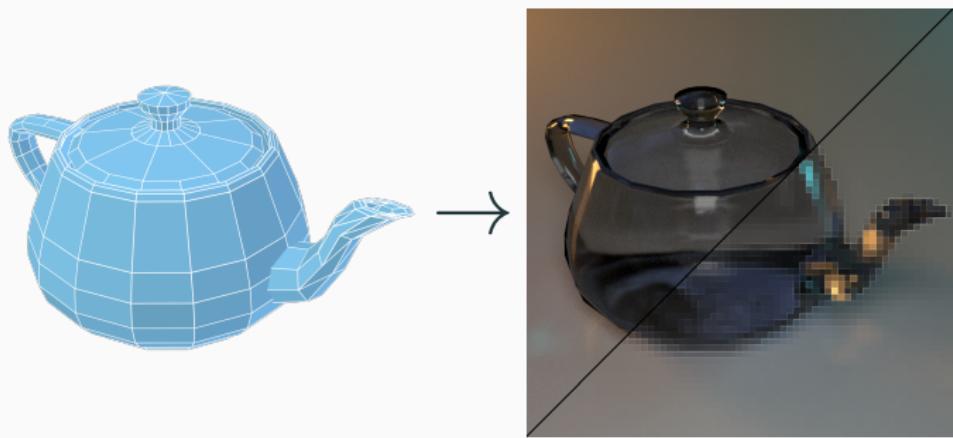
Sam Sartor

January 24, 2017

Mines Linux Users Group

Introduction

Definition



Computer graphics is the science of turning *shapes* into *pixels*.

Uses

Computer graphics is everywhere!

- Your terminal
- Web browsers
- Video games
- CAD software
- Movies, TV Shows
- Virtual reality
- Your bootloader
- QT, GTK+, wxWidgets
- Vim, Emacs, Notepad
- Embedded devices

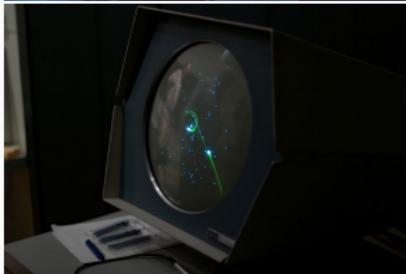


Online and Offline

History

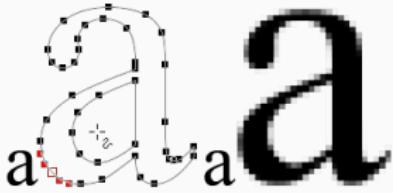
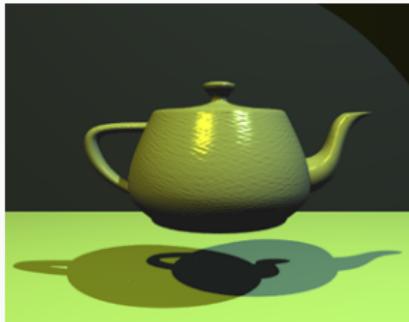
1950s & 1960s

- Military used computer controlled oscilloscopes to display strategic information
- Very simple graphical CAD programs and visualizers created
- Very first computer games
- Research into elementary 3D wireframe graphics
- Very early raster displays



1970s & 1980s

- Basic lighting models such as Phong developed
- Low-res, 2D games become commercially available
- CGI starts to be used in Movies such as 1982's *Wrath of Khan* and 1985's *Young Sherlock Holmes*
- Modern GUIs are developed
- High-quality digital typesetting becomes commonplace



PostScript type

Bitmap type

1990s & 2000s

- Fidelity and performance are immensely increased
- Personal computers, 3D video games, and GUIs become ubiquitous
- OpenGL and Direct3D standardize hardware graphics support
- CGI becomes commonplace in Movies, advertisements, and TV
- Global illumination and physically based rendering (PBR) techniques developed



Today

- Given enough time, budget and expertise, offline graphics are photorealistic
- Particle and fluid simulations are extremely fast and accurate
- Realtime graphics make extensive use of shaders and PBR techniques
- UIs and offline graphics are increasingly GPU accelerated
- Linux and Mac have improved support for games and graphical software



Text & User Interfaces

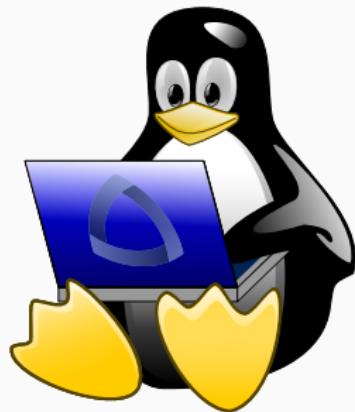
OpenGL

Offline Rendering

Copyright Notice

This presentation was from the **Mines Linux Users Group**. A mostly-complete archive of our presentations can be found online at
<https://lug.mines.edu>.

Individual authors may have certain copyright or licensing restrictions on their presentations. Please be certain to contact the original author to obtain permission to reuse or distribute these slides.



Colorado School of Mines
Linux Users Group