Introduction to Computer Graphics

CMSC 161: Interactive Computer Graphics

2nd Semester 2014-2015

Institute of Computer Science

University of the Philippines – Los Baños

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What is **Computer Graphics**?

It is concerned with all aspects of producing pictures or images using a computer

It provides a set of tools to create pictures and interact with them naturally

It is a field concerned with the generation, manipulation, and storage of digital graphical data.

What is **Computer Graphics**?

"Any use of computers to create and manipulate images"
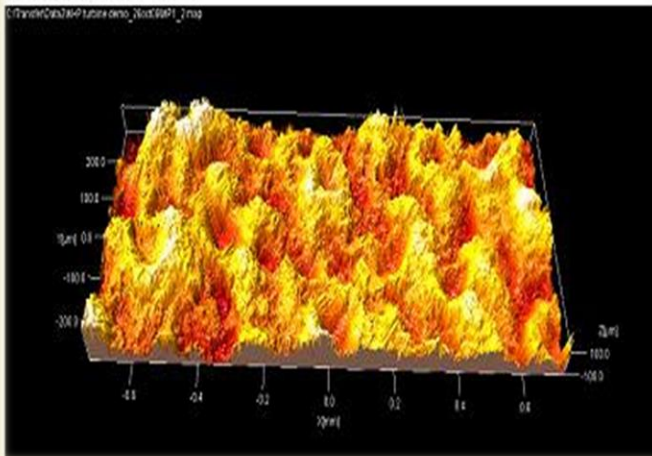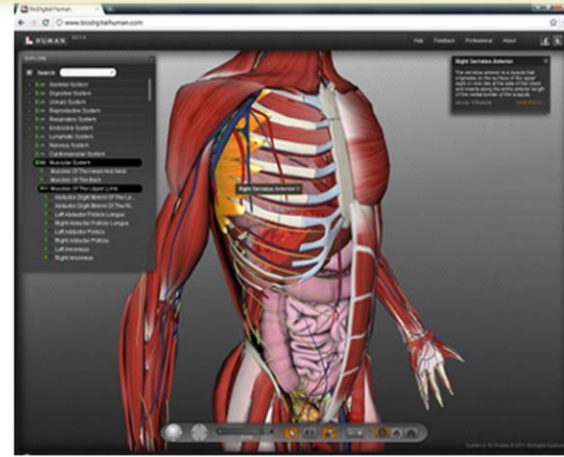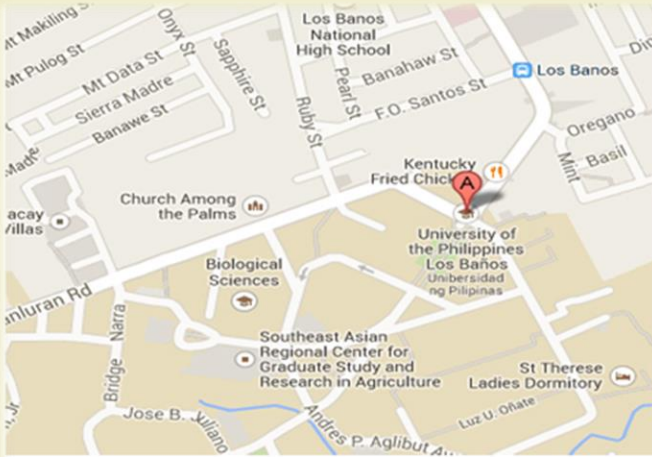
Applications of Computer Graphics
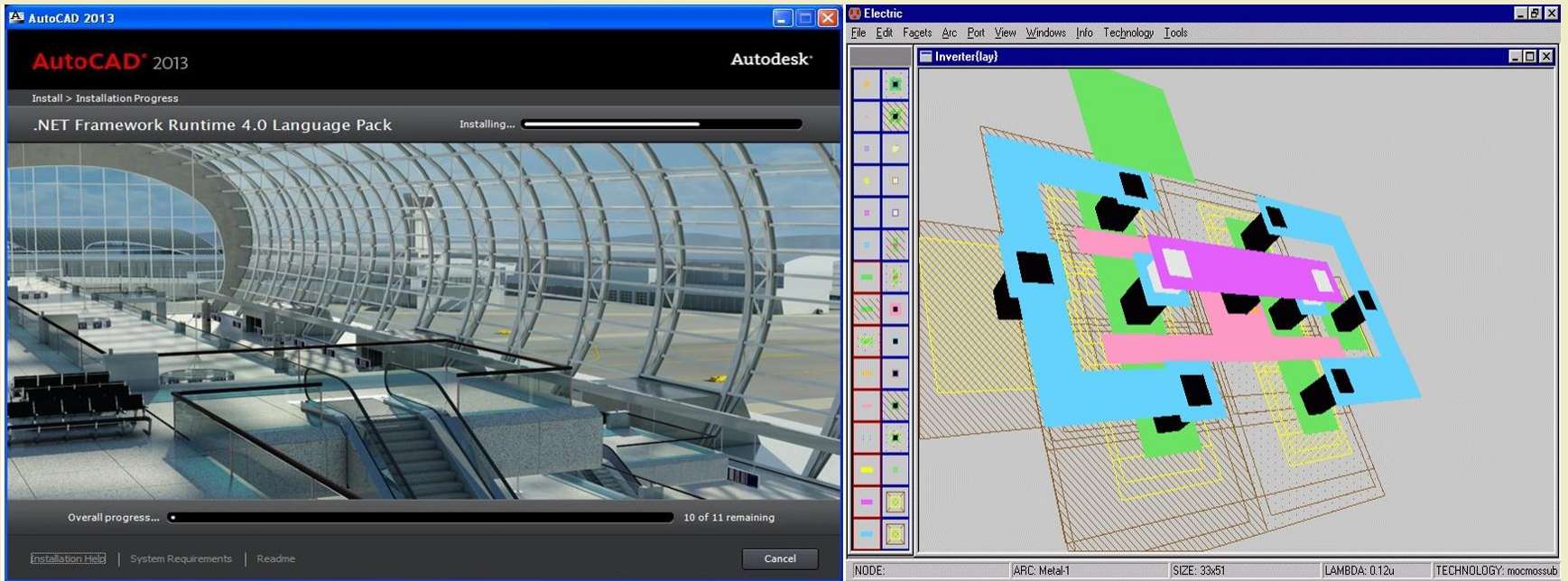
Display of Information

Design

Simulation and Animation

User Interfaces
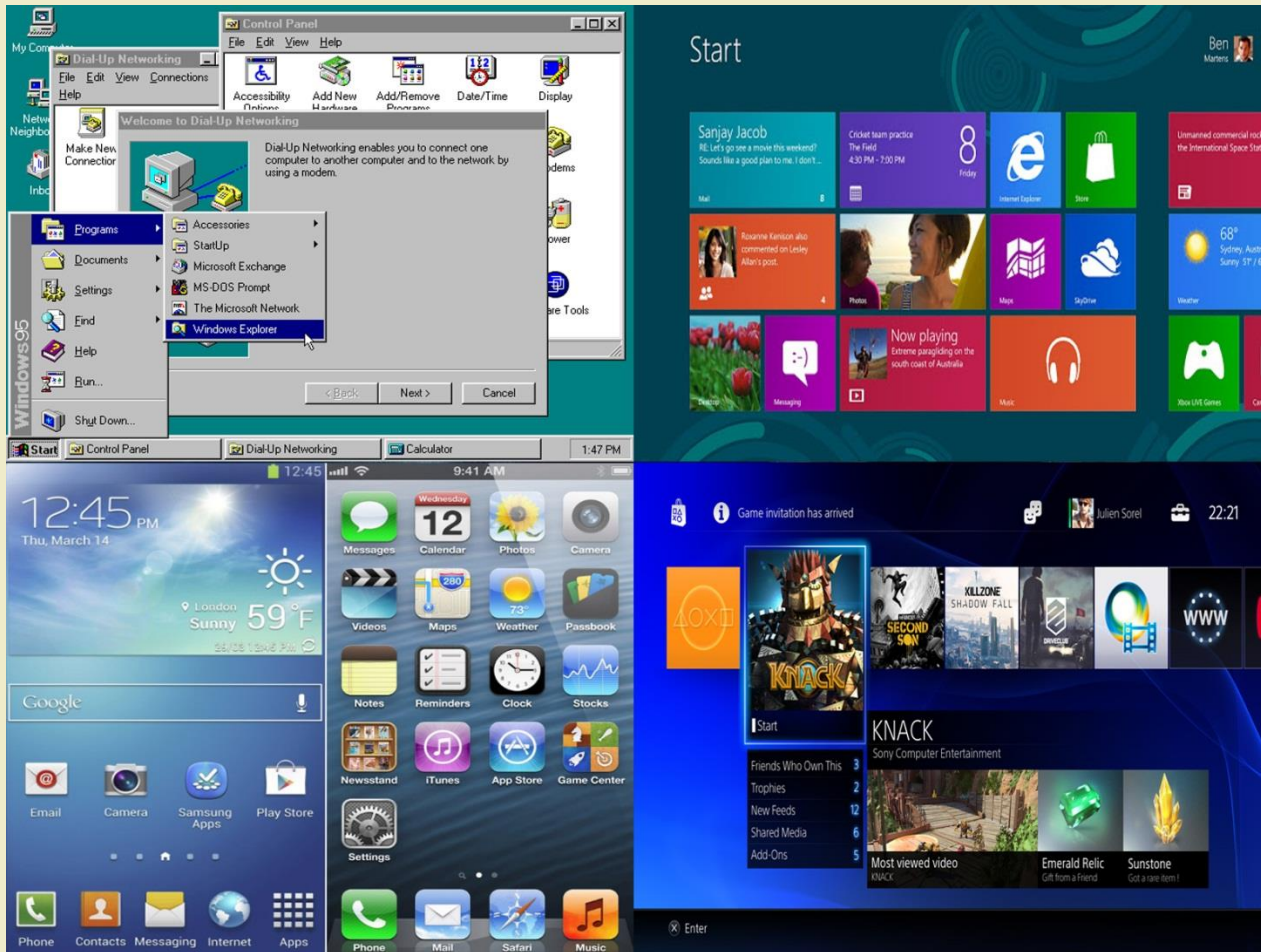
Display of Information

Design
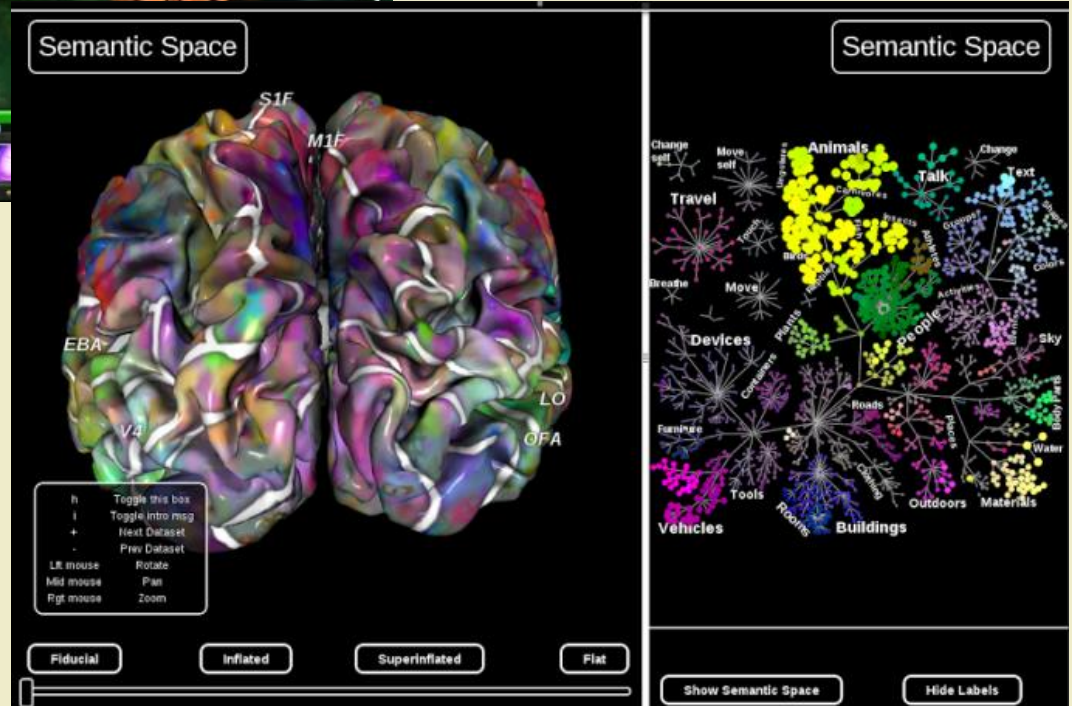
Simulation and Animation

User Interfaces

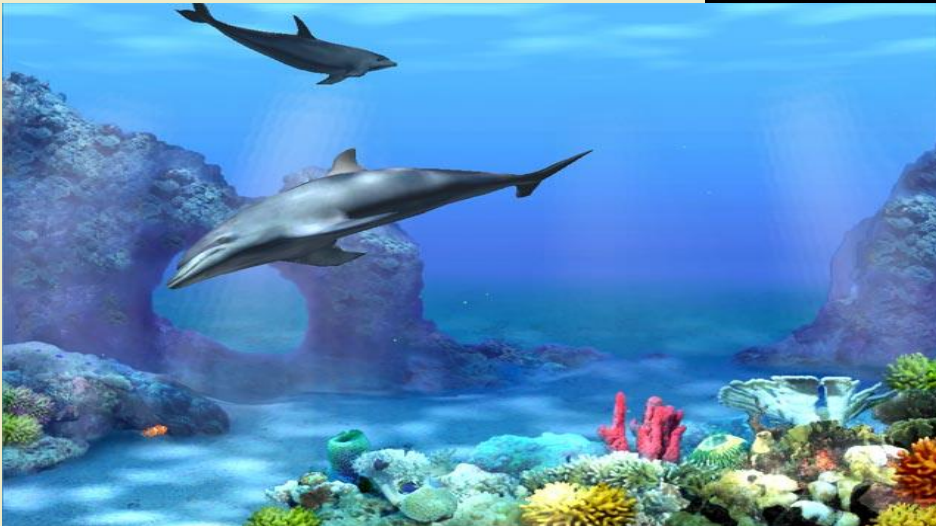# Interactive Computer Graphics

Computer Graphics + **Interactivity**

– Graphics can easily be influenced by user inputs

Interactive Computer Graphics

Interactive Computer Graphics

Graphics system model and its common components

GRAPHICS SYSTEM

Major Elements of a Graphics System
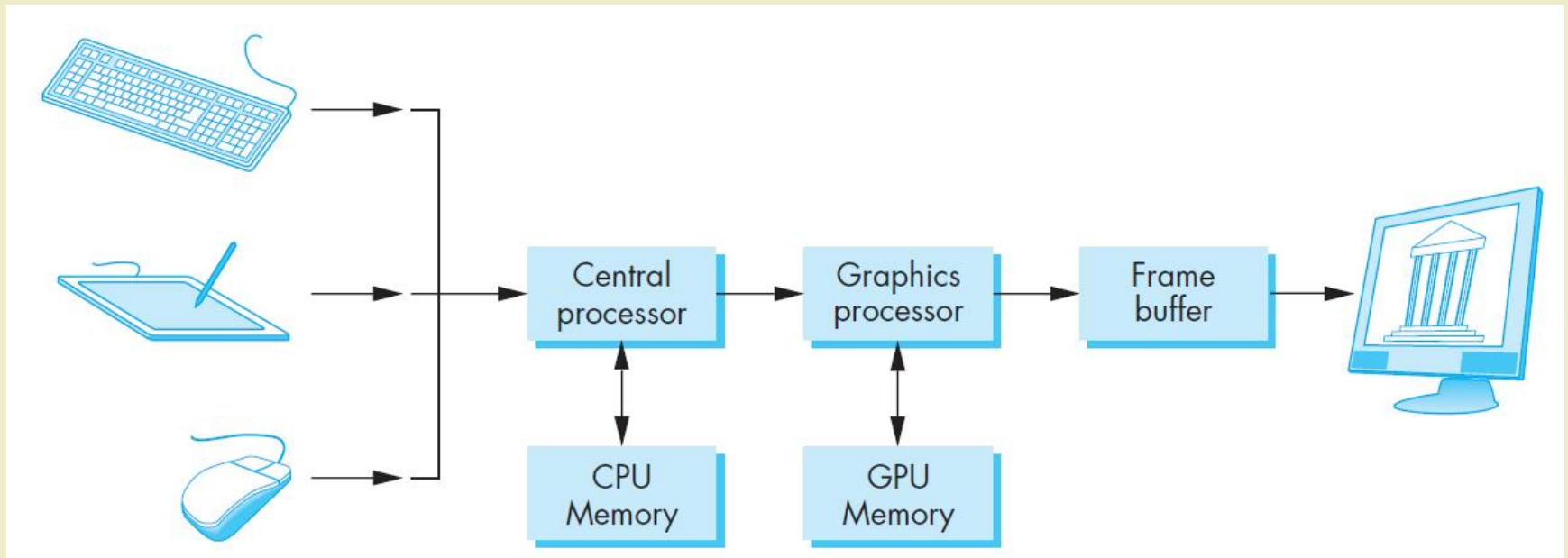
- Input Devices
- CPU and GPU
- Memory
- Frame Buffer
- Output Devices

The Frame Buffer

An array of picture elements (pixels) is called

a raster

These pixels are stored in a part of memory

called the frame buffer

The Frame Buffer

Resolution is the number of pixels in the frame buffer
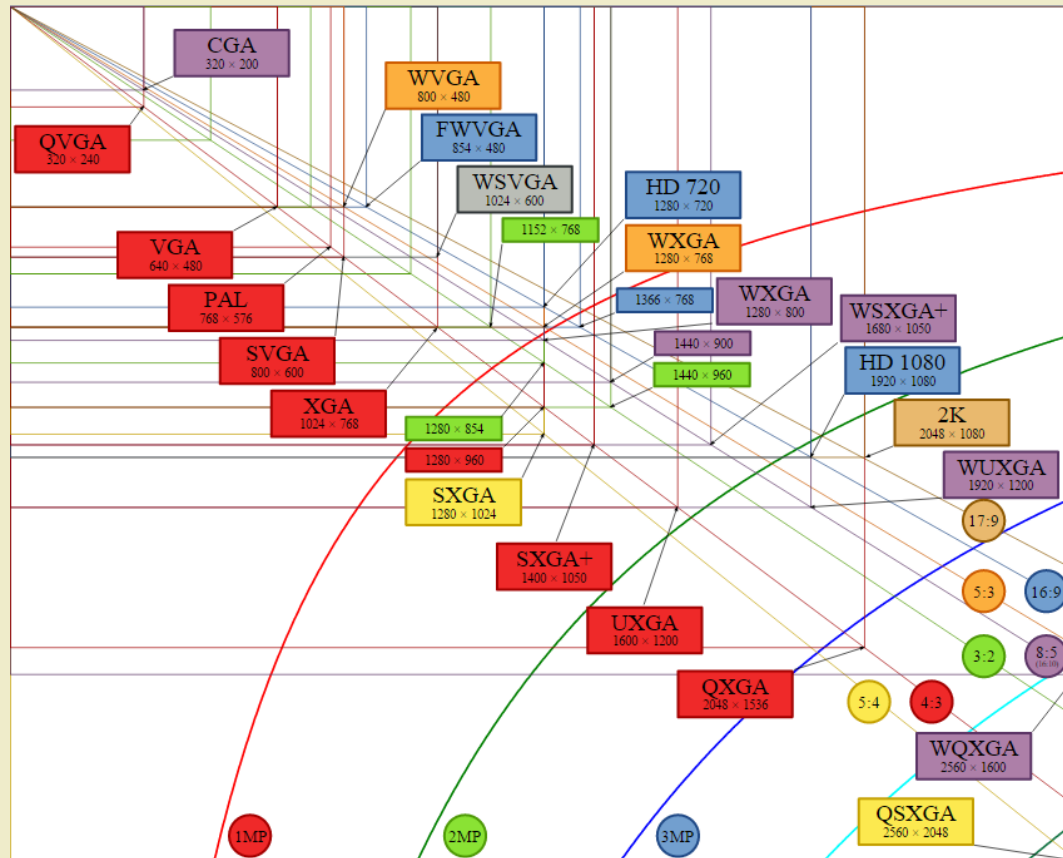
The Frame Buffer

Depth/Precision is the number of bits that are used for each pixel

1-bit "Color"   8-bit Color   16-bit Color

The CPU and GPU

Graphics Processing Units (GPU) are special purpose devices created to speed up graphics operations

- May contain thousands of processing units

- Nvidia GeForce GTX Titan Z contains 5760 CUDA cores

The CPU and GPU

Mainly responsible for

Rasterization/Scan Conversion

The CPU and GPU

Rasterization/Scan Conversion

Takes graphical primitives as input and assigns values to pixels in the frame buffer as output

Geometric entities to pixel colors and locations in the frame buffer

The Output Devices

CRT, LCD and LED Monitors

2D or 3D Printers

Plotters

Monitors

To see a flicker free image

light emitted by monitors must be refreshed

Refresh rate is normally

60 Hz (60 cycles per second)

Monitors

Progressive(p) and **Interlaced(i)** scan

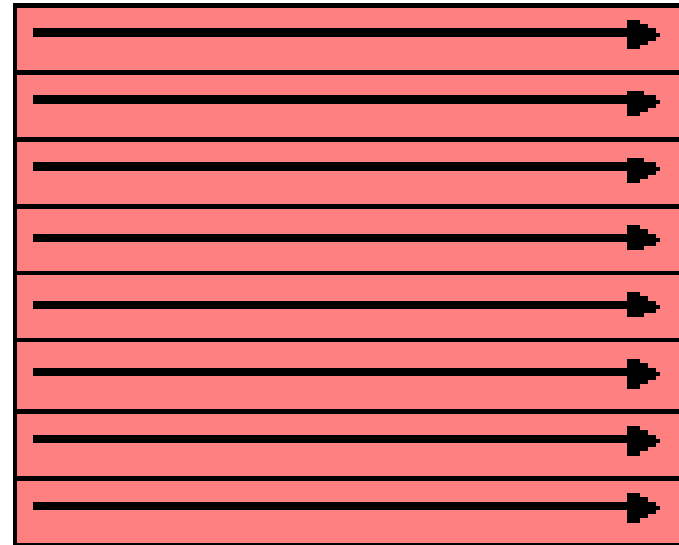- 1080p and 1080i

    1080 lines drawn progressively or interlaced

- Progressive scan draws/scans the image line by line sequentially

- Interlaced scan draws/scans the image by drawing the odd lines first then drawing the even lines

Progressive and Interlaced

From Computer Desktop Encyclopedia
© 2007 The Computer Language Co. Inc.

Interlaced

Progressive Scan
(Non-interlaced)

Progressive and Interlaced

Interlacciato

Progressivo

progressive scan
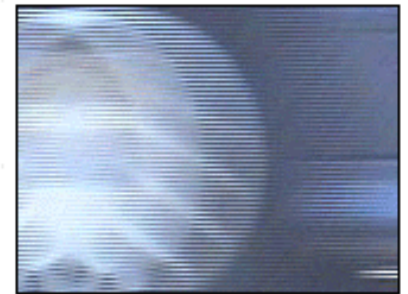
interlace

Input Devices

Physical Devices

Mouse, Keyboard, Trackball, Data tablets,

Joysticks, Spaceball

Input Devices

Logical Devices

Input strings from file or console

Widgets that are integrated to the application

Trackballs and Spaceballs

Plotters

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Class	Class Code
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CMSC 161 Lab UV-1L	9jb5h4
CMSC 161 Lab UV-2L	5bqta
CMSC 161 Lab UV-3L	ejeqro

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- SALOMON, D. 2011. The Computer Graphics Manual. Vol. 1. Springer. Northridge, CA.
- SHIRLEY, P. AND MARSCHNER, S. 2009. Fundamentals of Computer Graphics. 3rd ed.

Lecture Slides:

- CLARIÑO, M. CMSC 161 2nd Semester 2011-12 Topic 1 Lecture Slides.

Images:

- https://maps.google.com.ph/maps?ie=UTF-8&q=University+of+the+Philippines+Los+Ba%C3%B1os&fb=1&gl=ph&hq=University+of+the+Philippines+Los+Ba%C3%B1os&hnear=University+of+the+Philippines+Los+Ba%C3%B1os&cid=0,0,3291056317957223508&ei=Nxx9UorcGon-iAfD3oCYCQ&ved=0CKEBEPwSMAo
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