Development of Games

Lecture 11

Introduction to DirectX

Differences between OpenGL and DirectX

- DirectX
  - Product of Microsoft
  - Based on COM-objects
  - Close standard
  - Implementation exists only for Microsoft's products
- OpenGL
  - Was developed in 1992 by Silicon Graphics
  - Based on C
  - Open standard
  - Development is controlled by group ARB
  - Is used as main or single library for most of architectures and systems

Differences between OpenGL and DirectX (2)

- Direct 3D :
  - Was developed especially for using of GPU
  - Most of functions are corresponding directly to capabilities of modern GPU
  - Give more opportunities for control of GPU and resources by programmer
- OpenGL :
  - Was developed as library with opportunity of hardware support of function, most of function are implemented as programs with opportunity to execute by GPU
  - Most of functions are oriented on requirements of users but not features of hardware
  - Maximally frees user from hardware specific problems
  - Structure is finite machine with states and options, for visualization the procedure model is used

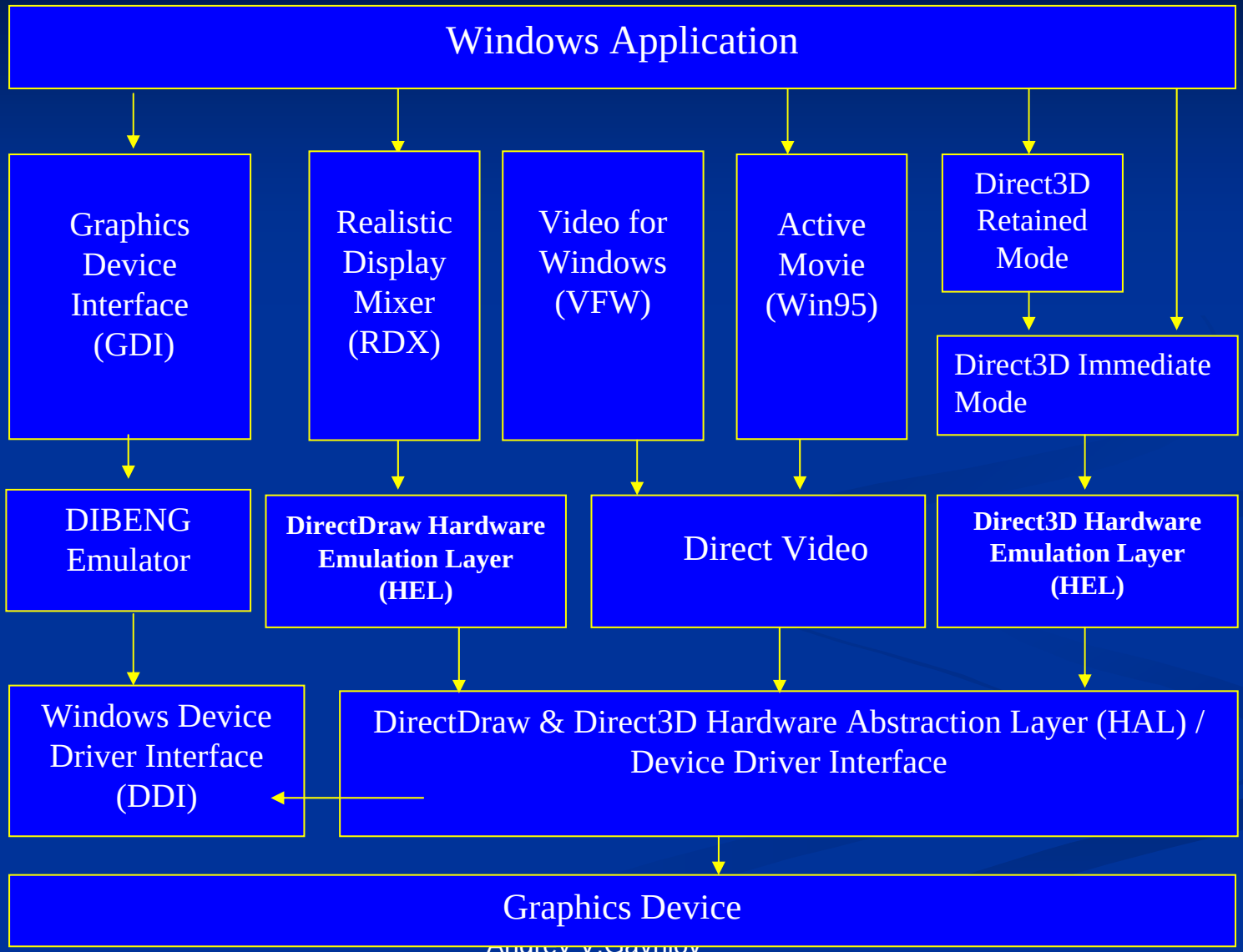
Differences between OpenGL and DirectX (3)

- Direct 3D :
  - Dominates in game industry (but situation may be changed)
  - COM allows to use in different program languages
  - Rarely is updated but new releases are supported all new and some future extensions
- OpenGL :
  - Long time is used and is standard in different areas but not in game industry
  - As primary it was oriented on scientific activity it contains many functions not needed for games
  - Unsuitable interface for extensions, it is possible any problems

Direct X - DirectDraw

- Very Fast - DirectDraw bypasses GDI and directly accesses video memory on graphics card (via surface object)
- PRIMARYSURFACE - direct access to display memory area.
- OFFSCREENSURFACE - offscreen “behind the scene drawing area”

Display Architecture in Win95



Direct3D - Modes of Operation

- Direct3D Retained Mode
  - Sophisticated Geometry Engine to create entire scene to be manipulated with high level API calls. - Functionality comes at performance cost (similar to OpenGL).
- Direct3D Immediate Mode
  - A device independent way for accessing low-level hardware acceleration (however programmers must design their own geometry and lighting modules).
  - Very Fast! But difficult to program!

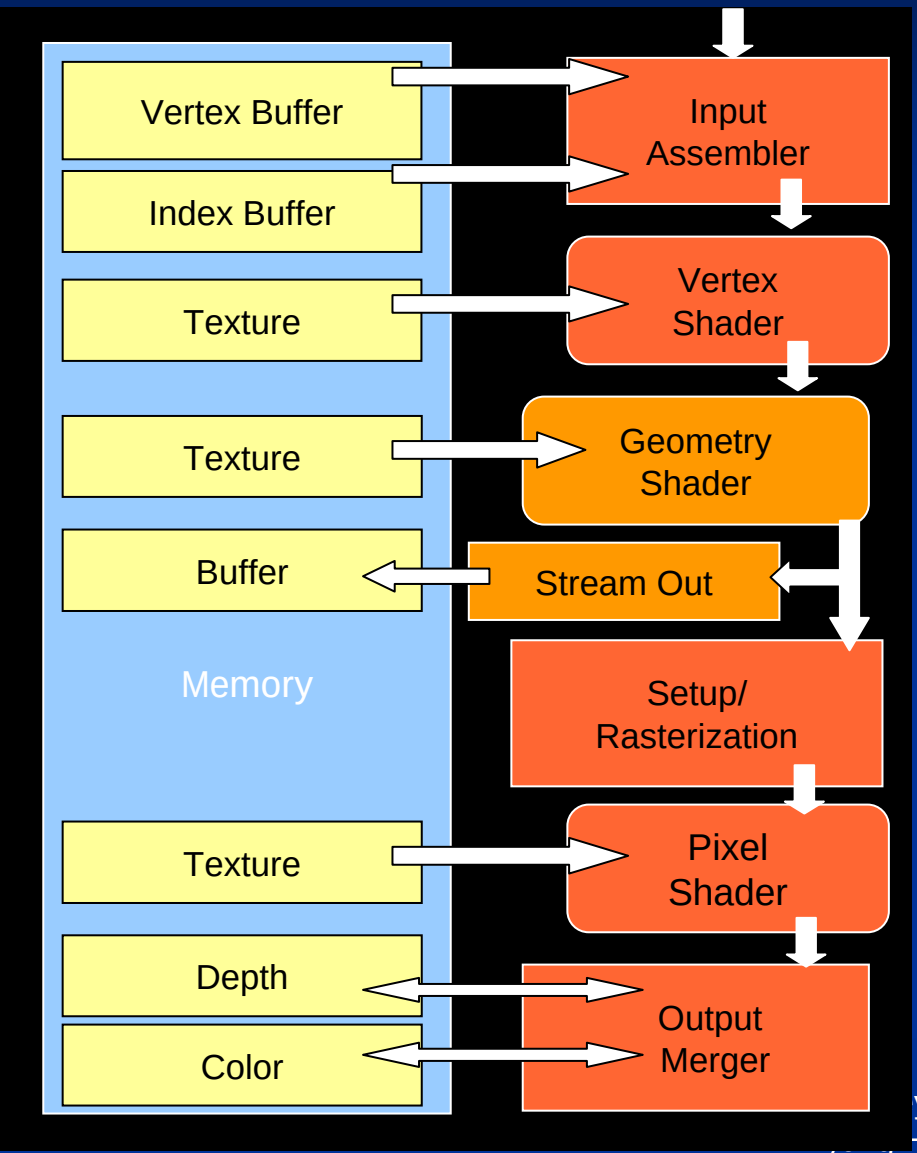
Direct3D

- Advantages:
  - Faster than OpenGL (Direct hardware accelaration)
  - Used in Games
- Disadvantages:
  - Platform Dependent (PC Windows platform)
  - Very difficult use (steep learning curve) with large code overhead incomparison to OpenGL.

Overview

- DirectX 7
  - Software rasterizer, DirectDraw, surface access, DirectShow integration.
- DirectX 8.x
  - Shaders! No Software rasterizer, no DirectDraw, no surface access, DirectShow integration
- DirectX 9
  - HLSL, DirectShow integration

Direct3D version 10



- New concept of architecture of GPU
- New concept of geometric shader embedded in GPU
- Simultaneous visualization of some models by one call

Graphics Core In Windows Vista