

New Graphics API and GPU Hardware Architecture Co-development

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Abstract

Starting late 1980s specialized 3D graphics hardware had been included in graphics workstations, in late 1990s almost every desktop PC had 3D graphics accelerator. At present time the GPU has become a standard part of any desktop or mobile computer system. Graphics APIs were developed in parallel with 3D hardware and from generation to generation they were absorbing all new features of hardware. Two major APIs' OpenGL and DirectX have significant influence on GPU architecture development as well as GPU technology achievements introduce new functionality to those APIs. This presentation describes the latest history of API and GPU co-development based on personal experience.

Keywords: graphics API, graphics processing unit (GPU), OpenGL extensions, D3D, Windows Graphics Foundation (WGF), general purpose GPU (GP GPU).

1. GRAPHICS API EVOLUTION AND SHADING LANGUAGES

Brief history overview of OpenGL and Microsoft DirectX graphics API. Shader assembly language. New high-level shading languages in Dx9 and OpenGL 2.0.

2. GRAPHICS HARDWARE AND GPU

From fixed function graphics hardware to fully programmable GPU. Vertex and pixel shaders. Common shader core in new generation. GPU as a desktop supercomputer (GP GPU).

3. API AND GPU CO-DEVELOPMENT

OpenGL as public domain API standard versus proprietary Microsoft DirectX API.

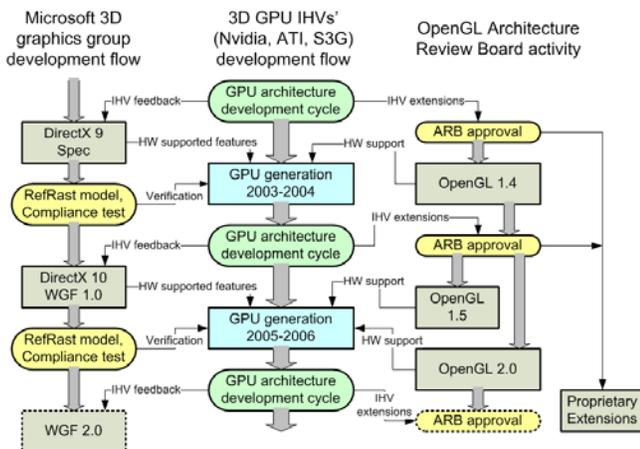


Figure 1: Graphics API and GPU development flow interaction.

How independent hardware vendors (IHV) help to develop both APIs? What is important for HW and SW vendors in API development?

4. WGF 1.0 AND GPU CO-DEVELOPMENT

Experience with WGF 1.0 and new generation GPU co-development in 2003-2005. IHV interaction with Microsoft and ISWs.

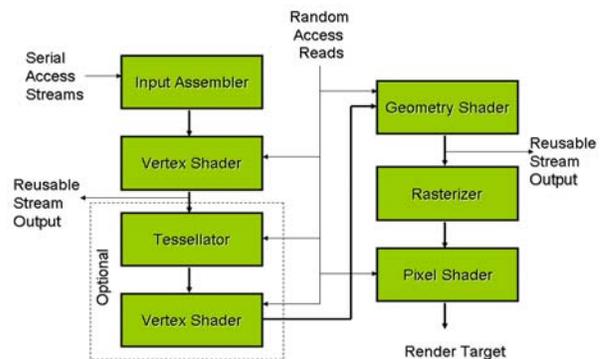


Figure 2: Microsoft WGF pipeline.

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About the author

Dr. Timour Paltashev is a graphics architecture manager at S3 Graphics Inc. He is also a professor at Northwestern Polytechnic University. For several years he serves in program committee of GraphiCon and Eurographics-SIGGRAPH Graphics Hardware conferences. He is a member of ACM and IEEE Computer Society. His contact email is tpaltash@s3graphics.com