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QUANTUM3D ANNOUNCES IGL178 COTS, SOFTWARE-BASED GPU FOR SAFETY-CRITICAL APPLICATIONS

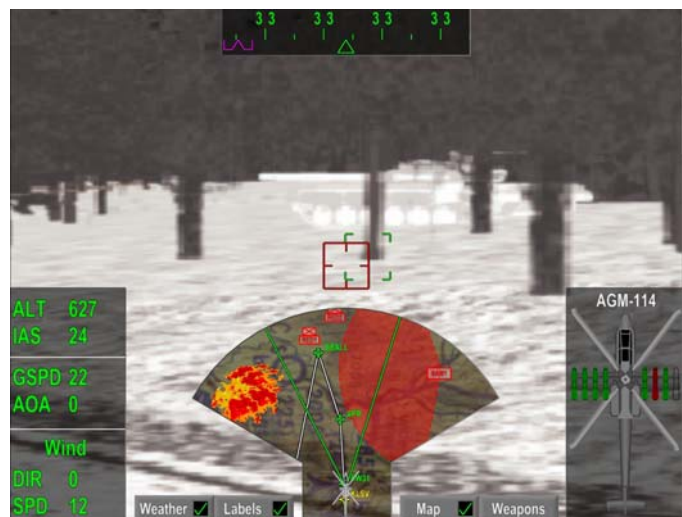
IGL178 is the Visual Computing Industry's First COTS, Obsolescence-Proof, High-Performance, FAA DO-178B Level-A Certifiable, Software-Based OpenGL SC and ES Graphics Processing Unit (GPU) that Enables Advanced, Realtime 2D/3D Graphics and Video on Virtually Any Embedded Platform

AMSTERDAM, NETHERLANDS, [Avionics 08 Conference](#)

– March 5, 2008 – [Quantum3D](#)[®], Inc., a leading provider of Commercial, Off-the-Shelf (COTS) open-architecture, realtime visual computing solutions for the Visual and Sensor Simulation and Training (VSST) and Embedded Visual Computing (EVC) markets, today announced the release of IGL178™, the industry's first, entirely software-based, FAA DO-178B Level-A certifiable [OpenGL](#)[®] Safety Critical (SC) and OpenGL Embedded Systems (ES) Graphics Processing Unit (GPU).

IGL178 enables avionics and other safety-critical visual computing application developers to deploy industry-standard realtime OpenGL ES and SC applications on virtually any embedded system or display device, including systems not equipped with hardware-accelerated GPUs. IGL178 also enables GPU-equipped systems for which safety-critical certifiable drivers are not available to host certified applications by eliminating un-trusted driver code. With its ability to support high-fidelity, high-performance realtime 2D and 3D graphics and video applications on a wide range of systems and operating environments, IGL178 is well suited for development and deployment of new classes of low-cost, obsolescence-proof avionics, weapon systems and other advanced-display applications, including Primary and Multi-Function Displays (PFDs and MFDs), Heads-Up Displays (HUDs), Standby Instruments and Soft Controllers. IGL178 also features unique capabilities that make it ideal for new applications, including scaleable Avionics Application Standard Software Interface ([ARINC 653](#))-partitioned safety-critical and multilevel-secure workstation applications.

Implemented by the Quantum3D IData[®] team and optimized for avionics and other safety- and mission-critical embedded visual computing applications, IGL178 is an efficient, small-footprint, comprehensive software implementation of OpenGL ES and SC that features extensive optimizations to provide high-performance, high-fidelity, precision software-based rendering. A key benefit of



Quantum3D[®] IGL178™ Enables Cost-Effective, Obsolescence-Proof Deployment of High-Fidelity, Safety Critical-Certified Visual Computing Applications on Virtually any Embedded Platform

IGL178 is that it offers application developers a scalable solution for embedded graphics that supports both CPU-accelerated and GPU-accelerated graphics subsystems with a single industry-standard API so that applications may be readily deployed across multiple platform types with minimal time and development expense.

"IGL178 addresses many of the biggest problems facing the safety-critical embedded graphics industry today—COTS GPU scalability, certifiability and obsolescence," said Ross Q. Smith, Quantum3D President and Co-Founder. "By enabling the usage of industry-standard OpenGL ES and SC on virtually any platform, IGL178 allows developers in all embedded markets to employ common tool chains and common software to deploy long-lifecycle, high-fidelity, precision 2D and 3D graphics and video-intensive applications on essentially all embedded visual computing platforms, even those without dedicated hardware graphics acceleration, as well as address new challenges like MLS workstation and ARINC 653 partitioned applications."

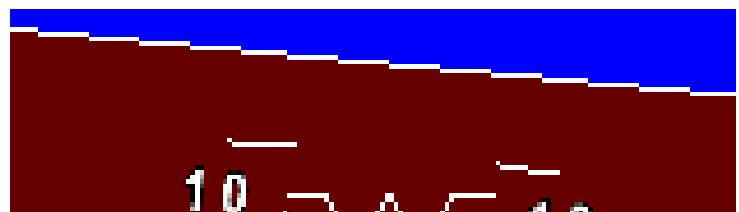
IGL178 Fundamentally Addresses Merchant GPU Obsolescence and Certifiability

While desktop or embedded merchant GPUs can provide powerful performance for visual computing applications, they also have significant limitations—especially for avionics, medical device and military applications where safety-critical certification and long-lifecycle support is required. Modern merchant GPUs are designed for volume PC and cell phone applications where features, performance and cost are the most important design factors. Merchant GPUs, in general, are not designed to meet the rigorous hardware verification requirements of FAA DO-254 or similar standards. Because of the complexity required to meet the needs of demanding video games and similar applications, the design of merchant GPUs makes such certification efforts resource and cost prohibitive for the GPU manufacturers and virtually impossible to conduct as a post-design effort. In addition, this same GPU complexity, combined with the limited volume of safety-critical and mission-critical applications compared with consumer applications, also results in limited availability and often expensive software development efforts to produce drivers that are suitable for FAA DO-178B Level-A or similar software certifications. Moreover, the short service life of merchant GPUs (typically one to three years, with five years for automotive components) requires expensive and frequent lifetime buys for end-of-life components when such components are employed on long-lifecycle (10- to 20-year) programs such as avionics systems. Also, application-specific requirements, such as video alpha blending, alpha-out channels, strict time partitioning, precision anti-aliasing, support for unique display formats and use with FPGAs, DSPs and multi-core designs, may be difficult or exceedingly expensive to implement with COTS GPUs. IGL178, by exploiting the available performance and capability of modern, embedded CPUs, fundamentally addresses merchant GPU limitations while still providing the capabilities and performance required for a wide variety of embedded visual computing applications.

IGL178 Unique Features and Capabilities

IGL178's highly optimized, comprehensive implementation of OpenGL ES and SC addresses merchant GPU scalability, obsolescence and certifiability issues addresses by providing a number of unique capabilities:

- Full OpenGL ES and SC functionality enabling applications to run in a processor-only mode while retaining upward compatibility with hardware accelerated GPUs
- Support for an optional virtualized driver that enables a standard PrPMC processor, second CPU or CPU core to function as a dedicated GPU in an embedded system
- Efficient high-performance implementation, supporting both floating- and fixed-point math with extensive CPU specific optimizations
- Complete, tailorable source code usable in any operating system and processor type
- Small implementation certifiable to safety standards, including FAA DO-178B Level-A, with an available FAA DO-178B Level-A Certification Kit
- Support for Quantum3D TrueStroke™ precision anti-aliased lines, points and fonts



Actual (Zoomed) Screenshot of Standard Avionics Display using Standard Lines and Fonts on a Merchant OpenGL® ES-Compliant GPU



Same Display with Quantum3D® TrueStroke™ Precision Anti-Aliases Lines and Fonts Supported by IGL178™

- Configurable support for 16, 24 and 32-bit frame buffer modes, with single, double or triple buffered rendering, Z-buffering, with alpha and with or without alpha-out
- Support for Off-Screen Rendering using a user-supplied frame buffer to accomplish video blending, static symbology backgrounds and other special-purpose features.

IGL178 Enables New Applications

In addition to supporting conventional avionics and similar mission- and safety-critical visual computing applications, IGL178 enables new classes of visual computing applications including:

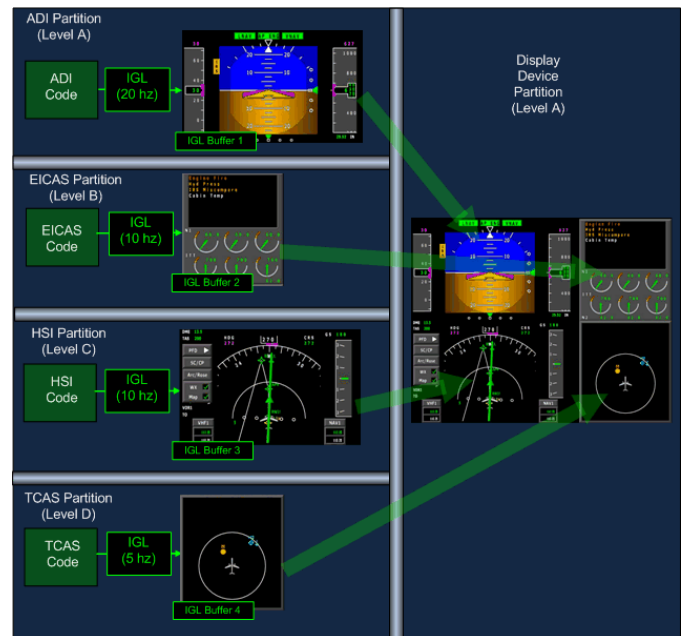
- Output of the rendered image to a display device that contains only a hardware frame buffer and display-control and interface functionality
- Rendering using a user-supplied frame buffer that may contain existing pixel data to be overlaid, such as live video data or previously rendered backgrounds
- Using the optional Virtualized IGL178 driver, developers may dedicate a processor in an embedded system to serve as a GPU using IGL178
- IGL178 may be used to perform off-screen, render-to-texture commands that, in turn, are supplied to a hardware-accelerated GPU, which enables cross-platform render-to-texture capabilities that insulate applications from reliance on vendor-specific OpenGL extensions.
- IGL178 may also be used to render a frame buffer with an alpha channel for use by dedicated video-blending hardware.

Support for Multi-Level Secure (MLS) Workstations and Multi-Critical Displays

With its unique, flexible architecture, IGL178 provides new capabilities that enable application developers to address multiple frame-rate, multi-level secure and multiple criticality-level embedded visual computing applications in a single display by supporting rendering into independent software frame buffers, which may then be transferred via IPC and written to a display-frame buffer via image compositing in a device interface partition. With its optional virtualized driver architecture, IGL178 also supports rendering into multiple virtualized geometry queues which may then be transferred via IPC and rendered using any OpenGL driver to a single display device, allowing multi-critical applications to employ a single GPU hardware accelerated driver. In either case, the result of the above capabilities is a strict partitioning of rendering applications from each other that allows each partition to render independently at different frame rates.

Compatibility with IData178 and a Key Component of FidelityVCF

IGL178 is fully compatible with IData, Quantum3D's industry-leading Human Machine Interface (HMI) and EVC Development and Deployment Tool Suite. By combining IData178 and IGL178, developers can deploy a trusted, safety-certifiable, small-footprint graphics software stack to any computing device. IData offers unique features such as multirate rendering, smart clear/scissor and static background rendering to enable applications to achieve unprecedented high performance levels from a software-based GPU solution. The partitioned, multi-critical HMI, advanced rendering capability and high performance are key features of FidelityVCF™, the DO-178B Level-A Certifiable Embedded Visual Computing Framework that combines IData178 with IGL178 and Sysgo's PikeOS ARINC 653 partitioned virtualized RTOS.



Multi-Critical EFIS Display Example Using Quantum3D® IGL178 Within Disparate ARINC 653 Partitions

IGL178 at Avionics 08

IGL178 will be on display at the Avionics 08 conference in the Quantum3D booth (#A24), March 5-6 in Amsterdam, Netherlands, at the Passenger Terminal Amsterdam. For more information on Quantum3D EVC products including IGL178 or to schedule an appointment at Avionics 08, please email salesinfo@quantum3d.com or contact Andy Pinkard at +44 798-938-2676.

Pricing and Availability

IGL178 has been selected for two FAA DO-178 certifiable avionics programs, both of which are currently in development. Quantum3D sells IGL178 as a binary software development tool, combined with a Target Reference Platform, for a wide variety of processors and operating environments including PowerPC® (Freescale, Motorola and IBM), Intel® IA32/IA64 and ARM® 11 CPUs combined with popular standard and safety-critical operating systems and Realtime Operating Systems (RTOSs) including Linux, Microsoft® Windows® XP and CE, Sysgo® PikeOS®, Wind River® VxWorks® and VxWorks AE653, Green Hills® Integrity® and Integrity-178B, LynuxWorks® LynxOS® and LynxOS-178 systems. International single-seat pricing for IGL178 Development Binary Licenses is priced at \$60,000 USD, and international, single-unit Target Reference Systems start at approximately \$7,500 USD. Both software and reference systems are available with standard lead times. IGL178 is also sold as a component of FidelityVCF, and IGL178 source code and porting services for customer-specific platforms are also available from Quantum3D. For applications that require [FAA DO-178B](#) or similar safety-critical certification, Quantum3D offers the IGL178 Level-A Certification Kit and support services to assist customers with their certification efforts.

About Quantum3D

Quantum3D is an industry leading, small business supplier of COTS, open-architecture, realtime visual computing software and hardware products for the Embedded Visual Computing (EVC), Deployable High Performance Embedded Computing (HPEC), Visual and Sensor Simulation and Training (VSST) and Embedded Training (ET) markets. Quantum3D's VSST products include advanced Image Generation (IG) solutions, realtime scene management software and synthetic environment content. Quantum3D's EVC products include FAA DO-178B Level A certifiable Human-Machine-Interface and visual computing application development and deployment software and tactical, embedded and industrial visual computing systems and subsystems for C2/C4ISR, machine vision, sensor processing, unmanned vehicle operator control and embedded training applications. Quantum3D is a privately held company headquartered in San Jose, California, with development centers located in Glendale, AZ, Huntsville, AL, and Orlando, FL and with European sales via Quantum3D, Ltd., located in Reading, UK. For more information about Quantum3D or Quantum3D EVC Products including IGL178, please visit www.quantum3d.com or send email to salesinfo@quantum3d.com.

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