SAPPHIRE
Professional Graphics Solutions

AMD FIREPRO

AMD FirePro™ W8100 Professional Graphics

Confidential Under NDA Until 9:00 AM ET
June 23rd, 2014

www.SapphirePGS.com

AMD Business Area

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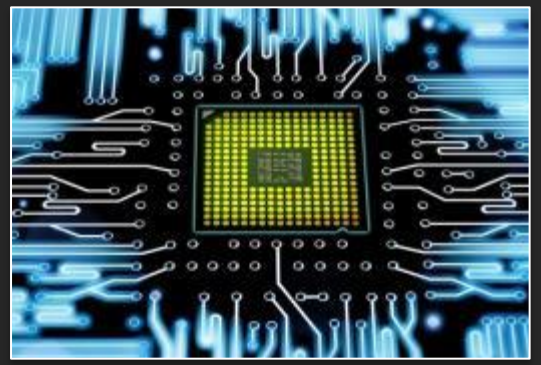
CLIENT



- Achieved desktop channel growth*
- Gaining traction with “Kabini” and “Temash” offerings
- New desktop product, “Kaveri” shipping in Q4 2013

DENSE SERVER

- Leveraging our differentiated SeaMicro server fabric
- Only company to design both x86 and ARM-based 64-bit server solutions
- Powering Verizon’s public cloud

EMBEDDED & SEMI-CUSTOM

- Semi-custom APU wins power Sony and Microsoft next generation game consoles
- Targeting APU and graphics IP in embedded devices

GRAPHICS

- Strong demand for new AMD Radeon™ R7/R9 Series products
- Record year of revenue growth in Professional Graphics
- Introduced Mantle for better AMD GPU and APU game performance

* Source: Mercury Research, PC Processor and Chip Set Report, October 2013.

The Professional Graphics Market

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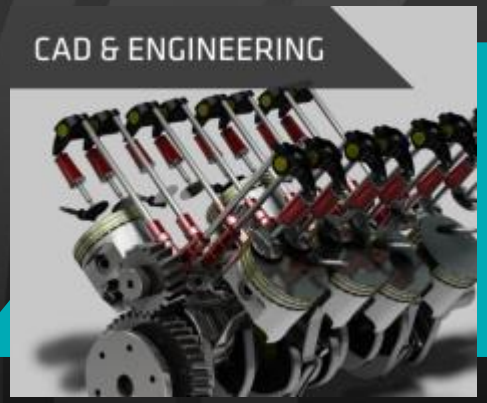
- Professional graphics is a > **$1 Billion** Market*
- New areas of growth include Cloud and HPC



Traditional Professional Graphics Markets

New Areas of growth

* Source: Jon Peddie Research, Market bulletin: workstations and professional graphics in Q3'13, December 2013.

Delivering The Right AMD FirePro solutions For

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Workstations

Data Centers

AMD FirePro™ S-Series For The Data Center

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Professional Graphics Solutions

Computing

AMD
FIREPRO
S SERIES

Visual Cloud

Deliver The Right Technologies For Key Workloads

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Computing

Visual Cloud

AMD Professional Graphics For Commercial Workflows

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Delivering the Right Workstation Experience

- AMD FirePro™ W-Series and V-Series
- Designed for Desktop and Mobile Workstations
- Certified for Engineering apps
- Optimized for Media & Entertainment apps
- High-performance graphics and GPU Compute
- AMD Eyefinity Multi-Display Technology
- Future-ready with DP1.2 for 4K / Ultra-HD Displays

OpenCL

AMD FIREPRO

Simplifying Deployment in the Data Center

- AMD FirePro™ S-Series
- Passive thermal solution designed for servers, blades and expansion chassis
- Accelerate applications beyond just graphics (GPU Compute with single and double precision)
- Virtualization solutions tested and verified with major hypervisors
- AMD FirePro™ drivers with application optimizations and certifications

OpenCL

AMD FIREPRO S SERIES

AVAILABLE NOW!!

AMD FIREPRO™ W9100

PROFESSIONAL GRAPHICS

DESIGNED FOR 4K

POWERED BY OPENCL

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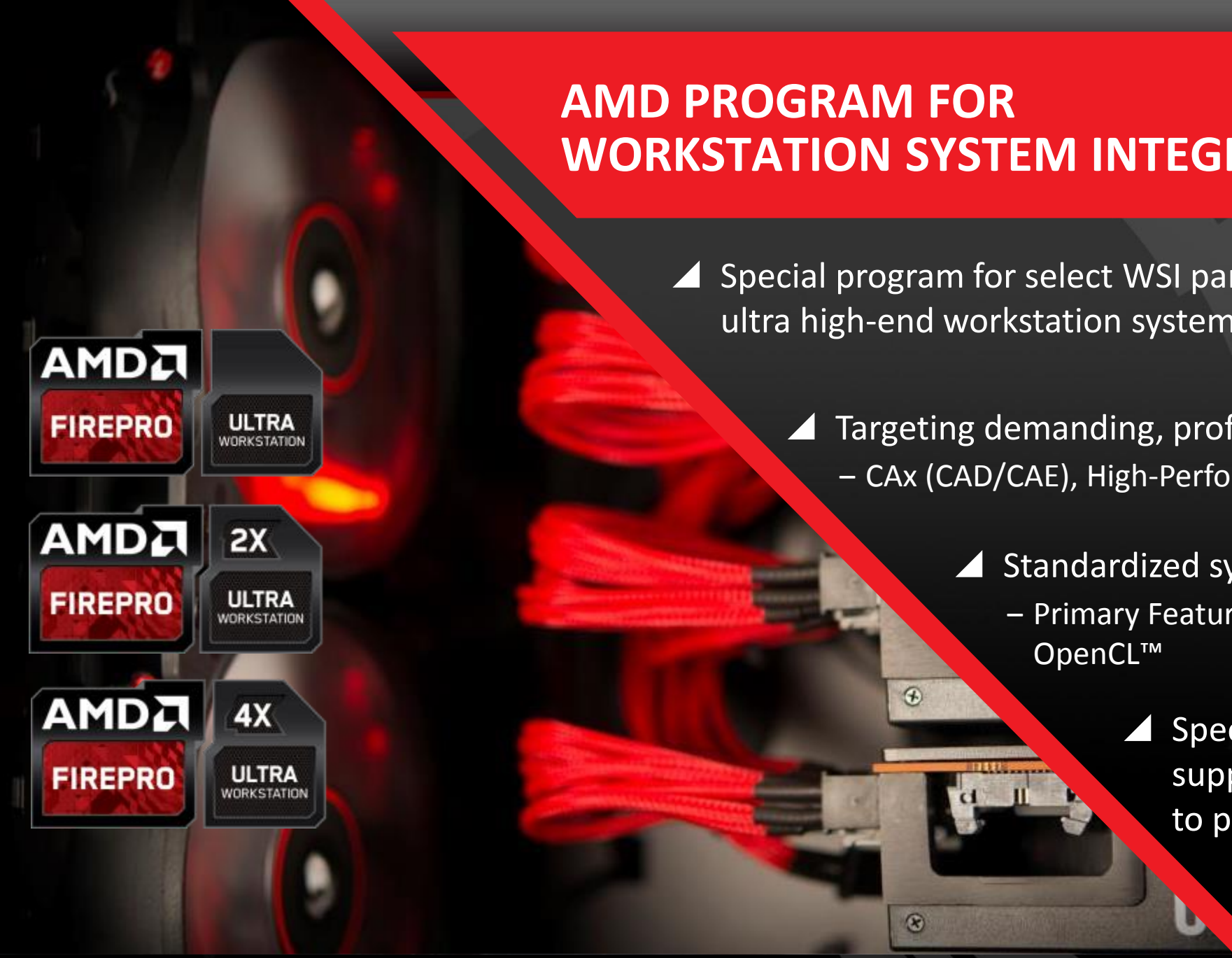
AMD PROGRAM FOR WORKSTATION SYSTEM INTEGRATORS



- Special program for select WSI partners to promote new class of ultra high-end workstation systems with AMD FirePro™ graphics
- Targeting demanding, professional workflows
  - CAx (CAD/CAE), High-Performance Computing and M&E
- Standardized system requirements
  - Primary Features to Address Key Areas: 4K and OpenCL™
- Special branding and marketing/PR support from AMD to help promote to professional users

AMD FIREPRO

AMD FirePro Ultra Workstation

THE

VISUAL SUPERCOMPUTER

FOR YOUR DESK

CPU	MEMORY	GRAPHICS	DISPLAY
Up to two **8-Core** CPUs	**32GB DDR3** **System** Memory or more Up to **64GB GDDR5** **Graphics** Memory	Up to four **AMD FirePro™ W9100** Graphics Cards	Up to six **4K Displays** per GPU

AMD FIREPRO W9100 – THE NAB ROCK STAR

http://youtu.be/0RuqMytVmI0

MEET THE NEXT ROCK STAR !

AMD FIREPRO™

W8100

PROFESSIONAL GRAPHICS

ADDING

BEST-IN CLASS GPU COMPUTE

TO YOUR WORKSTATION[1]

THE NEW

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AMD FIREPRO W8100

Over
2
Teraflops
Double Precision

Over
4
Teraflops
Single Precision

Up to four
4K
Displays with
DisplayPort 1.2

8
GB GDDR5
Frame Buffer

320
Gigabyte / sec
Memory bandwidth

2560
2nd-Gen GCN Stream
Processors

AMD FirePro™ W8100 vs. Quadro K5000

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BEST-IN CLASS GRAPHICS COMPUTE

	AMD FirePro™ W8100	Nvidia Quadro K5000	AMD Advantage
Rendering	2560 Stream Processors	1536 CUDA Cores	YES
OpenCL™ Support	1.2 (Ready for 2.0)	1.1	+ 2 TFLOPS (SP)
GPU Compute (SP)	4.2 TFLOPS	2.2 TFLOPS	1.9x
GPU Compute (DP)	2.1 TFLOPS	0.09 TFLOPS	23x
Memory Bandwidth	320 GB/s	173 GB/s	+ 2 TFLOPS (DP)
Memory Size	8 GB	4 GB	2x
Memory Interface	512-bit	256-bit	+ 4GB
# of 4K Displays	4	2	YES
PCIe® Bandwidth	32 GB/sec	16 GB/sec	2x

AMD FirePro™ W8100 vs. Quadro K5000 + Tesla K20

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	AMD FirePro™ W8100	Quadro K5000 + Tesla K20	AMD Advantage
# of GPUs	1	2	YES
GPU Compute (DP)	2.1 TFLOPS	1.26 TFLOPS	+66%
Memory Size	8 GB	4 + 5 GB	Unified

- AMD FirePro W8100 reduces need for complex dual-GPU configs in many workflows

AMD FIREPRO

Extending The ULTRA WORKSTATION

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Professional Graphics Solutions

THE **VISUAL SUPERCOMPUTER** FOR YOUR DESK

AMD FIREPRO ULTRA WORKSTATION

CPU	MEMORY	GRAPHICS	DISPLAY
Up to two **8-Core** CPUs	**32GB DDR3** **System** Memory or more Up to **64GB GDDR5** **Graphics** Memory	Up to four **AMD FirePro™ W8100** or Up to four **AMD FirePro™ W9100** Graphics Cards	Four / Six **4K Displays** per GPU

Putting The Visual Back Into Personal Supercomputing

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8 Tera FLOPS FOR **BIG** GPU COMPUTE

AMD FIREPRO ULTRA WORKSTATION

REAL TIME 4K FOR **BIG** GPU VIZ

Target Workflows:

- Engineering Analysis (CAE)
- High-Performance Computing

Target Workflows:

- Media & Entertainment
- High-end CAD
- Design Reviews

AMD FIREPRO

Take Your PERSONAL SUPERCOMPUTING To The MAX

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Professional Graphics Solutions

AMD FIREPRO 4X ULTRA WORKSTATION

	4x AMD FirePro™ **W8100**	4x Tesla **K20**	**AMD Advantage**
# of GPUs	**4**		**+ 12 GB**
Total GPU Memory	**32 GB**	20 GB	**YES**
Memory Bandwidth	**320 GB/s**	208 GB/	**+ 80%**
Double Precision Compute	**8.4 TFLOPS**	4.68 TFLOPS	**YES**

Take Your PERSONAL SUPERCOMPUTING To The MAX

SAPPHIRE
Professional Graphics Solutions

AMD FIREPRO 4X ULTRA WORKSTATION

	4x AMD FirePro™ **W8100**	4x Tesla **K20**	**AMD Advantage**
# of GPUs	**4**	4	
Total GPU Memory	**32 GB**	20 GB	**YES**
Double Precision Compute	**8.4 TFLOPS**	4.68 TFLOPS	**+ GFX**
Graphics	**3.3 Bi Tris/s (per GPU)**	Limited	**YES**
Display	**4x DP1.2 / GPU (16x 4K)**	n/a (not display ports exposed)	**YES**

The Increase Relevance Of GPU COMPUTE For Workstations

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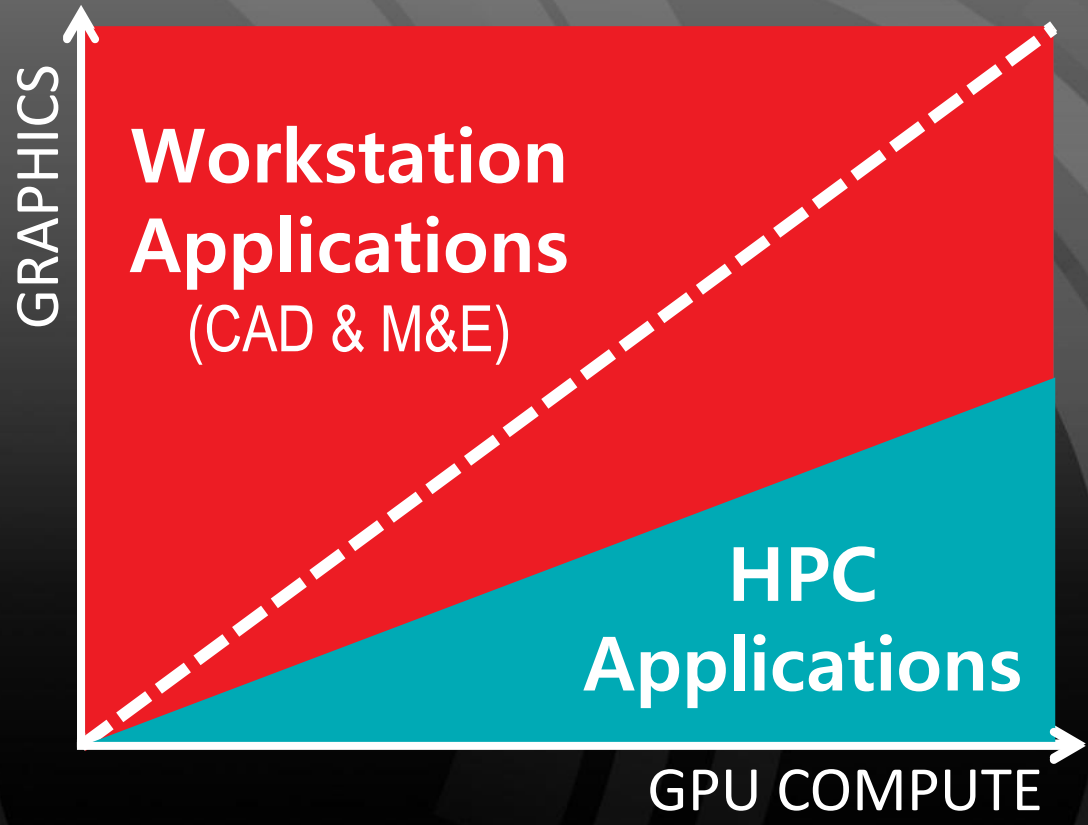
- Today's workstation applications take advantage of the GPU for compute
- Heavy influence on traditional CAD workflows
  - Concurrent engineering workflows with CAD and CAE on the same machine



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AMD FirePro™ W8100 Compute Leadership with OpenCL™

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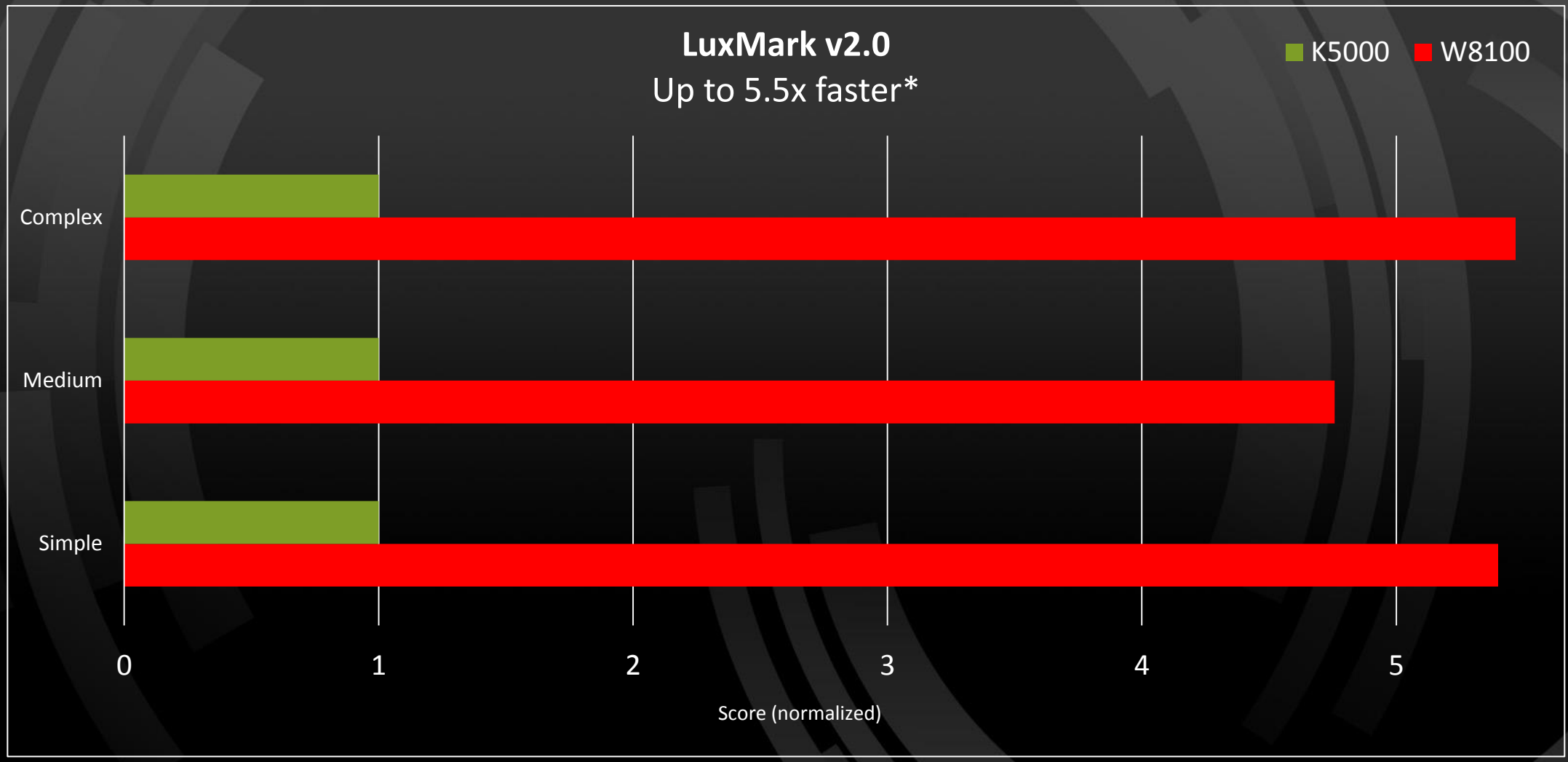
LUXMARK 2.0



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AMD FirePro™ W8100 Compute Leadership with OpenCL™

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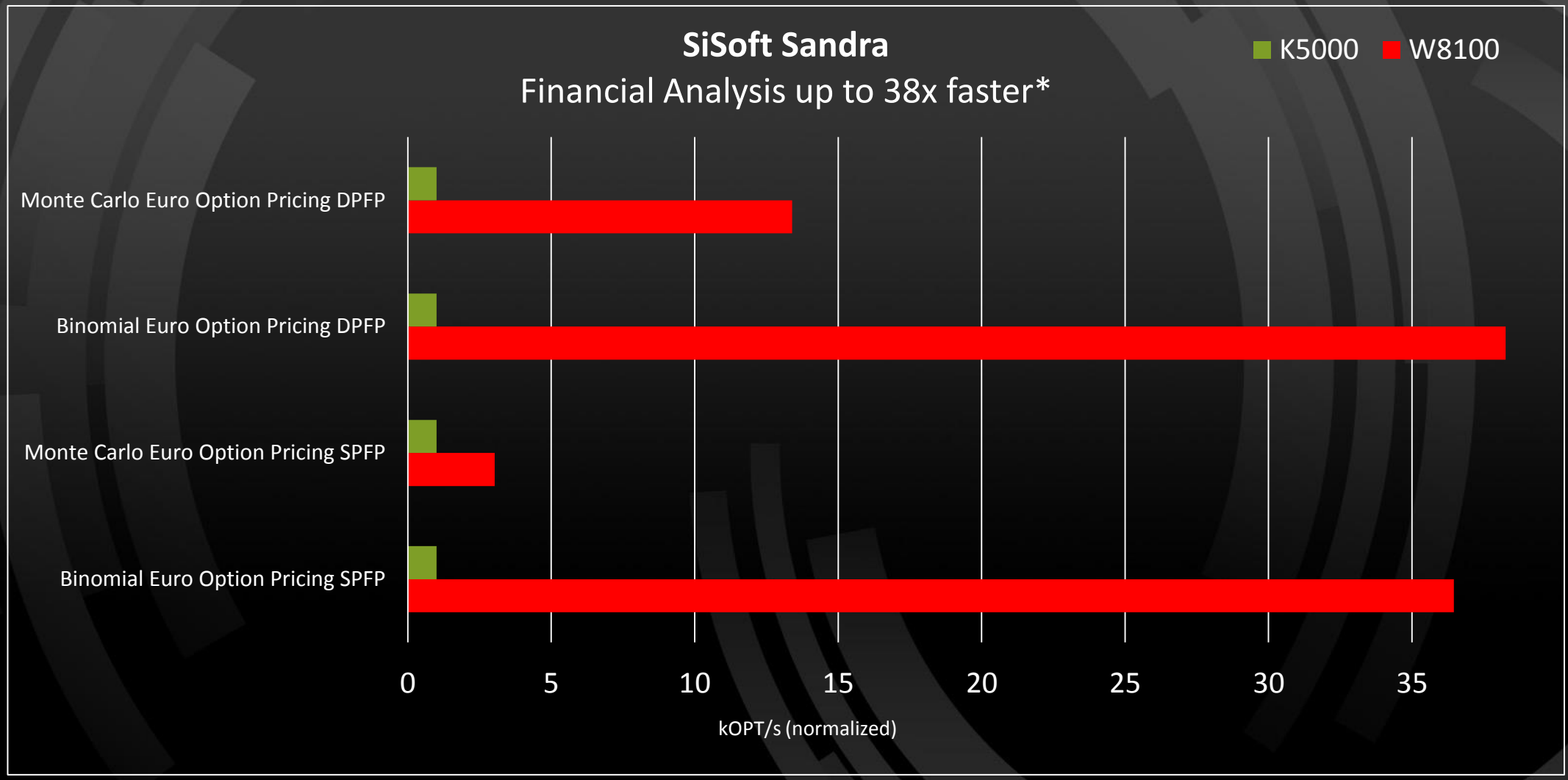
SISOFT SANDRA



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AMD FirePro™ W8100 Compute Leadership with OpenCL™

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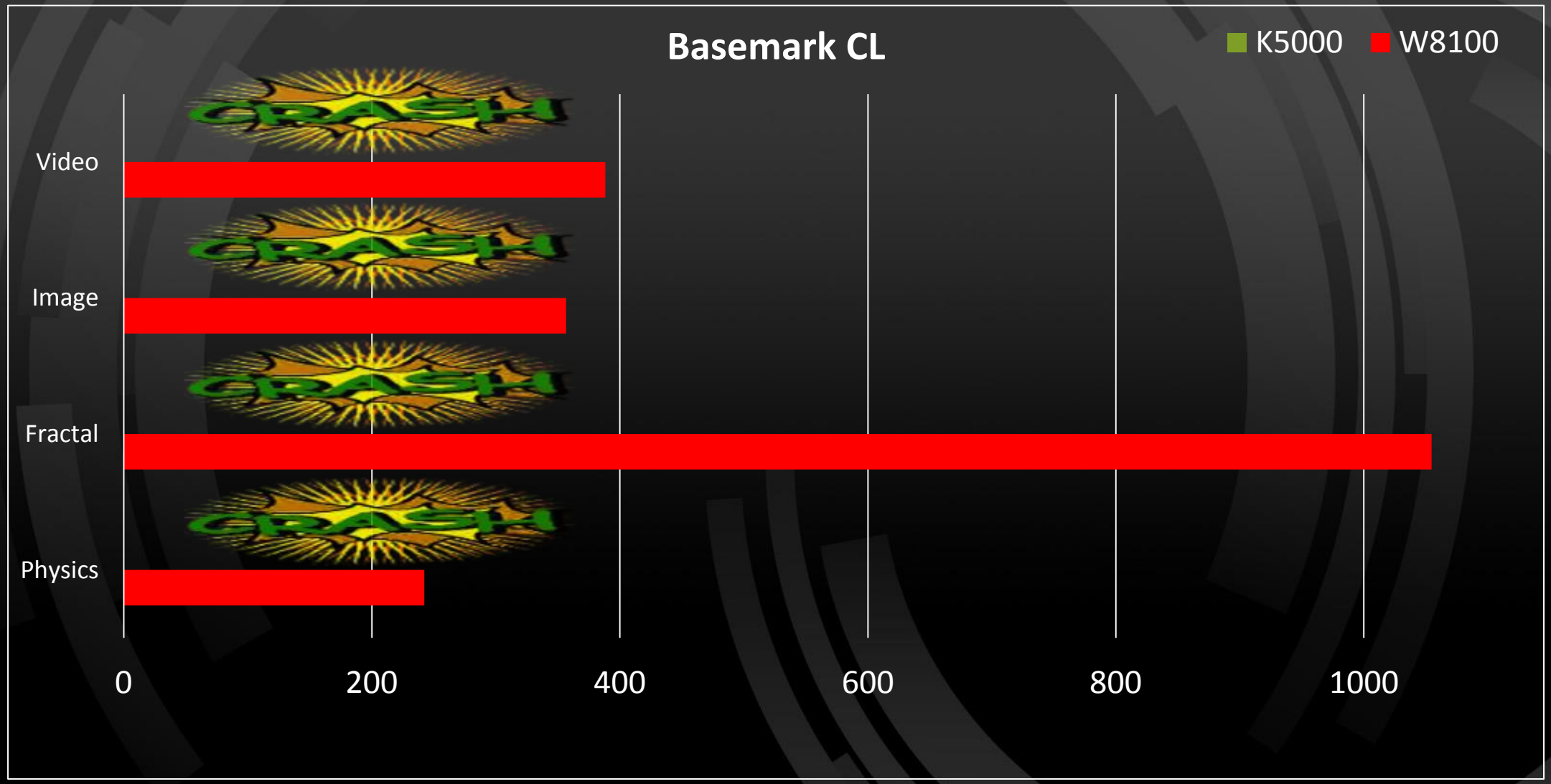
BASEMARKCL 1.1*



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* See footnote #3 at end of presentation

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AMD FIREPRO

Engineering Workflows
AMD FirePro ™ W8100 Professional Graphics

www.SapphirePGS.com

Solutions For Concurrent Engineering Workflows

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	3D DESIGN	CAE SIMULATION	VISUALIZATION
	GRAPHICS-CENTRIC	GRAPHICS + COMPUTE	GRAPHICS + COMPUTE + DISPLAY
CUSTOMER PAIN POINTS	◢ Assembly size ◢ Accurate representation ◢ Real-time interaction	◢ Data size ◢ Compute time ◢ Accuracy of Results	◢ Photorealistic Rendering ◢ Display Resolution ◢ # of Displays
AMD FIREPRO™ GRAPHICS LEADERSHIP	◢ 2560 GCN Stream Processors ◢ 8 GB GDDR5 VRAM ◢ PCI Express 3.0 (32GB/s)	◢ 2.1/4.2 TFLOPS (DP/SP) of GPU Compute ◢ 320 GB/sec Mem B/W ◢ Ready for OpenCL 2.0	◢ 4x UltraHD/4K via DP1.2 ◢ AMD Eyefinity technology ◢ DOPP for Edge-blending
BENEFITS	◢ Handle massive assemblies in real-time	◢ Rendering & Compute from with single GPU and multi-GPU scaling	◢ More realism without the need for complex Graphics Clusters

Solutions For Concurrent Engineering Workflows

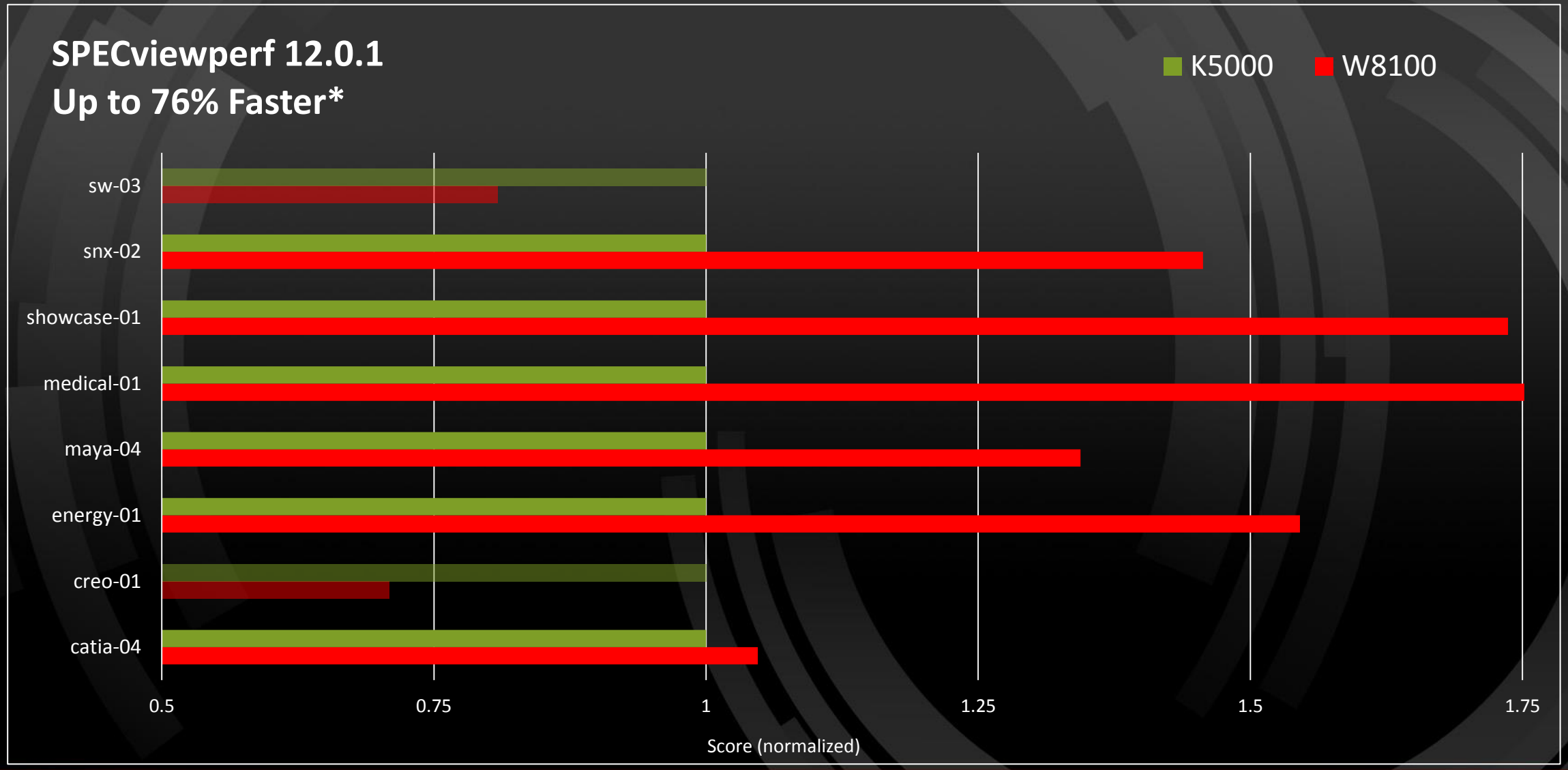
SAPPHIRE
Professional Graphics Solutions

	3D DESIGN	CAE SIMULATION	VISUALIZATION
	GRAPHICS-CENTRIC	GRAPHICS + COMPUTE	GRAPHICS + COMPUTE + DISPLAY
OPTIMIZED FOR	◢ CATIA v5/v6 ◢ Siemens NX 9.x ◢ SolidWorks 2013/2014 ◢ PTC Creo 2.0 & many more	◢ Simulia Abaqus 6.14 ◢ NX Nastran 9.1 ◢ CEI EnSight & more	◢ Optis THEIA-RT ◢ Autodesk VRED ◢ Ventuz
AMD FIREPRO™ GRAPHICS DELIVERS	**SPECviewperf 12 Performance Leadership** & Feature Differentiation	**GPU Compute Leadership** Single GPU with best-in-class 2TFLOPS double-precision compute and 8GB VRAM	**4K Display Leadership** and AMD Eyefinity Multi-Display Technology

AMD FirePro™ W8100 Performance Leadership

SAPPHIRE Professional Graphics Solutions

SPECVIEWPERF 12



Leadership in High-End CAD

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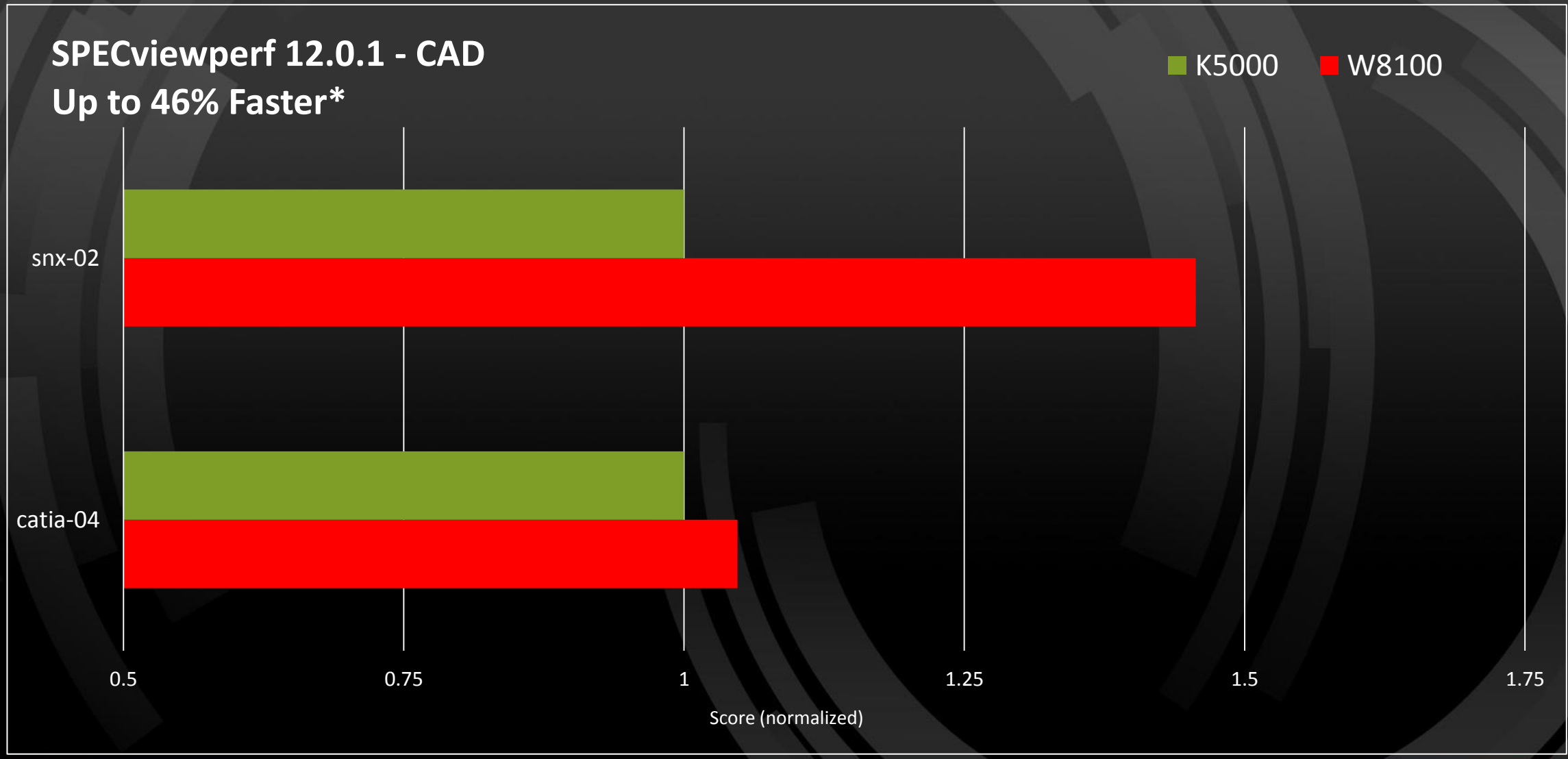
SPECVIEWPERF 12 – CATIA AND NX SCORES



Leadership In High-End CAD

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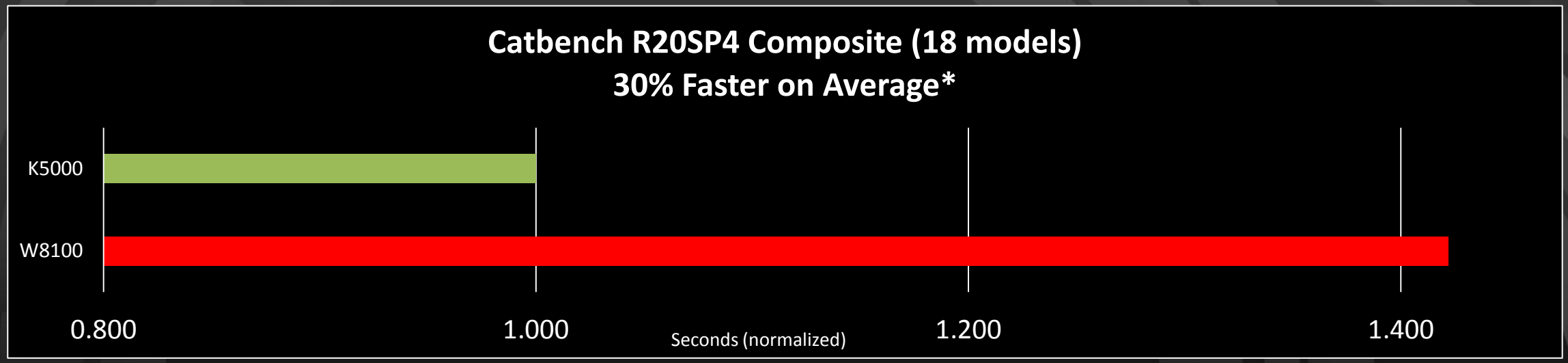
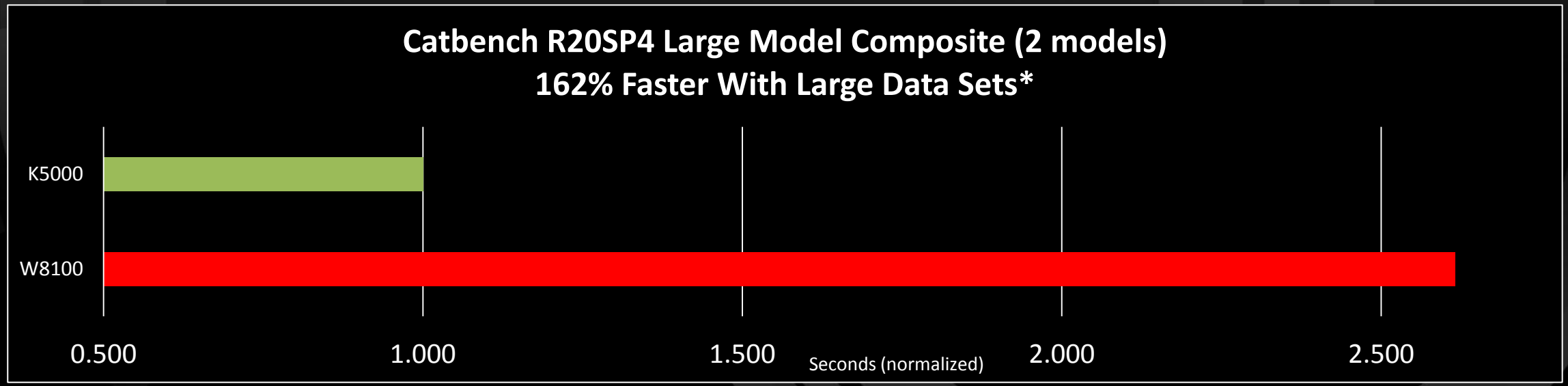
CATBENCH*





Leadership In High-End CAD

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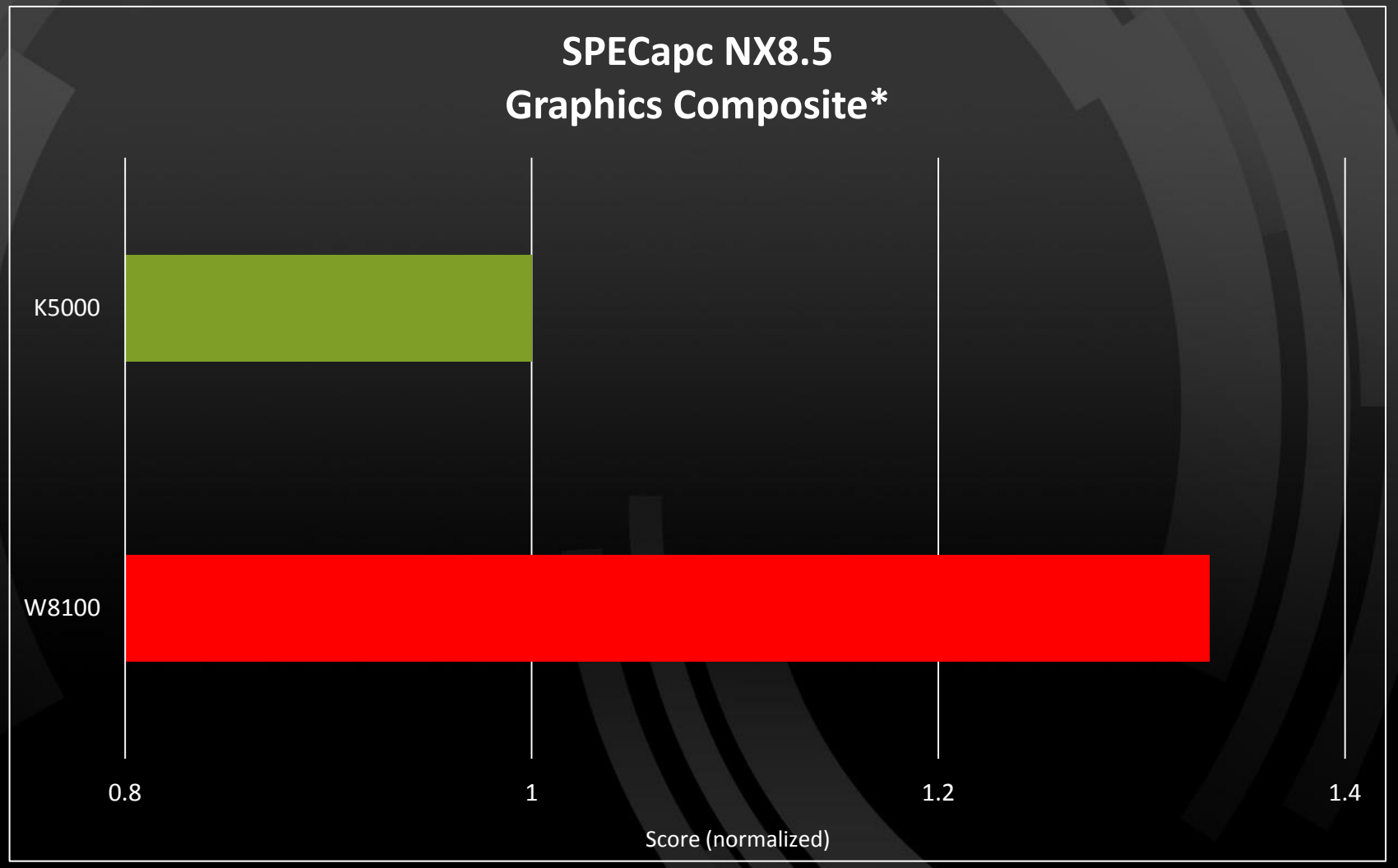
SPECAPC NX 8.5



AMD FIREPRO

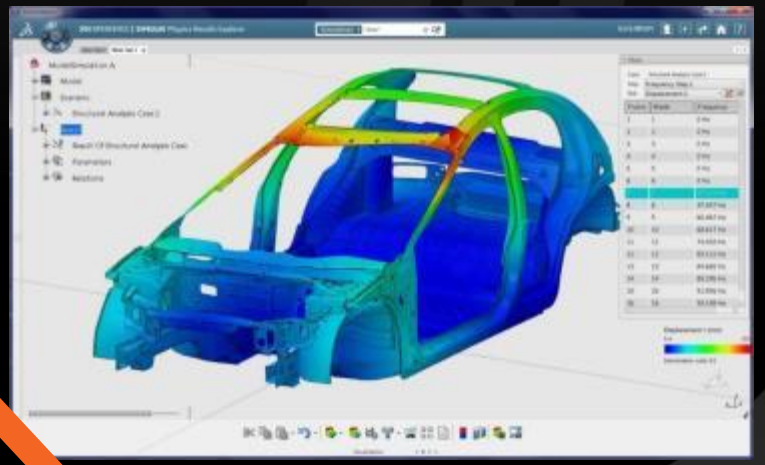
THE POWER OF AMD FIREPRO™ GRAPHICS
DASSAULT SYSTEMES SIMULIA WITH OPENCL™

"By incorporating the OpenCL programming interface into our current Abaqus release, we are providing more graphic hardware choices, such as AMD FirePro, and accelerating compute performance which will enhance our customers' ability to deliver innovative, high-quality products to market faster."

- **Matt Dunbar**
Chief Architect, SIMULIA
Dassault Systèmes

Abaqus 6.14

- Design and Simulate with Abaqus 6.14 powered by AMD FirePro™ and OpenCL™ technology
- AMD FirePro professional graphics delivers a powerful solution for CATIA and SIMULIA users to design and simulate on the same machine.



AMD FIREPRO

For more information on DASSAULT Systemes Simulia please visit: http://www.3ds.com/

THE POWER OF AMD FIREPRO™ GRAPHICS

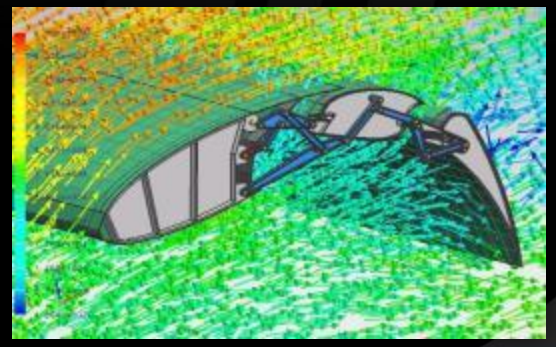
SIEMENS PLM SOFTWARE NX™ NASTRAN® WITH OPENCL™

"Siemens PLM Software and AMD share a common goal to collaborate with exceptional market leaders to deliver high performance innovative solutions that meet the demanding requirements of our customers. AMD has the necessary solutions and tools, such as their award-winning AMD FirePro™ graphics product line, to help Siemens provide customers with high performance simulations. As a result, customers are given the freedom to focus on innovation, industry leadership and top-line growth."

- **James W. Rusk**
Vice President Product Engineering Software
Siemens PLM Software

NX Nastran 9.1

- Design and Simulate with NX Nastran 9.1 powered by AMD FirePro™ and OpenCL™ technology
- AMD FirePro™ professional graphics delivers a powerful solution for NX™ users to design and simulate
on the same machine.



For more information on Siemens PLM Software please visit: http://www.plm.automation.siemens.com/en_us/

AMD FirePro™ W8100

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FEATURE/SPEC	BENEFIT
Over 2 TFLOPS of Double Precision	Leadership for Engineering Analysis and HPC
Over 4 TFLOPS of Single Precision	Best-in-class GPU Compute Power for demanding Engineering workflows[1]
Up to four 4K displays with DP1.2	Enables immersive Virtual Reality environments & compelling Digital Signage solutions
8 GB GDDR5 Frame Buffer	Twice as much as competing solutions[2]
320 Gigabyte/sec Memory Bandwidth	Best-in-class Memory Size[2]
2560 GCN Stream Processors	2nd-gen AMD GCN Architecture

...FOR **ENGINEERING** PROFESSIONALS

AMD FIREPRO

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Media & Entertainment workflows
AMD FirePro™ W8100 Professional Graphics

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Media And Entertainment Workflow

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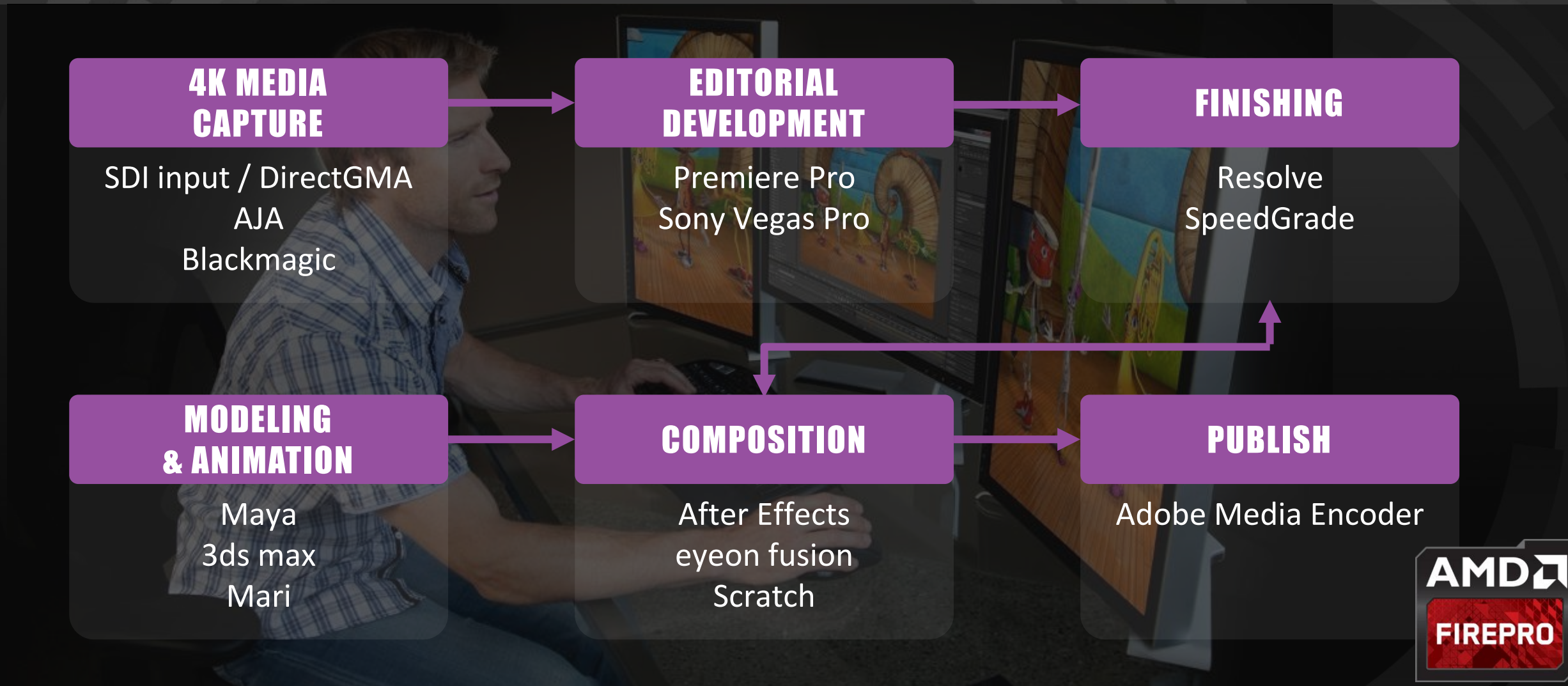
AMD FirePro™ Professional Graphics: Addressing The Entire 4K Production Pipeline

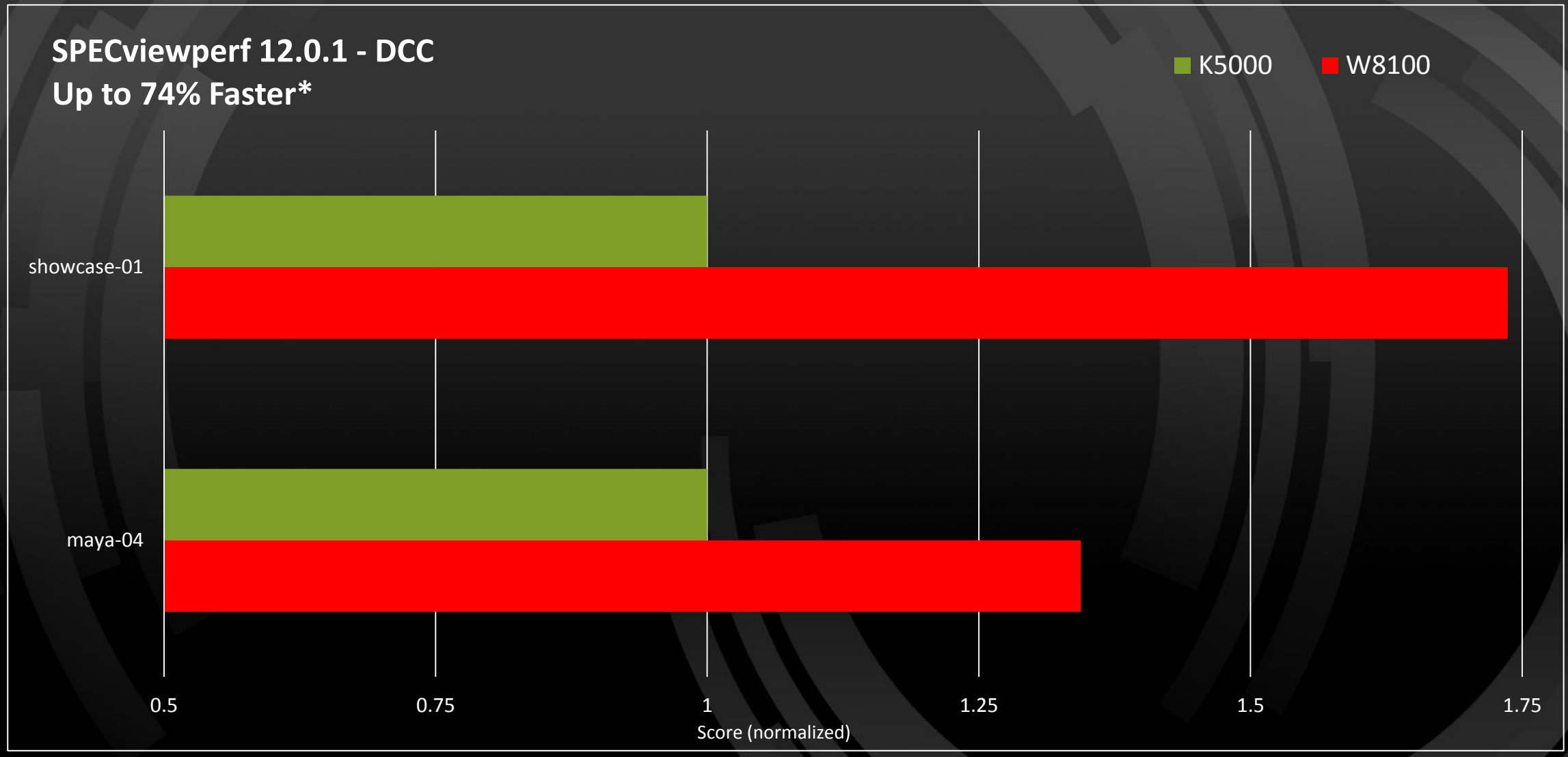


AMD FIREPRO

AMD FirePro™ W8100 Performance Leadership

SAPPHIRE Professional Graphics Solutions

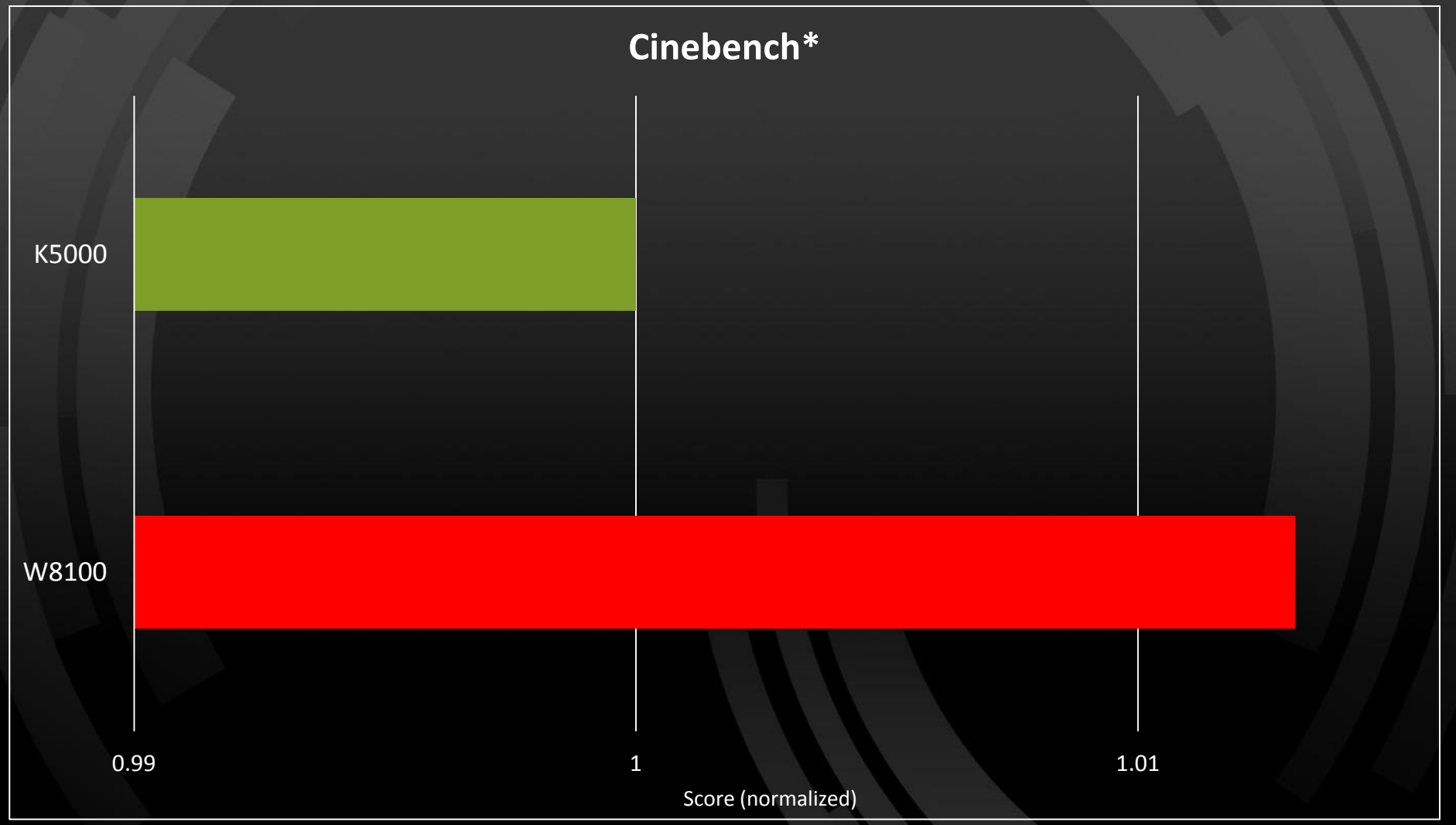
SPECVIEWPERF 12 – DCC SCORES



AMD FirePro™ W8100 Performance Leadership

SAPPHIRE Professional Graphics Solutions

CINEBENCH



* See footnote #3 at end of presentation

AMD FIREPRO

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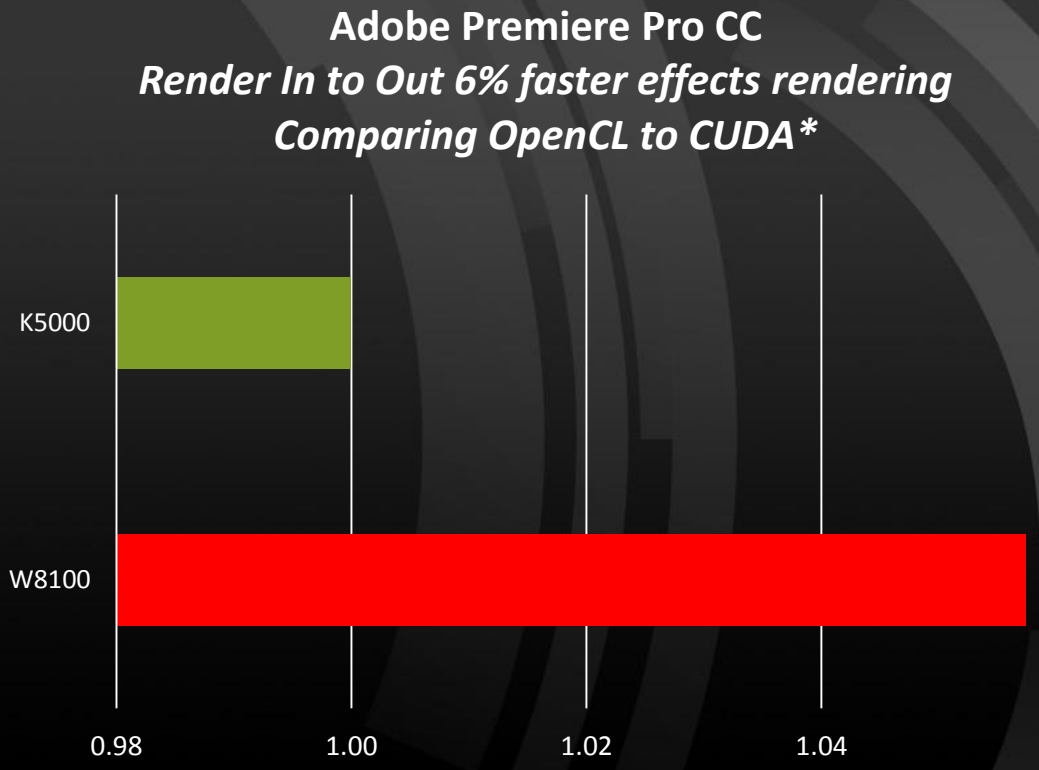
THE WORKFLOW SOLUTION

THE GOAL:

- Edit video faster and more fluidly with Adobe Premiere Pro CC. Editors do not like sitting around waiting!

THE CHALLENGE:

- Maintain real-time in 4K and beyond while applying effects, compositing and rendering to preview



AMD FIREPRO

* See footnote #3 at end of presentation

For more information on Adobe Premiere Pro CC please visit: http://www.adobe.com/ca/products/premiere.html

ADOBE PHOTOSHOP CC

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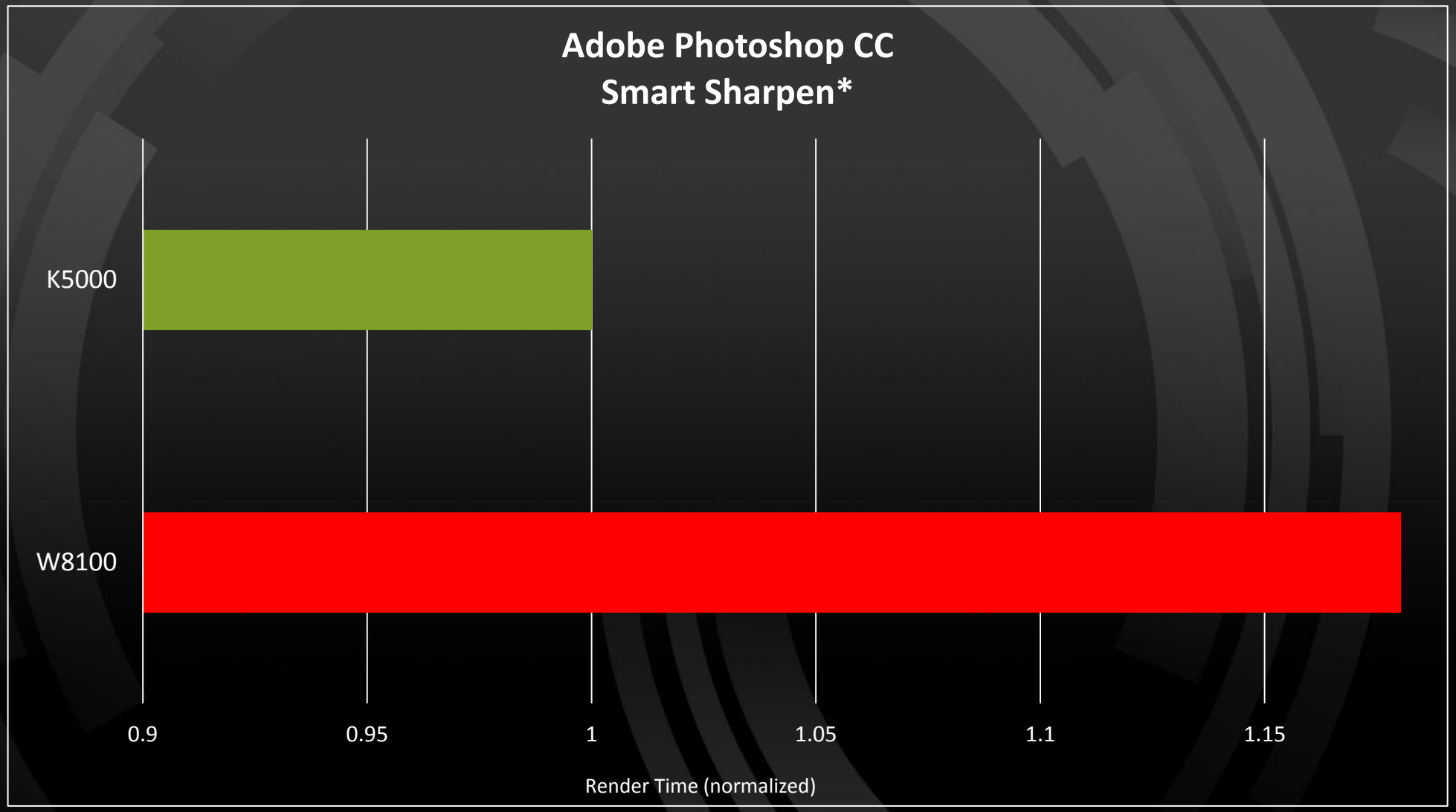

* See footnote #3 at end of presentation

AMD FIREPRO

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THE WORKFLOW SOLUTION

THE GOAL:

- Colorist productivity is of extreme importance and maintaining real-time performance while color correcting is an absolute requirement

THE CHALLENGE:

- Maintain real-time 4K video while color correction and applying effects on the fly

- AMD FirePro™ W8100 enables applying effects “on the fly”, using OpenCL™ accelerated by GCN
- Four AMD FirePro™ W8100 boards allow 4K @60Hz with more effect “nodes” than any other solution today!

AMD FIREPRO

For more information on Blackmagic DaVinci Resolve please visit:
http://www.blackmagicdesign.com/ca/products/davinciresolve

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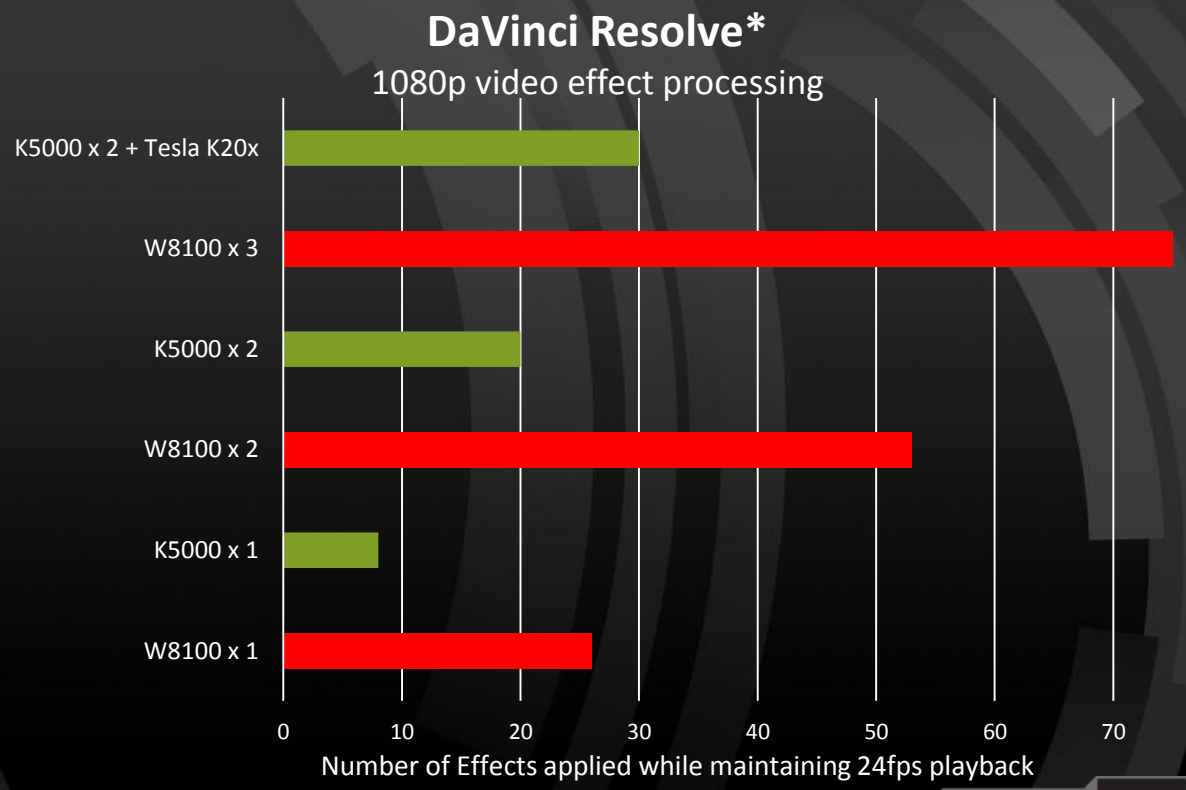
BLACKMAGIC DESIGN DAVINCI RESOLVE 10.1 WITH OPENCL™

- Using OpenCL™ cross-platform technology to unleash massively parallel processing power
  - Up to four AMD FirePro W8100 GPUs
  - Deliver over 16 TFLOPS of single-precision compute performance
  - Real-time image processing and advanced color correction effects



* See footnote #6 at end of presentation

"It is exciting to see the performance our customers will get using OpenCL™ on AMD's GPUs. …And with OpenCL™ support in DaVinci Resolve 10 for both Mac and Windows OS, you can use up to four GPUs with a single Resolve, giving absolutely amazing real-time performance."

Grant Petty
CEO, Blackmagic Design

AMD FIREPRO

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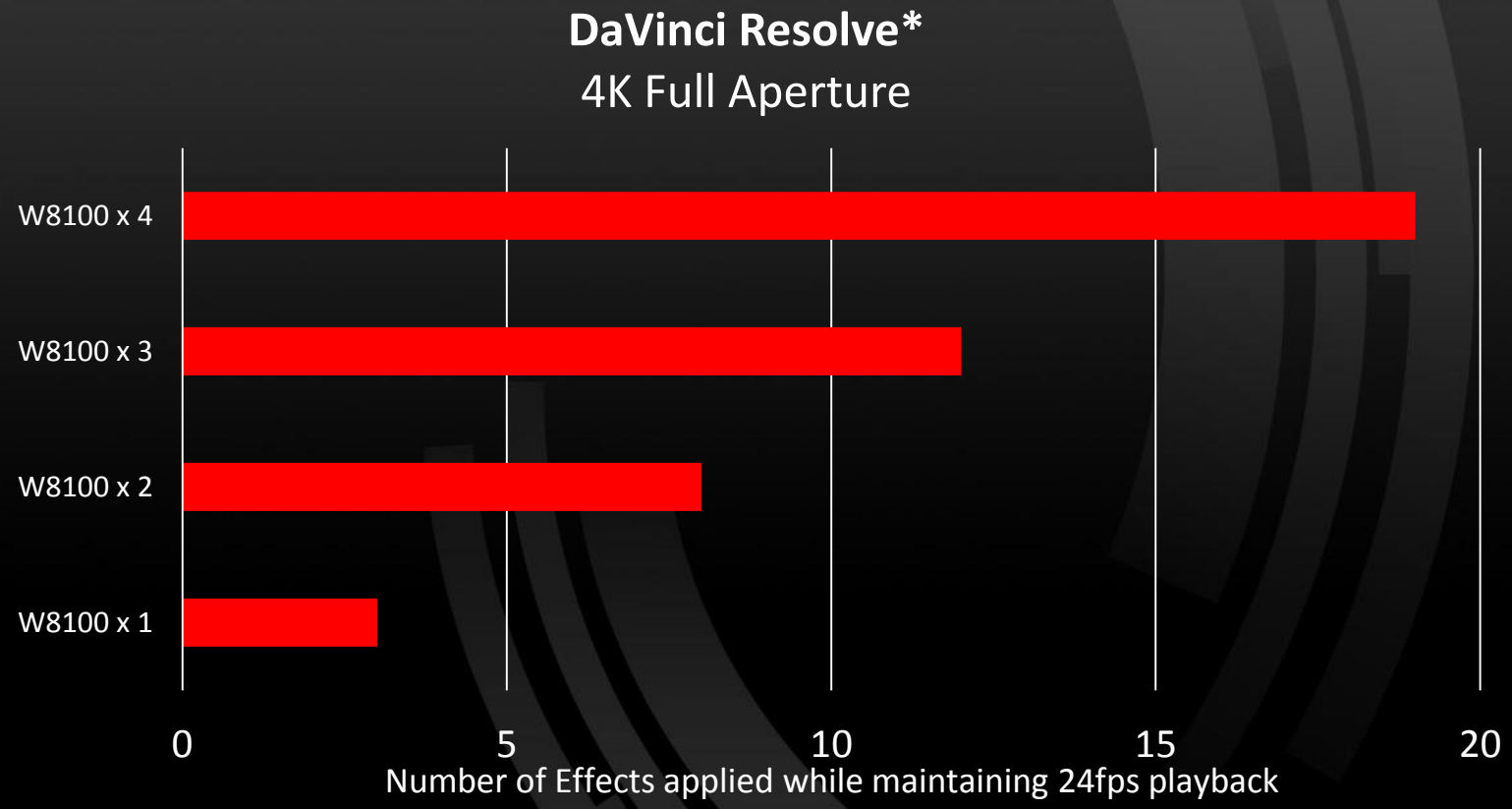
BLACKMAGIC DESIGN DAVINCI RESOLVE 10.1 WITH OPENCL™ *

- Resolve 10.1's OpenCL™ support allows the colorist to increase number of video post-processing effects by simply adding more AMD FirePro™ W8100 Professional graphics



AMD FIREPRO

* See footnote #6 at end of presentation

THE POWER OF AMD FIREPRO™ GRAPHICS

HIGH-QUALITY RENDERINGS WITH AUTODESK VRED 2014

VRED 2014

- Autodesk Vred is a visualization tool used to see designs in real-time fully rendered on the fly
- There is a drive to 4K and driving that many pixels and shaders needs horse power in the graphics department

- More advanced GCN architecture allowing much heavier scene files and models and massively complex models/textures
- Vred's use of GPU power in the form of shaders allows AMD FirePro W8100's 8GB GDDR5 load models into the GPU memory allowing smooth rotations
- 4K display support ensuing the designer can work with a model at a resolution that allows him to get a clearer idea of how the design will work in real-life

AMD FIREPRO

For more information on Autodesk VRED 2014 please visit: http://www.autodesk.com/products/vred/overview

THE POWER OF AMD FIREPRO™ GRAPHICS

HIGH-QUALITY RENDERINGS WITH V-RAY RT 3.0

V-RAY RT 3.0

- Chaos group Vray RT is the GPU-based version of their famous final render tool.
- There is a drive to 4K and driving that many pixels and shaders needs sufficient graphics power

- As V-Ray RT a GPU based render you can interact with scene changing the viewing angel and getting quick updates. VrayRT builds a rough rendering of the scene quite quickly which allows changes quickly to be seen
- The GCN architecture allows multiple compute process and graphic process at a same time this lends itself well to use interactive 3D applications that use V-Ray RT like Autodesk 3DS Max
- V-Ray RT can use multiple cards in a system to improve performance.

Image courtesy of Taylor James Ltd

AMD FIREPRO

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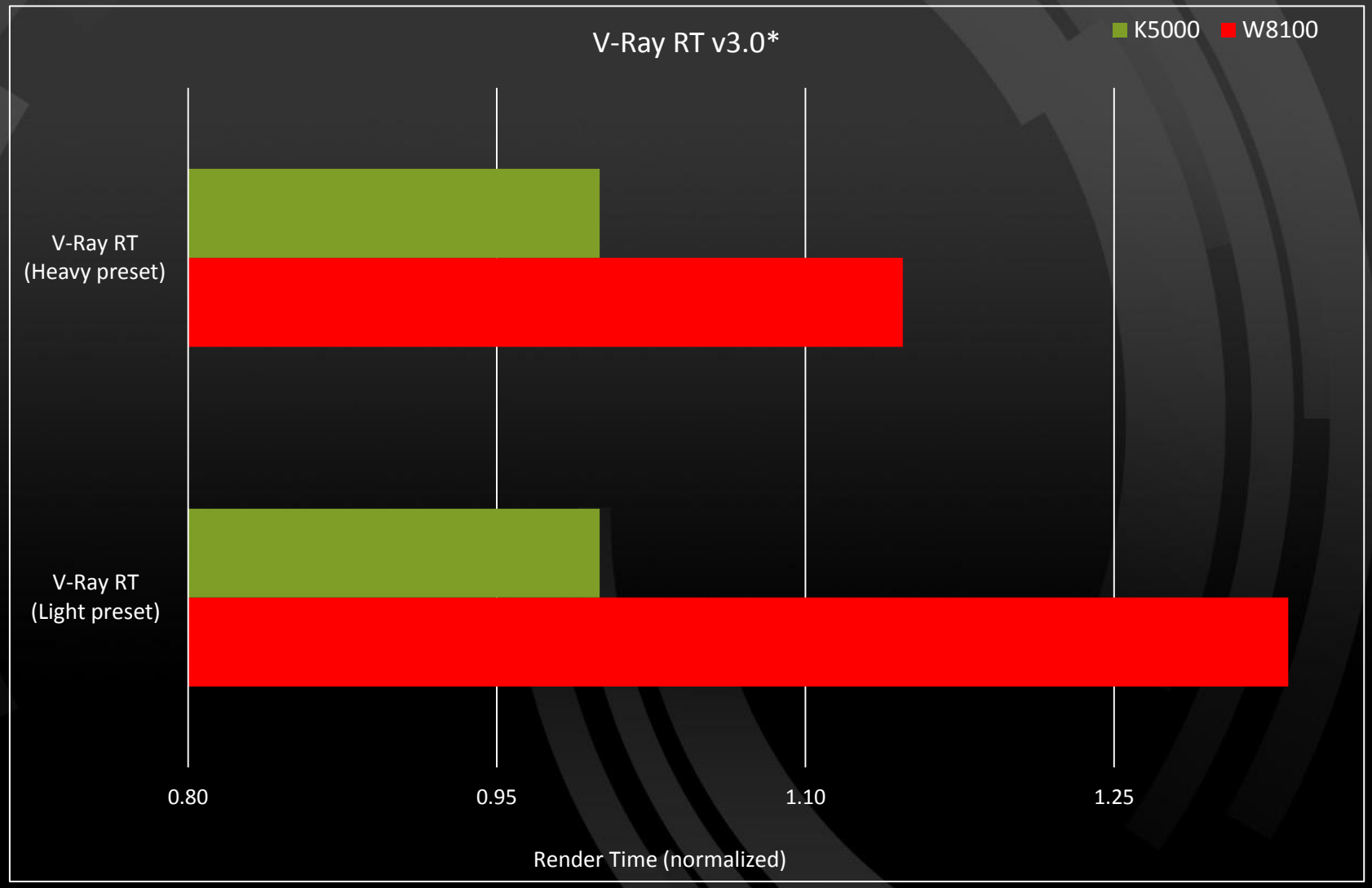
V-RAY RT V3.0 WITH OPENCL™



* See footnote #7 at end of presentation

AMD FIREPRO

AMD FirePro™ W8100

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FEATURE/SPEC	BENEFIT
Over 2 TFLOPS of Double Precision	Leadership for Engineering Analysis and HPC
Over 4 TFLOPS of Single Precision	Best-in-class GPU Compute Power for demanding Engineering workflows[1]
Up to four 4K displays with DP1.2	Enables immersive Virtual Reality environments & compelling Digital Signage solutions
8 GB GDDR5 Frame Buffer	Twice as much as competing solutions[2]
320 Gigabyte/sec Memory Bandwidth	Best-in-class Memory Size[2]
2560 GCN Stream Processors	2nd-gen AMD GCN Architecture

...FOR **CREATIVE** PROFESSIONALS

AMD FIREPRO

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AMD FIREPRO ULTRA WORKSTATION

- Digital Content Creation
- High-end CAD/CAE/CAM

AMD FIREPRO 2X ULTRA WORKSTATION

- Digital Video Editing & Post Production

AMD FIREPRO 4X ULTRA WORKSTATION

- High-Performance Computing
- 4K Color Correction

MINIMUM SPECS	RECOMMENDED SPECS
Dual Quad-Core 2.4GHz CPUs	Dual 8-Core 2.6GHz CPUs
16GB 1600MHz DDR3 memory	32GB 1866MHz DDR3 memory
2x PCIe 3.0 x16	4x PCIe 3.0 x16
1000W 80 Plus Platinum PSU	1500W 80 Plus Platinum PSU
	Tower case with 9 expansion slots (4 dual-wide + 1 single-wide (for SDI IO or Fusion IO))

AMD FirePro™ W8100 Product Specifications

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GCN Stream Processors	2560
Engine Clock	824 MHz
Memory Configuration	8 GB GDDR5 / 512-bit
Memory Speed	320 GB/s
Power Connectors	2 x 6-pin
Max Power Consumption	220 W
PCIe Standard	3.0
OpenCL™	1.2 (2.0 Coming)
DirectX®	11.2
OpenGL	4.3 (4.4 Coming)

AMD FIREPRO

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W8100
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Supporting Material

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1. AMD FirePro™ W8100 delivers 4.2 TFLOPS peak single-precision floating point performance, while the closest competing solution from Nvidia (as of June 2014) is the Quadro K5000 which offers only 2.15 TFLOPS. Visit http://www.nvidia.com/content/PDF/line_card/6660-nv-prographicssolutions-linecard-july13-final-lr.pdf for Nvidia product specs. FP-93
2. AMD FirePro™ W8100 features 8GB memory. Nvidia' s competing card in the market as of June 2014 is the Quadro K5000 with 4GB memory. Visit http://www.nvidia.com/content/PDF/line_card/6660-nv-prographicssolutions-linecard-july13-final-lr.pdf for Nvidia product specs. FP-94
3. SiSoftware Sandra, LuxMark, BASEMARK CL, Adobe Premiere Pro CC, and Adobe Photoshop CC test details:
   System Description: Dell T3610, Intel Xeon E5-1620 v2 @ 3.60 GHz, 8GB DDR3, Seagate HDD 7200RPM, Win7 64-bit SP1, , 1920x1080 resolution
   AMD Driver 13.352.1009 | Nvidia Driver 333.11
4. SPECviewperf 12.01 and Catbench 64-bit R20SP4 test details:
   System Description: Intel E5-1660 3.30GHz, 16GB DDR3, Win7 64-bit SP1, , 1920x1080 resolution
   AMD Driver 13.352.1009 | Nvidia Driver 334.95
5. SPECapc NX8.5 test details:
   System Description: HP Z820, Intel Xeon E5-2630 0 @ 2.3 GHz, 12GB, Win7 64-bit SP1, 1920x1080 resolution
   AMD Driver 13.352.1009 | Nvidia Driver 333.11
6. Blackmagic DaVinci Resolve v10.1 test details:
   System Description: Asus P9X79-E WS motherboard, Intel Xeon E5-2670 @ 2.60GHz, 16GB DDR3, OCZ Vertex 4 SSD, Win7 64-bit SP1, , 1920x1080 / 3840x2160 resolution
   AMD Driver 13.352.1009 | Nvidia Driver 333.11
7. Chaos Group V-Ray RT v3.0 test details:
   Light Preset: mental.ray.daylighting.high preset, No global illumination, No Light caching / Heavy Preset: Custom preset with Global Illumination enabled Primary Engine Irradiance map Secondary Engine light cache Irradiance map set on "Very High "
   System Description: Dell T3610, Intel Xeon E5-1620 v2 @ 3.60 GHz, 8GB DDR3, Seagate HDD 7200RPM, Win7 64-bit SP1, , 1920x1080 resolution
   AMD Driver 14.20 (5/16/2014 public beta) | Nvidia Driver 333.11

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