Case study

HP Z840 Workstation new adventures in virtual reality

The HP Z840 Workstation featuring supercomputing AMD FirePro™ W9100 graphics card

Media & Entertainment
VR Film-making

Objective
Reinvent immersive storytelling workflows in VR film-making

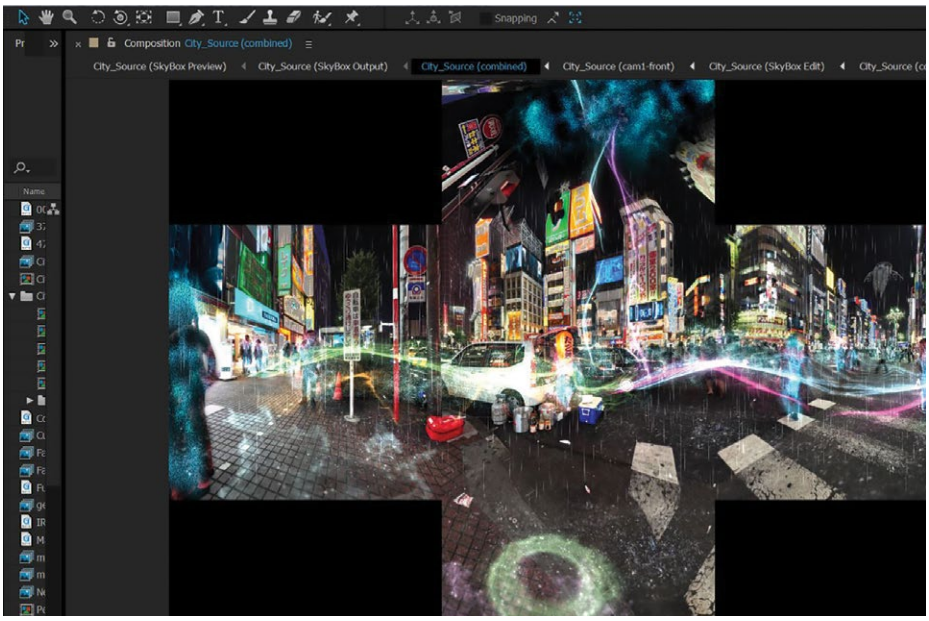
Approach
Deploy HP Z840 Workstation with featuring AMD FirePro™ W9100 graphics cards

IT matters
New awareness of the hardware processing power required to create virtual reality applications

Business matters - Reinvention of VR workflow

Award winning VFX filmmaker pioneers VR film-making workflows with HP Z840 Workstations

- Immersive story-telling



HAZ FILM

The HP Z840 Workstation featuring AMD FirePro™ W9100 GPUs helps award-winning director and visual effects artist Hasraf Dulull pioneer new methods of VR film-making.

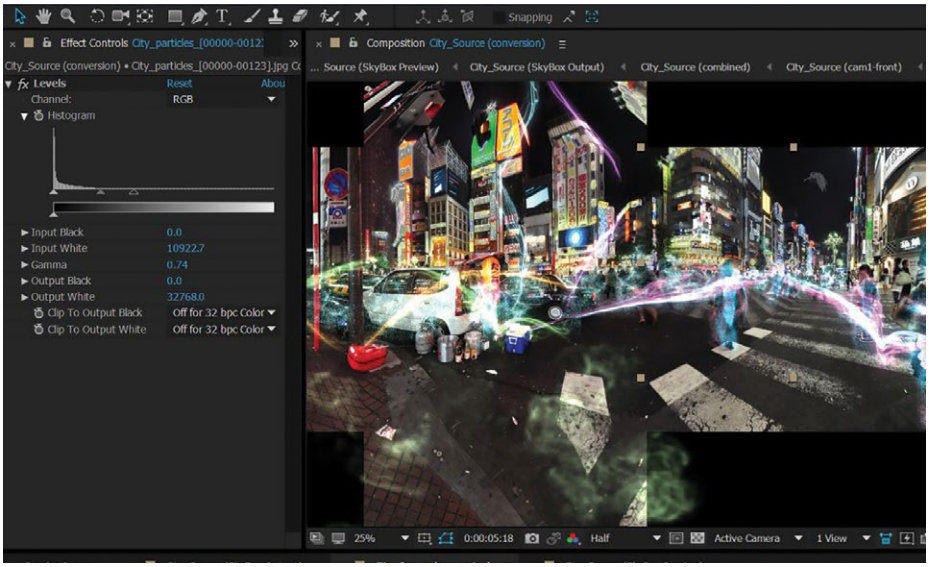
The release of the Oculus Rift marked the end of the beginning for virtual reality. Samsung has already launched its own Oculus-based Gear VR headset, and by the end of 2016, it is expected to be joined by models from manufacturers including Sony, Microsoft and HTC. By 2020, analyst Digi-Capital estimates that the combined virtual and augmented reality markets will generate a cool $150 billion in annual revenue[1]. No longer just a novelty for hardcore gamers, VR is now big business.

While virtual reality workflows are already relatively well-established in game development, with scores of indie and AAA titles now offering Oculus Rift support, VR is still pioneer territory for film-makers, as artists struggle to establish the best ways to create immersive video content.

One such pioneer is the award-winning visual effects supervisor and filmmaker Hasraf 'HaZ' Dulull, who recently created a 360 previs as a pitch for *Spirit City*: a VR project for UK-based immersive content developer Virtual View Productions to which he serves as VR Director.

The project enabled Dulull to test new methods of VR filmmaking – and the hardware required to do it – with the help of HP's Z Workstations featuring AMD's FirePro™ W-Series professional graphics cards.

[1]Source: Digi-Capital Augmented/Virtual Reality Report 2016 (www.digi-capital.com/news/2015/04/augmentedvirtual-reality-to-hit-150-billion-disrupting-mobile-by-2020)



"The speed of the HP Z840 Workstation helped me think creatively as a film-maker. I found myself throwing more and more effects at it because I knew I had the processing power. It was almost like the machine was pushing me to come up with cool ideas."

- Hasraf, 'Haz' Dulull, Director and Visual Effects Artist

Dulull footage
Watch Spirit City as a 360-degree video at
http://tinyurl.com/zmead3t

See more of Hasraf Dulull's short films at
http://hazfilm.com/

Telling stories in virtual reality

"I didn't want to go out and hire camera rigs, crews etc, to shoot live-action footage for a pitch or previs," says Dulull. "There are already a lot of 360-degree videos out there. Instead, I wanted to create something immersive entirely in visual effects / compositing with minimal external resources – pretty much myself since it's a pitch."

The choice was a natural one for Dulull, who previously worked as a digital compositor on movies including *The Dark Knight* and *Hellboy 2* before directing a series of acclaimed visual effects shorts, the most recent of which, SYNC, is now being developed into a full-length feature.

Spirit City places the viewer inside a car in a neon-lit, futuristic city. There is a gun on the back seat, and a bullet hole in the windscreen. Midway through, the action moves outside, revealing the car to be surrounded by billboard screens displaying what look to be surveillance videos, while the passers-by seem frozen in time, connected by glowing energy trails.

"Directors are still trying to figure out the best ways to tell stories in VR," says Dulull. "This is my way. I'm not spoon-feeding the audience, but I'm putting them in a situation where there are visual clues everywhere for them to figure out the story. People have different ideas of what's going on: that this is a police city, and they're a criminal, or a cop. I like that. That's immersive storytelling."

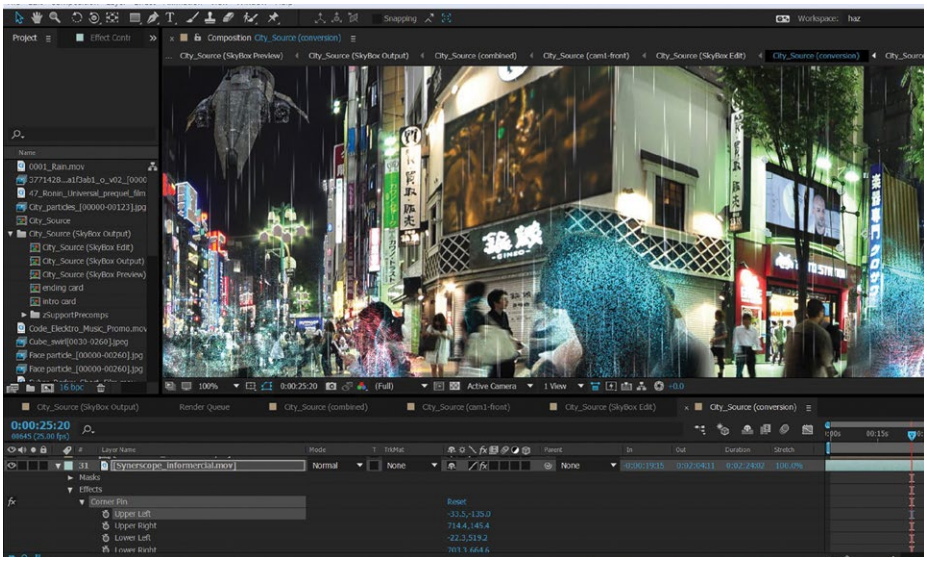
Building immersive environments

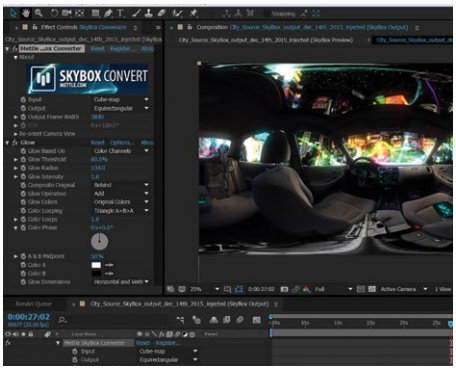
The car and its surrounding environment are entirely constructed from still images: stock photos of Tokyo, in the case of the latter. Dulull stitched the source material together using PanoStitcher, bringing the resulting equirectangular image first into Adobe® Photoshop® CC to refine manually, and then into Adobe After Effects® CC, where Mettle's SkyBox plugin converted the flat image into a cubic environment.

Dulull then began to composite in live-action visual effects elements such as rain, using Mesh Warp and Adobe After Effects® CC's other distortion tools to match the footage the environment. The strange faces in the sky above the city were created by taking slow-motion footage of an actor talking and passing it through Adobe After Effects® CC particle effects plugins Trapcode Particular and Trapcode Form.

Once compositing was complete, Dulull rendered the project out of Adobe After Effects® CC as a series of equirectangular images, importing them into Adobe Premiere Pro® CC for colour grading and to add audio, including a voiceover by actor Lance Reddick (The Wire, Fringe).

The footage was then rendered out of Premiere as an MP4 file and uploaded to YouTube as a 360-degree video, where Dulull could check the results using Google's low-cost Cardboard headset, which converts a standard smartphone into a virtual reality viewing device. The finished film was then reformatted for final-quality display on a Samsung Gear VR headset.





Speed into creativity

Working in this way gave Dululll a new awareness of the hardware processing power required to create virtual reality applications. “It’s not like conventional VFX work, where you’re creating shots to edit together,” he says. “Instead, you’re creating a single one-minute sequence. You’re rendering thousands of frames at 5K resolution, with hundreds of effects layers.”

The process is particularly computationally intensive due to the image-warping operations required. “The [SkyBox] plugin has to unwrap the image, put the effects in, then distort it back for you,” says Dululll. “It’s the warping that takes the most processing time.”

On Dululll’s existing laptop, each iteration of the short took 44 hours to render. But once he switched to an HP Z840 – the company’s top-of-the-range graphics workstation, which features dual-socket Intel Xeon E5 v3 processors and up to 512 GB of RAM – that time dropped to just 12 hours.

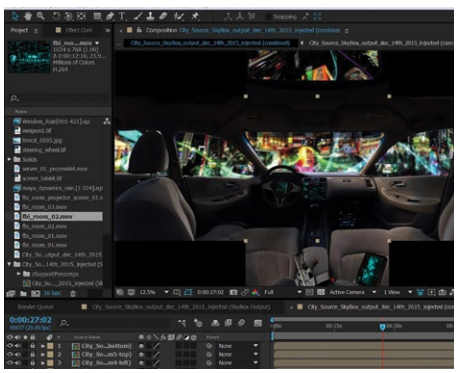
“The speed helped me think more creatively as a film-maker,” says Dululll. “I found myself throwing more and more effects at the workstation because I knew I had the processing power. It was almost like the machine was pushing me to come up with cool ideas.”

The power to work in real time

Another crucial component of the set-up was the twin AMD FirePro™ W9100 graphics cards installed in the HP Z840 Workstation. With their combined 10.48 TFLOPS of peak single-precision floating-point GPU compute performance and 32 GB of GDDR5 memory, the AMD FirePro™ cards enabled Dululll to preview the work at the resolution he needed, without lagging or stuttering.

“I wanted to preview everything at as high a resolution as possible so that I could make sure the edges of the images were really well stitched,” he says. “With my existing laptop, I had to use half-resolution just so that I could look around. On the HP Z840, I was getting almost real-time feedback on distortion effects, scrubbing through the timeline of the After Effects file to see how things moved. None of that would have been possible without those graphics cards.”

The AMD FirePro™ W9100 graphics cards also proved critical when it came to colour-correcting the rendered footage. “I would take it into Adobe Premiere Pro® CC and use the new Lumetri colour wheels to get a really nice grade,” he says. “You can put a box around an area and grade it like you would in DaVinci Resolve or Baselight, and you’re doing it on a 5K equirectangular image – in Premiere!”

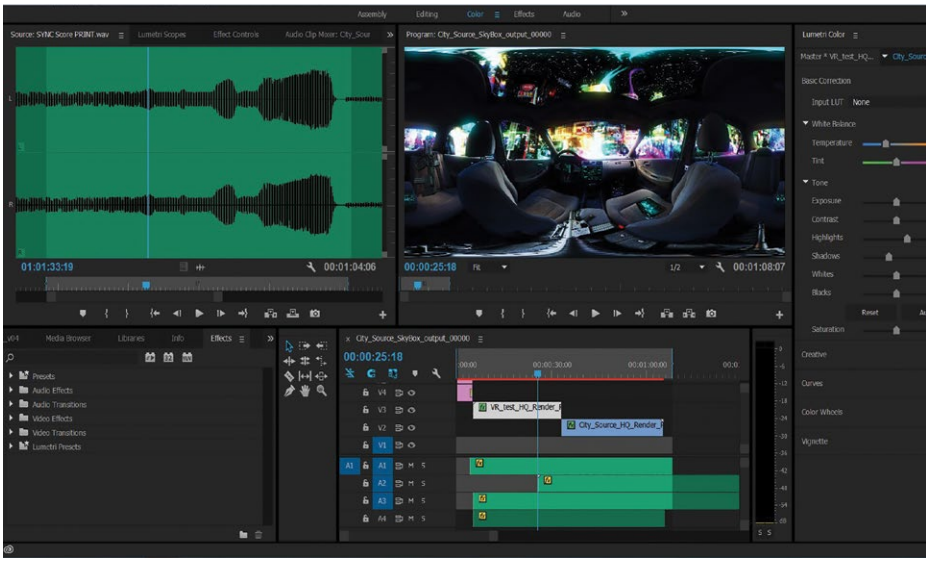


Customer at a glance

Application
Adobe® Photoshop® CC
Adobe After Effects® CC
Adobe Premiere Pro® CC

Hardware
HP Z840 Workstations, configured with:

- Dual 10-core Intel® Xeon® E5 v3 OpenCL™ 2.0
- AMD FirePro™ W9100 graphics card
- 64 GB system memory or is it 32 GB of GDDR5 memory
- 512 GB SSD OS Drive Win 8.1 64-bit Pro
- HP Z Turbo Drive PCIe SSD 512 GB
- HP Z Turbo Drive Quad Pro
- Skybox plugin
- HP DreamColor Z27x Studio Display



Memory
16 GB GDDR5

Compute performance
Up to 5.24 TFLOPs peak single precision floating-point performance

AMD Eyefinity technology
Support up to 6 displays

Supports
OpenCL™ 2.0

Pioneering new VRworkflows

Thanks to the combined power of the HP Z840 Workstation and the AMD FirePro™ W9100 GPUs, Dulull was able to complete *Spirit City* in time for the CES 2016 trade show, where Stuart Gallop, Stuart Gallop - CEO of VR entertainment company Virtual View Productions, used it to help pitch the IP to investors. The entire project had taken just over a month, from inception to delivery.

For Dulull, the short represents an important proof of concept for virtual reality film-making. "I meet so many film-makers who have these fantastic ideas for VR, but they're all theoretical," he says. "With *Spirit City*, I've actually gone out and tried it. Whether I've succeeded or failed artistically, I know what is required to create complex, visual effects-driven 360-degree video."

"I was getting almost real-time feedback on distortion effects, scrubbing through the timeline of the After Effects file to see how things moved. None of that would have been possible without AMD's FirePro™ W9100 graphics cards."

- Hasraf, 'Haz' Dulull, Director and Visual Effects Artist

While *Spirit City* uses only two fixed camera positions, Dulull now plans a series of further VR tech demos exploring how the same 2.5D effects methodology can be applied to films that require a moving camera: work in which AMD and HP's hardware will play an integral part.

"One thing I've learned on this project is that for VR, if you're going to do visual effects-heavy content, you need a beast of a machine – and most importantly, a beast of a graphics card so that you can see what you're doing in real time," he says. "On my future projects, I will most definitely try to get a workstation of the same spec as the HP Z840 and the AMD FirePro™ W9100 GPUs.

Learn more at
hp.com/go/filmandvideo
hp.com/zworkstations
fireprographics.com

Sign up for updates
hp.com/go/getupdated

Share with colleagues

Rate this document

4AA6-5178EEW, April 2016