EMPOWERING DIGITAL ARTISTS WITH NVIDIA QUADRO vDWS

nVIDIA

VIRTUAL GPUs DELIVER PEAK PERFORMANCE FOR ARTISTS CREATING BLOCKBUSTER VISUAL EFFECTS ON VDI.

Altered Carbon: Season 2 - © 2020 Netflix

SUMMARY

> DNEG wanted to deploy VMs for visual effects artists working at a new Montréal studio.

> Virtual workstations needed to deliver a great user experience for graphics-intensive 3D applications.

> The IT team deployed infrastructure installed with NVIDIA RTX™ GPUs and powered by NVIDIA® Quadro® Virtual Data Center Workstation (Quadro vDWS) software.

> Today, artists can access their VMs from anywhere and enjoy performance on the same level as physical workstations.

> DNEG's IT compute resources can easily be scaled according to the needs of artists and projects.

INTRODUCTION

DNEG is behind some of the most advanced and visually rich films and TV programs ever created. This world-renowned creative studio has won numerous accolades for its groundbreaking visual effects, including five Academy Awards, five BAFTA Awards, and 11 Visual Effects Society Awards. Recently, DNEG embarked on an ambitious project to deploy NVIDIA GPU-powered virtual workstations at its studio in Montréal.

CHALLENGE STATEMENT

Whether it's creating revolutionary effects for films like *Tenet* and *Dune* or high-end TV programs like *Altered Carbon 2*, DNEG has been impressing audiences with its groundbreaking visuals for more than 20 years. Thanks in part to a string of recent awards, DNEG's work is more in demand than ever before. What was once a single studio in London has grown into a global enterprise spread across the United Kingdom, Canada, the United States, and India. In 2018, DNEG opened the doors of its sixth global studio—in Montréal, Canada.

"With every new project, it's crucial to ramp up production quickly," said Graham Jack, Chief Technology Officer at DNEG. To hit the ground running in Montréal, DNEG's IT team needed to provide the studio's first group of 100+ artists IT equipment, including Wacom tablets, 2K monitors, and high-powered Linux-based workstations.
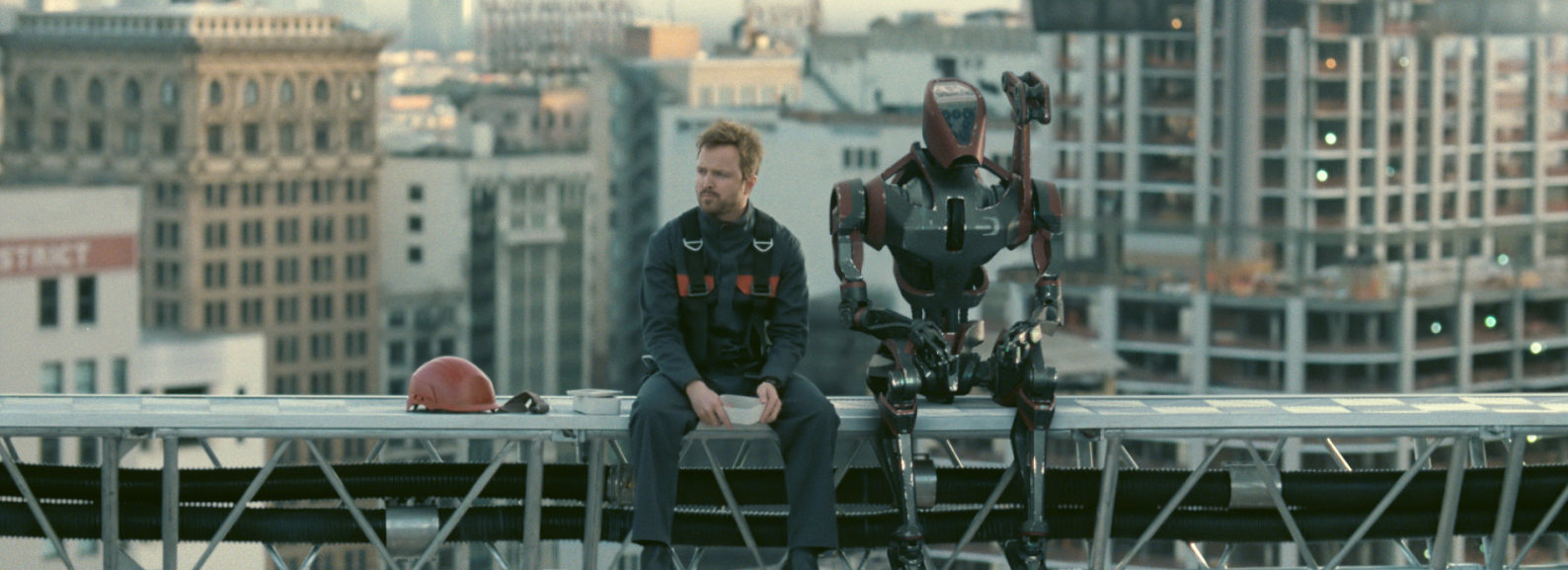
CUSTOMER PROFILE

DNEG

Organization	**Industry**	**Headquarters**	**Founded**	**Size**	**Website**
DNEG	Media and Entertainment	London, United Kingdom	1998	8,000 employees	dneg.com

Westworld: Season 3 - © 2020 Home Box Office, Inc.

SOFTWARE

Hypervisor: VMware ESX

Software Client: Teradici Cloud Access Software with PC-over-IP (PCoIP) Ultra

Graphics Acceleration: NVIDIA Quadro vDWS

HARDWARE

Server: Dell PowerEdge R740

GPU: NVIDIA Quadro RTX™ 8000 and NVIDIA P40

REASONS FOR NVIDIA

> High-end workstation performance for graphics-intensive 3D applications

> Future-proof infrastructure with resources that scale on demand

> Standardized software and drivers for simplified IT management

> Extra layer of security to protect intellectual property (IP)

Artists also needed to access animation and visual effects software, like Autodesk Maya, Foundry Nuke, SideFX Houdini, Foundry Mari, and Isotropix Clarisse iFX. "Scaling compute resources from the ground up was a big undertaking that would take considerable time," said Jack.

The IT team's challenge was compounded by an ongoing search for a suitable space to eventually accommodate more than 750 staff. Until there was a permanent location, the Montréal-based artists would be working in a temporary space. DNEG didn't want to install IT infrastructure that would have to be ripped out later. In this situation, high-performance virtual machines (VMs) made a lot of sense. "We had been thinking about a virtualized desktop environment for quite some time," said Jack. "The new studio seemed like a particularly good use case given that we could put all of the hardware into the data center. Then all we really needed was an internet connection."

Successfully deploying virtual desktop infrastructure (VDI) in Montréal had the potential to give DNEG a competitive edge by providing a template for IT innovation across its entire organization. While ramping up quickly was important, the IT team also needed to ensure that the new virtual workstations performed well for artists to avoid any major production setbacks.

SOLUTION STATEMENT

The first iteration of DNEG Montréal's VDI project was deployed in early 2018. The infrastructure comprised 10 Dell PowerEdge R740 servers, each installed with two NVIDIA P40 GPUs. The team uses NVIDIA Quadro vDWS software to virtualize the P40 GPUs and Teradici PCoIP to

The Dark Crystal: Age of Resistance - © 2019 Netflix

access remote desktops. To ensure a good experience, each artist was assigned an 8 gigabyte (GB) frame buffer. On this setup, each P40 GPU could accommodate three artists (six artists per server).

In an ideal world, the environment would have undergone a lengthy testing period before deployment. However, production on the studio's first film needed to start immediately. "The reality of hundreds of users starting any day kicked in, and ultimately we just had to make a call and go with it," said Jack. "As early adopters, we expected some issues. In the long run, we knew working through the kinks would be worth the effort. Ultimately, we'd be miles ahead of everyone else."

During the next year, the studio grew quickly, prompting the IT team to purchase an additional 26 Dell servers with two NVIDIA P40 GPUs each. "We chose Dell because it provides all of our visual effects servers, so we have a lot of experience with them," said Daire Byrne, global head of systems at DNEG.

When NVIDIA Quadro RTX 8000 GPUs were released in mid-2019, DNEG was excited to upgrade. "The RTX 8000 [NVIDIA] Turing™ architecture had the right configuration to handle our specific compute workloads," said Byrne. "Plus, it had enough memory that we could splice it up to match the other resources that we were allocating across all of our users." DNEG added to its existing infrastructure by purchasing 36 Dell servers and installing two NVIDIA RTX GPUs per server. To virtualize the RTX GPUs, the IT team licensed NVIDIA Quadro vDWS software. This setup, based on the NVIDIA RTX Server reference design, could accommodate four artists per GPU assigned a 12Q frame buffer (eight artists per server). "The power you get with the new RTX GPUs is evident when you look at how many users fit with larger profiles. One extra user per GPU is pretty impressive," said Byrne.

"Most artists don't even notice a difference between NVIDIA vGPU-powered VMs and physical workstations."

Graham Jack,
Chief Technology Officer,
DNEG

RESULTS STATEMENT

After using NVIDIA Quadro vDWS-powered VMs to complete production on *The Kid Who Would be King*, DNEG's Montréal artists have since worked on a number of major projects, including *Men in Black: International*. The VDI project has been so successful that it was serving approximately 750 users in Montréal by early 2020. DNEG has plans to deploy VDI across the globe, particularly in India.

Not only do NVIDIA virtual GPUs (vGPUs) provide flexibility and great performance, in some scenarios they even improve user experience on virtual workstations. "One of the ways our VMs excel is with QuickTime movie playback. If an artist is playing back full-frame video on a workstation with gigabit networking that is reading from the network storage, a long sequence might take several minutes to load," said Byrne. "But when they're loading frames on a VM with 25 gigabit networking, it actually loads faster than it plays back. NVIDIA vGPU-powered VMs are about 10X faster for IO workloads. Playback only takes a few seconds."

The IT team appreciates a number of additional benefits provided by NVIDIA vGPU-powered VDI. One is the extra layer of IT security. "Because artists access their workstations with a thin client, there's no risk of exposing clients' IP to unauthorized downloads," said Byrne. Another bonus is the element of future proofing. "Moving forward, artist compute demands will invariably grow larger. To give our artists more compute power, we can easily increase NVIDIA vGPU profile sizes and reduce the number of users we put on each server. We don't need to replace any equipment."

DNEG also enjoys benefits from having NVIDIA Quadro RTX 8000 GPUs installed in its VDI infrastructure. The RTX 8000 is an incredibly powerful GPU that features NVIDIA CUDA®, Tensor, and RT Cores and functions

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much the same as the NVIDIA Quadro GPUs installed in physical workstations used by artists at other DNEG studios. By using Quadro GPUs across its infrastructure, DNEG can standardize its software and drivers while also avoiding the complexity of purchasing different GPUs for different use cases or different GPU architectures.

LOOKING AHEAD

The RTX 8000 is based on the NVIDIA Turing architecture, which is designed to efficiently handle multiple simultaneous tasks to accelerate a variety of complex workloads, including graphics, deep learning, artificial intelligence, rendering, simulations, ray tracing, and more. Because RTX 8000 GPUs are suitable to run multiple workloads, IT has the flexibility to provision virtual workstations and render nodes or a combination of the two. "We're excited that RTX GPUs support ray tracing in Clarisse," said Jack. "It's still early days for that implementation, but it's something for future consideration."

DNEG is also excited about **NVIDIA Omniverse™**, a powerful collaboration platform for 3D production pipelines. "DNEG is in the process of looking at switching to a USD-based pipeline, so the release of Omniverse is quite timely for us," said Jack. Currently, DNEG is evaluating how Omniverse might be integrated into its pipeline as a tool for artists who need to view and edit large scenes. "Rather than sending scenes off to a CPU-based render farm, Omniverse could be quite useful for generating high-fidelity scenes in an instant," said Jack. "Those scenes could also be shown to clients or remote supervisors. Certainly, having access to a large pool of RTX 8000 GPUs will open up some interesting possibilities when we eventually move forward with Omniverse."