ENHANCING PRODUCTIVITY WITH NEW GPU VIRTUALIZATION TECHNOLOGY

Honda R&D uses innovative technology based on NVIDIA GRID to optimize its virtual desktop environment

NVIDIA

Enhancing service and operational efficiency for R&D/production centers by building next-generation engineering VDI based on NVIDIA GRID

ABOUT HONDA

Honda Motor Co., Ltd. is a global transportation equipment manufacturer. In 2015 alone, Honda sold 4.7 million four-wheel vehicles and 16.99 million motorcycles. The company is the world's 7th largest auto manufacturer as well as the world's top motorcycle manufacturer. With sales reaching about 7.4 Billion yen, Honda is a leading Japanese transportation equipment manufacturer.

Honda R&D has 26 research and development centers around the world and serves as the research and development section of Honda Motor Company's products. The Automobile R&D Center of Honda R&D is on the cutting edge of automotive innovation, delivering vehicles and motorcycles that take consumers to whole new places.
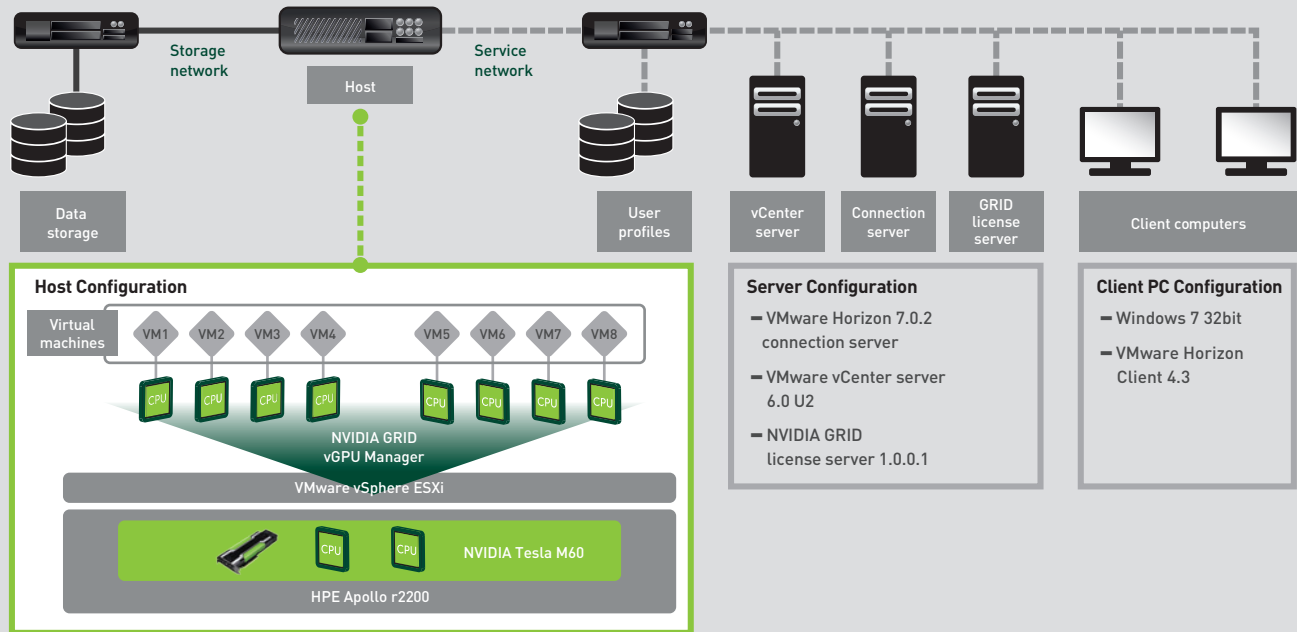
CHALLENGE

To create the most innovative designs and turn research into product, the Automobile R&D Center takes advantage of 3D CAD/CAE applications like Dassault Systèmes CATIA. It is critical that all users, engineers and designers have a high performance workstation that can handle the demands of applications like CATIA. These high-performance engineering workstation (EWS) environments are at the core of their R&D, and in 2015 the center launched a "new-generation EWS project," enabling users to leverage the same environment from anywhere and on any device without a change in quality or performance.

Honda turned to virtualization to deliver VDI environments to their R&D centers in Japan and immediately saw an increase in performance and productivity. However, VDI based on the pass-through method with VMware's virtualization allocates the server GPUs to each client on a fixed basis—connecting one physical GPU for each virtual client machine operating on the server. This method allocates the GPU of the same performance to all users.

As a result of pass-through, graphics-critical business applications performed poorly and user experience was not comparable to physical workstations. At the beginning of this project, a system was developed to measure and visualize the computer resources consumed by each user. This measurement system clarified that while some users had more than enough processing performance, other power users of CAD/CAE had a sub-par experience. [Figure 3]

Figure 1 **VDI System Configuration**

Host Configuration
- Virtual machines: VM1 VM2 VM3 VM4 VM5 VM6 VM7 VM8
- NVIDIA GRID vGPU Manager
- VMware vSphere ESXi
- NVIDIA Tesla M60
- HPE Apollo r2200

Storage network — Host — Service network

Data storage · User profiles · vCenter server · Connection server · GRID license server · Client computers

Server Configuration
- VMware Horizon 7.0.2 connection server
- VMware vCenter server 6.0 U2
- NVIDIA GRID license server 1.0.0.1

Client PC Configuration
- Windows 7 32bit
- VMware Horizon Client 4.3

"Since NVIDIA GRID was released, we have focused on the innovative vGPU technology, because we were convinced that it would serve as the core technology for optimizing resources. No conventional system could flexibly allocate processing performance to each CAD/CAE engineer."

~ Masashi Okubo, Assistant Chief Engineer, CIS Department, Digital Development Promotion Division, Automobile R&D Center, Honda R&D Co., Ltd.

Honda quickly learned that adding a more powerful GPU would not solve the problem, because it would only scale to a certain number of users and undoubtedly increase IT investment costs over time. To give users a workstation-like experience on any device, Honda turned to graphics-accelerated virtualization with NVIDIA GRID software and the Tesla M60 to deliver higher quality performance and experience when working with complicated designs and 3D analysis.

SOLUTION

NVIDIA GRID and Tesla M60 graphics processing enables faster performance, lower latency, and the increased compute power needed to fully leverage graphics-heavy applications like 3D CAD. In addition, NVIDIA GRID allows IT departments the right amount of vGPU necessary for the right users through a unified view of all physical GPUs. The ability to monitor and manage vGPUs through a single dashboard ensures that each user is allocated enough performance power to complete their tasks at hand. Simply put, graphics acceleration for all. [Figure 1]

"The goal of our project was to evolve the EWS, which significantly affects engineering productivity, to a system that could proactively meet high requirements of power users based on more efficient operation," said Masashi Okubo, the project leader. NVIDIA GRID makes considerable contributions to enhancing productivity and flexibility while controlling IT investment costs.
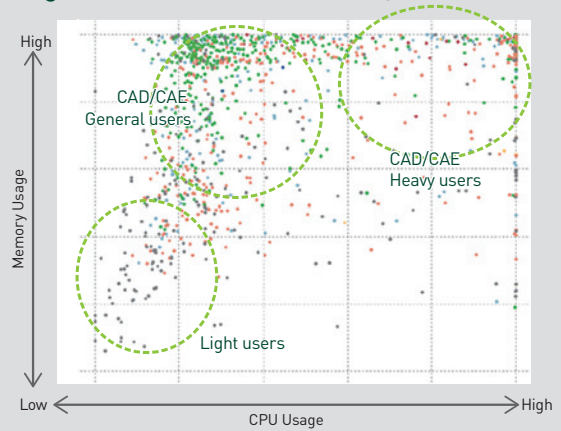
RESULTS

For eight months, the NVIDIA GRID proof-of-concept was tested with members across the global R&D organization including Hiroshi Konno

Figure 2   Standard, mid-range, and high-range machines are available
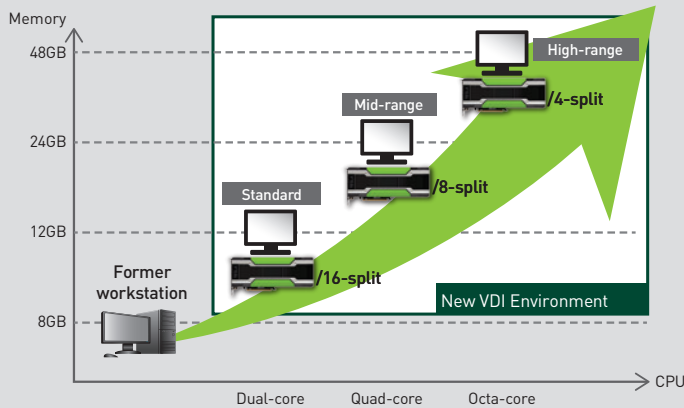
Figure 3   Resource monitoring

from Honda Motor Co. and Yuma Takahashi from Honda R&D, other R&D centers, the manufacturing department, and the car accessories department. Their conclusion: NVIDIA GRID would simultaneously meet the needs of power users and knowledge workers from anywhere in the world.

To make sure the right users had the right allocation, Honda rolled out three virtual client machines: high-range, mid-range, and standard. High-range machines have the octa-core CPU with the 4-split M60 GPU; mid-range machines, with the quad-core CPU and 8-split M60 GPU; and standard machines, with dual-core CPU with 16-split M60 GPU. This system structure can flexibly allocate necessary virtual machines to users according to the operational characteristics of each user. [Figure 2]

"Our current system has yet to be completed," said Konno, who played the core role in this system migration project. Today, teams are using the new EWS from their desktop. The goal is to enable teams to use their own devices in order to leverage VDI in the office and in the field. With graphics acceleration in the data center, NVIDIA GRID empowers teams to use CAD/CAE application on any device—even low-cost laptop computers.

Today, Honda R&D centers and factories around the world – from Ohio to Tokyo – are designing and developing in the new NVIDIA GRID-powered EWS environment. Across all Honda group companies, more than 4,000 VDI systems are taking advantage of not only better application performance and user experience but also the additional value of faster access to data and enhanced security of IP. Moving forward, there is an aggressive plan to migrate all client machines to the new system by 2020.

Looking forward Okubo explained, "In cooperation with NVIDIA, we would like to continue to evolve our system toward an even more innovative system that enhances productivity of our engineers and drives the development of new products."

To learn more about NVIDIA GRID visit
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