NVIDIA® GRID™ CASE STUDY

Ufa State Aviation Technical University

Passing with Flying Colors

NVIDIA

Ufa State Aviation Technical University implements NVIDIA GRID K2 to run 3D modeling applications.

AT A GLANCE

CUSTOMER PROFILE

Company: Ufa State Aviation Technical University

Industry: Education

Location: Ufa, Bashkortostan, Russia

Size: 20,000 students

SUMMARY

- Aviation university in Ufa, Republic of Bashkortostan, Russian Federation
- Over 20,000 students enrolled
- Tested NVIDIA GRID K2 versus local PCs running Autodesk applications
- NVIDIA GRID K2 consistently outperformed the local PCs

SOFTWARE

Key applications: Autodesk Inventor 2013, and 3D Studio MAX 2014

Desktop & Application Remoting: Citrix XenDesktop and StoreFront, Windows 2008R2

Hypervisor: Citrix XenServer

HARDWARE

GRID boards: K2

Servers: IBM DataPlex DX360 M4

Clients: Various PC configurations

CUSTOMER PROFILE

Ufa State Aviation Technical University (USATU) is a nonprofit organization that traces its roots to the first half of the 20th century. Since 1942, it has been located in Ufa, capital of the Republic of Bashkortostan, where it has become a leading Russian university that has earned international recognition for its science schools. Today, USATU is a large scientific, educational, innovative, and production complex that trains more than 20,000 qualified specialists at all levels from Bachelors to PhDs.

Students receive training in various aviation-related majors and areas of study, such as engineering, machining, metal working, instruments, applied mathematics, computer science, economics, and health/safety. USATU fosters relationships with specialists in various fields to stimulate innovation throughout the design life-cycle from initial research to final product. USATU also participates in both local and global government-supported training and research projects with companies located in Bashkortostan and other regions, maintains close relationships with the Russian Academy of Sciences, and participates in international educational and scientific programs.

SOURCE

This case study is adapted from a paper written by Vitaliy Gordienko, Maxim Ivantsov, Bulat Mukhametshin, Arthur Yuldashev, and Liliya Yuldasheva to document an experimental NVIDIA GRID K2 setup created by the USATU High-Performance Computing and IT departments for testing purposes.

TEST VIRTUALIZATION ENVIRONMENT

The environment used for testing NVIDIA GRID K2 technology consisted of an IBM iDataPlex DX360 M4 server equipped with two Intel Xeon E5-2670 CPUs, 128GB RAM, and two 60GB solid-state drives in a RAID 0 configuration. Two NVIDIA GRID K2 graphics cards provided the GPUs. A total of three virtual machines were created; the virtual machine used for testing included 4 virtual CPUs, 32GB RAM, and a single dedicated GPU.

5 REASONS FOR GRID

1. Outperforms local PCs.
2. Positive user feedback.
3. Cost savings.
4. Ease of deployment and management.
5. Suitable for diverse modeling needs.

Faculty and students from the departments of Aviation Thermal Engineering and Energy, Machinery and Foundry Technologies, Mechanical Engineering Technology, and Production Safety and Industrial Ecology participated in several practice projects using Autodesk AutoCAD, Inventor 2013, and 3D Studio MAX 2014. Citrix StoreFront provided the remote access for these users.

TEST ONE: NVIDIA GRID VERSUS LOCAL PC #1

USATU tested NVIDIA GRID K2 against a Windows XP local computer (PC #1) equipped with an Intel Core i3-2100 CPU running at 3.1GHz with 4GB of RAM and an NVIDIA GeForce GT 440 GPU.

The first test in this series used Autodesk Inventor 2013 and the model of a pneumatically activated machinist's vice shown in Figure 1, below. Running a shaded preview of the model on PC #1 presented display defects, such as blurred edges. Also, strong ripples appeared when attempting to move the model with interactive ray tracing enabled. By contrast, the virtual NVIDIA GRID K2 environment provided 2-3x faster tracing speed with no significant display defects.

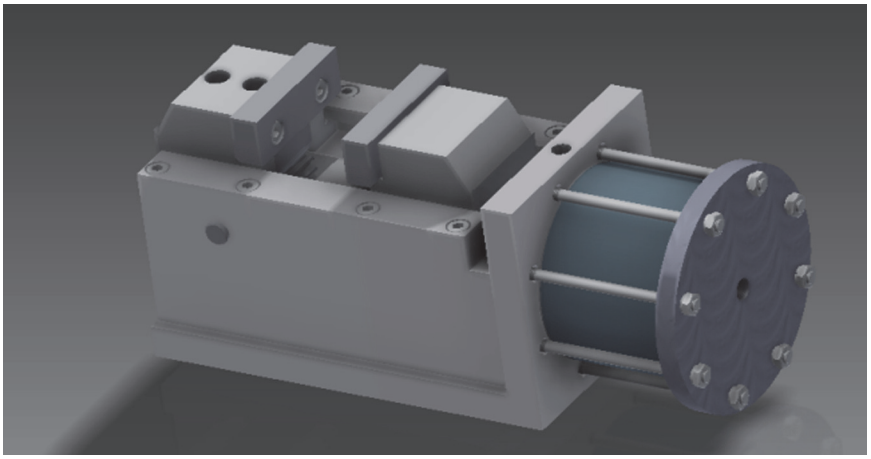

Figure 1: Pneumatic machinist's vice

The second test in this series used Autodesk Inventor 2013 and the array of more than 1,000 identical parts shown in Figure 2, below. This array rendered PC #1 practically unusable due to pronounced delays with panning, rotation, and scaling, as well as significant display defects. The virtual NVIDIA GRID K2 environment delivered accelerated rotation and scaling with immediate response and virtually no detectable defects.

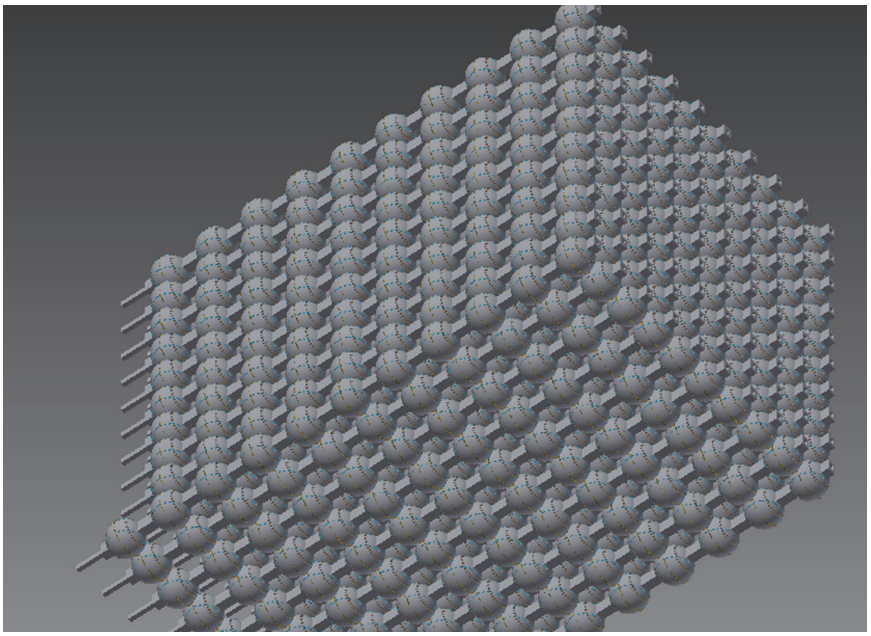

Figure 2: Array of over 1,000 identical parts

The detailed results for this test series are as follows:

Operation	Time in seconds (PC #1)	Time in seconds (GRID K2)
Starting Inventor	12	7
Changing the visual style to realistic with ray tracing	11	1
Opening form of part in Inventor Fusion from Inventor	120	25

TEST TWO: NVIDIA GRID VERSUS LOCAL PC #2

USATU then tested NVIDIA GRID K2 against a Windows XP local computer (PC #2) equipped with an Intel Core i7-950 CPU running at 3.07GHz with 8GB of RAM and an NVIDIA GeForce GT 460 GPU. The model used for this test was a complex reconstruction of an aviation accident created in Autodesk 3D Studio MAX 2014 that consisted of over 500,000 polygons. See Figure 3, below.

Both PC #2 and NVIDIA GRID K2 experienced some lag during rapid rotation of the model; however, NVIDIA GRID K2 consistently outperformed PC #2 in both responsiveness to manipulating the model and rendering speeds at high resolution. Similar outcomes were noted for additional tests performed using the Autocad Civil 3D infrastructure design suite and Roxar RMS (a resource-intensive geographic modeling application).

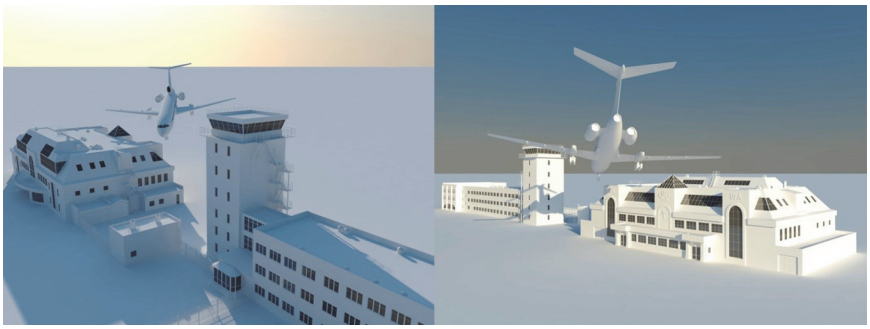

Figure 3: Complex model created in Autodesk 3D Studio MAX 2014

The detailed results for this test are as follows:

Operation	Time in seconds (PC #1)	Time in seconds (GRID K2)
Starting 3D Studio MAX 2014	12	7
Rendering images in JPG format at 256x188 using the default scan line renderer	300	75

TEST THREE: NVIDIA GRID ACCESSED FROM PC #3

The third test used a Windows 7 local computer (PC #3) equipped with an Intel Core Duo E7500 CPU running at 2.93GHz with 2GB of RAM and a GPU integrated with the onboard Intel G33 chipset to create the model shown in Figure 4, below, in the virtual NVIDIA GRID K2 environment using Adobe Inventor 2013.

Users experienced a stable connection with high-performance graphics comparable to using a premiere local workstation.

Figure 4: Test model created in Autodesk Inventor 2013 with NVIDIA GRID K2

SUMMARY

The preceding tests demonstrate the usability of NVIDIA GRID technology for various resource-intensive applications in design and education, such as:

- Demonstration projects for classes and presentations
- Deploying virtual NVIDIA GRID workstations and low-end clients instead of individual high-performance workstations
- Deploying virtual classrooms for use by various departments on a time-sharing basis.

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