NVIDIA RTX A5500
Simulation and Training

INDUSTRY OVERVIEW

- The constant increase in capabilities, performance, and complexities of aircraft, vehicles, and mission-critical systems places growing demands to operate and maintain complex simulation and training systems safely. The use of powerful GPUs and advanced technology in these systems are crucial to supplement in-person training and significantly shorten the learning cycle.
- Next-generation trainers and simulators are moving to multi-GPU solutions to maximize performance. Shifting to multi-GPU configurations provides for increased fidelity, consolidation of redundant processing and minimizes the amount of hardware required to drive large display solutions. Multi-GPU solutions help price-sensitive customers who want to optimize for cost-effectiveness when evaluating total ROI over the life of the solution. In addition to a reduced total cost of ownership, some additional benefits of a multi-GPU system are a smaller hardware footprint, fewer licenses, reduced heat generation, and reduced power consumption.
- More customers are implementing virtual reality (VR), augmented reality (AR), mixed reality (MR), and extended reality (XR) technologies, particularly for maintenance simulations, in training systems to enhance knowledge and skills at a reduced cost and risk. The proliferation of big data enables more effective uses of AI to enhance learning and safety in training and ultimately improve human performance in real-world scenarios.
- Security concerns often require keeping computing equipment and data secure in the data center, while maintaining accessibility to simulation and training applications and data. As government agencies work to support an increasingly mobile workforce, ensuring the security of sensitive data while still providing access is essential.
- NVIDIA Omniverse™, a platform for scalable multi-GPU real-time, true-to-reality simulation, is opening up new potential for next-generation training and simulation solutions. Growing interest in using Omniverse to create simulated environments and deliver high-performance simulation in real time will drive the need for more powerful GPUs with large GPU memory.

TYPICAL CUSTOMERS

Federal system integrators, training simulator companies, fighter units, pilots, flight schools, Department of Defense, national research labs, civilian agencies.

COMMON APPLICATIONS

OEM / system integrator custom software, BISim (VBS3/4, TerraSim), Bohemia Interactive, FlightSafety, Unity, Unreal Engine, Diamond Visionics, Presagis

WHO TO CALL ON

Decision Makers – CTO, CIO, senior DoD officials, program managers

Key Influencers – ISV partners, system integrators, DoD

THE SOLUTION

The NVIDIA RTX™ A5500, based on the latest NVIDIA Ampere GPU architecture, provides the power, performance, memory, and features required for immersive simulation and training systems. These immersive, full-body experiences with real-time feedback provide an interactive way for responders to familiarize themselves with equipment and processes and be more confident and skilled in tools, tactics, and timing used in real-world situations. With NVIDIA virtual GPU (vGPU) software support, you can access the power of the RTX A5500 from anywhere.

NVIDIA RTX GPUs are fully built by NVIDIA with long product life cycles and professional drivers and include many unique hardware and software features that can greatly simplify simulator configurations. Offering incredible visual quality and high performance, NVIDIA RTX GPUs can unlock the potential of real-time simulated environments.

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SIMULATION AND TRAINING

Source Preparation	Database Compilation	Rendering	Display
			

NVIDIA RTX A5500

Mission Simulation Training

Advanced simulation training and visualization gives military and safety-critical professionals agility in modeling and advances synthetic training.

Part-Task Training

Part task methods in a simulated training environment provide significant benefits in reducing overall training time on expensive training systems and enabling more effective whole task transfer performance.

Maintenance, Repair, Overhaul (MRO)

Flight simulators can help trainees develop the required critical skills to maximize MRO efficiency. In these simulators, trainees can fully experience complex processes and organizational issues.

Feature-Dense Terrain

Creation of simulated terrain is critical for training, mission rehearsal, visualization, and terrain analysis. Powerful graphics and rendering capabilities can help deliver complex, high-fidelity environments for simulation and training.

VR/AR/MR Solutions

VR-based training devices provide pilot trainees with more practice opportunities at a lower cost than dome-based or full flight simulators. The use of VR/AR/MR technologies for immersive, high-fidelity virtual simulation environments improves task performance and efficiency of training, while decreasing overall training time.

Virtualization

NVIDIA vGPU solutions can help increase security, improve mobility, and lower maintenance costs for flight simulation and training.

SIMULATION AND TRAINING WITH NVIDIA RTX A5500

The NVIDIA RTX A5500 helps deliver realistically immersive learning experiences with real-time feedback to help pilots, responders, or other safety-critical professionals to prepare for real-world situations.

- The RTX A5500 provides an extensive suite of display capabilities, ideal for multi-display and multi-projector deployments. The RTX A5500 features four DisplayPort 1.4a connectors, with support for up to four 5K displays and two 8K displays (8K displays can be driven at 60Hz with a single cable using Display Stream Compression (DSC)). In addition to these features, the A5500 provides additional capabilities required for simulation and training solutions:
  - **NVIDIA® Quadro® Sync II:** Add-on card that enables synchronization of display outputs of up to 4 RTX A5500 GPUs per sync card and up to 32 total displays or projectors to provide multi-display solutions free of visual artifacts with no impacts on performance.
  - **NVIDIA Mosaic™:** enables applications to span up to 16 high-resolution displays as a single desktop without changes to the application software.
  - **Warp and Blend:** enable the display of visually correct images on curved display surfaces without seams or bright spots.
  - **Projector Overlap:** create a single, unified desktop image from multiple projectors that support blending at projector overlap points for artifact-free displays.
- **CUDA Cores:** 10,240 NVIDIA Ampere architecture-based CUDA® cores provide over 34 TFLOPS of single-precision floating-point (FP32) compute performance for graphics-intensive visualization workloads and GPU-accelerated compute tasks.
- **RT Cores:** 80 second-generation RT Cores provide real-time ray tracing for compelling photo visual simulations, with the ability to run concurrent compute tasks such as ray tracing simultaneously with shading or denoising tasks.
- **Tensor Cores:** 320 third-generation Tensor Cores accelerate AI compute tasks for AI-augmented applications. By leveraging AI in Tensor Cores, simulations can achieve higher frame rates and visual fidelity with DLSS technology.
- **24GB of ECC GPU Memory:** The RTX A5500 features 24GB of GDDR6 memory with ECC (error correction code). Third generation NVIDIA® NVLink™ provides 48GB of combined memory with two A5500 cards, providing the memory needed for large, compelling simulation and training deployments.
- **Virtual Reality:** With VR-enabled training and simulation scenarios, safety-critical professionals can prepare for high-risk situations safely and affordably.
- **Virtual Workstation Software:** The NVIDIA RTX A5500 can be virtualized to provision powerful virtual workstations, which keeps computing resources and data secure while providing access to visual computing resources from anywhere.

PERSONAS

USERS	PILOTS, OPERATORS, MAINTENANCE STAFF, MILITARY PERSONNEL, DEVELOPERS, TRAINERS	EXECUTIVE DECISION MAKERS, IT MANAGEMENT
Key Questions to Ask	> How large are your typical models and datasets? > Which graphics cards are you currently using in your workstations? > Are any of your users working with virtual reality? > Do you have users using apps for remotely viewing and editing very large 3D models and images?	> Do users work on dual displays and/or 4K displays? > Do users ever complain that their machine crashed while working on a critical project? > How frequently does your company replace workstations?
NVIDIA RTX A5500 Use Cases	> Smooth design experience with simulation and visualization software tools, even when working with massive complex 3D models on 4K displays or in VR. > Interactive, physically based rendering to remain in the creative flow while iterating on concepts. > Content creation. > Image generation. > Display system.	> Enable smoother workflows and boost productivity with support for multiple displays. > Easily expand to more GPU memory by connecting 2 RTX A4500 GPUs with NVLink.

COMMON QUESTIONS

Q. Why should I consider NVIDIA RTX GPUs for simulation and training systems?

NVIDIA RTX professional solutions provide a complete hardware and software stack that is ideal for simulation and training. This includes hardware display output synchronization hardware as well as advanced multi-display and multi-GPU software required for multi-display, multi-projector, and multi-GPU solutions as well as enterprise-level support and deployment management software.

Q. Why should I buy NVIDIA RTX when NVIDIA GeForce GPUs provide the same/better performance for less money?

NVIDIA RTX solutions are built specifically for professional deployments, with a complete stack of software and hardware required to drive immersive simulation solutions. Built by NVIDIA with bulk availability with long-life product lifecycles, NVIDIA RTX GPUs are ideal solutions for multi-year deployments. Consumer solutions require additional hardware and software support to meet the needs of simulation and training, you need to consider the additional cost here to get the true price of consumer GPUs.

Q. GeForce GPUs can be modified to provide similar functionality to NVIDIA RTX GPUs at a lower cost, so why buy NVIDIA RTX GPUs?

The cost of modifying the GeForce® GPUs to provide display synchronization adds to the cost of the GPU itself. There is also an additional cost to create and maintain the software required to configure and deploy add-on synchronization for GeForce GPUs, this can result in significant cost over the life of the solution, especially for multi-GPU systems where the cost of multiple modified GeForce GPUs can exceed the cost of NVIDIA RTX GPUs. NVIDIA RTX solutions provide the Quadro Sync II hardware and required software as part of the cost of the products with all maintenance and support provided by NVIDIA at no additional cost. The complete NVIDIA RTX solution, both hardware and software, needs to be considered to understand the true value of NVIDIA RTX.

Q. What do NVIDIA RTX GPUs offer that consumer GPUs do not?

In addition to the features mentioned above, NVIDIA RTX GPUs provide support for the NVIDIA Enterprise Management Toolkit (NVWMI) which offers a robust set of asset management capabilities to IT administrators, including end-user display configuration and GPU monitoring. The toolkit's NVIDIA driver installer provides a flexible, convenient way to scale up the deployment of driver updates to hundreds of workstations from anywhere on the company network. The NVIDIA RTX Enterprise Drivers undergo extensive testing including tens of thousands of machine-hours of stress tests and thousands of hours of attended platform testing to provide enterprise-level stability and reliability.

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