



NVIDIA RTX™ SERVER FOR BARE METAL  
COMPUTE WITH ALTAIR NANOFLUIDX™  
2019 ON ASUS ESC8000 G4 DESIGN GUIDE

VERSION: 1.0



# TABLE OF CONTENTS

- Chapter 1. SOLUTION OVERVIEW ..... 1**
- 1.1 NVIDIA RTX Server Overview..... 1
- Chapter 2. SOLUTION DETAILS ..... 2**
- 2.1 Solution Configuration ..... 3

# Chapter 1.

## SOLUTION OVERVIEW

Designed and tested through multi-vendor cooperation between NVIDIA and its system and ISV partners, NVIDIA RTX™ Server provides a trusted environment for Simulation Engineers/Analysts to run overnight simulations for the Manufacturing & Design, Architecture, Engineering & Construction industries.

### 1.1 NVIDIA RTX SERVER OVERVIEW

#### Introduction:

Product Designs are increasingly complex making design validation and verification difficult with engineering simulations. Simulation models for such designs tend to be big as they need to be accurate. This leads to cost-prohibitive, time-consuming simulations. To perform more simulations in less time and to try out many product design ideas, one needs a powerful computer hardware to increase the engineering productivity by accelerating the engineering simulation throughput. NVIDIA RTX Server is a validated solution that brings GPU-accelerated power and performance to deliver the most efficient end-to-end design simulation solution, from interactive sessions in the desktop to batch simulation in the data center.

#### Audience:

The audience for this document include, but not limited to: Sales Engineers, Field Consultants, Professional Services, Partner Engineers, IT Managers and Customers who wish to take advantage of an appliance that is built and optimized to deliver on simulation workflows.

## Chapter 2.

# SOLUTION DETAILS

NVIDIA RTX Server is a highly flexible reference design that combines NVIDIA Quadro RTX 6000 and 8000 GPUs with NVIDIA virtual GPU software and leading third-party applications to deliver exceptional compute power in a validated system.

NVIDIA RTX Server for Bare Metal Compute with Altair nanoFluidX™ 2019 on the ASUS ESC8000 G4 is a reference design comprised of (a) NVIDIA Quadro RTX 8000 or RTX 6000 graphics cards; (b) Altair nanoFluidX 2019 CFD solver software; and a (c) ASUS ESC8000 G4 server. Combined, this validated solution provides unprecedented rendering and compute performance at a fraction of the cost, space, and power consumption of traditional CPU-based simulation nodes.

NVIDIA Quadro RTX 8000 and RTX 6000, powered by the NVIDIA Turing™ architecture and the NVIDIA RTX platform, brings the most significant advancement in computer graphics in over a decade to professional workflows. Not only can Designers and artists now wield the power of hardware-accelerated ray tracing, deep learning, and advanced shading to dramatically boost productivity and create amazing content faster than ever before, Simulation Engineers, and Fluid Dynamicists can also benefit from fast performance single precision GPU computing.

nanoFluidX is a particle-based hydrodynamics (SPH) simulation tool to predict fluid flow around complex geometries under complicated motion. It can be used, for example, to simulate oiling within conventional high-performance or electric vehicle powertrain systems comprising rotating shafts or gears and analyze forces and torques on individual components of the system. In addition, sloshing can be predicted in tanks experiencing transient motions. Conceived and optimized for use on clusters of Graphical Processing Units (GPUs), the software is extremely fast. For such typical gear-train applications, without the need to simplify geometries, the code can run an order of magnitude faster than a Finite-Volume code. GPU computing provides a significant performance advantage and power savings with respect to their more cumbersome CPU counterparts. nanoFluidX is one of the pioneering

commercial software packages written with NVIDIA CUDA bringing significant speed to the overall product development process with NVIDIA GPUs.

The ASUS ESC8000 G4 features a powerful GPU architecture that supports up to eight high-performance NVIDIA Quadro or Tesla GPU cards in a 4U chassis. With so much graphics power, the ESC8000 G4 lets you accomplish demanding computing tasks more quickly and with greater efficiency. An optimized internal layout enables the ESC8000 G4 to fit a wide variety of graphics cards – including dual-slot GPUs – with active or passive thermal modules. The ESC8000 G4 provides flexible system topology configurations options, including the ability to choose a single or dual root complex, making it ideal for deep learning requirements. The patented Adaptive Topology design enables users to switch the system topology easily via the intuitive web-based GUI of the ASUS ASMB9-iKVM server management solution, without changing any hardware configurations or cable routing. Link to the product page here: <https://www.asus.com/us/Commercial-Servers-Workstations/ESC8000-G4/>

## 2.1 SOLUTION CONFIGURATION

Table 1 outlines the system configuration utilized to complete the rigorous NVIDIA hardware verification as well as the NVIDIA RTX Server validation process.

Table 1: Solution components

Component	Vendor & Model	Details
System	ASUS ESC8000 G4	<ul style="list-style-type: none"> <li>• Dual Intel® Xeon® Gold 6248 processor: 2.5-3.9GHz; 20 Cores, 40 Threads</li> <li>• 384 GB ECC DDR4 memory</li> <li>• 1TB M.2 PCIe NVMe SSD</li> <li>• Ubuntu 18.04 LTS</li> </ul>
Graphics	8x Quadro RTX 8000 or RTX 6000  4x Quadro RTX NVLink HB bridge 2-slot  Quadro Driver Release 430 U2 (440.36)	Single GPU Spec <ul style="list-style-type: none"> <li>• GPU memory: 48GB or 24GB</li> <li>• CUDA cores: 4,608</li> <li>• Tensor cores: 576</li> <li>• RT cores: 72</li> </ul>

Application	Altair nanoFluidX 2019	
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