Specifications

High-Performance GPU/CPU Server Systems and Control Workstation

The Laboratory for Autonomous Systems Research (LASR), Code 1700, located at the U.S. Naval Research Laboratory (NRL) in Washington, D.C., requires the procurement, installation, configuration, and support of high-performance computing platforms and an integrated control workstation.

The purpose of this procurement is to provide:

1. **A 4-server GPU/CPU rack** capable of multi-threaded processing, GPU-accelerated workloads, AI and simulation applications, and integration with a system equivalent to Omniverse-based digital twin and simulation environments
2. **A control workstation** for remote monitoring, asset management, and system integration with the server rack.

All systems and services must be fully compatible, operational, and support integrated management workflows.

This document specifies the minimum technical and performance requirements for the hardware, software, and services to be provided by the vendor. Components that exceed specifications for listed components are also acceptable.

NOTE: Any reference to specific manufacturers is for example only and equivalent components are acceptable

Scope

The vendor shall provide all hardware, software, and services necessary to meet the technical specifications outlined in this document. All deliverables, including server systems, GPUs and CPUs, storage, memory, networking, and supporting infrastructure, shall be fully assembled, configured, tested, and operational.

All systems and services must be compatible with one another and suitable for high-performance computing, AI and simulation workloads, rendering, and digital twin applications.

Installation Site

All installation, configuration, and integration work will at the Naval Research Laboratory, Washington, DC 20375.

Technical Specifications:

The vendor must provide / system must include:

1. **High-performance GPU/CPU server system including**

   1.1. Complete 5U GPU direct-attached servers, fully configured to be installed together in a single rack including all of the following components and capabilities:
   - **1.1.1.** CSE-528G-R000NDP 5U rackmount chassis.
   - **1.1.2.** H14DSG-O-CPU motherboard.
   - **1.1.3.** Server processor supporting high-performance multi-threaded workloads.
   - **1.1.4.** Direct-attached GPU architecture supporting PCIe Gen 4 or higher.
   - **1.1.5.** Maximum supported DDR4 or DDR5 system memory.
   - **1.1.6.** NVMe and SATA storage compatibility.
   - **1.1.7.** PCIe expansion slots for GPUs and additional I/O cards.
   - **1.1.8.** Integrated high-speed networking ports (10GbE/25GbE or higher).
   - **1.1.9.** Redundant hot-swappable power supplies with optimized airflow.
   - **1.1.10.** Integrated remote management capability (IPMI or equivalent).
   - **1.1.11.** Total quantity: 4

   1.2. Complete dual CPU processors, each including all of the following components and capabilities:
   - **1.2.1.** DP/UP processor with 32 cores, 64 threads, 3.0 GHz base frequency, and ~128 MB cache.
   - **1.2.2.** Maximum supported DDR5 memory.
   - **1.2.3.** NVMe and SATA storage compatibility.
   - **1.2.4.** PCIe expansion capability for high-speed I/O cards.
   - **1.2.5.** Integrated networking ports supporting 10GbE, 25GbE, or higher.
   - **1.2.6.** Redundant hot-swappable power supplies with optimized cooling.
   - **1.2.7.** Integrated remote management capability.
   - **1.2.8.** Total quantity: 8 (2 per server)

   1.3. Complete DDR5 server memory modules, including all the following:
   - **1.3.1.** 96 GB DDR5-6400 memory modules.
   - **1.3.2.** 2Rx4 architecture with low-profile form factor.
   - **1.3.3.** ECC Registered DIMM (RDIMM) type.
   - **1.3.4.** Full support for DDR5-6400 data rates.
   - **1.3.5.** Compatibility with supported server motherboards.
   - **1.3.6.** Total quantity: 96 (24 per server)

1.4. Boot / System Complete NVMe PCIe SSD modules including all the following:

- **1.4.1.** Capacity of 960 GB.
- **1.4.2.** M.2 2280 form factor.
- **1.4.3.** PCIe 4.0 NVMe interface.
- **1.4.4.** Enterprise-grade 3D TLC NAND technology.
- **1.4.5.** Full PCIe 4.0 NVMe performance.
- **1.4.6.** Compatibility with server platform storage interfaces.
- **1.4.7.** Total Quantity: 4 (1 per server)

1.5. High-Capacity / High-Performance Complete NVMe PCIe SSD modules, including all of the following:

- **1.5.1.** Capacity of 7.68 TB.
- **1.5.2.** U.2 15mm form factor.
- **1.5.3.** PCIe 5.0 NVMe interface.
- **1.5.4.** Enterprise TLC NAND rated for ~1 DWPD.
- **1.5.5.** Full PCIe 5.0 NVMe performance.
- **1.5.6.** Compatibility with enterprise server platforms.
- **1.5.7.** Total quantity: 8 (2 per server)

1.6. Complete GPU accelerator modules, including all of the following:

- **1.6.1.** RTX PRO 6000 Server Edition.
- **1.6.2.** Approximately 96 GB GDDR7 GPU memory.
- **1.6.3.** PCIe 5.0 GPU interface.
- **1.6.4.** Support for GPU compute, AI, rendering, and virtualization workloads.
- **1.6.5.** Compatibility with supported GPU server platforms.
- **1.6.6.** Total quantity: 8 (2 per server)

1.7. Complete system management software licenses, including all of the following:

- **1.7.1.** Single node license for server management software suite.
- **1.7.2.** Hardware monitoring, alerting, reporting, and remote system management functionality.
- **1.7.3.** Compatibility with all server platforms included in the procurement.
- **1.7.4.** Total quantity: 4 (1 per server).

1.8. Complete workstation integration including all the following:

- **1.8.1.** Establish secure network connectivity between the control workstation and all servers.
- **1.8.2.** Configure the workstation to remotely access, monitor, and manage all servers.
- **1.8.3.** Ensure proper firewall, VLAN, or network segmentation configurations to allow uninterrupted remote management while maintaining network security.
- **1.8.4.** Verify 4 servers and hardware are visible, manageable, to the workstation.
- **1.8.5.** Provide documentation and training for proper use of the workstation for system monitoring, alerting, and remote administration.

1.8.6. Quantity: 1

1.9. Complete Omniverse Enterprise subscriptions, including all of the following:

1.9.1. Per GPU subscription.
1.9.2. One- to three-year subscription term.
1.9.3. Support for collaborative 3D design, simulation, rendering, and AI workflows.
1.9.4. Compatibility with GPU server platforms included in the procurement.
1.9.5. Total quantity: 8 (1 per GPU).

1.10. Complete server assembly services, including all of the following:

1.10.1. Assembly of server systems including processors, memory, storage devices, GPUs, and internal components.
1.10.2. Assembly performed according to manufacturer specifications and best practices.
1.10.3. Verification that all hardware components operate correctly together.
1.10.4. Total quantity: 4.

1.11. Complete one- to three-year on-site next business day support services, including all of the following:

1.11.1. Coverage for one to three years.
1.11.2. Next-business-day on-site response following service request.
1.11.3. Troubleshooting, repair, and replacement of defective components.
1.11.4. Coverage for all purchased server hardware.
1.11.5. Total quantity: 4.

1.12. Complete on-site integration services, including all of the following:

1.12.1. Configuration and integration of servers, racks, PDUs, GPUs, and associated hardware.
1.12.2. Integration of management software and system configuration.
1.12.3. System-level integration performed after physical installation performed in accordance with manufacturer standards.
1.12.4. Validation and testing to confirm full system operational readiness.
1.12.5. Total quantity: 1 service engagement covering 4 servers.

1.13. Complete rack on-site deployment, including all of the following:

1.13.1. Deployment of servers, racks, and power distribution units.
1.13.2. Physical installation, mounting, and cabling of hardware into customer data center racks
1.13.3. .Deployment performed in accordance with manufacturer procedures.
1.13.4. Deployment limited to physical installation and power connectivity only; excludes system configuration and software integration.
1.13.5. Total quantity: 1 service engagement.

1.14. Complete one- to three-year non-volatile technology support services, including all of the following:

1.14.1. Coverage period of one to three years.
1.14.2. Support for all non-volatile storage or memory components in procurement.

1.14.3. Troubleshooting and replacement of failed components.
1.14.4. Total quantity: 1

1.15. Complete Ubuntu operating system installation services, including all of the following:
1.15.1. Canonical Ubuntu Linux operating system.
1.15.2. Installation and configuration of Ubuntu 24.04 LTS (or newer) on each server system.
1.15.3. Verification confirming full operational readiness.
1.15.4. Total quantity: 4.

1.16. Complete server power cable bundles, including all of the following:
1.16.1. Dual-lock C20/C19 connector type.
1.16.2. Electrical rating: 20A, 12 AWG.
1.16.3. Approximately 3-foot cable length.
1.16.4. Black cable color.
1.16.5. Compatibility with server power supplies and PDUs.
1.16.6. Total quantity: 24 cables.

1.17. Complete AC power cord latch clamp sets, including of the following:
1.17.1. Function: Secures AC power cords to prevent accidental disconnection.
1.17.2. Compatibility with specified server platforms and power cables.
1.17.3. Total quantity: 48 units.

1.18. Complete USB KVM Cable sets, including all of the following:
1.18.1. USB KVM cable type.
1.18.2. Approximately 1.8-meter length.
1.18.3. Provides keyboard, video, and mouse connectivity functionality.
1.18.4. Compatibility with server KVM interfaces.
1.18.5. Quantity: 4 cables.

1.19. Complete 19-Inch LED KVM switch systems, including all the following:
1.19.1. 19-inch rackmount console with integrated display.
1.19.2. 16-port KVM switching capability.
1.19.3. Support for USB and PS/2 interfaces.
1.19.4. Centralized control of up to 16 servers.
1.19.5. Total quantity: 1 unit.

1.20. Complete modular airflow management panels, including all of the following:
1.20.1. 1U rackmount airflow management panel.
1.20.2. Standard 19-inch rack width.
1.20.3. Toolless modular installation design.
1.20.4. Total quantity: 3 units.

1.21. Complete server rack cabinet, including all of the following:

1.21.1. 48U rack capacity

1.21.2. 750 x 1200 mm enclosure

1.21.3. Adjustable depth rails supporting fully populated 5U GPU servers and PDU integration.

1.21.4. Integrated vertical and horizontal cable management channels.

1.22. Complete switched rack power distribution units (PDUs), including all of the following:

1.22.1. APDU11450SM rackmount PDU.

1.22.2. Switched and monitored power distribution capability.

1.22.3. Compatibility with rack infrastructure and server power connections.

1.22.4. Total quantity: 4 units.

1.23. Complete power distribution modules, including all of the following:

1.23.1. PDM3540IEC309-800 power distribution module

1.23.2. 40A breaker with 800cm output cable

1.23.3. Compatibility with rack infrastructure and server power connections

1.23.4. Total quantity: 4 units

1.24. The vendor must provide/system must include complete Limited Warranty and Maintenance Services, including all of the following:

1.24.1. 1- to 3-year warranty for all equipment and software components in the system.

1.24.2. Full replacement coverage for defective parts for one to three years.

1.24.3. One-year Customer Ready Service (CRS) on-site support.

1.24.4. Maintenance to ensure systems remain fully operational throughout the warranty period.

1.24.5. Total quantity: 4 service units.

2. 1U Control Workstation

2.1. Complete 1U workstation system nodes, including all of the following components and capabilities:

2.1.1. CSE-815BTS-R000WNP 1U rackmount workstation chassis.

2.1.2. X14SBW-F motherboard supporting server-grade processors and memory configurations.

2.1.3. PWS-861A-1R redundant or high-efficiency power supply per manufacturer specifications.

2.1.4. Trade Agreements Act (TAA) compliance.

2.1.5. Management workstation functionality for NRL team operations.

2.1.6. Total quantity: 1 node.

2.2. Complete CPU processor module, including all of the following:

2.2.1. Model/Architecture: GNR-SP 6507P, dual processor capable (2P).

2.2.2. 8 cores, Hyper-Threaded (HT).

2.2.3. Clock speed: 3.5 GHz.

2.2.4. 48 MB cache.
2.2.5. Power consumption: 150W.
2.2.6. SGX512, TDX2048, Level 0 (L0) capabilities per manufacturer specifications.
2.2.7. Fully compatible with SYS-512B-WR or equivalent motherboard and platform.
2.2.8. Total quantity: 1 unit.

2.3. Complete NVMe PCIe SSD storage modules, including all of the following:
2.3.1. 2.5-inch form factor, NVMe PCIe 4.0 interface, 15mm height.
2.3.2. Capacity: 1.9 TB.
2.3.3. Enterprise-grade TLC NAND, non-SED.
2.3.4. Endurance: 1 Drive Write Per Day (1DWPD).
2.3.5. Fully compatible with SYS-512B-WR or equivalent and supported storage interfaces.
2.3.6. Total quantity: 2 units.

2.4. Complete PCIe network adapter units, including all of the following:
2.4.1. PCIe G3 x4 interface.
2.4.2. Network ports: 2 × 10GbE RJ45 (Intel X710-AT2 or equivalent.
2.4.3. High-performance network connectivity for workstation operations.
2.4.4. Fully compatible with SYS-512B-WR or equivalent and supported network infrastructure.
2.4.5. Total quantity: 1 unit.

2.5. Complete AC power cable sets, including all of the following:
2.5.1. IEC60320 C14 to C13 connector type.
2.5.2. Length: 3 feet, 14 AWG.
2.5.3. RoHS compliance.
2.5.4. Reliable power delivery to the workstation.
2.5.5. Fully compatible with SYS-512B-WR or equivalent and associated PDUs.
2.5.6. Total quantity: 2 cables.

2.6. Complete tool-less 3.5-to-2.5 NVMe drive tray sets, including all of the following:
2.6.1. Tool-less drive tray for 3.5-inch bays supporting 2.5-inch NVMe drives.
2.6.2. Black tray with orange tab design.
2.6.3. Secure mounting, proper airflow, and easy serviceability.
2.6.4. Fully compatible with SYS-512B-WR or equivalent and supported NVMe drives.
2.6.5. Total quantity: 2 units.

2.7. Complete MCIO cables (x8 to 2 x4, 35 cm), including all of the following:
2.7.1. MCIO cable converting x8 to 2 x4 connections.
2.7.2. Length: 35 cm, 30 AWG.
2.7.3. RoHS compliant.
2.7.4. Reliable data transfer for expansion cards or storage devices.
2.7.5. Fully compatible with SYS-512B-WR or equivalent and supported MCIO devices.
2.7.6. Total quantity: 1 unit.

2.8. Complete MCIO cables (x8 to 2 x4, 60 cm, 85Ω), including all of the following:

- **2.8.1.** MCIO cable converting x8 to 2 x4 connections.
- **2.8.2.** Length: 60 cm, impedance: 85Ω, RoHS compliant.
- **2.8.3.** Reliable high-speed data transfer for expansion or storage interfaces.
- **2.8.4.** Fully compatible with SYS-512B-WR or equivalent and supported MCIO devices.
- **2.8.5.** Total quantity: 1 unit.

2.9. Complete CPU socket carriers (LGA4710, E2/E2B), including all of the following:

- **2.9.1.** Socket E2/E2B carrier, LGA4710.
- **2.9.2.** Supports GNR-SP HCC/LCC & SRF-SP processors.
- **2.9.3.** DG1.0 design, high-frequency (HF) support.
- **2.9.4.** Fully compatible with SYS-512B-WR or equivalent and supported processors.
- **2.9.5.** Total quantity: 1 unit.

2.10. Complete counter-rotating fan, including all of the following:

- **2.10.1.** Dimensions: 40 × 40 × 56 mm.
- **2.10.2.** Speed: 23,300 to 20,300 RPM.
- **2.10.3.** RoHS / REA compliant.
- **2.10.4.** Fully compatible with SYS-512B-WR or equivalent cooling infrastructure.
- **2.10.5.** Total quantity: 1 unit.

2.11. Complete assembly services for the 1U workstation, including all of the following:

- **2.11.1.** Full assembly of the 1U workstation including CPU(s), memory, storage, power supplies, fans, cables, and all components required for operational readiness.
- **2.11.2.** Verify proper installation and system functionality per manufacturer specifications.
- **2.11.3.** Assembly performed in accordance with manufacturer guidelines, TAA compliance, and safety standards.
- **2.11.4.** Total quantity: 1 unit.

2.12. Complete rack integration cable sets, including all of the following:

- **2.12.1.** Provide connectivity for power, data, management, and peripheral interfaces for workstation integration into the rack.
- **2.12.2.** Ensure reliable electrical and data connections with minimal signal loss.
- **2.12.3.** Fully compatible with SYS-512B-WR or equivalent and associated rack equipment.
- **2.12.4.** Total quantity: 1 set.

2.13. Complete on-site next business day support services, including all of the following:

- **2.13.1.** Coverage for one to three years.
- **2.13.2.** Next-business-day on-site response following service request.
- **2.13.3.** Troubleshooting, repair, and replacement of defective components.

2.13.4. Coverage for all purchased server hardware.
2.13.5. Quantity: 1 system.

2.14. Complete limited warranty and maintenance services, including all of the following:

2.14.1. 1- to 3-year warranty for all equipment and software components in the system.
2.14.2. Full replacement coverage for defective parts for one to three years.
2.14.3. One-year Customer Ready Service (CRS) on-site support.
2.14.4. Maintenance to ensure systems remain fully operational throughout the warranty period.
2.14.5. Quantity: 4 service units.

2.15. Complete Ubuntu operating system installation services, including all of the following:

2.15.1. Canonical Ubuntu Linux operating system.
2.15.2. Installation and configuration of OS: Ubuntu 24.04 LTS (or newer) on each server system.
2.15.3. Verification confirming full operational readiness.
2.15.4. Quantity: 1 installation.

3. Final Acceptance

3.1. Final acceptance of the High-Performance GPU/CPU Server Systems and Control Workstation shall occur once the delivered systems satisfy the requirements of this specification are installed and tested and any identified deficiencies have been resolved.

4. Delivery Date

Delivery date will be six months after the award.