Department of Genetics
University of Delhi South Campus
New Delhi - 110021

Specification of High-Performance Computing (HPC) Cluster with proper setup

Ref. no. UDSC/Genetics/AD/HPC/F/2024-25 **Dated 12.03.2025**

Quotations are invited through GeM / CPP portal (e-procurement) under 2-bid system for High-performance computing (HPC) cluster with proper setup with FOR destination price to be quoted in INR for University of Delhi, South Campus. The quote should be inclusive of all taxes and duties for supplying and installation of the item as described below.

1. Master System Cum Storage Node – 1 Qty

Form Factor	Max. 2U (including all units) rack mounted with sliding rails
Configured CPUs	2 x **Intel Xeon Gold 6526Y processor (5th generation) with** 2.80 GHz each processor with 16 Cores (Total 32 Cores)
Performance Benchmark	1. Specrate2017_fp_base >460 2. Specrate2017_int_base >330 System OEM must have listed SPEC benchmark score as afore mentioned in www.spec.org with the same model or a model from the similar series, with same CPU configuration as quoted in the bid
NVMe Support	At least one or more drive /Slots must have native support for NVMe drives.
Memory configured	256GB DDR5 4800 MHz Registered ECC RAM installed from day one. Total 16Dimm Slots.
Disks Bays	At least 12 or more LFF SATA HDD/SSD Bays.
RAID Controller	RAID Controller SAS3 12Gbps with 1GB Cache and Supports RAID levels 0, 1 ,5,6,10
SSD & HDD	2 x 960GB or higher Ent. SATA SSD Drives installed in Raid 1 from day one 10 x 10TB SATA HDD (Total 100 TB) Enterprise Grade 7200 RPM (can be expandable in future with additional JBOD or other nodes)
I/O slots	4 x PCIe Gen 5.0 x16, 2 x PCIe Gen 5.0 x8 based slots
Interconnect	2 x 1G Lan Ports with thru onboard or add on Controller. 2 x 25G SFP28 Ports with Cables
Other ports	1 x 1G (IPMI) dedicated port, 1 x VGA, 2 x USB 3.0 Ports, 1 HDMI Port
OS Certification	System should be certified for Windows,RHEL Server Operating system. Certificate copy must be attached with bid documents.
Power Supply	N+1 or more 80 Plus 1200W Titanium rated redundant Power Supplies.
Industry Standard	1. ACPI Specification v 2.0 or above Compliant 2. PCIe Base Specification Rev. 4.0 or above Compliant 3. WOL Support 4. Microsoft® Logo certifications 5. PXE Support

Compliance	6. VGA/Display Port 7. USB Specification 2.7 or above Compliant 8. 80 Plus compliant 9. SMBIOS 2.7 or above 10. Redfish API 11. IPMI 2.0
	12. Advanced Encryption Standard (AES) 13. SNMP v3 14. DMTF Systems Management Architecture for Server Hardware Command Line Protocol (SMASH CLP) 15. Active Directory v1.0 or better
Embedded Remote Management	Integrated management controller should support: a. Monitoring fan, power supply, memory, CPU, RAID, NIC for failures. b. Silicon root of trust, authenticated BIOS, signed firmware updates c. Real-time power meter, temperature monitoring, Policy based administration and management of System Temperature and Cooling Sub-System d. The system management solution should support browser based graphical remote console along with Virtual Power button, remote boot using USB/CD/DVD Drive. It should be capable of offering upgrade of software and patches from a remote client using Media/image/folder; It should support server power capping and historical reporting and should have support for system authentication
Cooling Subsystem	Monitoring of cooling sub system of server through metering utility, with speed control, and PWM.
Power & temperature	Real-time power meter, graphing, thresholds, alerts & capping with historical log data. Temperature monitoring vide indicators
Installation	Installation, Testing, Training, and Implementation costs for all above mentioned solution must be included from day one. (Should be done by OEM Engineers)
System Management Utility	Dedicated IPMI Management Port with Activated Licenses. Out of band Management Capabilities, Stack with a full IPMI implementation, Hardware Health monitor, Remote power control Etc. Product datasheet/manual must confirm the compliance.
System Security	Secure Boot (Firmware and Bios Level Security), Hardware root of trust, Malicious Code Free Design (Certified by OEM), Network card secure firmware boot: 1. Cryptographically secure firmware 2. UEFI Secure Boot and Secure Start support 3. Secure Erase 4. Ability to rollback firmware 5. TPM 1.2/2.0 Secure Recovery – recover critical firmware to known good state
Warranty	Minimum 5 years comprehensive Part, Labor, Onsite service calls must be attended by OEM engineer directly.

2. Compute System – 4 Qty

Form Factor	Max. 2U (including all units) rack mounted with sliding rails
Configured CPUs	2 x **Intel Xeon Gold 6526Y processor (5th generation) with** 2.80 GHz each processor with 16 Cores (Total 32 Cores)
Performance Benchmark	3. Specrate2017_fp_base >460 4. Specrate2017_int_base >330 System OEM must have listed SPEC benchmark score as afore mentioned in www.spec.org with the same model or a model from the similar series, with same CPU configuration as quoted in the bid.
NVMe Support	At least one or more drive /Slots must have native support for NVMe drives.
Memory configured	256GB DDR5 3200MHz Registered ECC RAM installed from day one. Total 16Dimm Slots.
Disks Bays	At least 8 or more LFF SATA HDD/SSD Bays.
SSD & HDD	**1 x 1920 GB** or higher Ent. SATA SSD Drives installed in Raid 1 from day one.
I/O slots	4 x PCIe Gen 5.0 x16, 2 x PCIe Gen 5.0 x8 based slots
Interconnect	2 x 1G Lan Ports with thru onboard or add on Controller. 2 x 25G SFP28 Ports with Cables
Other ports	1 x 1G (IPMI) dedicated port, 1 x VGA, 2 x USB 3.0 Ports, 1 X HDMI Port
OS Certification	System should be certified for Windows, RHEL Server Operating system. Certificate copy must be attached with bid documents.
Power Supply	N+1 or more 80 Plus 1200W Titanium rated redundant Power Supplies.
Industry Standard Compliance	1. ACPI Specification v 2.0 or above Compliant 2. PCIe Base Specification Rev. 4.0 or above Compliant 3. WOL Support 4. Microsoft® Logo certifications 5. PXE Support 6. VGA/Display Port 7. USB Specification 2.7 or above Compliant 8. 80 Plus compliant 9. SMBIOS 2.7 or above 10. Redfish API 11. IPMI 2.0 12. Advanced Encryption Standard (AES) 13. SNMP v3 14. DMTF Systems Management Architecture for Server Hardware Command Line Protocol (SMASH CLP) 15. Active Directory v1.0 or better

Embedded Remote Management	Integrated management controller should support: a. Monitoring fan, power supply, memory, CPU, RAID, NIC for failures. b. Silicon root of trust, authenticated BIOS, signed firmware updates c. Real-time power meter, temperature monitoring, Policy based
	administration and management of System Temperature and Cooling Sub-System d. The system management solution should support browser based graphical remote console along with Virtual Power button, remote boot using USB/CD/DVD Drive. It should be capable of offering upgrade of software and patches from a remote client using Media/image/folder; It should support server power capping and historical reporting and should have support for system authentication
Cooling Subsystem	Monitoring of cooling sub system of server through metering utility, with speed control, and PWM.
Power & temperature	Real-time power meter, graphing, thresholds, alerts & capping with historical log data. Temperature monitoring vide indicators
Installation	Installation, Testing, Training, and Implementation costs for all above mentioned solution must be included from day one. (Should be done by OEM Engineers)
System Management Utility	Dedicated IPMI Management Port with Activated Licenses. Out of band Management Capabilities, Stack with a full IPMI implementation, Hardware Health monitor, Remote power control Etc. Product datasheet/manual must confirm the compliance.
System Security	Secure Boot (Firmware and Bios Level Security), Hardware root of trust, Malicious Code Free Design (Certified by OEM), Network card secure firmware boot: 1. Cryptographically secure firmware 2. UEFI Secure Boot and Secure Start support 3. Secure Erase 4. Ability to rollback firmware 5. TPM 1.2/2.0 6. Secure Recovery – recover critical firmware to known good state
Warranty	Minimum 5 years comprehensive Part, Labor, Onsite service calls must be attended by OEM engineer directly.

3 <u>Cooling , Rack, UPS and its monitoring/support/services</u>

(a) **Primary switch - Qty 1**

Specification	Description 25 G Switch
Primary Switch	➢ 25G Network Switch with minimum 48 Ports of 25G SFP28 and 8 x 100G QSFP, with support of MLAG or equivalent feature. ➢ Must support EVPN – VxLAN based network. ➢ Must have Redundant Power Supplies. ➢ The switch should be from the same make of GPU Nodes OEM for seamless integration. ➢ A license for support or third-party transceivers should be activated from day one. ➢ Form Factor of Switch is not more than 1U. ➢ Switch should be TEC and MII certified. Certificate copy must be submitted with

F. Rack Specification Qty – 1 (42 U)

1. General Requirements

➢ Rack to be soundproof with passive and active Noise Cancellation

➢ Racks should be self-Contained.

➢ Proper Air circulation with 2 No Active Noise Cancellation Fan Trays

➢ Rack should have 100% assured compatibility with all equipment's conforming to **DIN 41494** (General Industrial Standard for equipment's) or Equivalent **EIA /ISO / EN** Standard

➢ The Racks should be not more than 42U mm in height with 800X1200 for Network application

Physical Specifications

➢ The Rack unit supported by Casters & Levelers should support a static load of at least 1,250 kg, total installed equipment weight.

➢ The Vendor should have Front Double-Glazed soundproof Glass door and Back Metal sound proof door

- The Rack should have two side panels, top Cover, four vertical frame posts, four adjustable 19" verticals and grounding and bonding accessories pre-installed by the manufacturer.

2. Equipment Access & Installation

- The Rack should have 42U usable Space
- The Rack should have 4No's adjustable, 19" verticals with punched 10mm square hole and Universal 12.7mm-15.875mm-15.875mm alternating hole pattern offers greater mounting flexibility, with Numbered U positions
- The OEM should include Mounting hardware for equipment fixing
- The front and rear doors should be easily detachable
- The front and rear doors should be open to allow easy access
- The doors of the rack should be reversible such that they can be mounted on either side.
- The racks should have side panels which can be removed without using tools, using easy finger latches for fast access to cabling and equipment.

Side panels should flush with the frame, so the overall width of the unit does not change with the side panels installed.

3. Material Requirements

- All weight bearing components should be made from steel with a thickness not less than 2.0 mm,
  19" equipment mounting angle should be 2.5MM and other parts not less than 1mm
- All sheet metal parts should be Pre-Treated and powder coated meeting ASTM Standard.

4. Grounding Requirements

- All enclosure components, i.e. frame, and door should be bonded together and to rack ground point
- OEM to provide rack ground point, Provision to further ground to Telecom Ground bus bar System
- Grounding and bonding as per UL Standards
- Manufacturers should provide Horizontal OR vertical Ground bus bar for equipment

Grounding as per Customer / Tender Requirement

5. Certifications, Environmental and Safety Requirements

- Racks should be manufactured by **ISO9001:2015, ISO14001:2004 & OHSAS18001:2007** Certified company and should have proper EHS Policy.
- Manufacturers must certify that the products are **RoHS** Compliance
- The manufacturer must certify that the products are Comply DIN41494 and Equivalent EIA/ISO/EN /CEA Standard.
- The racks comply minimum of IP 50 rating for protection against dust ingress, ingress of foreign bodies and ingress of water.
- The enclosure should both protect the user from mechanical hazards and generally meet the requirements for a mechanical enclosure (stability, mechanical strength, aperture sizes, etc.) as defined in IEC 60950 Third Edition.

6. Ventilation and Thermal Management

- The Rack should have ventilated with active fan module 2 No 360 CFM each one for suction, other for Exhaust
- No ventilation on the front door & rear doors,
- The Rack should provide the means to mount optional cooling accessories for high- density.
- The manufacturer should provide blanking panel kit to prevent the Recirculation of hot exhaust air.
- The manufacturer should provide air seal kit to seal all gaps to prevent recirculation of hot air.
- The Manufacture should provide Brushed cable entry and exit cutouts to avoid cold air leakage

7. Rack Power Distribution Units

Type Of PDU	Normal
Phase	1Phase
Rating	7.3
Current	32
Type Of Outlet	C13 & C19
No Of Outlet	20 X C13 & 4 X C19
PDU Mounting	Vertical/TOP Feed
Space Requirement	0

8. Cable Management

42U 800 width Racks

- The manufacturer should supply 2 No finger type cable management with detachable door for management of Vertical Cables.
- 2 No Loop Closed Type Cable Organizer for management of Horizontal and power cables.
- 2 No 300mm Cable basket for management of Vertical Cables.

9. Accessories

- The manufacturer should offer various fixed and sliding shelves with the ability to support up to 100 kg of non-rack mount equipment.
- The Rack should be having provision for Rack Display Unit Programmable / Mechanical

10. Security

- Rack should be with swing handle locking with Common Key
- Provision for Intelligent Locking / Digital locking / number locking feature which has provision to support IP based for future integration.
- OEM should Ensure this without any modification on the Door.

11. Stabilization

- The manufacturer should have an optional stabilizer plate kit, consisting of a plate, and mounting hardware that can be attached to the enclosure frame, and that can be bolted to the floor.
- The unit should have four adjustable leveling feet to help provide a stable base in the event of an uneven floor surface and to prevent rolling.

12. Delivery & Installation

- The unit should be shipped fully assembled as one orderable Unit.
- The manufacturer should offer an inside-delivery shipping option, which includes reasonable delivery to the inside of the building and removal and disposal of shipping material and packaging.

13. Warranty and Support

- The Products manufactured should provide warranty for 5 years from date of invoice the warranty does not cover wrong Usage or miss-handing the products.
- Electrical items such as Sockets, switches, fans etc. should have warranty for 5 years from date of installation.
- For the malfunction of any units/item in the rack, support should be provided within the next business day.

Warranty claims will be attended with in 2 or 3 working days.

4. S/W Stack

i). WORKLOAD MANAGEMER with Below Features

S.No	Description
	Scheduler like SLURM & PBSpro features should include: Scheduler should have: tested scalability on 50,000 nodes. Policy driven scheduling by balancing job turnaround time High resiliency ensuring jobs are never lost and jobs continue to run despite failures Flexible plugin framework Health checks to monitors and automatically mitigates faults Should be installed and used on at-least one of Top 500 HPCs worldwide. Perpetual & floating license with commercial support for all nodes with warranty upgrade. Fully featured version with no limitation to no of jobs and scalability of nodes.
1	Fully featured version with support backed suite, with no limitation to no of jobs and scalability of Systems

2	Integrated advanced scheduling features including cross-system scheduling, peer to peer scheduling with advanced fair share & hierarchical fair share reservations, preemption, access control lists (ACLs), Role based access control and backfilling scheduling, multi-cluster scheduling, Meta-scheduling for job scheduling and management across distinct clusters (earlier supplied by clusters are also to be covered)
3	Power aware job scheduling to support auto shutdown and auto boot of Systems as per the workload to be supported.
4	Topology-aware scheduling (both inter- and intra-System) to ensure maximum application performance while minimizing cross-job network contention;
5	Preemption and checkpointing (suspend/checkpoint/requeue) allow users to immediately run high-priority work
6	Plugin framework for custom health checking, mitigation, and notification capabilities including off-lining flaky Systems, restarting scheduling cycles and requeuing jobs
7	The Management Suite must offer Web/CLI based Job submission, monitoring, management and 3D remote visualization capability with secure access control which can be integrated with LDAP.
9	The Cluster Management Suite must Web based tool for administration of HPC including real time monitoring, historical repository based on jobs, users, application etc.
10	Product Data sheet / Manual for the suite offered must be submitted with bid.

ii) Operating System	CentOS
iii) Cluster Management S/W	Unified system management, monitoring toolset for configuration, diagnosis and management of the system, Cluster manager with provisioning, monitoring and reporting capabilities Support Package and Image based provisioning Support Diskfull and diskless cluster deployment Intuitive web interface to manage and customize the cluster Customizing networks and compute System profiles through GUI Customizing compute Systems (upto changing kernel parameter) Able to Push configuration changes and updates to the compute Systems without reinstalling and rebooting. Product datasheet for the offered S/W suite must be submitted Note : Offered Stack must have been deployed by OEM / Bidder earlier as well as part of HPC Solution to govt organisations during last 3 years – documentary evidence must be provided

iv) Software Support for both Serial and Parallel Environment	YES

5.**Supply, Installation, In-house training and after installation support: -**

Before acceptance and installation of any item, the quality, specification and quantity will be verified by Delhi University.

- Installation of items part of this tender will have to carried out by the vendor. Any specific requirement of vendor regarding installation of above mentioned items must be mentioned in the technical bid so that, if it falls under scope of work of buyer, then Delhi University can provide the resources for the same.
- 2 day **in-house training** by Certified Professionals of OEM at Delhi University including installation of software, bench-marking HPL, monitoring of HPC Cluster for 24 Hours, LINUX commands , HPC Management etc. Scripts for the bench- marking calculations will provide on request.
- After installation support must be provided by HPC Linux Experts of bidder on onsite and remote assistance basis during the complete warranty period of 5 years. Bidder must have internal HPC experts team available for the same.

6.**Eligibility Criteria**

Mandatory requirements for a bidder to qualify as a participant in this tender:

- Bidder should be either an Original Equipment Manufacturer (OEM) or an OEM authorized System Integrator Partner having back-to-back support agreement with the OEM. Manufacturer's Authorization Form (MAF) for participating in this tender is mandatory for bidders and should be attached along with the bid.
- All warranty and support must be serviced directly by the OEM or should be provided by an Authorized System Integrator Partner who must have back-to-back support from the OEM.
- The Bidder/OEM should have valid ISO certifications.
- 2-3Days admin and user training on the cluster usage and administration must be provided.
- The bidder should provide 5 years onsite NBD support for the proposed open- source cluster software and day-to-day troubleshooting for system errors arising from the OS/cluster software/job schedular whether proprietary or open source.
- Local support- OEM must have their own registered Service and support center in North India. Details must be listed on OEM Website. And OEM must provide documentary evidence issued by Govt department.
- OEM and Bidder must not be put on a holiday period or banned or debarred by any govt organization for >3 months during last 5 years.

- Make in India System offered must comply with DIPPs notification no. P- 45021/2/2017-PP(BE-II) with revisions till date and compliance with P- 45021/102/2019-BE-II-Part (1) (E-50310) Office Memorandum issued by GoI. OEM Certificate should be submitted with bid.

General Instructions

1. Premium branded instrument should be provided to ensure the high quality and reliability of experimental outcomes.
2. Details on website & product literature justifying the technical specifications must be provided. The vendor must provide appropriate link/ website detail to verify the technical specifications mentioned in the provided product broacher.
3. The system should come along with 5 years comprehensive for all items warranty. Should be supported with remote services, cloud connectivity online monitoring, and external barcode using USB, etc.
4. The supplier should have service center in Delhi/NCR for quick service within 48 to 72 hours
5. Firm MUST provide a compliance statement vis-à-vis specifications in a "tabular form" clearly stating the compliance and giving justification, if any supported by technical literature with clear reference of page number, paragraph, or lines. This statement must be signed, with the company seal, by the Tendered for its authenticity and acceptance that any incorrect or ambiguous information found submitted will result in disqualification of the Tender.

Important information

1. The quotation should be addressed to the "Professor Amit Dutt, Department of Genetics, University of Delhi South Campus, New Delhi-110021". The quote should be submitted with all terms and conditions and necessary documents latest by end of tender date.
2. Quotations must be submitted in a two-bid-system. The first part, technical bid, should consist of all technical details and supporting documents with terms and conditions. The compliance sheet must be filled by the vender.
3. The second part, financial bid, should contain item-wise pricing of items mentioned in the technical bid. Both the quotation documents/ bids are to be submitted through GeM/CPP portal of the Government of India only (e-procurement). Hard copies of bid will not be accepted.
4. The successful bidder must provide a performance bank guarantee (PBG) as per rule 171 GFR 2017 totaling 3%of the value of the main machine quote with a validity of 60 days upon completion of the warranty period. The PBG should be in favor of **"The Director, University of Delhi South Campus, New Delhi-110021"**. PBG must be provided at the time of Installation to avoid delay in payment release.
5. The bidder will have to quote all items together. Partial quotes will not be accepted. For each item, the make, model and technical specifications and quantity must be mentioned clearly. Original brochure must be provided.

6. The purchase committee reserve the right to request the participating vender for demonstration of the all the quoted technical specification/ capabilities of the offered model preferably at University of Delhi South Campus, New Delhi-21, or within the Delhi state. The purchase committee reserves the right to disqualify a participating vender if they fail to demonstrate the quoted technical specification and/or capability of the offered equipment/ model.

7. The quote should be valid for 90 days from the last date of submission of bid.

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