Indian Institute of Technology Palakkad
भारतीय प्रौद्योगिकी संस्थान पालक्काड

Nurturing Minds For a Better World

IIT PALAKKAD

CORRIGENDUM - IV

Tender No. TENDER/2023-24/110
Date of Publication: 03-10-2023

Indian Institute of Technology Palakkad Invites Tender under Two-bid system for the:

SUPPLY, INSTALLATION,TESTING AND COMMISSIONING OF HIGH PERFORMANCE COMPUTING FACILITY

Sr. No.	Reference	Tender Description	Corrigendum
	Last Date/Time for submission of ONLINE Bids	25-10-2023, 15:00 hours	05-12-2023, 15:00 hours
	Opening of Technical Bids	25-10-2023, 15:15 hours	05-12-2023, 15:15 hours
Technical Specifications for Proposed HPC Cluster:			
	Items: Master Node: QTY 02 Number CPU only Compute Nodes: QTY 48 High Memory CPU only Compute Nodes: QTY 04 GPU Node with NVIDIA H100 GPU – QTY 04 number GPU Ready Node – QTY 04 number		
1.1.2 1.2.1 1.3.1 1.4.1 1.5.1	Processor	Specrate2017_fp_base >= 320 Specrate2017_int_base >= 330	Specrate2017_fp_base >= 480 Specrate2017_int_base >= 490
1.1.3 1.2.2 1.3.2 1.4.2 1.5.2	RAM	DDR4 with minimum 3200 MHz ECC Memory in balanced configuration	DDR5 with minimum 4200 MHz ECC Memory in balanced configuration
	Items: GPU Compute Nodes GPU Ready Node		
1.4.9 1.5.9	Power supply	Redundant and Hot Pluggable, 80 Plus Platinum or better certified power supply along with IEC 14 type Power cables	Redundant and Hot Pluggable, 80 Plus Platinum or better certified power supply along with IEC 14 type Power cables or suitable Power cables

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	Items: NAS Storage		
1.7	100TiB NAS based Backup Storage The Supplier shall supply the equipment/items within the period specified in the tender document i.e. within 40 WEEKS of signing the purchase order or within the period mutually agreed between IITPKD and supplier. All the equipment and accessories should be delivered at IIT Palakkad Nila Campus, Kanjikode West, Palakkad - 678623, Kerala.	100TiB usable capacity with RAID 6 (8+2) or equivalent with dual parity.	200TiB usable capacity with RAID 6 (8+2) or equivalent with dual parity.
	Supply & Installation Period (Nvidia H100 GPU Card)		GPU cards shall be supplied within the period specified in the tender document i.e. within 28 WEEKS of signing the purchase order or within the period mutually agreed between IITPKD and supplier.
3	Eligibility Criteria	The bidder must have successfully installed at least THREE HPC cluster systems (having combination of CPU Nodes, GPU nodes and Storage with nodes connected over Infiniband network) in last FIVE years in any State/Central Government Academic/R&D/CFTI institutions.	The bidder must have successfully installed at least THREE HPC cluster systems (having combination of CPU Nodes, GPU nodes and Storage with nodes connected over Infiniband network) in the last SEVEN years in any State/Central Government Academic/R&D/CFTI institutions.
	Page No. 5	The Supplier shall supply the equipment/items within the period specified in the tender document i.e. within 20 WEEKS of signing the purchase order or within the period mutually agreed between IITPKD and supplier. All the equipment and accessories should be delivered at	The Supplier shall supply the equipment/items within the period specified in the tender document i.e. within 28 WEEKS of signing the purchase order or within the period mutually agreed between IITPKD and supplier. All the equipment and accessories should be delivered at IIT

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		IIT Palakkad Nila Campus, Kanjikode West, Palakkad - 678623, Kerala.	Palakkad Nila Campus, Kanjikode West, Palakkad - 678623, Kerala.
	Page No. 5 (Point 9 (b))	The Supplier shall thereafter proceed with the installation, commissioning, integration and validation and demonstrate operational acceptance of the equipment/items within the period specified. The equipment/items shall be installed and commissioned by the successful bidder within 20 to 25 days from the date of its receipt.	The Supplier shall thereafter proceed with the installation, commissioning, integration and validation and demonstrate operational acceptance of the equipment/items within the period specified. The equipment/items shall be installed and commissioned by the successful bidder within 30 days from the date of its receipt.
	Annexure-I of Eligibility Criteria (Technical): Point 4	The peak compute power of each such HPC cluster must be at least 150TF.	The peak compute power of one of the three such HPC installations must be at least 150TF
	Annexure-I of RFP Technical Specifications for Proposed HPC Cluster- 1.7 100TiB NAS based Backup Storage	The system must be specifically designed to provide enterprise NAS functionality (No ad-hoc configuration using off-the-shelf components).	The system must be specifically designed to provide enterprise NAS functionality (No ad-hoc configuration using off-the-shelf components).
	1.7 backup	Storage system should support network backups via NDMP v4 or latest. Full and incremental backups should be supported. Two-way or above NDMP backup modes should be supported. Provide the Backup server with suitable configuration along with associated Backup software .Backup software and backup server are to be integrated with the proposed disk system. Backup software should be installed on all servers. Licenses for backup software should be provided. Separate 10Gbps Ethernet network has to be provided for backup.	Storage system should support network backups via NDMP v4 or latest. Full and incremental backups should be supported. Two-way or above NDMP backup modes should be supported. Provide the Backup server with suitable configuration along with associated Backup software.Backup software and backup server are to be integrated with the proposed disk system. Backup software should be installed on all servers. Licenses for backup software should be provided. Separate 10Gbps Ethernet network has to be provided for backup.

<table>
<tr><th>Sr. No</th><th>Reference</th><th></th><th></th></tr>
<tr><td>1</td><td>Scale and Density of Integrated Data Center</td><td colspan="2">Tender Description -- - For 40 KW IT load, 2 X 20 KW DX based closed loop cooling solution. (The units should working redundant mode or in extended capacity)
Corrigendum - Refer below table for estimated IT load per rack and estimated number of servers per rack.
<table>
<tr><th></th><th>CPU</th><th>CPU</th><th>GPU+ Storage</th></tr>
<tr><th></th><th>Rack -1</th><th>Rack-2</th><th>Rack -3</th></tr>
<tr><td>No of Servers</td><td></td><td></td><td></td></tr>
<tr><td>1U</td><td>27</td><td>27</td><td></td></tr>
<tr><td>2U</td><td>2</td><td></td><td>8</td></tr>
<tr><td>Power Rating of Each Server</td><td></td><td></td><td></td></tr>
<tr><td>1U</td><td>0.8</td><td>0.8</td><td></td></tr>
<tr><td>2U</td><td></td><td></td><td>2</td></tr>
<tr><td>Storage Power</td><td></td><td></td><td>6</td></tr>
<tr><td>Switches</td><td></td><td>0.2</td><td></td></tr>
<tr><td>Total Power Required</td><td>23.2</td><td>21.8</td><td>22</td></tr>
</table>

Estimated IT load with 5% miscellaneous load will be 70.35 KW + Room heat load. So total heat load estimated will be around 72 KW. 4 X 25 KW In row Unit - DX based with 3 nos. in row unit in working and one unit will be in standby mode. Above IT load is estimated, however bidder may optimize/rearrange the same to fit their proposed solution as per the tender requirement.</td></tr>
<tr><td>2</td><td>Main Electrical Panel and Cabling</td><td colspan="2">Tender Description - DB panel to be mounted in the Utility cabinet along with all internally integrated cabling. Adequate precaution and compliances to be taken care for sizing/ratings of cables and switchgear, DB inside the integrated DC rack solution. IIT Palakkad shall provide Main Raw Power and UPS power at data center room with appropriate size of dedicated earthing at site.
Corrigendum - - IIT Palakkad shall provide Main Raw Power and UPS power to each rack as well as to In row unit with appropriate size of dedicated earthing at site. Each rack will get 2 X 32 Amps 3 phase five wire input power from UPS and each inrow will get 32 Amps , 3 phase , five wire input from raw power, also 16 Amps single phase UPS power will be provided to the Fire alarm panel. Bidder to submit the size and type of cable required for each input. Cable termination activity will be carried out by IIT Palakkad in consultation with the OEM representative.</td></tr>
</table>

3	**Cooling System**	**Tender Description** - - Each Cooling unit should have capacity of 20 kW. The unit shall be configured to provide air flow/pattern to provide uniform airflow over the entire height of the rack. EC fan /variable speed should be used for maximum efficiency and minimum power cost. A variable capacity compressor /inverter compressor, which permits steeples adaptation of the output in partial-load operation. Cooling system should come with monitoring and control panel. Compressor must be electrically protected through the adequate protection devices. Total CFM (cubic feet per minute) of each unit should be adequate to maintain the rack temperature. Supply cooling temperature to be maintained at 22°C or lower with an accuracy of ±1°C at site ambient conditions of 40 Deg. C. All units should work in tandem operation in order to share the heat load equally. (The units should work in redundant mode or in extended capacity). **Corrigendum-** Cooling System - Each Cooling unit should have capacity of 25 kW. The unit shall be configured to provide air flow/pattern to provide uniform airflow over the entire height of the rack. EC fan /variable speed should be used for maximum efficiency and minimum power cost. A variable capacity compressor by using inverter to be used for steeples adaptation of the output in partial-load operation. Cooling system should come with remote monitoring system. Compressor must be electrically protected through the adequate protection devices. Total CMH (cubic meter per hour) of each in row unit should be minimum **5500 CMH** to maintain the rack temperature. Supply cooling temperature to be maintained at 22°C or lower with an accuracy of ±1°C at site ambient conditions as per ASHRAE n=20. All units should work in tandem operation in order to share the heat load equally. Heating and humidifier to maintain correct operating environment throughout the data centre needs to be considered. Relative humidity to be maintained in the data center will be as per ASHRAE TC9.9. In Row units suitable for operation on R410a/R407C refrigerant. n row units should consists of cabinet, inlet filter, EC fans, Inverter Scroll Compressor, Direct Expansion Cooling Coil, Heater banks to maintain humidity inside the space, condensate drain pan of stainless steel construction, Condensate pump, humidifier, Microprocessor panel, programmable control complete with LCD display. The Row based cooling unit should get coupled with IT racks and supply cold air very close to IT load and remove hot air closely from IT load. Unit's airflow should be horizontal and should provide uniform air distribution over the entire face of the coil. The In row-based solution improves energy efficiency and cooling ability. Direct Expansion (DX) In Row unit draws air directly from the hot aisle, allowing the unit to take advantage of higher heat transfer efficiency due to higher temperature differences. It can then discharge room-temperature air directly in front of the servers it is cooling. Placing the unit in the row enables the unit to operate at higher return and supply air temperatures, yielding 100% sensible capacity. In row unit should have both bottom as well as top entry of refrigerant pipes. The unit should be equipped with variable speed, electrically commutated (EC), to allow for varying heat load. Variable Speed Fans shall be variable speed capable of modulating from minimum 20% to 100%. Thermal Containment should be provided for best in class. In row Cooling unit should supply cold air in front of rack and suck hot from rear end of it from hot aisle. Thermal containment should be with manual doors and auto close type. These Doors should be of transparent type. Refer drawing provided. The units should work in redundant mode also. The system shall be provided with relevant water detection kit which shall have sensors with wire of minimum 1.5mtrs and each of the sensor must be capable to detect individually any water below the false floor near the unit, the sensor must be connected to the unit microprocessor thus enabling the controller to give an alarm in case of wet floor. OEM should have installed and commissioned such units in India in last three years of minimum 100 numbers. Bidder to submit the documentary evidence along with tender. Bidder to submit size of incoming cable of In row unit required.

		Bidder to refer below calculation of CFM ,CMH. This is for reference only. |	Rack -1	Rack-2	Rack -3	| |---|---|---|---|---| | Rack power | 26 | 24 | 24 | Kw | | Supply Temp | 22 | Deg C | 72 | Deg F | | Return temp | 37 | Deg C | 99 | Deg F | | Delta T | 27 | 27 | 27 | Deg F | | Cooling Capacity | 7 | 7 | 7 | Tonns | | Energy Required to remove the Heat | 87074 | 81820 | 82570 | BTU/Hr | | Air Flow required per Rack | 2986 | 2806 | 2832 | CFM | | Total IT Heat Load | Kw | 67 | | Kw | | Room heat Load | Kw | 5 | | Kw | | Total Room heat Load | Kw | 72 | | Kw | | Room Heat Load | KW | 5 | | KW | | CFM in Room Required for IT Load | CMF | 8624 | | CMF | | CFM in room required for Room Cooling | CMF | 548 | | CMF | | CFM - Room Cooling + IT Load | CMF | 9171 | | CMF | | Losses @ 5 % | CFM | 459 | | CFM | | Total CFM By All In Row | CFM | 9630 | | CFM | | No Of In Rows | Nos | 4 | | Nos | | Working In rows | Nos | 3 | | Nos | | Rating of Inrow- Cooling Capacity | Kw | 25 | | Kw | | CFM Per In row | CFM | 3210 | | CFM | | **CMH Per In Row** | **CMH** | **5457** | | **CMH** | Above calculations are for reference only. However, bidder may propose a better solution to achieve 100KW of cooling capacity considering scalability and redundancy.
4	**Out Door Unit**	**Tender Description** -Copper piping with insulation tube of elastomeric, nitrile foam between each sets of outdoor & indoor unit as per specification. Piping to be properly supported by MS clamp. All transmission wiring between indoor to outdoor unit is kept in PVC conduit. **Corrigendum--** Copper piping with an insulation tube of elastomeric, nitrile foam between each sets of outdoor & indoor unit as per specification/ OEM requirement. Piping to be properly supported by MS clamp and same to be installed on Cable Tray. All transmission wiring between indoor to outdoor unit is kept in MS conduit. Bidder to consider maximum distance between In row to ODU unit as 20 meters. .
5	**Integrated Fire Security & Suppression System**	**Tender Description** - Rack based active fire suppression system including detection system, smoke extraction and extinguisher unit. The extinguisher should be NOVEC 1230 based and the extinguishing process should begin automatically when the main fire alarm is triggered. **Corrigendum-** Fire security and suppression system is required .Fire alarm system UL listed and FM approved along with smoke detectors , cabling etc. is required The fire alarm system shall comply with requirements of NFPA 72 (National Fire Alarm and Signaling Code).. Fire suppression system with Fluro Ketone FK-5-1-12 is required along with gas release control panel, CCOE approved seamless cylinders, discharge valve , discharge pipe, check valve and all other accessories required to make a complete operation system meeting applicable requirements of NFPA 2011 standards and installed in compliance with all applicable requirements of the local codes and standards. Refer drawing as provided.

6	**Water leak detection**	**Tender Description**- Integrated Rack Level Water leak Detection System for each Rack. **Corrigendum** - No separate water leak detection system is required. This should be a standard feature in the In row system.
7	**'U' Usable Space**	**Tender Description**- Minimum 'U' space to be available to mount IT equipment's should be 84U for set of 2 Rack Integrated DC **Corrigendum** - IT equipment's needs to be accommodated in three racks.
8	**Racks & enclosures with PDU**	**Tender Description**- Best in class IT Rack with containment, High density with 42U as standard, complete with shelf, cable manager & blanking panels with PDU. Each Rack frame should be 42 U 19'' mounting type with minimum 2000 mm (Height) x 800 mm (Width) x 1800 mm (Depth). Rack design should be a sturdy frame section; corners stiffened with welded MS die cast. Rack to be provided with all basic accessories like, blanking panels, baying kit, sliding keyboard tray, vertical cable manager as well as horizontal cable manager, earthing copper strip with insulators, PDU 32 amp vertical mounting with IEC type socket with 12 nos. of IEC C13 Sockets & 4 nos IEC C19 Socket with 2.5 mtr power chord with 32A MCB. Each rack shall have a minimum of two such PDU's. **Corrigendum** - Best in class IT Rack with containment, High density with 42U as standard, complete with shelf, cable manager & blanking panels with rack mounted non metered PDU. Each Rack frame should be 42 U 19'' mounting type with 800 mm (Width) x 1200 mm (Depth). Rack design should be a sturdy frame section, corners stiffened with welded MS. Rack to be provided with all basic accessories like, blanking panels, baying kit, sliding keyboard tray, vertical cable manager as well as horizontal cable manager, earthing copper strip with insulators, Rack should have both front as well as back door perforated. Back side door should be double folded. Non Metered rack PDU should be three phase. five wire 32 amp vertical mounting with internal neutral conductor size should be equal to phase conductor, with IEC type male and female socket with 18 nos. of IEC C13 Sockets & 4 nos IEC C19 Socket with 3 meter five core Cu-power cord of rated capacity with 32A MCB in build in PDU at incomer. Bidder to submit the size of CU cable. Each rack shall have a minimum two such PDU's. If storage takes more depth, the bidder is free to increase the depth of the storage rack.
9	**New Clause**	Following work is not part of scope of this tender. Same will be carried out by IIT Palakkad 1. Raised flooring in the server area 2. Fire rated false ceiling in server area 3. Fire rated gypsum partition for server area and blocking the existing window by fire rated gypsum partition. 4. Internal and external illumination 5. Fire rated entry glass door. 6. Providing UPS power to each rack by using wall mounting DBs. 7. Providing Raw Power to each In row Unit by using wall mounting DBs. 8. Providing UPS power to Fire alarm panel as well as to Gas release panel. 9. Providing DG as well Electricity Board power. 10. Grounding of raised flooring, grounding of IT Racks, Grounding of In row Units. 11. Earthing system along with Earth pits

10	**Drawing**	Bidder to use below drawing just for reference purpose