INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
MATERIALS MANAGEMENT DIVISION
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(PR No. 1000032471) **(Rfx No. 6100001381)**

Technical Specification of High -Performance Computer Node

Tenders are invited for a High-Performance Compute cluster solution at the Department of Chemistry, Indian Institute Technology Bombay, Mumbai. The proposed designs should adhere to the specifications given below.

1. Computing Nodes (Quantity 8) – Regular Nodes

Processors	2X Intel Xeon Gold 6248R with at least 24 cores per CPU socket and 3.0 GHz clock frequency
Memory	**32 GB *12**, with 3200MT/s dual rank, 100% balanced memory configuration
HDD	2 x 960 **GB** SSD
Network	2 x port 100 GBs Omni path /InfiniBand adaptor supporting PCIe x16 interface with cable and one management port: 4 x 1G Ports for Cluster & Systems Management
Power supply	Redundant Power supply and redundant hot plug fans and appropriate number of properly configured power distribution units (PDUs)
Port	Minimum USB 3.1
OS	**Linux ROCKY OS**
Type	Rack-mountable (1U or better) enclosures with maximum of 12 kVA power input per rack
Warranty	5 years of warranty on all supplied hardware directly by OEM
Out of Band; Agent Free System Management & Security Suite	Integrated Remote Management Console at Server Level with Agentless Out of Band Management with upto 8000 Device Management, Plug-in for Management Consoles like Vcenter, SCOM & Ansible& Integrated Advanced Cyber Resilient Features like Dual Hardware Silicon Root of Trust, Drift Prevention, Lockdown & Secure Erasure (All Included License)

These eight computing nodes should be integrated with the existing cluster procured earlier and they should be seemeleselly communicate with the existing PFS that are connected with the Infiniband switch. Additional cables and interconnect switches, if required, should be included in the provided soultion. The details of existing PFS is given below

S.No.	Description
1.	Parallel File System
	Technical Specification
	Sever OEM/Bidder supported OEM supported GPFS or Lustre, GlusterFS or equivalent PFS with following specification :- 200 TB (usable in Hardware RAID 6 (8+2) configuration only) Parallel File System based storage with 5GBps sustained throughput with 1MB block size for the PFS. PFS should comprise of separate Metadata and Object storage servers (if required) with no single point of failure in HA to be configured to deliver 5GBPS read/write performance
	Metadata Storage: More than or equal to 1% of the Usable Storage space offered (using SSDs configured as RAID1 or Similar with one hot-spare or distributed metadata.
	RAID rebuild time should not be more than 24 Hrs for the quoted disks
	Usable Storage(OST) : >= 200TB usable with Hardware RAID6 (8+2) Only (using 4TB or higher, 7.2K RPM NLSAS HDDs.) Software RAID is unacceptable
	Configured as RAID6 volumes with 2% hot-spare disks of the proposed storage.
	Throughput : >= sustained 5GB/s read/write performance with 1MB block size
	Proposed storage solution (MDT and OST) should be scalable to double the proposed solution capacity by adding only disk enclosures and additional disks but no controller enclosures and Licenses.
	MDS nodes to be configured in Active-Passive and OSS Nodes to configured in Active-Active.
	Connectivity from OSS/MDS nodes to Storage should be on 12Gbps SAS/16Gbps FC Only in case quoted with external servers.
	The entire PFS solution must provide No Single Point of Failure (NSPOF) and capable of handling the loss of the following without interruption: -One Power Supply -One Fan - One SSD for MDT and Two HDDs forOST - One I/O ServerNodes The I/O server must have redundant paths to the storage.
	Monitoring and Management tool for Hardware and PFS.
	Bidder should submit open source IOR benchmarks with 1MB block size and file size double than total storage cache and I/O node memory.

	All storage components (IO servers/Controller/Disk Enclosures /PFS) must be from the same server OEM so as to ensure seamless integration and homogeneity of the overall HPC solution.

High speed Infiniband Interconnect Network:

All the compute nodes, master nodes, Login nodes, Backup Server and storage have to be connected using 100G Infiniband/OPA 100G network switch. This configuration of the interconnect is as below:

Appropriate length cables to be provided for complete solution.

Cluster Management Network:

All the compute nodes, master nodes and storage have to be connected 1Gig Ethernet switch for Cluster

Supported Cluster Manager and Job scheduler.

Cluster Management Software:	Proposed cluster management tool to be fully deployed by its OEM on-site.
	Proposed cluster management tool to be fully supported by its OEM on-site.
	Proposed cluster management tool should have web based graphical remote access interface.
	Should be compatible to work on RHEL 5.x / RHEL 6.x / CentOS 5.x/ CentOS 6.x/ Fedora
	Should be able to provision above operating systems to compute nodes. Should be able to auto-provision applications to compute nodes
	Should allow HPC management console to be accessible from any system in the network.
	Should support role-based access to the HPC system.
	Every role should be able to be remotely managed using the Graphic User Interface.
	Should provide profile-based and fully automated provisioning features.
	Proposed cluster management tool should have a graphic user interface.

	Should support Add/Modify/Delete compute nodes from GUI window.
	GUI (Web) based monitoring feature to be part of proposed solution.
	The licenses are required for entire existing compute nodes as well as the new ones to be procured through this tender.
	Should support major power management modules like bullpap, wti, apc_snmp, ether_wake, ipmilan, drac, ipmitool, ilo, rsa, lpar, bladecente as per the hardware proposed.
Job scheduler:	Bidder should propose a job scheduler which is fully supported by them. Job Scheduler proposed should only be OGE / Torque / Open PBS or Licensed and supported version of PBS Pro. No other scheduler to be proposed.
Libraries, MPI and Compilers	Bidder should propose GNU Compilers & Intel Cluster Studio single user floating license for one year.
	Bidder should implement Open MP and MPI network.
	Bidder should set up the Cluster for MPI Communication over IB/GigE
	Vendor specific InfiniBand stack on Linux OS, if available, should be supplied.
	Vendor specific MPI implementation on Linux OS should be supplied.
Jobs Submission Portal:	Bidder should propose for **ISV supported** GUI Based Job submission portal.
	Proposed GUI Based job submission portal should be in production mode with at least 3 organizations in India of which 2 have to be Govt/research organization. At least 1 location from the same to be in production mode for last 3 years.
	The licenses are required for entire existing compute nodes as well as the new ones to be procured through this tender.
	Proposed portal should be integrated with existing LDAP or NIS authentication.
	Proposed job submission Portal should be fully integrated with proposed Cluster management tool and Scheduler**.**

Installation terms and conditions:

Successful vendors/OEM needs to install the cluster in the existing data centre and with the rack space provided. Since Racks space for the nodes are in place, no additional racks are solicited.

Terms & Conditions:

1. Complete installation and commission of the HPC Cluster Computer system to be done by the bidder. The quotations should be submitted with clear Scope of Work.

2. Bidders should be Reputed OEMS or Authorized Partners. If Bidder is the Authorized Partner/SI; they should submit valid Manufacturer Authorization Letter in their quotation for this specific bid.

3. All hardware and software should be quoted with 3+2 years warranty (24 X 7 with 4-6 hrs telephonic response). Undertaking from OEM of 5 years comprehensive onsite warranty.

4. Details of the Power and Cooling requirements for the proposed systems should be submitted. Power socket details should be provided.

5. A detailed compliance sheet has to be submitted in accordance with the above specifications. Any deviations has to be highlighted and details to be mentioned.

6. The quotation should also consist of all the necessary datasheets and brochures.

7. Any deviations from the above points the bidder will be disqualified and their bids will not be considered.

8. The bid must include all details of technical specifications of the equipment along with commercial terms and conditions. The bill of materials, printed technical brochure and any other document which will help in the evaluation of bids. One OEM can give only one quote either directly or through an authorized partner or service provider.

Eligibility Criteria of Bidders

(i) Bidder should be OEM/Authorized Partner /service provider of the OEM and a Letter of Authorization from OEM on the same and specific to the tender should be enclosed.

(ii) The OEM/bidder should be ISO 9001 certified (Maintenance & System Integration). Please attach a copy of the certificate.

(iii) The bidder must have experience of executing similar orders of HPC with more than 10 cores in India. The bidder must enclose documentary evidence of supplying and integrating minimum of 3 orders of HPC cluster of their own or of an OEM with at least 10 cores within the last 5 financial years for any organization. Bidder should also have experience in GlusterFS file system in past.

(iv) An undertaking from the OEM is required stating that they would facilitate the bidder on a regular basis with technology/product updates and extend support for the warranty as well.

Warranty and support

a) The vendor should provide a complete turnkey solution.

b) The vendor shall be responsible for round-the-clock operation and comprehensive maintenance for five years from date of start of operation and shall provide an undertaking for the same at the time of submitting the tender.

c) All equipment's / components should carry an onsite replacement warranty of five years.

d) **As these nodes are upgrade** to the existing cluster, it is important for the party to visit the facility and check the available rack space, power and cooling in the data centre to provide an apt configuration.

e) The vendor should assume responsibility and maintenance of the entire cluster and not just the eight nodes procured.

f) The installation should be done by certified and trained engineers followed by comprehensive user training.

g) Vendor/OEM should be responsible for smooth function of the cluster including software installation and this includes but not limited to Gaussian (09/16), ORCA, MOLCAS, Cp2k, VASP, Siesta, Amber and Chemshell. It is the responsibility of the OEM/Vendor to ensure that these software run very smooth in parallel environment across the cluster.