

Dated: July 8, 2013

**Corrigendum: Changes are underlined>.

Sealed quotations are invited for a hybrid CPU-GPU high performance compute cluster to be built with rack mountable servers with infiniband connection. Your quotation should reach the address given, latest by 4pm on July 15, 2013.

Specification for the High Performance Computing Cluster

<p>A. Head Node (Quantity 1) Processor: 2x Intel Xeon Processor E5-2670 (2.60GHz/8-Core/20MB/8GT-s QPI/115W) Memory: 32GB DDR3 Reg. ECC 1600MHz upgradeable to at least 128GB memory Internal Storage: 3x 2TB SATA Enterprise class 7.2K rpm. Support for up to total 5 HDD bays. Raid Card: RAID Controller Card with support for RAID 0, 1, 5, 10 I/O Ports: 4x Gigabit Ethernet Port, 1x Single-Port QDR 40Gbps Infiniband Adapter 17" LCD Monitor, Keyboard, Mouse and DVD Writer Power Supply: Redundant Power Supply with 80% efficiency. Chassis: 2U or better Warranty: 3 years on-site comprehensive warranty</p>
<p>B. Compute Nodes Processor: 2x Intel Xeon Processor E5-2670 (2.60GHz/8-Core/20MB/8GT-s QPI/115W) Memory: 32GB DDR3 Reg. ECC 1600MHz upgradeable to at least 128GB memory Internal Storage: 500GB SATA Enterprise class 7.2K rpm or higher. I/O Ports: 2x Gigabit Ethernet Port, 1x Single-Port QDR 40Gbps Infiniband Adapter Power Supply: Power Supply with 80% efficiency. Chassis: 2U or better Warranty: 3 years on-site comprehensive warranty Quantity: Provide pricing for following options: 1, 2, or 4 nodes.</p>
<p>C. GPU Capable Compute Nodes Processor: 2x Intel Xeon Processor E5-2670 (2.60GHz/8-Core/20MB/8GT-s QPI/115W) Memory: 32GB DDR3 Reg. ECC 1600MHz upgradeable to at least 128GB memory Internal Storage: 500GB SATA Enterprise class 7.2K rpm or higher I/O Ports: 2x Gigabit Ethernet Port, 1x Single-Port QDR 40Gbps Infiniband Adapter 2x NVIDIA Tesla K20 GPU cards pre-installed by OEM Power Supply: Redundant Power Supply <u>Chassis: 4U or better</u> Warranty: 3 years on-site comprehensive warranty Quantity: Provide pricing for following options: 1 or 2 nodes.</p>

D. Primary Interconnect: QDR Infiniband Switch

18-Port QDR 40Gbps Infiniband Switch with 100% non-blocking architecture and with connecting cables for all nodes.

HCA and Infiniband switch should be from the same OEM.

Warranty: 3 years on-site comprehensive warranty

E. Secondary Interconnect: Gigabit Ethernet Switch

16-port Gigabit Ethernet Switch with required number of cables for all nodes.

Warranty: 3 years on-site comprehensive warranty

F. Server Rack:

42U Server Rack (19'') with all required PDUs and accessories

HPC Software:

All open source: 64-bit Linux Operating System, Cluster Management Software, monitoring tool, compilers, libraries, and scheduler.

Price for each individual item A-F should be quoted separately. Bidder can quote a configuration over and above the minimum requirements mentioned above. The supplied hardware should have 3 years on-site comprehensive warranty including upgrades of BIOS, firmware, patches etc.

Scope of work:

Installation and integration of all supplied hardware and software shall be done by the bidder. The bidder shall install and configure all required hardware and software suites, including but not limited to racking and stacking, cluster networking, configuring all nodes, execution and submission of jobs, installation of compilers and applications, configuration of environment variables and license utility configuration, and a work load management solution (scheduler) with following features:

- i. Pre-emptive scheduling
- ii. Q management
- iii. Job monitoring and management
- iv. Job submission plug-ins
- v. Peer to peer scheduling
- vi. GPU/MIC enabled scheduling
- vii. Should have web-based (command line or GUI) job submission for users
- viii. Should have simple mechanism for adding/editing/deleting new/old applications
- ix. Role based login should be given (e.g. Administrator and user level)

The operating system should be a 64-bit open source Linux (e.g., Scientific Linux or CentOS). All nodes must have a full installation of the operating system. Bidder must supply C, C++, F77 and F90 compilers required for 64bit Linux/Unix. Any additional softwares and libraries installed on the master node must also be available on all nodes. Both the scratch space and the storage space must be available from all nodes. Further following tasks must be completed:

- i. Implementation of GNU and Intel compilers and MVAPICH2 and OpenMPI with IB.
- ii. Installation and configuration of batch queuing software like open PBS or similar.
- iii. Installation and configuration of GROMACS® and VMD® in parallel mode using IB interconnects. After installation, benchmarks with GROMACS® must be provided - with inter-node and intra-node scaling details. The software will be provided by the institute.

- iv. A minimum of 01 day admin and user training on the cluster usage and administration must be provided by the bidder. Charges, if any, should be mentioned in the financial bid.

Terms and Conditions:

1. OEM of the HPC servers quoted by the bidder should have been featured in at least 3 HPC clusters listed in the recent Top500 list (www.top500.org).
2. The bidders who can set up and manage the high performance compute cluster (as described in scope of work) are eligible to quote. **Experience required:**
 - a. The bidder must have experience of setting and managing of at least one high performance hybrid CPU-GPU compute cluster using infiniband interconnectivity and web-based cluster management utility with features mentioned above in last 12 months (or 2 in last 24 months). The details of such (place, system description) should be provided with the technical bid.
 - b. The bidder must have experience in installing and configuring at least one molecular dynamics simulation software (GROMACS, AMBER, or LAMMPS) in parallel on a hybrid CPU-GPU multi-node cluster in last 12 months (or 2 in last 24 months). The details of such (place, system description, benchmarking results) should be provided with the technical bid. The bidder should also provide contact details of the team member(s) providing this support service.
3. The quoted configuration for HPC should reproduce computational chemistry benchmark results on nanoseconds/day within 10% of those reported on <http://www.nvidia.com/object/gpu-test-drive.html#s=gromacs>.
4. Installation and full cluster commissioning with above-mentioned requirements is the responsibility of the bidder. The bidder should supply any additional items needed for the same.
5. The bid must include details of total power and cooling requirements for the offered solution.
6. The technical and commercial bids must be submitted in separate sealed envelopes subscribed with "Technical Bid" or "Commercial Bid" as appropriate. Both the technical and the commercial bids should be enclosed in an envelope titled "Quotation for hybrid CPU-GPU cluster for Chemical Engineering Department" and should be submitted to the undersigned. A compliance chart should be attached along with technical bid. Quotations must be valid for at least three months from the date of NIQ.

Technical Compliance Sheet: Clear and detailed information on how the technical conditions specified above have been complied with must be given in the technical portion of the bid via a technical compliance sheet. It is insufficient to just mention "Complied" against the above specifications. The technical sheet should contain details of the precise OEM, model no. of the workstation, etc.
7. IIT Delhi is exempted from paying **custom duty** under notification No.51/96 (partially or fully) and necessary "Custom Duty Exemption Certificate" can be issued after providing following information.
 - a. Shipping details i.e. Master Airway Bill No. and House Airway No. (if exists).
 - b. Forwarder details i.e. Name, Contact No., etc.Custom Duty Exemption Certificate will be issued to the shipment in the name of the Institute and Bills of Entry should be submitted to IIT Delhi later on.
8. IIT Delhi is exempted from paying **Excise Duty** and necessary Excise Duty Exemption Certificate will be provided for which following information is required.
 - a. Quotation with details of Basic Price, Rate & Amount on which ED is applicable.

9. Either the Indian agent on behalf of the Principal/OEM or Principal/OEM itself can bid but both cannot bid simultaneously for the same item/product in the same tender. If an agent submits bid on behalf of the Principal/OEM, the same agent shall not submit a bid on behalf of another Principal/OEM in the same tender for the same item/product.
10. If the bidder is an authorized dealer of any manufacturer, the authorized Indian dealership certificate from the principles should be enclosed. Similarly, proprietary certificate for proprietary items should be provided.
11. Please quote prices of imported items at **FOB (Freight on Board) IIT Delhi** inclusive of all taxes, freight, delivery, installation and onsite training charges. The quotation should provide the total price of the system including all taxes and transportation charges.
12. **Payment** will be via Letter of Credit. 90% payment against shipping documents & balance 10% after satisfactory installation.
13. **Delivery & Installation** period: within 8 weeks from the issue of supply order.
14. A special discount/rebate wherever admissible keeping in view that supplies are being made for educational purpose in respect of public institution of national importance may please be indicated.
15. **Rejection:**
 - a. Quotations not conforming to the set procedure as above will be rejected.
 - b. Incomplete and conditional submitted tenders would be summarily rejected.
 - c. IIT Delhi reserves the rights of acceptance or rejection of any or all quotations without assigning any reason thereof.

The quotation should reach the undersigned latest by 4.00 pm on July 15, 2013.

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