Satyendra Nath Bose National Centre for Basic Sciences
Sector-III, Block – JD
Salt Lake, Kolkata – 700098

SNB/TRC/15-16/*041*   20/02/2016

Proposals are invited from prospective vendors to discuss the technical specification [Expression of Interest (EOI)] of a High Performance Computing Cluster to be set up at S. N. Bose National Centre for Basic Sciences, JD Block, Sector III, Salt Lake, Kolkata -700098 for the project "Technical Research Centre" funded by Department of Science and Technology, Government of India.

The participating vendors in the EOI meeting are expected to provide benchmarking and scaling (for details see the technical specifications) on a machine whose teraflop rating should be at least 70% of the final configuration to be supplied.

Technical Specifications:

1.	System Architecture	Tightly integrated cluster with QDR/FDR Infiniband or Torus/Tree or Gemini interconnect. Both blade and rack based architectures are acceptable. There should be provision to use few nodes of the machine for running serial jobs and/or for high throughput visualization.
2.	Compute Power	A base system in the range of 50 TFLOPS of sustained compute power on HPL (turbo off). Vendor should provide an indicative budget of the proposed solution. The incremental cost along with all necessary hardware, licenses and software components with technical details for enhancing the system in a step of size 5 TFLOPS sustained HPL should be provided.
3.	Processor	Intel or AMD minimum speed of 2.5.
4.	Interconnect Topology	QDR/FDR Infiniband or 5D-Torus or Gemini interconnect or equivalent
5.	Operating System	64-bit Linux server version with support.
6.	Compute Nodes	The compute nodes should be either blade based with blade enclosure or chassis based with chassis enclosure designed for HPC solution. Node should be hot pluggable with RAS features.
7.	Memory	At least 2 GB per core DDR3/DDR4 at 1333 MHz or better. Option may be provided for a few fat nodes with at least 4 GB per core DDR3 at 1333 MHz or better.

8.	Application Benchmarking	The vendors should run the following application benchmarks:
		    1. VASP 2. NAMD 3. LAMMPS
		
		    And such similar softwares (like Quantum Expresso). Benchmarking should be carried out based on the input obtained on a system of size at least 70% (seventy percent) of the base system proposed including the processor and memory specification. This defines the "Benchmark System".
		The vendor should provide benchmark output as described in the benchmarking instruction given below:
		Benchmarking should have at least 4 data points.
		Benchmarking should also provide the heating and power rating, plotted as function of TFLOPS.

9.	High Performance Linpack (HPL) Benchmarking	The vendor should report the best HPL performance and efficiency on the base system proposed with turbo mode off.
10.	Compilers	PGI or Intel or XL compiler consisting of C, C++ and FORTRAN 77, FORTRAN 90, and FORTRAN 95 with at least 10 user floating license for each.
11.	Software tools	Software tools namely MPI OpenMP, SHMEM and other libraries/development kit required to run jobs should be quoted with minimum of 10 user licenses, wherever applicable.
12.	Management software	Management software stack consisting of cluster management/ system management etc should be quoted. All software must be supported by OEM/ISV.
13.	Job/Workload Management tool	The solution must include job scheduler as a separate line item with appropriate no of tokens/licenses for the entire system.

Login Nodes (2 units dedicated)

14.	Configuration	2 dedicated units .
15.	Other Nodes (Managing, head, monitoring)	Vendor must design and quote appropriate number of nodes to integrate the cluster solution to meet their proposed design of HPC system.

Storage and Backup:

16.	Storage and Backup	Storage sub-system with active-active at least one controller hardware RAID array. Minimum of usable 50 TB capacity of storage in RAID 5 layout. Native IB attached storage (FDR preferred / QDR acceptable). For Gemini or Torus it is not applicable. Separate data and metadata storage. Redundant power supplies and fans. No single point of failure in entire storage solution. There should be a provision for backup.

17.	RAID Support	1, 4, 5, 6
18.	Individual Disk	3 TB or higher capacity enterprise class SATA at 7200 RPM or better
19.	Parallel Filesystem	Luster 1.8.6 or newer based Parallel file system, or General parallel file system.
20.	IO Nodes	As necessary.

Warranty and Support, Site and Power Requirements:

Warranty	5 years of comprehensive on-site warranty.
Training	Two weeks of on site training on system administration, storage management and usage of the HPC server must be provided to SNBNCBS team.
Site requirements	Detailed site preparation document should be given. Details of power consumption, heat dissipation and cooling requirements should be specified. Space requirement should be specified. Details of noise generation by the system should be given.
Power rating and Heat dissipation	The power rating of the compute machine is expected to be less than 120 kW approximately with around 200 kBTU/hr cooling requirement.

Additional Softwares:

Apart from what is mentioned under no. 11, installation and porting of softwares and libraries such as VASP, CHARMM, GAUSSIAN, LAMMPS, GROMACS, OCTOPUS, CPMD, ABINIT, QUANTUM EXPRESSO, BLAS, LAPACK, ScaLAPACK, FFTW is required

Vendor Eligibility:

The participating vendors must be OEMs or OEM supported single vendors only with original authorization certificates from the OEMs. The service provider should be OEM. Vendors should have proven experience in setting up a minimum of three HPCC with at

least one at 20 TFLOPS (peak) in India and at two others at 100 TFLOPS (peak) elsewhere. A brief proof for such experience (copies of orders/installation certificate) should be provided during the meeting. The technical committee's decision regarding the suitability of the technical specification will be judged on the basis of benchmarking, power efficiency, heat generation etc.

The EoI meeting will take place at the Centre on 4th March, 2016 at 11:00 AM. The vendors are expected to make a short presentation of 10-15 minutes in addition to submitting the hard copy of the proposed solution.

REGISTRAR