INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH

PUNE

CLARIFICATION ON TENDER NUMBER - IISER-PUR-1363-13

ITEM DESCRIPTION- PROCUREMENT OF 25 & 30 TF HIGH PERFORMANCE CLUSTER AND 150 & 200 TB SAN STORAGE SOLUTION

Please refer our Press Tender Notice No.IISER/S&P/16/13 dated 3.2.2014 for procurement of 25 & 30 TF High Performance Cluster and 150 & 200 TB San Storage Solution . Tender Reference Number – IISER-PUR-1363-13.

Pre-Bid meeting was held on February 10, 2014 at 2.00 pm and minutes of meeting is as under.

At the outset, the Chairman welcomed all the Members and the representative of the Prospective Bidders and briefed in general the scope of the Project and thereafter requested Assistant Registrar (S&P) to brief the vendors on the salient features of the commercial terms and the indenting Officer to read out the clarification sought by the Prospective Bidders and replied thereto as detailed in Annexure –II and Annexure – III. We have attached a revised price schedule as Annexure – IV and Chapter – 4 , Technical Specification as Annexure – V.

The representatives present were satisfied with the replies given and it was informed that the corrections / additons / clarifications given, as discussed during the Pre-Bid Conference would be hosted on the website of IISER Pune and all the Prospective Bidders are required to take cognizance of the proceedings of the Pre-Bid Conference before submitting their bids as stipulated in the Bidding Documents.

The other terms & conditions of the notice issued on our IISER website www.iiserpune.ac .in will remain unchanged.No more correspondence in this regard will be entertained

The meeting ended with vote of thanks to the Chair.

Sd/-
Assistant Registrar (S&P)

10.2.2014

IISER PUNE

PRE-BID CONFERENCE FOR PROCUREMENT OF 30 TF HIGH PERFORMANCE CLUSTER AND 200 TB SAN STORAGE SOLUTION

TECHNICAL QUERIES AND CLARIFICATION

TENDER NUMBER - IISER-PUR-1363-13   DATE : 10.02.14

S.No	Query/Clarification Sought	Clarification / Amendment
1	**Page 26** We appreciate if IISER can confirm on 10G switch configuration. From write-up we understand IISER is looking for 1G switch only and should have 4*10G ports to get connection from Management nodes. We would appreciate if IISER can help remove 10G switch here	This is now amended, please refer to figure 1. The configuration now shows a 1 GE switch in addition to the IB switch. Only head nodes (to connect with one another) have 10G ports and not the compute nodes.
2	Page 27 0.7TFlops leads to 2U systems in configuration while typically in HPC we have 1/2 U systems available to save power & space. We request IISER to change the config and allow 0.3Flops or more (using any of the 3 different processor allowed).	This is now amended. The peak performance requirements are now 0.35 TF or better for head and compute nodes

3	Page 29 Compilers: We appreciate if IISER can confirm compiler from Open-source are allowed or we have to quote only Intel based.	Bidders are to propose open source or commercially available compilers and ensure that the same are supported. If quoting only open source compiler, bidders should also quote the prices of having intel and/or other commercial compilers as an optional extra.
4	Page 3 Benchmarking: we request you please change benchmark of HPCC to HPL due to time constrain and system availability.	The benchmarks have been amended. See Chapter 4 (sub section Benchmarks) for details
5	Page 28 Interconnect: We appreciate if IISER can consider of having FDR switch instead of QDR due to older technology.	The clause is amended to read: 4x QDR/FDR10 or better Infini band Switch with 100% non-blocking architecture (or 50% blocking architecture with FDR) with adequate ports to connect all compute nodes, master nodes and SAN storage (part 2 of tender) with ability to expand.
6	Software like OS & PFS, do we need to offer license software or open source are acceptable	For OS and PFS, IISER has a preference for open source solutions. Bidders are welcome to propose commercial options. Pricing for such solutions, should be for 3 years or more and included in bid.
7	4x QDR Infini band Switch with 100% non-blocking architecture with 50 ports with ability to expand. pls elaborate	The requirement is now amended to 4x QDR/FDR10 or better Infini band Switch with 100% non-blocking architecture (or 50% non-blocking architecture with FDR) with adequate ports to connect all compute nodes, master nodes and SAN storage (part 2 of tender) with ability to expand. The bidder is required to give an undertaking that the OEM would support the IB switch/configuration for five years from the time of installation.

8	Cluster Software: Like OS, Management, Schedular, Compilers All these need to offer commercial or open source are acceptable	For OS, management and scheduler IISER has a preference for open source options that are supported by the bidder. Bidder has to give undertaking for support of these options and related costs for 3 years have to be included in the bid. The clause related to the compilers has now been amended to – C, C++, Fortran90, 95, 2003 with 5 users perpetual if commercial licenses are quoted. Bidders are to propose open source or commercially available compilers and ensure that the same are supported. If quoting only open source compiler, bidders should also quote the prices of having intel and/or other commercial compilers and intel cluster tools kit as optional extras.
9	For Intel CPU solution, can we offer open source compilers or only commercial license compilers from Intel	Bidders are to propose open source or commercially available compilers and ensure that the same are supported. If quoting only open source compiler, bidders should also quote the prices of having intel and/or other commercial compilers as an optional extra.
10	iSCSI is not needed. Can IISER please remove it ? HPC storage will be connected to cluster over Infiniband and Ethernet and will be accessed by PFS or NFS protocol.	Please see the paragraph below figure 2 in Chapter 4.
11	We request IISER to clearly define connectivity. Does IISER mean to say I/O nodes with "2 ports of each 1Gbps, 10Gbps and IB network with a separate port for management" ? Typical PFS storage systems have I/O Nodes, storage controllers and disk shelves. I/O node can have IB or Ethernet connectivity to cluster and FC/SAS/IB connectivity to storage controllers.	In the SAN storage solution the head/controller nodes are to be connected to one another using (HA cluster fail over/fail back) using 1Gbps and 10Gbps connections.
12	We request IISER to remove iSCSI connectivity requirement HPC storage systems does not require iSCSI connectivity.	Storage requirements are not exclusively for the HPC, but will serve the needs of the entire Biology Department. Therefore iSCSI is required

13	Please remove "Snapshot and snap mirror ability".	This requirement is now removed and the clause has been modified appropriately.
14	IISER has mentioned "Our preference would be for Open Source solutions". Can IISER clarify how they expect such open-source solutions to be supported? Does IISER need commercial support with back-to-back support agreement with PFS development organization?	IISER expects that all opensource solutions are supported by the bidder and/or the OEM. The undertaking for such support should be provided by the bidder. Any and all costs relating to the support should be included in the bid. The tender clauses have been suitably modified to reflect this.
15	Can IISER please provide capacity distribution for NFS, PFS and Archive for 200TB and 600TB? We recommend following distribution: □ Scratch Space - 100TB usable capacity on Parallel Filesystem with 10K RPM SAS disks in RAID6 layout □ Home Directories - 50TB usable capacity on NFS filesystem with 3TB or higher capacity 7.2K RPM SATA disks in RAID6 layout □ Archive Space - 50TB usable capacity on NFS filesystem with 3TB or higher capacity 7.2K RPM SATA disks in RAID6 layout	IISER has now asked for pricing for 150TB usable disc space and 200TB usable disc space for the SAN storage solutions. For 150 (and 200) TB solutions IISER would want the following partitions - 25 TB (30 TB) 10K RPM or better SAS drives and the rest 125 TB (170TB) in 7.2K RPM or better SATA drives. IISER requires a solution where it could flexibly assign/create and dedicate variable quantities of disk space to PFS, NFS and archive. These needs are perceived to change over time.
16	Can IISER please clarify how many spare disks are required?	3 spare disks per disk type. See Chapter 4, part2, point 8 in table – section on RAID levels.
17	4 GB/s performance requirement for 200TB storage is too small, especially considering that this storage will be accessed over 100% non-blocking QDR Infiniband network. A single client to server QDR IB link is capable of 6 GB/s bi-directional throughput. Which means, a single compute node has capability to consume entire storage bandwidth of 4 GB/s. We request IISER to specify minimum 8 GB/s WRITE bandwidth for PFS capacity.	The 4GB/s performance requirement remains. Please refer to the newly added brief explanation of storage system requirements. Also refer to the amendments in the WRITE capacity in the storage benchmarks in clause 9 in the table relating to SAN storage.
18	IISER has clearly mentioned "OEM certified Linux based Operating System" for Linux cluster. Can you please explain what Windows nodes are you going to connect to PFS storage which requires file locking between UNIX and Windows users?	Storage requirements are not exclusively for the HPC, but will serve the needs of the entire Biology Department. (Chapter 4. Part 2 Storage)
19	Can IISER please clarify if 50TB increment pricing is to be provided above 200TB capacity?	Amended to: The expected size of storage is 200TB (pricing for 150TB should also be quoted) with an ability to expand to 2.5 Peta Bytes (PB) or greater for further needs.

20	We support compression only on tape based archival. Can IISER please remove compression feature request?	The compression feature remains and pertains to on disc compression.
21	Can IISER please clarify if 50TB increment pricing is to be provided above 200TB capacity?	Please refer to the amendment in the tender that now specifies that bidders should quote prices for 150TB and 200TB usable capacity storage solutions. Chapter 4 Part 2 Storage
22	OEM should have atleast 8 Installation in top500.org	The clause in the tender remains unchanged. 5 entries in the top500 list consistently for the last 3 years (5 out of 6 entries would also be considered)
23	Submitting benchmark on multiple option i.e. 2TF, 5TF,10TF plus also on 20TF and 30TF will be very time consuming activity considering activity listed in RFP and difficulty in getting allocation of the 30TF benchmark System. Request IISER to ask benchmrk on 2TF and 5TF as mandatory and balance as option. Requesting IISER to clarify names of all the 7 test required under HPC Challenge Benchmark.	This clause is amended to The bidder should carry out below listed benchmark programs on 5TF and 10TF configurations of the offered solution and submit the results achieved (with TFLOP count where applicable) in an output file, in the technical bid. 1. HPCC Benchmark:. (http://icl.cs.utk.edu/hpcc/) do only HPL 2. BioPerf code. (http://www.bioperf.org/) 3. Cbench: stress testing and analyzing cluster (http://sourceforge.net/apps/trac/cbench). 4. GROMACS (see GROMACS benchmark schedule below) See Chapter 4, Part 1: section on Benchmarks
24	OEM should also have atleast 10 years of network storage solution experience in India	Tender terms and conditions remain unchanged
25	Please confirm if bidders have to submit any documentary proof to the storage benchmark clause here which we believe is part of storage acceptance clause	IOZ one and IOR benchmark results have to be shown. See Chapter 4 Part 2 Section on Benchmarking for details
26	The system must be supported by a Service Centre manned by the principal vendor's technical support engineers. The support through this Centre must be available 24 hours in a day, seven days a week and 365 days a year. Also it should be possible to contact the Principals vendor support Centre on a toll free number/web/mail." Please mention the period of maintaining such a center.	3 years.

27	Using 2600 series CPU this clause cannot be met even we use the maximum speed in 12 core CPU	This is now amended. The peak performance requirements are now 0.35 TF or better for head and compute nodes
28	Is the choice of network optional to the bidders or both needs to be quoted. The RFP has contradictory references to QDR and Gig networks	This is now amended, please refer to figure 1. The configuration now shows a 1 GE switch in addition to the IB switch. Only head/management nodes have 10G ports and not the compute nodes.
29	HA should be part of the high performance cluster suite for auto failover with no human intervention. In the event of primary master node failure the secondary master node should seamlessly take over. We propose Storage nodes functionality not to be clubbed with Master Node as it is not the best practice in HPC. Any of the Master node failure will affect the Storage performance directly. If 2 nodes are just used as Master node in HA then one node failure does not afffect the cluster performance.	We believe that this is a confusion arising from considering the SAN storage as part and parcel of the HPC. This is not the case. Please refer to the newly added explanation of the SAN storage requirement in Chapter 4 of the tender.
30	Is IISER wanting bidders to provide only open source compilers as RFP has a mention of Intel Compilers/OEM supplied compilers or Open source compilers. Want to caution that performance csnnot be guaranteed with open source compilers. Pls clarify what needs to be proposed in response to RFP	Bidders are to propose open source or commercially available compilers and ensure that the same are supported. If quoting only open source compiler, bidders should also quote the prices of having intel and/or other commercial compilers as an optional extra.
31	Is there any specific linux that IISER is looking for? IBM recomends RHEL commercial OS for better performance and stability.	IISER does not have a preference for any specific Linux. Bidders are free to propose supported open source or commercial OS
32	It is strongly recomended to go for commercial software for such a large and critical infrastructure for the following reasons: 1. performance accountabiliy 2. Proven expert integrated HPC suite 3. Application integration template. 4. energy efficient green computing enabled software. 5. Expert support in case of crises. Open source software if implemented then in crises support cannot be guaranted by any OEM nor SI.	Tender terms and conditions remain unchanged

33	Commerical software provides better performance and compatibility commitments compared to the open source softwares. IBM does not take any responsibility for any open source based system performance and application intgration. With open source software there is no guarantee to problem resolution. Cluster size ask in RFP is big and prestigious enough to take such risk. Supported software are available at price which is specially worked out for Academic users.	IISER asks that the proposed solutions be supported by the bidder. Under no circumstances would software (OS, schedulers etc) that is not supported by the bidder/OEM be entertained.
34	As per specification Master node should deliver .7TF peak processing power which is not possible using Intel XEON IVY Bridge E5 Processor. Is IISER looking AMD Opteron or E7 Series of processor? Please confirm.	IISER is looking for Intel Xeon Ivy bridge processors only. The tender is amended to read The peak performance requirements are now 0.35 TF or better for head and compute nodes See Chapter 4 Part 1 for details
35	Can we propose RACK cooling solution with proposed RACK?	You may propose the solution but this is not a requirement for IISER.
36	As per specification, both master node act like a storage node in cluster mode? Is it work As per specification, both master node act like a storage node in cluster mode? Is it work for NFS File share? Please confirm.	This query probably arose because of the confusion of the roles of the storage and the HPC. The description of the requirements added in the extra paragaph in chapter 4 and the descriptions of the desired configurations of the head nodes in chapter 4 clearly delineates the roles of the master nodes for HPC and controller nodes for the storage
37	Tender asked for 2X1Gbps, 2X10Gbps & 2xI BQDR Port. Is it from front end I/O Nodes or from back end block storage? Please confirm.	Front End I/O nodes
38	Tender asked for 4GBps PFS Performance & 512MBps for NFS performance. Shall we consider it from 200TB Storage? Please confirm.	Yes, this is for the 200TB SAN storage

39	Tender asked for 200TB Storage for PFS & NFS Operation. How much space do you need for PFS & NFS Storage? Please confirm.	IISER has now asked for pricing for 150TB usable disc space and 200TB usable disc space for the SAN storage solutions. For 150 (and 200) TB solutions IISER would want the following partitions - 25 TB (30 TB) 10K RPM or better SAS drives and the rest 125 TB (170TB) in 7.2K RPM or better SATA drives. IISER requires a solution where it could flexibly assign/create and dedicate variable quantities of disk space to PFS, NFS and archive. These needs are perceived to change over time.
40	Storage should be scalable to 8GBps or better in same architecture. Is it required from PFS Storage? Please confirm.	Yes, the bidder should demonstrate that the same architechture should be able to support an upgrade to 8GB/s on the PFS part of the SAN storage solution.
41	Storage system must scale up to 600TB usable space. Performance will be given to systems that can demonstrate scalability up to 2PB just by adding disk and enclosures. As per our understanding, 2PB scalability for PFS Storage by adding back end storage system. Please confirm.	Amended to: The expected size of storage is 200TB (pricing for 150TB should also be quoted) with an ability to expand to 2.5 Peta Bytes (PB) or greater for further needs.
42	Does IISER need software or Hardware RAID? Please confirm.	Both software and hardware solutions would be entertained.
43	Please specify the 10G connectivity (RJ 45 or SFP+ base)	The 10G connectivity now exits only between the master nodes of the HPC. IISER prefers the connectivity in SFP+
44	PFS & NFS Storage support 2.5PB pr higher usable, single unified addressable space. Is it the feature required from PFS as it supports NFS export? Please confirm.	2.5 PB was for PFS and NFS. We are not expecting to have 2.5TB PFS right now but ability to put higher capacity PFS at later time if required. We will mostly use NFS to share the data across network.
45	Does IISER need automatic policy based archival? Please confirm.	IISER wishes to have a system configured such that the automated policy is decided/modified/amended easily as per IISERs requirements and needs over time.
46	Does IISER need high availability for Master node or it is required only for storage node operation? Please confirm.	High availability is required for a) master/head nodes of the HPC AND b) controller nodes of the SAN storage solution.
47	Is onsite engineer required? Please confirm.	No.

48	Request you to kindly change it to last 2 years or 5 entries in any 5 list from past three years	The eligibility criteria has been modified to say that the OEM partnering the bidder should have at least 5 entries in the last 3 years
49	As the number of benchmarks asked is more. Request you to kindly extend the due date for two weeks as it will take much time	The benchmark requirements have been modified. See Chapter 4 Part 1. Section on benchmarking. No extension has been granted
50	All servers should have ability to boot over the network with two or more Intel Xeon E5-2600 series CPUs. It is expected to have peak performance of 0.7TF per server

As the Ivybridge is the two socket CPU, Maximum 0.518 Tf can be achieved with single server. Request you ot kindly clarify. | This is now amended. The peak performance requirements are now 0.35 TF or better. |
51	Please specify the 10G connectivity (RJ 45 or SFP+ base)	The 10G connectivity now exits only between the master nodes of the HPC. IISER prefers the connectivity in SFP+
52	Request you to kindly elaborate features IISER is looking with the HA Mode	HA mode should be in active-active mode and any node can take all load in case of any node failure. HA should behave as a swappable dual controller storage.
53	As the PFS does not support protocols NFS and CIFS, iSCSI protocols, Request you to kindly elaborate the requirement of this protocols	As only part of the storage is going to be in PFS the specifications remain as they are. Please note the amendment to the storage requirement in chapter 4 part 2.
54	Request you to please suggest if we can give FC connectivity instead of SAS	Tender clause remains unchanged
55	Request you to kindly increase number of ports as 30Tf cannot be accommodated in 50 ports	The number of ports of the switch is not limited to 50 as specified in the original version. Please refer to amended version in Chapter 4, Part 1, section on Interconnects.
56	Request you to kindly specify the number of users for the Job Scheduler. Looking at the Size of cluster required we suggest you to atleast ask for 25 users	The number of users is going to be a variable, difficult to estimate number with a projected monotonic increase over the next 3-5 years. IISER would prefer job scheduler solutions that are open source and if the bidder is quoting commercial packages and the license is based on number of users - this should be set to 40.
57	Request you to kindly accept 800 GB SSD Drives instead of 900 GB	This has now been amended in Chapter 4, Part1 of the tender. The requirement is for 4TB of SSD disks. The bidders are free to choose how they would configure the system to match these requirements.
58	Are the benchmark runs made by a 3rd party /	OEMS/bidders have to perform the benchmarking on their

	partner organization acceptable? Or is it the OEM/SI has to perform the benchmarking on their own?	own.
59	Request to change it to, "The bidder should carry out below listed benchmark programs on 2TF, 5TF, and 10TF peak performance configurations of the offered solution. The results (with TFLOP count where applicable) should be presented in an output file and included in the technical bid."	The benchmark requirements have now been amended. See chapter 4, part 1 section on Benchmarks.
60	Is there a condition that the processor on which we do the benchmark, the same needs to be proposed.	yes
61	Is IISER asking for theoretical peak performance or 30TF or sustained peak performance of 30TF?	30 TF theoretical peak performance
62	Peak performance of 0.7TF is required per server. -Is this applicable to Master nodes only or also to Compute nodes? -Request IISER to look into GFLOP ratings of Compute nodes and alter it as 0.7TF Per Node is not achievable using Dual Socket Nodes (Using E5-2600 Series CPUs).	This is now amended. The peak performance requirements are now 0.35 TF or better for head and compute nodes
63	There seems to be a printing error one line 3 "Number of CPUs and cores to be determined for realizing the peak performance of minimum Teraflop (1Teraflop=1024 Gigaflop) throughput". We understand that 30TF peak performance is requested from the compute nodes.	The error is rectified in the revised tender
64	Request to change it to, "All software should be commercially licensed versions or open source."	See the amended clause in Chapter4, part 1, section on Management tools.
65	Are UPS & Cooling Solution in the scope of SI?	No, IISER provides the power requirement and the necessary infrastructure.
66	The QDR network itself would be built using multiple Infiniband Switches, each having capable reliability features. Eventuality fof failure of QDR network is very low. In case of failure, GigE Network can be	This is now amended, please refer to figure 1. The configuration now shows a 1 GE switch in addition to the IB switch. Only head/master nodes have 10G ports (to connect to one another) and not the compute nodes.

	used. Using Redundant 10G network as a failover would increase the cost and would not give higher performance benefits. Request IISER to consider this point.	
67	Are the technical bids going to be ranked or does it only need to satisfy a minimum qualification criterion	There will be no ranking of technically qualified bids

IISER PUNE

PRE-BID CONFERENCE FOR PROCUREMENT OF 30 TF HIGH PERFORMANCE CLUSTER AND 200 TB SAN STORAGE SOLUTION

COMMERCIAL QUERIES AND CLARIFICATION

TENDER NUMBER - IISER-PUR-1363-13   DATE :10.02.14

S.No	Query/Clarification Sought	Clarification / Amendment
1.	**Page No – 8, Chapter 1- Two-Bid System** Since there are two items , whether two or four envelopes is to be submitted	**Page No – 8, Chapter 1- The clause for Two-Bid System is amended as :** The two bid system should be followed for this tender. In this system the BIDDER must submit his offer in **four separate sealed envelopes.** Both the technical bid and commercial bid envelopes should be securely sealed and stamped separately and clearly marked as **Envelope No.1 – Technical Bid for High Performance Cluster for 25 TF and 30 TF solutions.** **Envelope No.2 – Commercial Bid for 25 TF and 30 TF High Performance Cluster"** **Envelope No.3– Technical Bid for 150 TB and 200 TB SAN Storage Solution.** **Envelope No.4– Commercial Bid for 150 TB and 200 TB SAN Storage Solution.** All the sealed envelopes should be placed in a fifth larger envelope. The main envelope which will contain both the bids should be super

		scribed with our **tender enquiry IISER-PUR-1363-13** **The format for the revised price schedule is attached below.**
2.	**Extension for Date of Submission of Technical Bids** Bidders requested to extend Bids submission date	The Date of Submission and opening of technical Bid remains unchanged, i.e. 5.3.2014 (3:00pm and 3:30pm respectively)
3.	**Page No 02 Clause No 09 - Eligibility Criteria for High Performance Computer Cluster -** OEM has to feature in the top 500 supercomputer sites (available at www.top500.org) consistently over the past 3 years with at least 5 installations globally and mentioned in the list. To Remove consistently over the past 3 years	**Page No 02 Clause No 09 - Eligibility Criteria** The eligibility criteria are now modified: OEMs have to feature at least 5 times over the past 3 years with at least 5 installations globally and mentioned in the list.
4	**Page No 02 Clause No 07 - Eligibility Criteria for High Performance Computer Cluster -** The bidder should have had average annual financial turnover of Rs. 10 Crores or more during the last three years ending 31st March 2013. To Amend average turnover figure from Rs 10 crores to 100 crores	**Page No 02 Clause No 07 - Eligibility Criteria** Tender Terms & Conditions prevails. No change in the Tender Terms & Conditions
5	**Page No 2 Clause No 4 - Eligibility Criteria for High Performance Computer Cluster** The bidder should have documentary evidence of purchase orders for three or more, including at least one successful installation, of infiniband based HPC clusters of 10TF or higher in a single order and based (installed/ordered) in India within the last 3 years. We understand this is the requirement:- -3 or more 10TF HPC Purchase orders in last 3 Years -The above mentioned clusters to be based on Infiniband. Pls confirm. Request the time duration to be extended to last 5 Years.	**Page No 2 Clause No 4 - Eligibility Criteria for – High Performance Computer Cluster** Tender Terms & Conditions prevails. No change in the Tender Terms & Condition
6	**Page No – 2, Clause No 06 - Eligibility Criteria for High Performance Computer Cluster** Bidder must be in existence in the HPC business for at least the last ten years. Documentary proof should be supplied	**Page No – 2,Clause No 06- Eligibility Criteria for High Performance Computer Cluster** The amended version of the tender eligibility Criteria now specifies that the bidder should

		have purchase orders dating back to 2004 or **beyond.**
	Request you to please specify the Documentary evidence, Reference PO or Incorporation certificate	
7	**Page No 04 Clause No 04 - Eligibility Criteria for SAN Storage -** The bidder should have supplied, installed and integrated at least one 100TB or higher network storage solution hosting a parallel file system in India within the last three years. To consider 100 TB Network Storage without PFA 50 TB Storage with PFS	**Page No 04 Clause No 04 - Eligibility Criteria For SAN Storage** Tender Terms & Conditions prevails. No change in the Tender Terms & Conditions
8	**Page No 04 Clause No 07 – Eligibility Criteria for SAN Storage-** The Bidders should have a technical support centre located in Mumbai/Pune Region. To consider bidders with technical support centre located in Pune	**Page No 04 Clause No 07 – Eligibility Criteria** Tender Terms & Conditions prevails. No change in the Tender Terms & Conditions
9	**Page No 14, Chapter – 2 - Delivery Period** The deliveries & installation must be completed **within 6 weeks** after placement of purchase order. To amend deliveries it as 14 weeks with delivery and installation	**Page No 14, Chapter – 2 - Delivery Period** *is* amended as: The deliveries & installation must be completed **within 8 weeks** after placement of purchase order
10	**Page No 35 Clause No 18 -** The storage should be compatible with HPC (part 1 of the tender). The responsibility of ensuring smooth integration with the HPC rests with the vendor of the storage/backup solution Request the responsibility of integration should also lie with the HPC provider	**Page No 35 Clause No 18 –** Tender Terms & Conditions prevails. No change in the Tender Terms & Conditions
11	**Page No 21 Clause No 11.6 -** Supply of spares for 10 years To change in time period from 10 years to 7 years	**Page No 49 Clause No 17 -** Supply of spares is amended as : The BIDDER shall assure the supply of spare parts after warranty is over for maintenance of the equipment supplied if and when required for a period of **7 years** from the date of supply of clusters on payment on approved price list basis.

12	**Page No 21, Chapter 3-** Warranty / Support	**Page No 21, Chapter 3-** Warranty / Support
	Support required is 24x7 Request to modify to (9 X 5 X 7)	Tender Terms & Conditions prevails. No change in the Tender Terms & Conditions

13	**Page No 16 Clause No 3.60 "EMD"** –
	
	The successful BIDDER, on award of contract / order, must send the contract / order acceptance in writing, within 15 days of award of contract / order failing which the EMD will be forfeited.
	
	  a) EMD forfeiture is not acceptable as contract signing is subject to negotiation
	  b) Request IISER to share the contract terms document
		Page No 16 Clause No 3.60 "EMD"
		
		a) Tender Terms & Conditions prevails as order is placed only AFTER finalization of contract.
		
		  No change in the Tender Terms & conditions.
		
		b) The tender document itself is a complete document comprising all the contract terms that will become part of contract document along with purchase order, agreement and Integrity pact.

14	**Page No 16 Clause No 3.8 "EMD" -** The EMD shall be forfeited; If the BIDDER withdraws the bid during the period of bid validity specified in the tender and In case a successful BIDDER fails to furnish the Security Deposit. Request EMD forfeiture if vendor does not comply with the terms & conditions and fails to submit security deposit	**Page No 16 Clause No 3.8 "EMD"** Tender Terms & Conditions prevails. No change in the Tender Terms & Conditions.

15	**Page No 18 Clause No 10.1 - Purchaser's Right to vary Quantities at the time of Award -** IISER, PUNE reserves the right at the time of award of Contract to increase or decrease the quantity of items specified in the Schedule of Requirements without any change in price or other terms and conditions.
	  a) It should be restricted to + / - 10% maximum of the quantity quoted as per RFP
	  b) We agree to provide the increased quantity at the same terms & conditions. However additional prices shall be charged for the goods supplied over the contractual quantity
		Page No 18 Clause No 10.1 - Purchaser's Right to vary Quantities at the time of Award
		
		We accept both conditions and the clause is amended accordingly.

16	**Page No 18 Clause No 12.2 "Corrupt or Fraudulent Practices" -** IISER, PUNE may declare a vendor ineligible, either indefinitely or for a stated duration, to be awarded a contract if it at any time determines that the vendor has engaged in corrupt and fraudulent practices during the execution of contract Request IISER for determination of breach to be made by an independent third party	**Page No 18 Clause No 12.2 "Corrupt or Fraudulent Practices"** Determination of breach would be made as per IISER stipulated guidelines, procedures and rules.
17	**Page No 19 Clause No 1.9 "Price" -** In case of INR bids the price criteria should be on F.O.R., IISER, PUNE. Govt. Levies like central excise duty, sales tax, octroi, WCT etc., if any, shall be paid at actual rates applicable on the date of delivery. Any increase or decrease in the rates of the applicable taxes or any new levy on account of charges in law shall be to the account of customer	**Page No 19 Clause No 1.9 "Price"** The statutory variation in duties and taxes is allowed
18	**Page No 21 Clause No 9 "Installation" -** Installation demonstration to be arranged by the bidder free of cost and the same is to be done within 15 days of the arrival of the equipment at site. Request schedule of 4 weeks for installation from the date of material receipt at IISER site	**Page No 21 Clause No 9 "Installation"** Tender Terms & Conditions prevails. No change in the Tender Terms & Conditions
19	**Page No 21 Clause No 10.1 "Warranty/Support" -** The items covered by the schedule of requirement shall carry minimum three years of comprehensive warranty from the date of acceptance of the equipment by IISER, PUNE. Warranty should start from the date of delivery at IISER Pune	**Page No 21 Clause No 10.1 "Warranty/Support" -** Tender Terms & Conditions prevails. No change in the Tender Terms & Conditions
20	**Page No 23 Clause No 16.2 "Penalty for delayed Services / LD"** If the bidder fails to Supply, Install and Commission the system as per specifications mentioned in the order within the due date, the bidder is liable to pay liquidated damages of 1% of order value per every week of delay subject to a maximum of 10% beyond the due date. Such money will be deducted from any amount due or which may become due to the bidder To reduce penalty amount to 0.5% of order value per every week of delay subject to a maximum of 5%	**Page No 23 Clause No 16.2 "Penalty for delayed Services / LD"** Tender Terms & Conditions prevails. No change in the Tender Terms & Conditions

21	**Page No 24 Clause No 19 "Arbitration"** Request IISER for Arbitration to be conducted under the Indian Arbitration and Conciliation Act 1996	**Page No 24 Clause No 19 "Arbitration"** IISER Pune agree for Arbitration to be conducted under the Indian Arbitration and Conciliation Act 1996
22	**Page No 44 Clause No 3.11 - PRE CONTRACT INTEGRITY PACT -** If the BIDDER or any employee of BIDDER on any person acting on behalf of BIDDER, either directly or indirectly, is a relative of any of the officers of the BUYER, or alternatively, if any relative of an officer of the BUYER has financial interest / stake in the BIDDERs firm, the same shall be disclosed by the BIDDER at the time of filling of tender. We can't ensure compliance given the size of company	**Page No 44 Clause No 3.11 - PRE CONTRACT INTEGRITY PACT** Tender Terms & Conditions prevails. No change in the Tender Terms & Conditions
23	**Page No 44 Clause No 5.3 - PRE CONTRACT INTEGRITY PACT** - In the case of successful BIDDER a clause would also be incorporated in the Article pertaining to Performance Bond in the Purchase Contract that the provisions of Sanctions for Violation shall be applicable for forfeiture of Performance Bond in case of a decision by the BUYER to forfeit the same without assigning any reason for imposing sanction for violation of this pact. Forfeiture is O.K, but it must be upon final determination by an independent third party that a breach is occurred	**Page No 44 Clause No 5.3 - PRE CONTRACT INTEGRITY PACT** Determination of forfeiture would be made as per IISER stipulated guidelines, procedures and rules.
24	**Page No 46 Clause No 6.3 - PRE CONTRACT INTEGRITY PACT** - The decision of the BUYER to the effect that a breach of the provisions of this Pact has been committed by the BIDDER shall be final and conclusive on the BIDDER. However, the BIDDER can approach the independent Monitors appointed for the purpose of the Pact. Determination of breach to be made by an independent third party	**Page No 46 Clause No 6.3 - PRE CONTRACT INTEGRITY PACT** Determination of forfeiture would be made as per IISER stipulated guidelines, procedures and rules.
25	**Page No 46 Clause No 7 "Fall Clause" - PRE CONTRACT INTEGRITY PACT** Request deletion , it is difficult to administer & validate such instances	**Page No 46 Clause No 7 "Fall Clause" PRE CONTRACT INTEGRITY PACT** – Tender Terms & Conditions prevails. No change in the Tender Terms & Condition

26	**Page No 47 Clause No 12 "Validity" - PRE CONTRACT INTEGRITY PACT**	**Page No 47 Clause No 12 "Validity" - PRE CONTRACT INTEGRITY PACT**
	Duration of the pact to be limited to the contract / bid validity period	Tender Terms & Conditions prevails. No change in the Tender Terms & Conditions
27	**Site Not Ready Clause** *Customer hereby agrees to make the site ready as per the agreed specifications, within the agreed timelines. Customer agrees that company shall not be in any manner be liable for any delay arising out of Customer's failure to make the site ready within the stipulated period, including but not limited to levy of liquidated damages for any delay in performance of Services under the terms of this Agreement.* Request inclusion of this clause for the bid	**Site Not Ready Clause** The said Clause shall be included at the time of signing the agreement with the successful bidder.
28	**Pass Through Warranty** *Since company is acting as a reseller of completed products, company shall "pass-through" any and all warranties and indemnities received from the manufacturer or licensor of the products and, to the extent, granted by such manufacturer or licensor, the Customer shall be the beneficiary of such manufacturer's or licensor's warranties and indemnities. Further, it is clarified that company shall not provide any additional warranties and indemnities with respect such products.* Request inclusion of this clause for the bid	**Pass Through Warranty** Tender terms and conditions prevail. The requested clause is not included.
29	**ERV Clause** *"It is agreed that the price quoted is arrived at based on the exchange rate of 1 USD = INR ___ ("Base Exchange Rate"). In the event the Base Exchange Rate either increases or decreases by percentage points greater than two per cent [2%], the prices shall be charged as per the then current exchange rate."* Request inclusion of this clause for the bid	**ERV Clause** Requested clause is not included.

| 30 | **Risk and Title**

The risk, title and ownership of the products shall be transferred to the customer upon dispatch of such products to the customer

Request inclusion of this clause for the bid | **Risk and Title**

The ownership of goods shall be passed on to IISER-Pune only after successful installation of the system. |
|---|---|---|
| 31 | **Non Hire Clause**

Customer acknowledges that personnel to be provided by Company represent a significant investment in recruitment and training, the loss of which would be detrimental to Company's business. In consideration of the foregoing, Customer agrees that for the term of this Agreement and for a period of one year thereafter, Customer will not directly or indirectly, recruit, hire, employ, engage, or discuss employment with any Company employee, or induce any such individual to leave the employ of Company. For purposes of this clause, a Company employee means any employee or person who has who has been involved in providing services under this Agreement.

Request inclusion of this clause for the bid | **Non Hire Clause**

Requested clause is not included. |
| 32 | **Limitation of Liability**

Notwithstanding anything to the contrary elsewhere contained in this or any other contract between the parties, neither party shall, in any event, be liable for (1) any indirect, special, punitive, exemplary, speculative or consequential damages, including, but not limited to, any loss of use, loss of data, business interruption, and loss of income or profits, irrespective of whether it had an advance notice of the possibility of any such damages; or (2) damages relating to any claim that arose more than one year before institution of adversarial proceedings thereon.
Subject to the above and notwithstanding anything to the contrary elsewhere contained herein, the maximum aggregate liability of Company for all claims under or in relation to this Agreement, shall be, regardless of the form of claim(s), shall be limited to contract value.

Request inclusion of this clause for the bid | **Limitation of Liability**

Requested clause is not included. |

33	**Saving Clause**	**Saving Clause**
	Company's failure to perform its contractual responsibilities, to perform the services, or to meet agreed service levels shall be excused if and to the extent Company performance is effected, delayed or causes non-performance due to Customer's omissions or actions whatsoever.	Requested clause is not included.
	Request inclusion of this clause for the bid	
34	**Deemed Acceptance**	**Deemed Acceptance**
	Services and/or deliverables shall be deemed to be fully and finally accepted by Customer in the event when Customer has not submitted its acceptance or rejection response in writing to Company within 15 days from the date of installation/commissioning or when Customer uses the Deliverable in its business, whichever occurs earlier. Parties agree that Company shall have 15 days time to correct in case of any rejection by Customer.	Requested clause is not included.
	Request inclusion of this clause for the bid	
35	**Change Order**	**Change Order**
	Either party may request a change order ("Change Order") in the event of actual or anticipated change(s) to the agreed scope, Services, Deliverables, schedule, or any other aspect of the Statement of Work/Purchase Order. Company will prepare a Change Order reflecting the proposed changes, including the impact on the Deliverables, schedule, and fee. In the absence of a signed Change Order, Company shall not be bound to perform any additional services.	Requested clause is not included.
	Request inclusion of this clause for the bid	
36	**Termination for default**	**Termination for default**
	Either party may terminate the contract if other party commits material breach of the terms and conditions of the contract. 30 days cure period will be given. Company will be paid for goods delivered and services	Requested clause is not included.

	rendered till the date of termination. We request inclusion of this clause for the bid	
37	**Page No 21 Clause No 10.1 " Warranty/Support" -**The defects, if any, during the guarantee/warranty period are to be rectified free of charge by arranging free replacement wherever necessary. This includes cost, insurance, freight, custom duty, octroi, local taxes if any should be borne by the beneficiary or his agent. A clear confirmation should be given for this item. Request the applicability of this clause to be limited to warranty support and not guarantee	**Page No 21 Clause No 10.1 " Warranty/Support"** The clause is modified and applicable to warranty support.
38	Is vendor allowed to bid either of the parts selectively or is it mandatory to bid both together ?	The vendor is allowed to bid either of the parts selectively
39	**Page No 2 " HPC Bidder Qualification"** OEM should have atleast 8 Installation in top 500.org	**Page No 2 " HPC Bidder Qualification"** Tender Terms & Conditions prevails. No change in the Tender Terms & Condition
40	**Page No 4 " Storage Qualification Criteria"** OEM should also have atleast 10 years of network storage solution experience in India	**Page No 4 " Storage Qualification Criteria"** Tender Terms & Conditions prevails. No change in the Tender Terms & Condition
41	**Page No 21, Clause 11.7 - Support** The system must be supported by a Service Centre manned by the principal vendor's technical support engineers. The support through this Centre must be available 24 hours in a day, seven days a week and 365 days a year. Also it should be possible to contact the Principals vendor support Centre on a toll free number/web/mail. Please mention the period of maintaining such a center.	**Page No 21, Clause 11.7 - Support** Refer page 2 clause 8 – The period of maintaining such a center is 3 years.

42	**L1 Criteria** Request you to kindly specify L1 criteria for HPC and Storage both, Will it be combined or can be separate?	**L1 Criteria** L1 criteria for HPC and SAN storage solutions would be evaluated independently.
43	**Page No – 9, Chapter 1 – Clause (V) – Security Deposit -** Undertaking that the successful BIDDER agrees to give a security deposit amounting to 10% of the purchase order value by way of Demand Draft in favour of The Director, IISER, Pune. The Security Deposit of 10% of purchase order is to be submitted in the form of Demand Draft/ Bank guarantee page 16	**Page No – 9, Chapter 1 – Clause (V) – Security Deposit** The Security Deposit of 10% of purchase order is to be submitted in the form of Demand Draft/ Bank guarantee. Please refer page 16, clause 4.1 also
44	**Solvency Certificate:** Two different certificate or single certificate worth Rs. 1.4 cr will do	**Solvency Certificate:** Both acceptable.
45	**Optional pricing for 4th year and 5th year support & warranty must be quoted:** Is this will taken in consideration while deciding the L1	**Optional pricing for 4th year and 5th year support & warranty must be quoted:** No, This is optional pricing and will not be taken while deciding L1.
46	Is it allowed to submit the offer for HPC compute from one OEM and Storage from other OEM	Yes, OEMs used by one bidder for the HPC cluster and the SAN storage could be different.
47	**Addendum Clause under Eligibility Criteria for High Performance Computer Cluster and SAN Storage** Any addendum clause under Eligibility Criteria	**Addendum in Clause - Eligibility Criteria for High Performance Computer Cluster** Benchmark performances, power usage , floor utilization will all be used as technical criteria to evaluate the bids **Addendum in Clause - Eligibility Criteria for SAN storage** Benchmark performance will be used as technical criteria to evaluate the bids.

CHAPTER-5 : PRICE SCHEDULE - A

FOR HIGH PERFORMANCE CLUSTER FOR 25 TF SOLUTION

Bill of Material and Price Schedule

The Bill of materials must be included in the technical offer as well as commercial offer. **However the Technical offer should not contain any price information.**

ALL THE BIDDERS SHOULD QUOTE THEIR OFFER IN FOLLOWING FORMAT FOR UNIFORMITY

Imported Supply

Sr. No.	Item Description	Quantity	Rate	Total Amount. Currency.
	Total Ex-Works			
	FOB/FCA Charges			
	FOB/FCA Price, **Name of Port.**			
	CIF/CIP Charges			
	CIF/CIP Price, **Name of Port.**			
Amount in Words:				

Indigenous Supply (Local Supply)

Sr. No.	Item Description	Quantity	Rate	Total Amount. Currency (Rs)
	Total			
	(+) Taxes etc.			
	Grand Total			
Amount in Words (in Rs)				

CHAPTER-5 : PRICE SCHEDULE - A

FOR HIGH PERFORMANCE CLUSTER FOR 30 TF SOLUTION

Bill of Material and Price Schedule

The Bill of materials must be included in the technical offer as well as commercial offer. **However the Technical offer should not contain any price information.**

 ALL THE BIDDERS SHOULD QUOTE THEIR OFFER IN FOLLOWING FORMAT FOR UNIFORMITY

Imported Supply

Sr. No.	Item Description	Quantity	Rate	Total Amount. Currency.
	Total Ex-Works			
	FOB/FCA Charges			
	FOB/FCA Price, **Name of Port.**			
	CIF/CIP Charges			
	CIF/CIP Price, **Name of Port.**			
Amount in Words:				

Indigenous Supply (Local Supply)

Sr. No.	Item Description	Quantity	Rate	Total Amount. Currency (Rs)
			Total	
			(+) Taxes etc.	
	Grand Total			
Amount in Words (in Rs)				

CHAPTER-5 : PRICE SCHEDULE - B

FOR SAN STORAGE SOLUTION 150 TB

Bill of Material and Price Schedule

The Bill of materials must be included in the technical offer as well as commercial offer. **However the Technical offer should not contain any price information.**

ALL THE BIDDERS SHOULD QUOTE THEIR OFFER IN FOLLOWING FORMAT FOR UNIFORMITY

Imported Supply

Sr. No.	Item Description	Quantity	Rate	Total Amount. Currency.
	Total Ex-Works			
	FOB/FCA Charges			
	FOB/FCA Price, **Name of Port.**			
	CIF/CIP Charges			
	CIF/CIP Price, **Name of Port.**			
Amount in Words:				

Indigenous Supply (Local Supply)

Sr. No.	Item Description	Quantity	Rate	Total Amount. Currency (Rs)
			Total	
			(+) Taxes etc.	
	Grand Total			
Amount in Words (in Rs)				

CHAPTER-5 : PRICE SCHEDULE - B

FOR SAN STORAGE SOLUTION 200 TB

Bill of Material and Price Schedule

The Bill of materials must be included in the technical offer as well as commercial offer. **However the Technical offer should not contain any price information.**

ALL THE BIDDERS SHOULD QUOTE THEIR OFFER IN FOLLOWING FORMAT FOR UNIFORMITY

Imported Supply

Sr. No.	Item Description	Quantity	Rate	Total Amount. Currency.
	Total Ex-Works			
	FOB/FCA Charges			
	FOB/FCA Price, **Name of Port.**			
	CIF/CIP Charges			
	CIF/CIP Price, **Name of Port.**			
Amount in Words:				

Indigenous Supply (Local Supply)

Sr. No.	Item Description	Quantity	Rate	Total Amount. Currency (Rs)
	Total			
	(+) Taxes etc.			
	Grand Total			
Amount in Words (in Rs)				

CHAPTER 4

SCHEDULE OF REQUIREMENTS, SPECIFICATIONS & ALLIED TECHNICAL DETAILS

FOR SUPPLY, INSTALLATION, COMMISSIONING HIGH PERFORMANCE COMPUTING CLUSTER AND SAN STORAGE SOLUTION

PART-I

## High-Performance Computing System

IISER wants to build a state of the art CPU based High Performance Computing (HPC) facility using distributed memory architecture. The HPC facility will be a Linux cluster with redundant master nodes, compute nodes, 40Gbps QDR/FDR10 infiniband interconnect or better. The cluster is expected to deliver a performance of 30TF(pricing for 25 TF solution also requested). Master nodes will use high performance solid state drives (SSDs) for data sharing via a Parallel File system or network file system on IB or better, delivering high performance I/O for a very demanding data intensive environment. T h e H P C system should have the
 flexibility to scale for computation and storage performance. The System should be equipped with libraries to perform scientific and benchmark tests.

I – Cluster hardware and software:

1) General Specification of cluster and head nodes:

a) Cluster Architecture:
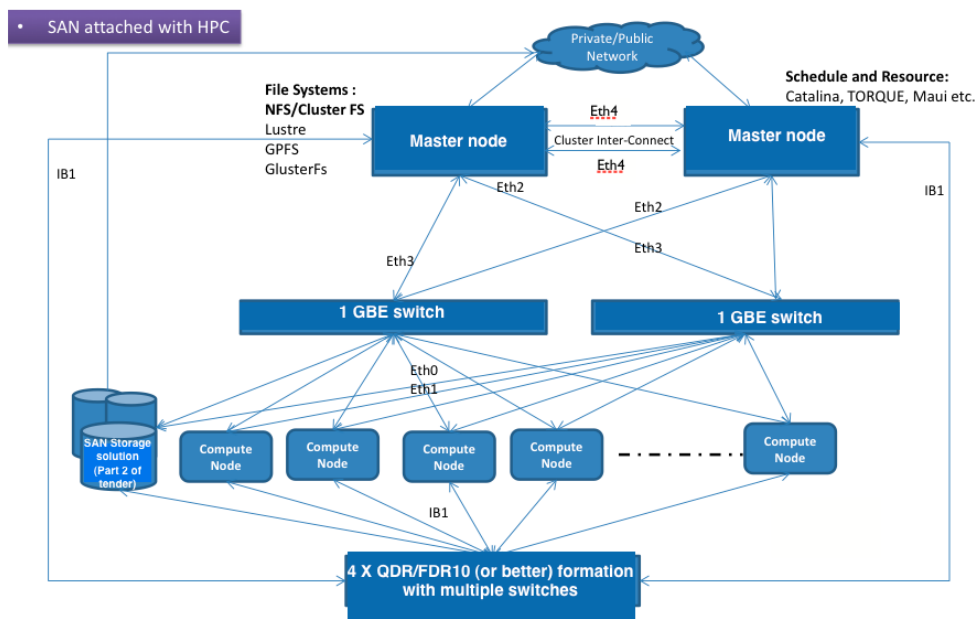
Eth0, Eth2, Eth3 -- Gig Card
Eth4 -- 10 Gig Card
IB1 -- InfiniBand 40Gb/s or better
2/3-36/18 40Gb/s InfiniBand or better switch systems
can be used for QDRs/FDR10 (or better) formation

Figure 1. Schematic of the cluster Architecture

The cluster will consist of management nodes and compute nodes connected by QDR/FDR10 or better IB interconnect. Two servers will be used to form a high availability master node interconnected with a 10GB/s network. This master node will serve as management, storage and login node. This node will have local storage using SSDs and will share volumes to all nodes via QDR/FDR10 or better IB interconnect. There will be a 10GBps interconnect between the servers that make the head nodes. QDR/FDR10 or better IB interconnect will be used for communication between the nodes and data storage sharing. All servers will be connected to the QDR/FDR10 or better switch and redundant 1 Gb/s Ethernet network switches. All servers should have ability to boot over the network with two or more Intel Xeon E5-2600 series CPUs. It is expected to have peak performance of 0.35TF or better per server. All servers should have redundant power supply and hot swappable disks, fans and cooling units. Cluster will be arranged in an integrated rack unit (IRU). Each rack will be populated with rack mountable servers running Linux. The Cluster should be scalable to accommodate future requirements. A schematic of the architecture of the cluster is given in Figure 1 above and the specifications of individual components (head nodes, compute nodes, switches etc) are provided below.

b) Head nodes– 2 Units (Rack mountable server)	
Processor Type	Dual/Quad CPUs with maximum cores per CPU possible.
Processor	Number of cores needed to obtain at least 0.35 TF peak processing power in each unit or better.
Memory Size	192 GB or better.
Internal Storage	600 GB or better in SAS disks in RAID1 with a spare disk for OS. 4TB capacity in SSD disks in RAID5.
Internal Media Drive	DVD ROM Drive
I/O Slots	Minimum 4 x Gigabit Ethernet Ports, 2x10 Gigabit,1x IB port

Head/Master Nodes - 2 in High availability (HA) mode

- Head nodes will serve as management node, storage node, utility node and login node.
- Recommended configuration in high availability for managing the proposed cluster, share storage for all nodes and login for users.
- Preferred configuration for HA node will be active-active.
- Network configuration for private and public vlans.
- Should have adequate memory, processing power, disk space, interconnect, network points and any other relevant adaptors to support the cluster and to run utility software such as Cluster management tool, load management tool, compilers, debuggers etc.
- Connectivity to SAN (from part 2 of this tender) is preferably through IB or equivalent.
- Should offer support for 1G Ethernet network card(s).
- Should be scalable as needs arise.

2. <u>Specification for the Compute nodes:</u>

1.	**No. and type of Processors**	Number of CPUs and cores to be determined for realizing the peak performance of minimum 30 Tera FLOP (1Teraflop=1024 Gigaflop; pricing for a 25 TF solution is also requested) through put. One of the following Intel Ivy bridge processors or better must be used for all the nodes 1. E5–2680v2 (10 cores, 2.8GHz) 2. E5–2695v2 (12 cores, 2.4GHz) 3. E5–2697v2 (12 cores, 2.7GHz)
2.	**System RAM**	4. 4Gb, DDR3 1600MHz per core or better must be provided
3.	**Internal Storage**	1* >= 300 GB SAS 10K RPMS or better disks. If the bidder/OEM proposes diskless nodes, the equivalent capacity of disk space is to be provided in a separate boot raid or similar.
4.	**I/O Slots**	Minimum 2 x Gigabit Ethernet Ports, 1x IB port
5.	**Interconnect**	4x QDR/FDR10 or better Infini band Switch with 100% non-blocking architecture (or 50% non-blocking architecture with FDR) with adequate ports to connect all compute nodes, master nodes and SAN storage (part 2 of tender) with ability to expand. 4 X QDR/FDR 10 or better IB supports to OFED (Open Fabrics Enterprise Distribution) and open MPI. Support for managing the interconnect through an integrated software, should be included. I nterconnect HBA, switch & cables should be from the same manufacturer/OEM certified. External dedicated managed Gigabit Ethernet switch(s) for cluster management should be provided. • Adequate ports for the proposed solution and Gigabit Ethernet switch. • Port trucking/ Bonding capability • High speed stacking capability • CAT6 Cables of appropriate length to suite the solution for GigE connectivity • IB cables to be SFP+ or better • Power cables should be compatible with the quoted rack. • Rack mounting kit
6.	**Racks**	•42U OEM racks with adequate rack accessories and PDU should be provided. If it does not conform to this size, then the exact

		dimensions of the racks and the number of tiles occupied by the rack should be mentioned. The rack height should not exceed 48U.
		•Cabling for all the power and network connectivity should be neatly structured.
		•1U Rack mounted TFT monitor/keyboard/mouse along with 32 port KVM over IP switch & 32 cables/IPMI (Intelligent Platform Management Interface) or equivalent to monitor &manage utility nodes, head nodes, storage nodes etc. other than compute nodes should be added in the proposal.
		• The number of racks required to accommodate HPC hardware excluding storage should not exceed 3.
7.	**Software Components:**	The optimized Compilers, tools and libraries should a) improve programming productivity; b) allow application scalability and performance; c) Offer support for MPI and Open MP. Various software components should be quoted as a separate line of items.
a.	**Compilers**	C, C++, Fortran90, 95, 2003 with 5 users perpetual if commercial licenses are quoted. Bidders are to propose open source or commercially available compilers and ensure that the same are supported. If quoting only open source compiler, bidders should also quote the prices of having intel and/or other commercial compilers and intel cluster tools kit as optional extras.
b.	**Software tools**	•OEM certified Linux based Operating System (OS).
		•Software tools namely libraries/development kit required to run jobs should be quoted with minimum of 5 users perpetual commercial license and also equivalent open source options.
c.	**Management tools**	•Software such as OS, and tools to manage the cluster and its hardware components are to be included.
		• Cluster monitoring tools should be provided such as Nagios, Ganglia.
		•All software should be commercially licensed versions or open source and must be

		supported by the OEM / Bidder
d.	**Job Scheduler**	Open source and commercial tools options should be quoted such as: Maui Cluster Scheduler or Moab Cluster suite, PBS, OpenPBS tools, platform LSF, TORQUE, Condor etc A comprehensive web portal that would allow users to a) choose their required resources(CPU/RAM); b) compile their codes; c) monitor job queues; d) provide easy access to job related data, and has the capability to easily perform basic operations like stopping, suspending, resuming or re-queuing jobs etc. should be provided.
8.	**Benchmarks**	The bidder should carry out below listed benchmark programs on 5TF and 10TF configurations of the offered solution and submit the results achieved (with TFLOP count where applicable) in an output file, in the technical bid. 1. HPCC Benchmark:. (http://icl.cs.utk.edu/hpcc/) do only HPL 2. BioPerf code. (http://www.bioperf.org/) 3. Cbench: stress testing and analyzing cluster (http://sourceforge.net/apps/trac/cbench). 4. GROMACS (see GROMACS benchmark schedule below) An acceptance test, consisting of a 72-hour burn test should be carried out. The bidder should arrange to run the application benchmark including LINPACK & mentioned software and submit a report. While submitting report make sure that all the timings outputs and makefiles (wherever applicable) are submitted in a digital format.
9.	**Installation**	The system should be OEM certified i.e. all hardware components namely utility nodes, head nodes, compute nodes or any other cluster specific server hardware, interconnect switches, cables and storage set-up as well as all software components namely operating system, cluster management software, compilers, libraries are to be installed and configured.
10.	**Site requirement**	• Detailed site preparation document should be provided. • Details of power consumption, heat dissipation and cooling requirements should

		be specified along with the detailed total cost of ownership for a period of 3 years. • Space and weight requirement should be specified. • The total power requirement to operate cluster hardware, the Uninterrupted power supply (UPS) and the precision air conditioners (PAC) should be clearly mentioned. Integrated chilled-water based in-rack/equivalent cooling of racks should be proposed.
11.	**Expected power rating**	Total of 95KW max. for the entire solution including cluster hardware during peak usage.
12.	**Acceptance**	Benchmark results to be demonstrated at the time of acceptance, after onsite burn test, should be within +3 % time deviation from OEM/bidder site benchmark time in order to release the balance payment.
13.	**Support**	3 years on site support and warranty must be provided directly by the OEM. Warranty Terms should be 24 x 7 (same day response). Optional pricing for 4th year and 5th year support & warranty must be quoted. The Bidder should have a technical support center located in Mumbai/ Pune with at least 2 technically qualified professionals in HPC systems installation/commissioning/product integration and support. Bidder should provide details of the cluster architecture and all other required information to the successful bidder of the storage solution (Part 2) Response time for head node and switch failure should be 4 hours or same day to minimize cluster down time Response time for all other non-essential faults and failures such as corrupt compute node etc., should be next business day.
14.	**Training**	Bidder shall provide user and admin training to IISER-Pune at site of minimum 02 days

GROMACS Benchmark schedule

Compilation of GROMACS 4.6.3

Visit: http://www.gromacs.org/Downloads for download of GROMACS 4.6.3.

Specify the operating system (version number) on which GROMACS 4.6.3 will be compiled.

Specify any additional environmental variables used during the process of compilation.
Specify all options used with every command of the compilation.
Specify the exact cmake version used (CMAKE version 2.8.11.x is required)
Specify the libraries and compilers with respective version numbers used for compilation.
Important: mdrun executables (created from compilation) for running benchmarks for each run should be double precision.
Benchmark Information and instructions: * Benchmark system contains DPPC + water = 121856 atoms. * A twin-range group based cut-off is used, 1.8 nm for electrostatics and 1.0 nm for Lennard-Jones interactions. * Input files can be downloaded from:
http://www.gromacs.org/About_Gromacs/Benchmarks
DPPC zip file contains 3 input files.
* To run simulation runs: you can change the value of nsteps in .mdp input file to 50000
* No other change in input files is permitted.
(The use of double precision executable for all benchmarks should be explicitly mentioned before the below table. If this statement is not mentioned all benchmarks will be considered as invalid)
* Using the information from your output files of each simulation run, complete the following table:

CPU Cores	Number of nodes	Number of nanoseconds/day
480		
240		
120		

Please supply the output files for each simulation run.

Part 2:
Storage

IISER is looking for an open source storage solution to fulfill the needs to backup, archive and sharing of data across the network. The solution should accommodate data flow over Ethernet network or InfiniBand (IB) 4x QDR/FDR10 or better network via NFS, CIFS, FC or iSCSI. The expected size of storage is 200TB (pricing for 150TB should also be quoted) with an ability to expand to 2.5 Peta Bytes (PB) or greater for further needs. A schematic architecture of the SAN storage is given in Figure 2 below.
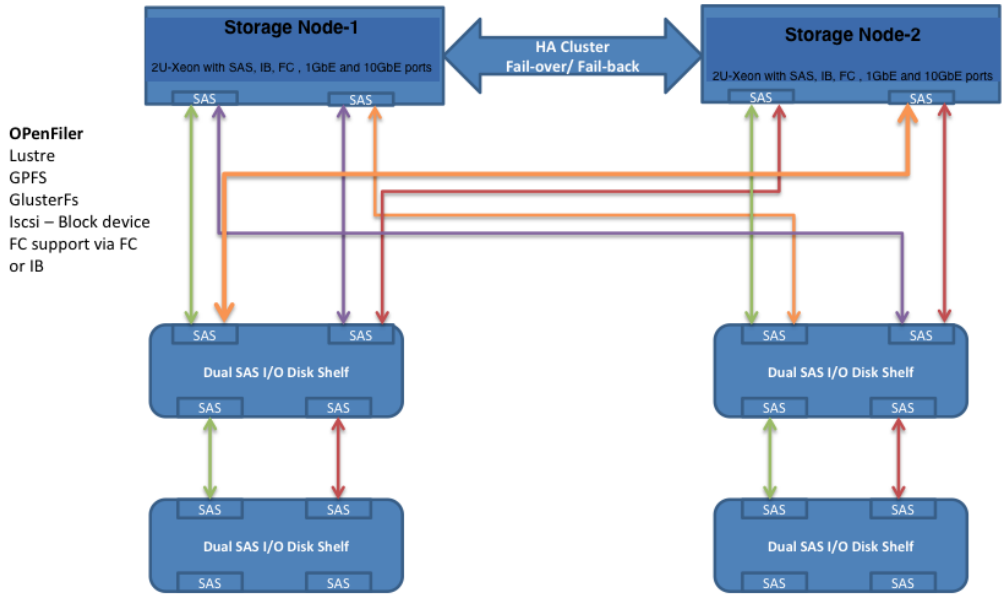
This storage is proposed for the IISER Biology department and would serve as storage for data produced by researchers in the department. The HPC would be among one of several computers connected to this storage. Except for the HPC, which would connect to the storage via IB interconnects, all other connections would be over the existing 1Gb/s LAN. The backup software should automatically backup data from specified machines, running on a variety of operating systems, periodically, based on policy. IISER is seeking a solution where it could flexibly assign/create and dedicate, with a user friendly interface, variable quantities of disk space to PFS, NFS and archive. These needs are perceived to change over time.

200 TB (or 150 TB) usable space upgradable to 2.5 PB		
Sr No.	Features	Storage Specifications
1.	Intended Use	1. Hosting Parallel File System. 2. File sharing via NFS and CIFS. 3. Disk based backup & archival system. 4. Block devices via FC or iSCSI.
2.	Controllers	Minimum Two storage controllers/nodes in active/active high availability configuration seamlessly integrated with file system to achieve requested capacity & performance. These storage controllers/nodes should be directly connected to disks or disk shelves via a SAS multipath connectivity with ability to be controlled by any controller. There should be 2 ports of each 1Gbps, 10Gbps and IB network with a separate port for management. System should have ability to add more network and IB ports as per need.
		All storage controllers/nodes must support

3.	Operating System	Linux based operating system. Parallel file system should be Lustre/GPFS/IBRIX/Gluster FS and POSIX compliant or equivalent or better. Must support NFS (version3 and above), CIFS, iSCSI protocols.
4.	Software features	Support integrated automatic RAID Manager, disk error checkup and mark them failed before data loss, error or warning alerts via email, SNMP and agent based monitoring; Automatic error reporting via email. Snapshot or other back up tools. Support for parallel file systems. If separate licensing is required for these features, it must be included in the bid. Our preference would be for Open Source solutions. IISER expects that all open source solutions are supported by the bidder and/or the OEM. The bidder should provide the undertaking for such support. Any and all costs relating to the support should be included in the bid.
5.	Protocol Support	NFSVersion3, CIFS, iSCSI over UDP and TCP. Parallel File system protocol for high speed with RDMA over QDR/FDR10 IB or equivalent or better interconnect.
6.	Disk Type	Archival & NFS Storage should be configured with 2TB/3TB or higher SATA HDDs (6Gbps or higher, 7200 RPM or higher). Parallel File System Storage and block device should support being configured with SAS (15K or 10KRPM or better) and/or SATA (7.2KRPM or better) to deliver required capacity and performance. For 150 (and 200) TB usable solutions, IISER would want the following partitions - 25 TB (30 TB) usable 10K RPM or better SAS drives and the rest 125 TB usable (170TB) in 7.2K RPM or better SATA drives.
7.	Redundancy	Disk Drive, power supplies (220V) and fan modules should be redundant and hot swappable. Should be able to protect data against simultaneous double disk failure in the same RAID group. System should not have any Single Point of Failure (SPOF). All storage servers/controllers for Lustre/GPFS/IBRIX must be highly available with support for automated fail over in case of failure of one. The meta data should be served from SAS @ 15K RPM disks.
8.	Raid Levels	RAID Level 6 or equivalent with 3 spare disks per disk type. Should support protection against double disk failures in same RAID

		group that needs to be demonstrated at the time of installation.
9.	Performance Requirement	Throughput requirement of aggregate 4GB/Sec or better WRITE on the offered solution; 512 Mega Byte/sec or better end to end throughput for NFS file system. Should be scalable to 8GB/Sec or better in the same system architecture. There should not be more than 25% degradation of performance in case of any component failure in the storage.
10.	File Locking	File Locking for Data protection from corruption while sharing files between UNIX and Windows users.
11.	File System Size	Parallel File System & NFS storage should independently support up to 2.5 PB or higher usable, single unified addressable space.
12.	Footprint	Storage for parallel file system, NFS and archival/back up must not consume more than 1 standard 42 RU racks for storage and associated servers.
13.	Rebuild Time	Should not take more than 15hrs to rebuild failed disk. This needs to be demonstrated at the time of technical evaluation. Preference will be given to the system that has special features to reduce rebuild time. Vendor must specify the maximum number of simultaneous rebuild tasks the storage system supports and it should not be less than 2 simultaneous tasks.
14.	Management Interface	Browser based management GUI. Should be compatible with MS Internet Explorer and Mozilla Firefox
15.	Quality of Service	Should offer feature to display throughput/Band width to hosts via web browser.
16.	Management Interface	Should have management tool to monitor status and health of the storage system, like Performance, throughput, Network Connection, controller health etc.
17.	Scalability	Storage system must offer scalability of storage capacity up to 2.5 TB usable space without adding extra controllers.
18.	Benchmarks	Open source IOZone or IOR must be used to demonstrate Aggregate performance of the storage system. They must be run with many to one distribution of large sequential read and write of 1MB I/O block size.

		Benchmark must be run in following modes with data size greater than 2.5 times the node memory: 1. All controller & disk LUNS working; 2. At least one RAID6 LUN is in rebuilding mode; Performance in both scenarios should not differ by 25%
19	Integration with the HPC	The storage should be compatible with HPC (part 1 of the tender). The responsibility of ensuring smooth integration with the HPC rests with the vendor of the storage/backup solution.
19.	Fault Tolerance	Storage system must support fault tolerance in case of failure of disk, shelves, backend cables and a single controller out of active-active controller pairs. Performance of the storage system must not degrade more than 25% of the peak 4GB/Sec number if such failure occurs.
20.	Data Integrity	Storage system must support detection of Silent Data Corruption by doing parity checking on write and read operations both. There must not be performance impact of more than 5% because of parity checking on read and write operations. System should also support fixing of corruption in case of parity mismatch.
21.	Network Protocol	Parallel File System must support RDMA over QDR/FDR10 IB/equivalent or better interconnect network. NFS and CIFS based storage must work over either IB/equivalent interconnector or 1G Ethernet network.
22.	Archival Storage	Storage system must support separate archival & backup storage capable of moving data on & off parallel file system. Archival storage must support compression and must be based on 2TB/3TB SATA 7K RPM spinning disks or better. It must be available to users via IB or 1G Ethernet network interface. Storage with technology that spins down unused disks is desirable. Storage solution should provide ability to move and restore files from parallel file system based on policies.
23.	Pricing	Pricing for 200TB (pricing for 150TB should also be quoted) total usable must be provided with all the features mentioned above with 3 years of support included in the bid price.
24.	Years of support	3 years on site support and warranty must be provided directly by the OEM. Warranty Terms should be 24 x 7 (same day response). Optional pricing for 4th year and

		5th year support & warranty must be quoted. The Bidder should have a technical support center located in Mumbai/ Pune region with at least 2 technically qualified professionals to support the provided storage solution. Response time for head/controller node and switch failure should be 4 hours or same day to minimize system down time Response time for all other non-essential faults and failures such as corrupt SAS/SATA discs should be next business day.
25	Acceptance	Benchmark results to be demonstrated at the time of acceptance, after onsite test, should be within +3 % time deviation from OEM/bidder site benchmark time. In addition, the backup software should automatically backup data from specified machines, running on a variety of operating systems, periodically, based on policy in order to release the balance payment.