INDIAN INSTITUTE OF TROPICAL METEOROLOGY
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Sub: **Minutes of the pre-discussion meeting for purchase** of "High Performance Computing (HPC) solution at Operational & Research Institute in MoES, Govt. of India" **held on 22/09/2016** at Aryabhatta Hall, at IITM, Pune.

The **pre-discussion meeting for purchase** of "High Performance Computing (HPC) solution at Operational & Research Institute in MoES, Govt. of India)" was held on 22nd September, 2016 at 1000 hrs. at IITM, Pune. The representatives of the following firms attended the pre-discussion meeting.

(1)   M/s. CRAY Supercomputers (India) Pvt. Ltd.
(2)   M/s. Hewlett Packard Enterprise
(3)   M/s. Altair
(4)   M/s. Mellanox Technologies
(5)   M/s. DDN India Pvt. Ltd.
(6)   M/s. SGI
(7)   M/s. Lenovo India Pvt. Ltd.
(8)   M/s. RSC India
(9)   M/s. Emerson Network Power (India) Pvt. Ltd.
(10)   M/s. NetApp India Marketing & Services Pvt. Ltd.
(11)   M/s. Huawei Telecommunications (India) Co. Pvt. Ltd.
(12)   M/s. Fujitsu India Pvt. Ltd.
(13)   M/s. Intel Technology India Pvt. Ltd.
(14)   M/s. Atos Bull
(15)   M/s. Dell Technologies

Committee went through the queries received from the various vendors and discussed each one of them in detail. Additional queries received after the due date were also addressed in the spirit of the EOI, with due consensus of all present. The committee arrived at appropriate responses for the queries. The queries and their responses are placed at Annexure-I.

The queries and their responses were shared and discussed with all vendors. The committee observed that there were certain common queries for which a clarification is required and same is being elaborated below;

a. In EOI Clause No. 3.0 i "Supply and Installation of an additional research HPC System" is to be read as "Supply and Installation of an additional research HPC System/Solution".

b. Upon request by the vendors, committee clarified that IITM on behalf of MoES shall enter into mutually agreeable Non-Disclosure Agreement (NDA) with vendor upon his request for specific sensitive third party information as classified and submitted in response to this EOI. In such case, vendor has to clearly specify the details of information to be covered under NDA.

c. The benchmarks output to be submitted by vendors shall include output files of Final Integration time step and all log files of the execution.

d. The vendors can continue to interact with IITM (point of contact as mentioned in EOI) for benchmark related queries only. However vendors were advised to consolidate and raise their queries. No queries shall be entertained after 14 October 2016, 1700 hrs.

#	Category	Question	IITM Response
		Reply to the queries raised by M/s. ATOS	
1	Benchmarking related	How has IITM defined FLOPS for the purpose of this EOI?	Rpeak (DP) on cpu based HPC System.
2	Benchmarking related	What is the basis for arriving at 10 PFLOPS capacity?	Arrived on the basis of applications and science plans of MoES considering existing systems available with MoES
3	Benchmarking related	Is it possible to have, if the option of 3 sites is finally chosen, which applications will be running in which site as well as the average CPU time per each application on a quarterly basis?	Further details in RFP
4	Benchmarking related	Do all the applications provided for benchmarking have the same priority and importance within the production environment?	Yes for this EOI
5	Benchmarking related	Regarding uptime could you clarify the difference between 95% on 12 months § c) p7 & 99.5% on quarterly basis § j) p10	As per EOI
6	Benchmarking related	How many IITM staff are dedicated (or Full time equivalent) on a 12 months period to the optimization of the following codes: ROMS, LETKF,WRF,GSI,GFS,CFSV2,DNS,UM1024,UM512?	All concerned ESSO-MoES Institutes are involved
7	Criteria of choice	Would that be possible to have details regarding the criteria and weights associated that would allow IITM to choose the suitable proposition? e.g. - Technical proposal (Architecture, system config, etc.), - Performance benchmarks (weight for each benchmark) - Storage (Weight for solution & Performance provided, both for Scratch & Archive) - Typical (Application based) Power usage – If TCO is requested, would that be possible that IITM provide an equivalent computation model of TCO to be to all competitors?) -Support personnel - Service levels - Added value (e.g. Long term collaboration, dedicated application expert to IITM, etc.) - Acceptance and term of conditions	Details in RFP, however vendor can give relevent information, if any in response to this EOI.
8	General	What would be the likely dates for signing of the contract and the availability of the Data Center sites?	Details in RFP

9	General	Can we get an extension of 2 weeks for submission of the EOI response along with the benchmark?	No extension. Schedule is as per EOI
10	Infrastructure related	All details available on current (to be re-used) infrastructure (environmental, mechanical, cooling and electrical details) would be appreciated - air and water cooling capacity, - existing max flow rate possible - Max Inlet water temperature - Room temperature - Room layout - Existing electricity (Amps, tri or single phase, etc.) - Max Floor load (If possible, could you provide the standard that qualifies the floor in an international standard?	Pls do site inspection
11	Storage	In case the option of the 3 sites would be finally chosen, (a) could you let us know what would be the network connections between the 3 sites (Black fiber, resiliency, etc.)? All details regarding the network between the 3 sites would be appreciated. (b) Do you plan to have a tiered architecture (Level 0: Disk scratch, Level 1: HSM disk, Level 2: HSM Tape or Cache) on each site? (c) would it be possible, depending on the sizing requirements of the 3 sites, to own a different architecture? Example } Main site • Level 0: Scratch (Disk) • Level 1: Disk (HSM) • Level 2: Tape(HSM) } Smaller sites: • Level 0: Scratch (Disk) • Level 1: Disk (Backup) • Level 2: Tape (Backup)	Details in RFP, however vendor can give relevent information, if any in response to this EOI.

| 12 | Storage | Could you explain what would be the driver (in addition to the capacity) to size the scratch and the archive system to support efficiently IITM production?
} Scratch
- Throughput based on synthetic benchmark?
- IOPs?
- Metadata operation
- Other?

} Archive
- Capacity on Level 1 (Disk, HSM), Capacity on Level 2 (Tape, HSM) & Expected performance (access time for put and/or get, etc., nb of mounts per hour depending, nb of concurrent access per amount of time, etc
Or
Data that would allow us to properly size Level 1 & Level 2 (See below some idea of information needed – List not exhaustive)
Total number of expected files that would go on the archive.
} Level 1
- % of files that remain permanently on disk (Never goes on tape)
- Average file size (e.g. Small files)

} Level 2
- % of files with a single copy + average file size
- % of files with a double copy on tape + Average file size

} Maximum Input/Output daily flow rate (Could also be average per hour)
} Split of files in COS; Expected access performance per COS.
} Etc. | Details in RFP, however vendor can give relevent information, if any in response to this EOI. |

Sl #	Tender Section	Tender Clause	Clarifications/Changes Requested	IITM Remarks
		Reply to the queries raised by M/s. HP		
1	**Page 4**	**200 Petabytes storage in the ratio of 1:3 Disk:Archive (Storage in a Phased manner)**	For the Archive portion, kindly advise the ratio of disk to tape.	Details in RFP, however vendor can give relevant information, if any in response to this EOI.
2	**Section 3.0 point k, page 6**	**This system shall be always kept state of art during the contract period and technology refresh interval should not be more than 6 months.**	This request is to be aligned with Industry technology refresh cycle.	As per EOI and RFP
3	**Section 3.0 point k, page 6**	**Setting up Data Center**	Is there a specific Tier level to be considered for Data center Design? Please clarify the certification level expected (TIA 942 or Uptime Tier)	Details in RFP, however vendor can give relevant information, if any in response to this EOI.
4	**Section 3.0 point k, page 6**	**Setting up Data Center**	Kindly advise on the available DC space across each of the 3 sites.	Pls do site inspection at IITM, Pune , NCMRWF, Noida and INCOIS Hyderbad. These are the tentativ site as of now
5	**Proforma I - Point 6**	**Certifications**	Kindly advise on the Certifications expected.	Industry standard certifications applicable to the proposed solution and available with vendor should be furnished.
6	**Section 5.0/5.1, Page 7,8**	**Benchmarks Related**		
a		**Benchmarks Related**	As per EOI document, each code is to be benchmarked on defined number of cores, please confirm if we need to run the benchmark for the given core count ?	As per Readme file

b		**Benchmarks Related**	As per EOI document, estimated size for the most compute intensive application is estimated around 200TF. Please confirm if that code need to be run on the defined cores as in README or at 200TF?	As per Readme file
c		**Benchmarks Related**	**<u>Verification procedure for all codes:</u>**	
d		**Benchmarks Related**	1. For results verification, should the md5sum for output files match between standard results files (provided in the code distribution) and the newly run results or between the 2 newly run results?	Between 2 newly runs.
		Benchmarks Related	2. If required, should the RMS error be computed between the standard result (from the results files provided in the code distribution) and the new run result?	RMSE is to be compared from the results files provided in the code distribution and the new run result
e		**Benchmarks Related**	Benchmarking should be done with **HT=on or HT=off**	Vendors choice but details to be submitted
f		**Benchmarks Related**	Can we change compiler optimization flags in addition to the flags mentioned in the README file.	As per EOI. Vendors can choose to change within EOI specs but details to be submitted
g		**Benchmarks Related**	Please specify the output files to be submitted for each application (applicable for all codes)	Output of Final Integration time step and the entire log of the execution.
h		**Benchmarks Related**	**LETK MOM4**	
			1. Readme does not mention about using NetCDF and NCO. But the compile script mom4p1_solo_compile.csh needs NetCDF and letkf_prep.ksh, letkf.ksh need NCO. Please suggest if there are any specific versions of NetCDF and NCO to be used?	Outputs provided in EOI are produced using NetCDF verion 4.2.1 & NCO version 4.4.2. However vendor is free to use later versions.

			2. Readme mentions to run LETKF-MOM4.1 every minute using the combination rocoto script and crontab. How/when would the cronjob stop firing the jobs through rocoto?	After writing output 56 ensembles, it will stop firing jobs.
			3. Test results in Readme of LETKF-MOM4 has "No of cores=3000". We have gone through the logs provided by IITM as well as the scripts for running the model but we don't see any run using 3000 cores. Run.xml.rocoto.letkf script sets MODEL_CORES to "64" and LETKF_CORES to "448". Do we need to change only MODEL_CORES to 3000?	The number 3000 is total number of cores used by all fired jobs. Please follow the readme files for rest. There is no need to change MODEL_CORES.
			4. Test results in Readme of LETKF-MOM4 indicate that the code was run using No of threads=2. We have gone through the logs provided by IITM and could not find run that used OMP_NUM_THREADS. Nor the build process indicate building with threads. Please clarify if this code is to be run in hybrid mode with OMP_NUM_THREADS=2?	The code was run as pure MPI. So use OMP_NUM_THREADS=1
¡		**Benchmarks Related**	**GFS**	
			1) In Step 10: Lib sp, sp_v2.0.1	
			sh makefile.sh is not present in folder *$GFS/para/lib/sorc/sp_v2.0.1*.	
			Please suggest which file to use.	Use makelibsp.sh for compilation.
			2) Sample output folder for GFS is run with 1534 cores (767 MPI process with 2 OpenMP threads).	

			Do we have to run GFS jobs on 1534 cores (767 MPI process with 2 OpenMP threads) OR 3068 cores (767 MPI process with 4 OpenMP threads)?	767 MPI cores with 4 OpenMP threads.
j		**Benchmarks Related**	**GSI:**	
			Makefile of w3emc_v2.0.3 refers to sigio_big_4 library. But there is NO source code building this library sigio_big in $GFS/v-14/nwprod/lib/sorc. The three sigio modules present in $GFS/v-14/nwprod/lib/sorc is	
			(1) sigio (2) sigio_v2.0.1 (3) sigio_v2.0.1-test	
			Please let us know the source code for sigio_big library.	Get the source code for sigio_big_4 from $(GFS_DRI)/para/lib/sorc/sigio_new
			prepobs_prepdata.fd and relocate_mv_nvortex refers to the library -lsp_v2.0.1_d while the source code $GFS/v-14/nwprod/lib/sorc has "sp" and "sp_v2.0.2". There are couple of other modules referring to "-lsp_4" or "-lsp_d" but compilation of sp fails. Please let us know if we are supposed to use sp_v2.0.2 instead of sp_v2.0.1 or sp.	use version sp_v2.0.2
			prepobs_prepdata.fd refers to sigio library from sigio_v2.0.1-test. But sigio_v2.0.1-test does not compile successfully, please suggest if we can modify the compilation script ?	Use/compile the script 'run' under $(GFS_DIR)/v-14/nwprod/lib/sorc/sigio_v2.0.1-test

				No, For GSI mention => 1+1+1+1+220=>224 cores (in 5 different dependent job scripts) For GFS=> 240+240+240=>720 cores (For 3 parallel job scripts) NOTE: Refer README for clarity on dependent jobs and GFS jobs in Running GSI and GFS section
			Should number of cores mentioned in gdas_anal.ll and GFS_fcst_opr.ll to be changed to 224 and 720 respectively? The core counts mentioned in these files and log files provided are different as compared to README.	
k		**Benchmarks Related**	**DNS:**	
			The results file "fort.20" contain values that are almost zero. Do we need to verify the md5sum for this file as well?	No need to check fort.20. Ignore it.
l		**Benchmarks Related**	**CFS:**	
			The compilation for global_chgres.fd indicates use of bacio library. But there are two bacio source codes provided (1) $(CFS_DIR)/sorc/global_chgres.fd/lib/sorc/bacio (2) $(CFS_DIR)/sorc/global_chgres.fd/lib/sorc/bacio/src. Can you please confirm if we have to use the second one for building global_chgres.fd?	Please use bacio source from $(CFS_DIR)/cfs.v2.1.18/lib/sorc/pmb/codes/nwprod/lib/sorc
		Benchmarks Related		
			For building global_chgres.fd, page 2 of README indicates use of "libsigio_4.a" supporting library while Page 7 indicates use of "-lsigio_big_4" library. Can you please confirm if –lsigio_big_4 built with $(CFS_DIR)/sorc/global_chgres.fd/lib/sorc/sigio module is to be used for global_chgres.fd?	Use the library as given in page 2 of CFS README file.

m		Benchmarks Related	**UM:**	
			1. Test results in the README (Pg. No. 7) are provided only for Intel v14x compiler, but README suggests to compile with Intel 16x also. Please let us know which Intel compiler version to use?	The standard output given is with v. 14 . However vendor is encouraged to submit results using any other compiler.
			2. grib_api version mentioned in the README (Pg. NO. 1) is of version 1.9.18. UM configuration script uses 1.14.3 version. Please suggest the grib_api version to be used.	Use 1.14.3 version.
o		Benchmarks Related	**GFS, UM and LETKF-MOM4.1:**	
			The README of UM, GFS and LETKF-MOM4 has results table with "No. of cores" mentioned in one column and "No of threads" in another column. For UM1024, it mentions 3072 cores run on thread=2. Does this mean the UM1024 should be run on 3072 core cluster ?	Yes.
			Is Hyperthreading ON for the runs whose runtime is listed in the README files under the column "Timings in sec" for the three Hybrid codes (MPI + OpenMP) GFS, UM and LETKF-MOM4.1?	HT was ON for these runs.
p		Benchmarks Related	**WRF:**	
			1. There are two submission script provided, one in WRF.tar and the other in wrfinput.tar, Please suggest which submission script to be used?	Please use scripts in WRF.tar.

			2. wrfinput.tar includes the input file for the second domain also. Simulation is run for single domain with the namelist.input provided. Can second domain input file (wrfinput_d02) be ignored?	Yes. Ignore.

Reply to the queries raised by M/s. LENOVO

Tender Clause Number	Tender Clause	Change / Clarification Requested	Reason	IITM Remarks
Page 0	Last date of receipt of EOI at IITM, Pune : 25th October 2016 at 1200 hrs. Opening of Envelope (Expression of Interest) : 25th October 2016 at 1500 hrs.	Last date of receipt of EOI at IITM, Pune : **25th November 2016 at 1200 hrs.** Opening of Envelope (Expression of Interest) : **15th November 2016 at 1500 hrs.**	The EOI is seeking extensive details on the HPC Solutions and 9 different weather model benchmark as part of the response. The input data is nearly 4 TB and we need to ship the storage media to remote location (outside country) for conducting the benchmark. Extension by another 40 days will be very helpful to complete all the add-on logistics.	No extension. Schedule is as per EOI
Page 4 : 2.0	Purpose of this EOI : This EOI is for augmentation of existing computing power available within MoES to the tune of 10 Peta Flops compute (99% CPU and 1% Accelerators) and 200 Petabytes…	1. Please elaborate on the scope of augmentation. 2. Please do let us know the estimated available power , cooling and civil infrastructure for running the compute and storage system.	As this project is a turn key HPC solution knowing the details of electrical and civil infrastructure will be very much helpful for sizing the complete ecosystem.	Pls do Site Inspection
Page 5 : 2.0	storage in the ratio of 1:3 Disk:Archive (Storage in a Phased manner). The total capacity may be distributed among ESSO-MoES Institutes at three sites. Site wise distribution details shall be made available in the RFP document.	**Question :** In 1:3 Disk : Archieve . Does Archieve means Tape media ?		Details in RFP, however vendor can give relevant information, if any in response to this EOI.

Page 5 : 3.0 a	For the purpose of this EOI, "vendor" or "tenderer" or "bidder" means the tenderer who is Original Equipment Manufacturer (OEM) of HPC system.	For the purpose of this EOI, "vendor" or "tenderer" or "bidder" means the tenderer **who would be forming a consortium** with Original Equipment Manufacturers (OEM)s of the various components of the HPC system.	HPC system constitutes of many components. Particularly for this HPC requirement, compute and storage are relatively equal in terms of volume and commercial value. So we request MoES to allow consortium based partnership bidding.	As per EOI
Page 6 : 3.0 h	It is highly desirable that all the software licenses that are supplied within the scope of work are right-to-use perpetual licenses for an unlimited number of concurrent users and should be supported by respective OEMs in the name of respective MoES Institutes. For e.g.: compilers, libraries, parallel file system etc.	It is highly desirable that all the software licenses that are supplied within the scope of work are right-to-use perpetual licenses for an 25/50/75 number of concurrent users and should be supported by respective OEMs in the name of respective MoES Institutes. For e.g.: compilers, libraries, parallel file system etc.	Most of our software vendors do not support the the unlimited license. Even unlimited option is available it will be at a huge premium. We request you to specify a limited number of concurrent users.	As per EOI
Page 6 : 3.0 i	Supply and Installation of an additional research HPC system which is atleast 2 percent (out of which 50% CPU and 50% Accelerator) of the total capacity as a standalone HPC with the provision to update with latest technologies in terms of processor, interconnect, storage, software,etc. This system shall be always kept state of art during the contract period and technology refresh interval should not be more than 6 months. The purpose is to keep MoES abreast with latest technology enabling them for better planning for future requirements.	Supply and Installation of an additional research HPC system which is atleast 2 percent (out of which 50% CPU and 50% Accelerator) of the total capacity as a standalone HPC with the provision to update with latest technologies in terms of processor, interconnect, storage, software,etc. This system shall be always kept state of art during the contract period and technology refresh interval should not be more than 12 months. The purpose is to keep MoES abreast with latest technology enabling them for better planning for future requirements. Question : 1) Please do let us know the scope of disposal of the old hardware. 2) Also need clarification on for how many years system refreshment is to be carried out by vendor/Bidder.	Considering the stability of the devices (Processor , Memory , Server, Interconnect and Storage) we recommend MoES to extend the technology refresh system time frame.	As per EOI and pre-discussion minutes (1) details will be in RFP (2) Contract Period

Page 6 : 4.0 a	For the purpose of this EOI, "bidder" means the tenderer who is Original Equipment Manufacturer (OEM) of HPC system. While OEMs may take support from System Integrators, the final Sales, Support and Services must be provided directly by OEM.'	For the purpose of this EOI, "vendor" or "tenderer" or "bidder" means the tenderer **who would be forming a consortium** with Original Equipment Manufacturers (OEM)s of the various components of the HPC system.	HPC system constitutes of many components. Particularly for this HPC requirement, compute and storage are relatively equal in terms of volume and commercial value. So we request MoES to allow consortium based partnership bidding.	As per EOI
Page 6 : 4.0 b	The bidder must have executed supply/system integration (minimum 750 Teraflops Rpeak CPU only on a single system) of similar (architecture similar to be quoted in this bid) HPC solutions in the past 3 years including High Performance Computers running operational weather, climate, ocean and earth system models. Duly certified documents authenticating the above aspect should be enclosed in the bid document such as acceptance certificate, installation report, institute profile where such system was installed and reference from the institute etc. without which the proposals shall not be considered.	Question : As per the legal agreement with IBM and Lenovo, all IBM x series servers will be considered as Lenovo x Series servers. May we request MoES to cosider IBM system x based installations of 750 TF within 3 years to be considered as Lenovo system x servers.	On September 29, 2014, Lenovo announced that all regulatory conditions for its acquisition of IBM's x86 server business have been satisfied and the anticipated closing will be effective on October 1, instantly making the company the #3 provider of x86-based server hardware, software and services. Lenovo acquired nearly 6,500 new colleagues in more than 60 countries, and a best-in-class business that provides greater access to the $225 billion worldwide enterprise IT opportunity and helps fuel its PC+ investments worldwide. x86 systems, operations and employees were integrated into Lenovo from October 1st 2014.	If the bidder has executed supply/system integration (minimum 750 Teraflops Rpeak CPU only on a single system) of similar (architecture similar to be quoted in this bid) HPC solutions in the past 3 years including High Performance Computers running operational weather, climate, ocean and earth system models. As per EOI.

Page 6 : 4.0 e	The bidder should have experience in running and supporting the global atmospheric, oceanicand earth system models on at least 750 Teraflop system operationally for at least one year. The bidder should submit duly certified supporting letter from the buyers for authenticating above aspect	Lenovo has been providing back end services to IBM for running and supporting HPC customers.We would request MoES to consider the support provided through IBM (with PO from IBM indicating the customer and nature of HPC support) for a 750TF cluster in operation for 1 year as an acceptance for this clause		If the bidder has experience in running and supporting the global atmospheric, oceanicand earth system models on at least 750 Teraflop system operationally for at least one year. As per EOI.
Page 7 : 5.0	The bidder has to run benchmaks on 200 TFlops for the most compute intensive application in the and provide the purchaser with the outputs along with relevant logs. . The benchmarks should be run by the OEM only who is responding to this EOI. Benchmark submitted by any third party will not be accepted. MoES may request for demonstration of successful porting and running of the applications on OEM's HPC system.	Considering a 200TF is a very large system specifically for a benchmarking purpose , we would request you to allow us to do the benchmark on 100TF and extrapolate the same to 200TF		No . As per EOI

| Page 8 : 5.0 | A benchmark suite has been prepared and is available with the EOI on a CD/DVD/USB device along with the readme, which contains the instructionsfor running these benchmarks. | Question : README file have results from the existing MoESAaditya (Intel SandyBridge Processor based cluster) . Are we expected to share the performance for the same core count using the proposing system as per the test result or equivalent compute power in TF? As per the shared results, MOM4 and UM-1024 requires 3000 cores (Translating to > 100 TF). However all other codes demands less computing power compared to the previous one. Requesting you to allow us to use 100TF for MOM4 and UM-1024 (ie. 100TF as maximum compute capacity). Question :The output files and the validation method is not clear for most of the models. Please share the precise steps for the validation of output. | | Minimum core count should be as per the Readme files. Results with Additional cores can also be submitted. As per EOI and readme files (The details of validation method is given for CFS the same method shall be applied with appropriate variables for other Models.) |

Sl. No. in EOI document	EOI Point	Clarification sought	IITM Remarks
	Reply to the queries raised by M/s. RSC		
3e	The bidder should deploy domain application specialistsat each site of MoES for tuning, porting and optimization of application programs/models during the contractperiod. The number of such specialists will vary with Institute	Kindly specify the scope of work (SOW), no. of domain application specialists required per site and their minumum qualification/skillsets required	Details in RFP, however vendor can give relevant information, if any in response to this EOI.
3j	The bidder should collaborate and periodically (once in 6 months atleast) produce results in improvising the performance and scalability of MoES HPC applications with emerging technologies and practices		
3i	Supply and Installation of an additional research HPC system which is atleast 2% (out of which 50% CPU and 50% Accelerator) of the total capacity as a standalone HPC with the provision to update with latest technologies in terms of processor, Interconnect, storage, software etc.	Kindly specify the Accelertator type for e.g. Intel KNL. Also Intel's KNL is a full-fledged processor and not just an accelerator. In this scenario can we offer the complete 100% system on Intel KNL?	Details in RFP, however vendor can give relevant information, if any in response to this EOI.
3k	Setting up the data center required to host the proposed HPC solution. MoES will provide the physical civil structure and electricity power to host the proposed HPC solution and also provide details on other infrastructure available with each of the MoES institutes. The bidder is required provide and seamlessly integrate the necessary additional infrastructure in terms of DG power, UPS, BMS, necessary cooling, entire data center ecosystem as per the requirements of the proposed HPC solution	Kindly confirm if data center to be set-up by OEM only directly or it can be outsourced by OEM to its third-party data center implemantation partner	As per EOI and Bidder is responsible
4b	The bidder must have executed supply/system integration (minimum 750 Teraflops Rpeak CPU only on a single system) of similar (architecture similar to be quoted in this bid) HPC solutions in the past 3 years including High Performance computers running operational weather, climate, ocean and earth system models.	OEMs may have multiple 750TF installations but not specifically running operational weather, climate, ocean and earth system models. Hence request IITM to relax this capability clause limited to any HPC domain	As per EOI

4	The bidder should be able to demonstrate minimum 95% uptime over a period of minimum 1 year with documentary evidence for a system size of not less than 1 Petaflop Rpeak CPU only on a single machine	Request IITM to relax this clause to a 750TF Rpeak CPU single system to enable more OEMs to bid and offer more competitive bids to IITM	No change. As per EOI
4d	The bidder should have been in existence for at least five years. Bidder should have well established service/support centre in India with trained manpower (Minimum educational qualification should be Bachelor in Engg/Masters in Science and atleast 2 years of work experience in HPC environment) for maintaining the solution and capable of deputing these personnel at various ESSO-MoES Institute.	RSC Group has been in the market since 2009 with HQ in Moscow, Russia with 50% of all Russian Supercomputers and 3 on Top 500 WW list. In India, we have forged a formal JV agreement with M/s Mega Networks Pvt. Ltd. for sales, service/support and Make in India efforts. They have been in existence since 1995. They have a well established service/support centre in India with trained manpower expereinced in HPC across the country to support various ESSO-MoES Institutes. Hope these credential suffice this requirement?	No change. As per EOI
4e	The bidder should have experience in running and supporting the global atmospheric, oceanic and earth system models on at least 750TF system operationally for at least one year	RSC has experience in running and supporting Weather customers. We request you to relax the system requirement to xxTF operationally for at least one year	No change. As per EOI
4f	The bidder should have executed at least one collaborative contract with weather forecasting organization nationally/internationally. The collaborative works carried out should be demosntrated through published literature or technical documents	RSC has installations at key weather agencies like Roshydromet in Russia National Weather forecasting agency and St.Peters Polytechnic University which runs weather, climate, ocean and earth system models. Our engineers are enageged in system uptime and warranty support activites. We therefore request MoES to relax this clause to enable bidders like us to participate in your prestigeous project.	No change. As per EOI
5	Benchmark tests and appropriate size of system of at least 200TF	We request IITM to consider benchmark tests on a system of size 100TF and allow extapolation (to be reproduced by OEM). Also we request IITM to share a single point of contact person for any queries/clarifications during benchmark runs	No change. As per EOI

Reply to the queries raised by M/s. SGI		
#	**Question**	**IITM Response**
1	How is the 1% of accelerators being determined – by 1% of FLOPS or 1% of the compute units/nodes?	1% of total solution capacity as per RFP benchmarks.
2	Can you indicate how many application specialists are expected at each of the sites? (Reference – Section 3.e)	Details in RFP, however vendor can give relevant information, if any in response to this EOI.
3	The instructions for all benchmarks provided build with Intel MPI. Is Intel MPI required? Or may vendors use other MPIs?	Any MPI

4	The WRF model includes inputs for 2 domains – a top and a nested domain.
	
	   ---rw---r------r------1 swift users 5848052060 Jan 28 2016 wrfinput_d02
	   ---rw---r------r------1 swift users 3168483964 Jan 28 2016 wrfinput_d01
	   ---rw---r------r------1 swift users 897777220 Jan 28 2016 wrfbdy_d01
	However, the setting below in 'namelist.input' limits the model to just the top domain.
	
	   max_dom = 1,
	
	Is the WRF benchmark to be run with the top domain only? Or is the model to be run on both domains?
		Run the model for single domain.

Sr No	Page & Point No	Specification	Queries	IITM Remarks
1	4 & Purpose of EOI	200 Petabytes storage in the ratio of 1:3 Disk: Archive	Request you to kindly suggest throughput of PFS storage and metadata performance for both Disk and Tape	Details in RFP, however vendor can give relevant information, if any in response to this EOI.
2	4 & Purpose of EOI	200 Petabytes storage in the ratio of 1:3 Disk: Archive	Request you to kindly suggest if HSM is required for tape backup or Software based backup is sufficient with Policy driven and GUI interface	Details in RFP, however vendor can give relevant information, if any in response to this EOI.
3	6 & 3.h	scope of work are right to use perpetual licenses for an unlimited number of concurrent users and should be supported by respective OEMs in the name of respective MoES Institutes. For e.g. compilers, libraries, parallel file system etc.	PFS is either bound with no.of processors or no. of servers. We request you to kindly suggest if we can propose for the exact no of processor or servers required for 10 PF	Details in RFP, however vendor can give relevant information, if any in response to this EOI.
4	6 & 5.i	State of Art: 2 percent additional includes (processor, interconnect, storage, software ,etc)	Is Storage means external storage with 1 PB Primary storage: 3 PB of Archive, with similar building block	2% of HPC Compute , Disk Storage and software stack.
5	Warranty		How many no.of years of warranty looking for	Details will be provided in RFP.
6	Data Center	Data Center Size and Floor Space	We request IITM to please suggest Data Center size and Floor space available for the Entire HPC setup.	Please do site visit.

The table above has the overall title:

Reply to the queries raised by M/s. DDN

			Reply to the queries raised by M/s. CRAY	
Sr No	Page & Point No	Specification	Queries	IITM Remarks
1. Accelerators / Research HPC System				
			a. Do these refer to the same requirement?	As per EOI
			b. Is the additional research HPC system required at each site?	Details will be provided in RFP.
			c. Can the additional research HPC system be part of the main system with a distinct partition, instead of being a separate stand-alone system?	As per EOI a spearate stand alone system howver vendor can provide information regarding the proposed distinct partition.
	On page 4 & on page 6, item (i)	On page 4, the EOI asks for 1% accelerators in a production environment (99% CPU and 1% Accelerators) which does not need to be refreshed; and on page 6, item (i) asks for an additional research HPC system which is at least 2 percent of total capacity.	**d**. Is this a refresh or an augmentation? (If it is a total refresh, unfinished work on older technology may be jeopardized.)	As per EOI and pre-discussion minutes.
			e. The EOI asks for a refresh cycle of 6 months. Cray feels this is more frequent than necessary. Cray	As per EOI and pre-discussion minutes.
			recommends a refresh cycle of at least 18 months. (The requested 6 month refresh cycle is too short	As per EOI and pre-discussion minutes.
			to complete evaluation and/or there may not be new technologies available every 6 months.)	As per EOI and pre-discussion minutes.
2. Application Benchmarks:				
			a. What output files need to be returned along with the EOI response?	output files of Final Integration time step and all log files of the execution.

			b. Cray is not able to locate reference output data for WRF. Will that be made available?	Please see in dir $(WRF)/v-14/WRFV3/test/em_real or in $(WRF)/v-16/WRFV3/run
			c. The DNS benchmark has fixed MPI ranks. Would it be possible to modify this benchmark to permit scaling tests?	No. The MPI ranks are fixed to read input data files written by MPI I/O
			d. 'checksum' values of output files between two identical runs are unlikely to match. Differences at the machine precision level are expected. Please review this requirement.	Checksum is requires only for tar files.
			e. Will there be any different benchmarks (either applications or parameter files or problem size etc.) at tender stage?	Details will be provided in RFP.
3				
			Notification says, 'Storage in a Phased manner' on page no. 5, under 'purpose of this EOI'. Is this applicable for both disk and archive portions of 200PB storage?	Details in RFP, however vendor can give relevant information, if any in response to this EOI.
4				
			Setting up of the data center is under scope of work. Some broad definition is provided in point no. 3.0(k). Additional details such as design of civil structure, already available infrastructure are requested.	Pls do site visit. Further details in RFP.

Reply to the queries raised by M/s. FUJITSU		
Sr No	**Queries**	**IITM Remarks**
1	Please specify if there is need for license for UM benchmark. If yes then will it be provided by IITM.	Not required for this EOI and it should not be used / distributed for any other purpose.
2	As seen in most of the benchmarks, there are directories named v-14 and/ or v-16. And then there are RUN1/ RUN2/ RUN3..etc. It is most desirable for IITM to provide a comprehensive (or separate) document to help benchmarking engineers to build and run these benchmarking applications.	As per Readme and EOI.

Sr No	Clause No	Description	Queries	IITM Remarks
1	4b, page 7	1. The bidder must have executed supply / system integration (min. 750 Teraflops Rpeak CPU only on a single system) of similar (Architechture Similar to be quoted in this bid) HPC solution in the past 3 years including High performance computers runniung operational wheather, climate , ocean & earth system models. 2. Duly certified doccuments authenticating the above aspects should be enclosed in bid doccument such as acceptance certificate, installation report, institute profile where such system was installed & refrence from the institute etc.without which the proposal shall not be considered.	1. It is acceptable to share 750TF cluster reference which is a shared cluster resourse & is leveraged to run weather , climate, ocean & earth system models , the reference cluster is top 20 scale which is nearly doubble the scale as specified in EOI? 2. Does similar architechture refer to the processor family, interconnect or storage platform ?with the advancement in the technology can alternate options be considered ?	(1) As per EOI (2)As per EOI. However vendor can provide relevant information.
2	4e, page 8	The bidder should have experience in running & supporting the global atmospheric , oceanic and eath system models at least 750 TF system operationally for at least one year. The bidder should submit duly certified supporting letter from the buyers for authenticating above aspect.	Is it accepatble to share 750 TF cluster reference which is a shared cluster resources & is leavearaged to run weather, climate, ocean & earth system models. The reference cluster is top 20 scale which is nearly doubble the scale as specified in EOI.	As per EOI

3	4f, page 8	The bidder should have executed at least one collaborative contract with weather forecasting organization nationally/internationally. The collaborative works carried out should be demosntrated through published literature or technical documents	Can an academic reference be considered ?	As per EOI
4	page7	Pre-qualification criteria	As all the references considered are global reference there are challenges in producing all the supporting doccuments in such a case can it be supported by self declaration? Can a sytem integrator reference be considered for the pre-qualification criteria ?	Self certification/declaration is not allowed. As per EOI

Reply to the queries raised by M/s. HUAWEI		
Sr No	**Queries**	**IITM Remarks**
1	If the HPC facility is used for applied science to support institutes requirement along with the global atmospheric , oceanic & earth system models , but not only for specifically same purpose requested in EOI.	As per EOI
2	Should the PO shall be in the name of OEM name only? Or OEM HPC consultant/SI that is supporting the HPC is also accepted.	As per EOI
3	What's meaning of site operational support? System maintenance only or just installation by the OEM and then arranging SI to support the site as 1st level of contact.	As per EOI
4	What is the performance benchmark required from the HPC cluster	Details will be provided in RFP