

CSIR Centre for Mathematical Modelling and Computer Simulation

NWTC Road, Bangalore – 560037

<http://www.cmmacs.ernet.in>

Expression of Interest (Eoi) for High-end Visualization System

CSIR Centre for Mathematical Modelling and Computer Simulation, Bangalore (CSIR C-MMACS) is planning to setup a three tier high-end visualization system comprising of a high-resolution visualization wall, a remote visualization server and a back-end accelerator based simulation/data generator system. In this regard, CSIR C-MMACS is inviting Expression of Interest (Eoi) in the form of a proposal followed by a Pre Indent Conference (PIC) from interested firms having experience in related fields. Interested parties may submit a technical proposal, along with the response sheets filled on or before **14th December 2012, 11:00 am** to the Controller of Stores & Purchase, CSIR C-MMACS. The pre Indent conference (date will be informed later) will be held with only those who respond to this EOI and have submitted the proposal before due date, to discuss on the aspects of technology, features, design, technical parameters and other related issues with the technical committee.

On the basis of the above conference/meeting, the technical committee shall finalize specifications after knowing/obtaining details about relevant/available technology in the market suiting the requirement and R&D needs of CSIR. The committee shall also evaluate the credentials / technical capabilities / financial standings and track record of the companies / vendors attending the PIC and shortlist the firms for RFQ process. The decision taken by the committee will be final and binding on all the prospective bidders.

For more technical clarification, please contact Dr G K Patra (gkpatra@cmmacs.ernet.in) or Mr V Anil Kumar (anil@cmmacs.ernet.in).

A: SCOPE

The objective is to develop suitable specifications for setting up of a high-end visualization infrastructure comprising of a large high-resolution visualization wall, a remote visualization server and a back-end accelerator based simulation cum data generation system along with storage. The broad specifications are as follows.

Broad Specifications	
Tier-1: Large visualization wall with accessories	
a.	<u>Display Resolution:</u> Provide options for <ol style="list-style-type: none">30MegaPixel in 2D and 15MegaPixel in 3D30 MegaPixel in both 2D and 3D20 MegaPixel in both 2D and 3D
b.	<u>Wall Size:</u> Provide options for size of the visualization wall for the following different wall size (Maximize the display using appropriate sized screens) <ol style="list-style-type: none">17'x8'(WxH)18'x10'(WxH)20'x12'(WxH)22'x14'(WxH)

- c. Capability: 2D and 3D viewing on the entire display
- d. Display Technology: Provide all possible options for the following:
 - i. Tiled (LCD/LED) display, projection based display.
 - ii. Very thin seam displays (less than 5mm) or seamless displays (LCD/LED or Rear Projection).
 - iii. Propose options with curvature for maximum visibility for the people sitting (if possible).
 - iv. Identify the optimum suited option, maximizing the quality and minimization of space utilization.
 - v. Provide all technical information that can help in deciding a suitable display technology
- e. Interacting facility: Propose all possible interactive devices and mechanisms including touch screen, controller touch table and capability to add multiple touch controllers.
- f. Features:
 - i. Facility for more than one input source as PIP on Display wall from the visualization cluster
 - ii. Position and scale any source on the wall either full screen or in a small portion,
 - iii. Disable and enable source display of sources on wall
 - iv. Inbuilt PIP video conferencing on Display wall
 - v. Support for expanding the number of input and output video sources
 - vi. Capability to control using multi-touch tables using gestures as an option
 - vii. Facility to apply filters for scaling like cubic, bicubic etc on top of the video sources to be finally output
- g. Associated Hardware: Propose all necessary hardware (including the type and speed of connectivity to the back-end system, required to take input from the visualization server and provide flexible windowing capability).
- h. Additional Facility: Integrated multiparty video-conferencing, teleconferencing and web casting facility (propose appropriate numbers of cameras and other related hardware infrastructure)
- i. Room interior options (such as typical sitting arrangements, lighting facility etc.) for maximum usability should also be suggested by the vendor for housing the facility in a 1500 (30x50) sq ft area.

Tier-2: Remote Visualization Server

Requirements:

1. Advanced capabilities to render very large data sets (sometimes of the order of 500GB) interactively.
2. Capability to visualize scientific data (both 2D and 3D), and also have the ability to interactively steer computational simulations.
3. Explore data sets and simulations collaboratively through visualization.
4. All the above facility for use in the visualization wall as well as remote users sitting across the country.

The server should have the following property

Server-Side Graphics

- a. System Architecture: Capability of 3D hardware acceleration and OpenGL

acceleration

- b. Operating System: The system should be based on LINUX only
- c. Parallel Architectures: Using multiple graphics cards for one program, sharing the load. These multiple graphics accelerators could be attached to a single system (with massive memory and many CPUs to render large data). Or a *cluster* of compute *nodes* with graphics accelerators can form a rendering system that can work together on the problem.
- d. Parallel decomposition: A problem can be split among multiple graphics cards in the application's data space or in display space.
- e. Software Architecture addresses server-side rendering at middleware, API, or application levels (such as Chromium, ParaView, OpenSceneGraph, EnSight etc.).
- f. Customization of post-processing visualization applications to run on the cluster using parallelization mentioned in points 'c, d, e' is desirable. Some of the applications being Gromacs, Gaussian, VASP, AMBER, MoM, NAMD, OpenFoam, WRF, etc. OpenGL based API's for end-user applications should be proposed.

Remote Visualization

- a. Transmitting rendered images, rather than raw graphical data, from servers to clients.
- b. Compression: By compressing rendered images on the server and decompressing them on the client, more-plentiful CPU cycles substitute for limited network bandwidth.

Other Information

- a. Sizing the system: Capability for minimum 10 concurrent remote visualization session including the visualization wall (a combination of 2D and 3D over LAN and WAN) of an average data size of 100 GB. (see the requirement provided in the section related to visualization wall and size the system accordingly)
- b. Minimum 4 concurrent users in a single session working in a collaborative fashion (interacting and operating on the same data, and view) should be possible. Propose for multiple audio or video conferencing service in a collaborative sessions (if possible)
- c. Both software and hardware solutions should be suggested for remote visualization, image rendering, remote collaboration etc., and also popular post-processing software used in the field of biology, chemistry, earth, engineering and material sciences. (Example NCAR graphics, ncview, xmgrace, VMD etc.)
- d. Storage: Should be accessing the storage of the HPC server on high speed connection (preferably FDR Infiniband or better)

Tier-3: Simulation cum data generation system

Accelerator based system

- a. Architecture: An accelerator based system with one or two accelerator's per node
- b. Size: The expected size of the system is at least 250 TeraFLOPS (double precision operation) of peak performance (excluding the CPU FLOPS)

- c. Interconnect: Infiniband FDR or equivalent interconnect
- d. Compilers: Appropriate software stack (compiler, debugger, ...) for the accelerator system should be proposed..
- e. Software: work load manager, cluster management
- f. Cooling: propose options for both air and RDHX based cooling
- g. Applications: Provide a comprehensive list of scientific applications already ported/tested on the proposed platform

Storage

- a. Size: Provide information for the following options
 - i. 2 Petabytes of usable capacity in a RAID 6 (8+2) configuration
 - ii. 1 Petabytes of usable capacity in a RAID 6 (8+2) configuration
 - iii. 500Terabyte of usable capacity in a RAID 6 (8+2) configuration
- b. File system: High performance parallel file system
- c. Design: No single point failure
- d. RAID: Provide technical information on possible RAID configurations. (Provide options for hardware and software RAID clearly mentioning about their advantages and disadvantages)
- e. Capability: Serve multiple clients simultaneously
- f. Performance: At least 10 GB/s write performance for 500 TB and 1 PB usable capacity and 20 GB/s write performance for 2PB usable capacity.
- g. Archival & Backup: A suitable and scalable archival and backup (option of both disk based and tape based) solution for option b.iii (above) with two, four and eight times the size (of b.iii).

RCC Prefab for housing the facility

- a. It is proposed to host the facility in a RCC prefab structure (suitably protected from natural phenomena). The total interior area required is about 4000 sqft in two floors (2000 sqft per floor). About 1500sqft in the ground floor for hosting the visualization wall along with sitting places for about 50 people for visualization. Remaining about 500 sqft area would be used to host associated hardware for visualization and as a lab space with 15 workstations. The first floor 1500sqft would be used as classroom sitting place for about 60 students and the rest 500 sqft will be used as a discussion room. The vendors are requested to provide design and specification for such an integrated facility.

B: PROPOSED ARCHITECTURE

CSIR C-MMACS is a centre of Council of Scientific and Industrial Research (CSIR), which has footprint in the physical space spreading across the nation and has its scientific pursuits spread across diverse disciplines such as biological, chemical, engineering, information, physical and earth sciences to name a few. CSIR C-MMACS is hosting the centralized HPC facility catering to the needs of computational scientists of CSIR. The proposed facility will be used by scientists remotely. Hence the architecture should consider the constraints that emerge out due to the spatial as well as technical diversity of the users.

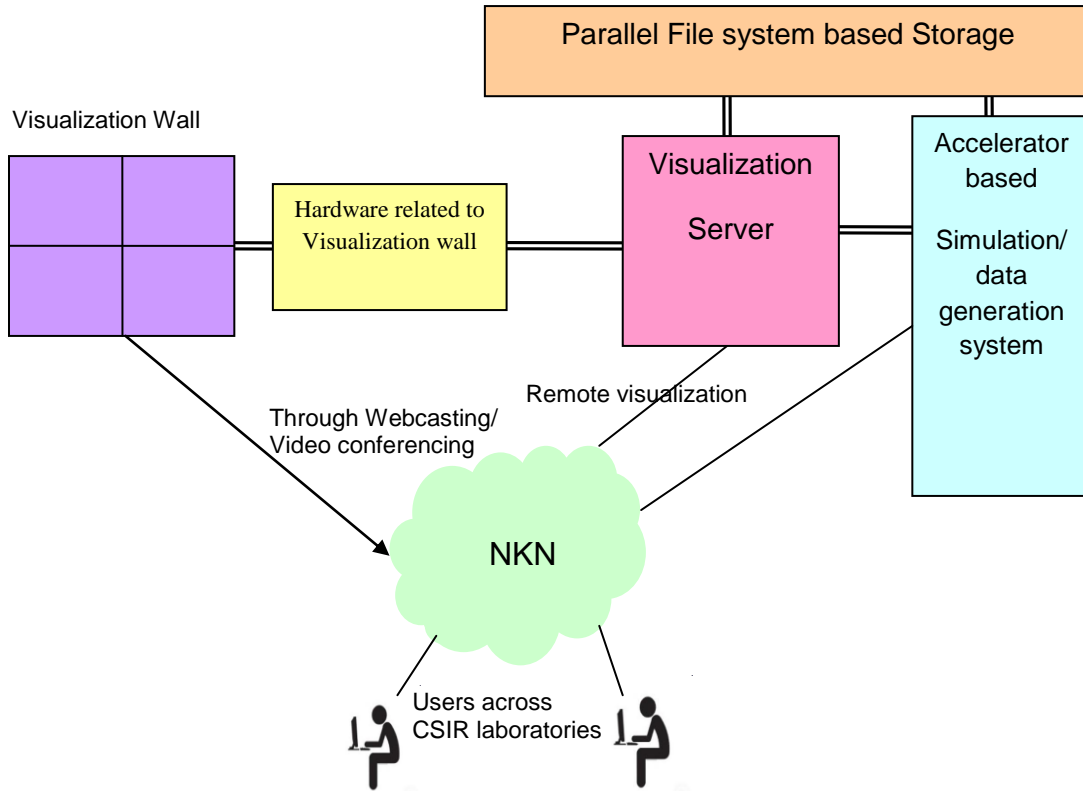


Figure. 1: Proposed Architecture of the high-end visualization system

Figure 1 represents the proposed architecture. However, this may not be the optimum design. Hence the bidder is requested to propose a solution taking this as the minimum requirement. The bidder is free to propose different architecture, clearly showing its advantages and disadvantages and provide it as an input to the technical committee.

C: GENERAL IMPORTANT NOTE:

- a. The bidder should provide either a comprehensive solution, for the complete visualization infrastructure or one or more of the major components namely Visualization wall and the visualization server, storage and the simulation/data generation server
- b. It is mandatory to participate in EOI and PIC for further participation in this process.
- c. CSIR C-MMACS reserves the right to change any or all of the components (scope or sequence). The decision taken by CSIR C-MMACS would be final and binding on all the prospective bidders
- d. RFQ will be served to those, who are shortlisted by the technical committee, after the PIC.
- e. The committee may select one particular Architecture/Technology based on the technical inputs and information provided by the vendors. Hence, once a technology/architecture is decided by the committee, all vendors will have to quote for the same, irrespective of what technology/architecture they have proposed in the EOI. Hence the vendors are requested to be as exhaustive as possible and should propose all possible technology/architecture to maximize the input to the committee.

D. PRE-QUALIFICATION CRITERIA FOR PARTICIPATING IN THE EOI AND PIC

1. The vendor must have established credentials for the product/solution they are quoting for.
2. Manufacturers' Authorization Form (MAF) (as per format given in Annexure F), should be provided with respect to all the components, for which the proposer is not the original manufacturer.

E. INSTRUCTIONS TO BIDDERS FOR FORMULATION AND SUBMISSION OF EOI document

The instructions mentioned should be read carefully by the bidders before submitting the technical proposal along with the response sheet and the proforma provided in the document.

- The bidder shall bear all costs associated with the preparation and submission of EOI, attending pre-indent conference etc., and CMMACS will in no case be responsible or liable for these costs
- The EOI document should be focused and the pages should be numbered serially. Proper reference to the technical details (page number, para etc.) should be provided in the response sheet.
- CSIR C-MMACS may ask for clarifications or further information to evaluate the Expression of Interests. If any information sought in this document is missing or not clearly specified by the bidder, it will be assumed that the bidder is not in a position to supply the information.
- CSIR C-MMACS reserves the right to accept or reject any application/suggestions without assigning any reasons whatsoever.
- An undertaking (self certificate) is to be submitted that the Organization has not been blacklisted by any Central/State Government Department/Organization.
- Canvassing in any form would disqualify the bidder from further participation.
- Please note that all the pages of the EOI documents should be signed with date and seal of the Organization. The completed EOI document along with the response sheet and the proformas, should be submitted in a sealed envelope super scribing **"Expression of Interest for high-end visualization infrastructure"** on or before the date and time of submission to the following address:

Controller of Stores & Purchase Officer
Purchase Section
CSIR Centre for Mathematical Modelling and Computer Simulation
NWTC Road, Behind HAL Airport
Bangalore – 560037
Karnataka
Tel #: 00 91 80 25051959 / 1967
Fax #: 00 91 80 25224292
e-mail:purchase@cmmacs.ernet.in / spo@ccadd.cmmacs.ernet.in

F. PRE INDENTING CONFERENCE (PIC)

1. A pre-indenting conference of all the bidders who have submitted the EOI will be held at CSIR C-MMACS, as per the time and venue, to be intimated in due course.
2. A maximum of three authorized representatives per bid may attend the Pre-indent Conference.
3. The technical committee will discuss with the bidders on the aspects of technology, feature, design, technical parameters and other related issues.
4. The technical committee will finalize specifications after knowing/obtaining details about relevant/available technology in the market suiting to the requirement and R&D needs of the Laboratory.
5. The committee will also evaluate the credentials / technical capabilities / financial standings and track record of the companies / vendors attending the PIC and shortlist the firms for RFQ process.

G: TIME SCHEDULE

Submission of Technical Proposal EoI: **14th December 2012 by 11:00 hrs**

Annexure- A: Format of Response Sheet

Visualization Wall		
<p>This is a facility to provide large high performance direct scientific visualization along with the capability to disseminate and collaborate through appropriate multi party video conferencing and web casting. The facility comprises of a visualization wall with LCD or equivalent display technology along with the necessary hardware for driving the display with navigation facility (3D and 2D), either through touch screen or through remotely controlled mechanism. All associated software should be mentioned for this purpose.</p>		
Sl. No	Description	Response
1	Name of the system	
2	Name of the firm the product belongs to/ manufacturer	
3	Are you ready to take up the project as a turn key basis including the pre-fab structure?	Yes/no
	High performance Visualization wall	
	Supply and configuration of the cluster with associated software for driving the display (3D and 2D) and having touch screen and central controlled navigation facility.	
	Multiparty videoconferencing facility with auto zoom on to the speaker (may be with multiple cameras)	
	Web casting facility	
	Agreed to carryout Civil work which include, providing a RCC pre-fab structure to host the visualization wall, along with furnishing	

4	Supply and configuration of the Visualization wall	
	What are the display technologies proposed Please mention the resolution, size, dimension and other details as well as the array size for the required display sizes.	
5	Is the system driving the arrayed visualization a cluster based?	Yes/No
	Name of the processor	
	Number of processors configured per node	
	Name and number of graphics card per node	
	Memory suggested per node	
	Total No. of nodes	
	Blade based / Rack based (size)	
	Interconnect type, the topology and the speed	
	Disk / Diskless	
	Number of login and cluster management nodes	
	The maximum distance the cluster can be located from the visualization wall and the type of communication connectivity required.	
5	Height of the rack in U and also in mm (Maximum 42U rack due to datacenter restriction)	
6	Possible to restrict to one rack?	Yes/no
7	Air cooled system only	Yes/no

8	Operating system	
	Compilers	
	Parallel library	
9	Attached list of software required for tiled visualization along with the purpose as per format attached in Annexure – D	Yes/no

Remote Visualization Server		
Capability to serve 10 concurrent data intensive visualization with software for image and video rendering. The users will be accessing these applications from Internet. Hence, all software related should be mentioned along with the purpose they are used for.		
Sl. No	Description	Response
1	Name of the system	
2	Name of the firm the product belongs to/manufacturer	
3	Capability of 3D graphics/image rendering	
4	Is the system SMP based?	Yes/No
	Name of the processor	
	Number of processing cores	
	Frequency of the cores	
	Graphics card required with a brief description	
	Total Global shared memory	
	Inter connect Architecture	
5	Is the system cluster based?	Yes/No
	Name of the processor	

	Number of processors configured per node	
	Name and number of graphics card per node	
	Memory suggested per node	
	Total No. of nodes	
	Blade based / Rack based (size)	
	Interconnect type, the topology and the speed	
	Disk / Diskless	
	Number of login and cluster management nodes	
6	Integration to the 500TB/1PB/2PB storage	
	Protocol of accessing the storage	
	Possibility of concurrent access by other servers, controlled by meta data server	
7	Height of the rack in U and also in mm (Maximum 42U rack due to datacenter restriction)	
8	Possible to restrict to one rack? If no how many racks?	Yes/no
9	Air cooled system and RDHX option proposed	Yes/no
10	Operating system	
	Compilers	
	Parallel library	
11	Attached list of software required for visualization (for rendering along with the purpose as per	Yes/no

	format attached in Annexure – C	
12	Work load manager	

Accelerator based Simulation Cum Data Generation System		
	Description	Response
1	Name of the firm	
2	Rank of the largest accelerator based system (if any) and also the largest system (more than 100 TF) in the latest top500 list by the OEM of the simulation cum data generation system.	
3	Name/ Model of the proposed system	
4	Name of the firm the product belongs to	
5	No. of racks for a typical 250TF peak performance	
6	Height and dimension of the rack in mm (Maximum 42U rack due to datacenter restriction)	
7	Air cooled and RDHX based cooling proposed	Yes/no
8	Number of CPU's configured per node	
9	Number of accelerator cards configured per node	
10	Are the accelerator cards connected on the same PCI bus?	Yes/no
11	No. of nodes per rack	
12	No. of nodes to achieve 250TF total peak	
13	Blade based / Rack based (size of per node in U)	
14	Name of processor	
	Frequency (GHz)	
	No. of cores/ processors	

15	Name/model of the accelerators proposed	
	Number of cores	
	Memory	
16	Disk / Diskless	
17	Total number of processing cores	
18	Total numbers of accelerators proposed	
19	Peak computing power of the system in TF	
20	Expected HPL sustained in TF and percentage	
21	Total Memory (GB)	
	Memory/core (in GB)	
	Memory Type	
	Frequency	
22	Interconnect technology	
	Interconnect topology	
	Interconnect speed	
23	Login Nodes with configuration	
	Cluster Management Nodes with configuration	
24	Operating system	
	Compilers	
	Parallel library	
25	Cluster management software	
26	Do you have experience in scientific benchmarking on accelerator based systems in areas related to Biology, Chemistry, Earth, Engineering and Materials?	<p style="text-align: center;">Yes/No</p> <p style="text-align: center;">If yes provide a list as per format provided in Annexure B. Also provide per node performance with 1, 2 or more (if applicable) accelerator cards per node.</p>

27	Would carryout minor modification of the existing data centre to cater the needs of this server?	
28	Workload manager	
29	HPL performance in % for a 10TF sustained system	
Storage (fill separately for each options of 2 PB, 1 PB and 500TB)		
SI No	Description	Response
1	Storage system proposed (name)	
2	Name of the firm the product belongs	
3	Total storage proposed in PB (to achieve the required usable capacity in a RAID 6 (8+2) configuration)	
4	No of OSS server with Configuration	
5	No. of MDS with Configuration	
	MDS in HA mode?	
6	Type of disk	
	Capacity of each disk	
	RPM of disk	
7	Parallel file system (Yes/No, if yes name)	
8	Raw Performance for large sequential Read/Write in GBPS	
	Performance for large sequential Read/Write with the parallel file system in GBPS	
	Typical write only performance	

9	Supported/ suggested RAID	
10	Height of the rack in U and mm (maximum 42U due to datacenter restriction)	
11	No. of Racks	
12	Proposed Backup and Archival solution	
13	Disk based archival or tape based archival?	
14	Capacity of the archival solution	
15	If tape based, then number of tape drives proposed	
16	Scalability of the archival solution and backup solution	

Power and cooling requirement				
SI No	Description	Response		
1	Accelerator system			
	Power requirement in KW/node			
	Power requirement in KW/rack			
	Total power for 250 peak system in KW			
	Total cooling requirement in BTU			
	Corresponding power requirement for cooling in KW			
2	Storage System	2PB	1PB	500PB

	Power requirement in KW/rack			
	Total power for storage with associated components of OSS and meta data servers, in KW			
	Total cooling requirement in BTU			
	Corresponding power requirement for cooling in KW			
3	Remote Visualization system			
	Power requirement in KW/rack			
	Total power required in KW			
	Total cooling requirement in BTU			
	Corresponding power requirement for cooling in KW			
4	Cluster for the visualization wall			
	Total power required in for the cluster and its cooling in KW			
	Total power required for the visualization wall and its cooling in KW			

Signature and Seal of the Bidder.....

Place :

Date :

Format for Annexure B

Experience in Benchmark on an accelerator based system

Name of the Firm.....

Table 1 (performance on multiple nodes)

Sl. No.	Name of the Benchmark	Size of the problem (such as resolution, no of molecules etc.)	Number of cores it can scale *	Time taken in seconds
1	NAMD			
2	AMBER			
3	LAMMPS			
4	GROMACS			
5	HPL			
#				

* If have multiple run information, please provide them

Add other softwares from the field of Biology, Chemistry, Earth, Engineering and materials etc

Table 2 (performance on a single node)

Sl. No	Name of the Benchmark	Size of the problem (such as resolution, no of molecules etc.)	Performance	
			1 card per node	2 cards per node
1	NAMD			
2	AMBER			
3	GROMACS			
4	HPL			
#				

Add other software from the field of Biology, Chemistry, Earth, Engineering and Materials etc

Table 3 : A comprehensive list of Scientific applications (please attach additional sheets if required)

Signature and Seal of the Bidder.....

Place :

Date :

Format for Annexure C & D

Software for Visualization server/Driving interactive visualization wall

Name of the Firm.....

Sl. No.	Name of the Software*	Purpose of use

* list all software for a complete solution

Signature and Seal of the Firm.....

Place :

Date :

Format for Annexure – E: Bidder Information Form -I

a) [The Bidder shall fill in this Form in accordance with the instructions indicated below. No alterations to its format shall be permitted and no substitutions shall be accepted. This should be done of the letter head of the firm]

Date: [insert date (as day, month and year) of Bid Submission] Tender No.: [insert number from Invitation for bids]

Page 1 of_ _____ pages

1. Bidder's Legal Name *[insert Bidder's legal name]*
2. In case of JV, legal name of each party: *[insert legal name of each party in JV]*
3. Bidder's actual or intended Country of Registration: *[insert actual or intended Country of Registration]*
4. Bidder's Year of Registration: *[insert Bidder's year of registration]*
5. Bidder's Legal Address in Country of Registration: *[insert Bidder's legal address in country of registration]*
6. Bidder's Authorized Representative Information Name: *[insert Authorized Representative's name]* Address: *[insert Authorized Representative's Address]* Telephone/Fax numbers: *[insert Authorized Representative's telephone/fax numbers]* Email Address: *[insert Authorized Representative's email address]*
7. Attached are copies of original documents of: *[check the box(es) of the attached original documents]* Articles of Incorporation or Registration of firm named in 1, above.
8. Solvency certificate (not older than twelve months) for Rupees Two Crore issued by scheduled/nationalized bank with which bidder holds the current account.
9. Status and details of disputes/ litigation/ arbitration, if any.
10. Whether the Organization has been blacklisted by any Central /State Government Department Organization.
11. An undertaking (self certificate) is to be submitted that the Organization has not been blacklisted by any Central/State Government Department / Organization.

Signature of Bidder _____

Name _____

Business Address

Format for Annexure –F: MANUFACTURERS' AUTHORIZATION FORM

[The Bidder shall require the Manufacturer to fill in this Form in accordance with the instructions indicated. This letter of authorization should be on the letterhead of the Manufacturer and should be signed by a person with the proper authority to sign documents that are binding on the Manufacturer.

Date: [insert date (as day, month and year) of Bid Submission]

Tender No.: [insert number from Invitation For Bids]

To: [insert complete name and address of Purchaser]

WHEREAS

We [insert complete name of Manufacturer], who are official manufacturers of [insert type of goods manufactured], having factories at [insert full address of Manufacturer's factories], do hereby authorize [insert complete name of Bidder] to submit a bid the purpose of which is to provide the following Goods, manufactured by us [insert name and or brief description of the Goods], and to subsequently negotiate and sign the Contract.

We hereby extend our full guarantee and warranty in accordance with Clause 21 of the General Conditions of Contract, with respect to the Goods offered by the above firm.

Signed: [insert signature(s) of authorized representative(s) of the Manufacturer]

Name: [insert complete name(s) of authorized representative(s) of the Manufacturer]

Title: [insert title]

Duly authorized to sign this Authorization on behalf of: [insert complete name of Bidder]

Dated on _____ day of _____, _____ [insert date of signing]

Format for Annexure-G: PERFORMANCE STATEMENT FORM (For a period of last 3 years)

Name of the Firm.....

Order Placed by (full address of Purchaser)	Order No. and date	Description and quantity of ordered equipment	Value of order	Date of completion of delivery as per contract	Date of actual completion of delivery.	Remarks indicating reasons for late delivery, if any	Has the equipment been installed satisfactory? (Attach a certificate from the purchaser/Consignee)	Contact person alongwith Telephone No., FAX No. and e-mail address

Signature and Seal of the manufacturer/Bidder.....

Place :

Date :

Checklist for EOI submission

SI no.	list	Tick if submitted
1	Technical proposal, numbered and signed	
2	Information on similar installations anywhere by the vendor	
2	Response sheet completed and signed (Annexure –A)	
3	Experience in Benchmark on an accelerator based system and a comprehensive list of ported/tested software on the proposed platform (Annexure –B)	
4	Software for Remote Visualization server (Annexure –C)	
5	Software for Driving interactive visualization wall (Annexure – D)	
6	Specification for RCC pre-fab structure	
7	Bidder Information Form (Annexure –E)	
8	MANUFACTURERS' AUTHORIZATION FORM (Annexure F)	
9	Copy of Articles of Incorporation or Registration/INC	
10	An undertaking (self certificate) is to be submitted that the Organization has not been blacklisted by any Central/State Government Department/Organization.	
11	Certificate to the effect that the bidder is or will be represented by an agent in India (In case a bidder not doing business within India)	