

High-Performance Computing Storage Solution for NYU Hospitals Center

Request for Proposal

Version 2.2

June 7, 2017

Presented by:

NYU Hospitals Center

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# Objective

NYU Hospitals Center (NYUHC) requests proposals and associated quotes in response to this Request for Proposals (RFP) for a new high-performance computing (HPC) storage system consisting of:

* 1. Parallel File System (PFS) and related installation, integration, support, maintenance, and warranty services needed to replace the existing Isilon storage subsystem supporting NYUHC’s high-performance computing (HPC) distributed memory cluster and its satellites.
  2. Backup and disaster recovery (DR) solution for the aforementioned PFS and related installation, integration, support, maintenance, and warranty services.
  3. **Optional** InfiniBand Interconnect to augment or replace the existing 10 GbE interconnect network.

# Milestone Calendar

The following calendar of events is based on planned New York University Hospital Centers (NYUHC) activities and anticipated vendor delivery capabilities. It is presented for illustrative purposes only. These milestones will be reviewed as necessary.

|  |  |
| --- | --- |
| Table 2-1 Milestone Calendar | |
| Milestone | Date |
| Request for Proposal published | June 7, 2017 |
| Intention to Bid | 5:00 PM EST; June 16, 2017 |
| Additional Questions Due | 5:00 PM EST; June 23, 2017 |
| Answers to Vendors Due | 5:00 PM EST; June 30, 2017 |
| Proposals Due | 5:00 PM EST; July 7, 2017 |
| Vendors Shortlist Issued | 5:00 PM EST; July 14, 2017 |
| Vendors Demos | 5:00 PM EST; July 21, 2017 |

Please also refer to Section 15 for further details on implementation timeline and Section 17 for evaluation criteria.

# Required RFP Response Format

Vendors are required to submit their Proposals in the specified electronic format. Vendor will submit their entire RFP response and all completed forms electronically via e-mail to NYUHC with vendor’s information and responses provided in the appropriate places therein. The required electronic applications formats are Microsoft Word and Microsoft Excel. Any supporting graphic or presentation-based slides may be submitted in a separate PowerPoint file. PDF format is **not acceptable** for any submitted text, graphics or slides.

**Vendors are required to submit separate Proposals for Component 1.1. (PFS) and Component 1.2. (backup and disaster recovery (DR)) as shown in Section 1. “Objective” above**.

Vendors can choose to submit Proposals for only one component. However, if a Vendor chooses to submit proposals for both Component 1.1. and Component 1.2. (preferred) then this Vendor is also required to submit a separate (third) Proposal for the combined Component 1.1. and Component 1.2. In addition, all vendors are encouraged to submit additional, separate Proposal for the optional Component 1.3. (InfiniBand Interconnect) as shown in Section 1. “Objective”.

# Proposal Due Date, Delivery Instruction and Communication

All Proposals are due on July 7, 2017no later than 5:00 PM EST.

Please send your complete electronic response via email to ITSourcing@nyumc.org

**Bidders Note:** All questions regarding interpretation or specifications must be submitted by email to ITSourcing@nyumc.org. Under no circumstances shall vendor contact any employee of NYUHC. Any dialogue initiated by the bidder not addressed to contacts above will result in an immediate disqualification. Discussions on other business matters and not related to this RFP are permitted.

# Proprietary Information, Non-Disclosure

Vendor shall have no rights in this document or the information contained therein and shall not duplicate or disseminate said document or information outside the vendor's organization without the prior written consent of NYUHC.

# Costs Incurred

All costs incurred in the preparation of the Proposal shall be borne by vendor. By submitting a Proposal, vendor agrees that the rejection of any Proposal in whole or in part will not render NYUHC liable for incurred costs and damages.

# NYUHC Reserves Right to Reject Any and All Bids

Nothing in this RFP shall create any binding obligation upon NYUHC. Moreover, NYUHC, at its sole discretion, reserves the right to reject any and all bids as well as the right not to award any contract under this bid process. NYUHC reserves the right to award portion of this bid. All bids should be governed by NYUHC standard Policy and Procedure and Terms and Conditions.

# Effective Period of Prices

All pricing quoted by vendor will remain fixed and firm until 2 years after the acceptance of the PO.

# Proposal Scope

* 1. NYUHC is looking at migrating its extant HPC storage system based on Isilon technology to a new HPC storage system providing a parallel file system (PFS).
  2. PFS will support NYUHC existing HPC distributed memory compute cluster (henceforth referred to as “Phoenix”), located on the East Coast, as well as other HPC services.
  3. In addition to the procurement of the primary PFS, which will be located in the NYUHC primary HPC datacenter on the East Coast, NYUHC is looking at migrating its HPC backup and DR infrastructure from Isilon storage pool, located on the West Coast, to another solution. This can include another instance of PFS or another adequate (but less expensive) technology. The backup and DR infrastructure will be, in principle, independent of the primary PFS, and will be placed in a datacenter on the West Coast. Also, please see Section 9.5. below.
  4. The support for backup and DR workflows between the two infrastructure elements mentioned in 9.2. and 9.3. must be included and fully described in the proposal.
  5. NYUHC will consider a solution where the backup is located close to the primary PFS on the East Coast and the DR solution is located on the West Coast.
  6. At the minimum, vendors are required to propose a PFS solution which will interface Phoenix and its satellite servers via 10 GbE and which will also support scalable InfiniBand infrastructure for future expansion (i.e. the solution must be “InfiniBand ready”).
  7. NYUHC is also looking at upgrading the existing Phoenix interconnect to InfiniBand. Vendors should price and quote such option separately, as an add-alternate. While doing that, Vendors should understand technical limitations of the existing Phoenix cluster, see Appendix A.
  8. In addition, NYUHC is soliciting vendors’ opinion whether data could be exchanged between the PFS and GPUs via GPUDirect RDMA.
  9. The integration phase must include migration of existing ~1 PB of data each from the existing HPC Isilon storage pool to the new PFS and from the existing Isilon backup and DR infrastructure to the new backup and DR infrastructure with minimal downtime.

# Business Requirements

* 1. All three components of the proposal (PFS, backup and DR infrastructure, and interconnect) must be modular and designed for easy capacity and performance expansion.
  2. All three components must be designed for easy ingest of data from research instruments (e.g. microscopes and sequencers) and for easy integration with the future local private cloud facility (e.g. OpenStack).
  3. While all three components should be designed for high performance, data security and confidentiality must be provided:
     1. Some data may contain PHI; the solution should be able to conform to the standards for storing and granting access to such information.
     2. The components must be HIPAA compliant. In particular, please describe how the components will integrate with Active Directory, and how they will support cyclical redundancy checks, checksums and control totals, per-file encryption, and other critical HIPAA controls.
     3. The components must include rich audit capabilities. In particular, audit capabilities, in addition to standard functionalities including failed login events, user privilege changes, etc., should also include logging capabilities for file- and mid-level directories, flexibility in turning logging on and off per directory and per file, and query interface for the logs thus created.
     4. Access to data should be able to be controlled at a granular level.

**Vendor Answer:** Indicate your compliance with each requirement and document any exception

# Technical Requirements

* 1. The PFS (General Parallel File System (GPFS) preferred) component must include 300 TB – 500 TB of global scratch for job I/O and 2 PB of cost effective magnetic disc storage capacity for users’ home and projects areas as well as for data ingests from instruments and data warehouses. While the proposals with single performance tier will be accepted, cost effective solutions (e.g. software based burst buffers or other I/O conditioners, fast spinning magnetic disks, SAS disks) for global scratch “partition” are welcome and encouraged.
  2. The PFS component should include support for policy based data movement between the global scratch and persistent storage areas.
  3. The PFS component must support data ingests of up to ~50 TB/day.
  4. The PFS component must support heterogeneous networks (c.f. Section 9.6.) as well as gateways to auxiliary/ancillary severs and data ingest points (service nodes).
  5. The PFS component must be tuned for a wide spectrum of file characteristics. In particular, the PFS must be high-IOPS capable and perform well on large numbers of small files. Refer to Appendix B for an approximate current breakdown of file sizes but please be mindful that future file characteristics may and will deviate from this depiction.
  6. The backup and DR component’s capacity must be commensurate with the initial capacity of the PFS component and be able to grow commensurately with the size of the PFS component. Currently, the Isilon backup and DR solution attach to a 10 GbE Nexus 56128 switch.
  7. The backup and DR component must be able to sustain up to 50 TB/day of new ingests. To accomplish this, as mentioned in Section 9.5, vendors may propose a solution where backup and DR infrastructure is geographically separated.
  8. The backup and DR solution (or its individual parts) may or may not be PFS based and must be cost effective.
  9. Scalable Director switch is our preferred InfiniBand technology. Please see Section 9.7. for more information.
  10. All components must be able to scale to tens of PB and hundreds of nodes.
  11. All equipment must fit into standard, 19 inch, 42U rack cabinets and should not exceed 25 kW of IT power per rack. All equipment must come with dual 208V power supplies and racks should be outfitted with smart PDUs.

**Vendor Answer:** Indicate your compliance with each requirement and document any exception

# Operational Requirements

* 1. All three components of the proposal (PFS, backup and DR infrastructure, and interconnect) must have remote management interfaces compatible with Bright Cluster Manager that can support all administrative functions.
  2. Monitoring and alerting capabilities such as user defined thresholds, sending alerts to other management systems, failure notification, etc. should be supported
  3. Default and customized reports should be made available for usage, performance, capacity and environmental factors.
  4. Access to the management interface should be secured with strong authentication and authorization controls in place, including directory integration and role-based access controls.
  5. NYUHC requires 24x7, one (1) hour response remote support for the solution and on-site support is required within four (4) hours.
  6. All three components must be covered by at least 3-year warranty/support and maintenance agreement. Please provide the option of extending the warranty/support and maintenance under the same condition for year 4 and 5 and please provide a detailed description of warranty/support and maintenance procedures for both the initial 3-year and extended agreements.
  7. Vendors are expected to provide an option of receiving automated alerts either from the storage components themselves or from a “call home” feature in order to insure proactive detection of potential failures and shipment of replacement parts.
  8. Vendors must include in the proposal IOR and IOzone benchmarks for the PFS components and appropriate benchmarks (such as SPECsfs or SPC-2) for the non-PFS backup and DR component. All PFS benchmarks must be provided as a function of the number of nodes (and MPI processes) from 1 to 64 nodes (1 to 1024 MPI processes) for file sizes from 4 B to 1 GB and record lengths (block sizes) from a minimum allowable value to 32 MB. These benchmarks will be repeated at vendor(s) sites (s) where the components are built and at NYUHC site(s) as a part of the acceptance criteria.
  9. The proposal must include hands-on PFS training for at least 6 systems engineers. This training must be quoted as a separate item.
  10. The proposal must include a detailed plan for migration of the existing ~1 TB of data each from the existing HPC Isilon storage pool to the new PFS and from the existing Isilon backup and DR infrastructure to the new backup and DR infrastructure. The data migration must be transparent to users and should not require extended system downtime.

**Vendor Answer:** Indicate your compliance with each requirement and document any exception

# Software and Licensing

* 1. All software, firmware and licenses necessary to achieve full functionality needs to be included.
  2. All software, firmware and licenses to configure this functionality should be provided, including terms and level of coverage.
  3. All Software update services need to be included in the service contract, including firmware updates and any other software related to the solution.

**Vendor Answer:** Indicate your compliance with each requirement and document any exception

# Pricing

Please provide pricing information separately for the three components of the solution (PFS, backup and DR, and interconnect) giving options for different kinds of disk (and tape technology, if any). If a vendor proposes both the PFS and the Backup/DR components, in addition to the separate pricing for these components, such vendor must also provide pricing for these two components combined. Similarly, please price all other options and add-alternates separately. NYUHC reserves the right to select all or any of the three components from a single vendor. All software, support and services should also be included in the quotes. An initial term of three years should be used for all warranty/support, maintenance, licensing and services. Operating costs for the initial solution covering Years Four and Five should be given, as should the cost to increase the capacity of each of the three components in discrete units. Vendors must quote disk retention services for both the PFS and backup and DR components as optional add-on to the warranty/support and maintenance contracts.

# Implementation Timeline

* 1. Implementation will be over multiple phases:
     1. Phase 1: Vendor selection: July 2017
     2. Phase 2: Hardware delivery date: September 15, 2017
     3. Phase 3: Installation, integration, configuration, testing and benchmarks: September 25, 2017 – October 9, 2017
     4. Phase 4: Burn-in period: October 10, 2017 – October 23, 2017
     5. Phase 5: Data migration: October 10, 2017 – November 9, 2017
     6. Phase 6: Acceptance: November 10, 2017

# Past performance and References

Please provide a list of three clients who have received services on similar engagements as the one outlined by this RFP and include the information below.

* Client name and headquarter address
* Contact name
* Telephone number
* Email address
* Length of time using your services
* Brief description of the service provided

Failure to provide suitable references to NYUHC will result in the vendor’s bid being rejected without further consideration.

**Vendor Answer:** Indicate your compliance with each requirement and document any exception

# Evaluation Criteria

* 1. Proposals will be evaluated based on the following criteria:
     1. Ability to meet NYUHC’s Business Requirements (Section 10)
     2. Conformance to Technical and Operational Requirements (Sections 11, and 12)
     3. Pricing and overall value (Section 13)
     4. Ability to execute and meet the proposed Implementation Timeline (Section 15)
  2. Delivery Requirements. Detailed delivery requirements will be provided to the winner(s) of the bidding process. However, all vendors responding to this RFP should be prepared to:
     1. Conduct site(s) visit(s) prior to finalizing the contract.
     2. Deliver, install, configure, and test the solutions(s) at NYUHC site(s).
     3. The delivery of all hardware must occur within 10 days of mutually agreed upon delivery date. Installation, configuration, and Vendor testing, including re-running of benchmarks (c.f. Section 12.8) must not take longer than 14 days from the delivery of the last hardware item.
     4. Meet mutually agreed upon performance requirements expressed in terms of results of benchmarks conducted earlier at Vendor’s site. The benchmarks must be repeated at the NYUHC site(s) to within mutually agreed upon accuracy.
     5. NYUHC will accept the system(s) only after mutually agreed upon “burn-in” period (usually 14 days) successfully ends.
     6. Migrate the existing ~1 PB of data each from the existing HPC Isilon storage pool to the new PFS and from the existing Isilon backup and DR infrastructure to the new backup and DR infrastructure. The data migration must be transparent to users and should not require extended system downtime.
  3. Final accepted solution is dependent upon successful fulfillment of Delivery Requirements (c.f. Section 17.2) and upon meeting the Implementation Timeline (c.f. Section 15). If all agreed technical and performance requirements are not met, then equipment will be returned to Supplier. Supplier will be responsible for shipment and will reimburse NUYHC costs incurred in any P.O. related to the implementation period.
  4. Vendors are encouraged to provide innovative solutions that are able to meet the business requirements specified in this document.
  5. Vendor’s reputation for providing HPC storage solutions.
  6. Customer testimonials and references (Section 16).