RFP Reference No.: NHB/ITD/RFP- Procurement of SAN Storage with buyback/2024, GEM/2024/B/5588697 dated 08-11-2024.

Request for Proposal (RFP) for
Procurement of SAN Storage with buyback at National Housing Bank

The replies to the pre-bid queries received from the prospective bidders for the Pre-Bid Meeting held on November 14, 2024, are placed herewith.

- I.T. Department
Date: 19-11-2024.

	Pre-Bid Queries from Prospective Bidder - 1			
S. No.	Bidding Document Reference(s) (Section number/ page)	Content of RFP requiring Clarification	Points of clarification Required	Reply to the Query
1	**Page-80, Point-2**	The Storage Systems should be Enterprise Class Storage System. The storage should have True dual Active-Active Controller architecture where a LUN should be accessible by all the controllers simultaneously.	**Kindly Change the Clause as below-** The Storage Systems should be Enterprise Class Storage System. The storage should have True dual Symetric Active-Active Controller architecture where a LUN should be accessible by all the controllers simultaneously. It should also guarantee 100% data availability. **Justification-** A storage system with a symmetric active-active controller architecture provides high performance, resilience, and continuous data access. This architecture allows each controller to simultaneously access any LUN, enabling seamless load balancing and failover across controllers. By distributing workloads evenly, it minimizes bottlenecks and improves response times for high-demand applications. Additionally, the architecture supports uninterrupted access to data, even in the event of a controller failure, aligning with the requirement for 100% data availability. This setup is ideal for environments where high availability and reliable access are critical, such as in enterprise and mission-critical applications.	No Change in criteria

2	**Page-80, Point-8**	Proposed storage should support NVME backend in redundancy expansion to support NVME.	**Kindly Change the Clause as below-** Proposed storage should support SAS backend expansion to support SAS, NLSAS, SSD/NVME. **Justificaiton-** The addition of the SAS/NL-SAS expansion provides scalability and enhances the storage system's flexibility, enabling future growth without the need for a complete infrastructure overhaul. By incorporating additional storage capacity through this expansion, the organization can efficiently manage increasing data volumes over time. This investment is protected because SAS/NL-SAS drives offer a balance of cost and performance, making them ideal for long-term data storage. This future-proofs the system, ensuring that it can meet evolving demands and minimize the need for more substantial, potentially disruptive investments in the future.	**Existing Clause:** Proposed storage should support NVME backend in redundancy expansion to support NVME. **Amended Clause**: Proposed storage should support NVME/SAS backend in redundancy expansion to support SAS, NLSAS, SSD/NVME. Corrigendum shall be issued.
3	**Page-82, Point-32**	The proposed make & model should have end-of-life and end-of-support period of at least 07 years and end-of-sale for upgrade from OEM for a period of 05 years, as on last date of bid submission.	Most of the OEM support the system for 5 year after end of sale and the end of sale is not declaired in advance. **Kindly Change the Clause as below-** The proposed make & model should not be delcales end of sale and the system should be supported for 5 years after declaration of end of sale.	No Change in criteria

4	**Minimum Eligibility Criteria Annexure 5 Point 7**	Bidder should have valid ISO 9001:2015, ISO/IEC 27001 certificates	As a start-up promoted by the Government of India, ISO 27001 is required to acknowledge the importance of information security and take steps to protect your data and systems. However, achieving ISO 27001 certification may not be feasible for start-ups due to cost and resource constraints **Kindly Change the Clause as below**- Bidder Should have valid ISO 9001:2015	No Change in criteria

Pre-Bid Queries from Prospective Bidder - 2				
S. No.	**Bidding Document Reference(s) (Section number/ page)**	**Content of RFP requiring Clarification**	**Points of clarification Required**	**Reply to the Query**
1	**Page-80, Point-8**	Proposed storage should support NVME backend in redundancy expansion to support NVME.	**Kindly Change the Clause as below-** Proposed storage should support NVME/ SAS backend in redundancy expansion to support NVME/SAS. **Justification-** The addition of the SAS/NL-SAS expansion provides balance in cost and performance and also provides investment protection with higher scalability using other type of drives.	**Existing Clause:** Proposed storage should support NVME backend in redundancy expansion to support NVME. **Amended Clause**: Proposed storage should support NVME/SAS backend in redundancy expansion to support SAS, NLSAS, SSD/NVME. Corrigendum shall be issued.

2	**Page-82, Point-32**	The proposed make & model should have end-of-life and end-of-support period of at least 07 years and end-of-sale for upgrade from OEM for a period of 05 years, as on last date of bid submission.	Most of the leading OEMs support the system for 5 year after end of sale and the end of sale is not declared in advance. **Request to change the Clause as per below request** The proposed make & model should not be declared end of sale and the system should be supported for 5 years after declaration of end of sale.	No Change in criteria
3	**Page-15,8.13 Implementation schedule**	Product delivery and installation - Within 6 weeks from the date of work order	**Kindly relax the Clause as below as per below request-** Product delivery and installation - Within 6 -8 weeks from the date of work order **Justificaiton-** Being enterprise class Storage system, delivery arrangements is applicable only back to back from their respective plant loaction to India and all leading OEM's usually takes 6-8 weeks for the Delivery from their global plant loactions.	No Change in criteria

4	**Page -15, 8.14 Performance Bank Guarantee (PBG)**	The successful Bidder will be required to provide performance bank guarantee/PBG of value amounting to 5% of the total cost of contract value, in the form of bank guarantee from a scheduled commercial bank in the format as substantially prescribed in Annexure-XVI.	**Kindly relax the Clause as below as per below request-** The successful Bidder will be required to provide performance bank guarantee/PBG of value amounting to 3% of the total cost of contract value, in the form of bank guarantee from a scheduled commercial bank in the format as substantially prescribed in Annexure-XVI. **Justificaiton-** Being Banking Industry standard Govt.RFP's for IT related Projects, 3% PBG would be applicable as per GeM GFR guidelines for Govt. Projects.	No Change in criteria
5	**Page-24, 10.2 Payment Terms**	90% payment will be released to selected bidder against delivery, Installation and operationalization of SAN Storage post sign-off of successful implementation by the Bank and balance 10% retention amount after completion of contract tenure (60 months). The 10% retention amount may be released against submission of equivalent amount of Bank Guarantee for the period of contract tenure (60 months).	We request from the Competent authority to ask One PBG for the entire contrat as 5% PBG already asked at Page -15, 8.14 Performance Bank Guarantee (PBG) where we requested to relax from 5% to 3% PBG **or** **Kindly relax the Clause as below as per below request-** 90% payment will be released to selected bidder against delivery, Installation and operationalization of SAN Storage post sign-off of successful implementation by the Bank and balance 10% payment amount will released against submission of equivalent amount of Bank Guarantee for the period of contract tenure (60 months).	No Change in criteria

Pre-Bid Queries from Prospective Bidder - 3				
S. No.	Bidding Document Reference	RFP Clause	Change Required and Justification	Reply to the Query
1	**Page-80, Point-8**	Proposed storage should support NVME backend in redundancy expansion to support NVME.	**Kindly Change the Clause as below-** Proposed storage should support NVME/ SAS backend in redundancy expansion to support NVME/SAS. **Justification-** These changes will not impact the performance and functionality requirement of the RFP. The addition of the SAS expansion provides balance in cost and performance and provides investment protection with higher scalability using other type of drives in future.	**Existing Clause:** Proposed storage should support NVME backend in redundancy expansion to support NVME. **Amended Clause:** Proposed storage should support NVME/SAS backend in redundancy expansion to support SAS, NLSAS, SSD/NVME. Corrigendum shall be issued.

Pre-Bid Queries from Prospective Bidder - 4				
S.No.		Relevant Clause of the RFP	Query	Reply to the Query
1		5. Scope of Work d. SAN Storage Management online training to be provided to the Bank officials.	Please confirm the no. of officials and location for the training.	No. of officials: 5-7 Training location: Online/offline(New Delhi) as per suitability. Training to be provided by the OEM.
2		General	Since the SAN switch is not part of the deliverables, we assume that the existing SAN switch will be used for connectivity and that sufficient ports are available in the same. Please confirm if our understanding is correct.	SAN switch is available with sufficient free ports for connectivity

3		General	We understand NHB will provide Rack, uninterrupted power supply, sufficient cooling along with air purification device to eliminate threat of electronic corrosion and abrupt failures. Please confirm is our understanding correct?	Bank will provide the provide Rack, uninterrupted power supply, sufficient cooling to eliminate threat of electronic corrosion and abrupt failures.
4		**Annexure XIX** **Point No. 8** Proposed storage should support NVME backend in redundancy expansion to support NVME.	**Kindly Change the Clause as below-** Proposed storage should support NVME/ SAS backend in redundancy expansion to support NVME/SAS. **Justificaiton-** The addition of the SAS/NL-SAS expansion provides balance in cost and performance and also provides investment protection with higher scalability using other type of drives.	**Existing Clause:** Proposed storage should support NVME backend in redundancy expansion to support NVME. **Amended Clause:** Proposed storage should support NVME/SAS backend in redundancy expansion to support SAS, NLSAS, SSD/NVME. Corrigendum shall be issued.
5		Cluase 10.2 Payment Terms Page no. 24 of RFP a.90% payment will be released to selected bidder against delivery, Installation and operationalization of SAN Storage post sign-off of successful implementation by the Bank and balance 10% retention amount after completion of contract tenure (60 months). The 10% retention amount may be released against submission of equivalent amount of Bank Guarantee for the period of contract tenure (60 months).	Requested to change the following: a. 95% payment will be released to selected bidder against delivery, Installation and operationalization of SAN Storage post sign-off of successful implementation by the Bank and balance 5% retention amount after completion of contract tenure (60 months). The 5% retention amount may be released against submission of equivalent amount of Bank Guarantee for the period of contract tenure (60 months).	No Change in criteria

| 6 | | Clause 11.21 Liquidated Damages Page no. 28 of RFP If the vendor fails to deliver and install the SAN Storage within the stipulated period of six weeks, Bank will impose a penalty of 1% of the order value for the late installed item for each week's delay or part thereof, subject to maximum of 10% of value of the contract. | Requested to change the following: If the vendor fails to deliver and install the SAN Storage within the stipulated period of six weeks, Bank will impose a penalty of 0.5% of the order value for the late installed item for each week's delay or part thereof, subject to maximum of 5% of value of the contract. | No Change in criteria |

Pre-Bid Queries from Prospective Bidder - 5				
S. No.		Relevant Clause of the RFP	Query	Bank Reply to Queries
1		**Minimum Eligibility Criteria, S. No. 3, page no. 35** The Bidder should have supplied and installation of SAN Storage in at least one Public Sector Bank / Financial Institution / PSU / Government Organization / Large Corporates (>100 Cr.) in India not older than 5 years. The Bidder should submit details like name of contact person, along with his phone number for above projects	The Bank requires clarification on whether the ">100 Cr." criterion is intended to refer to the annual turnover of the end customer or the total value of the purchase order for the SAN Storage project. If it pertains to the purchase order value, we believe there may be a typographical error. Could you kindly confirm the exact purchase order value requirement?	It is the turnover of the large corporate customers

| 2 | | Refer to Specification Document - SAN Storage System Specifications / Requirements, S.No.1 - The Storage should be configured with minimum 80 TiB usable capacity using 7.6 TB or lower NVME drive size (MLC/TLC/QLC NVME drives). Storage should be expandable to 120 TiB. | Drive type available with QLC drives are - 4.8TB, 9.6TB, 19.2TB & 38.4TB FCM4, if we are positioning NVMe QLC drives we have to consider 4.8TB or 9.6TB Drive (recommended) instead of 7.6TB for capacity sizing. Request you to revise the same or else add suggested capacity disk option also in the asked requirement accordingly. | No Change in criteria |

Pre-Bid Queries from Prospective Bidder - 6				
S. No.		Relevant Clause of the RFP	Query	**Reply to the Query**
1		**Technical Specification: Point 1** The Storage should be configured with minimum 80 TiB usable capacity using 7.6 TB or lower NVME drive size (MLC/TLC/QLC NVME drives). Storage should be expandable to 120 TiB.	**Change Request:** To Remove QLC Drives. **Reason:** TLCs have faster write speeds, lower latency, high endurance than QLC, making them a better choice for high-performance storage applications with reliability.	No Change in criteria

Pre-Bid Queries from Prospective Bidder - 7				
Sr No	SAN Storage System Specifications / Requirements	Change Request	Reason/ justification for change request	**Reply to the Query**

1	The Storage should be configured with minimum 80 TiB usable capacity using 7.6 TB or lower NVME drive size (MLC/TLC/QLC NVME drives). Storage should be expandable to 120 TiB.	The Storage should be configured with minimum 80 TiB usable capacity using 15.3 TB or lower NVME drive size (MLC/TLC/QLC NVME drives). Storage should be expandable to 120 TiB.	NHB has allowed QLC drives which comes with minimum 15.3 TB of individual size. This will neither reduce the performance nor relaibilty, as the IOPS mentioned in futher section will be offered and all the redundacy clause including hot spare will be maintained.	No Change in criteria
2	The Storage Systems should be Enterprise Class Storage System. The storage should have True dual Active-Active Controller architecture where a LUN should be accessible by all the controllers simultaneously.	The Storage Systems should be Enterprise Class Storage System. The storage should have True dual Active-Active Controller architecture where a LUN should be accessible by all the controllers simultaneously. The inter controller connectivity bandwidth should be minimum 100Gbps in redundancy	The inrecontroller connectivity bandwidth is very crucial factor while cross accessing any LUNs.	No Change in criteria
3	The storage system should have minimum 512GB cache. The proposed cache should be available across the controllers. Only write must be mirrored. Cache memory should be delivered on DRAM, any other device or HDD should not be considered as cache.	The storage system should have minimum 1024 GB cache. The proposed cache should be available across the controllers. Only write must be mirrored. Cache memory should be delivered on DRAM, any other device or HDD should not be considered as cache.	Higher cache offers high cache hit ratio which is better for the performance and low latency	No Change in criteria

| 4 | Storage management software should be able to integrate with Active Directory/ LDAP for user authentication | Storage management software should be able to integrate with Active Directory/ LDAP for user authentication. Offered storage shall support multifactor authentication such that Multifactor authentication (MFA) allows enhanced security by requiring users to provide two authentication methods to log in to an admin or data storage VM. | Multi factor authentication is a very important security factor specially for finance institution where any log in for destructive activity is cross checked by second authentication. | **Existing Clause:** Storage management software should be able to integrate with Active Directory/ LDAP for user authentication. **Amended Clause:** Storage management software should be able to integrate with Active Directory/ LDAP for user authentication. Offered storage shall support multifactor authentication such that Multifactor authentication (MFA) allows enhanced security by requiring users to provide two authentication methods to log in to an admin or data storage VM. Corrigendum shall be issued. |

Pre-Bid Queries from Prospective Bidder - 8				
S.No		Relevant Clause of the RFP	Query	**Reply to the Query**
1.		Pg: 80		No Change in criteria
			The Storage should be configured with minimum 80 TiB usable capacity using 7.6 TB or lower NVME drive size (MLC/TLC/QLC NVME drives). Storage should be expandable to 120 TiB.	

		Minimum Technical cum Functional Specifications	Q & R – Drive type available with QLC are as - **4.8TB, 9.6TB, 19.2TB & 38.4TB FCM4**, if **we are positioning NVMe QLC drives we have to consider 4.8TB or 9.6TB Drive (recommended) instead of 7.6TB for capacity sizing**.	
		Clause Number: 1		
			Note: However, we Can provide both the options.	
		Annexure XIX		
			FCM4 (FlashCore Module 4) is a cutting-edge storage solution developed, designed to provide high-performance, scalable, and low-latency flash storage for enterprise environments. It is primarily used in our FlashSystem storage solutions.	

Pre-Bid Queries from Prospective Bidder - 9				
S. No.		Relevant Clause of the RFP	Query	**Reply to the Query**
1		The Storage Systems should be Enterprise Class Storage System. The storage should have True dual Active-Active Controller architecture where a LUN should be accessible by all the controllers simultaneously.	CHANGE REQUEST : The Storage Systems should be Enterprise Class Storage System. The storage should have True dual Active-Active Controller architecture where a LUN should be accessible by all the controllers simultaneously. The inter controller connectivity bandwidth should be minimum 100Gbps in redundancy REASON: The inrecontroller connectivity bandwidth is very crucial factor while cross accessing any LUNs.	No Change in criteria

2		Storage management software should be able to integrate with Active Directory/ LDAP for user authentication	CHANGE REQUEST: Storage management software should be able to integrate with Active Directory/ LDAP for user authentication. Offered storage shall support multifactor authentication such that Multifactor authentication (MFA) allows enhanced security by requiring users to provide two authentication methods to log in to an admin or data storage VM. REASON:Multi factor authentication is a very important security factor specially for finance institution where any log in for destructive activity is cross checked by second authentication	**Existing Clause:** Storage management software should be able to integrate with Active Directory/ LDAP for user authentication. **Amended Clause:** Storage management software should be able to integrate with Active Directory/ LDAP for user authentication. Offered storage shall support multifactor authentication such that Multifactor authentication (MFA) allows enhanced security by requiring users to provide two authentication methods to log in to an admin or data storage VM. Corrigendum shall be issued.
3		The storage system should have minimum 512GB cache. The proposed cache should be available across the controllers. Only write must be mirrored. Cache memory should be delivered on DRAM, any other device or HDD should not be considered as cache.	CHANGE REQUEST: The storage system should have minimum 1024 GB cache. The proposed cache should be available across the controllers. Only write must be mirrored. Cache memory should be delivered on DRAM, any other device or HDD should not be considered as cache. REASON:Higher cache offers high cache hit ratio which is better for the performance and low latency	No Change in criteria

Pre-Bid Queries from Prospective Bidder - 10				
Page No	Clause No	RFP Clause	Queries	Reply to the Query
5	5. Scope of Work	b.Migration of data from existing Hitachi SAN storage to new SAN Storage. Required tools for data migration will be provided by the shortlisted bidder without any extra cost to the Bank.	Kindly share the details of migration to be done, such as data size, data type	Data size is 60 TB, Data type is block/file. Complete details will be shared with the successful bidder
5	5. Scope of Work	d.SAN Storage Management online training to be provided to the Bank officials.	Kindly share the details of training required, By bidder or OEM, any certification required, Topic, number of days etc.	No. of officials: 5-7 Training location: Online/offline(New Delhi) as per suitability. Training to be provided by the OEM.
8	6. Deliverables	d. The bidder shall rack mount, install, configure, and integrate the items and resolve issues, if any, with Bank's existing network viz. LAN/WAN/SAN etc.	Assume NHB shall arrange the rack space, power, network etc. which are required to install the new storage, kindly confirm.	Bank will provide the rack space, power,cooling, network for SAN
8	6. Deliverables	e.Implementation and Configuration of components should be owned by OEM as per scope mentioned.	Implementation and configuration of components should be owned by the **OEM/bidder** as per the mentioned scope. This is because the L1 bidder will manage the project during the tenure	Installation and configuration to be done bythe OEM/OEM Partner for first time and then bidder will manage the project during the tenure
9	6. Deliverables	o.Sign-off shall be given by the Bank, post successful implementation of the SAN and migration of the data from existing to new SAN.	Whether the warranty period will start after this complete activity?	Yes

26	11 General Terms and Conditions	11.9 Bidder must deploy manpower having requisite qualification, experience, skill set etc. for the project/contract.	Assume we have to arrange resources on-demand basis only, kindly confirm.	yes
27	11 General Terms and Conditions	11.17 Penalty If the bidder fails to maintain guaranteed uptime of 99%, the Bank shall impose penalty. Vendor shall resolve the issue within Four Hours of its reporting. Shortfall in Performance Penalty (% of the contract value of the equipment) >1% and <= 2% - 1 >2% and <= 3% - 3 >3% and <= 5% - 5	Kindly confirm the Upper cap of penalty imposed.	5 % of the contract value of the equipment for Shortfall in Performance Penalty up to 5%. Above 5 % Shortfall in Performance Penalty may lead to termination of the contract or NHB reserves the right to recover damages at 10 percent of the contract value as and by way of liquidated damages.
		General	Kindly confirm the frequency of Preventive maintenance required.	Half yearly
80	Minimum Technical cum Functional Specifications	The Storage should be configured with minimum 80 TiB usable capacity using 7.6 TB or lower NVME drive size (MLC/TLC/QLC NVME drives). Storage should be expandable to 120 TiB.	Please remove the **QLC type NVMe Drives.** Durability: TLC/MLC NVMe drives are generally more durable than QLC. Write cycles: QLC NVMe drives have a lower endurance rating than TLC/MLC, meaning they can only handle a limited number of write cycles before they start to degrade. Error-proneness: QLC NVMe drives can be more error-prone than TLC/MLC	No Change in criteria
80	Minimum Technical cum Functional Specifications	The proposed storage should support RAID 6(dual parity).	It reques to allow **RAID 5(Single parity)** / RAID 6(dual parity)**.**	No Change in criteria

80	Minimum Technical cum Functional Specifications	The storage system should have minimum 512GB cache. The proposed cache should be available across the controllers. Only write must be mirrored. Cache memory should be delivered on DRAM, any other device or HDD should not be considered as cache.	The storage system should have minimum **384GB cache**. The proposed cache should be available across the controllers. Only write must be mirrored. Cache memory should be delivered on DRAM, any other device or HDD should not be considered as cache. Justification: Every OEM has its own architecture to deliver IOPS /Throughput from storage, our NVMe Storage is Capable to deliver the required performance in less DRAM cache and with higher DRR ratio	No Change in criteria
80	Minimum Technical cum Functional Specifications	Storage System should have multiple Global Hot Spares. At least One Hot spare disk should be provided on each 30 drive.	Storage System should have multiple Global Hot Spares. At least One **Hot spare disk/Capacity** should be provided on each 30 drive. Justification: Instead of dedicated hot spare drives, we evenly distribute capacity equivalent of hot spare drive-in entire Raid/data drives to provide better rebuild time	No Change in criteria

S.No.	SAN Storage System Specifications / Requirements	Change Request	Reason/ justification for change request	Reply to the Query
		Pre-Bid Queries from Prospective Bidder - 11		
1	The Storage should be configured with minimum 80 TiB usable capacity using 7.6 TB or lower NVME drive size (MLC/TLC/QLC NVME drives). Storage should be expandable to 120 TiB.	The Storage should be configured with minimum 80 TiB usable capacity using 15.3 TB or lower NVME drive size (MLC/TLC/QLC NVME drives). Storage should be expandable to 120 TiB.	NHB has allowed QLC drives which comes with minimum 15.3 TB of individual size. This will neither reduce the performance nor relaibilty, as the IOPS mentioned in futher section will be offered and all the redundacy clause including hot spare will be maintained.	No Change in criteria
2	The Storage Systems should be Enterprise Class Storage System. The storage should have True dual Active-Active Controller architecture where a LUN should be accessible by all the controllers simultaneously.	The Storage Systems should be Enterprise Class Storage System. The storage should have True dual Active-Active Controller architecture where a LUN should be accessible by all the controllers simultaneously. The inter controller connectivity bandwidth should be minimum 100Gbps in redundancy	The inrecontroller connectivity bandwidth is very crucial factor while cross accessing any LUNs.	No Change in criteria

3	The storage system should have minimum 512GB cache. The proposed cache should be available across the controllers. Only write must be mirrored. Cache memory should be delivered on DRAM, any other device or HDD should not be considered as cache.	The storage system should have minimum 1024 GB cache. The proposed cache should be available across the controllers. Only write must be mirrored. Cache memory should be delivered on DRAM, any other device or HDD should not be considered as cache.	Higher cache offers high cache hit ratio which is better for the performance and low latency	No Change in criteria
4	Storage management software should be able to integrate with Active Directory/ LDAP for user authentication	Storage management software should be able to integrate with Active Directory/ LDAP for user authentication. Offered storage shall support multifactor authentication such that Multifactor authentication (MFA) allows enhanced security by requiring users to provide two authentication methods to log in to an admin or data storage VM.	Multi factor authentication is a very important security factor specially for finance institution where any log in for destructive activity is cross checked by second authentication.	Existing Clause: Storage management software should be able to integrate with Active Directory/ LDAP for user authentication. **Amended Clause:** Storage management software should be able to integrate with Active Directory/ LDAP for user authentication. Offered storage shall support multifactor authentication such that Multifactor authentication (MFA) allows enhanced security by requiring users to provide two authentication methods to log in to an admin or data storage VM. Corrigendum shall be issued.

S.No.	SAN Storage System Specifications / Requirements	Change Request	Reason/ justification for change request	Reply to the Query
		Pre-Bid Queries from Prospective Bidder - 12		
1	The Storage should be configured with minimum 80 TiB usable capacity using 7.6 TB or lower NVME drive size (MLC/TLC/QLC NVME drives). Storage should be expandable to 120 TiB.	The Storage should be configured with minimum 80 TiB usable capacity using 15.3 TB or lower NVME drive size (MLC/TLC/QLC NVME drives). Storage should be expandable to 120 TiB.	NHB has allowed QLC drives which comes with minimum 15.3 TB of individual size. This will neither reduce the performance nor relaibilty, as the IOPS mentioned in futher section will be offered and all the redundacy clause including hot spare will be maintained.	No Change in criteria
2	The Storage Systems should be Enterprise Class Storage System. The storage should have True dual Active-Active Controller architecture where a LUN should be accessible by all the controllers simultaneously.	The Storage Systems should be Enterprise Class Storage System. The storage should have True dual Active-Active Controller architecture where a LUN should be accessible by all the controllers simultaneously. The inter controller connectivity bandwidth should be minimum 100Gbps in redundancy	The inrecontroller connectivity bandwidth is very crucial factor while cross accessing any LUNs.	No Change in criteria

3	The storage system should have minimum 512GB cache. The proposed cache should be available across the controllers. Only write must be mirrored. Cache memory should be delivered on DRAM, any other device or HDD should not be considered as cache.	The storage system should have minimum 1024 GB cache. The proposed cache should be available across the controllers. Only write must be mirrored. Cache memory should be delivered on DRAM, any other device or HDD should not be considered as cache.	Higher cache offers high cache hit ratio which is better for the performance and low latency	No Change in criteria
4	Storage management software should be able to integrate with Active Directory/ LDAP for user authentication	Storage management software should be able to integrate with Active Directory/ LDAP for user authentication. Offered storage shall support multifactor authentication such that Multifactor authentication (MFA) allows enhanced security by requiring users to provide two authentication methods to log in to an admin or data storage VM.	Multi factor authentication is a very important security factor specially for finance institution where any log in for destructive activity is cross checked by second authentication.	Existing Clause: Storage management software should be able to integrate with Active Directory/ LDAP for user authentication. **Amended Clause:** Storage management software should be able to integrate with Active Directory/ LDAP for user authentication. Offered storage shall support multifactor authentication such that Multifactor authentication (MFA) allows enhanced security by requiring users to provide two authentication methods to log in to an admin or data storage VM. Corrigendum shall be issued.

| 5 | Page-80, Point-5 | The storage system should have minimum 512GB cache. The proposed cache should be available across the controllers. Only write must be mirrored. Cache memory should be delivered on DRAM, any other device or HDD should not be considered as cache | Kindly Change the Clause as below- The storage system should have minimum 512GB cache per controller. The proposed cache should be available across the controllers. Only write must be mirrored. Cache memory should be delivered on DRAM, any other device or HDD should not be considered as cache. Justification: this being an enterprise system we suggest seeking at least 1 TB Cache per system for better performance as Cache is not scalable in future. | No Change in criteria |