Addendum 2 dated 17th April 2023

[A] Impotant Dates:

Sr. No.	RFP	Timeline
1	Last Date of Submission of RFP Response (Closing Date)	**03:00 PM on 25th April, 2023**
2	Eligibility Cum Technical Bid Opening Date	**03:30 PM on 25th April, 2023**

Addendum to following Annexure:

- Annexure 12 – Project Details Scope of Work: Technical Specifications

All other Terms & Conditions are same as per our RFP for Supply, Installation and Maintenance of Mid-Range Storage at Bank of Baroda sponsored RRB's Data Centres (Bid Number: GEM/2023/B/ 3054235 dated 30th January 2023).

Addendum 2 dated 17th April 2023

Annexure 12 – Project Details Scope of Work

MINIMUM TECHNICAL SPECIFICATION FOR STORAGE: The proposed storage by bidder must comply with the technical specification given below:

S No	Clause in RFP	Clarifications/ Changes made
1	**Generic Specifications**	
1.1	The proposed array must be a Midrange storage configured with 550 TB of usable capacity at DC and DR and 50 TB usable capacity at NDR with not more than 7 TB drives and should deliver 1M IOPS (8K block size) with Raid 6 configuration. Usable capacity should be delivered without considering Deduplication or Compression or any other Data Reduction Techniques. Proposed solution shall be scalable to at least 2 PB of capacity without any deduplication and compression feature. All drives should be NVMe Flash only.	The proposed storage array must be configured with 550 TB of usable capacity at DC and DR and 50 TB usable capacity at NDR with not more than 16 TB drives and should deliver 1M IOPS (only for DC/DR) (8K block size) with Raid 6 configuration. Usable capacity should be delivered without considering Deduplication or Compression or any other Data Reduction Techniques. Proposed solution shall be scalable to at least 1 PB of capacity without any deduplication and compression feature. All drives should be NVMe Flash only.
1.2	Proposed storage array should support NVMe based Flash. Proposed Storage shall be the latest generation storage from the respective OEM. Built All NVMe Array and not Hybrid with NVMe drives.	Proposed storage array should support NVMe based Flash. Proposed Storage shall be the latest generation storage from the respective OEM. Built All NVMe Array and not Hybrid with NVMe drives. Storage array can support other drive types too.
1.3	The proposed storage array must support the latest industry standard dual ported native NVMe drives on both processor enclosure and Expansion enclosure with Single-Parity/Double-Parity Configuration. All Flash drives support two independent I/O channels with automatic failover and fault isolation.	No Change
1.4	Must be compatible with Operating Systems like MS Windows, Linux (RHEL/SUSE), Vmware, Unix and other equivalent OS as per Industry standard	No Change
1.5	Proposed storage solution should support below integration options to enable DevOps and Infrastructure	No Change

Addendum 2 dated 17th April 2023

S No	Clause in RFP	Clarifications/ Changes made
	automation. All mentioned options should be officially supported by storage vendor	
1.6	Proposed storage solution should support for Kubernetes Persistent Volumes using Container Storage Integration (CSI), Support for Ansible using official Ansible modules, Support for Powershell modules and Support for Python library	At present no container are present in the environment, but Bank may decide to implement the same in future.
1.7	Storage array must deliver sustained 1 Million IOPs (in terms of host) in Read-Write Ratio of 70:30 with less than one millisecond response time at fully populated capacity even in case of one controller or node failure.	Storage array must deliver sustained 1 Million IOPs with 8KB block size (in terms of host) in Read-Write Ratio of 70:30 with less than one millisecond response time at fully populated capacity even in case of one controller or node failure.
1.8	Storage array should support Hypervisors of major OEMs like VMWARE vSphere, Microsoft Hyper-V, RHEV, Nutanix, Oracle KVM and OPENSTACK.	Storage array should support Hypervisors of major OEMs like VMWARE vSphere, Microsoft Hyper-V, RHEV, Oracle KVM and OPENSTACK.
1.9	Non-disruptive LUN/volume access even in case of node/controller failure should be available.	No Change
1.10	Proposed storage should also support NDU software, hardware, firmware upgrades. Any such activity should be transparent to Operating System and application services.	No Change
2	**Architecture And Availability**	
2.1	The proposed storage array should be NVMe based scale-up and scale-out Active-Active architecture. All the hardware and software components should be redundant including power supply, fans, batteries etc. The proposed array must support non-disruptive replacement of failed hardware component, firmware/ microcode upgrades and hardware upgrades, hot swapping.	Mission critical applications are configured in active-active configuration at DC-NDR. Complete Details will be shared with successful bidder. No global load balancer has been deployed in the environment

Addendum 2 dated 17th April 2023

S No	Clause in RFP	Clarifications/ Changes made
2.2	Storage to be configured with minimum 4 controllers, from day one, guaranteeing performance and 100% availability of data and should offer at least 64 FC ports of 32 Gbps equally distributed across the four controllers as 16 ports per controller.	Storage to be configured with minimum 4 controllers for DC and DR, and 2 controllers for NDR from day one, guaranteeing performance and 99.99% availability of data and should offer at least 32 FC ports of 32 Gbps equally distributed across the four controllers with minimum 8 ports per controller. It should be scalable to 48 FC ports of 32 Gbps speed. There should not be any data loss due to disk failure/rebuild. Storage should be NSPOF (No Single Point of Failure) including Storage controllers. Each Storage unit should have dual power source and should perform without performance degradation even on single power source.
2.3	Proposed storage should be capable of natively supporting the following host connectivity: Block - FC, NVMe/FC, iSCSI, NVMe/TCP and VMware Virtual Volumes (vVols), File - NFS, CIFS & SMB, FTP and SFTP	Proposed storage should be capable of natively supporting the following host connectivity: Block - FC, NVMe/FC, iSCSI
2.4	Proposed storage shall be configured with 64 x 32Gbps FC port with all the SFP transceiver included and shall be scalable to 128 x 32Gbps FC ports.	Proposed storage shall be configured with 32 x 32Gbps FC port with all the SFP transceiver included and shall be scalable to 48 x 32Gbps FC ports.
2.5	Proposed storage array with minimum 48 CPU cores and minimum 1TB cache and scalable to 2TB across scale out controllers	The array should be supplied with at least usable minimum 2TB cache across all controllers for DC & DR Storages and 1 TB cache across all controllers for NDR Storage, all writes in DRAM or secondary cache must be mirrored across controllers for performance and service availability.
2.6	The proposed storage must support at least 90 NVMe drives across dual nodes/controllers.	No Change
2.7	Supported NVMe flash drive has various sizes like 7.6TB, 15.36TB & 30TB. Proposed storage should also support growing capacity by single	Supported NVMe flash drive has various sizes like 1.92TB, 3.84TB, 7.6TB, 15.36TB. Proposed storage should also

Addendum 2 dated 17th April 2023

S No	Clause in RFP	Clarifications/ Changes made
	drive increment for supporting granular upgrades.	support growing capacity by supporting granular upgrades.
3	**Storage Connectivity**	
3.1	Proposed Storage array should be capable of End-to-End NVMe must support back-end NVMe and must be able to extends the NVMe technology benefit across network via NVMe-over-Fiber Channel support and NVMe-over-Ethernet support.	Proposed Storage array should be capable of End-to-End NVMe must support back-end NVMe and must be optionally able to extends the NVMe technology benefits across network via NVMe-over-fiber channel support
3.2	The Proposed Storage solution must support different Host connectivity protocols like: 16Gb/32Gb FC, 25GbE/10Gbe Optical and 1GbE/10GbE Base-T	The Storage solution must support different Host connectivity protocols like: 16Gb/32Gb FC, 25GbE/10Gbe Optical.
4	**Data Availability**	
4.1	The proposed storage array should support QoS feature to assign priority to particular application/volume on the array.	No Change
4.2	The storage system should provide automatic detection of errors hardware fault, error logging and to send notification for alerts generated in the end to end infrastructure of proposed solution.	No Change
4.3	The proposed array must protect data in cache during a manual power down or an unexpected power outage by vaulting or flushing the data in cache to non-volatile flash modules.	No Change
4.4	In the event of power failure, Data in the cache should be safely written to the disks prior to performing a graceful shutdown.	No Change
5	**Data Reduction for space efficiency**	
5.1	The proposed array should support Always on enterprise class data services including - Thin Provisioning, Inline Compression & Deduplication, Replication, Snapshot. Data reduction must be supported on block (FCP, iSCSI), file (CIFS, NFS) data and VVOLs. Storage vendor must sign the	The proposed array should support Always on enterprise class data services including - Thin Provisioning, Inline Compression & Deduplication, Replication, Snapshot. Data reduction must be supported on block (FCP, iSCSI), file (CIFS, NFS) data and VVOLs.

Addendum 2 dated 17th April 2023

S No	Clause in RFP	Clarifications/ Changes made
	data reduction guarantee letter for supporting 4:1 data reduction ratio.	
6	**Data Encryption**	
6.1	The proposed array must include SED (or hardware) based Data at Rest Encryption (D@RE) solution to encrypt data on all drives (AES 256 bit) with embedded/external automated key management. Encryption should seamlessly work with all the storage features and without any performance penalty.	No Change
6.2	Bidder needs to integrate storage solution with the existing key management solution of the Bank	Storage solution should be compatible with all industry standard key Management Systems.
6.3	Encryption should not add any performance overheads	No Change
7	**Data Services**	
7.1	Proposed storage solution must support creating multiple NAS servers for tenant isolation with each file system scalable up to 256TB. NAS Server shall have support for 3rd party anti-virus software integration. NAS Servers may be a Gateway or Native Solution.	The storage license must be included as NAS enabled with minimum 100 TB license for NAS servers. NAS feature is not required for NDR Storage. There should be NSPOF (No Single Point of Failure) even if the NAS solution is provided through gateways.
7.2	Proposed storage solution should support snapshot. Storage arrays should have ability to use snapshot as writable volume. Proposed system should support snapshot scheduler. Proposed storage should allow snapshot replication with different retention for source and destination. Proposed storage arrays should support creating writable copies of the source volume which are immune to deletion of source LUN/volumes. Proposed array should support user accessible snapshots for NAS data to facilitate user-initiated single file recovery without administrative intervention.	Proposed storage solution should support snapshot. Storage arrays should have ability to use snapshot as writable volume. Proposed system should support snapshot scheduler. Proposed storage should allow snapshot replication with different retention for source and destination. Proposed storage arrays should support creating writable copies of the source volume which are immune to deletion of source LUN/volumes. Proposed array should support user accessible snapshots for NAS data to facilitate user-initiated single file recovery without administrative intervention
8	**Storage Resource Pooling**	

Addendum 2 dated 17th April 2023

S No	Clause in RFP	Clarifications/ Changes made
8.1	The proposed array should support mixing of different capacity of NVMe drives of various sizes in same storage resource pool.	No Change
9	**Software & Licensing**	
9.1	The proposed storage array should support 3 way replication of data across metro and global distances for DC, DR and NDR with zero data loss to support RTO and RPO. Required licenses for doing replication must be provided. To achieve the same, if needed seperate infrastructure needs to be provided.	The proposed storage array should support 2 way storage based replication of data across metro and global distances for DC, DR and NDR with zero data loss to support RTO and RPO. Required licenses for doing replication must be provided. To achieve the same, if needed seperate infrastructure like FCIP Routers or equivalent etc needs to be provided.
9.2	Proposed storage solution should include software to automate and orchestrate application/databases copy management - including but not limited to MSSQL, Oracle, Exchange etc - to create application/database consistent copy for multiple use cases including data repurposing, off-host backup, Test/Dev, Reporting etc. Proposed software should integrate with storage replication for application consistent disaster recovery	Complete database host details will be shared with the successful bidder.
9.3	Proposed storage should include native tools for data migration from existing HPE 3PAR, MSA, and EVA storage.	Proposed storage should include native tools for data migration from existing HPE 3PAR, MSA, and EVA storage. If native tools are not available then bidder can use other migration approaches and required migration software licenses to be provided by the bidder
10	**Storage Management Software and Hardware**	
10.1	The proposed array should be supplied with native Storage management software with Web based GUI capable of generating customized reports, real time monitoring, historical performance data for analysis and trending, capacity utilization monitoring.	The proposed array should be supplied with native Storage management software with Web based GUI capable of generating customized reports, historical performance data for analysis and trending, capacity utilization monitoring.

Addendum 2 dated 17th April 2023

S No	Clause in RFP	Clarifications/ Changes made
10.2	Proposed solution should also have cloud based monitoring and reporting tool with support for 2 years of historical reporting. Software should support monitoring and reporing multiple storage system. Required on-prem software and hardware should be included in the solution. Cloud based software should be accessible from any internet connected device with mobile application support for iOS and Android.	Proposed solution should also have cloud based monitoring and reporting tool with support for 2 years of historical reporting. Software should support monitoring and reporing multiple storage system. Required on-prem software and hardware should be included in the solution. Cloud based software should be accessible from any internet connected device.
10.3	Management of storage array from Vmware vCenter using plug-in	No Change
10.4	Storage management console should be Vmware aware and should report virtual machines running on storage datastore/VVOL container, including VM level performance and capacity details.	No Change
10.5	Storage management software should be able to identify performance bottleneck, Root Cause Analysis at host, SAN and storage level and should be able to troubleshoot storage performance problems.	Storage management software should be able to identify performance bottleneck, SAN and storage level and should be able to troubleshoot storage performance problems.
10.6	Storage management software should be able to identify performance bottleneck, Root Cause Analysis at host, SAN and storage level and should be able to troubleshoot storage performance problems.	This point stands deleted being a duplicate line item.
10.7	Software should also provide monitoring of data replication with storage at other sites.	No Change
10.8	The proposed array must provide an audit service to record activities including host-initiated actions, physical component changes, attempts blocked by security control.	No Change
11	**Application Aware Automation and Orchestration**	

Addendum 2 dated 17th April 2023

S No	Clause in RFP	Clarifications/ Changes made
11.1	Proposed storage solution should support below VMware integration options Vmware VAAI, SRM, VASA, VVOLs and Vmware cloud foundation (VCF) for multi-cloud data mobility. Proposed storage should include software to create VM consistent point-in-time copies with support for granular data restoration	No Change
11.2	Storage array should support VAAI and VASA integration, Vmware VRO and VRA plugins, certified with Vmware Cloud Foundation (VCF) and Support for Vmware SRM for inegration with storage based replication	Storage array should support VAAI and VASA integration, Vmware VRO , certified with Vmware Cloud Foundation (VCF) and Support for Vmware SRM for inegration with storage based replication
12	**Migration**	
12.1	Storage OEM should provide the online or Near-online migration approach for Oracle Databases running HPE Unix, Linux (Oracle, Red-Hat, Windows, VMware and Hyper-V Solutions). Storage OEM or the bidder should provide data migration approach from existing storage devices to proposed device and integrate. Successful bidder is required to participate in storage data migration drill and guide the Bank for an efficacious migration from the existing Storage Arrays i.e. HP MSA, EVA and 3PAR.	Detailed plan for migration along with downtime required need be provided with technical document. The size of data to be migrated at each site will be approximately 250TB spanning across multiple storage devices which will be consolidated into single device. Complete details will be provided to successful bidder. Also bidder to provide implementation plan. Migration of all the application, os, db from existing storage arrays to proposed storage arrays would be responsibility of the Bidder.
13	**EOSL**	
13.1	The product / storage array should not be in any roadmap for End of Sale in next five years as on date of RFP.	The software & hardware quoted by the bidder in this RFP should not be declared as End of Support Life (EoSL) by the OEM within 7 years from the date of bid submission Order. Proposed Storage should not have been declared End of Life (EoL) as on date of submission of bid.