REPUBLIC OF THE PHILIPPINES
Department of Science and Technology
**PHILIPPINE ATMOSPHERIC, GEOPHYSICAL and
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TERMS OF REFERENCE FOR THE SUPPLY, DELIVERY, INSTALLATION, INTEGRATION, TESTING AND COMMISSIONING OF PAGASA METEOROLOGICAL INFORMATION SYSTEM (PAGASA-MIS) STORAGE EXPANSION

I. OVERVIEW

The Climatology and Agrometeorology Division (CAD) of PAGASA is responsible for archiving, processing, and retrieval of meteorological information that PAGASA produces. CAD adheres to make all these information machine-readable and readily available for further analyses and customization according to users' needs.

Currently, the data products being produced by PAGASA (e.g., Satellites, Radars, Codar, Automatic Weather Stations, Automatic Rain Gauges, Upper-air observing instruments, manned surface observing stations, Hydrometeorological Stations, Numerical Weather Prediction and climate models outputs, among others) are being archived at the PAGASA Meteorological Information System (PAGASA-MIS). Based on the rate of data being ingested at PAGASA-MIS, the current set-up is projected to accommodate these data products only until one-and-a-half years from now. To sustain this service and in accordance with Section 7(d) of the PAGASA Modernization Act of 2015 (R.A. No. 10692), storage expansion is needed. Hence, PAGASA-MIS Storage Expansion, which aims to integrate and store the current and future data products of PAGASA, is implemented.

The current PAGASA-MIS Infrastructure is composed of two sites: the first one is located at the PAGASA Central Office, the active site, and another one is being hosted by Globe at Cebu Data Center, which serves as the backup and recovery site. The storage expansion project provides a hybrid scalable storage composite on both sites allowing a platform that has the capacity to burst on preferred cloud storage provider for addressing storage deficiency.

II. APPROVED BUDGET FOR THE CONTRACT (ABC)

The approved budget for the project amounts to One Hundred Two Million, Six Hundred Ninety Nine Thousand, Eight hundred and Five Pesos **(PhP 102,699,805.00)** inclusive of VAT and all applicable government taxes.

III. QUALIFICATIONS OF THE BIDDER

(Please refer to Section II. Instructions to Bidders, the Bid Data Sheet and Checklist of Eligibility and Technical Requirements of the Bidding Documents)

IV. DELIVERY PERIOD AND PLACE OF DELIVERY

The winning bidder shall deliver all hardware and software components including the delivery of the system but not limited to installation and configuration within the period of **nine (9) months** at the PAGASA Central Office located at PAGASA Science Garden Complex, BIR Road, Diliman Quezon City, and / or the offsite data center.

V. BID PROPOSAL CONTENTS

The prospective bidder is expected to comply and respond in accordance with the specific instructions to bidders and submit all the documentary requirements under the Checklist of Eligibility, Technical and Financial Requirements. The submission of documentary requirements must be properly arranged in order and with label.

The prospective bidder shall respond paragraph by paragraph and shall clearly indicate compliance to all the required specifications (*Please see Section VI. TECHNICAL SPECIFICATIONS*) and shall specify the number of days or schedules within which to complete the delivery of all the goods required (*Please see Section VII. SCOPE OF WORK*).

The prospective bidder shall be required also to include in this proposal, original descriptive literatures and unamended brochures of all equipment/materials to be supplied. If applicable, plans, drawings and diagrams/configurations must likewise be provided.

These details will allow the **PAGASA-Bids and Awards Committee** to fully evaluate and determine compliance from the prospective bidders.

The following are additional requirements which will be part of the technical bid documents:

- Prospective bidders shall include certificates of experience within the five (5) year period in the installation, configuration, troubleshooting and other technical support services of the software, hardware and database of the system they are offering.

- Prospective bidder must submit certificate of partnership with the application system developers of PAGASA-MIS in conjunction to the existing support and warranty until December, 2020.

- Prospective bidders shall submit their proposed network and system diagram.

- Prospective bidders shall submit a Ghantt chart showing the proposed schedule for the project.

- Prospective bidders must provide a list of their on-site local and warm body technical support to be deployed for the project accompanied by curriculum vitae and proof of their competency such as, but not limited to diplomas and certificates.

- Proposed Service Level Agreement which clearly indicates that technical support shall be provided no longer than four (4) hours on the time of the call, 24 x 7.

VI.   TECHNICAL SPECIFICATIONS

The winning bidder shall supply, deliver, install, integrate, test, and commission the PAGASA Meteorological Information System (PAGASA-MIS) Storage Expansion with the following minimum specifications:

I.   SOLUTION ARCHITECTURE

Specification	
1. Storage Expansion	
1. Provide for 200TB additional on-premises storage that can be used either for block or file storage	
2. Provide for a minimum of 600TB additional on-demand cloud storage service that can be used either for block or file storage via storage cloud gateways at any given time within the duration of the warranty.	
3. The on-premises storage expansion must be of compatible with the current storage head controller of the storage system	
4. The cloud storage service must be of the same provider as PAGASA's existing cloud infrastructure contract	
2. Network	
1. Provide for high-throughput, highly available storage network system between compute nodes and storage system	
2. Provide for secure connectivity between on-premises storage system to cloud storage system	
3. Provide dedicated network infrastructure that would enable hybrid cloud operations between PAGASA's on-premises infrastructure to PAGASA's existing cloud infrastructure	
3. API Platform and Cloud Compute	
1. Provide for highly available virtualized on-premises compute environment for PAGASA's API programs and performance sensitive processing	
2. Provide for cloud compute capacity for PAGASA's cloud-based utilities and non-latency sensitive programs and operations for 3 years	
3. Provide a graphical interface for administration and management of the on-premises and cloud platforms	
4. Provide 3G/LTE connectivity for select on-premises virtual machines	
5. Provide virtual machines for PAGASA's General FTP	

Specification	
servers for primary and disaster recovery site	
6. Provide virtual machines for PAGASA-MIS FTP servers for primary and disaster recovery site	
4. Enterprise Search	
1. Provide automatic file indexing and "search" function for select application documents located whether on-premises or in PAGASA's cloud infrastructure	
2. Provide search functions that can be invoked by other programs via REST API calls	
3. Provide a graphical interface for search functionality	
5. Database Licenses	
1. Provide renewal of database licenses for PAGASA-MIS for at least 3 years	
6. Hosting Services	
1. Provide hosting services for PAGASA's disaster recovery site for at least two (2) years	
2. Provide transfer, reconfigurations, commissioning and testing services of PAGASA-MIS from host site to PAGASA Datacenter facility Cebu when on or before the warranty period.	
7. PAGASA-MIS Software Components	
1. Interpolation Methods	
2. Additional Reports	
3. Typhoon Tracking with Associated Rainfall based on location and duration	
4. Homogenization	
5. Auto-map generation from Map Analysis (Tiling)	

II.   INFRASTRUCTURE

Specification	
1. General	
1. Provide for a hybrid cloud architecture with reliable and secure network connectivity between PAGASA on-premises data centers (primary and disaster recovery sites) and PAGASA's existing cloud infrastructure	
2. Must be compatible with PAGASA's existing hardware infrastructure	
3. Cloud services must be of the same provider as PAGASA's existing cloud infrastructure contract	
4. Provide for at least three (3) years of service and support maintenance	

2. On-Premises Storage Specification	
1. Must be supported and can be mixed with the existing drive enclosures in the same storage appliance compatible with PAGASA-MIS storage infrastructure (inclusive of additional racks if required)	
2. Must provide a total additional usable capacity of 200TB using RAID 5	
3. Each drive enclosures must have two (2) 2.5-inch SSD write flash accelerator	
4. Each drive enclosures must have two (2) hot-swappable I/O modules	
5. Each drive enclosures must have hot-swappable power supply/fan module assemblies	
6. Must provide six (6) Ethernet cards with dual 10GbE ports for the existing controllers. Ethernet cards must be certified and supported by the existing storage controllers	
7. Must include rack cabinet with the following specifications: o Industry standard, adjustable 19" rack with square mounting holes o Standard 600mm width, 1200mm deep and 42RU of space o Vertically mounted Power Distribution Units o Locking Front and Rear Doors o With Anti-tilt bars and Levelling feet o Must be configured with redundant 22KVA PDU	
3. Cloud Storage Specifications	
1. Flexible object storage that can be utilized as file storage	
2. Accessible via storage gateway deployed in PAGASA's data centers (Primary and DR)	
3. Accessible via REST-based APIs with customizable security access controls	
4. Capable of being replicated or cached into PAGASA's on-premises data centers	
5. Compatible with PAGASA's existing cloud infrastructure	
6. Additional 600TB of usable space	
7. Designed for 99.999999999% durability	
8. Provide 99.9% service availability	
9. Provide cloud storage access mechanism via user authentication	
4. Network Specifications	
1. Provide at least 10Gb, highly available connectivity between the virtualization environment and the storage system	
2. Provides 1-rack-unit (RU) 48 fixed 1 and 10 Gigabit Ethernet ports, of which the last 16 ports are unified ports. It also offers 6 QSFP ports using QSFP transceivers for Ethernet and FCoE support	
3. Operates at full wire speed, regardless of packet size and services turned	

Specification	
4. Supports Gigabit and 10 Gigabit Ethernet SFP options on all ports. SFP options include: 10G Twinax passive, Multimode Fibre, Single mode Fibre (short and long haul), Copper and Fibre Channel. 40 Gigabit Ethernet QSFP+ Multimode and Single mode	
5. Supports Jumbo frames on all ports (up to 9216 bytes)	
6. supports line-rate forwarding with all services enabled	
7. Allows the MTU size to be defined for each physical and logical interface	
8. Supports IEEE 802.3ad link aggregation support	
9. Supports up to 115K MAC Addresses	
10. The switch supports up to 4000 VLANs	
11. Supports ingress and egress bandwidth policing/rate limiting per flow/ACL	
12. Supports IEEE 802.1Q VLAN on all Ethernet-based interfaces	
13. Supports Q-in-Q	
14. Supports NX-OS	
15. Provide redundant network switches for high availability on primary site	
5. On-Premises Server General Specifications	
1. 3 x Rack Mount Servers	
2. Must connect to PAGAS's existing storage infrastructure via high-speed and highly available network	
6. On-Premises Server Detailed Specifications	
1. Intel Xeon Platinum 2.1Ghz minimum	
2. 24 cores per socket	
3. 24 cores per server (1 socket occupied)	
4. 128 GB RAM minimum, expandable to 3TB	
5. Minimum 2 x hard drive, 1.2TB storage minimum (raw) total	
6. 1 x Raid Controller	
7. 1 x Single Port 16Gb Fibre Channel HBA	
8. 1 x Dual Port 10Gb + Dual Port 1Gb Network Card	
9. Redundant Power Supply	
7. Cloud Compute Server Specifications	
1. Ten (10) virtual servers each with at least 8 vCPUs, 16GiB of RAM, and 128GB SSD	
2. Convertible to different vCPU counts as long as total core counts for the ten (10) virtual servers is maintained (i.e. 10 x 8vCPUs or 20 x 4 vCPUs or 5 x 16 vCPUs or other combinations)	
3. Can run Linux or Windows workload (license included)	
8. Additional Requirements for Infrastructure	

Specification	
1. Twelve (12) Hand Crank High Density Mobile Shelving Compact Space with safety lock (2ft depth, 10ft wide, 10ft high)	
2. Three (3) CD Cabinet 8 drawers with full extension ball bearing drawer slides, two (2) vertical and three (3) horizontal divider per drawer (56.5" high x 19" depth x 22" wide)	
3. Racks, cables, screws, railings, etc. that are not explicitly specified but are required for proper functionality of the infrastructure	

III.   SOFTWARE

Specification	
1. General	
1. Provide for software components that will run on the proposed hardware infrastructure, with functionalities enhancing the existing software modules in PAGASA	
2. On-Premises Virtualization Environment Specifications	
1. Capable of configuring virtual machines up to 128 virtual CPUs and 6 TB of RAM	
2. Provides role-based access controls	
3. Provide built-in modern UI based on HTML5 standards for administration	
4. Provide for a console to manage the virtualized environment	
5. Provide for a "plug-in" to integrate with PAGASA's existing cloud infrastructure	
6. Supports REST-based APIs	
3. Enterprise Search Specifications	
1. Provide for a cloud-based, open-source search and analytics engine	
2. Provide for flexible storage options of at least one (1) TB allocations for search indices	
3. Can be scaled up (add instances) or down (remove instances) depending on workload.	
4. Provide for an open-source analytics and visualization platform	
5. Provide for a graphical user interface (GUI) to perform searches across select document locations	
6. Provide a "serverless function" for automatic indexing of documents chosen by PAGASA contained in folders/buckets	
7. Can integrate with existing applications via API calls	
4. Database Licenses	
1. License renewal of existing PAGASA-MIS database for at least 3 years	

5. PAGASA-MIS Additional Components	
5.1 Additional Interpolation Method In Map Analysis Module	

1. Simple Kriging Interpolation Method
   2. Ordinary Kriging Interpolation Method
   3. Aurelhy Interpolation Method	

5.2 Additional Reports	

1. Meteorological Aerodrome Reports
   2. Monthly Synoptic Transmission Report
   3. WMO Standard Formats
   4. Other reports formats for productivity	

5.3 Typhoon Track with Associated Rainfall Analysis in Geospatial Data Module	
5.4 Selective Map tiling in Map Analysis module with auto publish capability to any web base Geographical Information System (GIS)	
5.5 Application Program Interface (API) for parameters with 5 days retention period in JavaScript Object Notation (JSON) file and Extensible Markup Language (XML) file.	
5.6 Astronomical Book Module re-organization.	
5.7 Severe Weather Data Module re-organization.	

5.8 Additional Observation Stations for Integration and data archive.
   a. Coastal radar
   b. Disdrometer
   c. Lightning Detection
   d. X-Band Radar
   e. Universal Model
   f. Climate Models
   g. Other data formats with significant use in research and development.	

6. Additional Requirements for Software	
1. Software licenses and cloud services that are not explicitly specified but are required for proper functionality of the software solutions	

VII. Workstations

1. Laptop 15"
1.1 Must have two (2) units with the following specifications or better: 1.2 Must have at least Intel core i7-8750H processor, or better 1.3 Must have at least a cached memory of 9MB or better 1.4 Must have at least a memory of 16GB DDR4, 2666Mhz or better 1.5 Must have a video memory of NVIDIA GTX 1050 Ti with 4GB GDDR5 memory or better 1.6 Must have at least a hard disk capacity of 1TB 5400rpm Hybrid with *GB cache or better 1.7 Must have at least an Integrated HD audio or better 1.8 Must have at least a Full HD, IPS, Anti–Glare LED backlight display or better 1.9 Must have a 802.11ac plus Bluetooth 4.2, dual band Gigabit Ethernet or better 1.10 Must have Windows 10 operating system

2. Laptop 13"
2.1 Must have two (2) units with the following specification or better: 2.2 Must have at least Intel core i7-8550U processor, or better 2.3 Must have at least a cached memory of 8MB or better 2.4 Must have at least a memory of 16GB LPDDR3, 2133Mhz or better 2.5 Must have a video memory of Intel UHN graphics 620 or better 2.6 Must have at least a storage capacity of 512GB PCIe Solid state drive or better 2.7 Must have a 13.3 inches FHD infinity edge display or better 2.8 Must have a 802.11ac plus Bluetooth Miracast capable or better 2.9 Must have Windows 10 operating system 2.10

2. SCOPE OF WORK

The scope of work covers the supply, delivery, integration, installation, configuration, testing, training and commissioning of PAGASA Meteorological Information System (PAGASA-MIS) Storage Expansion. The works and services to be performed under this contract shall essentially consist of, but not limited to, the following:

1. Installation: Hardware Components
1. Delivery, Installation and configuration
2. Interconnectivity and interoperability with PAGASA's existing hardware infrastructure
3. Installation and configuration of storage gateways
4. Installation and configuration of FTP servers
5. Configuration of storage subsystems for allocation to different subsystems
6. Installation and configuration of network components for interoperability and integration with existing PAGASA hardware and network infrastructure

	7. Storage balancing of capacity between the primary and DR site, utilizing both existing storage and additional storage capacity
	8. Installation of Twelve (12) Hand Crank High Density Mobile Shelving Compact Space
	9. Maintenance and support for 3 years
	10. 24/7 Support services
2. Installation: Software and Network Components	
	1. Installation and configuration of virtualized environment
	2. Installation and configuration of Enterprise Search Platform
	3. Development and deployment of indexing function for select folder/buckets into search engine
	4. Development and Configuration of additional PAGASA-MIS components
	5. Network configuration for secure routes between existing PAGASA network and new network introduced by the hybrid cloud system
	6. Establish connectivity between PAGASA data centers and PAGASA cloud infrastructure via secure lines
	7. Configure user authentication for cloud storage buckets/objects (i.e. no public access and unauthenticated access for all cloud storage)
	8. Subscription to cloud services for 3 years
	9. Maintenance and support for software component licenses for 3 years
	10. Managed services for cloud services for 3 years
	11. 24/7 Support services
3. Installation: Database Components	
	1. Provide services to ensure inter-operability between existing database system and proposed solution
4. Installation of electrical requirements, wirings, cabling, etc.	
	1. Must provide equipment configuration/layout including networking
5. Training and Testing	
	1. Training for five (5) on PAGASA-MIS Database Management System Administration (Food and location to be provided)
	2. Training for five (5) on Virtualization Environment Administration (Food and location to be provided)
	3. On-site training for fifteen (20) on Enterprise Search Administration (Food to be provided)
6. System acceptance	

GENERAL NOTES:

Prior to the undertaking of the project, **the winning bidder** should submit, provide and comply with the following:

1. Kick-off meeting must be conducted in coordination with the end-user in which the details of the project will be discussed. The schedule and venue will be advised by the end-user.

2. List of personnel that will undertake the project (programmer, supervisor, project manager,

etc).

3. Proposed technical plans, network diagrams, manuals and configuration scripts, datasheets, brochures and other documents essential to the project. Two (2) hard copies, book bind, presentable and soft copies.

3. <u>WARRANTIES</u>

1. Three (3) years warranty on all hardware and software.

2. Availability of technical support on 24/7 via email, phone, or SMS during the warranty period.

3. For severe or critical issues on the Security Module, Database and/ or, an SLA of 4 hours response time in 3 years term should be available.

4. Proof of Product: Datasheets/Brochures with indications of certified Standards.

5. The winning bidder shall neither assign, transfer, pledge nor subcontract any part or interest therein.

4. <u>TRAINING OF PERSONNEL</u>

Agency Personnel should be provided with training to operate all proposed hardware and software. They should also be able to perform first (1st) level trouble shooting and problem identification with documented guide books and references.