**Lot-2 High Performance Computing Node Center Implementation ဝယ်ယူတပ်ဆင်ခြင်းလုပ်ငန်း (Trunkey)**

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| ၁ | **<u>IML Monitoring</u>**<br>1 x HPE ProLiant DL360 Gen10 4LFF Configure-to-order Server<br>1 x HPE DL360 Gen10 4LFF CTO Server<br>1 x Intel Xeon-Bronze 3204 (1.9GHz/6-core/85W) FIO Processor Kit for HPE ProLiant DL360 Gen10<br>2 x HPE 8GB (1x8GB) Single Rank x8 DDR4-2933 CAS-21-21-21 Registered Smart Memory Kit<br>2 x HPE 1TB SATA 6G Midline 7.2K LFF (3.5in) SC 1yr Wty HDD<br>1 x HPE Smart Array E208i-a SR Gen10 (8 Internal Lanes/No Cache) 12G SAS Modular Controller<br>2 x HPE 500W Flex Slot Platinum Hot Plug Low Halogen Power Supply Kit<br>1 x HPE iLO Advanced 1-server License with 3yr Support on iLO Licensed Features<br>1 x HPE 1U LFF Gen9 Easy Install Rail Kit<br>1 x HPE CE Mark Removal FIO Enablement Kit<br>1 x HPE 3Y Proactive Care 24x7 SVC<br>1 x HPE iLO Advanced Non Blade Support<br>1 x HPE DL360 Gen10 Support<br>1 x HPE Installation and startup Service | 1 Set |
| ၂ | **<u>HPC MDS Server</u>**<br>2 x HPE ProLiant DL360 Gen10 8SFF Configure-to-order Server<br>2 x HPE DL360 Gen10 8SFF CTO Server<br>2 x Intel Xeon-Gold 6244 (3.6GHz/8-core/150W) FIO Processor Kit for HPE ProLiant DL360 Gen10<br>2 x Intel Xeon-Gold 6244 (3.6GHz/8-core/150W) Processor Kit for HPE ProLiant DL360 Gen10<br>24 x HPE 8GB (1x8GB) Single Rank x8 DDR4-2933 CAS-21-21-21 Registered | 1 Set |

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| | Smart Memory Kit | |
| | 4 x HPE 600GB SAS 12G Enterprise 10K SFF (2.5in) SC 3yr Wty Digitally Signed Firmware HDD | |
| | 2 x HPE DL360 Gen10 Low Profile Riser Kit | |
| | 2 x HPE Smart Array E208e-p SR Gen10 (8 External Lanes/No Cache) 12G SAS PCIe Plug-in Controller | |
| | 2 x HPE InfiniBand EDR/Ethernet 100Gb 2-port 841QSFP28 Adapter | |
| | 2 x HPE Smart Array E208i-a SR Gen10 (8 Internal Lanes/No Cache) 12G SAS Modular Controller | |
| | 2 x HPE Ethernet 10Gb 2-port FLR-SFP+ BCM57414 Adapter | |
| | 4 x HPE BladeSystem c-Class 10Gb SFP+ SR Transceiver | |
| | 4 x HPE 800W Flex Slot Platinum Hot Plug Low Halogen Power Supply Kit | |
| | 2 x HPE iLO Advanced 1-server License with 3yr Support on iLO Licensed Features | |
| | 2 x HPE 1U Gen10 SFF Easy Install Rail Kit | |
| | 2 x HPE CE Mark Removal FIO Enablement Kit | |
| | 1 x HPE 3Y Proactive Care 24x7 SVC | |
| | 2 x HPE iLO Advanced Non Blade Support | |
| | 2 x HPE DL360 Gen10 Support | |
| | 2 x HPE Installation and startup Service | |
| ၃ | **HPC MDT Storage** | 1 Set |
| | 2 x HPE D3710 Enclosure | |
| | 4 x HPE 300GB SAS 12G Enterprise 15K SFF (2.5in) SC 3yr Wty Digitally Signed Firmware HDD | |
| | 24 x HPE 800GB SAS 12G Mixed Use SFF (2.5in) SC 3yr Wty Digitally Signed Firmware SSD | |
| | 4 x HPE External 2.0m (6ft) Mini-SAS HD 4x to Mini-SAS HD 4x Cable | |
| | 1 x HPE 3Y Proactive Care 24x7 SVC | |

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| | 2 x HPE D2000 Disk Enclosure Support<br>2 x HPE Installation and startup Service | |
| ၄ | **<u>HPC OSS Server</u>**<br>4 x HPE ProLiant DL380 Gen10 8SFF Configure-to-order Server<br>4 x HPE DL380 Gen10 8SFF CTO Server<br>4 x Intel Xeon-Gold 6246 (3.3GHz/12-core/165W) FIO Processor Kit for HPE ProLiant DL380 Gen10<br>4 x Intel Xeon-Gold 6246 (3.3GHz/12-core/165W) Processor Kit for HPE ProLiant DL380 Gen10<br>48 x HPE 32GB (1x32GB) Dual Rank x4 DDR4-2933 CAS-21-21-21 Registered Smart Memory Kit<br>8 x HPE 600GB SAS 12G Enterprise 10K SFF (2.5in) SC 3yr Wty Digitally Signed Firmware HDD<br>4 x HPE DL Gen10 x8/x16/x8 Riser Kit<br>16 x HPE Smart Array E208e-p SR Gen10 (8 External Lanes/No Cache) 12G SAS PCIe Plug-in Controller<br>4 x HPE InfiniBand EDR 100Gb 1-port 841QSFP28 Adapter<br>4 x HPE Smart Array E208i-a SR Gen10 (8 Internal Lanes/No Cache) 12G SAS Modular Controller<br>4 x HPE Ethernet 10Gb 2-port FLR-SFP+ BCM57414 Adapter<br>8 x HPE BladeSystem c-Class 10Gb SFP+ SR Transceiver<br>8 x HPE 800W Flex Slot Platinum Hot Plug Low Halogen Power Supply Kit<br>4 x HPE iLO Advanced 1-server License with 3yr Support on iLO Licensed Features<br>4 x HPE 2U Small Form Factor Easy Install Rail Kit<br>1 x HPE 3Y Proactive Care 24x7 SVC<br>4 x HPE iLO Advanced Non Blade Support<br>4 x HPE DL38x Gen10 Support<br>4 x HPE Installation and startup Service | 1 Set |

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| ၅ | **HPC OST Storage**<br><br>4 x HPE D6020 Enclosure with Dual I/O Modules<br><br>264 x HPE 10TB SAS 12G Midline 7.2K LFF (3.5in) ST 1yr Wty Helium 512e Digitally Signed Firmware HDD<br><br>4 x HPE D6020 Dual I/O Module Option Kit<br><br>32 x HPE External 2.0m (6ft) Mini-SAS HD 4x to Mini-SAS HD 4x Cable<br><br>1 x HPE 3Y Proactive Care 24x7 SVC<br><br>4 x HPE D6020 Enclosure Support<br><br>4 x HPE Installation and startup Service | 1 Set |
| ၆ | **Servers for vCloud**<br><br>8 x HPE ProLiant DL380 Gen10 8SFF Configure-to-order Server<br><br>8 x HPE DL380 Gen10 8SFF CTO Server<br><br>8 x Intel Xeon-Gold 6246 (3.3GHz/12-core/165W) FIO Processor Kit for HPE ProLiant DL380 Gen10<br><br>8 x Intel Xeon-Gold 6246 (3.3GHz/12-core/165W) Processor Kit for HPE ProLiant DL380 Gen10<br><br>96 x HPE 32GB (1x32GB) Dual Rank x4 DDR4-2933 CAS-21-21-21 Registered Smart Memory Kit<br><br>16 x HPE 600GB SAS 12G Enterprise 10K SFF (2.5in) SC 3yr Wty Digitally Signed Firmware HDD<br><br>8 x HPE DL Gen10 x8/x16/x8 Riser Kit<br><br>8 x HPE 96W Smart Storage Lithium-ion Battery with 145mm Cable Kit<br><br>8 x HPE Smart Array P408i-a SR Gen10 (8 Internal Lanes/2GB Cache) 12G SAS Modular Controller<br><br>8 x HPE Ethernet 10Gb 2-port FLR-SFP+ BCM57414 Adapter<br><br>16 x HPE BladeSystem c-Class 10Gb SFP+ SR Transceiver<br><br>16 x HPE 800W Flex Slot Platinum Hot Plug Low Halogen Power Supply Kit<br><br>8 x HPE iLO Advanced 1-server License with 3yr Support on iLO Licensed Features | 1 Set |

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| | 8 x HPE 2U Small Form Factor Easy Install Rail Kit | |
| | 1 x HPE 3Y Proactive Care 24x7 SVC | |
| | 8 x HPE iLO Advanced Non Blade Support | |
| | 8 x HPE DL38x Gen10 Support | |
| | 8 x HPE Installation and startup Service | |
| ၇ | **<u>Storage</u>**<br><br>2 x AFF A220A Base Bundle<br><br>2 x SW,Data at Rest Encryption Enabled,A220,-C<br><br>1 x AFF A220,HA,24X960GB SSD,Base Bundle,NVE<br><br>2 x Power Cable,In-Cabinet,48-IN,C13-C14<br><br>1 x Rail Kit,4-Post,Rnd/Sq-Hole,Adj,24-32<br><br>4 x SFP+Optical 10Gb Shortwave<br><br>4 x SFP+ FC Optical 16Gb<br><br>8 x Cable,LC-LC,OM4,5m<br><br>2 x Data at Rest Encryption Capable Operating Sys<br><br>230 x SW,Per-0.1TB,Base Flash,01,-P<br><br>1 x Base Software Support<br><br>1 x PartnerChoice 4hr Parts Del and SSP<br><br>1 x SW-2,Base,CL,Node<br><br>2 x Power Cable,UK and Ireland,R6<br><br>2 x Power Cable,Japan,R6<br><br>1 x Hardware Warranty 3 Years | 1 Set |
| ၈ | **<u>ToR Switch for Private Cloud</u>**<br><br>2 x Nexus 3524x, 24 10G Ports<br><br>2 x SNTC-8X5XNBD Nexus 3524x, 24 10G<br><br>2 x Nexus 3500 Base License<br><br>8 x Nexus Fan, 30CFM, port side exhaust airflow<br><br>2 x Nexus 3524 Factory Installed 24 port license<br><br>2 x Nexus 3K/9K Fixed Accessory Kit | 1 Set |

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| | 4 x Nexus 400W AC Power Supply, Std airflow (port side exhaust) | |
| | 4 x Power Cord, 250VAC 10A BS1363 Plug (13 A fuse), UK | |
| | 2 x Nexus 3524 Layer 3 LAN Enterprise License | |
| | 2 x SWSS UPGRADES Nexus 3524 Ler 3 LayAN Enterprise Licens | |
| | 2 x Nexus 9500, 9300, 3000 Base NX-OS Software Rel 7.0(3)I7(9) | |
| | 2 x 8 units of SFP+ SR for Nexus 3k | |
| | 16 x 10GBASE-SR SFP Module | |
| ၉ | **Academic VMware vCloud Suite 2019 Advanced ( For 8 Servers)** <br> 16 x Academic VMware vCloud Suite 2019 Advanced <br> 16 x "Academic Basic Support/Subscription for VMware vCloud Suite 2019 Advanced for 1 year" | 1 Set |
| ၁၀ | **Professional Installation & Implementation Service** | 1 Set |
| ၁၁ | **Professional Technical Onsite Support** | 1 Set |
| ၁၂ | **Maintenance Annual Support** | 1 Set |
| ၁၃ | **EDR Switches** <br> 2 x Mellanox InfiniBand EDR 100 Gb/sec v2 36-port Power-side-inlet Airflow Unmanaged Switch <br> 72 x HPE 15m InfiniBand EDR QSFP Optical Cable <br> 1 x HPE 3Y Proactive Care 24x7 SVC <br> 2 x HPE Mlnx IB Edr 36P Support <br> 2 x HPE Installation and startup Service | 1 Set |
| ၁၄ | **HPC Compute** <br> 8 x HPE ProLiant DL380 Gen10 8SFF NC Configure-to-order Server <br> 8 x HPE DL380 G10 CTO Mod-X 8SFF WO NIC <br> 8 x Intel Xeon-Gold 6238R (2.2GHz/28-core/165W) FIO Processor Kit for HPE ProLiant DL380 Gen10 <br> 8 x Intel Xeon-Gold 6238R (2.2GHz/28-core/165W) Processor Kit for HPE ProLiant DL380 Gen10 | 1 Set |

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| | 96 x HPE 64GB (1x64GB) Dual Rank x4 DDR4-2933 CAS-21-21-21 Registered Smart Memory Kit<br><br>16 x HPE 480GB SATA 6G Read Intensive SFF SC SE4011 SSD<br><br>8 x HPE DL38X Gen10 x16 Tertiary Riser Kit<br><br>32 x NVIDIA T4 16GB Computational Accelerator for HPE<br><br>8 x HPE DL Gen10 x16/x16 GPU Riser Kit<br><br>8 x HPE InfiniBand EDR/Ethernet 100Gb 2-port 840QSFP28 Adapter<br><br>8 x HPE DL38X Gen10 Slot 1/2 x16/x16 FIO Riser Kit<br><br>8 x HPE 96W Smart Storage Lithium-ion Battery with 145mm Cable Kit<br><br>8 x HPE Smart Array P408i-a SR Gen10 (8 Internal Lanes/2GB Cache) 12G SAS Modular Controller<br><br>8 x HPE Ethernet 10Gb 2-port FLR-SFP+ BCM57414 Adapter<br><br>16 x HPE BladeSystem c-Class 10Gb SFP+ SR Transceiver<br><br>8 x HPE DL38X Gen10 High Performance Temperature Fan Kit<br><br>16 x HPE 1600W Flex Slot Platinum Hot Plug Low Halogen Power Supply Kit<br><br>8 x HPE 2U Small Form Factor Easy Install Rail Kit<br><br>1 x HPE 3Y Proactive Care 24x7 SVC<br><br>8 x HPE DL38x Gen10 Support<br><br>8 x HPE Installation and startup Service | |
| ၁၅ | **<u>Management Switch</u>**<br><br>2 x Catalyst 9200L 24-port data, 4 x 1G, Network Essentials<br><br>2 x SNTC-8X5XNBD Catalyst 9200L 24-port data, 4 x 1G, Net<br><br>2 x C9200L Network Essentials, 24-port license<br><br>2 x United Kingdom AC Type A Power Cable<br><br>2 x Config 5 Power Supply Blank<br><br>2 x C9200L Cisco DNA Essentials, 24-port Term license<br><br>2 x C9200L Cisco DNA Essentials, 24-port, 3 Year Term license<br><br>2 x Cisco Catalyst 9200L Stack Module<br><br>4 x Catalyst 9200 Stack Module | 1 Set |

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| | 2 x 50CM Type 4 Stacking Cable<br>2 x Network Plug-n-Play Opt Out SKU | |
| ၁၆ | **<u>Firewall with IPS license</u>**<br>1 x Cisco Firepower 2130 Threat Defense Chss,Subs HA Bundle<br>2 x Cisco Firepower 2130 NGFW Appliance, 1U, 1 x NetMod Bay<br>2 x SNTC-8X5XNBD Cisco Firepower 2130 NGFW Appliance, 1U,<br>2 x Firepower 2000 Series  400W AC Power Supply<br>4 x AC Power Cord (UK), C13, BS 1363, 2.5m<br>2 x Cisco Firepower Threat Defense software v6.3 for FPR2100<br>2 x Firepower 2000 Series SSD for FPR-2130/2140<br>2 x Firepower 2000 Slide Rail Kit<br>2 x Firepower 2000 Series Network Module Blank Slot Cover<br>2 x Firepower 2000 Series Fan Tray<br>2 x Firepower 2000 Series  400W AC Power Supply<br>2 x Firepower 2000 Series SSD Slot Carrier<br>2 x Cisco FPR2130 Threat Defense Threat Protection License<br>2 x Cisco FPR2130 Threat Defense Threat Protection 1Y Subs | 1 Set |
| ၁၇ | **<u>Cisco Firepower Management Center</u>**<br>Cisco Firepower Management Center, (KVM) for 2 devices<br>SWSS UPGRADES Cisco Firepower Management Center, (KVM) | 1 Set |
| ၁၈ | **<u>Data Center Cooling Solution</u>**<br>Vertiv<br>- In Row Cooling - CRV4 - 45kW, 380V/3ph/50Hz+N, with Small PACC display, EEV, condensate pump and G4 filter , spot leak sensor, steam humidifier, 1-stage reheat and air baffle. No filter clogged switch, no remote rack temperature sensors, no card -default communication protocol is Modbus RS485, | 1 Set |

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| | - LDF76-R3 Inverter outdoor condensers (single circuit) for R410A air cooled system, operate in 380~415V/3ph/50&60Hz,star connection, power supply.<br>- Cooling Pipping & Bracket for 50Meter Installation of piping, outdoor units, indoor units Installation, Testing & Commissioning | |
| ၁၉ | **Data Center UPS Solution (40KVA/40KW) with Run Time 10 minutes**<br>Vertiv<br>- EXS 0040kTH 16FN01000, Liebert EXS 40kVA 400V Stadard<br>- 32x4 Battery Subassembly (Contain Battery 9AH)<br>- Professional UPS Installation, T&C and Warranty | 1 Set |
| ၂၀ | **Robust Electrical System for Data Center**<br>Schneider<br>- Main UPS I/O Panel<br>- Panel and Installation<br>- Main Breaker (4Pole,100A,30kA, MCCB)<br>- Input Breaker (3Pole,100A, 30kA, MCCB)<br>- Output Breaker<br>- Bypass Breaker<br>- DB Breaker<br>- TVSS; MCT; MDVF; CTZ; ELR; ST | 1 Set |
| ၂၁ | **Utlity Panel For DC Room**<br>Schneider<br>- Panel and Installation<br>- Main Breaker (4Pole,40A,30kA, MCCB)<br>- Utility Breaker (3Pole, 63A, 10kA,Acti9,MCB)<br>- Utility Breaker (4Pole,63A,300kA,Acti9,RCCB)<br>- Utility Breaker (4Pole, 60A,30mA,Easy9,MCCB)<br>- DB Breaker (1Pole,16A,6kA,Easy9,MCB)<br>- TVSS; MCT; MDVF; CTZ; ELR; ST | 1 Set |

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| ၂၂ | **<u>Electrical Cable</u>**<br>RR<br><br>- Line to Line Cable (1Cx10sqmm,PVC)<br>- Line to Line Cable ( 1Cx16sqmm,PVC) for Cooling<br>- Earth Cable (1Cx10sqmm,PVC)<br>- Earth Cable (1Cx16sqmm,PVC) for Cooling<br>- Rack Power Cable (3Cx6sqmm,PVC)<br>- Light Power Cable (3Cx1.5sqmm,PVC)<br>- S.S.O and Comfort Cooling Cable (1Cx1.5sqmm)<br>- Line to Line Cable (1Cx4sqmm,PVC)<br>- Line to Line Cable (1Cx4sqmm,PVC)<br>- Accessories<br>- M&E Installation Testing and Commissioning (included cable termination and Cable Laying) | 1 Set |
| ၂၃ | **<u>Rack and Accessories</u>**<br>- 2 x Vertiv VE Rack, Model SR-V081120SF - 42U x 800W x 1100D<br>- 4 x C1650L - Basic Standard, 32A, 230V, 7.3kW, Vertical, (20) Locking IEC C13, (4) Locking IEC C19, Breakered, 3m power cord 2P+E (IP44), Black Powder Coat | 1 Set |
| ၂၄ | **<u>Cable Tray-Trunking and Conduit</u>**<br>MPEC<br><br>- Metal Trunking (W200xH100)<br>- Metal Trunking (W150xH100)<br>  o Flexible, Conduit and Accessories<br>  o Hacking and Fixing Cement | 1 Set |
| ၂၅ | **<u>Data Center Design, Consulting and Project Management</u>**<br>TIA942 Data Center Design (Tier II)  Composed of signle path for power and cooling distribution with redundant components 99.749%<br><br>- Complete Data Center Design | 1 Set |

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| | - Project Management<br>- Documentation<br>- Training and Complete Labeling | |
| ၂၆ | **ATS/AVR Control Panel and Bypass Panel**<br>ABB<br>- 2 x Supply and Install ATS 4 Pole 125A Panel and Accessories<br>- 1 x Supply and Install ATS Bypass Panel<br>- 1 x AVR Bypass Panel and Breakers<br>Standa<br>- Three Phase Digital Voltage Stabilizer<br>- Rated Power : 60kVA<br>- Input range : +/- (380~480V)<br>- output range : 380V<br>- Type of installation: Indoor (IP21) | 1 Set |
| ၂၇ | **Ground Electrical System Installation**<br>RR<br>- 440 x Line to Line Cable ( 1Cx50sq-mm, XLPE ), ATS & Bypass Panel, AVR Bypass Panel to Main & UPS I/O Panel in Server Room<br>- 110 x Line to Line Cable ( 1Cx25sq-mm, PVC ), ATS & Bypass Panel, AVR & Bypass Panel to Main & UPS I/O Panel in Server Room<br>- Outdoor Power Cable Installation and M&E material cost | 1 Set |
| ၂၈ | **Generator**<br>100KVA Disel Generator<br>Body Ground and Neutal Ground for Disel Generator | 1 Set |
| ၂၉ | **Fire Suppression, Alarm and Detection System**<br>Kiddie; FM200 Fire Suppression System for Data Center<br>- Cylinder with Nozle<br>- Fire Alarm and Detection System<br>- Smoke and Heat Detector | 1 Set |

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| | - Bell Siren<br><br>- Discharge Sign<br><br>- Fire Alarm Panel<br><br>- Only two layers protection | |
| ၃၀ | **Migration Existing IT Devices**<br><br>- Migrate existing IT devices from upper DC room to new DC room<br><br>- Include cable installation and management | 1 Set |

**Overview**

UCSY wants to implement High Performance Computing (HPC) System and Private Cloud Infrastructure to develop the skills and confidence of researchers and educators in the effective use of digital technology to support learning, teaching and research.

The objective of designing and implementing HPC System and Private Cloud Infrastructure are:

- To support the computationally intensive research and big data analysis research agenda of the Universities in Myanmar in the broad fields of computing, science and engineering.
- To provide country wide HPC System that enables cutting-edge research through the effective application of high-end Infrastructure.
- To develop and deploy quantum simulation, big data analysis, weather forecasting application, natural language processing application.
- To provide supercomputing servers for a wide range of private users across the Universities in Myanmar.
- To provide Infrastructure as a Service (IaaS), Platform as a Service (PaaS) to all Computer Universities through UCSY Private Cloud Infrastructure.
- To develop and deploy school management system, learning management system, library system, online repository system, students' projects and etc. for Computer Universities.
- To help meet the growing need for advanced computer education in Myanmar and to promote research activities.
- To support the multiple Lab Environments such as geographic information system lab, embedded system lab, computer graphic and visualization lab, artificial intelligence lab, image processing lab and etc.

UCSY seeks an experienced System Integration Provider to complete a pre-development analysis of existing Network Infrastructure, Server Room facilities and Data Center Services of UCSY and to provide and to deliver comprehensive turkey solution for HPC System and Private Cloud Infrastructure, and to integrate with existing Campus Network, new mmREN Network and existing Server Infrastructure with the proposed deployment HPC System and Private Cloud Infrastructure.

**Technical Specifications and Requirement**

University of Computer Studies (UCSY) looks for a solution provider to design and implement a HPC System for research students from all Computer and Technology Universities to conduct HPC research such as quantum simulation, big data analysis, weather forecasting application, natural language processing application and Private Cloud Infrastructure to improve operational efficiency by accelerating service delivery and providing Infrastructure as a Service (IaaS), Platform as a Service (PaaS) to all Computer Universities. The recommended overall design architecture for HPC and Private Cloud Infrastructure is below:
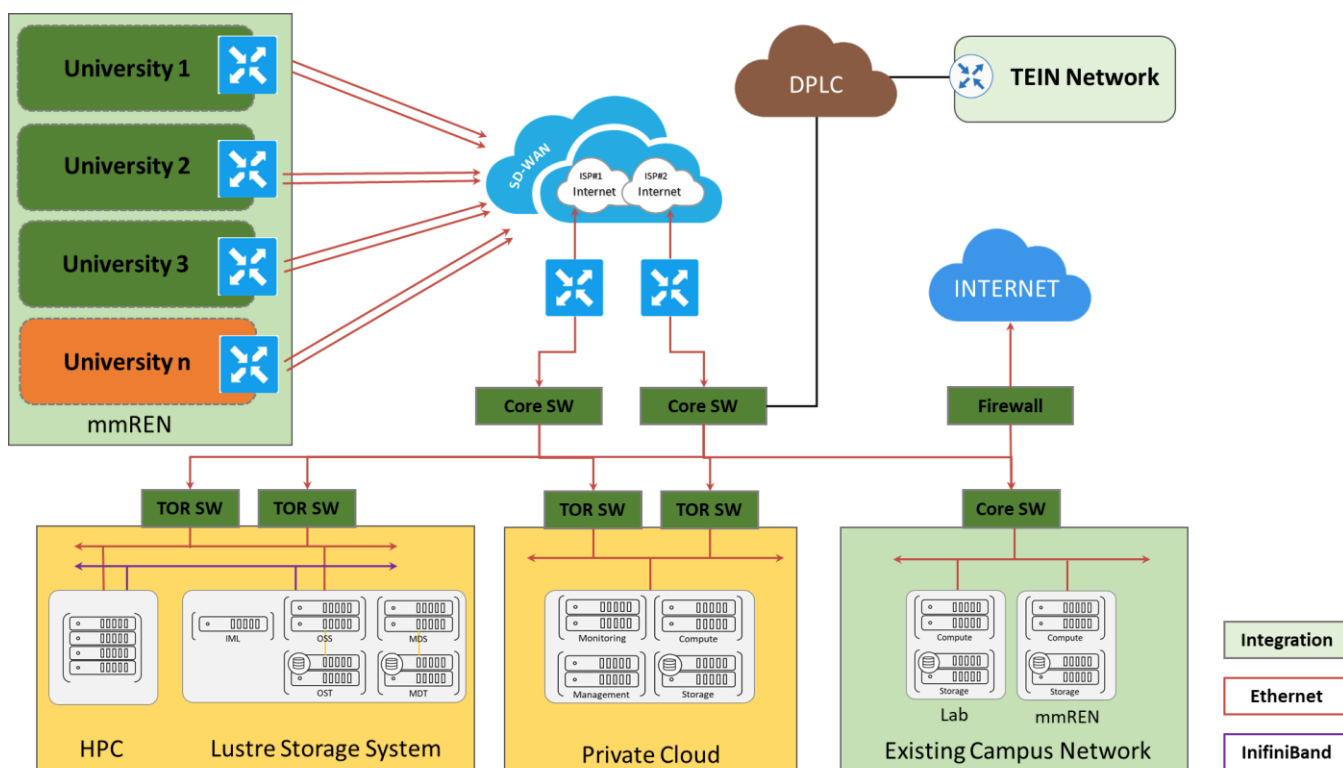


The HPC System and Private Cloud solutions include the following features and functions to provide high-performance computing research environment and private cloud production environment.

- Deploy High Performance Computing (HPC) System
- Setup and Deploy Private Cloud Infrastructure
- Integration with existing network, server systems and mmREN
- Provide Server room facilities for HPC System and Private Cloud Infrastructure

The proposed solution must provide HPC system and Private Cloud to deliver with the following capabilities.

HPC System

- High performance file system with Lustre for large scale cluster computing
- Hierarchical storage management for clusters implementation
- Concurrent access and process data for a high-performance file system
- Concurrent access to the same file or directory from multiple compute instances
- High performance computing simulation environment
- Open-source parallel file system access to data and distributed locking
- Efficient delivery of data to/from the compute servers or clients

Private Cloud

- Enterprise scale architecture for the delivery of Infrastructure as a Service (IaaS).
- Self-service portal for consumers to request and manage IaaS.
- Service catalog with automation and approval workflows.
- Logical separation for each business unit.
- Infrastructure service offerings for virtual machine consumption.
- Policy-based placement for infrastructure workloads.

The proposed solution should contain the following components and software for deployment.

- Object Storage Servers (OSSs)
- Object Storage Targets (OSTs)
- Metadata Server (MDS)
- Metadata Target (MDT)
- Lustre Clients
- Lustre Software
- Integrated Manager for Lustre
- Cloud Servers and Storage
- ToR Switches
- VMware vSphere
- VMware vRealize Suite

- vCenter Server

The following are preferred attributes for the solution to be proposed in response to HPC System and Cloud Infrastructure.

- All network equipment as specified in this document as minimum specification should be proposed.
- All equipment must include all licenses for full operation as specified in technical specification.
- Product must not announce end of sale product from completion date of commissioning.
- All servers and storage equipment must have 3 years equipment warranty and technical support.
- All network equipment has 3 years equipment warranty and technical support.
- All equipment must include all accessories for full operation, integration, installation and mounting but not limit to rack mount, etc.
- All nodes must be under Proactive Care Support with 24x7x365 with 4 hours response for every request.
- All equipment plug must be C14 type.
- License must be covered for required solution.
- The bidder shall provide at least two onsite server product certified engineers.
- Specifically identify the level of experience in deploying ONTAP9 for cloud and deploying All Flash FAS Systems.
- The bidder should provide Manufacture Authorization (MA) letter from vendors.
- The bidder must have experienced in designing, implementing, monitoring, maintaining HPC System and Private Cloud infrastructure.
- The bidder must have experienced in the field of Networking, Security, HPC and Cloud Computing.
- The bidder must have experienced in designing and deploying Data Center (DC) facilities.
- The bidders must provide Organization profile, Organizational Structure, Project Member Lists and Professional Certificates
- The organization chart of the implementation team and the number of the team members shall be provided including the team member profiles along with the proposal.
- PMP Certificates must be provided with the Project Managers' CV.
- ITIL Certificates must be provided with the Project Delivery Manager's CV
- VCP Certificates must be provided with the Deployment Engineer's CV
- HPE Certificates must be provided with the Deployment Engineer's CV

- All nodes must have Proactive Care Support with 24x7x365 with 4 hours response for every request.
- The Bidder must commit to work with UCSY on developing any tools or white paper(s) on the proposed solution.

## Scope of Work (SOW)

The bidder is required to the design and deploy for proposed solution in UCSY and the scope of bidder service should be included the following:

Data Center Facilities

- Supply and Installation for 45KW In-Row Cooling (47.5 kW Cooling) for High Density 42U, 5 Racks which can be able to make connect up to 16 units.
- Supply and Install 40KVA UPS (with built-in battery) have 10mins backup time in full load condition which can be able to make parallel configuration up to 4 units.
- Supply and Install Robust Electrical (2N Electrical) must have include surge protection, can be able to support maximum 6KVA per racks.
- Supply and Install 42U High Density Network (800 x 1100mm) Heavy Duty Height Adjustable leveling feet and casters provide 1,600kg static load and 1,000kg, 75% open high perforated doors for optimal air flow
- Supply and Install 20 Ways Power distribution units 32A, which can support 7.3kW
- Supply and Install Cable Trunking for overhead power distribution
- Supply and Install two sets of 125A ATS Panel with Bypass, one unit of 60KVA AVR with Bypass Panel
- Supply and Install Main Cable support to Hub Room from MDF Room
- Supply and Install Prime 100KVA Diesel Generator (Grounding System included)

HPC and Cloud Infrastructure

- Install, setup and configure HPE servers for OSS and MDS
- Install, setup and configure HPE Storage for OST and MDT
- Install, setup and configure InfiniBand Switches for storage and server connectivity
- Install, setup and configure HPE servers for cloud servers
- Install, setup and configure NetApp Storage for cloud storages
- Install, setup and configure Cisco Nexus Switches for cloud connectivity

- Deploy Compute Cluster System
- Deploy Lustre Cluster System
- Install and configure Lustre parallel filesystem with at least version 2.12.
- Install and configure Lustre management software and necessary tools.
- Configure the parallel file system with no single point of failures.
- Deploy VMware Virtualization
- Deploy VMware Cloud Management
- Deploy vRealize Log Insight
- Deploy vRealize Operations
- Integrate with existing Network and Server, and mmREN
- Perform User Acceptance Testing
- Submit the detail network architecture document for the proposed solution at UCSY.
- Provide the training plan and materials for HPC and Cloud
- Provide technical trainings to UCSY's employee.
- Provide a project management plan for the entire project.

**Professional Installation and Implementation Service**

- The bidders must provide a project management plan for the entire project.
- The bidders must provide a support engineer on-site, available 9:00am–4:30pm Monday to Friday, except for holidays, beginning on the project initiation date until to project completion. The support engineer will be expected to work closely with UCSY team to install, configure and test the system until the acceptance stage and until it is ready to run the production workloads.
- It is also expected that skill transfer of the system configuration, installation, and maintenance package be transferred to UCSY staff during this period or any other time the engineer is working on the system.

**Professional Technical Onsite Support**

- The Bidder must provide 12 months Lustre support to UCSY current Lustre file system.
- The Bidder must provide Ticket System and workflow for supporting Solution and Hardware Supporting.

- The Bidder must be able to fix any Lustre issues and make every effort to provide UCSY with a production ready solution.
- The Bidder must work with UCSY to provide workarounds and assist to make the file system stable for operations.
- The Bidder must file a Lustre bug report to the Lustre community if the issue(s) determined requires a fix to Lustre code base and must also track its progress through the Lustre release/development processes.
- The Bidder must work with UCSY to apply any available bug fix to the Lustre file system to resolve the issues.

**Maintenance Annual Support and Service**

Awarded Bidders will require maintaining the system for 12 months after the project roll out. Indicate the annual renewal costs, scopes and service level agreement.

- Hardware support will require replacement of failed or faulty critical components by the Next business Day (NBD) or sooner. A critical component is defined as one that is required to enable 90% of the system to run projects successfully. Software support will require telephone and email response to problem calls and questions. Response to software support calls to be next business day or sooner.
- The bidders should describe both the hardware and software support provided for the proposed system during the support period. Vendors must provide documentation to demonstrate a current ability to provide 24x7 support, as the UCSY may decide to take advantage of such a program.

The bidder shall provide the following operation and maintenance service and support for HPC and Cloud Infrastructure.

| Name | Operation and maintenance service and support |
|---|---|
| Servers | - Regular Firmware checking and upgrade<br>- Regular checking for resources, health alert and utilization<br>- Troubleshooting<br>- Hardware Replacement when we need to upgrade resources and utilization |
| Primary Storage | - Regular Firmware checking and upgrade for ONTAP Management<br>- Regular storage performance checking |

| | |
|---|---|
| | - Troubleshooting<br>- New/Resize LUN and Volume |
| Core Switches | - Regular Firmware checking and upgrade<br>- Troubleshooting for configuration and issue<br>- Regular check for WAN failover test & VPN services |
| InfiniBand Switches | - Regular Firmware checking and upgrade<br>- Regular checking for Power System & Network Ports utilization<br>- Hardware Replacement as needed |
| HPC Lustre Infrastructure | - Regular Health Check and Monitoring a Lustre File System<br>- Lustre Maintenance Service<br>- Managing Lustre Networking (LNet) as proper change request<br>- Upgrading a Lustre File System<br>- Lustre File System Troubleshooting<br>- Debugging a Lustre File System |
| Private Cloud Infrastructure | - Regular Health Check and Monitoring Private Cloud System<br>- Private Cloud Maintenance Service<br>- Managing Cloud Services<br>- Upgrading and Updating Cloud Software<br>- Troubleshooting, Debugging and System Recovery |