Reference Technical Requirements for IT Products

GITP Category B (Server Systems)

1. Specifications of Add-on Hardware and Software Items

For each of those items **marked with an asterisk**, the applicant who applies to become GITP provider of the sub-category of Category B to which such item belongs must propose at least one model (together with all requested information) for such item.

Whilst it is not mandatory to do so, for each of those items which are not marked with an asterisk, the applicant applying to become a GITP provider of the relevant sub-category to which such item belongs may wish to propose one model (together with the requested information) for such item.

1.1 Sub-Category B1 - Server Computer

1.1.1 Server Computer [Item No. 31000]*

Processor	■ 64-bit processor(s)
Memory	■ At least 30GB
Internal storage	■ At least 300GB
Network interface	■ At least four (4) x GbE port(s)
Others	■ Provide two (2) hot swap power supply units with redundant capability ■ Embedded Trusted Platform Module (TPM)
Operating system	■ Support one of the prevailing server operating systems, e.g. Windows, Linux or equivalent
Green Requirement	■ Shall comply with mandatory requirement of Green Product Code D06

1.1.2 Server Computer Processor [Item No. 31010]

Processor	■ Compatible with the proposed Server Computer [Item No. 31000]
Performance	■ With same performance as or better performance than the processor proposed under Server Computer [Item No. 31000]

1.1.3 Server Computer Memory [Item No. 31011]

Compatibility	■ Compatible with the proposed Server Computer [Item No. 31000]

1.1.4 Disk Controller Adapter [Item No. 31012]

Data Rate	■ At least 6Gbps SAS
Number of Ports	■ At least two (2)
RAID Support	■ RAID level 0, 1, 5, 6 or 10

Bus Architecture	■ PCI-E 3.0 or better

1.1.5 Host Bus Adapter [Item No. 31013]

Interface	■ Fibre channel or iSCSI
Bus Speed	■ At least 8Gbps
Host bus interface	■ PCI-E
Ports	■ Single port or more

1.1.6 Network Interface Adapter [Item No. 31014]

Interface Media	■ Copper Cable or Optical Fibre
Number of Ports	■ At least two (2)
Transfer Rate	■ At least 10Gbps
Bus Architecture	■ PCI-E 3.0 with x8 lanes or better
Connector	■ RJ45 connector or SFP+ connector

1.1.7 Server Hard Disk Drive [Item No. 31015]

Interface	■ SAS 6Gbps or SAS 12Gbps
Capacity	■ At least 600GB
Rotational Speed	■ At least 7,000rpm
Form Factor	■ 3.5 inches or less

1.1.8 Server Solid State Disk [Item No. 31016]

Capacity	■ At least 800GB
Read /Write Speed	■ At least 500MB/400MB per sec
Endurance[#]	■ At least 0.5 DWPD
Interface	■ SATA or SAS or Non-volatile Memory Express NVMe PCIe 3.0 or better

SSD endurance: drive writes per day (DWPD)

(DWPD) measures how many times you could overwrite the drive's entire size each day of its life.

1.1.9 Blade Chassis [Item No. 31017]

Form Factor	■ At most 12U
Blade bays	■ Eight (8) or more
I/O module	■ Two (2) or more
Power Supply module	■ Provide two (2) power supply units with redundant capability ■ Support the configuration of at least four (4) power supply units with redundant capability

Management module	■ Provides integrated user interfaces to monitor, control and manage all chassis resources ■ Support role-based security locally and/or with LDAP directory services
Others	■ Provide necessary interconnect cables

1.1.10 Blade Storage Module [Item No. 31018]

Feature	■ Provide at least four (4) x 16GFC uplink ports
Compatibility	■ Compatible with the proposed Blade Chassis [Item No. 31017]

1.1.11 Blade Network Module [Item No. 31019]

Feature	■ Provide 8GFC ports or 10GbE ports or 40GbE ports
Compatibility	■ Compatible with the proposed Blade Chassis [Item No. 31017]

1.1.12 Blade Network Upgrade Module [Item No. 31020]

Feature	■ Improve the performance or extend the capability of Blade Chassis (Network Module) [Item No. 31019]
Others	■ Provide all necessary accessories
Implementation Method	■ Implement either (a) through the addition of new module(s) or (b) through the activation of module(s) already included in the proposed Blade Chassis (Network Module) [Item No. 31019]

1.1.13 Blade Power Supply Unit [Item No. 31021]

Feature	■ Provide one (1) power supply unit
Compatibility	■ Compatible with the power supply unit in the proposed Blade Chassis [Item No. 31017]

1.1.14 Server Accessories [Item No. 31022]

Feature	■ Optical or SFP+ or QSFP+ Transceiver

1.1.15 Hardware Security Module [Item No. 31023]

Symmetric Algorithms ##	■ Support at least one of following symmetric algorithms: AES, ARIA, Camellia, Triple DES, SM4
Asymmetric Algorithms ##	■ Support at least one of following asymmetric algorithms: RSA, ECC, SM2
Hashing ##	■ Support at least one of following hashing algorithms: SHA-2, SM3
Operating System	■ Support one of prevailing server operating systems
API Support	■ Support at least one of following API:

	PKCS#11, Java Cryptography Architecture (JCA), Microsoft Cryptographic Application Programming Interface (CAPI), Microsoft Cryptographic Next Generation (CNG) API , OpenSSL, GM/T 0016-2012
Form Factor	■ Rack mount
Others	■ Necessary cables and accessories including rack mount kit

Notes to B/Ds: IT security products, particularly Hardware Security Modules, often support a diverse set of cryptographic algorithms, which may be incompatible with one another. B/Ds should procure the IT security products that fit their operation needs.

1.1.16 Key Management Appliance [Item No. 31024]

General Features	■ Provide key lifecycle management tools ■ Able to simplify the tasks of creation, tracking, auditing, and automated expiration and removal of keys ■ Provide centralised encryption key management ■ Support Key Management Interoperability Protocol (KMIP) communication with client devices for key management operations on cryptographic material
Keys Supported	■ Able to manage at least 20,000 encryption keys
Others	■ Necessary cables and accessories including rack mount kit

1.2 Sub-Category B2 - Storage System

1.2.1 Disk Storage System [Item No. 32000]*

Controller	■ At least two (2) controllers ■ At least four (4) ports per controller
Interface Port	■ At least four (4) x 8/16/32GFC ports or four (4) x 10GbE ports
Memory Cache	■ At least 32GB per storage system
RAID support	■ RAID 6 or better
Power supply	■ Provide two (2) power supply units with redundant capability
Features	■ Provide automatic failover ■ Provide or with option to provide remote site replication features ■ Provide or with option to provide encryption for data at rest
Management software	■ Provide storage management software with capabilities to manage and configure the disk storage system

1.2.2 Disk Storage System Disk Enclosure [Item No. 32010]

Feature	■ An external unit that supports to expand the storage capacity of a disk storage system
Drive support	■ At least ten (10) disk slots

Compatibility	■ Compatible with the proposed Disk Storage System [Item No. 32000]

1.2.3 Disk Storage System Remote Site Replication Module [Item No. 32011]

Feature	■ Perform Active-Active data replication at remote site ■ Provide synchronous or asynchronous replication
Compatibility	■ Compatible with the proposed Disk Storage System [Item No. 32000]

1.2.4 Disk Storage System Encryption Module [Item No. 32012]

Feature	■ Protect data at rest with hardware based encryption
Compatibility	■ Compatible with the proposed Disk Storage System [Item No. 32000]

1.2.5 Disk Storage System Expansion Accessories [Item No. 32013]

Feature	■ 16GFC or 8GFC or 10GbE Transceiver

1.2.6 Storage System Hard Disk Drive [Item No. 32020]

Interface	■ SAS 6Gbps or SAS 12Gbps
Capacity	■ At least 600GB
Rotational Speed	■ At least 7,000rpm
Form Factor	■ 3.5 inches or less

1.2.7 Storage System Solid State Disk [Item No. 32021]

Capacity	■ At least 1TB
Read /Write Speed	■ At least 500MB/400MB per sec
Endurance[#]	■ At least 0.5 DWPD
Interface	■ SATA or SAS or Non-volatile Memory Express NVMe PCIe 3.0 or better

SSD endurance: drive writes per day (DWPD)

(DWPD) measures how many times you could overwrite the drive's entire size each day of its life.

1.2.8 Storage System Encypted Hard Disk Drive [Item No. 32022]

Interface	■ SAS 6Gbps or SAS 12Gbps
Capacity	■ At least 600GB
Rotational Speed	■ At least 7,000rpm
Form Factor	■ 3.5 inches or less

1.2.9 Storage System Encrypted Solid State Disk [Item No. 32023]

Capacity	■ At least 1TB
Read /Write Speed	■ At least 500MB/400MB per sec
Endurance[#]	■ At least 0.5 DWPD
Interface	■ SATA or SAS or Non-volatile Memory Express NVMe PCIe 3.0 or better

SSD endurance: drive writes per day (DWPD)

(DWPD) measures how many times you could overwrite the drive's entire size each day of its life.

1.2.10 SAN Switch Module [Item No. 32030]

Interface	■ 16GFC or 32GFC or better
Ports	■ At least twenty four (24) ports with eight (8) ports activated
Others	■ Provide or with option to provide Inter-Switch Link (ISL) trunking as specified in SAN Switch Module (ISL Trunking) [Item No. 32032] ■ Rack mount with rack mount kit
Green Requirement	■ Shall comply with mandatory requirement of Green Product Code D03

1.2.11 SAN Switch Module (Expansion Unit) [Item No. 32031]

Feature	■ To extend the functionality or capability of the proposed SAN Switch Module [Item No. 32030]
Implementation Method	■ Implement either (a) through the addition of new module(s) or (b) through the activation of module(s) already included in the proposed SAN Switch Module [Item No. 32030]
Compatibility	■ Compatible with the proposed SAN Switch Module [Item No. 32030]

1.2.12 SAN Switch Module (ISL Trunking) [Item No. 32032]

Feature	■ Allow to create ISL trunk between interconnected switches
Implementation Method	■ Implement either (a) through the addition of new module(s) or (b) through the activation of module(s) already included in the proposed SAN Switch Module [Item No. 32030]
Compatibility	■ Compatible with the proposed SAN Switch Module [Item No. 32030]

1.2.13 SAN Switch Module (Transceiver) [Item No. 32033]

Feature	■ 16GFC optical transceiver
Compatibility	■ Compatible with the proposed SAN Switch Module [Item No. 32030]

1.2.14 Tape Library System [Item No. 32040]

Recording Technology	■ LTO-6 or LTO-7 or LTO-8 or better
Interface	■ At least two (2) SAS 6Gbps or two (2) 8GFC
Number of Slots	■ Support at least twenty (20) tape slots excluding slots for import/export media
Features	■ Provide or with option to provide encryption feature as specified in Tape Library System (Encryption Module) [Item No. 32042] ■ Come with integrated bar code reader
Others	■ Rack mount with rack mount kit

1.2.15 Tape Library System (Expansion Unit) [Item No. 32041]

Feature	■ A unit that can be added to enhance functionality or increase capacity of the proposed Tape Library System [Item No. 32040]
Compatibility	■ Compatible with the proposed Tape Library System [Item No. 32040]

1.2.16 Tape Library System (Encryption Module) [Item No. 32042]

Feature	■ Provide hardware based LTO encryption
Compatibility	■ Compatible with the proposed Tape Library System [Item No. 32040]
Implementation Method	■ Implement either (a) through the addition of new module(s) or (b) through the activation of module(s) already included in the proposed Tape Library System [Item No. 32040]

1.2.17 Tape Library System (Path Failover) [Item No. 32043]

Feature	■ Enable to use redundant control path when the primary path fails
Compatibility	■ Compatible with the proposed Tape Library System [Item No. 32040]
Implementation Method	■ Implement either (a) through the addition of new module(s) or (b) through the activation of module(s) already included in the proposed Tape Library System [Item No. 32040]

1.2.18 Tape Autoloader [Item No. 32050]

Recording Technology	■ LTO-6 or LTO-7 or LTO-8 or better
Number of Cartridge Slots	■ At least four (4)
Native Sustained Transfer Rate	■ At least 160MBps

Interface	■ SAS or 8GFC
Form Factor	■ 2U or less
Others	■ Support data compression ■ Support encryption

1.2.19 Tape Drive [Item No. 32055]

Recording Technology	■ LTO-6 or LTO-7 or LTO-8 or better
Native Sustained Transfer Rate	■ At least 150MBps
Interface	■ SAS 6Gbps
Others	■ Provide interface adapter for connection with server or tape library

1.2.20 Data Protection Appliance [Item No. 32060]

Features	■ Backup and recovery option for physical and virtual systems ■ Provide in-line deduplication ■ Provide compression ■ Support encryption for data at rest
Form Factor	■ Rack mount
Usable Capacity	■ At least 5TB base capacity ■ Support up to at least 15TB without deduplication
Interface	■ Support 8GFC ports or GBase-T network ports or 16GFC ports or 10GbE ports
Throughput	■ At least 7TB/hr
Supported Platform	■ Backup data in Windows/Linux environment or equivalent
Storage System Support	■ Support Virtual Tape Library or Open Storage Technology (OST)
Others	■ Provide two (2) power supply units with redundant capability ■ Provide backup system management function
Green Requirement	■ Shall comply with mandatory requirement of Green Product Code D06

1.2.21 Data Protection Appliance (Expansion Module) [Item No. 32061]

Expansion Capacity	■ Provide additional 5TB capacity to the proposed Data Protection Appliance [Item No. 32060]
Implementation Method	■ Implement either (a) through the addition of new module(s) or (b) through the activation of module(s) already included in the proposed Data Protection Appliance [Item No. 32060]

1.2.22 Data Protection Appliance (Interface Module) [Item No. 32062]

Feature	■ 16GFC or 10GbE SFP interface module

Compatibility	■ Compatible with the proposed Data Protection Appliance [Item No. 32060]

1.2.23 Data Protection Appliance (Memory Upgrade) [Item No. 32063]

Feature	■ At least 64GB
Compatibility	■ Compatible with the proposed Data Protection Appliance [Item No. 32060]

1.2.24 Network Attached Storage System [Item No. 32001]*

Connectivity	■ At least four (4) Ethernet ports
Memory	■ At least 16GB
RAID support	■ At least two of RAID levels 0, 1, 5, 6 or 10

1.3 Sub-Category B3 - Server System Software

1.3.1 Server Operating System Software 1 [Item No. 33000]*

Features	■ Provide printer sharing, file sharing, and the ability to manage a network name directory, security, and other housekeeping aspects of a network ■ Support the running of Windows server operating system or equivalent in virtual environment

1.3.2 Server Operating System Software 2 [Item No. 33001]*

Features	■ Provide printer sharing, file sharing, and the ability to manage a network name directory, security, and other housekeeping aspects of a network ■ Compatible with Linux server operating system or equivalent

1.3.3 Server Operating System Software 3 (Client User Licence) [Item No. 33010]

At least one (1) client user licence for one (1) user to access the server running the proposed Server Operating System Software 1 [Item No. 33000].

1.3.4 Server Operating System Software 4 (Client Device Licence) [Item No. 33011]

At least one (1) client device licence for one (1) device to access the server running the proposed Server Operating System Software 1 [Item No. 33000]

1.3.5 Server Operating System Software 5 (Remote Desktop Service – Client User Licence) [Item No. 33012]

At least one (1) client user licence for one (1) user to access the remote desktop service provided on a server running the proposed Server Operating System Software 1 [Item No. 33000]

1.3.6 Server Operating System Software 6 (Remote Desktop Service – Client Device Licence) [Item No. 33013]

At least one (1) client device licence for one (1) device to access the remote desktop service provided on a server running the proposed Server Operating System Software 1 [Item No. 33000]

1.3.7 Backup Software 1 (Licence) [Item No. 33005]*

Features	■ Automate routine backup tasks ■ Allow unattended remote operation ■ Allow various backup modes including full backup, incremental backup and differential backup ■ Provide deduplication in backup ■ Support encryption in backup ■ Allow to store data on disk and tape

1.3.8 Backup Software 2 (Licence) [Item No. 33006]*

Features	■ Backup virtual machines on a server ■ Allow recovery of specific virtual machine(s) ■ Allow to restore specific file(s) in virtual machine from the backup media

1.3.9 Backup Software 3 (Licence) [Item No. 33007]*

Features	■ Backup and restore a Windows/Linux server ■ Backup and restore a virtual machine ■ Provide backup validation to assure recoverability ■ Backup and restore a mail server (e.g. IBM Domino Server, Microsoft Exchange) ■ Backup and restore a database (e.g. IBM DB2, Microsoft SQL Server, Oracle Database) ■ Provide deduplication in backup ■ Provide encryption in backup ■ Able to integrate with a storage system to provide recovery from hardware snapshot

1.3.10 Backup Software 4 (Agent/Option Licence) [Item No. 33020]

Features	■ Backup and restore a Windows/Linux server and such Windows/Linux server is hosted on a machine other than the machine running the proposed Backup Software 1 ■ Restore specific file(s) from the backup media

1.3.11 Backup Software 5 (Agent/Option Licence) [Item No. 33021]

Features	■ Backup a virtual machine with four (4) virtual CPUs ■ Allow recovery of virtual machine from backup media ■ Restore specific file(s) in virtual machine from backup media

1.3.12 Backup Software 6 (Agent/Option Licence) [Item No. 33022]

Features	■ Backup a database (e.g. IBM DB2, Microsoft SQL Server, Oracle Database) ■ Allow to restore the database to any specific point in time

1.3.13 Backup Software 7 (Agent/Option Licence) [Item No. 33023]

Features	■ Backup and restore a mail server (e.g. Microsoft Exchange Server, IBM Domino Server) ■ Restore specific email(s) for specific user(s)

1.3.14 Backup Software 8 (Agent/Option Licence) [Item No. 33024]

Features	■ Manage one (1) tape autoloader with two (2) drives to perform backup

1.3.15 Backup Software 9 (Agent/Option Licence) [Item No. 33025]

At least one (1) agent/option licence to extend backup capabilities of the proposed Backup Software 1 (Licence) [Item No. 33005]. For example, the licence to allow the proposed Backup Software 1 to backup data in NAS device or virtual tape library.

1.3.16 Virtualisation Software 1 (Licence) [Item No. 33030]

Features	■ Run natively and directly on physical server without running on top of a computer operating system ■ Create virtual machines and allow multiple virtual machines running concurrently on a single physical machine ■ Allow dynamic allocation of storage capacity so that there is no need for dedicated storage capacity for each virtual machine ■ Allow virtual machines to access shared storage devices (e.g. SAN devices, NAS devices) ■ Allow virtual machines to have virtual storage capacity that is larger than the actual physical storage capacity ■ Support live migration of running virtual machines from one physical server to another with no downtime ■ Support high availability in the sense that in the event of a physical server failure, all the virtual machines in that physical server shall be automatically restarted on another physical server in the same cluster ■ Support fault tolerance with the capability to provide zero downtime, zero data loss and continuous availability for the applications running in virtual machines in the event of a physical server failure ■ Support up to at least two (2) virtual CPUs per virtual machine in fault tolerance
Supported Virtual Machines	■ Able to create Windows server virtual machines or Linux server virtual machines

1.3.17 Virtualisation Software 2 (Licence) [Item No. 33031]

Features	■ Run natively and directly on physical server without running on top of a computer operating system ■ Create virtual machines and allow multiple virtual machines running concurrently on a single physical machine ■ Allow dynamic allocation of storage capacity so that there is no need for dedicated storage capacity for each virtual machine ■ Allow virtual machines to access shared storage devices (e.g. SAN devices, NAS devices) ■ Allow virtual machines to have virtual storage capacity that is larger than the actual physical storage capacity ■ Support live migration of running virtual machines from one physical server to another with no downtime ■ Support high availability in the sense that in the event of a physical server failure, all the virtual machines in that physical server shall be automatically restarted on another physical server in the same cluster ■ Support fault tolerance with the capability to provide zero downtime, zero data loss and continuous availability for the applications running in virtual machines in the event of a physical server failure ■ Support up to at least four (4) virtual CPUs per virtual machine in fault tolerance ■ When the overall workload decreases, the proposed Virtualisation Software 2 shall be able to support the consolidation of workloads and the redistribution of virtual machines among the physical servers in a cluster so that some physical servers can be powered off to reduce power consumption
Supported Virtual Machines	■ Able to create Windows server virtual machines or Linux server virtual machines

1.3.18 Virtualisation Software 3 (Licence) [Item No. 33032]

Features	■ Run natively and directly on physical server without running on top of a computer operating system ■ Create virtual machines and allow multiple virtual machines running concurrently on a single physical machine ■ Allow dynamic allocation of storage capacity so that there is no need for dedicated storage capacity for each virtual machine ■ Allow virtual machines to access shared storage devices (e.g. SAN devices, NAS devices) ■ Allow virtual machines to have virtual storage capacity that is larger than the actual physical storage capacity ■ Support live migration of running virtual machines from one physical server to another with no downtime ■ Support high availability in the sense that in the event of a physical server failure, all the virtual machines in that

	physical server shall be automatically restarted on another physical server in the same cluster ■ Support fault tolerance with the capability to provide zero downtime, zero data loss and continuous availability for the applications running in virtual machines in the event of a physical server failure ■ Support up to at least 4 virtual CPUs per virtual machine in fault tolerance ■ When the overall workload decreases, the proposed Virtualisation Software 3 shall be able to support the consolidation of workloads and the redistribution of virtual machines among the physical servers in a cluster so that some physical servers can be powered off to reduce power consumption ■ Conduct predictive analytics by using self-learning algorithms to automatically analyse data about the virtual environment so as to provide alerts on underlying performance issues ■ Provide tool to view resource utilisation and to run "what-if" analysis for capacity planning
Supported Virtual Machines	■ Able to create Windows server virtual machines or Linux server virtual machines

1.3.19 Virtualisation Software 4 (Licence) [Item No. 33033]

Features	■ Provide centralised management for administrators to manage virtual machines, storage, physical hosts and cluster in a virtual environment ■ Able to intelligently allocate available resources among virtual machines based on predefined rules ■ Able to detect virtual machine failure and trigger the automatic restart of virtual machine ■ Able to manage the virtualisation software proposed under Virtualisation Software 2 (Licence) [Item No. 33031]

1.3.20 Virtualisation Software 5 (Licence) [Item No. 33034]

Features	■ Run natively and directly on physical server without running on top of a computer operating system ■ Create virtual machines and allow multiple virtual machines running concurrently on three (3) physical servers ■ Allow dynamic allocation of storage capacity so that there is no need for dedicated storage capacity for each virtual machine ■ Allow virtual machines to access shared storage devices (e.g. SAN devices, NAS devices) ■ Allow virtual machines to have virtual storage capacity that is larger than the actual physical storage capacity ■ Allow live migration of running virtual machines from one physical server to another with no downtime

	■ Support high availability in the sense that in the event of a physical server failure, all the virtual machines in that physical server shall be automatically restarted on another physical server in the same cluster ■ Provide centralised management for administrators to manage virtual machines, storage, physical hosts and cluster in a virtual environment ■ Able to intelligently allocate available resources among virtual machines based on predefined rules
Supported Virtual Machines	■ Able to create Windows server virtual machines or Linux server virtual machines

1.3.21 Virtualisation Software 6 (Licence) [Item No. 33035]

Features	■ Support software defined storage in a virtual environment ■ Able to aggregate local device storages to create a shared storage ■ Support non-downtime, non-disruptive scale-up and scale-out to grow capacity and performance whenever required ■ Support proactively migrate data to alternate devices in a cluster by continually analysing the health of storage devices and identifying devices that exhibit declining health before failure
Environment Setup	■ Shall be integrated with the virtualisation software proposed under Virtualisation Software 2 (Licence) [Item No. 33031]

1.3.22 Virtualisation Software 7 (Licence) [Item No. 33036]

Features	■ Support software defined storage in a virtual environment ■ Able to aggregate local device storages to create a shared storage ■ Support non-downtime, non-disruptive scale-up and scale-out to grow capacity and performance whenever required ■ Support proactively migrate data to alternate devices in a cluster by continually analysing the health of storage devices and identifying devices that exhibit declining health before failure ■ Perform block-level deduplication and compression to save storage space
Environment Setup	■ Shall be integrated with the virtualisation software proposed under Virtualisation Software 2 (Licence) [Item No. 33031]

1.3.23 Virtualisation Software 8 (Licence) [Item No. 33037]

Features	■ Able to create network services including routing, switching, firewall, load balancing and Virtual Private Network (VPN) in software and embed them in the hypervisor layer ■ Have the capability to perform the following functions: ▪ Switching

	- Enable logical layer 2 switching over layer 3 network in the virtual environment - Support Virtual Extensible LAN (VXLAN) based network overlays ▪ Routing - Support dynamic routing between virtual networks performed at the hypervisor kernel level - Support static routing and dynamic routing (OSPF, BGP) protocols ▪ Firewalling - Provide distributed stateful firewalling at the hypervisor kernel level - Provide micro-segmentation of firewall capability for each virtual machine in the virtual environment - Support for Active Directory and activity monitoring ▪ Load balancing - Provide load balancer that offers layer 4 and layer 7 load balancing with Secure Socket Layer (SSL) offload and SSL pass-through - Support server health checks ▪ VPN - Support Internet Protocol Security (IPsec) VPN and SSL VPN

1.3.24 Electronic Mail Software [Item No. 33040]

Features	■ Provide e-mail, calendar, contacts and task management ■ Provide functions for users to create and maintain contact information ■ Provide an instant messaging function ■ Provide user account management ■ Provide the capability to archive and restore e-mails ■ Support Post Office Protocol 3, Internet Mail Access Protocol 4 and Simple Mail Transfer Protocol

1.3.25 Server Management Software [Item No. 33050]

Features	■ Provide an integrated solution to manage hardware, applications, physical and virtual servers across different platforms (e.g. Windows/Linux) ■ Provide at least two (2) of the following functions: ▪ Monitor and report the health, capacity and usage of operating systems, applications and hardware devices ▪ Perform software distribution, patch management, operating system deployment and remote control of computers ▪ Support live migration of virtual machine between physical servers in a cluster environment ▪ Perform backup and recovery operations including the recovery of virtual machine

1.3.26 System Monitoring Software [Item No. 33060]

Features	■ Provide an integrated solution for centralised monitoring and managing distributed environment ■ Provide monitoring, analysing and reporting in system utilisation, performance and availability of system resources ■ Provide event triggering, notification, reporting, filtering and integration for easy monitoring and bottleneck isolation. ■ Provide graphical statistics reporting tools

1.3.27 Log Server Software [Item No. 33070]

Features	■ Collect log data from systems and applications ■ Provide web-based tools to view and filter log messages ■ Send email alerts, run script, and perform other actions to react to log messages ■ Manage log archives with scheduled compress, encrypt, rename, move and delete rules ■ Generate trend analysis graphs and deliver via emails

1.3.28 Configuration Management Software [Item No. 33075]

Features	■ Distribute and install software applications to computers including Windows 10 or equivalent based computers ■ Track and apply software updates to computers ■ Assess the compliance status of computers with established configurations ■ Deploy operating system including Windows 10 or equivalent to computers ■ Perform administrative tasks on the managed computers remotely

1.3.29 Patch Management Software [Item No. 33080]

Features	■ Scan computers including Windows 10 or equivalent based computers to identify what patches are required for particular computers ■ Deliver patches to the computers ■ Provide report on which computers have been patched and which ones have not

1.3.30 Software Asset Management Software [Item No. 33090]

Features	■ Scan computers in a network and report the software installed in these computers ■ Keep track of software usage such as installation of the software, users of the software and the computer that ran the software ■ Scan computers to detect the installation of unauthorised software ■ Provide inventory report of software

1.3.31 Mobile Device Management Software [Item No. 33095]

Features	■ Shall be able to offer **at least three (3)** of the following functions on mobile devices: - Prevent unauthorised mobile devices with access to corporate servers - Detect policy violations (e.g. international roaming) and take action, if needed, including disable access of mobile devices to corporate servers - Remote distribute and install applications on mobile devices - Remote configure and update settings of mobile devices - Remote lock mobile devices - Remote wipe data from mobile devices ■ Support at least one of the following mobile platforms: Android, EMUI, HarmonyOS, iOS and Windows

1.3.32 Server and Application Monitoring Software [Item No. 33100]

Features	■ Monitor the health, availability, capacity and usage of servers and applications in a computer network ■ Scan and automatically discover servers and applications within the network ■ Track server resource usage such as CPU load, memory used and disk capacity ■ Collect performance data of applications such as memory consumption and disk I/O usage ■ Generate alert once usage of particular resource (e.g. mailbox size of user) has reached a condition as defined by user ■ Provide tool to analyse performance of server and applications ■ Provide tool to view the real-time performance and health of servers and applications

1.3.33 Security Configuration Management Software [Item No. 33110]

Features	■ Assess the configuration of a server against the regulations or industry standards (e.g. PCI DSS) and report the policy compliance status ■ Allow users to define security configuration baselines for server and provide monitoring and reporting on non-compliance ■ Able to identify configuration-based risk in virtual environment ■ Provide report with information on issues and proposed solutions
Scanned Target	■ Windows/Linux based server

1.3.34 Email Security Software [Item No. 33115]

Feature	■ Check all incoming and outgoing emails through mail servers (e.g. IBM Domino Server, Microsoft Exchange Server) and provide real-time protection to block or quarantine emails containing viruses, worms, Trojans, and other malware ■ Block spam emails ■ Block phishing attacks by detecting links to malware web sites within both the email body and attachments ■ Provide logging and generate report on protection status

1.3.35 Virus Protection Software [Item No. 33120]

Features	■ Provide real-time scanning and detection of different types of computer viruses, worms, Trojan horses, spyware and bots ■ Provide automatic cleaning, quarantining of virus ■ Include one (1) year signature updates of the proposed virus protection software

1.3.36 Intrusion Detection and Prevention Software [Item No. 33125]

Features	■ Perform real-time network traffic analysis to and from server and block network traffic from malicious source ■ Monitor operating system and applications to detect malicious activities ■ Identify security policy violations ■ Generate alerts for administrative actions

1.3.37 Secure Deletion Software [Item No. 33130]

Features	■ Use software-based overwriting methods to erase data permanently beyond recovery ■ Support recognised overwriting standards

1.4 Sub-Category B4 - Server Application Software

Any software item other than client/device access licences under this sub-category*

1.4.1 Database Software 1 (Licence) [Item No. 34000]

Features	■ Provide the database engine supporting relational database model and SQL ■ Support ISO 10646 and HKSCS coded in ISO 10646 or support GB 18030 ■ Provide interactive tools supporting data browsing, sorting and record filtering under interactive mode ■ Include tools such as graphical querying tool, report writer and form designer

	■ Provide application development capability with macro language support and built-in program debugger
Supported Operating System platform	■ Able to run on Windows platform or Linux platform or equivalent

1.4.2 Database Software 2 (Licence) [Item No. 34001]

Features	■ Provide the database engine supporting relational database model and SQL ■ Support ISO 10646 and HKSCS coded in ISO 10646 or support GB 18030 ■ Provide interactive tools supporting data browsing, sorting and record filtering under interactive mode ■ Include tools such as graphical querying tool, report writer and form designer ■ Provide application development capability with macro language support and built-in program debugger ■ Provide or with option to provide in-memory database feature as specified in Database Software 3 (Licence) [Item No. 34010] ■ Provide or with option to provide Transparent Data Encryption feature as specified in Database Software 4 (Licence) [Item No. 34011] ■ Provide or with option to provide failover clustering feature as specified in Database Software 5 (Licence) [Item No. 34012]
Supported Operating System platform	■ Able to run on Windows platform or Linux platform or equivalent

1.4.3 Database Software 3 (Licence) [Item No. 34010]

Feature	■ Enable a database software to use memory for data storage rather than disk-based storage
Compatibility	■ Compatible with the proposed Database Software 2 (Licence) [Item No. 34001]

1.4.4 Database Software 4 [Item No. 34011]

Feature	■ Perform real-time encryption of data before storing the data in database with encryption key securely stored inside the database
Compatibility	■ Compatible with the proposed Database Software 2 (Licence) [Item No. 34001]

1.4.5 Database Software 5 [Item No. 34012]

Feature	■ Enable a database software to be run on three (3) or more physical servers concurrently (active-active) and if any one of these servers fails, the database software automatically continues to run on surviving servers

Compatibility	■ Compatible with the proposed Database Software 2 (Licence) [Item No. 34001]

1.4.6 Database Software 6 [Item No. 34013]

Feature	■ An expansion option or add-on licence to expand the functionality of the proposed Database Software 2 (Licence) [Item No. 34001]

1.4.7 Database Software 7 [Item No. 34014]

Features	■ Provide at least two (2) of the following functions to assist in the management of database: ▪ Perform diagnostic to resolve database performance problems (e.g. inappropriate database configuration, undersized memory, resource intensive SQL statements, etc.) in real time ▪ Collect operational statistics of the database at predetermined intervals to facilitate historical performance analysis ▪ Provide automatic tuning of SQL statements (e.g. through index creation or deletion) ▪ Allow real-time SQL monitoring with live display to track the execution details for a given SQL statement
Supported Operating System Platform	■ Able to run on Window platform or Linux platform or equivalent

1.4.8 Application Server [Item No. 34020]

Features	■ Provide a server environment for deploying and running applications including web applications and Java applications ■ Provide services such as construction of dynamic web pages to applications ■ Support clustering to provide load balancing and failover
Supported Operating System Platform	■ Able to run on Windows platform or Linux platform or equivalent

1.4.9 Application Development Tool [Item No. 34030]

Features	■ Provide at least two (2) of the following functions to assist in the development of applications: ▪ a visual user interface supporting drag-and-drop development environment ▪ a set of built-in templates or reusable classes / components ▪ source code editor to facilitate syntax checking ▪ compiler to generate executable code ▪ debugger to test and debug applications

1.4.10 Reporting Software [Item No. 34040]

Features	■ Support capturing of data from data sources, e.g. database, spreadsheets, XML and text files ■ Provide Graphical User Interface (GUI) editor with a set of tools for designing and customisation of report layout ■ Generate graphical report in various report formats, e.g. HTML and PDF

1.4.11 Document Management Software [Item No. 34050]

Features	■ Provide file concurrency control, e.g. Check-in and Check-out or notification of users for the file being updated and confirmation on overwriting of documents ■ Provide version control for documents and restore previous version of documents ■ Support search of content using Traditional Chinese, Simplified Chinese and English as keyword ■ Support integration with workflow application ■ Able to define document access rights for individual user and user group ■ Provide or with option to provide OCR feature ■ Able to generate audit log in report format

1.4.12 Content Management Software [Item No. 34060]

Features	■ Create web sites and portals with collaboration capabilities ■ Provide content management functions including version control, access control, retention policy and generation of audit report on the documents and web pages ■ Provide social networking capabilities including tools to create, access and manage content and allow collaboration by group ■ Allow multiple users to edit the same document at the same time ■ Provide tools to create and manage wikis, blogs and discussion boards and allow collaboration by group ■ Provide access through web browsers

1.4.13 Geographic Information System Software 1 [Item No. 34070]

Features	■ Provide tools to capture, store, analyse, and share geographic information including maps and spatial data ■ Provide centralised management of GIS resources including maps and spatial data ■ Provide tools to build and run mapping applications through the Internet ■ Shall be compliant with Open Geospatial Consortium (OGC) standards including: ▪ Web Map Service (WMS) ▪ Web Coverage Service (WCS)

	▪ Keyhole Markup Language (KML)

1.4.14 Geographic Information System Software 2 [Item No. 34071]

Features	■ Provide tools for map creation, advanced analysis, data management, and Web GIS integration with geographic database ■ Perform analysis on geographic data to discover spatial patterns and relationships ■ Generate reports and charts

1.5 Sub-Category B5 – AI Server Equipment

Any hardware / software item under this sub-category*

1.5.1 AI Server Computer [Item No. 35000]

Central Processor Unit	■ 64-bit dual/multi-socket server grade processor(s) with minimum of 8 cores
AI Accelerator	■ Integrated AI co-processor or discrete AI accelerator module, including Graphics Processing Unit (GPU) or Neural Processing Unit (NPU) ■ Suitable for intensive AI workload with performance of: ▪ At least 8 TOPS (for INT8) ## for GPU or NPU; or ▪ At least 10 TFLOPS (for FP32) ## for GPU
Memory	■ At least 64GB
Internal Storage	■ At least 1TB
Others	■ Provide two (2) hot swap power supply units with redundant capability
Operating System	■ Preloaded with one of the prevailing operating systems
Green Requirement	■ Shall comply with mandatory requirement of Green Product Code D06

Notes:

(i) TOPS (for INT8) stands for Trillions of Operations Per Second (for 8-bit Integer Operations)

(ii) TFLOPS (for FP32) stands for Tera Floating Point Operations Per Second (for 32-bit floating-point precision)

1.5.2 AI Server Components and Accessories [Item No. 35005]

Features	Server components and accessories supporting AI features including but not limited to: ■ AI accelerator: Graphic Processing Unit (GPU) or Neural Processing Unit (NPU) ■ Memory component: high-capacity memory or SSD

	■ Power supply unit for AI Server Computer

1.5.3 AI Server Software [Item No. 35010]

Features	Server software supporting AI solutions for different application areas including but not limited to: ■ AI-driven digital human customer service ■ AI meeting minutes summaries and communication collaboration ■ Document management and processing ■ Writing and content creation ■ Workflow management and automation ■ Creativity and promotional marketing ■ Data analysis and prediction
Other Requirements	■ The AI model(s) of the software shall be able to be installed and run on a local server computer

Reference

EPD computer equipment and products green requirements:

https://www.epd.gov.hk/epd/english/how_help/green_procure/pdf/Category%20D.pdf

List of Technical Abbreviations

Abbreviation	Definition
1000BASE-T	IEEE 802.3 standard for 1Gbps LAN media over twisted-pair copper wiring
802.11ax	IEEE 802.11ax standard for wireless local area network
A	Ampere
AAA	Authentication, Authorization and Accounting
AC	Alternating Current
AD	Active Directory
AIX	Advanced Interactive eXecutive
ARIA	Australian Recording Industry Association
BGP	Border Gateway Protocol
BGP-4	Border Gateway Protocol Version 4
BMP	Windows Bitmap
bps	Bit-per-second
CA	Certificate Authority
Cat	Category
CD	Compact Disc
CD-ROM	Compact Disc Read Only Memory
CFM	Cubic Feet per Minute
CIFS	Common Internet File System
CISA	Certified Information Systems Auditor
CISM	Certified Information Security Manager
CISSP	Certified Information Systems Security Professional
CPU	Central Processing Unit
DAT	Digital Audio
DDoS	Distributed Denial of Service
DDR SDRAM	Double Data Rate Synchronous Dynamic Random Access Memory
DES	Data Encryption Standard
DHCP	Dynamic Host Configuration Protocol

Abbreviation	Definition
DIMM	Dual In-line Memory Module
DP	Display Port
Dpi	dots per inch
DSA	Digital Signature Algorithm
DVD	Digital Video Disc
DVD +/-R	Digital Video Disc Recordable
DVD+/-RW	Digital Video Disc Rewritable
DXF	Drawing Exchange Format
DVI	Digital Visual Interface
DWPD	Drive Writes Per Day
DWG	AutoCAD Drawing File Format
E1	E-carrier System 1
EAN	European Article Number
ECC	Error-Correcting Code
EIA	The Electronic Industries Alliance
EMSD	Electrical and Mechanical Services Department
eSATA	External Serial Advanced Technology Attachment
FIPS	Federal Information Processing Standards
FoIP	Fax over IP
FTP	File Transfer Protocol
GB	Gigabyte
GbE	Gigabit Ethernet
Gbps	Gigabit per second
GBps	Gigabyte per second
GFC	Gigabit per second Fibre Channel
GHz	Gigahertz
GIF	Graphics Interchange Format
GIS	Geographic Information System
GUI	Graphical User Interface

Abbreviation	Definition
HDD	Hard Disk Drive
HDMI	High-Definition Multimedia Interface
HIM	Hardware Interface Module
HKSCS	Hong Kong Supplementary Character Set
HP	Hewlett-Packard Company
HTML	HyperText Markup Language
HTTP	Hypertext Transfer Protocol
Hz	Hertz
IBM	International Business Machines Corporation
ICAP	Internet Content Adaptation Protocol
IDE	Integrated Drive Electronics
IDS	Intrusion Detection System
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IOS	iPhone Operating System
IP	Internet Protocol
IPS	Intrusion Prevention System
IPSec	Internet Protocol Security
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
iSCSI	Internet Small Computer System Interface
ISDN	Integrated Services Digital Network
ISL	Inter-Switch Link
ISO	International Organization for Standardization
IT	Information Technology
ITU	International Telecommunication Union
JPG	JPEG File Interchange Format
kbps	kilobit per second
kpps	Kilo packets per second

Abbreviation	Definition
KML	Keyhole Markup Language
kVA	Kilovolt-Ampere
KVM	Keyboard, video and mouse
LAN	Local Area Network
LCD	Liquid Crystal Display
LDAP	Lightweight Directory Access Protocol
LED	Light Emitting Diode
LRDIMM	Load-Reduced Dual Inline Memory Module
LTO	Linear Tape-Open
MAC	Media Access Control
MACsec	IEEE 802.1AE MAC Security standard
MB	Megabyte
Mbps	Megabit per second
MBps	Megabyte per second
Microsoft	Microsoft Corporation
MLC	Multi-level Cell
Mpps	Million packets per second
MPLS	Multiprotocol Label Switching
ms	1,000th of a second
MU-MIMO	Multi-user, multi-in and multi-out
NAS	Network-attached storage
NAT	Network Address Translation
NFS	Network File System
NVMe	Non-volatile Memory Express
OATH	Initiative for Open Authentication
OCR	Optical Character Recognition
OEM	Original Equipment Manufacturer
OGC	Open Geospatial Consortium
OLAP	Online Analytical Processing

Abbreviation	Definition
Oracle	Oracle Corporation
OS	Operating System
OSPF	Open Shortest Path First
OSPFv3	Open Shortest Path First Version 3
OST	Open Storage Technology
OTP	One-time Password
PERT	Program Evaluation Review Technique
PC	Personal Computer
PCI	Peripheral Component Interconnect
PCI DSS	Payment Card Industry Data Security Standard
PCI-E	Peripheral Component Interconnect - Express
PCI-X	Peripheral Component Interconnect Extended
PDF	Portable Document Format
PERL	Practical Extraction and Report Language
PKI	Public Key Infrastructure
PNG	Portable Network Graphics
PoE	Power-over-Ethernet
PoE+	Power-over-Ethernet Plus
POP	Post Office Protocol
ppm	pages per minute
pps	packets per second
PVC	Polyvinyl Chloride
QSFP	Quad Small Form-factor Pluggable
RADIUS	Remote Authentication Dial-In User Service
RAID	Redundant Array of Independent Disks
RAM	Random-Access Memory
RDIMM	Reduced Dual Inline Memory Module
RIP	Routing Information Protocol
RIP-2	Routing Information Protocol Version 2

Abbreviation	Definition
RJ11	6P2C connector
RJ45	Registered Jack-45
RoHS	Restriction of Hazardous Substances Directive
ROM	Read-Only Memory
rpm	revolutions per minute
RSA	Rivest-Shamir-Adleman cryptosystem
RS232	Recommended Standard 232
SAN	Storage Area Network
SAS	Serial Attached SCSI
SATA	Serial Advanced Technology Attachment
SCSI	Small Computer System Interface
SD	Secure Digital
SED	Self-Encrypted Drive
SFP	Small Form-factor Pluggable
SFP+	Enhanced Small Form-factor Pluggable
SHA	Secure Hash Algorithm
SLC	Single-level Cell
SMB	Server Message Block protocol
SNMP	Simple Network Management Protocol
SNMP-2	Simple Network Management Protocol Version 2
SQL	Structured Query Language
SSD	Solid State Disk
SSL	Secure Sockets Layer
T1	T-carrier System 1
TACACS+	Terminal Access Controller Access-Control System Plus
TB	Terabyte
TPC-C	TPC-C is an on-line transaction processing benchmark
TPM	Trusted Platform Module
tpmC	TPC-C is measured in transactions per minute

Abbreviation	Definition
U	Rack unit
UNSPSC	United Nations Standard Products and Services Code
UPC	Universal Product Code
UPS	Uninterruptible Power Supply
USB	Universal Serial Bus
UTM	Unified Threat Management
UTP	Unshielded Twisted Pair
V	Volt
VA	Voltage-Amperes
VGA	Video Graphics Array
VLAN	Virtual LAN; a logical grouping of end stations within a bridged infrastructure
VPN	Virtual Private Network
VRRP	Virtual Router Redundancy Protocol
VXLAN	Virtual Extensible Local Area Network
W	Watt
WAN	Wide Area Network
WCS	Web Coverage Services
WEP	Wired Equivalent Privacy
WLAN	Wireless LAN
WMS	Web Map Service
WPA	Wi-Fi Protected Access
WPA2	Wi-Fi Protected Access 2
XML	Extensible Markup Language