Department of the Army Information Technology Enterprise Solutions-3 Hardware (ITES-3H) Thin Client CDRL

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OVERVIEW

1.a Standardized Configurations - Thin Client

1.a.i *Resources and Timeline to Facilitate the Development and Maintenance of the Proposed Thin Client Configurations*

The table below provides a typical schedule for the implementation of a VDI solution, broken down by phase. It is not intended as a final project plan or fixed schedule for this project, but is rather intended to provide guidance and some initial structure to the project as it is initiated. A more detailed project plan and timeline will be completed at the initiation of each task order under this contract. The maintenance is handled as a part of the Operate Phase of our Plan, Design, Implement, Operate (PDIO) methodology. The duration for the maintenance phase is defined in exhibit below**.**

Phase	Duration	Phase	Duration
Phase I: Plan	**2 weeks (total)**	**Phase III: Implementation**	**2 weeks (total)**
Vision & Scope	10 days	Production Implementation	7 days
Phase II: Design	**4 weeks (total)**	Documentation & Knowledge Transfer	3 days
Design and Planning	5 days	**Phase IV: Operate**	**TBD**
Proof of Concept	10 days	Post Install Implementation & Support	TBD
Testing & Validation	5 days		

Maintenance Phase Milestones. *MicroTech's PDIO ensures repeatable processes are applied to the Maintenance Phase.*

Staffing: This section is included to provide clients with an understanding of the expectations of internal staff to participate in the proposed project. Success and timely execution of projects often hinge on the ability of the internal staff to work with the project team and participate in the execution of the project. We make a best effort to estimate these commitment levels in terms of time, however, these requirements can vary based on a number of potential factors. The table below shows key Army resources that will work with MicroTech consultants during the implementation and the time commitment expected from their part. **Exhibit 10** defines the resource needs and expectations.

Role	Commitment Expectation
Project POC	Approximately 10%. The Project POC will Participate in Design & Planning sessions, Review & Approve deliverables, perform Issue escalation & conflict resolution, and will be the authority to approve project budget
Windows System Admin	25%-30%, participating in Design & Planning sessions, review deliverables, participate in critical application assessment, Operating System related activities, and in Knowledge Transfer sessions.
TC Administrator	Close to 50%, participating in Design & Planning sessions, review deliverables, participate in critical Citrix related activities, application migration and on knowledge transfer sessions.

Exhibit 10. *Resource needs and expectations*

1.a.ii *MicroTech's Engineering Efforts Required to Implement and Migrate Thin Client Solutions Over The Life of the Contract*

MicroTech is committed to providing the Army a robust and streamlined design and implementation solution around TC computing environments. This section describes our approach to developing a secure, robust and an up-to-date computing environment capable of supporting external and internal user needs via TC architectures. By incorporating the latest HW/SW technology, along with proven methodologies for success, our design will reduce the cost of procurement and operations, thus resulting in optimal Return on Investment (ROI).

Our experience shows that Army currently utilizes a number of varying technologies but as per directive is standardizing on TC computing architectures unless it is deemed non-interoperable, in which case a traditional desktop operating environment will be utilized. This section outlines our capabilities around TC solutions design and implementations standards in this document and will provide recommendations as such. The scope around TC computing environment deployments will include:

- Research of current directory services, network and application environment
- Gather and document business and technical requirements for TC needed solution
- Review and understand current application environment, (i.e., restricted access and needs)
- Create and document all necessary design requirements
- Revise the directory services and security policy designs as needed
- Incorporate a lab test and validate load balancing and failover client / server environment
- Test and validate the proposed technical solutions
- Document test results and report on outcomes
- Document strategies and tactical steps needed to maintain, build, failover/failback and disaster recovery processes and procedures

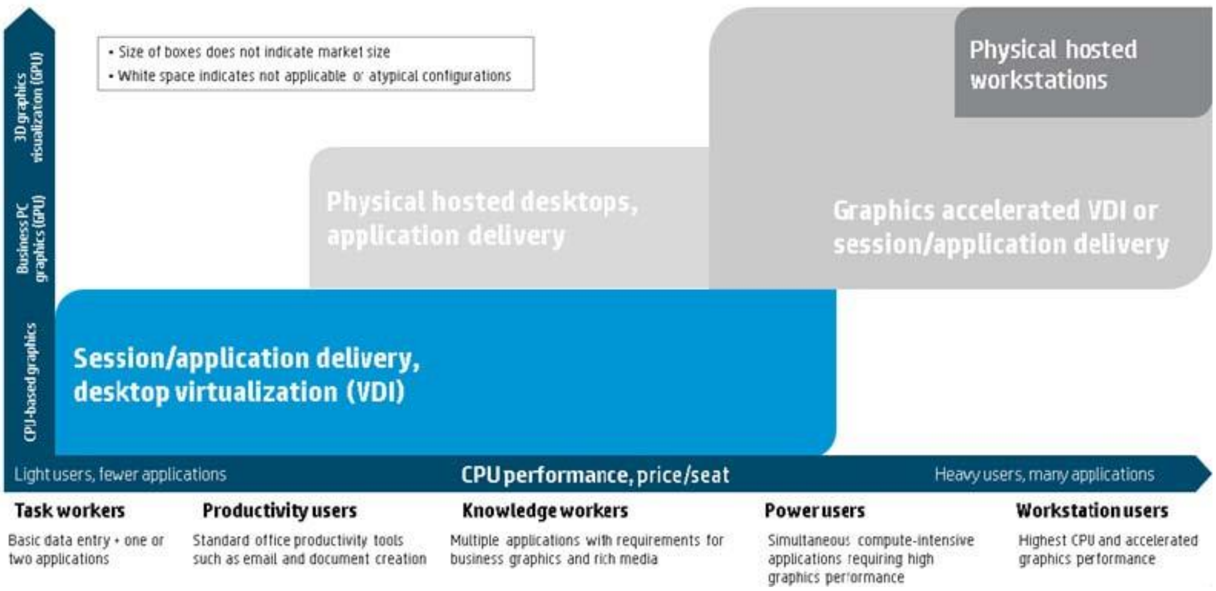
MicroTech adopts a phased approach to each of our delivery engagements. Collaborating years of experience and industry proven methodologies, our approach follows a strict Plan, Design, Implement and Operate (PDIO) methodology. This helps us to manage the project lifecycle and mitigate potential risks through the course of the project. Each of our technology implementation projects includes the following project phases. The various tasks MicroTech performs on a TC implementation are shown in **Exhibit 11**.

Planning Phase:	*Vision & Scope:* The first phase of the project is where we establish our baseline of information and set the stage for success. This phase includes any network discovery and documentation that needs to be completed, definition of project roles & responsibilities, and the development of a high-level project plan to move forward with.
Design Phase:	*Design & Planning:* After completing our initial discovery, we engage in a thorough Design & Planning phase. This includes our technology design sessions, where we engage with the team in a bi-directional dialogue to educate the staff while informing us of details particular to the environment critical to the project success. We complete draft design documentation based on the outcome of these sessions, and develop a more detailed project plan to move forward. *Testing & Validation:* We consider thorough lab testing and validation of a proposed design a vital step toward the success of any project. During this phase we explore any unknown factors with the design or implementation plan, and validate (or invalidate) any critical assumptions that we have made in our planning. We then incorporate our lessons learned from the lab into our design documentation and implementation plan, and are ready to move forward with implementation. *Proof of Concept:* We feel it is necessary that before beginning the implementation phase that we conduct a pilot rollout to a select group of "friendly" users, to "prove" the design in a live environment. Adjusting as necessary based on feedback from the pilot group, we are then ready to execute on the production roll-out.
Implementation Phase:	*Implementation:* After successful completion of the previous phases we now begin a successive rollout of the technologies and methodologies solidified in proof of concept. Where appropriate, we will coordinate Administrative or End-User training with the rollout schedule to maximize the impact of these training sessions. Documentation & Knowledge Transfer: In accordance with our philosophy of maximizing our potential for success by empowering your team to manage the technology we deploy, we bring focus to documentation and knowledge transfer once the implementation is complete. During this phase we complete any knowledge transfer with the administrative staff that was not completed during the planning, lab & implementation phases, and update the network documentation to reflect the current as-built state.
Operate Phase:	*Post Implementation & Support:* The Post-Implementation & Support phase gives us the opportunity to identify and resolve any open issues, and identify any additional needs moving forward that we may be able to support. We conduct a project quality and success assessment, and complete the final project sign-off as well as define next steps, if any, to provide ongoing support

Exhibit 1: Plan, Design, Implement and Operate (PDIO) Methodology.

The end result is a centralized TC solution capable of offering a reduction in administrative overhead, cost of operations, a quantified ROI and a reduced Total Cost of Ownership (TCO). Our vision of is represented in exhibit below.

Client virtualization technology landscape



1.a.iii *MicroTech's Understanding of the Impact of Thin Client Solutions*

TC environments house all data, applications, tools and the operating system in centralized locations datacenters (i.e., server farms or Area Processing Centers), utilizing terminal emulation to provide the end-user computing experience. This architecture allows for operational and security control from centralized, simple, and cost-efficiently managed locations thus elevating data loss, theft or corruption at the end-user level. In reality, the TC computing environment can best be conceptualized with the notion that organizational end-user computing has come full circle; pointing out that traditionally computing was performed via mainframes and dumb-terminal. As time and technology progressed, as well as significant cost savings, organizations started using fat-, or thick-, clients and computers with operating systems, processors, memory and storage space. Again, as time progressed the advantages of TC computing with regard to cost, security and administrative overhead began to take hold and now, just like the Army, many organizations are standardizing on TC (or dumb terminal) computing infrastructures thus utilizing backend processing and storage components to house data and applications.

TC Computing is a technology whereby applications are deployed, managed, supported and executed on the server and not on the client. Instead, only the screen information is transmitted between the server and client. This architecture solves the many fundamental problems that occur when executing the applications on the client itself.

In server-based computing environments, HW/SW upgrades; application deployment; technical support; and data storage and backup are simplified because only the servers need to be managed. Data and applications reside on a few centrally managed servers rather than on hundreds or thousands of clients. PCs become terminals. They can be replaced by simpler, less expensive and more importantly, easier to manage devices called “TCs”.

A TC mainly focuses on conveying input and output between the user and the remote server. It does not have local storage and requires little processing resources. In contrast, a thick or fat client does as much processing as possible and passes only data for communications and storage.

Key impacts of using TCs are related to reduced operational expenses, reduced capital expenditure due to reduced frequency of technology refreshes and reduced energy costs:

- TC hardware consumes 20W to 40W compared to an average PC that consumes 60W to 110W during operation mode, even though a single PC cannot be replaced by one TC due to the fact that for every 20 to 50 users you need one Terminal Server, due to executable files must be processed on a terminal server - electricity consumption about 70% less.
- A TC has a longer life cycle since it consists of less removable components and since processing is executed on the server, reducing the frequency of technology refresh needs.
- Reduced heat emission of a TC since no HDD is included. This plays a major rule for an organization situated in the hot areas of the world resulting in lower cooling system usage.
- Converting inventory of fat clients into TC expands the life cycle of fat clients.
- Publish Applications to home workspaces reduces the need for workforce mobility.
- Centrally manage the shutdown of TC during off hours reduces electricity consumption and CO_2 emission. A regular desktop, in sleep mode consumes an average power of 35w.

MicroTech is prepared to offer standardized configurations to CHESS customers based on any of the three following use cases defined in exhibit below.

TC <500	TC >500
One configuration shall be for an organization with less than 500 users.	One configuration shall be for an organization with more than 500 users.

1.b Introduction

In today's on-demand world, end-user expectations have reached new heights. End users want seamless access, with functional usage, to all of their personal and corporate applications and data - regardless of their endpoint device. With this level of expectation now serving as the status-quo, IT requirements have become complex and implementations have become expensive. Now that high performance and high availability need to be simultaneously balanced with simple, secure, inter-device accessibility, many enterprises struggle to find IT resources with expertise, and cost efficient solutions to validate such investments. Enter the era of hyper convergence (HC). By breaking down the physical infrastructure of traditional data centers and consolidating previously disparate components, HC has removed layers of technical complexity. Running in parallel to this hardware consolidation trend is the emergence of virtualized, software-defined solutions (mostly storage and networking) helping to simplify day-to-day management.

Hyper convergence With IT spending trends often coming under the watchful eye of CxOs, hyper convergence is serving as a technical catalyst to enterprise infrastructures, allowing them to leverage upon the benefits delivered by HC systems. Customers are beginning to see that deploying remote virtual desktops and applications (VDI, RDSH, Session / App virtualization) is simpler than ever, requiring fewer dedicated technical support personnel, with less training and expertise. The hyper converged model is opening up new segments of the market (mid-market and SMB markets, primarily) to previously implausible end-user computing scenarios, by successfully reducing complexity and high-costs.

Separate from, but equally as important to, are the obstacles of management complexity and unpredictable capital costs, was the challenge of widespread user acceptance. End users want simplistic, wide-ranging access, with performance comparable to their desktop PCs. To accommodate this, Hewlett Packard Enterprise needed an HC solution that yielded faster processing speeds, adequate capacity with predictable scaling, while also offering increased system flexibility and configurability.

MicroTech presents a solution with VMware® Horizon® virtual desktops on an HPE next-generation data center in-a-box, with emphasis on simplifying the deployment of virtual desktops on an appliance that integrates storage, networking and computing into each node. HPE tested the virtual desktops on an HPE Hyper Converged 380 (HC 380) appliance, leveraging HPE best-in-class technologies; HPE StoreVirtual Virtual SAN Appliance (VSA), and the OneView InstantOn (OVIO) startup and expansion wizard. With Horizon running on ESXi 6.0, we can now integrate NVIDIA GRID vGPU technology, and deliver powerful graphics rendering capabilities across multiple desktops.

This solution demonstrates a truly integrated end-user computing solution that can:

- Decrease the cost of infrastructure without compromising upon service level agreements.

- Provide testing user density quantities for sizing sample and to enable price/user modeling exercises.
- Expedite virtual and soft layer provisioning by providing sample configuration with guidance for similar deployments.
- Deliver acceptable user experience to satisfy demands of remote users and improve user acceptance.
- Display design principles to support a multitude of virtual workloads – desktops and applications (persistent, non-persistent), GPU-required, and deliver combinations of workloads simultaneously from same individual clusters.
- Accelerate and streamline desktop deployments with integrated components designed for end-user computing.
- Reduce risk with pre-tested server, storage and network configurations on systems that are workload-optimized for Virtual Desktop Infrastructure (VDI).

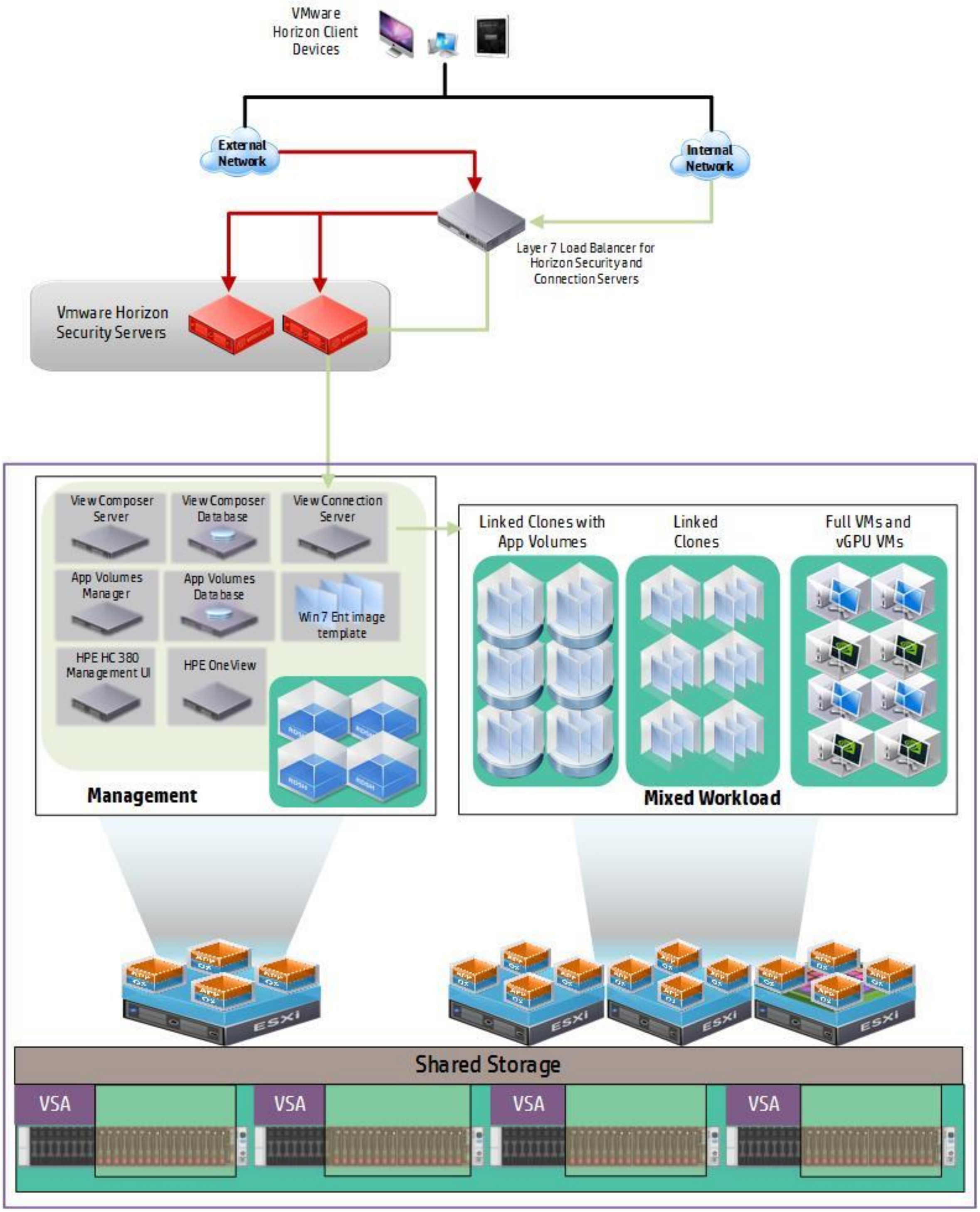
The HPE Hyper Converged 380 is the basis for the Microtech solution and offers highly available server and storage infrastructure and can be deployed and configured. The HPE Hyper Converged 380 comes complete with all server, storage, networking, and management tools needed to begin a deployment, and can be configured to support from two (2) to sixteen (16) nodes per management group. Because many environments require several clusters, or management groups, the HC 380 utilizes the HPE OneView InstantOn software, to enable rapid expansion of appliances and facilitation of simple, cost-effective, and linear growth per management group.

From a software perspective, the HC 380 is pre-configured for vSphere 6.0 and includes API integration via the HPE OneView for VMware vCenter™ plug-in to facilitate simplistic platform management and solution deployment. With VMware Horizon licensing applied, the HPE HC 380 platform serves as an ideal solution for customers looking for the rapid deployment and expansion of a wide range of end-user computing solutions.

The figure below presents a high-level overview of the architecture being proposed by MicroTech.

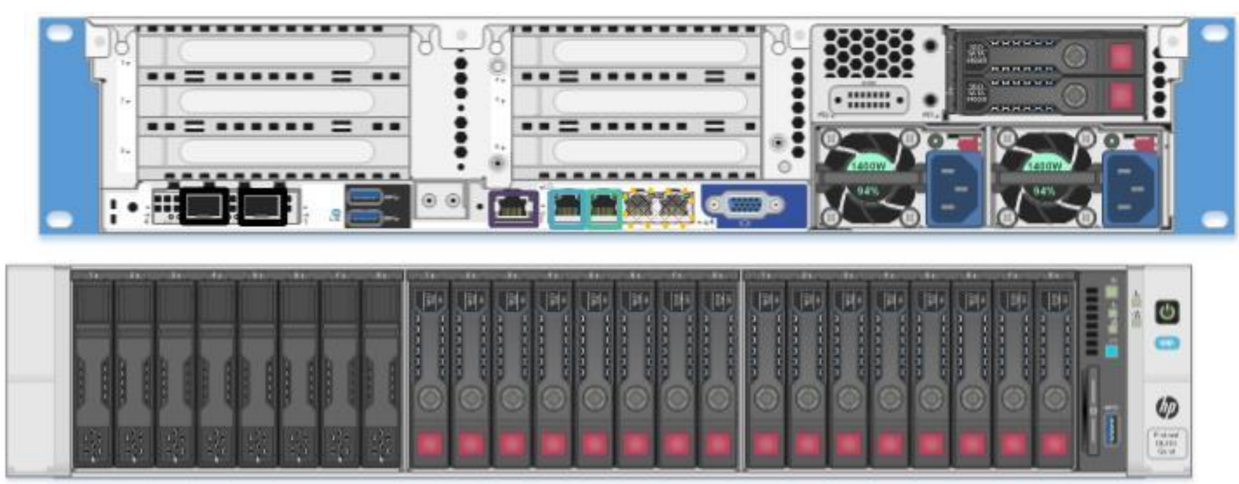
TC <500		TC >500	
Quantity	**Description**	**Quantity**	**Description**
0	HC380 Appliance for VDI [#1]	0	HC380 Appliance for VDI [#1]
3	HPE HC380 Cluster Node	5	HPE HC380 Cluster Node
3	HPE HC380 VDI SW	5	HPE HC380 VDI SW
3	HP DL380 Gen9 E5-2690v3 FIO Kit	5	HP DL380 Gen9 E5-2690v3 FIO Kit
3	HP DL380 Gen9 E5-2690v3 Kit	5	HP DL380 Gen9 E5-2690v3 Kit
3	Factory integrated	5	Factory integrated
48	HP 32GB 2Rx4 PC4-2133P-R Kit	80	HP 32GB 2Rx4 PC4-2133P-R Kit
48	Factory integrated	80	Factory integrated
12	HP 800GB 6G SATA WI-2 SFF SC SSD	20	HP 800GB 6G SATA WI-2 SFF SC SSD
12	Factory integrated	20	Factory integrated

36	HP 1.2TB 12G SAS 10K 2.5in SC ENT HDD	60	HP 1.2TB 12G SAS 10K 2.5in SC ENT HDD
36	Factory integrated	60	Factory integrated
3	HP Smart Array P440ar/2G FIO Controller	5	HP Smart Array P440ar/2G FIO Controller
3	HP Smart Array P840/4G Controller	5	HP Smart Array P840/4G Controller
3	Factory integrated	5	Factory integrated
6	HP DL380 Gen9 8SFF SAS Cable Kit	10	HP DL380 Gen9 8SFF SAS Cable Kit
6	Factory integrated	10	Factory integrated
3	HP DL380 Gen9 8SFF H240 Cable Kit	5	HP DL380 Gen9 8SFF H240 Cable Kit
3	Factory integrated	5	Factory integrated
3	HP Ethernet 10Gb 2P 560FLR-SFP+ Adptr	5	HP Ethernet 10Gb 2P 560FLR-SFP+ Adptr
3	Factory integrated	5	Factory integrated
6	HP 500W FS Plat Ht Plg Pwr Supply Kit	10	HP 500W FS Plat Ht Plg Pwr Supply Kit
6	Factory integrated	10	Factory integrated
3	HP DL380 Gen9 Sys Insght Dsply Kit	5	HP DL380 Gen9 Sys Insght Dsply Kit
3	Factory integrated	5	Factory integrated
3	HP DL380 Gen9 Secondary Riser	5	HP DL380 Gen9 Secondary Riser
3	Factory integrated	5	Factory integrated
3	HP 2U SFF Easy Install Rail Kit	5	HP 2U SFF Easy Install Rail Kit
3	Factory integrated	5	Factory integrated
3	HP 2U Security Bezel Kit	5	HP 2U Security Bezel Kit
3	Factory integrated	5	Factory integrated
3	HP 2U CMA for Easy Install Rail Kit	5	HP 2U CMA for Easy Install Rail Kit
3	Factory integrated	5	Factory integrated
3	HP Legacy FIO Mode Setting	5	HP Legacy FIO Mode Setting
3	HPE HC380 Base SW Image 6.0 FIO Kit	5	HPE HC380 Base SW Image 6.0 FIO Kit
1	HPE 3Y Proactive Care NBD Service	1	HPE 3Y Proactive Care NBD Service
3	HPE HC380 Cluster Node Support	5	HPE HC380 Cluster Node Support
6	VMw vSphere EntPlus 1P 3yr E-LTU	10	VMw vSphere EntPlus 1P 3yr E-LTU
1	VMw vCenter Server Std for vSph 3y E-LTU	1	VMw vCenter Server Std for vSph 3y E-LTU
1	HPE 3Y Proactive Care NBD Service	1	HPE 3Y Proactive Care NBD Service
6	HPE VMw vSphere EntPlus 1P 3yr SW Supp	10	HPE VMw vSphere EntPlus 1P 3yr SW Supp
1	HPE VMw vCntr Srv Std 3yr SW Support	1	HPE VMw vCntr Srv Std 3yr SW Support
1	HP Technical Installation Startup SVC	1	HP Technical Installation Startup SVC
3	HPE HyperConverged 380 Startup SVC	5	HPE HyperConverged 380 Startup SVC


VMware Horizon Client Devices
External Network
Internal Network
Layer 7 Load Balancer for Horizon Security and Connection Servers
Vmware Horizon Security Servers
View Composer Server
View Composer Database
View Connection Server
App Volumes Manager
App Volumes Database
Win7 Ent image template
HPE HC 380 Management UI
HPE OneView
Management
Linked Clones with App Volumes
Linked Clones
Full VMs and vGPU VMs
Mixed Workload
ESXi
Shared Storage
VSA
VSA
VSA
VSA

1.b.i *Hardware Solution components*

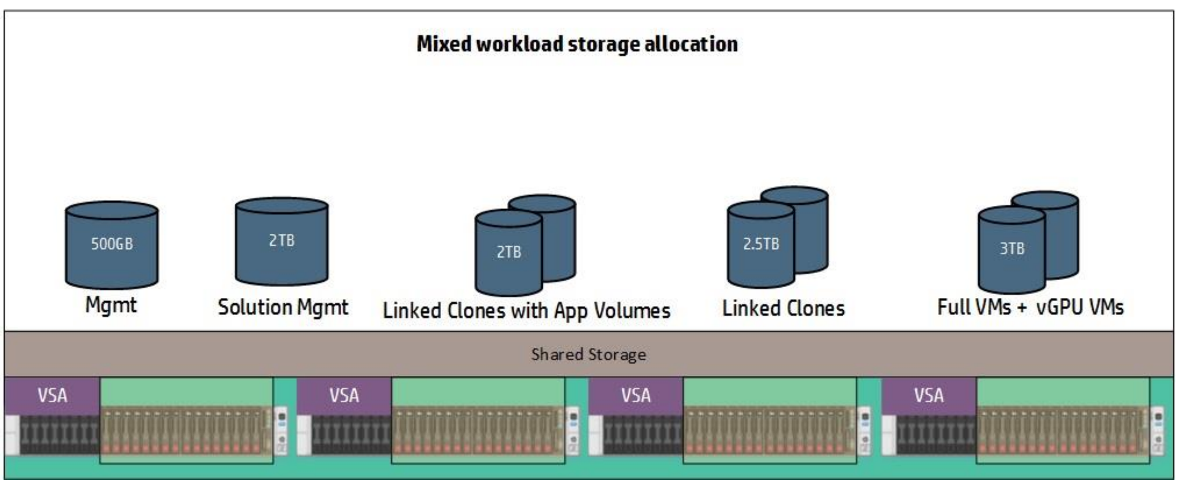
For this the MicroTech proposed architecture, an HPE HC 380 configured for VDI with the appropriate components for the 2 solution offerings. Our bill of materials for the two solutions scales for the amount thin clients per each scenario.



1.b.ii *Storage Components*

Storage is one of the most critical components in any VDI solution, with the need to balance cost, capacity, performance and efficiency. HPE HC 380 addresses these issues with storage clustering. HPE StoreVirtual storage delivers the performance advantages of being purpose-built to serve as flash-optimized architecture without compromising data resiliency, efficiency, or data mobility.

The HPE StoreVirtual VSA is the basis for the storage layer in the HPE HC 380, allowing a customer to consolidate multiple independent nodes into virtual pools of highly available, shared storage. All available capacity and performance is aggregated and becomes available to every system within the cluster; as well as being exportable via iSCSI to external systems. As storage needs increase, the HPE HC 380 can scale performance and capacity completely on-line. Each time new nodes or systems are added to an HPE HC 380 StoreVirtual environment, the capacity, performance, and redundancy of the entire storage solution increases in a linear fashion. Figure 6 below shows the configuration of the storage infrastructure as demonstrated in the mixed workload test case later in this document. In this diagram, the VSA is shown as a virtual machine with control of disks on the physical servers. The disks are owned by the VSA. Volumes are created and data is replicated to other nodes as it is written to each volume based on customer selected Network RAID levels.



1.b.iii *Management software*

The HPE HC 380 is a solution that is defined by its software stack. As such, software plays a crucial role in scalability and performance of the overall system.

The MicroTech HC 380 solution includes centralized solution management software as part of the core platform to simplify and expedite deployment, day-to-day administration, and

troubleshooting of HPE solutions. OVIO is designed to help speed customer's time-to-value by automating and reducing clicks required in the installation and expansion processes. CMC is included to provide remote, granular control, and updating and optimization of the virtual storage environment across multiple sites. CMC leverages the StoreVirtual VSA to deliver software-defined storage capabilities onboard the HC 380 (and most any other x86 system in the environment) allowing IT to use internal HDDs/SSDs to deliver data services on par with an enterprise-class SAN – from 99.9% HA and DR to sub-volume tiering automation.
Similar to the previous, and designed to integrate with VMware – HPE OneView for vCenter is a plug-in for VMware vCenter and serves as an intelligent bridge between vCenter, HPE Infrastructure, and HPE OneView. HPE OneView for vCenter provides visibility from the server, directly from VMware vCenter, so administrators can use the familiar VMware management tool to provision, monitor, update, and scale HPE compute, storage, and network resources without having to leave the vCenter console. By delivering the capabilities of HPE OneView into vCenter, administrators can now monitor health, configurations, capacity and even displays a visual mapping of virtualized workloads to physical resources making it possible to troubleshoot network problems in seconds, instead of hours. Rather than viewing physical and virtual infrastructure as two distinct entities, the HC 380 solution stack uses HPE OneView for VMware vCenter to manage both environments as one. Providing detailed insight into the relationship between your physical and virtual infrastructures, HPE OneView for VMware vCenter Server automates tracking, enhances management productivity, and helps you proactively manage change - leading to higher overall quality of service.

1.b.iv *Application software*

For the MicroTech solution is based on the VMWare Horizon software layer and consists of the below software for which versions would vary in each scenario and implementation during the contract.

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SOFTWARE
VMware Horizon Connection Server
VMware Horizon View Composer
VMware App Volumes Manager
VMware vSphere 6.0
VMware vCenter Server 6.0

1.b.v *Storage Environment*

The storage layer includes the HPE StoreVirtual Virtual SAN Appliance (VSA), the HPE StoreVirtual Centralized Management Console (CMC), and the HPE OneView for VMware vCenter. HPE OVIO was used to create a highly-redundant cluster of shared storage utilizing the local SSDs and HDDs disks from the servers to create a single storage pool. Adaptive Optimization technology is enabled by default on this storage to facilitate tiering of the SSDs and rotating media layers which optimizes performance based on the frequency with which blocks are accessed. In end-user computing environments, this translates to faster boot and recovery times as well as a greatly enhanced user experience.

The HPE HC 380 is also VMware certified for multi-site disaster recovery (DR), delivering business continuity with failover that is transparent to users and applications. The multi-site configuration maintains data availability beyond a single physical or logical site, and validates full compatibility with VMware high availability (HA) and fault tolerant (FT) features. Administrators can add capacity, increase performance, grow, and migrate volumes between HPE HC 380 clusters on the fly with no application downtime.

1.b.vi *End User Computing*

METHOD	DESCRIPTION
Linked Clones	A copy of a virtual machine that shares virtual disks with the parent virtual machine in an ongoing manner.
App Volumes	Real-time application delivery and lifecycle management tool that ensures applications are centrally managed and delivered to desktops through virtual disks.
Hosted Desktop	An instance of a desktop operating system that runs on a centralized server. Access and control is provided to the user by a client device connected over a network. Multiple host-based virtual machines can run on a single server.
Fully Provisioned VMs	A copy of a virtual machine that runs on unique, individual virtual disks, and is entirely separate from the parent virtual machine.
Graphics Enabled Users	Users connected to a virtualized environment that provides rich graphics, via NVIDIA GPU cards that have been enabled to provide this ability.

End User Computing (EUC) based on VMware Horizon 6 delivers hosted virtual desktops and applications to end users through a single platform. These desktop and application services, including a mix of Virtual Desktop Infrastructure (VDI), hosted applications, cloud based application delivery – can all be accessed from one unified workspace to provide end users with all of the resources they want, at the speed they expect, across devices, locations, media, and connections. For this reference architecture, HPE focused on a number of methodologies for achieving the goals of delivering an end-user workspace leveraging VMware Horizon.

The following Horizon components are leveraged as part of the architecture:

View Connection Server: End users connect through View Connection Servers to securely and easily access their personalized virtual desktops. The View Connection Server acts as a broker for client connections by authenticating and directing incoming user desktop requests.

View Security Server: A View Security Server is an instance of View Connection Server that adds an additional layer of security between the Internet and your internal network. Outside the corporate firewall, in the DMZ, you can install and configure View Connection Server as a View Security Server. Security servers in the DMZ communicate with View Connection Servers inside the corporate firewall. Security Servers ensure that the only remote desktop traffic that can enter the corporate data center is traffic on behalf of a strongly authenticated user. Users can access only the desktop resources for which they are authorized.

View Agent: The View Agent service communicates between virtual machines and Horizon Client. You must install the View Agent service on all virtual machines managed by vCenter Server so that the View Connection Server can communicate with them. View Agent also provides features such as connection monitoring, virtual printing, persona management, and access to locally connected USB devices. View Agent is installed on the guest operating system of the virtual machine in the data center.

App Volumes Manager: A Windows Server system used as the Web Console for administration and configuration of App Volumes and assignment of AppStacks and writable volumes. App Volumes Manager is also used as a broker for the App Volumes agents, for automated assignment of applications and writable volumes during desktop startup and/or user login.

App Volumes Database: A Microsoft SQL (production) or SQLExpress (non-production) database that contains configuration information.

App Volumes Agent: Software installed on all Windows desktops where users receive AppStack volumes and writable volume assignment. The agent runs as a service and utilizes a filter driver to handle application calls and file system redirects to AppStack and writable volume VMDKs. Windows desktops do not have to be members of the domain on which the App Volumes Manager server resides.

AppStack Volume: A read-only volume containing any number of Windows applications. Multiple AppStacks can be mapped to an individual system or user. An individual AppStack can also be mapped to more than one system or user.

1.b.vii *Capacity and sizing*

MicroTech sets out to complete configurations for a HPE HC 380 solution that can support the variety of deployments the Army may consider.