1. ***How does HPE position its storage portfolio for customers compared to the other mainstream suppliers?***

Primary Storage:

- **Intelligent Data Platform -** HPE's storage strategy is centered on delivering our customers an intelligent data platform. To speed transformation, businesses need an intelligent data strategy to ensure their data is always on, always fast, automated, and on-demand. An intelligent data strategy needs to enable hybrid cloud so that data is accessible and usable across cloud environments. On top of that, data needs to be powered by global intelligence to automate operations and keep everything optimized. The foundation of that strategy is the Intelligent Data Platform from HPE that's AI-driven, built for cloud and delivered as a service. From mission-critical, general purpose, and secondary to backup, big data, and AI use cases, our comprehensive portfolio powers all apps, on- or off -premises in the cloud, with true data portability to support data lifecycles. HPE InfoSight provides global intelligence across the portfolio and AI–driven optimization guidance, while HPE GreenLake delivers an as-a-service option for consuming HPE infrastructure exactly as customers need it. The Intelligent Data Platform from HPE can help customers transform with intelligent storage and enable hybrid cloud with modernized data protection, edge to cloud.

- **HPE InfoSight -** underpinning our intelligent data platform is HPE InfoSight, the industry's most advanced AI for infrastructure. HPE InfoSight is a core differentiator across our storage products as it fundamentally transforms how infrastructure is managed and supported. Every second, it collects and analyzes millions of sensors from over 100,000 systems across the globe, using the data to drive global intelligence and insights from storage to virtual machines. The benefit? HPE InfoSight predicts and prevents the problems that cause application disruptions and takes the work out of managing infrastructure. Infrastructure powered by HPE InfoSight continuously gets smarter and more self-sufficient learning from every connected system across the globe. Since 2010, HPE InfoSight has analyzed more than 1,250 trillion data points and saved enterprises more than 1.5 million hours of lost productivity.

- **HPE Primera** is our high-end platform for mission-critical workloads. It is designed to deliver the agility of the cloud while raising the bar on availability and performance, thus eliminating the compromises associated with traditional high end storage. HPE Primera is grounded in three core differentiators: 1. Advanced AI embedded in the array and connected in the cloud, 2. All-active architecture, and 3. a services-centric OS. Together, HPE Primera enables three new outcomes. 1. Simple, consumer-grade, on-demand experience so businesses can move faster. 2. 100% availability guaranteed so data and businesses are always-on and always fast. 3. Timeless Storage so businesses can stay modern by eliminating expensive disruptive forklift upgrades. Primary competitors include Dell PowerMax, Pure x70 and 90, and NetApp A800/720

- **HPE Nimble Storage** is our mid-range platform for business critical & general purpose workloads. It delivers the best price for performance and is the easiest to manage mid-range storage platform in the industry with data services that extend across hybrid cloud. It is a simple, fast, resilient system that businesses can count on while delivering industry leading space efficiency. It is grounded in two core differentiators: 1. Architected from day 1 for predictive analytics, and 2. Ultra-Efficient architecture. Together, HPE Nimble Storage delivers the following benefits. 1. Self-managing storage: 86% of issues predicted and resolved automatically. 2. Spend less on all-flash guaranteed 3. Trusted availability: over 99.9999% of measured availability across its installed base. 4. Transformed support experience: 85% less time spent resolving storage-related trouble tickets with direct access to Level 3 support. Primary competitors include Dell PowerStore, Pure x50 and 20, NetApp A300/220

- **HPE XP** is our high-end storage platform for mission-critical workloads with extreme scale requirements and traditional use cases like Mainframe/NonStop/OpenVMS connectivity. In addition, it is the de-facto storage platform for XP install base customers. It delivers a trusted and proven storage platform for enterprise applications at scale with extreme scalability up to 12 controllers and 21 million IOPs. Primary competition is HDS VSP

- **HPE MSA SAN Storage** is our entry storage for affordable, fast, and reliable storage with no data services. Primary competition includes Dell PowerVault and SC.

HCI

- **HPE Nimble Storage dHCI** – a disaggregated hyperconverged infrastructure (dHCI) platform for enterprises' and mid-market organizations' business critical applications and mixed-workloads at scale. It is designed from the ground up to deliver the HCI experience, but with more flexibility and better resiliency and performance than traditional HCI. With the dHCI automation software, the platform enables customer self-installation in 15-min from rack-to-apps and delivers software-defined infrastructure with VM-centric operations. It also brings the flexibility to scale resources independently to maximize efficiency and TCO and 99.9999% of data availability and sub-millisecond latency for business-critical applications and mixed-workloads.

- **HPE SimpliVity** is an industry-leading HCI solution for general purpose applications, small and medium businesses, and the enterprise edge. HPE SimpliVity is an all-in-one appliance with software-defined infrastructure and automation that simplifies IT operations. Its advanced data services include high availability uniquely achieved in as few as 2 nodes, built-in backup and disaster recovery, and multi-site management in a single pane of glass across distributed sites. HPE SimpliVity maximizes IT agility with the AI-driven intelligence of HPE InfoSight and cloud consumption experience through HPE GreenLake.

Cloud

- **HPE Cloud Volumes** is a suite of enterprise cloud data services that enables customers, in minutes, to provision storage on-demand with seamless bi-directional data mobility between on-premises and public cloud. It delivers enterprise performance and reliability, consistent data services with on-prem storage, and the ability to access the public cloud to unlock hybrid cloud use cases including data protection, test/dev, containers, analytics, and running enterprise applications in the cloud.

Unstructured Data

- **HPE Apollo 4000** is an industry leading platform for unstructured data. As enterprises embark on their digital transformation initiatives, they need a foundation on which they can develop the data-intensive use cases relevant to their business. Flexibilities in compute, networking and dense storage options uniquely position HPE Apollo 4000 to run any variety of data-intensive workloads in a small data center footprint. It is the ideal platform for unlocking data-driven insights quickly, with the economics that support the value of the data and with built-in security. The scale-out ready hardware tightly coupled with software-defined scale-out software from partners address the challenges associated with the size and growth of unstructured data in the enterprise, be it in files or objects. These systems come with holistic security built into the hardware providing rock-solid protection from any intrusions through the life of the infrastructure. All available on HPE GreenLake/as a service

2. ***Does Tom look after HPC storage? I'm thinking of the ClusterStor arrays and DataWarp Accelerator that were acquired when HPE bought Cray. If not will there be separate development or some sort of cross-pollination?***

No, HPC and HPC storage are part of an integrated group in a separate business unit. HPC is run as a segment with integrated R&D and GTM.

3. ***IBM and Dell are converging their mid-range storage products. Does HPE think such convergence is needed by its customers and why or why not? Will we see, for example, a converged Primera/3PAR offering and even a converged Primera/3PAR/ Nimble offering?***

We believe that businesses need workload-optimized systems to support mid-range and high-end requirements. Systems that are designed to deliver the right performance, resiliency, efficiency, and scale for the SLA and use case. With the introduction of HPE Primera last year, HPE consolidated its primary storage portfolio with one lead-with mid-range storage platform – HPE Nimble Storage, and one lead-with high-end storage platform - HPE Primera. Our HPE 3PAR installed base has a seamless upgrade path to HPE Nimble Storage and HPE Primera.

4. ***Will the XP systems remain a key aspect of HPE's storage portfolio and, if so, how are they distinguished from the Primera line*****?**

Yes, HPE XP Storage is a key aspect of HPE's storage portfolio. It is our high-end platform for mission-critical workloads with extreme scale requirements, traditional use cases like Mainframe, NonStop, OPVMS and Cobol Based environments, and XP install base customers. HPE Primera is our lead-with high-end platform for mission-critical applications to support virtualized, bare metal, and containerized applications.

5. ***I believe HPE is the only supplier with both HCI and dHCI systems in its range. How does HP position its SAN storage, its HCI systems and its dHCI systems?***

Yes - we have the most complete portfolio of SAN, HCI, and dHCI systems, allowing us to uniquely address all of our customer requirements. So, you have to put yourself in the shoes of each organization to understand what the right solution is for them.

In the last several years, HCI has offered small and medium businesses a new value proposition, delivering infrastructure simplicity with VM-centric operations and automation - and therefore HCI (and HPE SimpliVity) is performing very well in that segment. Additionally, we're increasingly seeing HCI becoming the go-to solution for the enterprise edge. In the mid-market and enterprise segment, organizations want more scaling flexibility, faster performance, and higher availability, and are predominately still deploying enterprise storage/AFA/SAN environments. We're hearing from our enterprise and mid-market customers that they want the simplicity of HCI but are unable to adopt it as they're giving up too much to gain the agility and simplicity. This is where we position HPE Nimble Storage dHCI - a disaggregated HCI platform that uniquely delivers the HCI experience but with better performance, availability, and scaling flexibility than HCI for business-critical applications and mixed-workloads at scale. In addition, in the enterprise core data center and service provider market, organizations here have the largest scale requirements and strictest SLA for performance and availability for their mission-critical applications. The right solution for them is high-end storage/SAN, so we position HPE Primera with HPE Synergy here as the core consolidation platform for mixed-workloads at scale.

6. ***What is the role of storage in HPE's composable systems? Will all the SAN, HCI and dHCI systems evolve towards composability?***

HPE has been a pioneer in delivering composability. Companies once forced into overprovisioning infrastructure are now able to create fluid pools of compute, storage, and network resources. Composability is designed for any application, at any SLA, and at any scale because all it takes is a single line of code to gather and deploy the IT assets needed to run any application, anywhere, at any scale.

From a storage perspective, our focus is to continue to deliver infrastructure that is fully automated, optimized and integrated with intelligence and composability. We drive a cloud experience on-premises with a strong foundation of composability on intelligent infrastructure for any workload. Bringing together the intelligence from an intelligent data platform with the composability of HPE Synergy, IT organizations have the absolute flexibility to support any application with the agility of the cloud in their on-premises data center—delivered as a service to scale to meet ever-changing business needs.

We fundamentally believe in flexibility and the need for workload-optimized systems designed for the use case. Composability - with the ability to support any applications across bare metal, virtualization, and containers - makes the most sense in large scale, enterprise core data center environments. For organizations who don't need this level of resource composition and flexibility, and perhaps are exclusively needing to support virtual machines, HCI - with a software-defined framework specifically for virtual machines - will make the most sense for them.

7. ***HPE is not perceived as a mainstream supplier of its own file storage technology. It partners widely with suppliers such as Qumulo, WekaIO and others. Long term should HPE have its own file storage technology or continue to set as a reseller/system integrator of other supplier's technology?***

With unstructured data, use cases are continuing to evolve. Here's the breakdown of our view of use cases and how we address them with our owned IP and partner solutions:

- AI/ML - HPE Ezmeral Container Platform, which is inclusive of HPE Ezmeral Data Fabric (MapR), enables data scientists and data analysts to build and deploy AI/ML pipelines to unlock insights with data.
- Distributed, scale-out enterprise-wide data fabric for edge to cloud - HPE Ezmeral Data Fabric (MapR) is a leading scale-out filesystem with enterprise reliability and data services, and one of the only file systems that offers batch processing, file processing, and streams processing.
- Analytics, Medical Imaging, Video Surveillance, etc - HPE Apollo 4000 in partnership with scale-out software partners such as Qumulo (file) and Scality (object) provides a great foundation for these use cases.
- HPC - We have market-leading HPC solutions (i.e. ClusterStor) from our acquisition of Cray

Like any market, we will continue to monitor the evolution of customer use cases and ensure we can help them address the use cases with differentiated solutions.

8. ***HPE is not perceived as a mainstream supplier of its own object storage technology. It partners with suppliers such as Cloudian and Scality. Long term should HPE have its own object storage technology or continue to set as a reseller/system integrator of these other supplier's technology?***

HPE will continue to monitor the market for object storage. Scality is the strategic HPE partner for massively scalable multi-cloud unstructured data stores - including S3 compatible object storage. The

HPE partnership with Scality is global and backed by joint go-to-market. This is all in addition to a global reseller agreement through which HPE offers Scality on our mainstream HPE price list.

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9. ***How will HPE evolve its storage offer at Internet Edge sites with a need, perhaps, for local data analytics?***

Enterprise edge, as we refer to the edge, is becoming more and more strategic for customers and an opportunity for infrastructure modernization. It can be a small site in a hospital or oil rig, or a distributed enterprise with remote offices/branch offices e.g. for banks or retail. Key characteristic is often no on-site resident IT staff and therefore the ability to remotely deploy, manage, operate, upgrade is really important.

We are seeing a growing market opportunity to leverage HCI at the enterprise edge. The simplified experience of a hyperconverged appliance addresses edge-specific requirements, including the need to power edge applications in a highly available, small footprint, protect data across sites, and facilitate entire lifecycle management remotely without local IT presence. HPE SimpliVity is our strategic platform to address this need with customers with numerous use cases and wins.

We also provide our customers the end-to-end lifecycle with HPE Aruba and our HPE EdgeLine servers to service all customer needs at the edge.

10. ***How is HPE building a hybrid cloud storage portfolio with data movement between and across the on-premises and public cloud environments?***

Due to several factors, including application entanglement, data gravity, application refactoring, security and compliance, and unpredictable costs, organizations have found it very challenging to move the majority of the applications that run their businesses to public clouds.

Customers are looking for a unified experience for all of their workloads (mission critical and cloud native apps) and wanting to modernize their apps at their own pace. Cloud 'first' mantra is moving to cloud 'everywhere.'

HPE's approach hinges on providing a true, distributed cloud model and cloud experience for all apps and data, no matter where they exist – at the edge, in a colocation, in the public cloud, and in the data center. Our approach helps customers modernize and transform their applications and unlock value across all stages of their lifecycle where it makes the most sense.

Our hybrid cloud storage portfolio: 1) on-premises private cloud, 2) enterprise data services across both on-premises private cloud and public cloud, and 3) seamless data mobility between on-premises private cloud and public cloud.

HPE delivers a seamless experience by extending our storage platforms to the public cloud with HPE Cloud Volumes. HPE Cloud Volumes is a suite of enterprise cloud data services that enables customers, in minutes, to provision storage on-demand and bridges the divide and breaks down the silos that exist between on-premises and public cloud. It brings consistent data services, bi-directional data mobility, and the ability to access the public cloud, unlocking hybrid cloud use cases from data migration, data protection, test/dev, containers, analytics, and running enterprise applications in the cloud. Our approach to HPE Cloud Volumes is highly differentiated compared to others. Other vendors simply look to run their storage appliance as a virtual storage OS in the public cloud marketplace, which only shifts the location of storage administration from on-prem to cloud. HPE Cloud Volumes is a true enterprise cloud service built on top of proven enterprise-grade storage with six-nines of measured availability and low-latency performance. This enables organizations to bring the consistent data service experience of on-prem to the public cloud - as a consumption service - without application refactoring.

Note also our recent announcement on Data protection services:

- HPE is delivering backup as-a-service through our proven, on-premises data protection solution, HPE StoreOnce. Through HPE GreenLake, customers deploy cloud services for local data protection with HPE StoreOnce on-premises.
- And to modernize data protection in the cloud, we introduced HPE Cloud Volumes Backup – an on-demand service that lets customers backup seamlessly to the cloud from any HPE or non-HPE primary storage arrays. HPE Cloud Volumes Backup unifies backup data in the cloud, removing mass fragmentation with open support for any primary storage array and any data protection software like Veeam, Commvault, Veritas NetBackup, MicroFocus, and others.

Unlike other cloud approaches, we're uniquely bringing customers a fresh approach to backup, with the ability to put backup data to work in any cloud with no lock-ins or egress charges when recovering that backup data from HPE Cloud Volumes Backup.

11. ***How does HPE see the market need for SCM, NVMe-oF, and Kubernetes and container storage developing. Will these three technologies become table stakes for each product in its storage portfolio?***

SCM

HPE 3PAR Storage pioneered the use of SCM, showcasing its performance benefits as early as 2016. Next, in 2019, we were the first vendor to introduce SCM as a caching tier on the 3PAR high-end platforms for extreme low latency requirements.
While other storage vendors have since caught up, SCM remains a niche use case because it is cost prohibitive to deploy as a persistent storage tier.

Our focus has been to democratize SCM and delivering it more widely through broader use cases. This is why this past June we introduced SCM for HPE Nimble Storage to deliver SCM-like performance for read-heavy workloads with 2X faster response times with an average of sub 250 microseconds latency at near the price of an all-flash array (~10-15% price premium depending on the HPE Nimble Storage all-flash array model).

Over time, we believe SCM will do the job of what SSD did 10 years ago, by providing a latency differentiation performance tier within AFAs.

NVMe-oF
We believe this is the next disruption in the datacenter fabrics. As with all fabric changes, this transition will happen gradually. It will take time for host ecosystems readiness, as well as customers' willingness to make substantial changes in their fabric infrastructure.

We are at the early stages of host ecosystem readiness. For example, Linux distributions are ready. VMware 7.0 has brought some level of fabric support (with the next release scheduled to go further).

For us, we know this disruption is coming, and are working hard with our partners to develop an end to end NVMeoF solution. We are committed to being ready once the market (partners and customers) is as well.

Kubernetes and Container Storage
As customers continue to modernize their apps, they need to modernize the underlying infrastructure and we see a clear shift toward container based applications. Kubernetes is the defacto open source standard.

HPE CSI Driver for Kubernetes for HPE Primera and HPE Nimble Storage enables persistent storage tier for stateful container-based apps, and for deploying VMs and containers on shared storage infrastructure. HPE CSI Driver for Kubernetes includes automated provisioning and snapshot management. Over time, we will extend CSI (which is an open specification) to deliver additional value-added capabilities for customers.

In addition to HPE Storage platforms for container support, HPE offers a market leading container platform, HPE Ezmeral Container Platform, to help customers modernize and deploy non-cloud native and cloud native applications. HPE Ezmeral Container Platform includes HPE Data Fabric (MapR) as the persistent storage tier for stateful container apps.