SOLUTION BRIEF

EMPOWER YOUR INFRASTRUCTURE-AS-A-SERVICE PLATFORM
Secure, Scale-Out Platform with DAS-like Performance

Infrastructure-as-a-Service (IaaS) is a consumption-based model for virtualized compute, storage, and networking capabilities that enables the elastic scale of cloud workloads. Traditionally, IaaS infrastructures were built by hyperscale cloud providers, but today this landscape is rapidly evolving. IaaS can exist at the edge, whether as an adjunct to typical hyperscale IaaS or as a standalone set of services. In fact, many larger-scale enterprises, especially those born in the cloud, are adopting cloud-like architecture on-premise, resulting in an in-house IaaS infrastructure that runs a variety of workloads serving both internal and customer needs.

Whether hyperscale, edge, or on-premise IaaS, the storage infrastructure supporting IaaS must:

- Support elastic and dynamic storage, compute and networking - grow and shrink storage, compute, and networking pools dynamically.
- Scale-out - the storage architecture should dynamically grow performance, throughput, and capacity.
- Provide a storage platform for diverse performance, resiliency, and isolation needs of multiple tenants.
- Support bare-metal, virtualized, and containerized environments.
- Be agile to address changing and expanding demands.
- Integrate APIs for application integration and automation opportunities for infrastructure management.
- Support scalability without over-provisioning or compromising performance.
- Be highly resilient - specifically, data must be available and protected based on application requirements.
- Offer a highly secure, multi-tenant environment.
- Provide QoS to meet SLA requirements for workloads.

These capabilities have to be met within rigorous CapEx and OpEx objectives. Indeed, it is possible to address one or more of the above requirements well with existing storage or IaaS solutions but having an optimal solution that can handle all these requirements without compromises has been elusive.

WHAT IS AN IDEAL SOLUTION FOR IAAS?

Data Center architectures are evolving rapidly. Networked storage, such as SAN and NAS, was developed to make storage available to a large number of users at the same time. However, scalability, manageability, and performance — especially with the older drive technologies — were limited. Direct-attached storage (DAS) improves latency and boosts throughput, but because storage and compute capacity are now constrained to the server form factor, it is not suitable for large and distributed datasets characterized by modern workloads. Software-defined storage in DAS architecture offers some level of composability of resources and storage sharing but is limited in performance and scale. Resource utilization in DAS is also typically lower. Thus, both architectures make compromises, which translate into higher costs and complexities.

An optimal data center solution capitalizes on the benefits of networked infrastructure and delivers DAS's performance at scale. It also needs industry-leading resiliency and security to ensure data is available and protected at all times. Fungible has purpose-built processors, namely Fungible Data Processing Unit™ (DPU) — that uniquely allows Fungibleto deliver storage solutions that are ideally suited for IaaS environments.

FUNGIBLE DATA PROCESSING UNIT™

The Fungible DPU is purpose-built to execute data-centric workloads in order of magnitude more efficiently than general-purpose CPUs. It fully implements the entire storage, networking, security, and virtualization stack. The Fungible DPU also enables TrueFabric™ technology – an open standards-based, end-to-end error and congestion-controlled network fabric that enables disaggregation of compute, storage, and GPU resources at a large scale.

PRODUCT PORTFOLIO
Fungible Storage Cluster

The Fungible Storage Cluster (FSC) offers customers a secure, ultra-high performance, scale-out storage platform that is uniquely qualified to address the needs of IaaS customers. By delivering industry-leading Quality of Service, and multi-tenancy functions, IaaS customers can immediately realize returns on their investment by leveraging the FSC platform.

The FSC comprises a cluster of two or more Fungible Storage Nodes and three Fungible Composer Nodes. Available in 1RU or 2RU form factors, the Storage Nodes feature a single or dual-controller design, supports up to 24 NVMe SSD drives, and comes with standard 100Gb Ethernet ports. Fungible's Data Processing Unit powers the Storage Nodes for optimal Networking, Security, and Storage services. Multiple FSC systems function together as massive, resilient, disaggregated storage pools, up to exabyte scale, unlike any other storage system. The smallest or largest storage capacity and/or performance requirements can be allocated on-demand over standard IPoE networks to fit any workload need.
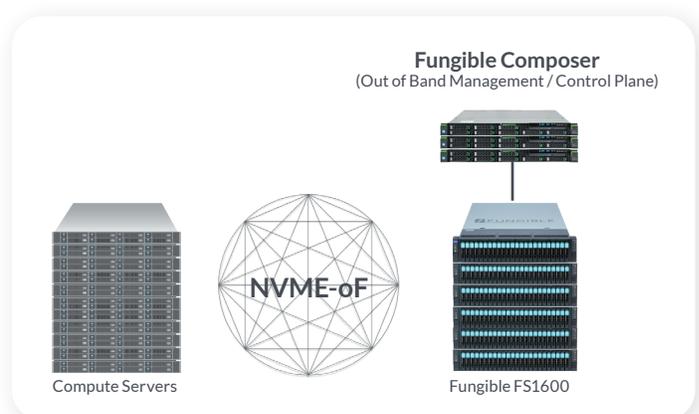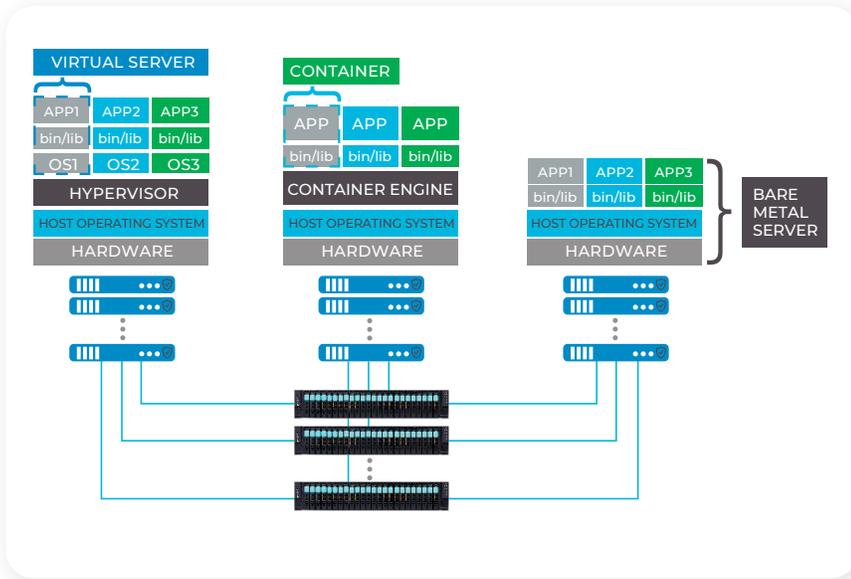

Figure 1: Fungible Storage Cluster

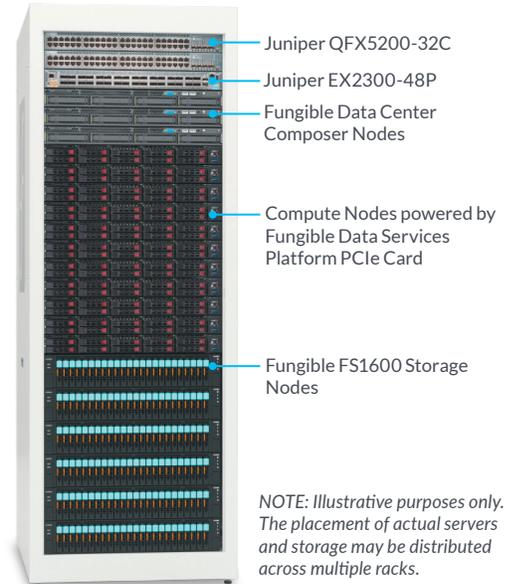Figure 2: Workload Environment on Fungible Storage Cluster

NOTE: *Illustrative purposes only. The placement of actual servers and storage may be distributed across multiple racks.*

Figure 3: Fungible Data Center

Fungible Data Center

The Fungible Data Center (FDC) transforms rigid, complex, and expensive data centers into simple, highly efficient, and on-demand powerhouses. The FDC is an on-premises, comprehensive, turn-key solution that delivers bare-metal performance at the cost efficiencies and simplicity of hyperscale data centers. It includes racks of disaggregated compute and storage servers powered by the Fungible DPU and is managed by the Fungible Data Center Composer (DCC) software.

By harnessing the full capabilities of the Fungible DPU, the FDC allows data center infrastructure to dynamically adapt to changing workload conditions by composing compute, storage, and network resources from a disaggregated pool of resources. The ability to hyper-disaggregate resources and then compose them efficiently enables a Fungible Data Center to maintain a minimal set of server configurations, allowing for economies of scale and management simplicity.

The Fungible Data Center comprises pre-configured racks of disaggregated compute and storage servers powered by the Fungible DPU, managed by the Fungible Data Center Composer software. The FDC ships with the following components:
The Fungible Data Center comprises pre-configured racks of disaggregated compute and storage servers powered by the Fungible DPU, managed by the Fungible Data Center Composer software. The FDC ships with the following components:

- Two or more Fungible FSC storage nodes. The FSC storage nodes are a high-performance, secure, scale-out NVMe-oF storage platform.
- A set of compute servers with industry standard processors, with no local disks, and one Fungible Data Services Platform (DSP) FC50/FC100/FC200 card. Fungible DPU power each DSP card. The DSP card is designed to fully offload the data center network, storage, and security processing from the CPUs, enabling the CPUs to focus on application processing. The DSP card implements a separation of control and data plane, with a fully programmable data path optimized for highly efficient data centric computations.

Figure 4: Workload Environment on Fungible Data Center

- A set of three dedicated management nodes host the Fungible Data Center Composer, a comprehensive software solution supporting bare-metal data center composition, provisioning, management, and orchestration.
- A set of pre-qualified, industry-standard Top-of-Rack (ToR) switches for data and management networks and routers. There is one ToR switch for the data network in each rack and one for the BMC management network. Each of the ToRs comes with DHCP relay capability, connecting to the data center spine network.

FUNGIBLE

KEY BENEFITS

Unparalleled performance – Deliver DAS-like NVMe performance without capacity and scale limitations to any customer on any server over standard networks. A single Storage Node provides up to 15 million IOPS of raw performance (4K read) at 60GB/sec by leveraging the performance of NVMe drives at latencies that are ~+10us of DAS across NVMe-oF.

Supports any IaaS – The Fungible products support bare-metal, virtualized, or containerized environments, offering both raw and durable block capabilities. It also includes a Container Storage Interface (CSI) Plugin for Kubernetes clusters.

Elastic like the cloud – Organizations can provision storage or compute on demand. Add capacity and/or performance linearly. Any amount of storage can be allocated to any server on the network at any time from the FS1600 storage pool. And because compute and storage resources can be scaled independently, CAPEX inefficiencies can be significantly reduced.

Hyper-scale and beyond – Scalability to extremely large numbers of workloads. The FSC and FDC can support hundreds of thousands of servers with granular QoS for IOPS and throughput.

Footprint and power savings – Real-estate and power are essential for IaaS providers, especially at the edge or on-premise. The performance and density of Fungible products enable a vast array of solutions to be consolidated into a relative handful of Fungible solutions.

Optimize compute resources for applications – CPU cores are not wasted on running storage services, such as data protection, compression, and encryption, allowing IaaS providers to fully monetize cores for applications.

Extreme, cost-effective durability – Fungible products support both within-system and across-system erasure coding for both hot and cold data at line rate, eliminating the need for expensive replication. Fungible products also support snapshots and clones.

Improved availability – While storage is one component of the overall infrastructure, FDC obviates the need for data migration when a DAS server is down. With a disaggregated platform, data is not trapped in the DAS server. Availability is handled at the storage system level.

Support for a highly secure, multi-tenant environment – Fungible products is built with a secure hardware root of trust and support encryption and QoS at a pre-volume level. The solutions also provide support for Active Directory user authentication, authorization, and auditing.

THE SOLUTIONS THAT KEEP ON GIVING:
A PERFECT FIT FOR IAAS PROVIDERS

The Fungible solutions give IaaS providers a powerful alternative to conventional storage, compute, and networking, eliminating nagging limitations and pushing infrastructure flexibility, performance, and value to unprecedented levels. The unparalleled performance translates to application use cases such as high-performance databases, parallel file systems, AI/ML, and analytics platforms. With Fungible, IaaS providers can now meet or exceed even the most stringent requirements.

For additional information and demo, contact sales@fungible.com

ABOUT FUNGIBLE

Silicon Valley-based Fungible is reimagining the performance, economics, reliability, security and agility of today's data centers.

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