REPORT REPRINT

Diamanti promises sparkling hyperconvergence for bare-metal containers

TIM STAMMERS, JAY LYMAN

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The startup has launched a hyperconverged, all-flash platform focused on hosting bare-metal containerized applications. With containerization now moving into the real world, its timing looks good.

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Startup Diamanti (formerly DataWise) has begun shipping the hyperconverged infrastructure (HCI) appliance that it began beta testing in 2016. The appliance has the unusual quality of being focused on bare-metal containerized applications, and although it entered GA only in April, Diamanti is already claiming a handful of deployments, including broadcaster NBC Universal and telco ShoreTel, and has named software vendor MemSQL as one of the first paying customers.

Diamanti's product is called the D10, and its focus on bare-metal containers is far from its only unusual quality. Diamanti's intent was to provide a simple-to-deploy platform (hence the HCI architecture) to be used with a customer's choice of container management software, such as Kubernetes or Mesosphere's DC/OS. The goals also included high performance and high utilization rates for physical resources. Diamanti says utilization is typically very low for bare-metal containerized infrastructure, which increases customers' costs.

As a result, the D10 features QoS controls, and a different architecture from standard HCI products. Under the command of open-source container management software, the D10 performs storage and networking virtualization and services in separate processors from the x86 host controllers. That improves consistency of performance and x86 utilization, Diamanti says. The platform also distinguishes itself by using all-NVMe flash storage, and a distinctly cutting-edge extension of NVMe across its network links.

THE 451 TAKE

Although persistent storage support for containerized applications is set to become a list item to check off, Diamanti is the only supplier we know of that has created an HCI platform designed specifically for containers – running the way containers were designed to do, on bare metal rather than in VMs. One possible criticism is that because Diamanti relies on open-source management software, its customers could create their own DIY equivalents to the D10. We don't think that's likely because of the strong technical content of the Diamanti product. As an all-flash product, the D10 is not cheap, which could make it tough to sell to midsized businesses. However, Diamanti has already found customers that have been prepared to pay that price, in return for what the company says is strong performance, high hardware utilization and hence physical density, and low operational costs. Judging by recent investigation completed by 451 Research into the rate of container adoption, Diamanti has come to market at the right time.

BACKGROUND

Containerization appears be moving rapidly from trials through test and development usage to production deployments, in-line with today's faster agile and DevOps release cycles. Early this year, a survey completed by 451 Research's Voice of the Enterprise (VotE) service found that of over 300 enterprise respondents, 19% had begun production deployment of containerized applications, and 8% were in broad production implementation.

Diamanti is based in San Jose, California, and its founders include VP of engineering Amitava Guha, and CTO Gopal Sharma and CEO Jeff Chou. Chou was formerly the senior director of engineering at Cisco, where he was involved in the development of the Unified Computing System (UCS) and Nexus switches. In February, Diamanti announced $18m series B funding, which took its total funding to over $30m. The series B round was led by new investor Northgate Capital and TransLink Capital, with additional contributions from existing investors Charles River Ventures, Draper Fisher Jurvetson and GSR Ventures.

In April 2016, the company named NBC Universal as its first beta tester, and later named analytics software vendor MemSQL as another beta program member. Diamanti says its total deployment count is now between five and 10, with customers including a service provider and a bank. Diamanti has hinted that bank is very large. So far, deployments have not yet involved first-line development, but have been used for production workloads including Cassandra, MongoDB and PostgreSQL, and QA testing. MemSQL is using Diamanti's product as a platform for so-called continuous integration, in which build and test is automated.

STRATEGY

Diamanti says it has been heavily involved in open source developments, having contributed the Flex Volume storage plug-in API and scheduler extension to Kubernetes. The company has not made its virtualization and QoS code open source, and the strength of that code makes Diamanti more than a simple integrator of third-party or open source code, it says. Currently Diamanti supports Kubernetes, Docker, Mesosphere's DC/OS container management and orchestration software and Red Hat OpenShift. It believes those are the best products to support at present, but says it could easily adopt other container management platforms in future if the situation changes.

Target customers are large enterprises in sectors that Diamanti believes are early adopters of containers, such as retail, media and web infrastructure, as well as faster-moving midsized enterprises in sectors such as gaming. The push for a better container infrastructure comes from developers, but Diamanti is focusing on conversations with operations staff. As with any other enterprise IT startup, Diamanti is building both its own salesforce and a reseller network.

The D10 list price is quoted as 'under $50,000' per node, and there is a three-node minimum configuration, so deals have so far averaged about $150,000 to $200,000. The aim is to sell much larger configurations, and currently the biggest deployment is 10 nodes, although the company says it has tested larger clusters.

PRODUCT

The D10 is delivered as a complete hyperconverged platform, including servers, with a minimum of three 1U compute-and-storage nodes. The data storage is all NVMe flash (3TB or 6TB per node, plus SATA flash for boots), and the NVMe-based networking is standard 10Gbit Ethernet. Not surprisingly, given the extensive use of NVMe, Diamanti claims strong performance, with each node handling up to one million 4KB IOPS, at latencies of 100 microseconds.

The decision to use a hyperconverged architecture was made in part to allow end-to-end control of the processor, network and storage resources, according to Diamanti, which says that would not have been possible with conventional stand-alone, SAN-attached storage.

The D10 allows self-service provisioning for developers – if the operations team wants to allow that – while the operations team sees the physical and logical infrastructure, down to container level, with views of hotspots and trends. The QoS is applied to single containers, network interfaces, or volumes, and allows minimum throughput to be defined. Diamanti says containers need QoS controls even more than VMs, because of the far higher number of containers running on servers. A single server typically runs 10 to 20 VMs, in contrast with hundreds of containers on one host. Also, the load applied by the containers is more changeable because of their dynamic nature, according to Diamanti.

The company also says that without QoS, organizations using containers have needed to heavily over-provisioned hardware to maintain headroom and avoid performance problems. Without QoS, IT organizations may also need to split out workloads across separate clusters to prevent performance problems, increasing the complexity and cost of operations. Diamanti says it knows of a media organization that was using 100 clusters to host a containerized application.

In contrast, Diamanti says the D10's IO isolation allows it to be operated at a claimed 90% utilization across CPU, network and storage. The D10's network and storage virtualization software does not run on the host x86 CPUs, but on a network processor mounted in a PCIe card installed in each host. This avoids interaction between the Diamanti software and customers' applications, the company says.

The D10 plugs into existing VLANs and DNS, and Diamanti says this reflects the fact that its network is not an overlay. Each container is allocated an IP address and can reside on any subnet.

The use of high-speed, all-NVMe flash for data storage is currently very unusual, although the almost universal consensus is that NVMe will become the dominant interface for datacenter flash over the next few years. To cap it off, Diamanti has also extended the NVMe interface to the links between the D10 nodes. So far, only a handful of storage vendors have made this move. Like the others, Diamanti is not yet using the formal NVMe over Fabrics (NVMf or NVMoF) specification developed by industry body NVM Express, but is using a proprietary equivalent that can run over standard Ethernet. We assume that also like others, Diamanti will adopt the industry standard when it is more mature.

Currently, data is protected against node failure by distributing replicas across a cluster. Erasure coding and compression are planned, and snapshots are in development along with asynchronous cluster-to-cluster replication.

COMPETITION

Persistent storage for containers was a red-hot topic during 2015 and 2016, and the first storage vendors to provide such support included Hedvig, Datera and Portworx. Since then, the storage support has begun to widen to other suppliers. To our knowledge, in February the Hewlett Packard Enterprise (HPE) 3PAR storage system became the first OEM storage to support persistent container storage. We expect other major storage system vendors will soon follow suit.

As said previously, 451 Research is unaware of any other HCI vendor that has developed a platform specifically for bare-metal containers. However, several of the leading HCI vendors have said that container virtualization usage could in time outweigh the currently dominant Type 1 or VM-style virtualization based on VMware vSphere ESXi, Microsoft Hyper-V, KVM or other hypervisors.

Some customers are deploying containers inside VMs, because that isolates containers and increases security while giving developers some of the benefits of container flexibility. Clearly, VMware and other Type 1 virtualization vendors would like this practice to continue. That is why VMware has developed vSphere features promised to simplify the use of containers inside vSphere VMs. However, bare-metal containers exploit more of the potential benefits of containerization, as well as eliminating the obvious drawbacks of using two layers of virtualization.

SWOT ANALYSIS

STRENGTHS

Diamanti's platform is very unusual, and the company has already named a handful of midsized and large enterprise deployments.

WEAKNESSES

As an all-flash system, the D10 is expensive on a per-GB basis.

OPPORTUNITIES

Diamanti's plan is to exploit what 451 Research and others widely expect to be growing usage of bare-metal containers, with a product that is specifically and uniquely designed to suit that purpose.

THREATS

The all-flash architecture and associated price of the D10 may limit it to a very select band of customers, and the adoption of bare-metal containers may still be to slow to allow Diamanti to exploit its first-mover status.