REPORT: TRENDS

The Cloud Comes into the Private Data Center

How Oracle ZS5 Brings Cloud Scale and Best Practices into On-Premises Data Centers

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EXECUTIVE SUMMARY

Data storage in a next generation apps world is experiencing a renaissance, even though storage is a commoditized and well-understood function in enterprise computing. Despite lower costs, data storage remains a strategic concern because the split personality of storage vendors has hindered enterprises from blending their on-premises and cloud environments.

Next generation apps require a different approach that blends both cloud and on-premises technologies. Next generation apps in the cloud require large-scale capacity, software-defined access for managing systems, and a substantially lower Total Cost of Ownership (TCO). Now, with increasing interest in running next generation apps on-premises, cloud-grade storage offerings are making their way back to where IT started, the on-premises data center.

The recently unveiled Oracle ZS5 Network Attached Storage (NAS) solution, a hardware appliance with associated software, is such a hybrid product. It was designed originally for IaaS use, but with on-premises deployments in mind. Now enterprises can deploy their storage-intensive next generation apps in their own data centers. They experience a cloud-grade solution that not only offers lower TCO than older, non-cloud-grade storage offerings, but also the strategic option to move from on-premises back to the cloud with no penalty. Finally, the identical architectures of ZS5 offerings for both Oracle Cloud and for on-premises use enable a number of attractive hybrid scenarios, such as development and testing, backup, High Availability (HA) and multi-temperature storage tiering.

Business Themes
Consumerization of IT  Digital Marketing Transformation  Data to Decisions  Technology Optimization
DATA STORAGE REMAINS A STRATEGIC CONCERN DESPITE LOWER COSTS

Since the dawn of computing, storage has always presented a challenge. Lack of random access memory and persistent shortages of storage capacity forced hardware pioneers to invent punch cards and later magnetic tape and media in order to push the limits of enterprise computing from the 1950s well into the 1980s.

The advent of the Hard Disk Drive (HDD) ultimately allowed for dramatic reductions in storage costs while increasing storage capacity faster. For instance, the time spent reading this short report has an opportunity cost equal to the expense of storing all electronic information the reader consumes – at work and at home – for at least the next 10 years.

Most enterprises today face a number of ongoing issues with data storage:

1. Information management of storage is still a key concern. While dropping storage costs may offset the rising volumes and growing complexity of data, this does not

Figure 1. The Ever-Falling Cost of Storage

Storage: The ever falling cost of 1 GigaByte

Opportunity cost of this presentation pays for 12 years of all your work & personal data.

Source: Constellation Research
mean that enterprises can afford to care less about their data. In general, humans tend to care less about things that get cheaper and are available in large amounts, but anyone who has gone on the quest to find that one special vacation picture knows the challenge: Humans as well as enterprises care a lot about the information management of data storage – where information is stored and how fast it can be accessed. Data is not something you want to lose.

3. **Data proximity remains a concern for performance.** Finally, performance is another relevant criterion for onsite storage of data. Even when data travels at the speed of light, data access is faster and enables superior end user experience when the data is located near the user.

THE SPLIT PERSONALITY OF STORAGE VENDORS CREATES MARKET CONFUSION

Despite innovations in storage in recent years, there still are major gaps in the marketplace:

- **Infrastructure-as-a-Service (IaaS) innovations fail to address on-premises deployments.** Unfortunately, most research and development work in storage in recent years has been done by IaaS vendors and not the traditional providers of storage. Worse, most of the storage architectures that have cloud scale are not even available for on-premises deployments. Most IaaS vendors designed their storage architecture in a way that would scale well for them, but...
would never be scalable and feasible for an on-premises deployment. In many cases, IaaS vendors are not even interested in providing their highly-tuned public cloud storage infrastructures for on-premises deployments. After all, they are selling their low-cost, cloud-scale storage capabilities as one reason to deploy to the vendors’ public cloud infrastructure.

- **Traditional storage vendors fail to deliver cloud scale.** Another group of storage vendors has missed the opportunity to become public cloud IaaS providers and/or to become the storage provider of choice for the IaaS vendors. These storage vendors neither adopted cloud-scale requirements nor built products to serve the cloud. As a result, a number of storage providers that compete in the on-premises, local data center storage market have not built products to compete with vendors who built storage services on a cloud scale. For a while, this has served both vendors and enterprises well. Vendors did not have to spend too much on the research and development (R&D) of cloud storage and they focused on making marginal technical improvements while enterprises saw small but acceptable reductions in TCO.

**NEXT GENERATION APPS REQUIRE A NEW HYBRID APPROACH TO DATA STORAGE**

The rise of next generation applications has changed the storage market dramatically. As enterprises decide to deploy next generation applications on-premises, they need to find storage vendors that can scale up to the requirements of these applications (see Figure 2). In most cases, the traditional storage vendors that have failed to supply the IaaS vendors with storage products or to offer their own IaaS storage products cannot provide competitive solutions to enterprises with the massive scale requirements of next generation applications.

Enterprises may start their next generation application deployment in the public cloud, but may want to later move these deployments back to on-premises data centers. Utilization of
assets, legal and statutory requirements, and lower Total Cost of Ownership (TCO) are the factors that CxOs look at today when making deployment choices for next generation applications.

In fact, the reversal of R&D streams from scaling on-premises storage products to IaaS scenarios has largely failed. The opposite strategy - re-using R&D that was designed for cloud scale and applying it to on-premises storage scenarios - is showing a lot of promise.

However, this strategy is only available to a small group of vendors with the experience and organizational DNA to understand the on-premises requirements prior to the rise of the public cloud and who also have the fortitude to create new storage products for their IaaS offerings. These products, designed and engineered for public cloud scale, must find their way back to enterprises for on-premises deployments.

**DATA CENTERS WILL BENEFIT FROM CLOUD-SCALE PRODUCTS**

Vendors who have concluded the “R&D circle” by first providing on-premises storage products and then creating and operating cloud-scale products in public clouds are now...

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**Figure 2. Seven Universal Use Cases for Next Generation Apps**

- Tame the Internet
- Revolutionize Intra-Enterprise Functions
- Data as a Service
- Orchestrate Things
- Digitize Value Chains
- Re-invent Communication
- Innovate the Human Machine Interface

**All need a platform & cloud strategy!**

*Source: Constellation Research*
bringing these cloud storage offerings back to on-premises data centers. The successful completion of this journey, coupled with the successful operation of products both in the public cloud and on-premises, enables these vendors to offer unique value propositions that matter to CxOs making storage vendor selections.

The very few storage vendors who have made the full circle from on-premises to public cloud and now back to on-premises offer enterprises a tangible set of six value propositions:

1. **Possess enterprise DNA.** When it comes to public cloud storage options, enterprises can find many providers, but few have been long term partners in enterprise IT success. Understanding enterprise requirements from the viewpoints of both best practices and technical capabilities is key for creating the ease of use that enterprises seek.

2. **Deliver cloud-scale products.** As enterprises decide to move their next generation apps to be on-premises, the system requirements do not shrink. They remain the same, as if these applications were to be deployed in the public cloud. Therefore, the public cloud-scale is critical for making the correct supplier decision.

3. **Enable data portability.** There are few things that concern CIOs and CTOs more than lock-in with a vendor or a set of technologies. Being able to transport data across locations and across the public versus private cloud divide at the lowest cost are other key factors.

4. **Empower advanced storage scenarios.** Even though an enterprise decides to deploy next generation apps on-premises, it does not mean that the company discards the public cloud for more advanced storage functions such as backup, High Availability (HA) and Data-Temperature Management (such as unloading “very cold” data to the public cloud). Enabling these advanced functions is another capability that CxOs are looking for when selecting storage vendors.

5. **Focus on uptime.** Downtime is always bad for IT, but especially bad for IaaS vendors.
Storage products designed for public cloud use need not only be hardened to achieve maximum uptime, but should be able to restore data as quickly as possible, faster than typical on-premises storage options allow.

6. **Provide lower storage TCO.** Ultimately, the total cost of ownership for a technology determines the viability of the technology for the enterprise. Saving storage space is paramount for IaaS vendors, but space isn’t cheap in on-premises data centers, either. CIOs and CTOs always have had a keen eye on the TCO of the solutions they run. Being able to tap into public cloud storage TCO while operating on-premises is extremely attractive to CxOs.

ORACLE INTRODUCES THE ZS5 SERIES TO ADDRESS NEXT GENERATION APP NEEDS

The Oracle ZS5 series delivers many of the value propositions mentioned above. Oracle has experience powering storage on-premises due to assets acquired with Sun Microsystems and it also offers a full IaaS solution that includes storage. Oracle ZFS Storage Appliances power Oracle IaaS, PaaS and SaaS Cloud Services, and the next generation ZS5 Series reflects design criteria — such as an extra large flash cache (307TB) — put forth by the Oracle Public Cloud team, so that it can continue to be used in the Oracle Public Cloud.

The servers and related software have the following capabilities attractive to CxOs making storage decisions (see Figure 3):

- **Cloud-proven server for on premises.** Oracle uses the ZFS Storage Appliance in the Oracle Cloud, where Oracle manages over 400 petabytes of storage across its IaaS, PaaS and SaaS infrastructure. ZFS Storage is used by both Oracle Cloud Services (with 70 million users in more than 4,000 environments) and Oracle Development (with more than 40,000 engineers building more than 3,000 products globally). Now, the latest version
of this cloud-architected storage appliance becomes available for on-premises deployments by companies.

- **Cloud best practices for on-premises servers.** The ZS5 series can be managed like an IaaS vendor manages its servers - fully API-driven, CLI-enabled – next to management options with OpenStack (Tinder and Manila, both native, and Swift via proxy). As an Oracle product, it can, of course, be managed by Oracle Enterprise Manager, too.

- **Cloud extensibility.** With a ZS5 storage appliance being a single machine that includes both hardware and software, numerous extension scenarios are possible. These include offloading development and testing to the cloud, low temperature storage to the cloud, and replication to the cloud for disaster recovery.

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**Figure 3. Key Capabilities of the Oracle ZS5 Series**

**The News: Oracle ZS5 Series**

1) **Oracle Introduces Cloud-Proven Fifth Generation ZFS Storage Appliance**
   - Cloud-hardened technologies for public cloud and on-premises deployments
     - The benefits of cloud-scale architectures brought to your data center
     - Enables 4:1 NAS consolidation and 40% Reduction in Database Storage

2) **Performance Boost for High-Performance File-Based Workflows and Backup & Restore**
   - **Up to 40% Overall Throughput Performance Increase**
     - Accelerate time-to-market, restore data faster, make smarter business decisions, shorten time to actionable intelligence, close books faster
   - **Restore Performance Increases to 60TB/HR, Backup Increases to 50TB/HR**
     - EMC Data Domain is ~5TB/HR and 28TB/HR*

3) **Oracle Engineered Storage Delivers Higher Degrees of Efficiency and Automation for Cloud-Centric Environments**

*A dedicated media server is required for EMC to achieve claimed higher backup rates

**Source:** Oracle
• **Cloud performance.** The ZS5 delivers performance in all areas that matter for storage. It creates up to a 40 percent throughput increase over its predecessor, has Backup performance at 50 terabytes per hour and Restore performance of 60 terabytes per hour.

• **Co-engineered with Oracle 12c.** Under Oracle’s “engineered together” strategy, the Oracle 12c database works very well with the ZS5 storage appliance. Performance in setup increases by 67 percent, database query performance has a fivefold increase and storage itself is reduced 12 times, thanks to the Oracle 12c hybrid columnar compression. Finally, 12c pluggable databases are “visible” to ZS5 and, thus, these databases can be managed more efficiently.

**ORACLE’S “CHIP TO CLICK” STACK DELIVERS LOW TCO**

Oracle is using a unique strategy in the high tech industry, designing integrated products along the complete technology stack – going from “chip to click”. This means all the way from the central processing unit to the user experience in the application, practically from the lowest layer in the ISO computing model to the very top.

In the case of the ZS5, Constellation sees this strategy at work for Network Attached Storage, effectively involving all layers of the stack, apart from the top application layer. But a product can only be as good as the use cases it was designed for. With Oracle creating the ZS5 primarily with public cloud deployments as core uses while maintaining on-premises deployment as an option, customers can use the same product for both purposes in their own data centers. An integrated storage appliance brings a number of tangible benefits for enterprises looking at solving storage needs for their next generation apps:

• **Designed for high-performance specifications.** A product designed for cloud use comes along with superior performance in the vital areas of backup and restore. While data loss is bad in any deployment of IT technology, IaaS providers know that
data loss and downtime cost them money directly, given how most Service Level Agreements (SLAs) are designed today. On-premises deployments of ZS5 benefit from these high-performance qualities, which reduce downtime risks and accelerate return to availability, both crucial to an enterprise’s on-premises deployments.

- **Born with cloud DNA.** Beyond the backup and restore capabilities, uptime is crucial for IaaS providers. Scheduled downtime can be avoided as much as possible. Enterprises not only benefit from higher uptime levels, they also can operate the most crucial uptime applications in their own data centers.

- **Enables agile and flexible deployments.** With identical products offered for both on-premises deployments as well as ZS5 deployments in the Oracle Cloud, storage load becomes “elastic” for an enterprise. This allows a complete use of storage in cloud or any hybrid scenarios, such as enabling development and testing environments in the cloud, bursting to the cloud, multi-temperature data tiering, and more.

- **Delivers suite benefits.** It comes as no surprise that Oracle creates synergies with other Oracle products, most prominently with the Oracle 12c database. The ZS5 has visibility into 12c-based pluggable databases and it shares a common pane of glass with Oracle’s Enterprise Manager hardware.

- **Lowers overall TCO.** Following Oracle’s organizational DNA of lowering the TCO for technology, the ZS5 enables enterprises to reduce their NAS total cost of ownership considerably, largely due to the inherent cloud DNA of the ZS5. Just like all leading cloud infrastructures, ZS5 can be operated completely through software, as all functions are exposed as APIs, enabling a significant cost reduction in one of the largest infrastructure expenses - personnel.

These benefits have already delivered results for companies, according to Oracle. For instance, a leading mobile components provider saved tens of millions of dollars by using ZFS Storage Appliances, with the bulk coming from a substantial 4:1 consolidation of NAS filers.
Similarly, a financial services leader saved tens of millions of dollars by switching to ZFS Storage technology from conventional NAS filers and achieved a 3:1 consolidation of backup devices by switching Oracle Database Backup to ZFS Storage Appliances.

Finally, in one of the areas that is probably the most storage-intensive, a film studio specializing in digital movie creation and effects was able to bring its product to market faster than on a previous, legacy storage infrastructure. The studio reads an average of one-quarter of a petabyte of data per night and ZS5 has proved to be two times faster than the previous storage system.

THE BOTTOM LINE:
CONSIDER ORACLE ZS5 FOR NEXT GENERATION APPS STORAGE

The system requirements for next generation apps have exploded, most prominently in the storage area. Enterprises not only need cost-effective, low TCO products for storing information, but also the flexibility to determine the most effective deployment of storage between on-premises and public cloud. The lower the cost of switching back and forth between on-premises and public cloud, the less friction enterprises will face in making optimized deployment decisions. Less friction in making deployment decisions also enables interesting hybrid storage scenarios including both on-premises and public cloud. These hybrid situations have the potential to turn into true differentiators for enterprises seeking agility and cost-effectiveness for their next-generation apps.
Holger Mueller
Vice President and Principal Analyst

Holger Mueller is vice president and principal analyst at Constellation Research, providing guidance for the fundamental enablers of the cloud, IaaS, PaaS, with forays up the tech stack into big data, analytics and SaaS. Holger provides strategy and counsel to key clients, including chief information officers (CIO), chief technology officers (CTO), chief product officers (CPO), investment analysts, venture capitalists, sell-side firms and technology buyers.

Prior to joining Constellation Research, Holger was VP of products for NorthgateArinso, a KKR company. He led the transformation of products to the cloud and laid the foundation for new business-process-as-a-service (BPaaS) capabilities. Previously, he was the chief application architect with SAP and was also VP of products for FICO. Before that, he worked for Oracle in various management functions - both of the application development (CRM, Fusion) and business development sides. Holger started his career with Kiefer & Veittinger, which he helped grow from a startup to Europe’s largest CRM vendor from 1995 onwards.

Holger has a Diplom Kaufmann from University of Mannheim, with a focus on Information Science, Marketing, International Management and Chemical Technology. As a native European, Mueller speaks six languages.
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