White Paper

Harnessing the Critical Enabler for Digital Transformation in Financial Institutions

Sponsored by: Pure Storage

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IDC OPINION

Digital transformation remains the key priority for virtually every financial institution in the world. This transformation is driven by a host of drivers and challenges that financial institutions are facing today. One such driver is changing customer requirements and a desire for 24 x 7 access through a channel of choice in real time. Another is the rising cost of doing business caused by tougher regulation, ageing legacy IT, and a generally tougher business environment.

The challenge for CIOs is to determine where and how to prioritize the limited resources at the organization's disposal. There has been a considerable focus in the past few years on improving the customer experience in the front office. One initiative that has received a lot of attention is omni-channel capability, aimed at integrating a growing number of digital and physical channels after they were built in organizational and IT siloes. Omni-channel banking refers to a customer experience that allows the customer to switch between various channels while having a continuous interaction with the institution. As a result, all channels need to have access to various data sources and formats in real time.

Another key painpoint for financial institutions is the upkeep and maintenance of legacy infrastructure, while facing the challenge to power new applications in the front and middle office. For instance, the immediate access to a consolidated data repository is an important enabler to deliver crucial insights at the right time. This is amplified by the accelerating growth of data volumes, the need for a more contextual and personalized customer experience augmented by analytics, and the need for financial institutions to enable greater productivity for employees who depend on fast and consistent flow of data. Lastly, the explosion of data – both internally and externaly – is a massive challenge for financial institutions. Dealing with a variety of different formats, degrees of cleanliness, and sources has made data management a key priority.

IDC believes that flash storage is a critical enabler for the improved performance, reliability, and lower cost it delivers over traditional storage solutions. While IT staff have understood the value of flash, business users tend to either not know or care about its benefits. The capability to deliver real-time actionable insights at the right time through the right channel is not just a matter of data – users also need to account for the piping that allows data to flow.

IN THIS WHITE PAPER

In this white paper, IDC will discuss the impact of flash storage as a critical enabler for digital transformation in financial instititutions, enabling the delivery of a superior user experience for customers and staff, increasing security and compliance, powering new analytics capabilities, and dealing with growing data volumes while reducing the overall total cost of ownership.

IDC believes that the rise of 3rd Platform technologies and in particular the new innovation accelerators such as cognitive computing, IoT, and next-generation security will drive the demand for and adoption of more powerful storage solutions based on all-flash arrays (AFAs). Having said that, the maintainance and operation of legacy applications also benefit from flash storage.

Unlike commodity networking and server processors, hard-drive-based storage media and systems have not become much faster in the past decade. Capacity expansion and density have been the key focus areas for storage innovation, but now is the right time to evaluate new flash storage technologies to accelerate performance and eliminate storage bottlenecks in the infrastructure.

Flash-based solid-state disks (SSDs) provide a distinct performance and cost-efficiency benefit relative to hard drives. SSDs are among the top enabling technologies that financial institutions are implementing to drive digital transformation across the entire organization to deliver a faster, more efficient, and more secure experience.

SITUATION OVERVIEW

A recent IDC survey showed that more than 50% of corporates see infrastructure modernization as a key requisite for digital transformation. However, our recent banking IT spending guide confirms the continous trend toward declining hardware spending by financial institutions as a proportion of their overall IT budget. Spending on storage technology and particularly flash storage is a clear exception to this trend, indicating the growing importance of storage to empower a financial institution's operations to keep up with the fast evolution of 3rd Platform technologies such as Big Data analytics (BDA), mobile, social, and cloud.

BDA and cloud in particular are core areas where flash is a true enabler of new capabilities. Financial institutions have been focusing on improving behavioral analytics to counter fraud, cybercrime, and money laundering and ensure KYC compliance. A strategic priority is to link various data sources and to manage the flow of data within organizations as well as into and out of the organization. Flash storage is the ideal platform to accelerate BDA initiatives and help provide the performance needed to serve data in real time.

The key drivers for the success of flash include:

- **Improved performance**. Flash storage speeds up both legacy applications and performance-hungry initiatives such as Big Data and analytics, the Internet of Things (IoT), clickstream analysis, and ecommerce websites. It is therefore a critical enabler of digital transformation, driving new capabilities such as omni-channel, real time, and context, where performance is key to success. Business-critical activities, like trading, obviously also need the fastest possible performance on the market.
- **More flexibility and scalability**. Although traditional enterprise applications still account for most datacenter deployments, Big Data analytics, cognitive computing, real-time behavioral analytics, IoT, business intelligence, live webchat, etc. are developing scale. If successful, they ramp up quickly and spread across the organization, driving a greater need for storage system scalability. An all-flash storage platform supports the goal of becoming more cloud-like, including automated, orchestrated, self-service offerings.
- **Higher productivity.** With the growing importance of analytics in everything a bank does, from a risk, compliance, or marketing and sales perspective, higher performance drives productivity. The faster that quantitative teams can run queries and crunch numbers that are going to the databases, the more efficient and productive they are and the more ground they can cover. This leads to better investment, risk, and credit models, which lead

to better performance and higher client retention and eventually new clients. It's all correlated.

- **Delivering more for less**. Easy integration with existing infrastructure is a key priority for many FIs, both on the application and the IT infrastructure layer, in order to keep operational costs down and drive as much efficiency as possible, despite growing data volumes. The pressure to improve cost efficiency in financial institutions remains a key driver for flash upgrades and migration. After decades of committing to high levels of datacenter investment, especially through purchasing high-end storage systems, the sector is reversing this strategy and focusing its efforts on reducing expenditure without compromising on enterprise-grade performance and features. Flash provides better performance for the same price, or sometimes even a lower price.

Digital Transformation Has Turned IT Infrastructure Into a Critical Business Enabler

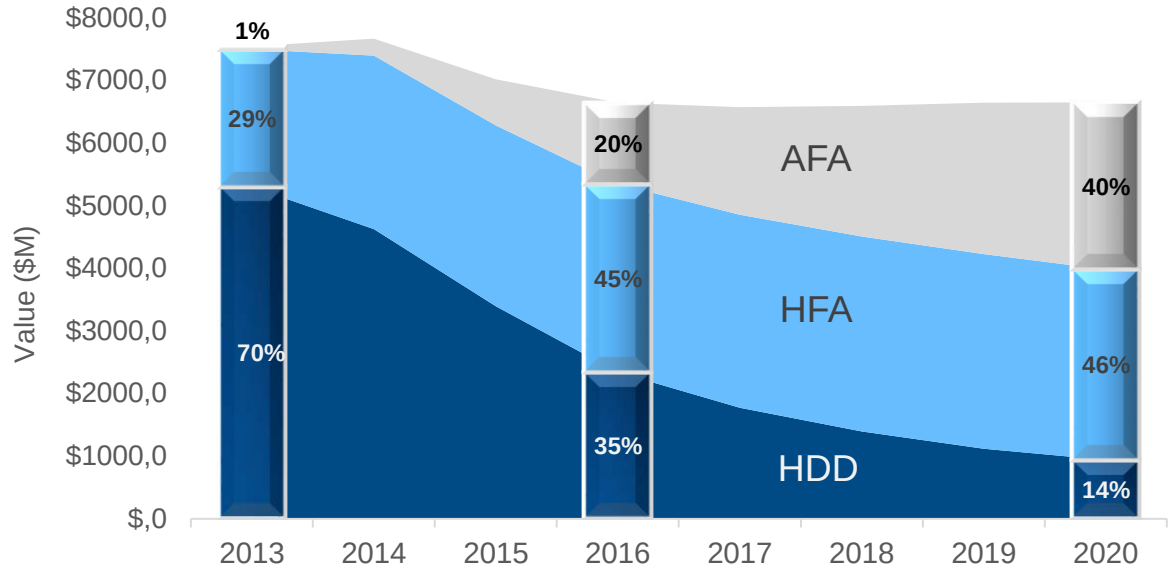
Most financial institutions around the world have put digital transformation at the core of their strategy and made considerable investments in digital frontline capablities, business process optimization, and business applications that build on data to deliver more value to users and customers. As their customers and the competition are changing, it is becoming clear that only those that successfully adapt to this change will stand a chance of winning. IDC believes there are three core capabilities that will enable institutions to succeed in the digital competition.

Firstly, in a digital world, the capacity to innovate will depend on an orgaization's abiltiy to translate its value and competitive advantage into code. Secondly, the creation of innovation boils down to a simple equation: innovation = code + data. Having access to the right, relevant, and timely data — both internal and external — and the ability to build the data pipelines into and out of an organization will determine the ability to innovate. Thirdly, speed, scalability, flexibility, and security will be the key success factors in the digital competition, all of which will be driven by cloud — and flash will be a critical enabler to get there.

Relying on legacy storage architectures, either based entirely on HDD or retrofitted with flash, will mean FIs are unable to tackle the emerging new applications requiring multi-PB scale and low latency. Flash is a prerequisite to deliver innovation, performance, and efficiency at the storage layer. For this reason, we already see flash storage accounting for 65% of all storage systems shipped in EMEA (including both all-flash and hybrid models), and this is expected to exceed 85% in 2020.

FIGURE 1

Western Europe Storage Forecast



Source: IDC, 3Q16 EMEA Enterprise Storage Tracker Forecasts

Role of IT in DX

The role of IT within financial organizations is changing rapidly from being considered a cost center to becoming a profit center. As a result, datacenter-related decisions are becoming increasingly business-related decisions, with more frequent involvement of the line of business.

In fact, the financial sector is perhaps one of the most exposed sectors to the adoption of 3rd Platform technologies such as Big Data analytics, cloud, mobile, and social, providing it with endless opportunities in terms of monetization of data assets in near real time, but also increasing threats to data security and privacy. IDC sees a rise in projects that are co-funded by LOBs and IT, and expects business-driven funding to overtake IT budgets within the next three years.

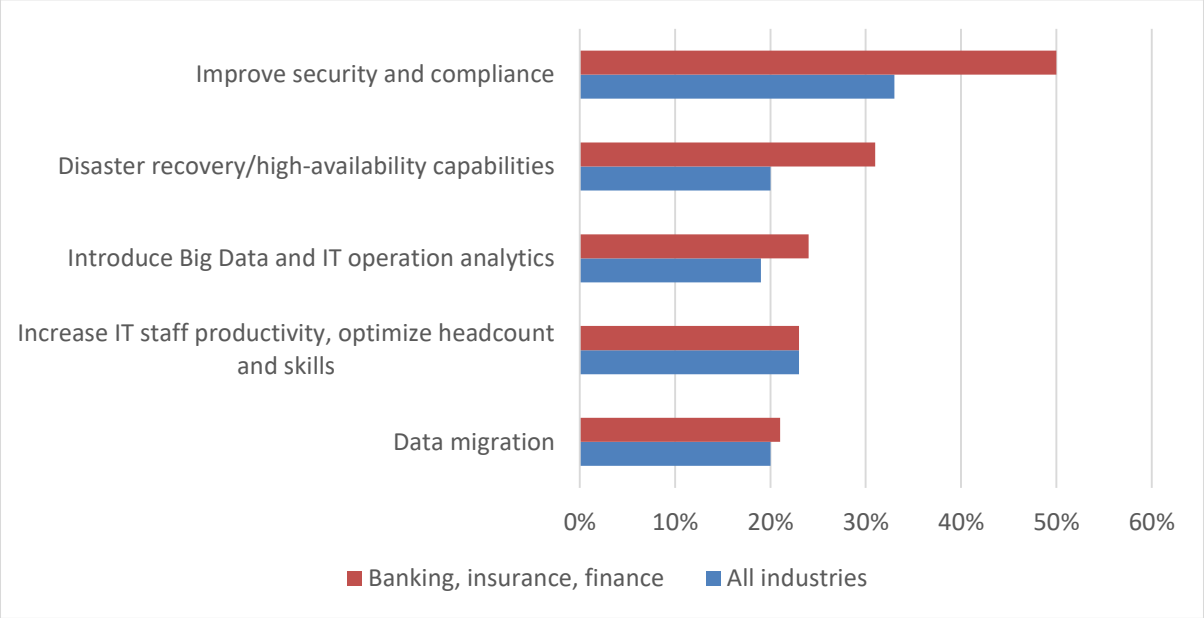
Also the perception of IT is changing from being a gatekeeper to being a partner in the innovation process. LOB executives believe that the most critical roles of the IT organization include helping LOBs to identify which parts of the business could be digitally transformed through the use of technology, to identify emerging technologies that could accelerate digital transformation, and to manage digital implementation projects.

Datacenter Priorities

Given this, the role of enterprise storage is central in helping financial institutions react quickly to leverage the new business opportunities represented by enormous data availability, while shielding themselves from the ever-increasing security threats.

FIGURE 2

What Are the Key Priorities for the Datacenter in the Next 12 Months?



Source: IDC, 2017

Security and compliance, disaster recovery, and BDA are the key priorities for financial sector organizations, according to IDC's *2016 European Datacenter Survey*. The survey clearly shows the importance of BDA for the financial sector compared with other industries, where it is a much lower priority.

IDC predicts increased spending on BDA in four areas in the next three years:

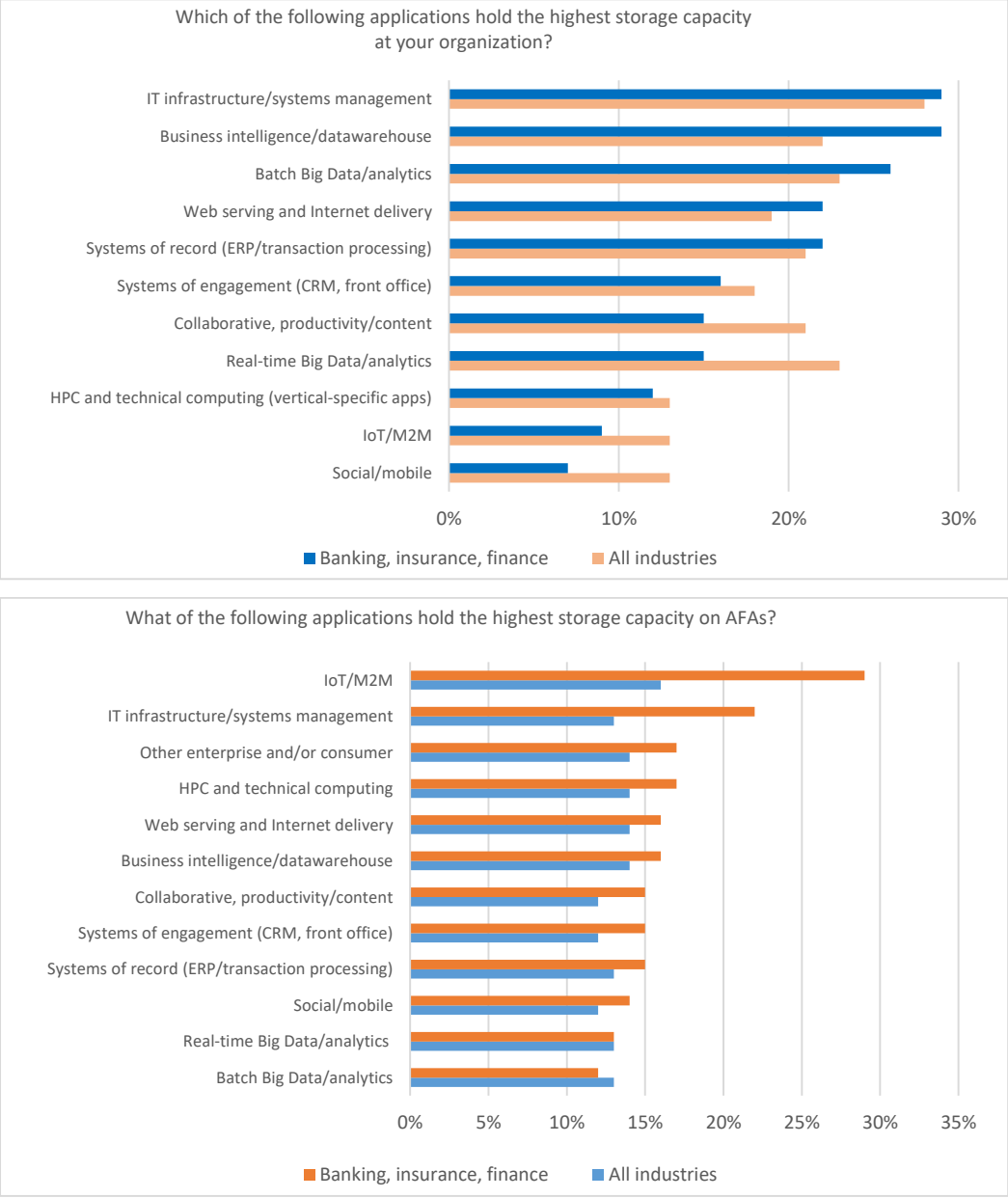
- Behaviorial analytics: for fraud, money laundering, cybercrime, and compliance in general.
- Cognitive computing applications leveraging natural language processing and machine learning: these are set to transform customer channels such as the contact center, web chats, and internal service desks.
- The rise of robot advisory tools to automate and supplement financial advice: from more sophisticated personal financial management tools, to product recommendation engines and contextual marketing capabilities feeding into an integrated CRM system offering a 360-degree view of the customer.
- Business intelligence applications.

BDA and Digital Workloads Drive Flash Adoption

Business intelligence, Big Data applications, and datawarehousing applications consume the most storage capacity due to their processing-intensive nature and the large amounts of data used in the analysis. BI applications have stringent requirements both in terms of capacity and performance, thus driving a preference for high-performance storage systems and flash storage in particular.

FIGURE 3

Application Workloads and Storage Capacity



Source: *IDC Datacenter Survey, 2016*

Batch Big Data/analytics applications are the third-largest consumer of storage capacity. Batch BDA applications have traditionally been deployed on commodity hardware, but we expect batch Big Data workloads to be migrated to all-flash arrays as they become more business critical.

AFA capacity is predominantly consumed by IoT and M2M applications. These new technologies push massive amounts of data, in diverse data formats, and the deployment of analytics that mine these oceans of data for business insights. Although the financial vertical shows slower adoption than average in IoT applications, it also shows higher than average intentions to increase investments in the next 12 months. This will be primarily driven by insurance, which is already

moving toward consumption-based business models; payments and customer experience management, such as loyalty, branch interaction, and contextual marketing on the retail banking side; and in trade finance and supply chain financing to track assets.

Web serving and Internet and transaction processing/systems of record also scored higher for FIs than other industries, both for overall storage capacity and for AFA. The next generation of Internet banking with richer functionality, analytics-driven, personalized content, moving to real-time processing — for instance, in payments, performance management, trade execution, live data feeds, and more sophisticated tools such as finanical planning, portfolio modeling, spending trackers, as well as moving toward real-time interaction through video and web chats — has pushed the limit of what traditional storage is able to deliver.

Financial institutions have a higher preference for deploying AFA systems in their datacenters, both for emerging and traditional workloads. They also have the highest percentage of HDD-only systems still active. The main reasons for this are the higher percentage of mainframes in their datacenters, as well as the higher-than-average capacity-intensive, compliance-related workloads they have to deal with.

Key Requirements for AFA Purchase

When asking financial institutions about the drivers for the purchase decision for AFAs, four areas differentiate financial services from the overall industry sample.

- **Higher focus on performance.** While this factor is naturally the highest ranked consideration factor across all verticals when it comes to evaluating an AFA, it ranks even higher in financial institutions. The importance of performance in some business-critical activities such as trading has an obvious impact on this ranking, but the emergence of new workloads also has an influence. The high demand for sophisticated data analytics, particularly with regard to compliance, security, and customer experience; the growing use of external and unstructured data; the emergence of new technologies such as IoT; and the need for high-performance workloads in trading and payments clearly raise the need for performance.
- **Higher focus on cost.** The pressure to improve cost efficiency in financial institutions is obvious due to the greater importance it puts on TCO and $/GB. The banking industry has gone through tremendous change in the past decade, driven by higher operating costs due to new regulations, rising labor costs, the maintenance of legacy systems and applications, and a generally more challenging business environment. Flash enables financial institutions to reduce TCO while allowing them to improve the performance of legacy applications. The cost issue is also driving financial institutions toward the cloud. IT implementations will increasingly be moving to combine workloads to share data and not just copy it, using NAND flash as the only active storage media. This, together with consolidation onto a cloud-enabled converged infrastructure, will reduce IT budgets and improve the productivity of IT. In the end, mission-critical data will be kept in-house on flash storage, while cold and archived data will be stored in the cloud.
- **Higher focus on response time/data availability.** Low response time and guaranteed availability scored significantly higher for financial institutions, and reinforces financial institutions' higher expectations for performance and latency. This is also driven by the need for reliability in a digital world, as downtime comes with a heavy reputational and regulatory cost.

FUTURE OUTLOOK

Financial institutions will increasingly be challenged by regulation and in particular the EU's General Data Protection Regulation (GDPR), which will require financial organizations to review their data protection and privacy policies with regards to data location, security, privacy, and data management. We believe GDPR will drive the modernization of datacenters, given the security issues, including content filtering solutions preventing unauthorized data from leaving/entering an ecosystem, data encryption tools, data mining solutions, access solutions to ensure only the right people have access to sensitive data, data masking, and data disposal solutions. The "right to be forgotten" will also require organizations to rethink their storage strategy and revisit their data management processes around primary and secondary data storage and metadata management to be able to identify, segregate, and manage privacy data. IDC also expects the demand for localized datacenters to rise. Placing content at the edge and closer to the end user will help provide a more personalized service through more resilient networks and less stress on latency and secured communication.

We also expect the competition from emerging fintech startups to intensify — and again this will be driven by regulation such as PSD2 and changing customer needs. Financial institutions need to deliver a much better digital experience to their customers in order to keep pace with these new competitors, which put data at the core of their business. The rise in new partnerships leveraging open APIs will also put pressure on bank infrastructure to cope with growing transaction volumes and customizing access, control, and data management over the storage infrastructure.

We are entering an era where real time will be the only time and financial institutions continue to struggle to deliver the application performance needed to deliver the user experience. The next generation of analytics will require even more performance and faster access to a growing number of data sources. New business models are on the rise, leveraging new technologies such as blockchain and IoT, which again will increase the volume of data tremendously.

Preparing for the Data Economy

IDC believes that the emergence of these data-driven technologies in combination with growing competition from outside the industry as well as the liberalization of data ownership, driven by initiatives such as PSD2, will usher in a data race in which financial institutions will strive to identify and secure the best data pipelines to fuel their digital innovation initiatives.

Data will be the grist to the innovation mill, and without the ability to store, access, and process large sets of quality data, digital innovation and as a result digital business models will stall. The industry has seen a hitherto unknown commoditization of financial products and it is obvious that differentiation in the future will depend on financial institutions' ability to develop relevant, contextual, and personalized products for their customers.

While other industries have successfully penetrated the financial services space, the financial services industry so far has apathetically stood by and watched. IDC believes, however, that there is a massive opportunity for financial institutions to become disrupters themselves by widening their scope and exploring new opportunities outside their traditional domain.

We are about to enter a new era in which data will be the most precious asset and the ability to extract and distribute value from that data will be the key success factor. The opportunity is to move beyond being a mere data producer and move up and down the data economy "stack" to expand into other critical roles of the data economy, such as data presenter, platform provider, insight provider, and data aggregator, to remain at the interface to the end customer and create valuable user experiences. Building on a deep understanding of the customer, the data economy will force financial institutions to rethink and reposition their business models to either become the

trusted advisor, aggregator, and facilitator of data or be marginalized as a mere product producer at the backend.

More than ever before, financial institutions' ability to succeed in the data economy will depend on their ability to manage, access, and analyze datasets; leverage, share, and monetize the insights; secure the data; and identify threats.

CHALLENGES/OPPORTUNITIES

Opportunities

- The sheer expansion of data and the need for high performance dictates that, in the not-so-distant future, data storage will either sit in the public cloud or on in-house all-flash array systems, depending on how critical the data is for the enterprise.
- The all-flash datacenter does away with the need for complex storage tiering. It also makes more efficient use of the storage medium since thin provisioning, compression, and deduplication can be carried out as standard, without having an impact on performance.
- Encryption of data at rest (as opposed to data in use) is yet another operation that can ruin the performance of hard drives, but presents no issue for all-flash arrays.
- Proliferation of flash and encryption at rest would require better tools for key management, especially for data that needs to be stored for regulatory purposes, sometimes for 10 or 20 years.
- The most important factors slowing AFA adoption were price point and the ability to scale, but both have now been overcome. Flash storage offers more for less.
- Financial institutions still have a higher than average presence of HDD-only legacy systems, due to the reliance on mainframes in their datacenters, as well as on the higher-than-average capacity-intensive, compliance-related workloads they have to deal with. Such systems, which sometimes still hold critical workloads, are (over)due refresh.
- Financial institutions are heavily investing in cloud-enabled infrastructure to power their private/hybrid cloud development. The performance requirements of cloud environments are stretching the physical limits of traditional rotating hard-disk drives, such as handling the random input/output operations-per-second (IOPS) demanded by highly virtualized production environments.

Challenges

- As businesses store more data, they will need to classify it better to separate information that can be deleted from information that can be sent to archive or kept on tier 1 arrays. GDPR compliance will be a key driver of this.
- A "flash will fix everything" approach is likely to lead to disappointment among the less-tech-savvy senior leadership teams. They generally have less understanding of how it will integrate into and perform within the organization's bespoke infrastructure.
- Hardware commoditization and the emergence of software-defined architectures are a challenge. Although most of the innovation is delivered by software, storage providers tend to have mostly a HW-centric approach. This has to change to ensure durability and reliability.
- Businesses will need to factor in the cost of migrating data to an AFA. While most AFA vendors have excellent track records implementing their AFA in less than a day, it does take time to migrate applications to that array. The applications that can justify having their data placed on an AFA are often critical to the business and anything more than a few moments of downtime is typically unacceptable.

How Pure Storage is Suited to Meet Financial Institutions' Requirements

As outlined in this paper, flash storage will be one of the most critical enablers to futureproof financial institutions and to help them succeed in a rapidly changing operating environment driven by new regulations, new risks, new competitors, and new digital and data-driven business and operating models.

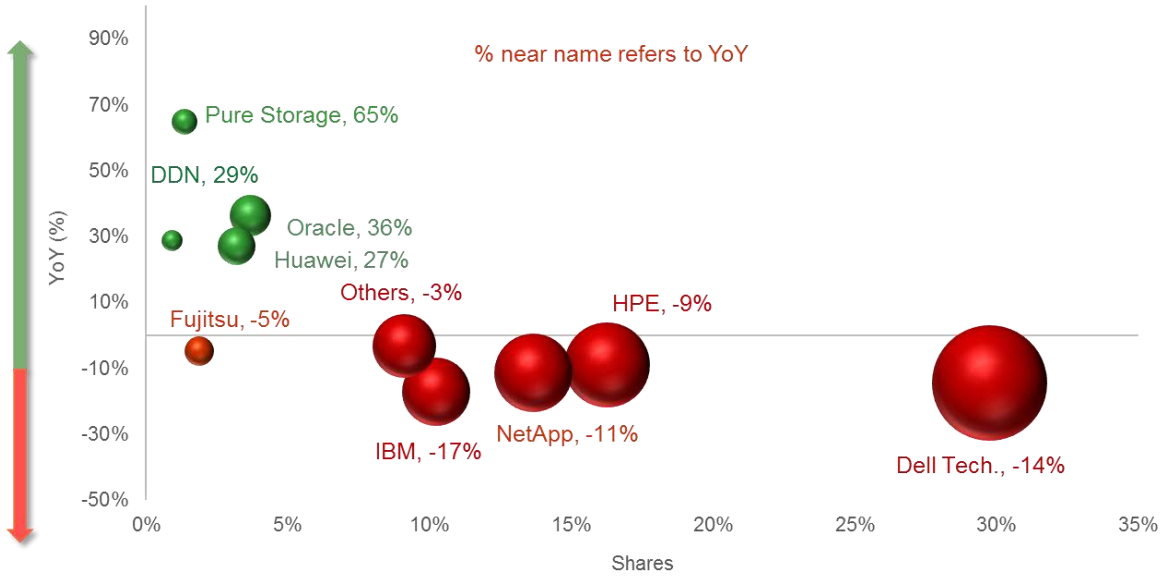
There is tough competition on the supply side of storage solutions, but at a time when hardware spending has come under tight scrutiny from technology buyers, IDC sees only very few vendors that manage to outgrow the market.

Pure Storage is the growth leader in the European storage market, executing on a strategy to deliver storage that is effortless, efficient, evergreen, and purpose-built to support new cloud operating models. It is also well positioned to tackle the main requirements defined by the financial services industry, such as the ability to:

- Conciliate performance with capacity and cost efficiency, to support analytical workloads and intensive IT infrastructure needs
- Guarantee a high level of built-in security to ensure compliance and shield institutions from malicious attacks

FIGURE 4

EMEA Competition: YoY and Shares



Note: Dell Technologies includes Dell and EMC brands.

Source: IDC, 3Q16 EMEA Enterprise Storage Tracker Forecasts

In summary the Pure Storage FlashArray//M AFA family features:

- **Guaranteed high performance and data reduction:** Pure Storage has been one of the first in the market to leverage inline data reduction to reach 5:1 data reduction ratios on average. Pure Storage's "Love your Storage" program guarantees that customers see the

data reduction ratio, performance, and reliability expected. The innovative program comes with no fineprint and ensures clients can get a full refund within 30 days.

- **Consistent, submillisecond response time:** The FlashArray//M, according to Pure Storage, is able to deliver 6 nines of availability, with less than 30 seconds of downtime per year.
- **Cost-effectiveness:** Thanks to its data reduction technology, Pure Storage is able to achieve cost reduction through a 10:1 or higher infrastructure consolidation ratio, bringing about considerable savings in terms of TCO thanks to a reduction in floor space and energy consumption, and fewer software licenses.
  - Pure Storage's **Evergreen program**, which provides customers with an upgrade of controllers every three years at no extra charge, ensures they always have an up-to-date array without committing to expensive refreshment plans and allows them to scale non-disruptively without forklift upgrades.
  - Pure Storage's **Capacity Guarantee** exploits its own BD analytics capabilities to ensure the array is well sized and thus helps avoid buying excessive storage capacity. If the user ends up needing more capacity than guaranteed, Pure Storage commits itself to supply the additional capacity needed, at no additional cost for the user.
- **Compliance to the highest security standards:** With financial institutions being the most targeted vertical for data theft, the FlashArray//M guarantees fully encrypted data with AES-256 encryption using a patented internal key management system which doesn't require the intervention of external input, and makes individual drives removed from their original array unable to unlock, while at the same time enabling the whole array to keep on working even when single drives have been removed.

CONCLUSION

Flash storage will play a critical role in enabling financial institutions to go through digital transformation and move from being a product- to a data-driven organization. The migration to flash is not only about performance, efficiency, reliability, and cost – it is becoming increasingly clear that it is a critical enabler of 3rd Platform technologies. The next generation of applications will be driven by data, and having immediate, secure, and cost-effective access to data will be crucial to succeed. In summary we see four key advantages of flash:

- The capability to consolidate, compress, reduce, and manage data to accelerate and simplify access in order to deliver a real-time and personalized experience to the customer and empower employees with the necessary information to be productive.
- The delivery of precise analytics of structured and increasingly also unstructured data to inject context into the customer relationship and power a new generation of performance-hungry analytical applications and risk management applications throughout the organization.
- The ability to speed up legacy applications and improve the performance of legacy infrastructure through easy integration of flash storage into a legacy IT environment to reduce TCO and create a modernization path for IT.
- The ability to cloud enable and futureproof the datacenter. Flash provides the requirements demanded by highly virtualized production environments. In the end, mission-critical data will be kept in-house on flash storage while cold and archived data will be dumped in the cloud.

About IDC

International Data Corporation (IDC) is the premier global provider of market intelligence, advisory services, and events for the information technology, telecommunications and consumer technology markets. IDC helps IT professionals, business executives, and the investment community make fact-based decisions on technology purchases and business strategy. More than 1,100 IDC analysts provide global, regional, and local expertise on technology and industry opportunities and trends in over 110 countries worldwide. For 50 years, IDC has provided strategic insights to help our clients achieve their key business objectives. IDC is a subsidiary of IDG, the world's leading technology media, research, and events company.

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