EXECUTIVE SUMMARY

The Storage Reliability Imperative

Evolving Requirements in the Era of Digital Transformation

Introduction

In this era of digital transformation, businesses are increasingly data-driven, and enterprises are working with more data than ever before. Most enterprises are already dealing with petabytes of data and looking ahead to supporting tens of petabytes in the near future. IT infrastructure is critical in turning this data into business value, making it a key input to successful business operations that must always be available. Enterprise storage solutions are right at the heart of the IT infrastructure needed to serve data up as needed to drive key business processes while at the same time ensuring that the data is both accurate and recoverable. As a result, requirements for enterprise storage are evolving to meet reliability imperatives at levels of scale unheard of in the past.

Evolving Storage Reliability Requirements

In crafting storage infrastructure to meet the reliability requirements of the digital era, IT must consider how different designs impact performance, availability, data durability, resiliency, and cost. It is critical to understand that all these topics are inter-related when designing storage infrastructure that can operate reliably at scale in today's business environment. At its core, reliability implies that a system will work as expected across both normal and failure mode operation, meeting specific performance, availability, and data durability requirements. Predictability is key here—the last thing IT managers need when unexpected events occur are surprises that impact the availability of services critical to successful business operation.

The Changing Approach to Reliability

Digital transformation has moved IT away from the more static, brittle infrastructure of the past to a more agile, dynamic environment that can quickly evolve as business needs dictate. To meet these changing market requirements, the storage industry's approach to reliability has changed in two fundamental ways.

First, we have moved away from a focus on system-level availability to one that centers on service availability—an approach that provides more agility. Agility is important as it enables different consumption models (traditional IT, public cloud, private cloud), provides workload portability, and opens options to implement availability zones that can span components, systems, racks, pods, data centers, and/or power grids, depending on availability and reliability requirements.

Second, fault detection, isolation, and recovery have become much more software-based and much faster than in the past, supporting the need for both higher availability and better flexibility. This development has allowed the management of unexpected events to become more automated, making recovery more predictable and lowering costs by removing the human factor. Given that humans are the least reliable "component" in a system, designs that reduce human factors during recovery have a positive impact on overall resiliency.

A number of other changes that dictate the requirements of today's storage infrastructure are shown below.

The Era of Digital Transformation Changes A Number of Factors Impacting Storage Reliability

Legacy Factors Impacting Storage Reliability

- More static IT environments
- Far less distributed IT infrastructure
- Fewer fault modes
- Hardware-focused fault resiliency
- Perimeter based security
- Expectation of planned downtime
- Less reliance on IT to drive critical business processes
- Minimal ransomware threats

Current Factors Impacting Storage Reliability

- Agile, dynamic IT environments
- Far more distributed IT infrastructure and users
- Far more fault modes
- Software-driven fault resiliency
- Zero trust security architectures
- Expectation of zero downtime
- Much broader scope of SLAs
- Far more reliance on IT to drive critical business processes
- High ransomware threats
- Operating at much higher scale

Infrastructure Density and Reliability

In the context of discussing each of the key considerations—performance, availability, data durability, and resiliency—the full paper of this summary notes that architectural complexity is a key detractor of system-level reliability and must be consciously managed when implementing storage infrastructure today. Both more powerful compute and denser media technologies increase storage infrastructure density, allowing systems designed to meet a target level of performance and capacity to be smaller and consume less energy and floorspace than ever before. Infrastructure density has a clear impact on overall reliability because simpler systems with fewer components are more reliable.

Many approaches exist to manage reliability, but there are trade-offs that need to be understood for storage managers to deploy the most cost-effective systems that also meet all their other requirements for performance, high availability, data durability, and resiliency. The longer paper linked above discusses the trade-offs in each of these areas in more detail, noting many innovations that should be considered when deploying modern storage infrastructure.

Pure Storage

Pure Storage is a $3 billion enterprise storage vendor with over 12,000 customers. In production use, our all-flash storage provides at least “five nines plus” availability with configurations like stretch clustering which can increase that to “six nines plus”—all validated by installed base data we have tracked over the last decade using Pure1® (our artificial intelligence/machine learning-driven system monitoring and management platform). We provide the industry’s most efficient all-flash storage solutions based on energy efficiency (watts per terabyte) and storage density (terabyte per unit of rack space) and offer both scale-up (FlashArray™) and scale-out (FlashBlade®) unified storage platforms that support block-, file- and object-based workloads. We have systems targeted at high-performance primary storage workloads as well as our new Pure//E™ family of systems which, with a raw cost per gigabyte at the system level of $0.15 to $0.20/GB (including three years of 24/7 support), are targeted at replacing all-hard disk drive systems coming up for technology refresh.

Learn More

If you’re interested in moving to highly efficient, all-flash storage that meets the high reliability requirements of the digital era, we’d like to meet to discuss how we can help move your business forward. We have a compelling reliability story with our storage solutions which, while beyond the scope of this executive summary, we’d be happy to discuss with you.

- **Get in touch:** Book a meeting
- **Read the full white paper:** “The Storage Reliability Imperative”

PS2494-01-en 09/23