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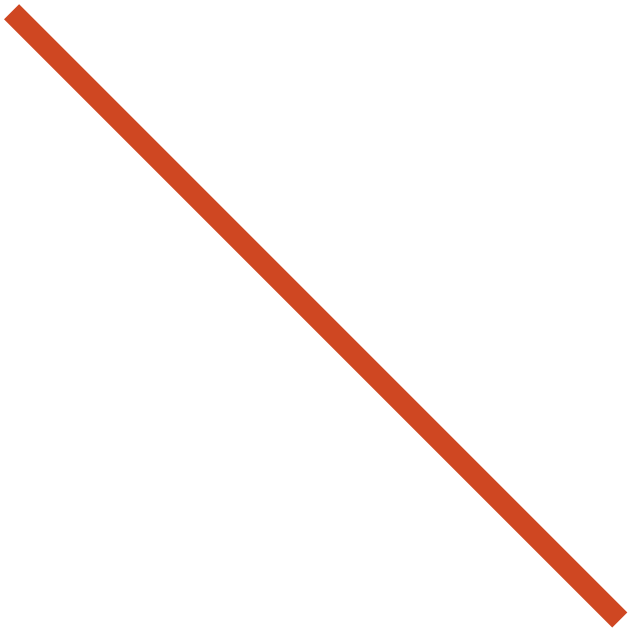
Practical Broadcast Storage



Essential Guide

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Introduction from HPE OEM Solutions

Welcome to the second Essential Guide collaboration between Hewlett Packard Enterprise (HPE) Original Equipment Manufacturer (OEM) Solutions and The Broadcast Bridge.

This time, we will be focusing on data storage for the media industry – discussing new storage developments and technologies, and how your broadcast business can capitalize on the growing opportunities in this area.

With more and more video content being shot in 4K resolution, coupled with an increase in camera and delivery formats, the demand for storage among broadcasters and content creators will only intensify. In fact, experts have predicted that storage needs will rise 24-fold between 2014 and 2020[1].

The solution to this data explosion is not more storage, but rather, a storage solution that is both scalable and intelligent; one that is able to grow with your data, automatically diagnose potential problems as they arise, and suggest ways to fix them.

At HPE, we've developed an intelligent storage system – known as HPE InfoSight – which automatically moves data where it's needed, when it's needed to create the most business value. Built with predictive analytic capabilities, HPE InfoSight can identify and fix failures and inefficiencies before they happen.

The following articles have been created to address the latest in deployable IT storage technologies, including the move to software-defined networks and artificial intelligence (AI):

1. **Practical Broadcast Storage - Part 1** is an overview of the three main types of storage available today, as well as the advantages of advanced IT and AI storage for broadcasters.

2. **Practical Broadcast Storage - Part 2** discusses the power of AI in enhancing future predictions, automating storage efficiency, and improving broadcast user experiences in real time.

3. **Practical Broadcast Storage - Part 3** shows how AI has influenced and significantly improved the reliability and resilience of broadcast storage systems.

We hope you find this Essential Guide a useful springboard for helping you identify and plan your next storage solution.

If you want to take advantage of HPE OEM Solutions' decades of broadcast innovation expertise, please get in touch and start building the broadcast systems you need to meet current and future market demands.

Sincerely,

Rod Anliker and Matt Quirk

Rod Anliker.

Matt Quirk.

[1] http://www.eweek.com/storage/media-entertainment-sectors-piling-up-content-in-clouds

Practical Broadcast Storage

By Tony Orme, Technology Editor at The Broadcast Bridge

Part 1

Broadcast and IT technology collaboration is continuing its journey with the cross-over between them becoming ever clearer. Storage is a major growth area with advanced methods achieving greater efficiencies and resilience. And as broadcast repeatedly demands more and more capacity, IT innovation is taking broadcasting to new levels of productivity.

Broadcast technology developed in the 1950's to record and playback media is still with us today. Even as broadcasters move to new digital server playback methods, the working practices video tape systems provided are still prevalent. To be more productive, broadcasters must embrace the complex methodologies and working practices of IT data storage now available.

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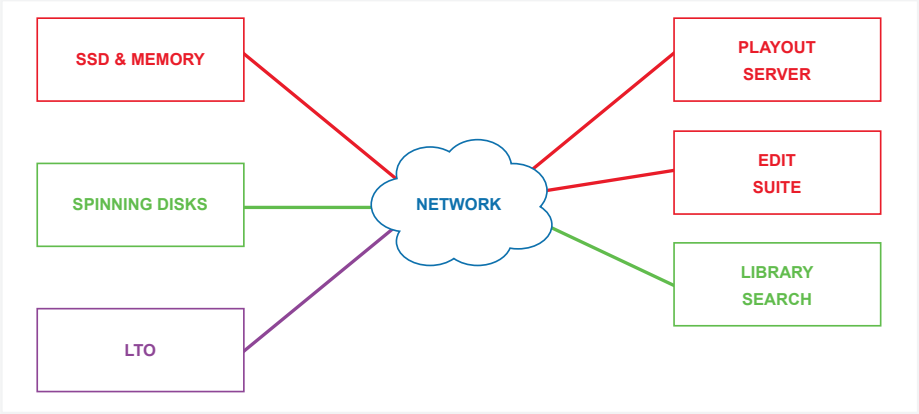

Diagram 1 – Using the IT storage, media assets are moved between technologies to improve efficiency. SSD and memory provides high-speed data to the playout servers and edit suites for transmission and on-line editing, spinning disks are used for general storage for the library search, and long-term archive and library storage uses LTO.

Most mainstream broadcast manufacturers have now stopped manufacturing replacement components for their VTR's, especially heads. Consequently, there is a massive drive to transfer video tapes to IT storage as there is a real fear that parts will soon become unavailable. But choosing the right storage is not as easy as it may first seem.

Advanced Storage

IT storage has moved on significantly from the simple spinning disk to take advantage of the advanced storage technologies now available. Although it's difficult to draw any true demarcation between them, three groups of storage type have emerged. LTO (Linear Tape-Open), high data capacity but low speed, spinning hardware disk drives, medium capacity and medium speed, and SSD (Solid State Drive) and memory, lower data capacity but incredibly high speed.

In the ideal world, all our data would be stored in SSD and memory to allow data to be available with the lowest delay and latency possible. However, SSD and memory storage is orders of magnitude more expensive than spinning disk drives and has a limited lifespan. And LTO tape storage is still more reliable than disk storage for long term archiving.

Consequently, data needed "now" is stored in SSD and memory, data needed with a small delay is stored in spinning disks, and data not needed for some time, or archive data, is stored in LTO. Intelligent data management systems constantly balances the need of the user with the technology available by moving information between the relevant storage medium.

Optimize User Experience

Using a bank as an example, SSD and memory would be used to store client information for high users of credit cards. When they present their card to the merchant, the banking system validates the card quickly to give the user the best possible experience. If the client hasn't used their credit card for some time, then their details may be moved to spinning disks giving a slightly longer delay when validating the sale but providing more regular SSD and memory customers with a consistent experience.

LTO archive would be used to store historic transactions. The bank wouldn't need access to this information immediately but would still be able to retrieve the data within a few hours. This would be fine for a forensic audit.

This model has developed over many years and has its roots in the 1970's when mainframe computing systems would move data between memory, disk drives and tape storage. And as new technologies are developed to improve latency, storage capacity, and reliability, the prevailing solutions are upgraded.

New to Broadcasters

However, the differentiated model of storage is new to broadcasters as they have always designed for maximum peak demand with minimum delay delivery for the entire system, especially in live environments such as news and sport.

Efficient information retrieval requires the association of accurate and refined metadata to facilitate searching and indexing of information. Due to the abstract nature of video and audio representation, its proved difficult to label video tape and digital clips with any meaningful information. This is usually restricted to timecode indexing with limited text references.

Video Tape Risk

As technology advanced and better video and audio standards became available, many of the tape formats used proprietary systems requiring obscure manufacturer specific hardware to record and playback the video tape. Nobody knows until the tape is threaded onto or inserted into the machine whether the material is retrievable or not.

Even if a broadcaster has moved to server storage and hasn't adopted IT best practices, or modern IT storage methodologies, then they will not be leveraging the benefits of advanced data storage. The challenge is the same as it is with video tape, it is just that it exists on server storage and not physical video tapes.

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Robust and Resilient

Moving to advanced IT storage gives us three distinct advantages. Firstly, IT storage and retrieval systems are much more efficient, scalable, and cost effective. Secondly, advanced storage systems are much more resilient as they constantly monitor data retrieval and analyze for disk errors and can predict failures. And thirdly, due to block storage methodologies, metadata is a function of the data being stored and is not associated with the physical medium it is stored on.

Live broadcast television requires media assets to be instantly available for real-time playback. Although high-speed data storage is important for the clip being transmitted at that moment in time, and any other media that is needed for the show, all the other media available to the broadcaster does not need to be stored in the high-speed storage.

Live programming requires a great deal of planning. Video tape assets must be available and even if media is stored on video servers, somebody must make sure the clip is physically on the machine and not on a mapped network drive somewhere. Although primitive, this proves advanced IT storage for media playback is already established in television workflows. For many broadcasters, it's only a small operational jump to move to the more efficient progressive IT storage systems.

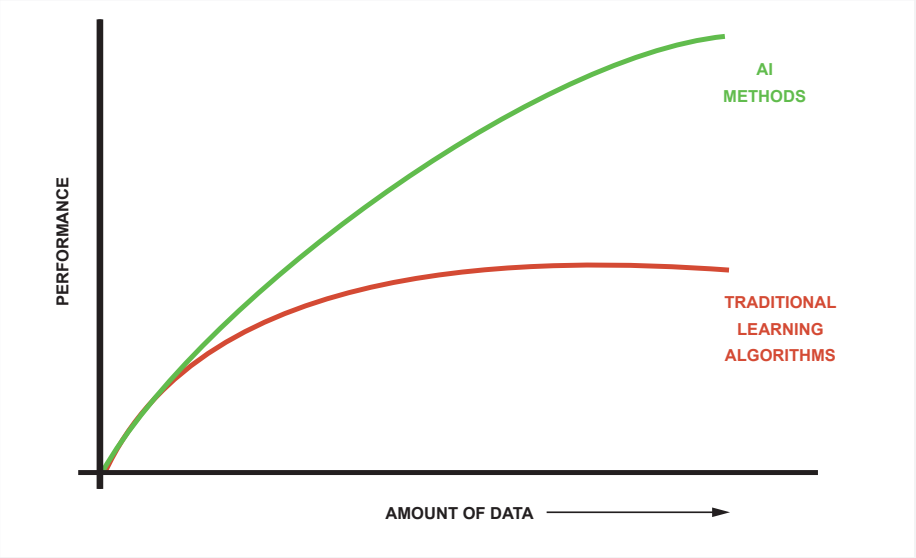

Diagram 2 - For broadcasters to leverage the benefits of Artificial Intelligence and Deep Learning systems, they must provide fast access to large amounts of data. Advance IT storage system make this possible and scalable.

Scalability is key when building any modern system. In the infrastructures of the past, broadcasters would have to calculate and predict how much storage was required, projecting anything up to five years into the future. Advanced storage allows broadcasters to scale both horizontally and vertically. Horizontally to increase storage at a specific technology. And vertically to increase or decrease the different technologies to meet the requirements of the operation.

Artificial Intelligence Storage

For example, if a broadcaster wants to leverage Artificial Intelligence, then they must increase the amount of SSD and memory storage available. Or if they are using international production teams working on a set of media assets, then they may need to be seamlessly moved to storage in a physical location close to their geographical operation.

Improved metadata is key to monetizing media assets. The richness of the metadata will make more of a broadcaster's library available to a greater audience as well as improving on their own internal workflows and working practices.

In Parts 2 and 3 we will dig deeper into the technology that underpins advanced IT storage and the highly intelligent systems they employ to simplify and automate workflows to improve efficiencies and scalability.

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Part 2

Broadcast systems are renowned for their high speed and high capacity data demands. Up to recently, they relied on bespoke hardware solutions to deliver the infrastructure required for live real-time uncompressed video. But new advances in IT data storage have now opened the doors for broadcasters to take advantage of this state-of-the-art IT innovation.

High-speed data and capacity requirements are now no longer exclusive to broadcasting, the proliferation of web sites and phone-apps has driven IT speed, capacity, reliability, and resilience way beyond the levels demanded by broadcasters. Big-data processing has further driven innovation and data storage systems capable of processing and streaming real-time video and audio is easily available using high-end IT solutions.

SDI broadcast infrastructures are highly tuned and optimized facilities that are difficult and expensive to maintain. Years of bolted-on tweaks and changes to facilitate new workflows add to the risk of outage and loss of transmission. Engineers are constantly chasing their tails trying to keep up with the changes to the system while maintaining high levels of reliability.

Web-site and phone-app service providers also encounter similar challenges to broadcasters, especially when trying to optimize data workflows, balance workloads, fine tune systems, and reduce the need for their team to constantly firefight.

IT Innovators Solutions

But IT innovators have been working hard to deliver high levels of intelligent automation and provide highly optimized infrastructures and workflows.

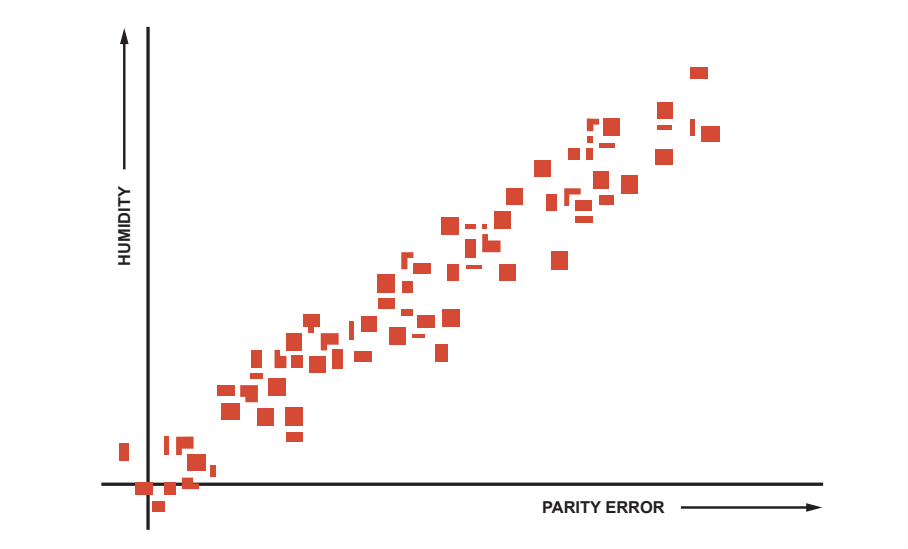

Diagram 1 – Although this statistical chart implies a high correlation between humidity and disc parity error, AI provides much greater levels of verification and prediction by parsing many more data sets.

Although the first experimental AI systems go back to the 1940's, recent advances in virtualized computation, networking, and storage has witnessed an explosion in the number of AI systems now available.

But what makes AI so important? Seemingly, we just analyze data collected from sensors and data-sets to help understand systems and provide a level of prediction. This method of statistical analysis has been used by engineers and scientists for hundreds of years.

By looking at the number of users logging onto a web-site, the designers can set a pre-programmed service to spin up new virtualized servers to meet the increased demand. If analysis indicates the number of users double for four hours on a Friday at 6:00pm, pre-emptive action can be taken to spin up the servers in anticipation of the increased demand.

Systems are Dynamic

For as long as businesses have been able to harness information, managers have analyzed data to help predict the future using ever increasingly complex statistical methods. But this form of analysis assumes a static or very slow-moving system.

Statisticians and Business Intelligence Analysts spend a great deal of time trying to find correlation between different data sets. In the example above, analysis indicated web-site users doubled at 6:00pm on a Friday. Although this is a simple example, it's difficult to establish with much certainty whether this is a trend or an anomaly. The data used for analysis is out of date before the information can be adequately scrutinized.

Context Aware

To improve the prediction, more data-sets would be needed so better correlations can be established. The prediction can never be 100% accurate, but accuracy is directly proportional to the number of correlated data-sets that can be established. AI comes into its own when we look at context-aware dynamic and fast-changing systems.

AI is a generic term that covers four different disciplines; reasoning, natural language processing, planning, and machine learning. Split into four more categories, machine learning includes supervised learning, unsupervised learning, reinforcement learning, and deep learning (or neural learning).

Traditional computer programming requires a set of logical rules to be provided for the data to be analyzed. Usually providing a series of decision trees, the programmer will parse the data and then provide binary outcomes. For example, if it's 6:00pm on a Friday, then spin up two more virtual web-servers.

Programming is Too Slow

Changing the data to variables, such as "6:00pm" and "Friday", allows generic rules to be established so that the time and day can be referenced from a database and easily changed. However, this method soon becomes complex and difficult to administer when the rules need to be adapted.

It might become clear that Tuesdays also need an extra server at 6:00pm. This would require the programmer to add an addition to the rule or add a completely new rule. The example is trivial, but complexity of the program soon escalates, and efficient software maintenance is further compromised.

The method is slow and potentially problematic as the rules must be constantly adjusted to improve the efficiency of the system.

AI Generates Rules

Instead of manually programming rules for the data, AI takes the opposite approach and the data is used to automatically generate its own rules within the context of the data it's working with in real-time. And that is the true power of AI.

Algorithms continuously monitor historic as well as real-time data and find accurate correlation between the data sets to help improve the future predictions for the system. This approach further improves efficiencies to take advantage of dynamic systems to constantly balance resource.

In the previous article in this series we looked at how advanced IT storage systems balance the user experience against the different storage resource available. An edit system would require instant low latency access to their edit masters and rushes, and this would be provided by the Solid-State-Device (SSD) and memory storage during the edit session.

Improving Efficiency

It would be uneconomical to continue to keep the media files in the high-speed storage when the edit session had finished so the files would need to be copied back to spinning disks. Although manual rules could be established to copy the files between the two storage mediums, AI provides a far more efficient method of providing this facility.

Algorithms can establish which files to copy based on previous sessions and the editor's behavior. If the editor was previewing off-line rushes earlier in the day, the AI algorithm would associate these files with them and automatically copy the media files to SSD and memory storage associated with the edit suite for their edit session.

Real-Time Analysis

AI not only provides ever increasing efficient levels of automation, it does it without any human analysis, programming, or intervention. The algorithms learn the behavior of the storage dynamics and accurately predict which files need to be transferred between the different storage medium to improve the user experience and make the most of the resource available.

All this happens in near real-time making the traditional record-analyze-program methods now obsolete. In the next article in this series, we look at how AI has influenced and greatly improved the reliability and resilience of storage.

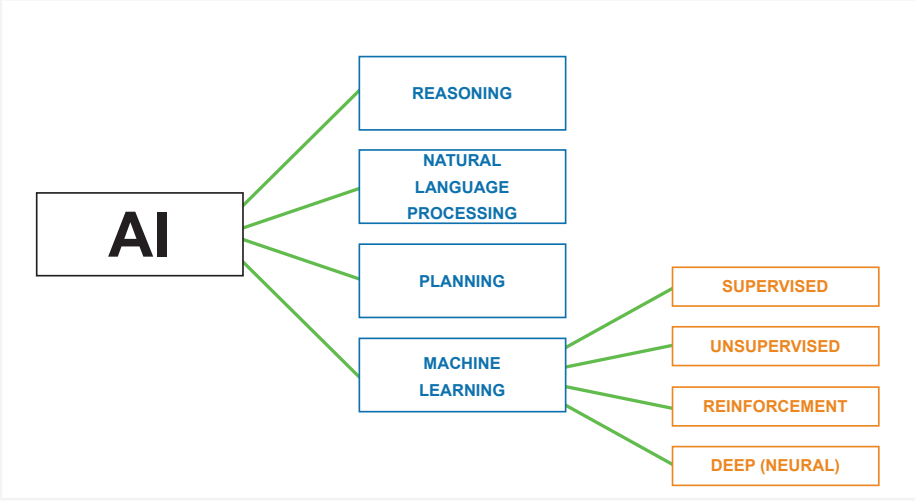

Diagram 2 – AI encapsulates four different disciplines and machine learning is further classified into four more classes.

Part 3

Artificial Intelligence (AI) has made its mark on IT and is rapidly advancing into mainstream broadcasting. By employing AI methodologies, specifically machine learning, broadcasters can benefit greatly from the advances in IT infrastructure innovation and advanced storage designs.

In the previous articles advanced IT storage systems were introduced and the benefits of each storage medium was investigated. Strategies to transfer files using AI were considered along with a brief introduction to the differences between simple statistical analysis and predictive AI.

Context-aware data-sets are those that have a high degree of correlation between them for the AI system in question. More correlation leads to improved future predictions of system behavior and greater efficiencies for dynamic systems.

Accurate Correlation is Paramount

For example, a data set that provides a record of disc drive parity errors combined with environmental measure such as temperature and humidity is a much greater predictor of disc drive failure than just detecting parity errors alone.

It might be that disc drives suffer parity errors when the humidity or temperature increases and once the environmental conditions restored the parity errors would subside. Although this may only cause a temporary delay to data retrieval it could potentially cause a shortened life expectancy for the disc drive. A traditional monitoring system would detect the initial errors and log an alarm but after a passage of time the log would be deleted or just forgotten about.

Diagram 1 – Reinforcement AI systems use a feedback loop to measure the outcome generated by the environments and provide a reward that is used to enable the intelligent agent to adapt and learn.

Find the Patterns

In this scenario the data-sets are thought of as two separate sources of information and they become separated from the long-term event, that is the failure of the drive. Its possible that other drives in the same rack didn't suffer any parity errors due to manufacturing tolerances. Therefore, any correlation between the failure of one drive and a brief rise in temperature or humidity many months before could easily be over looked.

It is scenarios like this where AI excels. AI algorithms constantly analyze data-sets and logs and look for correlation of patterns between them. The data might be from sources other than the disc drive, such as the environmental monitoring system or power logs, but combined they provide a powerful source of truth.

Optimize the Result

For AI to be truly successful it needs to aim for a known result so it can automatically tune its algorithms to look for ever increasingly accurate patterns of data and correlations. In the case of a disc drive failure the outcome is clear. Once a disc has failed the algorithm can hone into the related data-sets and find the required patterns.

Over time, more disc anomalies occur, and the AI algorithms increase their database of information. Furthermore, a vendor may make its anonymized analytical data available to all users of similar products thus further increasing the number of potentially correlated data sets and give global scope. This helps prediction and pre-empts failure.

Share Analytical Data

In our disc drive example, another client may have witnessed a similar scenario which resulted in a disc drive from a specific batch failing prematurely. This information could be recorded into a data-set and made available to other users of that batch of drives. This anomaly wouldn't be enough to trigger the replacement of all drives of the batch, only those that had suffered similar environmental changes in temperature and humidity.

A fine balance must be achieved when enforcing preventative maintenance. The very act of replacing a component such as a disc drive or power supply increases risk and can have unintended consequences. In this example, its not that the disc drive is necessarily faulty, just that in this situation its life expectancy may tend to the lower end of its Mean Time Between Failure (MTBF) specification. The AI algorithms creating data-sets throughout the world have shared information and can determine any disc drives with similar environmental deviation will fail in three years instead of five. It's still within its warrantee specification so not all drives should be replaced.

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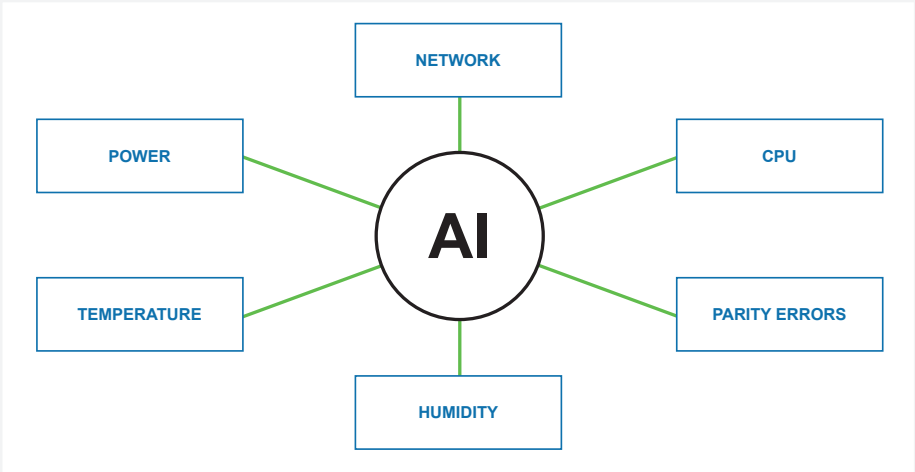

Diagram 2 – AI systems receive information from a diverse set of sensors and data-sets potentially from around the world, and run complex algorithms to find correlated patterns in real time, often these patterns are not easily available to human analysis.

Pre-Empt Failure

Predictive automation is used effectively to warn users when serviceable components need to be replaced or if an unexpected fault is developing in the hardware.

A further benefit is the simplification of complex storage systems. Traditionally, IT departments have relied on a small group of engineers who gain very specific detailed knowledge of how complex systems work in order to fine tune and optimize them. This is especially evident in storage due to the real-time interaction between the different storage mediums and the specialist long form files used in broadcasting. Predictive AI can help a business reduce its reliance on such specialist knowledge.

As well as predicting component life expectancy the correlated data is a rich source of information to provide both automated and suggested configurations for optimization. Again, this occurs in real-time and the AI optimization provided removes the dependency on local system knowledge. As the analytical information is anonymously shared throughout the globe, the accumulated specialized data leading to highly optimized storage that is far greater than any single expert or group of experts could ever hope to achieve.

More and More Data

AI is not restricted to obviously related data-sets and in some instances the more varied the available data-sets are, the more accurate the predictions become. This is a great benefit to cloud hybrid solutions. Analytical data gained from cloud systems can be used by the AI algorithms to optimize and simplify their interaction. Automated analysis can suggest when to use cloud systems and provide accurate costing information to help determine if on-prem systems should be used.

In the extreme, any part of the infrastructure that is creating monitoring logs or analytical data can be integrated into the AI algorithms to improve their predictions, optimization, and over-all efficiency.

AI Wins

The key win with AI is that the algorithms are constantly learning and adapting to new operational scenarios in real-time, many of which cannot be simulated in the development lab or tested during manufacture. It's unreasonable to expect vendors of storage systems to test for every possible environmental condition and event that could occur in the work place. This is even more evident with complex storage systems due to the exceptionally high levels of interaction between the storage mediums.

Innovation in IT is continuing to benefit broadcasters looking to leverage complex systems and infrastructure. AI, using context-aware algorithms and data-sets is leading the way to help simplify and optimize highly specialized IT storage to constantly balance the user experience, cost, and reliability.

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The Sponsors Perspective

Storage: How To Solve 5G's Biggest Challenge

The arrival of 5G brings both opportunities and challenges to communications, media and entertainment companies, as well as the original equipment manufacturers (OEMs) working to support them.

With three times higher capacity than the current 4G standard, 5G will generate exciting possibilities for the industry, including the delivery of on-site live event experiences, collaborative multiplayer online gaming on a larger scale and more cooperative media production services.

However, the industry will have to concurrently handle higher download speeds, growing data volumes, and ever-increasing demands for storage.

Current Storage Systems Need To Evolve For Today's Hybrid Cloud World

It's widely accepted that data volumes are growing, and will continue to grow, at an exponential rate. According to IDC, the amount of data created will reach 163 zettabytes by 2025, an increase of nearly 4,000 percent in little more than a decade[1].

[1] The Economist, 'Data is giving rise to a new economy,' May 6, 2017.

The problem extends beyond just volume. Data is now no longer confined to data centres, but can exist anywhere in the hybrid clouds, and is also increasingly being created and used at the edge of the network. For businesses to extract value from data, the latter needs to be readily available when and where it is needed; otherwise, data access takes more time, using more resources, decreasing efficiency and driving up costs, as well as eroding the customer experience.

Many current storage models are not designed to be deployed under these circumstances, which means that the process of moving data through the network or into and out of cloud services is subject to degradation or interruption.

It's time for a new kind of storage that can automatically provide the insights needed to optimize data placement, as well as predict and prevent problems.

Next-generation Storage Technology Is Intelligent

Intelligent storage from Hewlett Packard Enterprise (HPE) OEM Solutions comprises data centre storage hardware and cloud storage services that collect data from your IT environment and apply artificial intelligence (AI) to manage it. These intelligent storage technologies – collectively known as HPE InfoSight – continuously learn in their hybrid cloud surroundings to precisely understand your workload needs, move data to where it needs to be, and align costs to business value, all in real time.

HPE InfoSight continuously monitors your infrastructure data for patterns and events matching signatures that identify developing problems or opportunities for improvement. As new problems are detected, it can provide automated guidance to help you understand exactly what the problem is, where it lies, and how to resolve it — even if it lies outside the realm of storage.

The benefits of intelligent storage speak for themselves: users report 79 percent lower operational expenses[2] and a 20x reduction in cloud storage and transfer costs due to efficient data reduction[3].

At the same time, it is important to not view the storage challenge as a silo. Future-proofing your business goes beyond just adding more storage technology – it's about better data management.

The OEMs that will gain substantially are those that can help their customers better manage, transfer and store data. They will enable high-quality content, from more sources, consistently and at scale across multiple network technologies including 5G. One of the best and fastest ways to achieve this is to create an innovative edge solution.

Use new edge technologies to drive innovations that meet market demands

The edge can use AI, machine learning and automation to continuously learn, predict, and adapt to changes, needs, and threats in real time. This allows communications, media and entertainment organizations to act locally, in the moment, in context.

By developing products that take data center-level compute to the edge, your customers can minimize latency, which improves the viewer experience, reduces bandwidth, lowers costs, reduces threats, avoids duplication, improves reliability, and maintains compliance.

Having identified the edge opportunity early on, HPE OEM Solutions has already made large investments to lead the market in edge technology, and offers the full spectrum of rugged, edge-to-cloud products that are easy to manage and designed to flourish, even in the harsh edge environments where cameras are often in use.

Leading communications, media and entertainment OEMs like Nokia and Imagine Communications are partnering with HPE OEM Solutions to benefit from plug-and-play edge technology, OEM-specific expertise and 24/7 global support to bring solutions to market. These partnerships have already resulted in cutting-edge products tailored to current market needs.

Another of our broadcast partners, Starfish Technologies – as a result of collaborating with HPE OEM Solutions – has broadened its solutions portfolio and taken its business global.

Starfish Technologies: Creating A New Content Delivery Model

To compete in a crowded market and expand its business, Starfish needs to deliver turnkey, integrated digital video solutions while reducing operational costs and improving customer satisfaction.

Since teaming up with HPE OEM Solutions, Starfish is now able to offer solutions that enable digital streaming on multiple platforms, advert insertion, system monitoring and compliance recording – all of which are consolidated on high-quality HPE OEM Solutions servers configured to address the unique needs of each customer.

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[2] Enterprise Strategy Group, "Assessing the Financial Impact of HPE InfoSight Predictive Analytics: A Quantitative Analysis of HPE Customers," Adam DeMattia, Sept 2017.

[3] Illustrates potential savings based on HPE customer surveys.

By delivering software bundled and configured on high-quality HPE servers, Starfish has lowered implementation and support costs per customer by 20 percent[4].

By partnering with HPE OEM Solutions, your OEM business too can:

- **Innovate faster**: Using HPE OEM Solutions' existing components as building blocks allows you to focus on the value-add features and capabilities of your final product or service, and speed time to market.

- **Power edge analytics:** Edge solutions allow you to optimize capabilities and processes at the edge to create a more intelligent content management and delivery model. The data center-level performance and data handling of HPE Edgeline Converged Edge Systems enables deeper real-time analysis of operational data. Meanwhile, HPE OEM Solutions' fully integrated edge-to-cloud architecture allows your customers to generate timely and efficient decisions at the edge, and better analyze and connect data to enhance organizational-level decisions.

- **Minimize risk:** HPE Edgeline Converged Edge Systems enable data center-level compute and management directly at the edge. This helps reduce traffic to the data center, giving hackers fewer interception opportunities. Also, the data that is transferred can be stored in HPE Gen 10 servers, which are the world's most secure industry standard servers.

- **Benefit from AI-driven storage:** Unlock the full potential of all your data with the world's most intelligent storage, which precisely understands different workload needs, moves data to where it needs to be, aligns costs to business value, and can self-adjust in real time.

- **Gain from global support:** HPE Pointnext Services offers 24/7 global support, from design and implementation through to on-going customer care. Most crucially, Pointnext helps you develop the right consumption model. HPE OEM Solutions can deliver on-premise models with pay-per-use pricing, end-to-end lifecycle management, and capacity planning and management. This means you only pay for what you use, allowing you to focus on your apps and data, rather than your infrastructure. HPE OEM Solutions also has a number of partnerships to extend this model to off-premise providers.

The communications, media and entertainment industry is looking for OEMs to provide robust technology for the upcoming 5G era. Few companies can take on the 5G challenge on their own, which makes partnerships even more crucial, especially if OEMs want to create relevant, market-ready solutions quickly, securely and efficiently.

Stay ahead of your competition in the media industry, now and in the future, with HPE OEM Solutions. Find out more at www.hpe.com/oem/media.

[4] https://h20195.www2.hpe.com/v2/getdocument.aspx?docname=a00009096enw

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