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The Connection

A Journal for the HP Business Technology Community

Harnessing Big Data With NonStop and Logical Data Warehousing

Cloud-enabling NonStop Systems: Why You Should Care and How You Can Do It

The State of Automation
Going beyond the easy stuff with Quality Center

PLUS

Slice of NonStop interviews Sean Mansubi

Richard Buckle warns Will Robinson!

Dr. Bill Highleyman on Advocacy

May – June 2013 | Volume 34, No. 3

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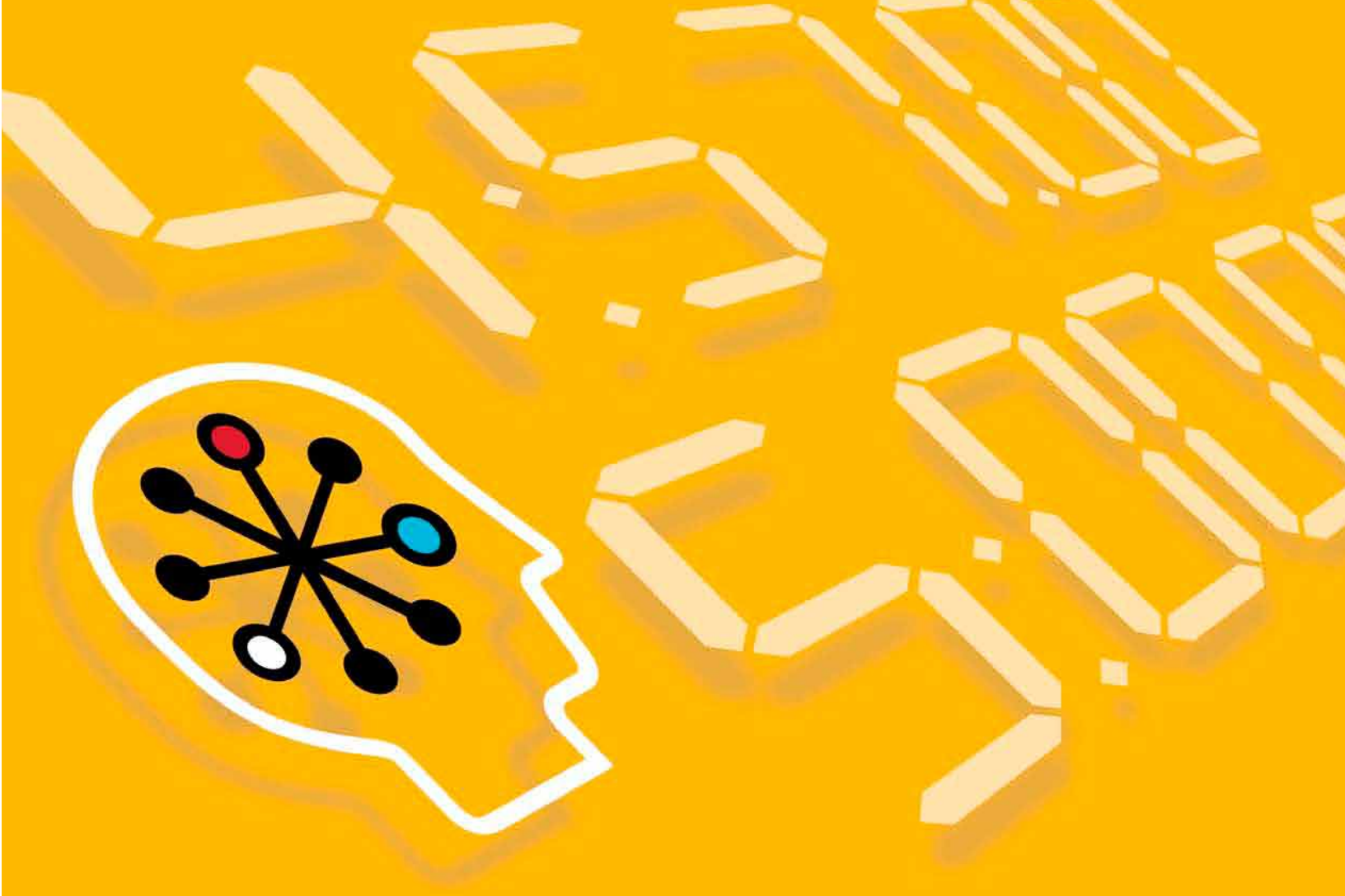

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News from HP's NonStop Enterprise Division

The theme of this issue of The Connection is application modernization. A quick glance at what NonStop has been up to over the past few years shows that modernization isn't limited to just the applications – you'll find that it also includes the hardware, the database and systems management plus the tools and development environment to go along with it. And for NonStop, we are always conscious of the fact that modernization must not come at the cost of meeting the mission critical needs of our customers.

On the hardware front, NonStop has clearly delivered on our strategy to move towards standard infrastructure. Built on common modular building blocks, we support all the relevant open standards for ease of application development and portability on the industry-leading HP Blades, standard memory, I/O, disks and power and cooling technologies. This allows for simplified integration into the data center and a lower cost of ownership, while still maintaining the continuous availability, scalability and reliability that you depend on from NonStop.

The investments we've made have also come to fruition on the software front, resulting in modern development tools and a more modern and open development environment. This gives you the ability to develop, architect and deploy your applications using industry standard tools. It allows you to integrate your applications with other applications in the enterprise as SOA services. You can store your data in NonStop's high performing standard relational database, while accessing it via industry standard database access technologies. Continued enhancements to NonStop's integrated stack also means easier porting of applications to NonStop, open source familiarity and cost-efficiency while still being fortified for software fault tolerance. For more information, see "How to install a modern app in OSS" by Rebecca Howey and Thomas White of HP's Advanced Technology Center team. Other HP articles of interest in this issue include HP Master Architect T.C. Janes' thoughts on big data, "Harnessing Big Data with NonStop and Logical Data Warehouse". In addition, you can learn more about HP's VP of NonStop Systems Development, Sean Mansubi, in Janice Reeder-Highleyman's Slice of NonStop.

Finally, I'd like to close with a sneak preview of NonStop at HP Discover 13 in Las Vegas. Sean Mansubi and I will lead with the business breakout session HP NonStop. Because your customers never wait. In it we will discuss our strategy, roadmap and how we fit in with the broader HP. I will also share some exciting ways customers are using NonStop outside of our traditional markets (hint: we're everywhere!). You will also have an opportunity to attend more in depth sessions on the hardware and software roadmaps, hear from HP NonStop experts in payments and telecommunications, and learn more about our latest application and development options. Of course, HP Discover is always a great opportunity to meet our fabulous partners and customers, and to learn about what's going on in the rest of HP. Sean and I look forward to seeing you there – be sure to ask him about his paper.

Randy Meyer
Director, HP NonStop
Product Management,
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A Note from Connect Leadership

As I looked over the articles for this month's Connection, the theme that really struck home with me was modernization. This was because I've spent the last couple of month's modernizing the City of Sparks' main data center.

When I started working for the City 29 years ago, we only had one HP 3000 server and 20 terminals. Over the years we've slowly added many more servers, a Storage Area Network and have added blades and virtualization.

The problem was that it was added almost haphazardly. And then I needed to add another blade chassis this year and our electricians said, nope…you are out of power.

It was a shock at first, but then we all realized that when our City Hall was built in the late '60's they built a great computer room for 1969. Over the years we hadn't done much to keep up with our power needs except adding a UPS and a circuit breaker here and there.

I took this opportunity to do more than upgrade my power. With help from my HP reseller we designed a new layout, planned for new cables and networking and also planned for future growth.

My staff and I spent a 14-hour day unplugging and moving every cable, server, power cord and then plugging them back in to get the servers and network working again. This was a challenge of major proportions that actually went off with only minor bumps as we went through the day. Pizza did help.

Power is still an issue. But that problem will be taken up as they rewire our entire City Hall this fall. I've also got a UPS that I'm working on finding budget to replace in the next year or so. And storage just continues to beg for more storage.

Speaking of wanting more, Connect NonStop users have a lot to look forward to this fall with another Connect NonStop Advanced Technical Boot Camp in San Jose November 3-5. This opportunity to gather with other NonStop users, HP Executives and engineers from around the world is your chance to update your knowledge of NonStop.

As always, feel free to contact me at any time. I look forward to seeing many of you at HP Discover in Las Vegas and other events over the rest of this year.

Steve Davidek
President, Connect Worldwide

A Slice of NonStop

Sean Mansubi Wrote a College Paper on Tandem. Now He's Vice President of NonStop Systems Development

Janice Reeder-Highleyman

Janice Reeder-Highleyman is Seeking the Peak in July. This annual hike-a-thon supports the Mount Washington Observatory, located at the top of the highest mountain in the Northeastern U.S. It's an all-day climb and descent for Janice. Having made the trek several times in the past, she considers quitting every year because of her advanced age. However, innovative hiking equipment keeps her on the trail, just like NonStop modernization enables the platform to remain relevant decades after its inception. Contact this freelance writer, editor, marketing specialist, and former ITUG chair at jreederhi@nac.net.

Sean Mansubi first introduced himself to NonStop in the 1980s when he was a Master's candidate in Electrical Engineering at San Jose State University. He already was working for HP and could have selected numerous topics about which to compose a research paper. Instead, Sean had heard of a unique data-processing platform with a reputation for extreme reliability and superb customer service. Intriqued, Sean decided to write his paper about Tandem Computers. Talk about foresight. Almost three decades later, Sean is HP's Vice President of NonStop Systems Development; and he remains as enamored of NonStop technology as he was during that initial introduction.

A Quality Customer Experience is Sean's Passion

Sean has held numerous management positions during his HP tenure - R&D roles, technical marketing assignments, Level III technical support responsibilities for HP's Enterprise Business, to name a few. But where Sean has spent the majority of his HP career and what Sean enjoys most is direct interaction with customers. It's no wonder that NED's conscientious care of NonStop customers resonated with Sean when he first assumed oversight over NonStop's hardware design and development. That was in 2008. Today, he oversees both hardware and software design and development.

One of Sean's initial goals was to learn as much as he could about the NonStop customer base. Somewhat to his surprise, that was easy. Randy Meyer may be famous for rattling off the names of every NonStop customer, but Sean discovered that the entire NonStop team is well-versed in the customers' stories: who they are and in what industries they're engaged, what solutions they use, what their hot points are, and what value propositions drove them to the NonStop platform. "What amazes me about NonStop customers," says Sean, "is how fiercely loyal they are to the platform. They have high expectations, and they are not afraid to approach NED with suggestions for product improvement. As long as we continue to provide them with a robust, high-quality solution that addresses their most complex challenges, NonStop customers will continue to embrace the brand."

NonStop is No Stranger to HP Staff

Throughout his HP tenure, Sean has worked with HP-UX, MPE, HP3000, HP9000, and even HP1000. He engages regularly with HP employees in other groups and divisions and thus is puzzled by the sense among NonStop customers and partners that NonStop is not well-known within HP. Sean disagrees. What he's seen both from middle management and senior personnel is a solid understanding of NonStop technology and its place within HP's enterprise class of servers. "Perhaps there was a time years ago when the benefits of NonStop may have not been well understood. But that is not the case now," Sean explains. "When I introduce myself to others as the Vice President of NonStop System Development, no one – not one person – ever asks me, 'what's a NonStop?'"

Investment Protection is a Top Priority for Customers

A well-defined strategy, superior products, properly executed roadmaps, and delivery on commitments – all are expectations on which NonStop customers have come to rely. In his interactions with customers and with NonStop partners, Sean hears most frequently the insistence on investment protection. Nowadays, that translates into NonStop modernization, a move toward open standards with regard to both hardware and software, expansion of the NonStop footprint into new geographies and markets, and attracting additional ISVs so that a broader solution portfolio is available to customers. "Customers expect NonStop to evolve," explains Sean. "However, they don't want the evolution to require them to have to constantly throw out their old stuff and buy new stuff."

How do you retain the uniqueness of Nonstop fault tolerance and continuous availability – the very features that have attracted such a loyal customer base – while modernizing fundamentals like the NonStop Kernel and ServerNet and placing them on Integrity, the standard BCS hardware? At what point does NonStop lose its uniqueness through modernization? Where those two questions merge is where the value to the customer is at its greatest. Therein lies the challenge for NonStop, one on which Sean and his team focus every day.

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Advocacy

SIGs are Dead. Long Live the SIGs

Dr. Bill Highleyman
Managing Editor
Availability Digest

Dr. Bill Highleyman is the Managing Editor of The Availability Digest (www.availabilitydigest.com), a monthly, online publication and a resource of information on high- and continuous availability topics. His years of experience in the design and implementation of mission-critical systems have made him a popular seminar speaker and a sought-after technical writer. Dr. Highleyman is a past chairman of ITUG, the former HP NonStop Users' Group, the holder of numerous U.S. patents, the author of Performance Analysis of Transaction Processing Systems, and the co-author of the three-volume series, Breaking the Availability Barrier.

Included in the March/April 2013 issue of The Connection was our Advocacy column, "Planning Our Way Forward." In it, we talked about the current state of Connect's Advocacy program. We noted that the Advocacy program was suffering from lack of use and from an apparent waning of HP interest.

A decade ago, we had an active online Advocacy forum and thirty-day responses from HP on issues that we escalated to them. We also had very active management Q&A sessions at our conferences. Advocacy was thriving. As time went on, however, the participation by our membership in the online process dropped to almost nothing.

To rejuvenate Advocacy, we turned to SIG (Special Interest Group) meetings at our conferences. They were active for a while but then have fallen into disuse as well. To make matters worse, the management Q&A sessions that meant so much to us disappeared. Advocacy was on its last breath.

There appeared to be two factors affecting the SIGs. One factor was that interest in SIGs had dropped off. SIG meeting attendance at the conferences had fallen, and SIGs were mainly attended by vendors rather than users. The other factor was that HP had become less responsive to the issues escalated to it, in part because of the small attendance at the SIG meetings. Why should we bother submitting issues that will be ignored by HP?

It is time once again to revive our Advocacy program. In last issue's article, I explored several tactics your Advocacy Committee was considering. We have now selected a course that we will implement in the next few months – LinkedIn forums.

It is apparent to us that our members flock to LinkedIn. LinkedIn forums are structured to make them easy to use and easy to administer. In the NonStop world, there are many active LinkedIn forums, including HP NonStop Tandem Professionals, the Tandem User Group, the NonStop Partner SIG, the NonStop Vendors Only SIG, NonStop SQL Professionals, the Continuous Availability Forum, and Real Time View.

It seems that everyone knows how to get onto LinkedIn and how to participate in discussions. Isn't this the perfect forum for a SIG? We think so. The NonStop SQL Professional SIG thinks so. Headed by Scott Randall, the SQL SIG, which lives on LinkedIn, has been one of the few successful SIGs in recent years.

Your Advocacy Committee unanimously agrees that LinkedIn is our course to salvation and have made this recommendation to the Connect Board. They have agreed and authorized us to move forward. In preparation for launching LinkedIn SIGs, we are now preparing the "rules for engagement." Though still early in the process, the rules include:

- The considerations for approving a new SIG and finding a SIG leader will be established.
- A "how to" list to guide new SIG leaders in setting up their LinkedIn forum is being prepared.
- The SIGs will be private. Only members approved by the SIG leader can join. This provision permits open postings that might not be appropriate for the world to see.
- SIG members must be Connect members.
- Product promotions will not be allowed.
- SIG leaders, at their sole discretion, can remove any posting they believe is inappropriate.
- The use of SIG forums will be used to advertise polls related to the SIG and to post the results.
- The criteria for escalating issues to HP will be based on a support metric to be determined.

Of course, no Advocacy program will be successful without HP's unqualified support and involvement. We will work closely with HP to ensure that the issues we escalate have enough support to warrant HP spending its resources to respond. Along these lines, we would like to welcome Susan Underhill and Michelle Doss of HP, who have been assigned to work with us on our Advocacy program to ensure that it will provide HP with useful feedback.

We look forward to a new era of active SIGs, including many new, exciting ones, such as Big Data, Enterprise Networking, and Enterprise Security. If you would like to offer comments on our plans, please feel free to contact our Advocacy Committee chairman, Alan Dick, at aland@logis.co.nz.

Advocacy almost died. We hope social media comes to its rescue. Long live Advocacy!

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Episode IV – A New Hope

(…for both Archived Legacy and Real-Time Transactions and NonStop EMS Alerts)

Mark Whitfield
Principal Consultant
Insider Technologies

Mark Whitfield is a Principal Consultant for the RTLX payments software at Insider Technologies and has spent over 22 years working with HP NonStop (formerly Tandem) systems at ascending points in the software development lifecycle.
After graduating, Mark's first 5 years were spent in NonStop electronic banking at what became FIS (formerly Deluxe Data International Operations / eFUNDS) working on sp/ARCHITECT which eventually evolved into CONNEX Advantage.
In 1995, Mark moved to Insider Technologies to focus more on HP NonStop monitoring, diagnostic and payments software which included software design, team leading and eventually product management for enterprise manager, BASE24, eps, XPNET and payment engine integrations. Email: mark.whitfield@insidertech.co.uk

A long time ago (well, 2010) at an EBUG conference far, far away (I guess it depends on where you're coming from but anyway, Madrid)… Cue anthemic signature music and then, as the strings slowly fade away, pan low and left to a NonStop hand held aloft on the back row of a technical track presentation and an Insider speaker raising his eyebrows to acknowledge… 'Yes, at the back'… a qualified voice is heard and a question is raised… 'Can I store and query on 10 to 15 years' worth of legacy, tape archived BASE24 TLF and PTLF transaction log data?'… the qualified voice continues… 'I would also like to query on related EMS messages, POS and ATM administration data'…slight pause… 'Oh yes, and display appropriate standard and custom tokens for EMS alerts, TLF and PTLF transaction data'… and one last volley of questioning tone 'with consideration towards on-site directives for PCI DSS compliance?'…

The Insider speaker is not fazed by the informed, acronym ridden questions but rather smiles knowing that his subsequent PowerPoint bullet points have all been pre-empted, phew. The usual adrenaline and nerves subside and the Insider speaker relaxes into a recent case study where all these questions have been answered. For a moment or three, he adopts the character of Morpheus talking to Neo (in 'The Matrix' training program… good code that) and presents his beautifully animated slides (probably over animated to be honest) as if to say 'Welcome to the World of the Real!'… In Reality, in answer to the delegate's question, I probably just said… 'Yes, all of that can be achieved and more, much more' but as a movie buff, I like to remember my past podium performances with a little more romance and poetry injected. That aside, the science fiction from this point on, now becomes science fact.

Fact: A Microsoft SQL Server database can contain up to 999 partitions (15,000 in MS SQL Server 2012)

Fact: Hard drive sizes these days are measured in terabytes. My desk ruler bears this out on the external hard drive I use to store NonStop IT conference photos.

Fact: 10 – 15 years of transaction data partitioned by month (including header, authorisation, tokens, administration, settlement and summary data) equates to 50+ terabytes.

Fact: (I mean factual conclusion)… Storing and accessing this amount of transaction data is very, very doable with today's database technology, with room to spare… read on.

The theme of this issue of 'The Connection' journal is Application Modernization. Sometimes modernization can be as much about dove-tailing with and extending a reliable, business critical, legacy application (and trusted platform like HP NonStop) into more widespread technologies (alas, known more intuitively by those pesky (but likeable) graduates).

In this context of BASE24 transactions (and other competitor payment engine solutions) and NonStop EMS message alerts (generated by XPNET nodes, stations lines, links, processes, device handlers, WebSphere MQ, Open System Services (OSS), Pathway and so on), this means taking fully optimised data feeds from the payment application, across TCP/IP (v4 and v6), onto server platforms like Windows running Microsoft SQL Server. Whilst doing this, making sure to uphold those golden NonStop commandments of check pointing and fail over for restart situations (or glitches in The Matrix… that's right, I am beginning to believe) and ensuring that transaction and EMS data is appropriately normalised (masked and/or encrypted if required) and stored to enable ultra-rapid query response times.

This following case study highlights how one of Insider's many clients have successfully enhanced their BASE24 ATM and POS transaction querying capabilities, away from restrictive, legacy green-screens to intuitive, browser based, wizard-driven visuals. This initiative and strategy has alleviated many back office headaches for chasing enquiries by card holders and other bank departments.

Third-party solutions are available for taking transaction data off the NonStop platform (and other systems) for monitoring purposes, escalation, producing real-time charts and management information reports. This case study acts as a 'real world' (versus Matrix dream world) summary for what works when taking sensitive payment data sideways and of course, for building your own product checklist if currently looking for solutions for extensive EMS and payment querying (multiple years), monitoring and problem escalation in real-time.

Summary + Client Profile

One of the largest banks in the Middle East (ME) was experiencing a growing amount of pressure from the central regulator to provide fast turnaround of customer card queries (across multiple bank departments with non-technical, back office staff) for transactions that dated back from more than a few months, to sometimes over 8 years. Failure to comply with this Service Level Agreement (SLA) would result in financial penalties for the bank and given the extremely large numbers of transactions involved, this presented a considerable challenge.

The bank has a significant network in the ME area with over 500 branches, more than 3,100 ATMs, 25,000 POS terminals; installed with merchants within the network of SPAN, GCC Net, MASTERCARD and VISA; and the largest customer base of any bank in the Kingdom, in addition to 130 remittance centres.

The bank uses the latest version of ACI's BASE24 Classic product on HP NonStop to acquire, authenticate, route, switch, and authorize financial transactions and these are held online (on the NonStop) for a fixed period.

For POS and ATM transactions older than 6 months, the transaction log files (and their corresponding alternate key/index files) are typically archived to magnetic tape for mass storage by the bank. This is because the data footprint of transaction log files (both TLF and PTLF) requires a sizeable number of gigabytes for each bank processing day.

If a customer query concerns one or more transactions that are not currently online, the bank needs to locate the transaction log file on a given tape, restore the tape archived file to an accessible NonStop disk (with the correct file security settings) and locate the appropriate customer card transactions using the payment application green screens. This process can take a considerable amount of time which is in conflict with the Central Bank's SLA directives.

In order to meet these imposed SLAs, the bank needed to find a solution that enabled the turnaround of card queries in minutes and hours rather than days or longer!, using modern, optimized database access techniques, encryption and masking (where appropriate) and partitioning. This would then provide secure querying of terabytes of transaction data which could then also be archived using the latest technology.

Problem - Context

The main business drivers and requirements behind this card transaction querying project were:

- Increasing pressure from the central regulator and in-house audit and compliance directives to provide quick turnaround of card transaction queries in line with newly imposed SLAs
- Provide secure, user-friendly, fast querying of terabytes of ATM and POS card transaction data across multiple bank departments for non-technical staff to respond to inquiries both internal and external
- Provide access to card transaction administration data, e.g. POS settlement records
- Enable the parsing of BASE24 standard token fields (BASE24, ATM and POS - S6, 24, B8, B9, 03, B4, AG, B7, B0, B1, 08, B2, B3, etc. etc. etc.) as well as bank customized tokens both of which are located at the trailing end of each card transaction record (in the (P)TLF logs) in a non-specified sequence
- To provide a card transaction query solution within budget and to timescale to avoid financial penalties imposed by the central regulator for broken SLAs
- To comply with bank PCI DSS directives for encryption and masking of Primary Account Numbers (PANs) and other sensitive card transaction fields
- To enable the reading, relay, parsing and storing of multiple years of BASE24 version 5.0+ POS and ATM transaction data within a reasonable timeframe

Solution – Selection Process

The first phase of this card querying project involved a Proof-of-Concept (PoC) exercise requiring each third-party involved to prove the transaction capabilities and efficiency of their solution.

The product was installed on a 32-bit Windows Server (on-site). For the PoC it was decided that a single Virtual Machine (VM) would be used. This could then be reused by the bank for subsequent PoC installs.

Transaction extraction agent objects were deployed from the product's Process Console view on the Windows Server to the live HP NonStop ServerNet system (later NonStop Integrity Blade system) running BASE24 Classic version 6.10. Note: A log replicated DR / standby NonStop node is also a valid option for extraction agent deployment. Multiple - HP NonStop nodes, Pathways and daily generated transaction logs can all be catered for. Look for this flexibility in your chosen solution and also compatibility with Active-Active payment engine configurations.

The extraction agents read and relay (across TCP/IP) all transaction data records from TLF (ATM) and PTLF (POS) entry-sequenced Enscribe files using advised and proven approaches for minimal CPU cycles (with log file position check pointing and recovery for connectivity issues, as standard out-of-the-box). This data relay is optimized and card transaction data then populates a Microsoft SQL (normalized) database on the Windows Server. The database is populated using efficient, multithreaded processes with best-approach disk I/O methods.

A secure browser (of your choice) can then query ATM, ATM administration and POS records along with displaying an agreed subset of related standard ACI tokens.

The PoC was a success and was subsequently presented to a number of departments within the bank (on a Sunday morning in the Middle East) and they were then quick to move to the implementation stage of the card transaction querying project. The bank also requested further product features including:

- Extraction and parsing of a further 38 transaction tokens, some bank customized, stored into XML row meta tags
- Extraction and parsing of the POS settlement records with full querying
- Deployment of multiple extraction agents to enable the ultra-fast download of many years' worth of ATM and POS transaction log files in any date order (and on any NonStop disk / subvolume)
- Further enhanced EMS message output for NonStop technical staff to check the status and position of the batch file extraction of (P)TLF log files
- Strong AES_256 encryption (and field masking) of PAN data fields in the transaction records to comply with on-site PCI DSS directives

Solution – Implementation

After integration testing, the software was then installed on two 64-bit, Quad Core Windows Servers (one for the transaction database and one for the main application). This approach further optimized performance of the solution by separating the fast parsing of transaction records and token data fields from the database read/write processes. Look for this flexibility in your chosen solution.

Multiple ATM and POS log extraction agents were then deployed to the bank's new HP NonStop Quad Core NB54004 Integrity Blade system.

The Microsoft SQL database was partitioned by month (fact reprise: up to 999 partitions allowed in MS SQL Server) and records inserted in line with the entry log timestamp of the original transaction record. A number of single terabyte hard drives were made available by the bank and connected to the Windows Server to receive the transaction data to the appropriate MS SQL file group partition (each monthly partition can grow at a configurable rate in terms of space allocation, e.g. 500MB).

Splitting out card data into monthly partitions enables MS SQL Server to provide fast look-up querying of transaction rows by pre-checking the partition schema for data row location based on the transaction timestamp. This enables ultra-rapid query response times for transaction data by locating disk and partition before primary key and index.

The bank had already restored from tape and readied all of the TLF (ATM) and PTLF (POS) log files from the previous processing year (2011).

Your chosen querying solution should not require the use of the NonStop alternate key index files for the rapid batch download of transaction data. This saves on NonStop disk space (and administration time) when restoring (P)TLF logs and allows more files to be restored from tape for each batch processing run. This change was requested by the bank in the original PoC.

Batch download speeds for the ATM and POS transaction logs now enable the bank to parse and replay weeks of card data in hours for subsequent, secure, concurrent querying by the various bank departments.

Results and Benefits

A summary of the business results and benefits a solution like this can provide:

- SLAs for customer and departmental queries on ATM and POS transactions reduced to eliminate bank penalties for slow customer response times (less reliance on green screens and ENFORMs)
- Bank technical staff time and resources are no longer required for locating and restoring appropriate ATM and POS transaction log files from tapes
- Concurrently accessible and secure browser query views for card transaction data (and related EMS) enable the various banking departments not to be totally reliant on HP NonStop BASE24 technical staff for ATM and POS queries
- By default, the solution provides another backup archive (beyond older tape media) of ATM and POS transaction data which can then be transferred to more modern, non-magnetic storage devices if required
- The ATM and POS area of the bank can now respond more quickly to requests by their own departments and external bodies for management information relating to card transactions. This can now be achieved using an inbuilt CSV export function and tools like Microsoft Reporting Services, Excel and Seagate's Crystal Reports
- Terabytes of card data can now be securely queried (and queries saved by user groups) based on any transaction field or set of fields (with both character and string wildcarding) in the ATM or POS record, a feature and capability not offered by BASE24 Classic. Something to look for in your chosen solution
- The bank do not need to keep as much ATM (TLF) and POS (PTLF) data online for green screen access and so can free up HP NonStop disk space for other uses since the transaction data is held in a partitioned, secured MS SQL database

A New Hope – Reprise

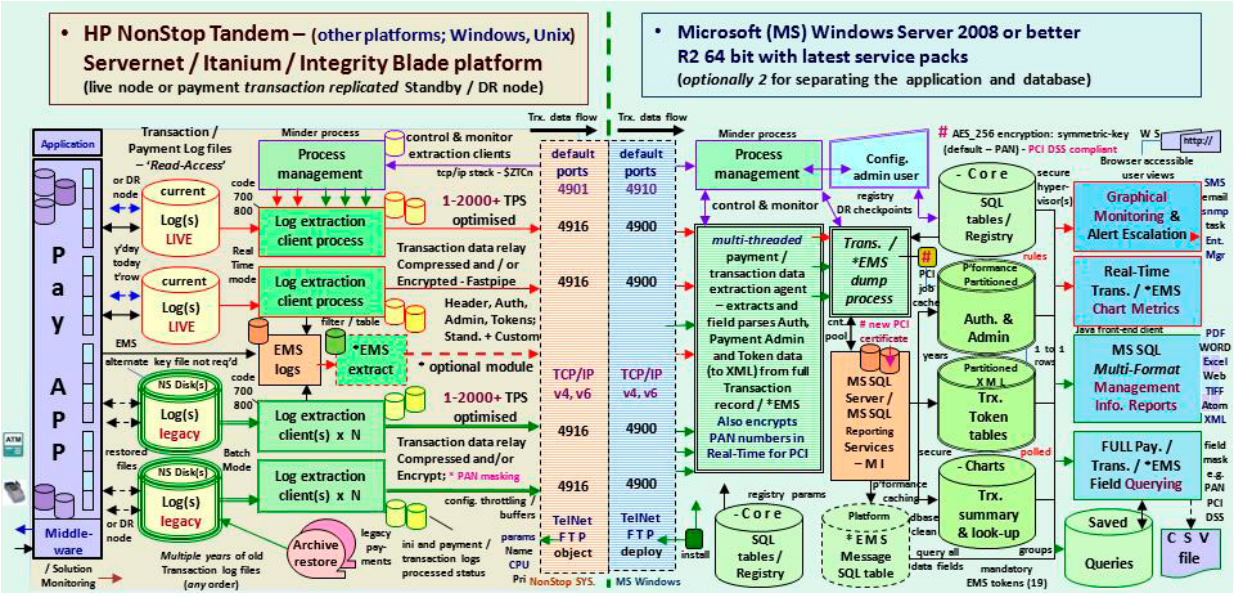
To summarise then, terabytes of payment and transaction data (50+ terabytes in this particular case study) can be hosted securely (with appropriate data encryption and masking) and queried with ease using mid-to-high end Server platforms. This of course coupled with advised approaches to database configuration, encryption, partitioning, indexing and normalisation for your chosen querying and monitoring solution.

Modern competing solutions for real-time monitoring and querying (and reporting) of payment data should provide a bank with:

- Colour coded, graphical monitoring view(s) for monitoring EMS alerts, system and ATM/ POS transaction level issues, e.g. possible fraud, transaction throughput down 10% or interchange/ switch down or quiet
- Full problem escalation via various gateways including; SNMP, SMS mobile, email, enterprise managers (e.g. HP Operations)

- A configurable set of self-refreshing transaction performance charts (line, pie and bar charts, gauges and tables) for monitoring; ATM/POS performance and usage, issuers, acquirers, card types, transaction types and of course, EMS alerts
- A comprehensive, non-technical, field-level querying view for all transactions (and settlements) processed by your payment application with CSV file export function (including full querying for NonStop EMS messages). All transaction / EMS queries can be saved by user group category to be re-executed as required
- Integrated ATM and POS management information reports generated both automatically and / or manually as required by the bank in various formats, e.g. PDF, Word, CSV, HTML

Look out for our next article, 'Episode V – The Insider Strikes Back (from a remote system)' in a future edition of 'The Connection' journal.



About RTLX by Insider Technologies

The RTLX product provides unique, real-time log and MQ extraction of transaction and system platform data for the close monitoring of payment engine applications. Data is relayed rapidly across TCP/IP to a normalised database on a Windows Server running Microsoft SQL. Transaction data can be encrypted and/or masked in-line with on-site PCI DSS directives. RTLX then provides four, extensible, browser based visuals for payment engine monitoring namely;

1) Graphical problem alerting
2) Transaction chart metrics
3) Comprehensive data querying
4) Management reports

About Insider Technologies

Founded in 1989, Insider Technologies Limited (Insider) is a UK-based software house and services company, which has grown to achieve an enviable track record and market position providing Business Application Monitoring (BAM) of high volume transaction processing systems.

In addition to a strong pedigree in financial processing systems (ATM, point of sale, fraud detection, card processing systems, money transfer SWIFT and SEPA), Insider also supplies international stock exchanges, defence, retail, telecommunications, utilities and livestock management applications and systems.

An HP partner, Insider Technologies provides both the Reflex and MultiBatch software solutions for business-critical 24x7 systems that evolved into what is known as HP NonStop computing technology and HP Integrity (formerly Tandem Computers).

A Microsoft Gold Certified Partner and Quality certificated to ISO 9001:2008 and TickITplus, Insider Technologies are also the team behind the Sentra and RTLX Reactor payment, transaction and message monitoring and tracking products for the Windows, HP NonStop, Linux and Unix platforms.

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So, you're moving to OSS? Now what?

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Even when core applications remain solidly in the Guardian space, many NonStop customers find themselves edging into the OSS world. New releases of third party products may run exclusively in the OSS environment; OSS software might be required to interface with external organizations, and new adjunct or complementary business services will almost certainly be implemented as OSS processes. While change is never exactly easy, incremental change at the edges of the enterprise represents challenge and opportunity – with less risk to core processes.

But it's still intimidating.

We're here to help. This series of tables represents generic tasks in a very high-level project plan used to initialize the OSS operating system components and install a third party OSS (Java and SQL/MX) application on a customer's new machine. Many application-specific tasks were omitted, and the descriptions of the remaining tasks are necessarily brief. This plan (especially tasks 20-24) also assumes the application was previously expanded and explored.

But it's a plan.

To help you get started, the rightmost column in each table references relevant OSS manuals. We also identified predecessor tasks and Resources (using common role/work group names). Investigate each step, augment with tasks required for your application and the vendor's documentation, and practice, practice, practice. Not surprisingly, the first steps belong to the Systems team.

ID	Task Description	Prior Task	Resource(s)	Notes and References
1	Create System Users		Systems	Use SAFECOM to create one or more system level users (or aliases) for each resource role. Define initial/default OSS directory assignments and privileges. Many file transfer utilities rely on the existence of an initial OSS directory.
2	Create Initial Directories	1	Systems	Establish the OSS /home directory structure. Open System Services Shell and Utilities Reference Manual
3	Determine disk layout.	2	Database System	Collaborate to determine optimal disk space assignments for database, TMF, OSS disk pools, etc.
4	Adjust SQLMXBUFFER	3	System	Use SCF to adjust SQLMXBUFFER settings. SQLMXBUFFERs and disk cache share the same memory pool (maximum of 1.2 gigabytes). For simplicity, keep separate OSS and SQL/MX disk pools and use a third set of disks for SQL/MP and Enscribe files. Monitor the SQL/MX disks regularly for relative usage of MX buffers and disk cache.
5	Adjust cache settings	4	Systems	Use SCF to review and adjust settings for disk cache.

NONSTOP

ADVANCED [T.B.C]

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The Connect NonStop Advanced [T.B.C] will be the most comprehensive technical education and training event dedicated exclusively to the HP NonStop Community with information driven by users for users.

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- Partner Pavilion
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- NonStop Availability Award Presented
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"It was an amazing event. Having everybody is at the same place and same time to exchange information and knowledge was most valuable to me and my company." - 2012 Attendee

Contact

For more information contact info@connect-community.org or visit http://www.connect-community.org/?TBC2013

ID	Task Description	Prior Task	Resource(s)	Notes and References
6	Move QIO to KSEG2 (required for Java)		Systems	Use SCF to move QIO to KSEG2. Then (typically) reboot. QIO Configuration and Management Manual
7	Configure TMF	3	Systems	Use TMFCOM to configure TMF components and objects: audit trails, dump and restore volumes, etc.
8	Create mount point directory(s)	6	Systems	Use OSS to establish a mount point directory (mkdir /Appl). Open System Services Management and Operations Guide
9	Create disk pool(s)	8	System	Create the disk pool definition file(s) / script(s). Open System Services Management and Operations Guide
10	Start the fileset(s)	9	Systems	Use SCF to add and start a name server, if needed. Then add and start a fileset for the new mount point. Open System Services Management and Operations Guide
11	Create application directories	10	Systems	Establish the OSS directory structure for the application (mkdir/Appl/bin…).
12	Install SQL/MX	11	Systems	Use OSS is to install SQL/MX. SQL/MX 3.2.1 Installation and Upgrade Guide
13	Install Java	12	Systems	Use OSS to install Java. NonStop Server for Java 7.0 Programmer's Reference Manual
14	Install Java add-ons and other software required for the application	13	Systems	The following components may be needed: • J/ODBC drivers • JToolKit (T2716) - contains APIs • Java Servlets (T1222) - required for web apps • HP JMeter for NonStop Java (T0866) - recommended performance analysis tool Other OSS and Guardian components may also be required (ASAP, queuing software, data replication software, etc.). JDBC Type 2 Driver Programmer's Reference for SQL/MX JDBC Type 4 Driver Programmer's Reference for SQL/MX JDBC Type 5 Driver SQL/MX Programmer's Reference JToolkit for Java API Reference Pages NonStop Serverlets for JavaServer Pages (NSJSP) 7.0 System Administrator's Guide NonStop Server for Java 7.0 Programmer's Reference & HP-UX HPjmeter 4.2 User's Guide
15	Initialize JDBC	14	Systems	Use OSS to initialize JDBC. JDBC Type 2 Driver Programmer's Reference for SQL/MX JDBC Type 4 Driver Programmer's Reference for SQL/MX

ID	Task Description	Prior Task	Resource(s)	Notes and References
16	Create resolver links for TCP/IP	15	Systems	Edit, in Guardian space, $SYSTEM.ZTCPIP.HOSTS & RESCONF. In OSS, create symbolic links for HOSTS, RESOLV.CONF, PROTOCOLS, NETWORK & SERVICES in the /etc directory. Open System Services Installation Guide HP NonStop TCP/IP v6 Configuration and Management Manual
17	Create data service	16	Systems	Use SCF to add a data service. SQL/MX Connectivity Service Manual Open System Services ODBC/MX Client Driver for SQL/MX
18	Add 'dba.manager' to MXCS	17	Systems	Use mxcs mode of mxci to grant OPERATOR privileges to the dba.manager user. SQL/MX Connectivity Service Administrative Command Reference Manual
19	Install any open source utilities	18	Systems	Identify useful utilities and install. Modify the /etc/profile and users' .profile files. SUTs for Release J06.14+ include many open source utilities (T1202). The "PuTTY" terminal emulator and "mxschema" are not included. Access Connect's ITUGLIB via: http://ituglib.connect-community.org/apps/Ituglib/HomePage.jsf

When the system is ready, the Database team can execute DDL scripts and prepare the database for use..

20	Modify DB scripts for disk layout	3	Database	Edit SQL DDL scripts to distribute the database.
21	Create the application schema(s) and tables	20, 21	Database	Obey the scripts in mxci to create the application schema(s) and tables.
22	Create metadata (catalog) convenience views [OPTIONAL]	21	Database	Download and run in OSS the (highly recommended) mxschema utility to create views of database metadata tables. https://h20392.www2.hp.com/portal/swdepot/displayProductInfo.do?productNumber=NSATC_UTILS
23	Create data source for J/ODBC access	18, 21	Database	Use mxcs or NSM/Web to create a data source. (NSM/Web must be installed and configured before use.) SQL/MX Connectivity Service Manual

With the database in place, the Applications team can install and configure the application, and web interfaces can be established.

continued on page 45

The State of Automation

Going beyond the easy stuff with Quality Center

Rob Walker
Managing Partner
Ascert, LLC

Rob is a Managing Partner at Ascert LLC, based in Cape Town, South Africa. He has worked with NonStop for almost 30 years, starting in the financial industry and later specialising in the testing products sector. In 1997 he joined SoftSell Business Systems, which later became Ascert, and was instrumental in extending the testing product range from it's original NonStop heritage to an open toolset supporting testing of any hardware and software platform.

Walk around the QA and testing departments of most enterprises with large or critical IT systems and you're almost certain to find HP Quality Center screens on more than a few desktops. With a majority share of the market, whether you love or hate it, Quality Center has become the tool of choice for large organizations to manage their QA processes as part of their strategy for application modernization.

With such ubiquity you would be forgiven for assuming that Test Automation would be a baked-in, part of the standard solution. But that's where we enter the twilight zone – a dimly lit world at the edges of Quality Center's boundaries, where automation is often mentioned but seldom seen. To be fair to Quality Center, test automation is hard, with complexity that escalates rapidly in the face of the vast and disparate universe of modern and legacy systems, devices, user interfaces, etc. The best that an off the shelf product can realistically offer is hooks as an entry point for managing test automation: a docking module to the outside world that enlightened customers will figure out how to use. And that's exactly what Quality Center offers, and has done since at least Test Director 8.0.

With such facilities available, you'd expect that on our imagined walkabout through Big Corporate QA, we would see very few of those Quality Center screens involved in manual testing activities. Sadly, that's not the case at present. Despite its widespread use, surprisingly few Quality Center installations take full advantage of that docking module to reap the full benefits of test automation.

Is this really a problem?

Whether you have a Quality Center automation gap or not will depend very much on the type of applications you are testing. If your testing revolves solely around interacting with and validating a standalone browser application, or a Windows GUI application at a PC, then you're already well served with automation tools. You can skip the rest of this article and get back to your day job.

Still reading? Don't be discouraged, you're amongst friends, a sizable community whose enterprise application testing needs don't fit such simple, one dimensional solutions. Even those cases where an application has a natural screen-based user interface, chances are that the real work is being done by all manner of middleware and back-end interfaces, silently going about their business of exchanging messages and updating databases. The NonStop community will recognize this problem more than most, with its widespread deployments of ATM and POS systems, financial interchanges such as SWIFT and ISO 8583, mobile banking systems using SOAP messaging, cell phone switches using ASN.1, stock exchanges etc. All of these are large, message based, transactional applications where the system's real business value passes through internal, headless interfaces that are difficult to integrate with a Quality Center world.

With no window or HTTP form for a client side testing tool to hook into, message based applications don't fall into the group that can easily be tested by tools such as HP's Load Runner or Quick Test Professional. There may be tools to help with the testing of such interfaces, but not all integrate with Quality Center, and even fewer support heterogeneous tests involving a mix of steps across different devices or interfaces. Without a comprehensive level of integration and support, device and message based interfaces become relegated into the *"too hard"* category, adding to the already longer than desirable queue for manual testing and verification. Quality Center, for all its capabilities, ends up as little more than a structured documentation tool for some of the most vital interfaces and valuable transactions within an organization's IT systems.

There are, for sure, a number of areas where manual testing is still the most effective approach. And HP, with its Sprinter tool, offers ways to better support those remaining manual test cases. But should we fall back on that so easily for device and messaging interfaces? The truth is that with their well defined and precisely specified operations, these interfaces are just as worthy candidates for test automation as GUIs and web pages, even if they are somewhat trickier to connect into. And because they are critical interfaces to our business, we should be looking to manage and automate that testing through the same, well established and proven Quality Center processes that we use for our other areas of testing. We simply aren't doing our job as testing professionals if we leave these languishing in that *hard-to-automate* bin.

Getting down to the bare metal

By now, hopefully most readers will have been persuaded that test automation for applications with headless and legacy interfaces is both desirable and if not easy, at least possible. Which takes us on to the next problem - How?

New users of Quality Center quickly become familiar

with the *New Test* button in the *Test Plan* module, where as well as naming the test the user will select what *Test Type* it is. The test type chosen is the hook for automation (or not, in the case of the MANUAL test type) – it tells Quality Center which docking module to use to reach the outside world. Chapter 20 of the ALM 11.0 User Guide has a table listing available test types, some of which integrate with HP's other testing tools:

- LR-SCENARIO – will use HP Load Runner as the testing engine
- QAINSPECT_TEST – will use HP QAInspect as the testing engine
- QUICKTEST_TEST – will use HP QuickTest Professional as the testing engine
- SERVICE-TEST – will use HP Service Test as the testing engine

The automation capabilities and limitations of these tools are already well covered on the web, so we won't review them here. But before considering these cases as *"problem solved"* in terms of automation, there are a couple of points that should be noted:

- A *Design Test* can only have one *Test Type* - if a test has steps that need actions across multiple different tools, automation becomes a lot less straightforward.
- The model used by most of these tools is to hold the actual test definition in their own internal format, typically via the Test Script tab or as an attachment to the test. This disconnects the automated definition of what the test does from the *Description* and *Test Steps* fields within Quality Center. That's not ideal if you want to be sure the test actions performed automatically are actually the same as those the Quality Center description says should be executed.

These issues sound relatively minor at first, but their impact on real-world tests are too frequent and damaging to be considered boundary cases. Take, for example, the actions involved in a typical cash machine transaction:

1. request a cash withdrawal at an ATM device
2. look for an associated authorization request at the host interface or card interchange and respond back
3. look for the correct response arriving at the ATM
4. finally go check a green screen or GUI and make sure the transaction reflects correctly in the balance and logs

Even this most basic transaction needs us to hook into three different tools, even though only one test type can be allocated and the associated tool most likely needs its own separate test definition in an external and proprietary format.

Beyond standard, single tool test automation

All is not lost though, that list of Quality Center test types has some extra tricks up its sleeve to help us:

- VAPI-XP – a powerful, *do-anything-you-like* test type with support for an automation script in Microsoft VBScript, Javascript, PerlScript, and PythonScript.
- Custom Test Types – a published Quality Center API open to anyone to create their own custom test type. Such custom test types are first class citizens in the Quality Center world, sitting alongside and with equal power as those supplied for HP and other testing tools.

There is a lot of good documentation on VAPI-XP, the current versions of which can be found in Chapter 27 of the ALM 11.0 User Guide. We won't repeat the information here, except to point out some noteworthy behaviors that are common to all flavors of VAPI-XP:

- They create an external test script, which although viewable and editable in the Test Script tab is actually held in a separate repository of flat files on the QC server. The script file is local to every test created – if you want a common automation script across tests you must create your own mechanism to duplicate a template script into every test, and a way to update all copies when the script changes.
- There is only one test script file. When you do a *Run Test* on such a test type, the entire script will be run once, regardless of whether the Quality Center test has actually been broken down into separate test steps. There is no concept of multiple entry points for the individual steps of a test.

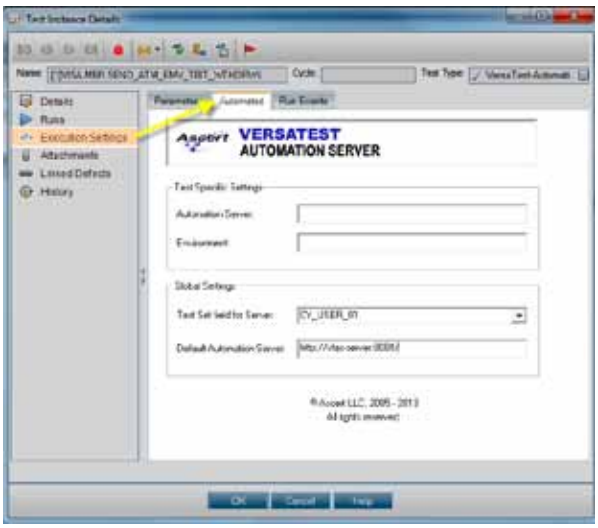
These pose some challenges to VAPI-XP as a candidate for creating a generic *"test automator"*. Don't be discouraged though. They can be worked around, and as a place to start exploring better test automation, VAPI-XP is both powerful and quick to get started with. One of the first full automation rigs created by Ascert for a customer in 2004 used a combination of VAPI-XP, Javascript, and VersaTest running on remote machines. Despite having a rather cumbersome infrastructure, it worked well and provided a high degree of automation.

The documentation on Custom Test Types is a little less comprehensive. Technical documentation and examples on packaging and creating them is there, but high level documentation on how all the pieces fit together is a little sparse. This is a shame, because despite being a tricky feature from a programming perspective, once you have it mastered it offers the most powerful approach currently available for test automation within Quality Center. Whereas it's possible to do most things in VAPI-XP, Custom Test Types provide the ability to package them up in a much simpler form for the user e.g. meaningful test type names and icons, custom panels for configuration, viewing etc.

The screenshot below shows how a Custom Test Type's configuration panel is seamlessly integrated with the standard Quality Center user interface, in this case providing an easy way for users to select which servers and environments are to be used for executing automated tests.

Before we move on from APIs to automation models we must answer a question that will be troubling observant readers. Why haven't we discussed the REST API, introduced by HP in ALM 11 and significantly expanded in ALM 11.5? The answer is that at present, it doesn't offer advances for automation of tests from within Quality

▶



Center. That's not a criticism of HPs enhancements. Support for an open, XML based API is a welcome step that provides a cleaner and less platform specific way to access the Quality Center repository. But it isn't yet clear how HP intends to provide a similarly platform neutral API for the *Run Test Set* functionality needed to execute tests from within Quality Center's own user interface. An open approach to replace this functionality certainly won't be able to use the current model, which relies on launching agent programs on local or remote Windows-based machines using ActiveX and Remote DCOM wiring. Until then, VAPI-XP or Custom Test Types are our best bet.

Towards a unified automation model

Although slightly different under the hood, both VAPI-XP and Custom Test Types provide a pathway towards a truly automated test environment within Quality Center. Both approaches provide a way to invoke custom automation code when a user clicks *Run Test Set*, and both allow automation code to use the Open Test API (OTA for short) to access the entity model within Quality Center, in particular the tests and test steps defining the actions to be performed.

That last part is so important to an effective automation model, we'll say it again – *"automation code can access Quality Center tests and test steps to decide what to do"*. Why re-invent the wheel and hold a separate and external automation script when Quality Center already has standard database fields that can hold it for us? Quality Center's model may not mirror how everyone thinks about testing, but it is sufficiently malleable that it can be made to fit most concepts of structured test organization. Using this model directly is such obvious best practice that it's a shame so few of the testing tools that do integrate with Quality Center follow this model.

By using standard Quality Center fields to store our automation description, we are forced to adopt a language that can be stored in text-based fields. Rather than being an extra chore, this turns out to be a very good thing. Doing so creates an action definition that as well as being automatable, is also highly readable, as shown in the following simplified example:

```
action := send
type := cash_withdrawal_request
amount := 50.00
card := 4929 1234 0000 5678
```

The automation code invoked by VAPI-XP or within the Custom Test Type uses OTA to read definitions such as the above for each step, parses them, performs the required actions, and returns the results including supplementary logs and application files back into Quality Center.

We're now very close to our goal of a unified automation model, but there is still one problem remaining – how to handle test steps needing action at different interfaces. With all the pieces we now have in place, achieving this is easier than you might think. All that is missing is a qualifier telling our automation code the interface or tool that each test step involves, as highlighted below:

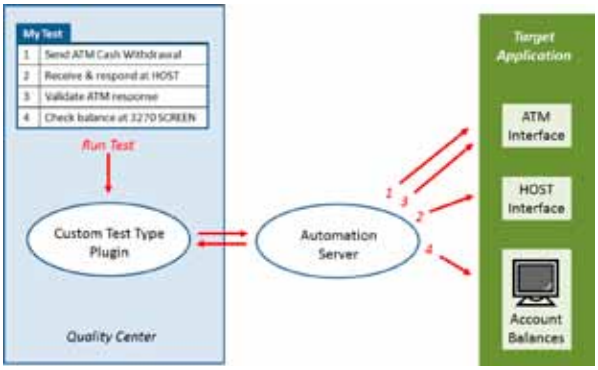
```
interface := ATM
action := send
type := cash_withdrawal_request
amount := 50.00
card := 4929 1234 0000 5678
```

With this in place, we have everything we need to use standard Quality Center *Test Steps* to contain interleaved sequences of actions to be performed automatically across multiple different application interfaces.

Before we move on to looking at a working implementation of these concepts, there is one last aspect to be noted about this automation approach. We've taken care to build a model where each *Test Step* in Quality Center defines an automated action to be performed at some interface. It is equally important that our automation component preserves this model during execution by creating result steps that when viewed in *Test Lab* will mirror the test steps defined in the *Test Plan*. As with the other parts, OTA provides access to all the necessary entities to achieve this.

Putting it all together

The following diagram builds on the concepts discussed to show our original 4 step multi-interface example with the automation components in place



The diagram follows the concepts discussed here, but takes them a stage further in implementation by splitting

continued on page 46

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Vice President
ETI-NET

Phil Menzies is Vice President of ETI-NET and has over 25 years of experience in the design of products and solutions for HP NonStop. After serving as an architect for Citicorp's Consumer Banking division, including design of a Tandem-based global network, Phil joined Tandem computers in 1980. Roles in software development, product management and marketing were followed by jobs away from NonStop, leading development and manufacturing of point-of-sale and lottery terminals. In 2003 Phil re-entered the NonStop space with ETI-NET, developing and promoting its backup solutions. For further information about this case study, contact information@etinet.com.

The virtual tape backup subsystem used by a large U.S. medical claims processor was approaching end-of-life. An active NonStop user, the company wanted to move to a competing virtual tape solution. While implementation of the new solution could be accomplished easily, the challenge was how to maintain access to the large quantity of backed-up and archived data accumulated over the life of the existing product. The claims processor turned to HP for assistance. What the company learned from HP was that use of one virtual tape solution did not necessarily imply a married-for-life commitment.

As virtual tape grows in popularity for backing up critical application data, companies increasingly face the challenge of moving their backup procedures off aging subsystems to the latest virtual tape appliances. Typically, such an upgrade may involve migration of the content of thousands of tape volumes. While upgrading to a new generation of the same product may be expedient, it is a choice that may be made at the cost of foregoing a move to a superior solution. Companies that wish to purchase another vendor's product may feel stymied by incompatible formats and expenditures that exceed budgetary constraints – particularly if the old product must be kept in place for some time until tapes expire.

Not so long ago, similar migration and upgrade conundrums confronted companies that moved from one technology of magnetic tape to a new one – SDLT to LTO1, for instance. As new tape technologies rolled out, the older ones became unsupported on current systems due to obsolete hardware interfaces and driver software. This left tape users with the Hobson's Choice of migrating content from thousands of old media to new media via their host systems or of retaining older subsystems to enable retrieval from the old media. Nowadays, solutions are available for migration between virtual tape products without the need to involve host systems. The result? NonStop customers benefit because the choice to switch vendors may offer a promising option if another virtual tape product is a better fit for current and future requirements.

Virtual Tape and Magnetic Tape: A Brief Overview

The heart of a company is its data – the detailed information about its customers, its products, its suppliers, its finances, and a never-ending list of other critical information. Statistics show that 93% of companies that lost their data for 10 days or more filed for bankruptcy within one year of the loss. For this reason, it has been the practice of IT organizations since the dawn of computing to back up their critical data so that it can be restored following a loss due to disasters, operator errors, or for any other reason.

Magnetic Tape

The traditional method for backup has been magnetic tape. Strategies usually involve some combination of daily, weekly and monthly backups as well as archiving for long-term retention. Best practices call for the backup tapes to be stored offsite in a secure facility so that a disaster that destroys the data center does not also destroy the tapes. If the data is to be restored, backup tapes must be retrieved from offsite storage and loaded into a disaster-recovery system.

Magnetic tape backups present several challenges and frequently take hours. Restoration of a large database can take significantly longer. Sometimes, the restoration may be unsuccessful if one or more magnetic tapes are lost or are unreadable.

Virtual Tape

Virtual tape mitigates many of the problems with magnetic tape. With a virtual tape subsystem, tape images are written to disk rather than to physical tape. The virtual tape subsystem may replicate to a location far from the production system so as to be immune to a common disaster.

Since there is no requirement to physically handle magnetic tapes (either manually or with tape robots), backups may be made more frequently. Thus, the amount of data that may be lost following the loss of the application database can be reduced dramatically. The recovery of a database is much faster, hours instead of days, since tapes do not have to be recovered from an offsite storage facility; and reading from disk is quicker and more reliable than reading from tape.

The Complexities of Tape Migration

As different as the technologies are, magnetic tape and virtual tape share a common challenge. Both at some point in time reach the end of their useful lives. Old tape formats may become obsolete and may not be readable by newer systems. Tape drives, drive interfaces, and driver software may no longer be available for older tape technologies on newer systems. Similarly for virtual tape - moves to improved disk technology, higher-speed / lower-cost servers, new operating system versions and improved virtual tape software may result in an older product no longer being supported.

In order to maintain the ability to retrieve archived data, both magnetic and virtual tapes must be rewritten periodically to newer technologies before the older equipment becomes unsustainable. Tape volumes can measure in the thousands, and it can be a massive project to move a magnetic or virtual tape library onto a new product.

In the case of virtual tape, if the upgrade is to a new generation of the existing virtual tape subsystem, the vendor will likely provide a means to accomplish the migration. However, if the upgrade is to another vendor's virtual tape subsystem there may be considerable compatibility issues. Not only must a means be found to read tape volumes from the old virtual tape subsystem and write them to the new subsystem, but the NonStop tape catalogs' contents must be preserved in the process so that archived databases, files, and tables can continue to be located.

Several challenges are inherent in migrating from one virtual tape subsystem to another:

- The formats of the tape images on virtual tape subsystems are proprietary. There are no industry standards that specify virtual tape image formats, so tape images cannot simply be copied directly from disk to disk between products.
- The internal media catalogs used by different virtual tape subsystem vendors also are different. As tape volumes are migrated, a media catalog must be populated on the new subsystem.
- The above two issues could be addressed by having the NonStop host system read tape volumes from the old virtual tape subsystem and write them to the new subsystem (for instance, by using the NonStop utility BACKCOPY) and re-catalog them. However, with thousands of tape volumes to migrate, this can impose an untenable load on a host that is otherwise performing normal production processing functions. And reading tapes on NonStop is generally much slower than writing them, resulting in bottlenecks.
- Tape backups that have been archived by the virtual tape subsystem to physical magnetic tape or to other external storage must also be retrieved and then moved to the new subsystem.
- Attempting to manually orchestrate virtual tape migration between products, either via BackCopy or via the GUIs of the products, could take man-years of effort, where thousands of volumes are involved.
- The migration will take some time (days, weeks, or for very large numbers of volumes, even months). During this time, how does the host know from which subsystem it can retrieve a given volume?

Medical Claims Processor's Virtual Tape Product Approaches Its End of Life

The medical claims processor we mentioned earlier manages two data centers – a production data center and a backup data center located hundreds of miles apart. Each data center has four HP NonStop systems. Backups were stored on a common NonStop virtual tape product; but as its equipment approached end-of-life, the company sought to replace it with an alternative product solution.

The Company Had Outgrown Its Current Virtual Tape Subsystem

Although the existing virtual tape subsystem had been adequate over the years, the claims processor had concerns with certain aspects of the product:

- The disk storage on the virtual tape subsystem was subdivided into segments. When a given segment filled, it was necessary to make space by manually moving some tape volumes to other segments with space remaining. This "re-balancing" required significant efforts on the part of the system operators.
- Although the virtual tape subsystem was configured as a cluster to provide fault tolerance, experience showed that its Linux Global File System (GFS) file system could crash and become corrupted when a member of the cluster crashed. This resulted in periodic subsystem outages.
- Clustering was a necessary evil for them. While it nominally improved availability in cases of hardware failures, it also made management of the subsystems complex.
- Even worse, since the product's media catalog was implicit in its file system, backup volumes occasionally were lost irretrievably in cases of file system corruption. This was unacceptable and was in stark contrast to the high integrity of the NonStop host systems.
- Long-term archived volumes were moved to second-tier storage to provide space in the virtual tape appliance. However, restoring those volumes from second-tier storage required manual effort.
- Large numbers of virtual tape volumes caused the product's GUI to slow to a crawl when listing the volumes stored.

The Quest for Improvement

As its virtual tape servers approached end-of-life, the claims processor reviewed its upgrade options. The company was reluctant to invest in a next-generation version with the same set of issues as its current virtual tape solution. However, that option had to be weighed against the prospect of investing in a potentially time-consuming, complex migration to a completely new virtual tape product.

As well as investigating alternatives to upgrading within the product line of its current virtual tape vendor, the claims processor also evaluated BackBox from ETI-NET. What it learned about BackBox features was promising. BackBox solved all of the issues that had plagued the company's existing virtual tape product:

- BackBox's disk storage is not fractured. All disk storage is homogenously available.
- BackBox's fault-tolerant architecture shares the load across its redundant Virtual Tape Controllers (VTCs) without the need for the complexity of clustering. Should one server fail, there is no failover impact

on the operation of the other. Restarted backups are simply routed to the surviving VTC.

- The entire tape media catalog is maintained securely on the NonStop server under TMF protection, so it is impervious to any VTC server failures.
- If a virtual tape image is not resident in BackBox's primary disk storage, BackBox retrieves the image from second-tier storage automatically.
- The BackBox GUI enables one-click provisioning of virtual tape volumes, including MEDIACOM/TMFCOM cataloging & labeling. The GUI also is responsive, even when dealing with thousands of tape volumes

Migration Challenges Remained

Although the claims processor was happy with BackBox features and benefits, it still was concerned about the challenges mentioned earlier with respect to the migration effort:

- Moving tape images from its old product to BackBox without bogging down its NonStop systems and impacting workloads of operations personnel.
- Maintaining the DSM/TC and TMF tape catalog contents.
- Finding tape volumes for recovery during the migration while volumes are distributed across both subsystems.

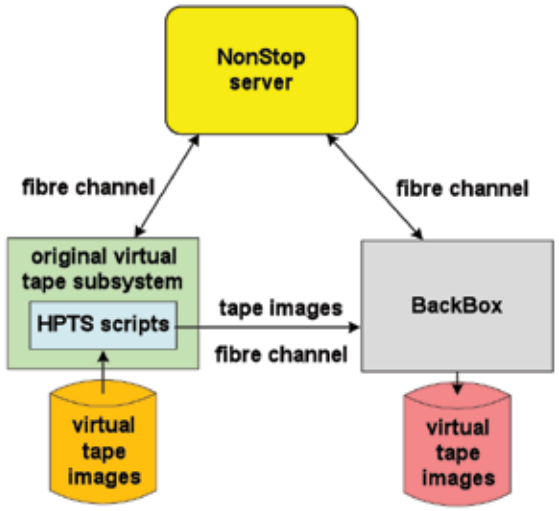
The Assistance of HP Technical Services Proved Invaluable

HP had recently worked with ETI-NET to develop migration procedures that would allow companies to simplify the process of moving off their existing virtual tape appliances to ETI-NET's BackBox virtual tape solution. To the claims processor's existing virtual tape product, the migration to BackBox would appear simply as if it were exporting its virtual tape volumes to physical tape. In reality, however, physical tape devices would be emulated by BackBox and connected to the virtual tape appliance via fibre channel (FC).

The existing virtual tape subsystem was already FC-connected to the NonStop systems. So the first step was to install BackBox and connect it to both the NonStop system and the existing virtual tape subsystem via FC. The connection between the two virtual tape subsystems permitted transfers of tape images to bypass the NonStop host systems.

HP configured the subsystems to support migration and together with the customer, analyzed the existing tape inventory's usage. A list of tape volumes to be exported was extracted from the existing subsystem's directory and was compared to a list of active volumes from Mediacom and TMF, eliminating expired and invalid tapes from needing to be migrated. The sequence of volume migration was then prioritized – avoiding those that would otherwise expire before completion of the migration process.

HP provided a transfer script mechanism that ran in the existing virtual tape subsystem. It mounted each virtual tape volume on an export drive so it would be exported to BackBox. Up to 6 virtual tape drives could be used in parallel to speed up the transfers. If a virtual tape volume was not on disk, it had to be restored to disk manually from its archive location before the export script could continue.



The Claim Administrator's Migration to BackBox

At the start of migration, automated mounting of tapes by BackBox was enabled on the NonStop systems and mounting by the old subsystem disabled. Then BackBox's import mechanism scanned the DSM/TC pools and TMF's catalog and re-created in BackBox storage the volumes designated as scratch so that they did not have to be migrated. This enabled processing of all new backups and TMF dumps by BackBox.

As tape volumes were exported from the existing virtual tape subsystem, they were reconstituted from their proprietary disk-resident representations into NonStop backup tape format. When BackBox received the volumes, it was as if they were backups being written to it by a NonStop system. Thus, conversion between the old and new virtual tape image formats was automatically provided by the migration process. BackBox stored the images on its connected HP StoreOnce de-duplicating storage and populated its NonStop-resident media catalog to manage the images.

During the migration, the NonStop catalogs (DSM/TC and TMF) were untouched. So a restore request for a given item would cause a mount request to be generated for the original volume containing it. Since a given volume might already have been migrated to BackBox or could still be on the original virtual tape subsystem, the question was which subsystem should respond to a mount request? The solution was simple. Processing of mount requests was only enabled for BackBox. If a restore request was for a volume that had not yet been migrated, it would remain pending until an operator manually migrated that volume to BackBox. This eliminated any ambiguities or conflicts during migration.

As virtual tapes resident on disk were migrated to BackBox, and once their transfer completion was manually verified, they could be deleted from disk to make room for retrieval of archived volumes. Once retrieved from long-term storage, these volumes were then migrated to BackBox, which in turn re-archived them. Due to the thousands of archived tape volumes and the

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Load Shedding

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A recent thread in our LinkedIn Continuous Availability Forum covered a very important topic – load shedding. What do you do if your system approaches full capacity? What do you do in an active/active system if you lose one node and the surviving nodes must carry the full load? What do you do following a failover if your backup system is smaller than your production system?

If you want to maintain a reasonable level of service, you may have to shed some of the load that is being carried by the system. But which load?

Paul Green of Stratus Technologies started a very active discussion on this topic on the Continuous Availability Forum by posing the following question:

"What is the appropriate load-shedding policy when a continuously-available system becomes overloaded?"

He started the discussion with the following observations:

All processing systems, whether manual or automated, have an upper limit on the number of transactions they can process per second. As designers of such systems, we project the capacity needed over a specific period of time and then engineer the system so that it satisfies those requirements. As the requirements change over time, we re-engineer the system to meet the new projections.

But unanticipated situations happen, whether from a natural event (a hurricane), human error, partial failure of the system itself, or simply a sudden and unanticipated increase in demand beyond the capacity of the system. Therefore, it seems that we need to specifically design for the case in which the incoming transaction rate exceeds the processing capacity of the system.

While internal queuing can handle momentary spikes, it can't handle prolonged spans of time. What policy should the system follow when it is overloaded? Should it simply let the requests queue up externally? Should it deny some requests and accept others? Some of these choices depend upon the nature of the application. All of them have impacts on society. All of them have unintended consequences.

In my experience, many organizations simply side-step this issue by trying to always have enough capacity. Fine, but as engineers, don't we owe it to our clients to be aware of this problem and try to solve it anyway? I can assure you that it happens with enough frequency to warrant thoughtful consideration.

We had dozens of meaningful comments on the subject. An important point that was made was that an overloaded system that cannot provide useful response times is a failing system:

From an end user's point of view, any overload situation is just another system outage. The person (or machine) waiting for a service and not receiving it could not care less whether some hardware is broken, some software ran into the woods, or there is "just" too much demand on the system. A system that is not sufficiently configured to support the current incoming load is just no longer a continuously available system.

But "failures" due to degraded response times do happen in the real world. Arguably, overloaded situations are more common than total application outages.

Another commentator noted that load shedding is not just a technical consideration:

While it is tempting to consider load shedding a technical decision, in reality it is a policy decision.

Whatever the decision about how to shed load (either in response to capacity shortfalls or to a security incident), it needs to be along the lines of policies already decided at the business management level. Cut-offs often have legal and responsibility implications, quantification and management of which is a senior management responsibility.

It's a senior management decision whether they want their system to be continuously available under high load conditions or not. It can be a clear business decision to let high load bring the business down. But this should be a conscious decision, not leading to surprised faces and panicking when this actually happens.

Some suggested that there be algorithms to discard less important transactions so that others could complete.

I suggest that the app throw away or reject the transactions that it knows that it won't be able to get to. A queue scanner, for example, could notate and drop or reject transactions that it knows won't be able to finish. That way it could keep the queue 'trimmed' and perhaps give the transaction the opportunity to quickly resubmit itself to another processor.

It may be possible to put priority on incoming requests (i.e. "looking" vs. "booking" requests). If so, reject low-priority requests with a clear error message: "system busy, please retry later". I know this text sounds lame, but it seems better than just dump timeouts for all requests.

Because an overload is very unlikely, the thing we did was [to] think about priorities. The critical online application has the highest priorities and the non-critical online and batch-applications have significantly lower

priorities. In addition, our monitoring checks for processes causing too much load, and it reduces the priority for such processes automatically.

I'll relate one design element that we had in a law enforcement message switching application. That system processed many different types of inquiries - some critical, some routine. We designed the initial message parser to reject all messages of a given type if system resources were being taxed. The user defined the order in which we would start rejecting traffic. That let the user continue to process the higher priority workload during abnormal conditions. We quickly learned that we had to add a delay to the "reject" message to prevent the users from immediately resending and taxing the system even more.

I think the lesson learned here is that you have to plan carefully what load to shed. Unfortunately, there are many monitors on the NonStop that are themselves very heavy consumers and probably should be curtailed or reduced in capability. I would even go so far as to say that ongoing Measure (a good practice) should have data amounts reduced and intervals lengthened during your "shed."

One person thought that moving excess load to a cloud may be a possible solution:

One argument for cloud computing is the theory that there should always be enough capacity available in the background to match the current demand. There is no reason why a continuously available system could not be part of a cloud, or even that continuously available systems might be the stuff that the cloud is built of.

In the NonStop world, there is a mechanism called Persistent Cloud Services that can be used to provision such extra capacity for high load situations. But care needs to be taken - when moving load into the cloud, you'll see extra latency (potentially disturbing); and you may also get hurt if you don't have fully dedicated physical servers assigned to you, but rather rely on virtual servers which in turn might run on physical servers that get overloaded. If you have a big business peak shortly before Christmas, you might not be the only one - and the cloud you are relying on just might get overloaded too. The cloud-service providing business is a pretty tough one, margins are low, and those who do actually believe that their provider will generously invest in ample capacity not needed for the rest of the year may be in for a surprise.

However, I am dubious about cloud solutions, too risky and out of our control.

Capacity planning is more than CPU workload:

Very often, capacity planning is done by looking at the CPU load only. But we have to look at everything that could reach the limits. If your communication lines do not have the necessary bandwidth, you will never have a chance to differentiate between the messages. And problems with line capacity can sometimes have very mysterious symptoms. A few years ago, we had protocol errors on a leased line; and that was the result of a bandwidth problem. The bandwidth was increased and the problems were gone.

Or think of such things as HSMs (Hardware Security Managers). Today we need a lot of HSM capacity as we have to regard rules like PCI/DSS. What happens if an HSM goes down? Will the remaining HSMs be able to handle the load?

So good and effective capacity planning involves all the components needed. I still prefer to look at that data myself to verify that everything is ok. I do not think there is any product available with the "look and feel" experience will give us.

What can we do about Distributed Denial of Service attacks?

A classic example that remains a problem is a web site under a DDoS attack in which the attacker is not yet identified (and hence the false requests can't be distinguished from the true ones). Distributed Denial of Service attacks are indeed a very special situation and ought to be rejected already at the network level. It would be a very tough requirement to size an OLTP system for the coordinated simultaneous attack of millions of botnet PC's hijacked by cybercriminals. But systems ought to be sized to handle the maximum conceivable genuine workload.

If you usually share the load between your systems, a DDoS attack will hit all the systems. So at the very beginning we already decided against such a load-sharing. In our active/active architecture, both systems have their own communication lines with different addresses (X.25 and TCP/IP). The customer can use whatever system he chooses, but he has to be able to switch the communication to the other system. So a DDOS attack would have to deal with 2 systems.

(See the April issue of the Availability Digest, which focuses on DDoS attacks.[1])

The ultimate is to never run out of capacity. Damian Ward of VocaLink espouses this philosophy:[2]

We run a 100% available service that uses 2 HP NonStop servers deployed in an Active/Active configuration. Our business is "risk averse," so we operate a policy where a peak day can be processed by a single NonStop system with 1 CPU down. Additionally, in this configuration, no single CPU can be operating at greater than 80% utilisation.

Imagine a 6 CPU system, (capacity 600), and remove a CPU from the theoretical model giving 5 cpu's (capacity 500). Then multiply the 5 remaining CPU's by 80% which actually only leaves us with a capacity of 400 (4 CPU's worth in the model) to do work.

The reality is that this single node actually has 6 CPU's capacity, so it already has 50% more than should be required to do the work. If we double this up to 2 sites; we have sized the system at a max capacity of 400 (4 CPU's), but in really 99.9%+ of the time we actually have a capacity of 1200 (12 CPU's) - 3 times that required to process our maximum expected workload.

Likewise we have a separate HSM pool associated with

[1] Availability Digest, April 2013.
http://www.availabilitydigest.com/digests/v08_i04/0804_digest.htm
[2] Avoiding Capacity Exhaustion, Availability Digest; July 2012.
http://www.availabilitydigest.com/public_articles/0707/workload_forecasting.pdf

each active NonStop system. A single HSM pool (with 1 device failed) can process an entire peak day.

For telecoms we operate a policy that all of a customer's bandwidth requirement can fit down a single physical circuit at again no more than 80% utilised. However for resiliency we have 2 full size telecoms circuits to each active NonStop, (4 in total) for each customer.

So in normal running we have triple the NonStop capacity required to process the peak day which is already significantly higher than the "average" day, more than double the required HSM capacity, and quadruple the telecoms capacity required. Finally our service operates a QoS system where Synchronous payments (customer waiting 15 sec round trip SLA) always take priority over Asynchronous payments (pre-scheduled payments). In theory all synchronous payments get serviced within the SLA and 15 sec customer timeout scenario, and asynchronous ones can take a little longer to process.

So, as has been stated before, this is mostly a policy and budgets decision. What is the capacity and availability model the business is prepared to pay for in order to mitigate service risk? The availability model we use ensures significant additional capacity is always available anytime.

This may seem wasteful but is nowhere near as wasteful as a conventional production/DR model where the extra capacity is dormant and cannot easily be brought on line, especially without customer impact.

Summary

Our author, Paul Green, adds his own insights into this issue:

Great discussion; thank you, everyone. Let me relate some real-world situations that I've been involved in. Let me add that I'm specifically interested in examining this issue from the point of view of the system architect, not the end-user. I fully agree that a system that can't handle the full incoming load is less than 100% available. I also fully agree that in the real world, we must do everything possible to avoid this situation. Hats off to Damian, who works for an organization that is willing to invest the money to ensure that sufficient capacity is always available. All I can say is that most of the customers that I've dealt with over my career wouldn't dream of funding such a deluxe infrastructure.

If I divide my customers into groups based on their approach to dealing with overload situations, they fall into several broad categories:

Category #1. "Avoid the problem". This group sets a goal of always having enough capacity to handle any workload, usually has a fairly predictable workload, and usually diligently monitors their systems and takes action far enough in advance to avoid the problem. So far, so good. However, if they do get overloaded, they have no defense. Generally speaking, they run around with their hair on fire, utterly surprised and in a panic because this was never supposed to happen. Their solution is usually to rush out and buy more hardware (only to see the situation repeat in 2-3 years).

Category #2. "Bounce the application". This group has one universal solution for any application issue. Restart it. If that doesn't work, restart the operating system. Keep doing this until the problem goes away. One of my customers has a hard-coded 4-second timeout between all clients and servers. If this timeout is ever reached, code is invoked to restart the application. While the technique is brutal, it has the benefit that you can easily predict the duration of the recovery time.

Category #3. "Protect the online application, defer batch". This group has two classes of inbound transactions: those that must be processed in real time (online), and those that can take a few hours or more (batch). The batch system simply recursively uses the online system to do its work. So when the online system is at peak load, they hold off entering batch transactions. This is a priority scheme in which the end users decide which service to purchase (online or batch) based on their needs and price. As before, success generally rides on proper manual intervention.

Category #4. "Muddle through". This group muddles along with no clear strategy. They try to have enough capacity, but aren't methodical about it. They have a bunch of ad-hoc, manual techniques to use when things get rough. If they can deflect blame onto someone else, they do so. These clients are usually under-funded and under-resourced.

Category #5. "Competent and Paranoid". Very rare creature. This group always has enough hardware capacity to handle any reasonable load and most unreasonable loads. They methodically track usage and accurately predict future requirements, and they are diligent about staying ahead of the demand. Further, they obsessively run accurate benchmarks of simulated traffic so that they know how their systems (hardware and software) behave under real-world situations. They know their maximum throughput, and they know (because they've simulated it) what happens if a line to an HSM goes down, or a line to Visa goes down, or a CPU goes offline, or any of the real-world things that can go bad does go bad. They know because they injected errors in their lab. They have thought about the problem. If they have a weakness, it is that they still require too much manual intervention. But otherwise, they are the best of the bunch.

I hope we can convince IT shops to adopt a defense-in-depth approach. Buying enough hardware early and often enough is necessary but not sufficient. The rest is up to the application architects.

I rather like the idea of introducing some randomness into the basket of possible solutions to load shedding. I think there is an analogy that can be made to the packet flow control algorithms of the Internet. I'm not an expert in packet flow control, so I won't try to go into details, but as I understand it, many devices today have what is called a "tail drop" or "tail truncate" algorithm -- they capture packets until their buffers fill up, and then they drop all incoming packets. The problem with such an algorithm is that it produces bursty traffic and introduces long latencies into the transmission of data. A new algorithm has been proposed in which the receiver randomly discards packets

as its queue fills up. The longer the queue, the more packets get dropped. The act of discarding packets provides a clue to the sender that he's transmitting too fast. His algorithm will slow him down. Communication continues and is never interrupted. It is fair because everyone is treated the same way. The pipe is still used efficiently (high degree of bandwidth utilization). Latency is kept low. Well-behaved senders are not penalized. It seems to me that these are some of the same qualities we'd like to see in any load-shedding algorithm. (If you are interested in reading about the newly-proposed load-shedding algorithm for TCP/IP, do an Internet search for "Controlling Queue Delay" by Kathleen Nichols and Van Jacobson.)

I'll bet the flow-control algorithms (if any) used in POS/ATM terminals still date from the time of low-speed, dial-up lines. But now that everything is online, why not come up with a consistent, unified approach? Instead of sending the request and starting up a 60-second timer that will abort the request (which is what many devices still do), [why not] have them retry sooner but back off an increasing amount of time each time they time out? If the whole network worked this way, then when the central server(s) got saturated, the system would automatically find the appropriate input rate that would match the processing capacity of the system. If the servers were only slightly overloaded, then most requests would still get processed on the first try, but some clients, chosen at random, would take a little longer. As the servers get more overloaded, more clients are delayed.

Work smarter, not harder.

Concluding Thoughts

Clearly, dealing with overloaded application processing systems is a real problem that deserves serious and sustained effort. We believe it is important to factor these concerns into both the initial design of the system and the ongoing maintenance. While the precise methods will vary from one application to another, due to the unique properties of each application, we can still draw some important lessons from this discussion.

First, every effort must be made to design a system that cannot become overloaded under any reasonable (or even moderately unreasonable) situation. Second, all affected parties should be involved in the up-front design of any load-shedding algorithms: senior management, end-users, application designers, and system vendors. Each of these parties has a unique role and set of insights. Third, to the greatest extent possible, the design should permit the software to dynamically take care of itself. While there will always be a need for manual intervention, automated interventions can be designed and tested under a wide variety of simulated conditions; and thus an organization can be assured that many situations will be quickly and effectively managed. Indeed, advance testing of system behavior, capacity and response time is fundamental to success of continuously-available systems. Fourth, there is a strong need for continuous monitoring, logging, and in some cases, publication of key system parameters. Certainly, operations staff requires detailed knowledge of system behavior. But in addition, users can often modify their own behavior if they know the system is overloaded; at the very least, they will appreciate the disclosure of anticipated response times. (Think of the difference between a call center that informs you of your anticipated wait time and one that does not do so). Lastly, building a culture that strives to provide service under all possible circumstances ensures that an organization will succeed.

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Combating the Growing Threat of Fraud

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The Fraud Business is Big Business

Criminals, fraudsters, cheaters and swindlers – they go by many names but they all share two common characteristics – they are adaptable and they are persistent. When one of their scams or schemes stops working, they try another one, and another one, and another one – until they find something that does work.

For the card fraudster, life used to be so much easier. At one time all they needed to do was to get hold of a copy of a card receipt. Once they had the card number and could fake the cardholder's signature they could ply their nefarious trade – stealing money and goods from merchants. Technology advances – magnetic stripes, electronic, online, real-time point of sale devices made it harder, but the fraudsters adapted. Life continues to get harder for them with each new enhancement – EMV, 3D Secure, Account Verification Services and an increasing array of other tools are being used to combat fraud.

So life is more difficult for the fraudsters but not impossible. Recent estimates from Visa and MasterCard place the total lost to card payment fraud at over US$10 billion per annum and it is growing. Card not present fraud is on the increase in many parts of the world – and not only is it being driven by the increase in online commerce but also because other fraud schemes are getting harder for criminals. The direct financial losses to fraud are well known, and sometimes are viewed as part of the cost of doing business. However, the change in consumer behaviour is often overlooked and can be much more important. Research has shown that 54% of consumers stop using their card or reduce their use of the card when they are affected by fraud. A further 8% of consumers stop using the merchant or website where they think the fraud occurred.

So, can anything be done to deal with this tidal wide of fraud and can anything be done to handle the changing approaches the fraudsters take? The answer is yes – of course something can be done.

Defence in Depth

As usual, no single component provides the complete solution – there is no magic silver bullet. Looking at the system from first principles – the credit and debit cards themselves must be difficult to clone or copy, the payment devices must protected against unauthorised access, the telecommunications infrastructure must prevent interception and man-in-the-middle-type attacks. The transaction processing systems – both hardware and software must be protected against intrusion and manipulation.

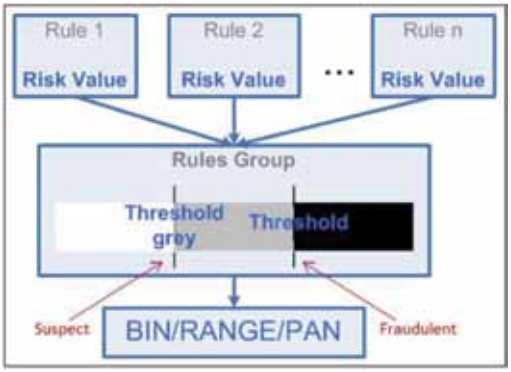
The focus of this article is on the tools and techniques that can be deployed when a sophisticated fraud prevention solution – such as BPC's SmartGuard – is used.

The Ideal – Stopping Fraud Before It Affects Customers

While it may seem obvious that the ideal solution is the solution that stops fraud before it affects customers, not all solutions achieve this. Any system that does not monitor 100% of transactions, in real-time cannot prevent fraud from affecting customers. A comprehensive fraud prevention solution should carry the following functions:

1. Monitoring 100% of transactions, regardless of their source
2. Recognizing fraudulent transactions using customer defined rules
3. Rapidly escalate suspicious transactions for further investigation
4. Improving customer services by increasing the interaction with your customers

Transactions from all sources, should be monitored, including payment networks, payment processors, ATMs, kiosks, Point of Sale devices, call centers, mobile and internet channels. The solution should not rely on sampling, instead it should monitor all transactions in real-time thereby providing operators with the ability to stop fraud before it affects customers. Not only do systems that use sampling miss fraud, but they typically react "after the fraud" has taken place.



Transactions should be analysed by a rules engine, using a predetermined set of rules for the transaction. Rules are typically combined in groups. Each transaction is given a transaction risk weight, which is the sum of the risk values of the rules in the group. If the value exceeds either the Suspect or Fraudulent threshold, the correct reaction template should be executed. Transactions that are clearly above board can be passed through, transactions that are clearly fraudulent can be stopped and transactions that require further investigation can be passed to operators for follow up. Reaction templates govern what happens to a transaction once it has exceeded a threshold and can be used to generate and return a response code, add the transaction / card to the stop list, send an SMS and / or email to the customer and / or to the

operator. Each transaction can be subject to an unlimited number of checks of different types including:

- S-type rules – these rules use simple, logical arguments to evaluate risk based on a wide range of transaction attributes, e.g. transaction amount, terminal id, transaction type, card number, country code, currency code, merchant address, date and time of transactions, etc. These checks are typically used to compare the current transaction against previous transactions.
- U-type rules– these rules utilise a user-matrix to combine hundreds of simple checks into 1 matrix – for example a user-matrix could be used to implement a check based on travel durations from one country to another. This can be used in situations where two transactions come in from different countries, to check whether a card holder could have travelled from one location to the other in the time between the transactions.
- P-type rules – these precedent rules use statistical results from previous activities and behaviours as input into the decision making process. This system uses multi-dimensional cluster recognition.

It should be possible to combine the rules in virtually unlimited ways thereby ensuring that you can replicate your business rules, and users should be able to use visual tools to rapidly create and tailor rules and rule groups. Each rules group must be given a set priority level, to ensure that the correct sequence of rules is applied to each transaction.

A case management system is needed to help operators investigate suspicious and fraudulent transactions. In addition to providing queuing systems, the solution should assign different priority levels to individual transactions thereby ensuring the service level agreements can be achieved.

Research has shown that 54% of people who are affected by card-based fraud will either stop using the effected card completely or dramatically reduce their use of that card. As online shopping grows and the use of cards continues to expand, this means that these customers are probably using a different card to make their purchases. In effect the long term implications of fraud on the card issuer can be much more than any short term financial losses. Faced with the increasing threat from fraud, combined with consumers' understandable fear of fraud, the way a financial institution deals with potentially fraudulent situations is critical.

The following example, which happened in real life, illustrates this.

A card holder goes on vacation, during which they use their card to make several small purchases. They then try to pay their hotel bill using the same card when they check out.

With many existing systems, when the card holder made the initial purchases, the offline sampling system picked up the transactions. As the transactions fit a predefined pattern for potential fraud (perhaps due to the location of the vacation), the system automatically blocks the card to prevent future losses. While the card has been blocked, the first time the customer finds out is when they try to use it to check out of the hotel – when the hotel tells the card holder that their card has been declined. The result of this example is considerable embarrassment in a public place. In this situation, how many customers would resolve to close their account as soon as they returned from their vacation?

With more sophisticated fraud prevention solutions, when the card holder made the initial purchases, they were picked up in real-time, and flagged as suspicious because of the rules. The reaction template ensured that an SMS was sent to the card holders registered mobile phone, asking the card holder to contact the call center. The card holder calls in and confirms that the transactions are not fraudulent. The operator then updates the system so when the card holder pays the bill the transaction is not stopped and the card holder is not embarrassed.

In the first situation the result was a lost customer, whereas in the second situation the result was a customer who talked about the excellent service they received from their card issuer. While this may seem like a made-up example, it did in fact happen – the first situation occurred as the writer of this article and his wife attempted to check out of their hotel on honeymoon. The second example also took place a short time later. The difference between the two situations was the card used, or to put it more accurately the fraud prevention solution used to protect the card used.

The Case Study – from a Bank's Perspective

Alfa-Bank is Russia's largest private bank. Founded in 1990 and a BPC Banking Technologies (www.bpcbt.com) customer since 1999, today it employs 18,000 people and operates over 465 branches, 2,400 ATMs, and 15,000 POS devices. The Bank has grown tremendously – for example in the early 2000's it supported approximately 100,000 cards from Visa and MasterCard, today the Bank has 6.3 million individual customers and 56,000 corporate customers, has issued more than 9 million cards and processes more than 1 million transactions per day.

With such dynamic growth, Alfa-Bank turned to BPC to help them improve their fraud prevention efforts. In 2008, the Bank deployed SmartGuard to provide their fraud prevention specialists with the tools they needed to efficiently and quickly detect suspicious transactions and stop fraud. The system's flexibility helps the bank quickly adjust to detect new types of fraud – for example if the Bank receives information about cards that have been stolen in a particular city, they can upload the name of the city or the acquirer and the system will pay particular attention to those transactions.

The Bank has been able to embed their deep expertise combating fraud into SmartGuard, for example building business rules to spot common fraudulent approaches. And with the system's "learning capabilities", Alfa-Bank is assured that prior experience is continually built into processing.

As a result of combining the solution's sophisticated rules with the Bank's deep expertise, the Bank has driven down fraud rates and generated a saving of US $1m per month. In addition to this, the Bank's reputation has been enhanced and the system's automated routines have freed staff up to focus on higher value activities.

For more information about how to dramatically reduce fraud levels using advanced fraud prevention solutions contact Daragh O'Byrne at d.obyrne@bpcbt.com

Harnessing Big Data With NonStop and Logical Data Warehousing:

A restyled data warehouse leveraging time value of information

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The term "big data" puts an inordinate focus on the issue of information volume in every aspect from storage through transform/transport to analysis. Big Data is not just about volume. Neither does Big Data automatically equal Hadoop. Big data with the characteristic of velocity also poses a generally unaddressed challenge. In a 2013 MIT Sloan School of Business study, for analytical innovators, the number 1 use of Analytics is making decisions in real-time. Business Intelligence serves to provide the ability to link together dual desires; the information on which to act; and the action itself, to ensure an optimized outcome. Some information managers deploy systems that assume users have qualified the information and have appropriate access to it or worse, simply default to existing practices.

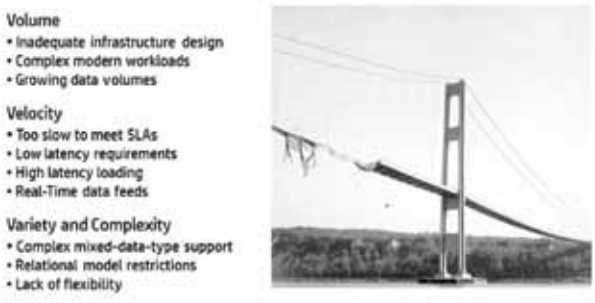

Figure 1. What's wrong with today's Data Management Architectures?

A Logical Data Warehouse makes possible the selection of a deployment architecture based on service-level expectation instead of defaulting to existing practices. Logical Data Warehousing is an outcome of research done by the analysts at Gartner, mostly credited to Research Vice President, Mark Beyer, who is the co-lead for Big Data research.

Hewlett Packard is one of the few organizations capable of creating a holistic Logical Data Warehouse solution that facilitates the change in direction from a single, centralized physical system to a distributed architecture on a time-value-of- information continuum, where computation is provided by individual systems, with each node optimized for specific workloads in order to answer any business question, any time.

If your organization must make decisions in real-time, then the questions that need to be addressed are those around situational awareness. Situational awareness is the perception of our business environment with respect to time and the projection of position after an event has taken happened. The desire to understand the options available is a normal human response to having to make decisions when confronted with events. Having the right information at the right time to be able to make the right decision is the challenge. The inability to do this is not necessarily a factor of not having enough data. It's not being able to evaluate the available data fast enough. This is where NonStop technology comes in.

In an all-HP Logical Data Warehouse, NonStop provides an out-of-the-box, integrated platform for real-time situational awareness providing a customizable solution optimized to address the high percentage of operational, real-time queries—often up to 80 percent— which are interactive lookups focused on data about a specific client, account or stakeholder.

THE CASE FOR CHANGE

Business intelligence is commonly built on an enterprise data warehouse (EDW). These systems integrate data from transactional systems that process an organization's interactions with customers, prospects, suppliers, business partners, competitors and regulators. EDWs are aligned to a corporate agenda and shared by business sponsors who drive demands for required information infrastructure to meet operational and analytical information needs across the organization. EDW's are commonly implemented as a centralized system: a single data-management technology running on a single computer system which is commonly an organization's largest database.

Figure 2. Original Vision of Enterprise Data Warehouse

The growing desire to monetize non-relational data has created an almost frenzied situation to optimize EDW

performance to support analytics and business intelligence in many organizations. The combination of highly variable performance, data concurrency and data quality requirements, with differing service-level agreements for each connected business unit, compounded with widely disparate security and access requirements often results in uncoordinated data warehouses and marts.

As data volumes, variety, and complexity continue to grow, and analytic workloads multiply, a single computer system, running a single database management system, may begin failing to meet expected service levels. Workload performance declines. When the centralized EDW does not deliver, line-of-business users take predictable action.

The typical initial response to long-running workloads and underperforming queries is to tune and partition the system. These actions may work for a time—for selected workloads— but inevitably, they draw valuable technical staff into an endless cycle of warehouse care and feeding.

When performance adjustments fail to make EDW performance satisfactory, disappointed users begin to extract data subsets and move them to data marts. Data marts are repositories developed to satisfy a set of specific end-user information needs. Many organizations build data marts and specialized databases because they have silo funding due to political factors, or because of data management barriers and sourcing issues. HP itself had 750 + at one time. The issues are now embedded in the various data marts' designs. Yet organizations continue to deploy data marts as if they are authoritative when, in fact, they are derived data. Numerous organizations with a strategic intention to build data warehouses have continued to fall into the trap of building and accumulating data marts.

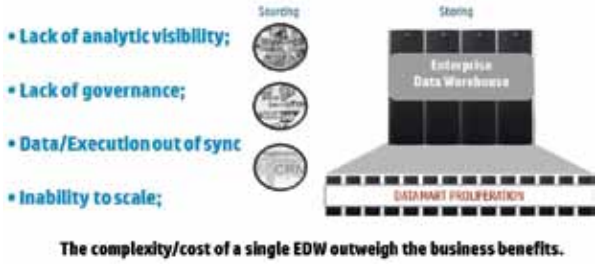

Figure 3. The Return of Data Mart Sprawl

The spreadmart warehouse topology depicted in Figure 3 is inevitably too complex to administer, reliant on tuning and costly to maintain. The costs of this running this type of infrastructure outweigh its value to the business. Many organizations have discovered the negative business impact of diverting highly skilled technical resources away from business-driving innovation and applying them instead to ineffective system maintenance.

As organizations grow their business intelligence portfolios, deploying analytic applications to derive greater value from their expanding data stores, their data warehouse systems assume ever more importance. These systems, originally conceived to support offline reporting and rudimentary analytic queries, are now expected to support enormous and growing data volumes, new unstructured and semi-structured data sources, and expanding communities of knowledge workers running a wide range of analytic workloads. For many organizations, redeployment of the same old solutions will leave them unable to keep pace with modern demands for mixed workloads, extreme performance, and advanced analytic applications.

So if the Big Data path leads not to just a bigger data warehouse or Hadoop, where does it lead?

One piece of a Big Data solution that answers any question, any time might be a column store database. A column-store database management system (DBMS) is a DBMS that indexes each column of a table, storing the indexes in lieu of row data — unlike traditional relational DBMSs using a row-store, where data is stored in rows, with indexes optional. In addition, most column-store DBMSs include additional optimization techniques (such as compression and tokenization) to further compress the data — using less storage and increasing input/output (I/O) performance. Vertica is a column store DBMS.

One piece of a Big Data solution that answers any question, any time might contain content analytics. Content Analytics defines a family of technologies that processes content, and the behavior of users in consuming content, to derive answers to specific questions. Content types include text of all kinds, such as documents, blogs, news sites, customer conversations (both audio and text), and the interactions occurring on the social Web. Analytic approaches include text analytics, rich media and speech analytics, as well as sentiment, emotional intent and behavioral analytics. As an example, Autonomy performs content analytics.

Complex-event processing (CEP) might be another piece. CEP is a kind of computing in which incoming data about events is distilled into more useful, higher level "complex" event data that provides insight into what is happening. CEP is event-driven because the computation is triggered by the receipt of event data.

Still another piece might be an in-memory data base. An in-memory database management system (IMDBMS) is a DBMS that stores the entire database structure in memory and accesses all the data directly, without the use of input/ output instructions to store and retrieve data from disks, allowing applications to run completely in memory. This should not be confused with a caching mechanism, which stores and manages disk blocks in memory cache for speed. uCirrus is an IMDBMS that can provide CEP like capabilities.

The last, but certainly not least piece is operational analytics. Operational analytics is related to faster, less costly and more effective operations. It can provide competitive advantage but, more often, is part of the cost of doing business and is required just to stay even with competitors, not to outpace them. NonStop has a proven record processing operational data.

Leading cross-industry innovators realize that incrementally adding to their already inadequate technologies cannot solve their multiple business/ IT challenges. Initiatives to transform current data environments into less complex, optimized informational solutions that deliver highest data quality while producing dramatic cost reductions, decreased time to market, and dramatic increase in revenue, all require a fundamental and comprehensive master plan of what the transformed environment must provide and how the environment is optimally architected. Innovative information leaders are implementing advanced technologies, column store and in-memory architectures, and integrated operational analytics to introduce and enable structural changes with long-term positive impacts on business performance and competitiveness. In the process, successful innovators realize that closely aligning business and IT processes, cultural and organizational processes and drivers, and treating data as a corporate asset are both key to a successful BI implementation. HP's own massive IT Transformation (in which the EDW was based on a variant of NonStop technology) is a lighthouse example of how technology-enabled strategic and structural changes can deliver superior long-term business benefits.

LOGICAL DATA WAREHOUSE

In 2010, Gartner estimated that over 70% of EDWs had performance issues (Data Warehouse Magic Quadrant, 2010). In a November 2010 global database survey, Forrester reported that 65% of enterprises found it difficult to deliver performance with their existing architectures. As data volumes, velocity and variety continue to grow, and analytic workloads multiply, a single computer system, running a single database management system, may begin failing to meet expected service levels. Everything has a tipping point. Big Data and legacy information management tip when workload performance declines and tuning/partitioning the system or spreadmart implementation fail to address the issue. By attempting to solve one problem the organization creates multiple new ones: data silos limit enterprise-wide analytics, creating blind spots; governance becomes impossible; data extract-and-offload operations create additional load on the already teetering EDW; and costs and complexity escalate. There must be a way to deploy a solution based on service-level expectation rather than being continually constrained by existing practices. Gartner calls the answer to this conundrum a Logical Data Warehouse (LDW).

Process Workloads on "Fit for Purpose" Nodes

In a Logical Data Warehouse data and compute resources are assigned to appliances and other systems specifically designed for well-understood workloads. Infrastructure components such as NonStop, Vertica and Hadoop app-servers offer optimal performance at affordable prices and their simplicity accelerates time-to-value.

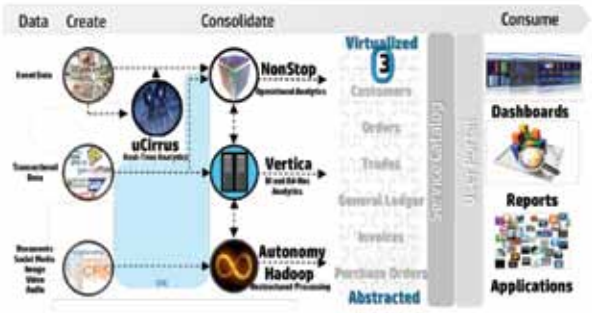

Figure 5. An HP Logical Data Warehouse

After defining your current state the most conspicuous starting point is to a) offload operational analytic queries to the NonStop node and b) absorb shadow data marts back into the logical warehouse on the appropriate platform. Whether offloaded from the central warehouse (structured data analytics) or deployed on purpose-built nodes before ever having been deployed on the central warehouse (Big Data volume and velocity analytic workloads), some organizations may have a different strategic priority: Move to accommodate new big data (volume) sources into the analytic infrastructure, using systems with real-time streaming analytic engines, and Hadoop/Autonomy IDOL to undertake preprocessing and initial analysis, and to ingest data into the logical warehouse. Data can then flow from those platforms to other analytics appliances and systems for further downstream processing. As new data paradigms and analytic platforms emerge, they may also be integrated.

Unencumbered of unstructured and velocity processing for which it was not designed, the central EDW will regain computational resources that can be focused on harmonization activities, including data integration and data quality oversight. Data management and computation could be offloaded from the EDW to platforms like: NonStop for operational analytics; a stream-processing system for real-time analysis of data on-the-wire (for example, from digital sensors or stock trades); and a grid running the Hadoop and/ or Autonomy IDOL for analyses of big data such as web-click streams and/or twitter feeds. The LDW is meant to be a flexible system: nodes may come and go.

Components of a Logical Data Warehouse:

If a Logical Data Warehouse is a set of data storage and/ or processing nodes, the mortar that binds these nodes takes the form of software, services, and networking hardware and software. Unlike a typical network or grid computing, a Logical Warehouse is a heterogeneous entity that may include a diverse set of nodes running a diverse set of tasks. Table 1 is labeled "possible" as each client's desired target state may vary, thus not all components may be required for each client.

Operational Analytics	NonStop Servers for low-latency, real-time query and Operational BI support; BI reporting and dashboard updating.
OLTP/Transactional	Nonstop for OLTP or other short-request query activity.
Analytics	Vertica for decision support, data mining, complex in-database analytics.
Line of Business Marts/ Warehouses	Vertica for data warehouse and specific LoB applications— retail analytics, ERP, etc.
ETL/Data Integration	Open data staging, bulk and trickle-feed data loading, ETL, ELT such as Informatica, Ab Initio.
Data Governance	Open Master data management (MDM), changed data capture (CDC), data quality (DQ), etc. from Informatica
Complex Event Processing	UCirrus XPRESSmp for real-time event processing of data compliance, data security, fraud detection, etc.
Real-Time Analytics (Big Volume)	UCirrus XPRESSmp for high-volume stream capture and analysis.
Data Virtualization/ Abstraction	Composite Software
Big (Non-Relational) Data Processing	Hadoop/Autonomy to analyze massive unstructured data sets.

Table 1. Possible Components of a Logical Data Warehouse

TIME VALUE OF INFORMATION

In order to answer all the questions, all the time, data needs to flow through an enterprise on a time continuum harmonized with business process execution. Time is the enemy of real-time data. Standard economics says money today is worth more than money in the future. This is why borrowers agree to pay interest on a loan (and why creditors require it). How much more money is worth today than in the future is determined by the discount or interest rate.

The value of information generally behaves in a similar manner to money. A particular piece of knowledge is very likely to be worth more today than a year from now. Knowing the price of a stock at 9AM helps you a little at 10AM, less at 3PM, less still the next morning and is essentially worthless a week from now. Information gets old. It loses value.

Real-time, operational analytics systems provide current information on conditions in a company and its environment. The term real-time is used loosely here — depending on the organization, it could mean that some of the data is new within the past 15 minutes and the response, if any, will be triggered immediately.

The fundamental benefit of real-time analytics is fresher and better information, leading to faster and smarter decisions, true situational awareness and improved business performance. In operational decision-making, fresh information is almost always more valuable than stale information. The half-life of the value of event data may be measured in minutes or perhaps milliseconds, depending on the kind of decisions to be made.

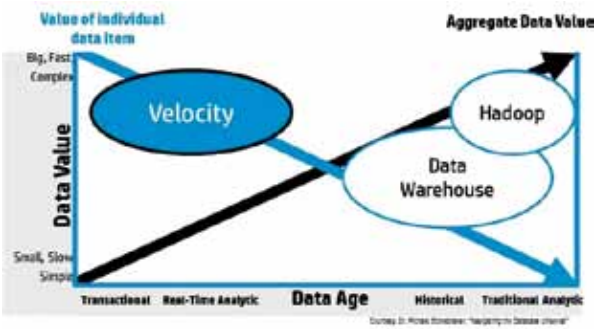

Figure 7. Value of Data Changes Over Time

In the Figure above, on the vertical axis you see Data Value. On the horizontal axis, one can follow data value as data ages. In this graph, the difference in data value depends on the type of data you are trying to master, the business objective you are trying to optimize and the potential tool the organization is leveraging. Real-time data focuses on what is happening right now, not on what has already happened. It enables situational awareness. The value of an individual data item is at its highest at the moment it is visible to the organization.

Real-time intelligence can also be used to affect individual transactions while they are still under way. In a Broker/Trader example, brokers and risk managers can use event data in a customer contact center can use event data to adjust their treatment of a trade prior to its flight to an exchange. Algorithmic trading systems in capital markets are even more sensitive to time. High-frequency trading strategies require that buying and selling decisions be made within a millisecond or two, because the opportunity will be gone when prices change slightly or when a competitor has grabbed the deal. A particular calculation can be worth hundreds of thousands of dollars if action is taken within a few milliseconds, or be worthless 10 milliseconds later.

SUMMARY

Traditionally Business intelligence was built on data existing within an organization and delivered by data warehouses. A Logical Data Warehouse with NonStop as the real-time component replaces or enhances a monolithic system with a distributed computing architecture leveraging the best technology in HP's portfolio. LDW enables the simplification of analytics through infrastructure consolidation while processing workloads on "fit for purpose" platforms. A Logical Data Warehouse makes possible the selection of a deployment architecture based on service-level expectation and eliminates the constant level of compromise between comprehensive data needs, performance optimization and time to delivery cycles. Each task can be provisioned with exactly the hardware, software, and data services it requires. NonStop provides an out-of-the-box, integrated platform for real-time situational awareness providing a customizable solution optimized to address operational, real-time queries allowing your organization to leverage time value of information.

Cloud-enabling NonStop Systems: Why You Should Care and How You Can Do It

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Defining Cloud Computing

The term "cloud computing" is regrettably appropriate because the term is rather vague ("cloudy"), and means very different things to different people. While there is a NIST definition of the term[1], this description covers about three pages and consists of the definition itself (in not too few words), five essential characteristics, three service models, and four deployment models.

The German Federal Office for Information Security[2] discussed the lack of a short and concise definition of cloud computing and therefore created its own[3], which we translate as follows: Cloud computing means the dynamic provisioning, usage, and accounting of IT services via a network. The range of services consists of the whole spectrum of IT, such as infrastructure (computing capacity and storage), platforms, and software.

Use Cases for Cloud Computing for HP NonStop Users

As an HP NonStop™ user, you run the most reliable hardware in the world—should you even be looking at cloud computing? The answer will depend first and foremost on your business requirements, as well as what is technically feasible and in your budget. Some aspects of cloud computing, such as dynamic provisioning, are a reality on HP NonStop systems already and have been for over 30 years (think of the dynamic load balancing of Pathway).

We will now list some use cases in which HP NonStop systems could play a role in implementing some aspects of cloud computing. We do not expect this list to be complete; we also have limited this list to use cases that are possible given the HP NonStop technology of today.

- Use case for applications developed from scratch:
  - o *Cloud use case 1*: HP NonStop systems provide a scalable database at the back end of an application that runs in the cloud
- Use cases for existing applications that are already running on NonStop systems:
  - o *Cloud use case 2*: Provide a new interface to an existing NonStop application, while leveraging cloud technologies
  - o *Cloud use case 3*: Move business and/or presentation logic from NonStop into the cloud
  - o *Cloud use case 4*: Push Pathway servers out into the cloud (where "the cloud" effectively means any platform that is not HP NonStop)

Several of these "cloud use cases" are running in production at NonStop customer sites already—they were simply implemented before the terminology of cloud computing arose. For instance, sharing workload between NonStop systems and "cheap off-the-shelf systems" is nothing new really: A couple of years ago, SABRE publicly introduced a concept called "hybrid computing" in which they offloaded the "looking" traffic to cheaper hardware, whereas the "booking" traffic was processed on the NonStop system. This is a good example for the third use case listed above.

Putting Concepts into Practice: The comForte Cloud Demo

In conjunction with this article, we decided to do an actual implementation of *cloud use case 1*—a completely new application that has the core running on HP NonStop systems and the presentation layer running in the cloud. We therefore designed and implemented a rather simple, Internet-facing application from scratch. Here's a quick overview:

1. The application implements a voting system for sports stars, which is available to everyone with Internet access.
2. A comForte NonStop system hosts the database backend.
3. The presentation layer and Web server are hosted in a public cloud infrastructure. This layer accesses the NonStop system for all reads and update processing.

We chose to implement the database backend on NonStop in COBOL for two reasons:

- It is very easy to implement a new Pathway server class in COBOL
- The resulting application infrastructure is typical for many legacy applications running on HP NonStop systems

Looking back at our earlier use cases, our cloud

[1] http://csrc.nist.gov/publications/nistpubs/800-146/sp800-146.pdf
[2] https://www.bsi.bund.de/EN/Home/home_node.html
[3] https://www.bsi.bund.de/DE/Themen/CloudComputing/Grundlagen/Grundlagen_node.html

demo is a direct implementation of cloud use case 1, however the technologies we used could be applied to use *case 2 and 3* as well.

Before we discuss the cloud demo in more detail, we need to discuss some typical NonStop application architectures first.

A Typical NonStop Application Architecture

Figure 1 shows the architecture of a typical legacy NonStop application. This architecture is well understood, rock solid, and the basis for hundreds of applications running in production across the world. Here are some pros and cons of this application design:

- Pro: Separation of business logic and presentation layer.
- Pro: Server classes can be implemented in a rich variety of languages.
- Pro: Built-in capability to "scale up" (called dynamic provisioning in cloud computing terms).
- Con: If Screen Cobol is used for client code, administrators have to contend with significant limitations in GUI capabilities, and no language other than Screen Cobol is supported for GUI design.
- Con: If Cobol is used for server code, it is getting harder and harder to find skilled Cobol programmers.

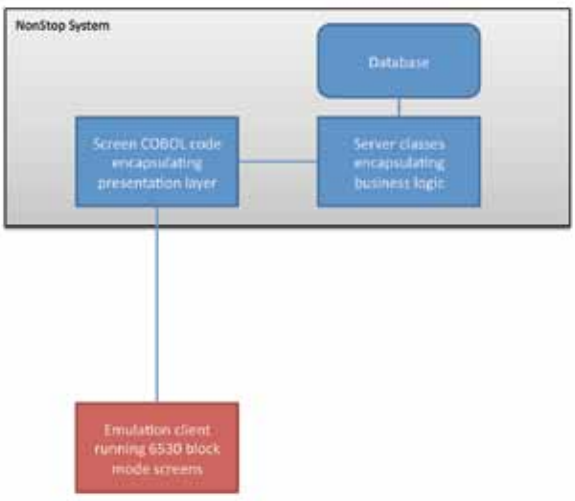

Figure 1: Architecture of a legacy NonStop application

Having looked at the typical legacy architecture, we will now look at modernization options.

Application Modernization Options

SOAP-enabling in a Two-tier Model

SOA(P)-enabling has been another IT buzzword in the past couple of years and SOA has already gone mainstream in many organizations. There have been several articles published in The Connection about this topic[4], so we will not discuss the motivation for SOA-enabling nor the implementation options in much detail.

Figure 2 shows how to SOAP-enable the application using such products as HP NonStop SOAP, NuWave SOAP/AM, ACI Webgate, and comForte CSL.

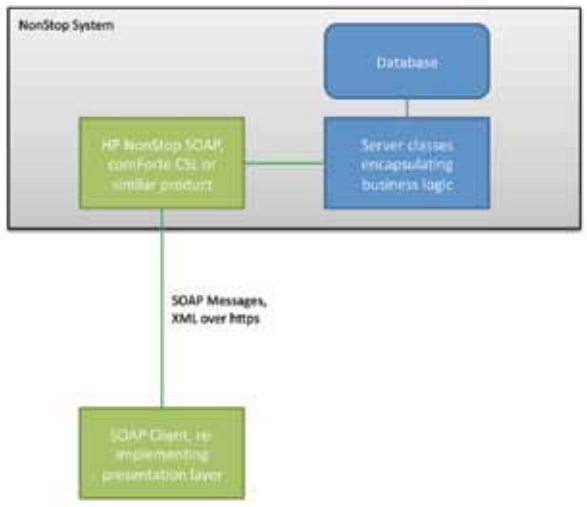

Figure 2: SOAP enabling a legacy application, two-tier approach

Here are some pros and cons of this application design:

- Pro: SOAP(WSDL) provides a well-defined interface into the HP NonStop system.
- Pro: Server classes do not need to be changed.
- Con: The SOAP protocol relies on XML, which is a rather heavy-weight way to describe data. This can put unacceptable load on the HP NonStop system in high-volume environments.

Application Modernization Using a Three-tier Architecture

Figure 3 shows a different approach for application modernization than the two-tier approach. In this case, products like comForte CSL, Cornerstone RSC, and TIC SOG (Server object gateway) allow remote systems to access Pathway servers using a leaner message format than XML. A three-tier architecture introduces a middle tier that resides between clients and the HP NonStop server and that handles the presentation layer. The required message wrapping (into SOAP or HTML) is done on the middle tier, which means that CPU load can be distributed among stateless, off-the-shelf systems.

This architecture has been used in production by several comForte CSL customers for many years. If the mid-tier system(s) are running in a private cloud environment, this is then an example of use case 2 combined with use case 3. The comForte cloud demo makes use of this application architecture.

[4] See for instance "NonStop Application Modernization: Proven Approaches, Real Results", Issue May/June 2011

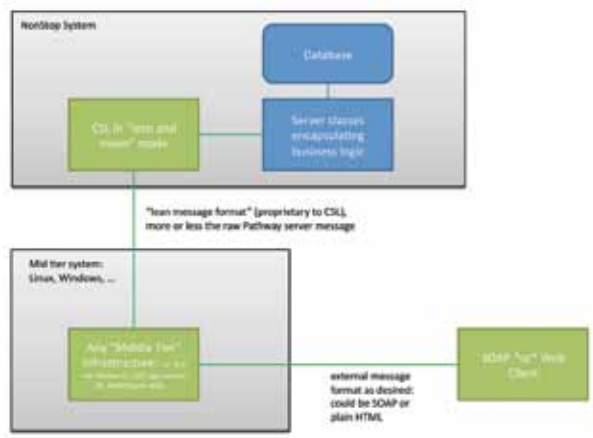

Figure 3: Modernizing a NonStop application, three-tier approach

Some Well-known Companies Providing Cloud Computing Expertise

There are a multitude of vendors in the cloud computing market. We will quickly introduce only three players here:

- Amazon Web Services (AWS) was officially launched in 2006 and now provides a rich set of offerings for both IaaS and SaaS approaches. The Amazon Elastic Compute Cloud (EC2) is among the most-used services within AWS, allowing users to rent virtual computers to run their own applications on. This is an example of the Infrastructure as a Service (IaaS) cloud model.
- Windows Azure became available in 2010 and directly competes with AWS (and several other cloud providers). We chose to run our demo within the Windows Azure public cloud as comForte is a Microsoft certified partner and we had in-house expertise working with Microsoft .NET for presentation layer development. The Azure framework we are using in the demo is an example of Platform as a Service (PaaS).
- Finally, HP has recently introduced the Converged Cloud architecture, which is a mixture of hardware, software, and service offerings. NonStop systems are already part of the HP Converged Infrastructure and we are sure there is more to come in the future.

Windows Azure: An Example of a Public Cloud Infrastructure

Microsoft launched Windows Azure as a cloud platform for creating and hosting Web services that can be quickly scaled up and down with minimal effort. Microsoft describes Windows Azure as a "flexible platform that supports multiple languages and integrates with your existing on-premises environment."

Windows Azure can be used in private cloud scenarios as well: A technology called Windows Azure Services for Windows Server 2012 enables customers to deploy a self-service portal, website, and virtual machine services from their own data centers.

Figure 4 is a part of the official Windows Azure poster[1] created by the Windows Azure team.

As shown in Figure 4, developers can use existing Web solutions that were developed in Visual Studio and publish them as Web role instances. Scalability and load balancing between end users (shown on top of the diagram) and Web roles can be achieved by using load balancer. If required, Web roles can offload computing jobs to worker roles: computing jobs between Web instances and Cloud Storage are effectively offloaded to scalable pools of workers directly or via queues.

Leaving the details of how Windows Azure works aside, the diagram shows a typical application that has both storage and computing running in a public cloud.

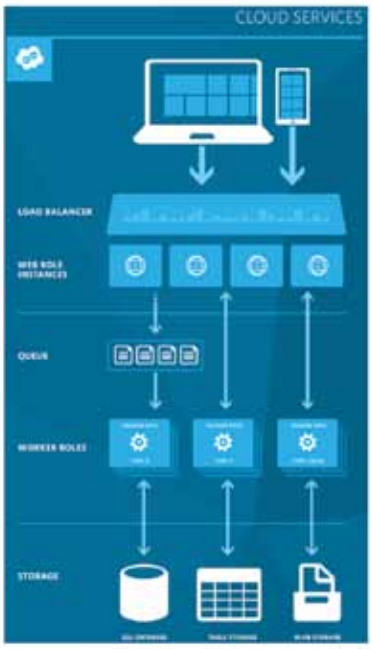

Figure 4: Windows Azure Cloud Services

The comForte Cloud Demo

How it Works

Figure 5 shows how we modified the default Windows Azure cloud application to have the data stored on our NonStop system rather than in the cloud. Comparing this with Figure 4 you will find that we now have the worker roles connecting directly to the comForte NonStop platform for any database access. To be able to do this, we employ the comForte CSL product and Figure 6 shows how this works in more detail.

[1] The poster is available at https://www.microsoft.com/en-us/download/details.aspx?id=35473 , copyright acknowledged. You will find that Microsoft Azure is a rather powerful set of technologies.

[5] See http://en.wikipedia.org/wiki/ACID

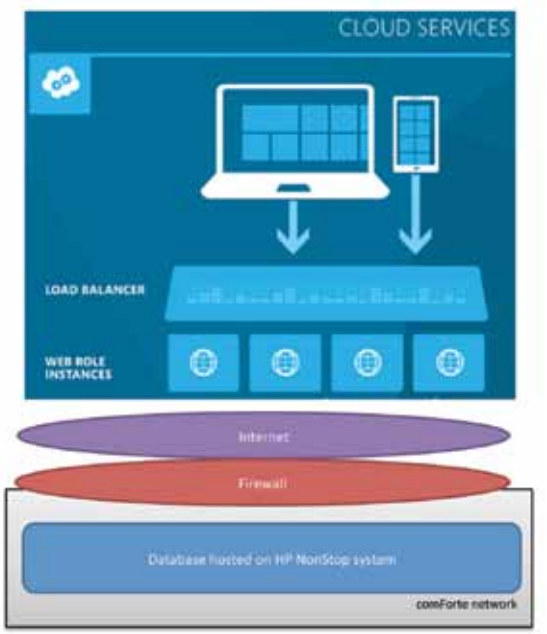

Figure 5: Accessing comForte NonStop system from Windows Azure cloud application

Did you note the similarity of Figure 6 to Figure 3? Again, we have found that production-proved NonStop application architectures translate readily into cloud computing approaches.

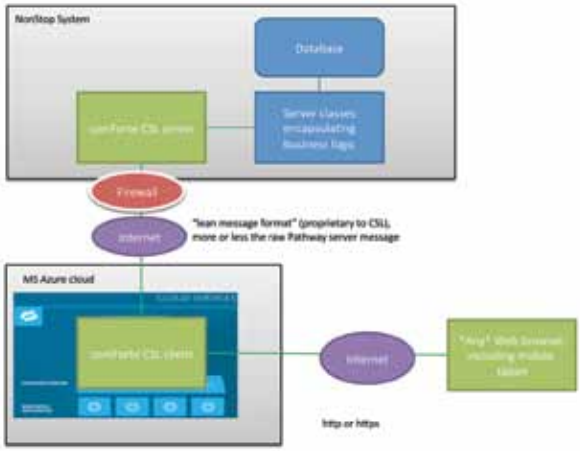

Figure 6: Under the hood of the comForte cloud demo

How to Get to the Demo, What it Looks Like

The demo can be accessed from any modern Web client, including through the Internet at the following URL: http://comforte.azurewebsites.net. As the URL shows, the website is NOT hosted by comForte but by Microsoft.

The demo should be live when you are reading this article; we did not want to give away too much and spoil the fun with our little application, which will collect the opinion of users about various international sports stars. Figure 7 shows a partial screen shot. More details and online help are available on the demo pages.

Figure 7: Partial view of comForte cloud demo

Evaluating the Demo Application Architecture

Earlier on, we commented on the properties of certain NonStop application architectures, including legacy and two-tier, SOAP-enabled implementations. Our demo now implements a modern three-tier application, with the presentation layer running in the Windows Azure public cloud. Let's look at some advantages we have gained through this approach:

- Broad acceptance. Development of the presentation layer is done in the Windows Azure framework. There are thousands of people doing exactly that. Also, there is a plethora of free tools available from Microsoft to ease development and testing.
- Simplicity. To get to the NonStop data, a simple .NET API is used within the Windows Azure code.
- Scalability. Scaling to support more end users accessing the application happens transparently in the Windows Azure cloud. This is done by increasing the number of the shared instance count, which denotes the number of processes dedicated to a website. In addition, to protect the NonStop system from overload, a limit of simultaneous user sessions per server instance can be configured within the comForte CSL product.
- Availability. The NonStop system serves as the rock-solid backbone of the application, providing:
  - o Unmatched availability: Only the HP NonStop platform consistently delivers availability up to 99.99999 %. Note that by adding a second, independent, public cloud as a source of transactions, the availability of the NonStop platform itself can be extended to the workloads running in the cloud. In addition, this approach optimizes the data integrity and ACIDness[5] of transactions.
- Security. The only connection from the NonStop system to the outside world is through a single open port in the firewall. That port exposes a well-defined message API only (rather than TACL or other dangerous services).

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I Can See 'Round Corners…

Richard Buckle
Pyalla Technologies, LLC
CEO

Richard Buckle is the founder and CEO of Pyalla Technologies, LLC. He has enjoyed a long association with the IT industry as a user, vendor, and more recently, as an industry commentator. Richard has over 25 years of research experience with HP's NonStop platform, including eight years working at Tandem Computers, followed by just as many years at InSession Inc. and ACI Worldwide.

Well known to the user communities of HP and IBM, Richard served as a Director of ITUG (2000- 2006), as its Chairman (2004-2005), and as the Director of Marketing of the IBM user group, SHARE, (2007-2008). Richard provides industry commentary and opinions through his community blog and you can follow him at www.itug-connection.blogspot.com, as well as through his industry association and vendor blogs, web publications and eNewsletters.

The quotes included in this feature come from some of Richard's clients including HP, Attunity, comForte, Infrasoft, IR and Opsol.

A series of advertisements by the Korean car company, Hyundai, are showing up in numerous magazines. Under the heading "With this car, you won't need a psychic to see what's around the corner" Hyundai then states, "We can't predict the future. But with an available forward-view cornering camera we can help you see what might come in contact with your vehicle before you see it through your windshield."

My earliest recollection of television shows is watching science fiction – who can easily forget the early comic portrayal of robots we all saw. My favorite? Of course the arm-waving "no-name" that frequently called out to the youngest member of the crew: "Warning, Will Robinson"! I only recently found out that the robot was a "Class M-3 Model B9, General Utility Non-Theorizing Environmental Control Robot", and that it became the precursor to many generations of robots to follow on television programs.

Modernization today takes many guises, but the image of robots always suggests that we are dealing with cutting-edge technology and whether they are used to plumb the ocean depths, defuse explosives, take our phone calls or simply vacuum dust off our floors, there's rarely a day go by without hearing about some new robot exploit. We can't predict the future and we do have trouble seeing around a corner, but if there's one thing apparent to all within the NonStop community it's the significant modernization of NonStop systems, to the point that sprouting a set of legs or arms wouldn't shock all that many of us.

On March 29, 2013, I posted ***Cash … at your service!*** to the blog on the electronic publication, ATMMarketplace. In that post I wrote about interactions I had with an automated, mobile, robotic ATM that was patrolling the corridor alongside the booth of Nautilus Hyosung. It was during the recent ATM Industry Association (ATMIA) event I attended, and I made the observation that the robot from Hyosung may have just been a trade show gimmick, but can we rule out something like a robot ATM becoming a mainstream device? How many of us would ever say no to an opportunity to get a little extra cash if the dispenser were standing right alongside of us!

Having posted this, it came as no surprise to me that the headlines of a March 26, 2013, CNBC publication, The Fiscal Times, included ***The Robot Reality: service jobs are next to go***. The feature that followed opened with the observation: "If you meet Baxter, the latest humanoid robot from Rethink Robotics – you should get comfortable with him, because you'll likely be seeing more of him soon. He's cheap to buy ($22,000), easy to train, and can safely work side-by-side with humans. He's just what factories need to make their assembly lines more efficient (and that) a spiffed-up version of the robot could soon be seen flipping burgers at McDonalds, folding t-shirts at Gap, or pouring coffee at Starbucks."

When modernization is raised in conversations with the NonStop community – and yes, there are discussions under way within several LinkedIn groups that have generated many comments – it really is just another glimpse around the corner as to where automation may take us. For as long as I can recall the NonStop system has proved best suited for interfacing with machines that operate around the clock.

For the most part, these have been customer-facing devices, including ATMs, the supermarket POS devices, railway ticket-dispensing kiosks and even the latest smartphones and tablets, without which we are reluctant to leave home. However, as the comment posted to LinkedIn by HP expert, Gerhard Schwartz, acknowledged, this isn't the only machines NonStop systems talk to. For many years, "in Europe, there are a good number of NonStop customers running industrial IT applications involving machine-to-machine (M2M) functionality ... Among these (customers) are some of Germany's premium car

manufacturers, companies producing steel and aluminum, as well as producers of machinery, farm equipment and household appliances just to mention a few." What then would prevent modern NonStop systems being at the very heart of managed robotic deployments?

It should come as no surprise to the NonStop community that with the arrival of more sophisticated robots – whether for industrial use or for household use – the volume of transactions generated will be enormous, and the tolerance for outages for robot's going "off-line", particularly at critical times, will decline to levels not previously witnessed. Mission critical application may take on a whole new meaning when technology advancements allow machines to pursue real "missions" on our behalf. Once we get beyond folding t-shirts and pouring Starbucks coffee, it's hard to envision successful deployments of future automated solutions without the presence of NonStop systems.

Modernization! Automation! Robots! Perhaps even Artificial Intelligence! As you follow the progression it's hard, too, to envision any tolerance for outages of any kind becoming acceptable. And yet, as complex as these devices may become, systems at the heart of their operations could be modern NonStop systems, similar to those we see deployed today. Embracing concepts as diverse as Big Data and Clouds are just the beginning, and near-term success will only help foster additional recognition of possible future roles for today's modern NonStop systems.

"Modernization, and indeed the desire by financial institutions to have the latest technologies, isn't something we can ignore today. The most conservative of financial institution recognize that real dollar savings can be generated with solutions that are simply easier to deploy and manage. We see this presenting opportunities for OmniPayments," according to Yash Kapadia, CEO of OmniPayments Inc. "Today, the core of our product is written in C. Furthermore, we have exploited Java for dashboards and we access NonStop SQL/MX. This has given us tremendous portability and whether the customer is running our products on NonStop systems or not, they benefit from having the same modern easy-to-manage solution and the cost savings we enjoy as a result can be directly passed on to them."

The monitoring solution, Prognosis, is written in a combination of C and C++ and as such has allowed Integrated Research to present Prognosis as a modern product, capable of running on multiple platforms. It was in the November 28, 2011, post to the IR web publication, realtime.ir, ***All at Sea!***, where I first quoted Jonathan DeVeaux, Head of Payments and HP NonStop at IR. DeVeaux told me at that time of how "very early on, we realized that there would be benefits for our customers if we took Prognosis to other platforms. Our strong presence today on open systems reflects this and as enterprises pursue more heterogeneous platform deployments, we are fully capable of monitoring it all!"

Having a modern solution, written in a modern language, makes it very easy to monitor multiple systems – even NonStop systems that themselves include controllers utilizing additional modern operating systems – so leveraging this knowledge and driving deeper into the data center is proving easy to do. "If our customers determine that there's value in having the oversight of the heterogeneous mix of systems, so typical of a modern data center," John Dunne, IR's General Manager, Products and Alliances, told me in the January 9, 2013, post to realtime.ir, ***Data centers with hybrid systems; challenges persist for all who monitor …***, "then IR will continue to ensure Prognosis features communicate with each other!"

Contemporary society sees opportunities around every corner and with the advent of even more intelligent devices (robots being just one branch of automation), they will all be reliant on modern software. According to Professor Seth Teller, a robotics researcher at MIT's Computer Science and Artificial Intelligence Lab and a source quoted in the above feature, "robots could create jobs in new industries we haven't even envisioned yet … robot IT and maintenance personnel, designers and salespeople for robot accessories, software, and apps, and robot security developers are just a few examples."

In an article in the January 14, 2013, CNBC publication, The Fiscal Times, ***The Rise of Robots – and Decline of Jobs – is Here***, robotics expert, Martin Ford, suggests that one reason we aren't seeing more robots today is that, "It's not about building the robot arm, it's about controlling the robot arm". As the author of the book ***The Lights In the Tunnel: Automation, Accelerating technology and the Economy of the Future***, Ford then adds, "It's about how to make the machine think and we're just getting to that point now."

Last year, in the November 12, 2012, USA Today newspaper there was the story ***Robots are marching into homes***, with the tag line "Consumer robots are increasingly becoming part of the American home. Vendor product announcements pick up." What then is driving the growth and acceptance of modern robots? "Cheap, powerful cameras, advanced sensors and other electronics now form the foundation of robotics projects. (Swiss multinational) ABB is demonstrating a robot that interprets dreams through paintings. The robot is on display in the lobby of a Paris hotel … Experts predict that, "Within 10 years, general-purpose robots — costing $25,000 to $30,000 per unit — will perform house chores while consumers are at work, or serve as butlers at cocktail parties."

It should also come as no surprise to members of the NonStop community that the arrival of even greater automation, as demonstrated by the latest generation of robots, is intimately tied to modern software. Giant gears and mechanized parts do not portray the type of robot we consider futuristic any longer, but merely the stuff of old B grade television shows. However, what the latest technology users and corporations alike find attractive predicates the presence of modern software.

However, it's not just the use of modern languages that makes NonStop systems as contemporary as any other modern system inside the data center, but the ability to demonstrate embracing such popular concepts as Big Data and Clouds. "At IR we believe that without embracing Big

Data, without equipping our users with the ability to put under monitoring 'management' all the data that's arriving that's associated with what's happening in the real world, we will seriously disadvantage our customers," DeVeaux said in a recent opinion paper, ***Big changes coming as monitoring turns to Big Data!***. Our customers "want to know a lot more about context – is this message load, right now, consistent with what we saw yesterday? This time, last month? Last year? What's changed – what's influencing this? What's behind an apparent new trend?"

Reading of vendors supporting initiatives embracing Big Data as part of solutions running on NonStop systems and then looking further afield to what may eventuate as we see greater usage of modern technologies, including robots for instance, it's clear to see that there is a bright future for NonStop systems. This was definitely the theme of March 28, 2013, post to Real Time View, Anticipate Change …, where I asked how many of us view our NonStop systems today as state-of-the-art? How many of us are evangelical in our praise of NonStop to senior managers and executives within our companies? And yet we should have no difficulties doing so – clearly, NonStop is as state-of-the-art as any alternate system offering. And yet, I observed in that post, we should have no difficulties doing so.

Saying that NonStop is as state-of-the-art as any alternate system offering is an oversimplification of course. However, when you look at the steps made in exploiting commodity hardware, the work being done to ensure a highly competitive future for NS SQL and the ease with which solutions vendors are porting Java solutions to NonStop, there's very little left of the former legacy Tandem Computer. The prospect for more widespread deployment of NonStop is certainly a tantalizing consideration for even the newest of entrants into the software business.

"Certainly, none of this is escaping the attention of WebAction" according to Founder and EVP, Sami Akbay. A Silicon Valley startup, Web Action, "is electing to involve the NonStop platform within its overall Big Data strategy recognizing that much of the relevant transactional data WebAction views as being important is generated from mission-critical applications. Perhaps we won't see robots managed directly from new NonStop applications (although there's nothing to rule out this happening at some point), although sensors that are a part of robots will likely produce data that ends up on NonStop where it will play a very important role in terms of broadening the role robots play in industry and indeed, potentially in society."

comForte CTO, Thomas Burg, has written an article for this issue of The Connection, ***Cloud-enabling NonStop systems: Why should you care and How can you do it?***, and it includes references to the soon-to-be-released maRunga product, developed by Infrasoft Pty Limited and distributed by comForte. Early promotion of what maRunga will provide has been the theme of several posts to Real Time View by former Tandem Computers executive as well as a former ITUG Vice Chairman, Margo Holen. "Everyone throws around terms like clouds and big data and reserves the right to interpret these terms as they please. That is OK, as both are relatively new and developing right in front of us," Holen wrote in the post of February 17, 2013, ***Plain White T's song running through my mind***.

Holen then went on to explain that for her, "what is important is the role NonStop will play: it is uniquely positioned to front end resources that themselves may not be as stable as you would wish – we all experienced Netflix fiasco over the (2012 – 2013) Holidays! NonStop front-ending clouds environment will be able to switch you from the environment that failed to the one that is churning away! To your user that will mean no interruption of services, and that's all that counts!"

"Modernization can mean so many things to the NonStop community and includes everything from ensuring you have a modern infrastructure and middleware, support modern languages and have deployed the latest, most up-to-date, security schemes," said Burg during a recent email exchange. "Cloud-enabling NonStop systems", Burg added, "is yet another aspect of modernizing NonStop systems that should be on customers' minds: technology options do exist already and there will be more in time. It is now up to NonStop users to identify potential business cases and to start implementing them."

I have always been a fan of science fiction and fantasy. Robots have been catching my attention ever since I saw them on television and in films. For me, robots are the representation of what today can be considered modern as far as technology is concerned. Robots that serve McDonalds hamburgers, fold t-shirts, and serve Starbucks coffee – that grabs my attention! However, more importantly, science fiction from yesterday is quickly becoming today's reality. MIR machines, flip-top phones, building and office doors that open as we approach them – all were first seen in science fiction shows.

But that's what the pursuit of modernization is all about – and with the NonStop systems we have today, we have computers every bit as modern as those from any other vendor. Elsewhere in this issue of The Connection there is bound to be more detailed information provided about the hardware that goes into modern NonStop BladeSystems and the work done to Java and to SQL to put it on par with other implementations. NonStop is as state-of-the-art as any alternate system offering.

Modernization! Automation! Robots! Artificial Intelligence! Big Data! Clouds! They all involve the processing of transactions with much of what is being exchanged, mission critical, and that puts NonStop in good standing. However, communicating this message still needs considerable effort from all within the NonStop community, and while I still cannot see 'round corners nor can I predict what the future holds for NonStop, in light of the technology that is becoming available, I have to believe modern NonStop systems will persevere.

So, you're moving to OSS? Now what?

Continued from page 19

ID	Task Description	Prior Task	Resource(s)	Notes and References
24	Place application in directory structure	11, 19	Applications	Expand the application delivery package and place into the proper directory structure. This often requires utilities like tar, gzip and/or jar.
25	Configure Pathway and server class	24	Applications	Configure Pathmon/Pathway naming, locations and server classes (including environment variables) – if needed. NonStop TS/MP System Management Manual
26	Deploy .war files for web interface(s)	25	WebAdmin	Deploy distributed .war files. iTP Secure WebServer Administrator's Guide
27	Configure externalized properties for web interface(s)	26	WebAdmin	Modify externalized properties for IP addresses, catalogs, schemas and user-id.

Before the application goes into production, all technical teams must work cooperatively to define operational and support activities.

28	Configure online dumps	21	Database, Systems, Operations	Use TMFCOM to configure online dump schedules for database protection.
29	Configure scheduled backups	27	Applications, Database, Operations, Systems	Determine backup fileset, schedule and methods; implement in batch scheduler. (Each OSS pathname has a corresponding Guardian filename.)
30	Identity logs to monitor	27	Applications, Database, Operations, Interface Group, Systems, WebAdmin	Identify logs to be monitored across the enterprise. Ported applications will not typically use VHS or EMS. Each layer of a framework typically uses its own set of logs (error and message).

That's it! Maybe it is true that the more things change, the more they stay the same. And maybe Alan Watts was right when he said, "The only way to make sense out of change is to plunge into it, move with it, and join the dance." (And if you need a partner, let us know.)

Tom White joined NED ATC/SDI ten years ago, following an established career as a NonStop consultant – and customer. He has worked with NonStop technologies since 1981, primarily in the financial sector, and with customers and vendors in oil & gas, transportation and the public sectors. He graduated from the University of Texas with a B.S. in industrial engineering and an M.S. in computer science.

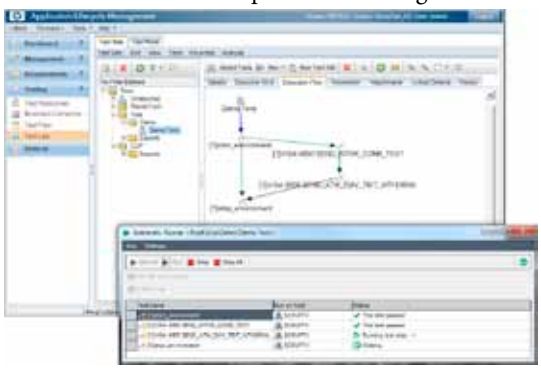
Rebecca Howey began working with NonStop computers in1984 and can still find her notes about modifying the E register. Her M.S. in library and information science also contributed to her development of enterprise data models for financial service and retail organizations. Before joining HP in 2002, she worked as a developer and data analyst, primarily in the telco, retail, and banking sectors.

The State of Automation

Continued from page 22

out the *"automation intelligence"* into a separate Automation Server. One of the drawbacks of Quality Center's custom test type architecture is that it requires plugins to be installed on the Quality Center server. At sites with large numbers of users, this can become a maintenance nightmare when a plugin update needs to be re-issued to every client in the organization. Moving the bulk of the automation logic out of the plugin and into a separate server lowers the frequency with which the plugin needs to be changed, and also creates a level of platform independence. The Automation Server is no longer restricted to only running on Windows platforms.

Another area of refinement that can prove useful is giving real-time feedback during test execution. Although Quality Center has no concept of individual test steps in the *Run Test* panel, it is possible to feed these back in status text messages to give the user a clear indication of test progress. Whilst on the subject of real-time feedback, we should also mention the importance of returning immediate pass/fail statuses back to Quality Center as each *Test* in a run completes. These form an integrated link between your automation model and other Quality Center features such as the Dashboard and the Execution Flow facility within Quality Center. The screenshot below shows both of these aspects in action together.



Is the effort worth it?

If everything we've talked about in this article sounds like a lot of effort, you'd be partially right – it can be. Which brings up the question of whether it's all worth it, or should we just allow those tests to remain in the too-hard bin, and leave our manual testers to execute and verify them.

The good news is there are ways to reduce this part of the modernization effort. HP has an active community of Quality Center partners, and offer tools that implement the approaches and practices discussed here, such as Ascert's own *VersaTest Automation Server Plugin for HP Quality Center*. Such plugins may not actually write your automated tests for you, but they provide you a framework to get up and running quickly.

Whether you start small with your *Smoke Test* or *Top 50* transactions, or go for a full Business As Usual (BAU) regression suite from day one, there are a lot of benefits to be had in return for automating your regularly run test packs:

- Automating not just the execution of tests, but also the far more time consuming and error prone aspects of validating and recording the results, even for tests with steps spanning different interfaces and test tools.
- Being cost and time effective to run a complete regression pack for every change and new release, rather than relying on a *"we don't think anything else should have been affected"* risk strategy simply because you can't manually run all of the tests you'd like.
- One single, common definition of your tests, held entirely within Quality Center, with far less chance that an external *"automation script"* can get out of date with the description held in Quality Center.
- Using Quality Center as the primary platform for definition and execution of automated tests reduces the number of staff to be trained in other tools.
- Subject Matter Experts (SMEs) are typically involved when changes are first implemented, but have usually long since moved on when an application reaches a BAU stage. A properly implemented automation model lets you capture the testing knowledge from these SMEs before they leave for other projects, and ensures that nothing is lost when repeating tests in months and years ahead.
- And last but not least a full, automatically logged, auditable record-of-fact for every test ever performed. Not just a vague and disputable list of pass/fail marks based on a manual inspection of some no longer available screen or log - but a complete record of every message field and interaction down to the finest level of detail that might be later required as evidence that diligent testing was performed.

In the end, it comes down to individual organizations to quantify the monetary value of these benefits. A large user of BASE24 and NonStop systems is on record as making savings of £1m year on year after working with Ascert and its partners to adopt the approaches described here as part of the user's application modernization project. The fact that they also significantly increased their test coverage in the process would have sent them singing all the way to the bank – except of course, they are a bank.

Ascert was founded in 1992 as a supplier of advanced testing software and services for the NonStop platform. Ascert's native and off-platform solutions allow a wide range of testing activities for the NonStop from functional through performance testing, managed directly or via HP Quality Center as part of an enterprise testing environment. Solutions built on Ascert's VersaTest technology are used for testing payments systems throughout the world. Ascert is an HP Partner and member of HP Software's Enterprise Management Alliance Program (EMAP).

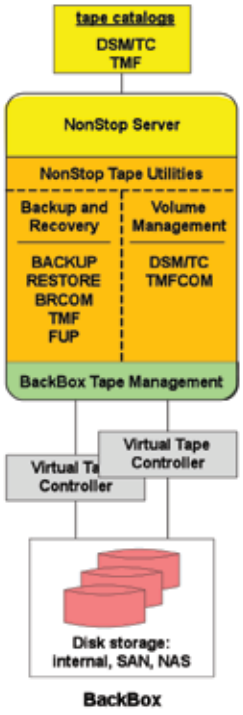
Upgrading Your Virtual Tape System: You're Not Married for Life to One Solution

Continued from page 26

manual involvement required to retrieve each of them, their migration has continued as a background activity for the operations personnel. When migration of all archived volumes is complete the original virtual tape subsystem will be able to be decommissioned.

Thus, the migration from the old virtual tape subsystem to BackBox was effected without placing any load on the NonStop servers, since data transfer flowed directly over the FC link connecting the two virtual tape appliances. Most importantly, the NonStop system maintained its access to all tape volumes during the migration process.

The ETI-NET BackBox Virtual Tape Solution



BackBox

ETI-NET's (www.etinet.com) BackBox product provides virtual tape solutions for HP NonStop systems and can utilize a wide variety of storage technologies, such as SAN, NAS and data deduplication products, such as HP's StoreOnce family – which was used by the medical claims processor. BackBox also supports automated use of enterprise backup solutions such as NetBackup, TSM, NetWorker, Data Protector and CommVault for long-term retention of virtual tapes. Virtual tape images can be retained on local storage, replicated to D/R sites, exported to physical tape, or automatically copied to an enterprise backup product. The latter capability enables the consolidation of NonStop backups with those from other platforms across the company, with policy-based storage assignment.

BackBox uses a Windows-based Virtual Tape Controller (VTC) that interfaces on the host side to the standard NonStop backup and recovery utilities (BACKUP, RESTORE, BRCOM, TMF, and FUP). Virtual tape volumes are controlled by unmodified Guardian media manager software such as DSM/TC or TMFCOM or by third-party media catalog products. To the NonStop systems, BackBox appears as multiple tape drives. However, instead of writing backup images to physical tape, the images are written to BackBox's storage subsystem via the VTCs. Likewise, when restoring data, BackBox appears as a standard tape drive to RESTORE. BackBox reads tape images from its disk subsystem and delivers them to RESTORE to recover the data.

In order to properly recover a specified virtual tape volume upon a NonStop mount request, BackBox maintains its own virtual tape media catalog on the NonStop system, protected by TMF. This catalog links NonStop virtual tape volumes to their BackBox image storage locations.

BackBox is normally configured to be fully redundant to match the fault-tolerant capabilities of the NonStop systems that it serves. In a fault-tolerant configuration, two VTCs share the load. A NonStop tape mount can be executed by either of the VTCs, which then handles the associated backup or restore transfer. A backup can be restored via either VTC, not just the one that wrote it. Should one VTC fail, the other VTC can take over all backup and restore activities without the need for manual intervention.

HPTS Support for BackBox Migration

HP has built substantial expertise with NonStop virtual tape products in the years since they originally were introduced. That expertise, along with working with ETI-NET over the last year, enabled HP to develop the migration process that allows companies to simplify moving off their existing virtual tape appliances to ETI-NET's BackBox virtual tape solution. To the claims processor's original virtual tape subsystem, the migration to BackBox appeared simply as if that subsystem were archiving its disk volumes to physical tape. In reality, however, the physical tape device was BackBox, connected to the virtual tape appliance via fibre channel.

HP offers VTS-to-BackBox migration as a service to its customers. It also uses the BackBox product to connect HP's StoreOnce deduplication appliances to NonStop servers.

Summary

As the first generation of virtual tape products reaches end-of-life, customers face a new challenge as they attempt to migrate from proprietary virtual tape formats to competing vendors' solutions. As has been the case with physical tape technologies, old virtual tape formats and equipment become unsupportable and have to be migrated to new platforms and storage media. But unlike physical tape, the virtual tape market has no standards in its storage formats; so disk-based virtual tape images are not directly transferable between different products.

Fortunately the actual task is not as difficult as it may first appear. HP Technical Services, in conjunction with ETI-NET, provides the necessary support to migrate older, NonStop-compatible virtual tape subsystems to ETI-NET's modern BackBox virtual tape subsystem.

The medical claims processor that once bemoaned its married-for-life status to a no longer satisfactory virtual tape subsystem learned to its delight that alternative solutions are available. The company discovered ETI-NET's BackBox and its powerful approach to implementing virtual tape for NonStop systems as well as HPTS' capabilities to automate the migration between products.

Cloud-enabling NonStop Systems: Why You Should Care and How You Can Do It

Continued from page 41

Authentication from the end user to the application can and should be handled in the Windows Azure part of the application. Authentication from the cloud to the HP NonStop system can be secured easily via SSL client authentication.

Project Timescales

After looking at all the diagrams and new technologies, you may think that implementing this demo system was a major effort for the comForte development team.

All in all, comForte spent less than two man weeks on the whole project—and it was the first of its kind for us. While we chose Windows Azure for demonstration purposes, other cloud computing providers and models could have just as easily been used.

maRunga: A New Product Implementing Cloud Use Case 4

If you are attending NonStop-specific events such as local TUGS or if your company has received a visit from an HP solution architect lately, you may already be familiar with the "Pet Store demo". The Pet Store demo shows a Pathway application that can dynamically start Pathway server-class instances that are running *not* on the NonStop platform, but on satellite systems in the cloud.

With this approach, more and more transactions can be processed in the cloud—while the NonStop system keeps track of all transactions and provides the database backend.

The technology behind the Pet Store Demo is about to be productized by Infrasoft and will be distributed worldwide by comForte.

Summary

There are no doubts that cloud computing will influence the future direction of enterprise IT. Whether the NonStop platform and applications running on it are viewed as "cloud compatible" or not might be the key criteria for CIOs evaluating the future of the HP NonStop platform in the enterprise.

We have looked at several use cases in this article. Using the comForte CSL product, we have provided an actual live demo that applies to three of the four use cases presented. We also have briefly mentioned the upcoming product, maRunga, which can help implementing the fourth use case.

So the technology is all there. Has your CIO been talking about clouds lately? If so, you may want to bring NonStop into the discussion…

A Slice of NonStop

Continued from page 8

Computer Science Majors Don't Learn About NonStop. Now They Don't Have To Learn

Sean's introduction to Tandem Computers came as the result of a paper he wrote for his Masters Degree in Electrical Engineering. Such knowledge acquired in the pursuit of academics was rare back then, even for computer science majors. They learned Cobol, Fortran, and PL/1. TAL was not part of their college curriculums, and graduates who were employed by Tandem learned TAL on the job.

Today's technology students don't have to learn TAL in order to develop on the NonStop platform. Modern NonStop in an open environment enables young graduates schooled in C++ and Java to build and maintain business functions on NonStop systems with little more under their belts than a course in NonStop basics. As far as Sean Mansubi is concerned, this bodes well for NonStop's future. Like the Tandem Computers whose air he first breathed in the 80s, NonStop is moving forward with the same clear vision that made Tandem such a success for decades.

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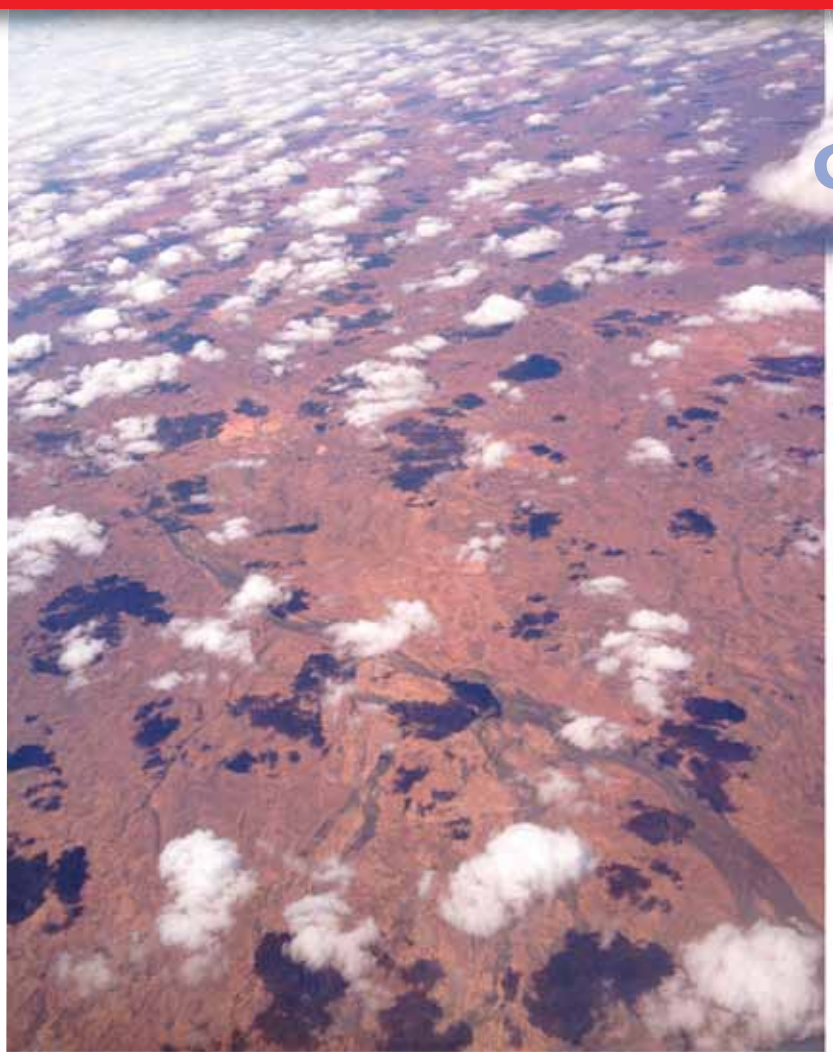

comForte's Client Server Link (CSL) solution is in production at several organizations in a scenario which as of late would be called 'cloud computing'. Building on this technology and expertise, comForte developed and implemented an adaptor for Windows Azure called CSL/Azure.

CSL/Azure connects the NonStop system with the Windows Azure cloud infrastructure.

Live Demo System –
See the comForte CSL/Azure live demo running in the Windows Azure public cloud
www.comforte.com/cloud9

Don't miss reading the article inside on cloud-enabling NonStop systems.

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