



Network Computing

Network Computing Request for Information Data Protection through Replication

Deadline: November 5, 2003

Introduction

Network Computing will publish a feature on data protection in our **January 22, 2004 issue**. A major element of this review will involve our analysis of vendor responses to a Request for Information (RFI) submitted on behalf of mythical retail company Darwin's Groceries.

You have been selected as a vendor that Darwin Groceries would likely consider as a data protection solution provider. To participate, you need to answer the questions and address issues that make up the deliverables portion of this RFI. If a question is not applicable or relevant, please say so.

Products that make up your proposed solution should be available by December 2003.

Schedule and Logistics

Please RSVP to Jon Toigo by October 15, 2003, whether or not you intend to participate. **Completed RFI responses must be received** via e-mail, US mail or delivery service by end of day **November 5, 2003**, to be included in the January 22, 2004 edition of Network Computing magazine. You should respond to this questionnaire by entering information directly into this file. Feel free to attach supporting information, but recognize that delivering a concise response will enable us to better focus on the key capabilities of your solution.

If you have any questions about the overall project or specific RFI questions, please contact the author, Jon William Toigo, at

jtoigo@intnet.net or by phone at 727-736-5367 (O) or 727-504-9311 (M).

Please return the questionnaire to Jon via the above e-mail address. Additional materials that cannot be submitted electronically may be sent to him at the following address:

Jon Toigo
Toigo Partners International LLC
1538 Patricia Avenue
Dunedin, FL 34698

REMEMBER: RFI responses must be received by end of day November 5, 2003, to be included.

Vendor response:

Vendor company name: Hewlett Packard
Vendor service name (if any): _____
Vendor contact name: Calvin Walker
Vendor contact telephone number: 1 281 927 8913
Vendor contact e-mail address: calvin.walker@HP.com
Date of submission: 11/7/03

Purpose

This RFI is proprietary to Network Computing and CMP Media, LLC. It is drafted and disseminated for the sole purpose of generating information on data protection/recovery products. Participating vendors must meet the minimum requirements for participation and understand that **all information returned to Network Computing in response to this RFI may be published** in print and in electronic form on our Web site, www.nwc.com. You may be able to redact some information at the discretion of NWC, but we consider it in our readers' best interest to provide as much of the completed RFIs as possible. Please let the author know if this will be a problem.

Effective Dates

Please note: Products proposed in this RFI **MUST** be generally available by December 2003. No beta products please. We reserve the right to examine a test unit (either in our lab or at a customer site) of any product submitted.

Please answer all questions. These will determine the winning bid and our **Editor's Choice Award**.

RFI Issue Date: Oct. 7, 2003
RSVP Deadline: Oct. 15, 2003
RFI Deadline: Postmarked by Nov. 5, 2003
Publication Date: Jan. 22, 2004

Scenario

Darwin's Groceries has a love/hate relationship with the communities it serves. When the company first began its chain of MiniMarts in the 1980s, everyone loved the convenience of a 24-hour grocer whose prices were on par with conventional grocery store chains. However, as the company expanded and began opening its SuperGigantic store chain, it caused an upheaval in the local markets where each store opened by driving "mom and pop" establishments out of business. Demonstrations, occasionally violent, have broken out during groundbreaking ceremonies for new stores. Management is worried that "anti-Darwin malcontents" could eventually target the company's technology infrastructure.

A key to Darwin's success has been the harnessing of information technology to reduce staff overhead. Cash registers forward purchase information back to a central server in each store. In the new SuperGigantic stores, wireless handheld computers with scanning wands are used by staff to update stock reports. A few stores are even opening wireless "hot spots" for use by customers with PDAs for "cartless shopping." As the customer walks down each aisle, his or her PDA shows what's on the shelves; customers click on what they want, and their orders are already billed to their credit or debit card and loaded into bags ready when they are ready to leave the store. Darwin has put a lot of money into this "next evolution in grocery shopping," which it hopes will replace cash register attendants.

Nightly, information collected at each of Darwin's stores is transmitted to a centralized data storage platform at headquarters. Smaller stores use VPN connections over the Internet or direct dial-up modem connections to perform the transfer. Larger stores and the SuperGigantic storefronts have dedicated network high-bandwidth connections to HQ, plus Internet VPN connections as a fallback measure.

Once data is collected at HQ, it is replicated and directed both to a process that updates store management and inventory control systems and to the company's tape backup process. Then, some data from the management and inventory systems is abstracted for use in a data warehouse that helps Darwin spot trends and create new marketing and pricing strategies. These strategies have, thus far, aided in improving company revenues and reducing company costs on an annual basis.

Darwin wants to make sure that its data is well protected during collection, transport and storage. It is seeking to improve its storage infrastructure and management capabilities to enable storage and data protection to scale non-disruptively, and to provide better information on the status of storage-related replication and backup processes. The company is interested in exploring disk-to-disk data replication strategies but has thus far been unable to find a vendor that could support its heterogeneous storage infrastructure. Ultimately, the company would like to use tape for archive and disk-based replication for disaster recovery.

The company would also like to consider cost-effective methods for replicating its headquarters infrastructure at an alternate site so that business would continue uninterrupted in the event of a fire or an interruption in network services. Management is thinking about expanding one of the SuperGigantic stores, located about 80 miles away

from headquarters, to serve as a disaster recovery site, either leveraging its existing WAN interconnect or increasing WAN bandwidth to handle remote data replication .

Your job is to give them what they want. Currently, key business processes and their storage infrastructure components are as follows:

1. Individual MiniMarts and SuperGigantic storefronts have centralized servers with NAS arrays for storage. The NAS platforms in individual MiniMarts have a capacity of about half a Terabyte; in the SuperGigantic sites, NAS capacity is about 1 TB. These are databases of store inventory and receipts. Changed data is transferred nightly across dedicated networks, Internet-based VPNs, or modem dial-up to headquarters. On weekdays, about 750 GB of data are transferred; on weekends, about 1.5 TB of data pass between the stores and headquarters. Currently, there is no backup for data in the stores themselves. In the event of a disaster, new equipment will be drop-shipped to the stores and data will be reloaded from HQ via network or DVD ROM.
2. Store Accounting Systems at HQ are Oracle databases that contain daily receipt information from all of the company's chain stores. Store information is spread over three large servers with direct Fibre Channel attached arrays, each providing approximately 10 TB of capacity. The company has needed to scale capacity about once per year, usually by deploying a new server and array and moving database components over the expanded platform. The tradeoff for this strategy has been a requirement to purchase all storage from one vendor, currently EMC. However, the vendor has announced that it is changing its platform design, forcing Darwin to migrate all of its platforms to the next generation storage array or find a new strategy. Hitachi Data Systems looks inviting, but the company is open to standards-based alternatives that will prevent a perceived vendor lock-in.
3. HQ's Inventory Management Systems are currently hosted on servers, each with a SCSI-attached 8 TB XIOtech array. This data is also considered critical and needs to be included in the disk-to-disk data replication scheme.
4. Data warehousing and data mining are performed in a workstation cluster sharing a common 10TB HDS array. This data is also deemed critical and Darwin wishes to include it in the burgeoning data protection strategy.
5. Data backup is currently conducted via Gigabit Ethernet and NDMP to three high-end tape libraries that are providing a barely-acceptable 2-4 TB per hour backup speed. Darwin wants to migrate away from tape and into a disk-based data replication solution – preferably one that is platform agnostic. Other attributes sought from the solution include the following:

The solution should provide the means for replicating mission-critical data reliably and securely across a WAN so that the remote data copy is synchronized to within five minutes of the original and is available for use by applications within 30 minutes of an interruption of normal processing operations.

Your solution should include mechanisms or functionality for:

- Hosting replicated data on storage platforms or topologies that do not replicate on a one-for-one basis storage platforms located in the production environment, thereby enabling greater flexibility and lower cost for the overall recovery strategy
- Monitoring the on-going performance of the replication strategy
- Testing the replication strategy without disrupting normal application or storage operations
- Securing data from eavesdropping or unauthorized access during the replication process and after “fail over” of application access to the replicated data set
- Scaling readily in response to increases or decreases in the volume of data to be replicated
- Culling from replicated data duplicate and/or non-critical data as well as data or files containing virus signatures or other malicious software code
- Automated techniques for optimizing data transfers across WAN interconnects of varying bandwidth and for optimizing WAN interconnects for best possible cost-efficiency

Architecture

HP Response

Partnering with HP will allow Darwin to benefit from the wide range of flexible solutions to solve their current and future storage needs. Based on the initial set of facts provided in this RFI, HP has developed an initial solution proposal to provide a robust and cost effective solution to Darwin's current business needs. However, it is important to emphasize that HP's broad portfolio offers the ability to refine this proposal further should additional needs be disclosed.

Selecting HP for your storage needs will provide the following key benefits:

1. Allow Darwin to continue leveraging its existing investment in hardware and software
2. Provide a framework that will continue to permit Darwin to make investments in multiple vendor solutions
3. Assure that mission critical data is replicated synchronously (real time) to guarantee that in the event of a disaster there is no data loss.
4. Drive the best return of Darwin's IT investments with integrated, scalable and heterogeneous solutions
5. Compliment Darwin's architectural choice with customer oriented services

1. Please describe the components or elements of the solution you are describing to Darwin's Groceries. This should include:
 - a. How you will deliver data replication across an 80-mile distance with, optimally, only five minutes of difference between production and recovery data sets. If a greater delta (difference in data) will be produced by your solution, explain why this is the case and what Darwin might be able to do to address the situation.

HP Response:

A key objective of Darwin is the replication of 1) mission-critical data 2) across an 80 mile distance. This objective by itself frames key attributes of a proposed solution. When data is considered mission critical an Enterprise can not afford to lose any transactions (as defined by a recovery point objective) or withstand a long period of time before the applications are back on line (as defined by Recovery Time Objective). As outlined in this RFI some of Darwin's key requirements are as follows:

- 1) Recovery Point Objective- <= 5 Minutes
- 2) Recovery Time Objective- <= 30 minutes
- 3) Data Value- Mission Critical
- 4) Replication Distance- 80 Miles
- 5) Current Storage Infrastructure- Re-use and integrate
- 6) Avoid vendor lock-in
- 7) Applications- Oracle

- 8) OSenvironment- Not stated
- 9) Cost limitations- Not stated
- 10) Migrate from a disk to tape backup strategy to a disk to disk replication strategy

Based on these requirements, HP has proposed a solution that will enable Darwin to fully meet all of their needs. Some of the key attributes of this proposed solution are:

- 1) Locally replicate only the mission critical data currently on Darwin's heterogeneous storage to a high performance EVA5000 array using the Continuous Access Storage Appliance (CASA)
- 2) Synchronously replicate, in a high availability configuration, to a second EVA 5000 via a Fibre Channel over Internet Protocol link at Darwin's disaster recovery site

The proposed Recommended HP solution will meet or exceed Darwin's requirements with the following products:

HP StorageWorks Continuous Access EVA with a SAN extension SAN fabric that consists of fabric switches and IP-SAN gateways (see the following link for more information on HP's Fibre channel over IP capability

http://h200006.www2.hp.com/bc/docs/support/UCR/SupportManual/TPM_aa-ru5cc-te/TPM_aa-ru5cc-te.pdf.)

HP StorageWorks Continuous Access EVA is a controller-based application that performs real-time replication between HP StorageWorks enterprise virtual arrays. The solution is enhanced to perform remote replication, and deliver high data availability and performance to users on Fibre Channel based campus, metro or continental Storage Area Networks (SANs). Continuous Access EVA provides customers with the highest level of storage data protection capabilities to meet their business continuity implementation goals. They can achieve a competitive advantage by combining disaster-tolerant solutions and disaster-tolerant managed services into their planning and daily routines, ensuring the data's security, availability and integrity - no matter what.

Continuous Access reliably performs remote sequential I/O replication of all writes real-time that enables disaster recovery of data at the destination location. Synchronous and Asynchronous write operations are performed between the source and destination array transparent to the host or network

Although not fully detailed in this RFI response, HP can offer lower cost alternatives by using the new HP OpenView Storage Mirroring product. This solution was not the primary recommendation since the Darwin data class is mission critical thus indicating a high-availability deployment scenario where host based replication may not be appropriate. However should Darwin require a solution that is lower cost, the HP Storage Mirroring Solution can satisfy many of the stated requirements depending on the definition of Mission Critical by Darwin.

HP OpenView Storage Mirroring (SM) offers a host-based application that performs remote copy over an IP LAN/WAN. The Storage Mirroring application operates on a WinTel server with Microsoft Windows 2000/NT operating systems. Some SM key features are asynchronous replication that can be scheduled to a fine granular level— Logical Unit Number (LUN), file or byte level. Other features include multiple replication configuration options including peer-to-peer and many-to-one. In addition,

Storage Mirroring is a very cost effective disaster recovery alternative from one host to another within a LAN or storage center or direct attached storage, between metro offices and regional centers. Additional configurations include replication from small office environments to enable low cost of entry for high return of business continuity. Storage Mirroring is an ideal low-cost entry host-based software product for IP networks. SM does not require high-bandwidth fibre channel networks, yet provides high capacity replication and zero-downtime services. SM provides near real-time full application or file recovery up to the last byte replication. SM is an excellent choice for low bandwidth; low Storage volume changes and meets business recovery goals within minutes or hours. Storage Mirroring offers low initial investment costs compared to alternative storage-based and fabric-based replication products. Basic list pricing for this product is \$4,495 per seat for Advanced Server and at a minimum would require 2 seats to create a replication link between Headquarters and the new disaster recovery site. Included as an attachment is a white paper detailing Oracle integration procedures (StorageMirroringOracle.DOC). For more information on Storage Mirroring please see <http://h18004.www1.hp.com/products/storage/software/sm/index.html>

- b. How you will enable the transition (fail-over) of application access from the production storage infrastructure to the remote backup infrastructure (optimally) within 30 minutes of an unplanned interruption in access to, or proper operation of, production storage.

HP Response:

The HP recommended solution will provide a real-time copy of Darwin's production data using a synchronous transport scheme at the remote disaster site. By employing this technology Darwin will be able to restore, or resume operations from the point of failure. With the documented procedures (white paper) for using the EVA Continuous Access remote replication solution in an Oracle environment, Darwin will be able to restore business operations within a thirty minute RTO objective.¹

When it comes to business continuity, often times even the most advanced technology cannot give you all the answers. Case in point: attempting to implement Disaster Tolerant solutions by addressing only your cluster or storage infrastructure. Focusing on just part of the problem typically results, at best, in unpredictable recovery times; at worst, in loss of key application data and extended periods of application downtime.

HP Disaster Tolerant Management service helps you implement effective recovery solutions based on the HP StorageWorks Continuous Access Enterprise Virtual Array (CA EVA, see link for more information <http://h18004.www1.hp.com/products/storage/software/conaccesseva/index.html>), a controller-based application that performs real-time Data Replication between HP StorageWorks EVAs. This complete package of tightly integrated services provides proven, low-risk disaster-tolerant solutions for even the most demanding and complex environments, with minimal disruption to your business.

¹ * The HP final white paper referenced will be available on or before April 2004

Seasoned HP Services consultants work with you to solve the key challenges of maintaining two datacenters: effective management of remote Data Replication, failover, and failback; and delivery of fast, predictable recovery times even following a major failure. Our experienced professionals are experts in implementing the latest in remote replication software, including HP StorageWorks CA EVA, which delivers a consistently high level of storage data protection, availability, and performance for users on fiber channel-based campus, metropolitan, or continental SANs.

Our business continuity specialists work closely with your staff to understand the key issues relevant to your business and IT environment. They mobilize all the resources necessary to rapidly implement and integrate network, server, storage subsystem, and data replication designs. And they combine extensive project management experience with a proven methodology to build sound, non-disruptive solutions.

This integrated services package is delivered by seasoned consultants from HP's Disaster Tolerant solution center and is laboratory-tested to facilitate deployment and integration with existing management environments. It addresses your entire Disaster Tolerant infrastructure to speed recovery times while reducing operational complexity.

Package deliverables include:

- Pre-installation knowledge transfer and planning
- Configuration and deployment of customized Disaster Tolerant management stations providing enhanced fail-over and continuous management and monitoring capabilities
- System manager and operator training focused on recovery from failure conditions
- Review of your technical recovery plan to help ensure alignment with your Disaster Tolerant infrastructure
- Disaster recovery test suite design
- Disaster recovery rehearsal execution to help ensure that your Disaster Tolerant infrastructure performs to your expectations

You may choose to manage your own Disaster Tolerant solution following HP Services training. Or HP can manage your entire environment for you. In the latter case, one of your datacenters could be located in an HP recovery center equipped with a robust infrastructure including UPS's and backup generators. This eliminates the need for additional facilities-related investments. Most important, it engages HP Services experts to monitor and manage your solution and frees your technical resources for other business-critical activities.

- c. How you will provide security for Darwin Grocery data from the point of creation, during transport, and while stored on production and recovery platforms.

HP Response:

Security for data stored on the HP proposed storage array both at the production site and disaster recovery site is protected by selective storage presentation. Selective Storage Presentation (SSP) allows logical drives on an array controller to be shared by multiple servers. A server connects to the array controller by using a host controller that is installed in the server. SSP allows users to name connections from host controllers to array controllers, and it allows users to grant or deny access to connections for each logical drive. The proposed IP-SAN gateways are certified for use with SAFENET's (High Assurance Gateways) for IP link data encryption.

- d. How your solution can be subjected to tests without disruption of normal operations.

HP Response:

HP assumes this question refers to the failover/failback capabilities of the HP StorageWorks Continuous Access EVA software.

HP Storage Services can provide Disaster recovery test suite design - to tailor tests for your newly integrated environment. The proposed HP solution also has the capability to perform a planned failover. HP recommends that you rehearse or practice these procedures so that you will be prepared to perform a failover, resumption of operation, or hardware recovery procedure quickly and accurately during a crisis. You may want to customize these procedures for your own use.

The procedures for a Planned Failover are:

1. Check to ensure that full normalization has occurred. If a merge or full copy was occurring when the failover process started, wait for them to complete.
2. Stop all host I/O on the source storage system. Follow the steps listed below for each operating system in your heterogeneous configuration:

Steps for each supported OS are listed in Continuous Access EVA Operations Guide

3. Perform a failover to the alternate site.
 4. If you plan to throttle I/O to specific storage systems, suspend your less important DR groups at your new source. This will force the controllers to replicate the most important data first when the links to the previous source controller are re-established.
 5. If you plan to operate for an extended time at the alternate site (Home storage system and Fibre Channel links must be functioning properly) and you have a DR group that needs failsafe mode enabled, perform these steps:
 - If DR groups were suspended, resume copying on affected destination DR groups. Wait for the log disk to finish merging.
 - Change affected DR groups to failsafe mode.
- Note: You can enable failsafe mode at the destination storage system while a merge or full copy is being performed.

6. Issue operating system–dependent commands for presentation of units to remote hosts to start host I/O.

Steps for each supported OS are listed in Continuous Access EVA Operations Guide

After the transfer of operation is complete, you have three options after the cause of the failover is resolved:

- Remain failed over at the alternate (or destination) site
- Return operations to the Home storage system
- Return operations to new hardware

- e. Details of the specific support of your solution for various storage infrastructure components deployed in the Darwin Groceries headquarters data center.

HP Response:

The proposed HP solution for disk to disk data replication at Darwin Groceries headquarters supports multiple storage infrastructures with the HP OpenView Continuous Access Storage Appliance (see link for more information - http://www.hp.com/products1/storage/products/virtualization_appliances/network/sv3000/index.html). A complete list of supported storage infrastructure is included with this RFI and is labeled CASAsupport matrix. Following is an example of some of the storage arrays supported. HP StorageWorks XP48, XP512, XP128, XP1024, EVA3000/EVA5000 V3.010, VA7410, VA7400, VA7110, VA7100, EMA12000, MA8000, MSA1000 and FC60 (single path only) EMC Symmetrix 4 and 5, EMC CLARiiON 4700, 5700; Hitachi 9200 and 9900; Dell Powervault 650F; IBM ESS (Shark) F20/2105

- f. Details of the specific support of your solution for the operating system and application software environments used at Darwin Groceries HQ.

HP Response:

The proposed HP solution supports the following operating systems HP-UX, Microsoft Windows NT/2000/2003; Sun Solaris, Linux Red Hat/SuSE/United, AIX, NetWare 5.1 and 6

- g. Details of any topology or hardware changes required (or recommended) to implement or facilitate the benefits of your proposed solution.

HP Response:

The topology needed to implement the HP proposed solution for data replication locally and to the remote site consist of implementing a highly available SAN environment at Darwin Groceries HQ.

This highly available SAN of 2 fabrics will consist of:

- 4 fabric switches
- 2 HP OpenView Continuous Access Storage Appliance,
- 2 HP StorageWorks EVA5000s and IP gateways. The existing storage infrastructure will be implemented into this SAN via fibre channel technology.

The remote disaster site will consist of:

- 2 fabric switches
- 2 HP StorageWorks EVA5000s and IP gateways.

See attached file: DARWINNEW.VSD for visual indication of proposed architecture

With the implementation of this proposed architecture the following key benefits are achieved:

- Enable Darwin to replicate all existing mission critical data from heterogeneous disk arrays and multiple OS's onto HP StorageWorks EVA5000 disk array platform. This allows Darwin to perform real time array to array remote data replication across the existing WAN infrastructure.
Allow Darwin more flexibility in managing new and existing storage infrastructure. If Darwin chooses, all storage can be virtualized into one common pool of storage by using the features of HP OpenView Continuous Access Storage Appliance and distributed to existing host as storage demands grow or decline.
- Create a storage environment with a highly redundant SAN and data replication scheme both locally and remotely.
- Enhance management of the proposed SAN and current storage infrastructure
- Assure that mission critical data is replicated synchronously (real time) to guarantee that in the event of a disaster there is no data loss.

The proposed solution is both scalable and able to provide for a heterogeneous server and storage infrastructure.

To address Data backup that is currently conducted via Gigabit Ethernet and NDMP to three high-end tape libraries that are providing a barely-acceptable 2-4 TB per hour backup speed. Darwin wants to migrate away from tape and into a disk-based data replication solution – preferably one that is platform agnostic.

The current proposed HP solution provides for all critical data to be replicated to the HP StorageWorks EVA5000s. With the proposed HP storage solution Darwin will have 3 copies of its critical data. One copy on the existing frames and that existing copy can be replicated to both local EVA5000s and the remote EVA5000s. This provides Darwin the opportunity to use its existing backup environment or implement other options based on the new environment.

HP offers solutions for Zero Downtime Backup and Instant Recovery with the use of HP StorageWorks Data Protector and the EVA5000.

If Darwin is interested in migrating from a disk to tape backup to a disk to disk backup, HP can provide this solution using combinations of the current and new architecture along with HP StorageWorks Data Protector. If Darwin has no additional space on its existing arrays or wishes to use inexpensive modular storage for a disk to disk backup

strategy, HP can propose the MSA1000 to provide the ability to scale the disk to disk backup from Giga-bytes to Tera-bytes.

- h. Details of any changes to wide area networks that are required (or recommended) to implement or facilitate the benefits of your proposed solution.

HP Response:

The proposed HP solution supports a variety of wide area networks. With the information provided in reference to IP bandwidth HP can not determine if Darwin Groceries HQ WAN needs modification. The following table provides some performance numbers for typical WANs.

Table 2: I/O Per Second, Throughput, and Percent Bandwidth Used for 2-KB Writes

Technology	Approximate IOPS	Throughput (Mbps) based on 2 KB per I/O	Approximate Single Stream Percent Bandwidth Used
2-Gbps Fibre Channel	417.50	8.35	0.4%
1-Gbps Fibre Channel	405.60	8.11	0.8%
1-GbE (Gigabit Ethernet) IP	403.13	8.06	0.8%
OC3 IP	393.44	7.87	5.1%
E4 IP	391.97	7.84	5.6%
100-Mbps IP	386.01	7.72	7.7%
T3 IP	361.40	7.23	16.1%
E3 IP	348.77	6.98	20.5%
10-Mbps IP	246.08	4.92	49.2%
E1 IP	82.91	1.66	82.9%
T1 IP	64.77	1.3	86.4%

- i. Details of management capabilities provided as part of your solution, specifically for verifying the proper operation of your solution, alerting Darwin IT managers to error conditions, optimizing the solution for cost-efficient operation especially in terms of WAN costs, and providing audit trails.

HP Response:

Management capabilities with the proposed HP solution are provided with HP OpenView Storage Operations Manager and the HP OpenView Continuous Access Storage Appliance. HP OpenView Storage Operations Manager version 1.0 offers system administrators managing Enterprise Virtual Arrays a robust and efficient array and SAN management solution for consolidating and centrally managing EVAs in a single SAN along with the devices in a distributed, heterogeneous storage network. HP OpenView Storage Operations Manager software simplifies installation and configuration of EVA arrays and includes device discovery technology for automatically identifying and visually monitoring heterogeneous storage devices in the SAN including arrays, JBODS, tape, NAS, and infrastructure products all from a central console.

HP OpenView Storage Operations Manager now supports an HP StorageWorks SMI-S EVA v1.01 provider in support of the SNIA SMI-S v1.0 specification for accelerating

technology adoption and simplifying management. Included is the foundation for the HP OpenView Storage Area Manager (SAM) suite enabling administrators to easily evaluate and extend Storage Operations Manager to include performance, usage, cost, and growth management for EVAs, disk, tape, direct-attach, and network storage infrastructures. HP OpenView SAM v3.1 software optimizes resource utilization, increases administrator efficiency and reduces cost of managed storage ownership.

Customer Benefits:

- Provides centralized storage configuration and monitoring for EVA arrays in a single SAN
- Extends EVA SAN management across distributed SANs with the rest of your storage resources all from a single management console
- Simplified management through compliance with the Storage Networking Industry Association (SNIA), Storage Management Initiative Specification SMI-S-V 1.0
- Continuous health monitoring and quick problem isolation through visible alerts and alarms that display the health of each device
- Maximized availability as changes in the storage network are immediately identified and mapped through continual automatic discovery
- Easy to interpret visual status of all aspects of the storage network, including redundant connections between devices
- Reduces Total Cost of SAN Ownership through a comprehensive, highly scalable, host independent management platform
- Simplified management of your entire IT infrastructure with comprehensive service management capabilities
- Protection against unauthorized LUN access
- Allows you to take advantage of advanced Enterprise Storage Resource Management functions (purchased separately) such as inventory management, performance optimization of networked devices in the SAN, metering and billing, capacity planning and forecasting to ensure service levels are met.

Features/Functionality

- Centralized management of Enterprise Virtual Arrays in single SAN with the HP OpenView Storage Management Appliance II or III with HP OpenView Storage Management Appliance v2.1 software
- Manage your heterogeneous networked storage including infrastructure (switches, HBAs, bridges), direct attached storage (DAS), Networked Attached Storage (NAS), and tape from a single management console using OpenView Storage Node Manager v3.1

- Compliance with SNIA SMI-S v1.0 standard with the HP StorageWorks SMI-S EVA v1.01 provider (EVA provider only)
- Comprehensive status and event monitoring of storage and information resource in the SAN
- Auto-discovery of Enterprise Virtual Arrays, hosts and a variety of networked storage devices
- Graphical device maps
- HP OpenView Operations and HP OpenView Service Desk support via Storage Node Manager v3.1
- LUN Masking via Selective Storage Presentation Manager

HP OpenView Continuous Access Storage Appliance has a browser-based management graphical user interface (GUI) that is used for most day-to-day management and monitoring tasks. Use of a secure logon and password allows for remote administration via a Web browser. For initial setup and scripting to automate repeated tasks, there is a keyboard-video-mouse console included, which the administrator can use with the command line interface (CLI). For organizations that implement CASAre remote data replication and for those that have multiple CASAs, these can all be managed from a single GUI.

It is a simple task to register multiple CASAs to be managed via a single GUI with a single logon and password. The CASA administrator can also set up visitor logons with only read access.

HP OpenView Continuous Access Storage Appliance storage management:

Once the LUNs on the connected storage systems have been scanned they are managed as CASA virtual disks. The storage virtualization technology allows these virtual disks to be partitioned to make multiple, smaller virtual disks or expanded (concatenated) to make larger virtual disks. To the storage administrator, a virtual disk is managed the same regardless of the storage system that provides the physical capacity. The storage virtualization technology also allows a range of data replication services at the virtual disk level; they are described below. Managing all the connected storage capacity as virtual disks is very efficient. It allows one storage administrator to manage the same capacity that may have previously required two or three administrators. Consider the case when the storage systems connected to the CASAs are from three different vendors—say, HP, EMC, and LSI. In this case, each storage system has a different management program that has to be mastered in order to reconfigure storage and allocate it to hosts. Migrating data from one storage system to another is also a disruptive task that requires considerable planning. CASA allows storage to be reconfigured and allocated from a single interface. Migrating data between connected storage systems is a painless and non-disruptive task.

Additionally, the capacity from all storage systems can be managed as a consolidated resource or “pool” rather than three islands

2. Deployment Issues:

- a. Describe the factors that impact the rollout of your solution and discuss the implementation timeframe you anticipate for Darwin Groceries if it selects your solution.

[HP Response:](#)

See Section 1B

If Darwin implements this solution, parts will be delivered according to the delivery schedule outlined in the documents listed in section 3B

- b. Describe how your solution can be scaled to meet the increasing volume of data generated by Darwin Groceries over time.

[HP Response](#)

HP's modular approach provides Darwin with a customer oriented, virtually unlimited approach to meet its changing needs. Capacity is easily added to the existing EVA5000 arrays up to a maximum of drive capacity per array based on disk choice (36TB). Once that maximum is reached Darwin may deploy a new array to meet the increasing data volume. With respect to software, the approach is much the same. As needs change based on a variety of conditions, Darwin can increase the capacity license amount almost instantaneously without any interruption in daily business operations. This combination of modular storage and creative licensing tiering provides an unparalleled simple and cost effective means of meeting future business needs.

- c. Describe any implementation support services that you offer, including consulting, training, customization, etc. Identify specifically the duration of services (e.g., the length of training) and any additional expense associated with these services.

[HP Response](#)

Service charges are outlined in the proposal documents identified in section 3B

See the following attached documents for service briefs:

- 1) [ARRAYI&S.PDF](#)
- 2) [SANSOLUTIONPRODUCTBRIEF.PDF](#)
- 3) [EVABCstartup.pdf](#)

[CASA Implementation Service overview – estimate 3-6.5 days](#)

- site preparation guidance
- hardware installation
- software configuration activation and demonstration

- orientation on functionality, hands-on operations and administration, backup
- “handoff” briefing with installation report

Continuous Access for EVA overview

- Updating the controllers to HP StorageWorks Snapshot Virtual Controller Software (VCS) Version 3.0.
- Installing CA GUI on the HP OpenView Storage Management Appliance
- Configuring CA at both sites
- Configuring the switches
- Configuring the OpenView Storage Management Appliance as a separate zone and creating a CA Zone
- Setting up alternate SAN Management Appliances (SMA) so that it has pre-discovered CA with its CA GUI
- Discussing the delivery of the service by telephone conference
- Conducting an installation verification test
- Delivering a customer orientation about the product

3. Solution Pricing:

- Describe your pricing methodology.

HP Response:

HP Storage hardware and software pricing is regularly updated to reflect market trends, competitive pricing changes and customer requirements for business value. The pricing and licensing philosophy is based on the following drivers:

1. License software based on a tiered “used” capacity structure allowing customers to map investment to their current requirements
2. Flexible software licensing provides for simple, cost effective capacity upgrades as needs change
3. Software, hardware and services pricing is designed to be market competitive and drive customer ROI.
4. Increasing price reduction based on scale

- Calculate the cost to Darwin Groceries for your proposed solution including optional components and services.

HP Response:

See attached files for details (All prices are represented as “List Prices”)-

- 1) EVAquote-BB1.DOC- Required, Array, switches and software
- 2) CASA701-BB2.DOC- Required, Continuous Access Storage Appliance
- 3) SANVALLEY.XLS- Required, Fibre-channel over IP switches
- 4) MSA-00.DOC- Optional, MSA arrays to replace existing tape libraries for disk-to-disk backup

- c. Identify maintenance or other recurring costs to Darwin after it has implemented your solution.

HP Response:

3 years of 24x7 support is included with the proposed solution quote.

- d. Identify any third-party components you have included in your solution and their cost to Darwin Groceries.

HP Response:

All third party products and prices are included in the detailed proposal outline in section 3B

4. Benefits:

- a. Describe how your enhanced data protection solution may be differentiated from a tape backup-and-restore solution from the standpoint of
- i. Shrinking backup windows
 - ii. Reduced time to data (restore) time
 - iii. Overall solution dependability
 - iv. Overall solution cost

HP Response:

HP StorageWorks Business Copy EVA is a local replication product for the EVA3000 and EVA5000 arrays providing snapshot and clone set-up and management. BC creates point-in-time copies of storage volumes using the snapshot and cloning capabilities of the array firmware. Basic Mode supports replication functions supported by the array firmware, meaning that basic snapshots and clones can be created. Other functionality such as mounting/un-mounting of volumes and pausing of applications can be accomplished either manually by using a scripting language to create user-defined scripts using the SSSU (Storage System Scripting Utility) or through the use of Enhanced Mode. Enhanced Mode is a new graphical interface and scripting environment that greatly simplifies storage management by creating, running, and managing storage replication jobs using controller based snapshots and clones. This product is indispensable for critical data center operations such as non-disruptive backups, snapshots of databases, and non-stop processing.

Business Copy supports the three types of replicated volumes created by the HSV controller; standard snapshots, Vsnapshots and Snapclones. All are **point-in-time** copies of data and are useful tools to **minimize downtime** for backups, perform application testing and support data mining

- **Snapshots:** A standard snapshot is a point-in-time virtual copy of the data, created in seconds and usable immediately, providing maximum flexibility for user applications. Disk capacity is reserved to accommodate the original size of the source volume.

- **Vsnaps:** Virtually capacity free snapshots (Vsnaps) allow the user to create a point-in-time copy, or snapshot, of a specified Virtual Disk (LUN). This Vsnap is similar to the standard snapshot except that it does not reserve the same amount of disk capacity as the production volume being copied. The amount of disk capacity used by the copy volume will grow as data in the production volume changes over time or if Vsnap is set to read/write, as changes are recorded to the Vsnap. The result is that no capacity is wasted using snapshots and the user avoids paying for storage that is not used.
- **Snapclones:** A Snapclone is a complete clone copy of a specified Virtual Disk (LUN). With traditional arrays, a clone can take hours to build depending on its size. Unlike traditional clones, Business Copy Snapclones are available virtually immediately. Within a few seconds of when the Snapclone is taken, the entire clone copy is available for use. The Snapclone normalizes in the background so that no time is wasted waiting for the copy to complete. Enterprise Snapclones can also be taken in any redundancy level (RAID 0,1, or 5). Snapclones provide the ability to take and use a clone without extensive advance preparation. Long "re-synch" times are also eliminated with Snapclones since a current clone copy can be available for use in minutes, not hours. Business Copy creates up to seven local copies of your data to increase productivity and overall business continuity, thus enabling a highly dependable solution.
- **manageable:** enables more efficient storage administration through an easy to use GUI to simplify and automate many manual tasks such as scripting
- **affordable:** licensing is now based on used capacity, not raw array capacity
- **centrally accessible:** the GUI runs on a centrally located appliance
- **reliable:** creates up to seven local copies of your data to increase productivity and overall business continuity
- **open:** supports multiple operating systems, including HP-UX, Windows NT, Windows 2000, Windows Server 2003, Solaris, and AIX.
- **flexible:** supports mixed disk array environments including the eva5000/eva3000 and MA/EMA storage arrays.
- **scalable:** scales from MA/EMA to eva3000 on up to the eva5000 to consistently meet your storage management needs
- **Extensible & scalable** capabilities with EVA and Business Copy EVA
 - o Up to 512 virtual disks per EVA
 - o Up to 511 snapclones per EVA
 - o Up to 7 snapshots per virtual disk
 - o Up to 448 snapshots/Vsnaps per EVA

- b. Remote disk-to-disk mirroring, one approach for data protection, has always carried with it two deficits in Darwin's view: hardware lock-in and high expense, especially in terms of WAN bandwidth and management. Explain how your solution addresses these concerns.

[HP Response:](#)

The topology needed to implement the HP proposed solution for data replication locally and to the remote site consist of implementing a highly available SAN environment at Darwin Groceries HQ.

This highly available SAN will consist of:

- 4 fabric switches ,
- 2 HP OpenView Continuous Access Storage Appliance,
- 2 HP StorageWorks EVA5000s and IP gateways. The existing storage infrastructure will be implemented into this SAN via fibre channel technology.

The remote disaster site will consist of:

- 2 fabric switches
- 2 HP StorageWorks EVA5000s and IP gateways.

With the implementation of this proposed architecture the following key benefits are achieved:

- Allow Darwin the capability to replicate all existing mission critical data from heterogeneous disk arrays and multiple OS's onto HP StorageWorks EVA5000 disk array platform. This allows Darwin to perform real time array to array remote data replication across the existing WAN infrastructure.
- Allow Darwin more flexibility in managing new and existing storage infrastructure. If Darwin chooses all storage can be virtualized into one common pool of storage by using the features of HP OpenView Continuous Access Storage Appliance and distributed to existing host as storage demands grow or decline.
- The proposed storage environment will create a highly redundant SAN and data replication scheme both locally and remotely.
- Management of the proposed SAN and current storage infrastructure are greatly enhanced
- Assure that mission critical data is replicated synchronously (real time) to guarantee that in the event of a disaster there is no data loss.
- The proposed solution is both scalable and able to provide for a heterogeneous server and storage infrastructure.

Continuous Access Storage Appliance overview

The Continuous Access Storage Appliance provides customers with heterogeneous data replication and virtualization capability to increase data availability utilizing a new economy of scale.

- Capable of mirroring and creating Vsnap (Point-in-Time images) across and between heterogeneous storage systems to increase availability across heterogeneous hosts.
- Provides the capability to migrate data between storage devices to facilitate removal of legacy equipment or to adapt data to different availability configurations when business needs change.

Customer benefits

- Virtualization: creates a logical pool of storage that can be more efficiently managed and administered
- Multi-node manager: centralized management of cascading appliances
- Cascading appliances provide enhanced scalability within a SAN or across SANs and enhanced performance

- Security: secure data access to protect against trespassing
- Central Management Integration (NEW): HP OpenView SAM 3.0 Suite DPs for discovery, mapping, performance planning and management, and billing capabilities
- Fibre Channel Mirroring: provides a new economy of scale for increasing local data access and availability
- IP mirroring: cost effectively increases ability to recover from site failures and/or create a centralized location for backup and recovery
- Vsnap (snapshot): creates a space-efficient point-in-time image to protect against manmade disasters, or creates additional static copies of databases utilizing only a fraction of the space
- Cascading appliances also provides scaling to manage and replicate data across larger and more geographically dispersed environments

For a list of hardware supported by CASA, visit:

http://www.hp.com/products1/storage/products/virtualization_appliances/network/sv3000/specifications.html

- c. Darwin wants a comprehensive business case to offer to management for the solution it selects, one offering not only risk-reduction, but also cost-savings and business-enablement value. Can you describe benefits in each of these categories that derive from your solution?

HP Response:

All IT investments require that solutions be measured on both IT benefits and Business benefits. Clearly, making a decision to place a disk-based Disaster Recovery solution in place is a significant investment. HP provides a comprehensive approach to this decision-making process. It involves IT benefits such as the traditional TCO approach (operational savings, improved efficiencies, etc). In addition, it will address business benefits such as improved availability of the applications and improved flexibility/agility of Darwin's Groceries. Reduced risk, better decision making, and faster time-to-market are several of the key benefits that result from putting an HP storage infrastructure in place.

HP makes use of a software modeling tool developed by an independent source (ITCentrix). By entering Darwin's Groceries inputs into the model, we are able to project the benefits of moving from their current storage approach to one that includes HP storage solutions. The model addresses three key areas:

- β Operational Efficiencies – reduced TCO, cost savings
- β Improved Availability – reduced risk, higher application availability
- β Enhanced Flexibility – more agile, faster time-to-market

The results of the modeling exercise are shown in the Business Value Report (attached). This comprehensive business case provides the following:

Considering both IT benefits and Business benefits, we have the following:

Total Projected Value = \$23,495,000 (over 5-year depreciation period)

Operational Savings: \$10.1 M
 Business Value of Availability: \$6.8 M
 Business Value of Flexibility: \$6.6 M

Financial Metrics

Return on Investment: 324%
 Internal Rate of Return: 36%
 Net Present Value: \$16.3 M
 Breakeven: 22 months

Should a disaster take place during the depreciation period, the following financial metrics pertain:

Financial Metrics – Disaster Savings

Return on Investment 354%
 IRR 42%
 Net Present Value \$2.1 M
 Breakeven: 14 months

5. Market Viability

- a. Describe how your solution compares with comparable solutions in the market today. (We encourage specific and explicit comparisons to competitive products.)

HP Response:

HP prefers not to provide competitors product information

- b. Describe your business model and financial performance to assuage consumer concerns about their investment and your prospects for longevity.

HP Response:

HP delivers vital technology for business and life. The company's solutions span IT infrastructure, personal computing and access devices, global services and imaging and printing for consumers, enterprises and small and medium business.

Our \$4 billion annual R&D investment fuels the invention of products, solutions and new technologies, so that we can better serve customers.

HP is a dynamic powerful team of approximately 140,000 employees with capabilities in 178 countries doing business in more than 40 currencies and more than 10 languages. Revenues for fiscal year 2002 (ended Oct 31, 2002) were \$72 billion.

Revenues for the Third Quarter (ended July 31, 2003) were \$17.35 billion, up 5% year over year.

The HP business model includes four main business groups:

- β Enterprise Systems Group – storage, servers, management software and solutions
- β Imaging and Printing Group – printing and imaging solutions for both business and consumer
- β HP Services – premier global IT services team
- β Personal Systems Group – personal computing solutions for home and business use

HP Response:

Please see attach file: DARWIN'SGROCERIES.PPT

- c. Identify key factors Darwin should consider in its business decision to select and deploy your solution.

HP Response:

As Darwin's Groceries reviews the proposed solutions, HP believes it is important to consider the technology, the cost of the investment, and the partnership. HP is a proven technology leader. As mentioned earlier, the cost of a disk-based Disaster Recovery solution is a significant investment. We believe that the above financial metrics and the accompanying Business Value Report make the case for moving forward. Most importantly, HP wants to be your business partner. We ensure that the deployment of your solution is implemented in a timely and proper fashion. With world-class services delivered by the HP Services organization, you can be sure that the total customer experience is truly best in class.

Review Criteria

1. Solution capabilities and suitability to requirements in the RFI
2. Deployment challenges and services
3. Business benefits of solution
4. Price of solution

Detail any other information that you consider important to Darwin Groceries' implementation that are not addressed by the questions above.