

**Total Cost Comparison:
IT Decision-Maker Perspectives on EMC®, HP® and Network
Appliance™ Storage Area Network Solutions in Microsoft
Exchange Environments**

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MERCER

Management Consulting

Prepared for:



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■ Executive Summary

Mercer Management Consulting, a global strategy consultancy, was engaged by Network Appliance to conduct primary research with IT decision makers to determine the total cost of acquiring, deploying, operating, and managing storage environments from various vendors to support Microsoft® Exchange.

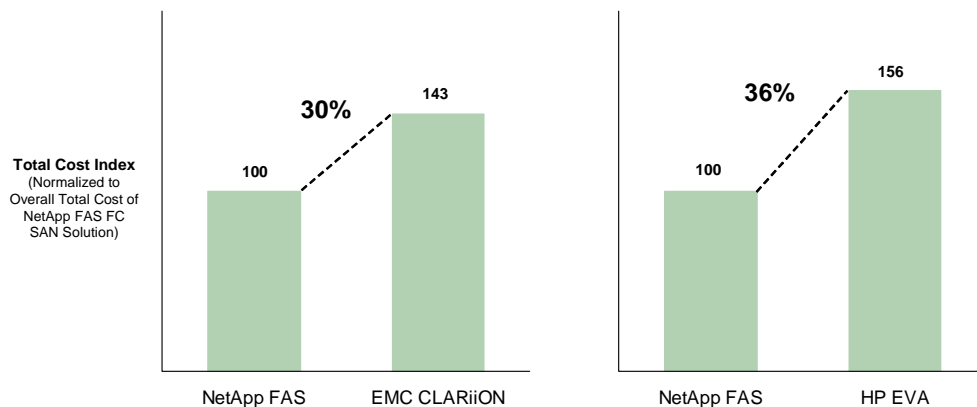
With email continuing its rapid growth and the increasing emphasis on messaging as a core business function, Microsoft Exchange is viewed by many organizations as a mission-critical application. In fact, in a recent survey, Mercer asked IT decision-makers to identify their most mission-critical application, and more cited Exchange than any other application. As one participant in this study stated, “Exchange is the one application that our employees live in. If Exchange is down, our business prospects suffer.”

Clearly, selecting the right storage solution for this kind of environment and managing the cost of that storage over time are key challenges. This study was designed to identify what drives total cost in Exchange storage environments and how EMC, HP, and Network Appliance storage area network (SAN) solutions compare in these environments. The findings included in this study are Mercer’s, based exclusively on actual cost data provided by network storage administrators and IT managers from more than 20 mid-sized and large enterprises across various industries in Europe, Asia Pacific, and North America.

The key findings of this research include:

- ***The total cost of a NetApp solution is lower than HP EVA™ and EMC CLARiiON™ in Exchange environments.*** Based on typical configurations and storage management policies, a Network Appliance solution is 30% less expensive than a typical CLARiiON solution and 36% less expensive than a typical HP EVA solution for the same size Exchange database in a fibre channel SAN environment.

Figure 1 – Relative Cost Advantage of NetApp vs. Comparables¹
Typical Exchange Deployments in Fibre Channel SAN environment



Source: Mercer Exchange Storage Total Cost Comparison Interviews, May 2006.

¹ In this report, results are presented in an indexed format to better illustrate variations between the individual data storage solutions, where they exist. The total cost associated with a NetApp Fibre Channel SAN solution has been set to 100 and total costs for other solutions are indexed to this. The approach to indexing has no impact on relative results.

- ***The ongoing costs associated with managing Exchange storage make up the largest percentage of total cost for all of the solutions evaluated and the largest source of total cost advantage for Network Appliance over competitive solutions.*** As hardware controller and disk prices continue to fall, management and operation costs are becoming increasingly important as the driver of total cost and represent 40%-50% of Exchange storage solutions. The NetApp software functionality and ease of use reduce the IT resources required to administer, monitor and manage the Exchange environment by 2x compared to EMC CLARiiON and HP EVA. Furthermore, NetApp provides easy access to single mailbox recovery through its SMBR feature, helping restore individual emails in minutes instead of hours.
- ***The NetApp Snapshot™ technology leads to 2x faster recovery times from application errors based on typical deployments of NetApp FAS controllers versus EMC CLARiiON and HP EVA in an Exchange environment.*** Study participants with NetApp environments typically create 7-8 Snapshot copies daily, allowing multiple near instantaneous point-in-time copies for customers to recover from. Conversely, typical EMC and HP deployments perform a full backup or clone, which requires more primary storage capacity and takes longer to recover, because performing multiple snapshot-equivalent copies was not justifiable from a cost-benefit basis in those environments.

■ Approach and Methodology

A. Mercer's Research Approach

Network Appliance engaged Mercer Management Consulting to conduct primary research with IT managers and network storage administrators to determine the total cost of acquiring, deploying, operating, and managing storage environments for Microsoft Exchange. Network Appliance commissioned this research with the belief that its storage solutions provided a total cost advantage over key competitors. However, Mercer had complete autonomy over the research, data analysis and results.

Participants in this study were recruited by Mercer for 60-90 minute structured interviews from two sources: NetApp customer and prospect lists and third-party panels of IT managers. Participants were targeted to provide diversity on a number of dimensions, including:

- Geographic region
- Industry
- Company size
- Number of active mailboxes
- Size of active mailboxes
- Primary vendor for Exchange storage
- Storage protocol used for Exchange storage

This study employs the same methodology as Mercer's March 2006 total cost comparison in enterprise database environments. The key differences between this study and the database study include:

- **Microsoft Exchange as the target application:** Data were gathered specifically for storage solutions used to support Microsoft Exchange.
- **Inclusion of end-user support costs:** Study participants noted that user support was vital to Exchange. The need to recover mailboxes at the individual level is unique to messaging applications, and the frequency of single mailbox recovery has a definite impact on administration time used. Therefore, these end-user support costs, which are not relevant in a database environment, were factored into this study.

B. Defining Total Cost

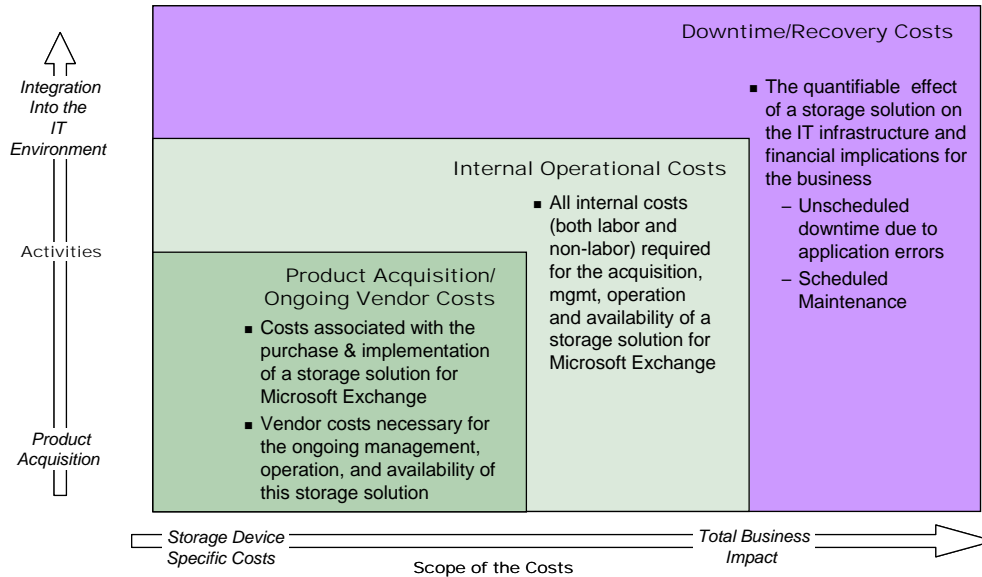
In the participant interviews, Mercer captured cost data across three categories: Product Acquisition & Ongoing Vendor Costs, Internal Operational Costs and Downtime and Recovery costs.

Figure 2 provides more detail on the total cost framework used with participants, which has the three primary elements:

- **Product Acquisition & Ongoing Vendor Costs** include all the up-front hardware, software, implementation and training costs associated with purchasing and implementing a storage solution for Exchange, as well as hardware and software support and maintenance agreements.

- **Internal Operational Costs** include all labor costs associated with the ongoing management and operation of the Exchange storage solution as well as all ongoing non-labor costs (e.g., facilities, environmental).
- **Downtime and Recovery Costs** include only those downtime costs that study participants could measure, specifically scheduled downtime and unscheduled downtime caused by application errors. Estimates of indirect business impact costs were not included in this study.

Figure 2 – Mercer’s Approach to Total Cost



C. Establishing a “Standard” Exchange Storage Environment

In order to ensure a consistent and accurate total cost comparison, participants were shown an Exchange storage architecture diagram, Figure 3, and asked to limit the scope of their answers to the storage elements described as “relevant cost areas” within the diagram (shaded in grey). The baseline environment for this study included a two-node active/passive cluster of Exchange servers connected to the primary storage through either Fibre Channel or iSCSI SAN.² The costs of the servers, Exchange licenses, switches and HBAs, and secondary storage were excluded from this analysis.

Data protection is achieved at two levels within the relevant cost areas. At the primary storage layer, disk resiliency is achieved through RAID protection. At the data protection layer, low-cost drives are used to mirror the data, which can be used for disaster recovery.³ The disks required for this purpose directly

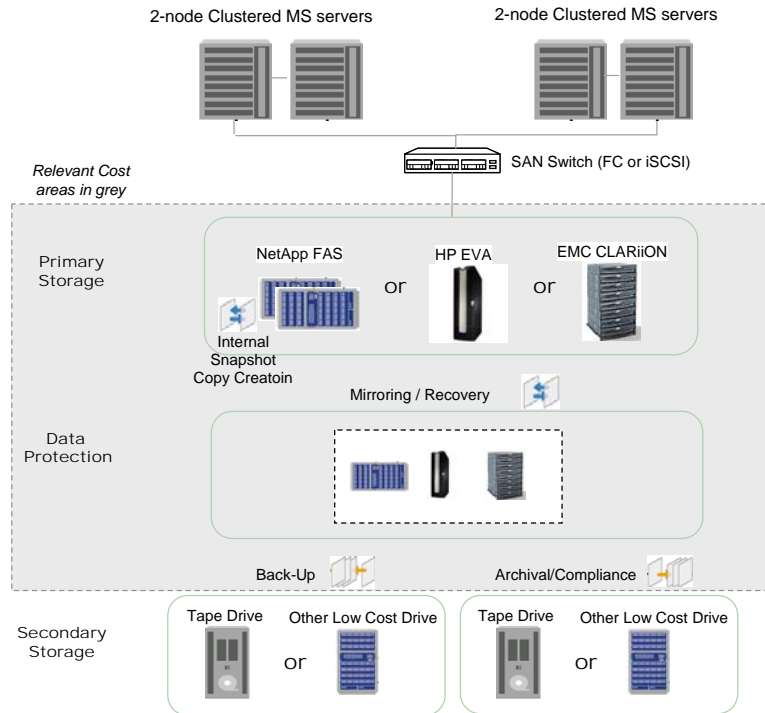
² This study found that the relative total cost performance of the solutions evaluated were consistent for both Fibre Channel and iSCSI SAN environments. Therefore, the results for Fibre Channel, which was the more commonly observed protocol, are used throughout this report.

³ Disaster recovery here refers to an additional copy of an Exchange database used to recover from file corruption or application errors, and can be housed at either the main campus or offsite. Although some users have true offsite DR capabilities in addition to local mirroring, this was not typical of environments studied and, therefore, not included in the baseline configuration presented in this study.

affect product acquisition costs. Additionally, admin time spent on backup and archiving is included in the total cost, as is time spent on Exchange related activities such as single mailbox recovery.

Participants gathered data for the interviews in advance based on this common architecture view and Mercer’s total cost approach. Where participants’ Exchange storage environment differed from the standardized architecture, Mercer identified the impact of these differences. The findings provided here constitute a consolidated view of all participants’ data over a five-year period,⁴ including both normalized costs for each cost category and typical variations based on company-specific factors.

Figure 3 – A Common Exchange Storage Environment View



D. Typical Customer Exchange Storage Environments

From study participant responses, the average size of an Exchange database was 400MB per active mailbox. For 5,000 mailboxes, which was the baseline used in this report, that equates to a 2TB Exchange database. The different approaches to Snapshot equivalent functionality used to back up the mailboxes lead to different storage requirements between NetApp FAS environments compared to EMC CLARiiON and HP EVA for the same size Exchange database.⁵ Based on study participant feedback, the

⁴ While vendors tend to suggest three-year product lifecycles, Mercer found that many IT organizations plan for longer cycles. Differences between the five-year view which is the baseline for this report and a three-year view, which are minor, are noted throughout the report.

⁵ Because NetApp environments have a 1.4x overhead capacity requirement for RAID protection and Snapshot functionality while HP and EMC environments have a 2.3x overhead capacity required for RAID protection and snapshot equivalents (mirrors), for a 2TB database, NetApp requires approximately 2.8TB of disk capacity in primary storage, while EMC and HP required approximately 4.6TB each. This study did not use the “Copy on Write” or the “Demand Allocated Snapshot” approach to Snapshot equivalent functionality that is possible in EMC and HP EVA environments since customer interviews indicated that typical deployments on those systems do not use those approaches.

storage capacity acquired is typically three times the minimum storage required to accommodate for future growth and proper scaling for optimal utilization. NetApp environments also factor in excess Snapshot capacity for growth. This takes into account Exchange-specific storage requirements, such as database verification and defragmenting.⁶

Data resiliency is also handled differently in NetApp, EMC, and HP environments. NetApp customers use RAID-DP™ with its Data ONTAP® 7G operating system, whereas EMC CLARiiON and HP EVA customers use RAID5.⁷ For data protection, each vendor's solution requires additional storage to mirror the original Exchange database along with transaction logs or Snapshot copies.⁸ However, NetApp customers are able to leverage FlexVol™ with Data ONTAP 7G, which study participants reported improves storage utilization by approximately 20%.

It is important to note that these configurations are not truly equivalent because EMC and HP solutions require more storage capacity to replicate the number of Snapshot copies created in the typical NetApp environment. Additionally, EMC and HP solutions require RAID1 or RAID10 to rival the low disk failure rate provided by RAID-DP. However, this study was designed to provide a total cost comparison based on how enterprises actually deploy the different systems, and the actual (not list) prices they pay for each element. The conclusions presented in this document are based on this more “real-world” view of a “typical deployment” for each vendor's solution.

⁶ Because of these factors, this study found that typical NetApp environments acquired 13.4TB of primary storage for a 2TB Exchange database, while EMC and HP environments acquired 13.8TB for the same size database.

⁷ RAID-DP provides double parity, using 2 out of a RAID set of 14 disks for parity in most customer deployments. Typical RAID5 configurations use one out of 8 disks for parity, according to study participants.

⁸ Participant data showed that NetApp environments typically create 7-8 Snapshot copies a day, whereas EMC and HP environments perform one Snapshot equivalent copy or clone per day.

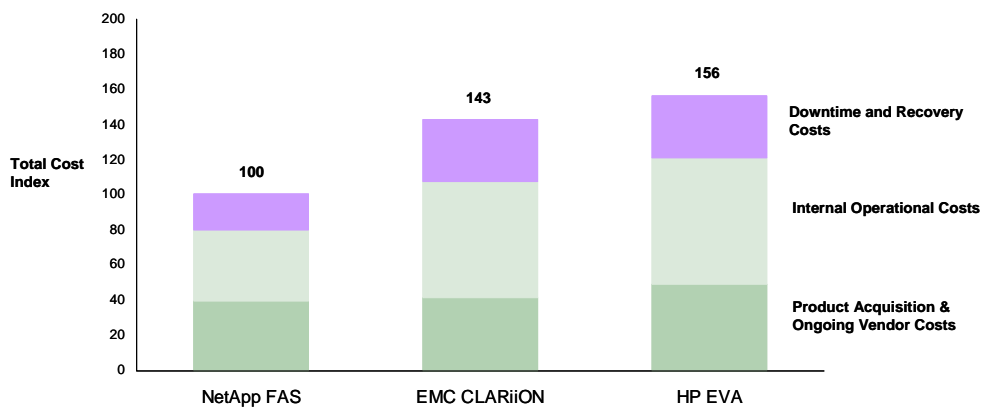
■ Overall Findings

A. Total Cost Comparison

For a typical deployment using typical data protection policies, a NetApp Exchange storage solution is 30% less expensive than a typical CLARiiON solution and 36% less expensive than an HP EVA solution for the same size Exchange database in a SAN environment.⁹

Put another way, CLARiiON is 43% more expensive and HP EVA is 56% more expensive than a comparable NetApp FAS solution. These data are represented in Figure 4.¹⁰

Figure 4 – Exchange Total Cost Comparison: Summary Findings
Indexed: Total Cost for NetApp FC SAN = 100



Source: Mercer Exchange Storage Total Cost Comparison Interviews, May 2006.

B. Drivers of Observed Cost Differences

The total cost advantage that NetApp holds over EMC and HP consists of three elements:

1. NetApp achieves a 5-20% cost advantage over competitor solutions in Product Acquisition & Ongoing Vendor Costs.
 - Customers with EMC and HP environments reported deploying more primary storage than NetApp environments for the same size Exchange database. They also incur greater costs for implementing those solutions.
 - NetApp deployments are less complicated and typically require one-fifth the amount of training costs for the system administrators as compared to similar EMC and HP deployments.

⁹ As noted above, this is based on a five year cost view. Under a three year view, NetApp is 26% less expensive than CLARiiON and 32% less expensive than HP EVA.

¹⁰ NetApp customers that are planning to upgrade NetApp Data ONTAP software expect this advantage to increase further as they take advantage of new policy-based space management capabilities in versions 7.1 and 7.2. However, since this technology is not yet widely deployed, these space savings have not been factored into this study.

2. NetApp has a 39-43% cost advantage over competitor solutions in Internal Operational Costs.
 - NetApp Exchange storage solutions require almost two times fewer resources to administer, monitor and manage than comparable EMC or HP environments.
 - NetApp provides easy access to single mailbox recovery through SMBR, helping restore individual emails in minutes instead of hours while at the same time avoiding expensive brick level backups.

3. NetApp has a 44% cost advantage over competitor solutions in Downtime and Recovery Costs.
 - NetApp Snapshot functionality allows it to recover two times more quickly from application errors than EMC or HP solutions.
 - EMC CLARiiON and HP EVA environments tend to require 33% more scheduled downtime than NetApp environments. This is because certain activities, like volume expansion, that can be done online using NetApp storage, requires scheduled downtime in HP and EMC environments.

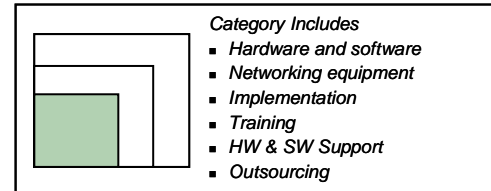
Each of these factors will be discussed in greater detail in the sections that follow.

■ Detailed Findings

A. Comparing Product Acquisition & Ongoing Vendor Costs

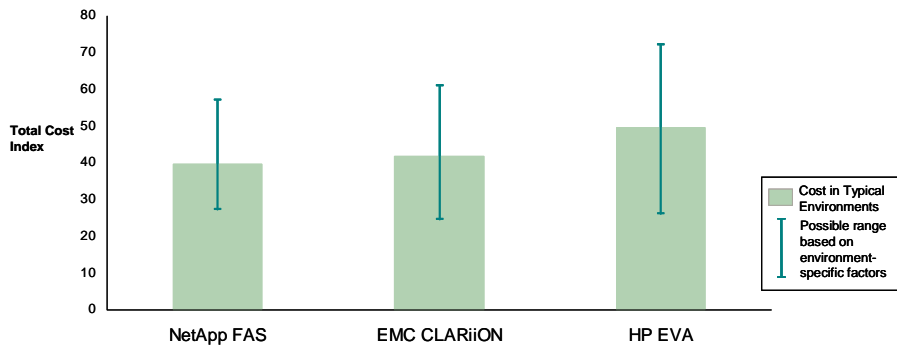
Overview

The first and most straightforward element of total cost analysis is Product Acquisition & Ongoing Vendor Costs. This category includes all internal and external up-front costs (using actual reported “street” prices) associated with acquiring and implementing a storage solution for an Exchange environment. This category also includes all costs paid to third-party vendors for hardware or software maintenance and support and for any required outsourcing or training.



Taking into account only these “upfront” costs, respondents suggest that NetApp SAN solutions are 5% less expensive than typical EMC CLARiiON solutions and 20% less expensive than HP EVA for the same size Exchange database. These data are presented in Figure 5.

Figure 5 – Exchange Product Acquisition & Ongoing Vendor Costs
Indexed: Total Cost for NetApp FC SAN = 100



It is important to note that even though Product Acquisition & Ongoing Vendor Costs are the most tangible and easily quantifiable cost elements (since they are often bundled as part of an initial invoice), these upfront costs represent 30%-40% of the total cost of Exchange storage solutions. Put another way, companies typically spend more on other cost elements than they do on the initial “invoice” price. While important, Product Acquisition & Ongoing Vendor Costs are only part of the total cost story.

Drivers of Differences Observed between NetApp and Competitive Solutions

There are several factors that drive differences in Product Acquisition & Ongoing Vendor Costs among these environments, the foremost of which include the following:

- *NetApp customers require less disk capacity than EMC or HP customers in their primary storage, and are able to more efficiently utilize their disks through Data ONTAP 7G. NetApp FlexVol, a feature of the Data ONTAP 7G operating system, supports automatic growth and shrinkage of the volumes without any risk to the data. This allows users to provision space more easily and reduces*

the amount of disks required for purchase. As one customer said, “[FlexVol] allows for 15-20% more productivity of our staff, and we are able to reduce storage by 40% based on aggregate volumes.”

- *Implementation costs vary by vendor, mostly due to the complexity of deploying EMC and HP solutions.* NetApp customers reported that implementations required only internal resources and took 1-1.5 full-time equivalent (FTE) days of administrator time. Conversely, EMC and HP deployments require 3-4x the amount of FTE time, and require support from the vendor or other third parties. As one study participant noted, “EMC was harder to implement. [Deploying] EMC became a six week engagement.”
- *Training costs for NetApp solutions are typically one-fifth those of EMC CLARiiON and HP EVA solutions.* Most NetApp customers indicated that they don’t require any formal training, and are able to pick up new features on the job because of the ease of use of the management interface. On the other hand, 70% of all EMC and HP customers participating in the study indicated that they paid for initial training, and most continue to do so on an ongoing basis.
- *Actual hardware and software prices paid varied quite significantly.* Study participant data showed that EMC and NetApp solutions had software as a larger part of acquisition cost than HP solutions, which tended to have higher hardware prices.

The Importance of Flexible Volume Sizes: A Global Services Firm’s Experience

The ability to change volume sizes is extremely beneficial in Exchange environments as it allows the Exchange administrator to deploy different sized mailboxes – or grow and shrink mailboxes – as needs arise with relative ease.

With most companies experiencing rapid and dynamic growth in their email storage environments, effectively managing volume sizes and reducing disk space can drive substantial cost savings. For one study participant, a global services firm, this was a key reason to select NetApp. “With [Data ONTAP] 7G, you have the ability to increase and decrease volume sizes on the fly, which allows you to not have to upgrade disks where you would have had to otherwise. We would have spent far more on additional disks if not for this.”

Drivers of Variation from Typical Values

It is important to note that the Product Acquisition & Ongoing Vendor Costs cited above are expected values in a range of data points gathered from study participants. The range bars in Figure 5 reflect the expected range of Product Acquisition & Ongoing Vendor Costs based on customer environment-specific factors. Several factors cause specific environments to differ from the expected value, including:

- Environments differing from the baseline architecture (Figure 3)
 - Number of NetApp Snapshot copies or EMC or HP snapshot-equivalents (BCV or mirrored copy) in primary storage
 - Data protection using different RAID formats
 - Number of mirroring and disaster recovery scenarios
- Additional vendor or third-party software for functions like back-up, archiving or single mailbox recovery
- Organization policies within companies restricting storage per mailbox
- Future growth / Expansion policies
- Organization policies that affect implementation timing and up-front training

- Variation in the amount paid to storage vendors for hardware and software through negotiated contracts, including maintenance and support

The variation in hardware and software costs among study participants was mainly driven by each participant’s particular architecture deployment. Although most participants have architectures similar to the baseline shown in Figure 3, some EMC and HP environments reduce costs by not having full backups or additional controllers for disaster recovery purposes. Additionally, most EMC and HP customers interviewed are using RAID5 for data protection, opening the window for greater potential data loss as compared with RAID-DP, which is used by NetApp customers as part of Data ONTAP 7G. As mentioned earlier in the study, these EMC and HP customers would be required to use RAID1 or RAID10 for true comparable performance. Some participants maintain an additional layer of data protection for disaster recovery, implementing offsite solutions to guard against true catastrophes. However, these scenarios are not typical, and for the purposes of this study, costs for such deployments are normalized to the baseline architecture. Finally, software costs vary due to some packages requiring licensing fees where as the core applications are sold up front with the controllers.

Other large drivers of variation for Product Acquisition & Ongoing Vendor Costs include policies related to mailbox sizes, and extra storage purchased for future growth or expansion. Although most study participants have limits on the size of the mailbox, these limits vary widely between 10MB/user to 1GB/user. Yet others have no restrictions and are more susceptible to dynamic growth of their Exchange database. A few participants have varying degrees of storage limitations between employees, executives, legal, or sales staff whose critical functions require them to have more storage needs. Expansion requirements vary as well, depending on the growth outlook for the company or the current storage utilization rate.

Variation also exists in both installation and training costs. This variance is primarily caused by the customer’s level of familiarity with the vendor and experience through previous deployments. As one participant put it, “Our storage engineers have worked at EMC before,” leading to a quicker implementation.

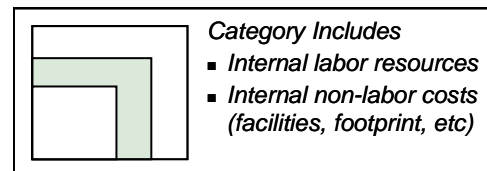
Maintenance and support contracts were usually signed for three year terms, but did vary based on service levels and fees paid. Whereas study participants with NetApp or EMC environments engage with the vendor directly for support, HP customers work through VARs.

This study assumes an average value for each Exchange database storage solution, and the range bars are used to portray variations across all participant responses.

B. Internal Operational Costs

Overview

Internal Operational Costs include all labor costs related to the ongoing management, operation and administration of Exchange storage solutions as well as all non-labor costs (e.g. facilities, environmental).

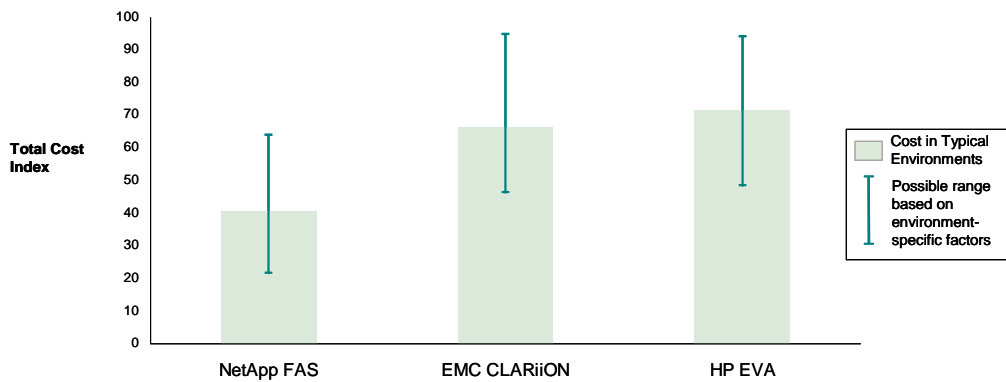


As hardware costs decrease due to lower disk and controller prices, Internal Operational Costs are becoming the single most important factor in determining total cost

of storage solutions. Furthermore, study participants suggested that they are increasingly aware of these costs while making purchase decisions and were able to quantify these costs when provided with targeted questions for data collection.

For a typical Exchange environment, Internal Operational Costs are 39% less for NetApp than for CLARiiON, and 43% less than for HP EVA. These costs are shown in Figure 6.

Figure 6 – Exchange Internal Operational Costs
Indexed: Total Cost for NetApp FC SAN = 100



Source: Mercer Exchange Storage Total Cost Comparison Interviews, May 2006.

Drivers of Differences Observed between NetApp and Competitive Solutions

There are three major factors that determine the NetApp cost advantage over CLARiiON and HP EVA in Internal Operational Costs.

- EMC CLARiiON and HP EVA customers require approximately 2x the number of full time equivalent resources that NetApp customers require to administer, monitor and manage the Exchange storage solution.* Differences in software functionality affect the time administrators need to spend on management activities for the Exchange SAN environment. Several study participants noted that NetApp has been able to make the storage and Exchange administrator’s job easier through “[SnapManager® for Exchange] and other good feature sets that make its application easy with actual backups using Snapshot technology.”
- NetApp FlexVol with Data ONTAP 7G also contributes to reducing the workload through its unique method of space provisioning.* One participant commented, “[Data ONTAP 7G has] benefits beyond better storage utilization. It allows us to manage storage more effectively, [leading to] improved quality of service.”

Managing Administration Costs in Exchange: A US High Tech Company’s Experience

Within an Exchange environment, there are three primary aspects to a storage administrator’s workload: user support, managing availability, and backup.

For one US-based high tech company, reducing user support costs was critical. By deploying NetApp Single Mailbox Recovery (SMBR) software with SnapManager for Microsoft Exchange, this organization reduced the time involved in recovering mailboxes from hours to minutes and eliminated the need to keep a standby server for just this task. “Users will delete their mail and not know for weeks. I can use [the NetApp] SMBR [feature] to pull up directly from tape backup.”

- *NetApp customers recover single mailboxes up to eight times more frequently than EMC or HP customers and spend one-eighth the amount of time per recovery.* A common theme in study participant interviews was the amount of time Exchange administrators need to spend on end-user support. NetApp customers are able to use SMBR, which is fully integrated into SnapManager for Exchange supporting single mailbox and individual email recovery. This feature allows users to restore single emails from Snapshot copies or tape in minutes in case the deleted items are no longer online per the company's Exchange policies.¹¹ Additionally, SMBR avoids having to do brick-level backups, which as one participant put it, "take too long in Exchange, and the tools for brick-level backup are not efficient."

Drivers of Variation from Typical Values

Several environment-specific factors create variance from typical values, including:

- Differences in salaries on a global basis
- Differences in the number of IT resources dedicated to managing the Exchange storage solution
- Organization policies for mailbox recovery

Labor costs and non-labor operating costs vary substantially around the world. This study relied on interviews with companies in developed economies in North America, Europe, and Asia Pacific. Therefore, the baseline costs in Figure 8 will be higher than those experienced in low-cost countries.¹²

Moreover, company-specific differences exist around the number of IT resources required for the management of Exchange storage solutions across all vendor environments. This is mostly a result of company size and policies. Whereas one company may require independent storage and Exchange administrators, another might consolidate the jobs into one. Furthermore, companies vary widely in terms of their use of the SAN storage environment for Exchange. In a lot of cases, the same environment was being shared by other databases, which even further complicated the FTE allocation for Exchange. Additionally, some companies discourage the recovery of single mailboxes because of the enormous time commitments. However, this study uses a resource allocation in the middle of the range for NetApp, HP EVA and EMC environments, and obtained consistent data by asking respondents to divide FTE time across a common set of tasks: capacity planning or provisioning, managing availability (Snapshot copies/mirrors), backups, archival/compliance, mirroring for DR, version changes or upgrades, user support, and others such as performance tuning or troubleshooting.

The range bars in Figure 6 account for variance in the number of IT resources managing Exchange storage solutions.

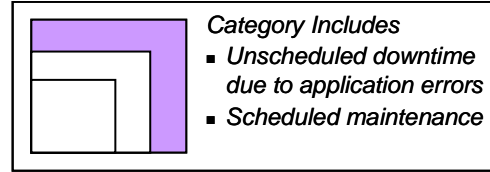
¹¹ Based on participant responses, NetApp customers use SMBR on average twice a week, whereas EMC and HP customers recover down to the single mailbox level on average once a month. Additionally, SMBR is able to restore the mailbox in approximately 15-30 minutes, while other procedures take approximately 2-4 hours.

¹² Overall, the total cost advantage of NetApp in a low-wage country (assuming one-half the wage rates typical in North America and Western Europe) would be 28% less than EMC CLARiiON and 34% less than HP EVA.

G. Downtime and Recovery Costs

Overview

Many participants do not currently factor Downtime and Recovery Costs into their total cost analyses for purchasing Exchange storage. Part of the reason for this is that it is often hard to generalize the frequency of system failure and its impact across environments. As a result, many IT environments ignore or discount this element of total cost.

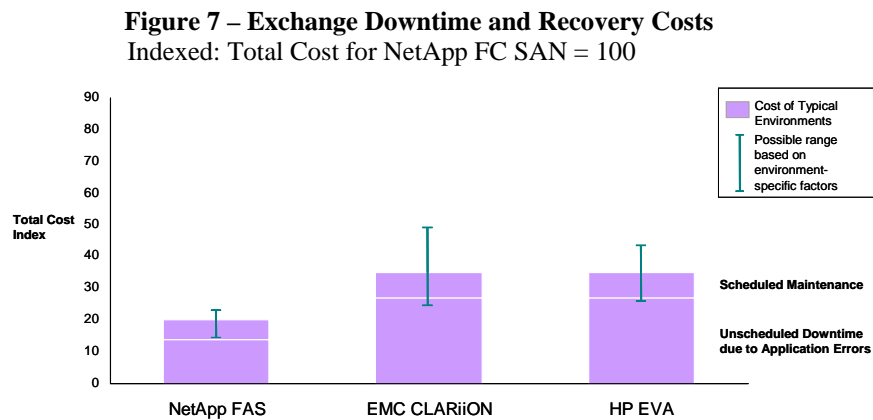


To account for both measurement difficulty and skepticism among some IT professionals, this study includes only two elements in the analysis of Downtime and Recovery Costs, and only includes data where study participants were able to credibly measure impact.¹³

- Scheduled Downtime
- Unscheduled Downtime Caused by Application Errors

In this study, participants were asked several specific questions aimed at understanding the scheduled and unscheduled downtime of their environments, and the participants were able to provide the relevant data. While smaller than Product Acquisition & Ongoing Vendor costs and Internal Operational costs, study participants found that Downtime and Recovery costs are measurable and that there are real differences among different vendors' solutions.

For a typical Exchange environment, the Downtime and Recovery Costs are 43% lower for NetApp solutions when compared to both EMC CLARiiON and HP EVA solutions. These costs are shown in Figure 7.¹⁴



Source: Mercer Exchange Storage Total Cost Comparison Interviews, May 2006.

¹³ This study excludes any calculation of downtime as a result of a storage system hardware failure. Study participants indicated that most of their systems were deployed in clusters or in fault tolerant configurations such that the likelihood of a hardware failure resulting in an outage was so close to zero as to not be relevant in a total cost calculation.

¹⁴ The downtime estimates used in this study are based on published figures by various research experts including Gartner, IDC, and Ferris Research. The estimated cost of unscheduled downtime was \$50,000 per hour.

Drivers of Differences Observed between NetApp and Competitive Solutions

Two important factors drive differences in Downtime and Recovery Costs between NetApp, EMC, and HP EVA environments:

- *NetApp solutions are able to recover two times faster than EMC CLARiiON or HP EVA solutions if faced with an application error.* The major reason for this is the unique NetApp Snapshot functionality which allows users to restore to the nearest point in time backup at least two times more quickly than restoring from a mirror. According to one participant, “If there is a database [file] corruption, we can restore from a local Snapshot copy which takes 10 minutes.” Additionally, NetApp customers average 7-8 Snapshot copies daily, which leads to better restore options, whereas EMC and HP customers typically do one full backup (BCV or clone).¹⁵

Mission-Critical Apps Require Fast Recovery: A Professional Service Firm’s Experience

Microsoft Exchange has become *the* critical application for most organizations, leading to more stringent uptime requirements. As one respondent in the study said, “This is the most important app for us. People use it continuously and when Exchange cannot run, people cannot work.” Customers are demanding higher availability, lower downtime, and faster recovery.

For one study participant, a North American law firm, the ability to improve recovery time and therefore reduce unexpected downtime was a key factor in their decision to install a NetApp SAN solution. “It’s amazing the number of times we’ve done a restore in minutes whereas it took us 1 ½ days before [deploying the NetApp SAN environment].”

- *NetApp has lower overall scheduled downtime costs compared to EMC CLARiiON and HP EVA systems.* One reason is because volume expansion can be done online for NetApp systems using Data ONTAP 7G’s ability to oversubscribe (thin provisioning). As one EMC customer explained, “Thin provisioning allows online expansion, but we don’t have this.”

However, because scheduled downtime is usually planned for times when business impact is minimal, it does not affect Downtime and Recovery Costs as heavily as unscheduled downtime due to application errors. While these figures vary greatly depending on the organization, conservative figures from participant interviews are located in Table 1.

¹⁵ Study participants reported, on average, that these types of errors occur roughly twice in every three years for a typical Exchange database.

Table 1 – Downtime/Recovery Costs: Key Drivers
Based on Respondent Data

	NetApp FAS	HP EVA	EMC CLARiiON
Expected Minutes per Year of Downtime due to Application Errors ²	40	80	80
Expected Minutes per Year of Downtime due to Scheduled Maintenance	180	240	240

1. This analysis excludes the cost of system failure, since respondents indicated that the probability of failure on each of the systems evaluated was so low as to be a non-factor in total cost analysis.

2. Respondents across all environments reported an average likelihood of 66% per year for an Application Error. Respondents reported that the time required to restore with NetApp is at least 2x faster because NetApp Snapshot functionality provides a quick restore option in the event of application errors.

Source: Mercer Exchange Storage Total Cost Comparison Interviews, May 2006.

Drivers of Variation from Typical Values

These Downtime and Recovery Costs are expected values in a range of potential data points. A few factors create variance from expected values, including:

- Variance in the expected hours of downtime based on the speed to restore
- Uptime requirements for Exchange based on organization policies
- Differences in the number of scheduled hours of downtime

While some environments have taken a number of precautions to both mitigate and manage unscheduled downtime, other environments have a higher tolerance for downtime. As a result, the ranges in Figure 9 are based largely on costs incurred for each participant’s environment while making this tradeoff. Users in high downtime cost environments tended to perform additional Snapshot copies, and keep them online for longer periods of time, while others were content with restoring from the previous night’s backup.

Organizations also vary in their service level agreements for Exchange, and therefore have differing uptime requirements. This directly affects the schedules and frequency with which scheduled downtime is performed. While some organizations attempt 24x7 operations and minimize downtime, others have entire windows during the weekends where outages go virtually unnoticed. In either case, employees are notified ahead of time, keeping the costs of scheduled downtime a small fraction of the costs related to unscheduled downtime.

■ Conclusion

Mercer's research with storage decision-makers found that the total cost of a NetApp storage solution for Exchange is 30-36% lower than typical and comparable deployments of offerings from EMC or HP. Much of the NetApp cost advantage, however, does not show up in the initial invoice but instead begins once the equipment arrives on site. Specifically, ongoing maintenance and administration of Exchange storage costs are the most prominent, and this is where NetApp has a key advantage.

Obviously, a total cost comparison is just one of several considerations that go into a typical purchase decision. Participants noted that a number of elements outside of this study (including specific hardware and software functionality, ongoing vendor relationships, and familiarity with equipment) are inputs that also weigh heavily in any decision. As a result, the importance of the total NetApp cost advantage over competitor solutions must be understood in the context of the broader set of decision criteria.

Interviews with IT managers identified another issue: as IT departments become more sophisticated in their management of lifecycle costs, more detailed cost comparison analysis is becoming the rule rather than the exception. In fact, Mercer research indicates that approximately 70% of survey respondents indicated that some form of robust total cost analysis is factored into their IT purchase process today. While some organizations focus primarily on the upfront vendor costs, most IT professionals expressed a desire for more sophisticated total cost comparisons that would include ongoing administration and management costs. Under that view, NetApp has a significant total cost advantage.

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