Tape Storage TCO

January 2010

Table Of Contents

Abstract

Malcolm Forbes once said, “Presence is more than just being there.” In the same light, the cost of storage is more than just the price you pay for it when you buy it. That may actually be a surprise to some - especially to those who rave about the great discount they received at the point of sale.

An old axiom is warranted here. “You get what you pay for.” Maybe “Caveat emptor” is also apropos. Regardless of the advice, or the Latin, you’d like to invoke here, the point is this. *Do not buy your storage based solely on the purchase price when you sign the contract!* If you don’t believe me, ask your Gartner analyst. This was one of their many recommendations during Gartner Data Center 2009[1].

So if one is not supposed to buy storage based exclusively on the sweetheart price received from a favorite storage vendor, what should one base the purchase decision on? A number of factors go into purchasing storage products. These may include technical, aesthetic, functional, relational, financial, and service considerations. While extraordinary breath may be expended on discussing all of these, this paper seeks to investigate primarily those which are financial in nature. Even so, it will touch upon a variety of points, many of which will tie back to other non-financial factors mentioned above.

This paper focuses on the Total Cost of Ownership (TCO) of a product or solution. To the point, it will concentrate on the short and long-term cost factors associated with owning or operating your gear and why you should be thinking about them when you buy. It will also provide a simple, theoretical TCO analysis as an example of what may be done when assessing purchase options. From this, you may quickly realize that highly discounted purchase prices up front do not always result in long-term cost savings to your firm.

[1] Source: Gartner Data Center Conference 2009, Las Vegas, NV

CapEx vs OpEx

Capital expense (CapEx) is what you'll initially pay for when you buy your storage. It includes one-time buy items such as the hardware, software licenses, installation, integration, and training. Because purchasing departments are rewarded for pounding down a vendor's price, and because budget conscious stakeholders like to think they received a great discount and are therefore superior negotiators, the capital outlay receives a disproportionate level of attention on the part of most buyers.

Operating expenses (OpEx) are the on-going costs of owning and operating your storage equipment. These costs include service contracts, power consumption, floor space maintenance and tax, insurance, cooling and air-handling, service level agreements, personnel overhead i.e., administration, configuration, management, security, and more. These costs are insidious and add up quickly, but are seldom considered during the purchase process because they generally don't occur until well after the point of sale.

Think of these OpEx costs like you would the insurance premiums paid on a large policy. If you add up the monthly payments over a 5 year period, for example, you'll quickly realize that you're paying a tidy sum of money to an insurer. In the case of storage, however, you're paying a tidy sum of money to the power company, your employees, hardware manufacturers, software vendors and others over time.

In fact, a May 2009 white paper from Hitachi Data Systems estimated that the OpEx costs of a storage solution may be as high as 80% of the total cost of ownership![2] If true, then focusing exclusively on the up-front purchase price of your storage buy is like navigating the Titanic around an iceberg by reference strictly to the ice you can see above water. We know how well that worked out.

Furthermore, ESG research[3] indicates that OpEx is the primary cost consideration for a growing number of buyers. Presumably for the same reason – it's becoming a much larger percentage of the cost pie associated with owning technology.

TCO Analysis

The actual TCO analysis is a multi-step process which requires some leg-work on the part of the buyer. While this may be time consuming, it's critical in conducting a TCO exercise that will be useful in making the appropriate purchase decision. However, a good storage vendor can help considerably in conducting a thorough, competitive analysis.

First, determine the factors which you should consider in your analysis. According to Gartner, the top data center cost items are personnel, software licensing, and power consumption. [4]

[2] Source: Hitachi Data Systems: Storage Economics, Four Principles for Reducing Total Cost of Ownership, Merrill, David R.

[3] Source: ESG Research Report: 2009 Data Center Spending Intentions Survey, March 2009

[4] Source: Gartner Data Center Conference 2009, Emerging Storage, Las Vegas, NV

Consequently, you must account for these factors. Obviously, you need to include hardware in your TCO work-up as well. Remember, software licensing and hardware purchases should include the costs for installation and training as well.

Beyond that, you should also account for floor space and maintenance contracts at a minimum. Then, depending on the extent of your operational requirements, you may also want to include costs associated with SLA agreements and penalties, scheduled downtime, and losses incurred by unplanned outages. These last costs are considered "soft" in nature in that they are difficult to quantify due to their non-predictable frequency and severity. These costs will also be influenced by the size and scope of your business operation as well as the industry in which you participate.

Data Collection

Once you've determined the factors you'll include in your analysis, the next step is to collect the data. As previously mentioned this can be time consuming. However, good information leads to good decisions so take the time and effort needed to gather good information.

Purchase Data

Hard costs, those which are readily quantified, will be the easiest to gather. Costs attributed to initial purchase, service or maintenance contracts, installation and training are all readily available from your vendor or vendors. The ease with which this data is gathered makes it simple to do a purchase price comparison only. Thus, it's one reason buyers frequently don't go beyond the purchase discounts they get up front when comparing vendors. The initial list price discounts are enticing and the analysis easy. What better recipe for disaster over the long run?

Now that the easy collection is done, the real work begins. You'll need to ascertain what the costs are for the less quantifiable or predictable variables. For instance, how much power will the storage solution consume in a year? How much downtime do you expect and what's the cost per hour of business lost? To get to this information, you'll need to review the vendor's technical specifications as well as visit with your finance people to determine how much revenue your organization generates on an hourly basis.

Power Consumption

Power consumption is normally specified in watts or BTU in vendor documents. These figures must then be converted to kilowatt hours (kWh) over the span of a year based upon usage patterns. Don't forget to include the cooling as it can easily double power consumption numbers! With the power consumption now known, multiple it by the price per kWh your firm is being charged. Getting this information may require conversations with the folks in finance or facilities who are more likely to see this information than are data center administrators.

Repeat this exercise for every piece of hardware you'll acquire in the solution and extend the annual cost out for every year you include in your analysis. You may also want to include accelerators for forecasted power cost increases i.e., inflation, depending on how far into the future you run your analysis.

Floor Space

Similar efforts will need to be conducted to determine the cost of operating your data center floor on a per square foot basis. Once again, your facilities and finance personnel should be able to help you determine what the internal business "tax" is for data center floor space per square foot per year. This tax may include facilities maintenance, insurance, property taxes, and other operational considerations. With this information in hand, you can reference the vendor specifications to determine how much floor space will be required for a particular solution. Multiply the solution footprint by the cost per square foot of the tax rate you received from facilities or finance. This will give you the annual floor space cost associated with the solution under consideration.

Service Level Agreements

Service level agreements will vary widely by industry as well as by Recovery Point Objective (RPO) and Recovery Time Objective (RTO). Each is likely to have its own penalty assessment which needs to be taken into consideration. Since service level violations are not uniformly predictable, determining costs associated with them becomes difficult. In such cases, you may have to rely upon historical data and trend it forward as a simple example.

Alternatively, you may compute SLA costs associated with outages based upon the expected mean time between failure (MTBF) information which vendors typically provide when asked. For instance, if a vendor specifies 99% up time, then you might calculate that you'll suffer a SLA violation for which there will be a defined penalty 1% of the time – or roughly 87.6 hours out of the year. Those kinds of SLA penalties can become expensive quickly and more than offset any sweetheart savings you thought you received from the vendor at the point of purchase.

Planned and Unplanned Outages

Planned and unplanned outages or service bottlenecks are normally the reason for SLA agreement violations which were previously discussed. However, these outages also result in idle time for personnel as well as increased costs for temporary equipment and personnel in some cases.

At the organizational level, these outages, particularly those which are not planned, may result in lost revenue if the outage prevents the business from conducting revenue generating transactions. This is particularly true for financial institutions. These costs may also need to be considered in a TCO exercise.

As with the SLA agreement component, you will need to either look at historical outage patterns and costs or calculate the outage based upon the MTBF from the vendor. With that information you can calculate the frequency of outages and the costs that will be incurred when they happen given the cost per hour of lost business.

Using the 99% vendor MTBF referenced in the SLA section, you should expect to have your solution out of operation just over 87 hours during the course of a year. If this outage means your organization has to lease temporary equipment and personnel to bridge that gap, multiply those hourly lease rates by 87.6 hours to calculate the expected cost of that outage. As with the SLA agreement calculation, these outage level costs can be significant.

Conversely, if your organization does not lease temporary equipment and personnel to bridge the outage gap and simply stops operating for that period of time, then multiply the lost revenue per hour by the hours out of service. As with the facilities tax referenced earlier in this paper, you will need to work with finance to determine at what rate your organization is losing revenue on an hourly basis because it can't transact business.

For example, assume your organization loses $1,000 an hour for every hour it can't conduct business. With an expected outage time of 87 hours per year, you may estimate that solution will cost your business $87,000 annually because it's operational "only" 99% of the year. Once more, the cost of the outage, even if only an expected cost, can easily sink any savings you may enjoy up front.

You can take the TCO analysis one step further when comparing multiple solutions. If a competing solution has an uptime of 99.9%, then you should expect the solution to be off line only 8.8 hours out of the year. At $1,000 per hour of lost revenue, a solution that reduces expected downtime by 80 hours (the difference between 99.9% availability vs 99%) will result in a significant TCO advantage, nearly $80,000 per annum for every year during the lifetime of the product!

TCO Modeling

Now that you've gathered your data, it's time to put it into a tool with which you can easily conduct your analysis. One simple tool you can use is a spreadsheet model using a Profit & Loss Statement (P & L) format. This form of model will allow you to easily capture the line items previously discussed for every year in your TCO exercise. You can build a simple model for each solution involved and readily compare the total cost across your options. From here, you can conduct sensitivity or "what if" analysis to understand how changes in various components over time will affect each solution's TCO. It's possible you'll also gain a deeper understanding of cost centers within your operation that may lead to efficiency improvements elsewhere.

The following table is a simple, hypothetical storage solution meant for example purposes only. Figures depicted are in thousands of dollars. This sample is provided as a point of reference or framework with which you can begin constructing your own TCO comparison models.

	Solution A				
	Year 1	Year 2	Year 3	Year 4	Total
Hardware	$ 100,000	0	0	0	$ 100,000
Installation	$ 7,000	0	0	0	$ 7,000
Training	$12,000	0	0	0	$ 12,000
Service Contract	0	$ 12,000	$ 12,000	$ 17,000	$ 41,000
Sub Total	$119,000	$ 12,000	$ 12,000	$ 17,000	$ 160,000
Software Licenses	$ 180,000	0	0	0	$ 180,000
Installation	$ 11,000	0	0	0	$ 11,000
Training	$ 20,000	0	0	0	$ 20,000
Service Contract	0	$ 20,000	$ 20,000	$ 20,000	$ 60,000
Sub Total	$ 211,000	$ 20,000	$ 20,000	$ 20,000	$ 251,000
Power Consumption	$ 8,000	$ 8,500	$ 9,000	$ 9,500	$ 35,000
Floor Space	$ 10,000	$ 10,250	$ 10,500	$ 10,500	$ 41,250
SLA Penalties	$ 10,000	$ 10,000	$ 10,000	$ 11,000	$ 41,000
Planned Outage	$ 8,000	$ 8,000	$ 9,000	$ 10,000	$ 35,000
Unplanned Outage	$ 17,000	$ 17,000	$ 18,000	$ 20,000	$ 72,000
Sub Total	$ 53,000	$ 53,750	$ 56,500	$ 61,000	$ 163,250

Solution A is front-end loaded with CapEx costs. The following table provides cursory information on the Total Cost of Ownership of the solution across four years. Notice that CapEx is slightly more than half of the total cost of ownership of the solution.

Solution A	
4 Year TCO	$ 574,250
Year 1 % of total	67%
CapEx % of total	57%

The following table is a simple, hypothetical storage solution, similar to the first, meant for example comparison purposes relative to Solution A. Figures depicted are in thousands of dollars. This second sample provided a point of TCO comparison relative to the first solution to help demonstrate the value of looking at total solution costs.

	Solution B				
	Year 1	Year 2	Year 3	Year 4	Total
Hardware	$ 65,000	0	0	0	$ 65,000
Installation	$ 5,000	0	0	0	$ 5,000
Training	$ 10,000	0	0	0	$ 10,000
Service Contract	0	$ 13,000	$ 13,000	$ 13,000	$ 39,000
Total	$ 80,000	$ 13,000	$ 13,000	$ 13,000	$ 119,000
Software Licenses	$ 140,000	0	0	0	$ 140,000
Installation	$ 9,000	0	0	0	$ 9,000
Training	$ 17,000	0	0	0	$ 17,000
Service Contract	0	$ 20,000	$ 20,000	$ 26,000	$ 66,000
Total	$ 166,000	$ 20,000	$ 20,000	$ 26,000	$ 232,000
Power Consumption	$ 15,000	$ 16,000	$ 17,000	$ 18,000	$ 66,000
Floor Space	$ 19,000	$ 19,500	$ 20,000	$ 20,500	$ 79,000
SLA Penalties	$ 18,000	$ 19,000	$ 20,000	$ 24,000	$ 81,000
Planned Outage	$ 12,000	$ 12,000	$ 14,000	$ 18,000	$ 56,000
Unplanned Outage	$ 22,000	$ 23,000	$ 25,000	$ 28,000	$ 98,000
Total	$ 86,000	$ 89,500	$ 96,000	$ 108,500	$ 380,000

Solution B provides significant up-front discounts relative to Solution A on the purchase price. However, OpEx costs across ensuing years can significantly change the total cost picture. Obviously, the CapEx for Solution B is quite low relative to the total cost as well as to that of Solution A. However, if the buyer focuses on CapEx exclusively, which is frequently the case, she will miss over 65% of the total cost iceberg! Furthermore, if the buyer makes a decision based only on the cost of the first year of ownership, then she will be neglecting to account for 55% of the total cost of the solution during the four year period in which she plans to own it.

Solution B	
4 Year TCO	$ 731,000
Year 1 % of total	45%
CapEx % of total	34%

As you can see by the over / under comparison below, the Purchase Price, or CapEx, for Solution A is 34% greater than that of Solution B. However, the Total Cost of Ownership for Solution A across a four year life is only 79% of that for Solution B. This yields a savings of $156,750 over a four year period by selecting Solution A despite larger up-front costs.

	TCO	Purchase Price
Solution A	$ 574,250	$ 330,000
Solution B	$ 731,000	$ 246,000

As a general rule, the longer the lifecycle of the solutions in question, the greater the overall difference there will be in TCO between the two. This is particularly important for capital products which may have a useful life in excess of 5 years.

One could carry the TCO analysis even further by discounting all costs back to today's dollars using an appropriate discount rate since tomorrow's dollars are less valuable than today's. However, the simple examples shown should provide you a solid gauge with which to bolster your purchase decision process.

TCO Decision

Now that you've collected the data and put it into a simple TCO model, you can more clearly assess the options and make an appropriate decision. Many customers simply do not investigate beyond initial purchase price. Without knowing the full costs of owning and operating a solution, they may subject themselves to significant cost pressures in the future which are related to service contract accelerators, significant down-time losses, exorbitant power consumption requirements, and other hidden costs.

A storage vendor who practically gives away hardware and software up front may very well be counting on large service contracts with annual accelerators or up-lifts which yield a great revenue stream for the vendor but further increase TCO costs to the buyer through outlying years. This can significantly increase solution TCO. If customers are not aware of this, they may readily jump at large up-front discounts only to discover once gear is installed and they're under service contract that OpEx costs are spiraling out of control.

Utilizing an easily built TCO model like that discussed in this paper readily helps you avoid unforeseen costs as well as ask much better questions of your storage vendor. Unlike some storage vendors which count upon buyers neglecting to conduct full due diligence as part of their sales strategy and understanding of OpEx factors, Spectra logic not only can assist you with a sound TCO analysis up front, but also provides tape storage technology that does more than competitors to drive down operating expenses through power sipping efficiency, intense density, small footprints, and superb availability.

Summary

Presence is more than just being there and cost is more than just the price you pay up front. Savvy buyers understand this and utilize the tools at their disposal to ensure they see as much of the total cost iceberg as possible. Knowing the factors that affect TCO, taking the time to gather the data, then plugging it into the appropriate analytical model is critical in making a smart storage purchase decision.

Granted, TCO analysis should not be the only purchase factor. It should be incorporated along with technology fit, usability, and even aesthetics. As such, it should be a critical component in making the kind of storage purchase decision which will positively affect your organization well beyond the point of purchase.

www.SpectraLogic.com

Spectra Logic Corporation
1700 N 55th Street
Boulder Colorado 80303 USA
800.833.1132
303.449.6400

Spectra Logic Europe Limited
Magdalen Centre
Robert Robinson Avenue
Oxford Science Park
Oxford UK OX4 4GA
+44 (0) 870.112.2150

For more information, please visit www.SpectraLogic.com