AVANADE® PERSPECTIVE

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Avanade is a global IT consultancy dedicated to using the Microsoft® platform to help enterprises achieve profitable growth. Through proven solutions that extend Microsoft technologies, Avanade helps enterprises increase revenue, reduce costs and reinvest in innovation to gain competitive advantage. Avanade consultants deliver value according to each customer's requirements, timeline and budget by combining insight, innovation and the talent of our global workforce. Founded in 2000 by Accenture and Microsoft, Avanade has more than 9,000 professionals serving customers in 22 countries worldwide. Additional information can be found at www.avanade.com.

Server Virtualization: A Step Toward Cost Efficiency and Business Agility

"When written in Chinese the word crisis is composed of two characters. One represents danger and the other represents opportunity," said President John F. Kennedy, who knew his share of crises.[i]

Danger and opportunity aptly describe the current economic climate. Financial pressures are forcing companies to be extremely cautious. But if, in the midst of a crisis, executives fail to identify areas to improve business performance, lower their organization's cost structure and increase efficiencies, these leaders are likely to miss the chance to create an opportunity out of crisis.

As the global financial turmoil highlights the increasing costs associated with creating and supporting computer hardware and the space it occupies, servers in the data center are attracting attention. Rapid growth and rampant mergers and acquisitions (M&A) during the past decade have led to the proliferation of servers, which has increased complexity and incompatible technologies.

This has resulted in significant waste of resources. Rather than continue adding equipment that occupies additional space, companies want to optimize their existing landscapes. The virtual competes with the physical. Less becomes more. And a lot of money is at stake: namely, the capital expense of owning, investing, and maintaining the data center space and equipment and the high-cost of energy required to operate those investments.

Executives must constantly re-evaluate and assess their strategies for cost reduction, efficiencies, business agility, faster deployment, and disaster recovery and business continuity. Virtualization offers a first-step solution to the cost equation that arises when technology contends with space.

The business benefits of virtualization are real. But so are the risks. Virtualization isn't a panacea. IT executives must take a long-term view of virtualization as a foundation for more efficiently run data centers and business operations and align it to their company's business objectives. When evaluating server virtualization, there are several factors to consider.

In this paper we will explore:

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What Is Driving Virtualization

High growth and "irrational exuberance" quickly come to mind when defining business in the late 1990s. Consolidation within industries certainly ranks as a possible definition of the business landscape as we near the end of the first decade of the 21st century.

But whether companies experienced rapid growth or found themselves on the buying or selling end of an M&A transaction, they added IT systems. They patched existing systems together to keep operations functioning and business moving. Unfortunately, that led to duplicate, incompatible and legacy systems. All of this has led to widespread inefficiencies, skyrocketing costs, complexity and inflexibility, to name a few challenges.

In the midst of IT adding and patching systems, global competition forced management to look for ways to reduce costs and complexity while maintaining or increasing service levels. Executives sought to make their businesses more nimble. They wanted to respond to fast-changing global conditions. They sought to become more efficient to better compete with competitors, lower costs and improve shareholder value.

Gartner notes that "virtualization is the highest-impact issue changing infrastructure and operations through 2012 …"

The proliferation of multiple system platforms, often resulting from mergers and acquisitions and the lack of an overall IT strategy, leads to challenges in responding to business demands. IT executives must deal with infrastructures that are complex and often disconnected. What follows are extra administrative, utility, facilities and management costs, and escalating requirements for data center space, as well as service and maintenance issues.

Typically when this happens, a company's technology infrastructure costs slip out of control. Server virtualization can become a compelling approach to getting control over server infrastructures.

Divergent paths–complex and costly IT systems colliding with business requirements for efficiency and agility–created an environment ripe for virtualization.

Virtualization—Like Jelly Beans in a Candy Dish

Virtualization is relatively simple in concept. In describing how it works, Steve Fink, Avanade Solution Architect, compares it to a candy dish filled with jelly beans. Think of the dish as server hardware and the jelly beans as representing the operating system. If you only have one jelly bean in the dish, it's not being used as effectively as it could. If you add more jelly beans, the dish space is used more effectively. That's basically what virtualization involves–optimizing a hardware resource.

Essentially, server virtualization helps maximize hardware use by aggregating more applications and services onto fewer pieces of hardware, while maintaining operating system separation. So server virtualization enables applications and services to safely coexist on the same server hardware, yet within multiple operating systems.

The virtualization process poses challenges, however. IT must understand what the operational process requires to move from many physical servers to fewer physical servers. Where a one-to-one relationship once existed between a server and its operating system, now a company might have a many-to-one relationship of operating systems to server hardware platforms. If not managed correctly, that can create challenges in IT operations and service delivery.

Avanade believes that a standardized set of operational processes can be applied to IT management to deal with the changes needed. But it does require companies to change the way they think about their servers, and how they use them.

Server Efficiency

The primary sales message for advocating virtualization is that companies are leaving money on the table–a high percentage of servers are woefully underused. Statistics on server utilization, as measured by CPU utilization percentage, differ depending on the source. Server utilization ranges anywhere from 5 percent to 40 percent. Avanade and independent industry surveys estimate that server utilization rates of 20 percent or less are more common. It warrants stating the obvious–tremendous inefficiency through excess capacity exists in data centers.

One Gartner report found that "even underutilized servers use high amounts of energy. Increasing utilization levels to 60% and more requires only modest increases in power. The effective use of virtualization can reduce server energy consumption by up to 82% and floor space by 85%"[ii]. Server virtualization can improve the use of many resources that companies already have invested in for administration, facilities, and hardware.

The ROI on Virtualization

In order for businesses to know if virtualization will help meet their financial goals, it's important to conduct a financial analysis to determine a company's server landscape total cost of ownership. Avanade created a modeling tool that calculates and compares virtualization costs, so clients can gain a detailed picture that can help them decide if, in fact, virtualization makes financial sense. The Avanade Virtualization Business Case Estimator™ (Figure 1) helps quantify the impact of server virtualization on cost savings, energy consumption, IT staffing, carbon footprint, and systems maintenance.

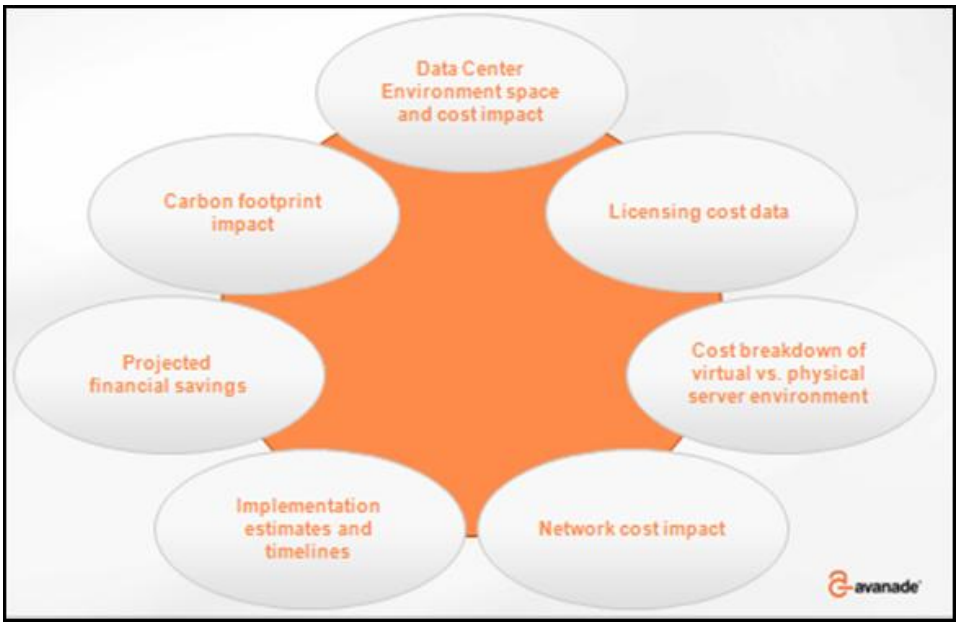

Figure 1

In the model, Avanade uses as many as 150 input variables that are analyzed to determine the financial impact of moving to a virtualized data center. That leads to a calculations matrix that can show clients the short- and long-term impact of data center virtualization. Clients typically realize short-term benefits when server virtualization is integrated into a strategic investment plan.

Here are examples of average results garnered with the Avanade Virtualization Business Case Estimator. Figure 2 shows the difference between a non-virtualized server and a virtualized environment when it comes to power costs.

Virtualization Cuts Energy Costs Consumption Nearly 75 Percent

Power Cost as Percentage of Total Cost	
Non-virtualized Server	4.36%
Virtualized OS	1.68%

Figure 2

Figure 3 indicates the cost savings that comes from virtualized guests on a server.

Cost Savings Realized

Savings from Virtualized Guests	
Hardware Annual	$ 2,560.62
Maintenance Annual	$ 467.54
Power Annual	$ 302.40
HVAC Annual	$ 102.82
Admin Annual	$ 1,434.38
Network Annual	$ 560.15
Data Center Allocation	$ 305.04
Enterprise Management	$ -
Storage	$ (1,330.59)
Backup / Archive	$ -
OS & Virtualization Licensing	$ 632.49
Cost Savings Per Instance	**$ 5,034.84**

Figure 3

When it comes to the return on investment, Figure 4 shows an operating cost savings of 12.06% and a return on investment of 1.1 years, or 14 months.

Return on Investment	
Migration Resource Investment (Workstations)	
Hardware investment (Workstations)	$4,654,780.85
Estimated Operational Savings	($1,492,671.17)
Migration Resource Investment (Servers)	$1,432,358.98
Hardware Investment (Servers)	$26,741,775.00
Estimated Savings of not purchasing Non-Virtualized Server Hardware	($18,208,337.00)
Estimated Labor Savings of not implementing Non-Virtualized Server Hardware	($3,105,461.36)
Estimated Investment to move to a Virtualized	$10,022,445.29

Figure 4

The Future of Virtualization

The media coverage today increasingly centers on server, desktop, application and storage as major segments of virtualization. Almost 40 percent of respondents had "virtualized a significant number of servers and services" with an additional 10 percent reporting that they had plans to do so within the next 12 months."[iii] Gartner notes that "virtualization is the highest-impact issue changing infrastructure and operations through 2012. It will change how you manage, how and what you buy, how you deploy, how you plan and how you charge."[iv] The worldwide virtualization market will grow to $3.5 billion in 2011, a 27.1% CAGR from 2006, shows an IDC forecast.[v]

Energy—Less Is More

Businesses are under increasing pressure to proactively address environmental concerns. While the primary drivers for companies to consider virtualization are improved business agility, speed, and cost benefits, green computing initiatives deliver a by-product: the benefit of an environmentally sound business practice. It can enhance corporate valuations and reputations for responding to sustainability and compliance requirements.

One example of a company that is focused on leveraging virtualization as part of a broader environmental and business commitment is the National Australia Bank (NAB) Group (see sidebar case study).

Conserving energy becomes increasingly essential in the future. In fact, as many as half the data centers in the world will soon face a shortage of cooling needs and energy capacity to deal with the newest, high-density computer equipment, some analysts say.

According to some research, enterprise data centers could spend as much on energy in the next few years as they do on hardware infrastructure. Some estimates go so far as to suggest energy bills could soon total more than half of the overall IT budget.

Case Study: National Australia Bank

NAB is a leading financial services organization with operations in multiple countries. The geographic distribution of its offices slowed regional application deployment. One of NAB's goals was to consolidate its IT infrastructure to help meet corporate goals for reducing power consumption.

NAB took advantage of Windows Server® 2008 virtualization technology to consolidate server hardware. NAB partnered with Avanade and Microsoft to achieve tangible business results–smaller server footprint (less space), easier technology management (higher performance), and improved energy efficiency (lower costs).

John Stewart, chief executive of National Australia Bank Group, made a commitment that NAB would be carbon neutral by 2010. The bank estimated that its IT environment accounted for more than 90 percent of the organization's total energy expenditure. To help the company meet its goal, NAB hoped to consolidate hardware and reduce power consumption and greenhouse emissions.

To read more details of how NAB initiated a comprehensive IT initiative to improve business performance, please click here.

Toby Velte, noted author of "Green IT: Reduce Your Information System's Environmental Impact While Adding to the Bottom Line," outlines the financial and environmental benefits that organizations can gain through server virtualization and consolidation. In his book, Velte offers a detailed implementation plan for integrating environmentally sound techniques and technologies as part of a business-driven green initiative.

Velte created a fictional company to show how virtualization and green IT might work. He gave the company 1,000 servers and 5,000 desktops with 500 terabytes (TB) of storage. Then he used the Avanade Virtualization Business Case Estimator to analyze variables involving server information, tool costs, human resources, licensing costs, financials, power costs, and data center facilities.

In this example, the non-virtualized costs per server came to $13, 047 and virtualized costs, $3,795. The carbon emission savings were 1,700 tons of carbon emissions per year. In total, the company saved $6.4 million a year with a positive return on investment achieved in 14 months.

Figure 5 shows how virtualization affects projected KwH and the carbon footprint.

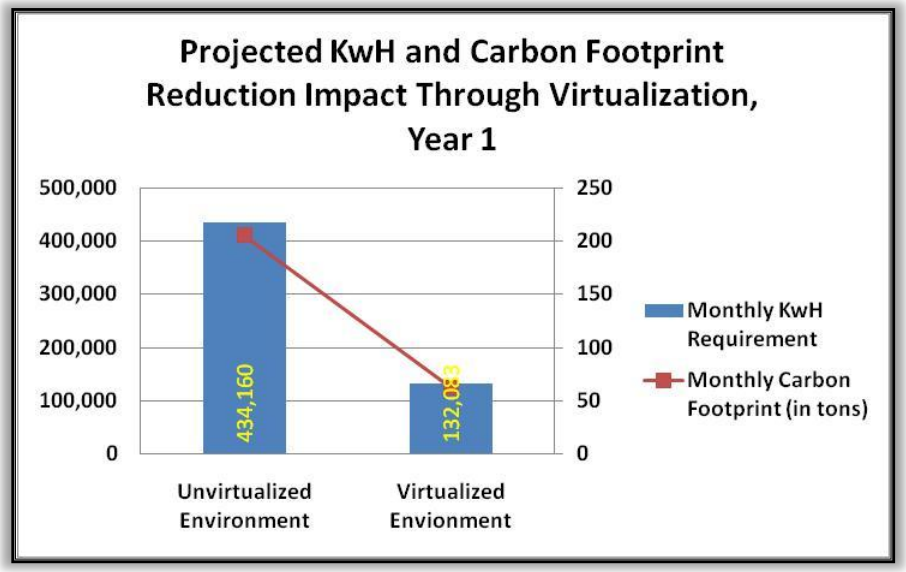

Figure 5

Figure 6 offers another picture of the carbon footprint.

Carbon Footprint Impact, Year 1			
	Unvirtualized Environment	Virtualized Environment	Savings through Virtualization
Monthly KwH Requirement	4,196,880	2,142,303	2,054,577
Monthly Carbon Footprint (in tons)	1,985	1,013	972
Annual Carbon Footprint (in tons)	23,821	12,160	11,662

Figure 6

And Figure 7 shows an annual power savings of $2.2 million.

Ultimately, virtualization works best when companies are open to modifying their operational process to accommodate increased environment complexities. An analysis of many variables can indicate savings that translate into a better bottom line. Velte believes that attitude change about IT is essential for virtualization to take place. He believes that too many IT managers have an unnecessary need to know where their servers are, and that IT departments must overcome their knee-jerk tendency to use another server when they get a new application.

Net Electricity Cost Savings of Moving to Virtualization, Year 1			
	Physical Server Count	**Monthly Savings**	**Annual Savings**
Unvirtualized Servers	**71**	$ 279,119.52	$ 3,349,434.24
Virtualized Host Servers	**3,590**	$(139,559.76)	$(1,674,717.12)
Storage		$ (2,937.90)	$ (35,254.83)
HVAC		$ 46,451.43	$ 557,417.18
Totals	**3,661**	**$ 183,073.29**	**$ 2,196,879.47**

Figure 7

Virtualization in Practice

Microsoft has made significant investments and inroads in server virtualization. In 2008, Microsoft launched Hyper-V™ as a key feature of Windows Server 2008. In this fictional case study, Avanade compared Microsoft Hyper-V and VMware® for Company AZT, which has 1,450 small branch offices. Each branch has five servers. The company wants to pursue a virtualization strategy that reduces the number of servers in each branch by more than half, to two servers. It plans to implement a technology called "clustering" to add some levels of redundancy.

Figure 8 deals with software licensing. Note the substantial savings in comparing Microsoft Hyper-V to VMware.

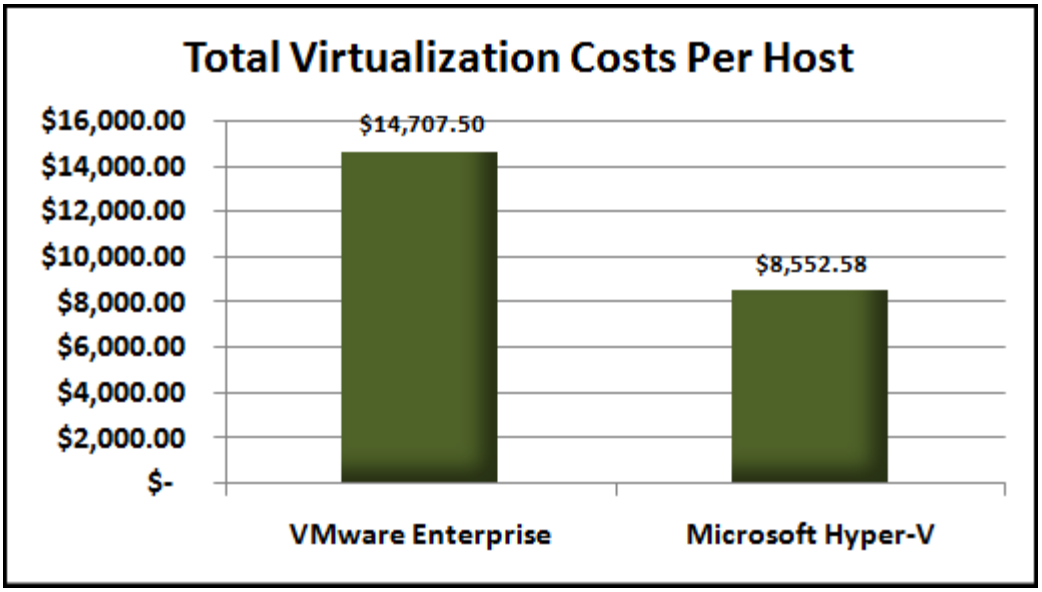

Figure 8

In this type of scenario, Avanade typically sees these kinds of cost benefits for Microsoft Hyper-V. Avanade was an early adopter of Microsoft Hyper-V. Based on our experience and work with clients, we believe Microsoft Hyper-V is enterprise-ready and a competitive solution to other virtualization offerings on the market. While Avanade is focused on the Microsoft platform, it has extensive experience working with

clients in heterogeneous environments. Avanade works within a client's chosen platform and helps them implement Microsoft solutions alongside other platforms in support of their business and technology objectives.

The Answer to Virtualization

Avanade provides a portfolio of virtualization solutions designed to help organizations reduce costs, enable business change and increase revenue. It results in more innovation and a greater competitive advantage. Avanade's approach is to:

- **Take a holistic approach** that ensures all dependencies, such as business and IT parameters, are considered.
- **Deploy in phases** to help reduce costs and keep risk within comfortable parameters.
- **Reuse reliable assets**, which can support minimal downtime and minimal impact on users.
- **Ensure fast implementations** that use proven assets and techniques that can reduce development times and speed development.

Avanade uses an extensive set of tools, methodologies, and best practices in enterprise technologies to help its customers implement virtualization solutions. The Avanade Data Center Transformation™ solution delivers a virtualized, automated data center that can provide agility through dynamic business processes.

Companies interested in virtualization can tap into the power of Microsoft Hyper-V and System Center Virtual Machine Manager and leverage key Avanade assets and capabilities, such as the Avanade Virtualization Business Case Estimator and ACA® Dynamic Systems Framework delivery accelerators, to improve time to scale, help reduce operational costs, and address green computing pressures, for optimal efficiency and rock-solid security.

Conclusion

The economic climate is forcing companies to look for every possible means of increasing efficiency, flexibility and cost effectiveness. Strategic companies will capitalize on the current business crisis to create future opportunities. Server virtualization offers possibilities in an environment where some organizations might be paralyzed with fear.

Virtualization involves a long-term strategy. It transforms how a company approaches IT and will require a change in how companies see their computing needs evolving and how they want to address them. Virtualization is the foundation for building an optimized data center that can help companies improve server efficiency, lower energy costs and enhance IT flexibility.

Avanade believes that companies can confront the risks and rewards that come with virtualization in a way that optimizes their data center in the most efficient and flexible manner. But don't think of it as a quick fix. Think of it as future fix that can pay off in the long run. And it can pay off because Avanade is committed to helping companies realize results with virtualization.

For more information, please visit www.avanade.com.

[i] John Fitzgerald Kennedy (1917–1963), U.S. president
Speech, April 12, 1959, Indianapolis

ii "Energy Savings via Virtualization: Green IT on a Budget," Gartner, 11/10/08.

[iii] InfoWorld, Dave Marshall Virtualization Report, 5/25/08.

[iv] "Virtualization Changes Virtually Everything," Gartner, 3/28/08

[v] InfoWorld, Dave Marshall Virtualization Report, 5/25/08.