THE PROS AND CONS OF VIRTUALIZATION FOR THE SMB: IS IT RIGHT FOR YOUR BUSINESS?

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Executive Summary

The way that people work, that companies do business, and that we interact with one another is undergoing one of the biggest changes since the development of the PC. Virtual computing lies at the heart of this revolution. As a technology, virtualization has been around for a number of years delivering benefits ranging from substantially lower costs, management time and energy consumption to greater agility and better disaster recovery. It releases employees from the limitations of traditional computing and transforms the way business is done.

These benefits, however, have been available primarily to larger organisations running many servers and hundreds or thousands of users who are able to take advantage of the technology in all its forms whether it is virtualization of the server, desktop, application or storage. Recently, however, the picture has started to change as costs have come down and virtualization technology has matured. Today, the benefits of virtualization are available to all but the smallest organisations. The starting point for many Small and Medium-sized businesses (SMB) is server virtualization as this is where some of the more obvious benefits can be found so that will be the focus of this document.

So what are the benefits, the costs and the limitations of server virtualization and how do you decide whether, as an SMB, you will see the benefits? How do you assess whether you will achieve a tangible return on investment and if so, over what period? What are the experiences of SMBs in actually living with a virtualized environment and what advice would they give others just embarking on this road? This document seeks to address these questions and to provide some recommendations based on PT Solutions' experiences in implementing server virtualization technologies into this sector.

Introduction

Over the years servers have proliferated as new hardware has been added to data centres - usually to fulfil specific functions or run different operating systems and in almost all cases with excess un-used capacity on each server. Server farms have expanded dramatically both in number and size and data centres have taken up valuable office space and consumed vast amounts of energy.

At the same time the number of expensive desktops, laptops, mobile devices and smart phones has grown exponentially as has the complexity of IT management; business processes have become increasingly inflexible and incapable of adapting to new business needs. Add to this the changing work patterns with greater mobility, hot-desking and home-working and it is clear that things needed to change. And change they have!

Virtualization of servers, desktops, applications and storage has revolutionised the industry and is spreading rapidly to every part of the IT market including SMBs. There is certainly a great deal of interest; a survey carried out by VMware (VMware: The Benefits of Virtualization for Small and Medium Businesses) showed that only 1 in 6 SMBs that didn't already have virtualization technology deployed were not considering it and this is confirmed in a more recent survey by Symantec which concluded that 70% of SMBs were actively considering virtualization. This same survey, however, found that just 10% of those SMBs surveyed had actually implemented virtualization so uptake has been cautious to date.

The many far reaching benefits of virtualization can include:

- Significant cost reductions: Less hardware is needed so there's less capital expenditure, servicing, maintenance, warranties, energy consumption, space, complexity and management time.
- Better systems agility: New applications can be deployed in minutes across the entire enterprise, live servers can be moved to new hardware or risk-free tests and development areas can be run knowing you can easily roll back, rebuild and

move servers around. The in-built agility of a virtualized environment allows you to respond to changing business demands quickly, safely and with minimal system downtime.

- Simplified desktop and application management: Virtualization allows for desktop growth in line with business strategy. Expansions are easily catered for, refreshing of desktops and migration to new upgrades is simple, as is the rollout of new applications while lowering support and lifecycle costs. One- time, one location management of OS and applications is a reality.
- Compliance and data security: Endpoint security is dramatically improved as data no longer resides on user devices and access to it is managed and controlled centrally through pre-configured policies.
- Workforce freedom and flexibility: Employees can work in the most efficient and productive way and access key information securely from any device, anywhere, at any time. Flexible working programmes can cut facilities costs and deliver real competitive advantage.
- Business Continuity and Disaster Recovery: Virtualization makes dealing with potential and actual risks and disruption much easier; risks are mitigated and recovery of data is almost instant as virtual server images can be left on hot standby ready for DR deployment. Physical server failures can be dealt with through seamless failover and downtime due to planned and unplanned outage can be kept near to zero.
- Sustainability: In a world where energy conservation and responsible usage is such a high profile issue and organisations are striving to deliver carbon neutrality, any reduction in data centre power consumption is not only financially rewarding but adds to their 'green' credentials and benefits the environment. Virtualization can make a substantial contribution in this area.

Although the focus of this document is server virtualisation it is worth having a brief look at network storage and at each of the main virtualization technologies as each can have its place in a typical SMB, particularly if restructuring of the IT infrastructure will be taking place anyway.

Network Storage

It may seem odd to start a review of virtualization technologies by looking at network storage but getting this part of the infrastructure right unlocks the true power of virtualization. Features like high availability, load balancing and site recovery, require shared network storage. Common access to shared storage provides the foundation that allows virtual servers and desktops to move freely between different hardware platforms. These technologies rely on shared storage to transfer running workloads between physical servers through the use of storage area networks (SANs) to connect multiple servers.

Load balancing can be automated, letting operating systems move between host servers based on set policies, so the load is balanced and hardware investment is maximized all without impacting the end-user. Virtual machine crashes are easily dealt with by simply restarting on another host. It is essential, therefore, that storage is considered when evaluating virtualization, particularly in an SMB environment where the IT infrastructure may simply consist of servers with direct attached storage.

Desktop Virtualization

Desktop virtualization delivers a complete desktop experience to users as a secure on-demand service whenever and wherever it is needed. It therefore offers new and powerful opportunities for IT departments to respond to changing user needs in a flexible way. Traditionally, a user's computer will run an operating system (such as Windows 7) with applications (such as Microsoft Office) from a local disk. A virtualized desktop can be either client-hosted or centralised on servers in the data centre (often referred to as Virtual Desktop Infrastructure or VDI).

Client-hosted desktop virtualization creates a separate OS environment on the desktop which allows non-compatible, legacy applications to operate within their native environment on top of another, perhaps more current, operating system. Another scenario may be that two IT environments may be run concurrently on the same physical device. VDI, however, allows for the centralisation of desktops, applications and data by taking the user's operating environment (OS, applications, files and data) and recreating them on a remote system - usually a virtual machine on a server in a data centre. The user simply accesses this remote environment from their device, wherever and whatever that happens to be, with all processing taking place on the remote virtual machine.

End users benefit from a rich remote experience with a higher degree of flexibility (work-from- home, hot-desking) and highly secure and flexible access to their information. IT departments benefit from increased business continuity, as data is centralised and integrated management of physical, virtual and session-based desktops. Desktop virtualization technology products include VMware View, Citrix XenDesktop and Microsoft VDI.

Application Virtualization

Application virtualization is a technology that allows users to execute applications without having them installed on their client computer. This is possible because the application virtualization technology takes resources such as memory allocations, device drivers, operating files, Windows registry keys, etc. and recreates these in the virtual environment.

When the underlying physical and recreated virtual resources are merged and presented to the client computer the virtualization layer makes the application perform as if it were installed on the client computer.
In this way, applications become centrally managed virtual services that are never installed on the client computer. The technology delivers a variety of benefits including:

- Applications can be streamed on-demand over the internet or via the corporate network to desktops, terminal servers and laptops resulting in greater user mobility as applications follow users.
- Accelerates OS and application deployments reducing support costs, management overhead and wasted user time.
- Automates and simplifies the application management lifecycle by significantly reducing application interoperability testing
- Better user experience when application upgrades or patches are needed as the user is unaware that the process has taken place - no waiting, re-booting or uninstalling retiring applications.
- Enables controlled application use when users are completely disconnected
- Creates application-specific copies of all shared resources that are isolated into their own virtual environments
- Allows for interaction with local system resources but prevents applications from overwriting the resources of other applications

Application virtualization technology products include VMware ThinApp, Citrix XenApp and Microsoft App- V.

Server Virtualization

Server virtualization is the most mature of the virtualization technologies and provides a very viable alternative to deploying multiple physical servers. Physical hardware servers are expensive to buy, run and maintain, and typically deliver very low levels of capacity usage - often as little as 5 to 20%.

Server virtualization allows physical servers to be deployed as virtual machines and consolidated onto less hardware. The result is lower operating and maintenance costs as power consumption from energy hungry servers is reduced and much less cooling is required.

As multiple virtual machines can be run on a single server and each is independent of one another, several different operating systems can co-exist on the same physical server. As long as the server has the required processing power and memory, as many as 15 or more virtual machines can function at the same time. Server virtualization technology products include VMware vSphere, Citrix XenServer and Microsoft Hyper-V.

Benefits of server virtualization for the SMB typically include:

- Improved server = lowers costs: Server virtualization improves server efficiency for SMBs by making better use of their server space through consolidation of multiple physical assets onto one virtual system. It can, therefore, reduce the capital cost of buying new servers and the on-going operational costs associated with servicing, maintenance, warranties, energy consumption, space, complexity and management time.
- Better reliability: Server virtualization can improve IT infrastructure reliability. As virtual machines can be moved between physical servers without requiring application interruption, server maintenance and upgrades can be carried out without disrupting users. New applications can also be easily tested before live launch, making the IT environment more stable and predictable.
- Greater business agility: Server virtualization improves the IT department's ability to deliver IT resources on-demand allowing it to respond rapidly as the needs of the business evolves and grow. Re-provisioning of resources is fast and new applications can be launched in days rather than weeks.
- Reduced staff time devoted to server management: As servers no longer have to be configured and managed one at a time, server virtualization makes management much simpler for IT staff. Management efficiency is also improved through the use of advanced tools for load balancing, live migration of virtual machines, capacity planning, and automated provisioning. These improved efficiencies can often transform the IT department from a maintenance team, performing routine tasks, to a more responsive strategic team that can add value to the business.
- High availability and business continuity: Keeping applications running when server problems occur is crucial to business productivity and profitability but many business continuity solutions are expensive and hard to implement. With virtualization, however, it's easy to build remote virtual machines on failover servers allowing seamless recovery and minimal downtime.
- Disaster Recovery: Clearly, disaster recovery is significantly easier in a virtualized environment but server virtualization also allows disaster recovery solutions to be fully tested well before they are actually needed to ensure a fast restart in the case of a site failure. Without server virtualization, many companies cannot afford the time and effort it takes to build a test server.

One more thing to think about…

Server virtualization fundamentally changes the way that SMBs need to handle data backup; understanding the new requirements is vital if data is to be protected and effective disaster recovery put in place. Although server virtualization is continuing at a pace, as confirmed by a recent survey of 6000 SMBs by Ponemon Institute on behalf of Acronis, it is also clear that the implementation of effective backup solutions is a continuing issue.

The survey shows that virtual server adoption among SMBs will increase by 21% in 2012, with 38% of SMBs expecting to have more than half their servers virtualized by the end of this year. The same survey found, however, that 33% of SMBs do not back up virtual servers as often as physical ones, and only 37% back them up daily.

An added complication is that most IT environments will have a mix of virtual and physical servers for the foreseeable future so the new backup strategy must continue to protect all of the existing physical servers and applications that may not have been virtualized as well as those virtual servers in the new environment. A new approach, based on tight integration with the hypervisor

and management layer of the new environment is needed that can take advantage of the backup features built in to these hypervisors.

And another thing…

Just as SMBs are leaving their businesses vulnerable in the area of data backup, it is clear from a recent Symantec survey (Small Business Virtualization Poll, August 2011) that a similar situation exists in relation to data security. The survey found that amongst SMBs "78% don't have antivirus software on their virtual servers; 48% don't have a firewall; and 74% forego endpoint protection".

Just as with backup, many SMBs site a lack of in-house expertise for their failure to implement adequate data security measures. One of Symantec's key recommendations is that SMBs should engage the services of a qualified IT consultant, such as PT Solutions, to develop a virtualization strategy which includes an assessment of the business' data security and back-up needs.

So is the time right for SMBs to consider server virtualization?

Virtualization in its various forms is a relatively mature technology now and has been adopted by the majority of larger organisations. Growth in that market has started to slow now and the large vendors in the market have turned their attention to the SMB sector. As a result, products have become more closely aligned with the needs of even the smallest businesses and costs have fallen so these technologies are within reach for most.

As ever, the answer to whether you should adopt the technology now really depends on your specific IT requirement as a business. In general terms, however, if you have several physical servers or are looking to replace or upgrade existing servers or applications, or improve your disaster recovery strategy then you really should take a close look at the virtualization options open to you.

The benefits of virtualization are now in reach for organizations of nearly every size, although SMBs have some particular considerations they must take into account. It is important to consider each in the context of your business and take appropriate advice from a specialist in SMB virtualization deployment such as PT Solutions. There are some challenges in creating a virtualized environment that are specific to smaller companies but there are also some areas where the potential benefits are more easily accessible. The following may prove helpful in your decision-making process:

1. Hidden benefits for SMBs attracted by cost savings

Clearly, the prospect of lowering IT costs is attractive to any smaller business and server virtualization can certainly deliver this. In addition, however, virtualization can provide higher availability and greater agility – areas often neglected by SMBs on cost grounds. These hidden benefits can deliver significant productivity gains, provide a competitive edge for the business and mitigate the risk of data loss.

2. Watch out for storage issues

As already noted, in order for virtual servers and virtual desktops to move freely between different hardware platforms, they must have common access to shared storage. Unless the company has already invested in a storage solution that supports this environment (such as a high performance SAN) this might be a significant additional investment. For SMBs, the cost of creating an appropriate storage infrastructure to support other virtualization technologies can be prohibitive.

3. Heavy CPU loads and bottlenecks

In a smaller business there is often the temptation to overload physical servers with too many virtual machines; it is also less likely that the IT infrastructure is configured to avoid I/O bottlenecks. If a single point of failure occurs in a virtualized environment, perhaps in one server or application, then more than one server may be affected and the result can be unacceptable downtime.

It should be remembered that virtualization adds overhead and a virtualized application will use more resources than before. It is important to make sure you have enough storage space, memory, CPU, network bandwidth and other resources to handle the applications plus the virtualization overhead. A virtualized application will only run faster than it did before if it is hosted on faster hardware.

The amount of additional overhead depends on a number of factors including the type of application being virtualized, the type of virtualization engine being used, the hardware available, and how it will be configured and used. You must allocate sufficient resources for all business-critical applications but be careful not to over-provision as this will negatively impact other virtual machines running on the server and reduce the cost benefit of the project.

4. Get advice to reveal all the cost implications

Virtualization can appear to be a cheap technology to acquire – particularly as the hypervisor and tools required for a SMB are often free. The reality is that deployment cost can be high when project management, shared storage infrastructure development, higher availability and the performance requirements of centralized operations are taken into account. You should seek advice from a specialist in this field who will be able to advise on the likely implications of adopting the technology.

5. Licensing

It is likely that converting to a virtualized environment will have some impact on application licensing and support. In your virtualized environment, for example, you may have many smaller servers each of which is likely to need its own operating system, there will also be a number of common applications such as antivirus, backup clients and back office connectivity – each of these will need appropriate licenses.

Terms and conditions of licenses and support agreements should be checked to see whether they are still valid and that support will continue as before.

6. On-going monitoring of the virtualized environment is essential

Once implemented it is important to monitor application performance to ensure that end-user service levels are maintained as before and that the virtualized environment is completely transparent to them. If not then hardware and network configurations will need to be modified.

7. Costs of training and changing roles in the IT department

Virtualization will require most SMBs to undertake some form of additional staff training and reorganization. Virtualization training and certification are vital in helping speed the adoption of the technology and in realising the value of the investment. This is an area, however, which shouldn't just be regarded as an extra cost, the reorganisation of the IT department and the greater efficiency that virtualization delivers frees staff from mundane maintenance tasks and allows IT to play a more strategic role in the organisation, creating real competitive advantage and contributing positively to customer satisfaction through improved service levels and response times.

8. Migration of existing infrastructure

The conversion of physical servers to virtual servers can be a more complex process than many IT managers in SMBs realise. Many tools are available to aid the transition and options exist for manual or automatic migration but the key to success is detailed project planning based on a thorough understanding of the existing infrastructure. The assistance of a specialist in this area can make all the difference.

9. Virtual server management issues

Although unlikely to be an issue initially for smaller companies, the ease with which new virtual servers can be added to the virtualized environment can eventually lead to a situation where management of the servers becomes increasingly complex.

10. Security threats should not be ignored by SMBs

As already noted, the recent Symantec survey (Small Business Virtualization Poll, August 2011) found that SMBs are often inadequately protecting their data as they don't have antivirus software on their virtual servers, firewalls or endpoint protection. Budget and staffing issues are the reasons cited for preventing them from taking these essential actions. Clearly, this situation is putting businesses at risk and is the direct result of their virtualization implementation. As a leading player in the IT security market, Symantec are well placed to advise on the security implications of virtualization in small businesses. Their recommendations are:

- Engage a qualified IT consultant to develop a virtualization strategy. Proactively develop guidelines and assess your organization's data protection and security needs. Once a strategy is in place, stick to it.
- Take appropriate measures to secure your virtual environments, including a firewall, antivirus and endpoint security. Make sure you have established security practices as an additional layer of protection.
- Protect your data by having a simplified approach to backup, and implement a solution that protects both physical and virtual environments.

The way forwards for SMBs

You could be forgiven for thinking, given the considerations outlined above, that server virtualization is unlikely to deliver significant benefits to SMBs and while it is the case that the fewer physical servers you have the more marginal the benefit, there are scenarios where even the smallest business can see real benefits, such as when servers are being retired or new applications installed. In a recent survey conducted by CDW into the SMB market, 79% of the businesses that have virtualized say small businesses can see significant benefits from server virtualization and 65% say virtualization has significantly improved their organization's IT Return-on-Investment (ROI). Small businesses that have virtualized are, on average, saving 18% of their total IT budget.

So how do you find out whether server virtualization is right for your business? Up front planning and evaluation can be difficult for IT personnel in SMBs to achieve in an environment where you're constantly putting out fires. Even though virtualization is intended to simplify IT management, deploying a virtual infrastructure can be a complex and demanding task, especially if you've never done it before. Unless you have a highly experienced team of IT professionals with expertise in virtualization, your starting point is likely to be to identify an independent and unbiased external specialist who can guide you through the process and quantify the costs and benefits.

At PT Solutions we go through a process with our clients that we call Solutions Analysis. When applied to a virtualization project we would typically look into the suitability of existing servers, applications and storage to determine whether virtualization is viable and if so which areas should be prioritised. This process would include checking which servers are compatible with virtualization

software, the current utilisation levels of the physical servers and how much server capacity will be needed in the virtual server environment. We would also analyse the mix of applications in use, as not all are a good fit for virtualization and some CPU-heavy applications may need to be deployed on multiple servers.

The planning phase is typically where most of the virtualization project time should be spent – with effective planning the implementation phase can be relatively straight-forward for smaller business. It is easy to focus on the mechanics of the transfer, however, rather than looking at the broader issues surrounding the implementation of a virtualization strategy. Licensing, staff training and on-going systems management demands must also be considered, planned for and budgeted. And finally don't forget to pay attention to potential security concerns – security needs to be one of the top priorities for implementing server virtualization.

Conclusion

Server virtualization now offers significant potential benefits to even the smallest businesses. The pressure for ever greater efficiency in medium-sized businesses and limited funds for IT deployments in smaller businesses is creating demand from the SMB sector that the key virtualization vendors in the market are falling over themselves to satisfy. But evidence shows that SMBs are cautious about converting their enthusiasm for the technology into actual deployment, and with good reason. The potential benefits will remain just that for some businesses where the mix of applications used is unsuitable for virtualization or the costs of upgrading hardware, storage and security outweigh the financial and operational gains on offer.

Without the expertise in-house to evaluate their unique set of circumstances, most SMBs will struggle to arrive at an informed decision, confident that they are not exposing themselves to greater risk and management overhead with an uncertain return on investment. That's where specialists in virtualization within the SMB sector can play such an important role. They can evaluate the business objectives from an IT perspective, take an independent look at the IT strategy employed, advise on the suitability of virtualization in all its forms, produce a detailed implementation plan and provide project management support that complements the in-house IT team.

Virtualization is undoubtedly revolutionising large parts of the IT environment and its benefits are reaching down into smaller companies. With expert advice and support and an effective virtualization implementation, IT can start to be seen as more than an overhead; improved customer service and greater business agility can flow directly from these technologies, giving businesses a real competitive edge.

About PT Solutions

At PT Solutions we understand how critical your IT infrastructure is to the success of your business - both now and into the future. That's why we take the time to understand your business needs, ensuring consistent and professional IT solutions and services. And it's why as a business we have increasingly specialised in creating virtualized IT environments within which organisations thrive and prosper. Virtualization releases employees from the shackles of traditional computing, reduces costs and transforms the way business is done. PT Solutions helps its clients to create virtual IT infrastructures that equip them for the future; delivering business-critical IT solutions that are agile and responsive to the changing needs of your business.