

Increasing Reliability and Availability in a Virtualized SQL Server Environment

What you need to know to prevent downtime and data loss

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Introduction

As companies continue to consolidate and look for best possible uses of both existing and new computer hardware, nowhere is this more apparent than server management. Perhaps some of the biggest areas of benefit for a virtualized environment can be found in putting the right applications support processes on the right servers.

By choosing the right physical servers and the right configurations in support of those applications, there are significant benefits to be realized by virtualizing your SQL environment. There are, however, some pitfalls to putting this type of solution in place. This paper will provide you some best practices and key success stories that you can use in designing and implementing your own virtualized SQL environment.

Some of the bigger benefits of virtualizing include reliability, performance and overall application availability. These are also the driving forces behind having the right pieces in place. It's not a matter of simply setting up a hefty server and then putting all applications on the server. You'll want to define what you're looking to accomplish for each application (performance, reliability, consolidation in general, etc.) and then determine the best approach to accomplish that given your budget and environment.

A major component of your virtualized environment will likely be availability and recoverability. Consolidation allows you to configure your systems to support these, and also helps to standardize the environment, making recovery more straightforward. By addressing server "sprawl," you can also address the wide array of application support requirements that a varied and complex environment can bring with it.

Overall Benefits of Virtualizing your SQL Server Environment

One of the main considerations that many companies face in reviewing virtualization options often begins with the issue of server sprawl. Adding servers over time to address specific applications, adding servers at the departmental level and adding servers to boost performance and provide split environments for transaction processing and reporting are just a few of the reasons you can commonly find sprawl.

By carefully considering each application on its own you're able find the best hardware on which to place the application. You can then wrap standardized procedures and policies around that installation, making it easier to support. You'll be able to more fully-utilize your hardware because you'll be in a position of picking and choosing which application combinations most fully-utilize the hardware, rather than simply installing the application and hoping it needed that horsepower on the server.

Another significant benefit to virtualization comes from the need to upgrade applications to more recent platforms. From the database and operating system environments to the server hardware itself, there can be immediate and significant performance and manageability improvements just by moving to a more recent platform. You gain from better performance on the underlying system and the updates to the database and operating system environments. In many cases, this type of update can be done

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“in-place” without significant application updates and in some cases without any application updates at all.

A very popular use of the virtualized environment is to deploy a more true Development -> Test -> Production environment. You can establish logically separate units that you can use for these different environments and let your users and developers have different levels of access within them. By separating the environments, you can provide safe, sandboxed-type environment to work in, while at the same time providing an environment that can easily be torn-down and reset to a known-good configuration.

Potential Pitfalls of Virtualization

There are some potential areas that you’ll want to plan for and watch out for as you consider and implement your consolidation solution. These can make the overall project less successful and can typically be avoided simply by thinking through what needs to happen and how you’ll be pulling together the different virtual machines.

One of the main areas that you can see challenges is that of performance. If you overload a server in an effort to fully-utilize it, you can over-tax the system. Keep in mind on your planning that it’s typically a good idea to limit multiple high-impact applications on a single server. A more beneficial implementation would be to deploy a high-impact production system along with several testing and development systems. This would allow for the production system to have the power it may need in a surge of usage, while at the same time would let you deploy the development and test systems in a controlled way.

Another area of concern can be monitoring and awareness of the virtual environment. Be sure you have the tools and documentation in place such that your support staff knows what to expect, where applications are running and how to access them. In some cases, as applications have been virtualized, the support staff was left stranded because they were conditioned to a “single-application, single-server” approach previously. Be sure to train them on the application’s locations and any new support requirement of the virtualized environment.

Finally, make sure you have a migration plan in place to move your applications to the new platform and that you’ve tested extensively. Remember too that there may be application-side settings and configurations to update to use the new server configuration. These can include web site configuration files, applications that are installed on client systems at your location, etc. The easy solution is to test well ahead of the migration work.

Increasing Reliability and Availability in a Virtualized SQL Server Environment

In looking at what you can expect to gain from a virtualized environment, there are several key capabilities and areas to consider. These are essentially “net gains” of moving to this type of environment – the benefits come not necessarily from performance or reliability. They come from new tools and approaches you will have available to you.

Capacity Planning – you’ll be in a much more controlled position to have good controls and information about capacity planning. You’ll have a review process in moving to a virtualized environment, and you’ll be able to use that information to understand what you need to have going forward in terms of capacity. What’s more, as you need additional capacity, you’ll have additional options available to you. It’s easier to add CPU, memory, disk and other resources because you’ll be in a position of not only having physical hardware that you can add, but you can also add *logical* resources, restart the virtual machine and you’ll be all set. You add a whole new layer of scaling to the solutions and options you have. Since resources are allocated against virtual machines, you can use this allocation to update resources as you need, moving them between virtual machines.

Key Benefits of Virtualization

Capacity Planning

New Project Options

Gain New Controls

New Infrastructure Options

New Disaster Recovery options

New Options for Projects – as mentioned earlier, with a virtualized environment you have new options on a single server. These options include the full support for multiple, distinct virtual machine hosts for the operating environment and let you set up the development, test and production environments without compromising any of them and without hardware purchases. Many shops have found this to be key; purchasing three servers to support the deployment model is expensive, but virtualizing to get the support has a much lower impact on budget and support.

Gain New Controls – by managing the host environment, and configuring each individual virtual machine, you can optimize all aspects of the environment. From security to disk allocations and CPU usage, there is an all-new level of control that is afforded to the management of the systems.

Gain New Infrastructure – traditionally, deploying Active Directory, DNS services, DHCP services and others could require dedicated servers for each. Using a virtualized environment provides new options and significant cost savings for these essential components.

New Disaster Recovery Options – since configuration information, settings and options are stored as part of the virtual machine image and not as part of the underlying physical hardware, moving a virtual machine to a new system is nearly as simple as copying it over and starting it up on the new target system. This is the same flexibility that allows you to optimize where a virtual machine is located, even after you’ve initially set it up. You have options for moving between systems to fine-tune which physical systems are hosting the virtual machine.

Getting Started with Your Virtualization Project

When you're ready to get started with your project, there are some key best practices that can help. These are gleaned from many different projects and lessons learned in the field and can save you a great deal of time and aggravation.

Start with a “bang” – as you review your current environment, look into the older hardware as an upgrade target first. This is due to several factors. First, from a purely practical standpoint, this hardware may be the first to experience issues in the future. By being proactive and moving applications off of the older hardware, you can avoid failure issues.

Second, by choosing these older systems and migrating those applications first, you can expect to see significantly better performance gains. You'll get the early win with users and administrators and can show the benefits of the environment. By establishing the early win, you'll enjoy additional support going forward.

Third, older systems can often be simpler to migrate with fewer external dependencies, custom configuration options and the like. Since more recent applications have focused so heavily on customization and supporting very broad ranges of utility, they can require additional attention in the migration process. By getting the easier migrations under your belt early on, you'll gain experience you can apply moving forward.

Take the time to design what will go where – it's easy to pick an application, upgrade it and move on. This can lead to issues though as you start to deploy more systems and end up with having to try to fit together applications, virtual machines and hosting servers. You'll save time, money and energy if you can start with the process of figuring out what applications you are working with overall, then determining how they best fit together given your hosting server options. If you first set up the plan and use that plan to fit the pieces together to best utilize your systems, you'll have the foundation you need to best use your servers and successfully move to the virtual environment.

Don't base utilization planning on “normal” – one mistake that has been repeatedly seen in the field is to base your plan on server usage based on normal application flows and activity. This can catch you off-guard if your applications experience spikes in usage, which is typical of most applications. Be sure your plans include reality-based usage over time and at peak, rather than just average utilization. If you can base your planning on the peaks, you'll have a higher success rate in the application deployments.

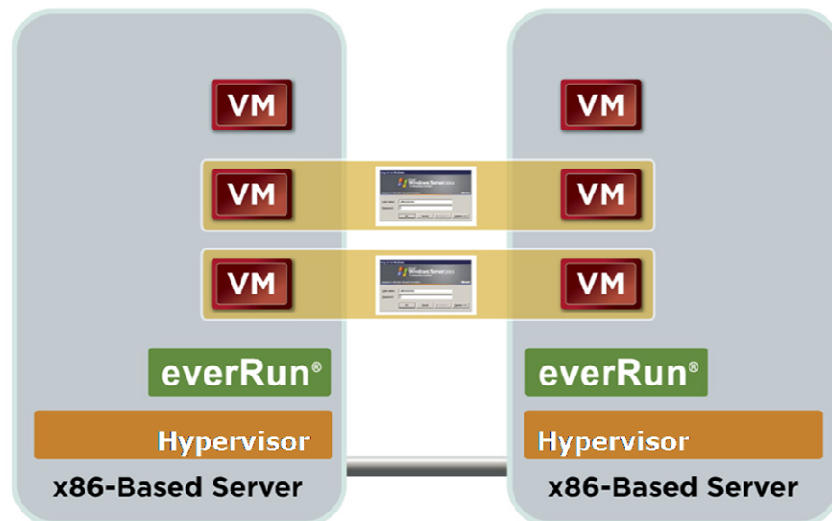
If it isn't broken... - don't virtualize just because you can. It's not an end-all, be-all solution. You should make sure your application will gain from using a virtual environment. There have been a few cases where an application was moved to a virtual environment, only to find out that it needed the full resources of the underlying server. Since this application then ended up being the only application on the server, the benefits were lost on the upgrade process. As you consider this, remember though that development and test environments are great server-sharing options. They are very low impact traditionally and can live along side more demanding virtual machines fairly safely.

The everRun Approach to Maximizing Your Options

Virtualizing your SQL environment can clearly have huge benefits when implemented correctly and thoughtfully. One of the options you should add to your considerations is the value of having a well-managed recovery tool in place to help when you need to react to a system issue. The right tools in place can mean not only an optimized environment, but an easy to manage and recover environment. This is where the Marathon everRun's automated availability platform can come into play. It works alongside your virtual machine environment and gives you instant recovery options.

Once in place, the management of critical system issues and failover and recovery become as simple as a click of a mouse. By putting the tools in place to help you manage and direct your virtual environment, you'll add the final step to assuring the maximization of your virtual environment.

everRun runs as an automated bridge between your primary and backup environments and gives you an instant ability to maintain your highly available environment.



With everRun's completely automated fault detection, management and response, everRun makes certain your applications stay online. Data loss can be a thing of the past; recovery times are entirely minimized or eliminated entirely.

You can use the tools to maintain a geographically separate backup location, addressing the catastrophic failure of your data center and providing the off-site response capability many installations need.

Alternatively, you can use commodity servers – standard configurations, brands and configurations – and let everRun provide the tools to create a completely fault-tolerant environment.

SQL Virtualization Success Story: The Sullivan Group

The Sullivan Group is a Human Resources Outsourcing company focused on supporting small and medium-sized businesses (SMBs). Serving hundreds of small businesses in Georgia and South Carolina, The Sullivan Group provides each customer with the critical support and expert resources needed for a wide range of HR challenges including employee benefits, payroll, compliance tactics, staffing, and workers compensation insurance.

In 2008, The Sullivan Group's IT department began the process of overhauling its IT infrastructure.

Led by Network Administrator Erika Simpson, the first phase of the update was to roll out a new Microsoft Dynamics-based software solution, SamWare, which provides critical business functions including human resources, payroll, financial management and compliance reporting.

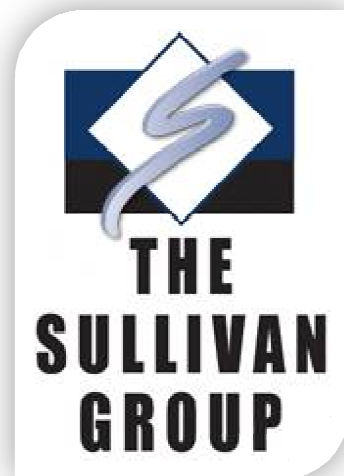
In conjunction with implementing SamWare, the IT team also wanted to adopt server virtualization technology in order to simplify its data center, consolidate hardware and reduce the company's environmental footprint. Server virtualization would also provide the company with high availability and disaster recovery benefits to ensure the safety and availability of critical business data.

"Another benefit and driving force behind adopting server virtualization was the expansion of our disaster recovery plan," said Erika Simpson, Network Administrator, The Sullivan Group.

"With our business located on the coast in Savannah, GA, we are always planning for hurricanes, storms and floods throughout the year which can threaten the integrity of data stored and managed in an unprotected data center. It is critical that our clients and their employees have continuous access to their necessary human resources documents including payroll information, tax filings and medical benefits to avoid compliance penalties. Many of these documents are irreplaceable, and we needed a solution that would provide us with the utmost protection of our clients' critical data."

For The Sullivan Group's new infrastructure, Simpson turned to Citrix, a global leader in application delivery infrastructure. Citrix XenServer virtualization solution proved to be the most attractive option for the company due to its open source ecosystem combined with the fact that the platform is fully integrated with automated high availability software from Marathon Technologies, a high-availability solutions provider based in Massachusetts.

Marathon's everRun® VM delivers reliable protection for critical virtual workloads by providing redundant virtual machines and synchronized mirroring of the entire system including network, applications and data. The integration of Citrix XenServer "bare-metal" performance and everRun VM's

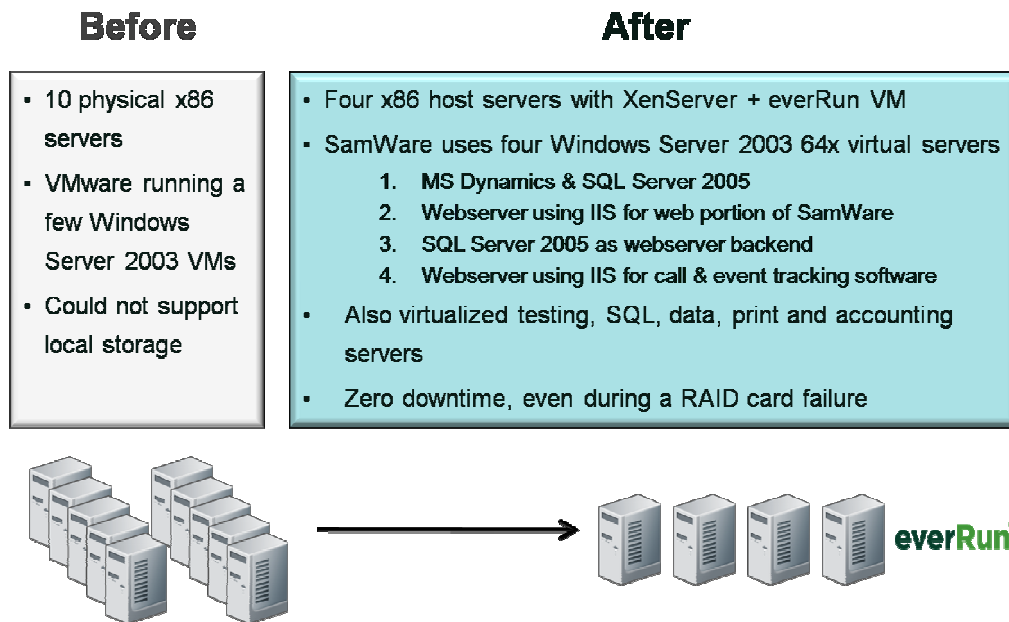


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unique software fault tolerant architecture provides companies like The Sullivan Group with the security to run business critical and other high-value applications in virtual environments.

Simpson was pleased that the tight integration of XenServer and everRun VM allowed for an easy implementation. "We were surprised with the ease of implementation. We were set up with the software within a week's time and haven't had any obstacles since; it's up and running flawlessly."

Since implementing Citrix XenServer and Marathon's everRun VM, which The Sullivan Group is now leveraging to protect their Microsoft SQL and SamWare applications, the company has had zero downtime, even during a significant failure.



"We experienced a hardware failure about two weeks after installing everRun VM where the entire server went down, but we never knew it occurred because of Marathon's everRun VM technology. Marathon ensured there was an uninterrupted end user experience in spite of component failures. Keeping our systems up and running at all times will allow us to provide superior customer service to our clients and gives us a significant competitive advantage in the HRO market," added Simpson.

After realizing the data protection benefits of running two of its critical applications in its new server virtualization environment, The Sullivan Group has plans to expand its use of virtualization. The company is planning to migrate five more applications from their physical environment to their virtual environments with the confidence that customers' data will be up, running and available at all times.

About Stephen Wynkoop

Stephen Wynkoop is a Microsoft SQL Server MVP and the founder and editor for SSWUG.ORG – the SQL Server Worldwide User’s Group where he writes a daily column and maintains the site overall. SSWUG features a weekly video program about the database and IT world, webcasts, articles, quarterly online virtual community events and Virtual Conferences several times a year. Stephen is the author of more than 10 books, translated into at least 7 languages. Stephen has been working with SQL Server since the very first version, with a prior experience in database platforms that included dBase and Btrieve.

About Marathon Technologies

Marathon Technologies is the only provider of fault-tolerant, automated, high availability and disaster recovery software for physical and virtual servers. Marathon’s everRun software prevents outages and data loss – without IT intervention - in Microsoft Windows Server and Citrix XenServer infrastructures.

For more information, visit: <http://www.MarathonTechnologies.com>

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