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**IBM Lotus Domino on VMware:
Options and Best Practices**

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Overview

It is a fact of IT life that over the last few years virtualization has stormed the data center. VMware is the de-facto market leader in the x86 virtualization market and has had tremendous growth and success, allowing organizations to simplify and reduce the cost of operating x86 architecture servers.

For the most part, organization start virtualization at the lower end servers, such as DNS, ActiveDirectory, and file shares which huge success. When an organization embarks on virtualization of higher end, heavily utilized servers such as relational database servers or IBM Lotus IBM Lotus Domino email and application servers, the project invariably fails. Organizations revert back to a physical infrastructure and swear never to try virtualization of email servers again. Often these “failures” have to do with “performance issues” that were apparent in the IBM Lotus Domino servers long before they were virtualized. Unfortunately for administrators and their employers, a virtual infrastructure is far less forgiving than their physical counterparts.

These horrific virtualization failures can cost an organization considerable money, time and frustration. Often the application in question and the application vendor, in this case IBM Lotus Domino and IBM respectively, are incorrectly blamed for being “virtualization intolerant”. However, this is not the vendors’ fault, and is unfortunately an example of a bad workman blaming his tools.

Although these applications can look “intolerant”, it is often the case that the organization does not have an optimized physical or virtual infrastructure capable of handling the very unique aspects of a high load application like IBM Lotus Domino or other email servers.

Effective planning, testing and implementation of VMware, x86 server, storage **and** IBM Lotus Domino can lead to better engineered, faster and more maintainable IBM Lotus Domino infrastructure.

Why Virtualize?

This is always the first question I ask a customer. Rarely do I receive an acceptable answer, if an answer at all. After the blank stares have eroded and open mouths have closed we endeavor to find the **business case** for such a move. Probably the most useful aspect of a virtualized IBM Lotus Domino environment is insulation from server hardware upgrades and changes. Unfortunately, most organizations virtualize due to the coolness factor and because their hardware vendor has somehow convinced them that they need to virtualize everything, including the kitchen sink.

Another good reason to virtualize is to insulate servers from software upgrades gone awry. BlackBerry Enterprise Server (BES) upgrades, be it service packs or full out release upgrades, have been known to fail for a variety of reasons. Being able to roll back any failed upgrade via virtual machine snapshots has saved more than a few IT jobs over the years.

Why Not to Virtualize?

This is a somewhat more complicated question. Virtualization converts and hardware resellers will have a horrendous time with this question. Still there are far more reasons not to virtualize, then there are reasons to do it.

One of the excellent features that VMware has added over the years is the ability to failover, in real time, to another VMware ESX host server. If one of the key reasons to virtualize IBM Lotus Domino is for high availability (HA), stop right there. With any server that had tremendous disk usage, such as IBM Lotus Domino, VMware Vmotion can have difficulties. Additionally, IBM Lotus Domino already has an industry-leading HA solution built right in, thanks to IBM Lotus Domino

clustering. Add IBM Lotus Domino clustering to your servers and your up-time should be around 99.999%.

If your application is slow on a physical server, fully expect worse performance when you virtualize. Fix the performance in the physical world first, where issue isolation is simple (you don't have 16 virtual server all using a 1Gbps network card, for example).

Further, if you are starting to look at IBM Lotus Domino Attachment and Object Service (DAOS) for the phenomenal space savings introduced thanks to this feature, don't forget the impact that IBM Lotus Domino server transactional logging will have on your storage infrastructure. Slow or flooded Storage Area Networks (SANs) are a common failure point with virtualization projects that include transactional logging.

How to Virtualize

Know the Performance BEFORE and AFTER

A classic mistake on any virtualization project is the lack of benchmarks prior to the move. If you do not know what, how and when of your physical server, how can you determine adequate performance after the move to a VM?

Truth is, very few physical IBM Lotus Domino servers are performance logged, let alone tuned. Fully expect a non-optimized physical server to also be a non-optimized virtual server, and expect the issues which existed when the server was physical to become more evident when the server is virtual.

Physical vs Virtual

With the exception of CPU counts, NIC setup and storage configuration, most virtual servers should exhibit similar performance to their physical brethren when installed on similar hardware.

Most physical IBM Lotus Domino servers are deemed "slow" due to misconfiguration of storage. This is a logical conclusion when you think through it. You can add or upgrade CPUs and NICs, but storage is hard to adjust once you are in production. The very thing that affects the server performance is the very thing most organizations will not address.

Similarly, any move to virtualization almost always had the implicit rule that storage will now be on the SAN. Moving a poorly performing IBM Lotus Domino server to an inadequate or poorly configured SAN can have catastrophic results for both IBM Lotus Domino and any other application using the same SAN or SAN fabric.

Storage

With the slow and methodical move to SANs it is even more important to ensure IBM Lotus Domino server storage is configured correctly. In a perfect world each storage component (shown below) will be on their own logical unit number (LUN) and be dedicated solely to a IBM Lotus Domino server. Each LUN should have dedicated drives assigned to it as outlined below:

1. OS – RAID 1
2. Page – RAID 1
3. Apps – RAID 1
4. View Rebuild – RAID 1
5. TX Logs – RAID 1
6. IBM Lotus Domino Data - RAID 5 or 10

Yes, your SAN administrator will hate you. And yes, your SAN administrator will misrepresent the truth to you about the LUN layout you requested being implemented. Be sure to double check this.

For (5) TX logs, I would actually recommend putting these on a dedicated disk inside the host and foregoing the SAN altogether due to the high sequential write nature of these files.

Remember, 1Gbps iSCSI has a real world through out of approx 140MB/s. In tests 2Gbps Fiber Channel (FC) will be about the same. 4Gbps and 8Gbps FC scale linearly, with each being twice as fast as the preceding. As 10Gbps Ethernet percolates, expect far superior performance over FC.

Based on throughput analysis ensure your IBM Lotus Domino SAN LUNs will not flood the SAN fabric.

Finally, make sure to adhere to the SAN and fabric manufactures recommendations for configuration, alignment and sizing.

Networking

If using iSCSI, separate that traffic from normal network traffic via separate fabric or VLANing.

If the bottleneck is not IBM Lotus Domino configuration or storage, it is almost always networking issues. Give each IBM Lotus Domino server it's own NIC card for server to server, server to client, and clustering traffic. NICs are cheap, so use them. Remember each VM can have up to 4 vNICs for VMDK version 4 and 10 for VMDK version 7.

Within IBM Lotus Domino ensure TCP Port Compression is enabled¹ for both clients and servers. This should reduce IBM Lotus Domino bandwidth by 10-35% depending on the traffic patterns.

Server Hardware

With the release Intel Xeon 55xx series of CPUs (aka "Nehalem") a considerable speed increase was given to applications. "Nehalem" core processors are 20-35% faster than the previous generation "Penryn" CPU cores. Additionally, Nehalem and subsequent CPU generations have been significantly enhanced for virtualization.

At the end of Q1 2010 Intel released the successor to "Nehalem", the "Westmere" core or Xeon 56xx. Westmere are 20-40% faster clock for clock over Nehalem, again adding a serious speed enhancement to applications. Further Westmere CPU can feature up to 6 cores per socket.

Upgrading 3-5 year old servers to current (or current -1) architectures can provide a considerable speed advantage over previous CPU architectures.

IBM Lotus Domino

If you are using Windows IBM Lotus Domino servers, during the next refresh cycle move to x64 bit OS and IBM Lotus Domino. This will enable IBM Lotus Domino to fully utilize all the RAM it needs and wants. Depending on the server usage envelope, you may want to give the virtual machine 16GB or even up to 32GB.

Under no circumstances should the VMware host or IBM Lotus Domino be allowed to balloon RAM. This will kill any and all high disk utilized servers.

Remember to take into account the large page file sizes that are required for a large RAM server.

¹ <http://blog.darrenduke.net/Darren/DDBZ.nsf/dx/do-you-want-Domino-to-use-20-30-less-bandwidth.htm>

Testing

Because IBM Lotus Domino can be configured less than optimally, yet still send and receive email, it often does not get the respect it deserves as an all in one email, application, and web server. The inability of organizations to treat IBM Lotus Domino as a true enterprise application leads to numerous failures, including problems in the virtualization of servers. Don't attempt to virtualize IBM Lotus Domino in a weekend – your organization would never treat SAP virtualization projects like that. Testing and planning makes the difference.

Conclusion

Every IBM Lotus Domino environment is different, as is every VMware environment. Only with proper planning, understanding and execution will you guarantee the success of any IBM Lotus Domino virtualization project.

Stakeholders need to be aware that SAN administrators do not know applications, hardware resellers rarely know software, and IBM Lotus Domino administrators rarely know SANs and servers. Each has their own agenda and are of expertise. The group needs to coordinate their efforts, communicate well, and understand that virtualization is a team sport. When in doubt, don't hesitate to contact an expert for assistance. To get the best advice, look for a resource who has hardware, network, VMware, and IBM Lotus Domino skills and who has successfully virtualized IBM Lotus Domino many times before. The right resources, the right reason, and the right plan can help you ensure success in your virtualization project.

About the author

Darren Duke is founder and technical lead consultant with Simplified Technology Solutions, Inc. (STS). He presents at events around the USA on IBM Lotus Domino and VMware and is available for consulting engagements.

His blog <http://blog.darrenduke.net> contains many useful IBM Lotus Domino, Quickr and Connections tips.

About STS

Simplified Technology Solutions, Inc. (STS) is a woman-owned Information Technology consulting company based out of Atlanta, GA. Our customer focused consultants specialize in delivering high quality solutions. We believe that personal integrity is the key to building long term, mutually beneficial relationships with our clients.

On average our people have been IT consultants for over 10 years and are recognized leaders in their fields. We publish articles on industry insider sites such as java.net and local IT sites like TechLinks. We advise the computer science department at American Intercontinental University and assist with MBA courses at Emory University. We present at organizations such as the Association of Information Technology Professionals, the Atlanta Lotus User Group (ATLUG), the Greenville Lotus User Group (GLUG), and **Lotusphere**.

One of our consultants served as technical editor for **Hacking BlackBerry**, published by Wiley-Wrox, and we have one of the only BlackBerry Certified consultants in the Southeast on our staff. STS presented "Advanced MDS Studio Development Techniques" at the **BlackBerry Developers Conference** in Santa Clara, CA at the invitation of RIM.

STS has been recognized as one of the best IBM Lotus Partners, recently being named to the exclusive IBM Lotus and Websphere Portal Business Advisory Council. STS is part of the Beta program for Lotus products, and is part of the Lotus Blogger Calls.

We have worked with Fortune 100 companies, mid-size businesses, and government agencies.

STS is a Research in Motion BlackBerry Alliance Member and an IBM Advanced, Microsoft, and VMware business partner. For more details, see our website at <http://www.simplified-tech.com>.

See the latest STS customer satisfaction survey at <http://www.simplified-tech.com/survey>

