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Future Proofing Datacenter Servers

October 2012

Future server-attach considerations might include convergence of data and storage networks or perhaps migration toward cloud computing, a promising technology now in its infancy. Today, legacy SANs, local data networks, and WANs require different protocols and connectors. This raises the question of how administrators will expand their storage footprint. Will they continue to use Fibre Channel (FC) or migrate to converged environments? How will this decision affect future design efforts and migration toward cloud computing?

The following questions were posed by QLogic to Richard Villars, vice president of IDC's Datacenter and Cloud research, on behalf of QLogic's customers.

Q. How are server-attach requirements changing with the advent of new server, storage, and networking trends?

A. Two major business trends are driving many of the issues right now for companies. The first of these trends is that we are moving to the next phase of virtualization. IDC research shows that, today, about 25% of larger companies have reached the point where over 80% of their overall servers are virtualized. Within the next couple of years, the percentage of companies with that many virtualized servers will be closer to 40% or 50%.

When you reach an 80% virtualization level, you really do start changing the dynamics of how you want to connect your servers in your IT environment. To continue getting benefits from virtualization, you must focus more on the issues around cost-effectiveness, improving operational efficiency, and providing higher performance for more valuable and mission-critical applications. All those things put a lot of stress on the existing server environment and supporting infrastructure.

The second major trend is the explosion in content that companies are experiencing today. Datacenter managers must deal with the fact that people want to start moving to electronic records, or they want to start doing digital video surveillance and storing more and more video information or storing more sensor logs to analyze that data. This kind of content load stresses the network because the infrastructure characteristics to support these applications are very different from what's needed for a virtualized server environment.

Combining these two trends presents many more challenges to connecting all the compute and storage resources together. You really need an infrastructure foundation that's much more flexible and scalable to deal with these very different, but intersecting trends.

Q. Increases in network data rates and diverse connections will affect options for future migration paths. How are these new requirements putting greater demand on third-party technology providers as well as their partners and service providers?

A. In this new environment, organizations need to be much more dynamic when it comes to deployment of assets. They must be able to expand capacity quickly and leverage new technologies — new processors, new network standards, new software applications. In this world, virtual machine (VM) migration (and supporting storage migration) is a standard part of the business process — not just inside a datacenter but across datacenters. The migration can't be a long, disruptive process; it needs to be done in real time during active working hours, without disrupting availability and scale.

What makes that possible? First, you need high bandwidth and the ability to decouple VMs from hardware on individual servers. The physical server adapter has to integrate with the virtual to identify and manage the virtualized servers, allowing migration with shared storage resources. The adapter must register multiple virtual worldwide port names with the Fibre Channel switch fabric. This registration process addresses the mapping disruption introduced by virtualization of the server infrastructure, enabling end-to-end virtualization over the servers and the storage network.

Bandwidth is also critical here because VMs will be offline during the migration process, so organizations need adapters with QoS to allow for secure segregation of I/O streams from a single piece of hardware. You need the right network resources and bandwidth to dynamically move virtual machines. You must dynamically move data sets nondisruptively to your actual business processes. These are absolute requirements that put more emphasis on having a very flexible and scalable but also highly tunable network environment, one that can accommodate this dynamic type of business model.

Nowhere is this more critical than in the service provider community. Service providers are very rapidly launching new services, rolling out new systems, and really trying to provide a much wider range of IT and content services to their customers. This is an environment, from a service delivery standpoint, where downtime or migration costs won't just be a burden on IT — they would break the business unless the migration is done right. So the service provider community is where we see successful migration as especially critical. Service providers must have the right network solutions that enable a dynamic and flexible foundation.

Q. How will the transition to 10 Gigabit Ethernet affect existing Fibre Channel environments?

A. Very high on the lists of many people today is the transition to 10 Gigabit Ethernet for their new server environments. What's interesting is that this isn't just another performance upgrade, like going from 100 megabytes to 1 gigabyte. Because of the market timing and environments, the transition to 10 Gigabit Ethernet is now part of the business model conversion I described earlier. It's part of moving to a highly virtualized environment, and it's part of having a foundation for large volumes of content that must be collected, stored, and served.

A big challenge for 10 Gigabit Ethernet is how it integrates with existing, mission-critical Fibre Channel SAN environments. It's absolutely critical to remember that while companies are motivated to move to a more common physical and cabling structure, they also recognize that various use cases and data flows they're dealing with require common management and easy conversion for 10 Gigabit Ethernet and Fibre Channel fabrics. These flows are actually increasing, and each has different management requirements. There are different requirements, for example, when it comes to administration and operational processes.

Therefore, you need a network/SAN adapter environment that does two things: First, it must work well with your existing networks while you're going through the transition. Second, it must provide and preserve all those different management processes in an underlying facility that allow individual administrators and groups to manage and run their part of the network without affecting, burdening, or limiting the other parts of the network that are also being used for business-critical needs.

Thus, flexibility of this network/SAN adapter environment is a real requirement. The flexibility should first and foremost ensure backward and future investment protection, provide flexibility for virtualized environments and cloud deployments, and offer granularity to allocate resources and enable flexible chargeback options. Server adapters, switches, and storage also need to provide the flexibility of various connector options (SR, LR, CU, RJ), as well as support for any protocol (FC, FCoE, iSCSI, TCP), thereby eliminating the need for datacenter administrators to rip and replace their gear as they move to new technologies. This flexibility allows them to set their own pace and helps keep costs in check when transitioning to a common physical and cabling structure.

Q. What are the challenges of datacenter physical and virtual infrastructure deployment and management?

A. In response to the first question, I discussed moving to an 80% or above virtualized environment. Many people think, 'Well, that just means I've gone all virtual then, so I don't have to worry about physical requirements anymore.' In reality, however, it's exactly the opposite. There are two reasons for this: One is that even when you're 80% or 90% virtualized, you still have 10% of your systems that aren't virtualized, that are physical. Those are often your most core, most mission-critical, most performance-sensitive systems. So you absolutely have to preserve your physical network skills for those nonvirtual systems.

The second and more important reason is that in a virtualized environment, companies quickly discover that if they don't have the right connection at the physical and logical layers — and they aren't complementary to and supporting each other — their virtual environment can blow up.

Everyone's heard of virtual server sprawl, which is an application-provisioning problem. Now, however, what organizations run into more often is a sort of virtual network sprawl. When you have a virtual machine in multiple systems and you want to move virtual machines and loads from one system to another, unless you have the right intelligent network infrastructure connections, suddenly you've got a bottleneck. The cause of the problems is no longer the servers and the storage but the server connection and the network. Network partitioning and QoS for segregation, security, and management — as well the ability to manage your hardware in virtualized, multiprotocol environments — are required to help eliminate these problems. All this will help you provision and configure your virtual environments and help keep virtual server and network sprawl in check.

Q. What do administrators need to know to ensure that the demands of business applications and workloads are met?

A. What you must do is move to a simpler, flatter network from a physical standpoint. But the infrastructure must still preserve all the rules, security, and policy management that are absolutely critical to comfortably running a virtual environment in a secure way.

The network management scheme should also enable dynamic provisioning of virtualized network links, such as mobile servers, and meet the consistent performance demands of solid state disk and business-critical applications.

ABOUT THIS ANALYST

As vice president of IDC's Datacenter and Cloud research, Richard Villars is a senior member of the IT Infrastructure research team, which assesses the development and adoption of solutions for datacenter transformation and exploitation of rapidly evolving technologies in the areas of big data and cloud. He develops IDC's viewpoints on the evolution of converged IT infrastructure as well as the adoption of public and private cloud solutions. He advises clients on the impact of open systems software and network efforts on organizations' infrastructure, deployment, procurement, and management practices.

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