



Let virtualization take your applications to a new level.

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THE TOP 10

Technical Tips for Virtualizing Tier 1 Business-Critical Applications

Critical Tier 1 applications in today's highly competitive business environments need two essential attributes to survive: agility and resilience. Agility gives you the ability to scale-up, or scale-down, performance capabilities for essential applications—such as Oracle, Exchange, SAP, SQL, and custom Java apps—in response to changing business conditions. Resilience lets you keep these critical applications online even when component failures occur, ranging from small single-device outages to major data center catastrophes. Virtualization is the technology enabler for both of these attributes. In fact, the consensus of IT experts is that you simply can't achieve both without virtualization. Getting your arms around the process for achieving agility and resilience can be daunting. This list of Top Ten tips for Tier 1 virtualization is a handy guide to see you through the course.

- 1 Start your** virtualization journey with a few small projects, both to gain operational experience that will make your future projects more successful, and to give you a better sense of product features that work well for your organization. A key step to choosing that initial project is assessing your existing server infrastructure to find self-contained applications that are less critical, and thus will suffer a lower impact from the learning process. Fortunately, virtualization platform vendors such as VMware offer a wealth of easy-to-use self-assessment tools that largely automate this process, so asking your platform vendor to demonstrate their assessment offerings is an excellent first step.
- 2 Virtualization introduces** additional management complexity that ultimately yields many rewards, such as the ability to move workloads between servers, and to detect and respond to impending failures before they cause application outages. It's far easier to exploit management advantages if you begin with a solid management infrastructure. You'll invest some time up front learning how to use tools such as VMware vSphere, but this investment will pay off when you virtualize demanding applications such as Oracle databases or Microsoft Exchange. You'll also save money by avoiding unnecessary and expensive over-provisioning—a common slip for first-time virtualizers.
- 3 The ability** to move applications from one physical server to another—virtual machine (VM) mobility—is an extremely powerful way to make applications instantly more mobile while giving you new disaster recovery (DR) and business continuity (BC) options. A prerequisite for VM mobility is a Storage Area Network (SAN), which relocates application code and data from server-internal hard disks to a centralized array of disks, giving you economies of scale, improved disk space utilization, and the ability to quickly add storage capacity without disrupting applications. These advantages are too important to lose, so don't deploy even one application in production without having a SAN in place. Fortunately, SAN appliances are both easy to set up and very cost effective compared to internal server storage, so there is no reason to not start with one.
- 4 Reaping virtualization's** DR and BC advantages requires different thinking than traditional application deployment: thinking in twos. Recovering from failures means having redundant resources, so include pairwise-design in your virtualization planning. You can do this even with a small virtualization project, by deploying two smaller rather than one large physical server, doubling up on disk capacity using two enclosures, installing dual Ethernet interfaces connected to pairs of switches, themselves having double interconnects, etc. At the application level, consider cluster techniques where resources such as the database and web server are paired with virtual companions in self-contained clusters that can operate—and fail over—together. Facilities such as Oracle's VM Storage Connect and Real Application Cluster (RAC) let you replicate data between clusters, giving you zero-downtime failover.

5 Every enterprise has a fiduciary responsibility to ensure the privacy of its data and applications. Virtualization gives you new opportunities for locking down your application infrastructure, using services such as VMware vShield, which goes beyond physical security to automate policy enforcement using application-aware introspection. Virtualization also enables a slew of advanced storage encryption capabilities to further bullet-proof application security. Oracle's Transparent Data Encryption (TDE) lets you protect sensitive data—a critical compliance requirement—via ultra-fast hardware encryption, without modifying your applications. VM mobility, such as VMware vMotion, lets you move applications to physical servers that have additional hardware encryption capacity when workload increases need extra performance.

6 There was a time when virtualization could not be used for certain resource-intensive applications, such as databases like Oracle and SQL Server, and high-transaction-rate applications like Exchange Server. But virtualization technology has advanced to the point where the performance objection is now moot. The “hypervisor tax,” the CPU and memory overhead incurred by virtualization services, is now just a few percent. Multicore CPUs—six cores are now common—and massive memory architectures measured in terabytes, ensure that hardware capacity is never a limiting factor. Avoiding resource bottlenecks, however, requires close resource monitoring. Fortunately, sophisticated management toolsets, such as vSphere, not only provide that monitoring but can automate application performance scaling to ensure users don't encounter the slowdowns common with traditional application hosting models.

7 Another common objection used in the past to dismiss virtualization is the perception of reduced reliability. It's true that a single physical host hosting multiple VMs naturally concentrates risk, in that failure of that host could disable all the applications it is running. But the technologies for reliable operation in the face of such failure—VM mobility, SAN replication and mirroring, application clusters—are well understood and very mature. You need only select the ones appropriate for your environment to not only meet traditional reliability metrics, but exceed them. With appropriate design, you can obtain DR and BC capabilities practically for free in the bargain.

8 Security concerns, particularly where compliance requirements such as PCI DSS or HIPAA exist, are often cited as a showstopper for virtualization. But the reality is that a virtualized environment can be more secure than the physical server network it encompasses, if you take advantage of security-oriented hypervisor and virtual network capabilities. For instance, a physical server might reside on a common network with multiple unrelated servers, creating security vulnerabilities should one of the neighbor servers be compromised. VMs can be isolated from each other using Virtual Ethernet to create private VLAN subnets for each server. One virtualization attribute that can affect overall security is thick vs. thin hypervisor implementation. A “thick” hypervisor is built on a large, general-purpose operating system, which tends to be more susceptible to vulnerabilities than a small, purpose-built “thin” hypervisor running on “bare metal” hardware. The thin approach also enables strong isolation between VMs and the outside world, greatly reducing the risk of malicious activity reaching VM interfaces.

9 Moving existing servers into a virtualized environment requires preplanning and specialized tools, such as VMware vCenter Converter. Such tools let you efficiently manage the server move process, called Physical-to-Virtual (P2V) migration, reducing downtime and making possible multiple concurrent migrations. For the servers you select to migrate as a result of your self-assessment process (see tip 1 above), you must size the target VM—memory, disk, and CPU capacity—and audit each physical host's hardware configuration to verify compatibility. For example, a physical host with a hardware fax card will require transitioning to a TCP/IP-based fax service. Note that VM resource capacities will often be far less than the original host contained. That's because many physical hosts operate at just a few percent of their maximum capability—they were overbuilt to accommodate workload surges. Virtualization lets you get back those wasted resources, using dynamic workload management to add more memory and CPU capacity when needed, and SAN management to expand disk capacity to accommodate growth.

10 Once you've conducted self-assessment, created a comprehensive management framework, implemented SAN facilities, and embarked on one or two pilot projects, you'll be well positioned for migrating the rest of your data center to a virtualized infrastructure. You should proceed in a stepwise fashion with this migration, moving one application set at a time, to avoid unexpected problems and minimize production system disruptions. At each step in the process, verify that all essential legacy system interconnections still function as expected. It's also a good idea to capture key performance metrics, such as interactive response time and batch job run times, before and after the P2V process, to detect any resource contention issues, which you should resolve before proceeding to the next step.



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