

# In a Virtual World

## *Virtualization & Software License Management*

### The Virtualization Boom

Datacenter server virtualization saves space, power and hardware cost for thousands of enterprises by consolidating physical machines. The reduction in the number of physical machines is achieved by increasing hardware (CPU and memory) utilization from a typical 10-15% to as much as 75-85%. In addition to the savings on hardware purchases, there are reduced cooling requirements and maintenance cost savings associated with fewer machines. Energy cost savings have been estimated to be in the range of \$300 to \$600 per year for each server that is eliminated by virtualization. The total savings due to virtualization can be in the millions of dollars per year for large enterprises. This is why 60% to 80% of IT departments have server consolidation projects underway, according to analyst reports.

Server virtualization has broken the bonds of legacy datacenter IT architecture in which a single application and a single operating system (OS) run on each server. In the virtual datacenter, multiple applications and operating systems can run securely on one server. It is this capability that allows hardware utilization to increase dramatically. The trend is to take it a step further and create pools of shared hardware resources that include not only multiple servers (compute resources), but also I/O and storage resources, that can be efficiently and dynamically allocated to many virtual machines. This virtual infrastructure provides increased flexibility, high availability, and scalability to meet today’s enterprise datacenter needs.

### Server Virtualization—A “New Again” Paradigm for Computing

While server virtualization is one of the hottest trends in IT today, the idea dates back to the 1960’s IBM mainframes. Server virtualization allows multiple software instances of a computing platform to run concurrently on one physical machine. These virtual machines or “VMs” are capable of running an operating system and a set of applications. Each VM may run a different OS—Windows, Linux, UNIX, etc.—or different versions of the same OS, depending on the needs of the software applications. This provides tremendous flexibility and security. The dominant approach to server virtualization is through a thin software layer—hypervisor—

between the physical machine and the VMs, as shown in Figure 1. The hypervisor is installed on the “bare metal” of the server, taking the place of the traditional OS. Hypervisors dynamically allocate hardware resources to each VM. This is the approach taken by the leading server virtualization solutions from VMware (ESX Server), Citrix (Xen) and Microsoft (Hyper-V).

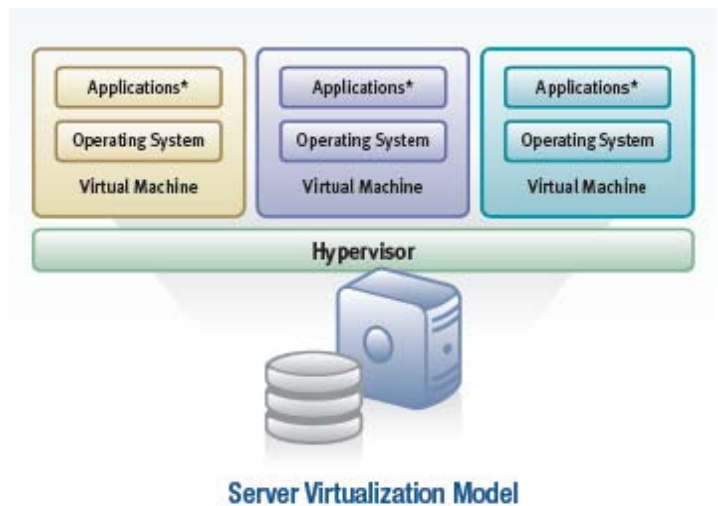


Figure 1

### Virtualization and License Compliance Challenges

While there are many benefits to virtualization, there are also a few challenges. An often overlooked aspect of the virtual datacenter is increased risk of software license non-compliance. There are two key drivers. First, it’s easy to create new virtual machines running copies of operating systems and software applications. Second, software publishers have adopted licensing rules for virtual environments that add significant complexity to the already complicated task of managing software licenses. Datacenter software is generally the biggest slice of the application investment pie, with typical costs for licenses in the tens to hundreds of thousands of dollars per server. Therefore, it’s critical to understand whether software is properly licensed on

virtual machines to avoid unexpected true-up costs and prevent under or over buying. Enterprises should implement software asset management (SAM) programs that provide license reconciliation between what was purchased and what applications are installed on both physical and virtual machines from the desktop to the datacenter.

A quick look at license complexity reveals that an automated SAM solution is required. For example, some vendor licenses require knowledge of the number of VMs associated with a given physical server. In one case, an application is entitled to be installed on up to 4 VMs per physical server and still consumes only one license. Additional copies of the application running on other VMs on that same physical server each require an additional license. Other types of licenses require knowledge of the underlying physical hardware such as the processor speed, number of processors, and/or the number of cores. This can be problematic because the physical hardware may be hidden from the virtual environment by the hypervisor.

Dynamic virtualization, where running VMs can be moved from one physical host to another, further complicates license compliance. Software licensing that is bound to physical host processors, may result in an enterprise drifting out of licensing compliance, if a VM is relocated to a different physical host with more CPUs. Some software vendors place license restrictions on the frequency of application transfers from one server to another (mobility restrictions) thereby compounding the risk of compliance drift. Since applications are contained within a VM, it's easy to violate this mobility rule and drift out of license compliance.

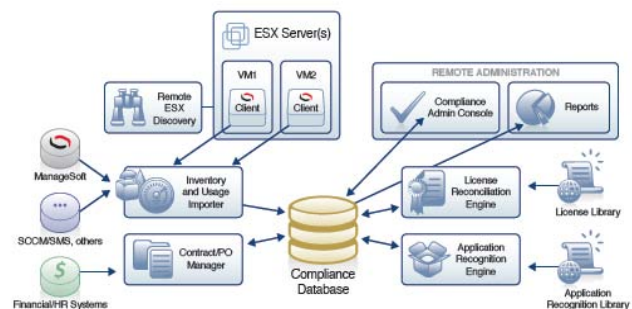
Table 1 identifies a few of the various license types or terms of use, and the associated physical and virtual environment data required to determine license entitlement. Clearly, tools are required to achieve and maintain license compliance.

## Software Asset Management Tool Requirements

SAM tools that can meet these virtualized datacenter license compliance challenges should have the following capabilities:

- Automatically discover virtual servers (e.g. VMware ESX Servers and Virtual Center Servers) on the network.
- Be able to correlate VMs to physical host machines and determine the number of VM's per server.
- Collect the hardware resource data (# of processors, processor type, # of cores, speed, etc.) from the hypervisor; collect hardware resource allocations per VM.
- Collect software inventory and usage data for each VM—typically this would be done via an agent that has been installed on the VM. Examples include Microsoft's SMS/SCCM agent, and ManageSoft's inventory agent.

Just like the SAM tools used in physical environments, tools for virtual environments also need to be able to translate the raw software inventory data into a recognized set of applications installed on each VM. This application recognition process may take into account various types of inventory data, including: file evidence, add/remove program information, and WMI data. SAM tools should also be able to reconcile the list of installed applications with software purchase data, license type, and associated conditions of use to generate a detailed license compliance report and out-of-compliance alerts. The following figure shows a block diagram of a software asset management solution for both physical and virtual environments that incorporates: virtual server discovery, an inventory importer, application recognition, license reconciliation, a contract and PO manager, as well as reporting capabilities.



A robust SAM solution enables IT organizations to keep track of what applications are installed and in use throughout the physical and virtual enterprise, allowing them to optimize their software investment, reduce costs, and avoid vendor audit surprises.

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License Type or Term	Data Required for License Entitlement
Maximum Number of VMs/ server	VM properties from hypervisor or underlying OS
Mobility restrictions	VM/Server identification information
Processor (CPU or Core)	Hardware parameters: <ul style="list-style-type: none"> <li>• Number of CPUs/cores per server</li> <li>• CPU class</li> </ul>
Processor Value Unit (PVU)	

Table 1