



## Virtualization in Hybrid Environments

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Many suppliers of virtualization technology tell IT executives that all of their problems can be solved through the use of their technology. What they don't often say is what they *really* mean is that everything will go well *if* the organization does the following things:

- ☒ Virtualizes *everything* using that supplier's virtualization technology,
- ☒ Manages it with that supplier's management tools,
- ☒ And doesn't have needs for features or functions that the supplier's products currently don't support.

Nearly all organizations deploying virtualization are working with hybrid environments. This paper will examine what it means to have a virtualized environment, what are the current challenges that type of environment presents, where virtual machine software fits and what technology can be considered the most crucial component of an overall virtualization strategy.

### WHY IS VIRTUALIZATION SO CONFUSING?

There are many forms of virtualization technology. Each of these types of technology has a place in a well-designed virtualization strategy. Due to an amazingly successful marketing campaign by a major supplier of one type of virtualization technology, the media, consultants and some analysts mistakenly equate virtualization with virtual machine software. In reality, virtualization is far more.

#### *MOVING FROM THE PHYSICAL TO THE LOGICAL*

In reality, virtualization is the use of hardware and software technology to present a logical view of resources to developers, administrators, operators and system users. This logical view is often strikingly different than the actual physical view.

This means creating a setting that is perfectly suited to the task at hand even though the physical environment may be quite different than this ideal environment.

#### *WHY DO ORGANIZATIONS GO TO THIS EFFORT?*

The appropriate use of virtualization technology offers organizations a number of benefits including improved levels of scalability, reliability and performance, far greater agility than possible in a physical environment and more optimal use of hardware, software and staff resources.

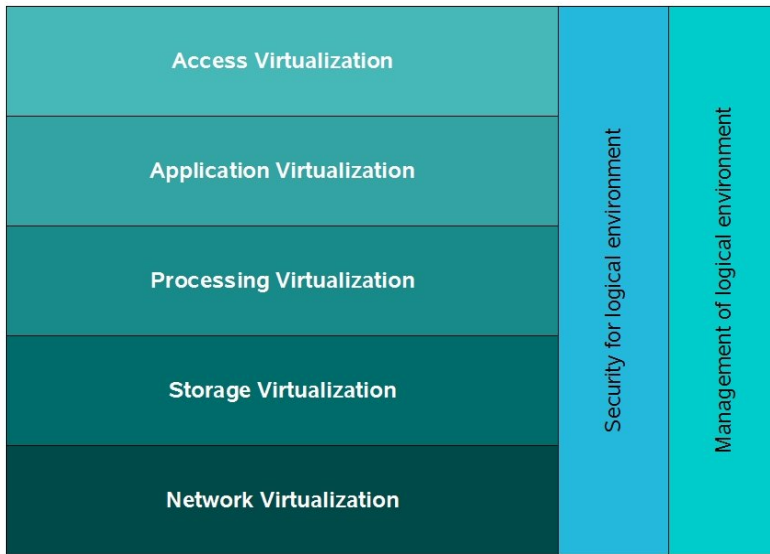
Virtualization technology makes it possible for many different computing resources to be viewed in a logical, not a physical way. Access, applications, processing, storage and network resources can be made to live in an artificial environment that is secure and well managed.

*A USEFUL TOOL THAT MAKES VIRTUALIZATION UNDERSTANDABLE*

Since so many have been confused by all of the hype in the market, The Kusnetzky Group has developed a tool, a pattern or model, to help its clients understand virtualization in greater detail. Figure 1 presents this model.

There are many layers of technology that virtualize some portion of a computing environment depending upon whether the organization is seeking performance, reliability/availability, scalability, consolidation, agility, a unified management domain or some other goal. Let's look at each of them in turn.

*Figure 1 Virtualization Technology*



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**Access Virtualization** - hardware and software technology that allows nearly any device to access any application without either having to know too much about the other. The application sees a device it's used to working with. The device sees an application it knows how to display. In some cases, special purpose hardware is used on each side of the network connection to increase performance, allow many users to share a single client system or allow a single individual to see multiple displays.

**Application Virtualization** - software technology allowing applications to run on many different operating systems and hardware platforms. This usually means that the application has been written to use an application framework. It also means that applications running on the same system that do not use this framework do not get the benefits of

application virtualization. More advanced forms of this technology offer the ability to restart an application in case of a failure, start another instance of an application if the application is not meeting service level objectives, or provide workload balancing among multiple instances of an application to archive high levels of scalability. Some really sophisticated approaches to application virtualization can do this magical feat without requiring that the application be re-architected or rewritten using some special application framework.

**Processing Virtualization** - hardware and software technology that hides physical hardware configuration from system services, operating systems or applications. This type of Virtualization technology can make one system appear to be many or many systems appear to be a single computing resource to achieve goals ranging from raw performance, high levels of scalability, reliability/availability, agility or consolidation of multiple environments onto a single system.

**Storage Virtualization** - hardware and software technology that hides where storage systems are and what type of device is actually storing applications and data. This technology also makes it possible for many systems to share the same storage devices without knowing that others are also accessing them. This technology also makes it possible to take a snapshot of a live system so that it can be backed up without hindering online or transactional applications.

**Network Virtualization** - hardware and software technology that presents a view of the network that differs from the physical view. So, a personal computer may

be allowed to only see systems it is allowed to access. Another common use is making multiple network links appear to be a single link.

**Management of virtualized environments** - software technology that makes it possible for multiple systems to be provisioned and managed as if they were a single computing resource.

## VIRTUALIZATION CHALLENGES

Organizations face several challenges when they start to consider deploying a fully virtualized environment. Let's examine them one at a time.

### *HYBRID ENVIRONMENTS*

A major challenge for most suppliers of virtualization technology is that today's datacenters are hybrid environments. Mainframes, midrange systems and industry standard systems all have their place in the datacenter. Since each of these systems were installed to provide a specific function and that function is still needed to support the organization's work, it is very unlikely that IT executives are going to walk away from those established systems.

IT budgets are quite limited and the last thing IT executives want to do is invest in re-implement something that is currently working. In the words of most developers, "if it's not broken, don't fix it."

This, of course, means that the marketing message that everything will be fine if everything is virtualized and managed using a single supplier's tools isn't very realistic in today's datacenter.

### *PHYSICAL AND VIRTUAL RESOURCES*

Mainframes have supported various forms of virtualization technology for well over 30 years. Midrange systems have supported virtualization for well over 20 years. Industry Standard Systems, a newcomer to the virtualization party, have supported various types of virtualization technology for only 15 years, give or take a decade or so.

Each of these types of systems supports different virtualization technology. These forms of technology are not interchangeable. Furthermore, each form of virtualization is designed to achieve certain goals. When organizations put the wrong tool to work, they usually end up with an unsatisfactory solution.

Each virtualization technology is a good tool for some tasks and not very good for others. IT decision-makers typically select the environment that makes the most sense for the task they have at hand. No single choice works for all tasks.

When all considerations are examined together, the reason for hybrid environments becomes clear. Modern datacenters have many types of systems, many types of virtualization technology and this situation is likely to continue far into the future.

### *WHAT'S THE MOST COST EFFECTIVE WAY TO MANAGE THESE RESOURCES?*

IT executives are looking for ways balance the need to make the best use of their limited resources while still offering their organization an agile, expanding selection of IT-based solutions and services. Although the benefits of a virtualized environment can be compelling, they are not compelling enough to persuade these executives to walk away from decades of investment to restructure everything. In the end, they just want to make the best use of the technology they already have on hand and will deploy new technology and new systems only when necessary.

These executives are now grappling with the problem of managing hybrid environments in a cost effective way. They are searching for the best tools. Often these tools do not come from the company offering virtual machine

software. Their tools were designed to manage only their environment aren't really designed to deal with the complex environment within the datacenter.

#### V I R T U A L   M A C H I N E   S O F T W A R E

Virtual machine software is one of the 5 segments in the processing virtualization segment of the Kusnetzky Group model of virtualization technology. The goal of this type of software is creating a logical or virtual environment for a whole stack of software, from the operating system all the way up to the application itself.

Virtual machine software is not the best choice of virtualization technology if the organization's goals are high performance or high levels of availability. It is not the appropriate tool to allow multiple application systems to share the same network or storage subsystem without interfering with one another.

These logical or virtual environments are called virtual machines. More than one of these virtual machines can run on the same physical machine without interfering with one another. This approach presents the appearance that the organization has multiple machines.

Virtual machine software makes it possible for multiple workloads to be consolidated onto a single physical machine in order to reduce costs of hardware and software. This software, all by itself, doesn't address the issue of how these virtual machines can be monitored, moved from physical machine to physical machine to orchestrate the workloads to meet service level objectives or organizational policies.

#### M A N A G E M E N T   I S   C R I T I C A L

Although many organizations seem willing to embark on the journey to a more virtualized environment without thinking much about how these environments are to be managed, this is not a very wise approach.

Most cost of ownership or return on investment studies executed over the last 15 years have shown that hardware and software costs, when taken together, typically only make up roughly 20% of the five-year cost. Staff-related costs, such as administration, operations and development, often make up between 50% and 70% depending upon a number of factors. This means that providing powerful tools to help administrators and operations staff is a crucial choice.

The further one goes down this path of thinking, the more and more critical management tools appear. These tools need to look at managing physical systems; virtual systems and applications running in either environment .They must make it possible to deal with all of these resources in a uniform way.

The selection of the proper management tools for the datacenter must take into account the following criteria:

- The tools must be able to see and manage all of the systems that make up an application solution
- These tools must also be able to see all of the different types of virtualization technology in use, gather statistics about their use and allow organizations to manage their ongoing operations
- The tools must be able to scale from the smallest datacenter to the largest without requiring changes. After all, most organizations plan to grow over time.



#### S U M M A R Y

Management of virtual environments increasingly can be seen as one of the most crucial functions in a virtualized datacenter. It is the one investment that is likely to offer the most immediate positive return on investment.

It is clear that it's difficult to manage what one can't see. It's also clear that unless organizations have been careful to consider a broad view, that they're likely to deploy tools for management of their physical resources and different tools for the management of their virtual resources.

The Kusnetzky Group would suggest that a broader view of virtualized environments would be better. Then it would be possible to find and acquire tools that see the entire environment not just small segments.