The Definitive Guide to Virtualization Management Software

Understanding, Analyzing, and Selecting the Best Virtualization Management Features and Software

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By David M. Davis, vExpert

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Part 1

The Virtualization Management Vision

Most modern data centers have become quagmires of chaos. With multi-tiered applications, hybrid clouds, multi-sites, 24×7 expectations, latency-sensitive applications, slashed budgets, and a constant rate of change – many datacenter managers and admins are in a constant state of struggle, grasping for anything as they, perhaps unknowingly, fall further into the abyss.

Truth is that the future of your datacenter doesn't have to bleak. With most enterprises adopting virtualization, they have made a smart play, in the right direction. However, like an airplane aloft without fuel, most enterprise data centers won't be able to glide along much further. It's critical that today's modern data centers do two things:

1. Continue the march to 100% virtualization
2. Implement the right virtualization performance and operations management solution

Here's why...

First, the greater the proportion of servers you have virtualized, the greater management and cost efficiencies you'll gain. Second, as virtualization is about maximizing your datacenter investment, it will require a smart performance management tools to ensure you don't exceed your hardware's capacity or mis-size your virtual machine containers. Only with the right tool can your virtual infrastructure perform and operate efficiently, on a daily basis.

These are your two missing ingredients. This guide contains all that you'll need to fully understand modern performance management tools, make the right choices for your company, implement the most critical functionality, and deploy the ultimate solution.

End your datacenter chaos. Follow this guide. Read on...

The Server Virtualization Consolidation Story

Once upon a time, the speed of hardware outpaced the speed of software. The CPU, memory, and storage capacities of datacenter servers left the inefficient operating systems and applications behind. Like a jumbo jet carrying just one passenger, servers in the datacenter spent most of their time sitting at idle while the company was paying the price in dollars and the admins were paying the price in management overhead. Technologists around the world realized that there had to be a better way and modern server virtualization was born.

As with any new datacenter change, server virtualization entered the datacenter in the areas of lowest priority. At most companies, server virtualization first proved its worth in the development and testing environment. Not only did server virtualization provide greater return on investment for datacenter hardware, it made the life of administrators and developers easier.

If server virtualization could provide such vast improvements for “dev and test”, then why not implement it in production? Prior to that, server virtualization had to mature.

After being proven at “bleeding edge” companies, with major advancements in performance, reliability, and availability, virtualization is being used in production at most every company in the world and for just about every type of application in the world – no matter how critical.

FLAWED MANAGEMENT TOOLS ARE PREVENTING THE VISION OF 100% VIRTUALIZATION FROM BECOMING REALITY.

Companies large and small who started with server virtualization a few years back have now virtualized roughly half of their servers (on average). Virtualization is

mature and virtualization is ready however the pace of consolidation has slowed. Why?

Enterprises have realized that while server virtualization was ready, the management tools that they had in place weren't.

At many companies, they still use aging physical server management tools whose manufacturers have tried to morph into virtualization management tools. At other companies, they implemented a "shiny and new" virtualization management tool but later realized that, while it had pretty charts and graphs, it really didn't help them as promised.

What Stage of the Virtualization Journey are you in?

The virtualization journey is like a one-way trip from New York to Los Angeles, with planned stops. From virtualizing your first test server to virtualization your last production server the virtualization journey has defined stages and it's important to understand where you are on the journey. This is especially true because most enterprises are stalled out, mid-trip, so you must figure out where you are and how to get to the finish.

WHERE ARE YOU ON THE ROAD TO 100% VIRTUALIZATION? ARE WEAK PERFORMANCE AND OPERATIONAL MANAGEMENT TOOLS THE CAUSE?

The waypoints of the virtualization journey:

- Virtualize Test/Dev
- Virtualize 25% of production
- Virtualize 50% of production
- Virtualize 75% of production

- Virtualize 100% of production

For those companies that do complete the consolidation of their servers with virtualization, they are beginning their journey to cloud computing.

However, the vast majority of enterprises remain stalled out at roughly the 50% virtualization mark.

Why You Need Virtualization Management Software

You learned how flawed virtualization software can be the root cause that enterprises experience virtualization stall and fail to rise from their datacenter chaos.

So why is virtualization management software so important?

Before you learn why, first pull your focus away from the typical “feeds and speeds” run down, that you’ve seen before, related to virtualization management tools.

Instead, push yourself to focus on why it is that a tool might be important and try to visualize how can a virtualization management tools make my life easier?

Visibility

No longer do you have to go through multiple screens looking at meaningless dials that no longer give you any confidence that the virtual infrastructure is in harmony.

What if you could, with once glance, instantly see your servers, virtual machines, resource utilization, trends over time, and whether or not there is a problem.

It's this kind of analysis, reporting, and visibility that virtualization admins deserve.

Performance and Capacity Analysis

To understand the performance of VM's and capacity utilization, both historically, and real-time, virtualization management tools must have deep insight into how virtual infrastructures work. Virtual machines are dynamically sized containers that move from one server to the next and from one storage container to the next. Their resource demands fluctuate on a daily, weekly, monthly, or even yearly basis. Virtualization management tools must take all of this into account, know what is normal, and be able to use that knowledge to help you prevent performance problems and capacity shortages before they happen.

Service Level Agreement (SLA) Monitoring and Management

Service level agreements are agreements between IT and the business, which define what the acceptable level of service is for their most critical applications.

Service levels cannot be accurately monitored or proven without a tool capable of those measurements. Combining service level monitoring/reporting capabilities in a performance management tool is, by far, the most efficient design.

Bottleneck Identification

Undeniably, one goal of server virtualization is to drive up utilization of CPU, memory, disk, and network resources. As you add more and more virtual machines to the virtual infrastructure, there will always be the “next bottleneck”. Do you know what your next bottleneck is today and how many days until your applications will experience crushing latency due to that bottleneck? Too many administrators don’t.

Smart virtualization admins will know how many days until their CPU, memory, disk (I/O and capacity), and network resources are depleted and use that knowledge to prevent performance problems before they happen.

Under Provisioning

In most instances, the virtual machine container is assigned a fixed amount of resources. The amount of resources to assign is always questioned when a new virtual machine is created but, as that resource utilization will change over time, the resource allocation vs. utilization should be constantly (ideally) analyzed to ensure that your virtual machines are “rightsized”.

Virtual machines that are under provisioned, at any point, will experience performance problems including application slowness or even total outage.

Over Provisioning & Waste Identification

When a virtual machine is under provisioned, the gut reaction of many admins who don’t have a smart tool is to immediately add more resources to the virtual machine which leads to over provisioning and wasted resources. In other cases,

wasted resources are created when virtual machines are first provisioned as it can be difficult to predict resource utilization prior to server virtualization.

What you need is a tool to very frequently analyze virtual machine resource utilization, report under and over provisioning to you, and take action (if authorized).

Forecasting

As you move toward the destination of complete virtualization, what additional hardware resources will you need and when will you need them? In conjunction with bottleneck prevention, your virtualization management tool should model resource utilization to allow you to, seemingly, size new hardware, budget it, await approval, deploy it, and bring it online in the cluster to share the load — all prior to resource depletion.

What-If Scenarios

Along with forecasting, your tool should be able to tell you not only that you will, need more memory resources in the virtual infrastructure on a certain date, but allow you to run “what if scenarios”. For example, your tool should be able to predict “what if I doubled the memory on all my servers, how many more virtual machines could I add and when would I hit another memory bottleneck?” or “what if I added 5 more servers at X capacity, how many more virtual machines could I add?”

Troubleshooting

Even with the best capacity and performance analysis tools, eventually trouble will occur in the virtual infrastructure. Perhaps a server had a hardware failure, there

was a network switch failure, or a SAN controller reset. When events happen, your tool should be able to quickly identify the source of the problem, not waste your time investigating numerous dead-ends until you stumble upon the problem.

Expeditious Root Cause Analysis

Not only must tools provide root cause analysis, it must be delivered fast. In many enterprises, even a sort outage can cost millions of dollars (all too many companies don't even want to think about it). Virtualization management tools must provide root cause analysis data and with a minimum number of clicks.

Monitoring and Alerting

While a traditional feature that we've come to expect, virtual infrastructures require that you employ a monitoring and alerting tool with higher intelligence.

When a failure occurs in the virtual infrastructure, rarely does just a single virtual machine fail. For example if a SAN LUN fails, you want to be alerted that the LUN failed and, perhaps, get a list of the virtual machines running on that LUN, not 100 alerts for every virtual machine that is down. Additionally, if a physical server fails, you want to be alerted that the physical server failed and that all virtual machines on that server were successfully restarted on other servers, thanks to vSphere High Availability (for example), not a 100 alerts of when VMs go down and 100 more alerts that virtual machines came up.

WHILE A TRADITIONAL FEATURE THAT WE'VE COME TO EXPECT, VIRTUAL INFRASTRUCTURES REQUIRE THAT YOU EMPLOY A MONITORING AND ALERTING TOOL WITH HIGHER INTELLIGENCE.

Cloud Computing Decision Making

With the rising popularity of cloud computing, many enterprises are rightly considering moving some portion of their datacenter to a public cloud. However, public clouds are sold in specific computing units and you pay for what you use. A smart tool will be able to analyze your current virtual infrastructure utilization and help you to estimate the cost savings you would see if you moved one or more servers to the public cloud.

Chargeback and Showback

Your virtual infrastructure is only there to support your company's applications. When it comes time to justify new infrastructure purchases or replacements, how do you know what company departments, divisions, or business units are responsible for that consumption? You can't divide the cost nor should you ask for contributions or throw out estimates if you don't have real analytics to back it up. A smart tool will use its knowledge of the virtual infrastructure performance utilization over time combined with common infrastructure costs (or customizable values) to provide chargeback (or show back) reporting. You can use those reports to divide costs of an upgrade, for example, or provide a monthly report to the business units, detailing the associated cost of their utilization.

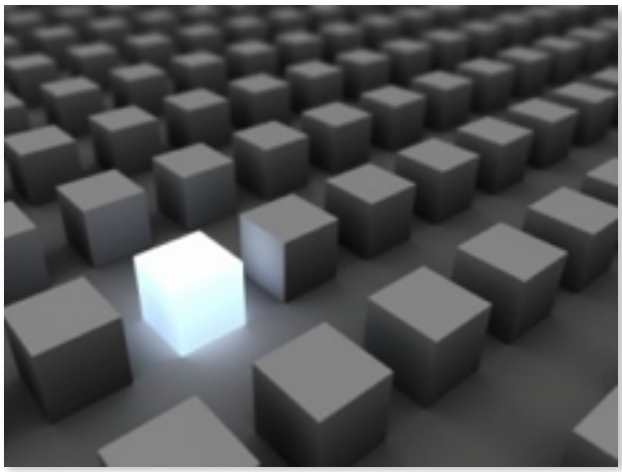
Change Management

With so many outages being caused by unplanned or mistaken changes to the infrastructure, an important piece of any virtualization management tool is change monitoring and management. Not only can many of the virtualization management tools monitor changes in the virtual infrastructure, many of them can remediate those changes to "fix" what was changed.

Application-Based Performance Reporting and Analysis

To get the complete visibility that you need, virtualization management tools need application insight. For example, service level reporting shouldn't just say that the "SQL Server VM was available 99.9% of the time", you must actually know if SQL server, as an application, was available 99.9% of the time. Or, in another example, you don't want to know that the "ping response to the SQL Server has been < 5 ms", you need to know that the "SQL server test query response takes consistently < 5ms".

Part 2



How to Select a Virtualization Management Solution

Now that we've defined virtualization management software and explored the various ways that it can help you and your company, now let's turn our attention to the selection of virtualization management software vendors and products.

All too often there is a good virtualization management product offered by a weak vendor or a poor virtualization management product offered by a strong vendor. In other words, strong virtualization management products and vendors don't always go hand in hand. Also too often, there is a weak virtualization management product offered by a company is a strong and very appealing marketing message. Because it can be so tough to identify strong virtualization management vendors and product, it's important that you learn about what to look for.

Many of the same qualities that you find in any good vendor, across numerous product categories, will share many of the same characteristics we'll discuss here. For example, no matter what product you buy, you want it to have good support, right? However, when it comes to purchasing software, there are other characteristics that are specific to that industry, such as the software licensing model in use.

To help you make smart decisions when choosing your next virtualization management tool, here's my complete list of what to look for in a virtualization management vendor:

History

As they say in the investment community "past performance does not indicate future results". While this saying is typically true, the history and stability of a vendor is still a very important factor in selecting a software vendor. After all, you want a vendor who has been around for some time and has proven success.

What you don't want is a vendor who just started offering virtualization management software last month or a vendor that goes out of business a few months after your purchase. The reason you likely don't want to rely on a brand new product (unless it's just for a very niche use case) is that new products likely won't have maturity in their feature set to give you the most for your money.

WHAT YOU DON'T WANT IS A VENDOR WHO JUST STARTED OFFERING VIRTUALIZATION MANAGEMENT SOFTWARE LAST MONTH OR A VENDOR THAT GOES OUT OF BUSINESS A FEW MONTHS AFTER YOUR PURCHASE.

When it comes to learning about the history of a vendor, I tend to ask every vendor the same series of questions:

- What can you tell me about the history of your company?
- How long have you been around?
- What makes your company unique?
- What's the financial trend for your company? (if they are a public company then you will be able to read their yearly K1 financial statements)
- How did this virtualization management product come about? (developed in-house, purchased, etc)

What's your R&D budget and how many of your staff do you have invested in it? What types of companies use your product and what are their primary use cases? The answers to these types of questions can tell you a lot about the company you are about to partner with. After all, remember that the acquisition of virtualization management software should be more than just a purchase. Instead, ensure that you feel that you are starting a new partnership with your software vendor.

Support

As with any product you purchase, you want to ensure that when you have trouble, you are able to get quality support, fast. There are a few ways to ensure that the vendor you select offers just that. Prior to your purchase, during your evaluation or proof of concept (PoC) period, ensure that you put the vendor's support to the test, more than once.

Here are a few things to look for:

- **Support options:** Today most companies offer more than just phone support. Email support, live chat, and even support via Twitter are becoming common.

- **Response time:** As with hardware, virtualization management software vendors may offer multiple levels of response with multiple associated price points and associated service level agreements (SLA).

- **Resolution time:** Resolution time take response time to the next level by tracking the time a support representative takes to actually resolve your issue

- **Support process:** The support process defines the steps you are required to take when support is needed. For example, you might have to open a ticket, talk to a level 1 representative and, if it can't be resolved, have it escalated to the next level. Some companies might require an online ticket to be generated first. Other companies might allow you to talk directly to a level 3 support representative if you a specific support contract.

- **Integration support:** Virtualization management products don't live "on an island". They talk to one or more virtualization management platforms and may talk to cloud management platforms, and even applications. How well does

your virtualization management software vendor support these integrations? Do they have a library or tested and supported configurations?

- **Online resource quality:** The online website quality and available resources will vary greatly from company to company. If you need support, you want the support website to be not only usable but easy to use. Besides the standard product documentation, the vendor should offer how-to videos, evaluation guides, customization guides, and other resources that show the vendor goes "above and beyond" the basics.

Ecosystem

An ecosystem is a community of living organisms, which works together. For a product or technology, the strength of that product or technology's ecosystem can be the difference between success and failure (and can determine your success or failure in using it).

For example, a company might create a strong ecosystem by well documenting their APIs, helping to build software partners, developing education and certification programs, by supporting the community, and by offering high quality online resources (like a free online video training course on how to use their product). Let's say that a virtualization management product made it easy for other vendors to create plugins that expands functionality. This would undoubtedly help to build their ecosystem and make end users happy.

One of the greatest measures of a product's ecosystem is to discuss that product with peers at your local user group meeting or in an online forum to see who else is using it, what their experience has been, and what their opinion is of the ecosystem around the product.

User Base

A large user base not only helps to facilitate an ecosystem but also shows that the product has experienced popularity. The size of the user base is also going to determine the amount of support you might find in a community forum, the number of blog posts that you might find about a product on the Internet, and the number of books that you might find available about a product in the local bookstore. I would recommend asking your vendor about the size of their user base during your product selection process.

Licensing and Pricing

Of particular interest when selecting a virtualization management vendor, is how the vendor licenses and prices their products. Of course this is because the licensing model is going to determine the price that your company ultimately pays, and the return on investment that you receive from the product. Over time different software vendors have come up with various pricing models, each with their own set of pros and cons. Some of the more popular licensing models are:

THE LICENSING MODEL IS GOING TO DETERMINE THE PRICE THAT YOUR COMPANY ULTIMATELY PAYS, AND THE RETURN ON INVESTMENT THAT YOU RECEIVE FROM THE PRODUCT.

- **Per-VM licensing:** when you buy a product using the per-VM licensing model, you own the product and are licensed to use it up to the number of virtual machines that you have paid for. As you add more virtual machines you would need to purchase more licenses. This licensing model is beneficial for companies that want to easily calculate cost on a per-VM basis and perhaps only want to purchase licenses for the virtual machines that require the software.

- **Per-Socket licensing:** when you buy a product using the per-socket licensing model, you own the product and are licensed to use it, up to the number of CPU sockets that you have purchased. As you add more servers or more CPU sockets on your existing servers you would need to purchase more licenses. This licensing model is beneficial for companies that are trying to maximize the number of virtual machines running on each host and on each CPU socket. Many say that the per socket licensing model offers a customer the lower cost option but this is up for debate and you should compare the costs for yourself.

- **Subscription-based licensing:** with subscription-based licensing you don't actually own the software but are licensed to use it as long as you pay your monthly or yearly subscription fees. Subscription-based licensing may be calculated in a number of ways, including per-VM, per-socket, or a usage-based cost model. The combination of the licensing model and the price point determines the price that your company is ultimately going to pay. You would then have to use that final cost in your return on investment calculations.

Suites and Bundling

Many companies make buying decisions based on whether or not something is available in a suite or a bundle. The classic example of a vendor successfully selling a suite or bundle of software is the Microsoft office suite. Today most companies use the Microsoft Office suite even though it in the past they might have only needed one of the solutions in the bundle, such as a word processor. Because Microsoft was able to bundle a suite of solutions together, enterprises gravitated towards that suite. While the office suite has ultimately been a success for both Microsoft and the enterprise, there will always be a debate as to whether or not the enterprise paid more than they ultimately should have because they were swayed into purchasing the suite/bundle.

When it comes to virtualization management software many companies will consider purchasing their solution from a vendor that they are already doing business with so that they can bundle multiple products together in a single purchase. For example you might consider purchasing your virtualization management software from your hardware vendor, from your VAR, from a backup software vendor, or other source where you feel that you can bundle the purchase of multiple products together in order to create value for your company or to simplify your life by having fewer IT vendors.

However, you must weigh the pros and cons of taking the easier "bundled route" vs selecting "best of breed" products.

Future Investment

When considering a virtualization management software vendor one of the factors that you should consider is that vendor's commitment to make future investment in software development for the product.

After all, you don't want to purchase a product and have it discontinued the following year or receive no new features or enhancements over time (this is especially true if you're paying software maintenance).

One of the ways to determine a vendor's plan for future investment in a software product is to simply asked them what their R&D budget is for that particular product or how many developers they have working on new features and enhancements. Another way is to look at the

YOU DON'T WANT TO PURCHASE A PRODUCT AND HAVE IT DISCONTINUED THE FOLLOWING YEAR OR RECEIVE NO NEW FEATURES OR ENHANCEMENTS

historical release frequency of the product. For example in the past three years, how many new major and minor releases have been made to the product and do they provide valuable new features? If a product has been frequently updated and enhanced in the past, it's likely that it will be frequently updated and enhanced in the future, as long as something major doesn't change with the company (such as the company being acquired).

Deep Domain Expertise In Multiple Disciplines

The final factor to consider when selecting a virtualization management software vendor is that vendor's experience across multiple disciplines. For example if a company is strong in data protection, that doesn't necessarily mean that they're also strong in performance and capacity management. Something to keep in mind is that virtualization management encompasses multiple disciplines. In other words virtualization performance management required deep experience in server performance (CPU and memory), network performance, storage performance, and even application performance. Additionally virtualization performance management must bring together data from these multiple domains and provide actionable insight and recommendations to help you both troubleshoot your real time congestion issues as well as manage your long-term capacity.

When selecting a virtualization management vendor I would consider whether or not the vendor has a history of creating strong virtualization management products that are able to analyze these multiple disciplines. If it's a brand-new company that's just getting started, I would want to know where their management and developers came from to know their history and experience in virtualization management.

Once you've narrowed down your list of preferred virtualization management vendors, you can begin further analyzing the best virtualization management products available from those vendors. Over the years there are number of factors that I have learned are most important when selecting these products, they are:

Feature Set

Certainly the most important factor when selecting a virtualization management product is going to be the feature set. The feature set is essentially the list of things that the product is going to do for you. For example, does the product monitor/alert about host and virtual machine issues, analyze performance, predict capacity utilization, identify capacity bottlenecks, track changes, and perhaps even perform orchestration? (for more ideas on what might be included in feature set, see the earlier section in this book entitled "why you need virtualization management software")

When comparing from one product to another, be careful not to simply use "checkbox analysis" and assumed that one product's feature is equal to another product's feature by the same name. Spend some time to compare the most important product features for yourself, if possible (or talk to other users who have).

BE CAREFUL NOT TO SIMPLY USE "CHECKBOX ANALYSIS" AND ASSUMED THAT ONE PRODUCT'S FEATURE IS EQUAL TO ANOTHER PRODUCT'S FEATURE BY THE SAME NAME.

Multi-Hypervisor and Cloud Management Platform Support

Of growing importance in selecting virtualization management tools is whether or not those tools support multiple hypervisors and even multiple cloud management platforms. For example, can the virtualization management tool manage both

VMware vSphere as well as Microsoft Hyper-V? And can the virtualization management tool manage virtual machines that are running in public clouds such as Amazon Web Services (AWS), VMware's vCloud Hybrid Service (vCHS), and Microsoft Azure? Keeping in mind that even if you aren't using multiple hypervisors today or don't have any plans to use a cloud management platform, these are still important factors that you should consider when selecting a virtualization management tool to ensure that your selection has been "future proofed".

Deployment Process And Resource Requirements

When selecting a virtualization management product you should consider the complexity of the deployment process as well as the resource requirements. As part of your product evaluation or proof of concept you'll get to see first-hand the resources required as well as what it takes to deploy the product. However, keep in mind that the deployment and resource requirements in a small proof of concept will be much different from that of a large enterprise data center.

There are a couple innovations in application deployment that you might find. The first one is when a software application can be downloaded and deployed as a virtual appliance. With the virtual appliance option, the user does not have to purchase an operating system or even install the application. The downside to the virtual appliance approach is that you must consider whether or not the virtual appliance will scale and how secure it might be.

THE DOWNSIDE TO THE VIRTUAL APPLIANCE APPROACH IS THAT YOU MUST CONSIDER WHETHER OR NOT THE VIRTUAL APPLIANCE WILL SCALE AND HOW SECURE IT MIGHT BE.

Additionally there are increased scaleability concerns if the virtualization management application database is contained inside the virtual appliance. The second new deployment process that is innovative is when products are sold “as a service”. What this means is that you purchase the product using subscription-based pricing and then either there is no installation in the customer data center or a small virtual appliance is used that simply sends data to and from the vendor’s datacenter, over the Internet. With “management as a service” solutions, that deployment process and resource requirements are virtually eliminated with the downside being your total dependence on the vendor as well as potential security concerns.

No matter the product you choose, ensure that you take special note of the deployment process and resource requirements during your testing and proof of concept.

Expandability and Interoperability

No matter the size of your virtual infrastructure, sooner or later you’ll want your virtualization management product to be expandable or interoperable. In other words, your virtual infrastructure is not an island and will eventually need to work with other management tools or provide you insight into what’s happening outside the virtual infrastructure.

For example, if you’re virtualization management tool tells you that a virtual machine running a database is experiencing high CPU utilization you will immediately want to know, in particular, what database is it that’s being heavily utilized? Most virtualization management tools cannot provide this type of insight without expandability. For example a plug-in could be added to the virtualization management tool that would then give you the insight needed into the utilization of the specific database tables. That is one example of expandability.

On the other hand, with interoperability, the virtualization management tool might talk directly to a database management application that would then provide your virtualization management tool the data needed to report to you, what database table is experiencing trouble. Additionally your virtualization management tool could send data the opposite direction and tell the database tool about host and virtual machine utilization. Thus, with expandability the various management tools are able to work together. The data exchanges required to make this happen are usually done with application programming interfaces or APIs.

VERIFY THAT WHATEVER VIRTUALIZATION MANAGEMENT TOOL YOU SELECT OFFERS A WELL-DOCUMENTED AND SUPPORTED API

My recommendation is to verify that whatever virtualization management tool you select offers a well-documented and supported API to ensure that the interoperability you might need in the future will be available and easy to do.

Scalability

If you have a very large number of hosts and virtual machines, you'll want to make sure that the virtualization management solution is able to support the size of your virtual infrastructure today. On the other hand, if you have a small virtual infrastructure, you'll want to ensure that the virtualization management solution can scale up to meet your needs in the future. The best way to ensure that you're covered in the area of scalability is to find out what other customers the vendor has using the tool today who have a similar size infrastructure and what case studies they can provide to make you feel comfortable. Ideally, I recommend taking this a step further and asking the vendor to provide customer references, which you could speak to, to discuss scalability (among other things).

Generally the scalability of any virtualization management solution is tied back to the architecture used in its design.

Architecture

The architecture of any software product is an area that most IT professionals generally don't go very deep into because of our lack of application development experience. While we may not feel too comfortable asking about the topic of software architecture, it is an area that we need to ask about when considering any virtualization management software application. The reason for this is that it's the software's architecture that determines the application's scalability, complexity, extensibility, and even required maintenance. I would ask questions like, "can you draw me a diagram of the applications' dataflow?"

If the number of nodes being managed increases dramatically, but would be done to the application and databases to support a very large number of transactions per second? (i.e.: can the application and database layers "scale out")
Over time, where will data grow in the application's database and what will be required to control that data growth without losing long-term trending information?
While you may feel uncomfortable asking about software architecture, ensure that you spend a few minutes discussing the software architecture and design of any virtualization management product under consideration with a knowledgeable software engineer from the vendor. This is something that you should do before purchasing the application so that you don't regret it later.

Web-Based vs Client-Based

Most enterprise applications from the past used Windows clients as their front-end which talked to an application and database server in the data center. Over time those Windows clients moved from so-called “fat clients” to “thin clients” but today are moving to web-based clients. With web-based clients, there’s no installation requirement for the end-user, there are no compatibility issues (as long as the user is using a supported web browser), the application can be accessed from any device, and there are no end-user clients that have to be patched or updated.

Mobile Management

Most of the enterprise management applications of the past offered options for mobile users to manage the data center remotely. Today, more and more enterprise application user interfaces are being designed with mobile device usage incorporated into the initial design. This results in much better support and usability for IT professionals to manage their data center “on the go”. Ensure that while shopping for a virtualization management application, you ask to see (and hopefully try for yourself) what it would be like to utilize the virtualization management tool from a mobile device. Ideally, this should be part of your evaluation and proof of concept process.

Usability

An area that forgotten all too often in enterprise software is usability. Too many enterprise applications still use the same clunky front-end interface created when the application was originally built. These aging user interfaces are not only ugly but their inefficiency causes administrators lost time, frustration, and, in some cases, downtime.

In many cases you can get a good feeling for the usability of an application simply by spending an hour, on your own, trying to accomplish common tasks. Very quickly you'll get a feeling as to whether or not the application is well designed, intuitive, and easy-to-use (or not). The leading virtualization management software vendors have user interface designers on staff who frequently we conduct end user usability studies to find opportunities to improve the application's usability. Additionally those vendors refresh the application's user interface as often as possible to ensure the application is not only appealing but also efficient and intuitive.

Most enterprise-grade applications today are moving towards HTML5 web-based interfaces that are responsive and designed with mobile devices in mind (from day one).

Multi-User And Role-Based Access

Another consideration when selecting a virtualization management product is its support for multi-user role-based access. While many virtualization management applications start off with just a single user (the virtualization admin), as the virtual infrastructure grows, the number of administrators will increase as will the number of opportunities for those administrators to delegate specific responsibilities to application owners, support personnel, or power users. For example, you might want to authorize a support manager with the ability to view performance charts on a group of critical virtual machines. Certainly, you would not want to grant them full virtualization admin rights or give them the virtualization admin username and password. Instead your virtualization management application should provide you with role-based access such that you could select, let's say, an individual Windows AD user or group and grant them a role in the virtualization management application to view the performance data that they need, without giving them access to other areas where they might get into trouble.

Evaluation Period And Proof Of Concept

Never should you purchase a virtualization management application without running it in your own environment for some period of time. During that period of time you should be able to gain experience using the application and the value of the application should become apparent. If an application cannot demonstrate its value during the evaluation period (or perhaps doing a longer proof of concept timeframe), then you should be considering a different application. Evaluation periods for virtualization management software generally range from 7 to 90 days and longer proof of concept projects may provide you with an extended evaluation window.

Time To Show Value & ROI

The only reason for a business to purchase a software application, such as a virtualization management tool, is so that tool can provide the business with a value greater than the cost of the software application. That value greater than the cost is the return on investment, or ROI. The ROI is calculated by subtracting the value from the cost. The cost of a software application should be easily quoted by the vendor but calculating the value gained can be very subjective. The subjectivity of the value is because, in many cases, it includes so-called “soft costs” such as efficiency improvements of the staff or other subjective values. However, the better ways to arrive at a more quantitative number (a “hard dollar number”, as it is called) for the value the application provides is to use financial numbers such as “decreased downtime for tier-1 applications due to improved troubleshooting abilities” or even the ability of an application to “predict a performance bottleneck before it happens”.

Another way to gain concrete numbers for the value an application provides is when an application can show you how much money you can save by taking the actions that it recommends. For example, if a virtualization management tool reported that 50 of your virtual machines were over provisioned, allowing you to right-size those virtual machines and not have to purchase additional server capacity, you can very quickly determine the financial value that was saved, thanks to the tool that you purchased. To be specific, if a tool cost $10,000 and it prevented you from having to purchase an additional server that you were about to buy, costing $20,000, then the immediate return on investment is $10,000. Most purchases at a company aren't expected to provide immediate ROI but to do so over a number of years. If any virtualization management tool could truly provide you immediate or short-term ROI, it's likely that company executives would quickly approve it.

Part 3

The Most Critical Features in Virtualization Management

Once you know what to look for in your next Virtualization Management software vendor and, in general, what capabilities those products should offer you, you'll want to start looking for specific functionality.

Examples of features that you would want in a virtualization management application might be reporting capabilities, what-if scenarios, problem prediction, change management, etc.

To help you make the right selection in your next virtualization management tool, let's explore the critical functionality to look for.

Visualization

One of the first things that any virtualization management tool does is to help you visualize what's happening in the virtual infrastructure. After all, it's one thing to see that 16,384 MB are being utilized on a physical server by VMs but it's another thing to know that the server only has 16GB, see that the memory utilization is trending upward dramatically, that 100% of the memory is utilized, that it's 80% utilized by a single VM, and that host paging is now occurring. Many tool vendors tout their "pretty charts and graphs" (which, in itself, isn't totally a bad thing). Those appealing charts and graphs are still important as they help you to visualize what is happening in the virtual infrastructure. You should be able to take a quick glance at a those charts and graphs and very quickly be able to be able to tell if you have a problem or not. Appealing charts and graphs are also useful for showing the status of the virtual infrastructure on a large screen, for example, in the datacenter.

That being said, the same vendors that spend so much time touting their "pretty charts and graphs" may also be doing it because that may be the most appealing feature that their virtualization management tool offers. While appealing charts

and graphs are a core requirement of a virtualization management tool, those visualizations, no matter how they are designed should be immediately useful and telling – helping the admin quickly identify problems or trends in the virtual infrastructure. Some vendors have taken “charts and graphs” to another level by utilizing heat maps or other innovative visualizations.

Alerting

Also a core function of a virtualization management tool is some form of alerting mechanism. After all, it’s not enough to identify problems if the virtual infrastructure administrator can’t be quickly notified to understand the problem and resolve it. For example, when a virtual datastore is experiencing high storage latency, all the applications running on virtual machines, stored in that datastore, will experience degradation.

Yes, centralized management tools like vCenter provide alerting but that is only basic alerting, based on simple thresholds. Smart virtualization management tools will take alerting to the next level, by developing baselines, over time, such that they know what normal utilization and performance is for your virtual infrastructure. When there is a deviation from that normal behavior (anomalies), the virtualization management tool will alert the administrator about the problem and, hopefully, offer a recommendation for remediation.

Key Performance Indicators (KPI)

Every virtualization management tool should apply some set of key performance indicators (KPI) to the virtual infrastructure. These indicators should be available when performing both real-time analysis as well as historical analysis. For

example, examples of KPIs might be performance, availability, CPU utilization, memory utilization, storage capacity, and storage latency. While every virtualization management tool will use different KPIs, for the most part, the majority of them will come back to the same common statistics related to performance and availability.

Your virtualization management tool should be able to quickly identify for you the most valuable KPIs and help you to monitor them over time to ensure the virtual infrastructure is on the right track.

Performance Monitoring and Capacity Planning

Traditionally, when someone talks about a virtualization monitoring and management tool, it is typically a performance tool that monitors for critical events, reports on utilization, and alerts when a threshold is violated. Over time, many of those tools were enhanced by adding capacity management and planning functionality.

Today, performance monitoring, alerting, and basic capacity management are typically the core functionality of most so-called "virtualization management" tools with most tools increasing their value by adding many of the other features/functions we will discuss in the remainder of this section.

DATA CAN EVEN BE USED TO PREVENT CAPACITY BOTTLENECKS BEFORE THEY HAPPEN.

Critical performance monitoring functionality includes the monitoring, alerting, and historical reporting of statistics like:

- Physical CPU utilization
- Virtual CPU utilization
- Physical memory utilization
- Virtual memory utilization
- Memory swapping
- Network interface utilization
- Storage controller I/O utilization
- I/O per second for a storage controller, LUN, or datastore

Capacity management, analysis, and planning tools take these performance statistics, recorded over time, and help virtualization administrators predict their capacity utilization in the future to find out how much additional capacity is available to, for example, add additional virtual machines.

This type of forecasting is extremely useful for helping to virtualization administrators determine when they need to add additional server or storage resources. This type of data can even be used to prevent capacity bottlenecks before they happen. Capacity planning is also extremely useful for IT budgeting.

Some capacity analysis tools allow you to build “what-if scenarios”. In a “what-if scenario”, the administrator has the ability to ask the tool, given current resource utilization, how many more, for example, virtual machines could be added if I increased the memory across all virtual hosts to, let’s say, 64GB? Another example would be how much more storage capacity I need to add to spin up an additional

200 virtual machines, given the average disk capacity utilization rates of my existing virtual machines? Finally, one more example would be if I added, for example, 50 new servers of a given capacity (which you specify), how many more virtual machine (of a given specific capacity) could be added to the virtual infrastructure?

Virtual Infrastructure Optimization

Optimization of the virtual infrastructure is needed at most organizations because virtual machine resource requirements are often difficult to determine and will vary over time. If virtual machines are over provisioned, for example, resources will be wasted that could be used by other virtual machines (and you are wasting your investment in server capacity). If virtual machines are under provisioned, with not enough resources, then the applications running inside will perform slowly. When a virtual machine is at it's optimal resource configuration it is said to be "rightsized". However, once a VM has been rightsized, it won't likely be rightsized for long as the application, running inside the VM, will certainly have variable usage over time.

The optimization of virtual machine resources is just one of the numerous optimizations that virtualization management tools can perform. Other examples are:

- **Control of "VM sprawl":** With virtual machines being so easily created and replicated, many companies are experiencing an increase of virtual machines that might be unapproved, unlicensed, or unused. The elimination of a large number of running virtual machines can help a company recoup tens or hundreds of thousands of dollars in wasted resources. Once the virtualization optimization tool reduces the number of virtual machines, it is recommended to use VM "lifecycle management tools" which create a catalog of virtual machines, an approval process for anyone wanting one, a usage monitoring

system for those VMs over time, and a removal process should the VMs no longer be needed.

- **Remove "Zombie VMs":** Along similar lines as VM sprawl, so-called "Zombie VMs" are VMs that are running but are receiving no utilization. As part of controlling VM sprawl, some applications specifically target to eliminate "zombie VMs" as a way of quickly saving the company money.

- **Remove "Orphaned VMs":** Virtual machines that are still taking up disk space but aren't actually powered on are called "orphaned virtual machines". This type of VM is another ideal candidate for removal, allowing you to recoup disk space. In many cases, tools that offer virtualization optimization can save a company enough in recouped resources to, in effect, pay for the virtualization optimization tool. Once resources are recouped, new virtual machines can be added without needing to purchase additional servers OR virtual machines can be consolidated onto fewer servers, allowing other servers to be returned on lease or shutdown.

Problem Detection and Prevention

We discussed capacity planning tools that can help you to determine how much capacity you have remaining with your current resources. If you were to run out of one of your resources, you you suffer a "capacity bottleneck". When a capacity bottleneck occurs, it's likely that applications either stop working or they run slowly. In times of trouble, simply finding that capacity bottleneck can be tough, resulting in more downtime for the company, more frustration for the end users, and a negative image for the IT department.

When a problem of some kind happens in the datacenter, it could be a configuration issue, server outage, or other issue. However, most of the causes of problems in the datacenter are due to performance / capacity issues. Of critical importance in a virtualization management tool is problem detection and prevention (many times called “bottleneck identification and prevention”).

When trouble occurs in the datacenter, no matter the cause, you want a know where the problem is and what needs to be done to fix it – FAST – and, hopefully, if it can be prevented in the future. If problems can be prevented, the tool is so much more valuable as no end end users have to be frustrated, no CIOs will look badly, and no admins will have to “run around like crazy” trying to restore service. Instead, administrators could be told what the “next bottleneck” will be and how many days before it causes a problem, allowing them to fix it before it starts.

“Single Pane of Glass”

You might find that it’s not too difficult for a company to create a virtualization management tool that provides you with some valuable information. However, what is difficult is for a virtualization management tool to become your “single pane of glass” for the entire virtual infrastructure (or perhaps even for the entire datacenter). The “single pane of glass” idea is that you won’t have multiple “windows” to look through for datacenter analysis. You will, in a single window (aka “single pane of glass”) be able to monitor and manage the entire datacenter.

While not every tool is going to be a “single pane of glass” for the entire virtual infrastructure or datacenter, it’s important to understand how close the tool you are considering will get you. Most of the time this is done by making the tool “extensible”. What extensible means is that the tool can be “extended” so that

additional capabilities can be added. In some cases these capabilities are simply integrated into your existing interface in, perhaps, another tab or window. Those forms of extensibility use a plugin, extension, or widget that pulls data from another management tool and displays it in your own. While this functionality is certainly beneficial, what some management tools are now offering takes this a step further by bringing data from the other management platforms into your primary management platform dataset. The integrated data can then not only be reported on but it can be correlated with data from your primarily platform (and other integrated data) to give you a complete view of your datacenter infrastructure. For example, if your performance and capacity management tool could bring in data from web servers, database servers, and email servers showing requests per second, transactions per second, and messages per second, you could see on a single graph when and how application-level utilization increases effect the utilization of server and storage resources like CPU, memory, and IO utilization. This level of integration is very desirable in future virtualization management tools as, in the end, what you get is an “end–to-end view” that provides a “single version of the truth”.

Service Level Agreement (SLA) Management and Monitoring

In service-provider environments, customers demand service level agreements (SLAs) that promise a certain level of service for their applications, servers, networks, or even technical support requests. In larger enterprises the use of service level agreements has also become the norm. Even if your company doesn’t use service-level agreements it’s smart to create your own service-level agreements to set a baseline and then determine if you can maintain or improve on those expectations. Additionally, it’s smart to use service level agreements, internally, in the IT department, to help justify your IT budgets and salary increases over time.

While many companies would like to use service level agreements in some form, their management tools don't always make this possible. This is because, to set and track service level agreements, you must be able to set specific high-level metrics and track them for a long period of time. Examples of service level agreements are:

- Server infrastructure or application uptime as a percentage of the entire year
- Network latency in milliseconds as an average for the year
- Mean time to recovery (MTTR) when an outage occurs

To calculate a metric like application uptime, you need a tool that recognizes that application specifically (a ping to the server might not guarantee that the application was really available), it must be checked every X number of seconds, recored, and then be available for reporting at any time. When it comes to a SLA like network latency or MTTR, it gets more complex as you have many different systems to monitor and report upon.

Chargeback/Showback

Many service providers / hosting companies must be able to bill their customers for their monthly usage and require a chargeback application that will report on the usage per customer (which is definable), what tier of services they used, which of their applications use it, and (based on predefined

COSTS CAN BE TURNED INTO ACTUAL INVOICES FROM IT TO THE HOSTING TENANT OR TO THE INTERNAL COMPANY DIVISION OR GROUP TO IMPLEMENT CHARGEBACK

numbers) what the cost was for that resources. With all of their information detailed, the datacenter admin can send automated resource utilization reports with associated costs.

Those costs could be turned into actual invoices from IT to the hosting tenant or to the internal company division or group if you opt to implement chargeback. On the other hand, if you simply want to have, for your own knowledge or budget justification, a report showing what business unit or group us using what resources with their associated costs, you could use “showback” and not actually invoice the business unit. Many businesses use “showback” today to justify infrastructure upgrades or other budgetary items.

Change Management

Because performance issues, capacity issues, and outages are, in many cases, caused by changed in the environment, it’s becoming more and more important that virtualization management tools are able to track changes and correlate those changes. For example, if someone accidentally shutdown a host comprising a 3 host cluster, with 1/3 of the compute capacity lost, there will very likely be performance issues for the virtual machines that are now running with significantly fewer physical resources to backup the virtual resources they have been allocated. Another example would be, let’s say that a week ago, someone who wanted to optimize the environment reduced the amount of vRAM on a virtual machine from 8GB to 2GB. They didn’t realize that once a month that VM is used to process data and create payroll reports. When the payroll department complains that their reports are running slowly and the virtualization admins checks their virtualization management too, it should show them that on the utilization graphs, the there was a change made to resize the virtual machine memory (which is the root cause of the performance issue today).

Some change management tools will also allow the administrator to “revert changes”. If you take the same example of the VM that has its memory improperly downsized, when the administrator reverted the changes, the memory configured could be returned back to its previous level to remediate the performance issue.

Storage Analysis

With virtual infrastructures being used to consolidate servers more and more densely, the majority of performance issues today end up being the result of storage I/O contention. Any tool that analyzes virtual infrastructure performance and capacity would be incomplete without some kind of storage I/O and capacity analysis piece. However, the source of raw storage statistics should always be an important consideration. Undoubtedly you want your virtualization management tool to obtain storage statistics from your virtualization management platform (like VMware vCenter) however there is additional value gained from tools that obtain their storage statistics directly from your physical storage systems as well.

More advanced virtualization management tools can go directly to your storage arrays and storage fabrics using industry standard protocols such with standardized storage protocols such as CIM and SIM-S. For virtualization management tools that manage VMware vSphere infrastructures, many support the VMware vSphere API for Storage Awareness to report storage properties, latencies, and availabilities. The ability of the virtualization management tool to go directly to the storage enables administrators to easily identify configuration errors, resource starvation issues, and performance bottlenecks, from the first-hand perspective of the storage system.

Application Awareness

More and more, virtualization management tools are moving deeper into the datacenter stack by communicating directly with critical applications for a deeper level of knowledge and analysis. Examples of applications that virtualization management tools might want to talk directly to are Active Directory, Exchange, web servers, database / SQL servers, and many more. As we covered in our "single pane of glass" section above, this application-level analysis can be done in a variety of ways. The virtualization management tool might just allow another application-level reporting tool to display statistics in the same console. In that case, the virtualization management tool needs no awareness of the application in particular. On the other hand, to bring back statistics directly from the application, greater knowledge and greater development is required on the part of the virtualization management software vendor. With data brought back directly from the application, it can be brought into the management tool's database so that it can be correlated, analyzed, and reported to the virtualization manager, providing insight into how application issues might cause infrastructure performance issues, and vice versa.

Automation

In server infrastructure, most people think about automation as in the automation of common server admin tasks. In virtualization management, there certainly could be some level of automation of common tasks. However, what you should be on the lookout for when selecting a virtualization management tool is the level of human interaction required to do its job. For example, once the tool has been run in your environment for some time (perhaps as little time as 5-7 days), how much daily input is needed from the administrator? Do they have to deal with a daily barrage of alerts, mostly of which are false positives? You don't want an

application that provides some basic level of assistance but, at the same time, requires a huge amount of daily “babysitting”. Virtualization management tools should be automated enough that they are “set it and forget it” – only requiring a minimal amount of human input once they have had time to learn the environment.

Physical Infrastructure Management

Not every company has achieved 100% virtualization and most companies still run physical servers in the datacenter. If you are one of those companies, you should consider virtualization management tools that can also manage physical servers. The goal of any datacenter manager should be to have as few tools as possible used for management, making staff as efficient as possible. If the virtualization management tool doesn’t support the management of physical servers using agents then perhaps it can receive alerts from them, or vice versa. Besides just traditional physical servers that require agents, more and more virtualization management tools are supporting the management of converged infrastructures such as Cisco UCS.

Cloud Infrastructure Analysis

As public infrastructure clouds have matured, more and more companies are considering or even making the move to the public cloud. With that transition, companies are on the lookout for virtualization management tools that can support the management of the virtual machines, whether they are on-premises or off-premises, in the public cloud. The most common public infrastructure cloud that virtualization management tools can manage is Amazon Web Services (AWS), Microsoft Azure and VMware vCloud Hybrid Service (vCHS). Does your

virtualization management tools support management of your VMs when they transition to the public cloud?

Dashboard Customization

Some virtualization management tools will have excellent user interfaces where others will be lacking. Certainly you want the “stock” interface to be as usable and appealing as possible. Once you feel comfortable with that default interface, your next question about the interface should be “what level of customization do you offer?” After all, even if you like the stock interface, others in your organization may not. You never know when application owners, database managers, support managers, and maybe even the CIO will ask you for their own custom dashboard with a custom view into the virtual infrastructure that shows only the statistics and analysis that they need to see. Ensure that whatever application you choose offers a customizable interface.

Custom Reporting

Offering a list of stock reports is going to be “the norm”. Those may be very useful reports but, you never really know what types of reports you will need until you have used an application for some time. Admins, application owners, consultants, developers, and CIOs will, at some point, likely need a custom report of what’s happening in the virtual infrastructure. As any virtualization management software vendors you are considering – what level of custom reporting do you offer? Can you go into a custom report-writer with a GUI interface that allows you to create your own custom virtual infrastructure reports?

Derived Metrics

Derived metrics are metrics that are dynamically created from other metrics. For example, let's say that you wanted to create a metric called "E-Commerce App Blended Utilization". That metric might be based on a formula derived from the CPU, memory, disk, and network utilization across 50+ different servers running across multiple clusters or even across a hybrid cloud. By allowing you to calculate your own derived metric, based on other multiple dynamic metrics, you have the opportunity to be much more efficient by being able to look at a single number that represents many other, ever-changing, statistics.

Baselines

A baseline is a picture in time of "what's normal". For example, say that the utilization of your e-commerce web server farm averages 50% on an average day during the year. If you came in one morning and the utilization was at 80%, you would know that something was wrong and would want to check it out. On the other hand, say that you have an file transfer server that runs, on average, at 10% utilization. If you looked and it was at 50% utilization, on average, that day, you would probably want to dig deeper into the utilization to find out why it had deviated so differently from it's baseline. Note that the baseline of the e-commerce web server was that "the norm" for CPU utilization was 50% so you wouldn't need to investigate that. In other words, you need the baseline of "what is normal" to be able to tell "what is abnormal". Can your virtualization management tool capture this baseline for you and help you to know when performance deviates from that baseline?

Part 4

Product Analysis, POC, and Deployment

Now that you know what features to look for in your next virtualization management tool, you need to apply this knowledge by doing product analysis.

So what are the best ways to go about identifying the available tools, learn about those tools, perform evaluations, and finally, price and purchase? It's likely that all of us have some experience making major purchases in the past but what are the best practices to perform that product selection and acquisition in a systematic way? Let's find out.

Identify

The first step in purchasing any virtualization management tool is to identify what products are available in the market today. New products are released all the time and many contain innovative features, designs, or licensing models that can have an effect on your product selection plans. With so many virtualization management products available, this is a great opportunity to learn what tools offer what features.

During this identification process, make sure that you keep all the vendor and products selection criteria, covered earlier in this guide, in mind.

If you recall, the criteria you should look for when selecting a vendor is:

- History
- User base
- Support
- Ecosystem

- Licensing and pricing
- Suites and bundling
- Domain expertise
- Future plans for investment

The criteria you should use for selecting a product is:

- Feature Set
- Multi-Hypervisor and Cloud Management Platform Support
- Deployment Process And Resource Requirements
- Expandability and Interoperability
- Scalability
- Architecture
- Web-Based vs Client-Based
- Mobile Management
- Usability
- Multi-User And Role-Based Access
- Evaluation Period And Proof Of Concept
- Time To Show Value / ROI

How do you find these virtualization management products? Lots of places!

Here are many of the great ways to find out about virtualization management tools (some that you may have used already and others that may be completely new to you):

- Local / national VAR
- Existing hardware or software vendor
- From a friend or coworker
- Local user group, such as your local VMware User Group (VMUG) or virtualization technology user group (VTUG)
- Twitter / Facebook / social media
- Gartner group, Wikibon, or other analyst firm
- Web search
- Blog website with a review or first-hand user experience
- Virtualization-focused trade show such as VMworld or TechEd – either in person or from a past expo hall vendor list on the web

If you are required to do a RFP, I would still encourage you to find ways to ensure that that solutions from the companies you feel are strong (based on your product search, above) submit a proposal. If, through the RFP process, you end up with a solution that you ultimately learn is superior then – great!

The question of "at what point do I narrow down / eliminate companies or products" is an interesting one. While it would be ideal to eliminate / narrow down companies at just one point in this process, that's probably not realistic.

You may eliminate companies from your search at any of these product analysis steps. Perhaps you will eliminate them while simply identifying them as you may feel that they just aren't a good fit. Perhaps you will need to learn more about them (maybe in a webinar or personal demo) before eliminating them. Perhaps you will need to evaluate them on your own virtual infrastructure before finding out that you don't like the user interface, for example. Or, finally, perhaps once you get a price from them, you will eliminate them as they are out of your budget.

LARGE GOVERNMENT AND EDUCATIONAL BODIES ARE USED TO USING "REQUEST FOR PROPOSALS" (RFP). THE RFP PROCESS HAS ITS PLUSSES. WITH A RFP, YOU WILL LIKELY LEARN ABOUT NEW PRODUCTS OR COMPANIES THAT YOU HAVE NEVER HEARD OF BEFORE.

Additionally, the pricing of a product can actually be done at any phase you wish. You may find out a price when you identify an application and use that to eliminate a tool or vendor, right off the bat. However, make sure that you also include "value" in your equation when considering price as the lowest cost solution is not always the best solution.

Learn

At this point you may have a lengthy list of virtualization management tools OR you may have used some of the criteria covered above to narrow that list down to just a few.

Either way, the next step is to learn about those vendors and their products. Some of that learning could be done on the vendor's website or from third-party analysis reports that you may find on the web.

In most cases today, the “learning” step for a new product is done via a webinar or online product demo.

Many vendors will hold regular online public webinar demos of their product and this is a great way to get an overview of the company, how the product helps, how it stacks up when you apply our product selection criteria, how it looks, and even if the people giving the demo are likable.

Another great way to learn more about software products today is to get an online personal product demo. While there is certainly some of this in the online webinar option, the online personal demo is more – personal. These demos are usually scheduled for just a single customer and, that way, they can find out where your pain point are today and use that opportunity to demo where their software solution can help. Don’t be afraid to ask for an online personal product demo, right off the bat. The great thing about an online personal product demo is that it can save you so much time and be much more efficient than performing an evaluation of the software for yourself. The vendor’s lab environment will be unique configured to demo their features and may be larger than the lab environment available at your company.

In other cases, a local VAR or the a pre-sales engineer from the software vendor will come to your company location to give you an in-person presentation and product demonstration. Of course, while it might take the most time out of your schedule, the in-person meeting is always going to give you the greatest all around opportunity to get to know the product and the people who represent it.

Evaluate

While you are free to perform your own software evaluations on as many tools as you have time to, it is generally recommended to narrow down the number of products to evaluate down to 2-3, if possible, so as to not invest a huge amount of time in the evaluation process.

With 2-3 products on your list, you could install them one at a time (or run them side by side, if you have the resources, time, and are able to multi-task your evaluation) to use them firsthand, in your own infrastructure, on your own time schedule.

In many cases, evaluations are more elaborate and companies call them a “proof of concept”. The proof of concept (or POC as it is called) takes the evaluation to the next level by attaching a specific time schedule and set of features/benefits that must be proven at a specific level. For example, a POC of a virtualization management tool that offers optimization might be done to prove that the tool can really recoup enough resources (through reclamation of currently wasted resources) to pay for itself. Another POC might be that the product can really scale to manage, say, 3000 virtual machines with the recommended sizing for that level of scale. Typically, the POC process includes assistance from (or is run by) an engineer from a VAR or the software vendor. That engineer is well versed in the product and documents what is to be proven, runs the tests, documents the results, and then presents the findings.

Some vendors offer generous evaluation periods such as 60-90 days so be sure to take full advantage of the evaluation period, prior to your purchase, to ensure

that, even after some period of time, you still see the same value in the product that you saw from the outset.

Price

As covered earlier, obtaining the pricing of a product can be done at this step or at any of the previous steps. That price can be used to eliminate the software product at any step you wish.

A few things to keep in mind when obtaining and evaluating the price of a virtualization management tool:

Take special consideration to the licensing model used such as “per VM” or “per socket”. Some vendors will give you the option to choose and one or the other will likely be more beneficial for your company, depending on your infrastructure design and consolidation ratio.

Software products are usually available for direct purchase from the software vendor, from a specialty distributor, and from a national or local VAR. You are encouraged to obtain prices from any and all of the different sources. In the case of national or local VARs, you are also encouraged to obtain pricing from multiple VARs as pricing will vary.

In many cases, the price will be formulated different when you receive it from different vendors. Different part numbers, different quantities, or suites/bundles could be used in generating a price quote so always ensure that the pricing you receive is “apples to apples” when performing your comparison.

Of special consideration when obtaining pricing is the cost of support and maintenance. Support is the support you receive when you have trouble with the software. In many cases that support is tiered into different response levels and priced accordingly (gold/silver/bronze with 4 hour, 8 hour, and 24 hour response, for example). Software maintenance is the periodic update packages and major upgrades to the application. That software maintenance can be very important as it, very likely, ensures that you always have the latest version and don't have to purchase (but clarify this with the vendor and ensure you have it in writing). Additionally, the ongoing support and maintenance of a software application can, if totaled over 2-3 years, easily surpass the original cost of the application. You are encouraged to not only compare the cost of the software application you are considering but also compare the cost of the ongoing support and maintenance.

Negotiate and Purchase

Remember – all purchases are up for negotiation. Software is a high-margin product. Once software is created there is almost no additional cost for the software vendor to reproduce the software and resell it to someone else. Enterprise software is usually priced very high with the assumption that the companies purchasing it are large enterprises with million dollar IT budgets. For these reasons, ensure that you spend time price-shopping and negotiating a discount before purchasing as it could save your company millions of dollars, depending on the cost of the software.

Additionally, no matter what level you discount you are able to negotiate on the software cost, it's also recommended to ask the vendor or VAR for complementary training classes and/or implementation assistance for the product.

Finally, vendors are always willing to negotiate a greater discount for a larger purchase. So, if you need new server hardware, desktop hardware, a network upgrade, etc – now is the time to leverage that for as large a discount as possible. Also remember that software vendors and VARs report their sales and profits quarterly and yearly (which may or may not sync with the calendar year). Vendors will have greater desire to negotiate a larger discount when you are making your purchase just before their quarter or year end results are calculated to ensure that their reported sales are as large as possible.

When it comes to purchasing the software, even the payment terms may be up for negotiation. Thus, you may be able to get a 90 day evaluation and a 90 day term to pay for it, allowing you to use the software application for half of a year before needing to pay for it.

Recommended Steps for Virtualization Management Product Deployment

In some cases the deployment of a product is simply done during the evaluation / proof of concept. However, in larger scale deployments the deployment process is much more complex and requires greater investment of time for planning, design, deployment, and training.

Design

Of most critical importance before any deployment is to ensure that you meet the system requirements of the application. What server hardware, storage hardware, server OS, database, and administrative interface requirements must be met to successfully deploy and run the virtualization management tool to it's optimum capabilities?

Most enterprise-grade virtualization management tools will have design and sizing guides. These guides will help you to match your management requirements (usually based on the number of sites, hosts, and virtual machines) with the size of the virtualization management tool infrastructure required.

For example, to manage 100 hosts and 3000 virtual machines, you may need two virtual machines (one for the database and one for the management application), each with 8GB of vRAM and 4 vCPUs configured. On the other hand, for a smaller installation that monitors just 10 hosts and 300 VMs, you might be able to monitor it with a single VM with just 8GB of vRAM and 2 vCPUs.

Consult your application's design/sizing guide, your VAR, and/or your deployment engineer for advice on how to size the resources needed for your deployment.

Deployment

The deployment of the virtualization management application may be as limited as a simply installation or as large as a multi-site installation and rollout over many months. Undoubtedly, your deployment will vary based on the size of your infrastructure and the complexity of the integrations that your management applications will leverage.

It's recommended to consult experienced engineers from the VAR or software vendor to ensure that your deployment is as smooth as possible.

Training

One of the often forgotten aspects of any new application deployment is training. Anyone who uses the application should be considered for training. In many cases, the software vendor offers training for their virtualization management application. In some cases, for training on very popular products, you may find off-the-shelf books, low-cost video training, and even blog content on the web from others experienced in using the product.

Follow-up Review

Another often forgotten aspect of deploying a new software application is the post-deployment review. After 30 days, is the product meeting expectations? Is it providing the value as promised? Are users (virtualization admins, primarily) using the application to it's potential? Have relevant personnel attended training? Are

expectations for use documented? Has the application been fully integrated at planned? Is the ROI as promised?

Not only are these some of the questions you should be asking after 30 days but they should also be asked quarterly and yearly to ensure that the return on investment (ROI) for the virtualization management application is being achieved, as planned.

Next Steps

After reading this definitive guide to virtualization management tools, what is your next step?

Most importantly – don't stop here. Virtualization management tools can bring tremendous value to companies of all sizes. The visualizations and optimizations they provide are invaluable.

Get started with the process of identifying, learning, and evaluating tools today!

About the Author

David Davis is a virtualization evangelist at Pluralsight.com, the global leader in video training for IT pros. He holds several certifications including VCP, VCAP-DCA, and CCIE #9369. He has been awarded the VMware vExpert award 6 years running and been in the IT industry over 20 years. David has spoken at major conferences like VMworld and authored hundreds of articles for websites and print publications, mostly around virtualization, for respected publications like Virtualization Review and ComputerWorld. He has authored 20+ video-training courses at TrainSignal/Pluralsight including vSphere 5, vSphere Troubleshooting, and vCloud Director Essentials.

His personal websites are VirtualizationSoftware.com and VMwareVideos.com, and co-owner of ActualTechMedia.com.