



YES TO VIRTUALIZATION PROJECTS, BUT DON'T VIRTUALIZE WASTE!

VISUALIZATION OF USEFUL WORK ACROSS IT ASSETS IS KEY TO ACHIEVING GREATER
EFFICIENCIES FROM VIRTUALIZATION PROJECTS.

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ABSTRACT: The effective use of virtualization can reduce server energy consumption considerably, but why is it many companies, which embraced virtualization, have not yet made the savings they had expected to make? Andy Hawkins, Product Manager at 1E explains why visualization of useful work across IT assets is key to achieving greater efficiencies from virtualization projects.

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Virtualization projects have the potential to lower IT costs

Server virtualization has been heralded as a significant way for organizations to increase operational efficiency, cut IT costs and reduce environmental footprint. Virtualization projects have the potential to lower IT costs through the consolidation of servers where the capacity provisioned exceeds the peak demand of the application. In fact, it has been said that the effective use of virtualization technologies can reduce server energy consumption by up to 82%¹, however, these savings are not a foregone conclusion and can only be realized if virtual servers are carefully managed and used productively.

There is a correlation between the amount of savings that can be made through virtualization and how well you plan your virtualization project. You may see some immediate energy savings at the beginning of a virtualization project but overall spend can actually *increase* unless demand and productive usage is carefully managed and deployment of new virtualized servers carefully controlled. If your servers are under-utilized, non-productive, over-provisioned or your virtual server environment sprawls out of control, the potential for dwindling savings or increased spend is amplified.

Beware of virtual sprawl

An increase in virtualized servers may be a success story but if that growth is unexpected then it is likely more attributable to virtual sprawl, one of the quickest ways to negate the benefits of a virtualization project. When the anticipated growth rate of a server estate is exceeded you need to understand why.

There is a trade-off between provisioning controls (typically strictly applied to physical servers) and the flexibility of virtualization. As an example, self-service can give anyone the ability to create their own servers which reduces the burden on procurement and IT, but the further this tool moves away from facilities and IT the less consideration is given to cost versus benefit.

The difficult challenge faced by those paying the bill is that they cannot measure the usefulness of servers being created. Actually this problem existed prior to virtualization but traditionally the focus was on achieving SLAs rather than assessing whether servers are being used efficiently if at all. Looking at a virtualized environment from an efficiency perspective reveals where anticipated savings are being lost across facilities and IT:

The hidden costs of virtualization

The standard specification of a server purchased to host virtual machines (VMs) is usually much higher than a standalone x86 server. Hosting multiple virtualized servers requires more CPUs and significantly more memory both of which contribute to power requirements and heat output.

If growth is not managed, energy demand will increase as organizations purchase more high specification host servers to support the growing number of virtual machines. This is a hidden cost for facilities departments.

If you virtualize 100% of your physical servers today then you will be operating more servers than you started with. The physical and environmental footprint has changed but you still need to monitor, patch, secure, backup and license the virtualized servers and now the host servers as well. Requirements such as high availability further

increase infrastructure costs. Yet the publicity of energy and space savings has created a mind-set that virtualized servers are cheap.

License agreements which incentivize the use of virtualization are another contributor to this. An environment suffering from virtual sprawl will be running applications that are not being used. Even if license cost is no longer a factor those installations still need to be managed and the “in use” count of licenses will be inaccurate. Waste can also be represented in terms of host resource (power, shared disk, RAM) and IT effort. The sum of these items reveals that the initial savings gained from virtualization will be lost if virtual machines continue to run after they’re no longer required. Research and advisory firm Gartner has named this paradox the 'Virtualization Catch 22'².

Server TCO models are complicated by virtualization. Internal chargeback mechanisms that worked when each application was conveniently ring-fenced by the hardware on which it ran are obscured now that one physical server hosts multiple applications belonging to different business units. Some organizations have adapted their models by simply applying the cost of operating a physical server to each virtualized server. This approach helps combat the mindset that virtual machines are somehow free but it is hardly accurate.

Increase the efficiency of your virtualization project

New tools designed for efficiency help identify what is useful and when. This knowledge makes it easy to establish an ongoing process to reclaim unused resource and avoid unnecessary spend on new resource. Traditional tools designed for systems and operations management struggle to deliver this information. Often a report of how busy a CPU is over time is used to represent how much “usage” took place. However this fails to reveal when or if that CPU usage provided business value.

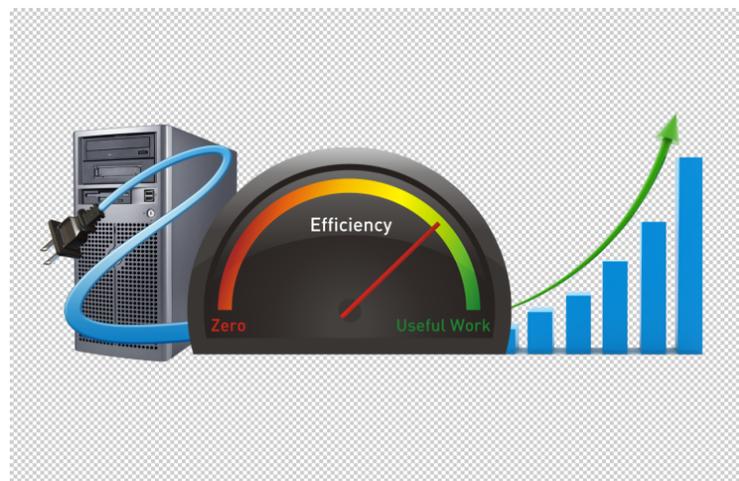


Figure 1: The key to greater virtualization efficiency is useful work visualization analysis

Several analysts classify these new tools as Data Center Infrastructure Management (DCIM) and predict huge growth in this market. Combining DCIM software with metrics from organizations such as The Green Grid is a good approach to implementing server efficiency management. The Green Grid’s Data Center Compute Efficiency Metric (DCcE) is a good example of such a metric. DCcE calculates useful work by considering that a server has a primary purpose for which all resource should ideally be used. Any resources allocated to secondary operations take away from the ideal and hence represent waste. If no resources are used to provide the primary service then that server is doing no

useful work. To put this in context and give an example of utilization versus usefulness, what is the point of powering a file server which never serves any files and only ever performs a backup and gets scanned for viruses?

A virtualization project often does not include metrics which can prove the benefits gained in efficiency. Adopting a metric and tool to measure efficiency enables the following three steps to enhance a virtualization project:

1. **Optimize your environment** – Take a retrospective look at your environment to assess efficiency rather than uptime or performance. Do this before instigating a systematic approach to virtualizing or going after the ‘low hanging fruit’. Your audit will identify hidden leaks in terms of cost, wasted energy, unused software, inefficient hardware and legacy systems that should be decommissioned instead of virtualized.
2. **Set a benchmark for efficiency** – Once you have identified what percentage of servers are doing useful work; whether any of the software you own is unused; and then taken steps to eliminate such waste, you can establish a benchmark for efficiency and accurately monitor for signs of sprawl in the future.
3. **Make the discovery of IT waste work for you** – Be prepared to find waste. When communicating the benefits of your audit back to the business, champion the savings you have made or stand to make, in quantifiable cash, energy or tonnes of reduced CO2 emissions.

Visualize in order to better virtualize

Presenting this data visually offers executives transparency over what is useful, what is unused and what is being wasted. Continuous monitoring and reporting proves that a virtualized environment is running efficiently and is a better solution to periodic checks initiated by a capacity problem or a reactive mandate.

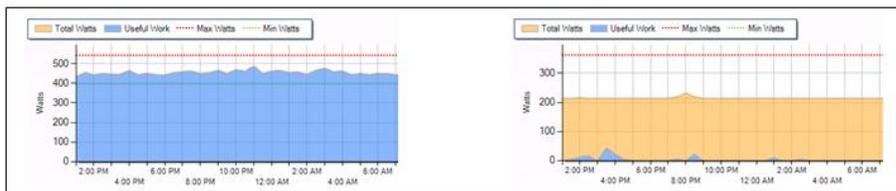


Figure 2 – Visual of a server that uses power for useful work all the time (L) and wastes most of the power doing nothing useful (R)

Publishing on-going measurements internally via a dashboard is a powerful way to combat sprawl by modifying behavior, akin to discovering how much it costs when ‘you leave the lights on’.

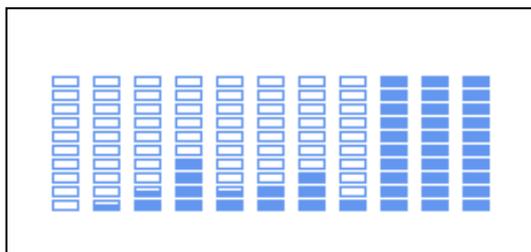


Figure 3 – Visualizing virtual sprawl, showing at a glance how much IT resource is providing value to the business

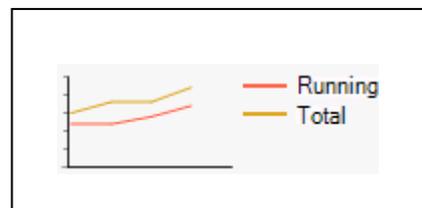


Figure 4 – Visualizing virtual sprawl, revealing how many dormant virtualized servers exist on a host. Sprawl gets worse as the gap between the lines widens

Chargeback schemes can help an organization gain transparency of and ultimately, optimize costs. They facilitate business and IT accountability by moving cash flow controls away from IT and back toward the lines of business, where the costs were initially incurred. Chargeback is a good mechanism to prevent or control virtual sprawl, as it helps departments or business units only use what they really need.

In summary, virtualization has clear benefits, including a reduction in energy consumption and floor space. In order to get the most out of virtualization you should be prepared to invest in tools which monitor efficiency, specifically the amount of useful work your IT assets are doing.

Creating visual representations of server workloads helps you better identify where you have instances of virtual sprawl within your environment and further, such visualizations ensure greater control of issues; facilitate the identification and elimination of waste, leaving you to experience the full potential of virtualization.

References

¹ How to cut datacenter costs (Rakesh Kumar, Gartner) May 09

² Server Virtualization for x86: A Benefits Impact Assessment (Cameron Haight, Stewart Buchanan, Thomas J. Bittman) May 09