Just because you virtualised……

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Discussions with some customers over the last few months have led me to realise that some people think that virtualisation will remove any need for efficient organisation of their computer room. It seems there are some very optimistic forecasts around about what virtualisation of servers can achieve. For example consolidation ratios of 20:1 are often quoted (e.g. BMC Software) and "Reduce hardware requirements by a 10:1 ratio or better," from VMware.

'Aggressive' virtualisation certainly seems to deliver results but there are also management issues of 'turf wars' and territoriality between IT users who often like to own and control the equipment running their application. Others take a negative stance to the 'all my eggs in one basket' approach.

> "While virtualization is a technology that is becoming more common, the pace of adoption is difficult to predict because it can present management challenges that may limit its applicability" [1]

Virtualization allows organizations to replace several dedicated servers that operate at a low average processor utilization level with a single "host" server that provides the same computer services and operates at a higher average utilization level. Given that most mid-range and high-end servers are already operated in this fashion, current trends toward server virtualization are occurring mostly in the volume server market.

Virtualization may offer significant energy savings for volume servers, as these servers typically operate at an average processor utilization level of only 5% to 15% [2]. The typical volume server will consume anywhere from 60% to 90% of its maximum system power at such low utilization. Although virtualization will increase the processor utilization level of the host server (thereby increasing its energy use), the incremental gain in host server energy use is more than offset by the energy savings realized by eliminating the significant energy load associated with running multiple servers at low utilization rates. According to research done by Lawrence Berkeley Labs, experimenting on a Dell PowerEdge 2400 server the difference in energy consumption between a server in idle and running at full load was about 18%. This means that virtualized servers would be expected to produce about 15 - 20% more heat than the average non-virtualized server.

According to a draft US government report [3], a 7% decrease in the total U.S. installed base of volume servers is expected by 2011. The calculation for this is derived from subtracting the high growth rate predicted for computer applications from the efficiency gains of virtualization when averaged across the sector. This equates to an average consolidation rate of only 11:10.

An average presumes that many people will do nothing about virtualization of course but a good example of aggressive virtualization is the United States Postal Service which was able to eliminate the need for 791 of its 895 physical servers through aggressive server virtualization and reportedly reduced its data center power consumption by 3.5 million kWh per year [4].

Even with the energy efficiency trends offered by efficiency trends such as virtualization, the aggregate electricity use associated with servers and data centers is going to rise over the next five years. However, this electricity use is likely to require a significant portion of U.S. electricity. US IT-related electricity use is expected to rise to about 103 billion kWh by 2011 with current trends, which is a 75% increase over 2006 electricity use and represents about 2.4% of total projected electricity use in America in 2011 [5].

So we can see that aggressive and targeted virtualization can offer substantial reductions in server use but the average reduction is likely to be about 7% and even then virtualized servers may be producing 20% more heat because of their higher loading.

The requirements to build a computer room and data centre with efficient and sufficient power, air conditioning, cable interconnection and the security of a well managed building is just as strong as ever; virtualization or no virtualization.

1 Dubie, Denise. 2007. Virtualization ROI Hard to Quantify. *NetworkWorld*, March 2007.
2 US EPA 2007
3 Draft Report to Congress on Server and Data Center Energy Efficiency, Public Law 109-431, April 2007
4 VMware 2007
5 US DOE 2007

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