

Fred Cohen & Associates - Analyst Report and Newsletter

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Virtualization and the cloud - risks and rewards

The concept and realization of virtualization are compelling for certain situations, and the use of cloud computing concepts, as a form of distributed computing in a virtualized space, is just as compelling. But this should not be confused with the notion of the "public" vs. "private" vs. "outsourced" issue.

Virtualization and cloud computing codified

Virtualization, from my simple view, is a method to allow resources to be allocated more flexibly in exchange for reduced performance per resource. This brings about an economy of scale because instead of having dedicated special purpose fixed performance resources, a total commoditized collection of resources can be shared and allocated as needed. As commodities, the cost per unit of utility is smaller, but the overhead of virtualization acts to increase the cost of use of those resources. If the virtual resources can be flexibly turned on and off, and if there is a large enough pool of available resources shared among a large enough group of users, the resources can be far more efficiently applied than custom resources applied to specific applications in stovepipes.

Cloud computing is really another word for distributed computing, in which the storage, computation, and communication are distributed to allow flexible use of available resources. In this sense, it is just virtualization with parallel processing at a finer grain than the computer. It is typically at the process or thread level, but can be at other higher or lower levels depending on the application. Again, the distributed resources can be shared among many applications and users so that as one needs more and another needs less, the resources can be balanced, and economies of scale leveraged for more cost efficiency. And again, resources not currently in use can be powered down, and more expensive resources allocated to higher paying or more premium services.

When we combine virtualization with distribution, we gain the ability to invoke a very wide range of different computational resources with commodity pricing, shared between a large number of users, and allocated per the need. For example, for forensic reconstruction, we may be able to have thousands of different computing environments available to us without having to keep thousands of disks or computers in inventory, while at the same time, running a large distributed database on those same machines with performance of the database flexing based on the need, and at the same time, running remote terminal services to allow any user with any platform to use any of a set of specific environments used for different applications, without the need for a multiplicity of hardware, or maintenance staff. Under high load, we may even be able to use the flexible resources of an outsourced provider to augment our total capacity, while scaling back to internal only infrastructure during lower load periods, thus saving unneeded costs while paying a premium during short periods when the value justifies the added costs.

Public, private, and outsourced

It all sounds just fabulous, and it is, except for some minor details... which always contain the devil. Virtualization and distribution are wonderful ideas, and the tradeoffs are relatively clear. If there is enough volume, they are a good deal. However, this is a different dimension than the private, outsource, and public dimension that it is often confused with. Cloud computing and virtualization capabilities are being largely developed by service providers offering software as a service (SaaS), computing as a service (CaaS), and other things as a service (XaaS). This brings up major issues in that the XaaS providers are developing proprietary capabilities and offering them at commodity prices. The capabilities are potentially compelling, but the risks associated with gaining those rewards are potentially problematic.

Private virtualization and distributed computing (clouds) are simply a matter of trading off the overhead of virtualization with the benefits of commoditization. Throw in some risk aggregation issues and provide enough redundancy to allow assured service under outages and common mode failures, and you can make a sound business decision to move in this direction for any enterprise with a data center containing hundreds of computers. For smaller scales, things get more complicated, but even for businesses with only 10 or so shared use computers, this is a strategy that can work well.

Outsourcing clouds or portions of clouds is also a well understood and well defined area. To the extent that the outsourcer meets all of the industry standards, compliance mandates, and visibility and controllability requirements of the internal cloud, outsourcing parts of the cloud is a sensible business decision. For example, in health care, payroll, and many financial industry applications, this has been done for many years and with great success. Outsourced specialized capabilities are at least as secure as in-house capabilities, they provide a nice separation of duties, and they gain economies of scale that make them more cost effective than internal providers for many applications. Given the alternative of tracking all payroll requirements for all states and countries, building your own systems to manage them, and supporting all of the other aspects of payroll-related issues, the dollar or two per month per employee involved in having this function performed by a major well-known outsourcer is a real bargain for any company that has less than tens of thousands of employees.

Moving toward the so-called "public" cloud is another story altogether. This goes in the "not yet ready for prime time" category. The basic reason is that the risks outweigh the rewards for most circumstances today. While going to google mail or Yahoo mail or any other mail for student email accounts in a university system may be an acceptable tradeoff, and sponsoring mailing lists for public membership on yahoogroups or any of their competitors may work reasonably well when nothing confidential or of high business value is at issue, the public cloud providers are not really ready for the needs of an enterprise, or even most small and medium sized businesses today. They don't yet understand regulatory mandates, have opaque security and auditing, don't deal with integrity or availability issues well, and don't know how to meet the management and accountability needs of business.

Conclusions

Finding the mix to meet the need is the key challenge today. Virtualization and distributed (cloud) computing are good to go, but the public cloud is not, because risks exceed rewards.