



Cloud Now?

No question, today's buzzword is "Cloud". It's going to cut your costs, reduce your workload and provide endless scalability. Gartner's 2008 report said, "no less influential than e-business". The Financial Times, in March 2009, "Not only is it faster and more flexible, it's cheaper. ...the emergence of cloud models radically alters the cost benefit decision". People say they are adopting it: A June survey by Applied Research – West, sponsored by F5 Networks, found that two out of three IT Managers interviewed reported they have dedicated budget funds for Cloud.

If you're a medium-to-small enterprise whose business is on the Web, serving your customers with serious proprietary applications such as SaaS or B2B eCommerce, are you missing out if you're not moving to Cloud now? Our real-world analysis for our hosting customers – whose revenue and customer retention depend on their "serious Web" applications – says, "NO, at least not for two or more years. For much of the savings – without the risk – go with Virtualization. Look toward Private Cloud."

To explain, we'll look at:

- **What do today's revenue-driving "serious Web" applications need?**
- **What – in simple English – is "Cloud"?**
- **How does Cloud fit – and not fit – for serious revenue-driving apps today?**
- **How can virtualization drive real-world saving and keep your Cloud options open?**



What Do Revenue-Driving Apps Need?

The bottom line for SaaS and B2B – serious applications – on the Web is the end-customer's experience. Happy customers stay with you, keep coming back for more and provide the revenue stream that means success.

First and foremost, that end-customer experience depends on the application or Web site: Its features and functionality. This is likely your expertise and your important intellectual property. Complex and feature-rich applications are investments, developed and enhanced over time. The success factors are your core competencies:

- Development savvy
- Subject-matter expertise
- Understanding the customer's needs
- Management of the development process.



Second, the end-customer's experience depends on application delivery: Uptime, performance and security. This is where Cloud would fit. The success factors for delivery:

- Data center/network security and fault tolerance
- Architecture and hardware sized and configured for your application
- Operating systems, middleware, and databases selected and configured your application
- Where applicable, compliance: PCI for ecommerce sites, HIPAA for healthcare, SOX...
- Proactive administration and operations
- Rapid and effective incident resolution

What Is Cloud?

There's plenty of confusion about what "Cloud" means. McKinsey & Company, the large consulting firm, has offered the following simple definition:

"Clouds are hardware-based services, offering compute, and network and storage capacity where:

1. Hardware management is highly abstracted from the buyer (can be anywhere geographically, are presented as virtual resources)
2. Buyers incur infrastructure costs as variable operating expense
3. Infrastructure capacity is highly elastic (up or down)"

The computing resources:

- Can be located anywhere geographically
- Are run in "multi-tenant" mode with multiple customers accessing the infrastructure simultaneously
- Are presented as virtual resources (CPU/Memory, Storage, Bandwidth...), deployed and managed by the customer, on demand, using automated self-service portals
- Are billed in some form of pay-per-use

Cloud, as we consider it here, is in the form of the "Public Clouds": Amazon Elastic Cloud Compute (EC2), Google Apps Engine, Windows Azure and other more traditional hosting providers like EDS and Verizon now entering the market.

How Does Cloud Fit?

Savings, scalability and **flexibility** are the promise of Cloud, and for some applications they are already delivering. Information Week reported in Sept. 2009 that Web hosting and development/testing are the most common uses of Cloud infrastructure.

Cloud’s benefits come from three important features:

1. Economies of scale, leveraging a large pool of shared resources to serve the variable demand from many customers, knowing that max utilization will never peak for all users at the same time. Today’s benchmark industry average is 10% average utilization of servers. Whether accurate or inflated, industry experts are predicting up to 280% improvement with Cloud, stretching that to 38% utilization or higher.
2. Standardization, to make components interchangeable, thus deployable to meet demand,
3. Automation, dramatically decreasing deployment time by pushing activities formerly handled by engineers and administrators to software portal tools, and the users who operate them.

When we line up those features – and what they mean about Cloud application delivery – against the needs of serious SaaS and B2B applications, there are some serious gaps.

“Serious Web” Requirement	Cloud Benefits	Cloud Issues
Data center/network security and fault tolerance	Most Cloud providers operate in high-quality SAS 70 Type II certified facilities with excellent connectivity	Multi-tenant (shared) Cloud environments have known security risks and documented breach incidents. Cloud providers’ proprietary self-service provisioning tools have a potential to introduce security vulnerabilities.
Architecture and hardware sized and configured for your application	Potential for scalability approaching ‘infinite’	Security, reliability and performance risks of dynamic resource allocation across multi-tenant platforms and geographic locations are uncertain and still being identified and addressed.
Operating systems, middleware, and databases selected and configured your application	Quick deployment of standard configurations	Limited to OSs, middleware and databases supported by the cloud provider; may be limited to specific versions and configurations.
Where applicable, compliance: PCI for ecommerce sites, HIPAA for healthcare, SOX...	None	Not compliant.
Proactive administration and operations	Committed to supporting the Cloud	Little or no support for non-standard configurations. Limited customer-instance-level monitoring.
Rapid and effective incident resolution; SLAs		Below-industry standard SLAs for availability of infrastructure components; none for performance. How and where your app’s computing resources have been ‘sliced’ and provisioned increases support complexity to problem resolution.

Our conclusion: For serious revenue-driving Web applications, the business risks of Public Cloud far outweigh the potential benefits...until the technologies mature.



How Does Virtualization Fit?

Unlike Cloud, virtualization has been around for years – in concept since the mainframe. The definition of virtualization is solid, and can even be found on whatis.com: “the use of software to allow a piece of hardware to run multiple operating system images at the same time”.

Where virtualization allows a piece (or a local cluster) of hardware to run multiple operating system images or instances at the same time, Cloud allows a very large pool, many pieces of hardware in one or more locations, to run mega-multiple operating system images at the same time. When it comes right down to it, one way of describing Cloud is “Virtualization on Steroids”.

Virtualization software is the underpinning of Cloud. When Information Week surveyed Cloud providers in June 2009, all but one of the ‘top twelve’ reported that they used the most popular virtualization software: VMWare, Xen or Microsoft to deliver their Cloud offerings. Virtualization vs. Cloud is mostly about scale.

Virtualization software, used in a local (non-Cloud) environment, is well-along the development and adoption curve; proven in a wide variety of enterprise and serious SaaS and B2B application delivery environments. Case studies report savings of 20% or more. As the underpinning of Cloud, it’s also the logical path to keep your Cloud options open.

No surprise: **savings, scalability** and **flexibility** are the promise of virtualization...on a smaller scale than Cloud...but proven and available today.

Virtualization’s benefits come from:

1. Increased server utilization: compared to the industry benchmark of 10% server utilization, experts, including McKinsey, estimate that average utilizations of up to 25% are reasonably achievable. That’s less than Cloud’s projected 38%, but still significant. Improved utilization reduces the number of devices required, driving down costs for hardware, space and power.
2. Automation: provisioning tools reduce deployment time, increasing productivity, decreasing labor.

When we line up those features – and what they mean about application delivery using virtualization – against the needs of serious SaaS and B2B applications, there’s very good alignment.



"Serious Web" Requirement	Virtualization Benefits	Virtualization Issues
Data center/network security and fault tolerance	Facility and connectivity are independent of virtualization. Virtualization on customer-dedicated hardware (single-tenant) is secure.	Virtualization on multi-tenant (shared) devices may be subject to some of the security risks of Cloud, depending on specifics of implementation.
Architecture and hardware sized and configured for your application	Highly scalable, to the physical constraints of the devices used.	Requires proactive monitoring and management.
Operating systems, middleware, and databases selected and configured your application	Reduced deployment time; very quick for 'standard' configurations, additional effort/ time for customization. Options limited only by your/your hosting provider's flexibility.	By exception, some very old OS, middleware and DB software versions may not be compatible with specific virtualization software.
Where applicable, compliance: PCI for ecommerce sites, HIPAA for healthcare, SOX...	Compliant on properly-configured single-tenant virtual platforms. Easy option to mix and match virtual and dedicated devices when needed.	Virtualization on multi-tenant (shared) devices may not be compliant.
Proactive administration and operations	Virtualization software provides tools. Otherwise, none/not applicable, independent of virtualization; depends on you and/or your hosting provider.	None/not applicable: Independent of virtualization.
Rapid and effective incident resolution; SLAs	None/not applicable: Independent of virtualization; depends on you and/or your hosting provider.	None/not applicable: Independent of virtualization.

Our conclusion: For serious revenue-driving Web applications, virtualization offers significant saving opportunities, limited and controllable risk, and a path to future Cloud options.



Virtualization Today for Real-World Savings

Keeping in mind that end-customer experience drives the business, customer experience is the critical constraint against which serious Web applications must balance potential savings. As we've guided customers through the process of transitioning to virtualization we've learned some real-world lessons:

1. Be realistic. Virtualization can't replace everything. You – or your hosting provider – will still need firewalls, load balancers, switches, backups, and monitoring.
2. Manage costs by remembering that not every application or software tier that can go virtual should go virtual, and even then, not all at one time.
 - The best candidates are applications that have very predictable resource utilization; the worst are applications already steadily consuming 35% or more of server capacity.
 - It rarely makes cost sense to replace a perfectly good, manufacturer-maintained dedicated server with a virtual instance. Wait until you need to spend on hardware or re-purpose equipment to take advantage of the dedicated machine.
 - High-availability requirements add complexity. Start with Web servers and App servers. HA databases are probably last on the list, and are a good example of a function you may choose not to virtualize at all.
3. Virtualization is an investment in hardware, software and expertise. From a development perspective it may mean some changes. From an application delivery perspective, If you're self-hosted it's about your equipment and people. If you use a hosting provider, it's about making sure they know the territory and do it right.
 - Servers with up-to-date chipsets that support VMA must be used. Other, older processors, even though they may be under maintenance and perfectly good, can lose up to 40% of throughput managing the hardware access overhead.
 - It's not just servers. Virtualization requires SAN, fibre cards and switches. Entry price for an EMC CX4-5F is \$15,000.
 - Then there's virtualization software. For example, VMWare for an environment with up to 10 servers will cost about \$12,000.
 - Your operations support or hosting team will need to know (or learn) your virtualization software of choice. Expect them to have (or need) training.
 - Your in-house or hosting network team will need to know new and complex concepts: 802.1q trunking, virtual switches. Expect them to have (or need) training.
4. Don't put too many eggs in one basket.
 - Ensure that multiple instance of the same function (Web servers, for example) won't be located on the same physical device, making a single point of failure.
 - Don't overreach by starting out with too many VMs on a single server or by skimping on server capacity.
5. You'll still need monitoring, management and backup tools. Virtualization doesn't change the basics.



6. Test, test and test again. There can be application issues. High availability in a virtual environment may require more resilience from your app. Cutover to a virtual environment is no different than any other cutover.
7. Monitor, monitor and monitor. Each piece of hardware carries risk for all of the applications running on it. Shared resources, especially SAN and virtual network, introduce new potential performance bottlenecks.

Looking Ahead: Private Cloud

Private Cloud is the middle ground: single-tenant, highly scalable, highly self-service; the tools and efficiencies of Cloud with the security and control of dedicated equipment. It's not ready yet, but it's an important development target for virtualization software.

Go virtual now...uncover any application issues there...migrate away from any old development languages, non-standard OS/middleware/database versions and unique devices...look to Private Cloud next...and...maybe move to Public Cloud someday, when it's ready for "serious Web".

ABOUT Mentora

Mentora is a pioneer in the new generation of managed application hosting providers, combining support of Linux and the newest technologies, system performance testing and a complete menu of managed services for networks, servers, operating systems, databases, and storage, with our exclusive, personalized ***named-engineer-on-call*** and ***Application Availability SLA***. Headquartered in Atlanta, Mentora has offices in Boston and Washington DC, and delivers services nationwide.