Time to Build Your Own Cloud? Key Technology Considerations

Public cloud services offer an easy start-up option. But, as a business becomes more successful, monthly charges can soar. Whether or not a private cloud is right for your business depends on a number of factors, including where and how you decide to build it and which technologies you choose.
Is the cost of delivering workloads outpacing your budget? If so, it might well be time to move to a cloud computing platform. By choosing efficient building blocks, including solid state drives, low-power DRAM, and an advanced server architecture, a high-performance, scale-out cloud infrastructure can be much more cost-efficient and faster to deploy than you may realize.

By answering three key questions, you can get past the usual cloud hype and determine whether building a private cloud with advanced technologies can significantly improve the success of your business.

**Will We Save Money?**
In 2011, a study by the Aberdeen Group showed that, on a per-application basis, private clouds produced a 12 percent combined annual costs savings over public clouds.

Since then, more and more companies have seen impressive private cloud cost efficiencies. Consider the start-up firm CloudMosa, developer of the Puffin Web browser, which accelerates the speed of Web browsing on mobile devices by shifting browser processing from the device to a cloud data center.

According to CloudMosa's founder and CEO Dr. Shioupyn Shen, Puffin's success soon cost the company plenty: In just six months, the bill for CloudMosa's rented space on its cloud provider's servers grew from $1,000 per month to more than $50,000 per month. The time had come for CloudMosa to build its own cloud data center.

To support Puffin users, who now view about a billion Web pages per month, Shen opted for a colocation environment. There, CloudMosa built a hyperscale data center that runs more than 1,000 servers. The infrastructure cost $1 million; renting that amount of capacity from a cloud services provider would have cost the company $500,000 per month.

"This is a huge savings for us," Shen says. “To build and run our own data center was a life-or-death decision for our business.”

**Should Our Private Cloud Be Colocated?**
Much of the labor and hassle associated with traditional data centers can be avoided with cloud technologies, particularly when running a private cloud in a colocation facility.

Colocation (or colo) advantages include:

- **Lower bandwidth costs.** Colo facilities generally provide higher bandwidth speeds and better network redundancy than you can get from fractional T1 or DSL lines.
- **Better power-outage protection.** Colo facilities can operate during extended outages.
- **Additional security.** Because it's a data center, a good colo facility provides plenty of physical and infrastructure security.

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Private cloud colocation approaches include two options:

- **Wholesale colocation**, in which you own and manage the cloud infrastructure (hardware and software) that you opt to locate at an off-site facility of your choosing. With this option, you’re responsible for all of the IT work.

- **Supported colocated private cloud**, in which you own the cloud infrastructure and colocate it off site — but engage a third party to provide some or all ongoing management and support.

### EIGHT COLO FACILITY CONSIDERATIONS

Here’s what to look for as you go colo shopping:

1. **Power provisioning.** Each colo provider has its own formula. Some charge per circuit, some for each cabinet, some meter actual usage. The number of circuits you need and how much you load them will affect your power costs.

2. **Carrier options.** Some colos are carrier neutral, so you can directly connect to any communications provider, while others maintain in-house relationships with selected providers. Also note whom you’ve contracted with for communications services — the carrier or the colo — because this might restrict your options when switching colos or moving to your own data center.

3. **Network and physical security.** How does the colo attend to network, administrative and physical security? Look for 24x7 staff on site, extensive camera surveillance, and multifactor authentication at building and data center spaces.

4. **Physical reliability.** Look for fully redundant systems for power and cooling, with generators and backup batteries for continuous uptime.

5. **Support options.** What sort of support will you need now and in the future? Some colos do it all; others do nothing. Even if you want no support now, you would probably like to have it available in case of emergency. Whichever way you go, make sure you have answers to these questions:
   - Does the colo offer 24/7 support?
   - Does its staff carry the appropriate certifications?
   - How does it monitor/log bandwidth use, security, configuration changes and patch management?
   - Who troubleshoots malfunctions and other issues, and what resolution processes are in place?
   - Does the colo offer data backup? Is backup offered via online replication, tape or at a secondary location?

6. **Compliance requirements.** Your business may require a colo facility that meets certain compliance mandates (HIPAA and OCR Audit Control in health care, PCI/DSS in retail/e-commerce, etc.).

7. **Is the colo facility audited?** SAS 70 audits have been replaced by SOC 2, SOC 1 (SSAE 16) audits that measure the security, availability, processing integrity, confidentiality and privacy controls of a data center’s system, as well as the operating effectiveness of these controls.

8. **Location.** Ideally, the location is safe from natural disasters, can easily incorporate high-availability and disaster recovery solutions, and enjoys a moderate climate (not too hot, not too cold).
How Do We Choose the Right Private Cloud Technology?

Once you have chosen the right private cloud hosting model, you will have important infrastructure choices to make that will have an impact on the efficiency and cost-effectiveness of your private cloud. Technology breakthroughs in server design, power management and automation make it easier than ever to build a cost-efficient private cloud. The key is to *right-size IT* by getting cloud infrastructure that’s built for the job today and tomorrow.

Right-sizing IT in a hyperscale private cloud environment often means changing the traditional IT approach that says a general-purpose, one-size-fits-all server can meet all your needs. Successful private clouds are instead using highly efficient server architectures that avoid costly data center expansions by delivering increased compute power within the same energy, cooling, and space footprint.

How? By running several workloads in a single chassis (which consolidates a hot-swappable coprocessor or graphics processing unit and storage sleds) to optimize data center space and performance. This approach:

- Maximizes productivity for scale-out environments
- Creates a scalable, redundant shared infrastructure
- Provides an efficient, flexible environment for specific workloads
- Enhances power efficiency with agile power supply options

Right-Sizing for a Private Cloud

By making intelligent and efficient use of streamlined system resources, you can deploy cost-effective models equipped with only the capabilities needed for your particular cloud environment. Purpose-built for scale-out cloud environments, Dell PowerEdge™ C Series servers offer a more streamlined feature set compared to general-purpose servers. They focus on providing right-sized workload performance while maximizing energy and space efficiency. In addition, PowerEdge C Series servers leverage Dell’s global supply chain as well as the extensive field experience of the Dell Data Center Solutions (DCS) team.

**Dell’s PowerEdge C5220 Microserver** was developed for dedicated and virtual hosting, content delivery networks and Web 2.0 applications. Designed to handle a wide range of lighter-weight workloads, the C5220 delivers an easy-to-service, highly dense hyperscale architecture of 8 or 12 nodes in a 3U shared infrastructure form factor chassis based on Intel’s® Xeon™ E3-1200 series processors. The PowerEdge C5220 8-sled version, meanwhile, has a mezzanine card slot for SAS drives, hardware RAID, or an extra dual port 1Gbe NIC. Its shared infrastructure provides a 4X increase in density, meaning 75 percent less to cool, so you can get more compute power into less floor space. And the C520 is cold-aisle accessible, so data center temps can be higher, which also lowers cooling costs.

Examples of the PowerEdge C5220 microserver’s efficiency include:

- A 12-node PowerEdge C5000 chassis recently achieved the top power-efficiency spot among all modular (or multinode) servers for a SPECpower benchmark. The PowerEdge C5220 scored a 6000 in the SPECpower_ssj2008 overall ssj_ops/watt, with up to 80 percent better efficiency over competitors.†
- Eight Dell PowerEdge C5220 servers residing in a C5000 chassis were configured into a Hadoop cluster that ran MapReduce benchmark tests of varying sizes, map processes and reduce processes in just 15.9 to 25.6 seconds on average, making this platform ideal for scale-out data analysis application workloads.‡

**Dell’s PowerEdge C6220** delivers an 80 percent improvement in performance with up to four 2-socket Intel Xeon E5-2600 processor-based servers in a smart 2U shared infrastructure chassis that saves more than 100 watts and provides 2.3 times the memory bandwidth of the previous generation. The C6220’s 135W processors deliver 20 percent more performance over 95W processors.§


Relying on older servers with less-efficient components for a private cloud carries a higher price tag than you may think, one that will claim more of your budget over time. By contrast, the savings generated by energy-efficient infrastructure has a cascading effect on the total cost of ownership (TCO). And it’s not just the server platform that runs more efficiently; costs associated with powering racks, cooling equipment and infrastructure management are optimized, too.

At the component level, Samsung’s low-voltage solid state drives (SSDs) and dynamic RAM memory (DRAMs) provide compelling examples of how state-of-the-art technology can enable new-generation servers to save considerably more power compared to previous-generation technologies. Because SSDs face none of the bottlenecks imposed by disk rotational speed limits, they significantly boost server efficiency. And they reliably write data onto the integrated circuits of non-volatile NAND flash memory.

A new Dell customer case study highlights the level of cost savings that can be potentially achieved by first choosing the right private cloud hosting model, and then deploying the right energy-efficient infrastructure to fit workload demands. CloudMosa designed its cloud using Samsung Green enterprise-class SATA SSDs because of their superior performance and power characteristics. Samsung Green SM825 and SM843T SSDs can singlehandedly support the workload of up to 245 conventional hard disk drives, offering speeds of up to 98,000 operations per second. Dell’s PowerEdge C servers also leverage Samsung’s ultra-low-power 40nm class, 2Gb-based, 1.35V Green DDR3 memory technology to deliver a 73 percent power saving compared to previous-generation technologies.

You can choose processors, memory, cards and connectivity per server node to mix workloads in the same chassis.

When it comes to building a private cloud, Dell offers guidance, best practices, deployment and support assistance every step of the way. And the potential rewards are great — enabling organizations to reduce IT infrastructure maintenance costs in some cases to less than 50 percent of IT spending.iv

Cloud solutions that bring together pretested, preassembled and fully supported hardware, software, and services make quick, easy work of deploying and managing an elastic, on-demand private cloud data center.

Cloud automation doesn’t have to be nearly as daunting as it sounds. Says CloudMosa’s Shen: “We developed an automatic installation program, so all we need to do is put in the server, connect the network, and everything figures itself. It starts to serve live traffic in about a half-hour after we turn on the power.”

Dell’s solutions portfolio provides a number of options that are appropriate for private cloud
deployments,” depending on the customer’s use cases and data center requirements. Some of these cloud automation options include:

- mCloud™ Helix, an energy-efficient, power-dense integrated OpenStack appliance, that allows Web hosting and cloud services companies to offer private cloud services to their customers
- The OpenStack™-Powered Cloud Solution, an Ubuntu®-based Infrastructure as a Service (IaaS), that builds an open source cloud foundation designed to handle massive data loads, while remaining flexible and scalable
- The Crowbar Software Framework, a modular, easy-to-use open source software framework that accelerates and automates open source deployments, including OpenStack and Hadoop
- OpenManage™ systems management, which provides embedded multivendor server management, agent-free server life-cycle management and single-console monitoring/management in data center environments
- SUSE® Cloud software, a Linux-based private cloud software for IaaS, which makes it possible for customers to create and manage enterprise-level Linux workloads across private and public clouds

Choosing the Right Approach

As CloudMosa’s experience shows, keeping IT costs in check involves taking control of the systems that do the heavy lifting — regardless of where you decide to locate them — to match requirements to the appropriate hardware.

Some of the most cost-efficient cloud data center designs use systems right-sized for the applications they power.

These systems, such as Dell’s PowerEdge C5220 and C6220 servers, share infrastructure by combining compute, storage, power and cooling resources to drive high levels of efficiency, compute density and system scaling. It all adds up to significantly lower TCO even as your enterprise demands more from its IT infrastructure. This approach:

- Reduces space, power and cooling costs
- Avoids rip-and-replace upgrades by building on existing investments as you add new infrastructure
- Enables simplified management and automation via a single console

A highly efficient, scale-out server design lets you further increase compute power without having to expand energy, cooling and space footprints. By installing energy-efficient SSDs, boosting density with high-performance, low-power memory, and sharing power supplies, fans and cables across server nodes, the right servers can deliver an 80 percent improvement in performance while sharply reducing power consumption.

Regardless of where they reside — collocated or in-house — private cloud solutions that bring together pretested, preassembled and fully supported hardware, software and services can be up and working quickly. Building and deploying the cloud capability your business needs has never been easier or more affordable.