Diamond
Management & Technology Consultants

insight

The Future Is Partly Cloudy

Cloud computing is here to stay, but the resulting systems are not clean and simple.

By Chris Curran and Nalneesh Gaur

Experienced CIOs have learned the hard way that achieving tangible benefits early in the technology lifecycle is no easy matter—whether its OO, CMMI, ITIL or SOA. Like those before it, cloud computing is a promising trend that deserves attention, balanced with a good dose of business sense. We believe the cloud will gain traction as leaders embrace some of the practical realities involved in introducing not just a new set of technologies, but accompanying processes and financial models. Over the next three to five years, many enterprises will operate a hybrid cloud model, one in which public and private infrastructure clouds, and traditional data center hosting coexist as part of the enterprise infrastructure ecosystem.

In order to minimize the risks, build the skills, address the "hidden" costs, and improve the odds that cloud computing will deliver real value, the CIO must dig deep to gain a clear picture of his or her organization's readiness. Only then should the CIO begin evaluating the company's systems architecture and building a roadmap to the appropriate hybrid cloud model.

Introduction

A June 2009 Microsoft-commissioned survey of 1,200 decision-makers in the United States, United Kingdom, Japan, and Germany finds that one in three plans to transform his or her application environment over the next two years to a model that relies more on virtualization and cloud computing.[1] Sixteen percent plan increased investment in cloud computing.

This interest is not surprising given that data center costs are and will remain one of IT's greatest expenses—at least 36 percent, according to a 2009 MIT Center for Information Systems Research/Gartner survey.[2] CIOs are listening because cloud providers promise lower, more predictable costs and agility—benefits seemingly at odds with one another.

But while cloud computing looks promising, how do companies gauge whether or not they are ready, which cloud models are most appropriate, and what their transition path should look like? CIOs looking to adopt cloud computing must grasp its cultural, organizational, financial, and technological implications.

For more information contact:
Chris Curran
Partner, Chief Technology Officer
chris.curran@diamondconsultants.com

Finding the Right Hybrid Cloud Path

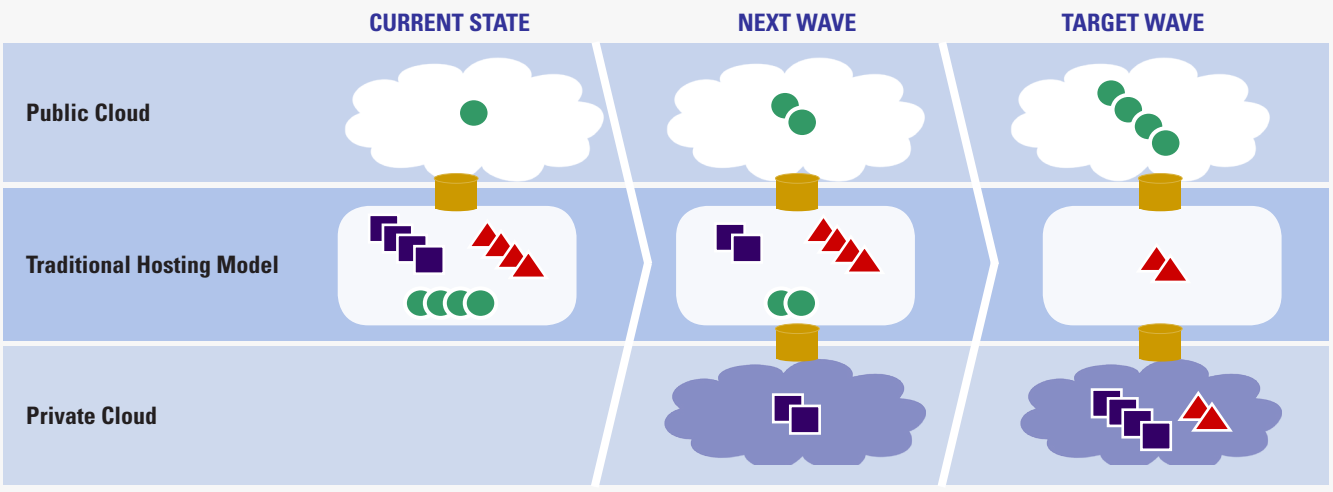
Early adopters of virtualization, utility, and grid technologies may have unwittingly progressed into the cloud operating model (see "Is That a Cloud?" sidebar, page 7). Commercial public cloud providers such as Amazon Web Services and Force.com are making it possible for these technologies and operating models to gain broader adoption. In some cases, public clouds are certainly worth exploring. This is true when a vendor offers an extremely mature service with broad functional appeal such as Salesforce.com or offers undeniable svalue such as Google's Exchange server in the clouds.

Public clouds offer greater scale and, as a result, greater cost savings. They are, however, immature, providing far less control over SLAs, raising security and compliance concerns, and complicating back-end integration. Private clouds are attractive because they offer similar benefits to those of a public cloud with increased control and advanced customization. Our own clients are selectively migrating or replacing applications within both public and private clouds.

Not all applications will be migrated to public clouds. In fact, we believe that the three operating models—traditional hosting, public clouds, and private clouds—will coexist for the next three to five years at the very least, especially for large and mature enterprises (see Figure 1).

We expect to see two directions in which companies will travel. Firms with high business and technology volumes demand high levels of performance. Many of these firms must also meet robust regulatory and security mandates (e.g., Wall Street firms and other large highly-regulated enterprises). Systems are likely to shift from the current hosting model to a hybrid cloud model that combines hosting with elements of a private cloud. These companies may selectively adopt public cloud services for things such as customer relationship management, but for the most part, public clouds will not be able to meet their needs in the near term. On the other hand, small to mid-size companies in less regulated industries, such as retail, may choose to augment their current hosting model (or even replace it) with the public cloud—able to extract its benefits without the need to meet more stringent requirements.

Facing the reality of heterogeneous cloud architecture, what characteristics would your business have?



Enterprises will eventually migrate or replace most applications to the cloud model, but core applications will remain in the traditional hosting model, at least for the next three to five years.

Source: Diamond Management & Technology Consultants, Inc.

Figure 1

Exploring the Hidden Costs on the Cloud Path

Cloud service providers can make compelling sales pitches in terms of cost of individual services (e.g., $500 per user per year), but numerous "hidden" expenses can alter a company's outlook—costs related to people, processes, and architecture associated with both the transition and the in-house operation of the resulting systems. CIOs and other IT professionals are already well acquainted with such expenses, but the challenge lies in uncovering them in the relatively unfamiliar cloud model and determining accountability for each (see Figure 2).

As our clients consider taking the next steps into the cloud, we are helping them explore five key questions to help uncover the hidden costs:

1. What are the viable paths to move (or replace) legacy applications into the cloud?
2. What architectural changes are required to integrate cloud and non-cloud applications?
3. How should we change our technology and operations processes to take advantage of different procurement, provisioning, and management models?
4. How will a private cloud give me more flexibility than current hosting or public cloud models?
5. What other complementary cloud services exist that I can take advantage of now?

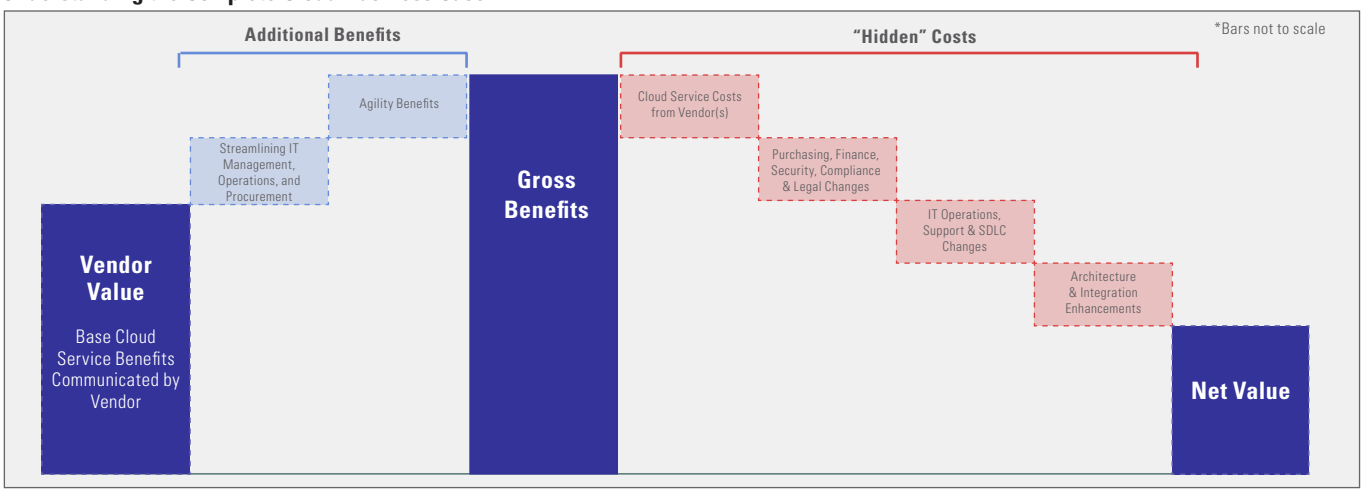
These questions recognize a transition from individual cloud-based applications to more complex systems. For example, when a cloud application such as Salesforce.com—which tracks targets and prospects through your business development, sales, and relationships cycles—really takes hold in your organization, the conversation quickly jumps to the "systems" conversation (a customer management system in this example), which prompts other questions:

1. How do I make sure all of the customers in Salesforce.com are synchronized with those in my customer management application, my billing application, and my six product systems?
2. Should I add custom application logic into Salesforce.com to validate customer and company information against my master list? Or should I do it externally?
3. What kinds of skills and other organizational considerations should I make for the IT staff that support my customer systems?

While we use Salesforce.com as an example—simply because of it wide adoption across industries—keep in mind that the preceding questions should be raised for other industry and enterprise application discussions.

As cloud applications and their underlying architectural platforms become more robust, so too will the discussions around the true costs of the "business systems" that incorporate them. So, it is important to get beyond the usage costs for a cloud service and spend enough time to understand the total costs to migrate, implement, integrate, train, and redesign the surrounding and supporting people, processes, and architecture.

Understanding the Complete Cloud Business Case



Source: Diamond Management & Technology Consultants, Inc.

Figure 2

Digging Deeper to Assess Cloud Readiness

Any new technology carries the potential for hidden risks beyond its sticker price. To get a full picture of benefits and risks of cloud computing, we recommend that enterprises should conduct a six-step readiness assessment. At the end of the assessment, an organization will be ready to engage a few targeted cloud providers to discuss high-priority candidate systems that may benefit.

Build or break the business case. How will the new model respond to M&A activity, geographic expansion and/or new product introductions? While costs are often a key driver for the cloud model, IT leaders should consider its agility benefits as well, whether it is about improving time-to-market for new products or quickly adding new offices or geographies.

Take stock of the application portfolio. First, IT leaders need to look at where each application in the pipeline sits in its respective lifecycle. Those that are nearing the end of life—where upgrading technology makes sense—would be logical choices to send to the cloud. Second, IT leaders need to identify the linchpins for new business growth, spots where existing applications might become stressed by business change.

Rank the range of relevant cloud offerings. Today's cloud services are designed to work best with multi-tiered application architecture. But a technological fit isn't the only concern. Service level agreements, security, and regulatory implications of moving into the cloud need to be considered as well. In addition, the ability to retire an in-house application—such as retiring a CRM application in favor of Salesforce.com—will likely impact cost as well as feature-set, usability, and flexibility. Likewise, moving a billing application to a Java-based platform in the cloud is one way in which re-platforming might play a starring role.

- Off-the-shelf cloud services include the "plain vanilla" versions of Salesforce.com, Google's Docs and Mail services, multi-media hosting, and cloud-based backups, among others. Fortunately (and unfortunately) these services are so easy to buy and use, some corporate users buy directly rather than going through more formal procurement or IT channels. To combat this, one of our clients is establishing blacklists on its perimeter to clamp down on unapproved usage.
- Customized cloud applications add organization-specific functions and extensions to the vanilla cloud applications, taking them a major step further because the organization must commit resources to learning the cloud provider's development tools, languages, and quirks. IT leaders should beware of vendor lock-in due to proprietary development tools, APIs, and runtime environments.
- A Custom application on a cloud platform uses a cloud-based application development platform such as Amazon's EC2, Google's Python environment, or 3tera in place of the organization using an off-the-shelf business application (or one that has simply added custom functions or extensions). Because infrastructure clouds are agnostic to deployment platforms, they offer more freedom for building and deploying applications. While there are limitations (e.g., few choices of tools and languages, limited data storage, movement options), they are great for quick and inexpensive prototyping, especially for Web 2.0 applications. For example, one of our transportation and logistics clients is evaluating Force.com and Google's platform to serve as a basis for a re-write of its core legacy systems that are barely supportable and that cannot scale fast enough to support aggressive geographic expansion.
- In-house integration solutions provide a means for merging data across cloud applications, such as customer information and online community user data. We believe integration services—

both message passing and database integration and hosting—are a huge opportunity for cloud providers. Amazon Simple Queue Service (SQS) offers such integration capabilities, but some of our clients have found it to be limiting in terms of number of queues, messages, and message size, and have resorted to in-house application integration solutions. Diamond has also used this approach internally, creating a custom Salesforce.com instance integrated with our Peoplesoft financials and additional in-house databases.

- Heterogeneous Cloud Architecture allows an organization to move an overall area of functionality, such as user authentication, to the cloud. One of our healthcare clients is in the process of moving all its internal and partner user-identity management functions to the cloud, which means all of the organization's major applications will utilize cloud-based services to authenticate users. A user's identity created in this manner becomes interchangeable across multiple organizations as more partners participate in the identity network (which adds a whole new set of issues).

Explore infrastructure-only cloud services. Companies can use Infrastructure as a Service (IaaS) as a vehicle for piloting low-risk applications in the cloud to prepare for broader cloud adoption. Leveraging opportunities in this area requires a comprehensive understanding of IaaS and the different infrastructure delivery models. Virtualization and workload management are two key components of any IaaS cloud model.

Assess readiness for a radical shift in resource planning. Migrating from managing servers to maximizing computing capacity will require a fundamental change in the planning mentality. Because virtual machines can be created almost instantly and by anyone (without proper governance and controls in place), they could easily multiply and result in wasted capacity and reduced cloud benefits. Clouds must also be sufficiently elastic to meet peak computing needs and then revert back to normal operations without wasting money and capacity. This requires IT leaders to understand current and future demands, and to evaluate current monitoring and asset management tools and processes for their suitability in the cloud model.

Seek out early adopters and launch a pilot project. Some areas of the business may have already enlisted cloud computing services. IT leaders will need to seek out these business users before launching any pilot. Initiatives that require quick time-to-market and increased flexibility, and that lack complex integrations, are ideal candidates for such a pilot.

Conclusion

There are risks associated with moving to the clouds, and it will take time for organizations to build the skills, address the "hidden" costs, and improve the odds that cloud computing will deliver real value. For the foreseeable future, most high-volume and high-performance companies will want to pursue a hybrid model—one in which public and private infrastructure clouds, and the traditional data center hosting (internal or third-party) coexist amid the enterprise infrastructure ecosystem. In many cases, industry requirements will determine whether a company leans more toward private or public cloud options. A benefit of the hybrid model is that it allows for experimentation and gradual transition.

CIOs face several key challenges as they embark on the path toward cloud computing. Possibly the most significant hurdle will be convincing their business partners that there's more than meets the eye in terms of cost. (Remember a few years ago when people were asking, "Why aren't we using an ERP system?" Here comes the questioning again.) Despite the hype, we believe CIOs have a lot to gain by experimenting with low-risk public cloud applications before seriously exploring vendor solutions.

The pace and direction of each organization's cloud computing migration strategy will differ. But what will remain constant is the need for an organization to understand its readiness for a new and potentially better approach to delivering business value. With a comprehensive assessment in hand, a CIO can begin evaluating the company's systems architecture and building a roadmap that demonstrates the business value in shifting pieces to the cloud, the company's readiness, and potential vendor fit.

One thing is clear: finding value in cloud computing will not be an all-or-nothing proposition.

Endnotes

[1] "IT Pro Survey: Could U.S. IT Pros Be Losing a Seat at the Strategic Table?" Study conducted on behalf of Microsoft by Harris Interactive Inc., 2009.

[2] Weill, Peter, Stephanie L. Woerner, and Mark McDonald. Center for Information Systems Research Briefing, Sloan School of Management, Massachusetts Institute of Technology. Vol. 9, No. 8, August 2009.

Is That a Cloud?

You can visit *Cloud Computing Journal's* Web site (cloudcomputing.sys-con.com) and find a single article that includes 21 different definitions of cloud computing. Wikipedia's description includes 84 references. And, of course, each vendor in the space seems to have a definition that plays to its advantages (see Figure 3). The cloud operating model is characterized by: massive scalability/elasticity, rapid provisioning, autonomic computing, multi-tenancy, pay-as-you-go, location agnostic computing, built-in disaster recovery, and service-oriented software.

Rather than offer yet another definition, we think it is more useful to describe three basic cloud computing types: public, private, and hybrid.

Public Clouds: These are owned and operated by third parties, and located outside the corporate perimeter where multiple tenants share their resources. Amazon Web Services (AWS) and Salesforce.com are examples of this type of cloud.

Private Clouds: These clouds leverage the same technology to effectively use company resources, but are built for the sole use of an enterprise and are often housed within the confines of its perimeter. For example, the Department of Veterans Affairs' private cloud analyzes sensitive data from over 100 clinics and hospitals to spot outbreaks of infectious diseases. Similarly, Fair Isaac Corporation established a private cloud, which enabled the company to shrink its server sprawl by 50 percent, saving roughly $740,000 annually in operational costs. In addition, the company reduced its energy usage by 33 percent.

Hybrid Clouds: These clouds extend across multiple cloud providers, both public and private. Each hybrid cloud is uniquely defined by the enterprise. At the front end, hybrid clouds sometimes utilize a cloud aggregator—a vendor that connects multiple cloud providers by managing and delivering applications across different servers in the cloud. RightScale and AppZero are examples of cloud aggregators.

Cloud services come in three forms:

IaaS, or Infrastructure as a Service, is built on virtualization technology for basic computing infrastructure, network and storage, and software that enables client self-service and pay-per-use billing. AWS and Savvis virtual hosting are examples of IaaS.

SaaS, or Software as a Service, makes the software available to its users over the Internet along with its support and maintenance. Examples include Salesforce.com CRM, Google Maps, and Google Apps.

PaaS, or Platform as a Service, offers application programming interfaces (APIs) and middleware that enable developers to successfully develop and deploy applications such as Google Apps, Salesforce.com, and Microsoft Azure.

While the benefits of cloud computing are promising, the features and functions vendors highlight in describing their cloud offerings fail to acknowledge the challenges preventing enterprises from moving mission-critical applications to the public cloud.

	VENDORS ARE SAYING...	THE REALITY IS...
Application Development	**Out-of-the-box features such as analytics, offline access, and mobile deployment speed application development.**	• There are serious challenges in back-end integration with mainframes, corporate directories, and other systems of records.
Application Migration	**Deploy applications and Web sites in the cloud five times faster than traditional hosting.**	• Lift-and-shift migration of multi-tier Web applications may succeed, but legacy monolithic applications may fail to take advantage of the cloud. • Most CPU-based and perpetual commercial licensing structure require too much upfront investment and do not scale with end-users' demands. • Requires specific skills related to developer talent and training.
Business Continuity	**Built-in disaster recovery capabilities, always-on availability.**	• Multiple cloud providers may be required to achieve availability objectives. • It is difficult to achieve because Interoperability standards between clouds are lacking. • Providers do not offer SLA failure penalties.
Security & Compliance	**Enhanced security and improved compliance with regulations.**	• Performing eDiscovery can be challenging. • It is difficult to verify specific compliance verification (e.g., PCI, HIPAA). • Public cloud providers are not prepared to handle audit requests.
Cloud Financials	**Cloud computing moves CapEx (capital expenses) to OpEx (operational expenses), closely correlating costs with resource use.**	• Business and IT must decide who will pay for the initial private cloud build out. After that, a financial charge-back solution should be put in place.

Source: Diamond Management & Technology Consultants, Inc.

Figure 3

About Diamond

Clients trust Diamond Management & Technology Consultants, Inc. (NASDAQ: DTPI) to help their companies grow, improve margins, and increase the productivity of their investments. Working together to design and execute business strategies that capitalize on changing market forces and technology, Diamond's consultants are experts in helping clients attract and retain customers, increase the value of their information, and plan and execute projects that turn strategy into measurable results.

Diamond's capabilities are rooted in deep strategy, technology, operations, and industry experience. The firm's approach to client service is based on objectivity, collaboration, and an unwavering commitment to its clients' best interests. Headquartered in Chicago, Diamond has offices in New York, Washington, D.C., Hartford, London, and Mumbai.

To learn more visit www.diamondconsultants.com

About the Authors

Chris Curran, a Partner and Diamond's Chief Technology Officer, works closely with senior client management on their most complex and strategic technology issues, helping define the IT organization, deploy technology governance and management practices, and develop business and technical architectures. In addition, Curran directs Diamond's own strategic investments in building the intellectual capital required to maintain the consulting profession's premier team of technology strategists and architects.

A sought-after speaker and thought leader, Chris is the co-author of Diamond's Digital IQ study and regularly contributes to Diamond's white papers. He writes the popular CIO Dashboard blog, is a featured "Expert View" columnist on CIO.com, and has a regular column in The CTO Forum magazine. Chris has contributed to several other publications, including Investor's Business Daily, Optimize, CIO Insight, Public CIO, ABA Banking Journal, Baseline and Enterprise Architect. He is also an active sponsor of the MIT Center for Information Systems Research and is a member of the MISQ Executive's advisory board.

Nalneesh Gaur is a Principal and Diamond's Chief Security Architect. He has broad technology and consulting experience in areas including enterprise architecture, information security, and infrastructure architecture and management. Nalneesh has helped clients develop their information security strategies, devise and implement plans to address regulatory compliance, implement complex security architectures, and architect complex data center hosting solutions. He is a contributing writer to a multitude of industry publications, and speaks on the topic of information risk management.

Diamond Associates Aditi Lyall and Akshay Deshpande also contributed to the research in this paper.

Diamond
Management & Technology Consultants

Suite 3000 John Hancock Center
875 North Michigan Ave.
Chicago, IL 60611, United States
T (312) 255 5000 F (312) 255 6000
www.diamondconsultants.com