



The Definitive Guide to the Cloud and Kentico CMS

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Introduction

Cloud computing is a broad industry term that describes a wide range of services and components. As with any other major development in technology, many vendors have started to push the term Cloud and Cloud computing. Unfortunately, they may be using it for product and deployment options that sit outside of the generally-accepted definition. In order to understand the value of the Cloud, it's important to first understand the types of available Cloud services. This allows organizations to choose where, when, and how they use Cloud computing.

In this whitepaper we explain the different types of Cloud Computing services commonly referred to as:

- Infrastructure as a Service (IaaS)
- Platform as a Service (PaaS)
- Software as a Service (SaaS)

We will illustrate how these services work, and provide some real-world guidance on using Kentico with each flavor of Cloud computing. This whitepaper explores the concept of Cloud computing and provides practical guidance on which flavors of Cloud computing and Kentico CMS may work best for an organization.

What is Cloud Computing?

With the almost daily bombardment of buzzwords, it should be pretty obvious that the IT industry gets caught up in fads. Most begin with imprecise definitions based on their creation in a marketing department, journalist's article or analyst report. Once the term hits mainstream, it then tends to represent a broad technology group or practice. Nobody should argue that Cloud computing is the hot technology buzzword of the day. Unlike many of these passing fads we have heard over the years, this one's here to stay.

Cloud computing is the next stage in the internet's evolution. It ultimately provides the way that everything from computing power, infrastructure, and application, to business process and personal collaboration is delivered as a service wherever and whenever you need it. The "Cloud" in Cloud computing is defined as a set of hardware, networks, storage, services and interfaces that combine to deliver the aspects of computing as a service. Cloud services include the delivery of software infrastructure and storage over the internet based on demand. For end users this means that rather than using locally installed hardware and software, they are using web applications and services installed in someone else's data center. Cloud computing is considered significant because it encapsulates a range of different technologies that have been developed through the history of computing. Cloud computing is an evolutionary step. The rise of the internet, increasing bandwidth, the movement to outsourcing, the development of service-oriented architecture, and the rise of mobile and wireless computing are all important components of this revolution.

The National Institute of Standards and Technology (NIST) has formally defined Cloud computing in a document found on their [Special Publications](#) page, titled "[A NIST Definition of Cloud Computing SP800-145](#)." They have identified several key traits that characterize Cloud computing:

- Elasticity and the ability to scale an application up or down
- Self service provisioning and de-provisioning
- Application programming interface (API)
- Billing and metering of service and usage in a pay-as-you-go model

They further defined a set of four broad deployment models for the infrastructure components of Cloud computing. These models are important for businesses to understand as they will determine where the physical infrastructure is located when using the Cloud. The following list provides specific characteristics of a Cloud model designed to solve an enterprise scenario.

- **Private Cloud** – This type of Cloud infrastructure model is provisioned for exclusive use by a single organization with multiple business units. It is typically owned, managed and operated by the organization or rented from a third party. The data center may be located either on-premise or off-premise.
- **Community Cloud** – This type of Cloud infrastructure model is provisioned for exclusive use by a specific community or group of consumers from organizations that have shared concerns. This may include security requirements, or policy and compliance considerations. The physical infrastructure may be owned, managed and operated by one or more of the organizations in the community or rented from a knowledgeable third party. The data center may be located either on-premise or off-premise.
- **Public Cloud** – This type of Cloud infrastructure model is provisioned for open use by the general public, and it may be owned, managed and operated by a business, academic or government organization. The data center exists on the premise of the cloud provider.
- **Hybrid Cloud** – The type of Cloud infrastructure model is a composite of two or more distinct cloud infrastructures (private, community, or public) that are used to deploy an application.

The Benefits of the Cloud

While Cloud computing is often referred to as a technology, it's actually a significant shift in the business and economic models for provisioning and consuming information. Properly implemented, this shift can lead to significant cost savings. It's important to understand that moving to the Cloud is not for every customer, and it is a decision based heavily on a business need. In talking with Kentico customers and partners, the following represents the key business benefits we have heard.

Full Hardware Utilization

The cloud helps to bring an economy of scale. One of the practicalities of Cloud computing means higher CPU utilization and the smoothing of the inevitable rollercoaster utilization that comes from any

computer-based workload. One of the key considerations is that your workload may share its server infrastructure with other organizations' computing needs. This allows Cloud computing providers to optimize the hardware needs of its data center and provide you with a lower cost.

Lower Power Costs

An inevitable result of the economies of scale is that Cloud computing uses less electricity. Better hardware utilization means more efficient power use. Idle servers waste energy, and in an on-premise data center, we all have servers that aren't fully utilized. So a Cloud service provider can often charge you less for energy used than you're spending in your own data center.

Lower People Costs

Ask any IT organization and it's an easy bet that the staffing budget is probably one of their biggest line items. Good IT people are expensive; their salaries, benefits and other employment costs are often high. But when you move to the Cloud, it doesn't suddenly require you to fire people. If you think of economies of scale, some of the money you pay the service provider goes into their staffing costs, which means you can redeploy some of your own scarce IT resources to other important tasks.

Reduced Capital Costs

When you run your own server, you're guaranteed up-front capital costs. Typically, you write a purchase order, make the purchase, get the equipment and pay the bill. You end up with an asset in your data center that you need to depreciate! With the world of Cloud computing, financing that capital investment is no longer your concern. Companies can invest their capital into their actual business practice that would otherwise be poured into hardware and software.

Resiliency without Redundancy

When you run your own server farm, you always buy more hardware than you need in case of device failure. In extreme cases, you will even duplicate an entire infrastructure. This is an incredibly expensive but necessary way to maximize uptime. Why not let the Cloud computing provider deal with the redundancy requirement? Cloud providers have several locations for their own data centers that allows them to mirror your data and applications across geographic boundaries. That's a less expensive way of doing things, and another way to enjoy the Cloud's economies of scale.

Welcome to Cloud Services

Cloud computing is driving a significant change in how applications, infrastructure and their network connections are viewed and managed. Cloud computing provides a broad range of service models, as shown in the following table.

	Infrastructure as a Service (IaaS)	Platform as a Service (PaaS)	Software as a Service (SaaS)
	<i>Migrate to it</i>	<i>Build on it</i>	<i>Consume it</i>
Definition	Provides flexible ways to create, use and manage virtual machines (VM's)	Provides the higher level capabilities and includes more than just Virtual Machines that are required to support applications.	Provides the highest level of business value for users.
Common Usage	Caching, networking, file storage, security	Application development, streaming services, decision support	CMS, Email, Collaboration, ERP
Providers	Amazon Web Services, Rackspace, Windows Azure Virtual Machines	Windows Azure Cloud Services, Windows Azure Websites, Google App Engine	Kentico+, Salesforce, Office 365

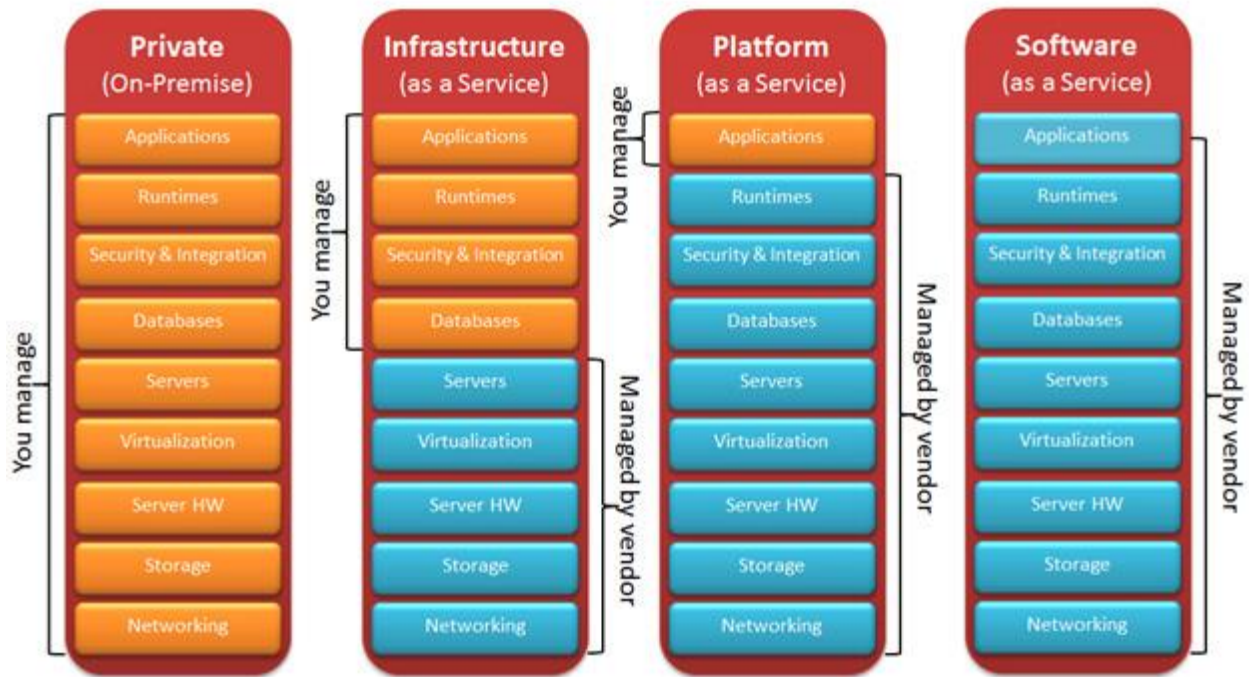


Are you a developer looking for more Kentico CMS Cloud information?

Kentico provides a wide range of Cloud-related information. Here is a list of the more important items for developers and system administrators.

Document name	Description
Kentico CMS Azure Guide	This guide describes the steps that are needed to successfully deploy a Kentico CMS website to the Windows Azure Cloud.
Azure Kentico Virtual Conference	Access over seven hours of streaming video that covers all aspects of Cloud computing and how to run Kentico CMS in the Cloud.

Think about Cloud services as a logical model – physical infrastructure sits at the bottom, platform services in the middle, and software on top. Other “soft” layers can be added on top of these layers as well, with elements like cost and security, extending the size and flexibility of the Cloud. For business users it’s a question of how much of this logical model they want to manage and pay for. The following table shows the simplified explanations of the Cloud computing deployment models and who is responsible for their daily management.



Infrastructure as a Service (IaaS)

Infrastructure-as-a-Service or IaaS, is the most basic Cloud service model. Providers of IaaS offer computers or services designed to replace physical components within a company’s datacenter. IaaS includes the capability to provision processing, storage, networks, and other fundamental computing resources and allow a consumer to deploy, run and manage their own software and infrastructure components. This may include both operating systems and applications. With IaaS, a company is freed from maintenance costs and wasted office space. A company is able to run their infrastructure on hardware they can access anytime. To deploy an application, IaaS users install operating system images and their application software on the Cloud infrastructure. In this model, Cloud providers typically bill IaaS services like a standard utility service we use in our homes. The cost reflects the amount of resources allocated and consumed over a defined period. Examples of IaaS providers include Amazon Web Services, Rackspace, Windows Azure Virtual Machines.

IT professionals who manage and maintain IaaS infrastructure have a cultural mind shift to adopt. Once viewed simply as a localized resource, infrastructure in the Cloud now carries the characteristics of a commodity and functions as a service. In this new model, it becomes dynamic, always available, and has self-service capabilities. That translates into the need for an additional skill set beyond what traditional IT administrators may already possess.

Key Characteristics of IaaS

- Resources are distributed as a service.
- Allows for dynamic scaling.
- Has a variable cost, utility and pricing model.
- Generally includes multiple users on a single piece of hardware.

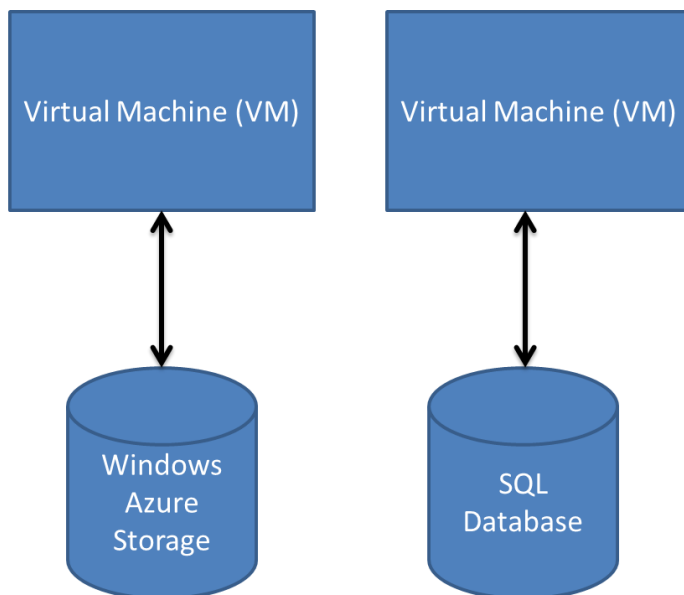
Where IaaS Makes Sense

- Wherever computing demand is volatile. This means where there are significant peaks and valleys in terms of demand on the infrastructure, such as sudden spikes in traffic from online campaigns or product launches.
- New organizations without capital to invest in hardware.
- Where the organization is growing rapidly, and locally scaling hardware would be problematic.
- Organizations looking to limit capital expenditures and to move to an operating based expenditure.

Where IaaS Would Not Be the Best Option

- Where regulatory compliance makes offshoring or outsourcing of data storage problematic.
- Where the highest levels of performance are required, and on-premise or dedicated hosting infrastructure has the capacity to meet the organization's needs.

Kentico in the IaaS Model



Kentico within the IaaS model is architected using Virtual Machines (VM). This model does provide a tremendous amount of control that includes file system access, the ability to create custom IIS configurations, and even VPN capabilities to internal systems. This increased control does mean that there is more maintenance required. However, this control does provide the option to create traditional deployments of website and applications that most application developers are familiar with. Also, you are able to deploy your own SQL server which enables you to use your own license if needed.

Platform as a Service (PaaS)

Platform-as-a-Service or PaaS is the Cloud-based delivery model for computing platforms that include the operating system, programming, execution environment, database, and web server. Extending the infrastructure model, a PaaS offering allows a company to develop and run their software solutions using a Cloud platform without the cost and complexity of buying and managing the underlying hardware and software layers. Common examples of PaaS offerings include Windows Azure Cloud Services, Windows Azure Websites, and the Google App Engine.



How much is Windows Azure?

Unfortunately, it's not an easy question to answer. Pricing has many different aspects like the size of your database and bandwidth. There are also many different add-on services available. Microsoft does provide a calculator that you can use to estimate your cost available [here](#).

PaaS is typically charged on a pay-per-use model. This provides instant scalability and reliability at a usage-based cost. Companies looking to invest in PaaS need to be able to estimate the demand of their applications, which is not always an exact science. This means they need to think architecturally. In the past, everything was self-contained, built-in — and typically all on-premise. Now, companies must focus on entirely new concepts like access control between on-premise and Cloud-based components.

Characteristics of PaaS

- Services to develop, test, deploy, host and maintain applications using an integrated development environment.
- Web-based user interface tools to create, modify, test and deploy different UI scenarios.
- Multi-tenant architecture that can include multiple concurrent users utilizing the same development application.
- Built-in scalability of deployed software including load balancing and failover.
- Vendor provided support.

Where PaaS Makes Sense

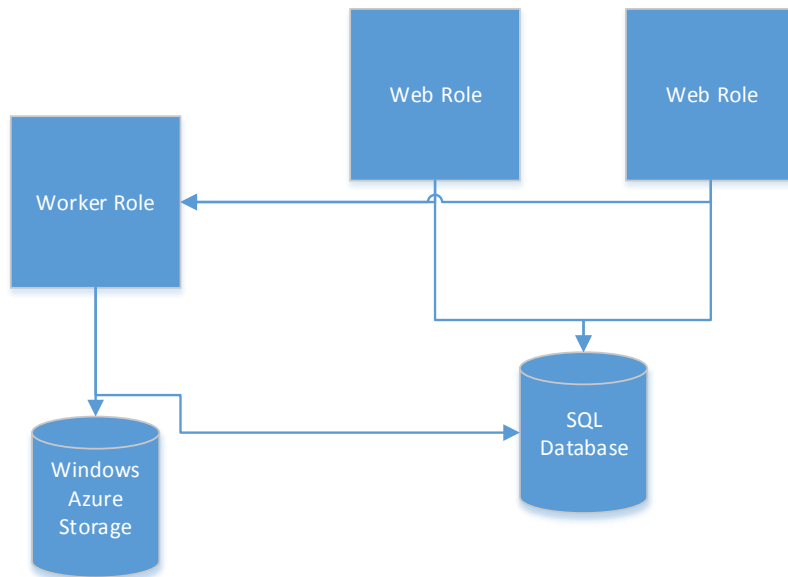
- PaaS is useful where businesses don't want to be burdened with the administration and maintenance of the underlying operating system.
- PaaS is extremely useful in any situation where multiple developers will be working together or where external parties are needed to interact with the development project. The growth of agile software development has been a strong driver in the adoption of PaaS.
- PaaS is also extremely useful where businesses are looking to automate testing and deployment services.

Where PaaS Would Not Be the Best Option

- When the application requires portability from the platform provider.

- Where proprietary languages and architecture approaches would impact the development process.
- Where application performance requires the customization of the underlying hardware and software.

Kentico in the PaaS model



When Kentico is created as an application and run in Windows Azure, the code and configuration together are called a Windows Azure Cloud service. By creating a Cloud service, you can create a multi-tier application in Windows Azure, defining multiple roles to distribute the process and allow flexible scaling of your Kentico implementation. For a Cloud service, Windows Azure maintains the infrastructure for you, performing routine maintenance, patching the operating systems and recovering from service and hardware failures. If you define at least two instances of every role, most maintenance as well as service upgrades can be performed without any interruption.



What is the Windows Azure Service Level Agreement?

All Cloud services must have at least two instances of every role to qualify for the Windows Azure Service Level (SLA) agreement. This SLA guarantees external connectivity to your internet-facing roles at least 99.95% of the time.

A cloud service role is composed of application files and configuration. Windows Azure provides two types of roles. A web role that provides a dedicated Internet Information Services (IIS) web-server used for hosting front-end web applications; and a worker role for hosting applications that run asynchronous or long running tasks independent of user interactions and input. The Kentico application is hosted within the web role and Smart Search used for site indexing is run within the worker role.

Software as a Service (SaaS)

Software-as-a-Service or SaaS is a Cloud-based software distribution and hosting model. Applications are hosted by a vendor or service provider in the Cloud and made available as a subscription service.

Companies aren't required to manage the Cloud infrastructure and platform and instead focus on the application. SaaS is the Cloud deployment model most people interact with in everyday life. The user accesses the application running on the Cloud infrastructure using a web browser, freeing IT professionals from infrastructure and platform management. Common examples include Kentico+, Salesforce, and Office 365.

The pricing model for SaaS applications is typically a monthly or flat per-user fee, so price is scalable and adjustable if users are added or removed at any point. SaaS eliminates the need to install and run the application on the Cloud user's own computers, and simplifies the associated maintenance and support. One of the major benefits of the SaaS model is that the scalability process is transparent and users see a single global access point.

Characteristics of SaaS

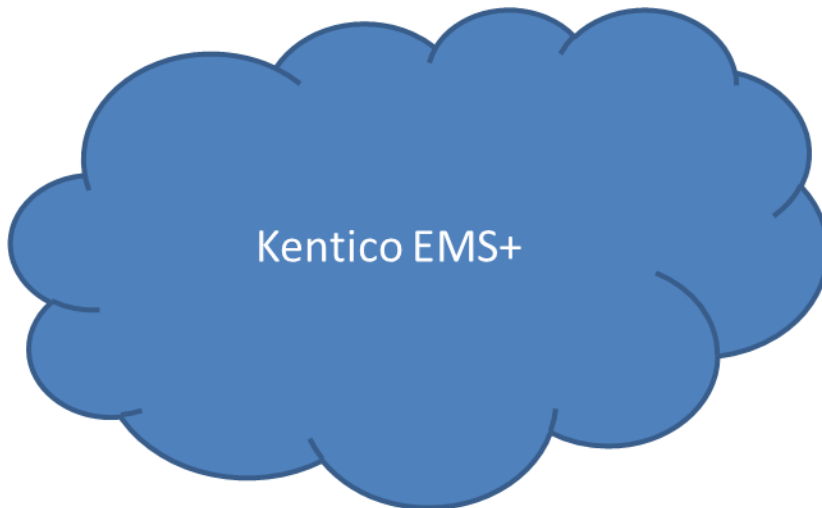
- Web-based access to commercial software.
- Application vendors manage the infrastructure and platform components.
- Software is managed from a central location.
- All users have the same version of the software.
- Users are not responsible for application software upgrades and patches.
- Application Programming Interfaces (APIs) allow for integration between different pieces of software.

Where SaaS Makes Sense

- Software that is used for a short-term need.
- Companies not wanting to manage infrastructure or platform components.
- Vanilla offerings where the solution is largely undifferentiated.
- Applications where there is a significant interplay between the organization and the outside world.
- Applications that have a significant need for web or mobile access.
- Software that has a significant demand spike based on usage. For example, billing software that is heavily used at the end of the month.

Where SaaS Would Not Be the Best Option

- Applications where a highly customized environment is a requirement.
- Applications where regulatory rules prevent the storing of data hosted externally.
- Applications where extremely fast processing of real-time data is required.
- Applications where an existing on-premise solution fulfills all of the organization's needs.



Kentico EMS+ is the SaaS offering for the Kentico Enterprise Marketing Solution (EMS), provided as a service in the Windows Azure Cloud. Kentico EMS is an integrated Customer Experience Management (CXM) solution that extends the Kentico CMS Ultimate Edition to create an out of the box marketing solution that helps you optimize website views and campaign results to yield better ROI. Kentico EMS is designed to empower marketers to deliver and optimize real-time customer-centric marketing across multiple channels.



How do I set up an account?

Please review the [Getting Started with Kentico+ video](#) for an overview of the automated client setup of a new Kentico EMS+ site.

Kentico EMS+ is licensed as a monthly service. Subscribers can allow Kentico to completely manage all platform and infrastructure components. This includes providing all upgrades and hotfixes automatically, while still allowing the development of custom code. Kentico EMS+ licensing includes both Azure hosting as well as an included Kentico EMS license. For more information about Kentico EMS+, please review <http://www.kentico.com/plus>.



Why did Kentico choose the Microsoft Azure Cloud for their SaaS model?

Kentico has a long history with many of the Cloud providers like Amazon. As a matter of fact, one of the first clients of Kentico CMS – [Gibson Musical Instruments](#) has been using Kentico and the Amazon cloud services for many years. It has always been a development priority to ensure that Kentico provides first-class support for Cloud services. Kentico is also a customer- and partner-driven company.. Our approach

to this was to analyze the existing Cloud platforms, and based on our findings, Azure became the clear choice for the following reasons.

- Kentico has a close relationship with Microsoft.
- Kentico is completely .NET based and Azure offers unique technical opportunities to leverage this for our customers.
- For the Cloud model to be successful, you need to have a trusted Cloud company.
- Microsoft has both a PaaS and IaaS offering – a choice that our customers demanded.



What are the main differences between running Kentico in Windows Azure and Kentico+?

- **Hosting model** – Kentico+ is delivered as Software as a Service model. This means that Kentico manages the Windows Azure configuration and management and frees the customer to focus on their application. When running Kentico in the Windows Azure Platform as a service the customer is responsible for the management and configuration.
- **Payment model** – Kentico+ offers a pay as you go model where the client pays a monthly fee that include their Kentico EMS license, networking and computing resources. For Kentico running as a cloud service the company must purchase their license from Kentico and then pay Microsoft for their Azure hosting.
- **License type** – Kentico+ offers only the Kentico EMS license, while Kentico as a cloud service allows a customer to purchase any available license.

Cloud Computing – Is it Right for You?

How do you know if Cloud computing makes sense for your organization? And if it does what sort of services should you also consider? Even though Cloud computing is everywhere and is being offered by all major technology players; never forget that its definitions continue to vary. While the data center in the Cloud is defined as server or collections of servers, for an organization look at the Cloud, this may represent a portion of a server. The power of the Cloud is being able to provide a portion of a server, storage space or bandwidth. Often called ‘capacity on demand’, this is one of the hallmarks of Cloud computing.



Is the Cloud right for your organization?

Answering that question is extremely difficult. With so many models and choices you have seen in this paper, Kentico understands this and has built a single solution that runs either on-premise, in the cloud, or as a SaaS model- all using the same software.

The ‘as a service’ moniker in Cloud computing has vendors offering Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). It’s important for customers to find the

right balance of cost to benefit. Concerns like availability, scalability, capacity, and regulatory concerns are important decision points. Understanding this, in addition to your organization's risks, is essential to determine if Cloud computing and associated services are right for you. So what makes sense for your organization? Here are some questions that you can ask.

Does the implementation cost justify the business disruption?

Application and data center migrations are costly, painful and complicated. CMS solutions that are tightly coupled to other applications may be the most expensive to migrate. Cost saving will vary by project and organization. Often the greatest savings are found with labor, hardware and software over a length of time. The key is to determine what that the time length is and if it outweighs the business disruption.

How much capacity and bandwidth will you use?

Whether you own or lease your server, the capital outlay is consistent from month to month. If more capacity or bandwidth is needed, someone creates a purchase order and eventually a new asset is available. Cloud computing is an 'on demand' service, and scalability is provided as needed. For many companies this type of utilization spike may be a problem. Know what you need before signing up.

Does your CMS require specific hardware configurations?

Some applications cannot and should not be virtualized as they require specific underlying hardware components. While tempting, it's best not to migrate these types of application to the Cloud. Ask your vendor for real customer references and architecture examples.

Do you have any regulatory hurdles?

Not all data can or should reside online. Governmental agencies may mandate that sensitive data remain local. Besides regulatory constraints, an organization has to be willing to place their customer's data in the hands of a third-party vendor. The Cloud requires that an organization has to be willing to give some level of control. If you are an organization that considers this unacceptable, then the Cloud may not be the place for you.



Have you looked at Windows Azure?

One of the strongest benefits Kentico has seen in using Windows Azure is that Microsoft has focused on helping customers lower the barrier of adoption by removing regulatory concerns. All certifications and standards that Microsoft Azure supports and has passed are fully documented [here](#).

Cloud Computing Challenges

Cloud computing isn't without baggage. The following are some of the most notable challenges that are often associated with Cloud computing. Although, some of these may project slowdown, many of them may also provide business opportunities if resolved with care and attention in the planning stages.

- **Security and Privacy** – probably one of the biggest hot buttons in relation to Cloud deployment. This includes the storing and securing data and monitoring the use of the Cloud by service providers. These are challenges that are best addressed by organizations by careful planning. This may include storing information internal to the organization and allowing it to be used on the Cloud. Often this may be used as a Hybrid Cloud support model.
- **Lack of Standards** – All of the major Cloud providers have documented interfaces. However, there isn't a clear industry standard associated with these and it's unlikely that most Clouds are natively interoperable. These are currently several groups like the Open Grid Forum (OGF) and the Open Cloud Consortium (OCC) working on these standards. However, they will take time to mature and it is not fully known whether they will address the industry concerns.

Which one: Amazon Elastic Compute Cloud (EC2) or Windows Azure?

Any organization considering moving their datacenter or dedicated environment to the Cloud requires a considerable amount of decision-making. This should include the development of a solid set of business requirements and a detailed analysis of the technology stack. Both Amazon and Microsoft provide a comprehensive offering stack.

At a high level, the Amazon Cloud is only an IaaS offering. This means they deliver the raw infrastructure and computing power. Windows Azure offers both IaaS and PaaS models. As an IaaS platform, Windows Azure delivers the raw infrastructure. When using the PaaS model for Windows Azure, this allows you to concentrate on application and deployment.

Summary

This whitepaper is an introduction to the terms, characteristics and services associated with internet-based computing; commonly referred to as Cloud computing. The primary business service models being deployed and common deployment models used are discussed. We also look at key considerations when looking at deploying your CMS to the Cloud.

When you open up just about any networking tool, the Internet is represented by a cartoon-like Cloud picture. Technically, Cloud computing is nothing more than the delivery of computing and storage capacity as a service to a community of end users. How does this impact our CMS or CXM installation? Well, as they say – Resistance may be futile! We are moving inexorably and incrementally towards the Cloud. It's time to understand what this means and how best to leverage it based on your own business needs.