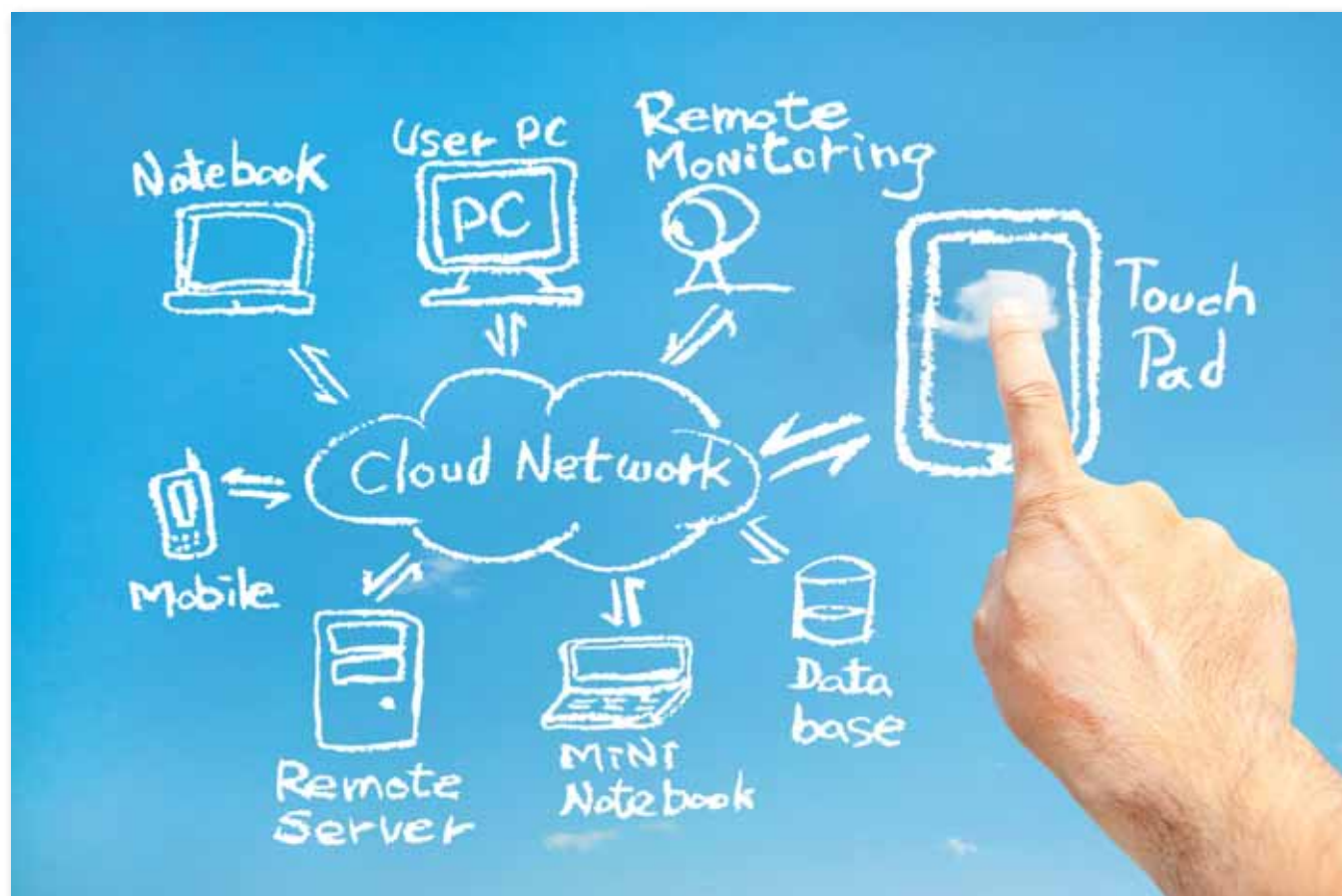# The Basics of Cloud Computing

Learn the basics of cloud computing and how it can benefit your district.

By Rich Kaestner

If you're like most school business officials, you have heard the term "cloud computing" bandied about and may have some idea of what the term means. In fact, you likely already leverage a cloud-computing solution somewhere within your district.

But what does cloud computing really mean? This brief article will put a bit of definition behind the term and help you better understand some benefits and considerations when evaluating cloud-computing solutions for your district.

What Is Cloud Computing?

Most organizations don't build and maintain their own electric power plants. Instead, they pay a utility company for actual usage. The concept behind cloud computing—also referred to as managed or hosted services—is that computing services are provided dynamically, as needed, by an external or internal supplier without an up-front capital investment by the user.

The National Institute of Standards and Technology provides the generally accepted definition of cloud computing: "Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction." Cloud computing has five essential characteristics:

On-demand self-service. Users access computing resources whenever they need them.

Broad network access. Users access capabilities with a variety of devices.

Resource pooling. Resources are pooled to serve several consumers using a multitenant model.

Rapid elasticity. Resources are delivered immediately according to the user's capacity requirements.

Measured service. Usage is monitored, controlled, and measured for billing, reporting, and managing.

Cloud computing has three models of service:

Infrastructure as a Service (IaaS) provides data center hardware for users, so it's like moving your data center (or server room) off premises. The user is still responsible for providing all software from the operating system to the end-user applications.

Platform as a Service (PaaS) adds the operating system and middleware to the IaaS hardware environment. This model is a good approach for schools and districts that maintain their own Website on an external provider's platform.

Software as a Service (SaaS) is a complete turnkey application provided by the service provider. It includes the hardware and software to host the application.

The National Institute of Standards and Technology defines four deployment models for cloud-computing services:

Public cloud. The cloud infrastructure is owned by an organization that sells cloud services and is available to the general public or a large industry group. An example of a public cloud is Amazon's Elastic Compute Cloud.

Private cloud. The cloud infrastructure is operated for a specific organization. It may be managed by the organization or a third party and may exist on or off premises. Private clouds feature metered usage and on-demand self-service.

Community cloud. The cloud infrastructure is shared by several organizations and supports a specific community that has common concerns, such as K–12 state or regional services or applications provided for schools. It may be managed by the organizations or a third party and may exist on or off premises.

Hybrid cloud. The cloud infrastructure is a combination of two or more clouds (private, community, or public) that remain unique entities but are bound together by standardized or proprietary technology that enables data and application portability.

Benefits: A K–12 Perspective

Cloud computing is often less costly than running an equivalent application in-house because the hardware and levels of application support are moved to the vendor. The district still needs to administer the application, manage the service provider, and pay monthly or annual operational fees, but it avoids a capital investment in server hardware.

Public K–12 institutions have long been in an information technology support crisis, made worse by the recent economic crunch. The time required to implement an application is generally shorter, in that the information technology (IT) department doesn't have to order and implement the hardware and software required to run the application. Stretched thin, school technology leaders look to the cloud to offload some server support requirements and certain areas of application-specific support and skill requirements.

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Also gaining increased attention in the K–12 realm is the use of mobile devices for anywhere, anytime learning and for teacher remote access. This trend naturally leads schools to embrace digital content, learning management suites, and collaboration tools. A desire for 24-7 mobile user and digital content access, combined with a lack of internal 24-7 support capabilities within the school system, further supports the concept of provisioning the resources outside the physical school infrastructure.

When today's school technology leaders talk about cloud computing, the conversation usually moves to discussions about Google Apps for Education, Microsoft Live@edu, or Office 365 for Education. In the past, the focus was on Exchange, Groupwise, or multiple systems for teacher and student email, office apps, storage, and collaboration.

Why the change? In today's economy, a district no longer needs to pay for and maintain its own email and office applications when they are available for (almost) free, along with collaboration capabilities. The already wide acceptance of specific SaaS applications in schools further illustrates the willingness to accept cloud computing as an approach for at least some operations.

Considerations

When contemplating moving to cloud computing or modifying a current model, district IT professionals should consider a variety of issues:

Security, privacy, and identity management are important. These topics are discussed in more detail in the article beginning on page 12.

The district's Internet and internal network bandwidth must be able to accommodate the data transmission loads presented by the cloud-computing service. Additional Internet and perhaps internal network bandwidth may be required to handle such issues as responsiveness, backup, and recovery of the cloud services.

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If the district has customized applications and interfaces with other applications, district personnel must recognize that cloud-computing providers' options for application interoperability are limited.

Service provider viability is another consideration. Is the cloud provider apt to go out of business? If so, what are the options for recovering data and getting up and running in short order?

The services must be in compliance with the Children's Internet Protection Act and the Family Educational Rights and Privacy Act.

Finally, service providers must be flexible regarding district control over options and release testing with a published, managed release schedule and a "sandbox" area for user testing before implementing new offering releases.

Cloud computing offers great advantages for understaffed school districts and for districts that are looking for ways to save money. However, districts must be willing to invest a considerable amount of planning and evaluation to ensure that the implementation is successful.

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