

Cloud computing in education

Savings, flexibility, and choice for IT

A Microsoft U.S. Education white paper
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www.microsoft.com/educloud

We're all in.

The logo features the text "We're all in." in a bold, sans-serif font. The words "all in." are contained within a blue, stylized cloud shape that has a white outline and a blue gradient fill. The cloud shape is positioned at the bottom right of the page, partially overlapping the white background.

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Introduction

The classroom is changing. From when the school bell rings to study sessions that last well into the night, students are demanding more technology services from their schools. It's important not only to keep pace with their evolving needs, but also to prepare them for the demands of the workplace tomorrow.

At the same time, education institutions are under increasing pressure to deliver more for less, and they need to find ways to offer rich, affordable services and tools. Those educators who can deliver these sophisticated communications environments, including the desktop applications that employers use today, will be helping their students find better jobs and greater opportunities in the future.

Cloud computing can help provide those solutions. It's a network of computing resources—located just about anywhere—that can be shared. They bring to education a range of options not found in traditional IT models. In fact, the integration of software and assets you own with software and services in the cloud provides you with new choices for balancing system management, cost, and security while helping to improve services.

What's in the cloud? Much of what's on your desktop or in your data center right now. For example, e-mail in the cloud is, in many cases, free for schools and universities that need to upgrade legacy systems and expand services. The cloud helps ensure that students, teachers, faculty, parents, and staff have on-demand access to critical information using any device from anywhere.

Both public and private institutions can use the cloud to deliver better services, even as they work with fewer resources. By sharing IT services in the cloud, your education institution can outsource noncore services and better concentrate on offering students, teachers, faculty, and staff the essential tools to help them succeed.

As you plan your long-term, data center strategy, your institution can benefit from opportunities in the cloud.

"We've entered a new era of science—one based on data-driven exploration—and each new generation of computing technology, such as cloud computing, creates unprecedented opportunities for discovery."

Jeannette M. Wing
Assistant Director for the Computer &
Information Science & Engineering
Directorate, National Science Foundation

February 2010

http://www.nsf.gov/news/news_summ.jsp?cntn_id=116336

Cloud terminology

Services include software and hardware, from e-mail to entire IT platforms, which are hosted in the cloud. This means that someone else makes them available to you on demand—that is, when you need them.

Service capacity is controlled in the cloud and is dynamic and elastic: Computing resources are allocated and deallocated as demand changes.

Cloud compliance

Cloud services comply with relevant statutes, such as the Health Insurance Portability and Accountability Act of 1996 (HIPAA), the Family Educational Rights and Privacy Act (FERPA), and the Schools Interoperability Framework (SIF).

Getting cloud confident

Why all the hype around cloud computing? Three words: cheaper, faster, greener. Without any infrastructure investments, you can get powerful software with lower or no up-front costs and fewer management headaches in the classroom on campus and beyond. The free or pay-as-you-go benefits are so compelling that the federal budget submitted to Congress in February 2010 commits to the use of cloud computing technologies and to a reduction in the number and cost of federal data centers.

The hype surrounding cloud computing is recent, but the services in the cloud are not particularly new. Windows Live Hotmail, one of the most popular messaging services worldwide, launched in 1996 and now serves 400 million accounts. People have been meeting in the cloud for at least 10 years using hosted conference services, such as Microsoft Office Live Meeting, which hosts 5 billion conference minutes a year.

What's new are the growing number of services and alternative payment models that promise appealing cost savings, security, and flexibility. Cloud options range from everyday services, such as e-mail, calendaring, and collaboration tools that members of your education community can use to collaborate online, to infrastructure services that free IT operations from mundane tasks and help you build on the investments you already have in place. System administrators can bring new services and computing capacity online quickly while managing costs as operational expenses. By allowing IT to respond quickly to changes, cloud computing helps administrators manage risks, peak demand, and long-term planning needs.

With cloud computing as part of your IT strategy, you can increase your data capacity without compromising security or requiring your school, college, or university to make heavy infrastructure investments—all while helping to lower your total cost of ownership. The trick is to find the right balance of on-premise and cloud services for your education institution.

School bytes

For the Stillman School of Business at Seton Hall, [cloud computing offers choice](#). Professors there now have the ability to text with students, their preferred method of communication.

Defining the cloud

Clouds in nature may appear loosely defined, but at the National Institute of Standards and Technology (NIST), cloud computing means the following:

- **On-demand service.** You can get what you need when you need it.
- **Broad network access.** The cloud brings network-based access to, and management of, software and services—meaning access is anywhere, anytime.
- **Resource pooling.** A large pool of users shares location-independent resources and costs in an environmentally sustainable way.
- **Flexible resource allocation.** As demands fluctuate, cloud services can scale rapidly. You don't have to worry about bringing new servers online or reallocating resources.
- **Measured service.** Most cloud usage is metered, often per user or per hour. With those services, you pay for what you use. Microsoft offers Microsoft Live@edu, a free option designed specifically for education institutions (see page 7).

Which cloud is right for you?

The choice to move to the cloud is not an all-or-nothing proposition. With different types of cloud offerings, you have flexible options about which services to obtain in the cloud and which to keep on-site. Your priorities and security requirements determine the level of cloud capabilities to explore.

If you look closely at the cloud, you'll see three distinct sets of offerings:

- Software as a Service (SaaS): The applications, such as e-mail, people use everyday.
- Platform as a Service (PaaS): The operating environment in which applications run.
- Infrastructure as a Service (IaaS): The on-demand data centers.

Outsourcing some capabilities to the cloud makes the most of what's on-site by freeing time, budget, and people. For example, with SaaS, you can add services, like e-mail, affordably. With PaaS, you can deliver services broadly without having to manage the infrastructure. With IaaS, you get pay-as-you-go data center capacity for adding CPUs, storage, networking, or Web hosting.



Figure 1. The three general types of cloud services: SaaS, PaaS, and IaaS

Cloud reality check

With cloud computing comes hype. What can you expect?

- **“It’s cheaper.”** The truth is, you need to balance the up-front savings with ongoing subscription costs to determine actual savings. The free service from Microsoft and pay-as-you-go approaches let you balance your IT budget with operational expense spending instead of capital expenses. So you can expect to reduce costs associated with server hardware, support and deployment, and power consumption.
 - **“It’s faster.”** Data-intensive computing in the cloud can be six times faster than in isolated data centers. You can deploy applications more quickly, too, compared to traditional means. And it’s certainly fast to procure on-demand services.
 - **“It’s greener.”** In 2006, the Department of Energy estimated that U.S. data centers consumed about 1.5 percent of all U.S. electricity use, and current projections show worldwide carbon emissions from data centers will quadruple by 2020. Consolidating and sharing resources can curb the waste of data center sprawl and reduce greenhouse gas emissions.
- So, yes, the cloud truly has a green lining.

Anytime, anywhere apps: SaaS

The cloud hosts the applications you use every day for productivity, contact management, payment processing, and more. In the current and future economy, SaaS makes sense. It can lower expenses associated with software acquisitions in the near term. Longer term, it helps organizations with limited IT resources to deploy and maintain needed software in a timely manner while, at the same time, reducing energy consumption and expense.

A growing number of academic institutions are turning to SaaS for their desktop applications. For example, Hinds Community College uses an e-mail solution hosted in the cloud. Students now have the free collaboration tools they want, people on campus have the tools they need to work together, and administrators are finding it easier and more cost-effective to manage.

Who uses SaaS in education?

- Instead of an expensive IT upgrade, [Seton Hall University implemented Microsoft Live@edu hosted collaboration services](#), including Windows Live SkyDrive online storage. Now students have the tools to be successful on campus and in the workforce.
- [Students at Eastern Washington University chose the Windows Live Hotmail Web-based e-mail service](#), and the ability to choose their own user names and share calendars when arranging meetings. By retiring the previous service, the university estimates it will save U.S.\$70,000 over three years.
- When [the University of Pennsylvania College of Arts and Sciences offered the option of using Windows Live@edu](#) (cobranded as Penn Live), 40 percent of students switched in four months. Students were provided with approximately 66 times more storage space, increased reliability, and an improved interface as compared to their previous service

SaaS for education: Microsoft Live@edu

The workplace is changing, and the desktop applications that employers use today will evolve to desktop applications combined with Web services tomorrow. Educators preparing tomorrow's workforce want to partner with companies that can give them affordable access to those tools today.

Microsoft Live@edu is a program that provides students, staff, faculty, and alumni long-term, primary e-mail addresses and other applications that they can use to collaborate and communicate online—all at no cost to education institutions. Students will be using Microsoft products similar to those used in many workplaces that help to prepare them for jobs after college.

- [University of Cincinnati has an extensive 55,000 Live@edu deployment](#), including user identity management and password synchronization with ILM, a single sign-on portal, and more. Students can launch any of the Live@edu applications directly from their Blackboard home page and synchronize with their class schedules.
- The Ohio University is almost done activating more than 140,000 Live@edu accounts for current students and alumni. While the school is looking to reduce costs and improve communications with alumni, students cite the modern Web interface, increased mailbox capacity, and powerful search capabilities as top features.
- Belmont University is using Microsoft Exchange Online to serve approximately 1,400 faculty and staff e-mail accounts. The Exchange Online implementation supports the school's green initiatives by saving space and energy costs. The university anticipates saving about \$30,000 a year by not having to hire additional IT staff to support.

SaaS planning tips

- Look for the ability to customize or configure the application for your environment. Not all SaaS providers allow configuration.
- Make sure an SaaS solution has all the features you want. Some hosted versions are not identical to their desktop counterparts.
- Can you share? The City University of New York chose Microsoft Live@edu, a hosted communication and collaboration solution that can reliably and securely host e-mail accounts across all 23 colleges.
- Don't focus solely on costs—look for ways to improve efficiencies. For example, can on-demand resources free your time to offer more critical services to students or staff, reduce time spent on more mundane IT chores, or get features into use more quickly?
- Realize that applications have been running in the cloud for years, but a variety of approaches exist. Look for service-oriented architectures (SOA), Web services standards, and Web application frameworks—they're easier to integrate.
- Make sure you own your data. Your service agreement with a provider should explicitly specify that the client owns the data—without a time limit. You don't want to get locked in if you need to switch providers.

Cloudsourcing checklist

Gartner uses the term “cloudsourcing” to refer to the way that organizations will provision services. Whether you want productivity software offered as a hosted service or a cloud-based messaging infrastructure, you must cloudsourcing carefully.

- **Know** your security and compliance needs. Can the provider meet them? Transparency, compliance controls, certifications, and auditability are some of the key criteria to evaluate.
- **Compare** vendor offerings—not just for features and costs but also for uptime, security, and flexibility.
- **Ask** whether service levels are negotiable. And what happens if the vendor falls short—are there meaningful penalties?

Considering SaaS

Consider SaaS for the following education needs:

- E-mail, calendar, and instant messaging
- Desktop productivity, such as document creation and sharing
- Collaboration and presence
- Payment processing
- Identity and relationship management

Platforms in the cloud: PaaS

The scalable architecture of the cloud is transforming how academic institutions think about how they serve their students, teachers, faculty, and staff. Size—of your service, budget, or staff—does not limit IT when the platform for custom services is as readily available and broadly deployable as the Web. Cloud platforms free you to focus on the services you can offer without worrying about or managing the infrastructure needed for those services.

PaaS is the operating environment of the cloud with the tools you need on demand to create and host online services, software, Web sites, and mobile applications. With PaaS, you can concentrate on delivering applications rather than on the underlying infrastructure, which a service provider maintains and updates in its data centers. You can also use PaaS to create multi-tenant applications—that is, services accessed by many users simultaneously.

With PaaS, you can develop new applications or services in the cloud that do not depend on a specific platform to run, and you can make them widely available to users through the Internet. PaaS delivers cloud-based application development tools in addition to services for testing, deploying, collaborating on, hosting, and maintaining applications. The accessibility of PaaS offerings enables any programmer to create enterprise-scale systems that integrate with other Web services and databases—an aspect of cloud computing that fosters additional opportunities for education IT and allows bigger thinking.

The open architecture of PaaS can support integration with legacy applications and interoperability with on-site systems—important considerations because education operates in a mixed IT world. Interoperability gives you the flexibility to take advantage of cloud benefits while retaining data and applications on-site as needed.

The future of PaaS in education

"We are working with Microsoft to provide the academic community a novel cloud computing service with which to experiment and explore, with the grander goal of advancing the frontiers of science and engineering as we tackle societal grand challenges."

Jeannette M. Wing,
Assistant Director for the Computer &
Information Science & Engineering Directorate,
National Science Foundation

"With cloud computing there's no reason to wait. It doesn't cost us any more to use a thousand computers for an hour than it does to use one computer for a thousand hours. So we get the answers tomorrow at no extra cost rather than waiting for the answers for six months."

David Patterson
Professor of Computer Science
University of California, Berkeley

PaaS planning tips

- Implement a secure, development-life cycle methodology for your applications that are hosted in the cloud, and evaluate the cloud provider's compliance against a similar process.
- Plan to scale your service. The multi-tenant architecture of PaaS offerings often comes with concurrency management, scalability, failover, and security so that you can think big when testing and developing software.
- Don't get overwhelmed by the proliferation of protocols and Web services available to PaaS developers. But do consider how you can integrate Web services and databases to create new services.
- Look for providers that help you develop more custom Web apps faster. For example, some PaaS environments help geographically dispersed teams collaborate and share code or include services for creating data models and policies visually.
- Follow the example of other institutions that are integrating Web services and open datasets within PaaS environments. For example, create mashups with datasets in the cloud, such as those available from the Microsoft Open Government Data Initiative (OGDI), a set of software assets designed to help bring useful data to the public.
- Remember that you can lease capacity as needed and use PaaS to test and debug high-memory or compute-intensive features in the cloud whether or not you deploy your services in the cloud.
- Compare how well vendor tools enable portability across clouds. Do they support application interactions and provide resources and policies for service interoperability? Some providers may not allow you to take your application and put it on another platform.

Considering PaaS

Consider PaaS for the following education needs:

- Coordinating collaborative software development projects that involve multiple departments
- Developing applications that can be shared by many users simultaneously
- Creating social networks or communities according to grade, school, or area of study
- Porting on-premise, line-of-business applications to the cloud
- Deploying Web services quickly
- Creating mashups of data to meet accountability and assessment needs

Data centers on demand: IaaS

How many data centers does it take to run a K–12 or higher education institution? Now that the cloud offers storage, networks, and servers as a service, technology is no longer bound by the traditional on-site IT department. On-demand data centers put virtually unlimited computing power into the hands of even the smallest education institution.

On-demand data centers—also known as IaaS—provide compute power, memory, and storage, typically priced per hour according to resource consumption. Some call IaaS bare metal on demand. You pay for only what you use, and the service provides all the capacity you need, but you're responsible for monitoring, managing, and patching your on-demand infrastructure. One big advantage of IaaS is that it offers a cloud-based data center without requiring you to install new equipment or to wait for the hardware procurement process. This means you can get IT resources at your school, college, or university that otherwise might not be available.

With IaaS, savings come from hardware and infrastructure costs but not necessarily from staffing because you are still responsible for system management, patch management, failover and backup, redundancy, and other system management tasks. Depending on the service, an IaaS provider typically handles load balancing, monitoring, and scaling automatically, and you manage your cloud deployments.

Virtual infrastructures

Providers of cloud computing services use virtualization to provide the elasticity so often cited as a benefit. Virtualization means to create virtual machines out of physical servers, that is, multiple operating environments within one physical environment. That way, you can squeeze the maximum computing capacity out of your existing resources. Virtualization technology is useful for any IT group interested in cost-effective data consolidation apart from cloud computing. Just be aware that virtual machines need to be managed and maintained, whether they reside on a service provider's infrastructure or in your own data center.

On-demand compliance

Compare IaaS offerings carefully. You should have a well-functioning compliance program for identities, data, and devices before adopting cloud services. Then ask prospective service providers whether they can meet your needs for transparency, compliance controls, certifications, and auditability.

IaaS planning tips

- Weigh the impact to your IT organization before adopting IaaS because you are still responsible for software patches, maintenance, and upgrades. Monitoring and managing applications in a provider's data center, in addition to those you host yourself, can become a burden to staff.
- Create a strong internal team to manage your security and compliance requirements together with a chosen cloud provider.
- Make sure you have a thorough understanding of how your current system works before you outsource any of it to the cloud. You need to know what you're getting.
- Look for service providers who can meet your redundancy needs for connectivity or storage so that you never lose needed services.
- Negotiate service-level agreements (SLAs) to ensure you get the level of security and identity management required by your organization.
- Understand that on demand is not all or nothing, and take advantage of pay-per-use pricing in the near term for some of the applications you run in a data center. Use existing, dedicated capacity for baseline resources while you assess the impact on your IT staff.
- Look at the access methods for an IaaS offering, and see if existing standards are used. Common protocols include XML (Extensible Markup Language), REST (Representative State Transfer), SOAP (Simple Object Access Protocol), and FTP (File Transfer Protocol).
- Plan an exit strategy. If you choose to change providers, make sure you know how to get applications from the cloud.

Considering IaaS

Consider IaaS for the following education needs:

- Hosting community and other public-facing Web sites.
- Storing—especially public data. The public cloud might even be a safer place to store data than your own data center, according to a team of engineers and computer scientists at the University of California.¹ However, data classification is a key requirement for evaluating risk and making informed decisions about the use of cloud computing.
- Testing large-scale applications in a discrete environment before deploying publicly.

Security in the cloud

Education institutions are entrusted with confidential information and private data. Cloud computing may seem risky because you cannot secure its perimeter—where are a cloud's boundaries? In addition, these institutions must comply with regulatory statutes, such as FERPA and HIPAA, and should support education standards, such as SIF.

NIST likens the adoption of cloud computing to wireless technology. Institutions learned how to protect their wireless data as they moved forward—and they will do the same with cloud computing.ⁱⁱ In building its solution, Aga Khan University in Pakistan found that cloud computing helped strengthen security and improve protection against viruses, [resulting in 66 percent reduction in calls to the IT department](#).

The bottom line? Education institutions vary in their security and regulatory compliance needs, but you know your unique needs of education IT best. You must look carefully at how well cloud providers protect key functions and sensitive data.

Security checklist

- ✓ **Integration.** Look for integration points with security and identity management technologies you already have, such as Active Directory, and controls for role-based access and entity-level applications.
- ✓ **Privacy.** Make sure a cloud service includes data encryption, effective data anonymization, and mobile location privacy.
- ✓ **Access.** When you place your resources in a shared cloud infrastructure, the provider must have a means of preventing inadvertent access. What is the provider's policy if protected data is released accidentally?
- ✓ **Jurisdiction.** The location of a cloud provider's operations can affect the privacy laws that apply to the data it hosts. Does your data need to reside within your legal jurisdiction?

Your own private cloud

Institutions with sensitive information and workloads would probably never want all of their data in a public cloud. Private clouds offer the scalability and shared resources of cloud computing on your terms—and on your turf. To achieve true cloud scalability in a private cloud, you must forecast demand to support the requisite degree of excess capacity and invest accordingly.

When should you avoid the cloud?

In the following cases:

- A regulatory or security issue prevents you from hosting even encrypted data in a public cloud.
- An application requires greater reliability or speed than the Internet.
- You want control over your assets, including physical possession of the hardware your data resides on. A private cloud offers one solution if you still want to take advantage of cloud benefits.

Who's in your cloud?

In the cloud, you share computing power with others. The right model for you is the one that meets your data classification, security, privacy, and education IT requirements.

Public cloud

A cloud infrastructure shared by the general public or industry, typically owned and managed by an organization that sells cloud services.

Community cloud

A cloud infrastructure shared exclusively by certain groups and managed by the group or a third party. It can be hosted on or off premise.

Private cloud

Cloud resources confined inside a firewall with private control over the cloud infrastructure. Some private enterprises run their data centers as a private cloud.

Hybrid cloud

An approach that uses a public cloud for some services, such as school announcements, but uses a private data center for others, such as storage of sensitive data that must comply with federal mandates.

Stepping into the clouds

As popular, cloud computing services outperform internal infrastructure—with 99.9 percent uptime or better in many cases—the road to the cloud looks good. Between the flexibility of the cloud and the power of on-premise software, your education institution can map a cloud strategy that works.

Step 1: Justify cloud services

- Start by discovering how much cloud computing is already taking place in your education institution, and consider how your existing applications could take advantage of the cloud.
- Evaluate a Web service or hosted application in a test or development environment. Did the service save you time or money? Use any savings to justify future endeavors.

Step 2: Budget for the cloud

- Consider how the cloud gives you a predictable budget and plan for IT resources. Offloading some IT functions to the cloud can free up funds to further develop services for students, teachers, faculty, staff, and parents.
- Talk to peers and find ways to share networks, computers, and even e-mail services. Cloud hosting could help you share common services, such as citywide school systems or state community colleges, and even generate revenue from your shared services.
- Know when to make your move. Some cloud strategies, such as PaaS, pay off over time, so factor in how long it might take to recoup your investment, and set expectations accordingly.

Step 3: Integrate cloud services

- Look for ways to integrate on-premise applications and databases with cloud technologies to offer more or faster services. But make sure your data is secured in transit, not just at the ends.
- Think big—especially if you're a small education institution. Cloud services are massively scalable. Who else might benefit? Keep other departments or districts in the loop.

Storm clouds

Expect the cloud not only to drive technology change, but also to change processes, people, and management procedures. All these factors need to be aligned as you plan any cloud implementation.

And keep an eye on the press as you go forward. The public perception of risk may raise concerns with your stakeholders.

Looking ahead to a world of IT choices

The cloud is a bridge from the desktop to a world of devices, from the average on-campus school day to remote services anywhere and anytime. As much excitement as there is in cloud computing, it is just one piece of a technology landscape that spans from the on-premise data center to the cloud and reaches people through the computer, Web, and phone.

At Microsoft, we see academic institutions using a blend of hosted and on-premise products and solutions that are deeply integrated. Today, your application can run solely on premise, it might store data or code in the cloud, or it can make use of other cloud infrastructure services. That's why our approach to cloud computing for education relies on a platform that gives you the power of choice to deploy services in the cloud or through on-premise servers—or to combine them in any way that works best for your organization and constituents.

Cloud benefits for education

How can the cloud help you transform education? Consider the following:

- **Flexible services.** Drive innovation with data services in the cloud that students, teachers, faculty, and staff can reuse. Offer your own data mashups on a portal.
- **Infrastructure.** Get all the IT resources you need, only when you need them, managed securely and predictably. And pay for only what you use. Any budget-constrained institution has to like that.
- **Applications and content.** Rather than waiting in the software procurement line, get hosted software, datasets, and services so fast you'll have plenty of time to work on your mission.
- **Policies and regulations.** Proceed carefully, but note how cloud computing can help you meet your institution's compliance requirements.
- **Creative IT.** Free your IT department from a keep-the-lights-on approach to foster some creative problem solving that can help teachers better engage their students.

Cloud technology from Microsoft

Education IT is not one size fits all—and neither is the cloud. That’s why our approach to cloud computing is created to provide you with choices and flexibility. Education IT will continue to run applications within its own environment while adding new applications and services that run in the cloud. Our focus is on making solutions for the real world of hybrid IT environments by providing cost-effective software and services that support your efforts to foster learning, create opportunities, and address challenges facing education. And our extensive community of partners is available to work with you to deliver innovative solutions on premise or in the cloud.

Software and services from Microsoft

- [Microsoft Live@edu](#) provides students, staff, faculty, and alumni long-term, primary e-mail addresses and other applications that they can use to collaborate and communicate online—all at no cost to your education institution.
- [Microsoft Business Productivity Online Suite](#) (BPOS) delivers a suite of services, also available as stand-alone software, for hosted communication and collaboration. [Microsoft Exchange Online](#) delivers your e-mail with protection, plus calendar and contacts. [Microsoft SharePoint Online](#) creates a highly secure, central location for collaboration, content, and workflow. [Microsoft Office Communications Online](#) provides real-time, person-to-person communications, through text, voice, and video. [Microsoft Office Live Meeting](#) delivers hosted Web conferencing.
- [Microsoft Exchange Hosted Services](#) offers online tools to help your organization protect itself from spam and malicious software, satisfy retention requirements for e-discovery and compliance, encrypt data to preserve confidentiality, and more. [Microsoft Forefront Online Protection for Exchange](#) helps protect e-mail from spam, viruses, phishing scams, and e-mail policy violations.
- [Microsoft Dynamics CRM Online](#) streamlines customer relationship management, and delivers results through your browser and within your everyday productivity applications.
- [Microsoft Office Web Apps](#) let you access documents from virtually anywhere and provide online access to your work and a core set of Microsoft Office functionality over the Web.

Microsoft in the cloud

As one of the largest, hosted-services providers in the world, Microsoft offers a solid track record as an online solution provider. Long established in the cloud, Microsoft continues to invest heavily—U.S.\$9.5 billion per year—in research and development to help drive the technology further.

Compliance

Recognizing that data in many forms is one of education’s most prized assets, Microsoft has invested more than \$2 billion in new data centers around the world. These centers today meet or exceed U.S. federal government and international security body standards. Microsoft online services and data centers adhere to stringent HIPAA and SIF requirements. The data centers are also SAS 70 and ISO 27001 certified, and they are audited by independent, third-party security organizations.

Uptime

Microsoft guarantees 99.9 percent uptime at its data centers, which are outfitted to operate during power outages and after natural disasters. Microsoft replicates data from its primary data centers to secondary data centers for redundancy without storing any data off-site.

Platform and infrastructure services from Microsoft

- [Azure Services Platform](#) supports applications, data, and infrastructure in the cloud, giving you the flexibility to run applications—or just store code or data—in the cloud, on premise, or with a combination of both. Azure Services Platform is an on-demand operating environment for hosting, managing, and creating application services in the cloud, which makes it the choice of many Microsoft partners who are using it to build their own public and private cloud services and data centers.
- Featuring Windows Azure for running Windows applications and storing data in the cloud, Azure Services Platform also includes [Microsoft SQL Azure Database](#), a cloud-based, relational database service built on Microsoft SQL Server that offers highly available, scalable, multi-tenant database services. Software developers can use [Windows Azure Tools for Microsoft Visual Studio](#) to create, configure, build, debug, and run Web applications and services on Windows Azure. [Windows Azure platform AppFabric](#), formerly known as .NET Services, makes it simpler for them to connect cloud services and on-premise applications.
- For more information, see our [Windows Azure platform white papers](#).
- [Microsoft Code-Named “Dallas”](#) makes it easy to find, purchase, and manage premium data subscriptions in the Windows Azure platform, and you can consume the data from any platform, application, or business workflow.
- [Dynamic Data Center Toolkit for Enterprise](#) is a free, partner-extensible toolkit that provides a framework for creating virtualized IT infrastructures. IT teams can use the toolkit with Windows Server 2008 R2 Hyper-V and Microsoft System Center Virtual Machine Manager 2008, along with partner extensions, to plan, operate, and deliver the foundation for a private cloud.
- [System Center Online Desktop Manager](#) lets you easily secure, update, monitor, configure, and troubleshoot computers from a single, Web-based console—without the overhead associated with installing and maintaining an on-premise management infrastructure.

Data with or without borders

If your data needs to stay within the U.S. borders, Microsoft can guarantee it with multiple data centers across the United States that provide reliability and failover for education customers.

In addition, our data centers preserve the chain of custody for documents. When moving documents between on-premise and cloud services, documents retain the format and fidelity needed to create a reasonable facsimile for investigations or Freedom of Information Act (FOIA) requests.

How green is our cloud?

Microsoft data centers are designed to reduce total energy consumption by 25–40 percent compared to traditional facilities.

Who’s who in our cloud?

Millions use Microsoft-hosted services, including Carleton University, City University of New York, Florida International University, Indiana University, Purdue University, Seton Hall University, and the National Science Foundation.

Calculate cloud cost savings

Get a customized estimate of the potential cost savings your education institution might achieve by building on the Windows Azure platform. Try our [Total Cost of Ownership Calculator](#).

Microsoft resources	Description
In the cloud	Microsoft cloud services offer you the power of choice. You can run some applications on premise, use hosted services managed by Microsoft or our partners, or use a flexible combination of both. Hosted solutions provide familiar features and experience in the cloud for users of Windows and Microsoft Office.
Microsoft Public Sector Idea Bank	You can participate in a community of developers and other professionals to influence the development of future solutions at the Microsoft Public Sector Idea Bank , which highlights on-demand solutions powered by Microsoft Dynamics CRM.
For interoperability	Academic institutions operate in a mixed IT world that requires integration and interoperability among its departments and their IT environments. Microsoft offers a multifaceted approach to achieving interoperability and is committed to solving real-world interoperability challenges with our customers through innovative products, community engagement, technology access, and support for technology standards.
About open source	Open source software is part of many data centers today, and Microsoft provides many resources for open source developers, including Port 25 , an open source community, and CodePlex , project hosting for open source software.
About infrastructure	Education IT departments are challenged more than ever to meet competing resource demands in new ways. Virtualization can help agencies control costs, improve manageability, drive agility, and improve availability. Data center sustainability is another approach to lowering costs and reducing environmental impact.
To save energy	Green IT solutions promote long-term sustainability and can offer significant savings through a combination of energy conservation, improved workflow, and streamlined deployment.

Endnotes

ⁱ Armbrust, Michael, et al. "Above the Clouds: A Berkeley View of Cloud Computing" (Technical Report No. UCB/EECS-2009-28), University of California, Berkeley, 2009. <http://www.eecs.berkeley.edu/Pubs/TechRpts/2009/EECS-2009-28.html>

ⁱⁱ Beizer, Doug. "NIST creates cloud-computing team." *Federal Computer Week*, February 25, 2009. <http://www.fcw.com/Articles/2009/02/25/NIST-cloud-computing.aspx>