



CLOUD COMPUTING

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FIELDS OF STUDY

Information Technology; Computer Science; Software

ABSTRACT

Cloud computing is a networking model in which computer storage, processing, and program access are handled through a virtual network. Cloud computing is among the most profitable IT trends. A host of cloud-oriented consumer products are available through subscription.

PRINCIPAL TERMS

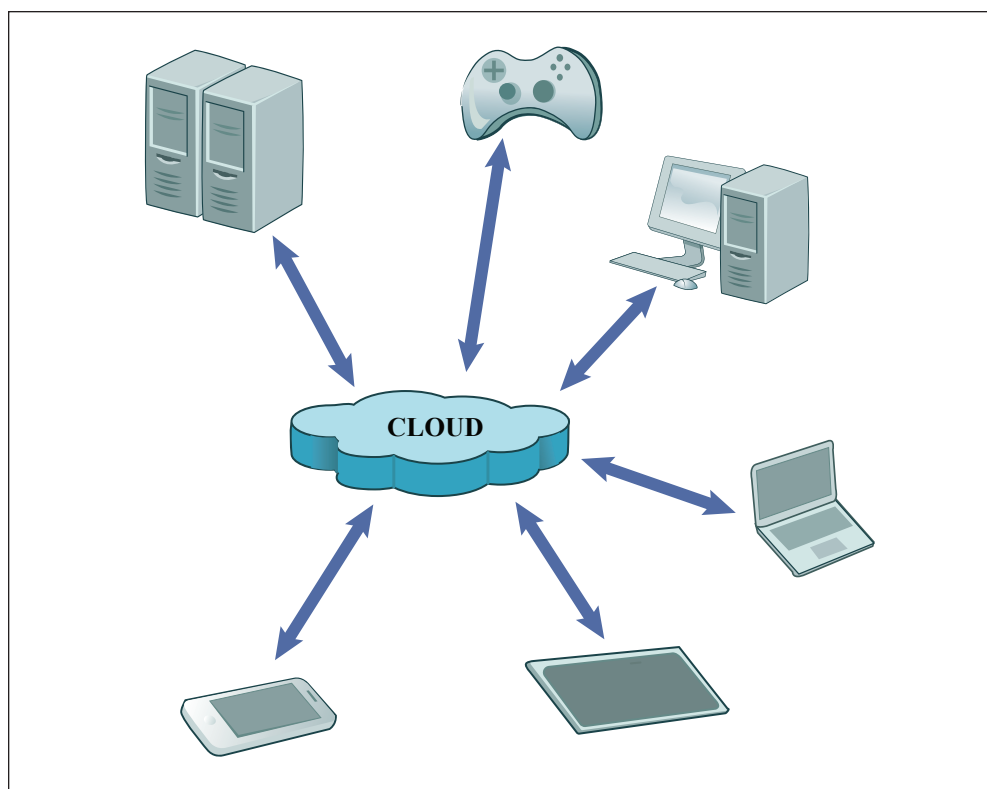
- **hybrid cloud:** a cloud computing model that combines public cloud services with a private cloud platform linked through an encrypted connection.
- **infrastructure as a service:** a cloud computing platform that provides additional computing resources by linking hardware systems through the Internet; also called “hardware as a service.”
- **multitenancy:** a software program that allows multiple users to access and use the software from different locations.
- **platform as a service:** a category of cloud computing that provides a virtual machine for users to develop, run, and manage web applications.
- **software as a service:** a software service system in which software is stored at a provider’s data center and accessed by subscribers.
- **third-party data center:** a data center service provided by a separate company that is responsible for maintaining its infrastructure.

Cloud Network Design

Cloud computing is a networking model that allows users to remotely store or process data. Several major Internet service and content providers offer cloud-based storage for user data. Others provide virtual access to software programs or enhanced processing capabilities. Cloud computing is among the fastest-growing areas of the Internet services industry. It has also been adopted by government and research organizations.

Types of Cloud Networks

Private clouds are virtual networks provided to a limited number of known users. These are often used in corporations and research organizations. Operating a private cloud



Cloud computing refers to the use of processors, memory, and other peripheral devices offsite, connected by a network to one's workstation. Use of the cloud protects data by storing it and duplicating it offsite and reduces infrastructure and personnel needs.

requires infrastructure (software, servers, etc.), either on-site or through a third party. Public clouds are available to the public or to paying subscribers. The public-cloud service provider owns and manages the infrastructure. Unlike private clouds, public clouds provide access to an unknown pool of users, making them less secure. Public clouds tend to be based on open-source code, which is free and can be modified by any user.

The **hybrid cloud** lies somewhere between the two. It offers access to private cloud storage or software services, such as database servers, while keeping some services or components in a public cloud. Setup costs may be lower with hybrid cloud services. A group using a hybrid cloud outsources some aspects of infrastructure investment and maintenance but still enjoys greater security than with a public cloud. Hybrid clouds have become widespread in the health care, law, and investment fields, where sensitive data must be protected on-site.

Cloud Computing as a Service

The **infrastructure as a service (IaaS)** model offers access to virtual storage and processing capability through a linked network of servers. Cloud-based storage has become popular, with services such as Apple iCloud and Dropbox offering storage alternatives beyond the memory on users' physical computers. IaaS can also give users greater computing power by allowing certain processes to run on virtual networks, rather than on the hardware of a single system. Using IaaS enables companies to create a corporate data

center through **third-party data centers**. These third-party centers provide expert IT assistance and server resources, generally for subscription fees.

The **platform as a service** (PaaS) model mainly offers access to a specific platform that multiple users can use to develop software applications, or apps. Many apps require access to specific development programs. The Google App Engine and IBM's developer-Works Open provide an environment that stores, supports, and runs web apps. PaaS allows software developers to create apps without investing in infrastructure and data center support. Providers may also offer virtual storage, access to virtual networks, and other services.

The **software as a service** (SaaS) model offers users subscription-based or shared access to software programs through a virtual network. Adobe Systems' Creative Cloud provides access to programs such as Photoshop, Illustrator, and Lightroom for a monthly fee. Users pay a smaller amount over time rather than paying a higher cost up front to purchase the program. SaaS supports **multitenancy**, in which a single copy of a program is available to multiple clients. This allows software providers to earn revenue from multiple clients through a single instance of a software program.

Advantages and Disadvantages of the Cloud

Cloud networking allows small companies and individuals access to development tools, digital storage, and software that once were prohibitively expensive or required significant management and administration. By paying subscription fees, users can gain monthly, yearly, or as-used access to software or other computing tools with outsourced administration. For service providers, cloud computing is cost effective because it eliminates the cost of packaging and selling individual programs and other products.

Data security is the chief concern among those considering cloud computing. The private and hybrid cloud models provide a secure way for companies to reap the benefits of cloud computing. Firewalls and encryption are common means of securing data in these systems. Providers are working to increase the security of public clouds, thus reducing the need for private or hybrid systems.

— Micah L. Issitt

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