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Review Article

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Utility Computing

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Abstract Utility computing (UC) refers to the process of providing computing utility-like services through an on-demand, rental or pay-per-use billing basis. Utility computing allows consumers to pay for the computing resources (which are made available over the Internet) they need as easy as obtaining electricity or gas. The customer simply pays by the hour, day or month, depending on the resources used. The major benefits of utility computing are convenience and better economics. Although people are now aware of the concept of utility computing, very few understand it. This paper provides a brief introduction to utility computing.

Keywords utility computing, computer utility, Internet computing utility, on-demand computing

Introduction

With the rapid progress of computing, storage, and networking technologies, we are going through a major shift in information technology (IT). The shift is so massive that it affects underlying architecture of how we develop, deploy, run, and deliver applications. This shift has led the concepts of cloud computing and utility computing. Cloud computing relates to the way we design, build, deploy and run applications that operate in a virtualized environment, while utility computing relates to the business model in which application infrastructure resources are shared [1]. They collectively lead us into an era of "Everything-as-a-Service."

Utility computing (UC) is a service provisioning of resources, such as computation, storage and services, as a metered service or pay-per-use. The service provider makes computing infrastructure resources (hardware, software, CPU time, memory, hard drive space, and network bandwidth) available to the customers as needed, and charges them for specific usage rather than a flat rate. Companies such as IBM, Hewlett-Packard, Microsoft, Google, Sun Microsystems, and Amazon established their own utility services for computing, storage, and applications [2].

The term "utility" is used in the same way as other services, such as water, gas, electricity, and telephone, that charge for the resources based on usage rather than on a flat-rate basis. Historically, companies obtained computing resources through upfront capital investments. Utility computing eliminates upfront capital requirements allowing companies to use computing resources anytime and from anywhere on-demand. In other words, this model has the benefit of a low or no initial cost to acquire computer resources. It is based on the principle that one company pays another company for servicing. Utility computing companies offer difference resources including software, servers, CPUs, monitors, devices, and Internet access [3].

Properties of Utility Computing

The properties of utility computing include the following:

- ***Scalability*:** The ability to quickly scale an application can make a difference between success and failure for a provider. Utility computing service providers should seek simultaneously both scalability and elasticity.

- *Manageability*: System administrators can edit, configure, and design applications using web-based drag-and-drop editor.
- *Availability*: This measures whether the provider has enough computing resources to satisfy all users that demand it.
- *Fixed Prices*: Currently, providers use simple pricing mechanism to charge users: fixed prices based on various resource types. For example, for processing power (as of October 2008), Amazon charges $0.10 per virtual computer instance per hour (h), while Sun Microsystems charges $1.00 per processor (CPU) per h [4]. In the future, many types of pricing models will emerge, including long-term contracts.

Utility computing can be either internal utility where the network is shared only within a company or external utility used by several companies.

Benefits and Challenges

Utility computing is a popular service model because of the convenience, flexibility, and economy it provides. It reduces the cost of IT. The consumer has access to almost unlimited supply of computing resources over the Internet which can be used whenever it is needed. The customer is completely absolved from the responsibility of maintenance and management of the hardware.

In spite of the obvious benefits of utility computing, there are several yet-to-be-addressed challenges preventing the full realization of utility computing. A major challenge is reliability. If a utility computing company has equipment problems or goes out of business, the customer's business may suffer. Another challenge is that both providers and customer must reorganize their current IT-related procedures and operations to include utility computing. Open standards are necessary to facilitate successful adoption of utility computing [5]. Utility computing systems can be attractive to hackers.

Since several jobs can run concurrently, a misbehaving job must not consume bandwidth to the extent that other jobs suffer. A fault tolerance solution should allow unaffected jobs to run without interruption [6].

Due to the heterogeneous computing resources, poor allocation of jobs to the resources may lead to in higher payments by the customers. It is therefore essential that job allocation should be efficient so as to minimize the cost [7].

Conclusıon

Utility computing is the packaging of computing resources (such as computation, communication, and storage) as a metered service. Utility computing basically means pay-as-you-go as regards to computing power. Cloud computing and grid computing services are based on the concept of utility computing. Utility computing is connected to cloud computing as it is one of the options for its accounting. Utility computing is expected to become widely prevalent in the future and become one of the next major sources of income in the IT services market [8].

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