Assistance of Cloud Computing For Green Computing

Rashmi R. Rathi

Department of Masters in Computer Application

Prof.Ram Meghe Institute Of Technology And Research,

Badnera,Amravati

rrathi777@gmail.com

9922466646

Abstract

Cloud computing is one of the most demanding topic today. Cloud computing enables users to share resources and carry out tasks remotely. Green computing is computing which uses electricity efficiently.

The advantages of cloud computing include reduced costs, easy maintenance and re-provisioning of resources, and thereby increased profits. Cloud also helps save the environment. This article covers cloud computing advantages while discussing how cloud computing contributes to green computing.

Keywords:

Cloud Computing Types, Advantages and Characteristics, Green Computing.

Introduction:

Green Computing and Cloud Computing are both hot topics these days. What can they do to benefit each other? Let's take a look. As energy costs keep going up, it makes sense for a business to conserve where it can. IT is one department where power consumption is a large budgetary concern. Your business may or may not need the full computing capability of modern servers all the time. Much of the time, those computers would sit there idle, but still consuming power and costing money.

Cloud computing enables users to share resources and carry out tasks remotely. Rather than using your own local PCs or servers to do the work, you connect to a remote data centre, often provided by an IT services or software company. It means more computing is migrating to purpose-built data centers.

One can define cloud computing as a pay-per-use model for enabling on-demand access to reliable and configurable resources that can be quickly provisioned and released - with minimal consumer involvement in terms of management. You pay only for the resources you use. You need not set up the infrastructure or buy the software. This is just an abstraction of the many advantages of cloud computing.

According to a 2001 study an office of 10 typical PCs, storing data locally and saving documents on a server, consumes an average of 215 kWh of electricity per working

week. Those PCs also produce a lot of heat, which may mean you need air-conditioning, using even more power.

In its most extreme form, cloud computing replaces your business PCs with 'thin clients' who contain no software, no disk and no moving parts. They connect to a remote server which stores data and does the actual work. Everything you need, you access remotely.

This can significantly cut the amount of energy you use in your office. On average, the same size office would consume 133 kWh per working week. That's a big difference: in terms of carbon emissions, it's like driving 9.000 fewer miles in a new car. Even allowing for improvements in PC efficiency since that 2001 study, you're still likely to see a saving
.
Cloud computing can also be define as-cloud computing is a delivery of computing as a service rather than a product by shared resources.

Cloud computing is a technology that uses internet and remote servers to maintain data and applications.
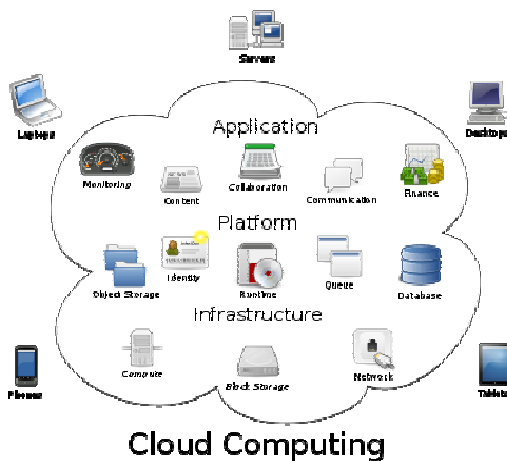
Cloud computing logical diagram

Example: Simple example of cloud computing is *yahoo mail, gmail, hotmail.*

You don't need software to use them. All a consumer would need is just an internet connection and you can just start sending emails.
The server and email management software is just on cloud (internet)
And totally managed by the cloud server provider yahoo, gmail etc. The consumer gets to use the software alone and enjoy the benefits.

Cloud computing types:

a)   *Public cloud:*
A public cloud is one based on the standard cloud computing model, in which a service provider makes resources, such as applications and storage, available to the general public over the Internet. Public cloud services may be free or offered on a pay-per-usage model.

b)   *Community cloud***:**
Community cloud shares infrastructure between several organizations from a specific community with common concerns (security, compliance, jurisdiction, etc.), whether managed internally or by a third-party and hosted internally or externally. The costs are spread over fewer users than a public cloud (but more than a private cloud), so only some of the cost savings potential of cloud computing are realized.

c)   *Hybrid cloud:*
Hybrid cloud is a composition of two or more clouds (private, community, or public) that remain unique entities but are bound together, offering the benefits of multiple deployment models. It can also be defined as multiple cloud systems that are connected in a way that allows programs and data to be moved easily from one deployment system to another.

d)   *Private cloud:*
Private cloud is infrastructure operated solely for a single organization, whether managed internally or by a third-party and hosted internally or externally. They have attracted criticism because users "still have to buy, build, and manage them" and thus do not benefit from less hands-on management,

essentially "[lacking] the economic model that makes cloud computing such an intriguing concept.

Green computing:
Green computing can be define as-
"the study and practice of designing, manufacturing, using, and disposing of computers, servers, and associated subsystems—such as monitors, printers, storage devices, and networking and communications systems — efficiently and effectively with minimal or no impact on the environment."

Why cloud computing is green computing:

1. Resource virtualization, enabling energy and resource efficiencies.

Virtualization is a foundational technology for deploying cloud-based infrastructure that allows a single physical server to run multiple operating system images concurrently. As an enabler of consolidation, server virtualization reduces the total physical server footprint, which has inherent green benefits.

From a resource-efficiency perspective, less equipment is needed to run workloads, which proactively reduces data center space and the eventual e-waste footprint. From an energy-efficiency perspective, with less physical equipment plugged in, a data center will consume less electricity.

It's worth noting that server virtualization is the most widely adopted green IT project implementted or planned, at 90 percent of IT organizations globally into 2011.

2. Automation software, maximizing consolidation and utilization to drive efficiencies.

The presence of virtualization alone doesn't maximize energy and resource efficiencies. To rapidly provision, move, and scale workloads, cloud-based infrastructure relies on automation software.

Combined with the right skills and operational and architectural standards, automation allows IT professionals to make the most of their cloud-based infrastructure investment

by pushing the limits of traditional consolidation and utilization ratios.

The higher these ratios are, the less physical infrastructure is needed, which in turn maximizes the energy and resource efficiencies from server virtualization.

3. Pay-per-use and self-service, encouraging more efficient behavior and life-cycle management.

The pay-as-you-go nature of cloud-based infrastructure encourages users to only consume what they need and nothing more. Combined with self-service, life-cycle management will improve, since users can consume infrastructure resources only when they need it -- and "turn off" these resources with set expiration times.

In concert, the pay-per-use and self-service capabilities of cloud-based infrastructure drive energy and resource efficiencies simultaneously, since users only consume the computing resources they need when they need it.

4. Multi tendency delivering efficiencies of scale to benefit many organizations or business units.

Multi tendency allows many different organizations (public cloud) or many different business units within the same organization (private cloud) to benefit from a common cloud-based infrastructure.

By combining demand patterns across many organizations and business units, the peaks and troughs of compute requirements flatten out. Combined with automation, the ratio between peak and average loads becomes smaller, which in turn reduces the need for extra infrastructure. The result: massive efficiencies and economies of scale in energy use and infrastructure resources.

So migrating workloads to cloud resources, or developing new workloads in a cloud-native environment, can help an IT organization contribute to energy-efficiency and sustainability goals. But so far, cloud services and their providers are doing little to help their customers on three other facets of a green IT program

Characteristics of cloud computing:

Cloud computing exhibits the following key characteristics:

- *Accessibility*
- *Service Management*
- *User Metering*
- *Automation*
- *Virtualization*
- *Cost Efficiency*
- *Flexibility*
- *Agility*
- Reliability
- Scalability
- Performance
- Maintenance

Advantages of cloud computing: As you can see, there are numerous advantages of cloud computing, the most basic ones are-

- Being Remote Accessibility
- Quick re-provisions.
- Reduce runtime and response time
- Minimize infrastructure Risk
- Lower Cost Of Entry
- Increased pace of innovation
- A mobile profile
- An interim evaluation for the business.

Advantages with Green Computing

This section talks about advantages of cloud computing under green computing. Green computing can be defined as energy efficient usage of computing resources. Most of the computers today are Energy Star certified. They are designed to reduce the consumption of electricity while also reducing emissions that damage the environment. Taking the advantages of cloud computing further contributes to green computing.

As cloud computing can always be used to re-provisioning of resources, when you need to expand, you need not buy the infrastructure to increase the carbon emissions by way of using more electricity to cool off the computer resources. You can just expand to the cloud to use the pre-built resources to stop the increase in electricity usage at your end. You also need not add cooling components thereby reducing the hazardous emissions. Thus, you save the environment while also saving on the expenses incurred due to a demand for expansion.

The expansion can be as small as writing a code for your business. There are several generic software available through SaaS. You can use the one that suits your company or personal needs. This saves you the trouble of adding one or more computers to your infrastructure for the purpose of storing the database(s) used by the code. This keeps a check on your electricity usage, thereby contributing to green computing.

Cloud computing also allows you to let your employees telecommute. This means large savings while contributing heavily to environmentally friendly green computing. Your employees can access the cloud - public or private - from any corner of the world and can work from their homes. This means they need not drive to the business premises. This saves them fuel and reduces carbon emissions, which in turn, saves the environment. You can also cut down the number of electronic devices when your employees are telecommuting. You use less computers and other machinery, which means reduced usage of electricity. If you use less computers and servers, you also cut down on cooling resources, which reduce both electricity usage and carbon emissions - again contributing to the environment and green computing.

As you can see, there are several advantages of cloud computing. Here's a summary:

Remote Accessibility: With cloud computing, your business is not restricted to a particular location. This applies to individuals also. You can access the services from anywhere. All you need is your ID and password. In some cases, there may be extra security requirements but as they too are mobile, you can easily access your cloud services from any part of the world.

Easy Expansion: As of the characteristics of cloud computing is its flexibility, you can quickly access more resources if you need to expand your business. You need not buy extra infrastructure. You just need to inform your cloud provider about your requirements and they will allocate resources to you. In most cases, the entire process is automated so the expansion takes just a few minutes. The same is applicable if you wish to use less resource. One of the best advantages of cloud computing is easy re-allocation of resources.

Security: Though people doubt cloud computing, clouds tend to be more secure than the traditional business models. Clouds offer real-time backup which results in less data loss. In case of outage, your customers can use the backup servers that sync with the main ones as soon as they are up. Your business gets maximum uptime without any loss of data during the transitions. Other than this, clouds are less prone to hacks and DDoS attacks as people don't know the whereabouts of your data.

Environmentally Friendly: Usage of ready-made resources tailored to your needs helps you reduce the electricity expenses. While you save on electricity, you also save on resources required to cool off computers and other components. This reduces the emissions dangerous to environment.

Conclusion:

Cloud computing is a better way to run your business. Instead of running your apps yourself, they run on a shared data center. When you use any app that runs in the cloud, you just log in, customize it, and start using it. That's the power of cloud computing.

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