A Theoretical Study of Grid Computing and Cloud Computing

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ABSTRACT
In general, talking about grid computing, everyone will think of the rage of the search for extraterrestrial year project, that is in the machine by installing a screen saver software that can take advantage of all leisure time when everyone's PC computing power to participate in the search alien calculations. This also illustrates the grid goal is to want as much as possible use of resources. It is through specific grid software, a huge project broken down into numerous independent of each other, less-related sub-tasks, and then calculated by the various computing nodes. It should be said from that point, job scheduling is a core value of grid computing. Turning now to cloud computing, we can immediately think of the Internet data center services, packaged into a variety of resources available outside. In general, though, like grid computing, cloud computing, like all of the resources to build into a huge pool of resources, but it provides a cloud computing out of resources in order to complete a specific task. For example, a user may need to apply a certain amount from the resource pool of resources to deploy their applications, rather than its mandate will be submitted to the entire grid to complete.

I. INTRODUCTION

We all are interested in knowing the real meaning of cloud computing and grid Computing. Anybody who is in the IT world is talking about them. And a many of people in the business world are asking this question, "What is cloud computing, and how is it going to favor in my business?" Cloud computing is the use of a 3rd party service (Web Services) to perform computing needs. Here Cloud depicts Internet. With cloud computing, companies can scale up to massive capacities in an instant without having to invest in new infrastructure. Cloud computing is benefit to small and medium-sized businesses. Basically consumers use what they need on the Internet and pay only for what they use. Cloud

Computing incorporates infrastructure as a service (IaaS), platform as a service (PaaS) and software as a service (SaaS) as well as Web 2.0. Cloud computing eliminates the costs and complexity of buying, configuring, and managing the hardware and software needed to build and deploy applications,

These applications are delivered as a service over the Internet (the cloud). Cloud is basically an extension

To the object oriented programming concept of abstraction. It eliminates the complex working details

From being visible to the users . What users can view is just an interface, which only involves receiving the inputs and providing the outputs. The process involved in generating the outputs is completely invisible. The cloud works on the concept of abstraction in a physical computing environment, which is done by simply hiding the actual processes from the users. In the cloud hosting environment, the data is placed over multiple servers in the cluster, though the credentials of the network connections are entirely hidden and the users cannot access anyone else's data. The Cloud environment includes derivatives from the UNIX paradigm of having multiple elements, where every element is exceptional at any individual task, instead of having a single huge element that takes care of all the tasks. Clouds as well as grid computing are newer concepts as compared to the other computing solutions. Few newbie webmasters misunderstand them to be synonyms of each other. Here are differences in the processing capabilities and functionality between the two. They also have a difference in their networks and the way they process the tasks. The concept encapsulates the actual complex processes that are undertaken by the system and presents a ser with a simplified interface. Hence, simplifying the interaction between the users and the system. The basic intention behind this is to making the system user-friendly but without disturbing the functionality of the overall processes. The fundamental concepts of Cloud and Grid computing are varied. Still it is possible to have a cloud cluster within a computational grid and vice-versa. You may have wondered about cloud computing as compared to grid computing.

II. THE BASIC IDEA ABOUT CLOUD COMPUTING

With cloud computing, companies can scale up to massive capacities in an instant without having to invest in new infrastructure, train new personnel, or license new software. Cloud computing is of particular benefit to small and medium-sized businesses who wish to completely outsource their data-center infrastructure, or large companies who wish to get peak load capacity without incurring the higher cost of building larger data centers internally. In both instances, service consumers use what they need on the Internet and pay only for what they use. The service consumer no longer has to be at a PC, use an application from the PC, or purchase a specific version that's configured for Smartphone's, PDAs, and other devices. The consumer does not own the infrastructure, software, or platform in the cloud. He has lower upfront costs, capital expenses, and operating expenses. He does not care about how servers and networks are maintained in the cloud. The consumer can access multiple servers anywhere on the globe without knowing which ones and where they are located. Example:

Amazon Web Services (AWS) – AWS delivers a set of services that together form a reliable, scalable platform 'in the cloud'. These pay-as-you-use cloud computing services include Amazon S3, Amazon EC2, Amazon SimpleDB, Amazon SQS, Amazon FPS, and others.

Salesforce.com – Delivers businesses over the internet using the software as a service model.

Google Apps - Software-as-a-service for business email, information sharing and security.

Software development in cloud

To develop software using high-end databases, the most likely choice is to use cloud server pools at the internal data corporate center and extend resources temporarily with Amazon Web services for testing purposes. This allows project managers to better control costs, manage security, and allocate resources to clouds a project is assigned to. The project managers could also assign individual hardware resources to different cloud types: Web development cloud, testing cloud, and production cloud. The cost associated with each cloud type may differ from one another. The cost per hour or usage with the development cloud is most likely lower than the production cloud, as additional features, such as SLA and security, are allocated to the production cloud.

The managers can limit projects to certain clouds. For instance, services from portions of the production cloud can be used for the production configuration. Services from the development cloud can be used for development purpose only. To optimize assets at varying stages of the project of software development, the managers can get cost-accounting data by tracking usage by project and user. If the costs are found to be high, managers can use Amazon EC2 to temporarily extend resources at a very low cost provided that security and data recovery issues have been resolved.

Environmentally friendly cloud computing

One incentive for cloud computing is that it may be more environmentally friendly. First, reducing the number of hardware components needed to run applications on the company's internal data center and replacing them with cloud computing systems reduces energy for running and cooling hardware. By consolidating these systems in remote centers, they can be handled more efficiently as a group.

Second, techniques for cloud computing promote telecommuting techniques, such as remote printing and file transfers, potentially reducing the need for office space, buying new furniture, disposing of old furniture, having your office cleaned with chemicals and trash disposed, and so on. They also reduce the need for driving to work and the resulting carbon dioxide emissions.

III. DEFINING GRID COMPUTING

Grid computing is a form of distributed computing whereby, resources of many computers in a network is used at the same time, to solve a single problem. Grid systems are designed for collaborative sharing of resources. It can also be thought of as distributed and large-scale cluster computing.

Grid computing is making big contributions to scientific research, helping scientists around the world to analyze and store massive amounts of data by sharing computing resources. Here are some real world examples of Grid Computing. Grids tend to be more loosely coupled, heterogeneous, and geographically dispersed compared to conventional cluster computing systems.

A Grid is basically the one that uses the processing capabilities of different computing units for processing a single task. This task though is managed by a single primary computing machine. What this machine does is, it divides the task into numerous tasks and gets processed from difference computing machines in the cluster. As soon as these tasks are completed by the machines, they send the result back to the primary machine which takes care of controlling all the tasks. All the results are clubbed together and a single output is provided. Grid computing offers two prime benefits i.e., first of all it uses the free processing power effectively and secondly, the time required for processing the tasks is significantly reduced.

Cloud computing evolves from grid computing and provides on-demand resource provisioning. Grid computing may or may not be in the cloud depending on what type of users are using it. If the users are systems administrators and integrators, they care how things are maintained in the cloud. They upgrade, install, and virtualized servers and applications. If the users are consumers, they do not care how things are run in the system.

IV. THE COMPARISON BETWEEN CLOUD COMPUTING AND GRID COMPUTING

For some, the comparison between these two types of computing could be hard to understand since they aren't much exclusive to each other. Rather, they are used for enhancing the utilization of the available resources. Furthermore, they both use the concept of abstraction at an extensive scale, each having distinct elements which interact with each other.

The only differentiating factor between the two is the method it adopts for computing the tasks within their individual environments. In grid computing, a single big task is split into multiple smaller tasks which are further distributed to different computing machines. Upon completion of these smaller tasks, they are sent back to the primary machine which in return offers a single output.

Cloud computing architecture is intended to enable users to use different services without the need for investment in the underlying architecture. Though, grid too offers similar facility for computing power, but cloud computing isn't restricted to just that. With a cloud users can avail various services such as website hosting etc.

Cloud computing and grid computing are scalable. Scalability is accomplished through load balancing of application instances running separately on a variety of operating systems and connected through Web services. CPU and network bandwidth is allocated and de-allocated on demand. The system's storage capacity goes up and down depending on the number of users, instances, and the amount of data transferred at a given time.

Both computing types involve multitenancy and multitask, meaning that many customers can perform different tasks, accessing a single or multiple application instances. Sharing resources among a large pool of users assists in reducing infrastructure costs and peak load capacity. Cloud and grid computing provide service-level agreements (SLAs) for guaranteed uptime availability of, say, 99 percent. If the service slides below the level of the guaranteed uptime service, the consumer will get service credit for receiving data late.

The Amazon S3 provides a Web services interface for the storage and retrieval of data in the cloud. Setting a maximum limits the number of objects you can store in S3. You can store an object as small as 1 byte and as large as 5 GB or even several terabytes. S3 uses the concept of buckets as containers for each storage location of your objects. The data is stored securely using the same data storage infrastructure that Amazon uses for its e-commerce Web sites. While the storage computing in the grid is well suited for data-intensive storage, it is not economically suited for storing objects as small as 1 byte. In a data grid, the amounts of distributed data must be large for maximum benefit. A computational grid focuses on computationally intensive operations. Amazon Web Services in cloud computing offers two types of instances: standard and high-CPU.

Issues to consider

Four issues stand out with cloud and grid computing: threshold policy, interoperability issues, hidden costs, and unexpected behavior.

Threshold policy

Let's suppose I had a program that did credit card validation in the cloud, and we hit the crunch for the December buying season. Higher demand would be detected and more instances would be created to fill that demand. As we moved out of the buying crunch, the need would be diminished and the instances of that resource would be de-allocated and put to other use.

To test if the program works, develop, or improve and implement, a threshold policy in a pilot study before moving the program to the production environment. Check how the policy detects sudden increases in the demand and results in the creation of additional instances to fill in the demand. Also check to determine how unused resources are to be de-allocated and turned over to other work.

Interoperability issues

If a company outsources or creates applications with one cloud computing vendor, the company may find it is difficult to change to another computing vendor that has proprietary APIs and different formats for importing and exporting data. This creates problems of achieving interoperability of applications between these two cloud computing vendors. You may need to reformat data or change the logic in applications. Although industry cloud-computing standards do not exist for APIs or data import and export, IBM and Amazon Web Services have worked together to make interoperability happen

Hidden costs

Cloud computing does not tell you what hidden costs are. For instance, companies could incur higher network charges from their service providers for storage and database applications containing terabytes of data in the cloud. This outweighs costs they could save on new infrastructure, training new personnel, or licensing new software. In another instance of incurring network costs, companies who are far from the location of cloud providers could experience latency, particularly when there is heavy traffic.

Unexpected behavior

Let's suppose your credit card validation application works well at your company's internal data center. It is important to test the application in the cloud with a pilot study to check for unexpected behavior. Examples of tests include how the application validates credit cards, and how, in the scenario of the December buying crunch, it allocates resources and releases unused resources, turning them over to other work. If the tests show unexpected results of credit card validation or releasing unused resources, you will need to fix the problem before running the application in the cloud.

Security issues

In February 2008, Amazon's S3 and EC2 suffered a three-hour outage. Even though an SLA provides data recovery and service credits for this type of outage, consumers missed sales opportunities and executives were cut off from critical business information they needed during the outage.

Instead of waiting for an outage to occur, consumers should do security testing on their own—checking how well a vendor can recover data. The test is very simple. No tools are needed. All you have to do is to ask for old data you have stored and check how long it takes for the vendor to recover. If it takes too long to recover, ask the vendor why and how much service credit you would get in different scenarios. Verify if the checksums match the original data.

An area of security testing you should do is to test a trusted algorithm to encrypt the data on your local computer, and then try to access data on a remote server in the cloud using the decryption keys. If you can't read the data once you have accessed it, the decryption keys are corrupted, or the vendor is using its own encryption algorithm. You may need to address the algorithm with the vendor.

Another issue is the potential for problems with data in the cloud. To protect the data, you may want to manage your own private keys. Check with the vendor on the private key management. Amazon will give you the certificate if you sign up for it.

V. CONCLUSION AND LIGHTS TO THE FUTURE

This article helps us plan ahead for working with cloud by knowing how cloud computing compares to grid computing, how you can resolve issues in cloud and grid computing, and what security issues exist with data recovery and managing private keys in a pay-on-demand environment. Potential consumers' demands for increased capacities over the Internet present a challenge for the developers and other members of a project team. Being aware of and resolving the issues of Web application design and potential security issues can make your team's experiences trouble-free.

Cloud computing is where an application doesn't access resources it requires directly rather it accesses them through something like a *service*. So instead of talking to a specific hard drive for storage and a specific CPU for computation, etc. it talks to some service that provides these resources. The service then maps any requests for resources to its physical resources, in order to provide for the application. Usually the service has access to a large amount of physical resources, and can dynamically allocate them as they are needed.

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