Cloud Computing: Programming Model and Information Exchange Mechanism

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Abstract: As an utterly new Internet application instance, Cloud computing will be the top way to access benefits and announcements momentarily. The hypothesis concentrates on the intention of Cloud computing and its application occasions, putting six technical benefits based on the commencement of its technical characteristics and investigations of the programming and assignment scheduling representative according to the present-used cloud computing strategy. Examples are applied to explain the programming process, its modifying directions, and the circle within which services and resources are exchanged. For the motivation of Cloud computing, how the social web may expand the Qos through transforming the kindness load will be debated. The development of Cloud computing is estimated at the end of the thesis.
Keywords: Cloud exchange, Qos, programming model, cloud computing

I. INTRODUCTION

With the evolution of computer technology, cloud computing is used more and more widely in scientific research, education, industry, the internet, and other transaction processing. With much precise technology becoming the mainstream, cloud computing has become the mainstream application mode.

Cloud computing consists of two definitions, the one describes the base installation, which is used to build an application program, equals the operating system on the PC, and the other represents the cloud computing application based on the base installation.

A grid system disintegrates a considerable task into many tiny tasks compared to grid computing. It operates them paralleled in different groups and servers, emphasizing the operation of scientific computing application systems. However, cloud computing is a computing platform with broader implications, sustaining the non-grid application, such as supporting the three-layer application architecture model of a foreground network server, application server, and database server in the network service program as well as sustaining the current network service program of Web 2.0 model. Cloud computing is the computing platform of the next generation, which may provide a dynamic resource pool, virtualization, and high applicability. The existing cloud computing technology embodies the following characteristics.

1) Cloud computing system provides service. The realization mechanism is clear to users. Users don't have to know much about the specific agency to achieve the needed service.
2) Incremental Redundancy provides reliability. Cloud computing system makes numerous business computers form groups to provide Data Processing Services. With the increasing of computers, the appearance of system errors dramatically increases. Adopting the software method without specialized hardware of reliability, namely, data redundancy and distributed storage, guarantees data reliability.
3) High applicability. By integrating a great deal of storage and high-performance computing capacity, the cloud may offer higher quality service. Cloud computing program systems may detect failure nodes automatically and eliminate failure nodes without affecting the regular system operation.
4) High-level programming mode. Cloud computing system provides high-level programming mode. Users may write their own cloud computing program and execute it to satisfy their needs after simple learning.
5) Economic efficiency. Compared to supercomputers with the same functions, forming a group of many commercial computers spends much less.
6) Diversified services. Users may pay different fees to obtain services of different levels.

II. CLOUD COMPUTING PROGRAMMING MODEL

Cloud computing mainly adopts the programming of Map-Reduce distribution system. Programmers only need to put their energy into the program itself. Regarding the processing of the groups, including their reliability and expandability, they will be dealt with by the platform. Map-Reduce forms the basic computing unit using simple definitions, Map and Reduce. Users only need to provide their Map-function and Reduce-function to process data paralleled. The programming mode only can be used to program the coupling programs within the tasks, which can be highly operated paralleled. Improving the programming mode to make it easier for the programmer to program tight coupling programs and let it be highly controlled when operating will be the developing direction of Map-Reduce programming mode. When operating Map-Reduce in groups, the programmer doesn't have to worry about partitioning, distributing, and to control the input data. Simultaneously the system will deal with nodal failure and nodal communication management. Figure 1 demonstrates a specific operational procedure of a MapReduce program.
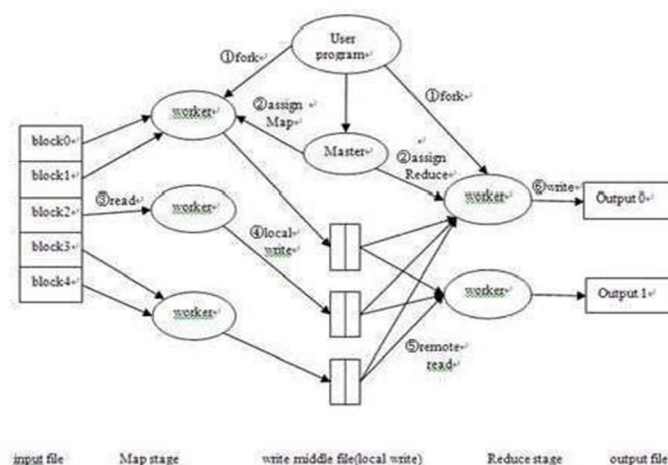

Figure.1 The process of Map-Reduce programming execution.

It can be seen from the figure it needs five steps to operate a Map-Reduce program, input the file; distribute the file to different workers to deal with paralleled; write middle files(local). Many Reduce workers operate at the same time, outputting the final result. Writing the intermediate file locally decreases the pressure of network bandwidth as well as time consumption. When working with Reduce, it takes advantage of a remote procedure call to read the needed data in the nodes according to the position of the middle file read from Master.

```
map(String input_key, String input_value):
    // input_key:document name
    // input_value:document contents
    for each word w in input_value:
        EmitIntermediate(w,"1");

reduce(String output_key, Interator intermediate_values):
    // output_key: a word
    // output_values: a list of counts
    int result = 0;
    for each v in intermediate_values:
    result+=ParseInt(v);
    Emit(AsString(result));
```

Figure.2 Wordcount program using MapReduce framework.

A Pseudocode based on Map-Reduce programming is given below to make Map-Reduce deeply understood. The program's function is to count the times the word appears. In the Map function shown in Figure 2, the user's program sends all the appeared words to a temporary middle space given by Map-Reduce (Key-Value mode). All the exact words are distributed to the same Reduce function through MapReduce moderate processing. And every Reduce-function only needs to add all the counts together to obtain the final result.

MapReduce is only one of the programming modes. DryadLINQ is another paralleled programming mode. But it is limited in the LINQ system of .NET, which also limits its development perspective. Map-Reduce, a more popular programming mode of cloud computing, is widely used in the cloud computing system. But the development tool based on it, Hadoop, still needs to be completed. Especially its

dispatching algorithm is too simple, which decreases the whole function of the system. Improving the development tool of MapReduce, including the task controller, storage system for databases, distribution for input data, cloud system controlling, etc., will be the development direction in the recent future. Moreover, applying the thought of Map-Reduce in other fields is another popular research direction.

III.   FEDERATION (INTER-NETWORKING) OF CLOUDS

Existing Cloud Computing providers have several information centres in various geographical areas over the Internet to optimally suffice clients' requirements worldwide. However, existing techniques do not sustain agencies and procedures for dynamically corresponding load-shredding among large data headquarters to decide the optimal establishment for hosting application assistance to acquire proper usefulness fulfilment statuses. Additionally, Cloud assistance providers cannot expect the geographic diffusion of users to swallow their usefulness. Hence the backpack coordination must transpire automatically, and the allocation of kindnesses must transform in comeback to modifications in the load
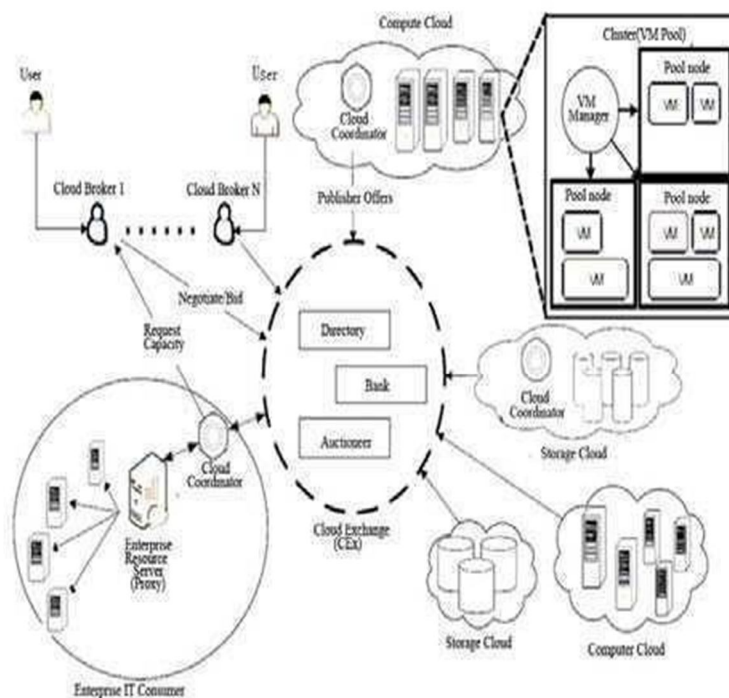

Figure.3 Clouds and their federated network mediated by a Cloud exchange.

Behaviour. Figure 3 depicts a service-oriented Cloud computing architecture consisting of a service consumer's Figure.2 Word Count program using MapReduce framework. Figure.1 The process of Map-Reduce programming execution. Figure.3 Clouds and their federated network mediated by a Cloud exchange. They are brokering and provider coordinator services that support utility-driven internetworking of clouds application scheduling, resource allocation, and workload migration. The Cloud coordinator segment is instantiated by individually data compromise that:

Exports the Cloud services, infrastructure, and platform-level, to the federation.

Keeps track of load on the data centre and negotiates with other Cloud providers for dynamic scaling of services across multiple data centres to handle the peak demands.

Monitors, the application execution and oversees that agreed SLAs are delivered.

The Cloud vendors acting on behalf of usefulness clients (users) specify appropriate Cloud assistance providers via the Cloud

Exchange and bargain with Cloud Coordinators to distribute help that meets the QoS requirements of hosted applications. The Cloud Exchange (CEx) is a demand creator for obtaining assistance providers and customers jointly. It aggregates the infrastructure demands from the Cloud brokers and evaluates them against the available supply currently published by the Cloud Coordinators. The applications that would benefit from the aforementioned federated Cloud computing system include social networks such as Facebook, and My Space and Content Delivery Networks (CDNs). Social networking sites serve dynamic content to millions of users whose access and interaction patterns are difficult to predict. Social networking websites are generally built using multi-tiered web applications such as WebSphere and persistency layers such as the MySQL relational database. Usually, each component will run in a different virtual machine, which can be hosted in data centres owned by various Cloud computing providers.

Additionally, each plug-in developer can choose which Cloud computing provider offers the more convenient services to run their plug-in. Consequently, a typical social networking web application is formed by hundreds of different services, which may be hosted by dozens of Cloud oriented data centres worldwide. Whenever there is a deviation in the earthly and spatial locality of workload, each application ingredient must dynamically climb to deliver a good differentia incident to users.

IV. THE DEVELOPMENT OF CLOUD COMPUTING SYSTEM IN THE FUTURE

From the aspect of users, the cloud computing system stores all the data, including the user's data, on a remote cloud storage platform through the internet, which reduces the pressure on the users to manage data. Simultaneously, the cloud computing system may hold much data processing. That is to say; cloud computing is the association of Sharing data calculation mode and Sharing service calculation mode, which is the development direction of next-generation computers. Cloud computing consists of two development directions: establishing the colossal base installation, which is closely related to the utility program. The other is to provide a richer user experience by building new cloud computing utility programs. Furthermore, for the establishment of cloud computing applications, many new social service networks, such as Facebook, embody the development tendency of it. Research, it is more emphasizes how to integrate many services through cloud computing.

This study created a process for organizing and glimpsing broken bones using deep learning. The investigation was accomplished by operating X-ray scans of a human's nutritional and broken bone. The original 100 photographs were collected from several references. The miniature data set was expanded to handle the overfitting problem in deep learning. The scope of the data assemblage was eventually changed to 4000. The model's exactness is 92.44 percent for healthy and fractured bones. The advised accuracy is extensively additionally than the 82.89 percent and 84.7 %

V. CONCLUSION

The appearance and rapid development of Cloud computing are the evolution of virtualization technology, data-intensive computing technology, and the reflection of application enrichment tendency in the Internet. There is yet to be a unified standard for Cloud computing. Although Cloud computing platforms are widely used and operated by Amazon, Google, IBM, and Microsoft, numerous problems in different aspects still exist, including industry standards, data security, service quality, application software, etc. The solution to the issues mentioned above demands further developments in technology.

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