Application Analysis and Development Strategy of Cloud Computing Technology in Computer Data Processing

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Abstract—In the past, data processing was completed on a computer or a server. This is because the resources available at that time were limited. However, with the progress of technology, it is possible to use multiple computers and servers to process large amounts of data. This is where cloud computing comes into play. Cloud computing allows users to access data from anywhere at any time using an Internet connection. It also reduces the cost of enterprises because they do not have to buy additional hardware or software for each user. Aiming at the problems of single scale of traditional computer data processing and poor degree of adaptive parallel computing, this paper proposes a multi-source information accelerated data processing method of cloud computing technology, analyzes the application of cloud computing technology in computer data processing, and adopts the dynamic optimization technology of cloud computing speed to build a dynamic adjustment model of multi-source information data flow application of cloud computing, so as to reduce the energy cost of cloud computing, Combined with the experience of data processing users, the model can support multi-user computing entity sharing in the cloud to improve the running efficiency of data flow applications and reduce the energy cost of computer data processing. This article first outlines the basic meaning of cloud computing technology, starting with providing conditions for data transmission and sharing, and highlighting the application value of cloud computing technology. It analyzes the trend of cloud computing technology, and combines the modeling of cloud computing technology in computer data processing to propose application countermeasures for cloud computing technology in computer data processing.

Keyword—computer, Data processing, Cloud computing technology.

I. INTRODUCTION

With the help of cloud computing technology, it provides a platform for computer data processing. Generally, there are two methods of processing data. One is to store various resources in a computer's hard disk, and the other is to store them in a mobile device, such as a USB flash drive. However, assuming that the computer's storage hard disk is damaged or the mobile hard disk is lost, it will cause data loss. Therefore, no matter which storage method is used, there will be many risks. Under the influence of cloud computing technology, conditions have been provided for computer data processing. People can access saved data by opening a browser, which provides many conveniences for computer data processing.

The so-called cloud computing is mainly a technology that adds services and application delivery functions based on computer technology, providing virtualized dynamic link resources under the influence of computer technology. In cloud computing, "cloud" refers to the computer internet, which is later transformed into overly dynamic and device abstraction in the process of computer processing data. Because cloud computing itself has a certain degree of openness and can perform large-scale data operations in a short time, it has strong data computing capabilities that can simulate nuclear explosions and predict weather changes. The user can connect with the data center through computers, intelligent communication devices, etc., and achieve corresponding data processing according to their own needs [1]. Currently, the widely recognized meaning of cloud computing is that cloud computing, as a data processing method that pays fees based on data, can provide users with true and accurate data access rights under the guidance of this method. The user can connect to a shared computing resource pool, including network resources, server resources, etc. These resources can be applied and searched by the user, making it easier to operate and communicate with service providers.

With the advent of the information age, data and information have shown explosive growth in many scientific fields. According to the survey of IDC (International Data Corporation), as of 2011, the total amount of global information was 1.8ZB (ZettaBytes). IDC predicts that by the next decade (2020), the total number of servers owned by all IT departments in the world will be 10 times more than the current number, and the data managed will be 50 times more. For these massive data with large-scale, polymorphic, distributed, non (semi) structured and other characteristics, how to effectively analyze and process them, mine valuable information from them, and achieve unified data management to maximize its benefits is an urgent problem to be solved in current practical applications[1]. The traditional massive data processing method mainly adopts parallel computing. At present, large parallel machines mainly include: SIMD (Single-Instruction Multiple-Data), SMP (Symmetric Multi-Processing), PVP (Parallel Vector Processor), Cluster OfWorkstation, DSM (Distributed Shared Memory) and MPP (Massively Parallel Processing). The traditional parallel processing mode mainly relies on high-performance computers. The hardware cost is too high, the parallel program is difficult to write, and it is difficult for ordinary users to operate. Its application range is also very limited. At present, this processing method is mainly applied to scientific computing, such as military, meteorological, biological, nuclear science, high-energy physics and other fields[2].

Cloud computing is a hot term in recent years. In essence, it is not a new technology. Cloud computing is a new technology model developed from distributed computing, parallel computing, utility computing and virtualization technologies. Cloud computing technology has the characteristics of distributed computing, ultra-large scale, virtualization, high reliability, high flexibility, scalability, on-

demand services, and can provide more efficient analysis and better computing capabilities for massive data processing. At present, cloud computing platforms mainly include Amazon cloud computing platform, Google cloud computing platform, IBM "Blue Cloud" computing platform, Eucalyptus, Hadoop, etc. Among them, Hadoop has become one of the most popular cloud computing development platforms in recent years because of its excellent performance in massive data processing[3]. Aiming at the current problems in massive data processing, massive small file processing and massive data storage, this paper combines the virtualization technology, distributed computing technology, and distributed storage technology and other related theories and technologies in cloud computing technology to build a massive small file processing model in cloud computing environment, and studies and establishes the PDF format document content mapping query mechanism and massive data storage mechanism in cloud computing environment, With a view to achieving high-speed and reliable data access, and efficient organization and management of massive data, so as to reduce the complexity of the development and use of massive information processing applications, and improve the unified management of data and the sharing of massive information[4].

II. RELATED WORK

A. Research status of cloud computing

The cloud computing system can process and analyze large data sets and provide efficient services to users. Data management technology must be able to efficiently manage large data sets. Secondly, how to find specific data in huge data is also a problem that cloud computing data management technology must solve.

Because of its flexible and scalable computing mode, cloud computing has been valued by many high-tech companies represented by IBM, Amazon, Google, and has become a sharp tool for companies to deal with massive information processing. Amazon has developed the Elastic Compute Cloud (EC2) to provide computing services for enterprises, IBM has launched the Blue Cloud plan, and Microsoft has launched the basic cloud computing platform of AZure. Yahoo is also a practitioner of cloud computing. It participated in and sponsored Hadoop, the cloud computing project of the Apache Free Software Foundation. Hadoop, which adopts the idea of Google to store and manage massive data, is an open source cloud computing platform provided by Apache, mainly composed of 9% of the distributed file system HDFS, MapReduce and HBase. HDFS is an open source implementation of GFS, MapReduce is an open source implementation of Google MapReduce, and HBase is an open source implementation of BigTable[5]. As an open source framework, Hadoop's support for big data is increasingly attracting the attention of IT executives. Hadoop has good advantages in scalability, robustness, computing performance and cost

It is free and open source, so it has become the mainstream big data analysis platform for current Internet enterprises. Because of its advantages of cost saving and high computing power, cloud computing has been vigorously promoted by many companies, so it has developed rapidly. On this basis, many concepts named after cloud have been proposed in the Internet, such as cloud storage, cloud security, cloud operating system, etc. These are all applications of cloud computing in professional fields[6].

Cloud is an extremely large resource pool with extremely rich computing and storage resources. Cloud databases are also composed of massive database groups, and some of these databases are fixed in the cloud, and some are composed of servers of small and medium-sized service providers. It is necessary to allocate storage tasks to these cloud databases reasonably and safely, so that the cloud storage system can achieve load balancing. Cloud computing is characterized by massive data storage and analysis after reading. The frequency of data read operation is far greater than the frequency of data update. Data management in the cloud is a read-optimized data management[7]. Therefore, the data management of cloud systems often adopts the data management mode of column storage in the database field, which divides tables into columns and stores them. The most famous data management technology of cloud computing is the BigTable data management technology proposed by Google. For data management using column storage, how to improve the update rate of data and further improve the random read rate is a problem that the future data management technology must solve.

Domestic and foreign scholars have done a lot of research on the key technologies and specific applications of cloud computing. Chen Haibo studied the credibility enhancement technology of cloud computing platform, starting from the enhancement of computer system credibility by computer hardware, operating system and application level, to improve the availability, maintainability, credibility, security and fault tolerance of cloud computing platform[8]. Pearson put forward the design principles in the design process of cloud computing services to solve the problem that the privacy information of users and enterprises is often leaked. Boulon designed and implemented a large-scale data monitoring system Chukwal, which is a data collection system based on Hadoop to monitor and analyze large-scale distributed systems[9]. Moretti provides an abstract example of All-PairS programming model, which can be used in data-intensive scientific applications. Liu proposed the GridBatch system, which can solve the problem of batch processing of data in the cloud infrastructure environment. In view of the shortcomings of spatial data storage and management technologies such as remote sensing images in the traditional distributed environment, Kang Junfeng integrated the existing cloud platform technology, combined with the characteristics of high-resolution remote sensing image applications, designed the high-resolution remote sensing image storage model (C-RSM) and management platform (C-RSMP) in the cloud computing environment, and the high-performance computing services built on it, Processing of high resolution (high spatial resolution, high spectral resolution, high temporal resolution) remote sensing images[10].

B. Data integration processing mechanism

Modern communication and communication technologies have greatly improved the speed and breadth of information dissemination. With the rapid development of information technology and the Internet, the amount of data in the network has increased sharply. In the information age, there has been a trend of data explosion, information flooding and noise. It is becoming increasingly difficult for people to obtain the information they need. With the explosive growth of data in the network, people's needs are not only simple query

information, but also hope to process and analyze these data at a higher level, so as to discover the potential knowledge in the data, so as to make better use of these data. At present, most database systems only provide data entry, query, statistics and other functions[11]. It is difficult to find the relationships and rules existing in the data, predict the future development trend based on the existing data, and excavate the hidden knowledge behind the data, resulting in data explosion, but poor knowledge.

The data integration process is the process of resource integration, which refers to organizing the originally discrete, diverse, heterogeneous and distributed information resources within a certain range into a whole through logical or physical methods, making it convenient for management, utilization and service. We can also understand data integration processing in this way, which is to gather scattered resources and turn disordered resources into order. This is also a broad concept of information and data integration, which includes information collection, organization

For the information retrieval process in this study, we propose a web crawler as a search engine to retrieve the relevant data corresponding to the computer[12]. The mathematical model is defined. Let's define a data vector document, as shown in (1):

$$n_i = [n_{j,i}] = [n_{1,i}, n_{2,i}, \ldots, n_{N,i}] \tag{1}$$

where $n_{j,i}$ is a word or term j^{th} in the ith news document n_i, and N is the number of words in the ith news document. N is varied for each news document. Let us define a news query document as in (2):

$$q = [q_j] = [q_1, q_2, \ldots, q_Q] \tag{2}$$

where q_j is a word or term j^{th} in the query, and Q is the number of words in the query. Q is varied for each query.

Let us define a truncated cosine similarity modified from cosine similarity as in (3) and (4):

$$tcs(q, n_i) = \frac{q \cdot n_i}{||q|| \times ||n_i||} = \frac{\sum_{j=1}^{L} q_j n_{j,i}}{\sqrt{\sum_{j=1}^{L} q_j^2} \cdot \sqrt{\sum_{j=1}^{L} n_{j,i}^2}} \tag{3}$$

$$L = \min(Q, N) \tag{4}$$

Processing and service. There are more and more types of resources, more and more databases and information resource retrieval systems, and various retrieval methods and means. This has resulted in data redundancy and low degree of correlation, a large number of information islands, and the retrieval burden of users is also increasing. Therefore, there is a need to have a means to centralize, sequence and correlate these information, integrate the retrieval system, so that users know where to find the information they need, how to find these information, and how to filter the retrieval results, which is the ultimate goal of data integration processing[13].

A unified data interface cannot be provided for a large amount of data, a common standard and specification cannot be adopted, and a common data source cannot be shared. Therefore, different application systems will inevitably form isolated islands of information. Information islands are the main crux to be solved in the current information construction, so how to completely eliminate information islands and effectively integrate the data resources of existing and future

business application systems has become the top priority in the current information construction[14].

Therefore, cloud computing is the integration and development of distributed computing, Internet technology, large-scale resource management and other technologies. Its research and application is a system engineering, covering important issues such as data center management, resource virtualization, massive data processing, computer security, as shown in Figure 1.
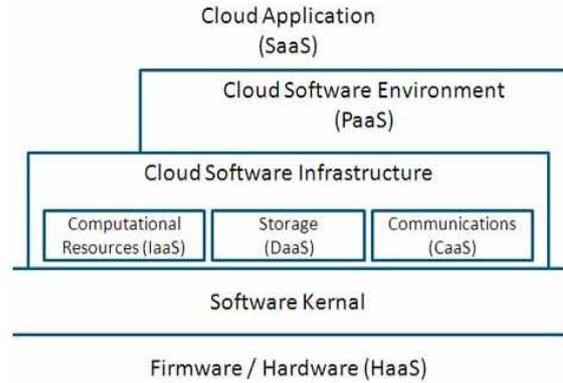

Fig. 1. The relationship between cloud computing and related technologies

The integration methods, approaches and means of information resources are various, but generally include three levels: one is the data layer (also known as the resource layer), that is, to integrate relevant information resources; The second is the operation layer (also known as the service layer or the middle layer), that is, the unified use of relevant information resources through software or platforms; The third is the system layer (also called the application layer), which includes the comprehensive integration of data content, software system and basic settings[15].

Data integration is a system engineering. How to optimize the integration engineering of information resources under the guidance of theory and driven by experience. Information data integration is not only about gathering information resources, but also involves information description, organization, processing, sorting, retrieval, service and other aspects, all of which need to be supported by certain technologies.

III. MODEL CONSTRUCTION OF CLOUD COMPUTING TECHNOLOGY IN COMPUTER DATA PROCESSING

A. Application model of big data information processing

The use of cloud computing technology for computer data processing utilizes the distributed grid computing capability of cloud computing and the service software instantiated in the virtual machine cloud to migrate the entire application to the cloud and reduce the cost of big data information processing. Cloud computing can save the energy cost of mobile users and thus promote the development of green cloud computing technology. Mobile users use virtual institutions to build data flow applications. In the cloud computing environment, the service software builds a closed-loop feedback model for big data information processing through the wireless LAN adaptive mobile data transmission grid. When accessing remote data and services, the process of big data analysis using cloud computing technology is expressed as a directed acyclic data flow graph G=(VE), Under the parallel selection mechanism, the cloud computing service mode consists of a series of groups V={i | i=1,2,..., v} good and a series of remote

data transmission hidden channels E={(I, j) | i, j ∈ V}. The component that generates the output data is called the exit node. Suppose the transmission range of the data flow model under the C/S architecture is:

$$T_0 + B + is + T_d + j_{i+1} < T_0 + B + is + T_d \qquad (5)$$

In the data flow diagram of big data processing using cloud computing technology in the critical path transmission channel mode, the key components are represented by the directed graph model Gp=(V, EpSCA,), where V, and Ep respectively represent the physical node set and link set carried by the cross channel of the key components in the data flow diagram, and SCAp represents the number of data units of the physical nodes in each component. It is also assumed that the undirected graph G5=(V5E, SAR,) represents the packet marker points of the input data of the application, where V, and E. The channel capacity is used to dynamically adjust the self-service resource service in order to realize the dynamic management of data processing resource configuration in the cloud computing environment. Indicates the dynamic adjustment factor: M: Gs → Ge, Gp.Gp 。 Submitted to users in SaaS mode, cloud computing can directly map to the underlying physical network. The link mapping process of cloud computing components and the overall architecture can be expressed as:

$$e_S = P(v_S)\ e_S \in E_S > v_s\ p_t) \in V_s \qquad (6)$$

According to the different service types of customers, the application model of establishing automatic control and optimizing resource allocation model for big data information processing is built in the link routing model of cloud computing. First, the nodes that cannot be used are removed and the optimal path mapping is selected on the remaining topology to build the cloud computing grid to reduce the

capacity overhead, so as to build the built-in network link model of big data information processing, as shown in Figure 2.
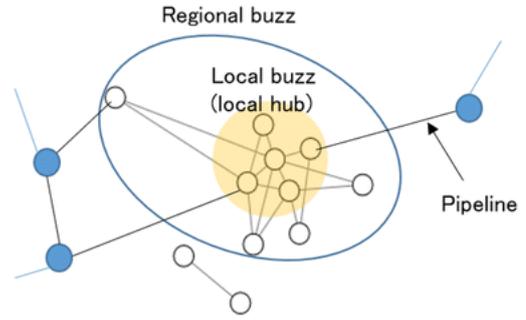

Fig. 2. Built-in network link structure for big data information processing

According to the built-in network link structure of big data information processing shown in Figure 2, the components and overall architecture of cloud computing are network-centric and exist in the network. The data flow model of big data information processing is based on the data-centric method. For a specific data flow application, the ith data packet transmitted in the cloud computing center is i, The interval of the strict transmission time component mapped to the thread or process is expressed as j=T-T. The amount of data transmitted in channel (ij) is one data unit when j= T;- When the range of Ta is (- c, oc), the weight u in node i represents the calculation time. The priority of two components of the input and output end of the data to process a data unit is determined by the priority attribute list to obtain the application model of big data information processing, as shown in Figure 3.
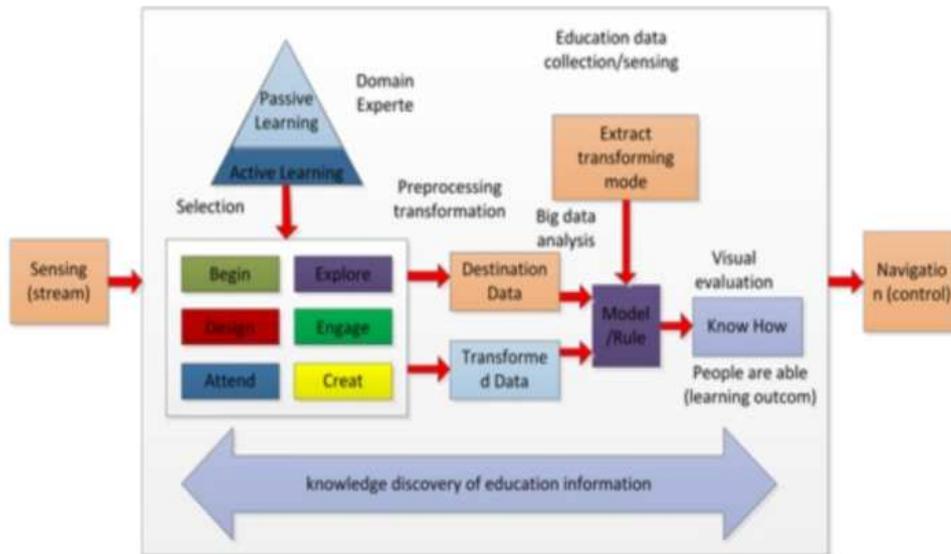

Fig. 3. Application model of big data information processing

B. The formulaic expression of cloud computing in computer data processing

In the mobile cloud system model, rely on local computing resources and wireless networks to build the grid architecture of cloud computing, select the components of the data flow graph to migrate to the cloud for cloud computing. Formulate expression and modeling of computer data

processing in cloud computing. The given data flow application {G (V E) s, d,} is composed of three parts: mobile client, wireless network and cloud to facilitate a directed graph model of cloud computing big data information processing, Assuming that all channel capacity is infinite, the optimization problem of big data information processing using cloud computing technology is described as follows:

$$\max_{x^i \ y^i \ jx^i \ y^i \ j} \max TP = \frac{1}{lp} \quad i \ j \in \{ 0,1,1 \ j \cdots \ p+1\} \quad (7)$$

Including:

$$tp = \max\{\max_{i \in V} \max_{i \in V} \left(x_i, \frac{si}{\eta p}\sum_{i \in V} x_i \right) \quad (8)$$

The energy cost of component migration of data flow in mobile cloud computing is described as follows:

$$k = Int\left(\frac{nk=Int\left(\frac{n\bar{Q}}{1-\bar{Q}}\right)+1}{1-\bar{Q}}\right) + 1 \quad (9)$$

Where Q is the size of the released CPU resources. The components running on the mobile client perform data parallel nursing on the receiving end and the sending end through the self-service mobile network. The limited set of transition states of a request sent to the resource manager in the cloud is:

$$f_{\log-M}(z) = (f_{\log}(z) \quad f_{\log-S}(z) \quad f_{\log-y}(z) \quad) = (f_{\lg}(z) \quad h_x^* f_{\lg}(z) \quad h_y^* f_{\lg}(z)) \quad (10)$$

Through the above formulaic expression of cloud computing in computer data processing, build a mathematical model to analyze the application mode and development strategy of cloud computing technology in computer data processing.

C. Construction of cloud computing system for computer data processing

This paper follows the principle of user personalized service customization, uses virtualization technology to build a cloud computing system for computer data processing, and proposes a multi-source information accelerated data processing method of cloud computing technology. In the process of computer data processing, cloud data sampling is carried out through web crawler technology, and feature extraction is carried out by problem semantic matching technology, The research on building the hierarchical model of multi-source information resource virtualization and computer data processing based on cloud computing technology mainly focuses on the architecture, data processing methods and data mining technology of computer virtual resources. In the cloud computing environment, various application resources are gathered, and resources are reconstructed, analyzed, integrated and matched to improve the computer data processing ability. This paper takes the computer data processing in the network virtual resource database as the sample data, Build and design cloud computing system.

The semantic expansion technology is used to construct the ontology model of n sample sets in the big data information transmission node, and the deep processing of data information resources through the establishment of the physical resource level platform uses cloud computing technology for indexing, extraction, reconstruction and expansion, and the output feature vector is $x_r=\{xy, zj,... m\}$ ". The resource level of the logical level carries out quantitative tracking and fusion through the information resource search module, Define the information resource input interface to realize cloud access, actively provide the information inside the virtual cloud system without the user's participation, dynamically capture the ontology semantic features of computer data processing according to the user's needs, and analyze and reconstruct the information inside the virtual cloud system of information resources, In practical applications, the use of cloud computing technology for big data information processing also requires information capture and intention analysis. The mathematical model is expressed as follows:

$$x_n = a_0 + \sum_{i=1}^{M_{AR}} a_i x_{n-i} + \sum_{j=0}^{M_{MA}} b_j \eta_{n-j} \quad (11)$$

The components assigned to the client first ask about the device characteristics of the mobile client. In the design of the framework, it is necessary to ensure the stability of cloud computing. The critical path index method is used to judge the convergence of data processing. In order to reduce the utilization of local resources, image components are defined for data diversion and distributed data flow parallel computing. The execution mode of distributed data flow in the cloud computing environment is shown in Figure 4.
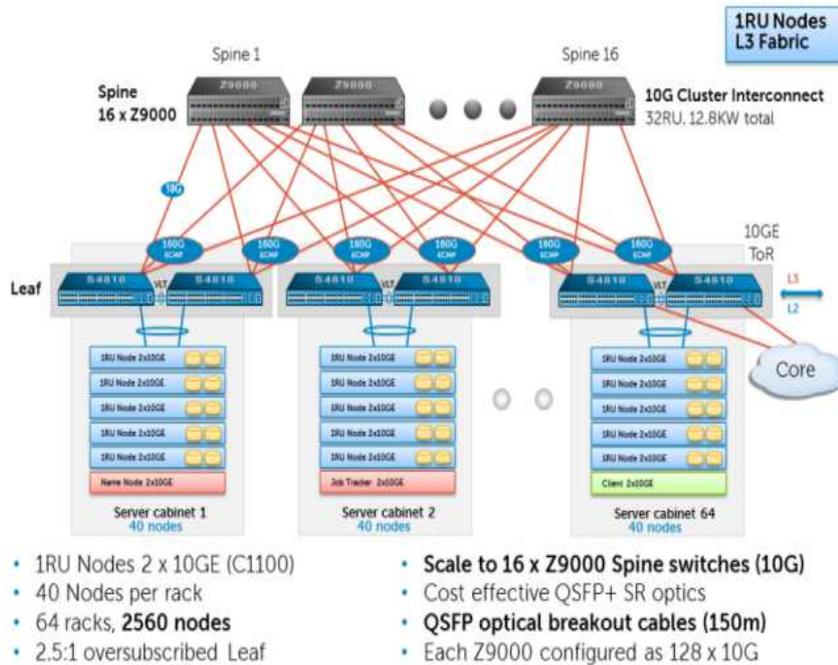

Fig. 4. Distributed data flow execution mode in cloud computing environment

IV. Results and analysis

At present, it has occupied an important position in the market, and has established a structure system centered on the application management of cloud computing technology, which has laid a solid foundation for the comprehensive development and due of this technology. Cloud computing has the following applications in real life: First, cloud products, which are developed through cloud computing technology, mainly include cloud computing servers, cloud operating systems, etc. Compared with existing technologies, the operation is simple and has great application value in practice. Second, cloud storage, which is mainly through cluster applications, network technology and other functions, cooperates the data needed to be stored in the network through software, and has high security, which plays a positive role in preventing data loss. Its commonly used cloud online storage includes Baidu Cloud Disk, Tencent Micro Cloud, etc. Thirdly, cloud security plays a great role in ensuring the application of cloud technology. Therefore, security, as the main guarantee for the wide application of cloud computing technology, is widely concerned by industry insiders; At present, the main cloud security technologies adopted include strengthening infrastructure, data encryption, firewall, etc., which can be of great value to ensure cloud security.

Using algorithm 1, algorithm 2 and algorithm 3, we collected 41448 samples of data, which are divided into three groups: true samples, false samples and suspicious samples.

13816 records were allocated to each group on average. We divide the data into three groups: training set, verification set and test set. The number of training data is 20310. The number of verification data is 8704, and the number of test data is 12435. Table 1 shows the training, validation and test set.

Data sets	No. samples	Ratio
Training	20,723	0.50
Validation	8290	0.20
Test	12,435	0.30
Total	41,448	1.00

In order to test the performance of the cloud computing technology designed in this paper in the realization of computer big data processing, a simulation experiment analysis is carried out. The simulation was tested under Windows 7. The programming language is Matlab. The packet monitoring array is evenly distributed. The application flow graph generator is used to randomly generate large data sequences. Cloud computing analysis of data is performed by analyzing the change of cloud computing throughput with the number of nodes in the application flowchart. Changes in bandwidth and CPU resources test the performance of cloud computing data processing. The throughput formula is $TP=1/t$. The simulation results are shown in Figure 5 and Figure 6.
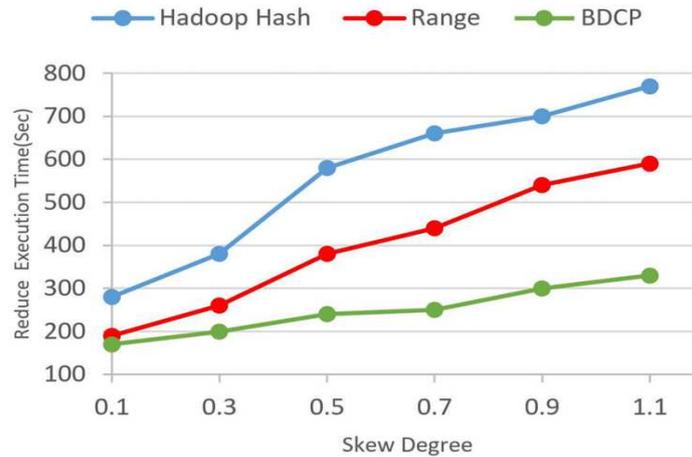

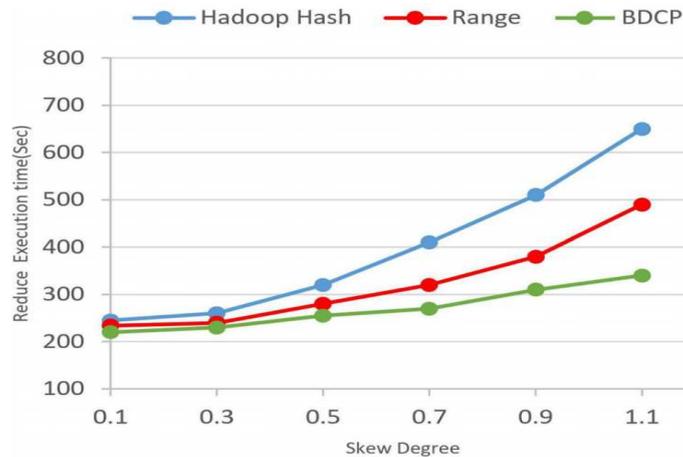Fig. 5.   Sort job on a file of size 6 GB, and 0.1 to 1.1 skew degree

Fig. 6.   Word count job on a file of size 6 GB, and 0.1 to 1.1 skew degree

It can be seen from the simulation effect diagram that when the controller receives the transmission signal from the data analysis module, the communication between the controller and the indicator light is formed, and the control indicator light starts to flash. From the control reading module, extract the hardware occupancy rates of cloud server, storage, background database and other hardware for data information processing within a week, and then calibrate them as Ti, Yi and Ui. Finally, compare the average change value of different hardware occupancy rates with the preset values t, y and u of virtualization resource allocation, and get a very objective and accurate result of cloud computing platform usage during data processing.

V. CONCLUSION

This paper proposes a multi-source information accelerated data processing method of cloud computing technology to analyze the application of cloud computing technology in computer data processing. It uses cloud computing speed dynamic optimization technology to build a dynamic adjustment model of multi-source information and data flow applications of cloud computing to reduce the energy cost of cloud computing, combine the experience of data processing users, and gather various application resources in the cloud computing environment. Through resource restructuring, Improve the computer data processing ability to form a set of universal and basic cloud computing data processing service mode to solve the user's large-scale data computing and resource parallel scheduling problems. This model can support the sharing of multi-user computing entities in the cloud, improve the running efficiency of data flow applications, reduce the energy cost of computer data processing, and use cloud computing for computer data processing has a good development prospect.

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