

Research on digital marketing system data model based on cloud computing

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Abstract

This paper proposed database marketing systems architecture based the Hadoop cloud computing, in order to achieve massive data processing and digital marketing, with taking the Group database marketing system as an example. In short, we build a cloud-based smart grid architecture of marketing, rely on the existing electricity network, as the theoretical basis for a national smart grid development planning, use cloud computing and the foundation of Hadoop platform technology. The process give full play to the advantages of the cloud computing model, provides open interconnect server and client interaction, system management background, unified and convenient resource allocation. This experiment reflects the true nature of the smart grid marketing system, provides valuable theoretical basis and practical significance for the development of smart grid.

Keywords: digital marketing, cloud computing, data model, data mining, Hadoop

1 Introduction

The application and development of the Internet not only promote the generation and development of emerging industries, deeply influence people's life, but also provide opportunities and challenges for traditional manufacture. [1] For manufacturing enterprises, the conventional marketing ways, such as advertising, promotional activities has been far from meeting their needs. Under traditional marketing approach, it usually takes a long cycle and requires high cost to realize the collection of customer data, manual analysis, and the formulation of appropriate marketing strategies and methods. Even in the case of lack of data, the marketing strategies are still blindly developed, which is difficult to achieve the desired results of the enterprise. While under database marketing, companies can easily collect and accumulate customer information, build huge customer repository, and then apply the cloud computing technology to fast and accurate screening and analysis of massive data, thus effectively mining customer data and maintaining relationship with customers.

With the rapid development of modern network technology, network intelligent degree rise, open platform became the base of promote grid enterprises turn to intelligent. The platform can be used to build a modern grid intelligent operation, format interchanged information network in different departments of electric system, realizes the automation of electric marketing business. Hadoop is such a platform, and it has an open platform technology, open source calculation method. It is the most widely used cloud computing development platform. Hadoop architecture is shown in Figure 1.

The architecture is the most essential part of the application system, is high-level abstraction of the system in its applications. This thesis studies the cloud-based Hadoop

shared storage and analysis system and its related technologies like MapReduce, HDFS, HBase, build a small Hadoop platform on the basis of this study [2]. Use fat server, thin client thinking of cloud computing model to explore the process of data analyzing and sharing. Combined with the technical work of the field of electric marketing, design a modern system architecture-grid smart marketing architecture based on Hadoop, from the perspective of the functional level of the marketing. Energy consumption statistics module as an example, simulate to achieve the statistics of large-scale clients electricity consumption. The experiments validate the feasibility of the changes of modern enterprise marketing mode.

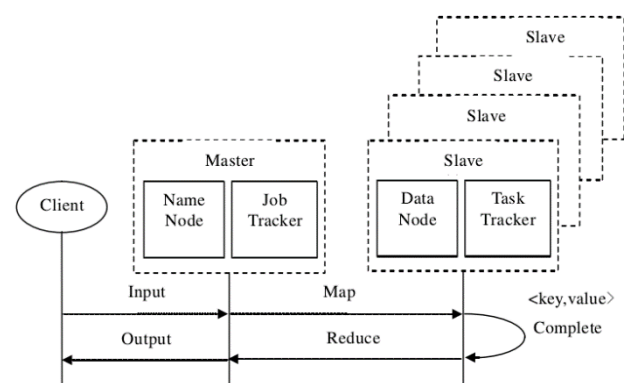


FIGURE 1 Hadoop architecture

2 Study processing

Thought.

The big data era has arrived, with a revolutionary changing to the human society, from all aspects such as government work, the way of thinking, business development. Media is

an industry with a large volume of data, especially through the Internet, new media has accumulated sufficient data to a level which can be used in commercial, but the ability to embrace and adapt to the big data era is the key factor deciding the future competition in the media industry. As a traditional media, marketing is facing more severe challenge, but at the same time there are new opportunities for development [3], needs to seize the historic opportunity to achieve innovation and development.

From a marketing perspective, the role of media has changed from a marketing channel to a marketer with urgent needs. The impact of big data technology is more directly reflected in the field, which is a breakthrough, exploring how to use the new technology has become an urgent task for marketing. But according to big data, the technical architecture, communication mode, mode, and many other aspects have many limitations and problems, which becoming an obstacle to achieve innovation [4].

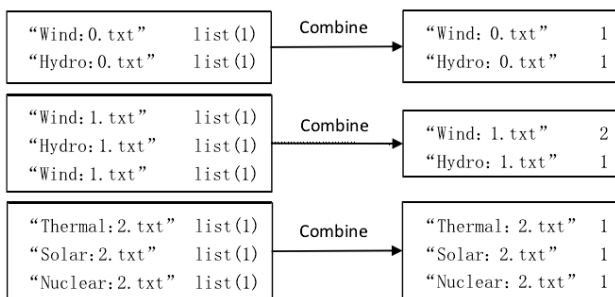


FIGURE 2 Combine processing output/input

Combine processing output and input are shown in Figure 2. In order to focus on the marketing innovation issues in the era of big data the paper selected 4I principles of EIMC as a starting point, and analyzed challenges and opportunities, then from four aspects such as interesting (fun principles), Interests (interest principle), Interaction (interactive principle), Individuality (personality principle) to research the marketing innovation of TV in big data era.

In the first part, focused on the marketing innovation from the perspective of interest principles of EIMC, and then discussed this problem from the other three principles successively. Finally, based on analysis of TV marketing innovation with perspective of the 4I principles of EIMC, combined with the current circumstances and stages of development with big data technologies, against with the practical problems and reemits, explored how to build integrated marketing system in the big data era from three levels.

Experiments.

```
import org.apache.hadoop.conf.Configuration;
import org.apache.hadoop.fs.Path;//shell
import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.Text;//
import org.apache.hadoop.mapreduce.Job;//job
import
org.apache.hadoop.mapreduce.lib.input.FileInputFormat;
import
org.apache.hadoop.mapreduce.lib.output.FileOutputFormat;
```

```
import org.apache.hadoop.util.GenericOptionsParser;
public class ECstatistics
{
public static void main(String[] args)throws Exception
{
Configuration conf=new Configuration(); //
Configuration
String[]otherArgs=new
GenericOptionsParser(conf,args).getRemainingArgsQ;
if(otherArgs.length!=2)
{
System.err.println("Usage:ECstatistics<in><out>");
System.exit(2);
}
Job job=new Job(conf,"ECstatistics");// Job
job.setJarByClass(ECstatistics.class);// ECstatistics
job.setMapperClass(TokenizerMapper.class);// Map
job.setCombinerClass(intSumReducer.class);//
Combine
job.setReducerClass(intSumReducer.class);// Reduce
job.setOutputKeyClass(Text.class);// Map:Text
job.setOutputValueClass(IntWritable.class);
// Reduce:IntWritable
File Input Format. Add Input Path ob, new Path (other
Args [0]);
```

Cloud Computing.

Cloud computing is a Internet application mode put forward by Google, which is the realization of some computer science concept in the Internet, such as distributed processing, parallel processing and grid computing. But along with the development of the web2.0 technology, digital marketing is also more used the idea and the technology of web2.0, which used to improve their own service, expanding the high-end complex network application, to the marketing 2.0 ahead. Therefore, adopting the cloud computing model as the underlying architecture of digital marketing can greatly improve the marketing's service in software environment, the application platform, data sharing and other aspects, which is the best solution. [5] But, to cloud computing in the early stage, there are many immature and discuss place when they application in the marketing, and the particularly important is how to make sure the information resources security, so, we must think carefully about the security risk which cloud computing will bring, so that we can cope with the possible challenges easy.

With the rapid development of network technology and computer technology information penetrates to the social fields in rapid and an unprecedented situation. The performance of information is more and more rich, now, documentation, image, audio, video and other multimedia information become the indispensable element to construct digital marketing, the main research content of this subject is how to make these information security effective utilization and management, how to set up digital marketing which is convenient, rich in content and information sharing, the traditional service model has been ragged. In this context, new service calculation mode-cloud computing which based

on distributed computing can meet the needs of the construction of digital marketing, so it will become the new trend of the development of digital marketing.

3 Model

Whatever in foreign countries or in domestic, cloud computing in the research on the application of digital libraries has just started, it is must use different methods in the research progress of home and abroad to start the research of the construction of the digital marketing based on cloud computing, which can achieve a comprehensive and in-depth research purposes. Cloud computing will make the digital marketing undergoing profound change in software environment, the hardware store, application platform and services methods. In the cloud computing applications process, in order to ensure the security of the digital marketing information resources, it is should be gradually establish and perfect the relevant industry standards, making ensure the safety of the information resources storage, realizing the information resources confidentiality and integrity, strengthen authority into user access control.

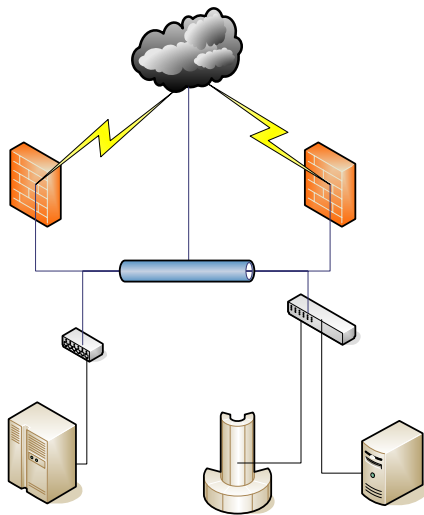


FIGURE 3 Cloud computing network topology

Cloud computing network topology is shown in Figure 3. The purpose of this paper is to construct a complete set of digital marketing cloud service system based on cloud computing. Specific content includes: analyzing the present situation of the domestic and foreign digital marketing and cloud computing applications development in system, introducing the related theories and concepts about the research; analyzing and researching the contents and characteristics of the demand of digital library users, discussing the service system structure and operation of the cloud model of digital library, designing function module of the digital library cloud service mode. Finally, this paper giving a empirical research about the system designed to verify its feasibility.

4 Data model

Data model, the core and base of sharing system, is the mainline of development and application of sharing system, which represents accurately data structure between data and semantic constraints of sharing system, defines static relationship characteristic, dynamic behavior and dependency rule of sharing system at more abstract level [6]. At present data models used widely apply graphic languages and text languages to define users group sharing behaviors and business sharing process intuitively. Which is lack of uniform concepts and accurate formal description, in the meantime the scarcity of firm theory foundation for consistency conversion of sharing system status, semantic integrity of models conversion and so on, results in the disjunction between theoretical research and practical application for data model. This is mainly because of the deficiency of accurate description and precise reorientation of inherent sharing law for existing data models, and this kind of law is related to essence of sharing computation, which is the foundation of analyzing user's group sharing behaviors and business sharing process furthermore. There is not only more significant theory sense but also more important practice value.

Therefore, aiming at users group sharing behaviors and business sharing processes, this paper provides and designs 40 pieces of share rules constraining users group sharing behaviors and business sharing processes, which being formal theory framework describing accurately and representing precisely sharing computation inherent law, and as semantic constraint to make BSDM(Basic Sharing Data Model). Based on this model this paper also makes formal language algebra model BKL(BSDM Kernel Languages); presents the concept of language reuse and makes rueful language family model which being BKL as its kernel by three methods of language reuse; applies categorical methods and tools to deeply study algebra properties and consistency conversion of system status, semantic integrity of models conversion and so on; designs and implements complex multi-tasks large scale sharing system Wetoband which being BSDM as its data model, makes high order type language model WFL (Wetoband Formal Language) by formal language theory and language reuse methods; and researches deeply distributed database integrity technology of Wetoband.

The deficiencies of accurate description and precise representation for inherent law which expresses the essence of sharing computation, define users group sharing behaviors and business sharing process intuitively by graphic languages and text languages, and scarcity of uniform concepts and accurate formal description are main problems for current many sharing system data models. This paper provides and designs share rules constraining users group sharing behaviors and business sharing processes, including 40 pieces of rules classified six sorts to express inherent law of sharing computation, makes a kind of convenient and efficient formal theory framework. The

share rules provided by this paper are not restricted to any particular circumstance of sharing computation, describe users group sharing behaviors and business sharing processes at much higher abstract level. Which resolves self-adaptation of users group organization, meanwhile also improves coordination and flexibility of business sharing behaviors, the universality of share rules also provide powerful support for application integration of sharing system. In Equation (1) and Equation (2), the proof procedure is shown in Figure 4.

$$f = \alpha(B, A)(g) \tag{1}$$

$$g = \alpha^{-1}(B, A)(f) \tag{2}$$

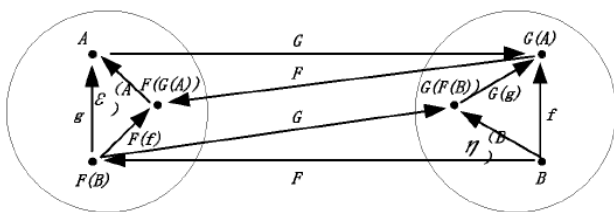


FIGURE 4 Framework, by Mohamed Amine Chatti

Current data models used widely can deal with rapid prototype developing and incremental programming, but their coordination and control of users group are so complex that lead to larger overheads of sharing system due to global data consistency. This paper makes BSDM based on 40 pieces of share rules, preserves advantages of traditional data model, classifies fully users group sharing behaviors, thus simplifies coordination and control mechanism of users sharing, maintains efficiently system global data consistency and reduces system costs.

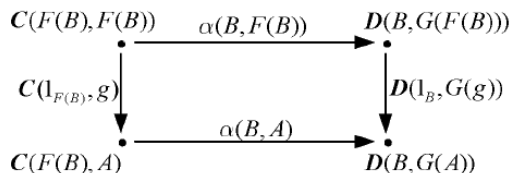


FIGURE 5 Freefolio ePortfolio and social knowledge management system

Freefolio ePortfolio and social knowledge management system is shown in Figure 5. To efficiently resolve the problem of formal description overly rigid for existing data model. This paper applies formal language theory and denotation semantic method of formal semantics to make algebra model of formal language of BSDM, namely BKL; provides the concept of language reuse, and makes language family model{L1} being BKL as its kernel, oriented different formal system applications and different formal languages in the different developing phase of formal system by applying simple reuse, extensive reuse and selective reuse finite times, provides a kind of tool of formal exchanging and communicating to describe user group sharing behaviors and business sharing process in formal language level.

Consistency conversion of sharing system status and

semantic integrity of models conversion are still an unsolved problem, there is no mature theory support and valid verification tool now. This paper breaks through the sharing computation limitation of traditional data models, applies perfunctory tool of category to analyze relationship between different category objects deeply, resolves uncertain computation of BKL syntax recognition; makes SDM(Sketch Data Model) to analyze consistency conversion of sharing system status in the formal framework of model category, and researches semantics integrity of BSDM deeply; provides a kind of algorithm ER2SDM conversing from traditional data model to SDM, keeps semantics integrity of data model conversing efficiently, which provides a kind of thinking combining engineering practice with category theoretical research for data model.

This paper designs and implements large-scale shoring system oriented complex multi-tasks, namely Wetoband being BSDM as its data model, applying formal language theory and language reuse methods provided by this paper to make high-order type language model WFL, and formally describes operations and semantic equations of Wetoband objects such as resource and tool and so on. In the meantime, this paper also researches the integrity technology of distributed database in the bottom of Wetoband architecture, provides a new kind of integrity check strategy, designs two kinds of generating algorithms containing different conditions completely for integrity test, makes use of distributed computation resources minimally; analyzes inherent relationship between main performance parameters relating to distributed database integrity checking cost by combine network theory comprehensively and deeply, makes a model evaluating integrity checking cost by using the dimension-reducing technology of artificial intelligence to provide an effective base for quantization comparison, and the lots of experiments results demonstrate that the proposed strategy and algorithms effectively reduce the integrity checking cost of distributed database, and the established cost evaluation model evaluates the cost of distributed database accurately.

5 Conclusion

1) The current situation of the Group was analysed and demand analysis of the Group database marketing system was conducted. Based on demand analysis, Hadoop distributed computing platform was targeted researched and reviewed, then understanding its advantages, the structure and operation mechanism. Finally the feasibility of building Group enterprise private cloud through Hadoop was analysed.

2) The data mining method commonly used in database marketing was explored. According to the actual needs and the primary objective of the Hongta Group database marketing system, promotion response model was constructed, thus improving customer response rates of their promotional activities; then a promotion decision-making model was built to provide decision-makers with effective

customer information, and help them determine promotional products and promotional customer base; computing methods of customer lifetime value and customer loyalty were designed, followed by customer loyalty early warning model as well as customer loyalty enhancement model.

3) The collaborative work program combining Hadoop and relational database was explored. Then the processing method of applying Map Reduce computation model to relational data in Hadoop Distributed platform was designed,

and following by discussion about how to use the optimal data set to select algorithm and then to build MapReduce Job data streams, achieving the target of universal designing at lower maintenance costs.

4) In accordance with the actual situation of the Hongta Group, the overall system design was given and the Hongta Group enterprise private cloud was realized in the application of Hadoop.

References

- [1] Trefke J, Gonzalez J.M, Uslar M 2012 Energy Conference Smart Grid standardisation management with use and cases *Exhibition (ENERGYCON) IEEE International* 9 903-8
- [2] Carter R, Ault G, Kockar I 2010 Techniques for assessing the value of energy storage in the transition to and operation of Smart Grids *Power and Energy Society General Meeting IEEE* 7 1-4
- [3] Ochi T, Nonaka, Yamashita D, et al 2012 Reliable power flow calculation with improved convergence characteristics for distribution systems *Innovative Smart Grid Technologies-Asia (ISGT Asia) IEEE* 5 1-6
- [4] Shih C-J, Chu K-Y, Lee Y-H, et al 2013 A Power Cloud System (PCS) for High Efficiency and Enhanced Transient Response in SoC *Power Electronics* 28(3) 1320-30
- [5] Vaskovskaya T 2012 Taking into Account Non-linearity of Model of Wholesale Market of Electric Power in Calculation of Market Power *Nonlinear Dynamics of Electronic Systems Proceedings of NDES* 7 1-4
- [6] Mar T, Zaunseder S, Martinez J.P, Llamedo M, Poll R 2011 Optimization of ECG Classification by Means of Feature Selection *Biomedical Engineering IEEE Transaction* 8 2168-77

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