Retraction

Retraction: Lightweight Visualization of 3D Model Based on Cloud Computing Information System (J. Phys.: Conf. Ser. 1982 012202)

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The authors of the article have been given opportunity to present evidence that they were the original and genuine creators of the work, however at the time of publication of this notice, IOP Publishing has not received any response. IOP Publishing has analysed the article and agrees there are enough indicators to cause serious doubts over the legitimacy of the work and agree this article should be retracted. The authors are encouraged to contact IOP Publishing Limited if they have any comments on this retraction.

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Lightweight Visualization of 3D Model Based on Cloud Computing Information System

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Abstract. The processing requirements of 3D model data in modern manufacturing industry and the data type characteristics of 3D model data source. With the popularity of modern cloud computing platform and the technical advantages of cloud computing platform, the 3D model information is stored in the information system, and the cloud computing technology is used to manage the information system. The purpose of this article is to combine cloud computing technology with lightweight 3D visualization technology such as Acrobat 3D to realize lightweight visualization of 3D model in information system. With the advantage of cloud computing platform which does not occupy local resources and has large data processing capacity combined with lightweight 3D visualization technology such as Acrobat 3D, 3D model data can be visualized in cloud fast traffic. This paper investigates and studies, compares the speed of reading information between the information system using cloud computing technology and the ordinary local storage information system, and tries to find out the advantages of cloud computing compared with the traditional information system. In addition, this paper also optimizes lightweight on the basis of 3D model data set. Reduce the collective product of its data without destroying the visualization of its basic information.

Keywords: Information Systems, Cloud Computing, 3D Model Lightweight, Data Visualization

1. Introduction
Nowadays, information technology and Internet technology are widely used in various social scenes, and play an irreplaceable role [1]. Thanks to the rapid development of computer network, the speed of data transmission is constantly improving, and the representative product is computer cloud computing technology. One of the advantages of cloud computing platform is its "cloud" computing power, which does not occupy local storage, and the addition, deletion, modification and query of data is faster and safer. The characteristics of cloud backup can ensure the security of data. Its biggest advantage is to deal with massive data, with the help of computer algorithms to manage multiple data sets, has excellent parallel processing ability. At present, the world is also a big data era of data explosion. Enterprises also need to break the traditional business management mode and manage enterprises scientifically with the help of new management information system, so as to improve the efficiency of enterprise information management [2]. Nowadays, with the rapid development of cloud computing...
technology, its advantages in information system are obvious and increasingly prominent. It has super computing power and information processing ability, which optimizes the method and mode of people collecting and managing information [3].

Many manufacturers use 3D model as a design foundation for communication and communication media for design, process, manufacturing, after-sales service and managers, suppliers, partners or internal and external customers of the company. Therefore, although the demand for 3D model data processing is large, the 3D model source data is very complex and the data scale is large, which is limited by the local network bandwidth. When uploading data or browsing inevitably delays uploading or uploading failure, the geometric information of the uploaded file will be omitted or it will take a long time to open the file [4-5]. Except for the design department, the process, production and business departments do not need to edit and modify the 3D model, just find the comments. As a result, there is no need to open 3D CAD/PDM of software or purchase software licenses. Sometimes only one 3D browser can solve 3 problems in D factory[6]. Enterprises will choose different 3D model design software according to their own situation, but now the 3D design software on the market is mixed, and the algorithms of the mainstream 3D model software are not the same. So it often occurs when reading 3D model data on different software. Very unfavorable to the communication between enterprises and customers, communication and sharing is very difficult. Therefore, the method of visualizing 3D models has become a difficult to search, transmit and share large-scale data models with high performance[7].

Through simple 3D visualization technology or adding notes and other convenient interactive work [8]. Through the lightweight 3D model data file, the lightweight 3D visualization technology combined with cloud computing technology can achieve the lightweight visualization of information system 3D model based on cloud computing. Although the lightweight 3D visualization solution is only a part of the product line of most manufacturing enterprises, it is basically a free program or plug-in for 3D CAD or PDM products, but its impact on manufacturing companies is self-evident [9]. Because some 3D visualization solutions only support a small number of CAD formats, most manufacturing enterprises only support the inherent file format. At present, the integration of PDM / PLM, ERP and other systems is poor in the 3D model design software market, and the lightweight visualization of 3D model is hindered to a certain extent. At this time, with the advantage of cloud computing processing a large number of data, through the technical calculation of the original data into available CAD format, so that different data formats can be lightweight 3D visualization. Improve the efficiency of enterprise communication and product design [10].

2. Method

2.1 Model U V Algorithm

For the use of 3D models in cloud computing, the basic method is to convert 3D models into data input to the computer cloud, so appropriate model algorithms should be used.

Given the A of coordinates (Xa, Ya, Za), B (Xb, Yb, Zb), C (Xc, Yc, Zc), the formula for calculating vectors is as follows: $\overrightarrow{AB}$

$$\overrightarrow{AB} = \overrightarrow{b}(Xb, Yb, Zb) - \overrightarrow{a}(Xa, Ya, Za)$$ (1)

$\overrightarrow{AC}$ The formula for calculating the vector is as follows:

$$\overrightarrow{AC} = \overrightarrow{c}(Xc, Yc, Zc) - \overrightarrow{a}(Xa, Ya, Za)$$ (2)

O P vector is calculated as follows:

$$\overrightarrow{OP} = \overrightarrow{AB} \times \overrightarrow{AC}$$ (3)

A formula for calculating the vector in which the U axis of a plane coordinate system is located is as follows:

$$\overrightarrow{m} = \overrightarrow{p} \times \overrightarrow{e}$$ (4)

A vector calculation formula for the V axis of a plane coordinate system is as follows:

$$\overrightarrow{n} = \overrightarrow{m} \times \overrightarrow{p}$$ (5)
With vectors, the vertex \( K \) (X \( K \) of any triangle in a rectangular coordinate system, YK, Plane UV coordinates (UK,) of the The coordinate value of the VK can be defined as a vector (Xk,) corresponding to K point Yk, Zk) the projection distance on and vector, respectively. (UK,) Annex VK) The formula is as follows:

\[
U_k = \frac{k \cdot m}{|m|} \quad (6)
\]

\[
V_k = \frac{k \cdot n}{|n|} \quad (7)
\]

The formula for calculating the U V coordinates of the vertex K redefined in the corresponding triangle is as follows:

\[
K \left( \frac{k \cdot m}{|m|}, \frac{k \cdot n}{|n|} \right) \quad (8)
\]

2.2 Principles for building information systems in cloud computing

Because there are many advantages in building small and medium-sized enterprise management information system in the cloud computing environment, but in the actual construction, we still have to follow certain principles. First of all, enterprises should first establish a database with high security level, with the database as the basis, they can better cooperate with the use of cloud computing. Reasonable database design can also make 3D model data better storage and modification. Secondly, this paper is a cloud computing information system based on the lightweight visualization of 3D model, so the key point of building information system based on cloud computing platform is the lightweight visualization of 3D model. In order to better and faster meet the relevant needs of enterprises, it is necessary to process the data of 3D model in cloud computing and make a specific information system.

2.3 Information system building process for cloud computing

The construction of information system in cloud computing environment should make full use of the advantages of cloud computing virtualization processing and distributed storage to build the system. Specifically, the system can be constructed from infrastructure layer, platform layer and application layer.

2.3.1 Infrastructure Layer. The construction of management information system at this level should take the network resources and computer resources as the core of the system and transform them into virtual abstract data to ensure the optimization of resource management. To establish a suitable data center, the data center includes service equipment and storage equipment. The storage equipment and service equipment in the database should be virtualized, and a virtualization platform should be built to integrate the virtualized hardware equipment, thus producing a large-scale virtual resource library. Of course, the functions of virtual integrated management equipment are diversified, not only with data management, resource control and load management functions, but also with resource layout and security management functions.

2.3.2 Platform Layer. The role of this level is to ensure that the system runs, tests have a good environment. In the cloud computing environment, the establishment of business information systems for enterprises, taking the development and testing environment as an example, in the design of open programs, programming languages, it is necessary to do everything well. Carefully design the code base, the form required for multiple application packages, and the metadata system running the system. In cloud computing environment, enterprise-based product information systems, platform developers should be in the cloud computing platform for offline environment and network environment for comprehensive testing. The online platform test uses the exclusive software to develop the test work, when the test is completed and transmitted to the online cloud platform, the cloud platform can choose whether to activate the program according to the requirements of the enterprise.
2.3.3 Application. The construction of enterprise management information system in the cloud computing environment, in the application layer, it is necessary to ensure that all applications are included. The actual construction process should be combined with the actual situation of enterprise management, so that the application layer includes all aspects of enterprise management. The enterprise management information system under cloud computing environment mainly includes financial system, data storage system, sales system and decision-making system. The main research direction of this paper is product design and research information system. The application layer is quite complex, and the category management plug-ins should be added when necessary to increase the organization of the application layer.

3. Experiment

3.1 Experimental subjects
A product information management system of a mechanical parts manufacturing enterprise is designed and studied in this paper. Based on the original 3D model data input system in the ordinary web environment and the lightweight 3D model data input system of the cloud computing platform, the output is then visualized. The same database used in this paper stores the same 3D model data. The former uses the traditional visualization method and the latter uses the software Acrobat 3D this lightweight 3D model introduced by Adobe company to read and visualize the 3D model information.

3.2 Experimental design
The experimental data need to be recorded in the course of the experiment: the size of the lightweight visual data after cloud computing. This set of data is used to compare the advantages of lightweight visualization in data capacity; the time needed to process the data of the same 3D model for visual transformation, using this set of data to compare the speed advantage of cloud computing in data processing; Also need to investigate customers and people who use, receive 3D model information visualization, investigate their cloud computing 3D model lightweight visualization effect, and then ensure the quality of information systems, rather than blindly optimize the speed of data processing and data volume.

4. Results
Table 1 records the time spent on three different sizes of models in different visual processing. Among them, Model A raw data visualization took 3 min, 37 s; spent on lightweight visualization through cloud computing Model B raw data visualization costs min,5.4 42 s; spent on lightweight visualization through cloud computing Model C raw data visualization took 11.2 min, 50 s; in lightweight visualization through cloud computing. As you can see, When the cost of raw data visualization is multiplied, Lightweight visualization takes only a small amount of time to grow, It's not hard to conclude that the larger the volume, The lightweight visual 3D model data based on cloud computing has more advantages.

|       | Model A | Model B | Model C |
|-------|---------|---------|---------|
| Visualization of raw data takes time | 3 min 3 |         |         |
| Lightweight visualization takes time | 37 s    | 5.4     | 11.2 min|

Table 1 Time spent processing data with different visualizations in different models
Figure 1 Comparison of Data Size of Cloud Computing Lightweight Visualization 3D Model Data

Figure 2 is the second set of data recorded in this study. Model A original 3D model file is 500 MB only 50 models after lightweight processing unless necessary, file B original 3D model file is 1024 MB only 70 models after lightweight processing unless necessary, file A Original 3D model file is 2048 MB after lightweight processing unless necessary file only 120 MB; we can conclude from this set of data, Lightweight visualization of cloud computing 3D model data can reduce the storage pressure of information systems.

Figure 2 Survey of customer satisfaction with lightweight visualization of cloud computing

The most important point of this experiment is the final visualization. If the lightweight visualization of cloud computing only reduces the pressure of data storage and reduces the time of data processing, it will lose its visualization effect. Therefore, this paper also investigates the recipients of 3D model data visualization, that is, customers or people who need to process the 3D model twice. As
shown in figure 2, 76.30% of them think that lightweight visualization of 3D models is much better than original visualization; 14.70% think that lightweight visualization of 3D models is slightly better than original visualization; 2.90% think that lightweight visualization of 3D models is the same as original visualization; 6.10% think that lightweight visualization of 3D models is worse than original visualization.

5. Conclusion
Complete 3D design, network collaboration design and so on become the mainstream. Lightweight 3D visualization technology helps manufacturing companies distribute lightweight 3D models directly to engineering, manufacturing, inspection, maintenance and repair departments, suppliers, customers, etc. And the use of pass Visual tools, can be better communication and data sharing. With the continuous improvement and improvement of lightweight solutions, especially the uniformity of lightweight forms and the openness of browsers, it will become an important tool for manufacturing companies to cooperate and share, and to achieve the complete three-dimensional support. Network collaborative design should be based on cloud computing high-speed information technology transmission function, based on cloud information system development and use is also a must for every enterprise. The lightweight visual design of the 3D model of cloud computing information system explored in this paper is easy to see from the experimental results that the original data of the 3D model is visualized using cloud computing data and lightweight technology. The results are very good. Compared with the visualization of raw data, the lightweight visualization data volume is smaller, the cloud computing processing speed is faster, in the display effect, the customer is satisfied with the lightweight visualization 3D model. Although this technology still needs to be improved, we have got a good research foundation, in the future technical improvement can go further and further.

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