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Retraction

Retracted: The Research of Multimedia Complex Intelligent System in Financial Reporting Mode

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Journal of Electrical and Computer Engineering has retracted the article titled "The Research of Multimedia Complex Intelligent System in Financial Reporting Mode" [1] due to concerns that the peer review process has been compromised.

Following an investigation conducted by the Hindawi Research Integrity team [2], significant concerns were identified with the peer reviewers assigned to this article; the investigation has concluded that the peer review process was compromised. We therefore can no longer trust the peer review process, and the article is being retracted with the agreement of the editorial board.

References

[1] Y. Li and X. Li, "The Research of Multimedia Complex Intelligent System in Financial Reporting Mode," *Journal of Electrical and Computer Engineering*, vol. 2022, Article ID 3212558, 10 pages, 2022.

[2] L. Ferguson, "Advancing Research Integrity Collaboratively and with Vigour," 2022, https://www.hindawi.com/post/advancing-research-integrity-collaboratively-and-vigour/.

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Research Article

The Research of Multimedia Complex Intelligent System in Financial Reporting Mode

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With the development of science and technology, in order to provide better financial information for economic decision-making, people urgently need a new financial reporting model. For the existing financial reporting model, it is only published in PDF or HTML format. This paper introduces multimedia technology and XBRL to reform, and studies the financial reporting model under the multimedia complex intelligent system, which can effectively remedy the drawbacks of the existing financial reporting model. Firstly, this paper introduces the theory and technical basis of the financial reporting model; secondly, according to the specific needs, it designs the relevant functions; finally, combined with multimedia technology and network technology, the financial reporting system under multimedia complex intelligent system is constructed. In addition, through testing the system implemented in this paper, the performance and functional practicability of the system are analyzed, which shows that the financial reporting system designed in this paper is suitable for today's economic environment and can provide financial information very well. When the number of process instances reaches 900 at the same time, the average flow cycle is only about 1.5 s.

1. Introduction

Financial report [1, 2] is the final product of accounting information system. The quality of financial report directly determines the value of accounting information, the usefulness of decision-making, and the competitiveness of accounting profession. However, in recent years, the quality of accounting information is not optimistic. The quality of financial reporting in the United States ranks first in the world. But the recent accounting scandals have frustrated investors' confidence. How to ensure and improve the quality of financial reports has become an urgent problem for the accounting theorists, practitioners and government departments in various countries.

The development of information technology, especially network technology, provides an opportunity for the improvement of financial reporting [3–5]. With the development of the times and the increasing social needs, the intelligent multimedia technology platform will continue to develop in the direction of high performance, intelligence, and good portability, and will occupy an important position in the era of 5 g and the Internet of things. As a new medium for transmitting financial reports, the Internet not only changes the way enterprises transmit information to users of financial information, but also affects the way financial reports are prepared, the content, the quality characteristics, and the reconstruction of financial reporting system [6]. Robert Elliott [7] mentioned in his book Wave Three that information technology is changing everything. It is gradually replacing the industrial age and unprecedentedly changing the way enterprises operate. It represents a new postindustrial era of wealth creation. However, the development of information technology, especially network technology, provides a material basis for the emergence of network financial reporting. At the same time, people urgently need the emergence of a new financial reporting model, which can provide more timely, comprehensive and convenient financial information for the increasingly globalized economic decision-making, and network financial reporting has these advantages. Enterprises all over the

world have set up their own websites and disclosed financial information on their websites, but neither information publishers, regulators, nor information consumers have fully enjoyed the convenience brought by electronic and network technology. The current online financial report is only a copy of the printed version (published in PDF or HTML format), and does not involve the use of information technology to reform the means of financial reporting.

With the development of integration and the increase of capital flow in the world, the risk of enterprise operation will also increase. This is mainly because there is a certain uncertainty in the circulation of capital between countries. Therefore, the higher the requirement of disclosure of enterprise financial information, the more accurate, comprehensive, and fast it is required. There is a certain lag, obviously cannot meet the needs of information users. With the rapid popularization of the Internet in the world, the readers of financial reports put forward higher requirements for the real time and comprehensive content of disclosure, especially many important information which is nonmonetized and can reflect the real situation of enterprises. Requirements for information are personalized, different users get different data; interactive, users can actively request through the Internet; requirements for information transparency, different users get the same information is consistent. It is very practical to build financial information platform through interactive website. Websites can affect more information audiences and provide more detailed information than traditional printing materials. At present, most online financial systems can only provide standard spreadsheets, which cannot meet many data format requirements, such as PDF and WORD. Although the content of these resources is needed by users, because these formats are customized by different software vendors, they cannot be smoothly transformed into each other, which makes the network financial report not only fail to improve the traditional financial report, but also fail to reflect the initiative and convenience of network interaction. The emergence of XBRL [8–11] meets various requirements of accounting information users for accounting information disclosure.

XBRL has a unified international standard and can be used as the standard of reporting structure to manage financial data. Network report based on XBRL has been widely recognized in the industry for its flexibility and openness. It can automatically collect and collate financial data based on the language specification of electronic communication of business and accounting data. Through instance documents, it is easy to generate reports containing different subsets of data, which enables regulators, intermediaries, or other users of financial information to extract the information they need according to their own authority and special needs and output it in their customary format. Therefore, it is possible for enterprises to provide differentiated financial reports by tailoring the information they need. The collection, publication, analysis, and utilization of accounting report information have been promoted to an unprecedented high standard and wide range. Compared with the original complex work of providing and using accounting data, it saves resources, greatly improves efficiency, and improves the accuracy, reliability, and timeliness of business reports. Because of these advantages, XBRL has developed rapidly all over the world since its birth in 1999.

Based on the above background, in order to design a good network reporting mode, this paper introduces multimedia technology and combined with XBRL, this paper studies a financial reporting model of multimedia complex intelligent system. The applicability of the system function is illustrated by testing the financial reporting system under the multimedia complex intelligent system.

2. Establishment of Financial Reporting Model under Multimedia Complex Intelligent System

2.1. Multimedia Technology. Multimedia is a compound of multiple and media [12]. Media has two meanings: one is the entity that stores information, such as disk, CD, tape, and semiconductor memory. It is translated into Chinese as medium; the other is the carrier that transmits information, such as digital, text, and sound, and the Chinese translation medium. So corresponding to multimedia is single medium. Literally speaking, multimedia is composed of multiple single media. Therefore, multimedia is the combination of computer and video technology. In fact, it is two media: sound and image [13, 14]. Multimedia itself, like all modern technologies, has two aspects. It consists of hardware and software, or a mixture of machines and ideas. We can conceptually differentiate multimedia technology and functions into control systems and information. Multimedia can be realized by the support of digital technology [15]. Multimedia represents the convergence of digital control and digital media [16]. Computer is the digital control system, and digital media is the most advanced form of storage and transmission of audio and video nowadays. Multimedia is not just a thing, but a complex combination of hardware, software and the interface when the two meet.

Multimedia technology is a real-time, integrated, and interactive computer integrated sound processing technology for text and image information. It is generally believed that multimedia technology refers to the technology that can process information on multiple carriers (media) and on multiple storage (media).

The development of multimedia technology has brought profound changes to the field of computer use, making computers from special products in offices and laboratories to common tools in the information society. They are widely used in school education, industrial production management, commercial advertising, public information consultation, military command and training, and even family life and entertainment.

With the rapid development of Internet technology and the rapid popularization of intelligent hardware, multimedia applications become more and more diversified and intelligent. The common computer application system of multimedia technology can process data, text and graphics, and multimedia computer can process image, sound, animation,

video, and other information in addition to the above types of information, which opens up a new field of computer application.

2.2. XBRL Technology

2.2.1. Technical Foundation of XBRL. XBRL is not an original technology. It is a markup language derived from XML (Extensible Markup Language) [17]. The core of XBRL is still XML. XML is applied in many fields, including professional services and manufacturing. Although the application of XML varies greatly in many fields, the technology of data transmission, analysis, and editing is basically the same. XML technology has become the core of XBRL application. Its main technical basis includes XML Namespace, Xpointer, Xlink, XML Schema, and XSL.

(1)XML Namespace. The greatest advantage of Extensible Markup Language (XML) is that it has expansibility function. It can self-define the elements needed, and then store them in the database with a special markup symbol. It is precisely because XML has the characteristics of self-definition that it will bring many problems in the actual process. For example, "Name" refers to the name of the recipient or the sender? "Number" is the number of books or papers, and so on. Namespace's purpose is to prevent XML from marking up confusing events. It works by linking URLs (Universal Resource Identification Numbers) to various elements and labeling each element with a prefix to indicate which set the prefix belongs to. Thus, there are two elements of "recipient: name" and "sender: name" or "book: number" and "paper: number," not just a "name" or "number." The disadvantages of XML are: because the file is read at one time, the memory consumption is relatively large; if the XML file is relatively large, it is easy to affect the parsing performance and may cause memory overflow.

(2) Xpointer. Xpointer (XML Pointer Language), the role of pointers as the name implies is pointing. By referencing the information in XML with the common resource identification number, Xpointer can point to the location of specific elements in XML correctly. If you change the "route" of the finger, you can also point to a certain range. This "route" change is to combine Xlink with Xpointer, and then use the character # to specify a point of the linked target document; you can select part of the document content operation, rather than all the resources in the document.

(3) Xlink. Xlink (XML Link Language) defines the standard way to create links to other related information in an XML file. The way it creates links is similar to HTML links, but Xlink's linking capabilities are more powerful than HTML links. Any element in an XML file can be represented by Xlink's linking.

(4) XML Schema. XML Schema [17] mainly constrains and defines the logical structure of data in XML documents. Constraints mean that XML Schema specifies the exact location of data items in an XML file. Definitions mean that Schema defines the data types of data items, such as character length, field type, and field name. For the data items contained in an XML document, the data types of each data item must meet the data types defined by Schema.

(5) XSL. XSL [18] refers to the Extensible Stylesheet Language, which is a language for presenting XML data in a readable format. XSL actually includes two parts. First, XSLT refers to XSL translation, which is used to transform XML document language. Second, the function of XPATH (XML Path Language) is to locate the location of an XML document according to a certain path. It is mainly used in XSLT and XPOINTER.

As we know, XML Namespace, Xpointer, Xlink, XML Schema, and XSL are the core technology foundation of XBRL language. They use network programming technology, various computer languages, and so on. It makes XBRL language powerful, and provides a good basis for the later study of financial reporting model in multimedia environment.

2.2.2. XBRL Technical Architecture. XBRL has four main components: Specification, Taxonomy, Instance Documents, and Style Sheets [9, 10].

(1) XBRL Specification. It is mainly used to describe the structure of XBRL files and specify the XBRL classification criteria and the grammar and semantics of instance documents. Technical specifications are the basis of the system, including five documents such as xbrl-instance.xsd, which are formulated by XBRL International Organization. Technical specifications define the rules that must be followed when defining classification criteria, such as the definition method of items, the definition method of label information, the rules associated with taxonomy. xsd files, and other XML files.

(2) XBRL Taxonomy. XBRL establishes different labels for each item in an enterprise report. All labels are collectively referred to as classification criteria. Classification criteria define the attributes of various projects and their relationships, which are equivalent to a "dictionary" for the exchange of business information in an industry. Classification standards are formulated on the basis of technical specifications and in combination with the actual situation of various countries, industries, and enterprises. Classification standards must conform to the technical specifications. Each classification standard contains one schema file and five XML files. The schema file is the core of the classification standard, among which:

The taxonomy. xsd file defines the elements and their type information contained in the classification criteria, and the other information of the project is defined in the other five XML files.

Definition. xml defines the relationship between elements from a conceptual point of view.

Computation. xml defines the relationship between elements from the perspective of data computation.

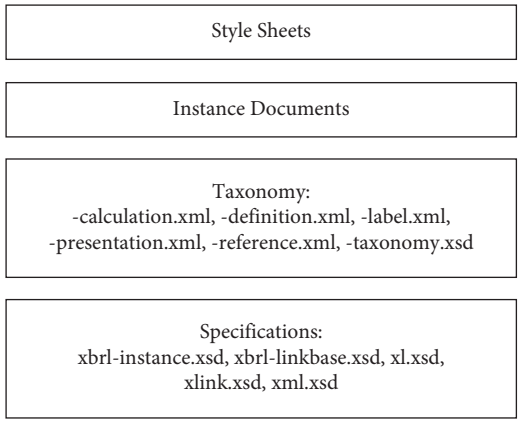

Figure 1: XBRL technical architecture.

The label. xml file defines the label of the element, and the information of the document determines the name of the element actually displayed in the financial report.

Presentation. xml file is defined in the financial report, the hierarchical relationship of elements, and display order.

Reference. xml file defines the reference information of elements. Through this file, combined with the information of definition. xml file, we can accurately understand the actual meaning of elements.

(3) XBRL Instance Documents. The example document is an example document of an enterprise's financial report, which mainly contains labels and data in the financial report. XBRL automatically extracts data from the accounting business database and generates case documents according to the corresponding application program between the financial report label and the accounting business data.

(4) Style Sheets. The example document mainly contains the basic data of the financial report. Its format is not easy to read directly. It must be arranged according to the publishing format of the financial report. The style sheet is used to define the display items and formats when the financial report is issued.

The technical architecture of XBRL can be shown in Figure 1.

Figure 1 shows that the technical architecture of XBRL includes modules such as Style Sheets, Instance Documents, Taxonomy, and Specifications.

3. Analysis and Design of Financial Reporting Model under Multimedia Complex Intelligent System

3.1. Requirement Analysis. The stakeholders in the financial reporting supply chain include investors, financial analysts, government departments and nonprofit organizations, audit institutions, securities regulatory authorities, enterprises, software underwriters, and banks. They can be divided into financial reporting providers, financial reporting requirements, and intermediaries.

3.1.1. Investor. For investors, the use of XBRL enables investors to obtain information about the enterprise more quickly, and at the same time can directly compare and analyze the obtained information, thus avoiding the problem of re-entry and reorganization. In addition, users can enjoy XBRL information free of charge through the network, which makes it easier for investors to access the company's financial information and improve the quality of investment decisions.

3.1.2. Financial Analyst. For financial analysts, in addition to disseminating financial information more quickly and accurately, using XBRL will help in-depth analysis of corporate financial information, because the information becomes smaller and easier to search, and more convenient is that the information obtained on the network can be directly used for analysis, but also can choose the output format it needs. This improves the efficiency of data collation, saves financial analysts a lot of data processing time, and applies its valuable professional resources to research information decision-making and other more valuable work.

3.1.3. Government Departments and Nonprofit Organizations. Government departments can plan the format of standard XBRL forms and documents and place them on government public websites for enterprises to fill in or submit information. This can ensure that the information they need can be collected more quickly, and also enable users of government information to obtain information more efficiently and quickly. In addition, there are many financial documents and forms in government organs and nonprofit organizations. Most documents and forms have certain formats. If XBRL document standard can be used uniformly, the document processing process of government or nonprofit organizations can be simplified and the efficiency of government work can be improved.

3.1.4. Auditing Offices. After enterprises gradually publish their financial information on the internet, auditing institutions will face the need to verify the network information. The most important advantage of using XBRL to uniformly disclose the financial information of enterprises is that it does not need to examine the information in different formats manually, but can obtain the content of the financial information disclosed by customers directly through standard applications. If it can be further connected with the daily transaction database of the enterprise, then on the basis of evaluating the internal control of the enterprise information system, the continuous review can be carried out directly through the network, which can reduce a large number of manual work and improve the efficiency and quality of audit.

3.1.5. Securities Regulatory Authority. For the securities regulatory authorities, if the listed companies adopt XBRL format instead of PDF format, the written information and data upload can be completed by the same steps. It will

greatly reduce the workload of data collectors, and can directly check, compare and analyze the financial reports disclosed, so as to achieve transparency and fairness of information disclosure at the minimum cost.

3.1.6. Enterprise. The application of XBRL technology can make the preparation of written financial statements, and the publication or upload of network financial information to the relevant competent units be completed by the predesigned application program at one time, without multiple executions separately. Greatly improve the efficiency of enterprises in preparing financial statements. At the same time, because XBRL files are not restricted by the platform, enterprises do not need to increase additional investment for the application of XBRL technology when purchasing the software and hardware of information system, which improves the freedom of enterprise purchasing system.

3.1.7. Software Underwriters. Software compatibility has always been a concern of software underwriters. As all software products related to financial information can use XBRL as their input and output form, it can easily solve the problem that integrated systems span different platforms, so XBRL enhances the synergy with other financial accounting and analysis software.

3.1.8. Bank. The application of XBRL enables all the financial data to be exchanged directly to the bank through the network or E-mail. The standard XBRL data can be used to automatically convert the file into the data format accepted by the loan analysis software without the need to re-enter the customer's financial data manually. For banks, it will be very convenient and reduce the cost of lending.

3.2. System Design. The design objectives of this system include the following aspects.

(1) To validate the feasibility of the ideas proposed in this paper, a prototype system is implemented to meet the needs of individual financial statement analysis of investors.

(2) Improve the interoperability of the system, increase the flexibility, and extensibility of XBRL file processing.

(3) Analysis rules can be dynamically extended to meet the increasing demand for analysis.

(4) Improve the standardization of the system to make it conform to international standards in document parsing, rule generation, service invocation, and so on.

The business of the system design is the elaboration of some kind of analysis, the definition of the special conditions of the proposed service application, and the use and display of the financial analysis service. In the financial analysis business model, we define a set of business services, give the behavior of completing all business in a financial analysis process, describe the different analysis service algorithms in detail, and define the necessary analysis metadata and parameters. This layer model defines a set of interconnected data to support an analysis, while most analysis services have similar interfaces and can be referenced by some defined templates.

The system follows the design principle of MVC [19–22], and is divided into three layers.

(1) Representation model, using JSP designed system pages, through browser access, user-friendly, the interface uses the commonly used left and right column style, the left side of the navigation menu, the right side of the operation and information display window, in line with user usage habits, users can use the interface almost without learning; in the information warrior, using data plus charts, the display effect is intuitive and beautiful.

(2) Control model. It is the implementation engine of analysis, and defines a set of tasks sequence of analysis business. The implementation of this layer model comes from user request, service identification, data import, analysis parameter setting, and related standards. It is a service-oriented description of a set of processes.

(3) Entity service model encapsulates an entity service of financial analysis business model, control model and underlying data, describing how to implement and use each analysis service. This layer model is a reusable, service-oriented design on a small-scale analysis business process, which can be reused for data analysis, such as the analysis of a group of listed companies' statements.

4. Implementation of Financial Reporting Model under Multimedia Complex Intelligent System

4.1. System Construction. Following the principle of constructing network financial report, according to the idea of defining the goal, main body and realization method of financial report, using multilevel database, XBRL technical classification standard, modular procedure, interactive mechanism and other elements, we can construct an interactive financial report model in multimedia environment. The model is shown in Figure 2.

It can be seen that the design of financial reporting mode under the environment of multimedia complex intelligent system includes database design, definable operation interface design, and interactive interface design from Figure 2.

4.2. Realization of Database. According to XBRL classification standard, a multilevel database of financial reporting model under multimedia complex intelligent system is constructed. It mainly includes three types: basic database, report database, and customer requirement database. XBRL classification standard standardizes the original data submitted by enterprises to the system, so that each element

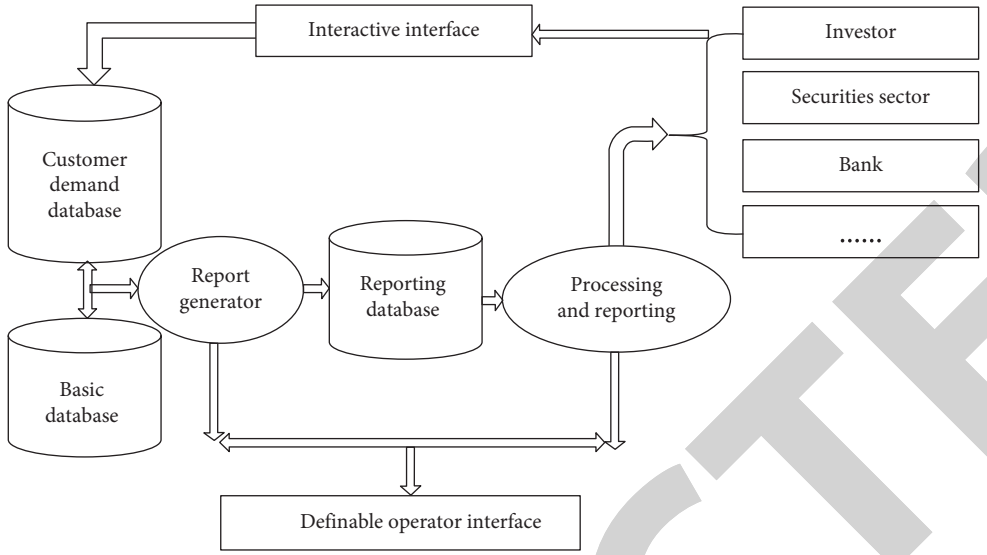

Figure 2: Financial reporting mode in multimedia environment.

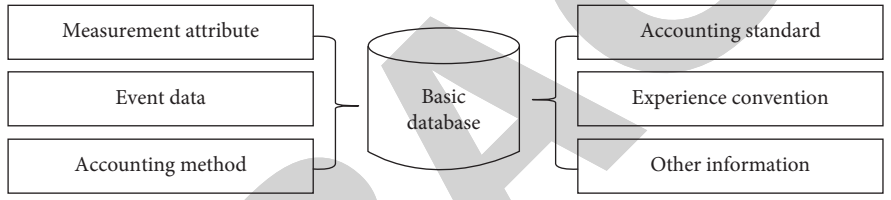

Figure 3: Basic database content.

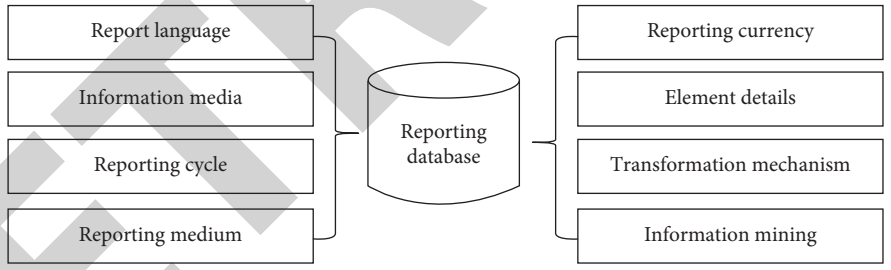

Figure 4: Reports database content.

is marked with a unique identity. From the original data into the enterprise information system, to the final generation of financial reports, any data processing node can achieve accurate positioning and traceability.

4.2.1. Basic Database. The basic database structure designed in this paper is shown in Figure 3:

Figure 3 shows that the basic database includes six modules, including measurement attributes, event data, accounting methods, accounting standards, empirical conventions, and other information.

4.2.2. Reporting Database. The structure of the reporting database designed in this paper is shown in Figure 4.

Figure 4 shows that the Reporting database includes modules such as Report language, Reporting currency, Information media, Element details, Reporting cycle, Transformation mechanism, Reporting medium, and Information mining.

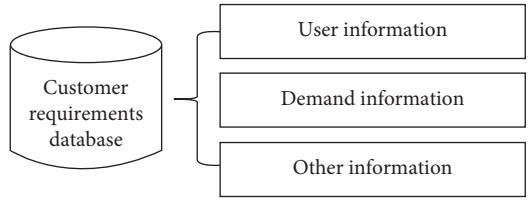

Figure 5: Customer demand database content.

4.2.3. Customer Requirements Database. The structure of the customer requirement database is shown in Figure 5.

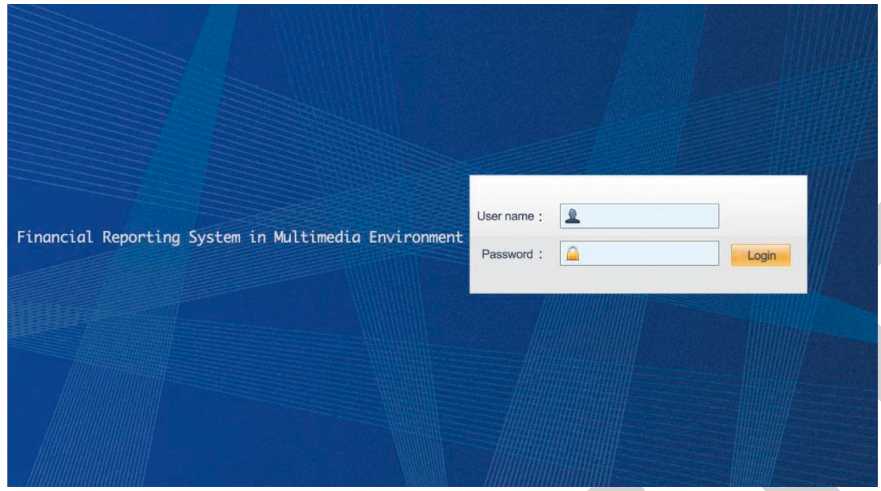

Figure 6: User login interface.

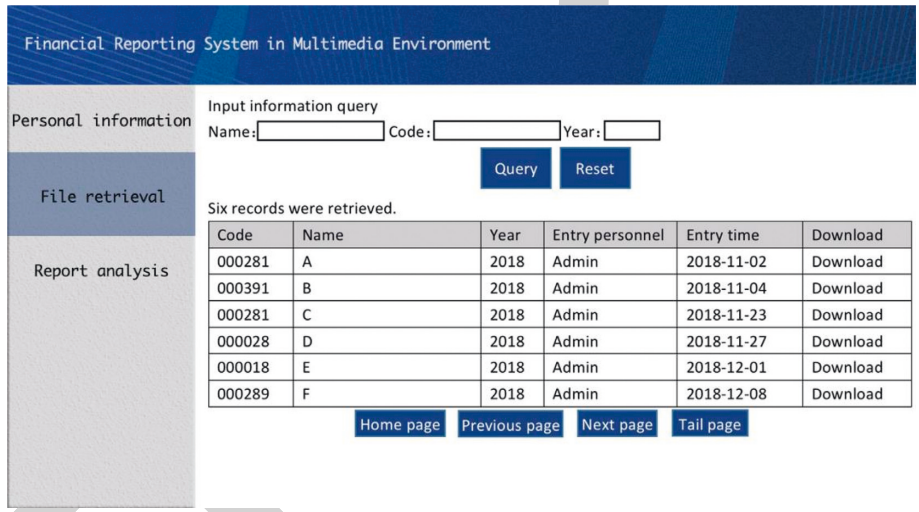

Figure 7: File retrieval interface diagram.

The database implementation of this paper adopts MySQL database developed by Swedish MySQL AB Company [23]. In WEB application, MySQL database is one of the best relational database management system applications. The main characteristics of MySQL database are small size, fast speed, low overall running cost, and low demand for server hardware, which makes many small and medium-sized websites and individuals tend to choose MySQL as their database management system.

4.3. System Effect Chart. Firstly, the login interface implemented in this paper is shown in Figure 6. Users only need to input their username and password to login to the financial reporting system implemented in this paper.

Secondly, the interface diagram of the file retrieval subsystem is shown in Figure 7. As can be seen from the figure, the user can search the file by name, code, and other information, and then query the required file and display the relevant information. The user can download it by clicking the download button on the right.

Finally, the report analysis subsystem implemented in this paper is shown, and its interface diagram is shown in Figure 8. The use of Report Analyses is to analyze the different preferences that have been customized, to analyze the information of a listed company and the year, and to customize the service forms such as "Enterprise Development Capability Analysis," and "Business Efficiency Analysis". As can be seen from the figure, the required analysis mode can be input from the left, added to the right, and clicked on the analysis button below to complete the analysis of the company.

5. Test and Analysis of Platform Implementation Effect

Firstly, through the system test, the system test finds that the software and the system requirements do not meet the specifications by comparing with the requirements of the system. It is mainly divided into functional testing, scenario testing, performance testing, data and database integrity testing.

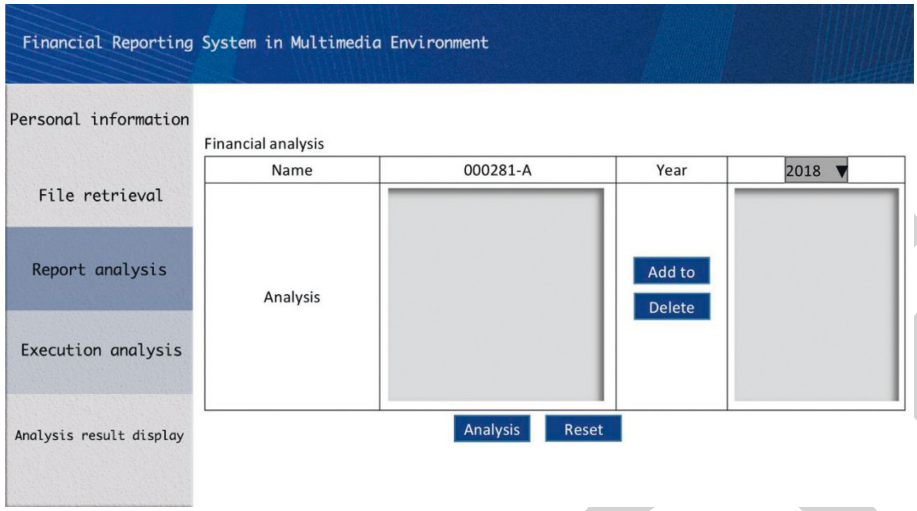

Figure 8: Report analysis interface diagram.

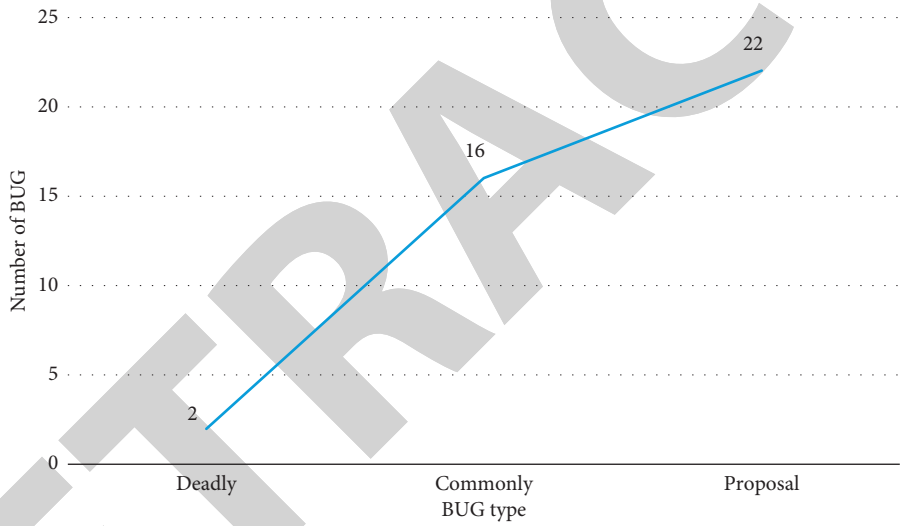

Figure 9: BUG statistical polygraph.

(1) Functional Testing: Testing based on system test cases. When the system test cases are reviewed and passed, the execution coverage of the system test cases reaches 100%, and the BUGs found in the system test are modified. Scene test proves that the repair rate of fatal and serious BUGs reaches 100%, the repair rate of general BUGs reaches 90%, and the repair rate of recommended severity reaches 60%.

(2) Scenario Testing: Functional Testing goes on to the third round and is retested. Scenario Testing begins. Write scenario flow for system scenario testing to verify system functions. When scenario flow validation meets scenario requirements, scenario testing can be completed.

(3) Performance test: Based on the performance test scheme, the system performance is tested. At the end of the first round of functional testing, the program performs performance testing without affecting performance testing. When the performance test indicators meet the performance requirements of the test scheme, the performance test can be completed.

(4) Data and database integrity testing: Ensure that database access methods and processes run properly, data will not be damaged.

After testing, the system will generate defect reports to record specific problems and time. After statistics, the number and type of BUG generated are found as shown in Figure 9. As can be seen from the figure, 40 BUGs were found in the test time, of which only 2 were fatal BUGs, 16 were normal BUGs, and 22 were recommended to be repaired, all of which were repaired. In the follow-up observation, only a few BUGs of recommended repair types appear. In addition, after scene testing, performance testing, data and database integrity testing, it is found that the test requirements of this paper meet the system requirements.

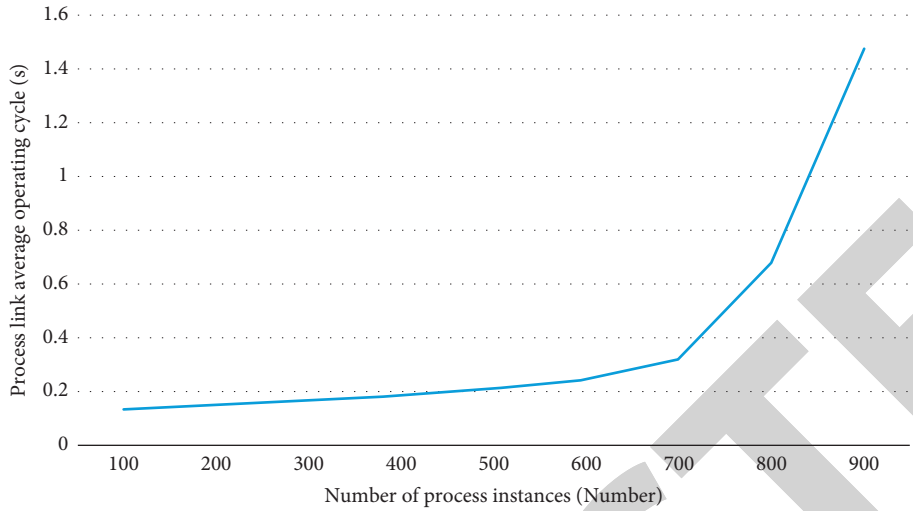

Figure 10: System throughput.

In addition, this paper also tests whether the throughput of the system meets the requirements of the application. Each thread of the system controls the corresponding process flow. When the process flows, record the start and end time, and finally get the average level of the cycle. The throughput test of the financial reporting system under the multimedia complex intelligent system designed in this paper is shown in Figure 10. When the number of process instances reaches 900 at the same time, the average flow cycle is only about 1.5 s, which shows that the system implemented in this paper can meet the application requirements.

6. Conclusion

The traditional financial report mode published in PDF or HTML format cannot meet the needs of users. People are also in urgent need of a new financial reporting model, and the emergence of XBRL technology gives the conditions for the emergence of a new financial reporting model, people also focus on this. This paper introduces multimedia technology and XBRL technology to reform the existing financial reporting model. On the basis of introducing the relevant theories of financial reporting, multimedia technology and XBRL technology, by analyzing the needs of different users and following the design principles of MVC, a financial reporting system under multimedia complex intelligent system is designed. Finally, the financial reporting system under multimedia complex intelligent system is realized by combining multimedia technology, open source XML technology, and database technology. Through the system test from four aspects of function test, scene test, performance test, data and database integrity test, it is shown that the system designed in this paper meets the design requirements, can be applied to today's economic environment, and provide financial information. The throughput test is also carried out in this paper, which shows that the system can provide good throughput and has good practicability. Although the research has realized the design of the system, the scope of the experimental data is too small, and there is no certain authority, so the next research direction will be carried out around the experiment.

Abbreviations

XML: Extensible markup language
Xpointer: XML pointer language
Xlink: XML link language
XSL: EXtensible stylesheet language
XPATH: XML path language
MVC: Model view controller.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

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