Developing the continuous assurance embedded continuous audit web services

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Abstract

The concept of continuous auditing has existed for more than two decades. Many scholars have proposed different application models of continuous auditing by adopting the Internet technology, and the main purposes were to provide the auditing service within the real-time financial statements information disclosure for achieving the task of enterprise's business assurance. In addition, the task of enterprise's business assurance has used the standards of continuous auditing to real-time monitor the enterprise rules and regulations, business process, workflow and the consistency in trade, event and standard. Thus, the continuous assurance (CA) is able to depend on certain subjects, after conducted compound analysis and independent verification, to real-time provide the independent and objective opinions for analysts, investors and financial institutions without the restriction on time and distance. The continuous assurance includes the multi-information integration, data integration and continuous auditing implementation for the external auditing unit. This study has proposed some conclusions and suggestions.

Keyword: Continuous Assurance, Continuous Audit Web Services, Extensible Markup Language

1. Introduction

Recently, since the emergence of electronic commerce (EC), the utilization of Internet technology has made data can be readily exchanged between different systems. However, it is really difficult to use the document format, HTML to conduct the operations of data output and comparison [3]; therefore, the format, Extensible Markup Language (XML), which defined the information exchange standard by using document characteristics, has been used to solve the issues of HTML document. In addition, within the need of real-time financial statements disclosure, American Institute of Certified Public Accountants (AICPA) has combined five major CPA firms to promote the Extensible Business Reporting Language (XBRL) for enterprises' financial statements, and conduct research to establish general standard languages for financial statements in order to make companies, investing institutions, CPAs, bankers, industrial analysts and competent authorities in the information of financial statements can use the general financial statements format to prepare, announce, exchange and analyze their financial data [3]. There are scholars who adopted the IT of XML and Web Services to design the model of accounting information system with continuous auditing web services (CAWS) [9]. Moreover, the main purpose of such development is to understand how to disclose the real-time financial statements; how to keep on real-time communication with external organizations; and how to achieve the assurance of real-time operation verification. Thus, the real-time financial statements integration needed to be implemented from the orientations of the information system integration, data integration and continuous auditing operation [4].

This study has divided into five flowing chapters: Chapter 2 Literature Review, Chapter 3 Research Methodology, Chapter 4 Conclusion and Implication.

2. Literature

The concept of continuous auditing has been proposed for more than 20 years [11,5]. The early continuous process auditing system (CPAS) has developed in Bell Laboratories of AT&T, and this method was mainly developed the paperless pattern for internal auditing operation [15], or various embedded auditing models (EAM) ([5,15,9]. As for the analysis and monitoring of transaction data, it can use a series of preset regulations to achieve the auditing purpose, such as the Alarm Notice or Red Header Flag [12]. In addition, this module is the basis of later continuous auditing module. As to develop exact module in this study, it has then adopted those models that recently proposed to conduct the follow-up discussion, among which, they are included the modules that developed by Rezaee (2002), Onions (2003) and Woodroof and Searcy (2004), as well as carried out the comparison and retrieved the information technologies with different advantages.

2.1. Reszee model

Rezaee (2002) has proposed that the Client/Server network framework is the conceptual framework of main continuous auditing; in the meanwhile, used the network to transfer data to auditing workstations. Such main concepts are shown as follows:

1. From auditee site's data and information system to implement the data collection, and link up the forms and lists in the database, and then transfer data to the auditing host through Modem or File Transfer Protocol (FTP). In addition, client systems can be deployed on different auditee ends respectively.
2. Formulated the data forms and lists in the auditing host, and transformed data from different platforms or systems (elimination, verification and reprogramming) into the formulated data formats.
3. Auditee site's data can automatically enter into different data areas in the auditing host, where those data areas can cover the original transaction data and ETL's intermediate data, such as the detailed file definition, business process and procedure and transaction regulations, etc.
4. Integrally conducted the automatic test on those data areas, and yielded the exception report.

2.2. Oninos model

Oninos (2003) has proposed that the conceptual framework of continuous auditing is the integrity of monitoring data, and suggested to use the Keystroke method to conduct the data examination, which including the common program of monitoring database and possible induction of fraudulence, as well as the application with wrong instruction. Its main concepts are as follows:

1. Collect different transaction and data sources in accordance with business process.
2. Data and corresponding XACL columns that used for the transaction data and database application.
3. Use the real-time computer-aided tools to inspect the data of transaction and database application, and the auditing center (OLSAC) will send out the alarm notice.
4. Expert System have search for the data definition.

2.3. Woodroof and Rearcy model

Woodroof and Searcy (2004) has proposed that the concept of continuous auditing is to collect the database for auditee end summons and journal transaction, and provide auditors with network interface. The operations of such pattern are the following five major steps:

1. Constructed in accordance with requirement for the auditing report.
2. Prior to define the exception regulations for the agent transaction monitoring program of auditee site. Such regulations can inspect the SysTrust standards or

transaction data of the third party, as well as send out the trigger alarm to auditors in accordance with regulations and conditions.
3. At the auditee site, it needs to preset the Digital Agent Program to collect the real-time transaction data for auditee end. And, it can also use the database's function library (Store Procedure) at the auditee site.
4. If the auditing is marked as needing additional data, and the Digital Agent can be re-conduct the retrieval of relevant data.
5. three-layer assurance. First layer is the reliable assurance. Second layer is the provision of real-time financial statement opinions. Third layer is the technology analysis data that violated the contract of third party, as well as provides the report or statement on the basis of XBRL.

According to the comparison among three modules, there was show that it needed to collect the auditing data with using various information technologies. In addition, the auditing procedures need to achieve the real-time, correct and automatic goal, as well as adopting the Computer Assisted Audit Techniques (CAATS), Digital Agent or Expert System to conduct the detection of fraudulence and error. Meanwhile, the GAS is the tool that most frequently used [13].

3. Research Methodology

As shown in Chapter 2 Literature Review, currently the CAWS mode is still halted for the discovery and discussion of the continuous auditing models and Internet technologies. In addition, this study is a brand-new subject of audit, it should be combined with knowledge from these two major fields: IT (Web Services, XML) and continuous auditing, and it has also studied the innovation and modulation for many issues. Moreover, discover the issues and propose the improvement and suggestion from making further use of practical operation for the case study, as for the process of this study, in addition to use these basic functions: literature review to collect and sort the data, the orders of research procedure are included the CAWS design, system prototype design and tool option, establishment of CA model, system prototype testing, modified system prototype after testing, and practical operation of system and log-on network.

3.1. Continuous Assurance Model design

The system framework is mainly divided into the auditor server, web service of registry and search (UDDI) and client server. The auditor server has installed various software, such as SQL 2005 database server, ACL, SSL enterprises virtual network and Internet server (IIS), etc. UDDI will be established in the Information Control Center and controlled by host's restrict procedures, and it

is composed of Service Provider, Service Register and Service Requester. The service requester is maintaining the registry and store mechanism for general investors and financial institutions, and announced the service items it offered. SOAP is the communication method between programs that formulated by XML syntax, and its document formats are already contained the auditing report of auditors after conducted continuous auditing, which will be stored in a form of XML language. After accepted by the SOAP host, then conducted the decryption, content reading, calling the data presentation layer to pack the XML document into the packet of SOAP, and then transfer it to the data presentation layer via the SOAP server. In addition, such repeated transferring procedure is able to transfer the relevant continuous auditing document to the Internet users. Detailed operations are shown as Figure 3-1 CA system framework.
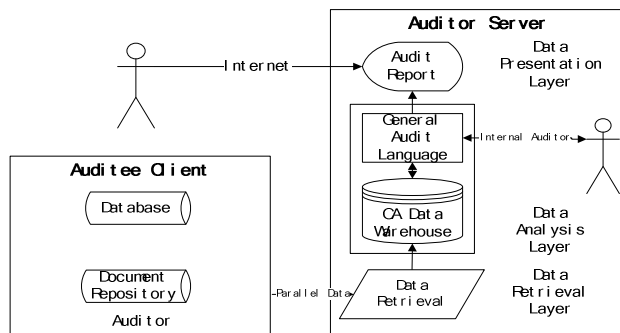

Fig.3-1 CA system framework

The prototype of CAWS is not only needed to conform to the standards of continuous auditing, but its function also can be operated on the Internet, and it should be different from the definition of traditional HTML document. Therefore, web service should be met the following three conditions:

1. Web service uses the SOAP format to replace the Multipurpose Internet Mail Extensions (MIME).
2. Web service is not categorized the Hyper Transmission Protocol (HTTP).
3. Web service can be provided with required data that defined by the explanatory data (metadata) from the auditing end.

Therefore, in order to conform to the conditions of the system prototype, it needs a completed mechanism and a supporting development standard (such as: web service). It not only makes the system prototype can be tested and used, but it also can be practically operated the continuous auditing functions for internal auditors. The development lists of the system prototype are shown as follows:

1. Web service / Operating system / Network Servers: MS.NET/MS Windows/IIS (Internet server)
2. Database: SQL Server 2005
3. User Site Tools: Java Client/ SOAP, WSDL and UDDI

4. Auditing Tools: ACL

3.1. Data retrieval layer

The main purpose of the Data Retrieval Layer is, according to the data that needs to conduct the verification for the continuous auditing, to use characteristics of function database (store procedure) and ETL (Extract Transform Load) in the database management system (DBMS), or integrated test facilities (ITFs) to retrieve the data from the transaction procedures to another data storage area (dataMart) [13]. Onions (2003), [10], Woodroof and Searcy (2004)). However, practically speaking, as for such method, the auditors should be familiar to the data procedure and column definition for such system, and then the data could be smoothly collected. Therefore, this study has improved the method of data collection, according to those procedures of business system, operating process, workflow, transaction and event to collect the relevant data within the concepts of continuous auditing, and used the tools of data management system (DMS) to construct the data warehouse of continuous auditing.
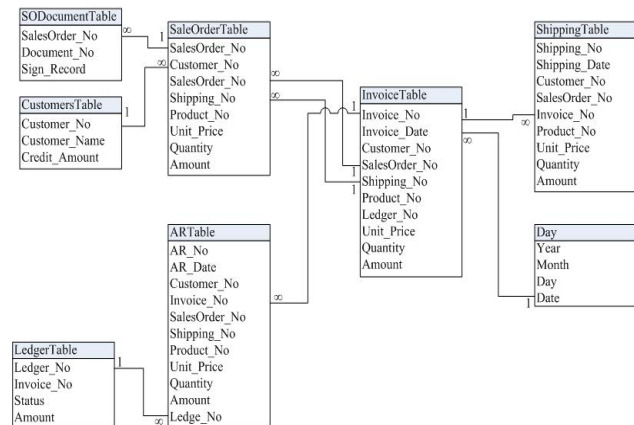

Fig.3-2 continuous auditing Data Warehouse

According to the theme of continuous auditing in Data Retrieval Layer, goal must is it answer to convey intact data to define, in order to make auditors easy than to the relation of every work, so the design of data warehouse is that a star framework. Prove, convey data and contain order data in ERP system for the situation of selling circulation following, the customer awards letter data, stock data, the ones that produces in goods data or invoice data or electronic signature system are signed the nuclear file waits. Every business process all has corresponding field. Data of continuous auditing data warehouse is according to Existence according to the goal of more examining than the other side, completeness, such criterion as accuracy, timeliness, etc., field data is collected in the necessity of defining continuous auditing,

collect data of detailed items of homework in the favorable follow-up corresponding case relative procedure. Detailed field framework, such as Figure 3-2 continuous auditing data warehouse.

At last, applied the Java object to package the aforesaid functions, and from different auditors' system host to provide the relevant data of continuous auditing , such as the real-time business system, operating process, workflow, transaction and event, etc., and they can be implemented in different operating systems, such as: IBM AIX, HP Unix, etc. Please refer to Figure 3-3 Data Retrieval object class.
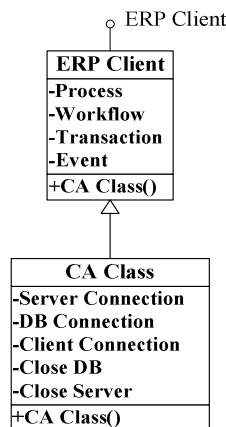

Fig.3-3 Data Retrieval object class

3.2. Data analysis layer

Since 1980, many researchers or primary accounting institutions have developed various computer assisted auditing software, which can automatically select the auditing procedures, such as the Decision Source System (DSS) or Expert System (KES) [8]. The main purpose of automatic auditing procedure is to provide auditors with more reliable and rapid auditing functions in order to avoid occurring errors with the routine auditing procedure, such as summarization, recalculation or cross comparison [7]. Practically speaking, general auditing software can provide auditors with self-edited instruction set or package function that provided by suppliers that will be able to increase the automatic capability of auditing software. Such as, take Table 3-1 Empirical test of Continuous Auditing goal by taking Sales Transaction as example, it has to collect the columns of client basic data, such as client number, name of client, journal number in the purchase operation, invoice number of delivery operation, journal number, total account receivable, detailed amount, posting code, date of delivery, detailed amount of summons, total amount of summons, amount of detailed subjects in day book, total amount of detailed subjects in day book, number of account receivable, etc.

Goal of continuous auditing	Goal Description	Empirical Transaction Test
Existence	Recorded sales transaction is true	Inspect the client of invoice who existed in the file of customer information or not. Journal of sales day book is possessed the purchase order or not
Completeness	All occurred sales transaction were entered into the account book	Trace back the delivery note to the journal of sales invoice, sales day book
Accuracy	Entered amount is accurate	Re-calculating the total amount of income and mapping with the posted income
Timeliness	Sales transaction is recorded at the correct time	Compare with the date of sales transaction record and the date of delivery record
Posting and Summarization	Sales transaction is properly recorded in the main file of account receivable and has been correctly summarized	Summarize the total amount of day book and trace he posting back to the general ledger and the main file of account receivable

Table 3-1 Empirical test of Continuous Auditing goal by taking Sales Transaction as example

After data has been collected and transformed, it is able to conduct the test on completeness (fraudulence or error) and validity (operating standards) for transaction. With using the analysis procedure and independent testing for the computer assisted auditing technology, it is able to reach the real-time verification, such as: invoice system, account payable system, etc. Therefore, Data Analysis Layer is not only the core of the continuous auditing process, but it also is an auditing tool. In addition, such part should be automatically and real-time determined that the control and implementation of the application system and financial report system is effective or not; furthermore, it can be rapidly mark the specific difference or abnormal information; independently confirm the completeness of the transaction data that disposed by the operating system; real-time to know well about the loss and reduction of cost; improve the efficiency and effectiveness of the SOX Section 404 evaluation; and control the defect quantitative analysis functions. Therefore, the main operations of such layer are the effectiveness of controlling the client server and the confirmation of continuous monitoring operation. This layer is used the most frequently utilized tool of auditing software [13] such as general auditing software (ACL), and the following models of automatic review for continuous auditing are based on the ACL syntax.
Existence 1:

Open %InvoiceTable%
OPEN %CustomerTable% SECONDARY
JOIN PKEY %InvoiceTable.Invoice_No % FIELDS
All SKEY %CustomerTable.Customer_No%
Unmatched TO "ExistNO1 " OPEN PRESORT
SECSORT
Open %LedgerTable%
OPEN %SaleOrderTable% SECONDARY
JOIN PKEY %LedgerTable.SaleNO % FIELDS All
SKEY %SaleOrderTable.SaleNO % Unmatched TO
"ExistNO2 " OPEN PRESORT SECSORT
Existence 2:
    OPEN %ShippingTable%
    OPEN %InvoiceTable% SECONDARY
    JOIN PKEY %InvoiceTable.CustomerNO % FIELDS
    All SKEY %CustomerTable.Customer.No%
    Unmatched TO "ExistNO2 " OPEN PRESORT
    SECSORT
Completeness:
    OPEN %ShippingTable%
    OPEN %InvoiceTable% SECONDARY
    JOIN PKEY %InvoiceTable.CustomerNO % FIELDS
    All SKEY %InvoiceTable.CustomerNO% matched TO
    "CompleteTable" OPEN PRESORT SECSORT
    OPEN %Ledger %
    OPEN %CompleteTempTable% SECONDARY
    JOIN PKEY %LedgerTable.CustomerNO % FIELDS
    All SKEY %CompleteTempTable.CustomerNO%
    matched TO "Complete_END" OPEN PRESORT
    SECSORT
Accuracy:
    OPEN %ARTable1%
    OPEN %ARDetailTable% SECONDARY
    Set folder /Result/DATACONFIRM
    JOIN PKEY %ARTable.ARNO % FIELDS All SKEY
    %ARDetailTable.ARNO % WITH ALL Many TO
    "%Complete_JOIN" OPEN PRESORT SECSORT
    COMMENT Check AR_Table.AMT with
    AR_Detail_Table.AMT Consistent
    OPEN %Complete%_JOIN
    SUMMARIZE ON %AR_Detail_Table.ARNO %
    SUBTOTAL %Detail_SUM_AMT % TO
    SUM_%cAR_SUM%
Timeliness:
    Table1Date="SaleOrderTable.Date"
    Table2Date="ShippingTable.Date"
    DEL FIELD T1PKEY OK
    DEFINE FIELD T1PKEY COMPUTED
    "" if T1PKEY=""
    "NO GOOD" if
    %TABLE1DATE%<>%TABLE2DATE%
    "OK"

3.3. Data presentation layer

After underwent the data collection and analysis, the final auditors should be presented the result of data verification. Such operation layer has used the web service function to upload the auditing report to the website to provide investors, financial institutions or any interested group as a reference [6,9].

4.Conclusion and implication

During the initial period of electronicalization, this case company has not yet referred to the auditing standards to establish the definition of forms and columns. Therefore, the later data collection has occurred the difficult situation of how to determine the retrieval column, at last, according to the continuous auditing target, the description of target, and empirical transaction to test the definition of relevant columns and construct the real-time collection of data within the information system to the continuous auditing data warehouse. In terms of improving the data quality for auditing and audited ends and adopting the intermediate data to enhance the capability of data sharing and improve the data checking efficiency for auditing. Therefore, if the auditing activity has any requirement, then the data warehouse should be always provided such service and able to completely use and implement.

As for real-time collecting the relevant data from these procedures of business system, business process, workflow, system transaction into continuous auditing data warehouse, that can make auditors to be able to use GAS to conduct the procedure verification and monitoring. It is not only able to increase the efficiency and quality of automatic auditing, but it also can adopt the automatic auditing procedure to mark or link up the original system database for reconfirmation; therefore, this system is possessed the competence to implement auditing or confirmation transaction and transfer proper data. It has also conformed to the demand of integrity within the continuous auditing, such as issues that mentioned in Sarbanex-Oxley Section 404.

As for IT, the use of XML and Web Services has been greatly applied to the B2B phase, the maturity of current technical framework has effectively increased the efficiency of data exchange, and then make enterprises' internal information sharing to achieve the consistency. Therefore, among the online experiences of the case study, we found that the confirmation task of continuous assurance has not only introduced by using the continuous auditing, but it should be also included the following.

1. Multi-systems integration: The integration with operating procedures of current procedures of current systems will facilitate the inspection of the consistency among enterprise rules and regulations, business process, workflow, transaction and event and standard, as well as completing the confirmation task of enterprises operation.

2. Data integration: the online procedure of each information system have not conformed to the auditing concept to build up its own auditing database, thus it is needed to through the establishment of data warehouse to make reinspection and define the corresponding database column and procedure in the information system.

3. Continuous auditing implementation: although this case company's introduction has conformed to these four principles: reliability, security, integrity and persistence, the CAWS has not only used the latest IT, it should be also adopted complete measures to construct the internal control procedure for the enterprises, including the issues of internal control system (COSO), the application management of computer software (GAS, EAMs, ITFs), management of system development tools (DBMS, Java) and management of information security (BS7799).

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