Online Invoicing System based on QR Code Recognition and Cloud Storage

Wei Zhang
Intelligent Science and Information Engineering College
Xi'an Peihua University,Xi'an, China
25100423@qq.com

***Abstract*—This paper studies an online invoicing system based on QR code recognition and enterprise information cloud storage, which belongs to the application field of cloud storage technology. The method is characterized in that: establish an enterprise information cloud storage server on the cloud, generate the unique QR code or bar code according to the enterprise's taxpayer identification number, and when the buyer requires the seller to provide invoices, the seller's invoice clerk only needs to scan the enterprise's QR code to obtain the enterprise's related information from the cloud and realize the automatic input function of invoice title, thereby greatly saving the time of information entry, enhancing the accuracy of information and improving the efficiency of work.**

Keywords—QR Cord Recognition, Cloud Storage, Online Invoice System

I. BACKGROUND

With the implementation of the latest policy documents "Regulations on the Transitional Policy for the Replacement of Business Tax into VAT Pilots" on May 1, 2016, there is an increasingly demand for enterprise users to actively require merchants to issue invoices. In order to further strengthen the management of value-added tax invoices, State Administration of Taxation released new rules to cover the provision of corporate tax numbers from special votes to ordinary invoices. The financial staff of many enterprises and public institutions have begun to issue notices to their employees, reminding employees to well remember or save the company's corporate tax numbers in order to reimburse or issue VAT ordinary invoices. However, due to the imperfection of the existing online invoicing system of local tax authorities, merchants need to spend more time in filling in the information of invoice title, tax number, address and the like, seriously affecting the work efficiency of invoicing and not conducive to the effective implementation of the state tax policy. How to facilitate the buyer to provide enterprise information and make the seller input enterprise information quickly so as to issue invoices online efficiently is the urgent problem to be solved for the current tax bill system.

II. INTRODUCTION

Invoicing refers to the business vouchers issued and received by all units and individuals in the purchase and sale of commodities, the provision or reception of services, and other business activities. It is the original basis of accounting, and is also an important basis for law enforcement inspections by auditing agencies and tax authorities. The receipt is the receipt and payment voucher. The invoice can only prove that the business has happened and cannot prove whether the payment is due or not.

Invoicing refers to the text issued by the buyer to the purchaser during economic activities. The content includes the name, quality, and agreement price of the product or service provided to the purchaser. In addition to the advance payment, the essential element of the invoice is that the buyer must pay the purchase party the purchase price according to the agreed terms. It must include the date and the quantity, and it is an important proof of accounting. The Chinese accounting system stipulates that invoices for the effective purchase of products or services are called tax invoices. The vouchers for government departments' fees and collections are not the same as the names of different fees collected during various periods, but they are often collectively referred to as receipts for collection of administrative services. For internal auditing and auditing, each invoice must have a unique running account number to prevent invoice duplication or skipping.

Two-dimensional bar code/two-dimension code is to record data symbol information in black and white on a plane (two-dimensional direction) according to a certain geometrical pattern. The use of code is cleverly used to construct the internal logic of the computer. The concept of "0" and "1" bit streams uses a number of binary geometric entities to represent literal numerical information, which is automatically read by an image input device or an optoelectronic scanning device to achieve automatic processing of information: it has a bar code Some commonalities of technology: each code has its own specific character set; each character occupies a certain width; has a certain check function. At the same time, it also has the functions of automatic identification of different lines of information, and the processing of the rotation point of graphics rotation.

Cloud storage is a new concept extended and derived from the concept of cloud computing. Cloud computing is the development of distributed computing, parallel computing, and grid computing. It is the process of automatically splitting huge computing processing programs into numerous smaller subroutines through the network. The huge system composed of multiple servers is then calculated and analyzed, and the results are passed back to the user. Through cloud computing technology, network service providers can process tens of millions or even billions of information in seconds, and achieve the same powerful network services as "supercomputers."

978-1-5386-1803-5/18/$31.00 ©2018 IEEE

The concept of cloud storage is similar to cloud computing. It refers to the functions of cluster applications, grid technologies, or distributed file systems. A large number of different types of storage devices in the network work together through application software to provide data storage. A system with business access capabilities ensures data security and saves storage space. In simple terms, cloud storage is an emerging solution that puts storage resources on the cloud for human access. Users can connect to the cloud at anytime, anywhere and through any networked device to conveniently access data. If this explanation is still difficult to understand, then we can use the structure of the wide area network and the Internet to explain cloud storage.

III. DESIGN IDEAS

In view of the shortcomings of the above technologies, this paper provides an online invoicing system based on QR code recognition and enterprise information cloud storage, which boasts the following advantages: the buyer provides the seller with the information of invoice title simply and conveniently while the seller can input the information of invoice title accurately and quickly, as well as low implementation cost, high efficiency, etc., and it reduces the traditional invoicing time from at least 1 minute to within 15 seconds.

This paper mainly addresses the solution for the enterprise to provide invoice services for consumers, and technology connection between the enterprise and the tax department not only exempts the drawer' staff from manually inputting the name of the drawee, taxpayer identification number, registered address and telephone number, account bank and account information, but allows the enterprise from issuing invoices for consumers conveniently, fast and in a low-cost cost. In the meanwhile, consumers do not need to remember or deliberately store enterprise billing information, but instead, merchants only need to scan the user QR code to intelligently acquire VAT special invoices, VAT ordinary invoices as well as the information of titles of VAT electronic invoices.

The technical task is implemented in the following way: set up an enterprise information cloud storage server on the cloud and keep data synchronization with the enterprise information database in the existing tax system, and the enterprise takes the taxpayer identification number as the unique identification code and generates the QR code or bar code according to the taxpayer identification number. Install the QR code or bar code scanning gun on the seller terminal, and after collecting the QR code or bar code data from the online invoicing system, request to obtain the buyer's name, taxpayer identification number, address, telephone number, bank of deposit and account number through the connecting cloud server of communication protocols and security protocols, and give identity authentication to the terminal after the server receives the request, and feed back the corresponding information to the terminal's invoicing system if there is no error. The system automatically fills in the corresponding information to the printed page, the drawer enters the "goods or taxable services, service name", "amount" and other information and then click the "print" button, and the notes printer automatically prints invoices.

The concrete implementation includes the following steps:

1. The tax system database of Tax Department exports enterprise-related information, including invoicing information such as name, taxpayer identification number, address, telephone number, bank of deposit, account number, and forms a data table to be stored on the enterprise information cloud storage server so that the data of the two are synchronous;

2. Provide the QR code or bar code data identification interface on the seller's invoicing system, and ensure that the bar code scanning gun can correctly transmit the collected information to the invoicing system;

3. All enterprises and public institutions generate the QR code or bar code for retention through the tax official website according to the unique tax identification number of the enterprise;

4. When the buyer requires the seller to issue an invoice, the seller provides the enterprise's QR code or bar code and converts it into the taxpayer identification number after the drawer scans the bar code, and the terminal invoicing system sends the enterprise-related information call request to the cloud storage server of cloud enterprise information through communication protocols and security protocols;

5. After receiving the terminal request, the cloud storage server of enterprise information carries out terminal identity authentication, and feeds back the enterprise information to the terminal invoicing system after passing the authentication;

6. Fill the information of invoice titles of the enterprise automatically in the corresponding position of the page where the invoice information of the terminal invoicing system should be completed;

7. The seller's drawer inputs the information of "goods or taxable services, service name" and "amount" and then click the "print" button, and the notes printer automatically prints invoices.

The research content of this project has the following prominent beneficial effects compared with the existing invoicing system in various regions:

1. The buyer does not need to provide the seller with complicated invoicing information of the unit, but only needs to provide the QR code or the taxpayer identification number, which is more convenient and accurate;

2. The seller's drawer does not need to input the purchaser's unit information word by word, but just scans the enterprise's QR code or bar code to ensure that the information is automatically completed in an efficient, accurate and reliable manner;

3. It can effectively shorten the invoicing time and reduce the traditional invoicing time from at least 1 minute to within 15 seconds;

4. Reduce the waiting time of invoicing customers and improve the satisfaction of customer services;

5. Effectively enhance the invoicing enthusiasm of consumers, reduce the phenomena of tax evasion on the part of the seller and promote the effective implementation of the national policy of replacing business tax with value-added tax.

IV. IMPLEMENTATION WAY

The system architecture design is mainly divided into three parts. The first part consists of the system foreground terminal devices, including the merchant invoicing system, scanning gun and notes printer; the second part is the Internet, which is linked with the foreground equipment through VPN; the third part is the background tax system, which mainly includes the support of the taxation management system, tax administration system, cloud storage server of enterprise information as well as systems related to tax department; the specific structure is shown in fig.1.

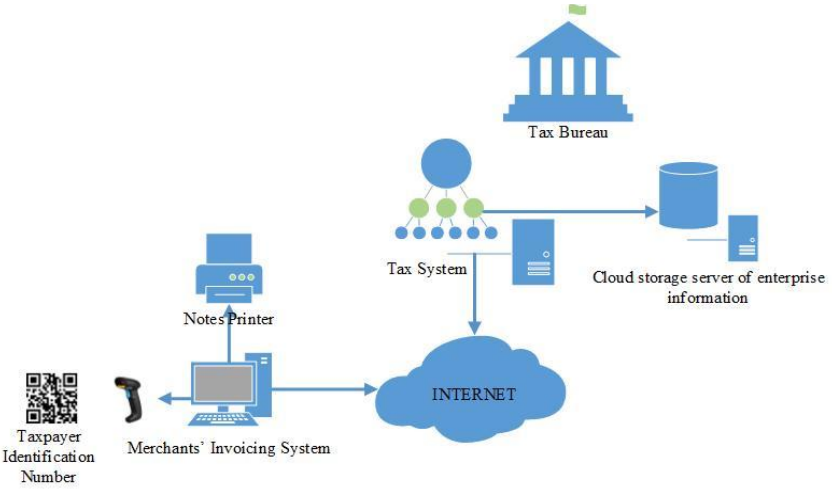

Figure 1. The Specific Structur

The concrete implementation includes the following steps:

Establish a cloud storage server of enterprise information on the traditional network invoice service system, store the enterprise information tables related to invoicing and maintain synchronization with the enterprise information database of the tax system, generate the corresponding QR code or bar code with the taxpayer identification number as the enterprise's unique identification code, and provide it for the enterprise to download and use through the official website of the tax department. At the terminal of the invoicing system, consumers provide the QR code for the drawer to scan it, the invoicing system identifies the QR code and converts the QR code into a taxpayer identification number, and then puts forward the request of obtaining the enterprise-related information to the cloud storage server of enterprise information; the server provides the corresponding information after identity authentication, and automatically completes it in the invoicing system. After the drawer inputs the information of "goods or taxable services, service name" and "amount", the notes printer automatically prints invoices. In the process of data transmission, both the upload and download of data need to be realized by communication protocols and security protocols. The workflow chart of online invoicing system for enterprise information cloud storage based on this method is shown in fig.2.

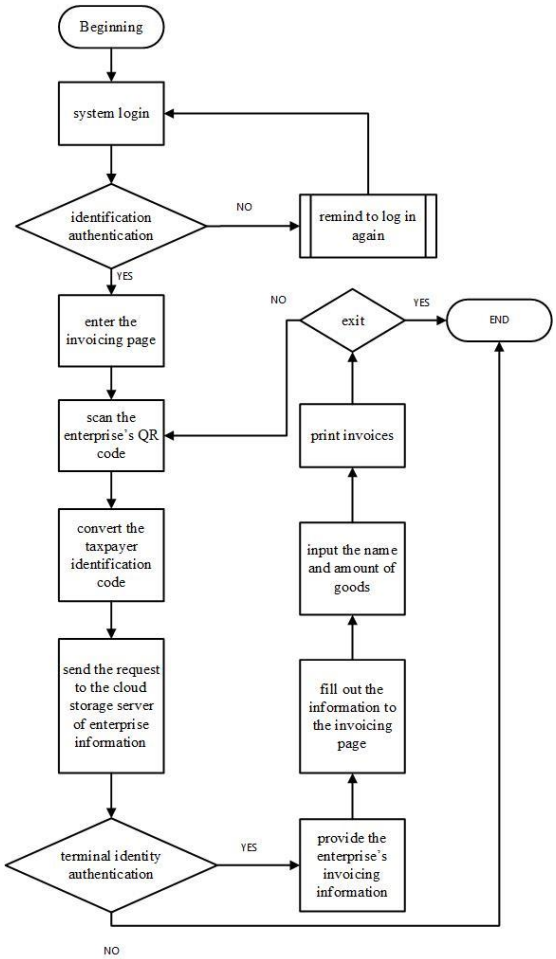

Figure 2. The Workflow Chart Of System

1) The seller's drawer logs on the online invoicing system to enter the user name and password for the user's identity authentication. If the authentication fails, the system will remind the user to log in again, and then enter the invoicing page after the authentication passes;

2) The drawer uses the QR code scanning gun to scan the enterprise's QR code or the bar code, and the system converts the bar code into the enterprise's taxpayer identification number;

3) The invoicing system sends the request of obtaining the enterprise information to the cloud storage server of enterprise information through communication protocols and security protocols (such as a VPN encryption tunnel);

4) The cloud storage server of enterprise information carries out identity authentication to the invoicing terminal, and if the authentication passes, feed back the enterprise-related information through communication protocols and security protocols (such as a VPN encryption tunnel);

5) The invoicing system automatically fills the enterprise information to the corresponding position of the invoice page;

6) The drawer clicks the print button after the drawer inputs the name and amount of goods;

7) The notes printer prints invoices and then the invoicing is completed.

V. CONCLUSION

The online invoicing system based on QR code recognition and enterprise information cloud storage can solve some problems for consumers to some extent such as the cumbersome entry of the information of invoice titles in the process of invoicing, which can greatly improve the efficiency of invoicing. The tax department establishes an cloud storage server of enterprise information on the cloud, generate the unique QR code or bar code according to the enterprise's taxpayer identification number, and when the buyer requires the seller to provide invoices, the seller's invoice clerk only needs to scan the enterprise's QR code to obtain the enterprise's related information from the cloud and realize the automatic input function of invoice title, thereby greatly saving the time of information entry, enhancing the accuracy of information and improving the efficiency of work. On the part of the buyer, there is no need to provide the enterprise's letterhead information, and the buyer only needs to provide the merchant with the enterprise's QR code. The enterprise QR code can be saved in the form of paper business cards or electronic photos, which is convenient for users to carry with them and finally realizes the dual convenience for the buyer to ask for invoices and for the seller to provide invoices.

REFERENCES

[1]. Shi Wenjie. Research on QR Code Security Based on PKI Technology[D]. Anhui University of Science and Technology, 2017.

[2]. An Jin, Zhang Dan. Food Traceability Information Query Algorithm Based on RFID and Image Recognition[J]. Bulletin of Science and Technology, 2017, 33(05):134-137.

[3]. Hu Changping, Huang Shushu. User Rights Protection in Public Cloud Storage Services [J]. Information Studies: Theory & Application, 2016, 39(11):17-21+27.

[4]. Zhu Bin. The Characteristics and Enlightenment of Development and Application of Electronic Invoices in Taiwan[J]. Taxation Research, 2016(08):96-99.

[5]. Qu Weifeng. Research on Rapid Identification and Software Design of Low-quality QR Codes[D]. Northwest Agriculture & Forestry University, 2016.

[6]. Li Ping. Some Suggestions on Perfecting China's Electronic Invoice Management[J]. International Taxation, 2016(04):74-77.

[7]. Dai Xinzhu, Huang Xun. Electronic Invoices Application in the Context of Tax Collection and Management[J]. Taxation Research, 2016(03):70-74.

[8]. Cao Jing. Research on the Obstacles of Electronic Invoices Operation in the View of Invoice System[J]. Productivity Research, 2015(12):157-160.

[9]. Li Hui, Sun Wenhai, Li Fenghua, Wang Boyang. A Review of Data Security and Privacy Protection Technologies of Public Cloud Storage Services[J]. Journal of Computer Research and Development, 2014, 51(07):1397-1409.

[10]. Fu Yingxun, Luo Shengmei, Shu Jiwu. Overview of Secure Cloud Storage Systems and Key Technologies[J]. Journal of Computer Research and Development, 2013, 50(01):136-145.

[11]. Zhou Di. Research on QR Code Perception and Recognition Technology[D]. Shandong Polytechnic University, 2012.

[12]. Zhang Xingwang, Li Chenhui, Qin Xiaozhu. Research and Preliminary Implementation of Cloud Storage Built on Cheap Computer Clusters[J]. Journal of Intelligence, 2011, 30(11):166-171+182.