

Multiple Image Entry System

Toshikazu Koyama Kenji Ono
Hirokazu Matsumura

In the past financial institutions processed fund transfers (fund transfer forms) and registered inter-account fund transfer requests as well as other various clerical processes in the back offices of branches, but these have now been centralized at clerical centers in an effort to promote clerical efficiency through volume processing.

In recent years though, the scope of work concentrated at clerical centers has been expanding to further increase efficiency and also reduce the clerical work load at branches. Also, in order to contribute to the increasing operating rates, personnel at clerical centers are not only assigned to specific tasks but they are also required to take on additional duties and accept various allocated tasks divided up according to time divisions, depending on how busy such clerical centers become.

However, with conventional systems dedicated to assigned tasks, the burden of providing spaces for the installation of systems, operational management and management of operators, becomes magnified and requires a set of terminals and a team of operators for each dedicated system in anticipation of peak loads for various tasks. There is a limit to the extent of reductions to which the operating rates of terminals and the rationalization of operators can be pushed.

With the popularization of internet banking, on the other hand, clerical procedures at present are becoming the domain of customers, which is leading to a reduction in the amount of conventional clerical processes by branches. For this reason, it is not a dedicated system that is sought after but rather a centralized mechanism for processing a diverse range of clerical tasks.

Against such a backdrop this paper introduces a solution that enables efficient centralized processing of clerical processes for a diverse range of forms.

Current status and needs of operational centralization

Data registration work relating to forms generated at branches primarily involves the sending of original forms to centralized clerical centers, where operators read the original forms themselves in order to enter the data. This is the most common data entry method used. When the original forms need to be delivered or circulated, labor and man-hours are expended for management of the original forms at the branches where the forms are sent and, at the centralized clerical center where such forms are received. Risks then emerge relating to the damage and loss of the original forms themselves. For these reasons it has not been easy to expand the scope of work for centralized processing.

Furthermore, an infrastructure is in the process of being built for image processing involving the allocation

of image scanners at branches in systems intended for the massive centralized processing of specific tasks, as represented by the central processing of fund transfer form images. The effective use of such a mechanism can achieve an image entry processing system. To further centralize clerical processes, however, the obligation that would be imposed on bank customers, such as the need for them to adjust to the modification of business forms to suit the specifications of the system, aside from the considerations required for preventing inconvenience to the financial institution, needs to be considered. This burden can be avoided with the assurance that no new skills are needed to manage or operate the new business system or newly implemented equipment will not need to be dedicated to specific tasks only.

Activities intended for markets

A fund transfer form image processing system and a multiple image entry system comprised of a combination of image and OCR component technologies were developed and launched for sale to meet such a background and environment (the term “multiple” used here represents multiple supporting features, such as the fact that any scanner irrespective of its vendors can be used, any form can be handled, the data entry screen does not change regardless of the specific tasks being conducted and any upper level equipment may be designated for notification once the collected data is prepared).

The following requirements were considered necessary for achieving a multiple image entry system:

- It must be possible for privately made forms brought in by customers to be handled without the necessity to modify the forms for the purpose of system conversion.
- Simple form scanning operations are required that can be performed without full awareness of specific tasks.
- Specific knowledge or skills should not be required for the task of entering operations.
- Maintenance work, such as the registration of form formats, must be easy and the scope of operations must be expandable.

The overall configuration of the system is comprised of a “branch system”, “centralized clerical center system” and a “multiple image entry server”, as shown in Fig. 1.

A branch system is able to acquire the images of various forms and slips from a variety of image scanners, including direct scanners and lot scanners that scan large volumes of forms in a batch process. Once a form is scanned its image is transmitted to the multiple image entry server via a network, while its characteristics are

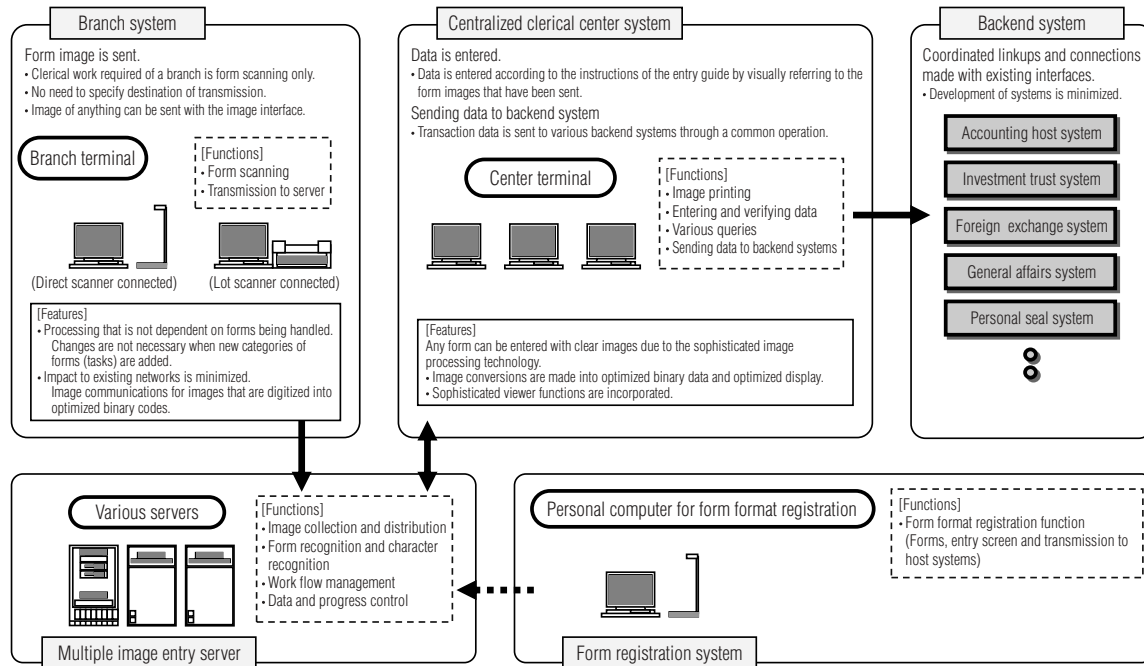


Fig. 1 System configuration diagram

identified and sorted according to its form type. Forms and slips received at the branch can be verified using corresponding form images at the centralized clerical center, just as if those forms and slips were actually available there, in order to perform data entry processing and management work. The aim of the “form registration system” is to identify forms subject to entry, as well as to set up entry fields and register systems. The “backend system” is a mechanism to coordinate the linkup of data with systems of users once the clean data is prepared by the data entry system.

Requirements for system conversion

(1) Form recognition technology¹⁾

A diverse range of forms must be handled. Specific tasks must be identified from the data of forms once they have been digitized into image data by the system in order to ensure that the operators scanning the forms do not have to be fully aware of the work procedures that are dependent on particular types of forms. The identification of forms (classification) is performed by the form recognition technology described below.

① Sheet ID identification

Sheet ID identification is a technology for identifying the kind of form given, recognizing a defined set of character strings and providing unique ID information (example: Character string of numbers) located at a specified position on each form. This technology is intended for forms that have standard formats with sheet IDs prepared in advance and is suited for processing forms in large volumes.

② Key item identification

Key item identification is a technology used to identify forms based on the results of character recognition, similar to the method used with sheet ID identification. However, although sheet ID identification requires that all

forms have a sheet ID at a common and specified location, the feature of the key item identification is its ability to handle key items that may be located at different positions on each form.

③ Ruled line characteristics identification

Ruled line characteristic identification is a technology used for identifying forms with the characteristics of ruled lines printed on forms. Since many ruled lines are used in tables that comprise the forms handled, it is an extremely effective method for categorizing a diverse range of forms in the multiple image entry system.

④Region characteristics identification

Region characteristics identification is a technology used for identifying forms with the characteristics of patterns found on the image of forms. The regions subject to identification are the areas containing corporate logos or other such appearing characteristic patterns, which can only exist on a particular type of form.

By incorporating these mechanisms, there is no need for operators to be attentive about the work procedures of each individual form while they perform the scanning operations to acquire form images at branches, as the simple operation of setting the forms on a scanner and pressing the scan button is all that is required.

(2) Simplified operability

Operators who enter data at centralized clerical centers must be able to see the status and display particular display screens with the use of easy operations if required. For this reason, operations without full awareness of specific tasks are made possible with uniform operability.

① Joint query status and menu screen

A screen layout provides a summary in a table format of the tasks that need to be processed and a progress status of the ongoing tasks, making it possible for operators to verify the details on a single screen, while providing a point of contact for starting operations (Fig. 2).

Operations for which an operator is authorized to process are made available with enabled operating buttons, facilitating data entry and verification operations without the full awareness of specific tasks.

業務分類	実数件数	処理完了	返却済	保留済	総数(分類別)	入力済	バリチェック済	送信済	送信中
総括	0	0	0	0	0	0	0	0	0
当日	38	7	2	0	2	15	12	0	0

業務分類	実数件数	処理完了	返却済	保留済	入力済	バリチェック済	送信済	送信中
1 郵便物登録 (25000256)	7	0	0	0	0	7	0	0
2 住所変更	0	0	0	0	0	0	0	0
3 EMR二次入力	5	1	0	0	4	0	0	0
4 郵便物専任送先住所変更 (11091007)	3	1	0	0	2	0	0	0
5 変更前住所	2	1	0	0	1	0	0	0

Fig. 2 Example of menu screen

② Data entry screen

In the screen layout a form image is displayed in the upper section, whereas the fields to enter data for the form are displayed in the lower section, thereby creating a unified screen layout (Fig. 3).

ご本人のおなまえ 代陸 太郎 様
 変更前のおところ 石川県金沢市高岡町1-33
 変更後のおところ 静岡県静岡市東区町2-1-5
 4200 120211 お電話 自宅 (054) 254-5461
 お店 (054) 254-1234
 静岡市東区町2-1-5
 420003 / 静岡工業

Fig. 3 Example of data entry screen

The operator performing the data entry processing only needs to enter data by visually referencing it to the locations specified on the screen image, without the need to be fully aware of the contents of the tasks at hand. The locations specified on such images are linked up with entry fields. When the entry is completed in one field and the display shifts to the next entry field, the displayed area of the form image is also being controlled to automatically shift the display to the corresponding area. The operator entering data cannot lose sight of the location that is subject to entry on the image displayed on

the screen as this configuration makes it possible for operators to concentrate on the current data entry operation.

The screen layout and operating scheme are unified and the same operations remain available even when the tasks are changed. Thus when new tasks are added to the system there is no need for operators to be trained for the purpose of learning new operations, etc.

Also adequate coverage is given to entry support functions, incorporating such mechanisms as guidance displays to guide operators through the entry of each field, thereby eliminating any need for specific skills to enter the data of any task.

Functions available with multiple image entry system

The following functions are available with the multiple image entry system, aside from the functions and features described so far.

(1) Form format registration function

This maintenance function extracts features on the images of forms subject to data entry for the purpose of form identification. Furthermore, this function features a mechanism for pairing the entry screen and individual fields on the original forms by setting up fields on the screen of which the data from forms are entered. This feature also offers a mechanism for editing information relating to transmission.

This function makes it possible for system users to operate, add new forms (tasks) and implement modifications on forms through modification procedures.

(2) Scanning function

This function makes it possible to acquire images regardless of the type of scanner used, whether it is a direct scanner connected directly to the terminals on the accounting systems installed at branches or a lot scanner capable of batch processing the scanning of forms. In order to reduce the operating work load of operators at branches the image scanning function is activated through the simple operation of pressing a button, in the same manner as faxing a document. Optimized binary data processing (image compression technology) has been adopted for the imaging of forms, in order to ensure that the form characteristics are extracted and the character recognition process is performed accurately. Images of the forms are obtained with superior quality. (Refer to form registration system function in Fig. 1.)

(3) Query functions

These functions enable various queries of the data available in the multiple image entry system. Functions include available transaction detailed list queries, individual transaction detailed queries, detailed investigations, output form queries, stored image queries and journal queries.

(4) Statistical function

This function encompasses all the handled data and processed tabulations based on various conditions then outputs data as statistical information.

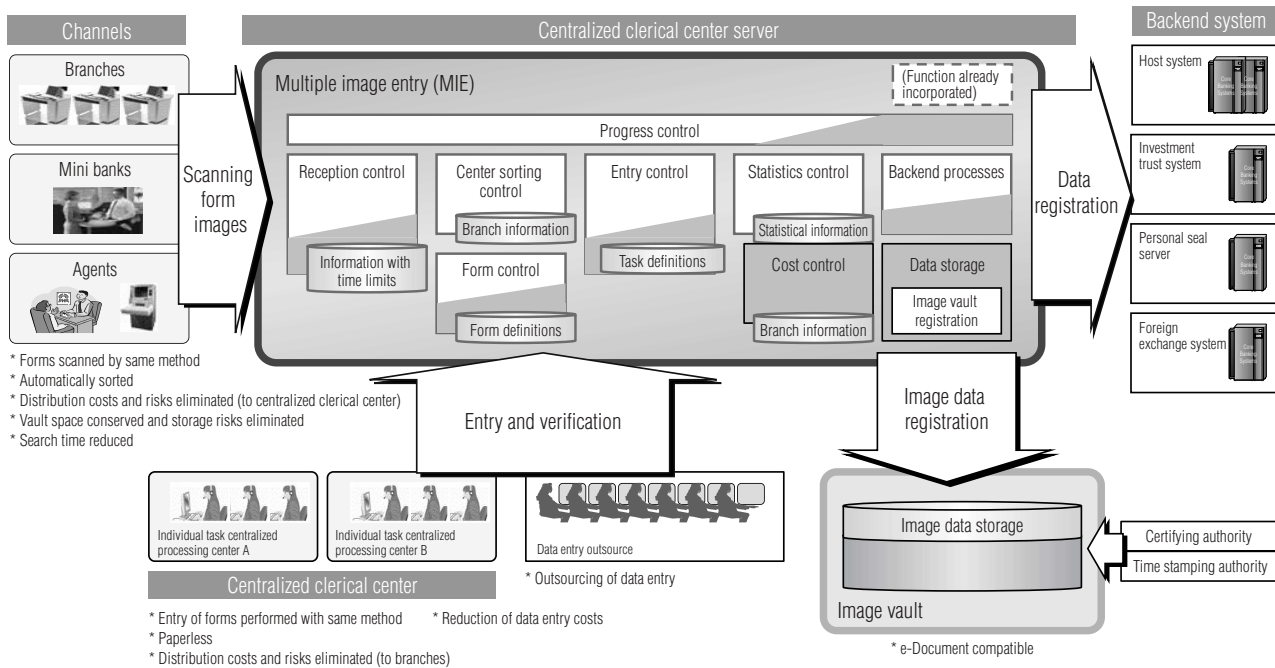


Fig. 4 Future foundation for form image processing

Effects of system implementation

(1) Improving efficiency and saving labor costs at branches

It is possible for operators at branches to scan the images of multiple business forms in the same fashion as faxing documents, without full awareness of specific tasks relating to individual forms. The classification of forms is now performed automatically according to individual tasks through the recognition processing of forms, thereby eliminating the need for specific skills by operators at branches, reducing the man-hours for work relating to the classification of forms.

(2) Operators at centralized clerical centers do not need to specialize

Operators entering data at a centralized clerical center can perform entry operations simply by viewing the images displayed on the screen, without any specialized knowledge. Furthermore, the data entry screen does not require operators to be fully aware of specific tasks and through the utilization of a unified operation screen layout operators can enter data by viewing the images displayed on the screen.

(3) Flexible applicability to tasks

Flexible adaptation to existing forms is possible. Various tasks can be accepted after maintenance work is performed, such as the registration of file formats, based on the image data of the applicable forms.

Future developments

This multiple image entry system is the data entry system depicted in the center of Fig. 4. Form images are loaded from various channels and the applicable tasks can be expanded. This paper has described a system comprised of a data entry mechanism that is not dependent on any particular task and for this reason the data entry work itself can be outsourced, which can lead to further reduced costs.

In the future we intend to create coordinated linkups with external certifying authorities and time stamping authorities for form images used for data entry and furthermore, coordinated linkups will be created with image vaults that provide functions to secure the authenticity of images making it possible to store form images long-term, in this way building and providing an image foundation that enables form-less operations without the need to store the original forms.

References

1) Noto and Hashimoto: "Image/OCR Components", OKI Technical Review, Issue 191, Volume 69, Number 3, pages 98 to 101; July 2002.

Authors

Toshikazu Koyama: Financial Solutions Company, Financial Systems Div., Back Office Center Solutions Development Dept.

Kenji Ono: Financial Solutions Company, Financial Systems Div., Back Office Center Solutions Development Dept., Development Team-2

Hirokazu Matsumura: Financial Solutions Company, Financial Systems Div., Back Office Center Solutions Development Dept., Development Team-2