Simplifying the Construction and Operation of Smart Card Systems: NICE V4.1

Yoshiki Ito, Masashi Tanaka, Junko Hashimoto, Kenji Murai, Koji Kishi, Shinichi Hirata, Takahiro Yamamoto†, and Sei Ijuin

Abstract

The NICE platform for issuing and managing multi-application smart cards has been enhanced with new functions including ones for joint-use, card reissue, and multi-language support to simplify the construction and operation of smart card systems. We describes these functions and their effects in this article.

1. Background

Smart cards are attracting attention as one way of enhancing security in the information society. If they can be designed to store more than one application, users will be able to receive multiple services with just one card, which will be more convenient. Cards of this type are called "multi-application smart cards". NTT is developing a smart-card management platform called NICE [1]-[6] that enables applications to be safely downloaded onto or deleted from multi-application smart cards over Internet-like networks. This platform has begun to be used in the government sector for resident registration cards and in the corporate sector for employee ID cards.

NICE V4.1 features four new functions which have been developed to (1) reduce construction and operating costs of smart-card systems and simplify their operation for small and medium-size companies and local governments and (2) expand the use of NICE to new fields including finance and international applications.

2. New functions

2.1 Joint-use

In the past, an enterprise that wished to deploy a system for issuing and managing smart cards had to purchase servers and other equipment and software and then construct and operate the system. The high cost of doing this has generated a demand from small and medium-size companies and local governments, which must manage a relatively small number of cards, for ways to reduce the cost of constructing and operating a smart card system. One effective way is to have multiple users share a single issuing/managing server and to allow users to access it from their business offices over an Internet virtual private network. Such a server could be operated on an ASP (application service provider) business model.

The joint-use function (**Fig. 1**) means that users only need a standard PC, simple smart-card issuing equipment, and an Internet connection environment to be able to use most NICE functions ranging from card issuing to card management from the convenience of their own offices. (If larger numbers of cards need to be issued, card issuing equipment could be located at a joint-use center or the task of issuing cards could be allocated to card manufacturers.) Compared with purchasing a server and software and deploying NICE on their own, using this scheme lets users can significantly reduce construction and operation costs.

2.2 Simplified OpS

Because NICE has mainly been incorporated into systems designed for specific applications, it has usually been operated in customized forms. To enable the NICE system to be customized easily, the NICE server consists of two parts: the "core" provides common

† NTT Service Integration Laboratories
Musashino-shi, 180-8585 Japan
E-mail: yamamoto.takahiro@lab.ntt.co.jp

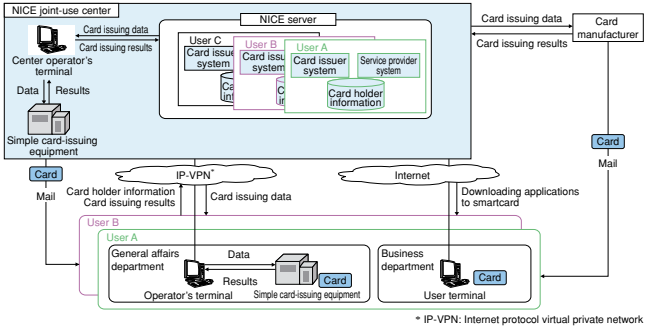

Fig. 1. Joint-use function of NICE.

management functions irrespective of the target application and the "business OpS" can be customized to suit the target business. The previous business OpS (operations system) was designed to accommodate various operation formats so the setup and operation procedures were inevitably complicated at times. Thus it is not very suitable for small and medium-size companies and local governments that cannot employ full-time operators.

With this in mind, we developed an easy-to-use business OpS that enables users to perform basic operations ranging from card issuance to daily management tasks after only one day of training. It was also designed to enable users to customize display messages and the layout of operation screens as needed.

(1) Simplified operation

To clarify the necessary and sufficient operating procedures in daily operations and to implement an easy-to-operate business OpS, we analyzed the frequency of performing certain functions and collected requests for system improvements from operators.

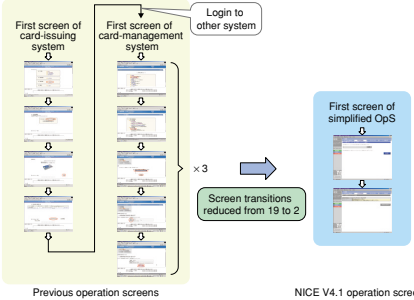

Fig. 2. Simplified card-issuing task.

The results revealed that registering the results of issuing a card, for example, required 15 screen transitions, 1 input operation, and 4 command executions. The new OpS significantly reduces this to 2 screen transitions, 1 input operation, and 1 command execution (**Fig. 2**). Furthermore, by dividing menu and operation screens into frames and arranging screen elements in a consistent manner, we were able to eliminate excess screen transitions and scrolling.

We also made it easier to perform operations without having to refer to manuals by providing a help display for each operation.

(2) Simplified customization

The simplified business OpS has been designed so that text messages displayed on operation screens can be read from a text file instead of being embedded in source-program files. This makes it possible to modify messages on screens simply by editing text files using a text editor. Moreover, screen layouts are now specified by style sheets, making it easy to modify screens according to the type of business being performed. These changes can reduce labor to 1/15 that for the previous OpS even when performing an overall customization of messages and screen layout.

(3) Extensive search functions

Users asked to be able to specify card user attributes (attribute codes, etc.) for each application system as a search condition when searching for card user information, card issuing results, and other data. This capability has been implemented, and the number of lines displayed in the search results can be specified for even greater customization.

2.3 Card reissue function for restoring even individual user data

When a multi-application smart card is reissued because of expiration, loss, theft, or damage, (1) the applications stored on the old card must be loaded onto the new card and (2) individual user data (such as user attributes and account balance) stored by these applications must be restored for each application on the new card. In previous versions of NICE and in smart-card management functions of other companies, the first action is done automatically. The second action cannot automatically restore individual user data that was updated after the card was issued, so service providers that provide applications must restore data for each reissued card by themselves. Since the number of reissued cards is expected to increase dramatically in the years to come as the use of multi-application smart cards spreads, there is a great need to make this data restoration more efficient.

NICE V4.1 includes an enhanced card-reissue function **(Fig. 3)** that enables a card issuer to get the latest individual user data stored and managed in each service provider's database and restore it in an application on the new card. This is accomplished by preregistering with NICE a script for generating restore commands by the service provider, and then using this script together with the latest user data provided by the service provider via the network to restore individual user data on the new card. In short, an application can be restored on a card up to its most recent state possessed by the service provider even in the case of a lost card. This new card reissue function makes it possible to carry out card-reissue processing by NICE alone and to reduce the reissuing work by about 80% for a card containing ten applications.

2.4 Multi-language support function

To enable NICE to be used in any country, the messages that it outputs must be written in the language of the target country. Moreover, it is necessary to satisfy both Japanese export laws and the importing country's laws governing the use of cryptography. We therefore made it easy to change the language of output messages and to replace the cryptography scheme. **Figure 4** shows how this multi-language

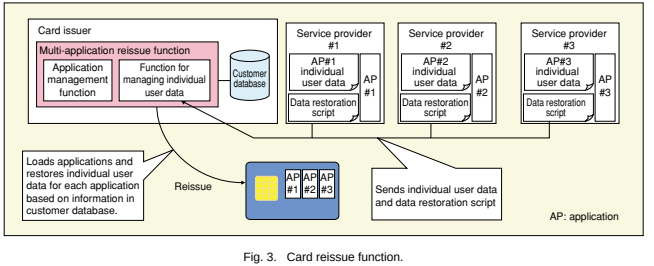

Fig. 3. Card reissue function.

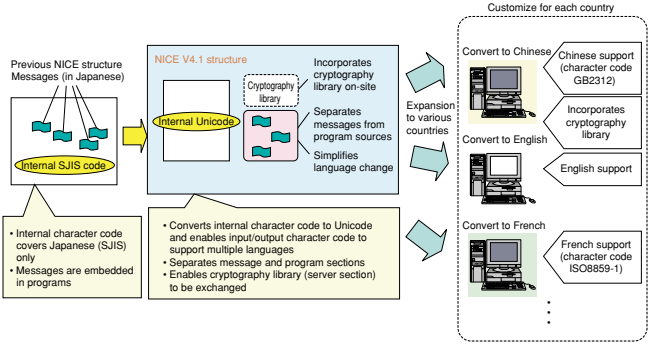

Fig. 4. Multi-language support.

function is achieved in NICE.

(1) Easy localization

Screen messages are stored in specific text files and style sheets are used to manage screens, text, and layout so that screen information can be easily changed to the target language by simply translating the text section. NICE uses Unicode*1 for input/output data and files and for database character codes, so it is possible to input and output card-holder information such as names and addresses in the language of the target country.

(2) Easy replacement of the cryptography products

The cryptography processing is based on the Java Cryptography Extension (JCE), a Java standard cryptography interface independent of specific cryptography products. Consequently, users in other countries can replace cryptography products with others having the JCE interface.

*1 Unicode: A character code specified by the Unicode Consortium representing characters of many languages in 2 to 4 bytes. It is incorporated in ISO 10464-1 and, in Japan, in JIS X0221.

3. Future plans

Capitalizing on the NICE V4.1 features described here, we plan to expand this joint-use multi-application smart card system to the corporate and government fields and pursue global expansion.

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Yoshiki Ito
Smartcard Service Promotion Project, NTT Service Integration Laboratories.
He received the B.E degree in electrical engineering from Akita National College of Technology, Akita in 2000. He joined NTT in 2002. He is engaged in the development of NICE.

Koji Kishi
Smartcard Service Promotion Project, NTT Service Integration Laboratories.
He received the B.A. and M.A. degrees in fundamental science from the University of Tokyo, Tokyo in 1994 and 1996, respectively. He joined NTT in 1996. He is engaged in the development of NICE.

Masashi Tanaka
Smartcard Service Promotion Project, NTT Service Integration Laboratories.
He received the B.E and M.E. degrees in mechanical engineering from Osaka Prefecture University, Osaka in 1999 and 2001, respectively. He joined NTT in 2001. He is engaged in the development of NICE.

Shinichi Hirata
Smartcard Service Promotion Project, NTT Service Integration Laboratories.
He received the B.E. degree in mathematics from Hokkaido University, Hokkaido in 1990. He joined NTT in 1990. He is engaged in the development of NICE.

Junko Hashimoto
Smartcard Service Promotion Project, NTT Service Integration Laboratories.
She received the B.E. and M.E. degrees in information engineering from Kyushu University, Fukuoka in 1997 and 1999, respectively. She joined NTT in 1999. She is engaged in the development of NICE.

Takahiro Yamamoto
Smartcard Service Promotion Project, NTT Service Integration Laboratories.
He received the B.E. degree in electrical engineering and the M.E degree in information engineering from Nagoya University, Nagoya in 1987 and 1989, respectively. He joined NTT in 1989. He is engaged in the development of NICE.

Kenji Murai
Smartcard Service Promotion Project, NTT Service Integration Laboratories.
He received the B.A. degree from the Faculty of Environmental Information, Keio University, Kanagawa in 1995. He joined NTT in 1995. He is engaged in the development of NICE.

Sei Ijuin
Senior Research Engineer, Smartcard Service Promotion Project, NTT Service Integration Laboratories.
He received the B.E. and M.E. degrees in electrical engineering from Waseda University, Tokyo in 1977 and 1979, respectively. In 1979, he joined Nippon Telegraph and Telephone Public Corporation (now NTT), Tokyo, Japan. He is engaged in the development of NICE.