TECHNIQUE FOR MULTIPLE PRODUCT LOADING IN A NATIVE CARD DEVICE AND METHOD USING THE SAME

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to Korean Patent Application No. KR 10-2012-0050476 filed on May 11, 2012 and the contents of which are incorporated by reference in their entirety.

BACKGROUND

[0002] The present invention relates to a method of processing a transaction about a particular product issued to a computer-readable medium, a method of issuing a product by using a computer-readable medium, a computer-readable medium and a card reader for the same, and a card issuing device for issuing a product or service according to a request from a customer.

[0003] According to the related art, in order to use two or more desired card products, a customer should purchase native cards respectively having functions of the card products. FIG. 1 illustrates a process of purchasing a native card for transportation by a customer. Referring to FIG. 1, a product having a prepayment or post-payment function is designed and configured. The product design does not reflect the needs of individual customer. According to a decision of a service provider, the demand for the product may be previously determined so as to configure a card. Based on the configured product, the product having the prepayment or post-payment function is loaded on a transportation card or credit card to fabricate the card. The card may include a prepaid card, a post-payment card, a commutation card, a related-service card, and an associated-service card. The fabricated card is delivered to a card seller, and the card seller distributes the card

according to selection of the product by a customer. The product may be in a lower layer of an application having a hierarchical structure and stored in an internal memory unit of a check card, a credit card, a cash card, or a commutation card to perform a function of prepayment, post-payment, or commutation ticket.

[0004] Further, according to a structure of the card of the related art, only one product may be loaded. FIG. 2 illustrates a conventional configuration of a product loaded on a native card for transportation. Referring to FIG. 2, the card may have a hierarchical structure having a mater key and an individual product under a physical master file (MF). According to a type of payment of transportation fees, a prepayment product, a post-payment product, and a commutation product may be respectively loaded on cards 1 to 3. The MF may have all the items needed for processing data, and data that are hardly changed may be recorded therein. The master key may be used by a card issuing device and a reader, may have authority to manage a card layer of a card media, and may be used for reading or writing an application or product from/to the card.

[0005] Further, according to the related art, in the case where a user wants an additional product, there is a difficulty of newly fabricating a card. FIG. 3 illustrates a process of distributing a new product of the native card for transportation according to the related art. Referring to FIG. 3, a product issuing unit completes a product configuration through product design, and fabricates cards to supply the fabricated cards to a card issuing company. The card issuing company(i.e. issuer) may configure and issue a product according to the need. That is, in response to requests for new products from users or according to addition of new products, products may be additionally issued. Cards, on which the issued products are loaded, may be supplied to card sellers. The card sellers may distribute the product-loaded cards,

which are supplied from the card issuing company, to customers. The card sellers may discard existing user cards and may make new cards to supply the new cards to the card issuing company. The card sellers may provide feedback to the card issuing company, and the card issuing company may configure and issue a product again based on the feedback.

SUMMARY

[0006] A typical transportation card may be classified into a prepayment, post-payment, and commutation type product. To use the products, customers should separately get cards in which the products are respectively stored. Particularly, in order to use related services such as automatic charging, free pass, credit(e.g. minus card), and tourist ticket, an associated card should be purchased in addition to an existing card.

[0007] A native card for transportation, which is about three times cheaper than an open platform card for transportation, has been widely and continuously used. However, the native card for transportation cannot be modified after being issued. Due to the characteristics of the native card for transportation, an issuance of an additional product is not easy. Thus, customers experience inconvenience of carrying several cards.

[0008] The present invention provides a technology for flexibly providing services related to various products with one card.

[0009] According to the present invention, logical and physical structures of a conventional native card for transportation can be modified so that various products are stored in a native card for transportation and services related to the products are added or deleted to improve utilization of a native card for transportation and improve user convenience. In detail, a data structure of a transportation card is

classified into three layers, and permission setting and authentication management are independent for each layer so that the card has a multiple management structure. Particularly, utilization of the native card for transportation is maximized by providing a function of post-issuing of a product and service.

[0010] An aspect of the present invention relates to a technology for performing a process of a transaction of a particular product by using a computer-readable device including hierarchical data including a card layer of a first level, an application layer of a second level, and a product layer of a third level. To this end, the card layer includes a list of one more applications existing in the application layer, and each application may include a list of one or more products existing thereunder. A priority order may be assigned to each application and each product.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Exemplary embodiments can be understood in more detail from the following description taken in conjunction with the accompanying drawings, in which:

[0012] FIG. 1 illustrates a process of purchasing a native card for transportation by a customer according to the related art;

[0013] FIG. 2 illustrates a configuration of a product loaded on a native card for transportation according to the related art;

[0014] FIG. 3 is a diagram illustrating a process of distributing a new product of a native card for transportation according to the related art;

[0015] FIG. 4 is a diagram illustrating a hierarchical data structure in a native card for transportation according to an embodiment of the present invention;

[0016] FIG. 5 is a diagram illustrating a product management layer for a service operating company according to an embodiment of the present invention;

[0017] FIG. 6 is a diagram illustrating a process of issuing a card media by using a card media issuing device according to an embodiment of the present invention;

[0018] FIG. 7 is a diagram illustrating an internal structure of the native card for transportation generated by the process of FIG. 6, according to an embodiment of the present invention;

[0019] FIG. 8 is a diagram illustrating an example of an application generated in the environment file of FIG. 6, according to an embodiment of the present invention;

[0020] FIG. 9 is a diagram illustrating an internal state of a card media kept in a service providing company, according to an embodiment of the present invention;

[0021] FIG. 10 is a diagram illustrating an operation of the product issuing unit during a process of the card media issuing device, according to an embodiment of the present invention;

[0022] FIG. 11 is a diagram illustrating a hierarchy of the native card for transportation generated when the process of FIG. 10 is completed, according to an embodiment of the present invention;

[0023] FIG. 12 is a diagram illustrating a process of adding a new product to an already fabricated card;

[0024] FIG. 13 is a diagram illustrating an operation of the service processing unit of the product management unit, according to an embodiment of the present invention;

[0025] FIG. 14 is a diagram illustrating a new card distributing process of the service processing unit of FIG. 13 in terms of a view of a customer, according to an

embodiment of the present invention;

[0026] FIG. 15 is a diagram illustrating a process of adding a product and service by the service processing unit of FIG. 13;

[0027] FIG. 16 is a diagram illustrating a product management system according to an embodiment of the present invention;

[0028] FIG. 17 is a diagram illustrating an internal hierarchical structure of a smartcard according to an embodiment of the present invention;

[0029] FIG. 18A illustrates a structure of an APP(application) list according to an embodiment of the present invention;

[0030] FIG. 18B illustrates a structure of the APP list according to another embodiment of the present invention;

[0031] FIG. 18C illustrates a structure of a product list under APP 1 according to an embodiment of the present invention;

[0032] FIG. 18D illustrates a structure of a product list under APP 2 according to an embodiment of the present invention;

[0033] FIG. 19 is a diagram illustrating a process of issuing a card by a card issuing device; and

[0034] FIG. 20 is a diagram illustrating a transaction process performed by a card reader by reading information of the card.

DETAILED DESCRIPTION OF EMBODIMENTS

[0035] Hereinafter, specific embodiments will be described in detail with reference to the accompanying drawings. The present invention may, however, be embodied in different forms and should not be constructed as limited to the embodiments set forth herein. The terms used herein are just for describing the embodiments and are not for limiting the present invention.

[0036] FIG. 4 is a diagram illustrating a hierarchical data structure in a native card for transportation according to an embodiment of the present invention.

[0037] Referring to FIG. 4, in level 1 under (i.e., lower layer of) a master file (MF), information such as a master key, an application list, a transportation application, and other applications may exist. In level 2 under level 1, for example, a prepayment product, a post-payment product, and a commutation product may exist in a lower layer of the transportation application. Since one or more products may be added or deleted to/from one application according to a request from a card user, various products may be combined to be used. Further, a service connected to a product may be added thereto. A user may add a desired service to a corresponding product so as to link the desired service to a loaded product. Therefore, the user does not need to get an extra associated card in order to add a new service to an existing service.

[0038] Compared to this embodiment, a data structure of a conventional native card for transportation is predetermined and fixed, and thus a space of the conventional native card for transportation may not be reused. A native card for transportation is such designed as to be limited in service scope and to be used for a definite purpose. For example, there is a transportation card only for using a city bus of Seoul. On the contrary, an open platform card may store or delete various applications according to the need, and thus may maximize utilization of a memory. For example, as the open platform card, there is a card storing a post-payment product which can be used for a city bus of a metropolitan city, an intercity bus, a card-usable taxi, and subways of the whole country.

[0039] FIG. 5 is a diagram illustrating a product management layer for a service operating company according to an embodiment of the present invention.

[0040] Referring to FIG. 5, product management of the service operating company may be performed in a product management unit. The product management unit may include a card media issuing unit, a product issuing unit, and a service processing unit. The product issuing unit may design, configure, and issue a product according to a request from the user of the transportation card or in order to improve ease of use. The card media issuing unit may issue a card media according to a request from the product issuing unit. The card media may be previously issued by predicting the demand for the native card for transportation, or may be issued according to a request from the product issuing unit. When an individual customer or corporate customer requests acceptance of a product or service in order to use a card, or adds a product or service to a previously issued native card for transportation, the service processing unit requests corresponding operations from the product issuing unit. The service processing unit may also receive complains from card users to provide feedback to the product issuing unit.

[0041] FIG. 6 is a diagram illustrating a process of issuing a card media by using a card media issuing device according to an embodiment of the present invention.

[0042] Referring to FIG. 6, the card media issuing device may store a master key in the card media. The master key may have authority to manage a card hierarchy in order to issue data in the card hierarchy. The card media issuing device may store card information including a card number and an issue date into a lower layer structure of the MF, i.e., level 1, and may generate an environment file. The environment file may store an environment key and an application list indicating a list of and location information on applications currently loaded on the card. The application list may store the details of a plurality of applications and products

loaded so that internal information of the card may be externally referred to.

[0043] FIG. 7 is a diagram illustrating an internal structure of the native card for transportation generated by the process of FIG. 6, according to an embodiment of the present invention.

[0044] Referring to FIG. 7, the master key, card information, and environment file may exist in level 1 as a lower layer structure of the MF. The card information may relate to a magnetic strip and internal storage capacity of the card, and the environment file may store the application list. A communication environment and connection environment in which the card issuing device prepares the card, or a communication environment and connection environment in which a card reader reads content of the card may also be stored.

[0045] FIG. 8 is a diagram illustrating an example of an application generated in the environment file of FIG. 6, according to an embodiment of the present invention.

[0046] Referring to FIG. 8, when data of the card layer corresponding to level 1 are issued by the card media issuing unit, a process of issuing data related to a corresponding application is performed in an application layer. The card media issuing device stores a master key having authority to manage the application layer and application information such as an application ID and issue date into a lower layer structure of the application. Thereafter, a product list 43 indicating a product access address, a product inventory, and a product number loaded on a current application is generated.

[0047] FIG. 9 is a diagram illustrating an internal state of a card media kept in a service providing company, according to an embodiment of the present invention.

[0048] Referring to FIG. 9, the master key, card information, environment

file, and transportation application may exist in level 1 as a lower layer structure of the MF. The transportation application may be used for paying for a transportation fee during getting on or off a transportation means such as, for example, a bus or a subway. In level 2, for example, a master key 41, APP information 42, and a product list 43 may exist as a lower layer structure of the transportation application.

[0049] FIG. 10 is a diagram illustrating an operation of the product issuing unit during a process of the card media issuing device, according to an embodiment of the present invention.

[0050] Referring to FIGS. 10 and 11, when a request for product issuance from a customer is received through the service processing unit, the product issuing unit may configure information on issuance of a product to be added to a card possessed by the customer, and may perform a process of issuing data related to the product in level 3 which is a product layer.

[0051] The card media issuing device may store, for example, a master key having authority to manage the product layer into level 3 which is a lower layer structure of level 2. Further, product information such as a product ID and issue date may be stored in level 3, and a payment key and a charge key related to a transaction using the card may be stored therein. The payment key may be used for a reader to read the native card for transportation and pay for a transportation fee. The charge key may be read by the reader to charge the prepaid transportation card before the balance thereof becomes short or before a user uses the card. After the payment key and charge key are stored, a history file may be generated. The history file may indicate, for example, the details of a transaction of a product loaded on a corresponding card, or may indicate charged content of the card.

[0052] FIG. 11 is a diagram illustrating a hierarchy of the native card for

transportation generated when the process of FIG. 10 is completed, according to an embodiment of the present invention.

[0053] Referring to FIG. 11, the master key, card information, environment file, and transportation application may exist in level 1 as a lower layer structure of the MF. In level 2, for example, the master key, application information, product list, and prepayment product may exist as a lower layer structure of the transportation application. In level 3, for example, the master key, product information, payment key, charge key, and history file may exist as a lower layer structure of the prepayment product.

[0054] FIG. 12 is a diagram illustrating a process of adding a new product to an already fabricated card.

[0055] Referring to FIG. 12, the product issuing unit may access the application layer by reading the master key of level 2 which is a lower layer structure of the transportation application, and may add a post-payment product by performing a writing operation. When the post-payment product is added, information on the post-payment product, such as product content, product number, order of priority, and product access address, may be recorded on the application list. For example, card 4 indicates the already fabricated card, and card 5 indicates that the post-payment product of the transportation application of level 2 is added to card 4.

[0056] FIG. 13 is a diagram illustrating an operation of the service processing unit of the product management unit, according to an embodiment of the present invention.

[0057] Referring to FIG. 13, the product issuing unit may design a product and may fabricate a card. A transportation card to which the product is issued may be fabricated and provided to a card issuing company. The service processing unit

may request product issuance from the card issuing company in response to product requests from customers or in order to issue an additional product. The issued products are provided to a card seller and distributed to the customers.

[0058] FIG. 14 is a diagram illustrating a new card distributing process of the service processing unit of FIG. 13 in terms of a view of a customer, according to an embodiment of the present invention.

[0059] Referring to FIG. 14, for new issuance, the customer may request issuance of a native card for transportation from the service processing unit. The service processing unit may configure products according to information on requested products and may request issuance of the products from the product issuing unit. The card media issuing unit may issue a card media and may provide the card media to the product issuing unit. The product issuing unit requested to issue the products may, previously or in response to a request from the product issuing unit, issue the products by using the card media issued by the card media issuing unit. When the products are issued, the product management unit may be requested to register the issued products. When the issued products are registered, the service processing unit may be requested to prepare to sell the products. When the preparation is completed, the service processing unit may distribute the products to the customer requesting new issuance, and the customer may select a product according to the need.

[0060] FIG. 15 is a diagram illustrating a process of adding a product and service by the service processing unit.

[0061] Referring to FIG. 15, a customer may request additional issuance of a service or product from the service processing unit, and a native card for transportation of the user may be received by the service processing unit. The

service processing unit may transfer the card of the customer to the product issuing unit to additionally issue the product or service, and may request issuance of the additional product or service. The product issuing unit requested to issue the additional product or service may issue the additional product or service, and may request registration of the issued product from the product management unit. Further, when the issued product is registered, or at the same time when the issued product is registered, the service processing unit may be requested to prepare to distribute the product. When the preparation is completed, the service processing unit may distribute the product to the customer.

[0062] FIG. 16 is a diagram illustrating a product management system according to an embodiment of the present invention.

[0063] Referring to FIG. 16, the product management system may include a card media issuing unit, a product issuing unit, a service processing unit, and a product management unit. The card media issuing device may issue a card media, and may manage information on level 1 which is a card layer and on level 2 which is an application layer. The service processing unit may reflect demands of customers to design and configure a product, and may manage a history of product issuance. The service processing unit may manage a history of issuance requests from customers. The product management unit may configure a product, may plan supply thereof, and may determine to provide a service according to a demand of a customer.

[0064] FIG. 17 is a diagram illustrating an internal hierarchical structure of a computer-readable device according to an embodiment of the present invention. Herein, the computer-readable device may be provided in the form of a card 2.

[0065] The card 2 may include a card layer 30, an application (APP) layer 40, and a product layer 50. Herein, the card layer 30, APP layer 40, and product layer 50

may be referred to as layers of level 1, level 2, and level 3, respectively.

[0066] In the card layer 30 of level 1, a card layer master key 31 may be prepared when a card issuing device 1 (see FIG. 19) generates the card layer, and may be used for performing a process of recording or deleting an environment file 33, and card information 32 of the card layer 30. Since only the card issuing device 1 knows a value corresponding to the card layer master key 31, another device may be prevented from accessing the card and generating or reading a card layer. The card information 32 may store a version, memory information, issue date, and preparer of the card. The environment file 33 is for, for example, general setting of an environment of the card, and may store a configuration of a structure of the card layer, a configuration of communication with various media, and an APP list 34 (according to some embodiment, the APP list 34 may be stored in level 1 as separate data distinguished from the environment file 33). Particularly, the APP list 34 may store information including at least one of a list of APPs currently stored in the card, access addresses of respective APPs, an order of priority of APPs, a list of products, product numbers, an order of priority of the products, and access addresses of the products. When an APP or product is added or deleted, the information already stored in the APP list 34 may be changed to be updated.

[0067] The APP layer 40 of level 2 is a lower layer of the card layer 30, and may include one or more APPs. The APP may be used for a transportation, communication, electronic money, or ID card. In the APP layer 40, an APP layer master key 41 may be used for the card issuing device 1 to write or delete data to/from the APP layer, and may also be used for accessing the APP layer 40 and performing a read operation. However, since only a person having authority to access a corresponding APP knows a value corresponding to the APP layer master

key 41, an unauthorized another person may be prevented from generating an APP or performing a read operation by accessing the card. APP information 42 may include information such as an APP ID and issue date, and a product list 43 may include information such as an inventory of products, product numbers, an order of priority of the products, and access addresses of the products.

[0068] The product layer 50 of level 3 may include, for example, lower layer data such as a prepayment product, post-payment product, or commutation product included in a particular APP of the APP layer 40. A product layer master key 51 is used for the card issuing device 1 to record or delete data to/from the product layer 50. Only a person authorized to access a corresponding product knows a value of the product layer master key 51. Thus, an unauthorized another person may be prevented from generating the product layer 50 or performing a read operation. Product information 52 may include a product ID and issue date. A payment key 53 may be used, for example, while a card reader 3 performs a process for a transaction. A charge key 54 may be used, for example, for a charging terminal to charge the card so that a user deposits a desired amount of money as an advanced payment to use an APP for a function of a prepaid card. A history file 55 may store a history of money payment according to use of the card by the user, a history of charging for use, and a history of addition or deletion of a product or APP.

[0069] According to the structure illustrated in FIG. 17, a computer-readable medium according to an embodiment of the present invention may be provided. This medium may include data on the card layer 30 including the APP list 34 and card layer master key 31. The medium may also include data on the APP layer 40 including an APP instance (i.e. application dedicated file) for one or more APPs. Herein, each APP instance may include information on the product list 43 and APP

layer master key 41. Each APP may also include data on the product layer 50 including a product instance for one or more products. Herein, each product instance may include product-related data and data on the product layer master key 51 for generating the product-related data. In the above description, the APP layer 40 is a lower layer of the card layer 30, and the product layer 50 is a lower layer of the APP layer 40.

[0070] Further, according to the structure illustrated in FIG. 17, a computer-readable medium according to another embodiment of the present invention may be provided. A program, which operates a device for exchanging information with the card 2, may be recorded on this medium. This program may include an operation of determining an APP instance of the highest priority among a plurality of APP instances existing in the APP layer by using APP priority information recorded on the APP list 34. Further, this program may include an operation of determining a product of the highest priority among one or more products under the determined APP instance of the highest priority by using product priority information recorded on the product list 43 included in the determined APP instance of the highest priority. Further, this program may include an operation of performing a process of a transaction for the determined product of the highest priority.

[0071] FIG. 18A illustrates an exemplary structure of the APP list 34 according to an embodiment of the present invention.

[0072] Referring to FIG. 18A, the card 2 may store one or more APPs, wherein one or more products may be loaded on each of the APPs. Each APP may have an inventory of products, an order of priority, and an APP access address. A user of the card 2 may request prioritization of a plurality of APPs. The order of priority among the plurality of APPs may be used for the card reader 3 to select an

APP of the highest priority for performing a process of payment. For example, APP 1 may have an APP access address of 0x1E and the highest priority (priority 1).

[0073] FIG. 18B illustrates a structure of the APP list 34 according to another embodiment of the present invention.

[0074] Referring to Table 1 of FIG. 18B, the APP list 34 may include a plurality of inventories of products, an order of priority of the products, APP access addresses, and product access addresses. For example, while the card reader 3 performs a process of reading the card 2, information on a product of the highest priority and an access address thereof may be checked on the APP list 34 of the card layer 30. Therefore, an access time to a corresponding product of the APP layer 40 may be shortened. This reduction of access time may reduce congestion at a ticket gate of a subway or at a bus stop during rush hour. Further, for example, Table 1 indicates that an order of priority of a plurality of products included in APP 1 and APP 2, APP access addresses for the products, and product access addresses for the products are stored.

[0075] Referring to Table 2 of FIG. 18B, an order of priority of APPs and an order of priority of products existing under each APP are separately provided. The order of priority of APPs or products may be determined according to selection of a user, or according to an order of previously issuing the APPs or products by the card issuing device 1.

[0076] FIG. 18C illustrates a structure of the product list 43 under APP 1 according to an embodiment of the present invention.

[0077] Referring to FIG. 18C, the product list 43 may include an inventory of products, product numbers, an order of priority, and product access addresses. A plurality of products may be stored under APP 1, wherein a unique product access

address may be assigned to each product, and according to selection of a user, an order of priority of the products may be determined. For example, a prepayment product (product 1-1) may have a product access address of 0x35 and the highest priority (priority 1).

[0078] FIG. 18D illustrates a structure of the product list 43 under APP 2 according to an embodiment of the present invention.

[0079] Referring to FIG. 18D, as described above with reference to FIG. 18B, one or more of products may be stored under APP 2, wherein a unique product access address may be assigned to each product, and according to selection of a user, an order of priority of the products may be determined. For example, a post-payment product (product 2-2) may have a product access address of 0x80 and the second highest priority (priority 2).

[0080] FIG. 19 is a diagram illustrating a process of issuing the card 2 by the card issuing device 1.

[0081] Referring to FIG. 19, in order to issue the card 2, the card issuing device 1 may perform a process starting from operation P110, operation P120, or operation P130. However, in order to initially issue the card 2, the process may start from operation P110. The card issuing device 1 may be provided with an input/output device for a user of the card issuing device 1 in order to add a new APP or product according to a request from the user.

[0082] The card issuing device 1 may generate the APP list 34 in the card 2 in operation P111, wherein this operation may be performed via operation S11 in which an APP list generation signal is transmitted to the card 2. The APP list generation signal, for example, may include information on storage content and on a starting address of a memory in which the storage content is to be recorded so that

the card issuing device 1 generates the APP list 34 in an environment file of the card layer 30. The APP list 34 may be generated, for example, in the format of Table 1 or 2 of FIG. 18B. The APP list generation signal may be transmitted, for example, via local area network, wired/wireless communication, or radio communication. Herein, a frequency band may be applied, for example, according to an operating speed and performance and may include a band which does not interfere with an RF using a wireless communication network or a radio wave of another communication device.

[0083] When the APP list 34 is already generated in the card 2, the card issuing device 1 does not need to generate the APP list 34 again. Herein, the card issuing device 1 may add a new APP according to a request from a user. To this end, the card issuing device 1 may determine whether the request from the user is to add a new APP by checking the request in operation P121. According to an embodiment, a request for adding an APP may be made through the service processing unit, wherein the service processing unit may exist in the card issuing device 1 or may separately exist. In the case where the service processing unit exists separately from the card issuing device 1, the service processing unit may notify the card issuing device 1 of whether to add an APP according to the request from the user.

[0084] In the case of not adding a new APP, it may be checked whether to add a new product under a particular APP in operation P131. A request for adding a product may be made through the service processing unit, wherein the service processing unit may exist in the card issuing device 1 or may separately exist. In the case where the service processing unit exists separately from the card issuing device 1, the service processing unit may notify the card issuing device 1 of whether to add a product according to the request from the user.

[0085] In the case of adding a new APP, the card issuing device 1 may

generate a new APP instance including the product list 43 in the card 2 in operation P122. This operation may be performed via operation S12 in which a new APP instance generation signal is transmitted to the card 2 from the card issuing device 1. For example, the new APP instance generation signal may be for generating the APP layer master key 41, APP information 42, and product list 43 in the APP layer for the new APP.

[0086] When the new APP is generated, the APP list 34 existing in the card layer may be updated. Therefore, the card issuing device 1 may update the APP list 34 of the card 2 in operation P123, wherein this operation may be performed via operation S13 in which an APP list update signal is transmitted to the card 2. For example, the APP list update signal may be for the card media issuing unit 1 to add information on an access address and priority order of the newly generated APP onto the APP list 34 or to delete an existing APP instance, in the case where the new APP is added or an APP is deleted.

[0087] The card issuing device 1 may check whether the number of already generated APPs in the card 2 is two or more in operation P124. When the number of generated APPs is only one, the one APP has the highest priority. Further, when the number of generated APPs is only one, operation P121 may be performed again. Otherwise, when the number of generated APPs is two or more, operation P125 for updating APP priority order information may be performed. This operation may be performed via operation S14 in which an APP priority order update signal is transmitted to the card 2 from the card issuing device 1. For example, the APP priority order update signal may be for determining an order of priority of APPs selected to be used by a user from two or more APPs. For example, a T-money APP may be determined as priority 1, and an X-Money APP may be determined as

priority 2. After updating the APP priority order information, operation P121 may be performed again.

[0088] The card issuing device 1 may check whether the request is for adding a new product under an existing particular APP in operation P131. A request for adding a product may be made by a product issuance medium via the service processing unit, wherein the service processing unit may exist in the card issuing device 1 or may separately exist. In the case where the service processing unit exists separately from the card issuing device 1, the service processing unit may notify the product issuance medium of whether to add a product according to the request from the user. In the case of not adding a new product, the card issuing device 1 terminates the card issuing process in operation P136. In the case of adding a new product, the card issuing device 1 may generate a new product instance in the product layer of the card 2 in operation P132. This operation may be performed via operation S15 in which a new product instance generation signal is transmitted to the card 2 from the card issuing device 1. For example, the new product instance generation signal may be for generating the product layer master key 51, product information 52, payment key 53, charge key 54, and history file 55 of the product layer 50 according to addition of the new product.

[0089] The card issuing device 1 may update the product list 43 of the APP instance existing over the newly generated product in operation P133, wherein this operation may be performed via operation S16 in which a product list update signal is transmitted to the card 2 from the card issuing device 1. For example, the product list update signal may be for preparing and updating a product name, product number, order of priority, and access addresses for the new product on the product list 43 included in a particular APP instance of the APP layer 40. Or, the product list update

signal may be for writing a new product name for a product number, order of priority, and access address already generated by the card issuing device 1.

[0090] The card issuing device 1 may check whether the number of products is two or more in operation P134. When the number of products is one, the product has the highest priority, and operation P131 may be performed again. When the number of products is two or more, the card issuing device 1 may update the product priority order information in the card 2 in operation P135, wherein this operation may be performed via operation S17 in which a product priority order update signal is transmitted to the card 2 from the card issuing device 1. For example, the product priority order update signal may be for performing an update operation in order to determine an order of priority of products of the product list 43 of the APP layer 40 or products of the APP list 34 of the card layer 30 and product list 43 of the APP layer 40 according to a request from a user so as not to overlap an order of priority of already generated products, in the case of updating the product list 43 by determining an order of priority of a new product. If the order of priority of the new product does not overlap the order of priority of already generated products, operation P135 may be omitted.

[0091] The above-described operations may start from one of operations P110, P120, and P130. Therefore, in order to perform operation P131, operations P111 and P121 do not have to be performed. Further, in order to perform operation P131, operation P111 does not have to be performed.

[0092] The card issuing device 1 may transmit the APP list generation signal to the card 2 to generate the APP list 34 in the card 2 in operation S11. In the case where a new APP is added, the card issuing device 1 may transmit the new APP instance generation signal to the card 2 to generate a new APP instance in the card 2

in operation S12. The card issuing device 1 may transmit the APP list update signal to the card 2 to update the APP list 34 in operation S13. When the number of APPs is two or more, the card issuing device 1 may transmit the APP priority order update signal to the card 2 to update the APP priority order information of the card 2 in operations S14. Operations S13 and S14 may be combined as one operation to be performed. In the case where a new product is added, the card issuing device 1 may transmit the new product instance generation signal to the card 2 to generate the new product instance in operation S15. The card issuing device 1 may transmit the product list update signal to the card 2 to update the product list 43 of the card 2 in operation S16. When the number of products is two or more, the card issuing device 1 may transmit the product priority order update signal to the card 2 to update the product priority order information in operation S17.

[0093] According to the method described with reference to FIG. 19, a computer-readable program, in which a program for carrying out the product issuing method according to an embodiment of the present invention, may be provided. This program may enable the card issuing device 1 to perform an operation of generating the APP list 34 in the car layer 30 of the card 2, an operation of generating an instance related to an APP including the product list 43 in the APP layer 40 of the card 2, an operation of updating the APP list 34 by reflecting information on the APP of the card 2, an operation of generating an instance related to a product in the product layer 50 of the card 2, and an operation of updating the product list 43 by reflecting information on the product.

[0094] FIG. 20 is a diagram illustrating a transaction process performed by the card reader 3 by reading information of the card 2. The card reader 3 may not only read the card 2 but also change information recorded in the card 2 or record new

information therein.

[0095] Referring to FIG. 20, the card reader 3 may read the APP list 34 from the card 2 in operation P210, wherein this operation may be performed via operation S21 in which the card reader 3 receives content of the APP list 34 from the card 2. For example, the reading of the APP list 34 may be a process of reading at least one of the APP priority order, APP access address, product priority order, and product access address prepared on the APP list 34. The received APP list 34 may be temporarily stored in a memory of the card reader 3 for a process of a transaction of a product. The reading of the card 2 by the card reader 3 may be performed via a process of recognizing the card of a user by using periodic radio waves transmitted from the card reader 3.

[0096] The card reader 3 may determine an APP having the highest priority among a plurality of prestored APPs in operation P211. This is because the order of priority of APPs is needed to be predetermined so that the card reader 3 performs a process of a transaction of the product having the highest priority. For example, this operation may be performed by using the APP priority order information stored in the APP list 34. However, when the number of APPs stored in the card 2 is one, operation P211 may be omitted.

[0097] The card reader 3 may read the product list 43 of determined APP from the card 2 in operation P212, wherein this operation may be performed via operation S22 in which content of the product list 43 of determined APP is received from the card 2. The product list of determined APP may indicate an APP of the highest priority determined by the card reader 3 from a plurality of APPs, or may indicate an APP which is only one APP that exists.

[0098] The card reader 3 may determine a product of the highest priority

among a plurality of products stored in the determined APP in operation P213. For example, the determination of the product of the highest priority may be determination, by the card reader 3, of a product of the highest priority which exists in the APP of the highest priority in the APP list 34, or determination of a product of the highest priority in the product list 43 in the APP of the highest priority. However, if only one product exists in the determined APP, the product may be determined at the same time when the APP is determined, and thus process P213 may be omitted.

[0099] The card reader 3 may check whether a process of a transaction of the determined product can be performed in operation S214. The card reader 3 may perform a process of a transaction with respect to a product under the APP of the highest priority according to selection of a user. However, for example, in the case where a prepayment product is the product of the highest priority, an amount of charged money may be in sufficient, and thus the transaction process for the determined product may not be performed.

[00100] If the transaction process of the determined product can be performed, the card reader 3 may perform the transaction process of the determined product in operation P215, wherein this operation may be performed via operation S23 in which the card reader 3 transceives, to/from the card, an RF signal or the like by using a wireless communication network for the transaction process of the determined product. For example, the performance of the transaction process may be a process for receiving a fee from a user through the card reader 3 in the case where the card was used by a user according to a purpose of an APP or is to be used by the user. Further, the transaction process may be for payment for the user, or may be for payment for a plurality of persons including the user. After performing the transaction process, a process for a refund may be performed according to a request

from a user, or in the case where a transaction process of a product for a plurality of users is needed, a process for the plurality of users other than the user for which the transaction process has been performed may be performed.

[00101] When there is no request from a user or when a transaction process for a normally determined product has been performed, the card reader 3 may terminate the transaction process in operation P216.

[00102] When the card reader 3 cannot perform the transaction process of the product determined in the card 2, the card reader 3 may check whether the determined product is the last product registered in a lower layer of the determined APP in operation P217.

[00103] When the determined product is not the last product of the determined APP, the card reader 3 may determine a product of the second highest priority in operation P218. The card reader 3 may repeat operation P214 to check whether a transaction process can be performed for the product of the second highest priority.

[00104] When the determined product is the last product of the determined APP, the card reader 3 may check whether the determined APP is the last APP of the APP list 34 in operation P219.

[00105] When the determined APP is not the last APP of the APP list 34, the card reader 3 may determine an APP of the second highest priority in operation P220. Further, the card reader 3 may repeat operation P212 to read the product list 43 of the product of the second highest priority.

[00106] When the determined APP is the last APP of the APP list 34, there is no more product to be read from the card 2, and thus the card reader 3 may terminate the transaction process in operation P221.

[00107] The card reader 3 may receive the APP list 34 from the card 2 to read

the APP list 34 in operation S21. The card reader 3 may determine an APP of the highest priority among a plurality of products existing in an APP, and may receive content of the product list 43 of the determined APP from the card 2 to read the product list 43 of the determined APP in operation S22. The card reader 3 may determine a product of the highest priority of the determined APP, and when a transaction process of the determined product can be performed, the card reader 3 may transceive an RF signal or the like to/from the card 2 to perform the transaction process for the determined product in operation S23.

[00108] By using the method described with reference to FIG. 20, a transaction process performing method according to an embodiment of the present invention may be provided. This method may include operation P211 in which an APP of the highest priority among a plurality of APPs is determined by using the APP priority order information recorded in the card 2. Further, the method may include operation P213 in which a product of the highest priority among one or more products under the determined APP of the highest priority is determined by using product priority information recorded in the product list 43 included in the determined APP of the highest priority. Further, the method may include operation P215 in which a process of a transaction for the determined product of the highest priority is performed. In the case where the transaction process of the determined product of the highest priority cannot be performed in operation P214, the method may further include operation P218, in which a product of the second highest priority among one more products under the determined APP of the highest priority is determined by using the product priority order information recorded in the product list 43 included in the determined APP of the highest priority, and operation P215, in which a transaction process of the determined product of the second highest priority

is performed.

[00109] Further, the transaction process performing method according to an embodiment of the present invention may include operation P217 in which it is determined whether a transaction process can be performed for all the products under the determined APP of the highest priority. Further, when the transaction process for all the products cannot be performed, the method may further operation P220 in which an APP of the second highest priority among the one or more APPs is determined by using the APP priority order information recorded in the APP list. Herein, the method may include operation P213 in which a second product of the highest priority among one or more products under the determined APP of the second highest priority is determined by using the product priority information recorded in the product list 43 included in the determined APP of the second highest priority. Further, the method may further include operation P215 in which a process of a transaction for the determined second product of the highest priority is performed.

[00110] The present invention is not limited to the above-described embodiments.

[00111] In the present disclosure, a 'single APP instance' may be simply referred to as 'an APP', and a 'single product instance' may be simply referred to as 'a product'.

[00112] In the present disclosure, each of the card issuing device 1 and card reader 3 may be referred to as a terminal.

[00113] According to the embodiments of the present invention, a customer of a native card for transportation can be provided with various products and services of a service providing company by using one card. Further, since the same service can

be provided to an existing customer, customers can be provided with various types of transportation by using one native card for transportation.

[00114] Further, according to the embodiments of the present invention, the service providing company can configure a product according to a request from a customer using a native card for transportation instead of previously preparing and issuing transportation cards. Thus, the cost of storage and distribution can be reduced. Moreover, since card management information is not needed, the cost of management can be reduced.

[00115] Although the a technique for multiple product loading in a native card device and method using the same have been described with reference to the specific embodiments, it(they) is(are) not limited thereto. Therefore, it will be readily understood by those skilled in the art that various modifications and changes can be made thereto without departing from the spirit and scope of the present invention defined by the appended claims.

WHAT IS CLAIMED IS:

1. A method for performing a transaction process for a particular product issued to a hierarchical data-stored computer-readable medium comprising a card layer, an application layer comprising one or more applications under the card layer, and a product layer comprising one or more products under the application layer,

wherein the card layer comprises an application list related to the one or more applications, and an arbitrary application among the one or more applications comprises a product list related to a product under the arbitrary application, and

the method comprises:

determining an application of the highest priority among the one or more applications by using application priority order information recorded in the application list;

determining a product of the highest priority among one or more products under the determined application of the highest priority by using product priority order information recorded in a product list included in the determined application of the highest priority; and

performing a transaction process for the determined product of the highest priority.

2. The method of claim 1, in the case where the transaction process of the determined product of the highest priority is not performable, further comprising:

determining a product of the second highest priority among one more products under the determined application of the highest priority by using the product priority order information recorded in the product list included in the

determined application of the highest priority; and

performing a transaction process of the determined product of the second highest priority.

3. The method of claim 1, further comprising:

determining, with respect to all of the products under the determined application of the highest priority, whether a transaction process for each of the products is performable;

determining, in the case where none of transaction processes for each of the products is performable, an application of the second highest priority among the one or more applications by using the application priority order information recorded in the application list;

determining a second product of the highest priority among one or more products under the determined application of the second highest priority by using product priority order information recorded in a product list included in the determined application of the second highest priority; and

performing a transaction process for the determined second product of the highest priority.

4. A computer-readable medium in which data are recorded, the data comprising:

a data structure of a card layer comprising an application list and a card layer master key for generating the application list;

a data structure of an application layer comprising an instance for one or more applications, wherein the instance for the one or more applications comprises a

product list and an application layer master key for generating the product list; and

a data structure of a product layer comprising an instance for one or more products, wherein the instance for the one or more products comprises product-related data and a product layer master key for generating the product-related data,

wherein the application layer is a lower layer of the card layer, the product layer is a lower layer of the application layer, and

the computer performs, according to the data, a method comprising:

determining an application of the highest priority among the one or more applications by using application priority order information recorded in the application list;

determining a product of the highest priority among one or more products under the determined application of the highest priority by using product priority order information recorded in a product list included in an instance related to the determined application of the highest priority; and

performing a transaction process for the determined product of the highest priority.

5. The computer-readable medium of claim 4, wherein, in the case where the transaction process of the determined product of the highest priority is not performable,

the computer performs, according to the data, performs the method, the method further comprising:

determining a product of the second highest priority among one more products under the determined application of the highest priority by using the product priority order information recorded in the product list included in the

determined application of the highest priority; and

performing a transaction process of the determined product of the second highest priority.

6. A method for issuing a product to a computer-readable medium storing hierarchical data comprising a card layer, an application layer comprising one or more applications under the card layer, and a product layer comprising one or more products under the application layer, the method comprising:

generating, in the card layer, an application list;

generating, in the application layer, an instance related to a first application comprising a first product list;

updating the application list by reflecting information on the first application;

generating, in the product layer, an instance related to a first product; and

updating the first product list by reflecting information on the first product.

7. The method of claim 6, further comprising:

Generating, in the product layer, an instance related to a second product; and

updating the first product list by reflecting information on the second product, wherein information on a relative priority order of the first and second products is included in the first product list.

8. The method of claim 6, further comprising:

generating, in the application layer, an instance related to a second application comprising a second product list; and

updating the application list by reflecting information on the second

application, wherein information on a relative priority order of the first and second applications is included in the application list.

9. The method of claim 8, further comprising:

generating, in the product layer, an instance related to a third product; and

updating the second product list by reflecting information on the third product.

10. A terminal comprising a communication unit and a processing unit,

wherein the terminal is configured to perform

a transaction process for a particular product issued to a hierarchical data-stored computer-readable medium comprising a card layer, an application layer comprising one or more applications under the card layer, and a product layer comprising one or more products under the application layer,

wherein the card layer comprises an application list related to the one or more applications, and an arbitrary application among the one or more applications comprises a product list related to a product under the arbitrary application, and

the processing unit is configured to

receive, through the communication unit, application priority order information recorded in the application list,

determine an application of the highest priority among the one or more applications by using the application priority order information,

receive, through the communication unit, product priority order information recorded in a product list included in the determined application of the highest priority,

determine a product of the highest priority among one or more products under the determined application of the highest priority by using the product priority order information, and

transceive, through the communication unit, a signal for performing a transaction process for the determined product of the highest priority.

11. A terminal comprising a communication unit and a processing unit,

wherein the terminal is configured to issue a product by using a hierarchical data-storable computer-readable medium comprising a card layer, an application layer comprising one or more applications under the card layer, and a product layer comprising one or more products under the application layer,

and the processing unit is configured to

transmit, through the communication unit, a signal configured to generate an application list in the card layer,

transmit, through the communication unit, a signal configured to generate an instance related to a first application comprising a first product list in the application layer,

transmit, through the communication unit, a signal configured to update the application list by reflecting information on the first application,

transmit, through the communication unit, a signal configured to generate an instance related to the first product in the product layer, and

transmit, through the communication unit, a signal configured to update the first product list by reflecting information on the first product.