DESCRIPTION

Title of Invention

BAGGAGE CHECKING SYSTEM AND BAGGAGE MANAGEMENT METHOD

Technical Field

[0001] The present disclosure relates to a luggage storage system and a luggage management method.

Background Art

[0002] Patent Literature 1 discloses a locker including a structure including a plurality of reception portions for receiving articles, and a housing that stores the structure. The structure is configured to be freely put in and taken out of the housing and is configured to be freely movable. According to this locker, it is possible to move luggage stored in one locker to another locker.

Citation List

Patent Literature

[0003] [Patent Literature 1] Japanese Unexamined Patent Publication No. 2015-219629

Summary of Invention

Technical Problem

[0004] An object of the disclosure is to provide a luggage storage system effective for improving the convenience of a luggage storage service.

Solution to Problem

[0005] A luggage storage system according to an aspect of the

disclosure is a luggage storage system including: a tag attached to a luggage; a plurality of storage spot terminals installed in a plurality of storage spots including a movable spot; a database that stores information on stored luggage; a first registration module that acquires identification information of the tag and identification information of a user from a mobile terminal that has read the identification information of the tag attached to the luggage at the time of depositing the luggage and registers the identification information of the tag and the identification information of the user in the database in association with each other; a second registration module that acquires the identification information of the tag and identification information of the storage spot from the storage spot terminal that has read the identification information of the tag and registers the identification information of the tag and the identification information of the storage spot in the database in association with each other; and a return determination module that acquires the identification information of the tag and the identification information of the user from the mobile terminal that has read the tag at the time of receipt of the luggage and determines whether or not the luggage may be returned based on whether or not the identification information of the tag and the identification information of the user are associated with each other in the database.

[0006] A luggage management method according to another aspect of the disclosure is a method that is executed by a server for management of stored luggage, the method including: acquiring identification information of a tag attached to a luggage and identification information of a user from a mobile terminal that has read the identification

information of the tag at the time of depositing the luggage and registering the identification information of the tag and the identification information of the user in a database in association with each other; acquiring the identification information of the tag and identification information of a storage spot from a storage spot terminal that has read the identification information of the tag and registering the identification information of the tag and the identification information of the storage spot in the database in association with each other; and acquiring the identification information of the tag and the identification information of the user from the mobile terminal that has read the tag at the time of receipt of the luggage and determining whether or not to return the luggage is possible based on whether or not the identification information of the tag and the identification information of the user are associated in the database.

Advantageous Effects of Invention

[0007] According to this disclosure, it is possible to provide a luggage storage system effective for improvement of the convenience of a luggage storage service.

Brief Description of Drawings

[0008] FIG. 1 is a schematic diagram illustrating a configuration of a luggage storage system.

FIG. 2 is a block diagram illustrating a functional configuration of a server.

FIG. 3 is a table illustrating storage content of a stored luggage database.

FIG. 4 is a table illustrating storage content of a spot position

database.

FIG. 5 is a hardware configuration diagram illustrating a server, a storage spot terminal, and a mobile terminal.

FIG. 6 is a flowchart illustrating an information presentation procedure for a deposit candidate spot.

FIG. 7 is a flowchart illustrating a registration procedure for deposited luggage.

FIG. 8 is a flowchart illustrating a procedure for updating position information of storage spots.

FIG. 9 is a flowchart illustrating a procedure for changing a storage spot.

FIG. 10 is a flowchart illustrating a procedure for presenting information on a current position of luggage.

FIG. 11 is a flowchart illustrating a procedure for changing a user associated with stored luggage.

FIG. 12 is a flowchart illustrating a procedure for setting a storage spot for receipt luggage.

FIG. 13 is a flowchart illustrating a procedure for setting a storage spot for receipt luggage.

FIG. 14 is a flowchart illustrating a return process procedure for stored luggage.

Description of Embodiments

[0009] Hereinafter, embodiments will be described in detail with reference to the drawings. In the description, the same elements or elements having the same function are denoted by the same reference numerals, and redundant description will be omitted.

[0010] [Luggage Storage System]

A luggage storage system 1 illustrated in FIG. 1 is a system that provides a temporary luggage storage service to users who desire to reduce a burden of carrying luggage, such as travelers, shoppers, or guests of amusement facilities (for example, theme parks). More specifically, the luggage storage system 1 provides a service of receiving luggage from a user at any one of a plurality of storage spots registered in advance and performing return of the luggage to the user at any one of the plurality of storage spots. The luggage storage system 1 includes a tag 2 to be attached to luggage 4, a plurality of storage spot terminals 200 installed at a plurality of storage spots 3, and a server 100.

[0011] The tag 2 holds identification information in a format that can be read by a mobile terminal 300 of a user of the luggage storage system 1, and can be attached to or detached from the luggage 4. Specific examples of the tag 2 include an IC tag that holds identification information as electronic data, a marker that holds identification information as image information such as a two-dimensional bar code, and a magnetic chip that holds identification information as magnetic data.

[0012] The mobile terminal 300 may be of any type as long as the mobile terminal is capable of wired or wireless network communication. Specific examples of the mobile terminal 300 include a laptop computer, a tablet computer, and a smartphone. The mobile terminal 300 includes an application for the user of the luggage storage system 1. The application may be a general-purpose network browser or a dedicated application installed for the luggage storage system 1.

[0013] The storage spots 3 are spots having a space capable of accommodating the luggage 4. The plurality of storage spots 3 include movable spots 3A. A movable spot means a spot that can be moved by the power of the movable spot. A specific example of the movable spot 3A may include a vehicle such as a truck. The movable spot 3A may be a flying body such as a drone. The plurality of storage spots 3 may include a fixed spot 3B, in addition to the movable spot 3A. A specific example of the fixed spot 3B may include a predetermined space in a building such as a store.

[0014] The storage spot terminal 200 is a communication terminal installed in the storage spot 3. The storage spot terminal 200 may be of any type as long as the storage spot terminal can perform wired or wireless network communication. Specific examples of the storage spot terminal 200 may include a desktop computer, a laptop computer, a tablet computer, and a smartphone. The storage spot terminal 200 includes an application for an administrator of the storage spot 3. The application may be a general-purpose network browser or a dedicated application installed for the luggage storage system 1.

[0015] The server 100 is connected to the storage spot terminal 200 and the mobile terminal 300 via a network 5 (for example, the Internet), and performs information processing for providing the luggage storage service. For example, the server 100 is configured to acquire the identification information of the tag 2 and the identification information of the user from the mobile terminal 300 that has read the identification information of the tag 2 attached to the luggage 4 at the time of depositing the luggage 4 and register the identification information of

the tag 2 and the identification information of the user in the database in association with each other, to acquire the identification information of the tag 2 and the identification information of the storage spot 3 from the storage spot terminal 200 that has read the identification information of the tag 2 and register the identification information of the tag 2 and the identification information of the storage spot 3 in the database in association with each other, and to acquire the identification information of the tag 2 and the identification information of the user from the mobile terminal 300 that has read the tag 2 at the time of receipt of the luggage 4 and determine whether or not to return the luggage 4 based on whether or not the identification information of the tag 2 and the identification information of the user are associated in the database.

[0016] FIG. 2 is a block diagram illustrating a functional configuration of the server 100. As illustrated in FIG. 2, the server 100 includes a luggage database 111, a spot position database 112, a first registration module 113, a second registration module 114, a spot position updating module 115, a deposit candidate presentation module 116, a status notification module 117, a receipt candidate presentation module 118, a transport route setting module 119, a receipt time notification module 121, a transport command module 125, a return determination module 122, a fee calculation module 123, and a return processing module 124 as functional components (hereinafter referred to as "functional modules").

[0017] The luggage database 111 stores information on the luggage 4 that is a storage target. For example, the luggage database 111 stores the identification information (tag ID) of the tag 2 attached to the

luggage 4, an identification code (user ID) of the user of the storage service of the luggage 4, an identification code (spot ID) of the storage spot 3 of the luggage 4, a storage start time of the luggage 4 in the storage spot 3, a storage end time of the luggage 4 in the storage spot 3, and a completion flag of the storage service of the luggage 4 in association with each other, as illustrated in FIG. 3. The completion flag is a flag indicating whether or not the luggage 4 is being stored. In FIG. 3, the completion flag of 1 indicates that the storage has ended, and the completion flag of 0 indicates that the storage is under way.

[0018] The spot position database 112 stores position information of the storage spot 3. For example, the spot position database 112 stores date and time and position information (for example, latitude and longitude) of each storage spot 3 in association with each other, as illustrated in FIG. 4.

[0019] Referring back to FIG. 2, the first registration module 113 acquires the identification information of the tag 2 and the identification information of the user from the mobile terminal 300 that has read the identification information of the tag 2 attached to the luggage 4 at the time of depositing the luggage 4 and registers the identification information of the tag 2 and the identification information of the user in the luggage database 111 in association with each other. The first registration module 113 also changes the identification information of the user in the luggage database 111 according to an input from the mobile terminal 300 after starting the storage of the luggage 4 and before return of the luggage 4. The second registration module 114 acquires the identification information of the tag 2 and the identification

information of the storage spot 3 from the storage spot terminal 200 that has read the identification information of the tag 2, and registers the identification information of the tag 2 and the identification information of the storage spot 3 in the luggage database 111 in association with each other.

[0020] The spot position updating module 115 repeats a process of acquiring current position information of each storage spot 3 from the storage spot terminal 200 and writing the current position information to the spot position database 112, at regular periods.

[0021] The deposit candidate presentation module 116 acquires current position information of the mobile terminal 300 from the mobile terminal 300 and transmits the current position information of the storage spot 3 in a first reference area including a position indicated by the current position information of the mobile terminal 300 to the mobile terminal 300. The status notification module 117 acquires a request for transmission of current position information of the tag 2 from the mobile terminal 300, acquires the identification information of the current storage spot 3 associated with the identification information of the tag 2 from the luggage database 111, and transmits the current position information of the storage spot 3 to the mobile terminal 300. The receipt candidate presentation module 118 acquires desired position information for receipt of the luggage 4 from the mobile terminal 300 and transmits the current position information of the storage spot 3 in a predetermined area including the position indicated by the desired position information to the mobile terminal 300.

[0022] The transport route setting module 119 acquires a designation of

the storage spot 3 for receipt of the luggage 4 from the mobile terminal 300, acquires the identification information of the current storage spot 3 associated with the identification information of the tag 2 attached to the luggage 4 from the luggage database 111, and sets a transport route of the luggage 4 from the current storage spot 3 to a storage spot 3 for receipt. The receipt time notification module 121 calculates a time at which the luggage 4 may be received in the storage spot 3 for receipt. The transport command module 125 transmits a command to transport and reload the luggage 4 to the storage spot terminal 200 of each storage spot 3 included in the transport route set by the transport route setting module 119.

[0023] The return determination module 122 acquires the identification information of the tag 2 and the identification information of the user from the mobile terminal 300 that has read the tag at the time of receipt of the luggage and determines whether or not to return the luggage 4 based on whether or not the identification information of the tag 2 and the identification information of the user are associated with each other in the luggage database 111. The fee calculation module 123 calculates an elapsed time from a deposit time to a receipt time of the luggage 4 and a movement distance from the deposit time to the receipt time of the luggage 4, and calculates a use fee of the luggage storage service based on the elapsed time and the movement distance. It should be noted that the fee calculation module 123 may calculate the use fee based on any one of the elapsed time and the movement distance. The return processing module 124 updates the content of the luggage database 111 according to the return of the luggage 4. For

example, the return processing module 124 acquires a request for update of the luggage database 111 from the storage spot terminal 200 of the storage spot 3 which has completed the return of the luggage 4, and changes the completion flag of the luggage 4 in the storage spot 3 to 1.

[0024] FIG. 5 is a diagram illustrating a hardware configuration of the server 100, the storage spot terminal 200, and the mobile terminal 300. As illustrated in FIG. 5, the server 100 includes circuitry 190. The circuitry 190 includes a processor 191, a memory 192, a storage 193, and a network adapter 194. The processor 191 executes information processing for providing the luggage storage service. The processor 191 may be packaged as one electronic component or may include a plurality of separately packaged electronic components. The storage 193 is, for example, a storage medium such as at least one hard disk or a nonvolatile memory, and stores a program and data for providing the luggage storage service. The memory 192 is, for example, a random access memory, and temporarily stores data for information processing of the processor 191. The network adapter 194 is connected to the network 5 in a wired or wireless manner, and performs input and output of information with the network 5 in response to a command from the processor 191.

[0025] The storage spot terminal 200 includes circuitry 290. The circuitry 290 includes a processor 291, a memory 292, a storage 293, a tag reader 294, a GPS sensor 295, and a network adapter 296. The processor 291 cooperates with the server 100 to execute information processing for managing the luggage 4. The processor 291 may be packaged as one electronic component or may include a plurality of

separately packaged electronic components. The storage 293 is, for example, a storage medium such as at least one hard disk or nonvolatile memory, and stores data and a program including the application for an administrator described above. The memory 292 is, for example, a random access memory, and temporarily stores data for information processing of the processor 291. The tag reader 294 reads the identification information held by the tag 2. Specific examples of the tag reader 294 may include an IC tag reader, a camera, and a magnetic reader. The GPS sensor 295 receives a satellite signal for a global positioning system (GPS). The network adapter 296 is connected to the network 5 in a wired or wireless manner, and performs input and output of information to and from the network 5 in response to a command from the processor 291.

[0026] The mobile terminal 300 has circuitry 390. The circuitry 390 includes a processor 391, a memory 392, a storage 393, a tag reader 394, a GPS sensor 395, and a network adapter 396. The processor 391 executes information processing for using the luggage storage service. The processor 391 may be packaged as one electronic component or may include a plurality of separately packaged electronic components. The storage 393 is, for example, a storage medium such as at least one hard disk or nonvolatile memory, and stores a program including the application for a user described above and data. The memory 392 is, for example, a random access memory, and temporarily stores data for information processing of the processor 391. The tag reader 394 reads the identification information held by the tag 2. Specific examples of the tag reader 394 may include an IC tag reader, a camera, and a

magnetic reader. The GPS sensor 395 receives the satellite signal for a GPS. The network adapter 396 is connected to the network 5 in a wired or wireless manner, and performs input and output of information to and from the network 5 in response to a command from the processor 391.

[0027] [Method of Providing Luggage Storage Service]

Subsequently, a method of providing a luggage storage service that is executed using the luggage storage system 1 will be illustrated. The method of providing the luggage storage service includes a luggage management method that is executed by the server 100. The luggage management method includes acquiring the identification information of the tag 2 and the identification information of the user from the mobile terminal 300 that has read the identification information of the tag 2 attached to the luggage 4 at the time of depositing the luggage 4 and registering the identification information of the tag 2 and the identification information of the user in the luggage database 111 in association with each other; acquiring the identification information of the tag 2 and the identification information of the storage spot 3 from the storage spot terminal 200 that has read the identification information of the tag 2, and registering the identification information of the tag 2 and the identification information of the storage spot 3 in the luggage database 111 in association with each other; and acquiring the identification information of the tag 2 and the identification information of the user from the mobile terminal 300 that has read the tag 2 at the time of receipt of the luggage 4 and determining whether or not to return the luggage 4 based on whether or not the identification

information of the tag 2 and the identification information of the user are associated with each other in the luggage database 111.

[0028] As an example, the method of providing the luggage storage service includes an information presentation procedure for a storage candidate spot, a procedure for registering deposited luggage, a procedure for updating position information of a storage spot, a procedure for changing the storage spot, an information presentation procedure for a current position of the luggage, a procedure for changing a user associated with the deposited luggage, a procedure of setting the storage spot for receipt, and a return process procedure for the deposited luggage. Each procedure will be illustrated in detail below.

[0029] (Information Presentation Procedure for Deposit Candidate Spot)

As illustrated in FIG. 6, the server 100 sequentially executes steps S01, S02, S03, and S04. In step S01, the deposit candidate presentation module 116 waits for the mobile terminal 300 to request presentation of candidate spots for deposit. In step S02, the deposit candidate presentation module 116 acquires the current position information of the mobile terminal 300 and the information on the first reference area including the position indicated by the current position information from the mobile terminal 300. For example, when the mobile terminal 300 is displaying a map of an area including the current position of the mobile terminal 300, the deposit candidate presentation module 116 acquires information defining the area displayed by the map as information on the first reference area. In step S03, the deposit

candidate presentation module 116 extracts the storage spot 3 in the first reference area based on the latest position information stored in the spot position database 112.

[0030] In step S04, the deposit candidate presentation module 116 transmits the current position information of all storage spots 3 (hereinafter referred to as "candidate spots") extracted in step S03 to the mobile terminal 300. It should be noted that the current position information need not be exactly the current information, but may be information in the past rather than a current time in a range in which the information can be regarded as substantially the same as the current information. The same also applies to the following. The range in which the information can be regarded as substantially the same as the current information means such a range that the user cannot recognize a difference. Therefore, the deposit candidate presentation module 116 may transmit the latest position information of the spot position database 112 to the mobile terminal 300 as the current position information of the candidate spot or may acquire the current position information from the storage spot terminal 200 of the candidate spot and transmit the current position information to the mobile terminal 300. The mobile terminal 300 that has received the current position information of all the candidate spots, for example, displays a mark of the candidate spot on the map. Then, the information presentation procedure of the deposit candidate spots is completed. The server 100 repeatedly executes this procedure.

[0031] (Procedure for Registering Deposited Luggage)

As illustrated in FIG. 7, the server 100 sequentially executes

steps S11, S12, and S13. In step S11, the first registration module 113 waits for registration of the deposited luggage 4 to be requested from the mobile terminal 300. In step S12, the first registration module 113 acquires the identification information of the tag 2 and the identification information of the user from the mobile terminal 300 that has read the identification information of the tag 2 attached to the deposited luggage 4. The identification information of the user is identification information of a user who is qualified for receipt of the luggage 4. For example, the identification information of the user may be identification information of a user who logs in to an application of the mobile terminal 300 or may be identification information of a user designated by an operator on the application of the mobile terminal 300. When the owner of the mobile terminal 300 is specified, the identification information of the user may be identification information of the mobile terminal 300 itself. In step S13, the first registration module 113 registers the identification information of the tag 2 and the identification information of the user acquired in step S12 in the luggage database 111 in association with each other.

[0032] Next, the server 100 executes steps S14, S15 and S16 in order. In step S14, the second registration module 114 waits for registration of the storage spot 3 for the deposited luggage 4 to be requested from the storage spot terminal 200. In step S15, the second registration module 114 acquires the identification information of the tag 2 and the identification information of the storage spot 3 from the storage spot terminal 200 that has read the identification information of the tag 2 attached to the deposited luggage 4. The identification information of

the storage spot 3 may be identification information of an administrator who logs in to an application of the storage spot terminal 200 or identification information of the storage spot terminal 200 itself. In step S16, the second registration module 114 registers the identification information of the tag 2 and the identification information of the storage spot 3 acquired in step S15 in the luggage database 111 in association with each other. For example, the second registration module 114 adds the identification information of the storage spot 3 acquired in step S15 to the combination of the identification information of the tag 2 and the identification information of the user registered in step S13. Then, the registration procedure for the deposited luggage 4 is completed. The server 100 repeatedly executes this procedure.

[0033] (Procedure for Updating Position Information of Depositing Spot)

As illustrated in FIG. 8, the server 100 first executes step S21. In step S21, the spot position updating module 115 confirms whether or not the storage spot terminal 200 of the storage spot 3 of which the position information is to be updated (hereinafter referred to as a "target spot") is online (whether or not the storage spot terminal 200 is connected to the network 5).

[0034] When it is determined in step S21 that the storage spot terminal 200 is online, the server 100 executes steps S22 and S23 in order. In step S22, the spot position updating module 115 acquires the current position information of the target spot from the storage spot terminal 200. In step S23, the spot position updating module 115 records a current date and time and the current position information of the target

spot in the spot position database 112 in association with each other.

[0035] Next, the server 100 executes step S24. When it is determined in step S21 that the storage spot terminal 200 is offline (is not connected to the network 5), the server 100 executes step S24 without executing steps S22 and S23. In step S24, the spot position updating module 115 determines whether or not confirmation of the current position information of all the storage spots 3 has been completed.

[0036] When it is determined in step S24 that the storage spots 3 of which the current position information is not confirmed remains, the server 100 executes step S25. In step S25, the spot position updating module 115 changes the target spot. For example, the spot position updating module 115 selects any storage spot 3 of which the current position information is not confirmed, and sets the storage spot 3 as the next target spot. Thereafter, the server 100 returns to the process of step S21. Thereafter, the change of the target spot and the acquisition of the current position information of the target spot are repeated until confirmation of the current position information of all storage spots 3 is completed.

[0037] When it is determined in step S24 that confirmation of the current position information of all the storage spots 3 has been completed, the server 100 completes updating the position information of the storage spots 3. The server 100 repeatedly executes the above procedure at regular periods. Accordingly, the current position information of each storage spot 3 is updated at regular periods.

[0038] (Procedure for Changing Storage Spot)

As illustrated in FIG. 9, the server 100 executes steps S31, S32,

and S33 in order. In step S31, the second registration module 114 waits for a change of the storage spot 3 to be requested from a storage spot terminal 200 of a storage spot 3 (hereinafter referred to as a "new spot") that takes over the stored luggage 4 from another storage spot 3 (hereinafter referred to as an "old spot"). In step S32, the second registration module 114 acquires the identification information of the tag 2 and the identification information of the new spot from the storage spot terminal 200 of the new spot that has read the identification information of the tag 2 attached to the stored luggage 4. In step S33, the second registration module 114 registers the identification information of the tag 2 and the identification information of the takeover spot acquired in step S32 in the luggage database 111 in association with each other. For example, the second registration module 114 changes combination data of the identification information of the tag 2, the identification information of the user, and the identification information of the old spot from a storing state (a state in which the completion flag is 0) to a returned state (a state in which the completion flag is 1), and newly registers combination data of the identification information of the tag 2, the identification information of the user, and the identification information of the new spot in the storing state. Then, the procedure of changing the storage spot 3 is completed. The server 100 repeatedly executes this procedure.

[0039] (Information Presentation Procedure for Current Position of Luggage)

As illustrated in FIG. 10, the server 100 sequentially executes steps S41, S42, and S43. In step S41, the status notification module

117 waits for the mobile terminal 300 to request presentation of the current position information of the luggage 4. In step S42, the status notification module 117 acquires the identification information of the tag 2 attached to the luggage 4 that is a current position information presentation target and the identification information of the user from the mobile terminal 300. In step S43, the status notification module 117 confirms whether or not the identification information of the tag 2 and the identification information of the user acquired in step S42 are associated with each other in the luggage database 111. The identification information of the tag 2 and the identification information of the user being associated with each other in the luggage database 111 means that combination data of the identification information of the tag 2 and the identification information of the user is stored in the luggage database 111 in the storing state (a state in which the completion flag is 0). In step S43, when it is determined that the identification information of the tag 2 and the identification information of the user are not associated with each other in the luggage database 111, the server 100 returns to the process of step S41.

[0040] When it is determined in step S43 that the identification information of the tag 2 and the identification information of the user are associated with each other in the luggage database 111, the server 100 executes steps S44, S45, and S46 in order. In step S44, the status notification module 117 acquires the identification information of the storage spot 3 in which the luggage 4 that is a current position information presentation target is being stored (hereinafter referred to as a “storing spot”) from the luggage database 111. For example, the

status notification module 117 acquires identification information of the storing spot from the data in the storing state (the state in which the completion flag is 0) among a combination of data of the identification information of the tag 2 attached to the luggage 4 and the identification information of the user. In step S45, the status notification module 117 acquires the current position information of the storing spot from the spot position database 112. For example, the status notification module 117 acquires the latest position information associated with the storing spot in the spot position database 112. It should be noted that the status notification module 117 may acquire the current position information of the storing spot from the storage spot terminal 200 of the storing spot. In step S46, the status notification module 117 transmits the current position information of the depositing spot to the mobile terminal 300. Then, the information presentation procedure for the current position of the luggage is completed. The server 100 repeatedly executes this procedure.

[0041] (Procedure for Changing User Associated with Stored Luggage)

As illustrated in FIG. 11, the server 100 sequentially executes steps S51, S52, and S53. In step S51, the first registration module 113 waits for change of the user associated with the stored luggage 4 (the user associated with the tag 2 attached to the luggage 4) to be requested from the mobile terminal 300. In step S52, the storage candidate presentation module 116 acquires the identification information of the tag 2 attached to the luggage 4 that is a user change target (hereinafter referred to as a "change target tag 2") and the identification information of the user (a user before the change) from the mobile terminal 300. In

step S53, the first registration module 113 confirms whether or not the identification information of the tag 2 and the identification information of the user acquired in step S52 are associated with each other in the luggage database 111. When it is determined in step S53 that the identification information of the tag 2 and the identification information of the user are not associated with each other in the luggage database 111, the server 100 returns to the process of step S51.

[0042] When it is determined in step S53 that the identification information of the tag 2 and the identification information of the user are associated with each other in the luggage database 111, the server 100 executes steps S54 and S55 in order. In step S54, the first registration module 113 acquires identification information of a new user from the mobile terminal 300. In step S55, the first registration module 113 updates the identification information of the user associated with the tag 2 that is a change target in the luggage database 111 with the identification information of the new user. For example, the first registration module 113 overwrites the identification information of the user included in the data in the storing state (the state in which the completion flag is 0) among the data including the identification information of the tag 2 that is a change target with the identification information of the new user. Then, the user change procedure is completed. The server 100 repeatedly executes this procedure.

[0043] (Procedure for Setting Storage Spot for Receipt)

As illustrated in FIG. 12, the server 100 sequentially executes steps S61, S62, and S63. In step S61, the receipt candidate presentation module 118 waits for a presentation of candidate spots for

receipt to be requested from the mobile terminal 300. In step S62, the receipt candidate presentation module 118 acquires the identification information of the tag 2 attached to the luggage 4 that is a receipt target (hereinafter referred to as "receipt target tag 2") and the identification information of the user from the mobile terminal 300. In step S63, the receipt candidate presentation module 118 confirms whether or not the identification information of the tag 2 and the identification information of the user acquired in step S62 are associated with each other in the luggage database 111. In step S63, when it is determined that the identification information of the tag 2 and the identification information of the user are not associated with each other in the luggage database 111, the server 100 returns to the process of step S61.

[0044] When it is determined in step S63 that the identification information of the tag 2 and the identification information of the user are associated with each other in the luggage database 111, the server 100 executes steps S64, S65, and S66 in order. In step S64, the receipt candidate presentation module 118 acquires the desired position information for the receipt of the luggage 4 and information on a second reference area including a position indicated by the desired position information from the mobile terminal 300. For example, when the mobile terminal 300 displays a map of an area including a desired position for receipt of the luggage 4, the receipt candidate presentation module 118 acquires information defining the area displayed by the map as the information on a second reference area. In step S65, the receipt candidate presentation module 118 extracts the storage spot 3 in the second reference area based on the latest position information stored in

the spot position database 112. In step S66, the receipt candidate presentation module 118 transmits the current position information of all storage spots 3 (hereinafter referred to as "candidate spots") extracted in step S65 to the mobile terminal 300. The receipt candidate presentation module 118 may transmit the latest position information of the spot position database 112 to the mobile terminal 300 as the current position information of the candidate spot or may acquire the current position information from the storage spot terminal 200 of the candidate spot and transmit the current position information to the mobile terminal 300. The mobile terminal 300 that has received the current position information of all the candidate spots, for example, displays a mark of the candidate spot on the map.

[0045] As illustrated in FIG. 13, the server 100 sequentially executes steps S67, S68, and S69. In step S67, the receipt candidate presentation module 118 acquires a designation of the storage spot 3 for receipt of the luggage 4 (hereinafter referred to as a "spot for receipt") and a desired receipt time from the mobile terminal 300. In step S68, the receipt candidate presentation module 118 acquires the identification information of the storage spot 3 in which the luggage 4 that is a receipt target is being stored (hereinafter referred to as a "storing spot") from the luggage database 111. In step S69, the receipt candidate presentation module 118 acquires the current position information of the storing spot from the spot position database 112.

[0046] Next, the server 100 executes steps S71, S72, and S73 in order. In step S71, the transport route setting module 119 sets a transport route of the luggage 4 from the storing spot to the spot for receipt. The

transport route includes a position at which the luggage 4 is reloaded between the storage spots 3 and a route on which each storage spot 3 moves the luggage 4. In step S72, the receipt time notification module 121 calculates a time at which the luggage 4 may be received in the spot for receipt based on the transport route set in step S71 (hereinafter referred to as a "set transport route"). In step S73, the receipt time notification module 121 transmits information on the time at which the luggage 4 may be received, which is calculated in step S72, to the mobile terminal 300.

[0047] Next, the server 100 executes step S74. In step S74, the transport route setting module 119 confirms whether or not decision of the set transport route is requested from the mobile terminal 300. In step S74, when it is determined that the decision of the set transport route is not requested, the server 100 executes step S75. In step S75, the transport route setting module 119 confirms whether or not cancellation of the set transport route is requested from the mobile terminal 300. In step S75, when it is determined that the cancellation of the set transport route is not requested, the server 100 returns to the process of step S74. Thereafter, the server 100 repeats the steps S74 and S75 until the decision or cancellation of the set transport route is requested.

[0048] When it is determined in step S74 that the decision of the set transport route is requested, the server 100 executes step S76. In step S76, the transport command module 125 transmits a command to transport and reload the luggage 4 to the storage spot terminal 200 of each storage spot 3 included in the set transport route. When it is

determined in step S75 that the cancellation of the set transport route is requested, the server 100 completes the process without executing step S76. Then, the procedure for setting the spot for receipt is completed. The server 100 repeatedly executes this procedure.

[0049] (Return Process Procedure for Stored Luggage)

As illustrated in FIG. 14, the server 100 sequentially executes steps S81, S82, and S83. In step S81, the return determination module 122 waits for receipt of the luggage 4 to be requested from the mobile terminal 300. In step S82, the return determination module 122 acquires the identification information of the tag 2 that is a receipt target (the tag 2 attached to the luggage 4 that is a receipt target) and the identification information of the user from the mobile terminal 300. In step S83, the return determination module 122 confirms whether or not the identification information of the tag 2 and the identification information of the user acquired in step S82 are associated with each other in the luggage database 111. In step S83, when it is determined that the identification information of the tag 2 and the identification information of the user are not associated with each other in the luggage database 111, the server 100 returns to the process of step S81.

[0050] In step S83, when it is determined that the identification information of the tag 2 and the identification information of the user are associated with each other in the luggage database 111, the server 100 executes step S84. In step S84, the return determination module 122 transmits a return permission notification to the mobile terminal 300 and the storage spot terminal 200. It should be noted that the return determination module 122 may transmit the return permission

notification to only one of the mobile terminal 300 and the storage spot terminal 200.

[0051] Next, the server 100 executes steps S85, S86, and S87 in order. In step S85, the fee calculation module 123 calculates an elapsed time from a deposit time to a receipt time of the luggage 4 that is a receipt target. For example, the fee calculation module 123 calculates the elapsed time based on a difference between a storage end time and a storage start time of the luggage 4 stored in the luggage database 111. In step S86, the fee calculation module 123 calculates a movement distance of the luggage 4 from the deposit time to the receipt time of the luggage 4 that is a receipt target. For example, the fee calculation module 123 calculates a movement distance (hereinafter referred to as a "transport distance") of all the storage spots 3 (hereinafter referred to as "related spots") involved in the storing of the luggage 4 that is a receipt target during the storing of the luggage 4 based on a history of the positions stored in the spot position database 112, and calculates the movement distance of the luggage 4 by adding the transport distances of all the related spots. In step S87, the fee calculation module 123 calculates a use fee of the storage service of the luggage 4 based on the elapsed time calculated in step S85 and the movement distance calculated in step S86. For example, the fee calculation module 123 calculates the use fee for a time by multiplying the elapsed time by a set fee per time, calculates the use fee for a distance by multiplying the movement distance by a set fee per distance, and calculates the use fee by summing the use fee for a time and the use fee for a distance.

[0052] Next, the server 100 executes steps S88 and S89 in order. In

step S88, the return processing module 124 waits for acquisition of a return completion notification from the storage spot terminal 200. In step S89, the return processing module 124 updates the content of the luggage database 111 according to the return of the luggage 4. For example, the return processing module 124 changes the combination data of the identification information of the storage spot 3 from which the return of the luggage 4 has completed and the identification information of the tag 2 attached to the luggage 4 to a storage completion state (a state in which the completion flag is 1) in the luggage database 111. Then, the return process procedure for the stored luggage 4 is completed. The server 100 repeatedly executes this procedure.

[0053] [Effects of embodiment]

As described above, the luggage storage system 1 includes the tag 2 attached to the luggage 4; the plurality of storage spot terminals 200 respectively installed in the plurality of storage spots 3 including the movable spot 3A; the luggage database 111 that stores the information on the luggage 4; the first registration module 113 that acquires the identification information of the tag 2 and the identification information of the user from the mobile terminal 300 that has read the identification information of the tag 2 attached to the luggage 4 at the time of deposit of the luggage 4 and registers the identification information of the tag 2 and the identification information of the user in the luggage database 111 in association with each other; the second registration module 114 that acquires the identification information of the tag 2 and the identification information of the storage spot 3 from

the storage spot terminal 200 that has read the identification information of the tag 2, and registers the identification information of the tag 2 and the identification information of the storage spot 3 in the luggage database 111 in association with each other; and the return determination module 122 that acquires the identification information of the tag 2 and the identification information of the user from the mobile terminal 300 that has read the tag 2 at the time of receipt of the luggage 4 and determines whether or not to return of the luggage 4 based on whether or not the identification information of the tag 2 and the identification information of the user are associated with each other in the luggage database 111.

[0054] According to the luggage storage system 1, it is possible to rapidly perform the registration of the deposited luggage 4 and the authentication of receipt of the luggage 4 based on communication with the mobile terminal 300 of the user. Further, it is possible to update the deposit spot 3 of the luggage 4 in real time based on the communication with the deposit spot terminal 200. Therefore, it is possible to easily track the position of the luggage 4. For example, even when the luggage 4 is reloaded between the deposit spots 3, it is possible to update the deposit spot 3 based on the communication with the storage spot terminal 200. Thus, it is possible to provide a highly convenient luggage storage service with high mobility of the movable spot 3A by enabling rapid deposit and receipt of the luggage 4 and enabling easy tracking of the position of the luggage 4.

[0055] The luggage storage system 1 may include the storage candidate presentation module 116 that acquires the current position information

of the mobile terminal 300 from the mobile terminal 300 and transmits the current position information of the storage spot 3 in the first reference area including a position indicated by the current position information of the mobile terminal 300 to the mobile terminal 300. In this case, the convenience of the luggage storage service can be further improved by making it easier to select the storage spot 3 close to the current position of the mobile terminal 300.

[0056] The luggage storage system 1 may further include the status notification module 117 that acquires the request for transmission of the current position information of the tag 2 from the mobile terminal 300, acquires the identification information of the current storage spot 3 associated with the identification information of the tag 2 from the luggage database 111, and transmits the current position information of the storage spot 3 to the mobile terminal 300. In this case, the convenience of the luggage storage service can be further improved by enabling tracking of the position of the luggage 4 using the mobile terminal 300.

[0057] The luggage storage system 1 may further include the transport route setting module 119 that acquires a designation of the storage spot 3 for receipt of the luggage 4 from the mobile terminal 300, acquires identification information of the current storage spot 3 associated with the identification information of the tag 2 attached to the luggage 4 from the luggage database 111, and sets a transport route of the luggage 4 from the current storage spot 3 to the storage spot 3 for receipt. In this case, the convenience of the luggage storage service can be further improved by enabling receipt of the luggage 4 at the storage spot 3

designated by the user.

[0058] The luggage storage system 1 may further include the receipt candidate presentation module 118 that acquires desired position information for receipt of the luggage 4 from the mobile terminal 300 and transmits the current position information of the storage spot 3 in a second reference area including the position indicated by the desired position information to the mobile terminal 300. In this case, the convenience of the luggage storage service can be further improved by making it easier to select the storage spot 3 close to a desired receipt position of the luggage 4.

[0059] The luggage storage system 1 may further include a fee calculation module 123 that calculates an elapsed time from a deposit time to a receipt time of the luggage 4 and calculates a use fee of the luggage storage service based on the elapsed time. In this case, since it is possible to automatically calculate the use fee according to the degree of use of the luggage storage service with high rationality, the convenience of the luggage storage service can be further improved.

[0060] The fee calculation module 123 may further calculate a movement distance from a deposit time to a receipt time of the luggage 4 and calculate the use fee based on the elapsed time and the movement distance. In this case, since it is possible to automatically calculate the use fee with high rationality, the convenience of the luggage storage service can be further improved.

[0061] The luggage storage system 1 may further include a fee calculation module 123 that calculates the movement distance from the deposit time to the receipt time of the luggage 4 and calculates a use fee

of the luggage storage service based on the movement distance. In this case, since it is possible to automatically calculate the use fee according to the degree of use of the luggage storage service with high rationality, it is possible to further improve the convenience of the luggage storage service.

[0062] Although the embodiments have been described above, the present invention is not necessarily limited to the above-described embodiments, and various modifications are possible without departing from the gist of the present invention.

Industrial Applicability

[0063] The present disclosure can be used for a luggage storage system that stores a luggage from a user at any one of a plurality of storage spots including movable spots and performs return of the luggage to the user at any of the plurality of storage spots.

Reference Signs List

[0064] 1 Luggage storage system
2 Tag
3 Storage spot
3A Movable spot
4 Luggage
111 Luggage database (database)
113 First registration module
114 Second registration module
116 Storage candidate presentation module
117 Status notification module
118 Receipt candidate presentation module

119 Transport route setting module

122 Return determination module

123 Fee calculation module

200 Storage spot terminal

300 Mobile terminal

CLAIMS

1. A luggage storage system comprising:

a tag attached to luggage;

a plurality of storage spot terminals installed in a plurality of storage spots including a movable spot;

a database configured to store information on the luggage;

a first registration module configured to acquire identification information of the tag and identification information of a user from a mobile terminal that has read the identification information of the tag attached to the luggage at the time of deposit of the luggage and to register the identification information of the tag and the identification information of the user in the database in association with each other;

a second registration module configured to acquire the identification information of the tag and identification information of the storage spot from the storage spot terminal that has read the identification information of the tag and to register the identification information of the tag and the identification information of the storage spot in the database in association with each other; and

a return determination module configured to acquire the identification information of the tag and the identification information of the user from the mobile terminal that has read the tag at the time of receipt of the luggage and to determine whether or not to return the luggage based on whether or not the identification information of the tag and the identification information of the user are associated with each other in the database.

2. The luggage storage system according to claim 1, further comprising a storage candidate presentation module configured to acquire current position information of the mobile terminal from the mobile terminal and to transmit current position information of the storage spot in a first reference area including a position indicated by the current position information of the mobile terminal to the mobile terminal.

3. The luggage storage system according to claim 1 or 2, further comprising a status notification module configured to acquire a request for transmission of current position information of the tag from the mobile terminal, to acquire the identification information of the current storage spot associated with the identification information of the tag from the database, and to transmit the current position information of the storage spot to the mobile terminal.

4. The luggage storage system according to any one of claims 1 to 3, further comprising a transport route setting module configured to acquire a designation of the storage spot for receipt of the luggage from the mobile terminal, to acquire identification information of the current storage spot associated with the identification information of the tag attached to the luggage from the database, and to set a transport route of the luggage from the current storage spot to the storage spot for receipt.

5. The luggage storage system according to any one of

claims 1 to 4, further comprising a receipt candidate presentation module configured to acquire desired position information for receipt of the luggage from the mobile terminal and to transmit the current position information of the storage spot in a second reference area including a position indicated by the desired position information to the mobile terminal.

6. The luggage storage system according to any one of claims 1 to 5, further comprising a fee calculation module configured to calculate an elapsed time from a deposit time to a receipt time of the luggage and to calculate a use fee of a luggage storage service based on the elapsed time.

7. The luggage storage system according to claim 6, wherein the fee calculation module is further configured to calculate a movement distance from a deposit time to a receipt time of the luggage and to calculate the use fee based on the elapsed time and the movement distance.

8. The luggage storage system according to any one of claims 1 to 5, further comprising a fee calculation module configured to calculate a movement distance from a deposit time to a receipt time of the luggage and to calculate a use fee of a luggage storage service based on the movement distance.

9. A method executed by a server for management of

stored luggage, the method comprising:

acquiring identification information of a tag attached to luggage and identification information of a user from a mobile terminal that has read the identification information of the tag at the time of depositing the luggage and registering the identification information of the tag and the identification information of the user in a database in association with each other;

acquiring the identification information of the tag and identification information of a storage spot from a storage spot terminal that has read the identification information of the tag and registering the identification information of the tag and the identification information of the storage spot in the database in association with each other; and

acquiring the identification information of the tag and the identification information of the user from the mobile terminal that has read the tag at the time of receipt of the luggage and determining whether or not to return the luggage based on whether or not the identification information of the tag and the identification information of the user are associated in the database.