(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 769 898 B1

(12) EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent:
30.11.2016 Bulletin 2016/48

(21) Application number: **12841921.5**

(22) Date of filing: **20.09.2012**

(51) Int Cl.:
B61L 27/00 *(2006.01)*

(86) International application number:
PCT/JP2012/005961

(87) International publication number:
WO 2013/057875 (25.04.2013 Gazette 2013/17)

(54) **TRAIN SCHEDULE EDITING SYSTEM, TRAIN SCHEDULE EDITING METHOD, AND TRAIN SCHEDULE EDITING PROGRAM**

SYSTEM ZUR BEARBEITUNG VON BAHNFAHRPLÄNEN, VERFAHREN ZUR BEARBEITUNG VON BAHNFAHRPLÄNEN UND PROGRAMM ZUR BEARBEITUNG VON BAHNFAHRPLÄNEN

SYSTÈME D'ÉDITION D'HORAIRES DE TRAINS, PROCÉDÉ D'ÉDITION D'HORAIRES DE TRAINS ET PROGRAMME D'ÉDITION D'HORAIRES DE TRAINS

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **19.10.2011 JP 2011229904**

(43) Date of publication of application:
27.08.2014 Bulletin 2014/35

(73) Proprietors:
- **Kabushiki Kaisha Toshiba**
  Minato-ku
  Tokyo 105-8001 (JP)
- **Toshiba Solutions Corporation**
  Tokyo 105-8001 (JP)

(72) Inventor: **UEDA, Jiro**
Tokyo 105-8001 (JP)

(74) Representative: **Awapatent AB**
P.O. Box 11394
404 28 Göteborg (SE)

(56) References cited:
JP-A- H06 127 391 **JP-A- 2005 119 472**
JP-A- 2007 168 672 **JP-A- 2007 168 672**

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 2 769 898 B1

Printed by Jouve, 75001 PARIS (FR)

Description

FIELD

[0001] Embodiments of the present invention relate to a train diagram edit system, a train diagram edit method, and a train diagram edit program.

BACKGROUND

[0002] In general, a railway operation company inputs data such as a departure time and an arrival time in each train station and a distance (kilometers) between adjacent stations to a server such as a work station, thereby creating diagram data in advance. Thereafter, the diagram data is displayed on a screen as an operation diagram (hereinafter referred to as a "diagram"). Using the diagram, a train operation is managed. For example, the diagram is a graph where a vertical axis represents a distance from a starting station (reference), a horizontal line represents a time, and an operation station name is on the vertical axis showing the distance between stations. One train operation is expressed as one line (train line) on the diagram.

[0003] In addition, an amount of the diagram data becomes quite large in proportion to the number of the operations of trains and the number of departure/arrival stations. Therefore, the diagram data is often created by a plurality of users by a collaborative work. Accordingly, a train diagram edit system is constructed by connecting a plurality of edit terminals to a server via networks to share the work. By using the network, the diagram data can be shared by the respective terminals placed in a company. In this case, the whole diagram data is managed exclusively, and consistency is kept. For example, the diagram edit system uses (1) a method of designating other users that can share the created diagram data upon registration, and allowing the users other than the creation person to refer a work status, (2) a method of temporarily lending other users a part of an edit authority of the diagram data, and exclusively managing the diagram data or the like.

[0004] The document JP 2007 168672 A forms part of the prior art. A railway traffic control system is disclosed in JP 2007 168672 A.

SUMMARY OF INVENTION

PROBLEM TO BE SOLVED BY THE INVENTION

[0005] As described above, when the creation of the diagram data is shared by a plurality of users (creation persons) on the network, an arrangement work is necessary to provide one diagram as a whole by modifying and changing the data in order to keep the consistency of the diagram data created by each creation person. However, in the above-mentioned diagram edit system, it is difficult to do such a work on the terminals via the network, because only the train numbers and the operation numbers are added to the train line displayed on the screen of the system. Therefore, a department manager cannot find out a department where the creation person belongs to and a name of the creation person by only referring to the train line. In addition, the system did not have a structure that only the diagram data to be managed can be extracted from a large amount of data created by a plurality of creation persons for mutual comparison. In particular, the trains may be mutually operated across companies (or across countries) in recent years. Therefore, the collaborative work in this case may be accompanied by great difficulties.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006]

Fig. 1 is a configuration diagram showing an example of a train diagram edit system according to a first embodiment;
Fig. 2 is a hardware configuration example of a diagram management server and diagram edit terminals shown in Fig. 1;
Fig. 3 is a block diagram showing an overall configuration example of the diagram management server and the diagram edit terminal;
Fig. 4 shows a specific example of a stored content of a train line operation plan table shown in Fig. 3;
Fig. 5 shows a specific example of a stored content of an authority setting information table shown in Fig. 3;
Fig. 6 shows a specific example of a stored content of a user information table shown in Fig. 3;
Fig. 7 shows a specific example of the train line register and update screen displayed on the diagram edit terminal shown in Fig. 1;
Fig. 8 shows a specific example of the train line display screen displayed in the diagram edit terminal shown in Fig. 1;
Fig. 9 is a table for illustrating a data transition of the train line operation plan table before and after the train line coupling processing;
Fig. 10 is a table for illustrating data transition of the authority setting information table before and after the train line coupling processing;
Fig. 11 shows specific examples of the train line coupling in the same department on the train line display screen displayed on the diagram edit terminal shown in Fig. 1;
Fig. 12 is a table for illustrating data transition of the train line operation plan table before and after the train line bulk coupling processing per train operation date;
Fig. 13 is a table for illustrating data transition of the authority setting information table before and after the train line bulk coupling processing per the train operation date;

Fig. 14 is a sequence diagram showing a specific example of train line register processing in the diagram edit system shown in Fig. 1;

Fig. 15 is a flow chart showing a specific example of train line display processing in the diagram edit system shown in Fig. 1;

Fig. 16 is a sequence diagram showing a specific example of processing of changing the engagement person of the train line in the diagram edit system shown in Fig. 1;

Fig. 17 is a sequence diagram showing a specific example of the train line coupling processing in the diagram edit system shown in Fig. 1;

Fig. 18 is a sequence diagram showing a specific example of train line bulk coupling processing per the train operation date in the diagram edit system shown in Fig. 1;

Fig. 19 shows a specific example of the authority setting information table according to a second embodiment;

Fig 20 shows a specific example of the user information table in the train diagram edit system according to the second embodiment;

Fig. 21 is a table for illustrating data transition of the train line operation plan table before and after the train line coupling;

Fig. 22 is a table for illustrating data transition of the authority setting information table before and after the train line coupling;

Fig. 23 shows a specific example of the train line coupling in different departments in the train line display screen displayed on the diagram edit terminal shown in Fig. 1;

Fig. 24 shows a specific example of a stored content of the authority setting information table in the train diagram edit system according to a third embodiment; and

Fig. 25 shows a specific example of a stored content of the user information table in the train diagram edit system according to the third embodiment.

DETAILED DESCRIPTION

[0007] A train diagram edit system according to an embodiment of the present invention is configured of a diagram management server that unifies the management of train line information including at least train numbers, train operation dates, operation stations, departure times and arrival times, and a plurality of diagram edit terminals that are network-connected to the diagram management server, and edit the train line information.

[0008] The diagram management server includes a data base unit and a data register and update unit. The data base unit stores user information that defines a relationship between a login user on a diagram edit terminal and an authority level; train line information; and authority setting information that defines a relationship between a creation person having an edit authority of the train line information and an upper user above the creation person. The data resister and update unit resisters and updates the data base unit upon request of the diagram edit terminals.

[0009] Also, the diagram edit terminal includes a data edit unit, a train line acquisition unit, and a train line display unit. The data edit unit edits the authority setting information and the train line information created by the creation person based on input information by the upper user, and requests register and update processing of the edited data to the data register and update unit, when the login user is defined as the upper user of the creation person in the authority setting information. The train line acquisition unit acquires the train line information where the login user has the edit authority from the data base unit. The train line display unit displays the acquired train line information. The train diagram edit system according to the embodiment of the present invention can effectively create the train line shared by a plurality of users. Also, there can be provided a diagram edit system and a diagram edit method that the upper user can easily edit the train line created by a general user and change the engagement person.

[0010] The diagram edit terminal further includes a train line coupling unit for coupling the train line information about two trains operated on the same date created by the user having the authority level lower than the login user into new train line information based on a comparison result of the orders of operation, the operation stations, the departure times and the arrival times, and for requesting the register and update of the data base unit to the data register and update unit based on the new train line information.

[0011] Hereinafter, embodiments of the present invention will be described with reference to the drawings.

<Embodiment 1>

[0012] Fig. 1 shows an overall configuration of a train diagram edit system according to the first embodiment. As shown in Fig. 1, the train diagram edit system is configured of a diagram management server 1 that unifies the management of train line information including at least train numbers, train operation dates, operation stations, departure times and arrival times, and a plurality of diagram edit terminals 3 that are connected to the diagram management server 1 via a network 2, and newly create train line information or edit the created train line information. The train line information newly created or edited in the diagram edit terminals 3 is saved and managed in a data base of the diagram management server 1.

[0013] Fig. 2 shows a hardware configuration of the diagram management server 1 and the diagram edit terminals 3 shown in Fig. 1. As shown in Fig. 2, a computer used for the diagram management server 1 and the diagram edit terminals 3 is configured of a CPU (Central Processing Unit) 11, a ROM (Read Only Memory) 12, a RAM (Random Access Memory) 13, an input output in-

terface 14, a system bus 15, an input apparatus 16, a display apparatus 17, an auxiliary storage apparatus 18 and a communication apparatus 19.

[0014] The CPU 11 is a processing apparatus for executing various arithmetic processing using a program or data stored in the ROM 12 or the RAM 13. The ROM 12 is a read-only storage apparatus that stores a basic program and an environment file for a computer operation. The RAM 13 is a storage apparatus that stores a program executed by the CPU 11 and data for executing the program, and can enable highspeed reading and writing. The input output interface 14 is an apparatus and a program that mediate a connection between a variety of hardware and the system bus 15. The system bus 15 is an information transmission path shared by the CPU 11, the ROM 12, the RAM 13 and the input output interface 14.

[0015] To the input output interface 14, hardware such as the input apparatus 16, the display apparatus 17, the auxiliary storage apparatus 18 and the communication apparatus 19 is connected. The input apparatus 16 is an apparatus that processes an input from a user, and is a key board or a mouse, for example. The display apparatus 17 is an apparatus that displays a calculation result and a creation screen to a user, and may be a CRT, a liquid crystal display, a plasma display and the like, for example. The auxiliary storage apparatus 18 is a high-capacity storage apparatus that accumulates programs and data, and is a hard disk apparatus, for example.

[0016] Fig. 3 is a block diagram showing an overall configuration example of the diagram management server 1 and the diagram edit terminal 3. As shown in Fig. 3, the diagram management server 1 includes a server side communication unit 101, a data base unit 102, a user authentication unit 103, a data extraction unit 104, a data coupling possibility determination unit 105, a data register and update unit 106 and an engagement person change message unit 107.

[0017] The server side communication unit 101 is an interface for data communication with a terminal side communication unit 301 described later, receives data sent from the diagram edit terminals 3, outputs the data to the user authentication unit 103, the data extraction unit 104, the data coupling possibility determination unit 105, the data register and update unit 106 and the engagement person change message unit 107 as appropriate, and send processing results in respective units to the diagram edit terminals 3.

[0018] The data base unit 102 is a storage apparatus that stores the user information that defines the relationship between the login user using the diagram edit terminal 3 and the authority level; the train line information; and the authority setting information that defines the relationship between the creation person having the edit authority of the train line information and the upper user above the creation person. Here, information is held within a train line operation plan table 102A, an authority setting information table 102B and a user information table 102C.

[0019] Fig. 4 shows a specific example of a stored content of the train line operation plan table 102A shown in Fig. 3. Here, the train line operation plan table 102A includes, in data items, train numbers for identifying the train lines, train operation dates, orders of operation, P/S (pass/stop), operation stations (departure/arrival stations and non-stop stations), platform numbers used in the operation station, departure times and arrival times. Any information other than these may be included. The table 102A may be configured of a part of the above-described information, and the other information may be determined separately by calculation, or may be provided from other data base where necessary.

[0020] Fig. 5 shows a specific example of a stored content of the authority setting information table 102B shown in Fig. 3. Here, the authority setting information table 102B includes, in data items, the train numbers, the train operation dates, the authority levels, the creation persons and department managers. Any information other than these may be included. The table 102B may be configured of a part of the above-described information, and the other information may be determined separately by calculation, or may be provided from other data base where necessary.

[0021] Fig. 6 shows a specific example of the user information table 102C shown in Fig. 3. Here, the user information table 102C includes, in data items, a user ID, the authority level, the department and the department manager. Any information other than these may be included. The table 102C may be configured of a part of the above-described information, and the other information may be determined separately by calculation, or may be provided from other data base where necessary.

[0022] The authority levels held in the authority setting information table 102B and the user information table 102C in the diagram management server 1 are as follows: [Authority 0]: An authority level representing the creation person, as the general user, who can edit only the train line where an own user ID is set in a user row of the authority setting information table 102B.

[0023] [Authority 3]: An authority level representing the department manager user who can edit all of the train lines where an own user ID is set in a department manager row of the authority setting information table 102B.

[0024] The user authentication unit 103 is a program to authenticate the user by referring to the user information table 102C based on the user ID and an input password of the user who uses the diagram edit terminal 3. The authority level of the login user acquired upon the authentication is output to the data extraction unit 104 together with the user ID.

[0025] The data extraction unit 104 extracts the train line information to be displayed from the train line operation plan table 102A at a diagram edit terminal 3 side depending on the authority level of the login user acquired by the user authentication unit 103, and sends the train line information to the diagram edit terminal 3 via the

server side communication unit 101.

[0026] The data coupling possibility determination unit 105 is a program to determine whether it is possible to perform a train line coupling processing by acquiring an operation station, an order of operation, a departure time and an arrival time included in the train line information about the former train and the later train from the train line operation plan table 102A, when the train line information on a same date of the train operation to be coupled is acquired at the diagram edit terminal 3 side.

[0027] The data register and update unit 106 is a program to register and update the train line information upon register and update request from the diagram edit terminal 3.

[0028] The engagement person change message unit 107 is a program to notify an engagement person change message to the diagram edit terminal 3 used by the changed creation person, and to output new train line information in real time, when the creation person in the train line information stored in the train line operation plan table 102A is changed by register and update processing in the data register and update unit 106.

[0029] The diagram edit terminal 3 includes the terminal side communication unit 301, an input unit 302, a data edit unit 303, a train line acquisition unit 304, a train line display unit 305, a train line coupling unit 306 and a train line bulk coupling unit 307.

[0030] The terminal side communication unit 301 is an interface for data communication with the server side communication unit 101, sends data outputted from the input unit 302, the data edit unit 303, the train line acquisition unit 304, the train line display unit 305, the train line coupling unit 306 and the train line bulk coupling unit 307 to the server side communication unit 101, and outputs the data received form the server side communication unit 101 to each unit as appropriate.

[0031] The input unit 302 is an input interface for a terminal user to input information to the data edit unit 303, the train line acquisition unit 304, the train line coupling unit 306 and the train line bulk coupling unit 307 in a variety of an input screen etc.

[0032] The data edit unit 303 is a program to send train line information including the train numbers, the train operation dates, the operation stations, the departure times and the arrival times inputted by the upper user such as the department manager in the train line register and update screen and the authority setting information including the department, the authority level and the user ID to the diagram management server 1, and request the register and update of the train line information and the authority setting information stored in the data base unit 102. In this regard, a train line register and update screen is displayed under the condition that the user authentication is completed between the diagram management server 1 and the diagram edit terminal 3. Fig. 7 shows a specific example of the train line register and update screen displayed on the diagram edit terminal 3 shown in Fig. 1. Information about the train operation station (the departure/arrival station) and time are held in the train line operation plan table 102A. The train line is determined uniquely by a combination of the train number and the train operation date. The authority level, the department and the user ID for each train line are held in the authority setting information table 102B. Corresponding to registered information in the train line operation plan table 102A and the authority setting information table 102B, the user information table 102C also holds the relationship between the user ID and the upper user, i.e., the department manager as user default information, whereby the creation person and the department manager can be retrieved using the train number as a key at a diagram management server 1 side.

[0033] The data edit unit 303 has a function that edits the authority setting information and the train line information created by the creation person based on the input information by the department manager (the upper user), and requests the register and update processing of the edited data to the data register and update unit 106, when the login user is defined as the department manager (the upper user) of the creation person (the general user) in the authority setting information.

[0034] The train line acquisition unit 304 is a program to request extraction of all of the train lines where the login user has the edit authority to the data extraction unit 104 of the diagram management server 1, and to acquire the train line information stored in the data base unit 102 and the authority setting information corresponding thereto. The train line display unit 305 is a program to create and display the train line display screen based on the train line information and the authority setting information acquired at train line acquisition unit 304. Specifically, as the creation person is held per the train number in the authority setting information table 102B and the department is held per the user ID in the user information table 102C, the user ID is taken out from the authority setting information table 102B using the train number as a key, and the department information is taken out from the user information table 102C using the user ID as a key. Then, the information extracted at the diagram management server 1 side is sent to the diagram edit terminal 3 side, and the user ID of the creation person and the department where the creation person belongs to are displayed per the train line in the train line display screen.

[0035] Fig. 8 shows a specific example of the train line display screen displayed in the diagram edit terminal 3 shown in Fig. 1. Here, a vertical axis represents a distance, and a horizontal axis represents a time. Operation station names are put on the vertical axis in accordance with the order of operation. In addition, the train line information is represented by an arrow line within a coordinate. The train number, the user ID and the department are shown close to the train line, thereby finding out the user who is the creation person of the train line as well as the department the user belongs. Also, the authority setting information held at the diagram management

server 1 is displayed on the screen of the diagram edit terminal 3 together with the train line information.

[0036] The train line coupling unit 306 is a program to couple the train line information about two trains operated on the same date created by the user having the authority level lower than the login user into new train line information based on a result of comparison of the orders of operation, the operation stations, the departure times and the arrival times, and to request the register and update of the data base unit 102 to the data register and update unit 106 based on the new train line information. Even if the train line information about two trains is created by the user having the authority level not lower than the login user, it may be coupled, where special permission is made. Before executing coupling processing, the data coupling possibility determination unit 105 of the diagram management server 1 is requested to determine whether or not it is possible to perform the coupling. The coupling is executed only when a notice that the coupling is possible is received from the data coupling determination unit 105. Specifically, when the department manager is the login user, two train lines created by the department manager's own department can be coupled into one train line, where the arrival time is before the departure time in the same station among the train lines in the same department shown on the screen of the diagram edit terminal 3.

[0037] Figs. 9 and 10 are tables for illustrating data transitions of the train line operation plan table 102A and the authority setting information table 102B before and after the train line coupling processing, respectively. Here, shaded two records are coupled, and the new train line information is registered. The two records before coupling are deleted, and the train number 111A, which is the number of the former train, is taken over as a new train number of the new train line information.

[0038] Alternatively, the train number 112A that is the later train or the train number separately designated by the user may be used as the train number added to the new train line information. For example, when the creation persons of the two train lines are the user A and the user B, it is possible to disperse the workload by designating a user C. When the train number where the user ID of the department manager is set in a creation person row is used, it is possible to transfer the edit authority of the train line after the coupling to the department manager, and to limit the edit by the general user. In other words, the train line can be effectively created by sharing by a plurality of the general users, and can be advantageously adjusted finally by the department manager in a bulk management.

[0039] Fig. 11 shows specific examples of the train line coupling in the same department on the train line display screen displayed on the diagram edit terminal 3 shown in Fig. 1. Here, there is shown that the display on the screen is changed corresponding to the data transitions shown in Figs. 9 and 10 above.

[0040] The train line bulk coupling unit 307 is a program to extract and display, as a candidate, other train operation date having the train number according to the coupling processing executed in the train line coupling unit 306 when the bulk coupling of the train line is requested by the login user on the train line display screen, and to execute the coupling processing similar to that executed in the train line coupling unit 306 about the train operation date selected by the user.

[0041] Figs. 12 and 13 are tables for illustrating data transitions of the train line operation plan table 102A and the authority setting information table 102B before and after the train line bulk coupling processing per the train operation date, respectively. Here, shaded five records are on the train operation date (2011/07/02) designated by the user. The train lines (2 records) of the train number 112A on the same date are coupled to the train line of the train number 111A, and the new train line information is registered. In other words, the records show the case where the same processing as the train line coupling processing on the train operation date (2011/07/02) illustrated in Figs. 9 and 10 applies to the case that other train operation date (2011/07/01) is designated.

[0042] Hereinafter, the operation of the train diagram edit system configured as described above will be described in detail referring to Figures.

[0043] Fig. 14 is a sequence diagram showing a specific example of train line register processing in the diagram edit system shown in Fig. 1.

[0044] In S1401, the diagram edit terminal 3 creates the train line information it is in charge of.

[0045] In S1402, the diagram edit terminal 3 sends the train line information created at S1401 to the diagram management server 1.

[0046] In S1403, the diagram management server 1 receives each train line information created at the diagram edit terminal 3 used by the creation person of the train line (the general user).

[0047] In S1404, the diagram management server 1 takes out the authority setting information from the train line information received at S1403, and stores it on the authority setting information table 102B.

[0048] In S1405, the diagram management server 1 stores the train line information received at S1403 to the train line operation plan table 102A.

[0049] Fig. 15 is a flow chart showing a specific example of train line display processing in the diagram edit system shown in Fig. 1.

[0050] In S1501, the diagram management server 1 acquires the authority level of the login user upon authentication processing.

[0051] In S1502, the diagram management server 1 determines whether or not the authority level of the login user is the authority level of the department manager. If the authority level is determined as the department manager, it proceeds to S1503. In contrast, if the authority level is determined as not the department manager, it proceeds to S1504.

[0052] In S1503, the diagram management server 1

acquires all of the train lines in the own department from the data base unit 102 (the train line operation plan table 102A) based on the authority level of the department manager.

[0053] In S1504, the diagram management server 1 determines whether or not the authority level of the login user is the authority level of the general user. If the authority level is determined as the general user, it proceeds to S1505. In contrast, if the authority level is determined as not the general user, it proceeds to S1507.

[0054] In S1505, the diagram management server 1 acquires the train line information it is in charge of from the data base unit 102 based on the authority level of the general user.

[0055] In S1506, the diagram management server 1 sends the train line information acquired at S1503 or S1505 to the diagram edit terminal 3, and the diagram edit terminal 3 receives and displays the train line information on the screen and ends the processing.

[0056] In S1507, the diagram management server 1 sends a login error message to the diagram edit terminal 3, and the diagram edit terminal 3 receives and displays the login error message on the screen and ends the processing.

[0057] Fig. 16 is a sequence diagram showing a specific example of processing of changing the engagement person of the train line in the diagram edit system shown in Fig. 1.

[0058] In S1601, the diagram edit terminal 3 used by the department manager changes the creation person of the train line in the own department on the screen.

[0059] In S1602, the diagram edit terminal 3 sends a request for changing the engagement person to the diagram management server 1 based on changed engagement person information on the screen.

[0060] In S1603, the diagram management server 1 changes the creation person of the train line of interest based on the request for changing the engagement person received.

[0061] In S1604, the diagram management server 1 uses the diagram edit terminal 3, acquires the user information among the login users from the user information table 102C, and creates a user list.

[0062] In S1605, the diagram management server 1 checks the user list created at S1604 with the changed creation person of the train line at S1603, and detects the person to be notified.

[0063] In S1606, the diagram management server 1 sends the engagement person change message to the diagram edit terminal 3 used by the person to be notified.

[0064] In S1607, the diagram edit terminal 3 used by the person to be notified displays the received engagement person change message on the screen.

[0065] In this way, when the creation person of the train line is changed by the department manager, the diagram management server 1 notifies the change in real time to the diagram edit terminal 3 used by the changed creation person of the train line, and the information is displayed on the screen of the diagram edit terminal 3, thereby sharing the information.

[0066] Fig. 17 is a sequence diagram showing a specific example of the train line coupling processing in the diagram edit system shown in Fig. 1.

[0067] In S1701, the diagram edit terminal 3 selects any two or more of train lines to be coupled by a mouse operation etc. on the screen by the login user upon a train line coupling mode.

[0068] In S1702, the diagram edit terminal 3 sends the train number and the train operation date about the former train and the later train before coupling selected on the screen to the diagram management server 1.

[0069] In S1703, the diagram management server 1 acquires the train line having the largest number of order of operation among the operation station information about the former train from the train line operation plan table 102A based on the information received.

[0070] In S1704, the diagram management server 1 acquires the train line having the smallest number of order of operation among the operation station information about the later train from the train line operation plan table 102A based on the information received.

[0071] In S1705, the diagram management server 1 compares the operation station information acquired at S1703 and S1704, and determines whether or not the train lines can be coupled. Here, if it is determined that the train lines can be coupled, it proceeds to S1708. In contrast, if it is determined that the train lines cannot be coupled, it proceeds to S1706.

[0072] In S1706, the diagram management server 1 sends a notification that the train lines cannot be coupled, to the diagram edit terminal 3 used by the department manager.

[0073] In S1707, the diagram edit terminal 3 used by the department manager receives the notification that the train lines cannot be coupled, pops up the notification on the screen, encourages the department manager to re-select the train lines, and returns to S1701.

[0074] In S1708, the diagram management server 1 sends a notification that the train lines can be coupled, to the diagram edit terminal 3 used by the department manager.

[0075] In S1709, the diagram edit terminal 3 sends new train line information after coupling and the train number designated to the new train line information to the diagram management server 1.

[0076] In S1710, the diagram management server 1 receives the train line information, and stores the new train line information using the train number designated as a key on the train line operation plan table 102A. Here, the train line information served as a basis for the new train line information will be deleted from the train line operation plan table 102A in order to avoid duplicate the data.

[0077] In S1711, the diagram management server 1 detects the person to be notified from the login users, and sends the engagement person change message to

the diagram edit terminal 3 used by the person to be notified. The person to be notified may be the creation person of each train line before coupling, the creation person of the train line after coupling, etc., and can be set freely.

[0078] In S1712, the diagram management server 1 sends the changed train line information to the diagram edit terminals 3 used by the department manager and the person to be notified.

[0079] In S1713, the diagram edit terminal 3 used by the department manger displays the received train line information on the screen.

[0080] In S1714, the diagram edit terminal 3 used by the person to be notified (the general user) displays the received engagement person change message and the changed train line information on the screen.

[0081] In this way, when the department manager is logged in, all of the train lines in the department managed by the department manager are sent from the diagram management server 1 to the diagram edit terminal 3, the two train lines designated at the diagram edit terminal 3 are then received at the diagram management server 1, whether or not the coupling processing can be performed is checked at the server side, the coupling processing is executed, thereby coupling the two train lines into one.

[0082] Fig. 18 is a sequence diagram showing a specific example of train line bulk coupling processing per the train operation date in the diagram edit system shown in Fig. 1.

[0083] In S1801, the diagram management server 1 acquires the train line information about the former train and the later train before coupling in the coupling processing executed immediately before it. Here, the train line information before coupling may be saved temporarily in a memory area of any of the diagram management server 1 and the diagram edit terminal 3.

[0084] In S1802, the diagram management server 1 refers the train line operation plan table 102A, and acquires another train operation date having the train line information acquired at S1801.

[0085] In S1803, the diagram management server 1 sends the another train operation date acquired at S1802 to the diagram edit terminal 3.

[0086] In S1804, the diagram edit terminal 3 displays the another train operation date information on the screen.

[0087] In S1805, the diagram edit terminal 3 sends the another train operation date designated by a mouse operation etc. by the department manager from a list of the train operation dates displayed on the screen to the diagram management server 1.

[0088] In S1806, the diagram management server 1 executes train number bulk coupling processing executed immediately before to the train operation date received.

[0089] In this way, after the coupling processing by the diagram management server 1 shown in Fig. 17, bulk coupling processing is executed on the train having the same train number on the another train operation date, thereby further alleviating the workload in the diagram edit.

[0090] Accordingly, by the train diagram edit system according to the embodiment of the present invention, the following advantages are provided.

(1) When the authority setting information table 102B holds the authority level, the creation person (a name of a user created train line data) and the department manager of the train line creation (the upper user), the edit authority can be managed per the user and the department.

(2) The department manager of the train line creation can identify the user ID of the creation person (the general user) of the train line held in the authority setting information table 102B, and as the upper user, the department manager can change the creation person as appropriate.

(3) The creation person of the train line changed can take over quickly an edit work of the train line where the engagement is changed by receiving the engagement person change message in real time on the diagram edit terminal 3.

(4) The department manager can easily select and confirm the train line of the own department by displaying the authority level and the creation person held in the authority setting information table 102B.

(5) The creation person (the general user) can easily confirm and edit the train line engaged by oneself on the diagram edit terminal 3 by focusing the train line initially displayed based on the user ID and the authority level of the user logged in the diagram management server 1. Also, the train lines other than the train line engaged by oneself may be displayed for reference. In this case, the edit work of the train lines to be fit with those created by other users can be possible.

(6) The department manager can couple the train lines of the own department such that the train lines divided into plural lines can be coupled into one new train line.

(7) The coupling processing in (6) can also be applied to other train operation dates under the predetermined conditions. Therefore, when a plurality of dates can be designated, the bulk coupling processing of the train lines can be successively done on a plurality of the train operation dates.

<Embodiment 2>

[0091] In the diagram management system according to a second embodiment, only the configuration of the data base unit 102 included in the diagram management server 1 is different from the diagram management system according to the first embodiment, and the processing in the diagram management server 1 and the diagram edit terminal 3 is similar to the diagram management sys-

tem according to the first embodiment. Accordingly, the points different from the first embodiment will be described in detail.

[0092] Figs. 19 and 20 each shows a specific example of a stored content of the authority setting information table 102B and the user information table 102C in the train diagram edit system according to the second embodiment. Here, in the authority setting information table 102B shown in Fig. 5 and the user information table 102C shown in Fig. 6, a data item about a business manager who is the upper user of the department manager (a user having [Authority 6]) is added. Here, [Authority 6] is an authority level representing the business manager. The user having this authority level can edit all of the train lines where own user ID is set on a business manager row of the authority setting information table 102B.

[0093] Figs. 21 and 22 are tables for illustrating data transitions of the train line operation plan table 102A and the authority setting information table 102B before and after the train line coupling, respectively. Referring to the authority setting information table 102B shown in Fig. 22 using a train number 111A acquired by a record stored in the train line operation plan table 102A shown in Fig. 21 as a key, it is found that the user ID of the creation person of the train line is a user A, and the user ID of the department manager is a user AAA. Accordingly, the business manager having the user AAA can edit all of the train lines created by the user A and user AA having the authority level of the general user in an own company regardless of the departments. In Fig. 21, when shaded three records are designated by the business manager, they are sequentially coupled by the processing similar to the first embodiment to update to two records of the same train number. Fig. 23 shows a specific example of the train line coupling in different departments in the train line display screen displayed on the diagram edit terminal 3 shown in Fig. 1. Here, there is shown that the display on the screen is changed corresponding to the data transitions shown in Figs. 21 and 22 above. The number (111A) designated by the business manager as the train number is added to a new train line, and the creation person is changed to the user A only.

[0094] In this way, the train diagram edit system according to the second embodiment offers the following advantages in addition to the advantages offered by the first embodiment by defining the business manager as the upper user of the department manager in the data base unit 102. (1) When the login user is the business manager, the train lines can be managed in a bulk across different departments in the same company.

[0095] (2) In the case of (1), the business manager can freely edit the train lines created by the own company and change the creation person even when the department manager is absent.

<Embodiment 3>

[0096] In the diagram management system according to a third embodiment, only the configuration of the data base unit 102 included in the diagram management server 1 is different from the diagram management system according to the first embodiment, and the processing in the diagram management server 1 and the diagram edit terminal 3 is similar to the diagram management system according to the first embodiment. Accordingly, the points different from the first embodiment will be described in detail.

[0097] Figs. 24 and 25 each shows a specific example of a stored content of the authority setting information table 102B and the user information table 102C in the train diagram edit system according to the third embodiment. Here, in the authority setting information table 102B shown in Fig. 19 and the user information table 102C shown in Fig. 20, a data item about a supervisor (a user having [Authority 9]) is added. Here, [Authority 9] is an authority level representing the topmost user. The user having this authority level can edit all of the train lines where own user ID is set on a supervisor row of the authority setting information table 102B.

[0098] Here, a supposed supervisor will be described in detail, concerning to railway conditions in Europe, as an example. In Europe, railway transportation is liberalized, and railway operation companies can freely operate trains on infrastructure railways. In particular, in the train lines of cross-border international trains in Europe, railway companies of a plurality of countries require adjustments. If each company freely creates the train line, there is higher likelihood that operational problems may happen. For example, the train lines operating between an "A" country and a "B" country are created such that the train lines in the "A" country are created by the railway company in the "A" country, and the train lines in the "B" country are created by the railway company in the "B" country, and respective train lines are coupled. In train diagram lines thus created, the train lines may not be sufficiently adjusted. Waiting is generated where rail way tracks are crossed, and the trains may be significantly delayed. Thus, the supervisor according to the third embodiment is a new user installed to unify the management of a plurality of cross-border train lines created by a plurality of companies.

[0099] In this way, the train diagram edit system according to the third embodiment offers the following advantages in addition to the advantages offered by the first embodiment by defining the supervisor in the data base unit 102.

(1) Since the supervisor has an authority to edit the train lines separately created by a plurality of the companies, the trains can be mutually operated effectively among train lines by different companies.

(2) When one train enters from the "A" country to the "B" country as described above, the train diagrams of the "A" country to the "B" country can be collectively managed. Also, when the trains run crossing railway tracks, the supervisor can detect and modify

a plan that the trains will pass the crossing railway tracks at the same clock via the diagram edit terminal 3.

(3) Since the supervisor has an authority to edit the train lines created by a plurality of the companies, the supervisor can modify both of the train lines created by the railway company in the "A" country and created by the railway company in the "B" country. In addition, when the train lines are modified by the supervisor, and the predetermined conditions are met, e.g., when the arrival time of the train to the "A" country is earlier than the departure time of the train from the "B" country, the train diagram edit system can couple the train lines based on the authority level of the supervisor similar to the first and second embodiments.

(4) When information about the supervisor who unifies the management of the train lines crossing the companies is held in the authority setting information table 102B and the user information table 102C in the diagram management server 1, the supervisor can edit the train lines and change the creation person even when the business manager is absent.

[0100] While some embodiments of the present invention are described, these embodiments are exemplary only and are not intended to limit the scope of the invention. These novel embodiments can be embodied in other various forms, and various omissions, replacements, and changes can be performed within a scope which does not depart from the gist of the invention. These embodiments or the modifications are included to the scope or the gist of the invention and are included in a scope of the invention described in claims and equivalent thereof.

[0101] For example, although the diagram management server 1 includes the server side communication unit 101, the data base unit 102, the user authentication unit 103, the data extraction unit 104, the data coupling possibility determination unit 105, the data register and update unit 106 and the engagement person change message unit 107, a part of the functions may be decentralized, which may be executed by other computer. Also, it may be possible to get data etc. outside via the network, and a calculatable and executable program may be provided from another place. Furthermore, it is possible to design the diagram edit terminal 3 to have a part of the functions.

[0102] Further, although the diagram edit terminal 3 includes the terminal side communication unit 301, the input unit 302, the data edit unit 303, the train line acquisition unit 304, the train line display unit 305, the train line coupling unit 306 and the train line bulk coupling unit 307, a part of the functions may be decentralized, which may be executed by other computer. Also, it may be possible to get data etc. outside via the network, and a calculatable and executable program may be provided from another place. Furthermore, it is possible to design the diagram management server 1 to have a part of the functions.

[0103] The program and related data for executing the process according to the embodiments of the present invention may be provided by a computer readable storage medium. For example, the recording medium includes a CD-ROM (Compact Disk Read Only Memory), a floppy disk (FD), a CD-R (Compact Disk Recordable), a DVD (Digital Versatile Disk).

[0104] The program and related data for executing the process according to the embodiments of the present invention may be downloaded via a network, e.g., an Internet or Ethernet and stored on a computer. In addition, the program and related data may be provided on the network being capable of downloading on the computer or the like. Further, the program and related data for executing the process according to the embodiments of the present invention may be provided on respective separated places of a cloud being capable of downloading or executing the program on the respective places.

[0105] Also, the program and related data for executing the process according to the embodiments of the present invention may be provided by storing on a ROM or a flash memory within the apparatus.

Description of Symbols

[0106]

1	diagram management server
2	network
3	diagram edit terminal
11	CPU
12	ROM
13	RAM
14	input output interface
15	system bus
16	input apparatus
17	display apparatus
18	auxiliary storage apparatus
19	communication apparatus
101	server side communication unit
102	data base unit
102A	train line operation plan table
102B	authority setting information table
102C	user information table
103	user authentication unit
104	data extraction unit
105	data coupling possibility determination unit
106	data register and update unit
107	engagement person change message unit
301	terminal side communication unit
302	input unit
303	data edit unit
304	train line acquisition unit
305	train line display unit
306	train line coupling unit
307	train line bulk coupling unit

Claims

1. A train diagram edit system, comprising:

a diagram management server (1) that unifies the management of train line information including at least train numbers, train operation dates, operation stations, departure times and arrival times; and
a plurality of diagram edit terminals (3) that are network-connected to the diagram management server (1), and edit the train line information, **characterized in that** the diagram management server (1) includes:

a data base unit (102) that stores user information that defines a relationship between a login user on the diagram edit terminal (3) and an authority level; train line information; and authority setting information that defines a relationship between a creation person having an edit authority of the train line information and an upper user above the creation person; and
a data register and update unit (106) that registers and updates the data base unit (102) upon request of the diagram edit terminals (3), and
the diagram edit terminal (3) including:

a data edit unit (303) that edits the authority setting information and the train line information created by the creation person based on input information by the upper user, and requests register and update processing of the edited data to the data register and update unit (106), when the login user is defined as the upper user of the creation person in the authority setting information;
a train line acquisition unit (304) that acquires the train line information where the login user has the edit authority from the data base unit (102); and
a train line display unit (305) that displays the train line information acquired; and
a train line coupling unit (306) for coupling the train line information about two trains operated on the same date created by the user having the authority level lower than the login user into new train line information based on a comparison result of the orders of operation, the operation stations, the departure times and the arrival times, and for requesting the register and update of the data base unit (102) to the data register and update unit (106) based on the new train line information.

2. The train diagram edit system according to claim 1, wherein
the diagram management server (1) further includes an engagement person change message unit (107) for notifying an engagement person change message to the diagram edit terminal (3) used by the changed creation person and for outputting the new train line information in real time, when the creation person in the train line information stored in the train line operation plan table is changed by register and update processing in the data register and update unit (106).

3. A train diagram edit method in a computer system including a diagram management server (1) that unifies the management of train line information including at least train numbers, train operation dates, operation stations, departure times and arrival times; and a plurality of diagram edit terminals (3) that are network-connected to the diagram management server (1), and edit the train line information, **characterized in that** the train diagram edit method comprises the steps of:

storing user information that defines a relationship between a login user on a diagram edit terminal and an authority level; train line information; and authority setting information that defines a relationship between a creation person having an edit authority of the train line information and an upper user above the creation person on a data base by the diagram management server (1);
data-editing the authority setting information and the train line information created by the creation person based on input information by the upper user, and requesting register and update processing of the edited data to the diagram management server (1) by the diagram edit terminal (3), when the login user is defined as the upper user of the creation person in the authority setting information;
registering and updating the data base upon a request from the diagram edit terminals (3) by the diagram management server (1);
acquiring the train line information where the login user has the edit authority from the data base unit (102) by the diagram edit terminal (3); and
displaying the acquired train line information by the diagram edit terminal (3); and
coupling the train line information about two trains operated on the same date created by the user having the authority level lower than the

login user into new train line information based on a comparison result of the orders of operation, the operation stations, the departure times and the arrival times, and requesting the register and update of the data base unit (102) to the diagram management server (1) based on the new train line information by the diagram edit terminal (3).

4. A train diagram edit program to carry out the train diagram edit method of claim 3 that can be stored on a storage medium and be executed by a computer, comprising:

a function of storing train line information including at least train numbers, train operation dates, operation stations, departure times and arrival times; **characterized in that** the train diagram edit program comprises user information that defines a relationship between a user that edit the train line information and an authority level; and authority setting information that defines a relationship between the user having an edit authority of the train line information and an upper user above the creation person; and
a function of registering and updating the train line information re-edited based on the input information about the upper user, when the user is defined as the upper user in the authority setting information; and
a function of coupling the train line information about two trains of the same train created by the user into new train line information based on a comparison result of the orders of operation, the operation stations, the departure times and the arrival times, and registering and updating the data base based on the new train line information.

5. The train diagram edit program according to claim 4, wherein

the user is a general user who can edit the train line information based on the user's own general user edit authority, and
the upper user is a department manager, a business manager or a supervisor who can edit all train line information based on an upper edit authority.

6. The train diagram edit program according to claim 4, wherein,
when the user is defined as the upper user in the authority setting information, the function of registering and updating edits the user within the authority setting information based on the input information about the upper user.

7. The train diagram edit program according to claim 4, further comprising:

a function of notifying, when the user stored is changed, a change message to a changed new user and to output the new train line information.

8. The train diagram edit program according to claim 4, further comprising:

a function of displaying a plurality of train lines to be selected on a diagram edit terminal (3) for editing a diagram, and displaying information relating to the user and the upper user close to the train line displayed.

9. The train diagram edit program according to claim 8, further comprising:

a function of determining whether or not the train lines can be coupled by comparing the train line having the largest number of order of operation among the operation station information about the former train with the train line having the smallest number of order of operation among the operation station information about the later train from train line information about the train lines selected on the diagram edit terminal (3).

10. The train diagram edit program according to claim 4, further comprising:

a function of acquiring the train line information where the user has the edit authority by the diagram edit terminal (3); and
a function of displaying the train line information acquired by the diagram edit terminal (3).

11. The train diagram edit program according to claim 4, wherein the train line information includes train numbers, train operation dates, operation stations, departure times and arrival times, further comprising:

a function of bulk coupling processing executed on the train having the same train number on another train operation date having the train line information about the former train and the later train before coupling in the coupling processing.

12. The train diagram edit program according to claim 4, wherein

the authority setting information table includes a relationship between a creation person having edit authority of the train line information and an upper user above the creation person, and
the train line information created by the creation

person is edited and the edited data is registered and updated based on input information by the upper user when the upper user of the creation person is defined.

Patentansprüche

1. Zugdiagrammbearbeitungssystem, das Folgendes umfasst:

einen Diagrammverwaltungsserver (1), der die Verwaltung von Zugstreckeninformationen vereinigt, die mindestens Zugnummern, Zugbetriebsdatumsangaben, Betriebsstationen, Abfahrtszeiten und Ankunftszeiten enthalten; und mehrere Diagrammbearbeitungs-Terminals (3), die mit dem Diagrammverwaltungsserver (1) vernetzt sind und die Zugstreckeninformationen bearbeiten, **dadurch gekennzeichnet, dass** der Diagrammverwaltungsserver (1) Folgendes enthält:

eine Datenbankeinheit (102), die Folgendes speichert: Nutzerinformationen, die eine Beziehung zwischen einem Login-Nutzer an dem Diagramm-Terminal (3) und einer Befugnisebene definieren;
Zugstreckeninformationen; und Befugniseinstellinformationen, die eine Beziehung zwischen einer Erstellungsperson, die eine Bearbeitungsbefugnis für die Zugstreckeninformationen besitzt, und einem höheren Nutzer, der über der Erstellungsperson steht, definieren; und

eine Datenregistrierungs- und -aktualisierungseinheit (106), die die Datenbankeinheit (102) auf Verlangen der Diagrammbearbeitungs-Terminals (3) registriert und aktualisiert, und
wobei der Diagramm-Terminal (3) Folgendes enthält:

eine Datenbearbeitungseinheit (303), die die Befugniseinstellinformationen und die Zugstreckeninformationen, die durch die Erstellungsperson erstellt wurden, auf der Basis von Eingabe-Informationen von dem höheren Nutzer bearbeitet und eine Registrierungs- und Aktualisierungsverarbeitung der bearbeiteten Daten bei der Datenregistrierungs- und - aktualisierungseinheit (106) anfordert, wenn der Login-Nutzer als der höhere Nutzer der Erstellungsperson in den Befugniseinstellinformationen definiert ist;
eine Zuglinienerfassungseinheit (304), die die Zugstreckeninformationen aus der Datenbankeinheit (102) erfasst, wenn der Login-Nutzer die Bearbeitungsbefugnis hat; und
eine Zuglinienanzeigeeinheit (305), die die erfassten Zugstreckeninformationen anzeigt; und
eine Zuglinienkopplungseinheit (306) zum Einkoppeln der Zugstreckeninformationen über zwei Züge, die am selben Tag betrieben werden, die durch den Nutzer erstellt wurden, dessen Befugnisebene unter der des Login-Nutzers liegt, in neue Zugstreckeninformationen auf der Basis eines Vergleichsergebnisses der Betriebsreihenfolgen, der Betriebsstationen, der Abfahrtszeiten und der Ankunftszeiten, und zum Anfordern der Registrierung und Aktualisierung der Datenbankeinheit (102) bei der Datenregistrierungs- und -aktualisierungseinheit (106) auf der Basis der neuen Zugstreckeninformationen.

2. Zugdiagrammbearbeitungssystem nach Anspruch 1, wobei
der Diagrammverwaltungsserver (1) des Weiteren eine Beauftragtenauswechselungs-Mitteilungseinheit (107) enthält, um eine Beauftragtenauswechselungs-Mitteilung an den Diagramm-Terminal (3), der durch die ausgewechselte Erstellungsperson verwendet wird, zu übermitteln, und um die neuen Zugstreckeninformationen in Echtzeit auszugeben, wenn die Erstellungsperson in den Zugstreckeninformationen, die in der Zuglinienbetriebsplantabelle gespeichert sind, durch eine Registrierungs- und Aktualisierungsverarbeitung in der Datenregistrierungs- und -aktualisierungseinheit (106) ausgewechselt wird.

3. Zugdiagrammbearbeitungsverfahren in einem Computersystem, das einen Diagrammverwaltungsserver (1) enthält, der die Verwaltung von Zugstreckeninformationen vereinigt, die mindestens Zugnummern, Zugbetriebsdatumsangaben, Betriebsstationen, Abfahrtszeiten und Ankunftszeiten enthalten; und mehrere Diagrammbearbeitungs-Terminals (3) enthält, die mit dem Diagrammverwaltungsserver (1) vernetzt sind und die Zugstreckeninformationen bearbeiten, **dadurch gekennzeichnet, dass** das Zugdiagrammbearbeitungsverfahren folgende Schritte umfasst:

Speichern von Nutzerinformationen, die eine Beziehung zwischen einem Login-Nutzer an einem Diagramm-Terminal und einer Befugnisebene definieren;
Zugstreckeninformationen; und Befugniseinstellinformationen, die eine Beziehung zwischen einer Erstellungsperson, die eine Bearbeitungsbefugnis für die Zugstreckeninformati-

onen besitzt, und einem höheren Nutzer, der über der Erstellungsperson steht, definieren, in einer Datenbank durch den Diagrammverwaltungsserver (1);
Datenverarbeiten der Befugniseinstellinformationen und der Zugstreckeninformationen, die durch die Erstellungsperson erstellt wurden, auf der Basis von Eingabe-Informationen von dem höheren Nutzer, und Anfordern einer Registrierungs- und Aktualisierungsverarbeitung der bearbeiteten Daten bei dem Diagrammverwaltungsserver (1) durch den Diagramm-Terminal (3), wenn der Login-Nutzer als der höhere Nutzer der Erstellungsperson in den Befugniseinstellinformationen definiert ist;
Registrieren und Aktualisieren der Datenbank auf eine Anforderung von den Diagrammbearbeitungs-Terminals (3) durch den Diagrammverwaltungsserver (1);
Erfassen der Zugstreckeninformationen aus der Datenbankeinheit (102) durch den Diagramm-Terminal (3), wenn der Login-Nutzer die Bearbeitungsbefugnis hat; und
Anzeigen der erfassten Zugstreckeninformationen durch den Diagramm-Terminal (3); und
Einkoppeln der Zugstreckeninformationen über zwei Züge, die am selben Tag betrieben werden, die durch den Nutzer erstellt wurden, dessen Befugnisebene unter der des Login-Nutzers liegt, in neue Zugstreckeninformationen auf der Basis eines Vergleichsergebnisses der Betriebsreihenfolgen, der Betriebsstationen, der Abfahrtszeiten und der Ankunftszeiten, und Anfordern der Registrierung und Aktualisierung der Datenbankeinheit (102) bei dem Diagrammverwaltungsserver (1) auf der Basis der neuen Zugstreckeninformationen durch den Diagramm-Terminal (3).

4. Zugdiagrammbearbeitungsprogramm zum Ausführen des Zugdiagrammbearbeitungsverfahrens nach Anspruch 3, das auf einem Speichermedium gespeichert und durch einen Computer ausgeführt werden kann, das Folgendes umfasst:

eine Funktion zum Speichern von Zugstreckeninformationen, die mindestens Zugnummern, Zugbetriebsdatumsangaben, Betriebsstationen, Abfahrtszeiten und Ankunftszeiten enthalten, **dadurch gekennzeichnet, dass** das Zugdiagrammbearbeitungsprogramm Nutzerinformationen, die eine Beziehung zwischen einem Nutzer, der die Zugstreckeninformationen bearbeitet, und einer Befugnisebene definieren, und Befugniseinstellinformationen, die eine Beziehung zwischen dem Nutzer, der eine Bearbeitungsbefugnis für die Zugstreckeninformationen besitzt, und einem höheren Nutzer, der über der Erstellungsperson steht, definieren, umfasst; und
eine Funktion zum Registrieren und Aktualisieren der Zugstreckeninformationen, die auf der Basis der Eingabe-Informationen über den höheren Nutzer erneut bearbeitet werden, wenn der Nutzer als der höhere Nutzer in den Befugniseinstellinformationen definiert ist; und
eine Funktion zum Einkoppeln der Zugstreckeninformationen über zwei Züge desselben Zuges, die durch den Nutzer erstellt wurden, in neue Zugstreckeninformationen auf der Basis eines Vergleichsergebnisses der Betriebsreihenfolgen, der Betriebsstationen, der Abfahrtszeiten und der Ankunftszeiten, und Registrieren und Aktualisieren der Datenbank auf der Basis der neuen Zugstreckeninformationen.

5. Zugdiagrammbearbeitungsprogramm nach Anspruch 4, wobei
der Nutzer ein allgemeiner Nutzer ist, der die Zugstreckeninformationen auf der Basis der eigenen allgemeinen Nutzerbearbeitungsbefugnis des Nutzers bearbeiten kann, und
der höhere Nutzer ein Abteilungsleiter, ein Betriebsleiter oder ein Vorgesetzter ist, der alle Zugstreckeninformationen auf der Basis einer höheren Bearbeitungsbefugnis bearbeiten kann.

6. Zugdiagrammbearbeitungsprogramm nach Anspruch 4, wobei,
wenn der Nutzer in den Befugniseinstellinformationen als der höhere Nutzer definiert ist, die Funktion zum Registrieren und Aktualisieren den Nutzer innerhalb der Befugniseinstellinformationen auf der Basis der Eingabe-Informationen über den höheren Nutzer bearbeitet.

7. Zugdiagrammbearbeitungsprogramm nach Anspruch 4, das des Weiteren Folgendes umfasst:

eine Funktion zum Übermitteln, wenn der gespeicherte Nutzer ausgewechselt wird, einer Änderungsmitteilung an einen eingewechselten neuen Nutzer, und zum Ausgeben der neuen Zugstreckeninformationen.

8. Zugdiagrammbearbeitungsprogramm nach Anspruch 4, das des Weiteren Folgendes umfasst:

eine Funktion zum Anzeigen mehrerer auf einem Diagramm-Terminal (3) auszuwählender Zuglinien zum Bearbeiten eines Diagramms, und Anzeigen von Informationen bezüglich des Nutzers und des höheren Nutzers nahe der angezeigten Zuglinie.

9. Zugdiagrammbearbeitungsprogramm nach An-

spruch 8, das des Weiteren Folgendes umfasst:

eine Funktion zum Bestimmen, ob die Zuglinien eingekoppelt werden können oder nicht, durch Vergleichen der Zuglinie mit der größten Zahl der Betriebsreihenfolge unter den Betriebsstationsinformationen über den vorherigen Zug mit der Zuglinie mit der kleinsten Zahl der Betriebsreihenfolge unter den Betriebsstationsinformationen über den späteren Zug anhand von Zugstreckeninformationen über die auf dem Diagramm-Terminal (3) ausgewählten Zuglinien.

10. Zugdiagrammbearbeitungsprogramm nach Anspruch 4, das des Weiteren Folgendes umfasst:

eine Funktion zum Erfassen der Zugstreckeninformationen durch den Diagramm-Terminal (3), wenn der Nutzer die Bearbeitungsbefugnis hat; und
eine Funktion zum Anzeigen der durch den Diagramm-Terminal (3) erfassten Zugstreckeninformationen.

11. Zugdiagrammbearbeitungsprogramm nach Anspruch 4, wobei die Zugstreckeninformationen Zugnummern, Zugbetriebsdatumsangaben, Betriebsstationen, Abfahrtszeiten und Ankunftszeiten enthalten, und das des Weiteren Folgendes umfasst:

eine Funktion zur Masseneinkopplungsverarbeitung, die an dem Zug ausgeführt wird, der die gleiche Zugnummer an einem anderen Zugbetriebsdatum hat, wobei die Zugstreckeninformationen über den vorherigen Zug und den späteren Zug vorliegen, bevor die Einkopplung in der Einkopplungsverarbeitung ausgeführt wird.

12. Zugdiagrammbearbeitungsprogramm nach Anspruch 4, wobei
die Befugniseinstellinformationstabelle eine Beziehung zwischen einer Erstellungsperson mit der Bearbeitungsbefugnis für die Zugstreckeninformationen und einem höheren Nutzer, der über der Erstellungsperson steht, enthält, und
die Zugstreckeninformationen, die durch die Erstellungsperson erstellt wurden, bearbeitet werden und die bearbeiteten Daten auf der Basis von Eingabe-Informationen von dem höheren Nutzer registriert und aktualisiert werden, wenn der höhere Nutzer der Erstellungsperson definiert ist.

Revendications

1. Système de modification de diagramme de train, comprenant :

un serveur de gestion de diagramme (1) qui unifie la gestion d'informations de lignes de train comprenant au moins des numéros de train, des dates d'exploitation de train, des gares d'exploitation, des heures de départ et des heures d'arrivée ; et
une pluralité de terminaux de modification de diagramme (3) qui sont reliés en réseau au serveur de gestion de diagramme (1), et qui modifient les informations de lignes de train, **caractérisé en ce que** le serveur de gestion de diagramme (1) comprend :

une unité de base de données (102) mémorisant des informations d'utilisateur définissant une relation entre un utilisateur connecté sur le terminal de modification de diagramme (3) et un niveau d'autorité ; des informations de lignes de train ; et des informations de réglage d'autorité définissant une relation entre un créateur ayant une autorité de modification des informations de lignes de train et un utilisateur supérieur au-dessus du créateur ; et
une unité d'enregistrement et de mise à jour de données (106) enregistrant et mettant à jour l'unité de base de données (102) à la demande des terminaux de modification de diagramme (3), et

le terminal de modification de diagramme (3) comprenant :

une unité de modification de données (303) modifiant les informations de réglage d'autorité et les informations de lignes de train créées par le créateur sur la base des informations d'entrée par l'utilisateur supérieur, et demandant le traitement d'enregistrement et de mise à jour des données modifiées à l'unité d'enregistrement et de mise à jour de données (106), lorsque l'utilisateur connecté est défini en tant qu'utilisateur supérieur du créateur dans les informations de réglage d'autorité ;
une unité d'acquisition de lignes de train (304) acquérant les informations de lignes de train où l'utilisateur connecté a l'autorité de modification à partir de l'unité de base de données (102) ; et
une unité d'affichage de lignes de train (305) affichant les informations de lignes de train acquises ; et
une unité de couplage de lignes de train (306) pour coupler les informations de lignes de train concernant deux trains exploités à la même date créées par l'utilisateur ayant le niveau d'autorité inférieur à l'utili-

sateur connecté dans les nouvelles informations de lignes de train sur la base d'un résultat de comparaison des ordres d'exploitation, des gares d'exploitation, des heures de départ et des heures d'arrivée, et pour demander l'enregistrement et la mise à jour de l'unité de base de données (102) à l'unité d'enregistrement et de mise à jour de données (106) sur la base des nouvelles informations de lignes de train.

2. Système de modification de diagramme de train selon la revendication 1, dans lequel
le serveur de gestion de diagramme (1) comprend en outre une unité de message de changement d'intervenant (107) pour notifier un message de changement d'intervenant au terminal de modification de diagramme (3) utilisé par le créateur changé et pour délivrer les nouvelles informations de lignes de train en temps réel, lorsque le créateur dans les informations de lignes de train mémorisées dans le tableau de plan d'exploitation de lignes de train est changé par le traitement d'enregistrement et de mise à jour dans l'unité d'enregistrement et de mise à jour de données (106).

3. Procédé de modification de diagramme de train dans un système informatique comprenant un serveur de gestion de diagramme (1) qui unifie la gestion d'informations de lignes de train comprenant au moins des numéros de train, des dates d'exploitation de train, des gares d'exploitation, des heures de départ et des heures d'arrivée ; et une pluralité de terminaux de modification de diagramme (3) qui sont reliés en réseau au serveur de gestion de diagramme (1), et qui modifient les informations de lignes de train, **caractérisé en ce que** le procédé de modification de diagramme de train comprend les étapes de :

la mémorisation d'informations d'utilisateur définissant une relation entre un utilisateur connecté sur un terminal de modification de diagramme et un niveau d'autorité ; d'informations de lignes de train ; et d'informations de réglage d'autorité définissant une relation entre un créateur ayant une autorité de modification des informations de lignes de train et un utilisateur supérieur au-dessus du créateur sur une base de données par le serveur de gestion de diagramme (1) ;
la modification de données des informations de réglage d'autorité et des informations de lignes de train créées par le créateur sur la base des informations d'entrée par l'utilisateur supérieur, et la demande du traitement d'enregistrement et de mise à jour des données modifiées au serveur de gestion de diagramme (1) par le terminal de modification de diagramme (3), lorsque l'utilisateur connecté est défini en tant qu'utilisateur supérieur du créateur dans les informations de réglage d'autorité ;
l'enregistrement et la mise à jour de la base de données à la demande des terminaux de modification de diagramme (3) par le serveur de gestion de diagramme (1) ;
l'acquisition des informations de lignes de train où l'utilisateur connecté a l'autorité de modification à partir de l'unité de base de données (102) par le terminal de modification de diagramme (3) ; et
l'affichage des informations de lignes de train acquises par le terminal de modification de diagramme (3) ; et
le couplage des informations de lignes de train concernant deux trains exploités à la même date créées par l'utilisateur ayant le niveau d'autorité inférieur à l'utilisateur connecté dans les nouvelles informations de lignes de train sur la base d'un résultat de comparaison des ordres d'exploitation, des gares d'exploitation, des heures de départ et des heures d'arrivée, et la demande de l'enregistrement et la mise à jour de l'unité de base de données (102) au serveur de gestion de diagramme (1) sur la base des nouvelles informations de lignes de train par le terminal de modification de diagramme (3).

4. Programme de modification de diagramme de train pour effectuer le procédé de modification de diagramme de train de la revendication 3, qui peut être mémorisé sur un support de mémorisation et exécuté par un ordinateur, comprenant :

une fonction de mémorisation d'informations de lignes de train comprenant au moins des numéros de train, des dates d'exploitation de train, des gares d'exploitation, des heures de départ et des heures d'arrivée ; **caractérisé en ce que** le programme de modification de diagramme de train comprend des informations d'utilisateur définissant une relation entre un utilisateur modifiant les informations de lignes de train et un niveau d'autorité ; et des informations de réglage d'autorité définissant une relation entre l'utilisateur ayant une autorité de modification des informations de lignes de train et un utilisateur supérieur au-dessus du créateur ; et
une fonction d'enregistrement et de mise à jour des informations de lignes de train remodifiées sur la base des informations d'entrée concernant l'utilisateur supérieur, lorsque l'utilisateur est défini en tant qu'utilisateur supérieur dans les informations de réglage d'autorité ; et
une fonction de couplage des informations de lignes de train concernant deux trains exploités à la même date créées par l'utilisateur dans les

nouvelles informations de lignes de train sur la base d'un résultat de comparaison des ordres d'exploitation, des gares d'exploitation, des heures de départ et des heures d'arrivée, et d'enregistrement et de mise à jour de la base de données sur la base des nouvelles informations de lignes de train.

5. Programme de modification de diagramme de train selon la revendication 4, dans lequel
l'utilisateur est un utilisateur général qui peut modifier les informations de lignes de train sur la base de la propre autorité de modification d'utilisateur général de l'utilisateur, et
l'utilisateur supérieur est un chef de service, un responsable d'activité ou un superviseur qui peut modifier toutes les informations de lignes de train sur la base d'une autorité de modification supérieure.

6. Programme de modification de diagramme de train selon la revendication 4, dans lequel
lorsque l'utilisateur est défini en tant qu'utilisateur supérieur dans les informations de réglage d'autorité, la fonction d'enregistrement et de mise à jour modifie l'utilisateur à l'intérieur des informations de réglage d'autorité sur la base des informations d'entrée concernant l'utilisateur supérieur.

7. Programme de modification de diagramme de train selon la revendication 4, comprenant en outre :

une fonction de notification, lorsque l'utilisateur mémorisé est changé, d'un message de changement à un nouvel utilisateur changé et de délivrance des nouvelles informations de lignes de train.

8. Programme de modification de diagramme de train selon la revendication 4, comprenant en outre :

une fonction d'affichage d'une pluralité de lignes de train à sélectionner sur un terminal de modification de diagramme (3) pour modifier un diagramme, et d'affichage d'informations concernant l'utilisateur et l'utilisateur supérieur à proximité de la ligne de train affichée.

9. Programme de modification de diagramme de train selon la revendication 8, comprenant en outre :

une fonction de détermination si les lignes de trains peuvent être couplées ou non par la comparaison de la ligne de train ayant le plus grand nombre d'ordres d'exploitation parmi les informations de gares d'exploitation au sujet du premier train à la ligne de train ayant le plus petit nombre d'ordres d'exploitation parmi les informations de gares d'exploitation au sujet du dernier train à partir des informations de lignes de train concernant les lignes de trains sélectionnées sur le terminal de modification de diagramme (3).

10. Programme de modification de diagramme de train selon la revendication 4, comprenant en outre :

une fonction d'acquisition des informations de lignes de train où l'utilisateur a l'autorité de modification par le terminal de modification de diagramme (3) ; et
une fonction d'affichage des informations de lignes de train acquises par le terminal de modification de diagramme (3).

11. Programme de modification de diagramme de train selon la revendication 4, dans lequel les informations de lignes de train comprennent des numéros de train, des dates d'exploitation de train, des gares d'exploitation, des heures de départ et des heures d'arrivée, comprenant en outre :

une fonction de traitement de couplage en vrac exécutée sur le train ayant le même numéro de train à une autre date d'exploitation de train ayant les informations de lignes de train concernant le premier train et le dernier train avant le couplage dans le traitement de couplage.

12. Programme de modification de diagramme de train selon la revendication 4, dans lequel
le tableau d'informations de réglage d'autorité comprend une relation entre un créateur ayant une autorité de modification des informations de lignes de train et un utilisateur supérieur au-dessus du créateur, et
les informations de lignes de train créées par le créateur sont modifiées et les données modifiées sont enregistrées et mises à jour sur la base d'informations d'entrée par l'utilisateur supérieur lorsque l'utilisateur supérieur du créateur est défini.

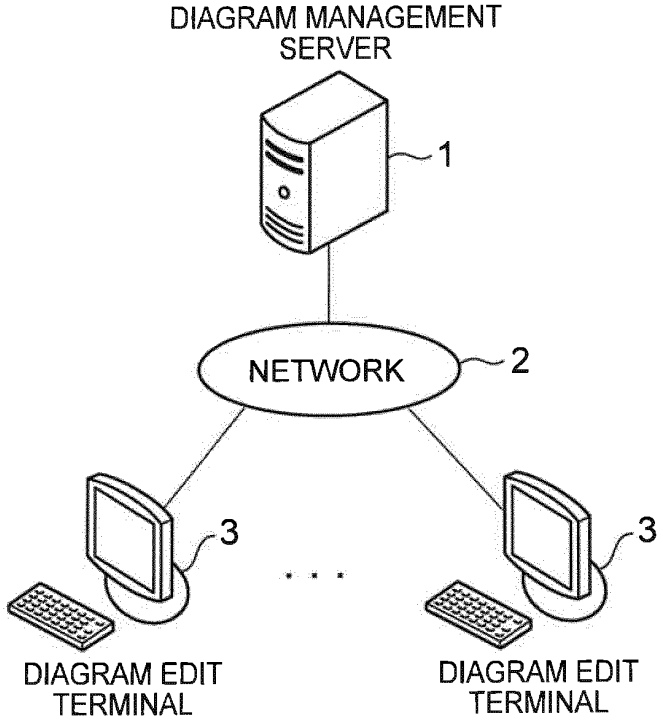
DIAGRAM MANAGEMENT SERVER
1
NETWORK
2
3
3
DIAGRAM EDIT TERMINAL
DIAGRAM EDIT TERMINAL

FIG. 1

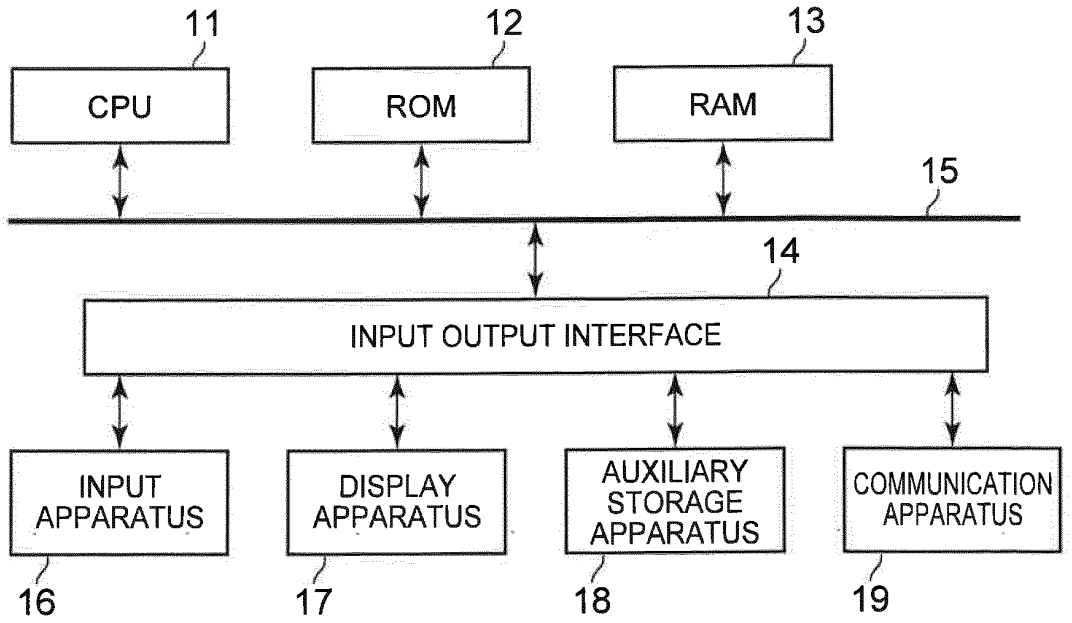
11
CPU
12
ROM
13
RAM
15
14
INPUT OUTPUT INTERFACE
INPUT APPARATUS
DISPLAY APPARATUS
AUXILIARY STORAGE APPARATUS
COMMUNICATION APPARATUS
16
17
18
19

FIG. 2

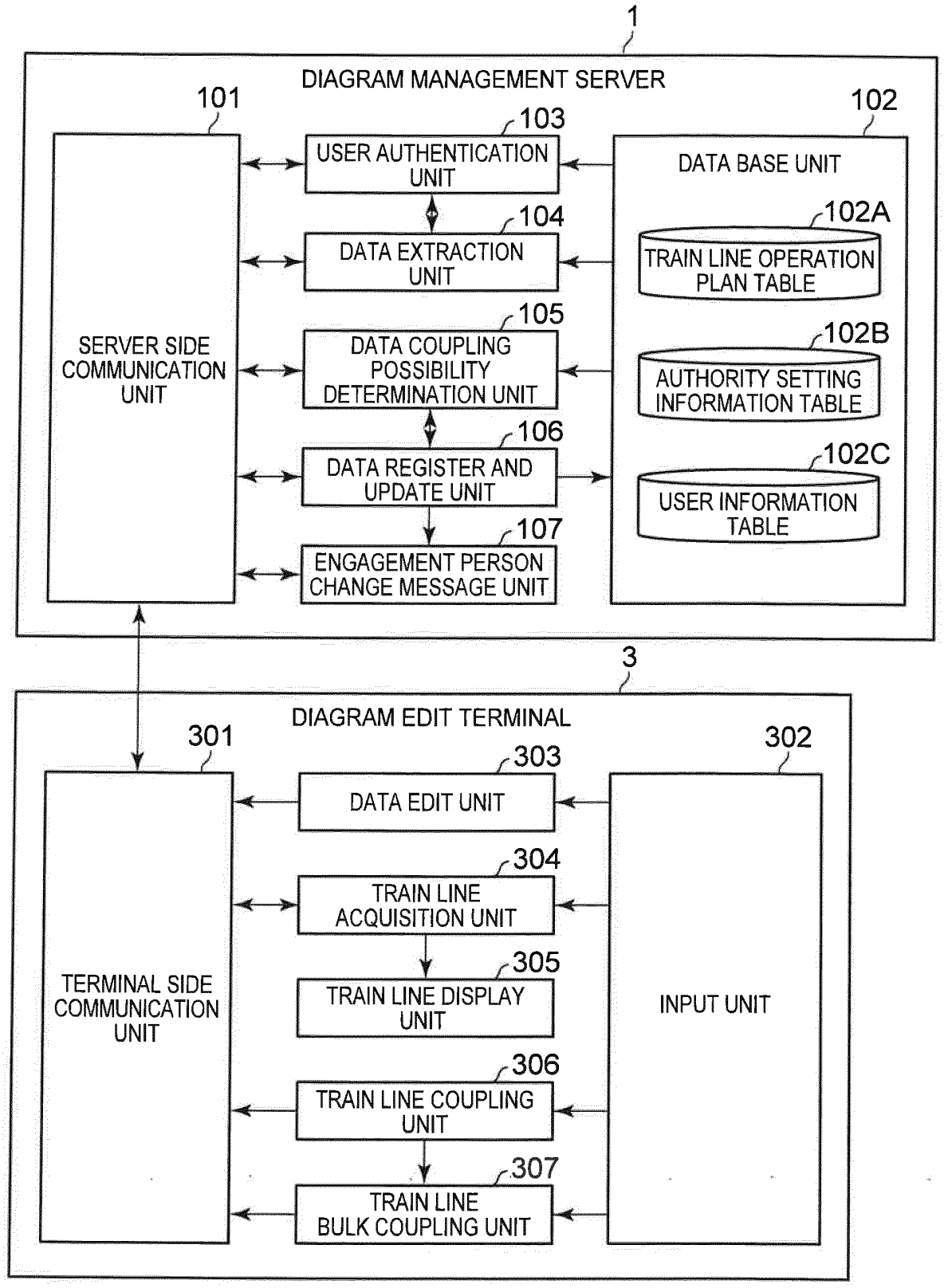
1
DIAGRAM MANAGEMENT SERVER
101
SERVER SIDE COMMUNICATION UNIT
103
USER AUTHENTICATION UNIT
104
DATA EXTRACTION UNIT
105
DATA COUPLING POSSIBILITY DETERMINATION UNIT
106
DATA REGISTER AND UPDATE UNIT
107
ENGAGEMENT PERSON CHANGE MESSAGE UNIT
102
DATA BASE UNIT
102A
TRAIN LINE OPERATION PLAN TABLE
102B
AUTHORITY SETTING INFORMATION TABLE
102C
USER INFORMATION TABLE
3
DIAGRAM EDIT TERMINAL
301
TERMINAL SIDE COMMUNICATION UNIT
303
DATA EDIT UNIT
304
TRAIN LINE ACQUISITION UNIT
305
TRAIN LINE DISPLAY UNIT
306
TRAIN LINE COUPLING UNIT
307
TRAIN LINE BULK COUPLING UNIT
302
INPUT UNIT

FIG. 3

TRAIN NUMBER	TRAIN OPERATION DATE	ORDER OF OPERATION	P/S	OPERATION STATION	PLATFORM NUMBER	DEPARTURE TIME	ARRIVAL TIME
111A	2011/07/01	1	STOP	AAA	1	05:00	
111A	2011/07/01	2	PASS	AAB		05:02	05:02
111A	2011/07/01	3	STOP	BBB	2		05:05
112A	2011/07/01	1	STOP	BBB	2	05:10	
112A	2011/07/01	2	STOP	CCC	1		05:16
...	...	...	...	...	...	...	...

FIG. 4

TRAIN NUMBER	TRAIN OPERATION DATE	AUTHORITY LEVEL	CREATION PERSON	DEPARTMENT MANAGER
111A	2011/07/01	0	USER A	USER AA
112A	2011/07/01	0	USER B	USER AA
...	...	...	...	...

FIG. 5

USER ID	AUTHORITY LEVEL	DEPARTMENT	DEPARTMENT MANAGER
USER A	0	DEPARTMENT A	USER AA
USER B	0	DEPARTMENT A	USER AA
USER AA	3	DEPARTMENT A	USER AA
...	...	...	...

FIG. 6

TRAIN NUMBER: 111A

TRAIN OPERATION DATE: 2011/07/01

STATION NAME	PLATFORM NUMBER	P/S	ARRIVAL TIME	DEPARTURE TIME
AAA	1	STOP		05:00
AAB		PASS	05:02	05:02
BBB	2	STOP	05:05	

<AUTHORITY ATTRIBUTION>

AUTHORITY: 0

DEPARTMENT: DEPARTMENT A

USER ID: USER A

FIG. 7

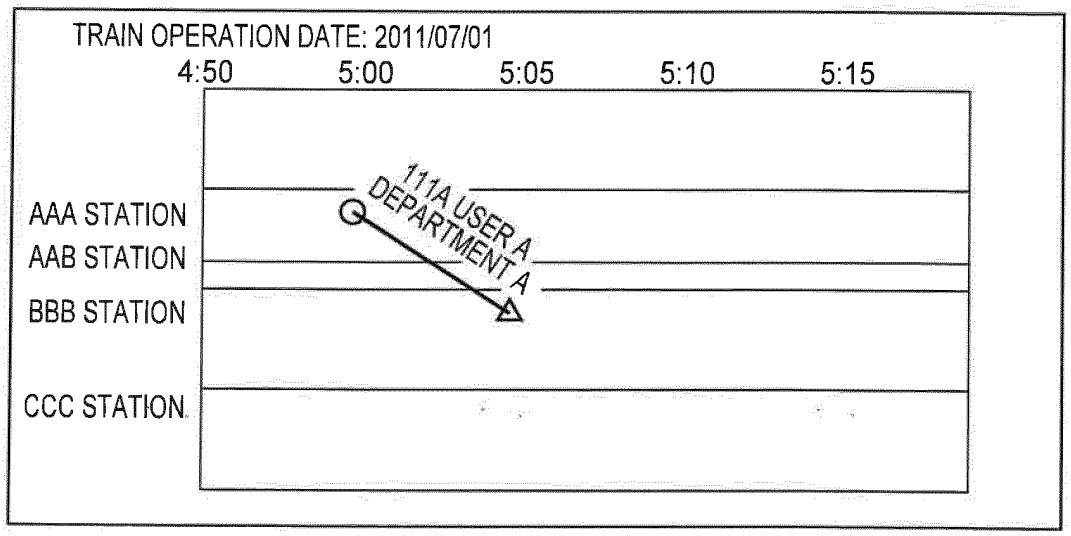

FIG. 8

TRAIN NUMBER	TRAIN OPERATION DATE	ORDER OF OPERATION	P/S	OPERATION STATION	PLATFORM NUMBER	DEPARTURE TIME	ARRIVAL TIME
111A	2011／07／01	1	STOP	AAA	1	5:00	
111A	2011／07／01	2	PASS	AAB		5:02	5:02
111A	2011／07／01	3	STOP	BBB	2		5:05
112A	2011／07／01	1	STOP	BBB	2	5:10	
112A	2011／07／01	2	STOP	AAA	1		5:16

↓

TRAIN NUMBER	TRAIN OPERATION DATE	ORDER OF OPERATION	P/S	OPERATION STATION	PLATFORM NUMBER	DEPARTURE TIME	ARRIVAL TIME
111A	2011／07／01	1	STOP	AAA	1	5:00	
111A	2011／07／01	2	PASS	AAB		5:02	5:02
111A	2011／07／01	3	STOP	BBB	2	5:10	5:05
111A	2011／07／01	4	STOP	CCC	1		5:16

FIG. 9

TRAIN NUMBER	TRAIN OPERATION DATE	AUTHORITY LEVEL	CREATION PERSON	DEPARTMENT MANAGER
111A	2011／07／01	0	USER A	USER AA
112A	2011／07／01	0	USER B	USER AA

↓

TRAIN NUMBER	TRAIN OPERATION DATE	AUTHORITY LEVEL	CREATION PERSON	DEPARTMENT MANAGER
111A	2011／07／01	0	USER A	USER AA

FIG. 10

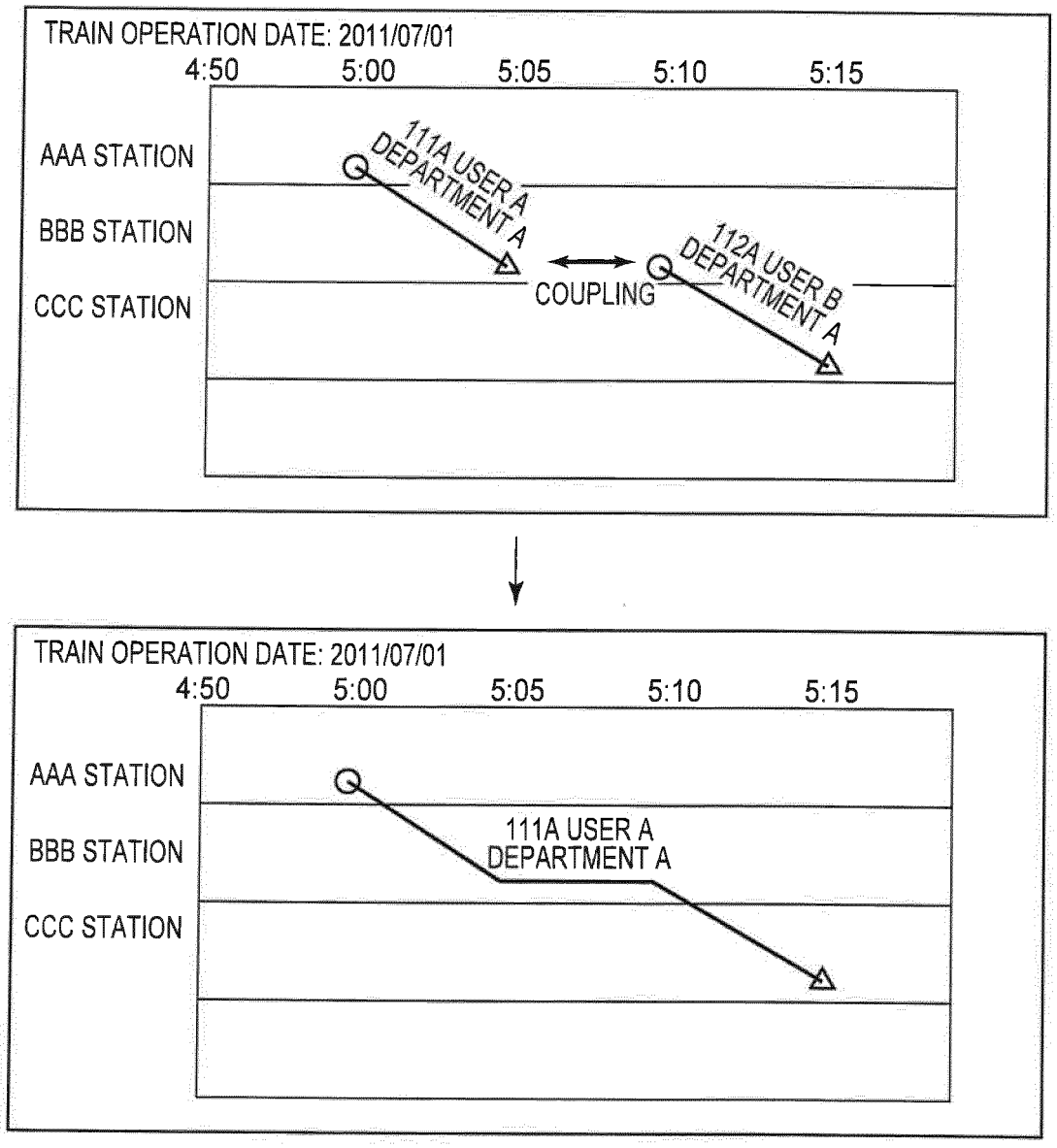
TRAIN OPERATION DATE: 2011/07/01
4:50
5:00
5:05
5:10
5:15
AAA STATION
BBB STATION
CCC STATION
111A USER A
DEPARTMENT A
COUPLING
112A USER B
DEPARTMENT A
TRAIN OPERATION DATE: 2011/07/01
4:50
5:00
5:05
5:10
5:15
AAA STATION
BBB STATION
CCC STATION
111A USER A
DEPARTMENT A

FIG. 11

TRAIN NUMBER	TRAIN OPERATION DATE	ORDER OF OPERATION	P/S	OPERATION STATION	PLATFORM NUMBER	DEPARTURE TIME	ARRIVAL TIME
111A	2011/07/01	1	STOP	AAA	1	5:00	
111A	2011/07/01	2	PASS	AAB		5:02	5:02
111A	2011/07/01	3	STOP	BBB	2	5:10	5:05
111A	2011/07/01	4	STOP	CCC	1		5:16
111A	2011/07/02	1	STOP	AAA	1	5:00	
111A	2011/07/02	2	PASS	AAB		5:02	5:02
111A	2011/07/02	3	STOP	BBB	2		5:05
112A	2011/07/02	1	STOP	BBB	2	5:10	
112A	2011/07/02	2	STOP	CCC	1		5:18
111A	2011/07/03	1	STOP	AAA	1	5:00	
111A	2011/07/03	2	PASS	AAB		5:02	5:02
111A	2011/07/03	3	STOP	BBB	2		5:05
112A	2011/07/03	1	STOP	BBB	2	5:10	
112A	2011/07/03	2	STOP	CCC	1		5:16

TRAIN NUMBER	TRAIN OPERATION DATE	ORDER OF OPERATION	P/S	OPERATION STATION	PLATFORM NUMBER	DEPARTURE TIME	ARRIVAL TIME
111A	2011/07/01	1	STOP	AAA	1	5:00	
111A	2011/07/01	2	PASS	AAB		5:02	5:02
111A	2011/07/01	3	STOP	BBB	2	5:10	5:05
111A	2011/07/01	4	STOP	CCC	1		5:16
111A	2011/07/02	1	STOP	AAA	1	5:00	
111A	2011/07/02	2	PASS	AAB		5:02	5:02
111A	2011/07/02	3	STOP	BBB	2	5:10	5:05
111A	2011/07/02	4	STOP	CCC	1		5:15
111A	2011/07/03	1	STOP	AAA	1	5:00	
111A	2011/07/03	2	PASS	AAB		5:02	5:02
111A	2011/07/03	3	STOP	BBB	2		5:05
112A	2011/07/03	1	STOP	BBB	2	5:10	
112A	2011/07/03	2	STOP	CCC	2		5:16

FIG. 12

TRAIN NUMBER	TRAIN OPERATION DATE	AUTHORITY LEVEL	CREATION PERSON	DEPARTMENT MANAGER
111A	2011/7/1	0	USER A	USER AA
111A	2011/7/2	0	USER A	USER AA
112A	2011/7/2	0	USER B	USER AA
111A	2011/7/3	0	USER A	USER AA
112A	2011/7/3	0	USER B	USER AA

↓

TRAIN NUMBER	TRAIN OPERATION DATE	AUTHORITY LEVEL	CREATION PERSON	DEPARTMENT MANAGER
111A	2011/7/1	0	USER A	USER AA
111A	2011/7/2	0	USER A	USER AA
111A	2011/7/3	0	USER A	USER AA
112A	2011/7/3	0	USER B	USER AA

FIG. 13

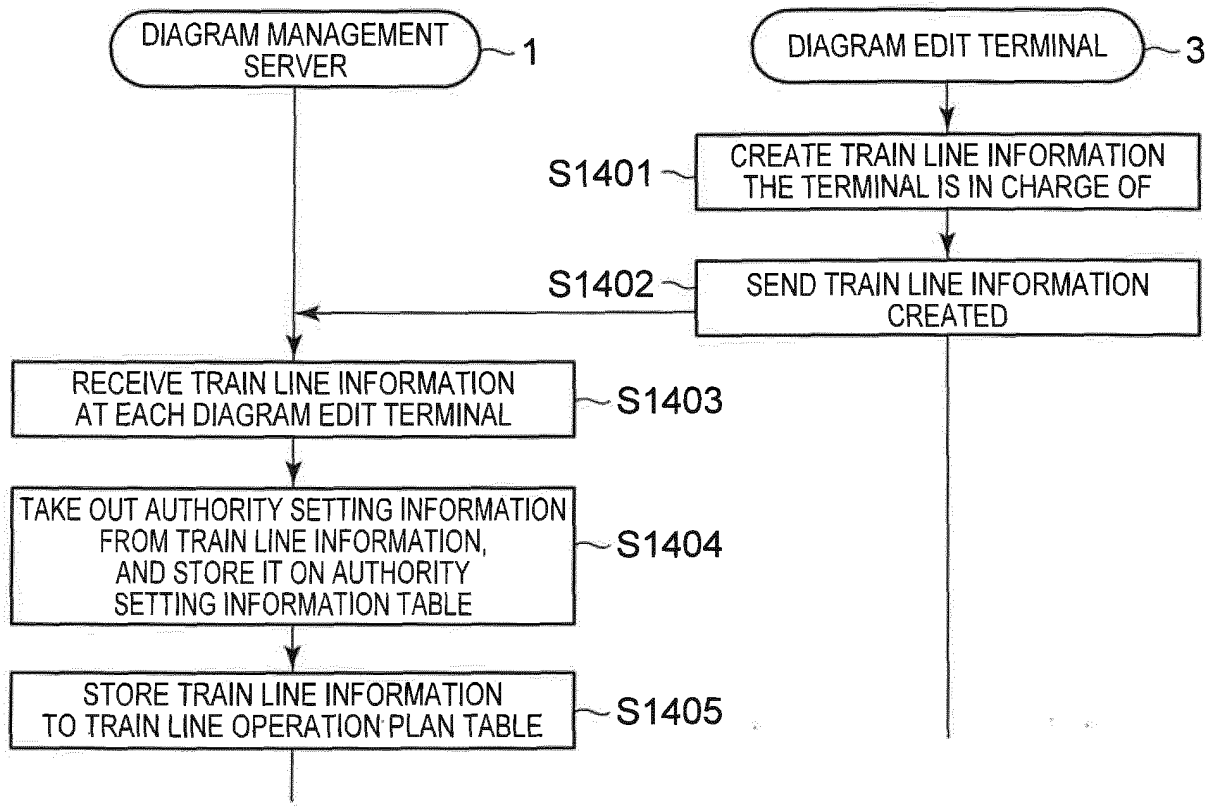

FIG. 14

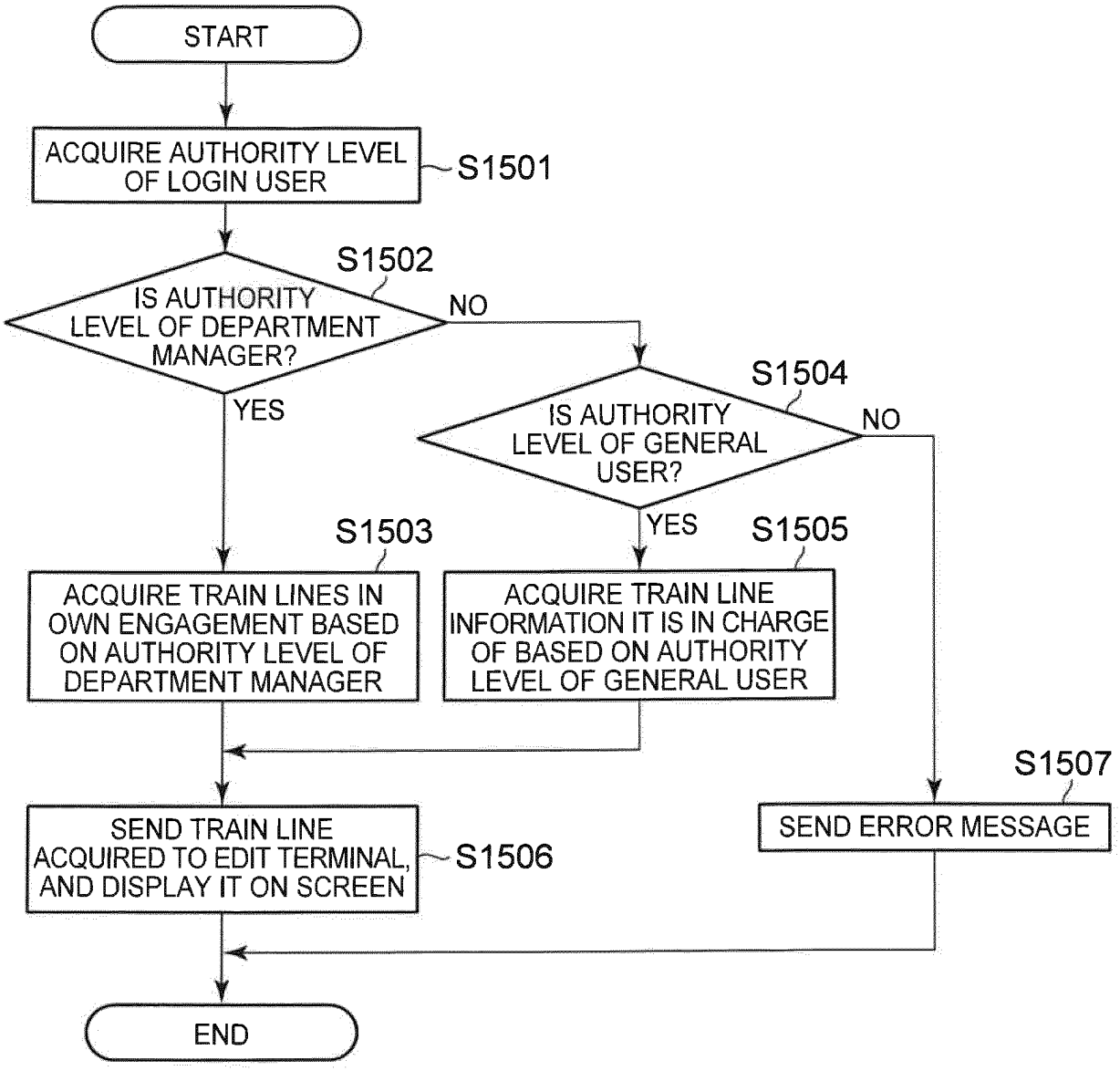
START
ACQUIRE AUTHORITY LEVEL OF LOGIN USER
S1501
S1502
IS AUTHORITY LEVEL OF DEPARTMENT MANAGER?
NO
YES
S1504
IS AUTHORITY LEVEL OF GENERAL USER?
NO
YES
S1503
S1505
ACQUIRE TRAIN LINES IN OWN ENGAGEMENT BASED ON AUTHORITY LEVEL OF DEPARTMENT MANAGER
ACQUIRE TRAIN LINE INFORMATION IT IS IN CHARGE OF BASED ON AUTHORITY LEVEL OF GENERAL USER
S1507
SEND TRAIN LINE ACQUIRED TO EDIT TERMINAL, AND DISPLAY IT ON SCREEN
S1506
SEND ERROR MESSAGE
END

FIG. 15

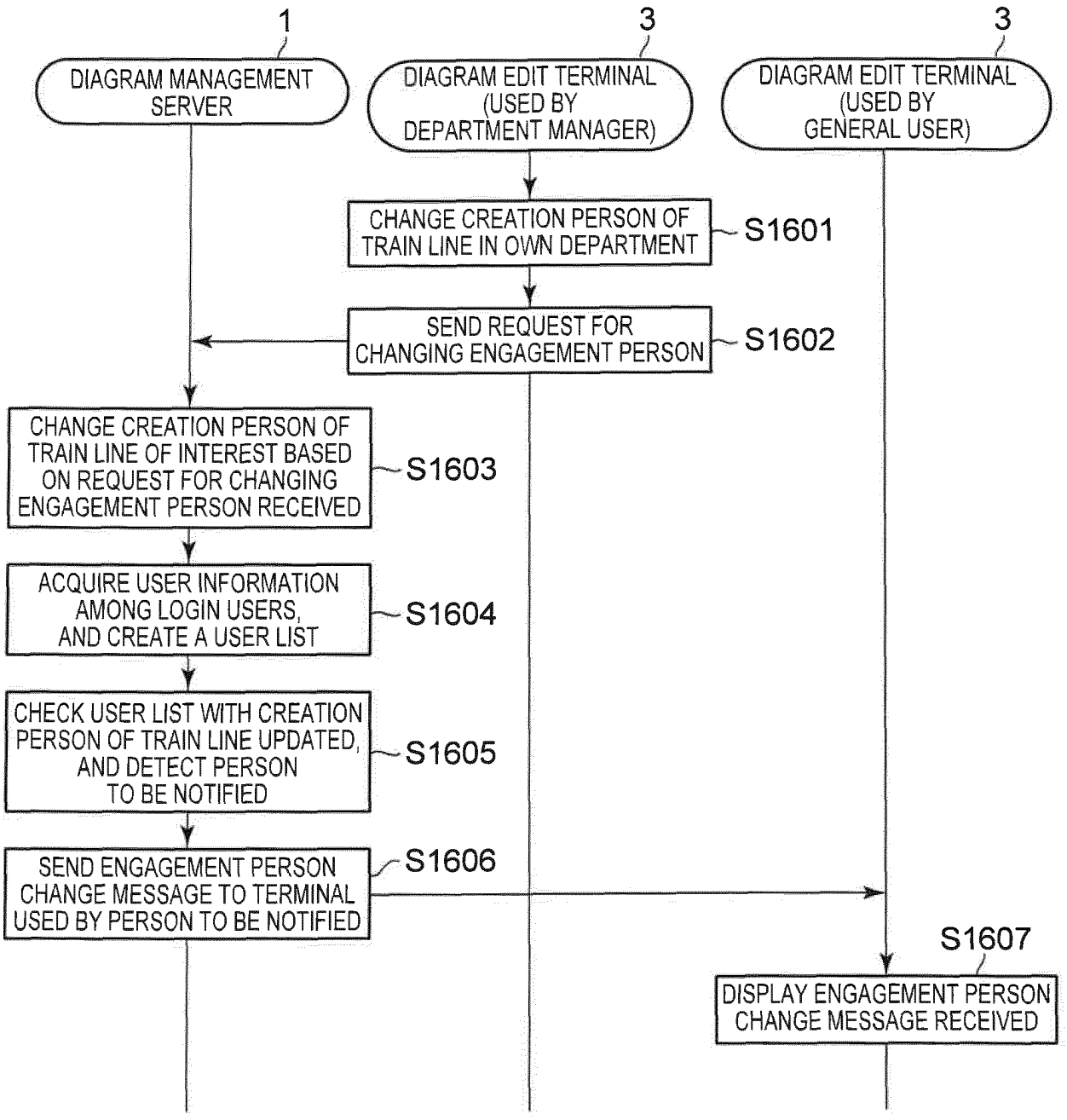
1
3
3
DIAGRAM MANAGEMENT SERVER
DIAGRAM EDIT TERMINAL (USED BY DEPARTMENT MANAGER)
DIAGRAM EDIT TERMINAL (USED BY GENERAL USER)
CHANGE CREATION PERSON OF TRAIN LINE IN OWN DEPARTMENT
S1601
SEND REQUEST FOR CHANGING ENGAGEMENT PERSON
S1602
CHANGE CREATION PERSON OF TRAIN LINE OF INTEREST BASED ON REQUEST FOR CHANGING ENGAGEMENT PERSON RECEIVED
S1603
ACQUIRE USER INFORMATION AMONG LOGIN USERS, AND CREATE A USER LIST
S1604
CHECK USER LIST WITH CREATION PERSON OF TRAIN LINE UPDATED, AND DETECT PERSON TO BE NOTIFIED
S1605
SEND ENGAGEMENT PERSON CHANGE MESSAGE TO TERMINAL USED BY PERSON TO BE NOTIFIED
S1606
S1607
DISPLAY ENGAGEMENT PERSON CHANGE MESSAGE RECEIVED

FIG. 16

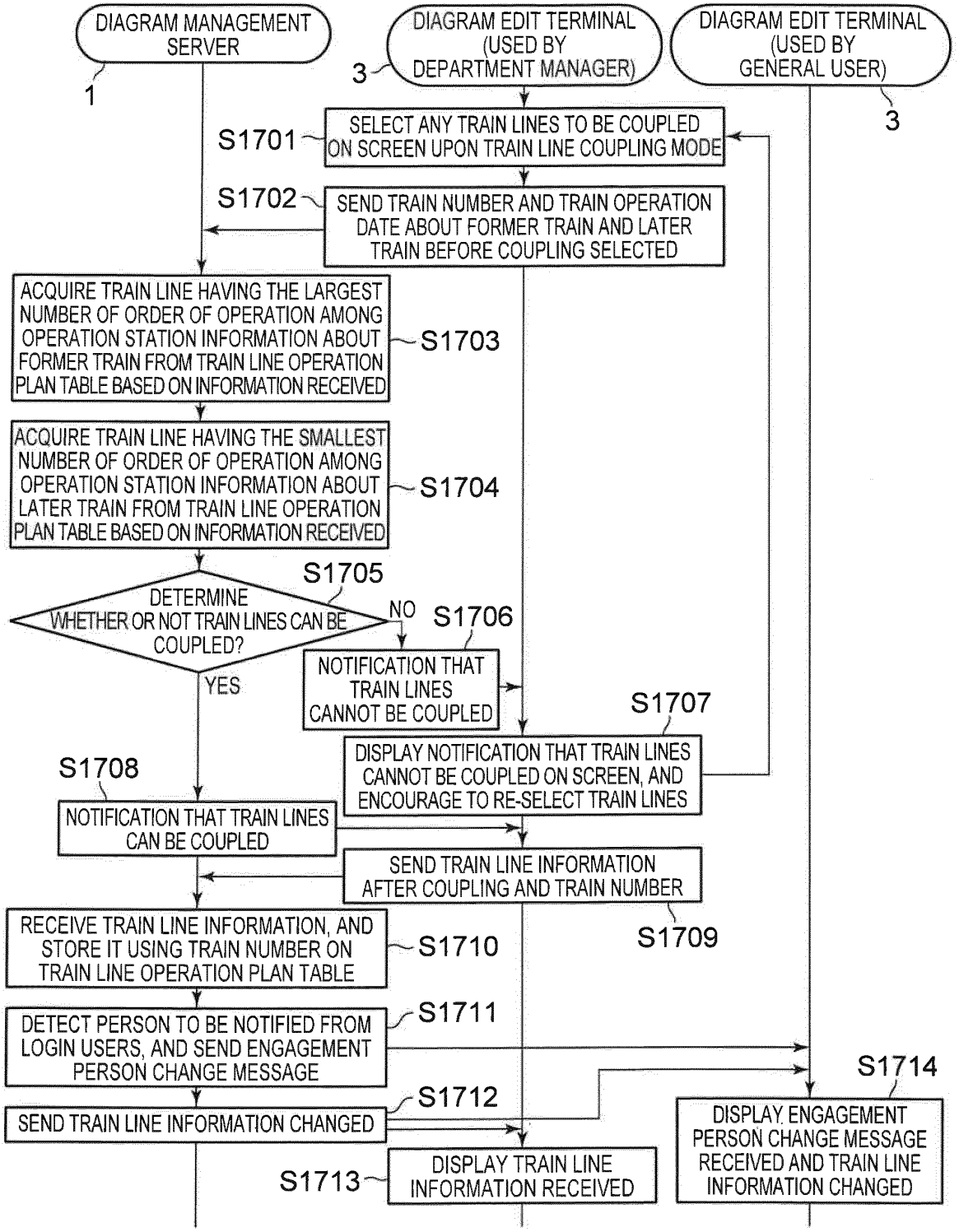
DIAGRAM MANAGEMENT SERVER
1
DIAGRAM EDIT TERMINAL (USED BY DEPARTMENT MANAGER)
3
DIAGRAM EDIT TERMINAL (USED BY GENERAL USER)
3
S1701
SELECT ANY TRAIN LINES TO BE COUPLED ON SCREEN UPON TRAIN LINE COUPLING MODE
S1702
SEND TRAIN NUMBER AND TRAIN OPERATION DATE ABOUT FORMER TRAIN AND LATER TRAIN BEFORE COUPLING SELECTED
ACQUIRE TRAIN LINE HAVING THE LARGEST NUMBER OF ORDER OF OPERATION AMONG OPERATION STATION INFORMATION ABOUT FORMER TRAIN FROM TRAIN LINE OPERATION PLAN TABLE BASED ON INFORMATION RECEIVED
S1703
ACQUIRE TRAIN LINE HAVING THE SMALLEST NUMBER OF ORDER OF OPERATION AMONG OPERATION STATION INFORMATION ABOUT LATER TRAIN FROM TRAIN LINE OPERATION PLAN TABLE BASED ON INFORMATION RECEIVED
S1704
S1705
DETERMINE WHETHER OR NOT TRAIN LINES CAN BE COUPLED?
NO
S1706
NOTIFICATION THAT TRAIN LINES CANNOT BE COUPLED
YES
S1707
DISPLAY NOTIFICATION THAT TRAIN LINES CANNOT BE COUPLED ON SCREEN, AND ENCOURAGE TO RE-SELECT TRAIN LINES
S1708
NOTIFICATION THAT TRAIN LINES CAN BE COUPLED
SEND TRAIN LINE INFORMATION AFTER COUPLING AND TRAIN NUMBER
S1709
RECEIVE TRAIN LINE INFORMATION, AND STORE IT USING TRAIN NUMBER ON TRAIN LINE OPERATION PLAN TABLE
S1710
S1711
DETECT PERSON TO BE NOTIFIED FROM LOGIN USERS, AND SEND ENGAGEMENT PERSON CHANGE MESSAGE
S1714
S1712
SEND TRAIN LINE INFORMATION CHANGED
DISPLAY ENGAGEMENT PERSON CHANGE MESSAGE RECEIVED AND TRAIN LINE INFORMATION CHANGED
S1713
DISPLAY TRAIN LINE INFORMATION RECEIVED

FIG. 17

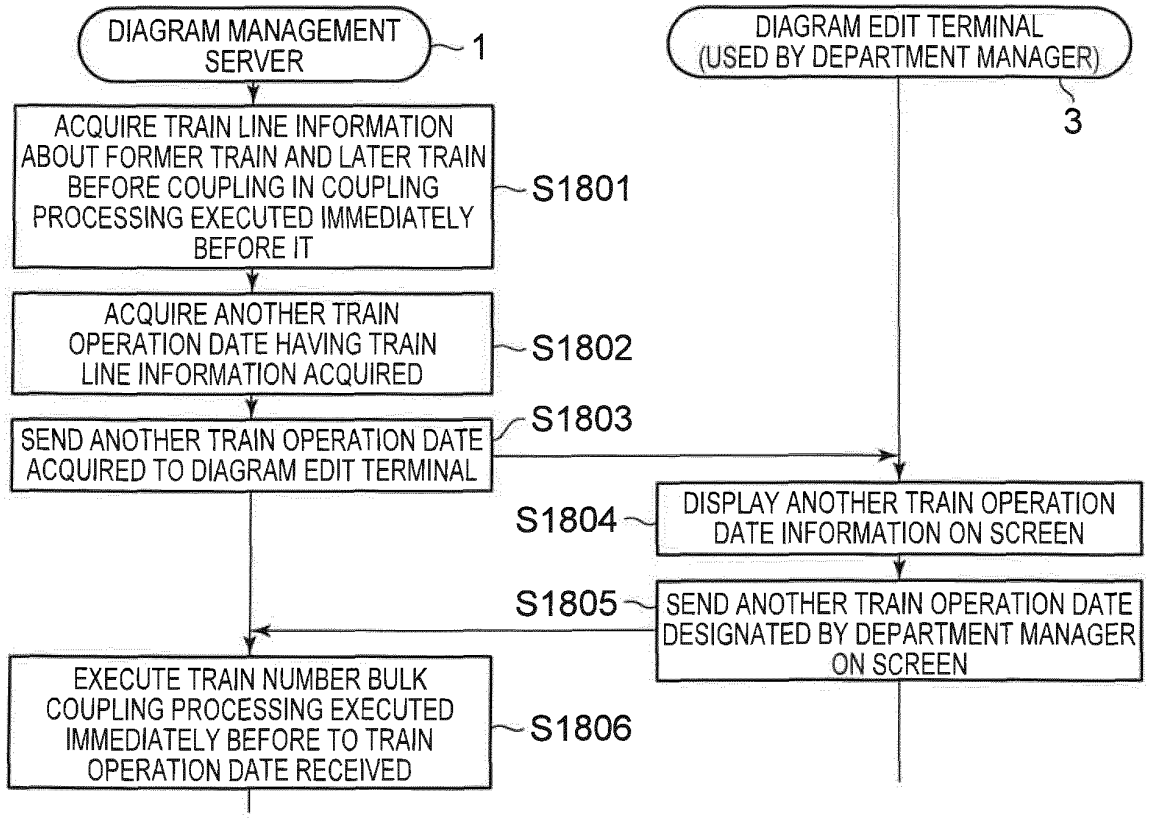

FIG. 18

TRAIN NUMBER	OPERATION NUMBER	AUTHORITY LEVEL	CREATION PERSON	DEPARTMENT MANAGER	BUSINESS MANAGER
111A	123	0	USER A	USER AA	USER AAA
112A	123	0	USER B	USER AA	USER AAA
...	...	...	...	...	...

FIG. 19

USER ID	AUTHORITY LEVEL	DEPARTMENT	DEPARTMENT MANAGER	BUSINESS MANAGER
USER A	0	DEPARTMENT A	USER AA	USER AAA
USER B	0	DEPARTMENT A	USER AA	USER AAA
USER AA	3	DEPARTMENT A	USER AA	USER AAA
USER AAA	6	—	—	USER AAA
...	...	...	...	...

FIG. 20

TRAIN NUMBER	TRAIN OPERATION DATE	ORDER OF OPERATION	P/S	OPERATION STATION	PLATFORM NUMBER	DEPARTURE TIME	ARRIVAL TIME
111A	2011／07／01	1	STOP	AAA	1	5:00	
111A	2011／07／01	2	PASS	AAB		5:02	5:02
111A	2011／07／01	3	STOP	BBB	2		5:05
112A	2011／07／01	1	STOP	BBB	2	5:10	
112A	2011／07／01	2	STOP	AAA	1		5:16

↓

TRAIN NUMBER	TRAIN OPERATION DATE	ORDER OF OPERATION	P/S	OPERATION STATION	PLATFORM NUMBER	DEPARTURE TIME	ARRIVAL TIME
111A	2011／07／01	1	STOP	AAA	1	5:00	
111A	2011／07／01	2	PASS	AAB		5:02	5:02
111A	2011／07／01	3	STOP	BBB	2	5:10	5:05
111A	2011／07／01	4	STOP	CCC	1		5:16

FIG. 21

TRAIN NUMBER	TRAIN OPERATION DATE	AUTHORITY LEVEL	CREATION PERSON	DEPARTMENT MANAGER	BUSINESS MANAGER
111A	2011/07/01	0	USER A	USER AA	USER AAA
112C	2011/07/01	0	USER C	USER CC	USER AAA

↓

TRAIN NUMBER	TRAIN OPERATION DATE	AUTHORITY LEVEL	CREATION PERSON	DEPARTMENT MANAGER	BUSINESS MANAGER
111A	2011/07/01	0	USER A	USER AA	USER AAA

FIG. 22

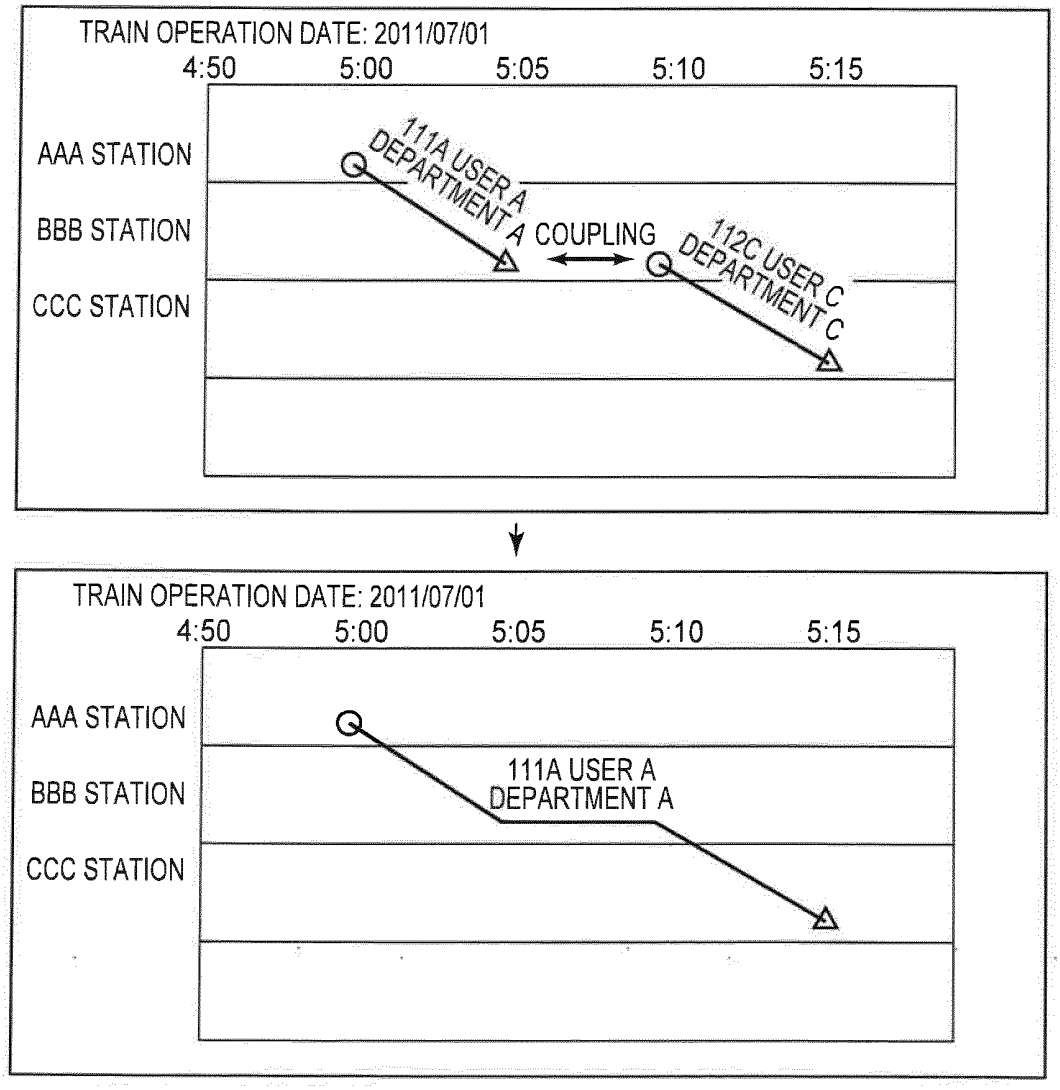

FIG. 23

TRAIN NUMBER	TRAIN OPERATION NUMBER	AUTHORITY LEVEL	CREATION PERSON	DEPARTMENT MANAGER	BUSINESS MANAGER	SUPERVISOR
111A	123	0	USER A	USER AA	USER AAA	USER AAAA
112B	123	0	USER B	USER AA	USER AAA	USER AAAA
...	...	...	...	...	...	...

FIG. 24

USER ID	AUTHORITY LEVEL	DEPARTMENT	DEPARTMENT MANAGER	BUSINESS MANAGER	SUPERVISOR
USER A	0	DEPARTMENT A	USER AA	USER AAA	USER AAAA
USER B	0	DEPARTMENT A	USER AA	USER AAA	USER AAAA
USER AA	3	DEPARTMENT A	USER AA	USER AAA	USER AAAA
USER AAA	6	—	—	USER AAA	USER AAAA
USER AAAA	9	—	—	—	USER AAAA
...	...	...	...	...	...

FIG. 25

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2007168672 A **[0004]**