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

(57) Train lines can be effectively created, shared by a plurality of users. Upper users can edit the train lines created by general users and make engagement person change. A diagram management server stores user information defining a relationship between a login user and an authority level; train line information; and authority setting information defining a relationship between a creation person having edit authority of the train line and an upper user in database. When the login user is defined as upper user of the creation person in the authority setting, the diagram edit terminal requests register and update of the train line information created by the creation person based on authority level of the login user, and the diagram management server registers and updates the train line information. Then, from database, the diagram edit terminal acquires the train line information that the login user has the edit authority, and displays the train line information.

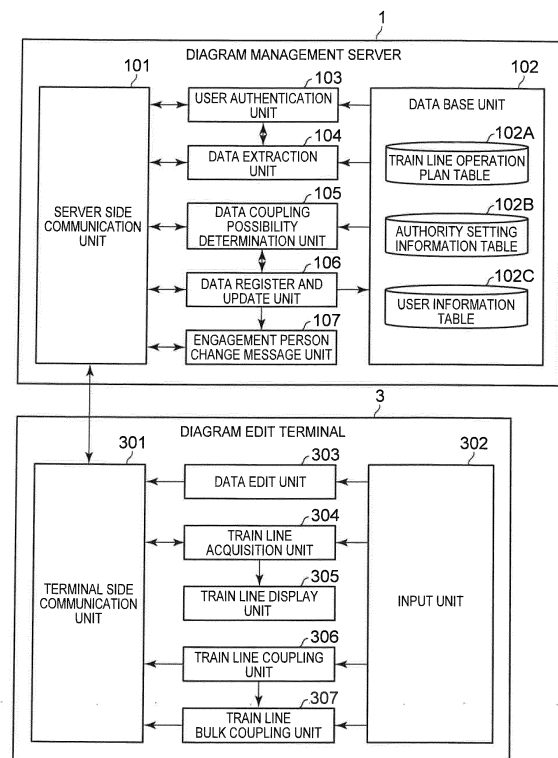


FIG. 3

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is based upon and claims the benefit of priority from the prior Japanese Patent Application No. 2011-229904, filed on October 19, 2011, the entire contents of which are incorporated herein by reference.

FIELD

[0002] Embodiments of the present invention relate to a train diagram edit system, a train diagram edit method, and a train diagram edit program.

BACKGROUND

[0003] 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.

[0004] 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.

[0005] The following documents relate to the above-described technology, the entire contents of which are incorporated herein by reference.

Patent Document 1: Japanese Patent Application Laid-open No. 2007-62554

Patent Document 2: Japanese Patent Application Laid-open No. 2006-27555

SUMMARY OF INVENTION

PROBLEM TO BE SOLVED BY THE INVENTION

[0006] 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

[0007]

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

[0008] 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.

[0009] 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 register and update unit registers and updates the data base unit upon request of the diagram edit terminals.

[0010] 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.

[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 interface 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 with-

in 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 from 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 manager 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 process-

ing 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.

[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 cal-

culatable 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 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, the diagram management server including:

a data base unit that stores user information that defines a relationship between a login user on the 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; and

a data resister and update unit that resisters and updates the data base unit upon request of the diagram edit terminals, and the diagram edit terminal including:

a data edit unit 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, when the login user is defined as the upper user of the creation person in the authority setting information;

a train line acquisition unit that acquires the train line information where the login user has the edit authority from the data base unit; and

a train line display unit that displays the train line information acquired.

2. The train diagram edit system according to claim 1, wherein

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.

3. The train diagram edit system according to claim 2, wherein

the diagram management server further includes an engagement person change message unit for notifying an engagement person change message to the diagram edit terminal 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.

4. A train diagram edit method in a computer system including 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, comprising 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;

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 by the diagram edit terminal, 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 by the diagram management server;

acquiring the train line information where the login user has the edit authority from the data base unit by the diagram edit terminal; and displaying the acquired train line information by the diagram edit terminal.

5. A train diagram edit method according to claim 4, further comprising the steps of:

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 to the diagram management server based on the new train line information by the diagram edit terminal.
6. A train diagram edit program 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; 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.
7. The train diagram edit program according to claim 6, further comprising:
- 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.
8. The train diagram edit program according to claim 6, 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.
9. The train diagram edit program according to claim 6, 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.
10. The train diagram edit program according to claim 6, 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.
11. The train diagram edit program according to claim 7, further comprising:
- a function of displaying a plurality of train lines to be selected on a diagram edit terminal for editing a diagram, and displaying information relating to the user and the upper user close to the train line displayed.
12. The train diagram edit program according to claim 11, 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.
13. The train diagram edit program according to claim 6, further comprising:
- a function of acquiring the train line information where the user has the edit authority by the diagram edit terminal; and
- a function of displaying the train line information acquired by the diagram edit terminal.
14. The train diagram edit program according to claim 7, 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.
15. The train diagram edit program according to claim 6, 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.

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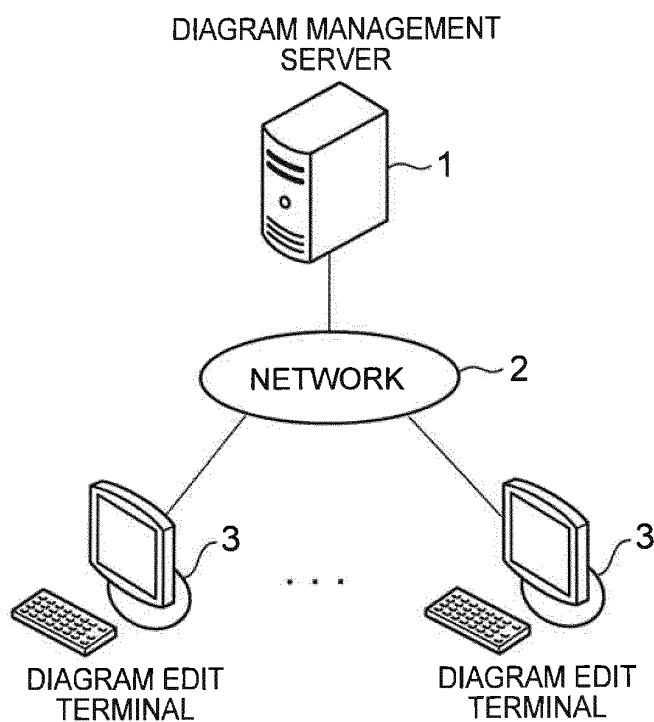


FIG. 1

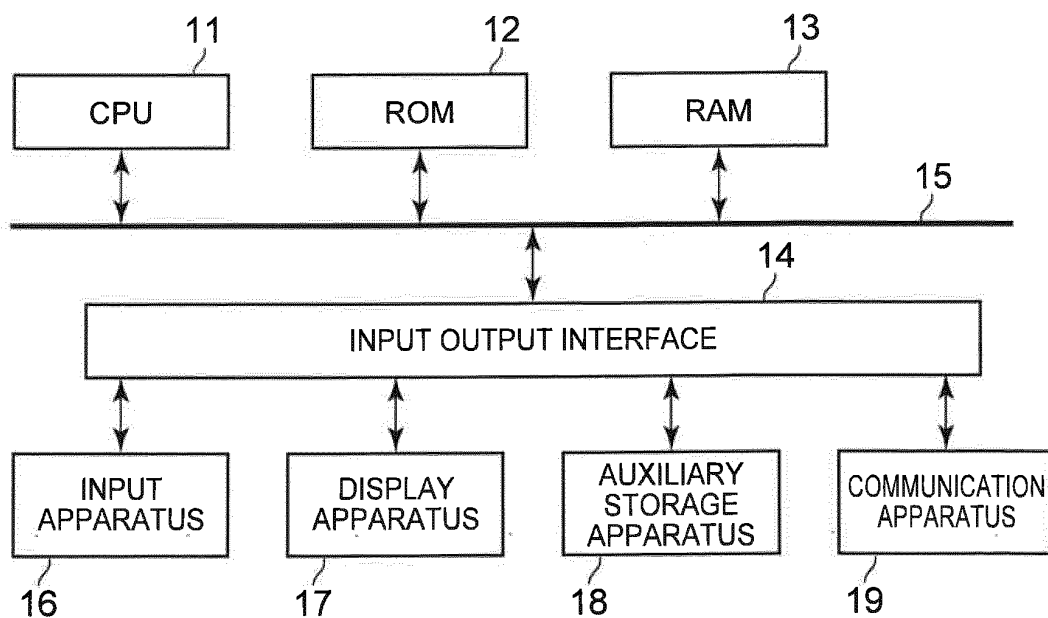


FIG. 2

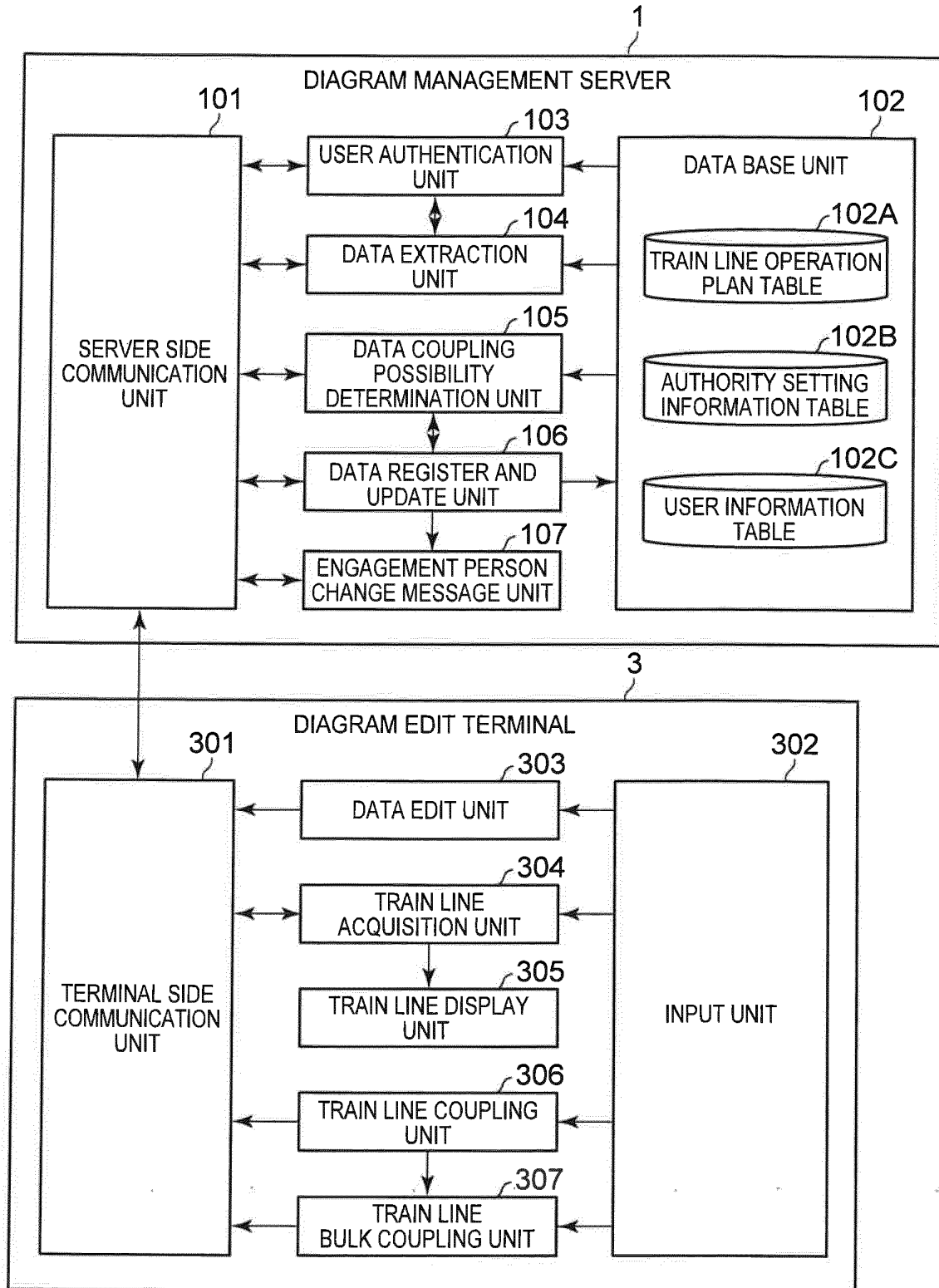


FIG. 3

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

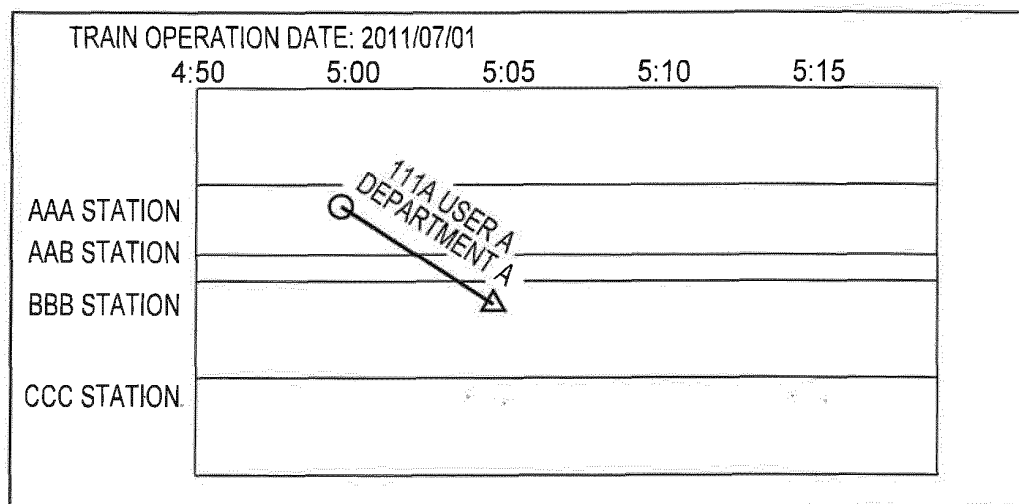


FIG. 8

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

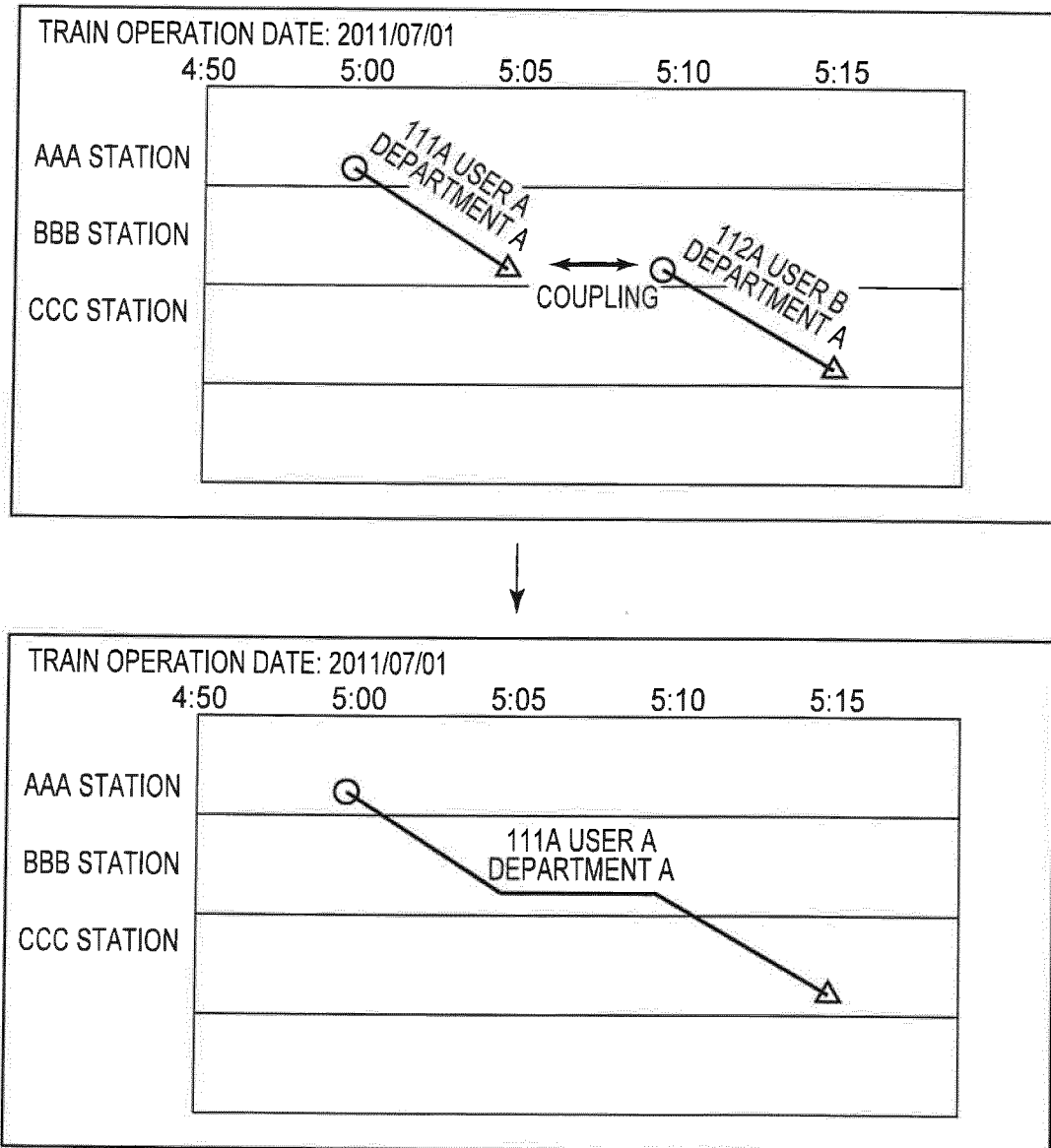


FIG. 11

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

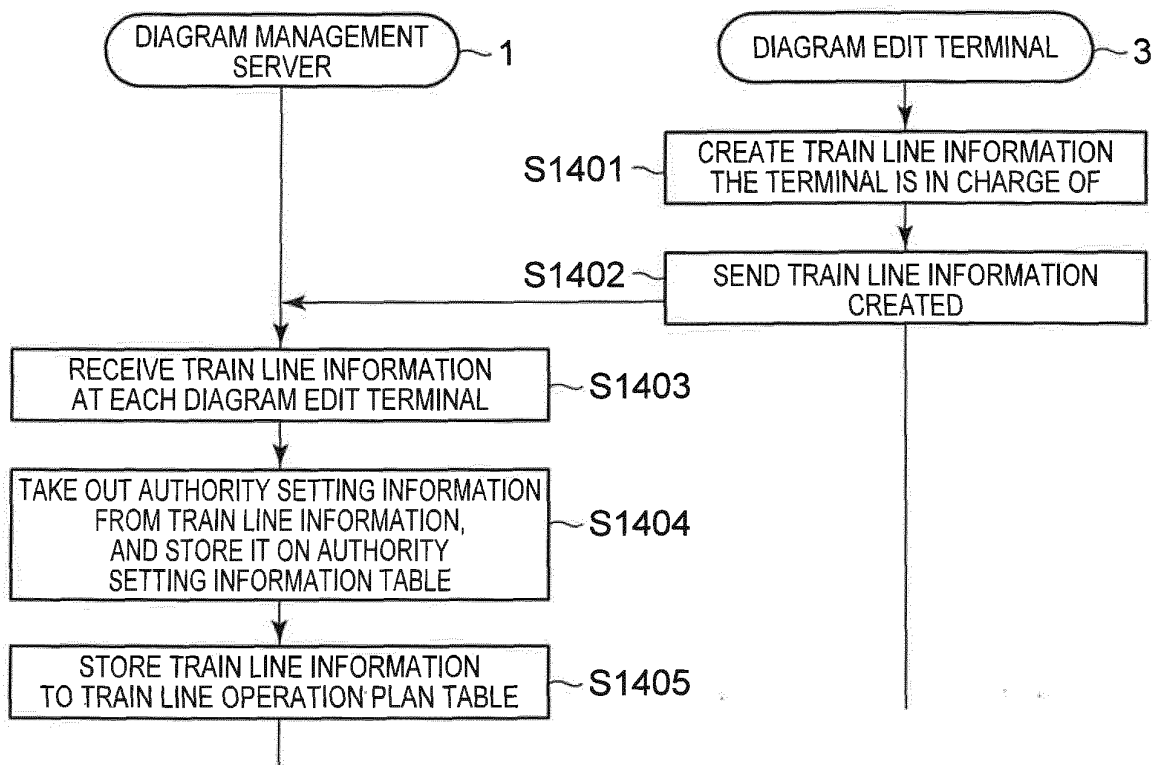


FIG. 14

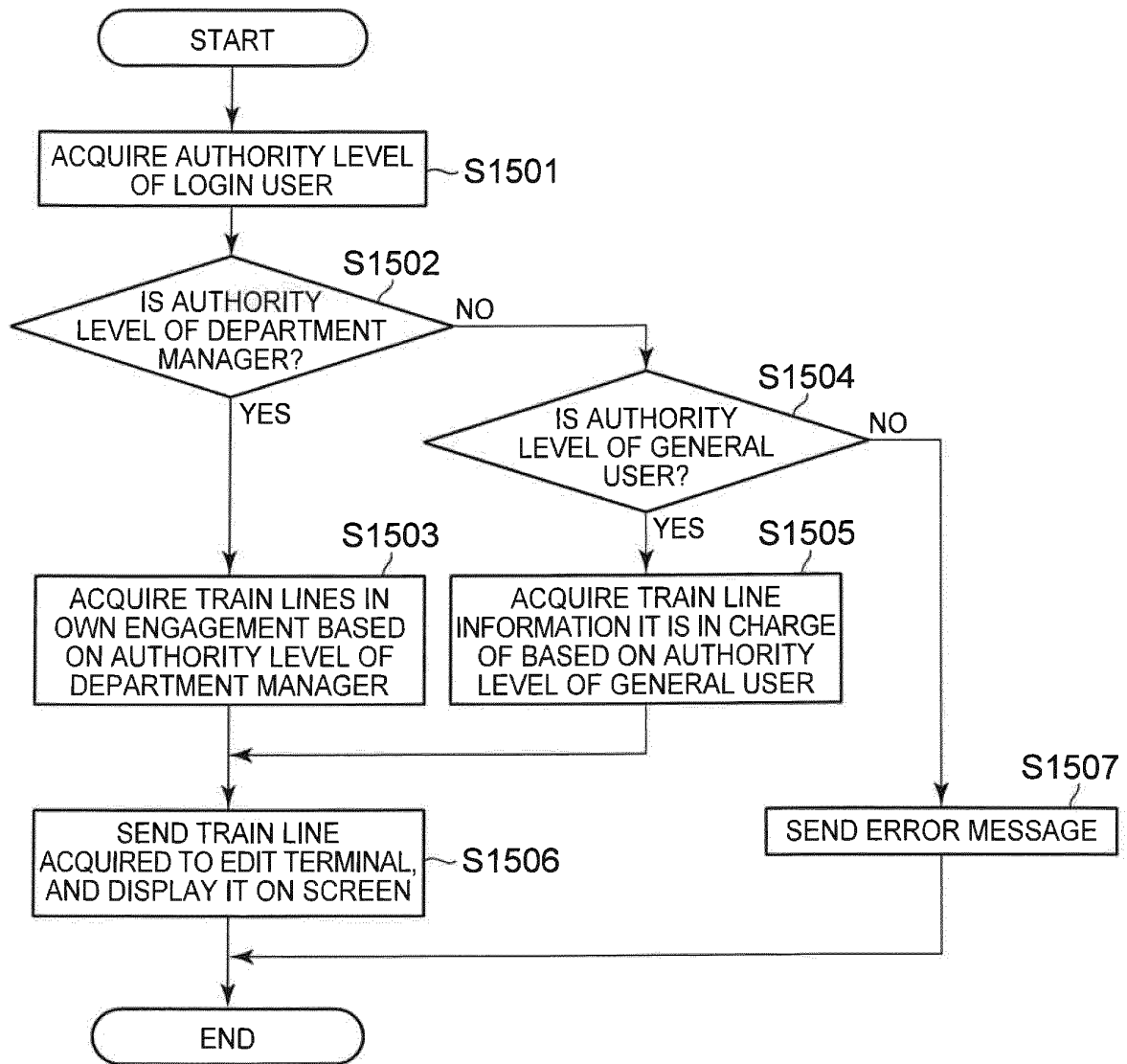


FIG. 15

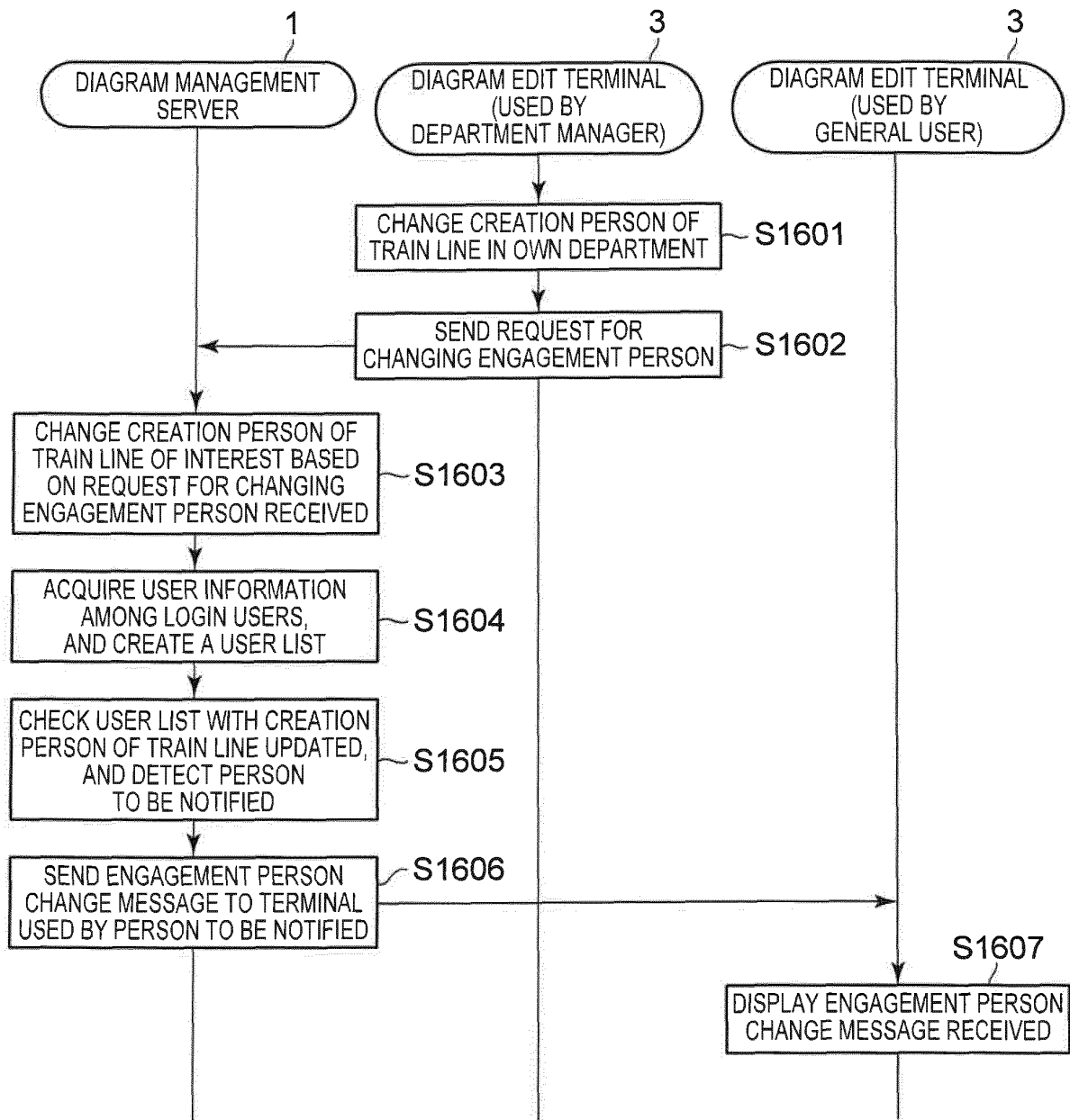


FIG. 16

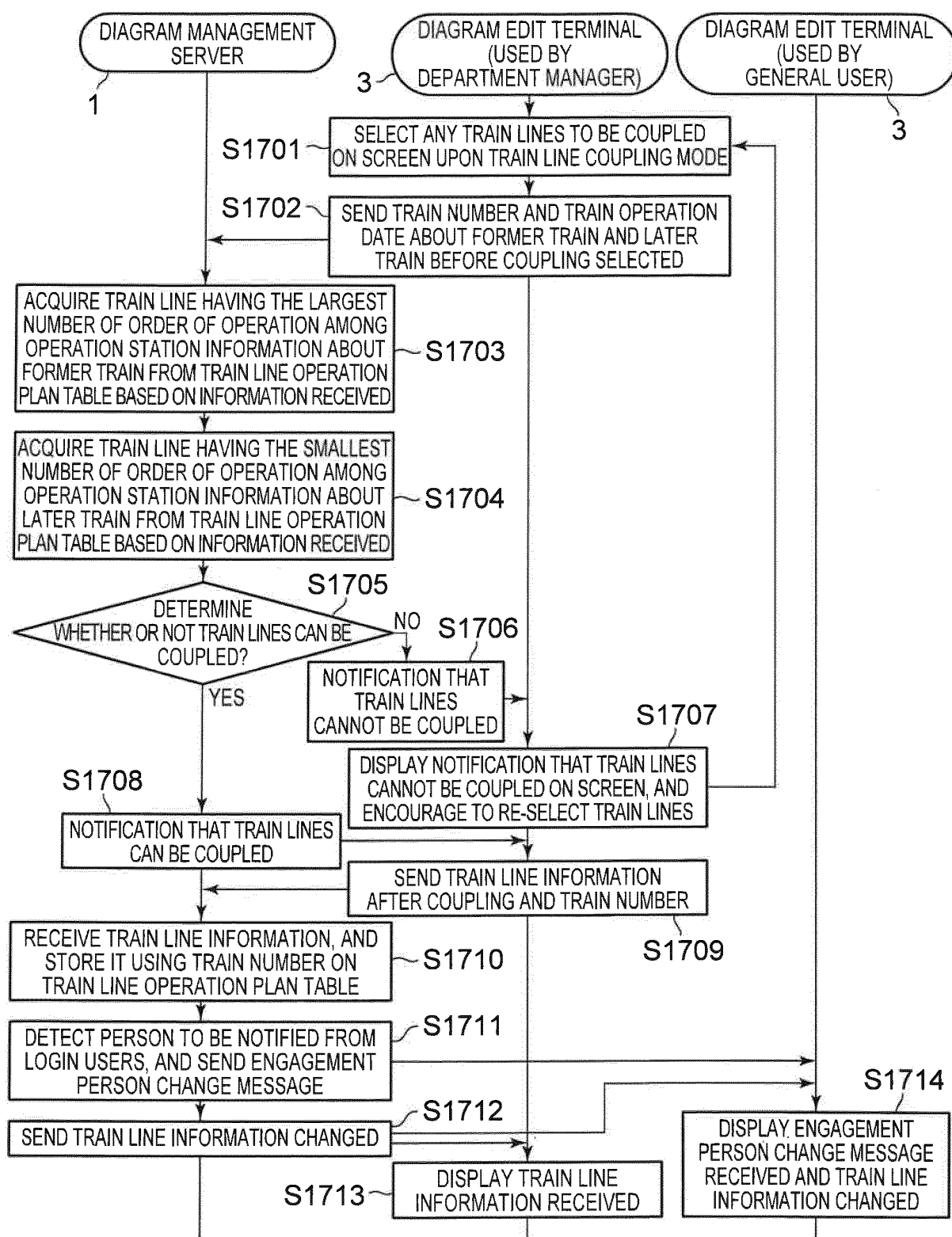


FIG. 17

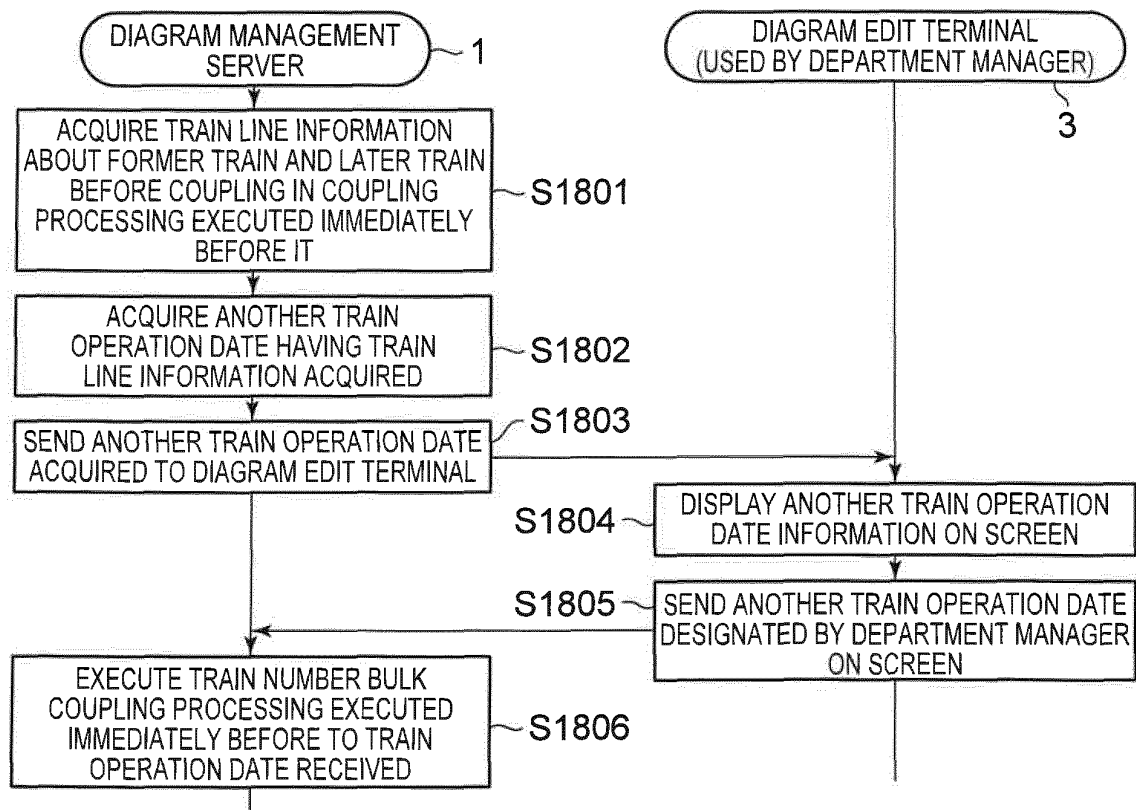


FIG. 18

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

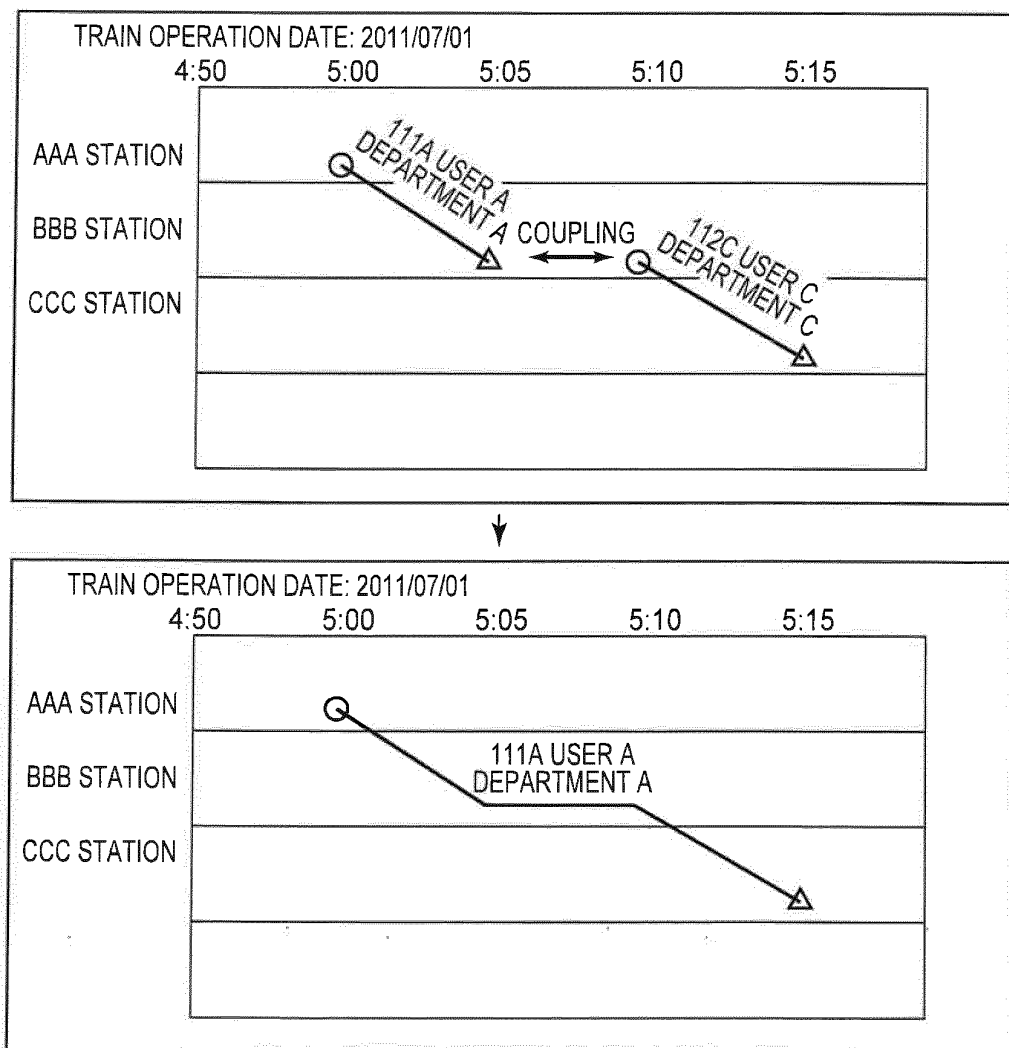


FIG. 23

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

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2012/005961

A. CLASSIFICATION OF SUBJECT MATTER

B61L27/00 (2006.01) i, G06Q50/30 (2012.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B61L27/00, G06Q50/30

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2012
 Kokai Jitsuyo Shinan Koho 1971-2012 Toroku Jitsuyo Shinan Koho 1994-2012

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2007-168672 A (Mitsubishi Electric Corp.), 05 July 2007 (05.07.2007), paragraphs [0008] to [0024]; all drawings (Family: none)	1, 4, 6, 8-10, 13, 15 7, 11, 14 2-3, 5, 12
Y	JP 06-127391 A (Hitachi, Ltd.), 10 May 1994 (10.05.1994), paragraph [0050] (Family: none)	7, 11, 14
Y	JP 2005-119472 A (Hitachi, Ltd.), 12 May 2005 (12.05.2005), paragraphs [0031] to [0032] (Family: none)	14

☐ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search
29 November, 2012 (29.11.12)Date of mailing of the international search report
11 December, 2012 (11.12.12)Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

REFERENCES CITED IN THE DESCRIPTION

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