DESCRIPTION

Title of Invention: **DEVICE MANAGEMENT SYSTEM AND DEVICE MANAGEMENT SERVICE PROVIDING METHOD**

Technical Field

The present disclosure relates to a device management service providing method for managing a device installed in a building by using a network.

Background Art

A system that manages, via a network, air conditioner information of an air conditioner installed in a building has been proposed (for example, PTL 1 (Japanese Patent No. 6160789)). In PTL 1, the air conditioner is connected to an information mediation device, the information mediation device is connected to an information management apparatus via the network, and the information management apparatus manages the air conditioner information.

Summary of Invention

Technical Problem

A management apparatus connected via a network has many advantages, such as being capable of using management records of devices installed in other buildings or devices of other users and being capable of centralized management of the devices disposed in the other buildings. However, constant control of the devices by the management apparatus via the network may be inefficient in some cases. An extreme case is a case where the network is disconnected, in which case, device control becomes unavailable.

Solution to Problem

A device management system according to a first aspect includes a device, a control terminal, and a management apparatus. The device is disposed in a building. The control terminal is connected to the device. "Connected to the device" includes a case of being built in and connected to the device. The management apparatus is connected to the control terminal via a network. Both the control terminal and the management apparatus are configured to be capable of acquiring a control command that is created by a user. (a) The control command that is created by the user is acquired by either one or both of the control terminal and the management apparatus. (b) On the basis of the control command that is acquired in (a), control of the device is shared and executed in either one or both of the control terminal and the

management apparatus, wherein (c) the control terminal and the management apparatus register the control command that is acquired in the (a), and wherein the management apparatus (d) determines whether the control command that is acquired in the (a) is to be executed in the management apparatus or to be executed in the control terminal, wherein (b1) the control command is executed in the management apparatus if it is determined that the control command is to be executed in the management apparatus in the (d), wherein (e) the control command is transmitted to the control terminal if it is determined that the control command is to be executed in the control terminal in the (d), and wherein (b2) the control terminal executes the control command that is transmitted from the management apparatus in the (e).

In the device management system according to the first aspect, since both the control terminal and the management apparatus can acquire and execute the control command, the user can cause the control command to be shared and executed in either one or both of the control terminal and the management apparatus.

In the device management system according to the above embodiment, since the control command is executed by being allocated to the management apparatus and the control terminal, the control command can be executed efficiently.

In an embodiment, the above device management system includes a plurality of devices and a plurality of control terminals. The plurality of devices are installed in a building. The plurality of control terminals are each connected to a corresponding device among the devices. (d1) If it is determined that a device or devices that is/are a target or targets of the control command belongs to a single control terminal among the control terminals in (d), the management apparatus determines that the control command is to be executed in the control terminal, and, if it is determined that the devices that are targets of the control command belong to the plurality of control terminals in (d), the management apparatus determines that the control command is to be executed in the management apparatus.

In the device management system according to the above embodiment, since the control command related to the single control terminal is to be executed in the control terminal, and the control command related to the plurality of control terminals is to be executed in the management apparatus, the control command can be executed smoothly.

In an embodiment of the above device management system, while the control terminal is executing control of the device on the basis of the control command, if an execution time of the control is longer than a predetermined time, the control terminal cancels execution of the control of the device based on the control command. In addition, the management apparatus executes the control of the device based on the control command.

In the device management system according to the above embodiment, since the management apparatus executes the control command if the control terminal takes an

extremely long time to execute the control command, the time for executing the control command can be shortened.

In an embodiment of the above device management system, (d2) even if the management apparatus determines that the device that is a target of the control command belongs to a single control terminal among the control terminals in the (d1), the management apparatus determines that control based on the control command is to be executed in the management apparatus if execution of the control based on the control command in the control terminal is estimated to be longer than a predetermined time.

In the device management system according to the above embodiment, since the management apparatus executes even the control command that belongs to the single control terminal, execution of the control command can be prevented from taking an extremely long time.

In an embodiment of the above device management system, (g) the control terminal or/and the management apparatus acquire data of the device or data related to the device as device data. (h) The control terminal or/and the management apparatus that acquire the device data determine whether an event has occurred on the basis of the device data. (b3) If it is determined that the event has occurred in (h), the control terminal or/and the management apparatus execute the control command.

The device management system according to the above embodiment can execute the control command upon the event that occurs in response to acquisition of the device data.

In an embodiment of the above device management system, (g) the control terminal or/and the management apparatus acquire data of the device or data related to the device as device data. (h) The control terminal or/and the management apparatus that acquire the device data determine whether an event has occurred on the basis of the device data. (d3) If the event has occurred, the control terminal or/and the management apparatus that acquire the device data determine whether the control command is to be executed in the control terminal or the management apparatus. (b4) The control terminal or/and the management apparatus execute the control command that is determined to be executed in (d3).

In the device management system according to the above embodiment, if the event has occurred, since the control command is executed by being allocated to the management apparatus and the control terminal, the control command can be executed efficiently.

In an embodiment of the above device management system, (h2) subsequently to the determination of the event in the (h), the control terminal or/and the management apparatus determine whether a secondary event is caused to occur on the basis of the control command that is registered or a program that is defined by the system. (b5) If it is determined that the secondary event has occurred in (h2), the control terminal or/and the management apparatus

execute the control command.

The device management system according to the above embodiment can execute the control command upon occurrence of the secondary event.

In an embodiment of the above device management system, (j) the event that is determined in the control terminal in (h) or the secondary event that is caused to occur in the control terminal in (h2) is transmitted to the management apparatus. (h3) On the basis of the event or the secondary event that is transmitted from the control terminal in (j), the management apparatus determines whether the control command that is registered is to be executed in the management apparatus. (b6) The management apparatus executes the control command that is determined to be executed in (h3).

The device management system according to the above embodiment can execute the control command in the management apparatus upon occurrence of the event or the secondary event in the control terminal.

In an embodiment of the above device management system, the management apparatus includes a database. (k) The management apparatus stores, in the database, the event or the secondary event related to the control command that is executed in (b3) to (b6).

In the device management system according to the above embodiment, since a history of the event or the secondary event is accumulated in the database, control can be performed so that the secondary event is caused to occur, for example, by using the database.

In an embodiment of the above device management system, both the management apparatus and the control terminal or the control terminals are capable of executing the control command in an identical form.

In the device management system according to the above embodiment, since both the management apparatus and the control terminal or the control terminals are capable of executing the control command in the identical form, a user's input in the identical form may suffice.

A device management service providing method according to a second aspect uses a device management system. The device management system includes a device, a control terminal, and a management apparatus. The control terminal is connected to the device. The management apparatus is connected to the control terminal via a network. Both the control terminal and the management apparatus are configured to be capable of acquiring a control command that is created by a user. (a) The control command that is created by the user is acquired by either one or both of the control terminal and the management apparatus. (b) On the basis of the control command, control of the device is shared and executed in either one or both of the control terminal and the management apparatus, wherein (c) the control terminal and the management apparatus register the control command that is acquired in the (a), and

wherein the management apparatus (d) determines whether the control command that is acquired in the (a) is to be executed in the management apparatus or to be executed in the control terminal, wherein (b1) the control command is executed in the management apparatus if it is determined that the control command is to be executed in the management apparatus in the (d), wherein (e) the control command is transmitted to the control terminal if it is determined that the control command is to be executed in the control terminal in the (d), and wherein (b2) the control terminal executes the control command that is transmitted from the management apparatus in the (e).

In an embodiment of the above device management service providing method, both the management apparatus and the control terminal are capable of executing the control command in an identical form.

In the device management service providing method according to the above embodiment, since both the management apparatus and the control terminal are capable of executing the control command in the identical form, a user's input in the identical form may suffice.

Brief Description of Drawings

[Fig. 1] Fig. 1 is a diagram illustrating an overall configuration of a device management system 1.

[Fig. 2] Fig. 2 is a flowchart in which the device management system 1 executes a control command.

[Fig. 3] Fig. 3 is a flowchart illustrating the manner of execution of automatic control by a device management apparatus in a case where an event occurs.

[Fig. 4] Fig. 4 is a flowchart illustrating the manner of execution of automatic control by the device management apparatus in a case where a secondary event occurs.

[Fig. 5] Fig. 5 is a flowchart illustrating processing performed in a case where a control terminal requires a time longer than or equal to a predetermined time for executing a control command.

[Fig. 6] Fig. 6 is a flowchart illustrating processing performed in a case where the system 1 requires a time longer than or equal to the predetermined time for executing processing on a first execution mode.

Description of Embodiments

<First Embodiment>

(1) Overall Configuration

As illustrated in Fig. 1, a device management system 1 according to this embodiment

Now, the occurrence of the event will be more specifically described. For example, as the device data, data indicating that the device 21 is powered on at the current time 22:10 is acquired. In addition, as the control command, a control command indicating that the device is powered off from 22 o'clock to 5 o'clock is registered. Thus, by collating the above device data against the above control command, the control terminal 30 determines that the event has occurred (S211).

If the event has occurred in step S211, automatic control is executed in step S212. In the above example, the control terminal 30 powers off the device 21.

If no event has occurred in step S211, the control terminal 30 ends the processing.

Next, a case where the management apparatus executes control after the device data is transmitted to the management apparatus in step S202 will be described.

The management apparatus 10 checks a control command that is registered in the management apparatus 10 and that is to be executed in the management apparatus. Thus, the management apparatus 10 checks whether the event serving as a trigger of the control command to be executed in the management apparatus has occurred (S203).

If the event has occurred in step S203, the management apparatus executes automatic control in step S204. If no event has occurred in step S203, the management apparatus ends the processing.

Note that both the control terminal 30 and the management apparatus 10 acquire the device data in this embodiment. The control command is registered to be executed in either the control terminal 30 or the management apparatus 10 depending on details. Thus, whether the management apparatus or the control terminal executes the event is determined depending on which the control command is registered in. Note that the same applies to a secondary event described below.

(3-3) Case Where Secondary Event Occurs

Next, a secondary event will be described.

The secondary event is an event that occurs as a result of certain calculation processing using a device state value. In contrast, the event described in (3-2) is an event that can be detected when the device state value changes. Such an event herein may be referred to as a primary event to be distinguished from the secondary event.

Next, a case will be described in which, in control commands registered in the system 1, both a control command related to the primary event and a control command related to the secondary event are present.

Fig. 4 illustrates a flow of device control in the device management system 1 in a case

where the secondary event is present.

First, the control terminal 30 acquires device data from each device 21 and the sensors 22a and 22b around the device (S301). Subsequently, the control terminal 30 transmits the device data to the management apparatus 10 via the network (S302). In the following description, steps in the control terminal 30 and steps in the management apparatus 10 are separately described.

First, steps in the control terminal 30 will be described. The processor of the control terminal 30 performs processing for calling a control command related to the primary event from the memory of the control terminal (S311). This processing is completely the same as that in the case of (3-2). Subsequently, the control terminal 30 transitions to processing of a control command related to the secondary event (S312).

Now, examples of the processing based on a control command of the secondary event will be described. For example, the device data is an indoor temperature. In addition, details of the control command are such that a cooling operation automatically starts when the indoor temperature exceeds 28°C, which is a threshold. In such a case, for example, the control terminal acquires an indoor temperature of 30°C as the device data in step S301. Subsequently, the control terminal 30 performs processing for the primary event in step S311, and then transitions to processing for the secondary event in S312. In this step, the control terminal compares an actual indoor temperature and an indoor temperature that is a processing condition of the control command with each other. In this case, the indoor temperature being 30°C according to the data exceeds the processing condition, which is the indoor temperature being 28°C, and thus, an air conditioner (device) is controlled to perform a cooling operation (S313). In other words, the control terminal 30 executes automatic control.

Next, processing in the management apparatus at and after step S302 will be described. Following S302, the management apparatus 10 performs processing for the primary event (S303). This processing is completely the same as the processing in (3-2).

Subsequently, in step S304, the management apparatus 10 determines whether the secondary event has occurred. If the secondary event has occurred, the management apparatus executes automatic control in S305. If no secondary event has occurred in S304, the management apparatus ends the processing.

Note that the primary event and the secondary event are all stored in the database 12 of the management apparatus 10 in the same manner as the control command. The storage may be the memory of the server 11 or the memory of the control terminal 30. The primary event and the secondary event may be stored in both the management apparatus 10 and the control

The control command registered in and recorded on the management apparatus can be executed, needless to say when the control command is registered, and also when an event occurs, for example, after a time elapses.

The control command may also be registered in the control terminal. The registered control command may also be recorded on the control terminal.

Since the control command is registered in both the management apparatus and the control terminal, the system can select the management apparatus or the control terminal to perform execution depending on details of the control command. In addition, even if communication between the management apparatus and the control terminal is disconnected, the control terminal can execute the control command.

(4-3)

In this embodiment, the control command is registered in the management apparatus (S102). The management apparatus determines whether the control command is to be executed in the management apparatus or to be executed in the control terminal and allocates the control command (S103).

The determination by the management apparatus can make appropriate allocation.

(4-4)

In this embodiment, the criterion for the management apparatus to allocate the control command to the management apparatus or the control terminal (S103) in (4-3) is whether the control command is to be executed in a plurality of control terminals in cooperation with each other or to be executed in a single control terminal.

By using such a criterion, the control terminal generates the advantage of being capable of controlling a single device when the control is only for the device that belongs to the control terminal. In addition, the data traffic (= communication cost) between the management apparatus and the control terminal for execution of the control command can be reduced.

(4-5)

The device management system 1 according to this embodiment records the control command on a memory. When the control terminal 30 acquires the device data (S201), the system 1 determines whether the event has occurred (S203, S211), and, if it is determined that the event has occurred, executes automatic control (S204, S212).

Since the device management system 1 according to this embodiment registers and records the control command in and on the system in the above manner, a broadly standardized system can be easily established.

(4-6)

CLAIMS

1. A device management system (1) comprising:

a device (21) that is installed in a building;

a control terminal (30) that is connected to the device; and

a management apparatus (10) that is connected to the control terminal via a network,

wherein both the control terminal and the management apparatus are configured to be capable of acquiring a control command that is created by a user,

wherein (a) the control command that is created by the user is acquired by either one or both of the control terminal and the management apparatus, and

wherein (b) on the basis of the control command that is acquired in the (a), control of the device is shared and executed in either one or both of the control terminal and the management apparatus,

wherein (c) the control terminal and the management apparatus register the control command that is acquired in the (a), and

wherein the management apparatus

(d) determines whether the control command that is acquired in the (a) is to be executed in the management apparatus or to be executed in the control terminal,

wherein (b1) the control command is executed in the management apparatus if it is determined that the control command is to be executed in the management apparatus in the (d),

wherein (e) the control command is transmitted to the control terminal if it is determined that the control command is to be executed in the control terminal in the (d), and

wherein (b2) the control terminal executes the control command that is transmitted from the management apparatus in the (e).

2. The device management system according to Claim 1, comprising:

a plurality of devices that are installed in a building; and

a plurality of control terminals that are each connected to a corresponding device among the devices,

wherein (d1) if it is determined that a device that is a target of the control command belongs to a single control terminal among the control terminals in the (d), the management apparatus determines that the control command is to be executed in the control terminal, and, if it is determined that the devices that are targets of the control command belong to the plurality of control terminals in the (d), the management apparatus determines that the control command

is to be executed in the management apparatus.

3. The device management system according to Claim 1 or 2,

wherein, while the control terminal is executing control of the device on the basis of the control command in the (b2), if an execution time of the control is longer than a predetermined time,

the control terminal cancels execution of the control of the device based on the control command, and

the management apparatus executes the control of the device based on the control command.

4. The device management system according to Claim 2,

wherein (d2) even if it is determined that the device that is a target of the control command belongs to a single control terminal among the control terminals in the (d1),

the management apparatus determines that control based on the control command is to be executed in the management apparatus if execution of the control based on the control command in the control terminal is estimated to be longer than a predetermined time.

5 The device management system according to Claim 1,

wherein (g) the control terminal or/and the management apparatus acquire data of the device or data related to the device as device data,

wherein (h) the control terminal or/and the management apparatus that acquire the device data determine whether an event has occurred on the basis of the device data, and

wherein (b3) if it is determined that the event has occurred in the (h), the control terminal or/and the management apparatus execute the control command.

6. The device management system according to Claim 5,

wherein (g) the control terminal or/and the management apparatus acquire data of the device or data related to the device as device data,

wherein (h) the control terminal or/and the management apparatus that acquire the device data determine whether an event has occurred on the basis of the device data,

wherein (d3) if the event has occurred, the control terminal or/and the management apparatus that acquire the device data determine whether the control command is to be executed in the control terminal or the management apparatus, and

wherein (b4) the control terminal or/and the management apparatus execute the control command that is determined to be executed in the (d3).

7. The device management system according to Claim 5 or 6,

wherein (h2) subsequently to the determination of the event in the (h), the control terminal or/and the management apparatus determine whether the control terminal or/and the management apparatus cause a secondary event to occur on the basis of the control command that is registered or a program that is defined by the system, and

wherein (b5) if it is determined that the secondary event has occurred in the (h2), the control terminal or/and the management apparatus execute the control command.

8. The device management system according to any one of Claims 5 to 7,

wherein (j) the event that is determined in the control terminal in the (h) or the secondary event that is caused to occur in the control terminal in the (h2) is transmitted to the management apparatus,

wherein (h3) on the basis of the event or the secondary event that is transmitted from the control terminal in the (j), the management apparatus determines whether the control command that is registered is to be executed in the management apparatus, and

wherein (b6) the management apparatus executes the control command that is determined to be executed in the (h3).

9. The device management system according to any one of Claims 5 to 8,

wherein the management apparatus includes a database, and

wherein (k) the management apparatus stores, in the database, the event or the secondary event related to the control command that is executed in the (b3) to (b6).

10. The device management system according to any one of Claims 1 to 9,

wherein both the management apparatus and the control terminal are capable of executing the control command in an identical form.

11. A device management service providing method for a user of a device that is installed in a building, the device management service providing method comprising:

using a device management system including the device, a control terminal that is connected to the device, and a management apparatus that is connected to the control terminal

via a network,

wherein both the control terminal and the management apparatus are configured to be capable of acquiring a control command that is created by the user,

wherein (a) the control command that is created by the user is acquired by either one or both of the control terminal and the management apparatus, and

wherein (b) on the basis of the control command, control of the device is shared and executed in either one or both of the control terminal and the management apparatus,

wherein (c) the control terminal and the management apparatus register the control command that is acquired in the (a), and

wherein the management apparatus

(d) determines whether the control command that is acquired in the (a) is to be executed in the management apparatus or to be executed in the control terminal,

wherein (b1) the control command is executed in the management apparatus if it is determined that the control command is to be executed in the management apparatus in the (d),

wherein (e) the control command is transmitted to the control terminal if it is determined that the control command is to be executed in the control terminal in the (d), and

wherein (b2) the control terminal executes the control command that is transmitted from the management apparatus in the (e).

12. The device management service providing method according to Claim 11,

wherein both the management apparatus and the control terminal are capable of executing the control command in an identical form.