

SPECIFICATION

TITLE OF THE INVENTION

DISTRIBUTED DATACENTER CONFIGURED WITH
5 CONTAINER-TYPE OR MODULE-TYPE DATACENTER

CROSS-REFERENCE TO RELATED APPLICATION

The present application claims priority from Japanese Patent
Application No. 2011-100028 filed on April 27, 2011, the content
10 of which is hereby incorporated by reference into this application.

TECHNICAL FIELD OF THE INVENTION

The present invention relates to a technique for a datacenter.
More particularly, the present invention relates to a technique
15 effectively applied to a distributed datacenter configured with a
plurality of transportable datacenters distributed at remote
locations.

BACKGROUND OF THE INVENTION

20 In recent years, as development of use of IT techniques by
companies or others, modes have been taken in many cases, in which
a lot of IT devices such as a computer device such as a server, a
network device, or others regarding an information processing
system for business use are intensively arranged in a datacenter,
25 and are collectively operationally managed. These modes include,
for example,: a mode of independent operational management by a
company itself; a mode of outsourcing operational management to an
IT vendor or others; a mode of a cloud computing service which
provides an IT resource owned and operationally managed by an IT
30 vendor or others to a user as required; and others. Also, regarding
a datacenter, there are modes including: a mode of owning the
datacenter by a company itself; a mode of rooming a space in a

datacenter owned and operationally managed by an IT vendor or others;
and others.

As a datacenter used in various modes as described above, a
dedicated large-scale establishment is mainly used for storing
5 various facilities (for example, a redundant power supply facility,
a network line, a cooling and heat exhausting facility such as an
air conditioner, a floor layout suitable for arranging devices, an
aseismic structure, a security facility, and others) for stably
operating a lot of IT devices. Such a datacenter generally adopts
10 a mechanism in which an operation state of an operating IT device
and a facility state in the establishment are collectively and
intensively monitored and operated by a dedicated monitoring room,
monitoring center, or others.

As a technique related to this, for example, regarding the
15 monitoring of the facility state, Japanese Patent Application
Laid-Open Publication No. 2010-527491 (Patent Document 1) describes
a technique that enables an operator at a datacenter to specify a
datacenter resource such as available power or cooling device in
a specific region or housing in the datacenter so as to support the
20 installation of a new device in the datacenter, obtain a requirement
for the datacenter resource, and monitor performance of a system
related to the datacenter resource.

On the other hand, in order to satisfy the needs such as
desirably installing the datacenter more simply and quickly, use
25 of a small/transportable datacenter such as a so-called
container-type (or module-type) datacenter with using a
transportation container or others has been expanded. For example,
US Patent No. 7278273 (Patent Document 2) describes a module-type
datacenter configured with one or more modules on which a plurality
30 of computers are mounted and an air-conditioning system for cooling
in a transportation container.

Such a transportable datacenter has advantages that it can

be easily and quickly constructed in a short period of time at a low cost, and there is less limitation of an installing location or others because of the portability. Further, it also has an advantage that, by adopting a building block method of combining
5 a plurality of containers, additional installation and removal in each container unit can be easily performed to result in the improvement of expandability/flexibility as avoiding the wasteful investment. Still further, by combining a lot of containers, a large-scale datacenter can be also constructed.

10 For example, Japanese Patent Application Laid-Open Publication No. 2011-12407 (Patent Document 3) describes a technique regarding a datacenter building for storing a plurality of units each in which an electronic calculator or others is contained, the building including: a frame-type structure having
15 a plurality of unit-arranging parts vertically provided in a plurality of levels; and a carrier device arranged adjacently to the frame-type structure, the carrier device being able to vertically and horizontally move the unit as flatly keeping to bring it in a front surface of the unit-arranging parts, and then, send
20 the unit into any unit-arranging part, so that a lot of units can be safely arranged even when a site for the installation is limited.

SUMMARY OF THE INVENTION

As described above, it is considered that, while the
25 transportable datacenter such as the container type can be used to construct a large-sized and large-scale datacenter by combining a lot of the datacenters, the datacenter is used in many cases mainly to construct datacenters of small-to-medium-sized companies or others by themselves since the datacenter can be easily constructed
30 because of the portability and the less limitation of the installing location. In this case, a plurality of small-sized and small-scale datacenters are installed at various locations, and are

independently operationally managed mainly by each company itself or others which owns these datacenters.

However, these companies or others do not have human and technical resources, and therefore, cannot suitably and
5 independently operationally manage it by itself in many cases. Also, the individual operational management of these datacenters may cause waste in a point of view of efficient utilization of the human resources and IT resources, and therefore, may cancel or decrease the utility value of the transportable datacenter due to large burden
10 in cost. Further, a mode of using such a transportable datacenter as a backup datacenter for disaster control or others for a main datacenter of the company or others is assumed, and the needs of effective use of excess resources at normal operation is also assumed.

15 Accordingly, a preferred aim of the present invention is to provide a distributed datacenter having a central management center which collectively operationally manages a plurality of distributed transportable (container-type or module-type) datacenters from a remote location. The above and other preferred aims and novel
20 characteristics of the present invention will be apparent from the description of the present specification and the accompanying drawings.

The typical ones of the inventions disclosed in the present application will be briefly described as follows.

25 A distributed datacenter according to a typical embodiment of the present invention has a configuration in which one or more transportable datacenters are distributed at a plurality of geographically-separated locations, and the transportable datacenters at the respective locations are mutually connected via
30 a communication network, and has the following features.

That is, the distributed datacenter has a central management center which can operationally manage the transportable datacenters

at the respective locations from a remote location, each location has a local management center having a resource management table, which stores a state of each IT resource owned by the transportable datacenters installed at the respective locations, to operationally manage the transportable datacenters, and the IT resource owned by the transportable datacenter operationally managed by a first local management center at a first location is used by a second local management center at a second location via the central management center.

The effects obtained by typical aspects of the present invention will be briefly described below.

According to the typical embodiment of the present invention, the distributed datacenter having the central management center which collectively operationally manages the plurality of distributed transportable datacenters from the remote location can be achieved.

BRIEF DESCRIPTIONS OF THE DRAWINGS

FIG. 1 is a diagram showing an outline of a configuration example of a distributed datacenter according to an embodiment of the present invention;

FIG. 2 is a diagram showing an example of a data structure and specific data of a local resource management table in the embodiment of the present invention;

FIG. 3 is a diagram showing an example of a data structure and specific data of a central resource management table in the embodiment of the present invention;

FIG. 4 is a diagram showing an outline of an example of a process flow of supplying a resource from a container-type datacenter at another location in the embodiment of the present invention;

FIG. 5 is a diagram showing an outline of an example of a

process flow of returning the resource supplied from the container-type datacenter at another location in the embodiment of the present invention; and

FIG. 6 is a diagram showing an outline of an example of a process flow of integrally managing container-type datacenters at a plurality of locations in the embodiment of the present invention.

DESCRIPTIONS OF THE PREFERRED EMBODIMENTS

Hereinafter, embodiments of the present invention will be described in detail with reference to the accompanying drawings. Note that same components are denoted by the same reference symbols throughout the drawings for describing the embodiment, and the repetitive description thereof will be omitted.

<Outline>

A distributed datacenter according to an embodiment of the present invention has a configuration in which one or more transportable datacenters such as container-type datacenters or module-type datacenters (hereinafter, simply referred to as "container-type datacenters" in some cases) are distributed at a plurality of geographically-separated locations, and the datacenters at the respective locations are mutually connected via a communication network. Also, the distributed datacenters have a central management center which can intensively operationally manage these datacenters or others from a remote location. Meanwhile, each location has a local management center which can operationally manage its container-type datacenter or others.

The container-type datacenter used here is a datacenter in which, for example, a computer device such as a server or an IT device such as a network device is arranged in a container having an area of about 20 to 30 m² and a height of about 3 m or in a region surrounded by partitions and can be operated nonstop in principle.

As a facility for stably operating the IT device, the

container-type datacenter has, for example, a connection point for receiving a supply of power and a communication line required for operating the IT device from outside. Also, the container-type datacenter also has a temperature and moisture adjustment mechanism
5 or an air conditioning facility for satisfying an operating condition of the IT device, an uninterruptible power supply device for continuously operating the IT device at instantaneous interruption of power, an aseismic device and a seismic isolation device for avoiding the falling or others due to an earthquake, a
10 monitoring camera for monitoring an inside of the region, a room-entering/leaving management device, and other facilities such as a fire/smoke detector and fire fighting/extinguishing equipment. Further, the container-type datacenter has a management system for performing operational management such as monitoring and operating
15 the IT device and the facilities from the remote location.

<System Configuration>

FIG. 1 is a diagram showing an outline of a configuration example of the distributed datacenter according to the embodiment of the present invention. As described above, a distributed
20 datacenter 1 has a configuration in which datacenters are distributed at a plurality of geographically-separated locations, and each location has: one or more container-type datacenters (DC) 21 combined and arranged by a building block method via a local network 22 such as a LAN (Local Area Network); and a local management
25 center 20 which can autonomously operationally manage the datacenter at each location.

Since the datacenter is configured with the container-type DC 21 at each location, an establishment such as a building dedicated for the datacenter is not required, and therefore, the invention
30 has a feature of low cost because the datacenter can be easily and quickly configured in a short period of time. Also, the invention has an advantage that, by adopting the building block method,

additional installation and removal in each container unit can be easily performed to result in the improvement of expandability/flexibility as avoiding the wasteful investment.

The container-type DC 21 and the local management center 20 at each location are connected the other via a network 30. As the network 30, for example, a public communication network such as the Internet or a communication network partially using a general public line such as a WAN (Wide Area Network) or a VPN (Virtual Private Network) can be appropriately used.

Also, the distributed datacenter 1 has a central management center 10 which can intensively operationally manage the container-type DCs 21 at the respective locations from the remote location. Note that the central management center 10 and/or each local management center 20 has a mechanism performing the operational management of the IT device in a general datacenter or others (the mechanism such as an operational management system for starting and stopping each device and software, monitoring its failure, managing a use rate and a use volume of the resource, and monitoring a performance).

<Resource Management Table>

The local management center 20 at each location stores a local resource management table in order to manage the IT resource (hereinafter, simply referred to as "resource" in some cases) in the container-type DC 21 managed by itself. FIG. 2 is a diagram showing an example of a data structure and specific data of the local resource management table. A local resource management table 23 is a table which stores states of the resources owned by the container-type DC 21 operationally managed by each local management center 20, and has items such as "resource ID", "resource type", "volume", "management source", and "access ID".

The item of the "resource ID" stores information of an ID for identifying each resource which is a management target. The item

of the "resource type" stores information of a name and an ID or others for identifying a type (for example, a CPU (Central Processing Unit), a storage, an input/output device, a network band, or others) of the target resource. The item of the "volume" stores information
5 regarding a volume (for example, a CPU power, a storage volume, or others) of the target resource. The item of the "management source" stores information of a name or others for identifying a management center which operationally manages the target resource. As described later, normally, each resource is operationally managed
10 by either the local management center 20 or the central management center 10. However, the resource may be temporarily in an "unoccupied" state. The item of the "access ID" stores information of a user ID which has an access authority to the target resource.

On the other hand, as described later, the central management
15 center 10 has a feature of capable of intensively performing the operational management or others of each container-type DC 21 from the remote location and also capable of supplying a resource owned by each container-type DC 21 and assigning the resource to another location. Therefore, in order to manage the resources of the
20 container-type DC 21 managed by the central management center 10 itself, the central management center has a central resource management table. FIG. 3 is a diagram showing an example of a data structure and specific data of the central resource management table. A central resource management table 11 is a table for storing states
25 of the resources intensively operationally managed by the central management center 10, and has items such as "owner DC", "resource ID", "resource type", "volume", "user DC", and "access ID".

The items of the "resource ID", the "resource type", the "volume", and the "access ID" are the same as those in the local
30 resource management table 23 of FIG. 2, and therefore, their repetitive descriptions are omitted. The item of the "owner DC" stores information of a name and an ID or others for identifying

the container-type DC 21 physically owning the target resource. The item of the "user DC" stores information of a name and an ID or others for identifying the container-type DC 21 (or location) practically using the target resource.

5 When the central management center 10 intensively operationally manages the resource owned and used by the container-type DC 21 at the location, a value of the same container-type DC 21 is stored in the "owner DC" and "user DC". Also, as described later, when the central management center 10 obtains
10 the resource owned by the container-type DC 21 at the location and assigns the resource to another location, values of different container-type DCs 21 are stored in the "owner DC" and "user DC".

 Note that the above-described each table shown in FIGs. 2 and 3 can be configured by various means such as a database and a file
15 table. Also, the data structure (items) of these tables is merely an example, and other table structures and data structures may be used as long as the structure can store and manage the similar data.

<Mutual Supply Process of Resource>

 In the distributed datacenter 1 of the present embodiment,
20 the resource can be assigned between the geographically-separated locations. Normally, at each location, the local management center 20 manages a use state of the resource in the container-type DC 21 operationally managed by the local management center itself with using the local resource management table 23. Here, for example,
25 when a virtual sever is newly constructed in the container-type DC 21 at one location, if the corresponding container-type DC 21 does not own sufficient resources, an unoccupied resource owned by the container-type DC 21 at another location can be supplied for use.

 FIG. 4 is a diagram showing an outline of an example of a
30 process flow of supplying the resource from the container-type DC 21 at another location. First, as an initial state, it is assumed, as a normal operation at each location, that all resources of the

container-type DC 21 are operationally managed by a corresponding local management center 20. Therefore, it is assumed that, on the local resource management table 23 in each local management center 20, a value (in the example of FIG. 2, "local") indicating the local management center 20 is shown in all "management source" of each resource.

Here, a request-source local management center 20a, which is a local management center 20 at a location desiring the supply of the resource, makes a request for the resource to the central management center 10 (S01). The request for the resource contains, for example, information of the type and volume or others of the required resource.

The central management center 10 having received the request for the resource selects a location to be the supply source (S02). Although various methods of selecting the supply source can be thought, they are not particularly limited. For example, a location whose distance is geographically closer or a location having the container-type DC 21 owning more resources or more non-allocated resources may be preferentially selected. Also, the selecting process may be systematically performed by the central management center 10, or a result selected by an administrator or others may be specified.

Next, the central management center 10 suggests information of the required resource to a supply-source local management center 20b, which is the local management center 20 at the selected location (S03). The information of the required resource contains, for example, information of the type and volume or others of the required resource. The supply-source local management center 20b having received the suggestion of the information of the required resource extracts information of one or more provision-available resources, and reports the information to the central management center 10 (S04). At this time, the provision-available resource is "temporarily

reserved" by updating the value of the "management source" in the local resource management table 23 in the supply-source local management center 20b to a value (in the example of FIG. 2, "unoccupied") indicating the unoccupied state in which the resource is not managed by any management center.

Although various methods of obtaining the provision-available resource can be thought, they are not particularly limited. For example, among the resources of the container-type DC 21 operationally managed by itself (for example, in the example of FIG. 2, the resources having the value of the "management source" in the local resource management table 23 as "local"), a non-allocated (unused) resource or a resource having a small use rate may be extracted. Also, the information of the provision availability obtained by such a method may be previously stored in the local resource management table 23 for each resource. Note that the information of the provision-available resource contains, for example, information of the resource ID and volume or others.

The central management center 10 having received the information of the provision-available resource from the supply-source local management center 20b selects a provision-acceptable (supplied) resource with using the information of the provision-available resource suggested from the supply-source local management center 20b, and suggests the selection information to the supply-source local management center 20b (S05). The information of the provision-acceptable resource contains, for example, information of the resource ID of the target resource or others.

The supply-source local management center 20b having received the suggestion of the provision-acceptable resource updates the value of the "management source" in the local resource management table 23 to a value (in the example of FIG. 2, "central") indicating

the central management center 10 for a provided resource, and besides, reports the information regarding the provided resource to the central management center 10 (S06). At this time, for a not-provided resource, the value of the "management source" in the local resource management table 23 is returned to the value (in the example of FIG. 2, "local") indicating the supply-source local management center 20b, and then, the operational management is continued or restarted. The information regarding the provided resource contains, for example, the resource ID, resource type, and volume of the target resource, and further contains information of an access ID, access authority, and address or host name of an access destination or others as information regarding the access.

The central management center 10 having received the report of the information of the provided resource provides the information regarding the corresponding resource supplied from the supply-source local management center 20b to the request-source local management center 20a (S07). The information regarding the supplied resource contains, for example, the resource ID, resource type, volume, and besides, information regarding the access to the target resource, or others.

The request-source local management center 20a having received the information regarding the supplied resource accesses, based on the information, the target resource owned by the container-type DC 21 operationally managed by the supply-source local management center 20b, and uses the target resource (S08). In the present embodiment, it is assumed that the central management center 10 performs the operational management such as the failure monitoring for the corresponding resource. However, it is possible that the request-source local management center 20a performs that.

Note that the above-described process and message transmission/reception in each management center can be partially or entirely executed by a terminal operation by an operator, an

administrator, or others in each management center, or can be executed by an automatic process with taking a systematic event (such as the message reception) or others as a trigger.

Also, in the example of FIG. 4, the case of selecting one
5 supply-source location (supply-source local management center 20b) at the step of S02 for the resource supply is described as the example. However, for the request for one or a plurality of resources from the request-source local management center 20a, it is also possible that the central management center 10 selects a plurality of
10 supply-source locations for the resource supply. At this time, for example, the central management center 10 may continuously perform a series of processes to the local management center 20 at each selected location at the steps of S03 to S07 for sequentially supplying the plurality of resources, or may suggest the required
15 resources to each selected location as simultaneous report at the step of S03 for simultaneously and parallelly supplying the plurality of resources.

FIG. 5 is a diagram showing an outline of an example of a process flow of returning the resource supplied from the
20 container-type DC 21 at another location. Here, the resource supplied from the container-type DC 21 operationally managed by the supply-source local management center 20b in the process flow shown in FIG. 4 can be returned based on the request from the supply-source local management center 20b or the request-source local management
25 center 20a.

For example, when the resource is returned based on the request from the supply-source local management center 20b such as when it is desired to return the resource currently provided at the location of the supply-source local management center 20b, the supply-source
30 local management center 20b first makes a request for returning the currently-provided resource to the central management center 10 (S11). The request for returning the resource contains, for example,

information of a resource ID of a return-target resource or others. The return-target resource is selected by an arbitrary method from, for example, resources having the value of the "management source" in the local resource management table 23 as the value (in the example of FIG. 2, "central") indicating the central management center 10.

The central management center 10 having received the request for the resource return specifies the container-type DC 21 which is currently using the target resource with reference to the central resource management table 11, and instructs the resource return to the request-source local management center 20a operationally managing the corresponding container-type DC 21 (S12). The instruction of the resource return contains, for example, the information of the resource ID of the return-target resource or others.

The request-source local management center 20a having received the instruction of the resource return stops using the target resource (S13), and, after the stop, reports the resource-use stop to the central management center 10 (S14). The report of the resource-use stop contains, for example, the information of the resource ID of the stopped return-target resource or others.

The central management center 10 having received the report of the resource-use stop reports the return of the target resource to the supply-source local management center 20b (S15). The report of the resource return contains, for example, the information of the resource ID of the return-target resource or others. At this time, if the central management center 10 operationally manages the target resource by itself, the central management center may stop the resource.

The supply-source local management center 20b having received the report of the resource return collects the target resource, and restarts the use and operational management (S16). At this time, the value of the "management source" in the local resource management

table 23 is updated to the value (in the example of FIG. 2, "local") indicating the local management center 20.

Note that, for example, when the resource is returned based on the request from the request-source local management center 20a such as when the resource currently used at the location of the request-source local management center 20a is not required, the process may start from the step of S13, and the request-source local management center 20a selects the return-target resource by an arbitrary method at the step of S13 to stop the use of the corresponding resource. Also, similarly to the example of FIG. 4, the above-described process and message transmission/reception in each management center may be partially or entirely executed by, for example, a terminal operation by an operator, an administrator, or others in each management center, or by an automatic process with taking a systematic event (such as the message reception) or others as a trigger.

As described above, according to the distributed datacenter 1 of the present embodiment, the resource owned by the container-type DC 21 can be assigned between the geographically-separated locations via the central management center 10.

<Switching between Integral Operation and Autonomous Operation>

Further, the distributed datacenter 1 of the present embodiment has two types of operational management methods such as integral operational management of the container-type DCs 21 at the plurality of locations and autonomous operational management of the DCs at each location. Normally, as described above, the local management center 20 at each location manages the unoccupied state of the resource (the provision-available resource) of the container-type DC 21 operationally managed by itself. However, depending on the operational state, it is required that the central management center 10 collectively and integrally manages the

resources at a part or all of the locations in the distributed datacenter 1 in some cases.

FIG. 6 is a diagram showing an outline of an example of a process flow of the integral management of the container-type DCs 21 at the plurality of locations. First, the central management center 10 selects a target location integrally managed (S21). Here, for example, with reference to the central resource management table 11 or others, the target location (the local management center 20) integrally managed is selected by the operation by the operator, the administrator, or others. Note that the selection of which location is to be the target for the integral management can vary depending on the operational state. Obviously, all locations can be the target for the integral management.

Next, the central management center 10 requests all resources to the local management centers 20 (in the example of FIG. 6, integral-target local management centers 20c and 20d) at respective locations which are the target for the integral management (S22), the resources being owned by the container-type DCs 21 operationally managed by the local management centers 20. Each of the integral-target local management centers 20c and 20d having received the request for all resources reports a management state of each of their-managing resources to the central management center 10 (S23). The report of the management state contains, for example, information of the resource ID, resource type, volume, and current management source of each resource, or others. Note that, here, as different from the step of S04 in the example of FIG. 4, all resources at the locations are integrally managed, and therefore, it is not required to "temporarily reserve" the resources, and the value of the "management source" in the local resource management table 23 may not be changed.

The central management center 10 having received the report of the management state of the resources from each of the

integral-target local management centers 20c and 20d suggests the provision-acceptable (integrally-managed) resources to each of the integral-target local management centers 20c and 20d (S24). Here, in principle, all resources of the container-type DCs 21
5 operationally managed by the integral-target local management centers 20c and 20d are the target. Note that a resource showing a state of being already operationally managed by the central management center 10 on the central resource management table 11 may be excluded from the suggested target resources. Information
10 of the suggested resources contains, for example, the resource ID (if all resources are to be the target, specification of all resource target) of the target resource or others.

Each of the integral-target local management centers 20c and 20d having received the suggestion of the provision-acceptable
15 resources updates the value of the "management source" in the local resource management table 23 for the provided resources (all resources in principle) to the value (in the example of FIG. 2, "central") indicating the central management center 10, and besides, reports the information regarding the provided resources to the
20 central management center 10 (S25). The information regarding the provided resources contains, for example, the resource ID, resource type, and volume of each target resource, and besides, information of the access ID, access authority, and address or host name of the access destination, or others as the information regarding the
25 access.

Based on the information, the central management center 10 having received the report of the information of the provided resources accesses the target resource owned by the container-type DC 21 operationally managed by each of the integral-target local
30 management centers 20c and 20d to start the operational management (S26).

Note that, as the process of switching the integral

operational management to the autonomous operational management, that is, the process of returning the resources to the integral-target local management centers 20c and 20d by the central management center 10, for example, the central management center
5 10 may stop the operational management for the target resource (or all resources), and then, execute the same process at the steps of S15 and S16 in the example of FIG. 5. Also, similarly to the example of FIG. 4, the above-described process and message transmission/reception in each management center may be partially
10 or entirely executed by, for example, a terminal operation by an operator, an administrator, or others in each management center, or by an automatic process with taking a systematic event (such as the message reception) or others as a trigger.

Also, in the example of FIG. 6, at the step of S22 or S24,
15 the requests for all resources are made from the central management center 10 to each of the integral-target local management centers 20c and 20d as simultaneous report for simultaneous and parallel processing. However, a series of processes at steps of S22 to S26 may be continuously performed to each of the integral-target local
20 management centers 20c and 20d for sequential process.

As described above, according to the distributed datacenter 1 of the present embodiment, the two types of the operational management methods such as the integral operational management of the container-type DCs 21 at the plurality of locations and the
25 autonomous operational management of the DCs at each location can be appropriately switched for use.

< Reservation and Automatic Addition of Resource >

Further, in the distributed datacenter 1 of the present embodiment, by using the local resource management table 23 of the
30 local management center 20, the resource can be previously reserved. Therefore, for example, when another container-type DC 21 is additionally installed on the container-type DC 21 for expansion

at each location by the building block method, an operational configuration can be automatically added.

Normally, in order to easily perform the processes from the installation of the container-type DC 21 to the operation thereof
5 in a short period of time, a standard configuration of its own server device, network device, storage, and others is previously defined, and each container-type DC 21 is installed based on the standard configuration in principle. Therefore, in principle, a volume of an unoccupied resource owned by an unused container-type DC 21 which
10 is newly installed is constant and already known. Therefore, for the container-type DC 21 which is newly installed, the local resource management table 23 can be previously prepared.

In this manner, for example, when a location is newly constructed, the local resource management table 23 for the
15 container-type DC 21 which is newly installed is previously created and is reflected on the local management center 20, so that the operational management of the unused container-type DC 21 in the initial state can be quickly and easily performed. Also, when the container-type DC 21 is additionally installed at a
20 currently-operating location, by automatically registering each resource of the corresponding container-type DC 21 onto the local resource management table 23, the operational management of the additionally-installed container-type DC 21 can be quickly and easily performed.

25 Also, since the local resource management table 23 can be previously prepared, the value of the "management source" of the resource planned to be installed, which is registered on the local resource management table 23, is previously updated to the value (in the example of FIG. 2, "central") indicating the central
30 management center 10, so that the volume of the resource planned to be collectively operationally managed or used (including the resource to be assigned to another location) by the central

management center 10 among the resources of the container-type DC 21 which is newly installed can be reserved, and the datacenter can be quickly and flexibly constructed and operated.

As described above, according to the distributed datacenter 1 of the embodiment of the present invention, it is possible to achieve the distributed datacenter having the central management center 10 collectively operationally managing the plurality of distributed transportable datacenters such as the distributed container-type DCs 21 from the remote location. In the distributed datacenter 1 of the present embodiment, each management center manages the resource owned by the container-type DC 21 with using the resource management table. With using this system, for example, the resource owned by the container-type DC 21 can be assigned between the geographically-separated locations. Also, the two types of the operational management methods such as the integral operational management of the container-type DCs 21 at the plurality of locations and the autonomous operational management of the DCs at each location can be appropriately switched for use.

Further, with using the local resource management table 23, the resource of the container-type DC 21 can be previously reserved. Therefore, when the container-type DC 21 is newly installed or additionally installed, the operational configuration can be automatically added, and besides, the volume of the resource operationally managed by the central management center 10 can be also reserved. In these manners, as keeping the feature of the container-type DC 21 which can be easily and quickly constructed, the datacenter having higher expandability and flexibility can be constructed and operated.

In the foregoing, the invention made by the inventors of the present invention has been concretely described based on the embodiments. However, it is needless to say that the present invention is not limited to the foregoing embodiments and various

modifications and alterations can be made within the scope of the present invention.

The present invention can be used for a distributed datacenter configured with a plurality of transportable datacenters
5 distributed at remote locations.

What is claimed is:

1. A distributed datacenter having a configuration in which one or more transportable datacenters are distributed at a plurality of geographically-separated locations, and in which the
5 transportable datacenters at the respective locations are mutually connected via a communication network,

the distributed datacenter having a central management center which can operationally manage the transportable datacenters at the respective locations from a remote location,

10 each location having a local management center having a resource management table, which stores a state of an IT resource owned by each of the transportable datacenters installed at the respective locations, to operationally manage each of the transportable datacenters, and

15 the IT resource owned by the transportable datacenter operationally managed by a first local management center at a first location being used by a second local management center at a second location via the central management center.

20 2. The distributed datacenter according to claim 1, wherein, when the IT resource owned by the transportable datacenter operationally managed by the first local management center is used by the second local management center via the central management center,

25 the central management center suggests a required IT resource to the first local management center based on a request from the second local management center,

the first local management center having received the suggestion of the required IT resource reports a
30 provision-available IT resource to the central management center based on the resource management table of the first local management center,

the central management center having received the report of the provision-available IT resource suggests a provision-acceptable IT resource to the first local management center,

5 the first local management center having received the suggestion of the provision-acceptable IT resource updates the resource management table of the first local management center so that a provided IT resource is managed by the central management center, and besides, reports information regarding the provided IT
10 resource containing information regarding access to the provided IT resource to the central management center,

the central management center having received the report of the information regarding the provided IT resource provides the information regarding the provided IT resource to the second local
15 management center, and,

based on the information regarding the provided IT resource, the second local management center having received the information regarding the provided IT resource accesses the provision-acceptable IT resource owned by the transportable
20 datacenter operationally managed by the first local management center.

3. The distributed datacenter according to claim 2, wherein, when the first local management center having received the
25 suggestion of the required IT resource from the central management center reports the provision-available IT resource to the central management center based on the resource management table of the first local management center,

the first local management center updates the resource
30 management table of the first local management center so that a management state of the provision-available IT resource is an unoccupied state.

4. The distributed datacenter according to any one of claims 1 to 3, wherein

autonomous operational management of each of the transportable datacenters installed at each location by the local management center at each location and integral operational management of all of the transportable datacenters installed at a part or all of the locations by the central management center can be switched.

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5. The distributed datacenter according to claim 4, wherein, when the transportable datacenter subjected to the autonomous operational management by the local management center is switched so as to be subjected to the integral operational management by the central management center,

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the central management center requests all of the IT resources to the local management center,

the local management center having received the request for all of the IT resources reports a management state of each of the IT resources to the central management center based on the resource management table of the local management center,

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the central management center having received the report of the management state of each of the IT resources suggests all of provision-acceptable IT resources to the local management center,

25

the local management center having received the suggestion of all of the provision-acceptable IT resources updates the resource management table of the local management center so that all of provided IT resources are managed by the central management center, and besides, reports information regarding all of the provided IT resources containing information regarding access to all of the provided IT resources to the central management center, and

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the central management center having received the report of

the information regarding all of the provided IT resources operationally manages all of the provision-acceptable IT resources based on the information regarding all of the provided IT resources.

5 6. The distributed datacenter according to any one of claims 1 to 5, wherein

 each of the transportable datacenters installed at each location has a previously-defined standard configuration, and,

 when the transportable datacenter is additionally installed
10 at each location, IT resources based on the standard configuration are previously registered on the resource management table in the local management center at the corresponding location.

7. The distributed datacenter according to claim 6, wherein,

15 among the IT resources based on the standard configuration and previously registered on the resource management table, an IT resource planned to be operationally managed by the central management center is previously updated so that the IT resource is managed by the central management center.