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HIGH-DENSITY STORAGE SERVERS

Abstract

A server includes a chassis, a system board, and at least one storage module. The chassis includes an opening. The chassis also includes a first accommodation space and a second accommodation space, and the first accommodation space is closer to the opening relative to the second accommodation space. The system board is located in the second accommodation space. The storage module includes a push-pull bracket, a storage board, and a plurality of storage devices. The storage board is secured in the push-pull bracket, and is electrically connected to the system board. The plurality of storage devices are disposed on opposite sides of the storage board, and are pluggably connected to the storage board. The storage module is slidably connected to the chassis by the push-pull bracket, to allow the storage module to be pushed into the first accommodation space through the opening.

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Background/Summary

CROSS REFERENCE TO RELATED APPLICATIONS [0001] This application is a continuation of International Application No. PCT/CN2023/117462, filed on Sep. 7, 2023, which claims priority to Chinese Patent Application No. 202211395979.8, filed on Nov. 8, 2022. The disclosures of the aforementioned applications are hereby incorporated by reference in their entireties.

TECHNICAL FIELD
[0002] The present application relates to the field of computer servers, and in particular to high-density storage servers.
BACKGROUND
[0003] With the development of Internet technologies and big data fields in recent years, the demand for server storage has been increasing, and the storage capacity requirement for a single server is also increasing.
[0004] In a conventional high-density storage server, due to factors such as design and layout of components inside a server chassis, the quantity of drives housed in a server is restricted, and the growing demand for large storage capacity cannot be met.
SUMMARY
[0005] Embodiments of the present application provide a server, which allows for an increased quantity of storage devices that can be placed in a server chassis to implement a high-density server, and the present application relates to the field of computer servers.
[0006] To achieve the purpose, the embodiments of the present application provide the following technical solutions.
[0007] In a first aspect, a server is provided in embodiments of the present application. The server includes: a chassis, a system board, and at least one storage module. The chassis includes an opening. The chassis also includes a first accommodation space and a second accommodation space, with the first accommodation space being closer to the opening relative to the second accommodation space. The system board is located in the second accommodation space. The storage module includes a push-pull bracket, a storage board, and a plurality of storage devices. The storage board is secured in the push-pull bracket, and is electrically connected to the system board. The plurality of storage devices are disposed on opposite sides of the storage board, and are pluggably connected to the storage board. The storage module is slidably connected to the chassis by the push-pull bracket, to allow the storage module to be pushed into the first accommodation space through the opening.
[0008] In some embodiments of the present application, the server may be provided with at least one storage module. In each storage module, the storage board may be disposed in the middle of the push-pull bracket, so that the plurality of storage devices are disposed on opposite sides of the storage board, and the plurality of storage devices are pluggably connected to the storage board. Therefore, insertion directions of the storage devices in the push-pull bracket can be increased, so that the push-pull bracket of the server is available on both sides on the premise of an unchanged

specification in a unit space. This, in turn, allows for more space inside the chassis to accommodate the storage devices, thereby implementing a high-density storage server. In addition, when the storage devices need to be maintained, the push-pull bracket can be directly pulled out of the chassis in the Y-axis direction, and the storage devices can be directly taken out in the X-axis direction for maintenance. After the maintenance is completed, the push-pull bracket is pushed into the chassis, which facilitates directly plugging of the storage devices, thereby improving maintenance efficiency of the server by the staff.
[0009] In some embodiments, the push-pull bracket includes a support plate and a cage, and the cage is located on one side of the support plate. The cage includes a mounting position, and the storage board is mounted in the mounting position. The cage also includes a plurality of plugging slots, and the plurality of plugging slots are disposed on opposite sides of the mounting position, to allow the storage devices to be plugged into the plugging slots and electrically connected to the storage board.
[0010] With this configuration, the storage board is mounted in the mounting position. That is, the storage board is mounted in the cage. Furthermore, the space on both sides of the storage board in the cage may be used for placing the storage devices, and the plurality of storage devices may be disposed on the opposite sides of the storage board. Furthermore, the storage devices may be plugged into the plugging slots and electrically connected to the storage board in different directions, so that the plugging directions of the storage devices in the push-pull bracket are increased, and the push-pull bracket of the server is available on both sides even though the specification of a unit space is unchanged. This, in turn, allows for more space inside the chassis to accommodate more storage devices, thereby achieving higher density in a storage server.
[0011] In some embodiments, the push-pull bracket also includes a slide rail assembly. The slide rail assembly is located between one side surface of the support plate facing away from the cage and the chassis.
[0012] With this configuration, the slide rail assembly can be used to realize the functions of the push-pull bracket in the Y-axis direction in the chassis. When the server is in a normal operating condition, the slide rail assembly is used to place the push-pull bracket in the first accommodation space in the chassis. However, when the storage devices in the server need to be maintained, the push-pull bracket may be pulled out of the chassis by using the slide rail assembly, and then the storage devices on the push-pull bracket can be pulled out in the Y-axis direction for maintenance, thereby improving maintenance efficiency of the server by the staff.
[0013] In some embodiments, the slide rail assembly includes at least one telescopic slide rail. The telescopic slide rail includes a first fixed slide rail, a connecting slide rail, and a second fixed slide rail. One side of the first fixed slide rail is fixedly connected to the chassis, and the other side of the first fixed slide rail is slidably connected to the connecting slide rail. The first fixed slide rail is provided with a first limiting structure on both ends thereof configured to prevent the connecting slide rail from detaching. One side of the second fixed slide rail is fixedly connected to the support plate, and the other side of the second fixed slide rail is slidably connected to the connecting slide rail. The second fixed slide rail is provided with a second limiting structure on both ends thereof configured to prevent the connecting slide rail from detaching.
[0014] With this configuration, the first fixed slide rail of the telescopic slide rail is fixedly connected to the chassis, and the second fixed slide rail of the telescopic slide rail is fixedly connected to the support plate. The support plate can be driven to slide in the chassis through relative movement between the first fixed slide rail and the second fixed slide rail, so that the storage module slides in the chassis by the push-pull bracket, and the storage module can be pushed into the first accommodation space through the opening. Based on this, friction when the push-pull bracket slides in the chassis can be reduced, which allows the push-pull bracket to be pulled out of the chassis in the Y-axis direction and the storage devices to be directly taken out in the X-axis direction for maintenance of the storage devices. That is, it is more convenient to perform plugging

operations on the storage devices, thereby improving the maintenance efficiency of the server by the staff.

[0015] In some embodiments, there are a plurality of the storage modules, and the plurality of storage modules are arranged in a first direction. The first direction is parallel to one of the plugging directions of the storage devices. A first air flow gap is formed between two adjacent storage modules.

[0016] With this configuration, cool air flowing through the first air flow gap can respectively enter two storage modules adjacent to the first air flow gap, to dissipate heat generated by each storage device in the two storage modules. Since the cool air directly touches on each storage device without being affected by the heat from other storage devices, it helps improve the heat dissipation effect of the cool air on each storage device, thereby enhancing the heat dissipation effect and heat dissipation efficiency of the server.

[0017] In some embodiments, the width of the first air flow gap in the first direction is greater than or equal to 4 mm.

[0018] This configuration ensures that the width of the first air flow gap is not too small, which allows sufficient cool air to flow through the first air flow gap and dissipate heat from each adjacent storage device, thereby enhancing a heat dissipation effect of the cool air on each storage device.

[0019] In some embodiments, the width of the first air flow gap in the first direction is less than or equal to 12 mm.

[0020] This configuration ensures that the width of the first air flow gap is not too large, and the internal space of the chassis occupied by the first air flow gap is not too large, to meet the demand for space in the chassis for accommodating a plurality of storage devices.

[0021] In some embodiments, in the first direction, a second air flow gap is configured between the storage module and the chassis. The first direction is parallel to one of the plugging directions of the storage devices.

[0022] With this configuration, the cool air flows through the second air flow gap and enters each adjacent memory module of the second air flow gap, to dissipate heat generated by each storage device. Since the cool air directly interacts with each storage device without being affected by the heat of other storage devices, it helps improve the heat dissipation effect of the cool air on each storage device, thereby enhancing the heat dissipation effect and the heat dissipation efficiency of the server.

[0023] In some embodiments, the width of the second air flow gap in the first direction is greater than or equal to 4 mm.

[0024] This configuration ensures that the width of the second air flow gap is not too small, which allows sufficient cool air to flow through the second air flow gap and dissipate heat from the adjacent storage devices, thereby enhancing the heat dissipation effect of the cool air on each storage device.

[0025] In some embodiments, the width of the second air flow gap in the first direction is less than or equal to 6 mm.

[0026] This configuration ensures that the width of the second air flow gap is not too large, and the internal space of the chassis occupied by the second air flow gap is not too large, which can meet the demand for space in the chassis for accommodating the plurality of storage devices in the chassis.

[0027] In some embodiments, along a push-pull direction of the storage module, the chassis includes a side plate opposite the opening. The side plate includes a plurality of heat dissipation holes.

[0028] With this configuration, cool air can enter the server through the opening. After the cool air absorbs the heat from the storage devices in the server, the temperature of the air rises. The heated air can flow out of heat dissipation holes T. Based on this, heat dissipation of each storage device in

the server is accomplished.
[0029] In some embodiments, the server also includes a cable. One end of the cable is electrically connected to the system board, and the other end of the cable is electrically connected to the storage board. The chassis also includes a third accommodation space. The third accommodation space is located between the first accommodation space and the second accommodation space. The third accommodation space is used for storing the cable.
[0030] With this configuration, when the push-pull bracket is pushed toward a direction facing away from the system board, the cable can extend from the third accommodation space to the first accommodation space, ensuring that, when the push-pull bracket is pulled out of the chassis, the system board and the storage board can still maintain an electrical connection. When the push-pull bracket is pushed toward a direction close to the system board, the cable can retract into the third accommodation space and be stored in the third accommodation space. This ensures that the storage space of the system board located in the second accommodation space and the storage space of the storage module located in the first accommodation space are not affected. Furthermore, the push-pull bracket can slide more flexibly in the chassis.

Description

BRIEF DESCRIPTION OF DRAWINGS
[0031] FIG. **1** is a structural diagram of a server according to an embodiment of the present application;
[0032] FIG. **2** is a structural diagram of a server according to another embodiment of the present application;
[0033] FIG. **3** is a top view of a server according to an embodiment of the present application;
[0034] FIG. **4** is a structural diagram of a heat dissipation module in FIG. **2**;
[0035] FIG. **5** is an assembly diagram of a slide rail assembly and a chassis in FIG. **3**;
[0036] FIG. **6** is a structural diagram of a telescopic slide rail in the slide rail assembly in FIG. **3**; and
[0037] FIG. **7** is a structural diagram of a server according to yet another embodiment of the present application.
DESCRIPTION OF EMBODIMENTS
[0038] The following clearly and completely describes technical solutions in embodiments of the present disclosure in combination with accompanying drawings. Apparently, the described embodiments are some but not all of the embodiments of the present disclosure. All other embodiments obtained by those skilled in the art based on the embodiments provided in the present disclosure fall within the scope of protection of the present disclosure.
[0039] Unless otherwise specified in the context, in the entire specification and claims, the terms “comprise” and its other forms, such as a singular form in third personal “comprises” and the present participle form “comprising”, are to be interpreted in an open, inclusive sense, that is, “including but not limited to”. In the description of the specification, terms such as “one embodiment”, “some embodiments”, “exemplary embodiments”, “example”, “specific example”, or “some examples” are intended to indicate that specific features, structures, materials, or characteristics related to the embodiment or example are included in at least one embodiment or example of the present disclosure. The schematic representation of the above terms does not necessarily refer to the same embodiment or example. In addition, specific features, structures, materials, or characteristics may be included in one or more embodiments or examples in any suitable manner. It is also noted that all numbers mentioned in the specification are approximate, not exact. Persons skilled in the art should understand that small variations in the dimension of a component, for example, in the width of the air flow gaps, are within the scope of the disclosure, as

long as the variations do not alter the desired functions and effects of the component.
[0040] In the embodiments of the present application, terms “first” and “second” are used only for descriptive purposes, and should not be interpreted as indicating or implying relative importance or implicitly specifying a quantity of technical features indicated. Thus, features defined by “first” and “second” may explicitly or implicitly include one or more of such features. Unless otherwise specified in the description of embodiments of the present disclosure, “a plurality of” represents two or more.
[0041] When some embodiments are described, terms “coupled” and “connected”, along with their derivatives, may be used. For example, the term “coupled” may be used to indicate that two or more components are in direct physical contact or electrical contact with each other when some embodiments are described. For another example, the term “coupled” may be used to indicate that two or more components are in direct physical contact or electrical contact with each other. However, the term “coupled” or “communicatively coupled” may also refer to two or more components that are not in direct contact with each other but still collaborate or interact with each other. The embodiments disclosed are not necessarily limited to the content of the context.
[0042] The terms “component”, “module”, “system”, etc. used in the specification are intended to represent computer-related entities, hardware, firmware, a combination of hardware and software, software, or executing software. For example, the component may be, but is not limited to, a process running on a processor, the processor, an object, an executable file, an execution thread, a program, and/or a computer. As shown in the figures, both an application running on a computing device and the computing device may be components. One or more components may reside in a process and/or execution thread, and the components may be located on a single computer and/or distributed between two or more computers. In addition, these components may execute from various computer readable media with various data structures stored thereon. The components may communicate through a local and/or remote process such as based on signals with one or more data packets (for example, data from two components that interact with other components in a local system, distributed system, and/or across a network, such as the Internet, where communication with other systems occurs through signals).
[0043] FIG. **1** is a structural diagram of a server according to some embodiments of the present application. FIG. **2** is another structural diagram of a server according to some embodiments of the present application. It may be understood that FIG. **1** and other relevant accompanying drawings only schematically show some of the components included in the server **100**, and the actual shapes, actual sizes, actual locations, and actual structures of these components are not limited by FIG. **1** and the other accompanying drawings.
[0044] Embodiments of the present application provide a server. As shown in FIG. **1**, and in combination with FIG. **2**, the server **100** includes: a chassis **10**, a system board **20**, and at least one storage module **30**.
[0045] In an embodiment shown in FIG. **1**, the server **100** is in a cubic shape. For convenience of description of the following embodiments, an XYZ coordinate system is established. A width direction of the server **100** is defined as the X-axis direction, a length direction of the server **100** as the Y-axis direction, and a height direction of the server **100** as the Z-axis direction. It is noted that the coordinate system of the server **100** may be flexibly configured according to actual needs, which is not specifically limited here.
[0046] The chassis **10** includes an opening **11**. The chassis **10** includes a first accommodation space **12** and a second accommodation space **13**, and the first accommodation space is closer to the opening **11** relative to the second accommodation space **13**.
[0047] In some examples, as shown in FIGS. **1** and **2**, the chassis **10** includes a first side plate S**1** and a second side plate S**2** arranged opposite each other in the X-axis direction, and the chassis **10** also includes a top plate S**3** and a bottom plate S**4** arranged opposite to each other in the Z-axis direction. Also, the chassis **10** includes a third side plate S**5**. In the Y-axis direction, the third side

plate S**5** is disposed opposite to the opening **11**, and the first side plate S**1**, the second side plate S**2**, the top plate S**3**, and the bottom plate S**4** are circumferentially disposed around the third side plate S**5**, and are fixedly connected to the third side plate S**5**. An accommodation space A is formed by the first side plate S**1**, the second side plate S**2**, the top plate S**3**, the bottom plate S**4**, and the third side plate S**5**. In the Y-axis direction, the accommodation space A includes a first accommodation space **12** and a second accommodation space **13**, and the first accommodation space **12** is farther from the third side plate S**5** relative to the second accommodation space **13**.

[0048] Furthermore, the other side edges of the first side plate S**1**, the second side plate S**2**, the top plate S**3**, and the bottom plate S**4** are connected to each other without configuring a side plate, to form the opening **11** of the chassis **10**. In this way, an external object can be pushed into the accommodation space A through the opening **11**. The first accommodation space is farther from the third side plate S**5** relative to the second accommodation space **13**. That is, the first accommodation space is closer to the opening **11** relative to the second accommodation space **13**.

[0049] The system board **20** is located in the second accommodation space **13**. That is, the system board **20** may be configured on one side of the chassis **10** away from the opening **11**.

[0050] In some examples, the system board **20** may be connected to the bottom plate S**4** of the chassis **10**, to secure the system board **20**, which prevents problems such as displacement of the system board **20**. In some embodiments of the present application, a connection method between the system board **20** and the bottom plate S**4** is not limited, which may include soldering or other connection methods.

[0051] As shown in FIG. **2**, the storage module **30** in the server **100** includes a push-pull bracket **31**, a storage board **32**, and a plurality of storage devices **33**. The storage module **30** is slidably connected to the chassis **10** by the push-pull bracket **31**, to enable the storage module **30** to be pushed into the first accommodation space **12** through the opening **11**.

[0052] That is, the push-pull bracket **31** may move back and forth in the Y-axis direction in the chassis **10**. The push-pull bracket **31** may be pulled from the first accommodation space **12** to the exterior of the chassis **10** in a direction from the third side wall S**5** toward the opening **11**. Also, the push-pull bracket **31** may be pushed from the exterior of the chassis **10** to the first accommodation space **12** in the direction from the opening **11** toward the third side plate S**5**.

[0053] FIG. **1** only shows the server **100** as including two storage modules **30** arranged in the X-axis direction for example. However, some embodiments of the present application do not limit the quantity of the storage modules **30** in the server **100**. For example, the server **100** may include 3, 4, or 5 storage modules **30** arranged along the X-axis.

[0054] In some examples, the push-pull bracket **31** is located in the first accommodation space **12**. In other words, the push-pull bracket **31** is disposed on one side of the system board **20** close to the opening **11**, to avoid any obstruction being disposed between the push-pull bracket **31** and the opening **11**. This allows for free movement of the push-pull bracket **31** in the Y-axis direction.

[0055] In some examples, the push-pull bracket **31** may be configured as a drawer structure. A plurality of storage devices **33** may be placed in the push-pull bracket **31**. The push-pull bracket **31** in the server **100** may be pulled out in the Y-axis direction, which facilitates picking up and placing of the storage devices **33** stored in the push-pull bracket **31** at any time.

[0056] Accordingly, in a normal operating state of the server **100**, the push-pull bracket **31** may be placed in the first accommodation space **12** of the chassis **10**. When the storage devices **33** in the server **100** need maintenance, the push-pull bracket **31** may be pulled out of the chassis **10** (the push-pull bracket **31** may be pulled from the first accommodation space **12** to the exterior of the chassis **10** along a direction from the third side plate S**5** toward the opening **11**), and then the storage devices **33** on the push-pull bracket **31** may be taken out in the Y-axis direction for maintenance, thereby improving the maintenance efficiency of the server by the staff. After online maintenance of the storage devices **33** is completed, the push-pull bracket **31** may be pushed into the chassis **10** (along the direction from the opening **11** toward the third side plate S**5**, the push-pull

bracket **31** is pushed from the exterior of the chassis **10** toward the first accommodation space **12**), so that the plurality of storage devices **33** on the push-pull bracket **31** are stored in the chassis **10**.
[0057] The storage board **32** may be secured in the push-pull bracket **31**. The storage board **32** is electrically connected to the system board **20**, enabling signal transmission between the storage board **32** and the system board **20**. Also, the storage board **32** is electrically connected to the plurality of storage devices **33**, enabling signal transmission between the storage devices **33** and the storage board **32**.
[0058] In some examples, the storage devices **33** are drives, and the storage board **32** is a drive backplane. The drive backplane is electrically connected to the system board **20**, and the drives are electrically connected to the drive backplane, enabling signal transmission among the drives, the drive backplane, and the system board **20**.
[0059] In some examples, the plurality of storage devices **33** are disposed in the push-pull bracket **31**, and are pluggably connected to the storage board **32**. In this way, the plurality of storage devices **33** may transmit signals to and from the storage board **32**.
[0060] In some examples, the storage board **32** may be a double-sided storage board. In the X-axis direction, the storage board **32** includes a first side surface C**1** and a second side surface C**2** that are disposed opposite to each other. The first side surface C**1** is closer to the first side plate S**1** relative to the second side surface C**2**. Also, the second side surface C**2** is closer to the second side plate S**2** relative to the first side surface C**1**. Both the first side surface C**1** and the second side surface C**2** of the storage board **32** are pluggably connected to the plurality of storage devices **33**, to implement the storage board **32** as a double-sided storage board.
[0061] Accordingly, the storage board **32** may be fixed in the middle of the pull-push bracket **31**, and the storage board **32** is vertically disposed in the pull-push bracket **31**. In this case, a length of the storage board **32** may be configured to extend in the Y-axis direction, and a width of the storage board **32** may be configured to extend in the Z-axis direction, so that the storage board **32** is vertically disposed in the push-pull bracket **31**.
[0062] Since the storage board **32** in the server **100** provided in some embodiments of the present application may be a double-sided storage board, the plurality of storage devices **33** may be disposed on opposite sides of the storage board **32** and be pluggably connected to the storage board **32**. That is, the storage devices **33** may be disposed on both sides of the push-pull bracket **31**. In this way, plugging directions of the storage devices **33** in the push-pull bracket **31** may be increased, so that the push-pull bracket **31** of the server **100** is available on both sides without changing the specification on the unit space. This, in turn, allows for more space inside the chassis **10** to accommodate the storage devices **33**, thereby achieving higher density in the storage server.
[0063] And, when the storage devices **33** needs maintenance, a storage device **33** that is closer to the first side plate S**1** may be plugged in and out along a direction toward the first side plate S**1**; and a storage device **33** that is closer to the second side plate S**2** may be plugged in and out along a direction toward the second side plate S**2**. That is, there is no obstruction in the Z-axis direction of the storage devices **33**, which is more convenient for plugging operations on the storage devices **33**, thereby improving the maintenance efficiency of the server by the staff.
[0064] In addition, when the server **100** includes a plurality of storage modules **30**, a push-pull bracket **31** of each storage module **30** may be pulled out separately. That is, only one push-pull bracket **31** may be pulled out each time, and maintenance can be performed on the storage devices **33** on the push-pull bracket **31**, which can prevent other adjacent push-pull brackets **31** from obstructing plugging operation of the storage devices **33**, and facilitate plugging operations on the storage devices **33**, thereby enhancing the maintenance efficiency of the server by the staff. Alternatively, it can be configured that two adjacent push-pull brackets **31** in the server **100** cannot be pulled out simultaneously. That is, a large gap can be maintained between the push-pull brackets **31** that are pulled out simultaneously. This ensures that there is sufficient space on one side of a storage device **33** to be plugged away from the storage board **32**, allowing for plugging operations

on the storage device **33**, and preventing other push-pull brackets **31** from obstructing the plugging operation of the storage device **33**, thereby enhancing the maintenance efficiency of the server by the staff.

[0065] In some examples, each storage device **33** may include a first interface, and the storage board **32** may include a plurality of second interfaces corresponding to the first interfaces of the storage devices **33**. That is, one storage device **33** may be plugged into one second interface on the storage board **32** via its first interface, thereby achieving an electrical connection between the storage device **33** and the storage board **32**. In some embodiments of the present application, the quantity of second structures on the storage board **32** is not limited. That is, the quantity of storage devices **33** pluggably connected on the storage board **32** is not limited in embodiments of the present application.

[0066] In some examples, the first side surface C**1** of the storage board **32** includes a plurality of second interfaces, and the second side surface C**2** of the storage board **32** also includes a plurality of second interfaces.

[0067] In some examples, the quantity of the second interfaces on the first side surface C**1** may be equal to the quantity of the second interfaces on the second side surface C**2**. It is understandable that, in other examples, the quantity of the second interfaces on the first side surface C**1** may not be equal to the quantity of the second interfaces on the second side surface C**2**. In embodiments of the present application, the quantities of the second interfaces on the first side C**1** and the second side C**2** of the storage board **32** are not limited.

[0068] In summary, the server **100** in some embodiments of the present application may include at least one storage module **30**. In each storage module **30**, the storage board **32** may be disposed in the middle of the push-pull bracket **31**, so that a plurality of storage devices **33** are disposed on opposite sides of the storage board **32** and are pluggably connected to the storage board **32**. In this way, the plugging directions of the storage devices **33** in the push-pull bracket **31** can be increased, so that the push-pull bracket **31** of the server **100** is available on both sides without the need to change the specification on the unit space. This, in turn, allows for more space inside the chassis **10** to accommodate the storage devices **33**, thereby achieving higher density in the storage server. In addition, when the storage devices **33** needs maintenance, any push-pull bracket **31** can be directly pulled out of the chassis **10** in the Y-axis direction, and the storage devices **33** can be directly taken out in a ±X-axis direction (the storage devices **33** can be directly taken out in a direction away from the storage board **32**) for maintenance of the storage devices **33**. After maintenance, the push-pull bracket **31** is pushed into the chassis **10**, which facilitates plugging operations on the storage devices **33**, thereby improving the maintenance efficiency of the server by the staff.

[0069] In some embodiments, as shown in FIGS. **1** and **2**, the quantity of the storage modules **30** in the server **100** is more than one, and the plurality of storage modules **30** are arranged in a first direction. The first direction is parallel to a plugging direction of the storage devices **33**. The first direction is also parallel to the X-axis direction.

[0070] The server **100** is configured to include a plurality of storage modules **30**, so that the storage devices **30** inside the chassis **10** can accommodate more storage devices **33**, to implement a high-density storage server.

[0071] Since the server **100** accommodates a greater quantity of storage devices **33**, a large amount of heat may be generated inside the server **100** during normal operation. The heat cannot be dissipated quickly in a confined space, causing the temperature inside the server **100** to continuously rise. This can easily lead to damage to the storage devices **33**, thereby affecting the quality of the storage devices **33**. Further, the server **100** needs to be cooled by cool air, to prevent the internal temperature of the server **100** from becoming too high, thereby affecting the quality of the storage devices **33**.

[0072] Thus, the cool air can be distributed into the interior of the server **100** through the opening **11**, facilitating heat dissipation for the server **100**. However, a path of the cool air entering from the opening **11** is as follows: the opening **11**, a first column of storage devices, a second column of storage devices, a third column of storage devices, . . . an nth column of storage devices. Based on this, when the cool air enters the first column of storage devices and absorbs heat from the first column of storage devices, the temperature of the cool air will rise to a certain degree. The heated cool air then enters the second column of storage devices, to dissipate heat from the second column of storage devices, and the temperature of the heated cool air will rise again. The further heated cool air enters the third column of storage devices, to dissipate heat from the third column of storage devices, and so on until the nth column of storage devices. As the cool air is transferred to subsequent columns of storage devices, the temperature of the cool air has risen to such an extent, making it unable to cool subsequent storage devices effectively. This lowers heat dissipation efficiency for the server **100**.

[0073] FIG. **3** is a top view of a server according to some embodiments of the present application.

[0074] In some embodiments of the present application, the server **100**, as shown in FIG. **3**, is configured with a first air flow gap **40** formed between two adjacent storage modules **30**.

[0075] Based on this, there are two paths for the cooling air to enter through the opening **11**. In the first path (as shown in the arrow flowing through the first air flow gap **40**), the cool air flows through the first air flow gap **40**, and enters adjacent storage devices **33** through the first air flow gap **40**, to dissipate heat from each storage device **33**. The cool air flowing through the first air flow gap **40** may respectively enter each of the two storage modules **30** adjacent to the first air flow gap **40**, to dissipate heat from each storage device **33** in the two storage modules **30**. Since the cool air directly touches each storage device **33** without being affected by the heat of other storage devices **33**, it improves the heat dissipation effect of the cool air on each storage device **33**, thereby enhancing the heat dissipation effect and the heat dissipation efficiency of the server **100**.

[0076] The second path is already described above, which is: the opening **11**, the first column of storage devices, the second column of storage devices, the third column of storage devices, . . . the nth column of storage devices. A specific heat dissipation process is consistent with the above description, and will not be repeated here.

[0077] Since the first air flow gap **40** on the first path is unobstructed, cool air can preferentially enter the first air flow gap **40**. Based on the first air flow gap **40**, heat dissipation is performed on adjacent storage devices **33**. That is, most of the cool air preferentially enters the first air flow gap **40**. Of course, there is also a small amount of residual cool air that dissipates heat from each storage device **33** through the second path.

[0078] Embodiments of the present application do not restrict the cool air from flowing through the second path, as long as part of the cool air can directly act on each storage device **33** through the first path, which improves the heat dissipation effect of the cool air on each storage device **33**, thereby improving the heat dissipation effect and the heat dissipation efficiency of the server **100**.

[0079] In some embodiments, as shown in FIG. **3**, the width of the first air flow gap **40** in the first direction is greater than or equal to 4 mm. That is, in the X-axis direction, the width of the first air flow gap **40** between two adjacent storage modules **30** is greater than or equal to 4 mm. The first direction is also parallel to the X-axis direction.

[0080] When the width of the first air flow gap **40** in the first direction is equal to or approaches 4 mm, sufficient cool air may flow through the first air flow gap **40** and dissipate heat from adjacent storage devices **33**, thereby enhancing the heat dissipation effect of the cool air on each storage device **33**. Since the width of the first air flow gap **40** is relatively small, the first air flow gap **40** may occupy less internal space of the chassis **10**, thereby providing sufficient space in the chassis **10** for accommodating a plurality of storage modules **30**.

[0081] In some embodiments, as shown in FIG. **3**, the width of the first air flow gap **40** in the first direction is less than or equal to 12 mm. That is, in the X-axis direction, the width of the first air flow gap **40** between two adjacent storage modules **30** is less than or equal to 12 mm. The first direction is also parallel to the X-axis direction.

[0082] When the width of the first air flow gap **40** in the first direction is equal to or approaches 12 mm, the space requirements for accommodating the plurality of storage modules **30** in the chassis **10** can be satisfied. Since the width of the first air flow gap **40** is relatively large, sufficient cool air is allowed to flow through the first air flow gap **40** and dissipate heat from adjacent storage devices **33**, thereby enhancing the heat dissipation effect of the cool air on each storage device **33**.
[0083] In some embodiments, the width range of the first air flow gap **40** in the first direction is 4 mm˜12 mm. With this configuration, the width of the first air flow gap **40** is neither too large nor too small, which can improve the heat dissipation effect of the cool air on each storage device **33** because it prevents overcrowding in the chassis **10**.
[0084] In some embodiments, the width of the first air flow gap **40** in the first direction is less than or equal to 6 mm. That is, in the X-axis direction, the width of the first air flow gap **40** between two adjacent storage modules **30** is less than or equal to 6 mm.
[0085] When the width of the first air flow gap **40** in the first direction is equal to or approaches 6 mm, the space requirements for accommodating the plurality of storage modules **30** in the chassis **10** can be satisfied. Since the width of the first air flow gap **40** is relatively large but not too large, sufficient cool air is allowed to flow through the first air flow gap **40** and dissipate heat from adjacent storage devices **33**, thereby enhancing the heat dissipation effect of the cool air on each storage device **33**.
[0086] In some embodiments, the width range of the first air flow gap **40** in the first direction is 4 mm˜6 mm. That is, in the X-axis direction, the width range of the first air flow gap **40** between two adjacent storage modules **30** is 4 mm˜6 mm.
[0087] This configuration can better prevent the first air flow gap **40** from occupying too much space in the chassis **10** thereby enhancing the heat dissipation effect of the cool air on each storage device **33**, by providing sufficient space in the chassis **10** for accommodating the plurality of storage modules **30**.
[0088] In some examples, the width of the first air flow gap **40** in the first direction may be any one of 4 mm, 5 mm, 6 mm, 7 mm, 8 mm, 9 mm, 10 mm, 11 mm or 12 mm. However, in some embodiments of the present disclosure, the width of the first air flow gap **40** in the first direction is not limited here.
[0089] In some embodiments, as shown in FIG. **3**, in the first direction, a second air flow gap **50** is included between the storage modules **30** and the chassis **10**. The first direction is parallel to a plugging direction of the storage devices **33**. The first direction is also parallel to the X-axis direction.
[0090] The second air flow gap **50** is disposed between the storage modules **30** and the chassis **10**. The heat dissipation process of the second air flow gap **50** is similar to that of the first air flow gap **40**. The second air flow gap **50** also includes two cool air paths. In the first path, cool air flows through the second air flow gap **50**, and enters adjacent storage modules **33** through the second air flow gap **50**, to dissipate heat from each storage module **33**. Since the cool air directly interacts with each storage device **33** without being affected by the heat of other storage devices **33**, it improves the heat dissipation effect of the cool air on each storage device **33**, thereby enhancing the heat dissipation effect and the heat dissipation efficiency of the server **100**.
[0091] The second path is the same as described above, which is through the opening **11**, the first column of storage devices, the second column of storage devices, the third column of storage devices, . . . the nth column of storage devices. The specific heat dissipation process is consistent with the above description, and will not be repeated here.
[0092] Since the second air flow gap **50** on the first path is unobstructed, the cool air can preferentially enter the second air flow gap **50**, and heat dissipation is performed on the adjacent storage devices **33**. That is, most of the cool air preferentially enters the second air flow gap **50**. Of course, there is also a small amount of residual cool air that absorbs heat from each storage device **33** through the second path.

[0093] Embodiments of the present application do not prevent the cool air from flowing through the second path, as long as part of the cool air can directly act on each storage device **33** through the first path, which improves the heat dissipation effect of the cool air on each storage device **33**, thereby improving the heat dissipation effect and the heat dissipation efficiency of the server **100**.
[0094] In some examples, the server **100** may include only one storage module **30**, and there is a second air flow gap **50** between a side surface of the storage module **30** close to the first side plate S**1** and the first side plate S**1**, and there is a second air flow gap **50** between a side surface of the storage module **30** close to the second side plate S**2** and the second side plate S**2**.
[0095] In other examples, as shown in FIG. **3**, the server **100** may include 2 storage modules **30**, a storage module **30** closer to the first side plate S**1** in the 2 storage modules **30** is a first storage module **30***a*, and a storage module **30** closer to the second side plate S**2** in the 2 storage modules **30** is a second storage module **30***b*.
[0096] There are a second air flow gap **50** between a side surface of the storage module **30***a* close to the first side plate S**1** and the first side plate S**1**, and a second air flow gap **50** between a side surface of the second storage module **30***b* closer to the second side plate S**2** and the second side plate S**2**.
[0097] In addition, there is a first air flow gap **40** between the first storage module **30***a* and the second storage module **30***b*. That is, in this case, the server **100** includes the first air flow gap **40** and the second air flow gap **50**. Therefore, the server **100** gains the beneficial effects of the above first air flow gap **40** and the second air flow gap **50**, which will not be repeated here.
[0098] In yet other examples, the server **100** may include 3 storage modules **30**. The 3 storage modules **30** are respectively a first storage module, a second storage module, and a third storage module. A storage module **30** closest to the first side plate S**1** among the 3 storage modules **30** is the first storage module. A storage module **30** closest to the second side plate S**2** among the three storage modules **30** is the second storage module, and the second storage module is located between the first storage module and the second storage module.
[0099] There are a second air flow gap **50** between a side surface of the first storage module close to the first side plate S**1** and the first side plate S**1**, and another second air flow gap **50** between a side surface of the second storage module close to the second side plate S**2** and the second side plate S**2**.
[0100] In addition, there is a first air flow gap **40** between a surface of the third storage module close to the first storage module and a surface of the first storage module close to the third storage module. Also, there is a first air flow gap **40** between a surface of the third storage module close to the second storage module and a surface of the second storage module close to the third storage module.
[0101] Understandably, when the server includes more than 3 storage modules **30**, it is similar to the above, and in combination with the description of the 3 storage modules **30**, the difference lies in the addition of a corresponding first air flow gap **40**.
[0102] In some embodiments, as shown in FIG. **3**, the width of the second air flow gap **50** in the first direction is greater than or equal to 4 mm. The first direction is parallel to the X-axis direction. That is, in the X-axis direction, the width of a second air flow gap **50** between a surface of the storage module **30** closest to the first side plate S**1** of the chassis **10**, which is close to one side of the first side plate S**1**, and the first side plate S**1**, is greater than or equal to 4 mm. Alternatively, in the X-axis direction, the width of a second air flow gap **50** between a surface of the storage module **30** closest to the second side plate S**2** of the chassis **10**, which is close to the second side plate S**2**, and the second side plate S**2**, is greater than or equal to 4 mm.
[0103] When the width of the second air flow gap **50** in the first direction is equal to or approaches 4 mm, sufficient cool air may flow through the second air flow gap **50** and dissipate heat from the adjacent storage devices **33**, thereby enhancing the heat dissipation effect of the cool air on each storage device **33**. Since the width of the first second flow gap **50** is relatively small, the second air

flow gap **50** may occupy less internal space in the chassis **10**, thereby providing sufficient space in the chassis **10** for accommodating the plurality of storage modules **30**.

[0104] In some embodiments, as shown in FIG. **3**, the width of the second air flow gap **50** in the first direction is less than or equal to 6 mm. The first direction is parallel to the X-axis direction. That is, in the X-axis direction, the width of a second air flow gap **50** between a surface of the storage module **30** closest to the first side plate S**1** of the chassis **10**, which is close to one side of the first side plate S**1**, and the first side plate S**1**, is less than or equal to 6 mm. Alternatively, in the X-axis direction, the width of a second air flow gap **50** between a surface of the storage module **30** closest to the second side plate S**2** of the chassis **10**, which is close to the second side plate S**2**, and the second side plate S**2**, is less than or equal to 6 mm.

[0105] When the width of the second air flow gap **50** in the first direction is equal to or approaches 6 mm, the space requirements for placing the plurality of storage modules **30** in the chassis **10** can be satisfied. Since the width of the second air flow gap **50** is relatively large, sufficient cool air is allowed to flow through the second air flow gap **50** and dissipate heat from the adjacent storage devices **33**, thereby better enhancing the heat dissipation effect of the cool air on each storage device **33**.

[0106] In some embodiments, as shown in FIG. **3**, the width range of the second air flow gap **50** in the first direction is 4 mm˜6 mm. With this configuration, the width of the first air flow gap **40** is neither too large nor too small, which can improve the heat dissipation effect of the cool air on each storage device **33** by preventing occupying excessive space in the chassis **10**.

[0107] In some examples, the width of the second air flow gap **50** in the first direction may be any one of 4 mm, 5 mm or 6 mm. However, in some embodiments of the present disclosure, the width of the second air flow gap **50** in the first direction is not limited here.

[0108] In some embodiments, as shown in FIG. **2** in combination with FIG. **3**, along a push-pull direction of the storage module **30**, the chassis **10** includes a side plate S**5** opposite to the opening **11**. The side plate S**5** includes a plurality of heat dissipation holes T.

[0109] The push-pull direction of the storage module **30** is parallel to the Y-axis direction. In the Y-axis direction, the chassis **10** includes the side plate S**5** opposite to the opening **11**. The side plate S**5** is a third side plate S**5** of the chassis **10**. The third side plate S**5** is provided with a plurality of heat dissipation holes T.

[0110] With this configuration, the cool air enters the server **100** through the opening **11**. After the cool air dissipates heat from each storage device **33** in the server **100**, the temperature of the cool air rises. The heated cool air may flow out of the heat dissipation holes T. Accordingly, heat dissipation of each storage device **33** in the server **100** is carried out.

[0111] Some embodiments of the present application do not limit the quantity and the shape of the heat dissipation hole T on the side plate S**5**, which may be configured according to the actual situation. For example, the shape of the heat dissipation hole T may be circular, square, triangular, etc. FIG. **2** is illustrated by using a circular shape of the heat dissipation hole T as an example.

[0112] In some embodiments, as shown in FIG. **2** in combination with FIG. **3**, in the Y-axis direction, the heat dissipation holes T at least partially overlap with the storage device **33**, and the heat dissipation holes T do not overlap with the second air flow gap **50**. The heat dissipation holes T may not overlap with the first air flow gap **40** in the Y-axis direction as well

[0113] The heat dissipation holes T are disposed to at least partially overlap with the storage device **33**, so that air that has absorbed heat from the storage device **33** can be directly transferred to the exterior of the chassis **10** through the heat dissipation holes T, which shorten the path of the cool air, and prevent the heated cool air from flowing in the chassis **10**, which would affect the heat dissipation efficiency. In the Y-axis direction, the heat dissipation holes T do not overlap with the second air flow gap **50**. This prevents the cool air from being directly transferred to the exterior of the chassis **10** through the heat dissipation holes T without first absorbing the heat from the storage device **33** through the second air gap **50**, thereby improving a utilization rate of the cool air and enhancing a heat dissipation effect of each storage device **33** in the server **100**. In the Y-axis direction, the heat dissipation holes T do not overlap with the first air flow gap **40**. Based on the same principle, this prevents the cool air from being directly transferred to the exterior of the chassis **10** through the heat dissipation hole T without first absorbing heat from the storage device **33** through the first flow air gap **40**, thereby improving the utilization rate of the cool air and enhancing the heat dissipation effect of each storage device **33** in the server **100**.

[0114] The above describes various components in the server **100**, as well as the spacing between various components. The following introduces an example structure of the storage module **30** in the server **100**, in combination with the accompanying drawings.

[0115] FIG. **4** is a structural diagram of a heat dissipation module in FIG. **2**.

[0116] In some embodiments, as shown in FIG. **4**, the push-pull bracket **31** in the storage module **30** includes a support plate **311** and a cage **312**, and the cage **312** is located on one side of the support plate **311**. The cage **312** includes a mounting position Q, and the storage board **32** is mounted in the mounting position Q. The cage **312** may also include a plurality of plugging slots K. The plurality of plugging slots K are disposed on opposite sides of the mounting position Q, to enable the storage devices **33** to be plugged into the plugging slots K and electrically connected to the storage board **32**.

[0117] Accordingly, the storage board **32** can be mounted in the mounting position Q. That is, the storage board **32** is mounted in the cage **312**. Furthermore, the space on both sides of the storage board **32** in the cage **312** may be used for placing the storage devices **33**. The plurality of storage devices **33** may be disposed on opposite sides of the storage board **32**. In this way, there are more plugging directions of the storage devices **33** in the push-pull bracket **31**, so that the push-pull bracket **31** of the server **100** is available on both sides without changing the specification of a unit space. This, in turn, allows for more space inside the chassis **10** to accommodate the storage devices **33**, thereby achieving higher density in a storage server.

[0118] In some examples, as shown in FIG. **4** and in combination with FIG. **2**, a plugging slot K located on one side of the mounting position Q close to the first side plate S**1** is a first plugging slot K**1**, and the plugging slot K located on one side of the mounting position Q close to the second side plate S**2** is a second plugging slot K**2**.

[0119] In the X-axis direction, there is a gap between the first plugging slot K**1** and the second plugging slot K**2** that are arranged adjacent to each other, which is used to form the mounting position Q. Accordingly, the cage **312** can be divided into two storage spaces, thereby increasing the available space for accommodating the storage devices **33** in the cage **312**.

[0120] A part of storage devices of the plurality of storage devices **33** may be plugged into the first plugging slot K**1** in the direction from the first side plate S**1** toward the mounting position Q, and electrically connected to the storage board **32** in a pluggable manner. Another part of storage devices of the plurality of storage devices **33** may be plugged into the second plugging slot K**2** in the direction from the mounting position Q toward the second side plate S**2**, and electrically connected to the storage board **32** in a pluggable manner.

[0121] Accordingly, the storage devices **33** may be plugged into the plugging slots K in different directions and electrically connected to the storage board **32**, so that the insertion directions of the storage devices **33** in the push-pull bracket **31** may be increased, and the push-pull bracket **31** of the server **100** is available on both sides on without changing the specification. This, in turn, allows for more space inside the chassis **10** to accommodate the storage devices **33**, thereby achieving higher density in a storage server.

[0122] FIG. **5** is an assembly diagram of a slide rail assembly and a chassis in FIG. **3**. To better illustrate the position of the slide rail assembly **313** in the server **100**, FIG. **5** also illustrates the system board **20** in the chassis **10**.

[0123] In some embodiments, as shown in FIG. **5** and in combination with FIG. **3**, the push-pull bracket **31** also includes a slide rail assembly **313**. The slide rail assembly **313** is located between

one side surface of the support plate **311** facing away from the cage **312** and the chassis **10**.
[0124] The push-pull bracket **31** also includes the slide rail assembly **313**, and the slide rail **30** assembly **313** is extendable in the Y-axis direction, allowing the storage module **30** to be slidably connected to the chassis **10** through the push-pull bracket **31**. This allows the storage module **30** to be pushed into the first accommodation space **12** from the opening **11**, or pulled from the first accommodation space **12** to one side of the opening **11** away from the first accommodation space **12**.
[0125] That is, the slide rail assembly **313** allows the push-pull bracket **31** to move back and forth in the Y-axis direction in the chassis **10**. When the server **100** is in a normal operating condition, the slide rail assembly **313** is used to place the push-pull bracket **31** in the first accommodation space **12** in the chassis **10**. When the storage devices **33** in the server **100** need to be maintained, the push-pull bracket **31** may be pulled out of the chassis **10** by using the slide rail assembly **313** (the push-pull bracket **31** may be pulled from the first accommodation space **12** to the exterior of the chassis **10** in the direction from the third side plate S**5** toward the opening **11**), and then the storage devices **33** on the push-pull bracket **31** may be pulled out in the Y-axis direction for maintenance of the storage devices **33**, thereby improving the maintenance efficiency of the server by the staff.
[0126] The slide rail assembly **313** is located between one side surface of the support plate **311** facing away from the cage **312** and the chassis **10**. The following two cases may be included:
[0127] In a first case, the slide rail assembly **313** is located between one side surface of the support plate **311** facing away from the cage **312** and the bottom plate S**4**.
[0128] In a second case, the slide rail assembly **313** is located between one side surface of the support plate **311** facing away from the cage **312** and the top plate S**3**.
[0129] In summary, in the above two cases, the slide rail assembly **313** is disposed at both ends of the push-pull bracket **31** in the Z-axis direction. With this configuration, the slide rail assembly **313** can be prevented from occupying one side surface of the push-pull bracket **31** in the X-axis direction, so that the storage devices **33** are disposed on both sides of the push-pull bracket **31** in the X-axis direction, and the slide rail assembly **313** does not affect the plugging of the storage devices **33**. Therefore, the insertion directions of the storage devices **33** in the push-pull bracket **31** can be increased, so that the push-pull bracket **31** of the server **100** is available on both sides without changing the space specification. This, in turn, allows for more space inside the chassis **10** to accommodate the storage devices **33**, thereby achieving a high-density storage server.
[0130] In summary, in the above two manners, the slide rail assembly **313** is disposed at both ends of the push-pull bracket **31** in the Z-axis direction. The configuration also prevents the slide rail assembly **313** from affecting the sizes of the first air flow gap **40** and the second air flow gap **50** when the slide rail assembly **313** is disposed at both ends of the push-pull bracket **31** in the X-axis direction, and prevents the slide rail assembly **313** from blocking transfer of cool air in the first air flow gap **40** and the second air flow gap **50**, which is conducive to improving the heat dissipation effect of each storage device **33** in the server **100**.
[0131] In some embodiments, as shown in FIG. **5** and in combination with FIG. **3**, the slide rail assembly **313** includes at least one telescopic slide rail H. The support plate **311** can be driven to slide in the chassis **10** by using the telescopic slide rail H, so that the storage module **30** slides into the chassis **10** by the push-pull bracket **31** and the storage module can be pushed into the first accommodation space **12** through the opening **11**. With this configuration, friction caused by the push-pull bracket **31** sliding into the chassis **10** can be reduced, which allows the push-pull bracket **31** to be pulled out of the chassis **10** in the Y-axis direction and the storage devices **33** to be directly taken out in the X-axis direction for maintenance. That is, it is more convenient to perform plugging operations on the storage devices **33**, thereby improving the maintenance efficiency.
[0132] In some examples, the slide rail assembly **313** may include two telescopic slide rails H. The two telescopic slide rails H are spaced on one side of the support plate **311** away from the cage **312**.

The force acting on the slide rail assembly **313** can be distributed, thereby allowing for a better fixed connection with the support plate **311**, and preventing the support plate **311** from swaying left and right during reciprocation (left and right refer to deflection toward one side of the first side plate S**1** or toward one side of the second side plate S**2**). This facilitates improving stability of the support plate **311** during its movement, and facilitates improving stability of the storage module **30** during its movement.

[0133] In some embodiments of the present disclosure, positions of the two telescopic slide rails H in the slide rail assembly **313** are not limited. For example, the two telescopic slide rails H are respectively a first telescopic slide rail Ha and a second telescopic slide rail Hb. The first telescopic slide rail Ha may be arranged to overlap with the storage board **32** in the Z-axis direction, and the second telescopic slide rail Hb may be arranged at a position closer to the first side plate S**1** relative to the first telescopic slide rail Ha.

[0134] It is understandable that, in some other examples, the first telescopic slide Ha and the second telescopic slide Hb are respectively arranged at positions of two sides of the support plate **311** in the X-axis direction, which are not limited in some embodiments of the present disclosure.

[0135] FIG. **6** is a structural diagram of a telescopic slide rail in the slide rail assembly in FIG. **3**.

[0136] In some embodiments, as shown in FIG. **6** and in combination with FIG. **3**, the slide rail assembly **313** includes at least one telescopic slide rail H. The telescopic slide rail H includes a first fixed slide rail H**1**, a connecting slide rail H**3**, and a second fixed slide rail H**2**. One side of the first fixed slide rail H**1** is fixedly connected to the chassis **10**, and the other side of the first fixed slide rail H**1** is slidably connected to the connecting slide rail H**3**. One side of the second fixed slide rail H**2** is fixedly connected to the support plate **311**, and the other side of the second fixed slide rail H**2** is slidably connected to the connecting slide rail H**3**.

[0137] The slide rail assembly **313** includes at least one telescopic slide rail H. The telescopic slide rail H includes a first fixed slide rail H**1**, a connecting slide rail H**3**, and a second fixed slide rail H**2**. The first fixed slide rail H**1** of the telescopic slide rail H is fixedly connected to the chassis **10**, and the second fixed slide rail H**2** of the telescopic slide rail H is fixedly connected to the support plate **311**. The support plate **311** can be driven to slide in the chassis **10** through relative movement between the first fixed slide rail H**1** and the second fixed slide rail H**2**, so that the storage module **30** slides in the chassis **10** by the push-pull bracket **31**, and the storage module **30** can be pushed into the first accommodation space **12** through the opening **11**. With this configuration, when the push-pull bracket **31** slides in the chassis **10**, friction can be reduced, which allows the push-pull bracket **31** to be pulled out of the chassis **10** in the Y-axis direction and the storage devices **33** to be directly taken out in the X-axis direction for maintenance. That is, it is more convenient to perform plugging operations on the storage devices **33**, thereby improving the maintenance efficiency of the server **100** by the staff.

[0138] In addition, since the first fixed slide rail H**1** and the second fixed slide rail H**2** are slidably connected by the connecting slide rail H**3**, the second fixed slide rail H**2** extends out a greater distance, which in turn allows the push-pull bracket **31** to slide out further. This facilitates pulling out the push-pull bracket **31** from the chassis **10**. Further, it is more convenient to perform plugging operations on the storage devices **33**, which is conductive to efficient maintenance of the server **100** by the staff.

[0139] Accordingly, the first fixed slide rail H**1** is provided with a first limiting structure on both ends to prevent the connecting slide rail H**3** from detaching. The first limiting structure blocks both ends of the first fixed slide rail H**1**, which allows the first fixed slide rail H**1** and the connecting slide rail H**3** to slide relative to each other. However, the connecting slide rail H**3** remains attached to the first fixed slide rail H**1**, ensuring stability of the telescopic slide rail H.

[0140] The second fixed slide rail H**2** is provided with a second limiting structure on both ends thereof, to prevent the connecting slide rail H**3** from detaching. The second limiting structure blocks both ends of the second fixed slide rail H**2**, which allows the second fixed slide rail H**2** and the connecting slide rail H**3** to slide relative to each other. However, the connecting slide rail H**3** remains attached to the second fixed slide rail H**2**, ensuring the stability of the telescopic slide rail H.

[0141] In some examples, the first limiting structure may be a metal block, and is disposed at both ends of the first fixed slide rail H**1** and fixedly connected to both ends of the first fixed slide rail H**1**. The first limiting structure may be used to prevent the first fixed slide rail H**1** and the connecting slide rail H**3** from coming off a track.

[0142] In some examples, the second limiting structure may be a metal block, and is disposed at both ends of the second fixed slide rail H**2** and fixedly connected to both ends of the second fixed slide rail H**2**. The second limiting structure may be used to prevent the second fixed slide rail H**2** and the connecting slide rail H**3** from coming off track.

[0143] FIG. **7** is a structural diagram of a server according to yet another embodiment of the present application.

[0144] In some embodiments, as shown in FIG. **7**, the server **100** also includes a cable **60**. One end of the cable **60** is electrically connected to the system board **20**, and the other end of the cable **60** is electrically connected to the storage board **32**. Accordingly, the system board **20** may transmit a signal to the storage card **32** via the cable **60**.

[0145] In some examples, the storage board **32** includes a first connector F**1** (which may refer back to FIG. **4**). The system board **20** includes a second connector F**2**. One end of the cable **60** is electrically connected to the first connector F**1**, and the other end of the cable **60** is electrically connected to the second connector F**2**, so that the storage board **32** is electrically connected to the system board **20**. However, in some embodiments of the present application, models of the first connector F**1** and the second connector F**2** are not limited, as long as it is ensured that the storage board **32** is electrically connected to the system board **20** for signal transmission.

[0146] In some examples, the cable **60** may be a flexible cable. Flexible cable refers to a cable that can be bent or deformed and is flexible, which ensures that when the push-pull bracket **31** moves back and forth in the Y-axis direction, that is, when the push-pull bracket **31** is pushed in a direction facing away from the system board **20** (a direction from the second accommodation space **13** toward the first accommodation space **12**), the flexible cable changes from one deformation state to another. Since the cable is flexible, the deformation does not impede movement of the push-pull bracket **31**. Also, when the push-pull bracket **31** is pushed in a direction close to the system board **20** (in a direction from the first accommodation space **12** toward the second accommodation space **13**), the flexible cable restores to its previous deformation state. However, in any configuration, the flexible cable can be used for signal transmission.

[0147] In some examples, the chassis **10** also includes a third accommodation space **14**. The third accommodation space **14** is located between the first accommodation space **12** and the second accommodation space **13**; the third accommodation space **14** is used for storing the cable **60**.

[0148] When the push-pull bracket **31** is pushed in the direction facing away from the system board **20** (in the direction from the second accommodation space **13** toward the first accommodation space **12**), the cable **60** can extend from the third accommodation space **14** to the first accommodation space **12**. This ensures that when the push-pull bracket **31** is pulled out of the chassis **10**, the system board **20** and the storage board **32** can still maintain an electrical connection. When the push-pull bracket **31** is pushed in the direction close to the system board **20** (in the direction from the first accommodation space **12** toward the second accommodation space **13**), the cable **60** can retract into the third accommodation space **14** and be stored in the third accommodation space **14**. This ensures that the storage space of the system board **20** located in the second accommodation space **13** and the storage space of the storage module **30** located in the first accommodation space **12** are not affected. Furthermore, the push-pull bracket **31** can slide into the chassis **10** more flexibly.

[0149] In some embodiments, as shown in FIG. **7**, in the Y-axis direction, the storage board **32** includes a first part **32***a* and a second part **32***b*, and the second part **32***b* is closer to the system board **20** relative to the first part **32***a*. The first part **32***a* of the storage board **32** is located between the first plugging slot K**1** and the second plugging slot K**2**. That is, in the X-axis direction, the first part **32***a* overlaps with the cage **312**. The second part **32***b* of the storage board **32** extends from the cage **312** in the Y-axis direction. That is, in the X-axis direction, the second part **32***b* does not overlap with the cage **312**.

[0150] Accordingly, the first part **32***a* is configured to be pluggably connected to a plurality of storage devices **33**, and the second part **32***b* of the storage board **32** is configured to be electrically connected to the system board. The second part **32***b* is closer to the system board **20** relative to the first part **32***a*, thereby eliminating the need for the first part **32***a* to reserve additional space for electrical connection to the system board **20**. This configuration also facilitates a pluggable connection between the first part **32***a* and the plurality of storage devices **33**. At the same time, the second part **32***b* closer to one side of the system board **20** is configured electrically connected to the system board **20**, that is, the second part **32***b* is electrically connected to the system board **20** by the cable **60**. The position of the second part **32***b* facilitates accommodation of the cable **60**, preventing the cable **60** from obstructing the sliding movement of the push-pull bracket **31** in the chassis **10**.

[0151] For example, the first connector on the storage board **32** may be located on the second part **32***b*. As a result, it is easy to accommodate the cable **60**, thereby preventing the cable **60** from obstructing the sliding movement of the pull-push racket **31** in the chassis **10**.

[0152] The above descriptions are only embodiments of the present application, and the protection scope of the present application is not limited here. Any changes or substitutions conceived by those skilled in the art within the technical scope disclosed in the present application shall fall within the protection scope of the present application. Therefore, the protection scope of the present application shall be subject to the protection scope of the claims.

Claims

1. A server, comprising: a chassis, a system board, and at least one storage module; wherein the chassis comprises an opening, the chassis comprises a first accommodation space and a second accommodation space, and the first accommodation space is closer to the opening relative to the second accommodation space; wherein the system board is located in the second accommodation space; wherein the storage module comprises a push-pull bracket, a storage board, and a plurality of storage devices; the storage board is secured in the push-pull bracket, and is electrically connected to the system board; and the plurality of storage devices are disposed on opposite sides of the storage board, and are pluggably connected to the storage board; and wherein the storage module is slidably connected to the chassis by the push-pull bracket, to allow the storage module to be pushed into the first accommodation space through the opening.

2. The server according to claim 1, wherein the push-pull bracket comprises a support plate and a cage, and the cage is located on one side of the support plate; the cage comprises a mounting position, and the storage board is mounted in the mounting position; and wherein the cage further comprises a plurality of plugging slots, and the plurality of plugging slots are disposed on opposite sides of the mounting position, to allow the storage devices to be plugged into the plugging slots and electrically connected to the storage board.

3. The server according to claim 2, wherein the push-pull bracket further comprises a slide rail assembly, and the slide rail assembly is located between one side surface of the support plate away from the cage and the chassis.

4. The server according to claim 3, wherein the slide rail assembly comprises at least one telescopic slide rail, and the telescopic slide rail comprises a first fixed slide rail, a connecting slide rail, and a second fixed slide rail; wherein one side of the first fixed slide rail is fixedly connected to the chassis, and the other side of the first fixed slide rail is slidably connected to the connecting slide rail, and the first fixed slide rail is provided with a first limiting structure on both ends thereof configured to prevent the connecting slide rail from detaching; and wherein one side of the second fixed slide rail is fixedly connected to the support plate, the other side of the second fixed slide rail is slidably connected to the connecting slide rail, and the second fixed slide rail is provided with a second limiting structure on both ends thereof configured to prevent the connecting slide rail from detaching.

5. The server according to claim 1, wherein a plurality of the storage modules are arranged in a first direction, and the first direction is parallel to a plugging direction of the storage devices; and wherein a first air flow gap is formed between two adjacent storage modules.

6. The server according to claim 5, wherein a width of the first air flow gap in the first direction is greater than or equal to 4 mm.

7. The server according to claim 5, wherein a width of the first air flow gap in the first direction is less than or equal to 12 mm.

8. The server according to claim 1, wherein, in a first direction, a second air flow gap is formed between the storage module and the chassis; and wherein the first direction is parallel to a plugging direction of the storage devices.

9. The server according to claim 8, wherein a width of the second air flow gap in the first direction is greater than or equal to 4 mm.

10. The server according to claim 1, further comprising a cable; wherein one end of the cable is electrically connected to the system board, and the other end of the cable is electrically connected to the storage board.

11. The server according to claim 1, wherein, in a push-pull direction of the storage module, the chassis comprises a side plate opposite to the opening; and wherein the side plate comprises a plurality of heat dissipation holes.