DATA CENTER WITH LIQUID COOLING CABINET

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The disclosure based on and claims priority to Chinese Patent Application No. 202311117709.5, filed on August 31, 2023, the entire contents of which are incorporated herein by reference.

TECHNICAL FIELD

[0002] The disclosure relates to a field of data center technology, and particularly to a data center with a liquid-cooling cabinet.

BACKGROUND

[0003] A data center is a foundation to support the rapid development of the digital economy, and the increase of computing power demand causes a problem of heat dissipation of servers to become more and more critical.

[0004] At present, air-cooling heat dissipation has been gradually unable to meet the demand of data center heat dissipation, and the research of liquid cooling has started in a dominant position. Cold plate liquid cooling is a main form of liquid cooling. In the cold plate liquid cooling mode, a primary side circulation water path, a secondary side circulation water path and a heat exchange unit are arranged, a coolant in the secondary side circulation water path exchanges heat with the cooling water in the primary side circulation water path in the heat exchange unit, and a secondary side circulation water pump set on the secondary side circulation water path pumps the coolant to servers for heat exchange, thereby finally achieving cooling and heat dissipation of the servers. In the related art, the secondary side circulation water pump can be mainly installed in a data center with the cold plate liquid cooling in two ways, that is, a way of being installed outside a cabinet, and another way of being installed inside the cabinet. When the secondary side circulation water pump is installed outside the cabinet, an overall space occupied by a device may increase. When the secondary side circulation water pump is installed inside the cabinet, if the secondary side circulation water pump fails, a water supply path, a water return path and a circuit needs to be removed respectively before the secondary side circulation water pump can be removed from the cabinet, which is difficult to maintain and install.

SUMMARY

[0005] An objective of the disclosure is to provide a data center with a liquid cooling cabinet, which can save the space and facilitate the maintenance and repair of the secondary side circulation water pump.

[0006] The objective of the disclosure can be achieved through the following technical solutions.

[0007] A data center with a liquid cooling cabinet including a cabinet, a server, a conduction cooling assembly and a heat exchange assembly, in which the server and the heat exchange assembly are arranged in the cabinet, and the conduction cooling assembly is installed on the server;

[0008] the heat exchange assembly includes: a base, a heat exchange unit, a power supply module, a base connector and a secondary side circulation water pump module, in which the heat exchange unit and the power supply module are arranged in the base, the base connector is arranged on an outer peripheral wall of the base, the base connector includes a first electric connector, a first coolant supply connector and a first coolant return connector, the first coolant supply connector is connected with a coolant supply pipe, the coolant supply pipe passes through the heat exchange unit, the first coolant return connector is connected with a coolant return pipe, and the power supply module is connected with the first electric connector;

[0009] the secondary side circulation water pump module is provided with a water pump connector, in which the water pump connector includes a second electric connector, a second coolant supply connector and a second coolant return connector, and a detachable connection between the secondary side circulation water pump module and the base is realized by a plug-in manner between the water pump connector and the base connector; and

[0010] in which in case that the water pump connector is connected with the base connector in the plug-in manner, the first electric connector is electrically connected with the second electric connector, the first coolant supply connector is connected with the second coolant supply connector, the first coolant return connector is connected with the second coolant return connector; and the conduction cooling assembly, the coolant supply pipe, the secondary side circulation water pump module and the coolant return pipe are connected in an end-to-end manner in order to form a secondary side circulation water path.

[0011] In the embodiments of the disclosure, the base is provided with at least two base connectors, and each base connector is detachably connected with the secondary side

circulation water pump module;

[0012] in which there is a first valve assembly arranged on the coolant supply pipe, the first valve assembly is capable of controlling a connection or a disconnection between a first coolant liquid supply connector of each base connector and a coolant supply pipe, there is a second valve assembly arranged on the coolant return pipe, and the second valve assembly is capable of controlling a connection or a disconnection between a first coolant return connector of each base connector and a coolant return pipe.

[0013] In the embodiments of the disclosure, a power line is connected between the power supply module and the first electric connector, the first electric connector connects with the second electric connector in the plug-in manner, and the first electric connector is flexibly connected with the base;

[0014] in which in case that the secondary side circulation water pump module is pulled out from the base, the first electric connector is capable of moving outside relative to the base by following the secondary side circulation water pump module when the first electric connector is connected with the second electric connector in the plug-in manner.

[0015] In the embodiments of the disclosure, there is a winder arranged in the base, and an elastic recovery assembly is connected between the winder and the base;

[0016] in which in case that the secondary side circulation water pump module is installed on the base, the power line is at least partially wound on the winder.

[0017] In the embodiments of the disclosure, the coolant supply pipe includes a liquid supply main pipe and a plurality of liquid supply branch pipes corresponding to base connectors, the liquid supply main pipe passes through the heat exchange unit, in which one end of each liquid supply branch pipe is connected with an upstream end of the liquid supply main pipe, and the other end of each liquid supply branch pipe is connected with the first coolant supply connector of each base connector one by one;

[0018] in which the coolant return pipe includes a liquid return main pipe and a plurality of liquid return branch pipes corresponding to the base connectors, in which one end of each liquid return branch pipe is connected with a downstream end of the liquid return main pipe, and the other end of each liquid return branch pipe is connected with the first coolant return connector of each base connector one by one; and

[0019] in which the first valve assembly includes a plurality of first valves connected to the liquid supply branch pipes one by one, and the second valve assembly includes a plurality of second valves connected to the liquid return branch pipes one by one.

[0020] In the embodiments of the disclosure, the data center with the liquid cooling cabinet further includes a primary side coolant supply pipeline and a primary side circulation water pump, in which the primary side coolant supply pipeline passes through the heat exchange unit, and the primary side circulation water pump is connected with the primary side coolant supply pipeline and is arranged outside the cabinet.

[0021] In the embodiments of the disclosure, an outer peripheral contour of the base and an outer peripheral contour of the secondary side circulation water pump module are in quadrangular prism shape, and a side wall of the secondary side circulation water pump module is fitted with an outer peripheral wall of the base in case that the secondary side circulation water pump module is installed on the base.

[0022] In the embodiments of the disclosure, the conduction cooling assembly includes a plurality of conduction cooling plates, and the secondary side circulation water path further includes a first manifold and a second manifold; and

[0023] in which the first manifold and the second manifold are arranged on a back surface within the cabinet, a water inlet end of the first manifold is connected with a downstream end of the coolant supply pipe, a water outlet end of the first manifold is connected with a water inlet of each conduction cooling plate, a water inlet end of the second manifold is connected with a water outlet of each conduction cooling plate, and a water outlet end of the second manifold is connected with an upstream end of the coolant return pipe.

[0024] In the embodiments of the disclosure, the heat exchange assembly is arranged at a bottom surface within the cabinet and arranged below the server.

[0025] In the embodiments of the disclosure, the data center with the liquid cooling cabinet includes a plurality of cabinets, in which each cabinet is provided with a server, the conduction cooling assembly and the heat exchange assembly.

[0026] The data center with the liquid cooling cabinet in the embodiments of the disclosure is provided with a heat exchange assembly configured with a secondary side circulation water pump module, in which the heat exchange assembly is installed inside a cabinet, which can effectively save the space. In addition, a detachable installation between the secondary side circulation water pump module is realized by a plug-in manner between a base connector on an outer side wall of the heat exchange assembly and a water pump connector of the secondary circulation water pump module. When the secondary side circulation water pump module is connected with the base in the plug-in manner, a circuit, a liquid supply water path and a liquid return water path of the secondary circulation water

pump module can be connected at the same time, which is convenient to install. When the secondary circulation water pump module fails, the secondary circulation water pump module can be directly pulled out from the base, which is convenient for maintenance.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] The disclosure is described in detail in conjunction with accompanying drawings and preferred embodiments, but those skilled in the art appreciates that these accompanying drawings are drawn for the objective of explaining the preferred embodiments and should not be used as a limitation of the scope of the disclosure. In addition, unless otherwise noted, the accompanying drawings are intended to conceptually represent composition or construction of described objects and may be shown exaggeratedly, and the accompanying drawings are not necessarily drawn to scale.

[0028] FIG. 1 is a structural diagram of a data center with a liquid cooling cabinet according to an embodiment of the disclosure.

[0029] FIG. 2 is a structural diagram of a water path of a heat exchange assembly of a data center with a liquid cooling cabinet according to an embodiment of the disclosure.

[0030] FIG. 3 is a schematic diagram of a circuit of a heat exchange assembly of a data center with a liquid cooling cabinet according to an embodiment of the disclosure.

[0031] FIG. 4 is a schematic diagram of a water circulation of a secondary side circulation system of a data center with a liquid cooling cabinet according to an embodiment of the disclosure.

[0032] FIG. 5 is a side view of a base of a data center with a liquid-cooling cabinet according to an embodiment of the disclosure.

[0033] FIG. 6 is a side view of a secondary side circulation water pump module of a data center with a liquid cooling cabinet according to an embodiment of the disclosure.

[0034] In the accompanying drawings, reference numerals respectively represent: 10. cabinet;

[0035] 20. server;

[0036] 30. conduction cooling assembly; 31. conduction cooling plate;

[0037] 40. heat exchange assembly; 41. base; 42. heat exchange unit; 43. power supply module; 44. base connector; 441. first electric connector; 442. first coolant supply connector; 443. first coolant return connector; 45. secondary side circulation water pump module; 451. water pump connector; 451a. second electric connector; 451b. second coolant supply

connector; 451c. second coolant return connector; 46. coolant supply pipe; 461. liquid supply main pipe; 462. liquid supply branch pipe; 47. coolant return pipe; 471. liquid return main pipe; 472. liquid return branch pipe; 48. first valve assembly; 481. first valve; 49. second valve assembly; 491. second valve; 410. power cord; 420. winder; 430. primary side coolant supply pipeline;

[0038] 50. primary side circulation water pump;

[0039] 60. first manifold;

[0040] 70. second manifold.

DETAILED DESCRIPTION

[0041] Preferred embodiments of the disclosure are described in detail with reference to the accompanying drawings. Those skilled in the art appreciates that these descriptions are descriptive and illustrative and should not be interpreted as a limitation of the scope of protection of this disclosure.

[0042] First of all, it should be noted that terms like top, bottom, upward, downward, and other directions mentioned in the disclosure are defined with respect to directions in each accompanying drawing. They are relative concepts, and can therefore change according to their different positions and different practical states. Therefore, these or other directions should not be construed as limiting terms.

[0043] In the description of this disclosure, it should also be understood that, unless specified and limited otherwise, terms like “install”, “connect” should be understood broadly. For example, it can be a fixed connection, a detachable connection, or an integrated connection; or it can be directly connected or indirectly connected through an intermediate medium.

[0044] It should be noted that the term “comprising/including” does not exclude other elements or steps, and that “a” or “one” does not exclude a plurality.

[0045] In addition, it should be noted that any individual technical feature described or implied in the embodiments of the disclosure, or shown or implied in the accompanying drawings, can continuously to be combined among these technical features (or equivalents thereof) to obtain other embodiments of the disclosure that are not directly referred to in the disclosure.

[0046] It should also be understood that terms like “first”, “second”, etc. are used in this disclosure to describe various types of information, but such information should not be

limited to these terms. These terms are used to distinguish the same type of information from one another. For example, without leaving the scope of this disclosure, “first” information may also be referred to as “second” information, and similarly, “second” information may also be referred to as “first” information.

[0047] It should be noted that the same reference numeral represents the same or roughly the same component in different accompanying drawings.

[0048] FIG. 1 to 6 shows a schematic diagram of a data center with a liquid cooling cabinet according to preferred embodiments of the disclosure. The data center includes a cabinet 10, a server 20, a conduction cooling assembly 30, and a heat exchange assembly 40.

[0049] The server 20, the conduction cooling assembly 30, and the heat exchange assembly 40 are installed in the cabinet 10, and the conduction cooling assembly 30 is attached to the server 20.

[0050] In addition, the heat exchange assembly 40 includes a base 41, a heat exchange unit 42, a power supply module 43, a base connector 44 and a secondary side circulation water pump module 45. The heat exchange unit 42 and the power supply module 43 are arranged in the base 41. The base connector 44 is arranged on an outer peripheral wall of the base 41. The base connector 44 includes a first electric connector 441, a first coolant supply connector 442 and a first coolant return connector 443. The first coolant supply connector 442 is connected with a coolant supply pipe 46. The coolant supply pipe 46 passes through the heat exchange unit 42. The first coolant return connector 443 is connected with a coolant return pipe 47. The power supply module 43 is electrically connected with the first electric connector 441. The secondary side circulation water pump module 45 is provided with a water pump connector 451. The water pump connector 451 has a second electric connector 451a, a second coolant supply connector 451b and a second coolant return connector 451c. A detachable connection between the secondary side circulation water pump module 45 and the base 41 is realized by the plug-in manner between the water pump connector 451 and the base connector 44.

[0051] When the water pump connector 451 is connected with the base connector 44 in a plug-in manner, the first electric connector 441 is electrically connected with the second electric connector 451a, the first coolant supply connector 442 is connected (detachable butt-jointed) with the second coolant supply connector 451b, and the first coolant return connector 443 is connected with the second coolant return connector 451c. The conduction cooling assembly 30, the coolant supply pipe 46, the secondary side circulation water pump

module 45 and the coolant return pipe 47 are successively connected in an end-to–end manner in order to form a secondary side circulation water path.

[0052] A secondary circulation process is as follows. A low-temperature coolant that is cooled by the heat exchange unit 42 enters the secondary side circulation water pump module 45 through the coolant return pipe 47, and is distributed to the conduction cooling assembly 30 by the coolant supply pipe 46 under a pumping action of the secondary side circulation water pump module 45 for a heat exchange with a heating element in the server 20, so that the heating element in the server 20 is effectively cooled. After the heat exchange, high-temperature coolant flows back to the heat exchange unit 42 through the coolant return pipe 47 for the heat exchange, and then becomes the low-temperature coolant to flow out from the heat exchange unit 42 to form a circulation.

[0053] Based on the above technical solution, the data center with the liquid cooling cabinet of the disclosure is provided with the heat exchange assembly 40 configured with the secondary side circulation water pump module 45, and the heat exchange assembly 40 is installed in the cabinet 10, which can effectively save space. In addition, a detachable installation of the secondary side circulation water pump module 45 is realized by in the plug-in manner between the base connector 44 on an outer side wall of the heat exchange assembly 40 and the water pump connector 451 on the secondary side circulation water pump module 45. When the secondary side circulation water pump module 45 is connected with the base 41 in the plug-in manner, a circuit, a liquid supply water path and a liquid return water path of the secondary side circulation water pump module 45 can be connected at the same time, which is convenient to install. When the secondary side circulation water pump module 45 fails, the secondary side circulation water pump module 45 can be directly pulled out from the base 41, which is convenient for maintenance.

[0054] Specifically, the cabinet 10 can be configured as a hollow frame structure or a box structure with a cabinet door, which is not limited here. Take the cabinet 10 with a cabinet door on the front as an example. The secondary side circulation water pump module 45 is installed on the left or right side of the base 41. When the maintenance is required for the secondary side circulation water pump module 45, a person can open the cabinet door, reach into a side of the cabinet 10, and pull the secondary side circulation water pump module 45 down from the base 41 and take it out of the cabinet 10. When the secondary side circulation water pump module 45 needs to be installed or replaced, a person can align the water pump connector 451 of the secondary side circulation water pump module 45 with the

base connector 44, and connect the water pump connector 451 with the base connector 44 in the plug-in manner.

[0055] In some embodiments, for the data center with the liquid cooling cabinet, as illustrated in FIG. 2, FIG. 3 and FIG. 5, two base connectors 44 are spaced arranged on a same side wall of the base 41, and each base connector 44 is detachably connected with a secondary side circulation water pump module 45. At the same time, a first valve assembly 48 is provided on the coolant supply pipe 46, and a second valve assembly 49 is provided on the coolant return pipe 47. The first valve assembly 48 is capable of controlling a connection or a disconnection between a first coolant liquid supply connector of each base connector 44 and the coolant supply pipe 46, and the second valve assembly 49 is capable of controlling a connection or a disconnection between the first coolant return connector of each base connector 44 and the coolant return pipe 47.

[0056] Among the two secondary side circulation water pump modules 45, one is used for system operation and the other is in a standby state. When the system is running, by controlling the first valve assembly 48 and the second valve assembly 49, a water path of one secondary side circulation water pump module 45 is enabled, while a water path connected of the other secondary side circulation water pump module 45 is switched to the disconnection state, serving as a standby and not activated. When one secondary side circulation water pump module 45 fails, working states of the first valve assembly 48 and the second valve assembly 49 may be switched to realize a connection of a water path of the secondary side circulation water pump module 45 in the standby state, thus activating the secondary side circulation water pump module 45 in the standby state and disconnecting a water path of a faulty secondary side circulation water pump module 45, which facilitates to remove the faulty secondary side circulation water pump module 45 for maintenance without affecting a continuous operation of the system.

[0057] According to actual requirements, it is also possible to select to install more than two secondary side circulation water pump modules 45 as standbys, that is, at least two secondary side circulation water pump modules 45 are install as standbys.

[0058] Specifically, as illustrated in FIG. 2, the coolant supply pipe 46 includes a liquid supply main pipe 461 and at least two liquid supply branch pipes 462. The liquid supply main pipe 461 passes through the heat exchange unit 42. One end of each liquid supply branch pipe 462 is connected to an upstream end of the liquid supply main pipe 461, and the other end of each liquid supply branch pipe 462 is connected to a first coolant supply connector 442 of

each base connector 44 one by one. The coolant return pipe 47 includes a liquid return main pipe 471 and at least two liquid return branch pipes 472. One end of each liquid return branch pipe 472 is connected to a downstream end of the liquid return main pipe 471, and the other end of each liquid return branch pipe 472 is connected one by one to a first coolant return connector 443 of each base connector 44.

[0059] Based on this and referring again to FIG. 2, in some embodiments, the first valve assembly 48 includes a plurality of first valves 481 connected to liquid supply branch pipes 462 one by one, and the second valve assembly 49 includes a plurality of second valves 491 connected to liquid return branch pipes 472 one by one. The first valve 481 and the second control valve 491 are both two-port valve. In an actual operation process, the first valve 481 on the liquid supply branch pipe 462 connected to the secondary side circulation water pump module 45 needing to be started and the second valve 491 on the liquid return branch pipe 472 connected to the secondary side circulation water pump module 45 needing to be started are switched to a connection state, so that the water path of the secondary side circulation water pump module 45 is connected, and remaining first valves 481 and remaining second valves 491 are switched to a disconnection state.

[0060] As an alternative implementation, the first valve assembly 48 may also be a multi-port valve arranged at a connection fulcrum of each liquid supply branch pipe 462 and the liquid supply main pipe 461, and the second valve assembly 49 may be a multi-port valve arranged at a connection fulcrum of each liquid return branch pipe 472 and the liquid return main pipe 471. By replacing two-port valves with multi-port valves, switching of a connection state of each flow path can also be realized.

[0061] In some embodiments, the data center with the liquid cooling cabinet also includes a control system (not illustrated in the accompanying drawings). The control system is electrically connected with the power supply module 43, the secondary side circulation water pump modules 45, the first valve assembly 48, and the second valve assembly 49. The control system is configured to: according to the actual requirements, switch the working states of the first valve assembly 48 and the second valve assembly 49, so as to control a connection or a disconnection of a water path of each secondary side circulation water pump module 45, and finally separately control a start and stop of each secondary side circulation water pump module 45.

[0062] Preferably, in some embodiments, as illustrated in FIG. 3, a power line 410 is connected between the power supply module 43 and the first electric connector 441, and the

first electric connector 441 is flexibly connected with the base 41. When a secondary side circulation water pump is connected with the base 41 in a plug-in manner, the first electric connector 441 is connected with the second electric connector 451a in the plug-in manner, and at least part of the power line 410 is idle in the cabinet 10, that is, at least part of the power line 410 are not under tension. When one of the secondary side circulation water pump modules 45 fails, the secondary side circulation water pump is needed to be pulled out from the base 41 in a process of removing a faulty secondary side circulation water pump module 45. In this case, due to the plug-in manner between the first electric connector 441 and the second electric connector 451a, the first electric connector 441 follows the faulty secondary side circulation water pump module 45 to move outwards relative to the base 41, so that the secondary side circulation water pump module 45 is still energized after being pulled out for a certain distance. During a maintenance, it is needed to remove the faulty secondary side circulation water pump module 45 from the base 41 and take it out of the cabinet 10 for simple online maintenance. During this process, the secondary side circulation water pump module 45 needs to be kept energized. Only when a damage is found during online maintenance, the first electric connector 441 is manually disconnected from the second electric connector 451a, so as to send the faulty secondary circulation water pump to maintenance.

[0063] Specifically, as illustrated in FIG. 3, a winder 420 is rotatedly installed in the base 41, and an elastic recovery assembly is connected between the winder 420 and the base 41 (not illustrated in the accompanying drawings), whose structure is similar to a commonly used tape measure. When the secondary side circulation water pump module 45 is installed on the base 41, at least part of the power line 410 is wound around the winder 420. When the secondary side circulation water pump module 45 is pulled out, the power line 410 wound around the winder 420 is pulled out with the first electric connector 441 moving outwards. When the first electric connector 441 is pulled out, and after the connection between the first electric connector 441 and the second electric connector 451a is manually disconnected, under an action of the elastic recovery assembly, the winder 420 is capable of automatically resetting to wind the power line 410, thereby pulling the first electric connector 441 to automatically reset to the base 41.

[0064] Exemplarily, the first electric connector 441 and the second electric connector 451a are a male connector and a female connector respectively for plugging. A slide rail and a hole (not illustrated in the accompanying drawings) are provided on the side wall of the base

41, in which the slide rail and the hole are connected in sequence from the outside to the inside. With an elastic force action in the pre-stretched elastic recovery assembly, the first electric connector 441 is movably placed in the slide rail. The first electric connector 441 may be prevented from entering an inside of the base 41 via the slide rail, and the power line 410 is connected to the first electric connector 441 through the hole. When the first electric connector 441 is pulled out for a certain distance and after the first electric connector 441 and the second connector 451a are manually disconnected, the first electric connector 441 can be automatically accommodated into the slide rail with the automatic recovery action of the winder 420.

[0065] As an alternative implementation, other connection forms may also be used between the first electric connector 441 and the second electric connector 451a, such as through a snap connection, etc., which is not limited.

[0066] Exemplarily, as illustrated in FIG. 3, the winder 420 is installed in the power supply module 43 which can prevent the power line 410 from being interfered by other components in the base 41 during a winding and unwinding process.

[0067] In some embodiments, referring to FIG. 2, the data center with the liquid cooling cabinet also includes a primary side water supply pipeline 430 and a primary side circulation water pump 50. The primary side water supply pipeline 430 passes through the heat exchange unit 42, and the primary side circulation water pump 50 is connected to the primary side water supply pipeline 430 and is arranged outside the cabinet 10. Primary side cooling water is used for heat exchange with a secondary side coolant flowing through the heat exchange unit 42, so as to realize a circulation cooling for the server 20 using the secondary side coolant.

[0068] When the system works, a primary side circulation process is as follows. The primary side circulation water flows out from cooling source (not illustrated in the accompanying drawings), enters into the heat exchange unit 42 through the primary side water supply pipeline 430, flows out from the heat exchange unit 42 after a heat exchange with a coolant in the secondary side circulation water path at the heat exchange unit 42, and returns to the cooling source with a pumping action of the primary side circulation water pump 50 to form a circulation.

[0069] In some preferred embodiments, as illustrated in FIG. 1, the heat exchange assembly 40 is arranged at the bottom surface within the cabinet 10, and the servers 20 is arranged above the heat exchange assembly 40. There are usually a plurality of partitions

arranged up and down at intervals in the cabinet 10, and the servers 20 and the heat exchange assembly 40 are respectively arranged on each partition to achieve up and down stacking, which is convenient to assemble.

[0070] Further, in order to facilitate rational utilization of space of the cabinet 10, an overall shape of the cabinet 10 is set in a quadrangular prism shape, and correspondingly, an outer peripheral contour of the base 41 and an outer peripheral contour of the secondary side circulation water pump module 45 are both set in the quadrangular prism shape. When the secondary side circulation water pump module 45 is installed on the base 41, a side wall of the secondary side circulation water pump module 45 is fitted with the outer peripheral wall of the base 41, and the base 41 and the secondary side circulation water pump module 45 after assembly are in the quadrangular prism shape.

[0071] Preferably, the base connector 44 is configured to be convex from an outer wall surface of the base 41 and to be provided on the outer wall surface, and the water pump connector 451 is concave inwards relative to an outer peripheral wall of the secondary side circulation water pump module 45. When the secondary side circulation water pump module 45 is plugged into the base 41, the base connector 44 is fitted and accommodated in the water pump connector 451.

[0072] As an alternative implementation, the base connector 44 may also be arranged in a concave shape and the water pump connector 451 may be arranged in a fitted convex shape.

[0073] In addition, usually a plurality of heating elements in the server 20 are needed to be cooled by heat dissipation, and a plurality of servers 20 are needed to be arranged in the cabinet 10. In order to dissipate heat from each heating element, as illustrated in FIG. 4, the conduction cooling assembly 30 in some embodiments includes a plurality of conduction cooling plates 31 attached to different heating elements of each server 20. The secondary side circulation water path also includes a first manifold 60 and a second manifold 70, both of which are arranged in the cabinet 10. A cooling channel is provided in a conduction cooling plate 31, and two ends of the cooling channel are respectively a water inlet and a water outlet. The first manifold 60 has a water inlet end and a plurality of water outlet ends. The water inlet end of the first manifold 60 is connected to a downstream end of the coolant supply pipe 46, and the plurality of water outlet ends of the first manifold 60 are connected to water inlets of the conduction cooling plates 31 one by one. The second manifold 70 has a plurality of water inlet ends and a water outlet end, and the plurality of water inlet ends of the second manifold 70 are connected to water outlets of the conduction cooling plates 31 one by one,

and the water outlet end of the second manifold 70 is connected to an upstream end of the coolant return pipe 47. The low-temperature coolant flows out of the heat exchange unit 42 and is distributed to each conduction cooling plate 31 through the first manifold 60, after the heat exchange in the conduction cooling plate 31, the coolant flows into the coolant return pipe 47 after collected by the second manifold 70.

[0074] Exemplarily, the first manifold 60 and the second manifold 70 are arranged at a back surface within the cabinet 10, and the plurality of water outlet ends of the first manifold 60 and the plurality of water inlet ends of the second manifold 70 are arranged vertically at intervals to facilitate a connection of the water path.

[0075] Preferably, in some embodiments of the disclosure, the data center with the liquid cooling cabinet includes a plurality of cabinets 10. Each cabinet 10 is configured with servers 20 and a heat exchange assembly 40. In this way, if a secondary side circulation water pump module 45 fails, it only affects one cabinet 10 and does not affect the entire data center.

[0076] In conclusion, in the embodiments of the disclosure, the data center with the liquid cooling cabinet is provided with a heat exchange assembly 40 configured with a secondary side circulation water pump module 45, and the heat exchange assembly 40 is installed in the cabinet 10, which can effectively save the space. In addition, a detachable installation of the secondary side circulation water pump module 45 is realized by a plug-in manner between the base connector 44 on an outer side wall of the heat exchange assembly 40 and the water pump connector 451 on the secondary side circulation water pump module 45. When the secondary side circulation water pump module 45 is connected with the base 41 in the plug-in manner, the circuit, the liquid supply water path and the liquid return water path of the secondary side circulation water pump module 45 can be connected at the same time, which is convenient to install. When the secondary side circulation water pump module 45 fails, the secondary side circulation water pump module 45 can be directly pulled out from the base 41, which is convenient for maintenance.

[0077] The disclosure is disclosed in the specification with reference to the accompanying drawings and which enables those skilled in the art to implement the disclosure, including manufacturing and using any device or system, using suitable materials, and using any combination of methods. The scope of the disclosure is limited by the claimed technical solutions, and includes other examples envisaged by those skilled in the art. As long as such other examples shall be deemed to fall within the scope of protection defined by the claimed technical solution in the disclosure, as long as such other examples include structural

elements that are not different from those of the claimed technical solutions in literal language, or such other examples include equivalent structural elements that are not materially different from those of the claimed technical solutions in literal language.

WHAT IS CLAIMED IS:

1. A data center with a liquid cooling cabinet, comprising: a cabinet (10), a server (20), a conduction cooling assembly (30) and a heat exchange assembly (40), the server (20) and the heat exchange assembly (40) being arranged in the cabinet (10), and the conduction cooling assembly (30) being installed on the server (20);

wherein the heat exchange assembly (40) comprises: a base (41), a heat exchange unit (42), a power supply module (43), a base connector (44) and a secondary side circulation water pump module (45), wherein the heat exchange unit (42) and the power supply module (43) are arranged in the base (41), the base connector (44) is arranged on an outer peripheral wall of the base (41), the base connector (44) comprises a first electric connector (441), a first coolant supply connector (442) and a first coolant return connector (443), the first coolant supply connector (442) is connected with a coolant supply pipe (46), the coolant supply pipe (46) passes through the heat exchange unit (42), the first coolant return connector (443) is connected with a coolant return pipe (47), and the power supply module (44) is connected with the first electric connector (441);

wherein the secondary side circulation water pump module (45) is provided with a water pump connector (451), wherein the water pump connector (451) comprises a second electric connector (451a), a second coolant supply connector (451b) and a second coolant return connector (451c), and a detachable connection between the secondary side circulation water pump module (45) and the base (41) is realized by a plug-in manner between the water pump connector (451) and the base connector (44); and

wherein when the water pump connector (451) is connected with the base connector (44) in the plug-in manner, the first electric connector (441) is electrically connected with the second electric connector (451a), the first coolant supply connector (442) is connected with the second coolant supply connector (451b), the first coolant return connector (443) is connected with the second coolant return connector (451c); and the conduction cooling assembly (30), the coolant supply pipe (46), the secondary side circulation water pump module (45) and the coolant return pipe (47) are connected in an end-to-end manner in order to form a secondary side circulation water path.

2. The data center according to claim 1, wherein there are at least two base connectors (44) arranged on the base (41), and each base connector (44) is detachably connected with one secondary side circulation water pump module (45);

wherein there is a first valve assembly (48) arranged on the coolant supply pipe (46), the

first valve assembly (48) is capable of controlling a connection or a disconnection between a first coolant liquid supply connector (442) of each base connector (44) and the coolant supply pipe (46), there is a second valve assembly (49) arranged on the coolant return pipe (47), and the second valve assembly (49) is capable of controlling a connection or a disconnection between a first coolant return connector (443) of each base connector (44) and the coolant return pipe (47).

3. The data center according to claim 1, wherein a power line (410) is connected between the power supply module (43) and the first electric connector (441), the first electric connector (441) is connected with the second electric connector (451a) in the plug-in manner, and the first electric connector (441) is flexibly connected with the base (41);

wherein when the secondary side circulation water pump module (45) is pulled out of the base (41), the first electric connector (441) is capable of moving outside relative to the base (41) by following the secondary side circulation water pump module (45) when the first electric connector (441) is connected with the second electric connector (451a) in the plug-in manner.

4. The data center according to claim 3, wherein there is a winder (420) arranged in the base (41), and an elastic recovery assembly is connected between the winder (420) and the base (41);

wherein when the secondary side circulation water pump module (45) is installed on the base (41), at least a part of the power line is wound on the winder (420).

5. The data center according to claim 2, wherein the coolant supply pipe (46) comprises a liquid supply main pipe (461) and a plurality of liquid supply branch pipes (462) corresponding to base connectors (44), the liquid supply main pipe (461) passes through the heat exchange unit (42), wherein one end of each liquid supply branch pipe (462) is connected with an upstream end of the liquid supply main pipe (461), and the other end of each liquid supply branch pipe (462) is connected with the first coolant supply connector (442) of each base connector (44) one by one;

wherein the coolant return pipe (47) comprises a liquid return main pipe (471) and a plurality of liquid return branch pipes (472) corresponding to the base connectors (44), wherein one end of each liquid return branch pipe (472) is connected with a downstream end of the liquid return main pipe (471), and the other end of each liquid return branch pipe (472) is connected with the first coolant return connector (443) of each base connector (44) one by one; and

wherein the first valve assembly (48) comprises a plurality of first valves (481) connected to the liquid supply branch pipes (462) one by one, and the second valve assembly (49) comprises a plurality of second valves (491) connected to the liquid return branch pipes (472) one by one.

6. The data center according to claim 1, further comprising a primary side coolant supply pipeline (430) and a primary side circulation water pump (50), wherein the primary side coolant supply pipeline (430) passes through the heat exchange unit (42), and the primary side circulation water pump (50) is connected with the primary side coolant supply pipeline (430) and is arranged outside the cabinet (10).

7. The data center according to claim 1, wherein an outer peripheral contour of the base (41) and an outer peripheral contour of the secondary side circulation water pump module (45) are in a quadrangular prism shape, and a side wall of the secondary side circulation water pump module (45) is fitted with an outer peripheral wall of the base (41) when the secondary side circulation water pump module (45) is installed on the base (41).

8. The data center according to claim 1, wherein the conduction cooling assembly (30) comprises a plurality of conduction cooling plates (31), and the secondary side circulation water path further comprises a first manifold (60) and a second manifold (70); and

wherein the first manifold (60) and the second manifold (70) are arranged on a back surface within the cabinet (10), a water inlet end of the first manifold (60) is connected with a downstream end of the coolant supply pipe (46), a water outlet end of the first manifold (60) is connected with a water inlet of each conduction cooling plate (31), a water inlet end of the second manifold (70) is connected with a water outlet of each conduction cooling plate (31), and a water outlet end of the second manifold (70) is connected with an upstream end of the coolant return pipe (47).

9. The data center according to claim 1, wherein the heat exchange assembly (40) is arranged at a bottom surface within the cabinet (10) and arranged below the server (20).

10. The data center according to claims 1 to 9, comprising a plurality of cabinets (10), wherein each cabinet (10) is provided with the server (20), the conduction cooling assembly (30) and the heat exchange assembly (40).