

WHAT IS CLAIMED IS:

1. A system ~~(1)~~ for heat removal from server racks, comprising:

a mixing chamber ~~(20)~~ of a substantially rectangular frame, and

at least one heat removal cabinet,

- 5 wherein the mixing chamber is defined by:

a first major surface partitioned to have multiple first spaces,

wherein each first space is configured to attach or
removably attach on a server cluster frame (10) rack or an outer
enclosure, wherein

- 10 at least one first space attaches or removably attaches a
server rack, and

the first major surface receiving heat generated is
configured to receive heated air coming from the server racks;

- 15 a second major surface partitioned to have multiple second
spaces,

wherein each second space is configured to attach or
 removably attach ~~on the~~ at least one heat removal cabinet-(60) or
an inner enclosure,

at least one second space attaches or removably attaches the
 5 at least one heat removal cabinet, and wherein

the second major surface is configured to expel-expelling
the heat to the at least one heat removal cabinet-(60); and

an impermeable top-(21), bottom-(25) and lateral surfaces-(23)
 disposed adjacent to the first and the second major surfaces, forming an
 10 enclosure of the mixing chamber;

~~characterized in that~~ wherein

the first major surface-comprising is partitioned into the
multiple first spaces by a plurality of first partition assemblies
assembly-(24) configured, each matching to a width and a height
 15 of-communicating the server racks-(30) or the outer enclosures
(41); and,

wherein the first partition assemblies are configured
to attach or removably attach the server rack or the outer
enclosure,

the second major surface ~~comprising~~ is partitioned into the
multiple second spaces by a plurality of second partition
assemblies ~~assembly (24) configured, each matching to a~~ width
 and a height of ~~communicating the~~ heat removal cabinet ~~(60)~~ or
 5 the inner enclosure ~~(42)~~,

wherein the second partition assemblies are
configured to attach or removably attach the heat removal
cabinet or the inner enclosure, and

when each of the first partition assemblies receives either
 10 the server rack or the outer enclosure and each of the second
partition assemblies receives either the heat removal cabinet or the
inner enclosure, the mixing chamber forms an enclosed chamber,
and

the heat generated from each server rack mix inside the
 15 mixing chamber and achieve temperature equilibrium before
being expelled.

2. The system ~~(1)~~ for heat removal from server racks according to claim 1,
 wherein the first and the second partition assemblies ~~assembly (24) has web~~
~~structure (204) thereon~~ are permeable to air, enabling heated air therethrough
 20 so that a volume of the heated air is mixed homogenously and a temperature of
 the heated air in the mixing chamber approaches equilibrium.

3. The system-(1) for heat removal from server racks according to ~~any one~~
~~of preceding claim~~ claim 1, wherein the first and the second partition
~~assemblies assembly (24) coupled with~~ further comprise

an air diffusing means and

5 guide plates,

wherein the guide plates are attached to the impermeable top
surface and the impermeable bottom surface facing inside of the mixing
chamber, and

the air diffusing means comprises ~~comprising~~ at least one diffuser
10 ~~(26)~~ mounted substantially vertical between the guide plates ~~(28)~~.

4. The system-(1) for heat removal from server racks according to claim 3,
wherein the diffuser ~~(26) comprising web structure (206)~~ is permeable to air.

5. The system-(1) for heat removal from server racks according to claim 4,
wherein the diffuser ~~(26)~~ is manually or automatically pivotable to provide a
15 diffusion angle (α, β) , which is an angle of the diffuser with respect to the plane
of the first and second major surfaces.

6. The system-(1) for heat removal from server racks according to claim 5,
further comprising an actuator having an actuation rod or linkage,

wherein the diffuser is operatively connected to ~~an~~ the actuator ~~(210)~~ comprising ~~actuation rod (211) or linkage, and~~ whereby upon an actuation or retraction of the actuation rod or linkage, the actuator adjusts ~~to adjust~~ the diffusion angle with respect to the plane of the first and the second major surfaces.

7. The system ~~(1)~~ for heat removal from server racks according to claim 6, further comprising a computer or a controller that runs a program,

wherein the actuator ~~(210)~~ is operatively connected to ~~a~~ the computer or the controller, and

~~wherein the computer comprising executable programs~~ is configured for receiving telemetry data from one or more measuring instruments of temperature, energy, pressure, and mass flow rate, ~~thereby~~ and for instructing the diffuser to adjust the diffusion angle.

8. The system ~~(1)~~ for heat removal from server racks according to claim 1, ~~wherein the heat removal cabinet (60)~~ further comprising at least one heat exchanger ~~(61) therein,~~ receiving a cooling fluid ~~such as chilled water, refrigerant, or air.~~

9. The system ~~(1)~~ for heat removal from server racks according to claim 8, ~~wherein the cooling fluid is configured at~~ a volume flow rate, pressure,

temperature, or a combination thereof of the cooling fluid is controlled to cool the heated air.

10. The system-~~(1)~~ for heat removal from server racks according to claim 8, wherein the heat exchanger is ~~selected from~~ one or more types selected from
 5 the group consisting of the following types: fin, shell and tube, brazed plate, cross flow, counter flow, and counter current flow.

11. The system for heat removal from server racks according to claim 8, wherein the cooling fluid is chilled water, refrigerant, or air.

12~~14~~. The system-~~(1)~~ for heat removal from server racks according to claim 1, wherein the heat removal cabinet-~~(60)~~ comprising comprises a plurality of fans
 10 ~~(63)~~ providing a ~~substantial~~ differential static pressure between the heat removal cabinet and ambient, and a differential static pressure between the heat removal cabinet and the mixing chamber.

13~~12~~. The system-~~(1)~~ for heat removal from server racks according to claim 1,
 15 wherein a number of heat removal cabinets is two or more, and

the heat removal cabinets-~~(60)~~ of a same row are arranged by alternating
a number of the heat removal cabinets-(N) and a vacant space.

14~~13~~. The system-~~(1)~~ for heat removal from server racks according to claim-~~10~~
13, wherein the vacant space enabling a redundancy of a total number of the

heat removal cabinets is higher than ~~the~~ a minimum number of cabinets required ~~(N)~~, thereby providing redundancy cooling capacity or backup cooling capacity.