

WHAT IS CLAIMED IS:

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

a mixing chamber 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 a server rack or an outer enclosure,

 at least one first space attaches or removably attaches a

- 10 server rack, and

 the first major surface is configured to receive heated air
coming from the server rack;

a second major surface partitioned to have multiple second
spaces,

- 15 wherein each second space is configured to attach or
removably attach the at least one heat removal cabinet or an inner
enclosure,

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

the second major surface is configured to expel heat to the
at least one heat removal cabinet; and

5 an impermeable top, bottom and lateral surfaces disposed
adjacent to the first and the second major surfaces, forming an enclosure
of the mixing chamber;

wherein

10 the first major surface is partitioned into the multiple first
spaces by a plurality of first partition assemblies, each matching to
a width and a height of the server rack or the outer enclosure,

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

15 the second major surface is partitioned into the multiple
second spaces by a plurality of second partition assemblies, each
matching to a width and a height of the heat removal cabinet or
the inner enclosure,

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 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 mixing chamber and achieve temperature equilibrium before being expelled.

2. The system for heat removal from server racks according to claim 1, wherein the first and the second partition assemblies are permeable to air, enabling heated air therethrough 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 for heat removal from server racks according to claim 1, wherein the first and the second partition assemblies further comprise

an air diffusing means and

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 at least one diffuser mounted substantially vertical between the guide plates.

4. The system for heat removal from server racks according to claim 3, wherein the diffuser is permeable to air.

5. The system for heat removal from server racks according to claim 4, wherein the diffuser is manually or automatically pivotable to provide a 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 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 the actuator, and upon actuation or retraction of the actuation rod or linkage, the actuator adjusts the diffusion angle with respect to the plane of the first and the second major surfaces.

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

wherein the actuator is operatively connected to the computer or the controller, and

5 the program is configured for receiving telemetry data from one or more measuring instruments of temperature, energy, pressure, and mass flow rate, and for instructing the diffuser to adjust the diffusion angle.

8. The system for heat removal from server racks according to claim 1, further comprising at least one heat exchanger receiving a cooling fluid.

10 9. The system for heat removal from server racks according to claim 8, wherein a volume flow rate, pressure, temperature, or a combination thereof of the cooling fluid is controlled to cool the heated air.

10. The system for heat removal from server racks according to claim 8, wherein the heat exchanger is one or more types selected from the group
15 consisting of 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. The system for heat removal from server racks according to claim 1,
wherein the heat removal cabinet comprises a plurality of fans providing a
differential static pressure between the heat removal cabinet and ambient, and
a differential static pressure between the heat removal cabinet and the mixing
5 chamber.

13. The system for heat removal from server racks according to claim 1,

wherein a number of heat removal cabinets is two or more, and

the heat removal cabinets of a same row are arranged by alternating the
heat removal cabinets and a vacant space.

10 14. The system for heat removal from server racks according to claim 13,
wherein a total number of the heat removal cabinets is higher than a minimum
number of cabinets required, thereby providing redundancy cooling capacity or
backup cooling capacity.