

CLAIMS

1. A modular data center, comprising:

a cooling module comprising a cooling module enclosure and a first cooling unit housed within the cooling module enclosure, the cooling module enclosure comprising a first interface side wall with a first cooling module supply opening that receives a first portion of cooling air from the first cooling unit; and

a data module comprising a data module enclosure for housing data equipment, the data module enclosure comprising a second interface side wall with a first data module supply opening that receives the first portion of the cooling air from the first cooling module supply opening such that the first portion of the cooling air flows into the data module enclosure and removes heat from the data equipment,

wherein the first interface side wall faces the second interface side wall, and

wherein at least portions of the first cooling unit, the first cooling module supply opening, the first data module supply opening, and the data equipment are linearly aligned with one another.

2. The modular data center of claim 1, wherein the first cooling module supply opening and the first data module supply opening are directly coupled together.

3. The modular data center of claim 1, wherein the first cooling unit, the first cooling module supply opening, the first data module supply opening, and the data equipment are arranged such that the first portion of the cooling air flows between the first cooling unit and the data equipment with a primarily lateral orientation.

4. The modular data center of claim 1, wherein the cooling module enclosure comprises an cooling module outer frame and a cooling module partitioning structure arranged within the cooling module outer frame, the cooling module partitioning structure defining a plurality of partitions, including a first cooling module partition housing the first cooling unit and defining a first cooling module supply channel extending at least between the first cooling unit and the first cooling module supply opening.

5. The modular data center of claim 4, wherein the first interface side wall defines a second cooling module supply opening, and the second interface side wall defines a second data module supply opening that receives a second portion of the cooling air from the second cooling module supply opening such that the second portion of the cooling air flows into the data module enclosure and removes heat from the data equipment, a second data module supply opening aligned with the second cooling module supply opening, wherein the cooling module further comprises at least a second cooling unit, and wherein the plurality of cooling module partitions includes at least a second cooling module partition housing the second cooling unit and a second cooling module supply channel extending at least between the second cooling unit and the second cooling module supply opening.

6. The modular data center of claim 5, wherein the first and second cooling module supply channels are adjacent one another in a longitudinal orientation and fluidly isolated from one another.

7. The modular data center of claim 6, wherein the data module enclosure further comprises a cold aisle laterally adjacent the second interface side wall, a series of data cabinets housing the data equipment laterally adjacent to the cold aisle, and a hot aisle laterally adjacent the data cabinets.

8. The module data center of claim 7, wherein the data module enclosure further comprises a floor supporting the cold aisle, the series of data cabinets, and the hot aisle, the data module enclosure further defining a data module return plenum extending between the hot aisle and a first data module return opening in the second interface side wall.

9. The modular data center of claim 8, wherein the cooling module partitioning structure defines a third cooling module partition, and wherein the cooling module further comprises a first fan unit housed within the third cooling module partition,

and wherein the first interface side wall also defines a first cooling module return opening and the third cooling module partition defines a first cooling module return channel extending at least between the first fan unit and the first cooling module return opening.

10. The modular data center of claim 9, wherein the first cooling module supply channel is directly below the first cooling module return channel.

11. The modular data center of claim 10, wherein the cooling module partitioning structure further defines a fourth cooling module partition, and wherein the cooling module further comprises a second fan unit housed within the fourth cooling module partition, wherein the first interface side wall also defines a second cooling module return opening and the fourth cooling module partition defines a second cooling module return channel extending at least between the second fan unit and the second cooling module return opening.

12. The modular data center of claim 11, wherein the first and second fan units create a pressure differential such that the first and second portions of the cooling air flow from the first and second cooling units, through the first and second cooling module supply openings, through the first and second data module supply openings, across the cold aisle, and across the data equipment to remove heat therefrom to result in heated air such that the heated air flows into the hot aisle, through the return plenum, through the first and second cooling module return openings back to the first and second cooling units as a repeating cyclical air flow.

13. A modular data center, comprising:

a cooling module comprising:

a cooling module frame;

a cooling module partitioning structure at least partially supported by the cooling module frame, the cooling module partitioning structure including a first series of cooling module supply partitions, each forming a cooling module supply channel with a

cooling module supply opening at a respective end to result in a series of cooling module supply openings;

a plurality of cooling units, each respectively arranged in one of the cooling module supply partitions and generating a respective portion of cooling air; and

a data module comprising a data module enclosure for housing data equipment, the data module enclosure comprising a data module interface side wall that defines a series of data module supply openings,

wherein the data module and cooling module are attached to one another with each of the series of data module supply openings being aligned with a respective one of the series of cooling module supply openings such that the portions of the cooling air from the cooling units flow through the cooling module supply channels, through the cooling module supply openings, through the data module supply openings and onto the data equipment for the removal of heat from the data equipment,

wherein the cooling module partitioning structure faces the data module interface side wall, and

wherein at least portions of each of the series of cooling module supply channels, the series of cooling module supply openings, the plurality of cooling units, the series of data module supply openings, and the data equipment are in a common horizontal plane.

14. The modular data center of claim 13, wherein the series of cooling module supply openings are arranged in a longitudinal row.

15. The modular data center of claim 14, wherein the series of cooling module supply channels, the series of cooling module supply openings, the plurality of cooling units, and the series of data module supply openings are arranged such that the portions of the cooling air flow between the plurality of cooling units and the data equipment with a primarily lateral orientation.

16. The modular data center of claim 15, wherein the data module enclosure further comprises

a cold aisle laterally adjacent the data module interface side wall,
a series of data cabinets housing the data equipment laterally adjacent to the cold aisle,
a hot aisle laterally adjacent the data cabinets, and
a floor supporting the cold aisle, the series of data cabinets, and the hot aisle, the data module enclosure further defining a data module return plenum extending between the hot aisle and a series of data module return openings in the data module interface side wall.

17. The modular data center of claim 16, wherein the cooling module partitioning structure defines a first series of cooling module return partitions, each forming a respective cooling module return channel, fluidly coupled to a respective one of the series of data module return openings, and wherein the cooling module further comprises a plurality of fan units, each respectively arranged in one of the cooling module return partitions.

18. The modular data center of claim 17, further comprising a controller coupled to the data module and the cooling module and configured to adjust temperature, pressure and humidity associated with the data equipment in real time.