CLAIMS

What is claimed is:

1. A modular data center comprising:

a plurality of unit structures arranged generally parallel to one another;

a plurality of supports for supporting the unit structures elevationally above a floor, and wherein adjacent ones of the unit structures form hot aisles therebetween through which hot air generated from data center components may be channeled;

each said unit structure forming an elongated structure having:

a frame structure;

a roof panel supported by the frame structure; and

a ceiling panel spaced apart from the roof panel for defining a volume through which the hot air from one of the hot aisles may be received and channeled; and

the roof panel helping to form a cold aisle between adjacent rows of data center components disposed below the unit structure, the cold aisle being configured for channeling cold air between the data center components.

2. The modular data center of claim 1, wherein the unit structures each include a plurality of foldable panels configured to be suspended below the unit structures to help contain cold air within the cold aisle.

3. The modular data center of claim 2, wherein the foldable panels of each said unit structure are foldable into a space efficient configuration disposed closely adjacent the roof panel to facilitate shipping and packaging.

4. The modular data center of claim 1, further comprising at least one penthouse exhaust structure configured to be supported above a given one of the hot aisles between two adjacently positioned ones of the unit structures, the penthouse exhaust structure including at least one fan for exhausting at least a portion of the hot air from the hot aisle to an ambient environment.

5. The modular data center of claim 4, wherein each said penthouse exhaust structure includes a plurality of exhaust fans arranged in opposing fashion.

6. The modular data center of claim 1, further comprising a plurality of the penthouse exhaust structures arranged to extend generally perpendicular to the unit structures, and to communicate with a plurality of the hot aisles formed between associated pairs of the unit structures.

7. The modular data center of claim 1, further comprising a plurality bridging ceiling panels disposed between adjacent ceiling panels of adjacently positioned ones of the unit structures, to assist in forming the hot aisles.

8. The modular data center of claim 1, wherein the unit structures each comprise at least one cable tray supported from the frame structure so as to be suspended from the unit structure.

9. The modular data center of claim 8, wherein the cable tray is supported by a hanger, the hanger in turn being coupled to the frame structure.

10. The modular data center of claim 9, wherein the hanger is pivotally supported from the frame structure such that the hanger and cable tray are pivotable between a deployed position and a stowed positioned.

11. The modular data center of claim 1, further comprising a modular cooling unit adapted to be positioned adjacent to the unit structures so as to provide a cooling airflow into the cold aisle of at least one of the unit structures.

12. The modular data center of claim 1, further comprising a plurality of modular cooling units adapted to be disposed generally perpendicular to common ends of the cold aisles of the unit structures, to generate a plurality of cooling airflows that are directed into the cold aisles of the unit structures.

13. The modular data center of claim 1, further comprising at least one of:
a modular power supply unit;
a modular power cabinet unit;
a modular uninterruptible power supply (UPS) unit; and
a modular power distribution unit (PDU).

14. The modular data center of claim 1, further comprising:
a modular power supply unit;
a modular power cabinet unit;
a modular uninterruptible power supply (UPS) unit; and
a modular power distribution unit (PDU); and
wherein the modular power supply unit, the modular power cabinet unit, the modular uninterruptible power supply (UPS) unit and the modular power distribution unit (PDU) each have approximately a common length, width and height.

15. The modular data center of claim 14, wherein the length and the width are the same as a length and width of the unit structure.

16. The modular data center of claim 1, wherein the unit structures are configured to form two halls for the modular data center, and further comprising a modular office storage section separating the two halls.

17. A method for forming a modular data center comprising:

providing a plurality of unit structures each having a frame, each said unit structure operating to help form a cold aisle through which cold air is circulated, and a hot aisle through which hot air is circulated;

supporting the unit structures above a floor to allow data center components to be positioned under each of the unit structures in two rows facing each other to help form the cold aisle;

using one said row of each of the two rows of data center components from adjacent ones of the unit structures to help form the hot aisle therebetween;

further configuring each of the unit structures to form a volume, defined at least in in part by a ceiling panel and at least in part by a roof panel, through which the hot air from one of the hot aisles may be received and channeled; and

further using the roof panel to help form the cold aisle between adjacent rows of data center components disposed below the unit structure, the cold aisle being configured for channeling cold air between the data center components.

18. The method of claim 17, further comprising using at least one of:

a penthouse exhaust structure configured to be supported above a given one of the hot aisles between two adjacently positioned ones of the unit structures, to assist in exhausting at least a portion of the hot air from the hot aisle to an ambient environment; or

a plurality of foldable panels operably associated with each of the unit structures to help form the cold aisle associated with each said unit structure.

19. The method of claim 17, further comprising using at least one of:

a modular cooling unit to generate cold air to be circulated into the cold aisle;

a modular power supply unit;

a modular power cabinet unit to supply power to the data center components disposed adjacent the cold aisles;

a modular uninterruptible power supply (UPS) unit to supply power to the data center components; and

a modular power distribution unit (PDU) for distributing power to the data center components.

20. A modular unit structure configured to help form a modular data center, the modular unit structure including:

a frame forming an elongated structure;

at least one roof panel secured supported by the frame;

a plurality of supports for supporting the frame above a floor;

at least one ceiling panel supported by the frame in spaced apart relation to the roof panel to form a volume between the ceiling panel and the roof panel, the volume operating as a hot aisle for channeling hot air originating from data center components positioned below the unit structure, where the data center components are positioned in two rows facing one another;

the unit structure further operating to help form a cold aisle between the two rows of data center components, through which cold air is circulated; and

wherein additional ones of the unit structures may be disposed adjacent one another in a plurality of rows to form a modularly expandable data center.

CLAIMS

What is claimed is:

1. A modular data center comprising:

a plurality of unit structures arranged generally parallel to one another;

a plurality of supports for supporting the unit structures elevationally above a floor, and wherein adjacent ones of the unit structures form hot aisles therebetween through which hot air generated from data center components may be channeled;

each said unit structure forming an elongated structure having:

a frame structure;

a roof panel supported by the frame structure; and

a ceiling panel spaced apart from the roof panel for defining a volume through which the hot air from one of the hot aisles may be received and channeled; and

the roof panel helping to form a cold aisle between two adjacent rows of data center components disposed below the unit structure, the cold aisle being configured for channeling cold air between the data center components

and using one said row of each of the two rows of data center components from adjacent ones of the unit structures to help form the hot aisle there between;

the modular date center further comprising a plurality bridging ceiling panels disposed between adjacent ceiling panels of adjacently positioned ones of the unit structures, to assist in forming the hot aisles.

2. The modular data center of claim 1, wherein the unit structures each include a plurality of foldable panels configured to be suspended below the unit structures to help contain cold air within the cold aisle.

3. The modular data center of claim 2, wherein the foldable panels of each said unit structure are foldable into a space efficient configuration disposed closely adjacent the roof panel to facilitate shipping and packaging.

4. The modular data center of claim 1, further comprising at least one penthouse exhaust structure configured to be supported above a given one of the hot aisles between two adjacently positioned ones of the unit structures, the penthouse exhaust structure including at least one fan for exhausting at least a portion of the hot air from the hot aisle to an ambient environment.

5. The modular data center of claim 4, wherein each said penthouse exhaust structure includes a plurality of exhaust fans arranged in opposing fashion.

6. The modular data center of claim 1, further comprising a plurality of the penthouse exhaust structures arranged to extend generally perpendicular to the unit structures, and to communicate with a plurality of the hot aisles formed between associated pairs of the unit structures.

7. The modular data center of claim 1, further comprising a plurality bridging ceiling panels disposed between adjacent ceiling panels of adjacently positioned ones of the unit structures, to assist in forming the hot aisles.

8. The modular data center of claim 1, wherein the unit structures each comprise at least one cable tray supported from the frame structure so as to be suspended from the unit structure.

9. The modular data center of claim 8, wherein the cable tray is supported by a hanger, the hanger in turn being coupled to the frame structure.

10. The modular data center of claim 9, wherein the hanger is pivotally supported from the frame structure such that the hanger and cable tray are pivotable between a deployed position and a stowed positioned.

11. The modular data center of claim 1, further comprising a modular cooling unit adapted to be positioned adjacent to the unit structures so as to provide a cooling airflow into the cold aisle of at least one of the unit structures.

12. The modular data center of claim 1, further comprising a plurality of modular cooling units adapted to be disposed generally perpendicular to common ends of the cold aisles of the unit structures, to generate a plurality of cooling airflows that are directed into the cold aisles of the unit structures.

13. The modular data center of claim 1, further comprising at least one of:
a modular power supply unit;
a modular power cabinet unit;
a modular uninterruptible power supply (UPS) unit; and
a modular power distribution unit (PDU).

14. The modular data center of claim 1, further comprising:
a modular power supply unit;
a modular power cabinet unit;
a modular uninterruptible power supply (UPS) unit; and
a modular power distribution unit (PDU); and
wherein the modular power supply unit, the modular power cabinet unit, the modular uninterruptible power supply (UPS) unit and the modular power distribution unit (PDU) each have approximately a common length, width and height.

15. The modular data center of claim 14, wherein the length and the width are the same as a length and width of the unit structure.

16. The modular data center of claim 1, wherein the unit structures are configured to form two halls for the modular data center, and further comprising a modular office storage section separating the two halls.

17. A method for forming a modular data center comprising:

providing a plurality of unit structures each having a frame, each said unit structure operating to help form a cold aisle through which cold air is circulated, and a hot aisle through which hot air is circulated;

supporting the unit structures above a floor to allow data center components to be positioned under each of the unit structures in two rows facing each other to help form the cold aisle;

using one said row of each of the two rows of data center components from adjacent ones of the unit structures to help form the hot aisle therebetween;

further configuring each of the unit structures to form a volume, defined at least in in part by a ceiling panel and at least in part by a roof panel, through which the hot air from one of the hot aisles may be received and channeled; and

further using the roof panel to help form the cold aisle between adjacent rows of data center components disposed below the unit structure, the cold aisle being configured for channeling cold air between the data center components.

18. The method of claim 17, further comprising using at least one of:

a penthouse exhaust structure configured to be supported above a given one of the hot aisles between two adjacently positioned ones of the unit structures, to assist in exhausting at least a portion of the hot air from the hot aisle to an ambient environment; or

a plurality of foldable panels operably associated with each of the unit structures to help form the cold aisle associated with each said unit structure.

19. The method of claim 17, further comprising using at least one of:

a modular cooling unit to generate cold air to be circulated into the cold aisle;

a modular power supply unit;

a modular power cabinet unit to supply power to the data center components disposed adjacent the cold aisles;

a modular uninterruptible power supply (UPS) unit to supply power to the data center components; and

a modular power distribution unit (PDU) for distributing power to the data center components.