CLAIMS:

1. An automated warehouse storage system for storage and retrieval of items and conveying items within the storage system, the system comprising:

a plurality of primary multilevel storage racks, the primary multilevel storage racks positioned parallel with one another, and extending in a first direction;

wherein the plurality of primary multilevel storage racks has at least one storage rack exchange level, in which items are delivered to or retrieved from the storage racks, and at least one exchange position in the at least one storage rack exchange level;

and wherein at least one transfer shuttle is configured to travel in a second direction spanning the exchange positions of the storage racks and transverse to the first direction, the transfer shuttle and the exchange positions configured for exchanging items between the transfer shuttle and the exchange positions of the storage racks to retrieve or deliver items,

wherein the primary multilevel storage racks are located in facing pairs with an aisle in between each storage rack of the pair and, wherein

the primary multilevel storage racks of neighboring aisles adjoin one another;

an automated storage and removal apparatus is provided for each aisle for storage and retrieval of items, which exchanges items directly between adjacent storage racks in a certain level by actively displacing items between a storage rack of a first aisle and a storage rack of an adjacent aisle using passive transverse conveyance locations and the automated storage and removal apparatus is an aisle shuttle located in the aisle and

wherein an exchange position is formed by an exchange platform being accessible by the transfer shuttle and also being accessible by the automated storage and removal apparatus of each aisle,

the storage-entry and removal-from-storage apparatuses are racking serving units or single-level racking serving units and

the exchange position is formed by an exchange platform being accessible by the transfer shuttle and also being accessible by the automated storage and removal apparatus of each aisle, such an exchange platform formed in the sense of a flat surface.

2. A system as defined in claim 1, wherein the exchange positions are located at one end of the storage racks.

3. A system as defined in claim 2, wherein at least one aisle has more than one exchange position, preferably one in-line with each rack of an aisle.

4. A system as defined in claim 1, wherein the exchange platform allows single deep or multiple deep placement of items in both the first direction and the second direction.

5. A system as defined in claim 1, wherein an exchange position has conveyor means allowing positioning of an item for take-up by the transfer shuttle and vice versa for the automated storage and removal apparatus or aisle shuttle.

6. A system as defined in any of the preceding claims, wherein an exchange position is formed by a "ball conveyor".

7. A system as defined in any of the preceding claims, wherein the exchange positions are located at either one end or middle of the storage racks.

8. A system as defined in any of the preceding claims, wherein the transfer shuttle is adapted to carry an item orientated transversely compared to the orientation of the item on the aisle shuttle.

9. A system as defined in any of the preceding claims, further comprising a secondary rack oriented to extend in the second direction.

10. A system as defined in any of the preceding claims, further comprising a second plurality of primary multilevel storage racks, the exchange positions of the first plurality of primary multilevel storage racks and the second plurality of primary multilevel storage racks facing each other.

11. A system as defined in any of the preceding claims, further comprising an item lift in each rack for exchange of items between storage rack levels and the storage rack exchange level.

12. A system as defined in any of the preceding claims, wherein the transfer shuttle is configured to travel on tracks.

13. A system as defined in any of the preceding claims 1 – 11, wherein the transfer shuttle and/or aisle shuttle is in the form of a track guided transport vehicle or mobile platform or in the form of a wire guided transport vehicle or mobile platform.

14. A method of storing, retrieving and conveying items within a storage facility, the method comprising:
providing a plurality of primary storage racks positioned parallel with one another and extending in a first direction, being serviced by a storage and retrieval device;
providing a plurality of aligned exchange positions located at one end of each of the primary racks in an exchange level, the receiving items from the storage and retrieval device and exchange positions configured for allowing take-up of items by the storage and retrieval device;
providing a transfer shuttle in the exchange level and configured to run substantially in a second direction transverse to the first direction in the exchange level, its travel spanning the plurality of aligned exchange positions and,
exchanging items between the shuttle and the exchange positions to transport one or more items between the racks, further comprising providing a plurality of aisle shuttles configured to run in the first direction as storage and retrieval devices and using a lift to transport items to and from the exchange level, the method further comprising:
transferring an item from a rack onto the aisle shuttle,
conveying the item in the first direction to a position proximal the exchange position using the aisle shuttle,
transferring the item onto the exchange position in the second direction;
transferring the item from the exchange end in the first direction and onto the transfer shuttle;
conveying the item in the second direction using the transfer shuttle.

15. A method as defined in claim 14, the method further comprising:
conveying the item in the second direction to a position proximal the exchange position using the transfer shuttle;
transferring the item onto the exchange position in the first direction;
transferring the item from the exchange end in the second direction and onto an aisle

shuttle;

conveying the item in the first direction using the aisle shuttle

transferring an item to a rack from the aisle shuttle.