C L A I M S

1. A storage system comprising:

a package stocker configured to store a plurality of semiconductor packages, each of the plurality of semiconductor packages including one or more nonvolatile memory dies;

a drive including at least one socket on which a semiconductor package among the plurality of semiconductor packages is able to be detachably mounted~~, and a controller configured to control the one or more nonvolatile memory dies of the semiconductor package mounted on the socket~~;

a host apparatus communicatively connected to the drive and configured to execute reading ~~and~~ or writing data from ~~and~~ or to the one or more nonvolatile memory dies of the semiconductor package mounted on the socket~~via the controller~~; and

a package transport device configured to transport each of the plurality of semiconductor packages between the package stocker and the drive,

wherein the host apparatus is further configured to:

determine a first semiconductor package that includes a first nonvolatile memory die to be accessed, among the plurality of semiconductor packages;

when the first semiconductor package is mounted on the socket of the drive, execute reading or writing data from or to the first nonvolatile memory die~~ via the controller~~; and

when the first semiconductor package is not mounted on the socket of the drive, cause the package transport device to transport the first semiconductor

package to ~~the socket of~~ the drive, and to mount the first semiconductor package on the socket of the drive.

2. The storage system according to claim 1, wherein

the host apparatus is further configured to:

when the first semiconductor package is not mounted on the socket of the drive and the drive includes an empty socket, cause the package transport device to transport the first semiconductor package to ~~the empty socket of~~ the drive, and to mount the first semiconductor package on the empty socket of the drive; and

when the first semiconductor package is not mounted on the socket of the drive and the drive includes no empty socket, cause the package transport device to detach a second semiconductor package ~~mounted on the socket~~ from the socket of the drive, and cause the package transport device to transport the first semiconductor package to ~~the socket of~~ the drive ~~from which the semiconductor package has been detached~~, and to mount the first semiconductor package on the socket of the drive from which the second semiconductor package has been detached.

3. The storage system according to claim 1, wherein

the host apparatus is further configured to:

manage a priority of each of the plurality of semiconductor packages; and

control a location where each of the plurality of semiconductor packages is present, based on the priority of each of the plurality of semiconductor packages, such that:

a semiconductor package having a priority of a first level is mounted on the socket of the drive;

a semiconductor package having a priority of a second level lower than the priority of the first level is held in the package transport device; and

a semiconductor package having a priority of a third level lower than the priority of the second level is stored in the package stocker.

4. The storage system according to claim 3, wherein

the package stocker includes a first storage location and a second storage location, and

the host apparatus is configured to control the location where each of the plurality of semiconductor packages is present, based on the priority of each of the plurality of semiconductor packages, such that:

the semiconductor package having the priority of the third level is stored in the first storage location of the package stocker; and

a semiconductor package having a priority of a fourth level lower than the priority of the third level is stored in the second storage location of the package stocker.

5. The storage system according to claim 4, wherein

a distance between the first storage location and the package transport device is shorter than a distance between the second storage location and the package transport device.

6. The storage system according to claim 1, wherein

the package stocker is further configured to store a plurality of trays, each of the plurality of

trays accommodating a first number of semiconductor packages, the first number being two or more,

the drive includes the first number of sockets on which the first number of semiconductor packages accommodated in one of the plurality of trays are able to be collectively and detachably mounted, and

the host apparatus is further configured to:

identify a first tray that accommodates the first semiconductor package, among the plurality of trays;

when the first number of semiconductor packages accommodated in the first tray are mounted on the first number of sockets of the drive, execute reading or writing data from or to the first nonvolatile memory die ~~via the controller~~; and

when the first number of semiconductor packages accommodated in the first tray are not ~~connected to~~mounted on the first number of sockets of the drive, cause the package transport device to transport the first tray to the drive, and to mount the first number of semiconductor packages accommodated in the first tray on the first number of sockets of the drive.

7. The storage system according to claim 6, wherein

the host apparatus is further configured to:

manage a priority of each of the plurality of trays, the priority of each of the plurality of trays being determined based on a priority of each of the plurality of semiconductor packages; and

control a location where each of the plurality of trays is present, based on the priority of each of the plurality of trays, such that:

the first number of semiconductor packages accommodated in a tray having a priority of a first level are mounted on the first number of sockets of the drive;

a tray having a priority of a second level lower than the priority of the first level is held in the package transport device;

a tray having a priority of a third level lower than the priority of the second level is stored in a first storage location of the package stocker; and

a tray having a priority of a fourth level lower than the priority of the third level is stored in a second storage location of the package stocker.

8. The storage system according to claim 7, wherein

a distance between the first storage location and the package transport device is shorter than a distance between the second storage location and the package transport device.

9. The storage system according to claim 6, wherein

the package stocker includes a tray loading/unloading slot configured to be used to:

add one of the plurality of trays to the package stocker from an outside of the package stocker; and

eject one of the plurality of trays from the package stocker to the outside of the package stocker.

10. The storage system according to claim 9, wherein

the package stocker includes at least a pair of rails extending in parallel to each other and on which one of the plurality of trays is able to be placed, and

the one of the plurality of trays placed on the pair of rails is movable along the pair of rails.

11. The storage system according to claim 10, wherein

the package transport device is opposed to the tray loading/unloading slot, and

the pair of rails of the package stocker extends in a direction from the tray loading/unloading slot toward the package transport device.

12. The storage system according to claim 6, wherein

each of the plurality of semiconductor packages includes a first surface, a second surface opposite to the first surface, and a plurality of ball-type metal terminals disposed on the second surface, and

each of the plurality of trays has a surface in which an opening through which the plurality of ball-type metal terminals of each of the first number of semiconductor packages are exposed is formed.

13. The storage system according to claim 6, wherein

each of the plurality of semiconductor packages includes a first surface, a second surface opposite to the first surface, and a plurality of ball-type metal terminals disposed on the second surface,

the drive further includes a board on which at least the first number of sockets are disposed,

the board includes one or more first recessed portions, and

each of the plurality of trays has a lower surface in which an opening through which the plurality of ball-type metal terminals of each of the first number of semiconductor packages are exposed is formed, and

the lower surface of each of the plurality of trays includes one or more first protrusions configured to fit into the one or more first recessed portions of the board of the drive.

14. The storage system according to claim 13, further comprising:

a lid member that includes one or more second recessed portions, wherein

each of the plurality of trays has an upper surface opposite to the lower surface, the upper surface includes one or more second protrusions, and

at least one of the plurality of trays placed on the board is covered with the lid member such that the one or more second recessed portions of the lid member are fitted with the one or more second protrusions of the upper surface of the at least one of the plurality of trays.

15. The storage system according to claim 1, wherein

each of the plurality of semiconductor packages includes a plurality of nonvolatile memory dies.

16. The storage system according to claim 15, wherein

each of the plurality of semiconductor packages includes a first surface, a second surface opposite to the first surface, and a plurality of ball-type metal terminals disposed on the second surface, and the plurality of ball-type metal terminals are connected to channel terminals of the plurality of nonvolatile memory dies.

17. The storage system according to claim 1, wherein

the host apparatus includes a processor

configured to execute a first program for managing an amount of data stored in at least one of the plurality of semiconductor packages stored in the package stocker.

18. The storage system according to claim 1, wherein

each of the plurality of semiconductor packages stores a package identifier, and

the host apparatus is further configured to:

read the package identifier from the first semiconductor package mounted on the socket of the drive by the package transport device;

determine whether the read package identifier coincides with the package identifier of the first semiconductor package; and

in response to determining that the read package identifier coincides with the package identifier of the first semiconductor package, execute reading or writing data from or to the first nonvolatile memory die.

19. The storage system according to claim 6, wherein

each of the plurality of semiconductor packages stores a package identifier,

each of the plurality of trays includes a tray identifier, and

the host apparatus is further configured to:

read the tray identifier from the first tray transported to the drive by the package transport device;

determine whether the read tray identifier coincides with the package identifier of the first tray; and

in response to determining that the read tray identifier coincides with the tray identifier of the first tray,

read the package identifier from the first semiconductor package accommodated in the first tray;

determine whether the read package identifier coincides with the package identifier of the first semiconductor package; and

in response to determining that the read package identifier coincides with the package identifier of the first semiconductor package, execute reading or writing data from or to the first nonvolatile memory die.

20. The storage system according to claim 19, wherein

at least one of the one or more nonvolatile memory dies included in each of the plurality of semiconductor packages includes an information storage area to store the package identifier,

the tray identifier of each of the plurality of trays is represented by a barcode,

the drive includes a controller and a barcode reader, and

the host apparatus is configured to:

read the package identifier from the information storage area of the at least one of the one or more nonvolatile memory dies included in the first semiconductor package using the controller of the drive; and

read the tray identifier from the first tray using the barcode reader of the drive.