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Claims of 6,425,035	U.S. Patent No. 6,219,771 to Kikuchi, et al., filed August 18, 1997, issued April 17, 2001 "Data storage apparatus with improved security process and partition allocation functions"
1. A storage router for providing virtual local storage on remote storage devices to devices, comprising:	The '771 invention describes <i>virtual local storage</i> : "Furthermore, with the move to large volume disk apparatus, it is possible to consider <i>partitioning a single disk</i> and then <i>having each host use a different partition</i> , but with conventional disk apparatus it has not been possible, while using a single interface, to identify a host device and then have each host device use a different partition." [1:58-63] "With the invention of the fourth apparatus, the disk apparatus is able to identify a host device from the host address imbedded within the command sent from the host device. Moreover because a partition offset information value is stored for each host device, the disk apparatus is able to allocate a different disk partition to each host device. Consequently, <i>a single disk apparatus can essentially appear as a different disk to each host device</i> , enabling the efficient usage of modern large volume disk apparatus." [8:37-45]
a buffer providing memory work space for the storage router;	The '771 invention includes <i>a buffer providing memory work space for the storage router</i> : "With this third apparatus, host information relating to access authorization is not stored internally beforehand, but rather is sent from the host devices which control the disk at the point of disk startup. Consequently, the amount of <i>non volatile memory set aside for data storage</i> can be reduced." [3:1-5] "A RAM (random access memory) 109 is memory which is used, as required, for

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	<p><i>temporarily storing data during execution of a program.</i>" [5:21-23]</p>
<p>a first controller operable to connect to and interface with a first transport medium;</p>	<p>The '771 invention includes a <i>Fibre Channel controller operable to connect to and interface with a Fibre Channel transport medium</i>:</p> <p>"Common ways of connecting the host device and the disk apparatus include a SCSI (Small Computer System Interface) and <i>Fibre Channel</i>." [1:31-33]</p> <p>"A first apparatus according to the present invention comprises: a <i>host device interface</i> for sending and receiving data to and from a plurality of host devices, a data storage device for storing data to be sent to a host device, and a control device for controlling the writing of data to, and the reading of data from, the data storage device." [2:7-12]</p> <p>"With a third apparatus, a construction is adopted where in addition to the items which characterize the second apparatus, the host check unit incorporates a startup setting function which requests host information from a <i>plurality of host devices</i> when the control device is activated." [2:63-67]</p> <p>"A <i>host device interface 112</i> is an interface for exchanging commands and data from a host device with the disk apparatus 101. In the case of a disk array, a SCSI is used for both the host device interface 112 and for the disk interface 111, but generally <i>it is acceptable for the host device interface 112 and the disk interface 111 to be of different types</i>.</p> <p>"For example, a <i>Fibre Channel could be used for the host device interface 112</i> and a SCSI used for the disk interface 111." [30-39]</p>
<p>a second controller operable to connect to and interface with a second transport medium; and</p>	<p>The '771 invention includes a <i>SCSI controller operable to connect to and interface with a SCSI bus transport medium</i>:</p>

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	<p>“Common ways of connecting the host device and the disk apparatus include a <i>SCSI</i> (Small Computer System Interface) and Fibre Channel.” [1:31-33]</p> <p>“A first apparatus according to the present invention comprises: a host device interface for sending and receiving data to and from a plurality of host devices, <i>a data storage device for storing data</i> to be sent to a host device, and a control device for controlling the writing of data to, and the reading of data from, the data storage device.” [2:7-12]</p> <p>“A disk interface 111 is an interface for exchanging data and commands between the CPU and a data storage unit 105 which will be either a disk or some other storage medium.” [5:26-29]</p> <p>“A host device interface 112 is an interface for exchanging commands and data from a host device with the disk apparatus 101. In the case of a disk array, <i>a SCSI is used</i> for both the host device interface 112 and <i>for the disk interface 111</i>, but generally it is acceptable for the host device interface 112 and the disk interface 111 to be of different types.</p> <p>“For example, a Fibre Channel could be used for the host device interface 112 and <i>a SCSI used for the disk interface 111</i>.” [30-39]</p>
<p>a supervisor unit coupled to the first controller, the second controller and the buffer,</p>	<p>The ‘771 invention’s functions are generally performed in hosts, which suggests moving this function to an <i>internal supervisor unit</i>:</p> <p>“A first apparatus according to the present invention comprises: a host device interface for sending and receiving data to and from a plurality of host devices, a data storage device for storing data to be sent to a host device, and <i>a control device for controlling</i> the writing of data to, and the reading of data from, the data storage device.” [2:7-12]</p>

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	<p>“With this third apparatus, host information relating to access authorization is not stored internally beforehand, but rather is sent from the host devices which control the disk at the point of disk startup. Consequently, the amount of non volatile memory set aside for data storage can be reduced.” [3:1-5]</p> <p>“An example configuration of the above embodiment which uses a <i>general purpose CPU (central processing unit)</i> is shown in FIG. 3. A disk apparatus 101 comprises a CPU 106 which <i>performs the centralized function of controlling reading and writing</i>. The CPU 106 is <i>connected to various circuit devices via a bus 107</i>. Of these devices, a ROM (read only memory) 108 is memory solely for reading, and stores various programs and fixed data.” [5:13-20]</p>
<p>the supervisor unit operable to map between devices connected to the first transport medium and the storage devices,</p>	<p>The ‘771 invention <i>maintains a configuration for SCSI storage devices connected to the SCSI bus transport medium that maps between Fibre Channel devices and SCSI storage devices</i>:</p> <p>“Furthermore, with the move to large volume disk apparatus, it is possible to consider <i>partitioning a single disk</i> and then having each host use a different partition, but with conventional disk apparatus it has not been possible, while using a single interface, to identify a host device and then have each host device use a different partition.” [1:58-63]</p> <p>“The control device comprises an address registration unit, in which the <i>host address of each host device has been registered in advance, for the purpose of authorizing access</i>, a command interpretation and execution unit which on receipt of a command from a host device via the host device interface outputs the host address of the host device based on the command, and an address verification unit for verifying the</p>

	<p>host address output from the command interpretation and execution unit against the host address registered in the address registration unit, and for determining whether or not the particular host device has access authorization.” [2:13-23]</p> <p>“As a second apparatus according to the present invention a construction is adopted where, in addition to the items which characterize the first apparatus, <i>a host information storage unit in which information about the hosts such as host names and passwords is stored</i>, is incorporated into the address registration unit, and a host check unit which, on receipt of host information from a host, determines whether or not that particular host has access authorization based on the host information received from the host and the host information stored in the host information storage unit, is incorporated into the command interpretation and execution unit, and this host check unit incorporates an <i>address registration function which registers the access authorization based on the host information</i>, and the host address determined for the host device, in the address registration unit.” [2:37-51]</p> <p>“With this second apparatus, when a host device logs in to the disk apparatus seeking authorization to use the disk, <i>the address is registered in the address registration unit</i>, and subsequently, the <i>host address is extracted</i> from any commands sent from the host device <i>and verified against the host address registered in the address registration unit</i>, and in those cases where access is authorized the command interpretation and execution unit transmits the command from the host device to the data storage unit and executes the command. In this way, any <i>alterations in host address</i> can be easily accommodated.”</p>
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