

CLAIMS

1. A computer-implemented method for verifying block data, the computer-implemented method comprising:

5 selecting, from a block comprising a plurality of data nodes, a data node configured to store newly added data;

 determining whether the selected data node comprises associated data associated with the newly added data; and

 in response to determining that the selected data node does not comprise associated data
10 associated with the newly added data:

 determining a character string corresponding to the newly added data; and

 determining a verification value of the newly added data for the selected data node by calculating the character string based on a predetermined algorithm; and

 in response to determining that the selected data node comprises associated data associated
15 with the newly added data:

 separately determining a first character string corresponding to the associated data and a second character string corresponding to the newly added data;

 sorting the first character string and the second character string by using a predetermined method; and

20 determining the verification value of the newly added data for the selected data node by calculating a sorted character string based on a predetermined algorithm;

 calculating an update verification value of the selected data node based on the verification value of the newly added data, wherein calculating the update verification value of the selected data node comprises

25 determining an original verification value of the selected data node obtained before the newly added data is stored; and

 calculating the update verification value of the selected data node based on the original verification value and the verification value of the newly added data; and

 obtaining a block verification value of the block based on the update verification value of
30 the selected data node and original verification values of other data nodes comprised in the block,

wherein the block verification value of the block is used to verify whether data stored in the block is consistent with data stored in other blocks in a blockchain.

2. The computer-implemented method of claim 1, wherein selecting the data node comprises:

5 in response to receiving the newly added data, determining block information used to store the newly added data, wherein the block information comprises a block identifier and a data node identifier;

searching, based on the block identifier and as a found block, the blockchain for a block corresponding to the block identifier;

10 determining, from the found block and as a found data node, a data node corresponding to the data node identifier; and

using the found data node as the selected data node configured to store the newly added data.

3. The computer-implemented method of claim 2, wherein determining the block information

15 comprises:

calculating data content corresponding to the newly added data, to obtain the determined block information.

4. The computer-implemented method of claim 1, wherein the predetermined algorithm

20 comprises an encryption algorithm and the verification value comprises an encrypted value of the newly added data.

5. The computer-implemented method of claim 4, wherein the encryption algorithm

25 comprises a hash algorithm and the encrypted value comprises a hash value of the newly added data.

6. The computer-implemented method of any one of claims 1 to 5, wherein calculating the

sorted character string based on the predetermined algorithm comprises calculating a character string group included in the verification value of the newly added data.

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~~7. The computer-implemented method of any one of claims 1 to 6, wherein, if it has been~~

~~determined that no data has been stored in the selected data node;~~

~~determining the original verification value of the selected data node obtained before the newly added data is stored comprises determining the verification value of the newly added data as the original verification value of the selected data node.~~

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87. The computer-implemented method of claim 1, wherein obtaining the verification value comprises:

determining a tree structure corresponding to the plurality of data nodes comprised in the block;

10 determining the original verification values of the other data nodes comprised in the block;

traversing the tree structure based on the update verification value of the selected data node and the original verification values of the other data nodes comprised in the block, to obtain a verification value of a root node of the tree structure; and

determining the verification value of the root node as the block verification value of the block.

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98. A non-transitory, computer-readable medium storing one or more instructions executable by a computer system to perform operations comprising:

selecting, from a block comprising a plurality of data nodes, a data node configured to store newly added data;

20 determining whether the selected data node comprises associated data associated with the newly added data; and

in response to determining that the selected data node does not comprise associated data associated with the newly added data:

determining a character string corresponding to the newly added data; and

25 determining a verification value of the newly added data for the selected data node by calculating the character string based on a predetermined algorithm; and

in response to determining that the selected data node comprises associated data associated with the newly added data:

30 separately determining a first character string corresponding to the associated data and a second character string corresponding to the newly added data;

sorting the first character string and the second character string by using a

predetermined method; and

determining the verification value of the newly added data for the selected data node by calculating a sorted character string based on a predetermined algorithm;

calculating an update verification value of the selected data node based on the verification value of the newly added data, wherein calculating the update verification value of the selected data node comprises

determining an original verification value of the selected data node obtained before the newly added data is stored; and

calculating the update verification value of the selected data node based on the original verification value and the verification value of the newly added data; and

obtaining a block verification value of the block based on the update verification value of the selected data node and original verification values of other data nodes comprised in the block, wherein the block verification value of the block is used to verify whether data stored in the block is consistent with data stored in other blocks in a blockchain.

109. A computer-implemented system, comprising:

one or more computers; and

one or more computer memory devices interoperably coupled with the one or more computers and having tangible, non-transitory, machine-readable media storing one or more instructions that, when executed by the one or more computers, perform one or more operations comprising:

selecting, from a block comprising a plurality of data nodes, a data node configured to store newly added data;

determining whether the selected data node comprises associated data associated with the newly added data; and

in response to determining that the selected data node does not comprise associated data associated with the newly added data:

determining a character string corresponding to the newly added data; and

determining a verification value of the newly added data for the selected data node by calculating the character string based on a predetermined algorithm; and

in response to determining that the selected data node comprises associated data associated

with the newly added data:

separately determining a first character string corresponding to the associated data and a second character string corresponding to the newly added data;

5 sorting the first character string and the second character string by using a predetermined method; and

determining the verification value of the newly added data for the selected data node by calculating a sorted character string based on a predetermined algorithm;

calculating an update verification value of the selected data node based on the verification value of the newly added data, wherein calculating the update verification value of the selected data node comprises

determining an original verification value of the selected data node obtained before the newly added data is stored; and

calculating the update verification value of the selected data node based on the original verification value and the verification value of the newly added data; and

15 obtaining a block verification value of the block based on the update verification value of the selected data node and original verification values of other data nodes comprised in the block, wherein the block verification value of the block is used to verify whether data stored in the block is consistent with data stored in other blocks in a blockchain.

20 [1110](#). An apparatus for verifying block data, the apparatus comprising a plurality of modules configured to perform the method of any one of claims 1 to [87](#).