CLAIMS

1. A data processing method for a multi-blockchain, the multi-blockchain comprising a target chain and a target service subchain, a target chain network corresponding to the target chain being independent of a target service subnetwork corresponding to the target service subchain, the target service subnetwork being constructed by a target consensus node in the target chain network based on a target service requested by a service object, the method being performed by the target consensus node, and the method comprising:

obtaining chain height voting information of a management node of the target chain for the target service subchain, wherein a subchain control contract configured for controlling the target service subchain is deployed on the target chain, the subchain control contract comprises a target registered node performing identity registration for the target service subchain;

determining, in response to determining the management node as the target registered node based on the subchain control contract, a target chain height of the target service subchain based on the chain height voting information and the subchain control contract; and

generating height confirmation information corresponding to the target chain height based on the subchain control contract, and transmitting the height confirmation information to a verification node in the target service subnetwork,

the height confirmation information being configured for the verification node to write, based on the height confirmation information, the target chain height into a subchain management contract on the target service subchain, the subchain management contract being configured to instruct the verification node to determine, based on the target chain height, a chain height obtained after execution of the target service.

2. The method according to claim 1, wherein the determining a target chain height of the target service subchain based on the chain height voting information and the subchain control contract comprises:

determining a voting type of the chain height voting information based on a node registration identity of the target registered node; and

determining the target chain height of the target service subchain based on the chain height

voting information, the voting type of the chain height voting information, and the subchain control contract.

3. The method according to claim 2, wherein the chain height voting information comprises first-type height voting information of the management node for the target service subchain, the first-type height voting information comprising a node identifier of the management node, a public key certificate of the management node, a voted-for height generated when the management node performs voting on the chain height of the target service subchain, and signature information of the management node, the signature information of the management node being obtained by the management node after performing signature addition on the voted-for height based on private key information of the management node, the subchain control contract comprising node registration configuration information of a registered node associated with the target service subchain, the node registration configuration information comprising a node identifier of the registered node and a public key certificate of the registered node, the public key certificate of the registered node being obtained after the target consensus node performs, by invoking the subchain control contract, identity registration for registered node information submitted by the registered node; and

the determining a voting type of the chain height voting information based on a node registration identity of the target registered node further comprises:

obtaining the node identifier of the management node from the first-type height voting information, searching the node identifier of the registered node for a target node identifier the same as the node identifier of the management node, obtaining a public key certificate of the target registered node corresponding to the target node identifier from the public key certificate of the registered node, and using the obtained public key certificate of the target registered node as a target public key certificate;

using the public key certificate of the management node comprised in the first-type height voting information as a to-be-processed public key certificate, and performing signature verification on the signature information of the management node based on the to-be-processed public key certificate and the target public key certificate, to obtain a signature verification result of the management node;

determining the management node as the target registered node when the signature

verification result of the management node indicates that the signature verification succeeds; and

determining a voting type of the first-type height voting information based on the node registration identity of the target registered node.

4. The method according to claim 3, wherein the performing signature verification on the signature information of the management node based on the to-be-processed public key certificate and the target public key certificate, to obtain a signature verification result of the management node, comprises:

using certificate data information in the to-be-processed public key certificate as to-be-processed certificate information, and using certificate data information in the target public key certificate as target certificate information;

comparing the to-be-processed certificate information with the target certificate information, to obtain a comparison result; and

performing, in response to the comparison result indicating the to-be-processed certificate information being consistent with the target certificate information, signature verification on the signature information of the management node based on public key information in the to-be-processed public key certificate, and using a verification result obtained when the signature verification succeeds as the signature verification result of the management node.

5. The method according to claim 3, wherein the node registration configuration information comprises a first-type node registration identity or a second-type node registration identity registered by the registered node for the target service subchain; and

the determining a voting type of the first-type height voting information based on the node registration identity of the target registered node comprises:

searching the node registration configuration information for the node registration identity of the target registered node corresponding to the target node identifier, and using the found node registration identity of the target registered node as a target node registration identity;

determining, when the target node registration identity is the first-type node registration identity, based on the first-type node registration identity, that the voting type of the first-type height voting information is a first voting type; and

determining, when the target node registration identity is the second-type node registration identity, based on the second-type node registration identity, that the voting type of the first-type height voting information is a second voting type.

6. The method according to any one of claims 2 to 4, wherein the management node comprises a first-type management node and a second-type management node, the first-type management node being a management node registering the first-type node registration identity in the subchain control contract, and the second-type management node being a management node registering the second-type node registration identity in the subchain control contract, an identity level of the first-type node registration identity being higher than an identity level of the second-type node registration identity; and the chain height voting information comprises first-type height voting information of the first-type management node and the second-type management node for the target service subchain, the first-type height voting information comprising first chain height voting information of the first voting type determined by the first-type management node based on the first-type node registration identity, and second chain height voting information of the second voting type determined by the second-type management node based on the second-type node registration identity; and

the determining the target chain height of the target service subchain based on the chain height voting information, the voting type of the chain height voting information, and the subchain control contract comprises:

determining a voted-for height generated when the first-type management node performs voting on the chain height of the target service subchain as a first voted-for height, and determining a voted-for height generated when the second-type management node performs voting on the chain height of the target service subchain as a second voted-for height; and

invoking, based on the first voted-for height, the subchain control contract to determine a reference voting height threshold for the target service subchain, and determining the target chain height of the target service subchain based on the reference voting height threshold, the first voted-for height, and the second voted-for height.

7. The method according to claim 6, wherein when a quantity of the first-type management nodes is M1, a quantity of the first voted-for heights is M1, M1 being a positive integer; when a quantity of the second-type management nodes is M2, a quantity of the second voted-for heights

is M2, M2 being a positive integer; and

the invoking, based on the first voted-for height, the subchain control contract to determine a reference voting height threshold for the target service subchain, and determining the target chain height of the target service subchain based on the reference voting height threshold, the first voted-for height, and the second voted-for height comprises:

invoking the subchain control contract to determine a first voted-for height having a minimum height in the M1 first voted-for heights as the reference voting height threshold of the target service subchain;

obtaining voted-for heights less than or equal to the reference voting height threshold from the M1 first voted-for heights and the M2 second voted-for heights, using the obtained voted-for heights as candidate voting heights, and using a voted-for height having a maximum height in the candidate voting heights as a target voted-for height; and

using voted-for heights greater than or equal to the target voted-for height in the M1 first voted-for heights and the M2 second voted-for heights as to-be-processed heights, and using the target voted-for height as the target chain height of the target service subchain when a quantity of the to-be-processed heights is greater than a vote count threshold, the vote count threshold being greater than or equal to (M1+M2)/2.

8. The method according to any one of claims 1 to 7, wherein the generating height confirmation information corresponding to the target chain height based on the subchain control contract, and transmitting the height confirmation information to a verification node in the target service subnetwork comprises:

constructing a height confirmation transaction based on the chain height voting information and the target chain height, packaging the height confirmation transaction into a target block of the target chain when a transaction packaging condition associated with the target chain is satisfied, and submitting the target block comprising the height confirmation transaction onto the target chain;

invoking the subchain control contract on the target chain to execute the height confirmation transaction in the target block, to obtain the height confirmation information corresponding to the target chain height; and

transmitting the height confirmation information to the verification node in the target service subnetwork through a target cross-chain relay, the target cross-chain relay being configured to isolate the target service subnetwork and the target chain network.

9. The method according to any one of claims 1 to 8, wherein the chain height voting information comprises second-type height voting information of the management node for the target service subchain, the second-type height voting information being determined by the management node when it is detected that a service risk exists on the target service subchain, the second-type height voting information comprising a voted-against height of the management node generated when the management node performs voting on the chain height of the target service subchain, and the second-type height voting information being in a first risk handling transaction determined by the management node based on a risk transaction, the risk transaction being generated by the management node based on the voted-against height; and the method further comprises:

writing, when obtaining the first risk handling transaction transmitted by the management node, the risk transaction indicated by the first risk handling transaction into the subchain control contract, determining a chain height greater than the voted-against height on the target service subchain as an invalid chain height, and generating subchain locking information associated with the risk transaction; and

transmitting the subchain locking information to the verification node in the target service subnetwork,

the subchain locking information being configured for the verification node to stop executing a risk service associated with the risk transaction, and for the verification node to perform, when receiving a second risk handling transaction submitted by a service management object associated with the target service subnetwork, risk elimination on the risk service based on the second risk handling transaction, and

the subchain locking information being further configured to instruct the verification node to set a service state of the target service subchain to a locked state, the target service subchain in the locked state stopping transaction chaining and stopping performing cross-chain interaction with a first chain and a second chain comprised in the multi-blockchain, both the first chain and the second chain being blockchains different from the target service subchain.

10. The method according to claim 9, further comprising:

invoking, when obtaining a risk release transaction transmitted by the service management object in response to that the risk service is successfully handled, the subchain control contract to execute the risk release transaction, to obtain risk release information configured for releasing the risk transaction, and transmitting the risk release information to the verification node,

the risk release information being configured for the verification node to use the voted-against height as the target chain height of the target service subchain, and restore the service state of the target service subchain from the locked state to an unlocked state; and the management node being configured to perform voting starting from a block corresponding to a chain height next to the target chain height when detecting that the risk release information exists on the target service subchain.

11. The method according to any one of claims 1 to 10, further comprising:

reading, when obtaining a subchain data query request transmitted by the service object through a service terminal, the target chain height of the target service subchain based on the subchain control contract, and comparing a to-be-verified chain height indicated by the subchain data query request with the read target chain height, to obtain a comparison result; and

generating, when the comparison result indicates that the to-be-verified chain height is less than or equal to the target chain height, subchain query response information corresponding to the subchain data query request, and returning the subchain query response information to the service terminal, the subchain query response information being configured to indicate that the to-be-verified chain height queried by the service object is a confirmed chain height on the target service subchain.

12. A data processing method for a multi-blockchain, the multi-blockchain comprising a target chain and a target service subchain, a target chain network corresponding to the target chain being independent of a target service subnetwork corresponding to the target service subchain, the target service subnetwork being constructed by a target consensus node in the target chain network based on a target service requested by a service object, the method being performed by a verification node in the target service subnetwork, and the method comprising:

receiving height confirmation information corresponding to a target chain height of the

target service subchain transmitted by the target consensus node, the height confirmation information being generated by the target consensus node based on a subchain control contract deployed on the target chain, the subchain control contract being configured for controlling the target service subchain, and the target chain height being determined by the target consensus node based on chain height voting information of the management node for the target service subchain and the subchain control contract and in response to determining, based on the subchain control contract, that the management node of the target chain is a target registered node; and the subchain control contract comprising the target registered node performing identity registration for the target service subchain; and

writing the target chain height corresponding to the height confirmation information into a subchain management contract on the target service subchain, and determining, based on the target chain height, the chain height obtained after execution of the target service.

13. The method according to claim 12, wherein the writing the target chain height corresponding to the height confirmation information into a subchain management contract on the target service subchain, and determining, based on the target chain height, the chain height obtained after execution of the target service comprises:

writing the target chain height corresponding to the height confirmation information to the subchain management contract, obtaining a buffer height synchronized from the target chain, and using a sum of the buffer height and the target chain height as a block production height threshold; and

invoking a subchain service contract on the target service subchain to execute the target service, to obtain a target service execution result, generating a proposal block with a target block height based on the target service execution result, and determining, based on the target block height and the block production height threshold, a chain height obtained after execution of the target service, the target block height being greater than the target chain height, and the target block height being less than or equal to the block production height threshold.

14. The method according to claim 13, wherein the method further comprises:

using a chain height that is on the target service subchain and that is located after the target chain height as a to-be-confirmed chain height;

setting, based on the subchain management contract, a service state of the target service subchain to a locked state when the to-be-confirmed chain height reaches the block production height threshold and updated height confirmation information from the target consensus node for the to-be-confirmed chain height is not obtained; and

writing, when obtaining the updated height confirmation information transmitted by the target consensus node for the to-be-confirmed chain height, the to-be-confirmed chain height corresponding to the updated height confirmation information into the subchain management contract, and restoring the service state of the target service subchain from the locked state to an unlocked state.

15. The method according to any one of claims 12 to 14, wherein the chain height voting information comprises second-type height voting information of the management node for the target service subchain, the second-type height voting information being determined by the management node when it is detected that a service risk exists on the target service subchain, the second-type height voting information comprising a voted-against height of the management node generated when the management node performs voting on the chain height of the target service subchain, and the second-type height voting information being in a first risk handling transaction determined by the management node based on a risk transaction, the risk transaction being generated by the management node based on the voted-against height; and the method further comprises:

stopping, upon receiving subchain locking information transmitted by the target consensus node, execution of a risk service associated with the risk transaction based on the subchain locking information, and setting the service state of the target service subchain to the locked state, both the first chain and the second chain being blockchains different from the target service subchain, and the subchain locking information being obtained after the target consensus node writes the risk transaction into the subchain control contract;

performing, upon receiving a second risk handling transaction submitted by a service management object associated with the target service subnetwork, risk elimination on the risk service based on the second risk handling transaction, and returning risk handling success information to the service management object, the risk handling success information being configured to instruct the service management object to transmit a risk release transaction to the

target consensus node in response to that the risk service is successfully handled, the risk release transaction being configured to instruct the target consensus node to generate, based on the subchain control contract, risk release information configured for releasing the risk transaction; and

receiving the risk release information returned by the target consensus node, using the voted-against height as the target chain height of the target service subchain based on the risk release information, and restoring the service state of the target service subchain from the locked state to an unlocked state.

16. A data processing method for a multi-blockchain, the multi-blockchain comprising a target chain and a target service subchain, a target chain network corresponding to the target chain being independent of a target service subnetwork corresponding to the target service subchain, the target service subnetwork being constructed by a target consensus node in the target chain network based on a target service requested by a service object, the method being performed by a management node of the target chain, and the method comprising:

obtaining chain height voting information generated when the management node performs voting on a chain height of the target service subchain, a subchain control contract configured for controlling the target service subchain being deployed on the target chain, the subchain control contract comprising a target registered node performing identity registration for the target service subchain;

transmitting the chain height voting information to the target consensus node,

the chain height voting information being configured for the target consensus node to determine, when determining the management node as the target registered node based on the subchain control contract, a target chain height of the target service subchain based on the chain height voting information and the subchain control contract, and generate, based on the subchain control contract, height confirmation information corresponding to the target chain height, the height confirmation information being configured to be transmitted to a verification node in the target service subnetwork, the verification node being configured to write the target chain height corresponding to the height confirmation information into a subchain management contract on the target service subchain, the subchain management contract being configured to instruct the verification node to determine, based on the target chain height, a chain height obtained after

execution of the target service; and

obtaining the target chain height from the subchain management contract, and performing voting on the target service subchain based on the target chain height.

17. A data processing apparatus for a multi-blockchain, the multi-blockchain comprising a target chain and a target service subchain, a target chain network corresponding to the target chain being independent of a target service subnetwork corresponding to the target service subchain, the target service subnetwork being constructed by a target consensus node in the target chain network based on a target service requested by a service object, the apparatus being run on the target consensus node, and the apparatus comprising:

an information obtaining module, configured to obtain chain height voting information of a management node of the target chain for the target service subchain, a subchain control contract configured for controlling the target service subchain being deployed on the target chain, the subchain control contract comprising a target registered node performing identity registration for the target service subchain;

a height determining module, configured to determine a target chain height of the target service subchain based on the chain height voting information and the subchain control contract when determining the management node as the target registered node based on the subchain control contract on the target chain; and

an information transmitting module, configured to generate height confirmation information corresponding to the target chain height based on the subchain control contract, and transmit the height confirmation information to a verification node in the target service subnetwork,

the height confirmation information being configured for the verification node to write, based on the height confirmation information, the target chain height into a subchain management contract on the target service subchain, the subchain management contract being configured to instruct the verification node to determine, based on the target chain height, a chain height obtained after execution of the target service.

18. A data processing apparatus for a multi-blockchain, the multi-blockchain comprising a target chain and a target service subchain, a target chain network corresponding to the target chain being independent of a target service subnetwork corresponding to the target service

subchain, the target service subnetwork being constructed by a target consensus node in the target chain network based on a target service requested by a service object, the apparatus being run on a verification node in the target service subnetwork, and the apparatus comprising:

an information receiving module, configured to receive height confirmation information corresponding to a target chain height of the target service subchain transmitted by the target consensus node, the height confirmation information being generated by the target consensus node based on a subchain control contract deployed on the target chain, the subchain control contract being configured for controlling the target service subchain, and the target chain height being determined by the target consensus node based on chain height voting information of the management node for the target service subchain and the subchain control contract when the target consensus node determines the management node of the target chain as a target registered node based on the subchain control contract; and the subchain control contract comprising a target registered node performing identity registration for the target service subchain; and

a height writing module, configured to write the target chain height corresponding to the height confirmation information into a subchain management contract on the target service subchain, and determine, based on the target chain height, the chain height obtained after execution of the target service.

19. A data processing apparatus for a multi-blockchain, the multi-blockchain comprising a target chain and a target service subchain, a target chain network corresponding to the target chain being independent of a target service subnetwork corresponding to the target service subchain, the target service subnetwork being constructed by a target consensus node in the target chain network based on a target service requested by a service object, the apparatus being run on a management node of the target chain, and the apparatus comprising:

a vote obtaining module, configured to obtain chain height voting information generated when the management node performs voting on a chain height of the target service subchain, a subchain control contract configured for controlling the target service subchain being deployed on the target chain, the subchain control contract comprising a target registered node performing identity registration for the target service subchain;

a vote transmitting module, configured to transmit the chain height voting information to the target consensus node,

the chain height voting information being configured for the target consensus node to determine, when determining the management node as the target registered node based on the subchain control contract, a target chain height of the target service subchain based on the chain height voting information and the subchain control contract, and generate, based on the subchain control contract, height confirmation information corresponding to the target chain height, the height confirmation information being configured to be transmitted to a verification node in the target service subnetwork, the verification node being configured to write the target chain height corresponding to the height confirmation information into a subchain management contract on the target service subchain, the subchain management contract being configured to instruct the verification node to determine, based on the target chain height, a chain height obtained after execution of the target service; and

a height obtaining module, configured to obtain the target chain height from the subchain management contract, and perform voting on the target service subchain based on the target chain height.

20. A computer device, comprising: a processor and a memory,

the processor being connected to the memory, the memory being configured to store a computer program, and the processor being configured to invoke the computer program, to cause the computer device to perform the method according to any one of claims 1 to 16.