

atomic transaction on a blockchain includes: receiving a transaction submitted to the blockchain; determining whether the transaction is a fulfilling transaction; in response to a determination that the transaction is a fulfilling transaction, identifying an offering transaction that corresponds to the fulfilling transaction; determining whether the offering transaction is valid and whether the fulfilling transaction satisfies an execution condition specified in the offering transaction; and in response to a determination that the offering transaction is valid and that the fulfilling transaction satisfies the execution condition specified in the offering transaction, executing a replacement instruction specified in the offering transaction and executing the fulfilling transaction and the offering transaction, the replacement instruction being specified in a data field of the offering transaction and comprising at least one instruction defined by a user of the offering transaction to replace at least one parameter specified in the offering transaction with at least one other parameter specified in the fulfilling transaction.

[0009] In another aspect, a device for providing an atomic transaction on a blockchain includes: one or more processors; and one or more computer-readable memories coupled to the one or more processors and having instructions stored thereon that are executable by the one or more processors to: receive a transaction submitted to the blockchain; determine whether the transaction is a fulfilling transaction; in response to a determination that the transaction is a fulfilling transaction, identify an offering transaction that corresponds to the fulfilling transaction; determine whether the offering transaction is valid and whether the fulfilling transaction satisfies an execution condition specified in the offering transaction; and in response to a determination that the offering transaction is valid and that the fulfilling transaction satisfies the execution condition specified in the

offering transaction, execute a replacement instruction specified in the offering transaction and executing the fulfilling transaction and the offering transaction, the replacement instruction being specified in a data field of the offering transaction and comprising at least one instruction defined by a user of the offering transaction to replace at least one parameter specified in the offering transaction with at least one other parameter specified in the fulfilling transaction.

[0010] In still another aspect, a non-transitory computer-readable medium has stored therein instructions that, when executed by a processor of a device, cause the device to perform a method for providing an atomic transaction on a blockchain. The method includes: receiving a transaction submitted to the blockchain; determining whether the transaction is a fulfilling transaction; in response to a determination that the transaction is a fulfilling transaction, identifying an offering transaction that corresponds to the fulfilling transaction; determining whether the offering transaction is valid and whether the fulfilling transaction satisfies an execution condition specified in the offering transaction; and in response to a determination that the offering transaction is valid and that the fulfilling transaction satisfies the execution condition specified in the offering transaction, executing a replacement instruction specified in the offering transaction and executing the fulfilling transaction and the offering transaction, the replacement instruction being specified in a data field of the offering transaction and comprising at least one instruction defined by a user of the offering transaction to replace at least one parameter specified in the offering transaction with at least one other parameter specified in the fulfilling transaction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate embodiments. In the following description, which refers to the drawings, the same numbers in different drawings represent the same or similar elements unless otherwise represented.

[0012] FIG. 1 is a schematic diagram of a blockchain system, according to an embodiment.

[0013] FIG. 2 is a schematic diagram of a computing device for implementing a node in a blockchain system, according to an embodiment.

[0014] FIG. 3 is a schematic diagram depicting a protocol for providing an atomic transaction on a blockchain, according an embodiment.

[0015] FIG. 4 is a flow chart of a method for providing an atomic transaction on a blockchain, according an embodiment.

What Is Claimed Is:

1. A computer-implemented method for providing an atomic transaction on a blockchain, the method comprising:

receiving a transaction submitted to the blockchain;

determining whether the transaction is a fulfilling transaction;

in response to a determination that the transaction is a fulfilling transaction, identifying an offering transaction that corresponds to the fulfilling transaction;

determining whether the offering transaction is valid and whether the fulfilling transaction satisfies an execution condition specified in the offering transaction; and

in response to a determination that the offering transaction is valid and that the fulfilling transaction satisfies the execution condition specified in the offering transaction, executing a replacement instruction specified in the offering transaction and executing the fulfilling transaction and the offering transaction, the replacement instruction being specified in a data field of the offering transaction and comprising at least one instruction defined by a user of the offering transaction to replace at least one parameter specified in the offering transaction with at least one other parameter specified in the fulfilling transaction.

2. The method of claim 1, wherein:

the replacement instruction further comprises an instruction written in a combination of one or more programming languages to be executed if the execution condition specified in the offering transaction is satisfied.

3. The method of claim 1, further comprising:

determining whether the replacement instruction is set to nil; and

in response to a determination that the replacement instruction is set to nil, that the offering transaction is valid, and that the fulfilling transaction satisfies the execution condition specified in the offering transaction, executing the fulfilling transaction and the offering transaction.

4. The method of claim 1, further comprising:

determining whether the transaction is an offering transaction; and

in response to a determination that the transaction is an offering transaction, setting a status of the transaction as pending.

5. The method of claim 1, further comprising:

determining whether the transaction is a normal transaction; and

in response to a determination that the transaction is a normal transaction, executing the transaction.

6. The method of any preceding claim, wherein determining whether the transaction is a fulfilling transaction further comprises:

determining whether the transaction specifies a target transaction identifier; and

in response to a determination that the transaction specifies a target transaction identifier, recognizing the transaction as a fulfilling transaction.

7. The method of claim 6, wherein identifying the offering transaction that corresponds to the fulfilling transaction further comprises:

retrieving the target transaction identifier specified in the fulfilling transaction;
and
identifying the offering transaction based on the target transaction identifier.

8. The method of any preceding claim, wherein determining whether the offering transaction is valid further comprises:

determining whether the offering transaction is valid based on at least one of a timeout parameter specified in the offering transaction or a status indicator specified in the offering transaction.

9. The method of any preceding claim, wherein the execution condition specified in the offering transaction specifies a smart contract and a method defined in the smart contract to be invoked by the fulfilling transaction.

10. The method of any preceding claim, wherein the execution condition specified in the offering transaction specifies a target value and how the target value compares against a parameter contained in the fulfilling transaction.

11. The method of any preceding claim, further comprising:

determining whether the fulfilling transaction and the offering transaction are executed successfully; and

in response to a determination that both the fulfilling transaction and the offering transaction are executed successfully, committing the execution of both the fulfilling transaction and the offering transaction on the blockchain.

12. The method of claim 11, further comprising:

in response to a determination that at least one of the fulfilling transaction and the offering transaction is executed unsuccessfully, reverting both the fulfilling transaction and the offering transaction.

13. A device for providing an atomic transaction on a blockchain, comprising:

one or more processors; and

one or more computer-readable memories coupled to the one or more processors and having instructions stored thereon that are executable by the one or more processors to perform the method of any of claims 1 to 12.

14. An apparatus for providing atomic transaction on a blockchain, the apparatus comprising a plurality of modules for performing the method of any of claims 1 to 12.

15. A non-transitory computer-readable medium having stored therein instructions that, when executed by a processor of a device, cause the device to perform the method of any of claims 1 to 12.