CLAIMS

1. A computer-implemented method for processing blockchain-based transactions, comprising:

receiving a target transaction initiated by a member node device in a blockchain, wherein the target transaction comprises a reference time parameter, wherein the reference time parameter is a reference block height value ~~time stamp~~ generated when the target transaction is created within a transaction validity period, wherein the~~a~~ transaction validity period corresponds to a numerical interval between a differential value and a block height value of a candidate block in the blockchain, wherein the differential value is a difference between the block height value of the candidate block in the blockchain and a block height~~a first value and a second value, wherein the first value is a difference between a creation time stamp of a candidate block and a first threshold, and wherein the second value is a sum of the creation time stamp of the candidate block and a second~~ threshold, and wherein the reference time parameter is used to determine whether the target transaction is a valid transaction within the transaction validity period;

~~determining, based on the reference time parameter, whether the target transaction is a valid transaction within the transaction validity period, wherein determining whether the target transaction is the valid transaction period comprises:~~

comparing the reference block height value ~~time stamp~~ with each of the block height value of the candidate block in the blockchain and the differential value to determine whether the reference block height value is greater than the differential value and less than the block height value of the candidate block in the blockchain~~first value and the second value to determine whether the reference time stamp is greater than the first value and less than the second value, and~~ ;

in response to determining that the reference block height value is greater than the differential value and less than the block height value of the candidate block in the blockchain, determining, based on the reference time parameter, whether that the target transaction is ~~invalid~~a valid transaction within the transaction validity period; and

in response to determining that the target transaction is the valid transaction within the transaction validity period, ~~preventing a~~ recording ~~of~~ the target transaction to a generated

candidate block.

~~2. The computer-implemented method of claim 1, wherein the reference time parameter is a reference block height value generated when the target transaction is created, wherein the transaction validity period corresponds to a numerical interval between a third value and a block height value of the candidate block in the blockchain, wherein the third value is a difference between the block height value of the candidate block in the blockchain and a third threshold, and wherein determining, based on the reference time parameter, whether the target transaction is the valid transaction within the transaction validity period comprises:~~

~~comparing the reference block height value with each of the block height value of the candidate block in the blockchain and the third value to determine whether the reference block height value is greater than the third value and less than the block height value of the candidate block in the blockchain; and~~

~~in response to determining that the reference block height value is greater than the third value and less than the block height value of the candidate block in the blockchain, determining that the target transaction is a valid transaction within the transaction validity period.~~

~~3. The computer-implemented method of claim 2, wherein before comparing the reference block height value with each of the block height value of the candidate block in the blockchain and the third value, the method further comprises:~~

~~determining whether a block number of the candidate block is greater than a block number of a latest block in the blockchain; and~~

~~in response to determining that the block number of the candidate block is greater than the block number of a latest block in the blockchain, comparing the reference block height value with each of the block height value of the candidate block in the blockchain and the third value.~~

2~~4~~. The computer-implemented method of claim ~~3~~1, wherein the target ~~invalid~~ transaction comprises a unique identifier of the target transaction~~.~~, wherein recording the target transaction to the candidate block in response to determining that the target transaction is the valid transaction within the transaction validity period comprises:~~an illegal transaction~~

in response to determining that the target transaction is the valid transaction within the transaction validity period, querying whether a transaction idempotent record corresponding to

the unique identifier of the target transaction is stored in a predetermined transaction idempotent table, wherein the predetermined transaction idempotent table is used to store a transaction idempotent record corresponding to the valid transaction within the transaction validity period; and

in response to determining that the transaction idempotent record corresponding to the unique identifier of the target transaction is not stored in the predetermined transaction idempotent table, recording the target transaction to the candidate block.

35. The computer-implemented method of claim 14, wherein the reference time parameter comprises a physical clock or a logical clock.

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

receiving a target transaction initiated by a member node device in a blockchain, wherein the target transaction comprises a reference time parameter, wherein the reference time parameter is a reference block height value generated when the target transaction is created within a transaction validity period, wherein the transaction validity period corresponds to a numerical interval between a differential value and a block height value of a candidate block in the blockchain, wherein the differential value is a difference between the block height value of the candidate block in the blockchain and a block height threshold, and wherein the reference time parameter is used to determine whether the target transaction is a valid transaction within a transaction validity period~~time stamp generated when the target transaction is created, wherein a transaction validity period corresponds to a numerical interval between a first value and a second value, wherein the first value is a difference between a creation time stamp of a candidate block and a first threshold, and wherein the second value is a sum of the creation time stamp of the candidate block and a second threshold, and wherein the reference time parameter is used to determine whether the target transaction is a valid transaction within the transaction validity period~~;

~~determining, based on the reference time parameter, whether the target transaction is a valid transaction within the transaction validity period, wherein determining whether the target transaction is the valid transaction comprises:~~

comparing the reference block height value with each of the block height value of the candidate block in the blockchain and the differential value to determine whether the reference

block height value is greater than the differential value and less than the block height value of the candidate block in the blockchain;~~time stamp with each of the first value and the second value to determine whether the reference time stamp is greater than the first value and less than the second value, and~~

in response to determining that the reference block height value is greater than the differential value and less than the block height value of the candidate block in the blockchain, determining, based on the reference time parameter, whether that the target transaction is a valid transaction within the transaction validity period~~time stamp is smaller than the first value or greater than the second value, determining that the target transaction is an invalid transaction within the transaction validity period~~; and

in response to determining that the target transaction is the~~–~~ _ ~~in~~valid transaction within the transaction validity period, ~~preventing a~~ recording the target transaction to ~~a generated~~the candidate block.

~~7. The non-transitory, computer-readable medium of claim 6, wherein the reference time parameter is a reference block height value generated when the target transaction is created, wherein the transaction validity period corresponds to a numerical interval between a third value and a block height value of the candidate block in the blockchain, wherein the third value is a difference between the block height value of the candidate block in the blockchain and a third threshold, and wherein determining, based on the reference time parameter, whether the target transaction is the valid transaction within the transaction validity period comprises:~~

~~comparing the reference block height value with each of the block height value of the candidate block in the blockchain and the third value to determine whether the reference block height value is greater than the third value and less than the block height value of the candidate block in the blockchain; and~~

~~in response to determining that the reference block height value is greater than the third value and less than the block height value of the candidate block in the blockchain, determining that the target transaction is a valid transaction within the transaction validity period.~~

~~8. The non-transitory, computer-readable medium of claim 7, wherein before comparing the reference block height value with each of the block height value of the candidate block in the blockchain and the third value, the operations further comprise:~~

~~determining whether a block number of the candidate block is greater than a block~~

~~number of a latest block in the blockchain; and~~

~~in response to determining that the block number of the candidate block is greater than the block number of a latest block in the blockchain, comparing the reference block height value with each of the block height value of the candidate block in the blockchain and the third value.~~

59. The non-transitory, computer-readable medium of claim 48, wherein the ~~invalid~~ target transaction comprises a unique identifier of the target transaction~~.~~, wherein recording the target transaction to the candidate block in response to determining that the target transaction is the valid transaction within the transaction validity period comprises:

in response to determining that the target transaction is the valid transaction within the transaction validity period, querying whether a transaction idempotent record corresponding to the unique identifier of the target transaction is stored in a predetermined transaction idempotent table, wherein the predetermined transaction idempotent table is used to store a transaction idempotent record corresponding to the valid transaction within the transaction validity period; and

in response to determining that the transaction idempotent record corresponding to the unique identifier of the target transaction is not stored in the predetermined transaction idempotent table, recording the target transaction to the candidate block~~an illegal transaction~~.

610. The non-transitory, computer-readable medium of claim 49, wherein the reference time parameter comprises a physical clock or a logical clock.

711. 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:

receiving a target transaction initiated by a member node device in a blockchain, wherein the target transaction comprises a reference time parameter, wherein the reference time parameter is a reference block height value generated when the target transaction is created within a transaction validity period, wherein the transaction validity period corresponds to a

numerical interval between a differential value and a block height value of a candidate block in the blockchain, wherein the differential value is a difference between the block height value of the candidate block in the blockchain and a block height threshold, and wherein the reference time parameter is used to determine whether the target transaction is a valid transaction within a transaction validity periodtime stamp generated when the target transaction is created, wherein a transaction validity period corresponds to a numerical interval between a first value and a second value, wherein the first value is a difference between a creation time stamp of a candidate block and a first threshold, and wherein the second value is a sum of the creation time stamp of the candidate block and a second threshold, and wherein the reference time parameter is used to determine whether the target transaction is a valid transaction within the transaction validity period;

determining, based on the reference time parameter, whether the target transaction is a valid transaction within the transaction validity period wherein determining, whether the target transaction is the valid transaction comprises:

comparing the reference block height value with each of the block height value of the candidate block in the blockchain and the differential value to determine whether the reference block height value is greater than the differential value and less than the block height value of the candidate block in the blockchain;time stamp with each of the first value and the second value to determine whether the reference time stamp is greater than the first value and less than the second value, and

in response to determining that the reference block height value is greater than the differential value and less than the block height value of the candidate block in the blockchain, determining, based on the reference time parameter, whether that the target transaction is a valid transaction within the transaction validity periodtime stamp is smaller than the first value or greater than the second value, determining that the target transaction is an invalid transaction within the transaction validity period; and

in response to determining that the target transaction is the invalid transaction within the transaction validity period, preventing a recording the target transaction to thea generated candidate block.

12. The computer-implemented system of claim 11, wherein the reference time parameter is a reference block height value generated when the target transaction is created, wherein the transaction validity period corresponds to a numerical interval between a third value and a

~~block height value of the candidate block in the blockchain, wherein the third value is a difference between the block height value of the candidate block in the blockchain and a third threshold, and wherein determining, based on the reference time parameter, whether the target transaction is the valid transaction within the transaction validity period comprises:~~

~~comparing the reference block height value with each of the block height value of the candidate block in the blockchain and the third value to determine whether the reference block height value is greater than the third value and less than the block height value of the candidate block in the blockchain; and~~

~~in response to determining that the reference block height value is greater than the third value and less than the block height value of the candidate block in the blockchain, determining that the target transaction is a valid transaction within the transaction validity period.~~

8~~13~~. The computer-implemented system of claim ~~12~~7, wherein the target~~invalid~~ transaction further comprises a unique identifier of the target transaction~~.~~, wherein recording the target transaction to the candidate block in response to determining that the target transaction is the valid transaction within the transaction validity period comprises:

in response to determining that the target transaction is the valid transaction within the transaction validity period, querying whether a transaction idempotent record corresponding to the unique identifier of the target transaction is stored in a predetermined transaction idempotent table, wherein the predetermined transaction idempotent table is used to store a transaction idempotent record corresponding to the valid transaction within the transaction validity period; and

in response to determining that the transaction idempotent record corresponding to the unique identifier of the target transaction is not stored in the predetermined transaction idempotent table, recording the target transaction to the candidate block~~an illegal transaction~~.

9~~14~~. The computer-implemented system of claim 7~~13~~, wherein the reference time parameter comprises a physical clock or a logical clock.