

CLAIMS

1. A computer-implemented method, the method comprising:
 - obtaining a request for establishing a trust point for a specified record in a series of records stored in a ledger system by a computing device in the ledger system, the trust point indicating that records before the trust point in the series of records are trustworthy;
 - determining whether the specified record is a candidate trust point;
 - in response to determining that the specified record is a candidate trust point, determining whether the specified record is a timestamp record that comprises trust timestamp information from a trust time server by the computing device, the trust time server being associated with a trust time authority and independent from the ledger system;
 - in response to determining that the specified record is not a timestamp record, identifying a timestamp record that is adjacent to the specified record among timestamp records in the series of records by the computing device;
 - determining whether the timestamp record is trustworthily traceable to the specified record by the computing device; and
 - in response to determining that the timestamp record is trustworthily traceable to the specified record, marking the timestamp record to be the trust point in the series of records by the computing device.
2. The method of claim 1, wherein each record of the series of records comprises a respective transaction.
3. The method of claim 1 or 2, wherein each record of the series of records comprises a respective hash of a preceding record immediately before the record in the series of records.
4. The method of any preceding claim, wherein determining that the timestamp record is trustworthily traceable to the specified record comprises at least one of
 - verifying that the timestamp record comprises information that is traceable to and authenticates the specified record; or
 - verifying the specified record comprises information that is traceable to and authenticates the timestamp record.

5. The method of any preceding claim, wherein determining that the timestamp record is trustworthily traceable to the specified record comprises:

verifying that each record from the timestamp record to the specified record in the series of records includes a respective hash of a preceding record immediately before the record.

6. The method of any preceding claim, wherein determining whether the specified record is a candidate trust point comprises:

verifying whether the specified record is trustworthily traceable to a preceding trust point before the specified record in the series of records.

7. The method of claim 6, wherein the preceding trust point is one of:

a trust point immediately before the specified record in the series of records, or
a first record that is a source for trust points in the series of records.

8. The method of claim 6 or 7, wherein verifying whether the specified record is trustworthily traceable to the preceding trust point before the specified record in the series of records comprises at least one of:

tracing from the specified record back to the preceding trust point in the series of records, or

tracing from the preceding trust point forward to the specified record in the series of records.

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

receiving a verification request to verify a to-be-verified record that is after the specified record in the series of records; and

determining that the to-be-verified record is verified by verifying that the to-be-verified record is trustworthily traceable to the timestamp record without verifying records preceding the timestamp record in the series of records.

10. The method of any preceding claim, further comprising:
transmitting a timestamp request to the trust time server;
receiving a trust timestamp and associated signature for the timestamp request from the trust time server; and
storing the trust timestamp and associated signature as a record in the series of records,
wherein the record storing the trust timestamp and associated signature from the trust time server is a new timestamp record in the series of records, and
wherein the new timestamp record is stored immediately after a most recent record stored in the series of records when the timestamp request is transmitted and comprises a hash of the most recent record.
11. The method of claim 10, wherein records between the new timestamp record and a preceding timestamp record immediately before the new timestamp record in the series of records are grouped in a unit, and
wherein the new timestamp record is included as a last record in the unit.
12. The method of claim 11, wherein the timestamp request comprises at least one of:
an identifier of the timestamp request among timestamp requests transmitted to the trust time server,
an identifier or a hash of the most recent record, or
a hash digest of hashes of the records in the unit.
13. The method of claim 11 or 12, wherein identifying the timestamp record comprises one of:
identifying a last record in a unit that includes the specified record to be the timestamp record, and
identifying a last record in a preceding unit immediately before the unit that includes the specified record to be the timestamp record.
14. A system for managing trust points in a ledger system, 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 one of claims 1 to 13.

15. An apparatus for managing trust points in a ledger system, the apparatus comprising a plurality of modules for performing the method of any one of claims 1 to 13.