

METHOD AND SYSTEM FOR DATA STORAGE UPON DATABASE FAILURE

CROSS REFERENCE TO RELATED PATENT APPLICATION

This application claims foreign priority to Chinese Patent Application No.
5 201410389882.5 filed on 8 August 2014 entitled "METHOD AND APPARATUS FOR
DATA STORAGE UPON DATABASE FAILURE," which is hereby incorporated by
reference in its entirety.

TECHNICAL FIELD

10 The present disclosure relates to Internet technology, and, more particularly, to a
method and device for data storage, especially a method and device for data storage in the
event of a failure of a database.

BACKGROUND

15 Upon a receipt of a transaction request from an upstream server, a transaction
processing server performs a transaction processing of the transaction request and updates a
data value stored in a primary database by using a result of the transaction processing. For
example, when the primary database is mainly used for storing account balances and the
upstream server is used for processing payment behaviors of users, provided that a payment
20 behavior of a user A is paying \$100, the upstream server will transmit a transaction request to
the transaction processing server, the transaction request being used for requesting to subtract
\$100 from an account balance of the user A. Upon the receipt of the transaction request, the
transaction processing server uses the transaction request to perform a transaction processing
which is to subtract \$100 from the balance account of the user A. Further, provided that the
25 corresponding account balance of the user A in the primary database is \$1000, the transaction
processing server needs to subtract \$100 from the account balance \$1000 of the user A stored
in the primary database and update the account balance of the user A stored in the primary
database to \$900.

In the existing technologies, in the event of a failure of the primary database, the
30 primary database stops providing service, and the primary database continues to provide
service only when the primary database is recovered to guarantee the accuracy of data.
However, in the event of the failure of the primary database, the transaction processing server

CLAIMS

What is claimed is:

- 5 1. A method comprising:
 determining, by a server, a transaction request has been received within M seconds of
a failure of a primary database, M seconds being a number of seconds before the failure of
the primary database;
 acquiring a transaction identification and a data variation value corresponding to the
10 transaction request;
 determining whether a data value corresponding to the transaction identification is
stored in a standby database;
 determining an accurate data value corresponding to the transaction identification by
using a data value requested by the transaction request from a reading database and the data
15 variation value, in response to determining that the data value corresponding to the
transaction identification is not stored in the standby database; and
 storing the transaction identification and the accurate data value in the standby
database, thereby providing uninterrupted transaction processing in an event of the failure of
the primary database.
20 2. The method of claim 1, further comprising:
 in response to determining that the data value corresponding to the transaction
identification is stored in the standby database,
 determining that the accurate data value corresponding to the transaction
25 identification is stored in the standby database; and
 discarding the acquired transaction identification and the data variation value.
3. The method of claim 1, further comprising providing a service based on the
accurate data value stored in the standby database.
- 30 4. The method of claim 1, wherein:
 the primary database provides a reading service and a writing service when there is no
failure of the primary database;

the standby database provides the writing service and the reading service in the event of the failure of the primary database; and

the primary database synchronizes data with the reading database within the M seconds.

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5. The method of claim 4, wherein when there is no failure of the primary database, the reading database provides a backup function to the primary database and provides the reading service without the writing service.

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6. The method of claim 1, wherein the determining the transaction request in M seconds comprises:

informing an upstream server to reinitiate a transaction request that was initiated within the M seconds before the failure of the primary database;

receiving the reinitiated transaction request; and

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determining that the reinitiated transaction request is retransmitted by the upstream server and was initiated within the M seconds before the failure of the primary database.

7. The method of claim 1, further comprising:

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before determining whether the data value corresponding to the transaction identification is stored in the standby database,

determining that the data value corresponding to the transaction identification is stored in the reading database;

determining that the accurate data value corresponding to the transaction identification has already been stored in the reading database; and

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discarding the acquired transaction identification and the data variation value.

8. The method of claim 1, further comprising:

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before determining whether the data value corresponding to the transaction identification is stored in the standby database, determining that the data value corresponding to the transaction identification is not stored in the reading database.

9. The method of claim 1, wherein the determining the accurate data value corresponding to the transaction identification by using the data value stored in the reading database and the data variation value comprises:

determining that the data value corresponding to the transaction identification is not
5 stored in the reading database;

acquiring a data value requested by the transaction request from the reading database;
and

determining that a sum or combination of the data value requested by the transaction
request from the reading database and the data variation value is the accurate data value
10 corresponding to the transaction identification.

10. The method of claim 1, wherein the determining the accurate data value corresponding to the transaction identification by using the data value stored in the reading database and the data variation value comprises:

determining that the data value corresponding to the transaction identification is
15 stored in the reading database; and

determining that the data value corresponding to the transaction identification stored
in the reading database is the accurate data value corresponding to the transaction
identification.

11. The method of claim 1, further comprising:

after the primary database recovers from the failure,

recovering the accurate data value stored in the standby database to the
primary database;

25 storing the accurate data value;

providing a service based on the accurate data value stored in the primary
database.

12. A server comprising:

30 one or more processors;

a memory communicatively coupled with the one or more processors;

an acquisition module that determines a transaction request has been received within M seconds of a failure of a primary database and acquires a transaction identification and a data variation value corresponding to the transaction request, M seconds being a number of seconds before the failure of the primary database;

5 a judgment module that determines whether a data value corresponding to the transaction identification is stored in a standby database;

 a determination module that determines an accurate data value corresponding to the transaction identification by using a data value stored in a reading database and the data variation value, in response to determining that the data value corresponding to the
10 transaction identification is not stored in the standby database; and

 a storage module that stores the transaction identification and the accurate data value in the standby database,

 wherein the server provides uninterrupted transaction processing in an event of the failure of the primary database.

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13. The server of claim 12, wherein the judgment module further determines that the accurate data value corresponding to the transaction identification is stored in the standby database and discards the acquired transaction identification and data variation value, in response to determining that the data value corresponding to the transaction identification is
20 stored in the standby database.

14. The server of claim 12, wherein:

 the primary database provides a reading service and a writing service when there is no failure of the primary database and synchronizes data with the reading database within M
25 seconds;

 the standby database provides the writing service and the reading service in the event of the failure of the primary database; and

 the reading database provides a backup function to the primary database and provides the reading service without the writing service, when there is no failure of the primary
30 database.

15. The server of claim 12, wherein the acquisition module further:
informs an upstream server to reinitiate the transaction request that was initiated
within the M seconds before the failure of the primary database;
receives the reinitiated transaction request; and
5 determines that the reinitiated transaction request is the transaction request which is
retransmitted by the upstream server and was initiated within the M seconds before the failure
of the primary database.

16. The server of claim 12, wherein the judgment module further determines that
10 the data value corresponding to the transaction identification is stored in the reading database
before determining whether the data value corresponding to the transaction identification is
stored in the standby database;
determines that the accurate data value corresponding to the transaction identification
has already been stored in the reading database; and
15 discards the transaction identification and the data variation value.

17. The server of claim 12, wherein the judgment module further determines that
the data value corresponding to the transaction identification is not stored in the reading
database before determining whether the data value corresponding to the transaction
20 identification is stored in the standby database.

18. The server of claim 12, wherein the determination module further:
determines that the data value corresponding to the transaction identification is not
stored in the reading database;
25 acquires a data value requested by the transaction request from the reading database;
and
determines that a sum or combination of the data value requested by the transaction
request from the reading database and the data variation value is the accurate data value
corresponding to the transaction identification.

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19. The server of claim 12, wherein the determination module further:
determines that the data value corresponding to the transaction identification is stored
in the reading database; and

determines that the data value corresponding to the transaction identification stored in the reading database is the accurate data value corresponding to the transaction identification.

20. One or more non-transitory memories having stored thereon computer-executable instructions executable by one or more processors to perform operations comprising:

determining a transaction request has been received within M seconds of a failure of a primary database, M seconds being a number of seconds before the failure of the primary database;

acquiring a transaction identification and a data variation value corresponding to the transaction request;

determining whether a data value corresponding to the transaction identification is stored in a standby database, the determining including;

determining an accurate data value corresponding to the transaction identification by using a data value stored in a reading database and the data variation value, in response to determining that the data value corresponding to the transaction identification is not stored in the standby database; or

determining that the accurate data value corresponding to the transaction identification is stored in the standby database and discarding the acquired transaction identification and data variation value, in response to determining that the data value corresponding to the transaction identification is stored in the standby database; and

storing the transaction identification and the accurate data value in the standby database, thereby providing uninterrupted transaction processing in an event of the failure of the primary database,

wherein:

the primary database provides a reading service and a writing service when there is no failure of the primary database and synchronizes data with the reading database within M seconds;

the standby database provides the writing service and the reading service in the event of the failure of the primary database; and

the reading database provides a backup function to the primary database.