Claims

1. A method for processing a failure of a cipher change of ciphertext data in a database, comprising:

storing a record's error information when a cipher change of ciphertext data in the record fails, the error information comprising an identifier of the record and a failure cause; and

determining a retry strategy based on the stored failure cause, and employing the retry strategy to reperform the cipher change of the ciphertext data in the record having the identifier; and

wherein: the failure cause comprises: a database state anomaly; and the determining a retry strategy based on the stored failure cause comprises: determining a retry strategy of immediately reperforming the cipher change of the ciphertext data in the record when the failure cause is the database state anomaly, for a number of times not exceeding a first predetermined number.

2. A method for processing a failure of a cipher change of ciphertext data in a database, comprising:

storing a record's error information when a cipher change of ciphertext data in the record fails, the error information comprising an identifier of the record and a failure cause; and

determining a retry strategy based on the stored failure cause, and employing the retry strategy to reperform the cipher change of the ciphertext data in the record having the identifier; and

wherein: the cipher change of the ciphertext data is performed by a field value access component on the record's field value in which the ciphertext data is located; and

the failure cause comprises: a state anomaly of the field value access component; and

the determining a retry strategy based on the stored failure cause comprises: determining a retry strategy of reperforming the cipher change of the ciphertext data in the record after a first predetermined time has elapsed when the failure cause is the state anomaly of the field value access component, for a number of times not exceeding a second predetermined number.

3. The method according to Claim 2, wherein: the cipher change of the ciphertext data is performed by the field value access component invoked by a cipher change execution component; the failure cause comprises: an execution anomaly of the cipher change

execution component; and

the determining a retry strategy based on the stored failure cause comprises: determining a retry strategy of immediately reperforming the cipher change of the ciphertext data in the record when the failure cause is the execution anomaly of the cipher change execution component, for a number of times not exceeding a third predetermined number.

4. A method for processing a failure of a cipher change of ciphertext data in a database, comprising:

storing a record's error information when a cipher change of ciphertext data in the record fails, the error information comprising an identifier of the record and a failure cause; and

determining a retry strategy based on the stored failure cause, and employing the retry strategy to reperform the cipher change of the ciphertext data in the record having the identifier; and

not reperforming the cipher change of the ciphertext data in the record having the identifier when the failure cause is a decryption failure of the ciphertext data in the record.

5. The method according to any one of Claims 1-4, further comprising: after the reperformed cipher change of the ciphertext data in the record having the identifier according to the retry strategy fails, writing the record's error information into a failure log.

6. The method according to any one of Claims 1-5, wherein the storing a record's error information comprises: adding the error information of the record with the cipher change failure to a retry processing table, and tagging the error information as unsuccessful; and

the determining a retry strategy based on the stored failure cause, and employing the retry strategy to reperform the cipher change of the ciphertext data in the record having the identifier, comprises: when predetermined retry conditions have been met, reading the error information tagged as unsuccessful in the retry processing table, determining the retry strategy based on the failure cause in the read error information, employing the determined retry strategy to reperform the cipher change of the ciphertext data for the record having the identifier in the error information, and revising the tagging of the error information to successful if the cipher change is successful; if the cipher change is unsuccessful, modifying a retry number for the error information, and when the retry number reaches a maximum number allowed according to the retry strategy, deleting the error information from the retry processing table and writing the error information into a failure log.

7. The method according to any one of Claims 1-6, wherein the error information also comprises: an old key version number and a new key version number; and

the employing the retry strategy to reperform a cipher change of the ciphertext data in the record having the identifier comprises: employing the retry strategy, and reperforming the cipher change of the ciphertext data in the record having the identifier based on a key corresponding to the old key version number and another key corresponding to the new key version number.

8. The method according to any one of Claims 1-7, wherein the ciphertext data comprises: ciphertext data for a credit card number.

9. An apparatus for processing a failure of a cipher change of ciphertext data in a database, the apparatus comprising:

an error information storage unit, configured to store a record's error information when a cipher change of ciphertext data in the record fails, the error information comprising an identifier of the record and a failure cause; and

a strategy and retry unit, configured to determine a retry strategy based on the stored failure cause, and employ the retry strategy to reperform the cipher change of the ciphertext data in the record having the identifier, wherein the failure cause comprises: a database state anomaly, and

the strategy and retry unit is configured to determine a retry strategy of immediately reperforming the cipher change of the ciphertext data in the record when the failure cause is the database state anomaly, for a number of times not exceeding a first predetermined number.

10. An apparatus for processing a failure of a cipher change of ciphertext data in a database, the apparatus comprising:

an error information storage unit, configured to store a record's error information when a cipher change of ciphertext data in the record fails, the error information comprising an identifier of the record and a failure cause; and

a strategy and retry unit, configured to determine a retry strategy based on the stored failure cause, and employ the retry strategy to reperform the cipher change of the ciphertext data in the record having the identifier, wherein: the cipher change of the ciphertext data is performed by a field value access component on the record's field value in which the

ciphertext data is located, the failure cause comprises: a state anomaly of the field value access component, and

the strategy and retry unit is configured to determine a retry strategy of reperforming the cipher change of the ciphertext data in the record after a first predetermined time has elapsed when the failure cause is the state anomaly of the field value access component, for a number of times not exceeding a second predetermined number.

11. The apparatus according to Claim 10, wherein: the cipher change of the ciphertext data is performed by the field value access component invoked by a cipher change execution component; the failure cause comprises: an execution anomaly of the cipher change execution component; and

the strategy and retry unit is configured to determine a retry strategy of immediately reperforming the cipher change of the ciphertext data in the record when the failure cause is the execution anomaly of the cipher change execution component, for a number of times not exceeding a third predetermined number.

12. An apparatus for processing a failure of a cipher change of ciphertext data in a database, the apparatus comprising:

an error information storage unit, configured to store a record's error information when a cipher change of ciphertext data in the record fails, the error information comprising an identifier of the record and a failure cause;

a strategy and retry unit, configured to determine a retry strategy based on the stored failure cause, and employ the retry strategy to reperform the cipher change of the ciphertext data in the record having the identifier; and

a retry cancellation unit, configured to not reperform the cipher change of the ciphertext data in the record having the identifier when the failure cause is a decryption failure of the ciphertext data in the record.

13. The apparatus according to any one Claims 9-12, wherein the apparatus also comprises: a retry failure unit, configured to write the record's error information into a failure log after the reperformed cipher change of the ciphertext data in the record having the identifier according to the retry strategy fails.

14. The apparatus according to any one of Claims 9-13, wherein the error information

storage unit is configured to: when there is a cipher change failure for ciphertext data in a record, add the error information of the record with the cipher change failure to a retry processing table, and tag the error information as unsuccessful; and

the strategy and retry unit is configured to: when predetermined retry conditions have been met, read the error information tagged as unsuccessful in the retry processing table, determine the retry strategy based on the failure cause in the read error information, employ the determined retry strategy to reperform the cipher change of the ciphertext data for the record having the identifier in the error information, and revise the tagging of the error information to successful if the cipher change is successful; if the cipher change is unsuccessful, the error information storage unit is configured to modify a retry number for the error information, and when the retry number reaches a maximum number allowed according to the retry strategy, delete the error information from the retry processing table and write the error information into a failure log.

15. The apparatus according to 9-14, wherein the error information also comprises: an old key version number and a new key version number; and

the strategy and retry unit is configured to employ the retry strategy, and reperform the cipher change of the ciphertext data in the record having the identifier based on a key corresponding to the old key version number and another key corresponding to the new key version number.

16. The apparatus according to any one of Claims 19-15, wherein the ciphertext data comprises: ciphertext data for a credit card number.