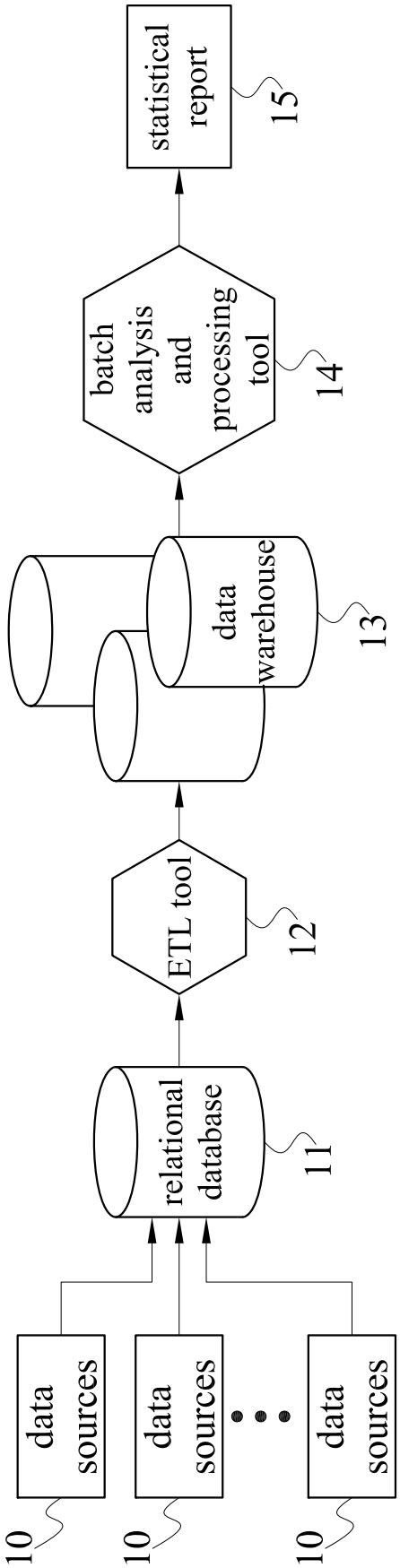
data sources
data sources
data sources
10
10
10
relational database
11
ETL tool
12
data warehouse
13
batch analysis and processing tool
14
statistical report
15

Fig. 1

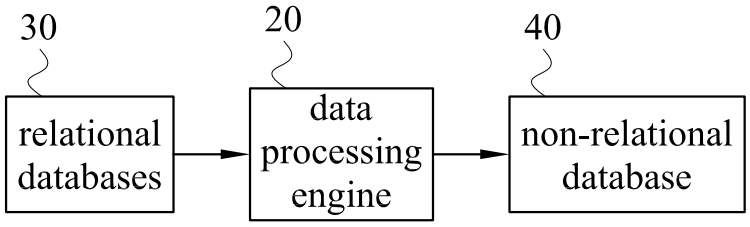
30
20
40
relational databases
data processing engine
non-relational database

Fig. 2

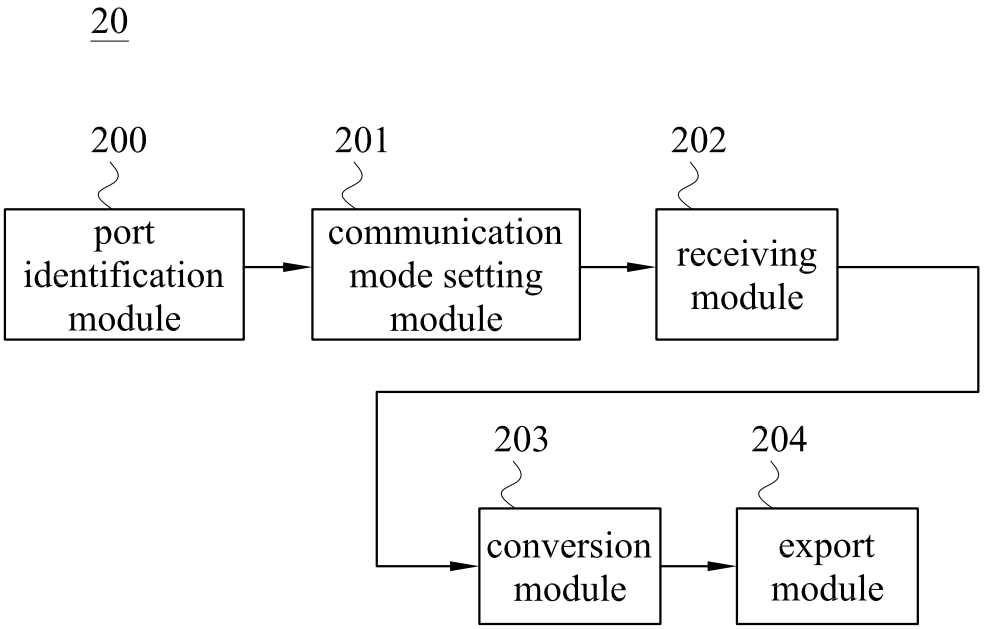
20
200
201
202
port identification module
communication mode setting module
receiving module
203
204
conversion module
export module

Fig. 3

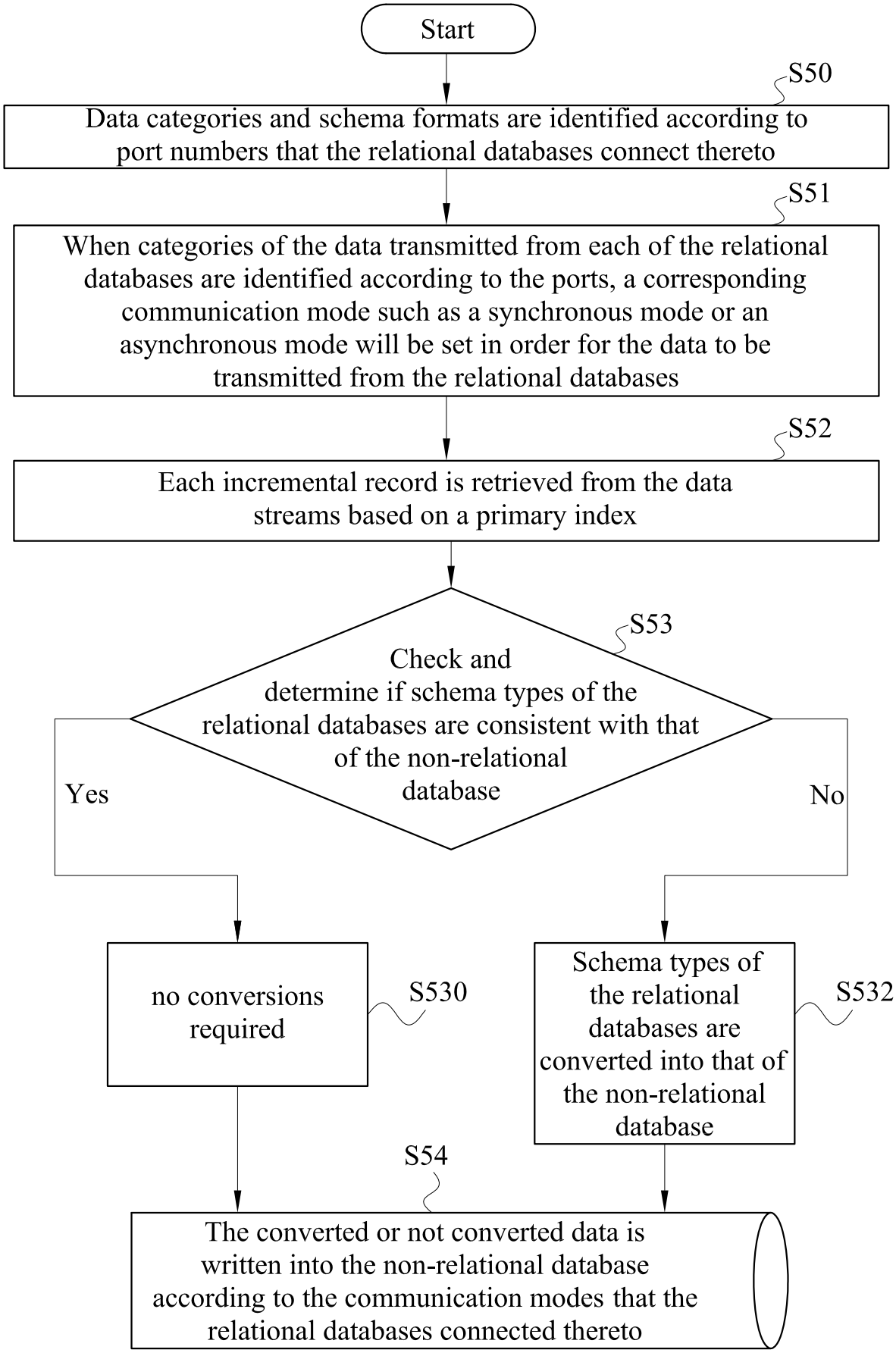
Start
S50
Data categories and schema formats are identified according to port numbers that the relational databases connect thereto
S51
When categories of the data transmitted from each of the relational databases are identified according to the ports, a corresponding communication mode such as a synchronous mode or an asynchronous mode will be set in order for the data to be transmitted from the relational databases
S52
Each incremental record is retrieved from the data streams based on a primary index
S53
Check and determine if schema types of the relational databases are consistent with that of the non-relational database
Yes
No
no conversions required
S530
Schema types of the relational databases are converted into that of the non-relational database
S532
S54
The converted or not converted data is written into the non-relational database according to the communication modes that the relational databases connected thereto

Fig. 4

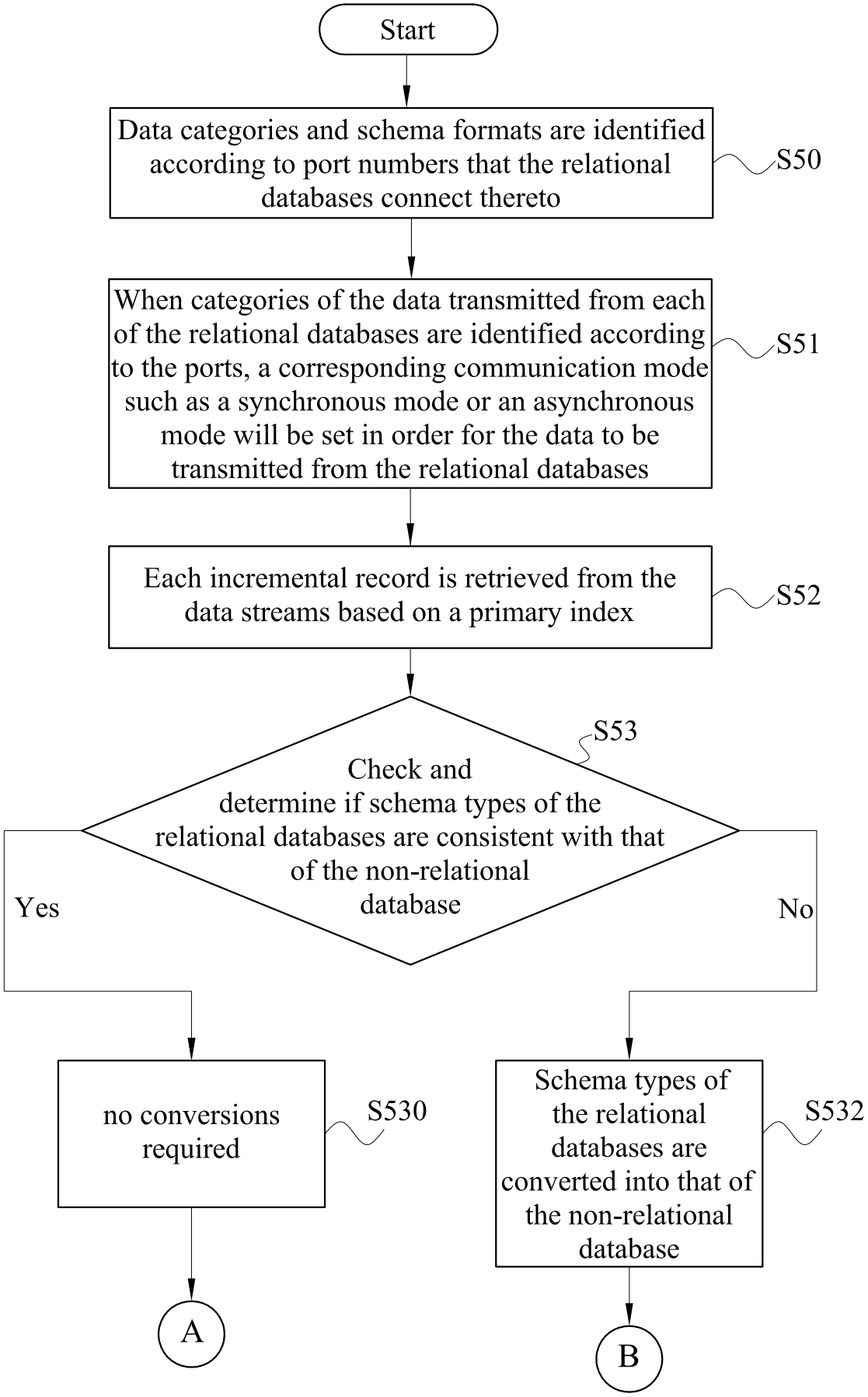
Start
Data categories and schema formats are identified according to port numbers that the relational databases connect thereto
S50
When categories of the data transmitted from each of the relational databases are identified according to the ports, a corresponding communication mode such as a synchronous mode or an asynchronous mode will be set in order for the data to be transmitted from the relational databases
S51
Each incremental record is retrieved from the data streams based on a primary index
S52
S53
Check and determine if schema types of the relational databases are consistent with that of the non-relational database
Yes
No
no conversions required
S530
Schema types of the relational databases are converted into that of the non-relational database
S532
A
B

Fig. 5A

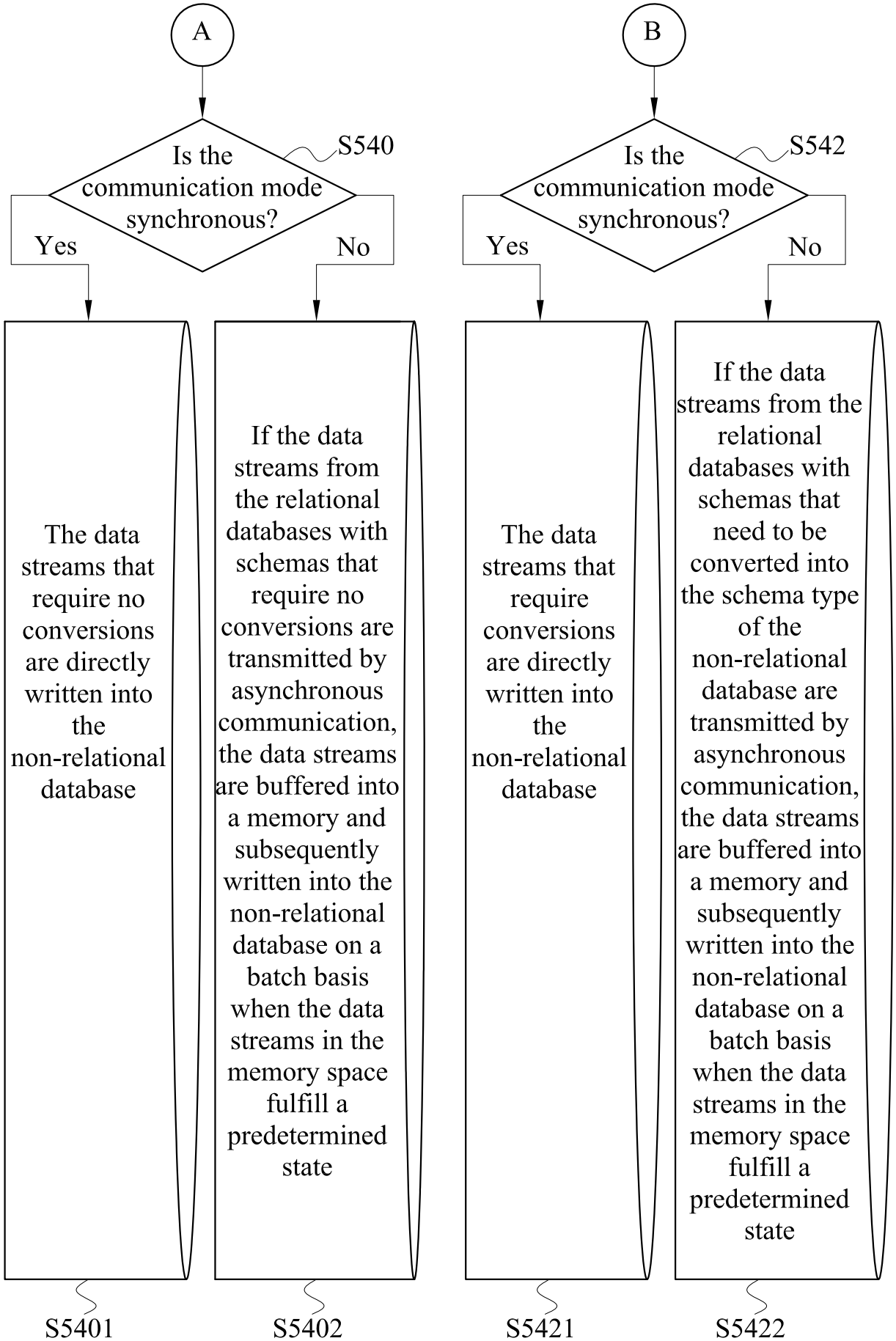
A
Is the communication mode synchronous?
S540
Yes
No
The data streams that require no conversions are directly written into the non-relational database
If the data streams from the relational databases with schemas that require no conversions are transmitted by asynchronous communication, the data streams are buffered into a memory and subsequently written into the non-relational database on a batch basis when the data streams in the memory space fulfill a predetermined state
S5401
S5402
B
Is the communication mode synchronous?
S542
Yes
No
The data streams that require conversions are directly written into the non-relational database
If the data streams from the relational databases with schemas that need to be converted into the schema type of the non-relational database are transmitted by asynchronous communication, the data streams are buffered into a memory and subsequently written into the non-relational database on a batch basis when the data streams in the memory space fulfill a predetermined state
S5421
S5422

Fig. 5B

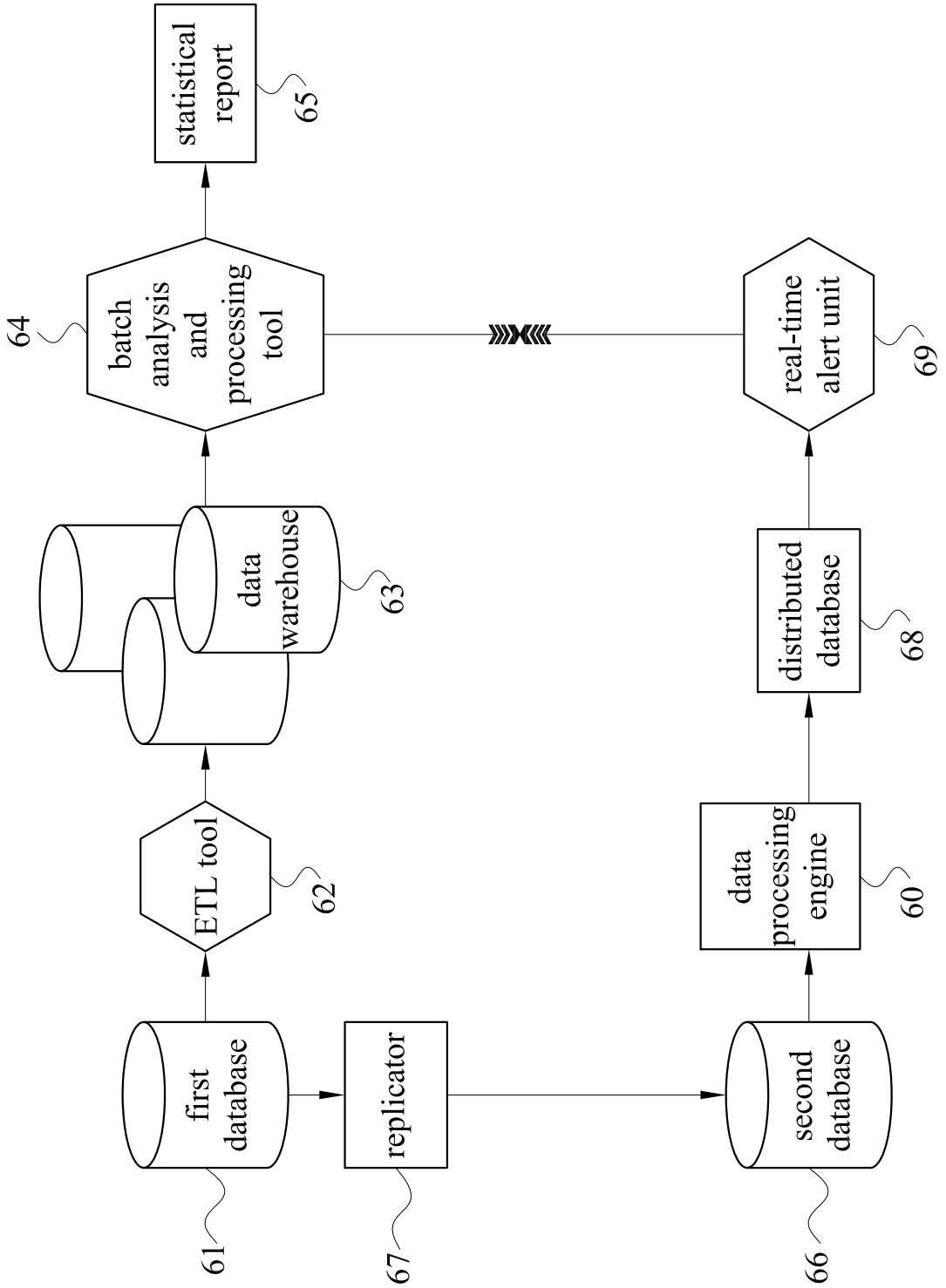
first database
61
replicator
67
second database
66
ETL tool
62
data warehouse
63
data processing engine
60
distributed database
68
batch analysis and processing tool
64
real-time alert unit
69
statistical report
65

Fig. 6