



Introducing a new storage engine for MySQL “SPIDER”

Database Sharding by Storage Engine

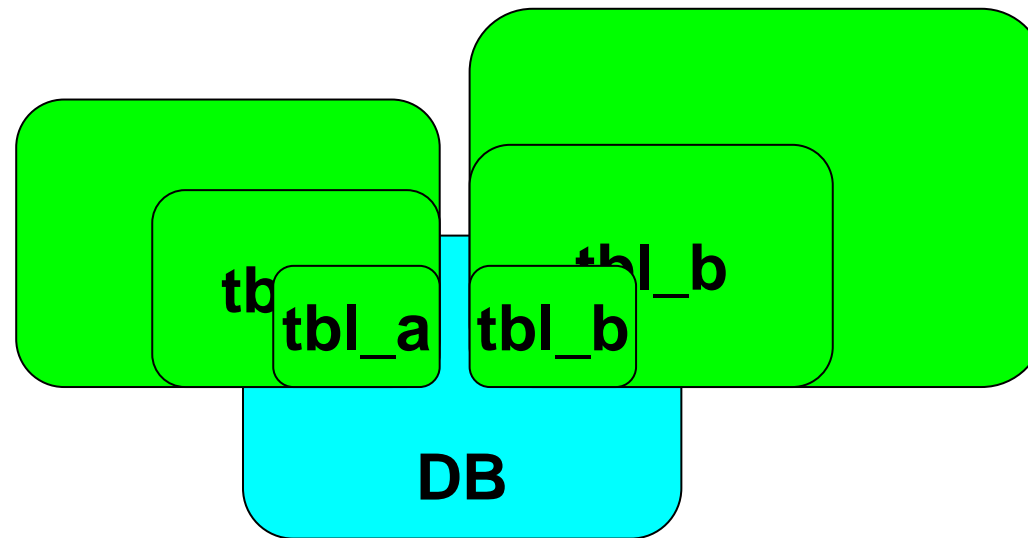
Spider – spinning a rainbow web



ST Global., Inc
Kentoku SHIBA



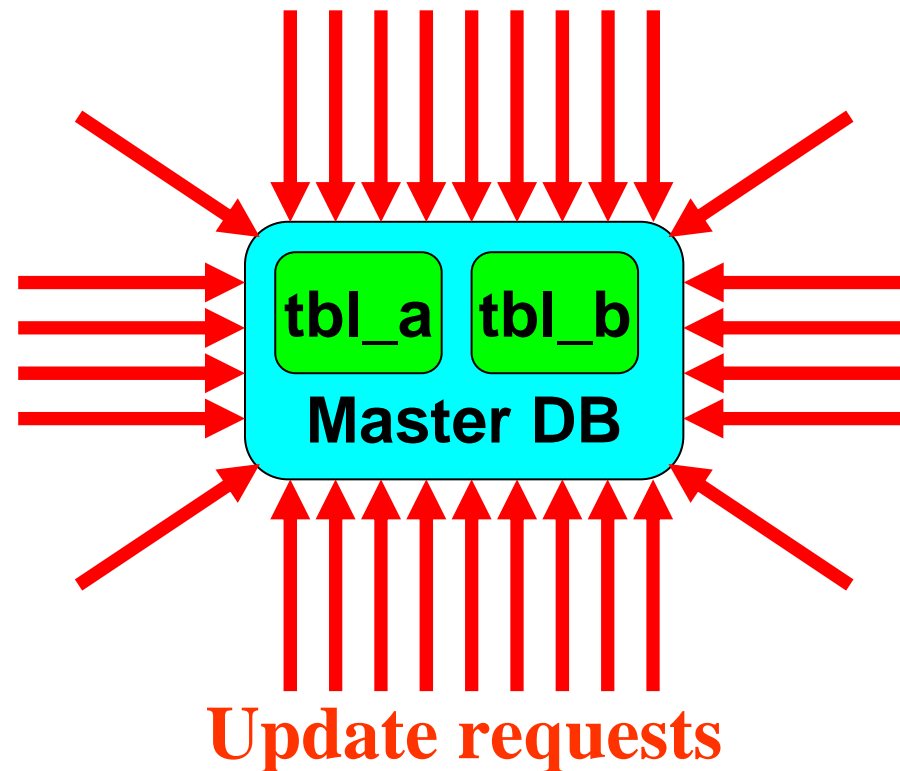
Problem of too many records



Too many records in the DB
server.



Problem of too many requests

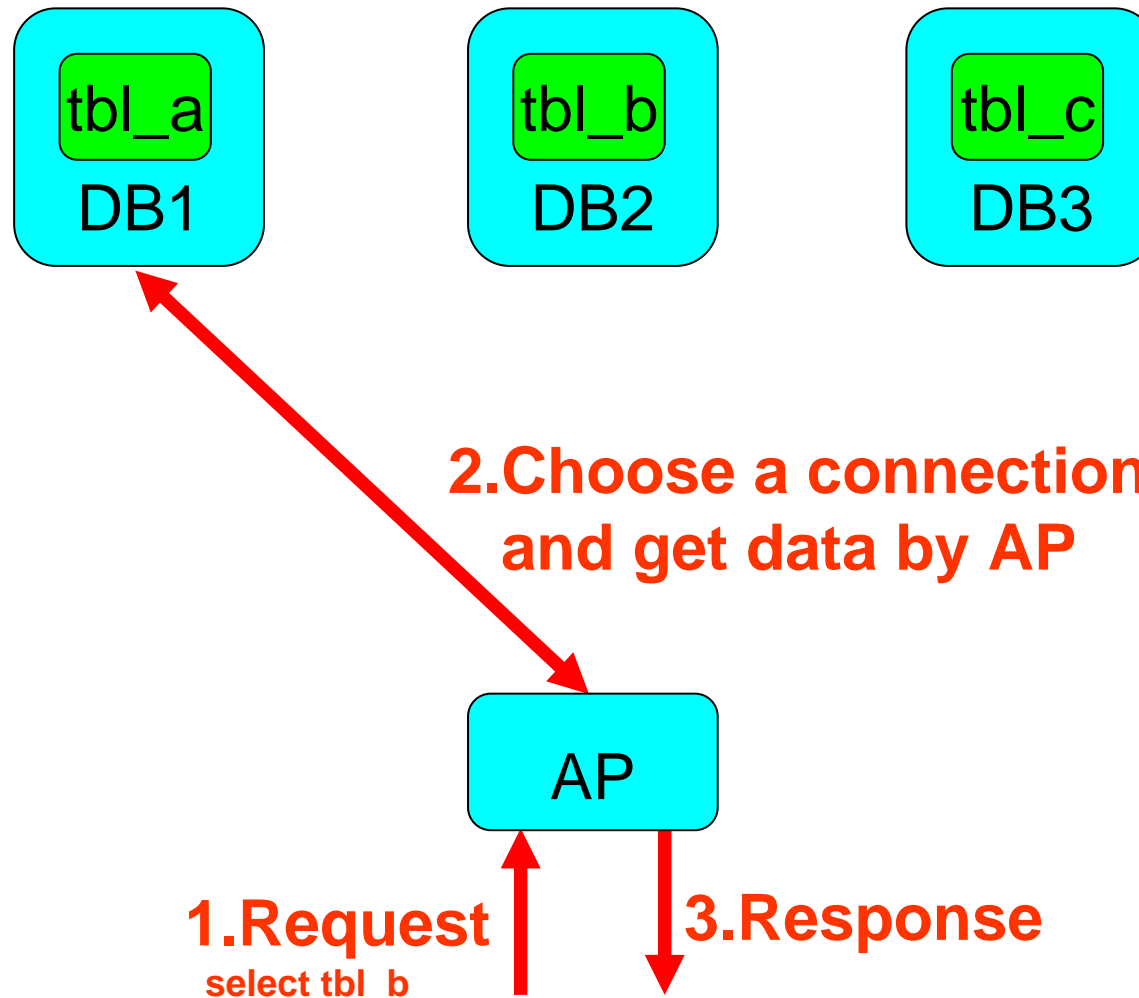


Too many requests to the Master DB.

DB SHARDING by an application can resolve these problems.



Structure sample of DB sharding by application



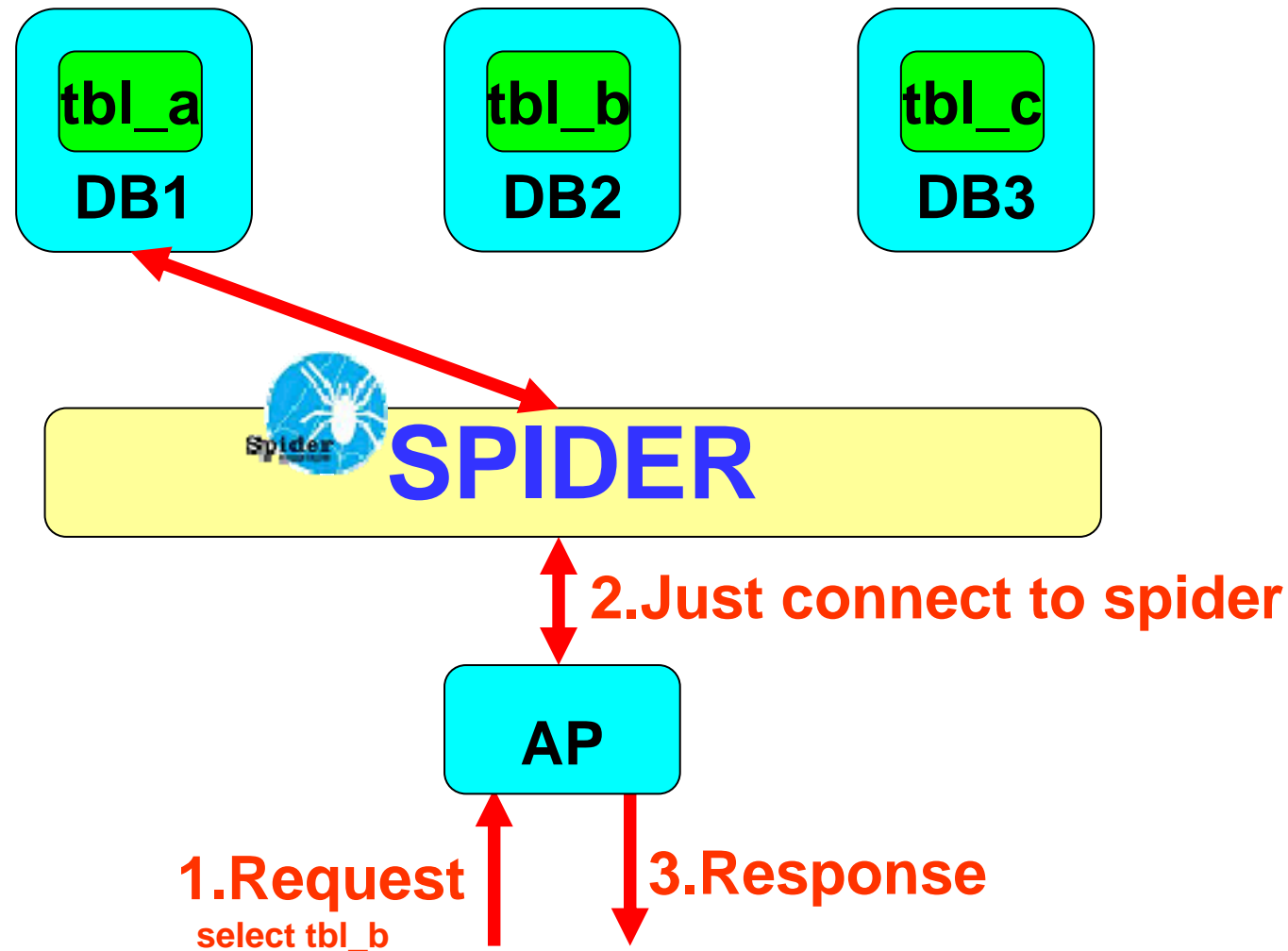
Do you have any problem?

It is very difficult to implement “DB sharding by application” to an application and when implemented requires a lot of effort.

**But by using Spider,
you can implement DB sharding very easily,
without modifying any
application**



Structure sample of DB sharding by Spider



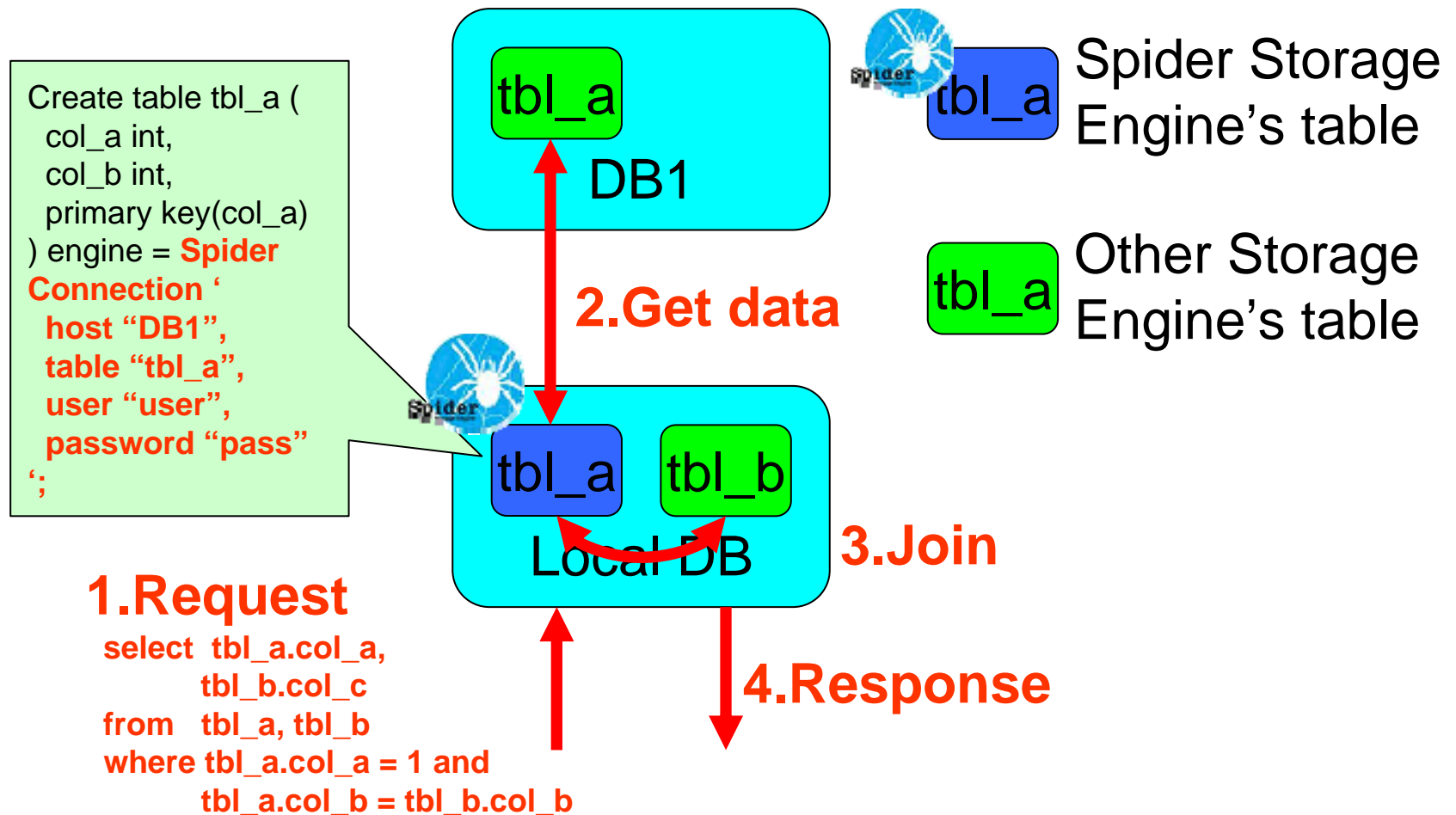
What is "Spider"

- 1. Spider Storage Engine creates table links from local databases to remote databases.**
2. Spider can create sharding of the databases.
3. Spider supports XA transaction and table partitioning.
4. Spider is being offered to the public by GPL.

<http://spiderformysql.com>



Table link



Spider makes available tables in remote MySQL servers to be used like that in local MySQL servers.



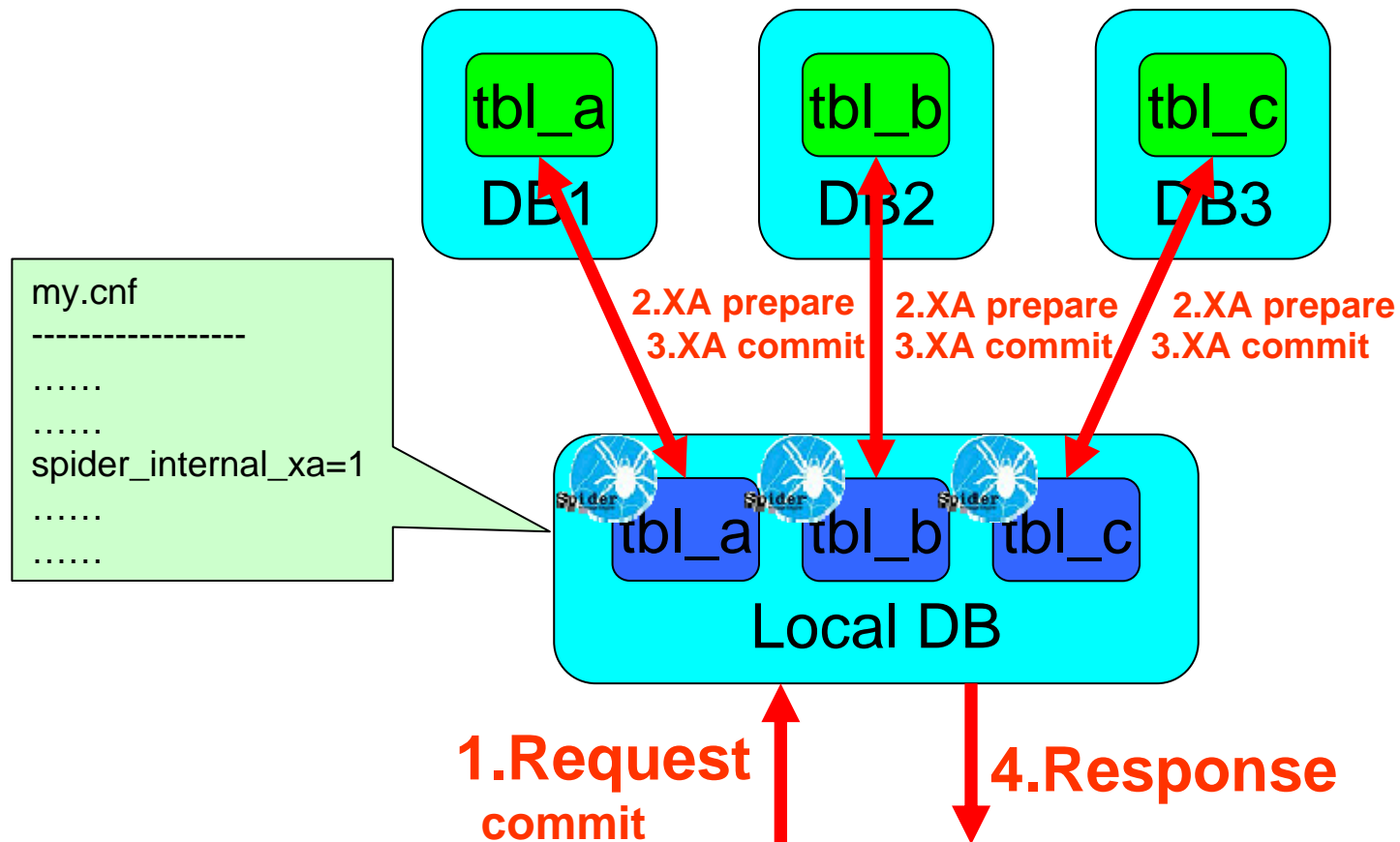
What is "Spider"

1. Spider Storage Engine creates table links from local database to remote databases.
- 2. Spider can be used for database sharding.**
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XA transaction with Spider



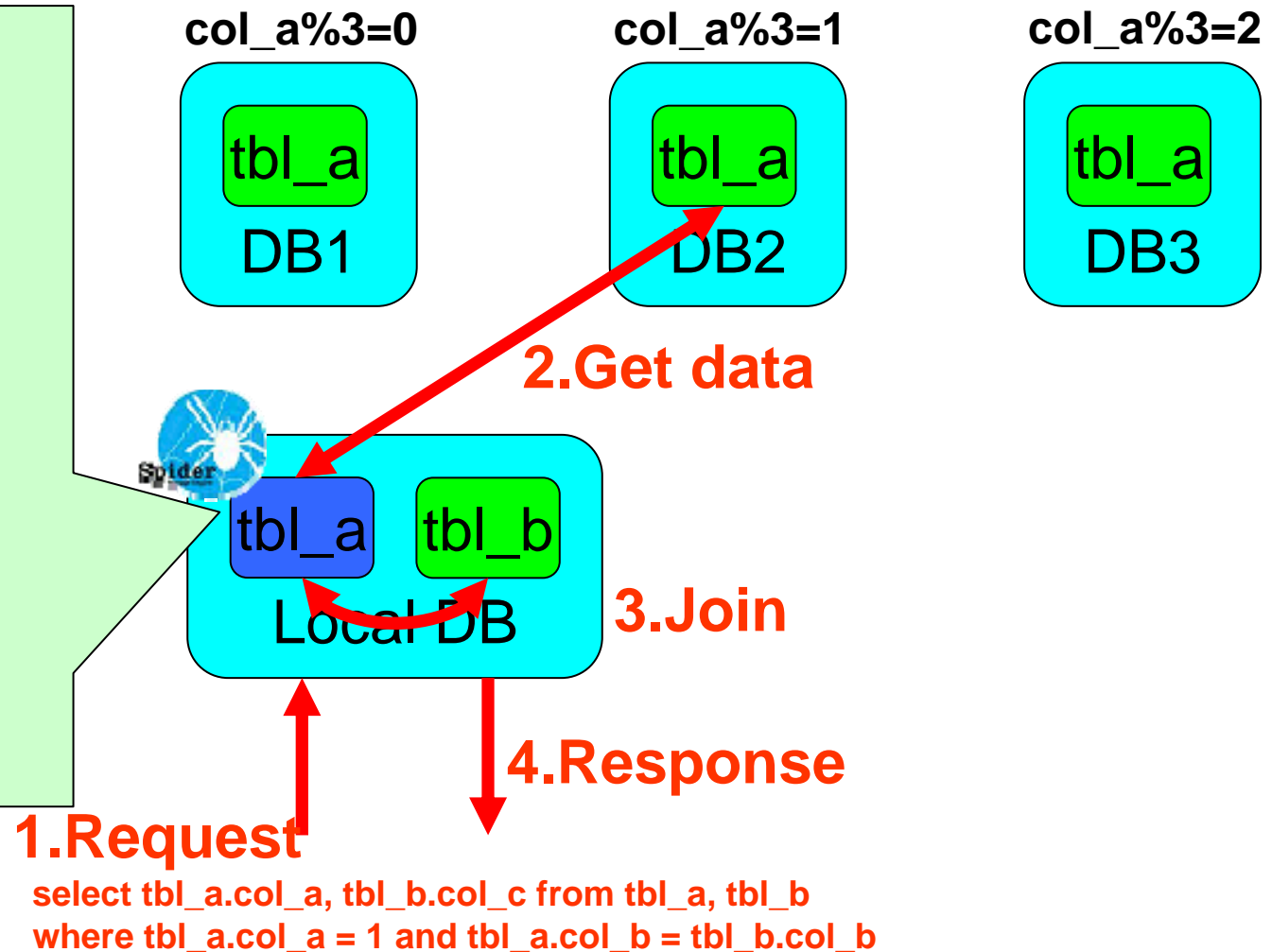
Spider can be used for DB clustering.



Table partitioning with Spider

```
Create table tbl_a (  
  col_a int,  
  col_b int,  
  primary key(col_a)  
) engine = Spider  
Connection '  
  table "tbl_a",  
  user "user",  
  password "pass"  
,
```

```
partition by list(  
  mod(col_a, 3)) (  
  partition pt1 values in(0)  
  comment 'host "DB1"',  
  partition pt2 values in(1)  
  comment 'host "DB2"',  
  partition pt3 values in(2)  
  comment 'host "DB3"'  
);
```



Spider supports DB sharding.



What is "Spider"

1. Spider Storage Engine creates table links from local database to remote databases.
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DB SHARDING by Spider

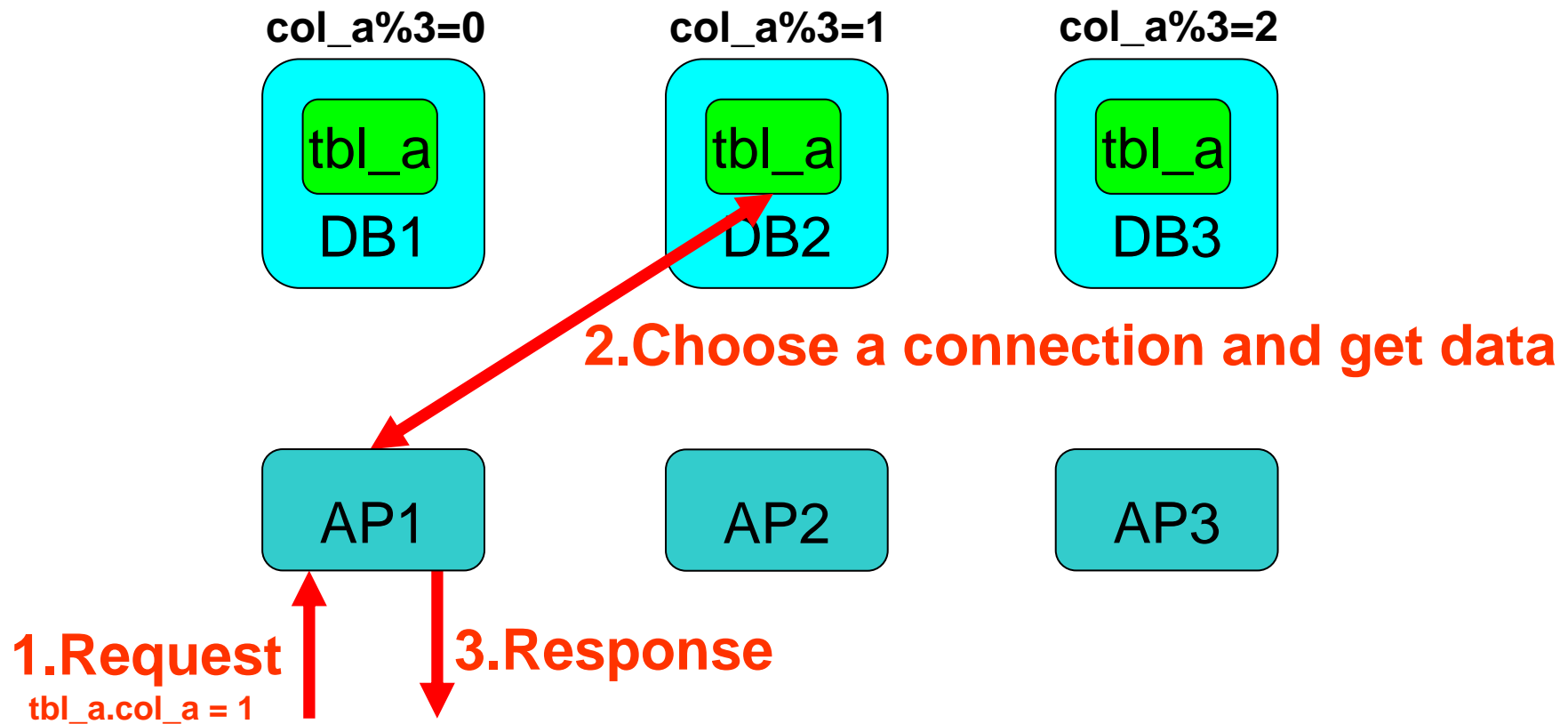


DB sharding by application

DB sharding by an application is usually used for resolving performance issues that are caused by increasing data or increasing update requests.



DB sharding by application



DB sharding by an application can resolve performance problems.



DB sharding by application

But...

DB sharding by application has the following problems.

- Can not join tables with different database servers.
- Applications must implement or abandon synchronized updates on different database servers.
- The application engineers need to have a high level of database skill to implement database sharding.
- It is very difficult to implement “DB sharding by application” to an application and when implemented requires a lot of effort.



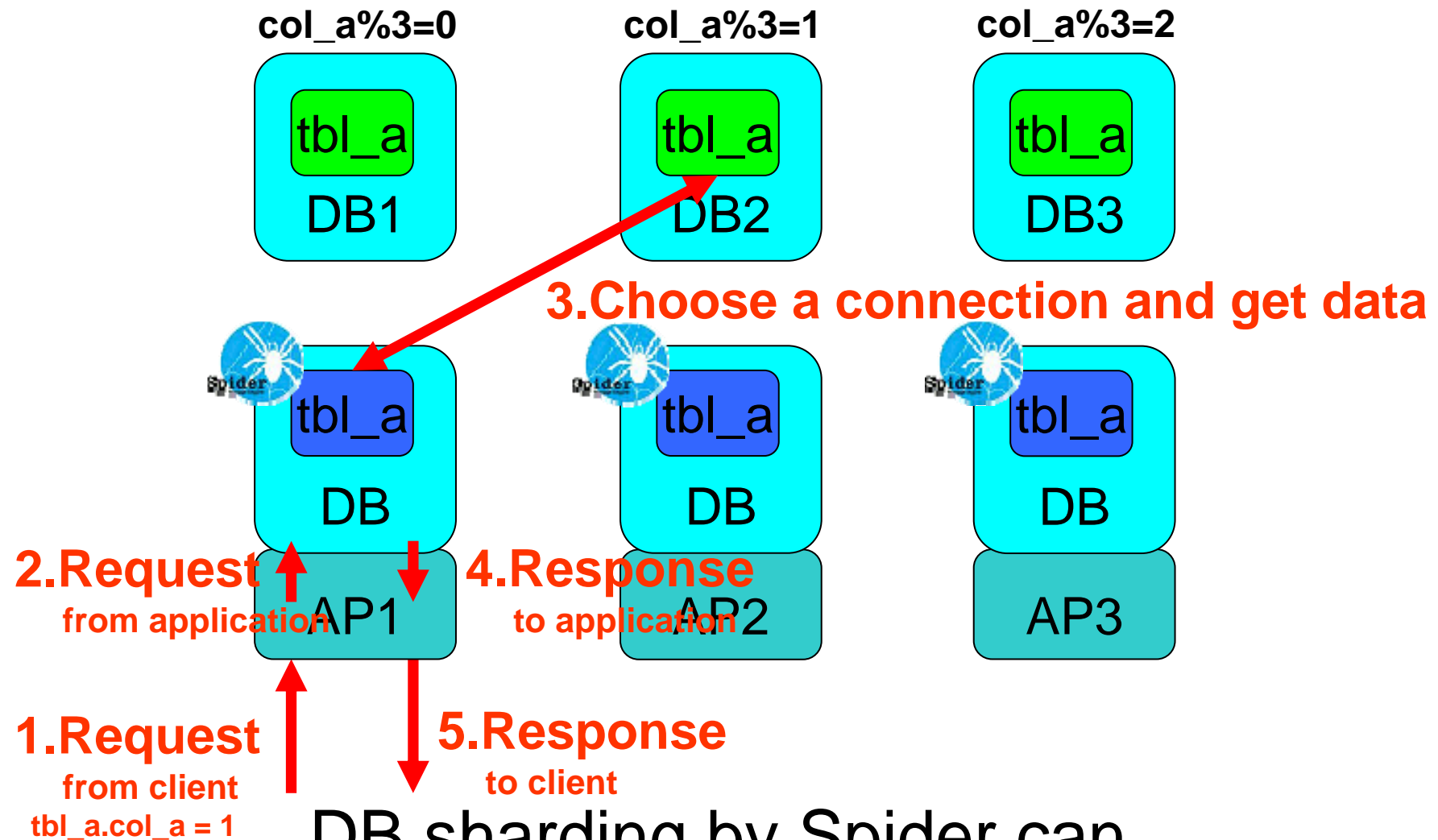
DB sharding by Spider

You get an additional choice now!!

You can use Spider
for SHARDING!



DB sharding by Spider



DB sharding by Spider can resolve performance problems.



DB sharding by Spider

And...

- Tables in different servers can be joined.
- The application does not need to implement synchronized update. (Spider does it.)
- The application engineers can develop applications without DB sharding skills.
- It is very easy to deploy on the database for it usually requires no changes in the application and the SQL.





Case study



About Sagool.tv

Sagool.tv is a video streaming website,
like www.youtube.com

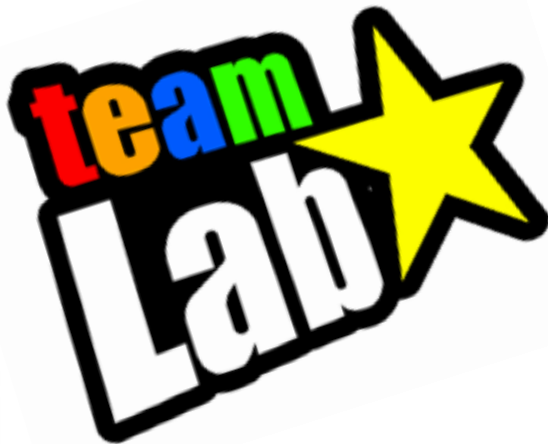
But all the content is collected
from the web by crawlers and
we can watch videos idly like TV.

Sagool.tv was created by

[Team Lab Inc.]

<http://www.team-lab.com>

<http://www.team-lab.net>



Sagool.tv (search page)

The screenshot shows the Sagool.tv search results for the keyword 'actface'. The page features a navigation bar with links for 'TOPページ', '検索', 'ランキング', and '好きな動画'. A search bar contains the text 'actface' and a '検索する' button. Below the search bar, it indicates '16件の動画のうち7件を表示' (Displaying 7 out of 16 videos). A list of video thumbnails is displayed, each with a title, duration, and a '好きな動画登録数' (Number of videos liked). The videos include 'AU Actface Concept Phone', 'au design project actface-RHYTHM', 'au design project actface-PLAY cellphone version(English)', 'au design project actface-PLAY 1min version(English)', 'au design project actface-PLAY 7min version(English)', 'au design project actface(アクトフェイス)-PLAY 1min version', 'au design project actface(アクトフェイス)-RHYTHM', 'au design project actface(アクトフェイス)-PLAY 1min version', and 'au design project actface(アクトフェイス)-RHYTHM 1min version'. A video player on the right side of the page shows a video titled 'au design project actface-RHYTHM' with a progress bar at 00:17 / 00:59. The player also includes a '好きな動画に登録' (Register as a liked video) button and a '似たもの動画を見る' (View similar videos) button. Below the player, there is a '再生待ち動画' (Videos waiting to be played) section with 7 / 50 videos, and an 'おすすめ動画' (Recommended videos) section with a '更新する' (Update) button.



Sagool.tv was created by Team Lab Inc.

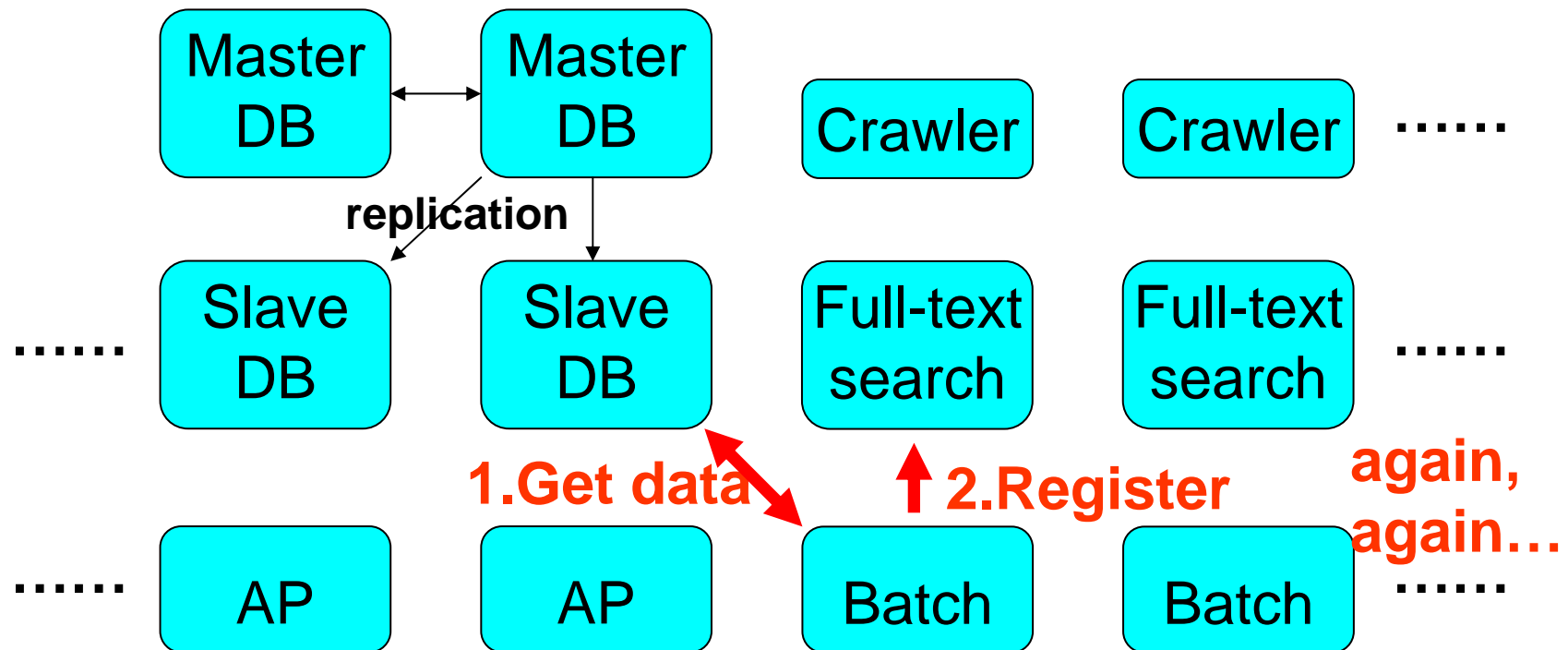


Sagool.tv was created by Team Lab Inc.
 ST Global., Inc All Rights Reserved



ST Global., Inc All Rights Reserved

Sagool.tv previous Architecture



Batch processing must create a full-text index every day.



The Problem of Sagool.tv

But...

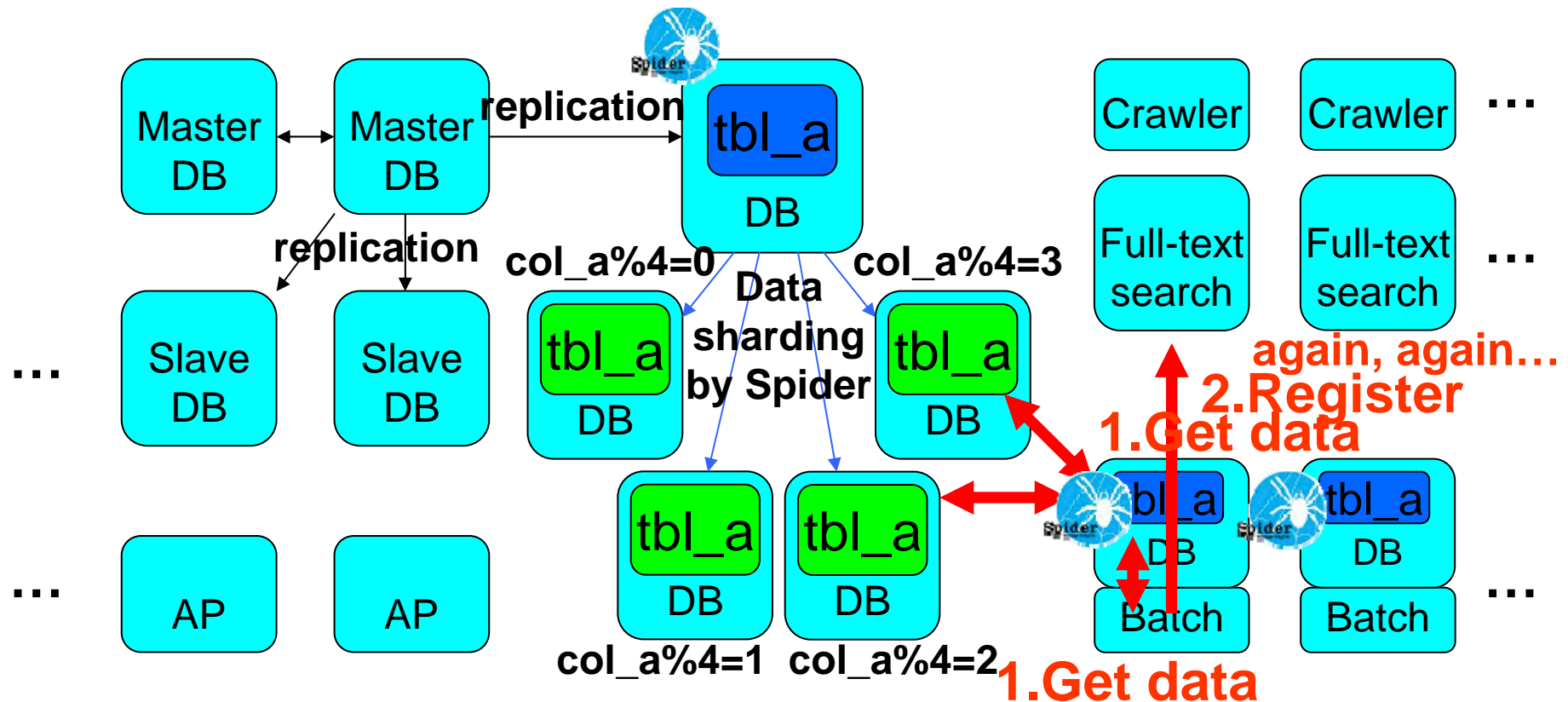
The DB reference performance degraded as the number of records increased.

The batch processing took well over 24 hours once 30 million records were exceeded.

In this case, the MySQL cluster could not be used because their servers had hard memory limitation.

Then, Spider was used.





We added a slave DB using Spider and 4 remote databases.

Then we added a MySQL server with Spider on the batch server.



Sagool.TV: Increase the performance

As a result

1. By using Spider, the DB reference performance improved dramatically **by decreasing the number** of records on each server.
 - The DB performance increased **X10**.
 - The batch processing became **X5 faster**.
(Batch times are currently about 8 hours)
2. Spider is **transparent** so there is **NO** need to modify the applications.
3. Spider can be applied in the areas of the DB where there are problems **without making changes to the architecture**.



SPIDER makes SHARDING easy

Another Example: KADOKAWord.jp

KADOKAWA is the largest publisher in Japan.

Their site has a large number of websites (over 80)
for its media, books, and merchandise.

KADOKAWord.jp is cross-searching
service for their websites content.

KADOKAWord.jp is operated
by **KADOKAWA MEDIA MANAGEMENT CO.,LTD.**



KADOKAWord.jp with SPIDER

At KADOKAWord.jp

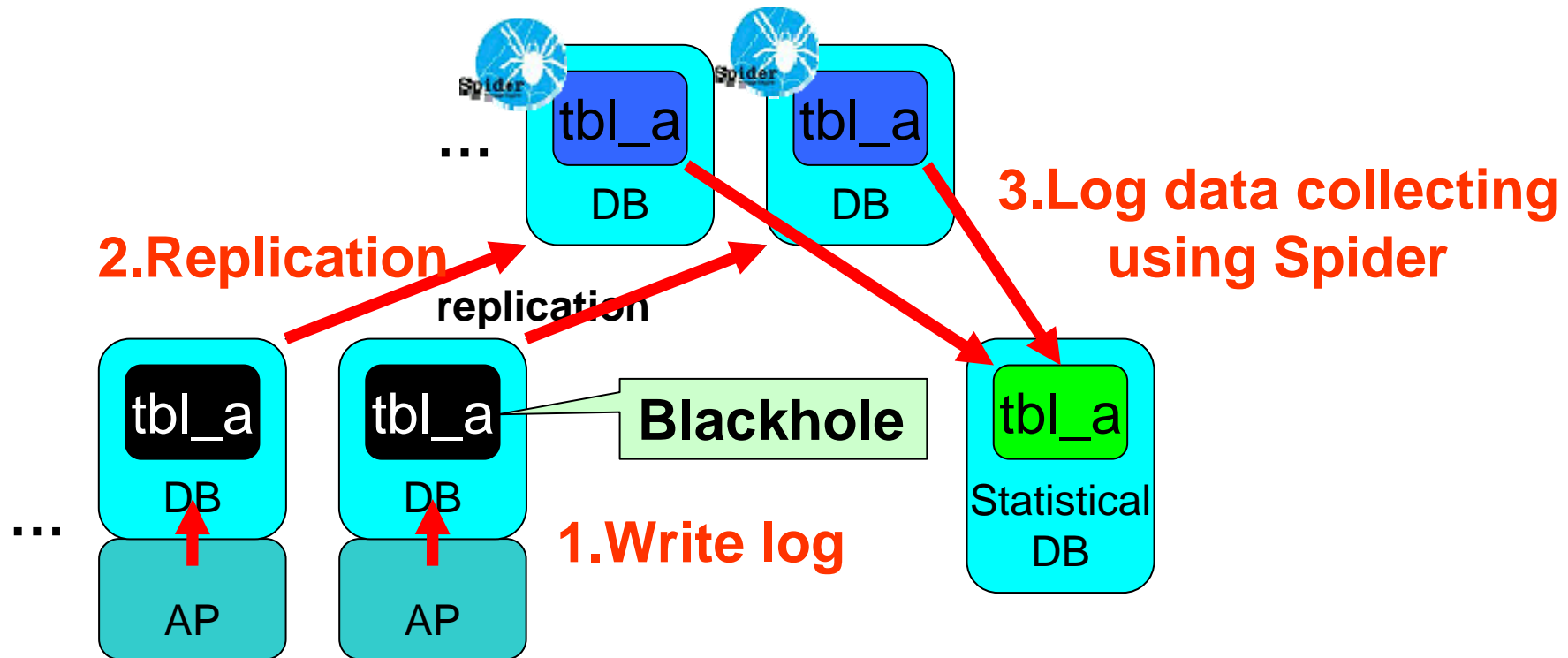
Blackhole and Spider were used

because...

spikes in log traffic from it's group sites is often generated.



KADOKAWord.jp: Architecture with SPIDER



Currently,
there have been no problems with high log traffic.



Expanding MySQL's basic functionality using Spider



Expanding MySQL's basic functions

**Spider can reinforce and expand other
Storage Engines' features by
cooperation.**



Some samples of the expanded functionality

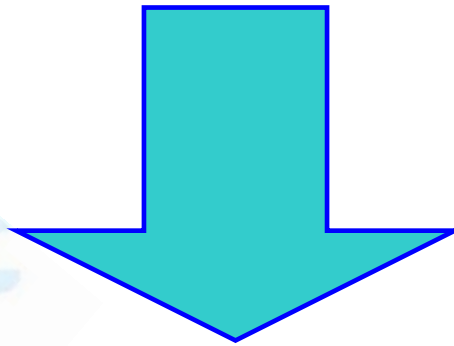
1. Slave trigger
2. Double timestamp
3. Multistep partitioning
4. Range partitioning for MySQL Cluster
5. Parallel replication
6. Synchronous replication
7. "Insert delayed" for InnoDB
8. Effective use for query cache

etc...



1 : Slave trigger

At row level replication, which is available from MySQL 5.1, on the master side, row changes made by the trigger are logged. On the slave side, only the row changes are seen, and the trigger is not executed.

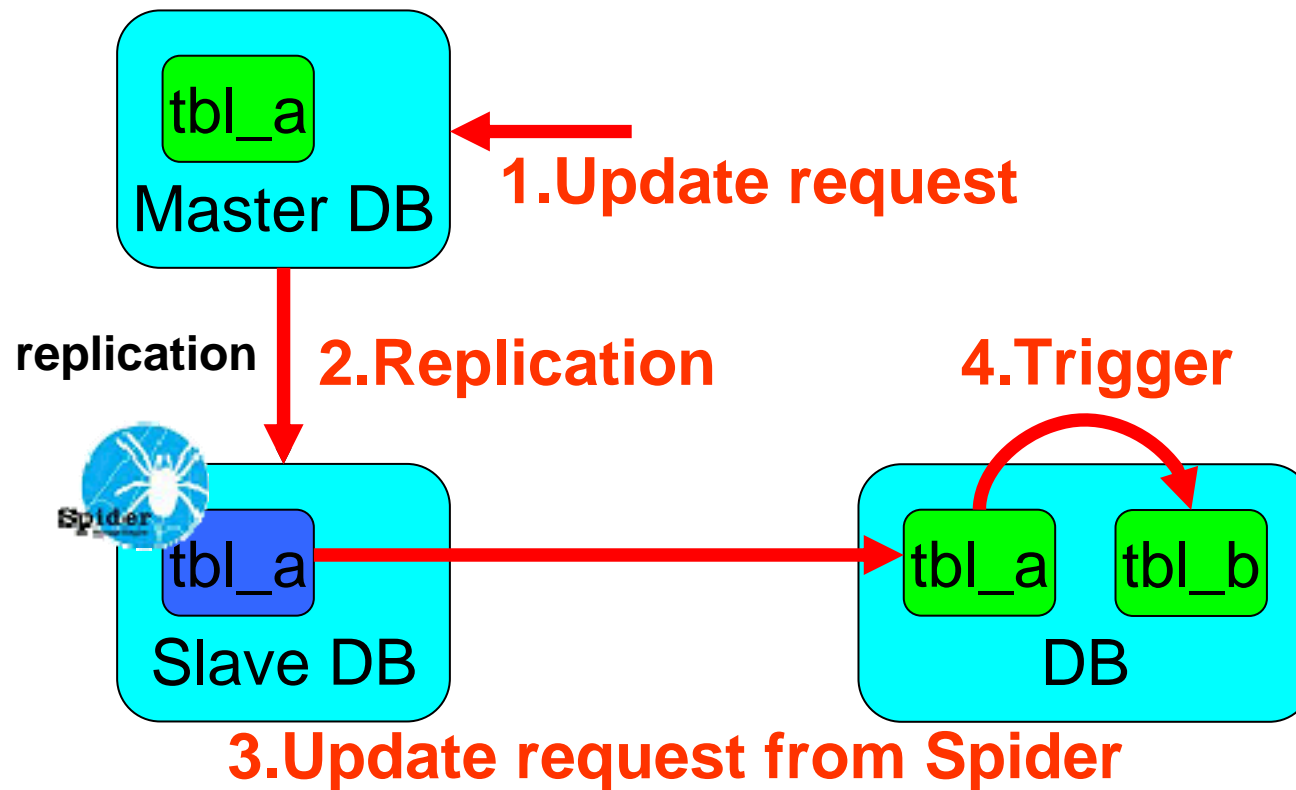


Using Spider.....

you can use the triggers on the slave side.



1 : Structure sample of slave trigger

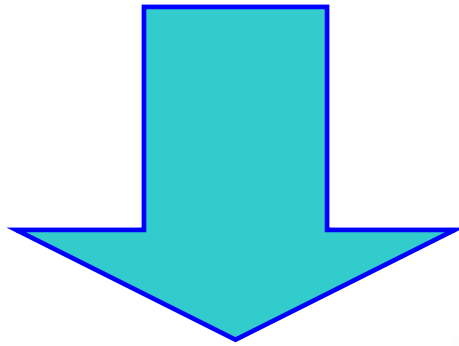


You can use the trigger for statistical information without service performance issues.



2: Double timestamp

In MySQL, there is only one column for the timestamp for each table.



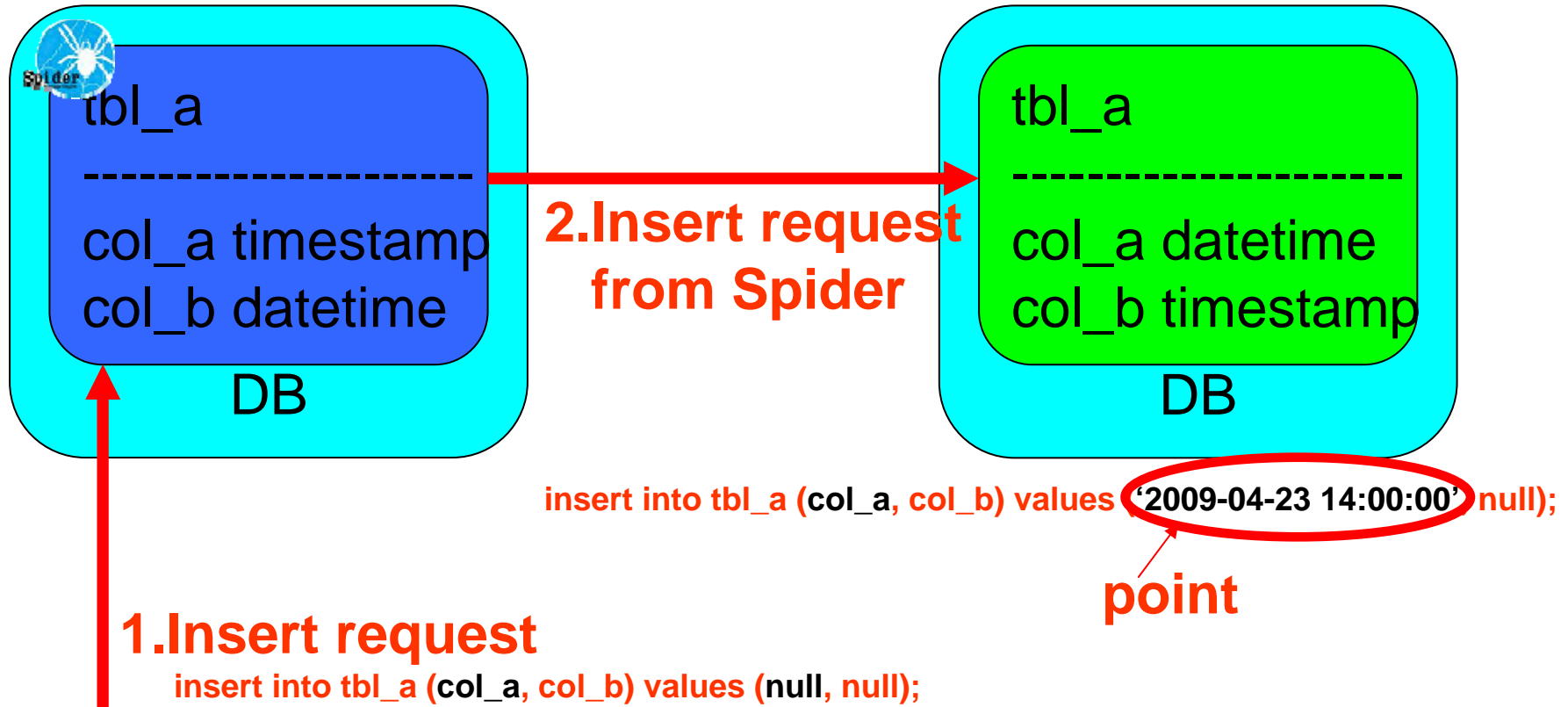
Using Spider...

you can use two timestamp columns.

(You can use more timestamp columns when Spider table links other Spider table.)



2: Structure sample of double timestamp



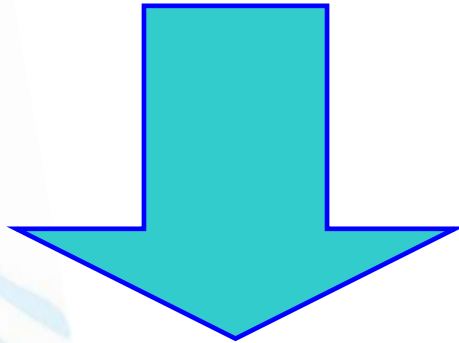
Double timestamp is easy to do with an application, too.



But you get an additional choice with Spider.

3 : Multistep partitioning

The table partitioning feature available on MySQL 5.1 can use only two steps, partitioning and sub-partitioning.



Using Spider...

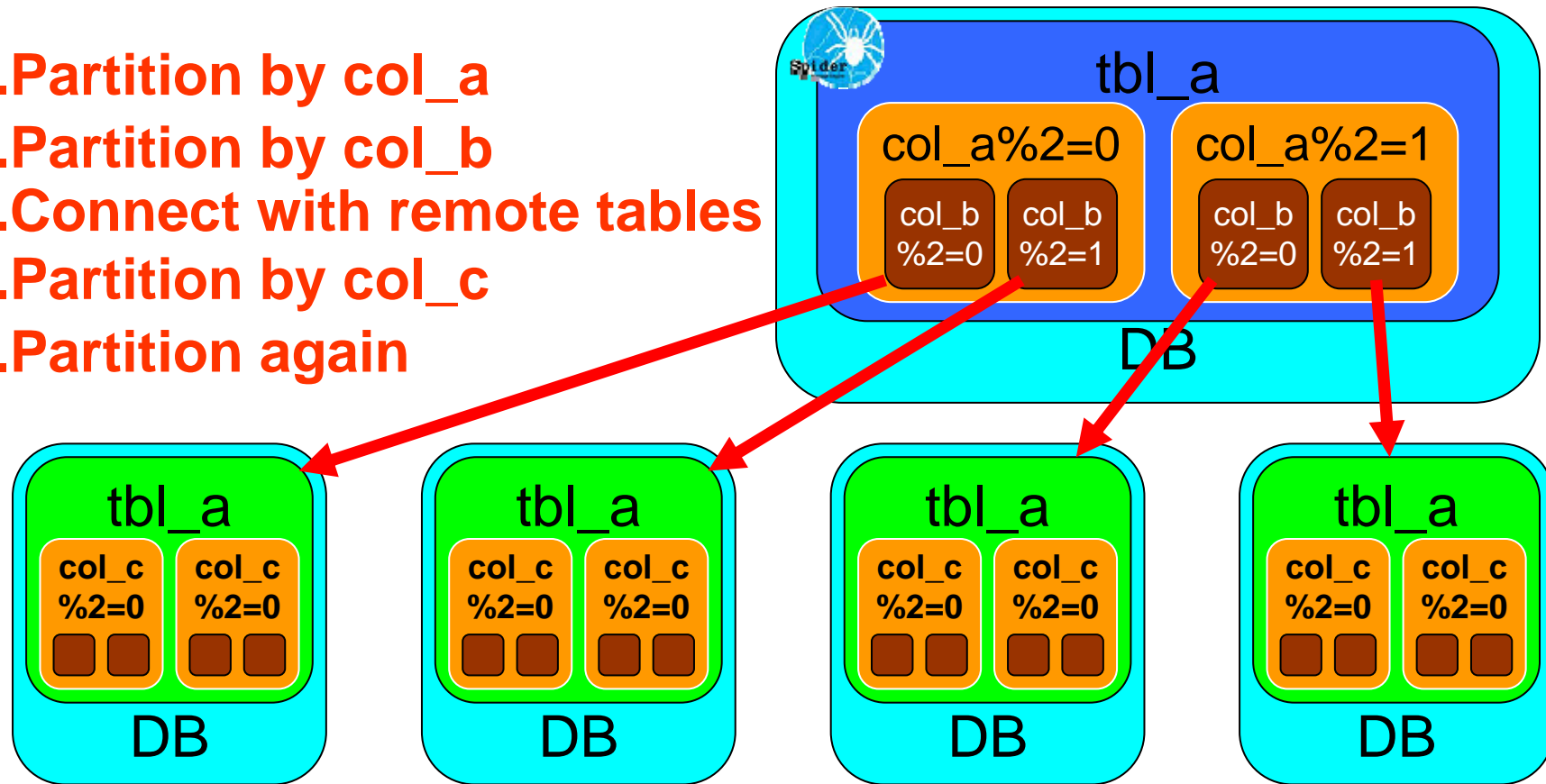
you can use four step partitioning; two steps on the Spider table and two Steps on the remote table.

(You can use more step for partitioning when Spider table links other Spider table.)



3: Structure sample of multistep partitioning

1. Partition by col_a
2. Partition by col_b
3. Connect with remote tables
4. Partition by col_c
5. Partition again

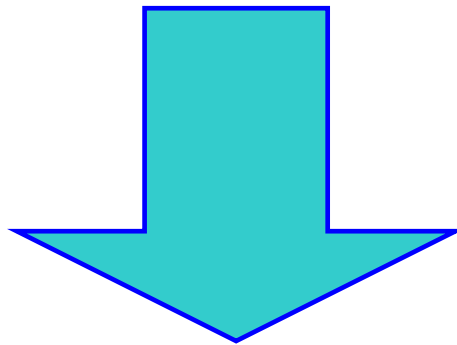


You can divide the table data into smaller pieces.



4: Range partitioning for MySQL Cluster

MySQL Cluster can only use (LINEAR) KEY partitioning.



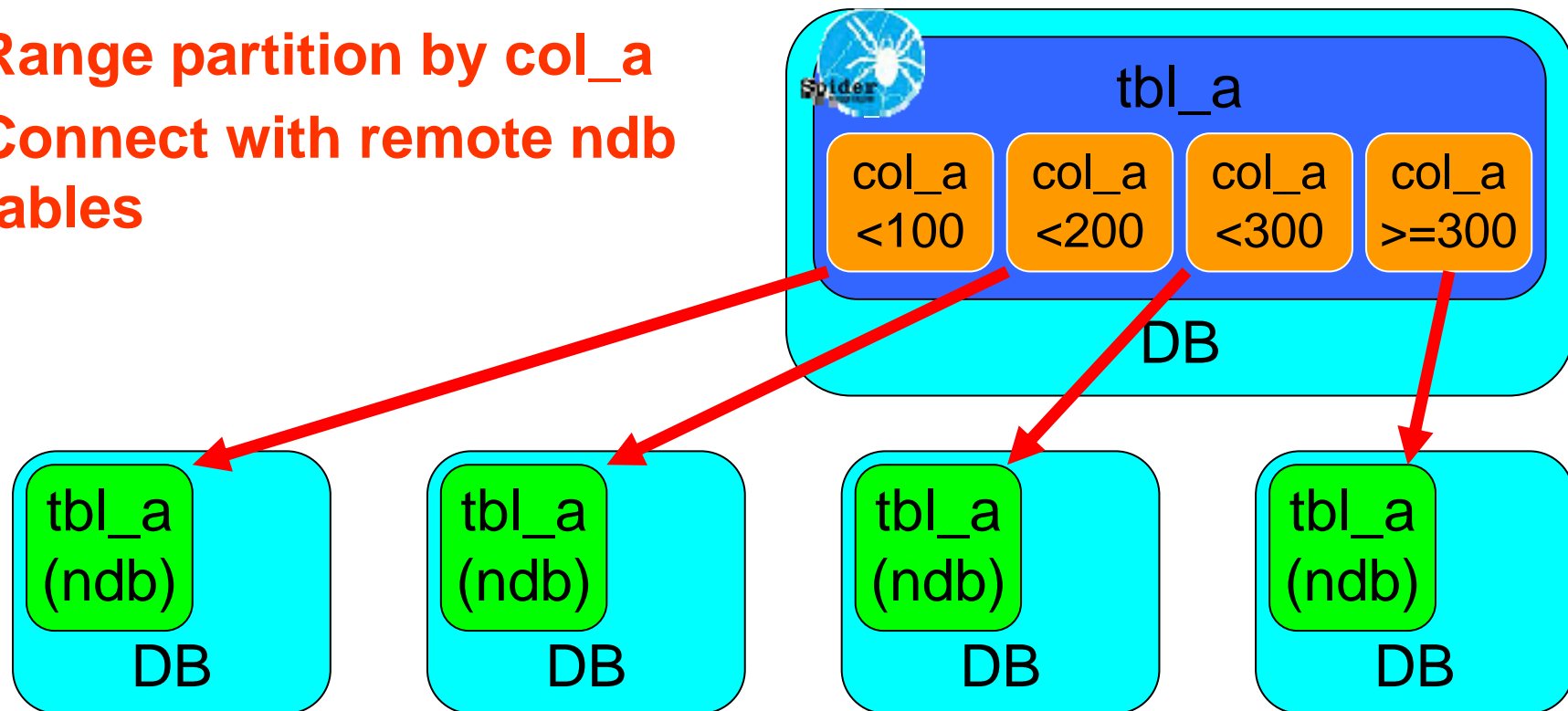
Using Spider...

you can use other types of partitionings for MySQL Clusters.



4: Structure sample of range partitioning for MySQL Cluster

1. Range partition by col_a
2. Connect with remote ndb tables

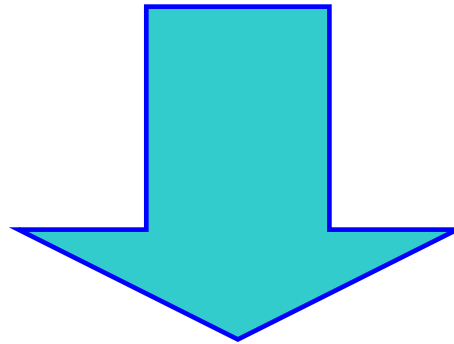


The Range partition can be virtually achieved this way.



5: Parallel replication

MySQL uses Serial Replication.

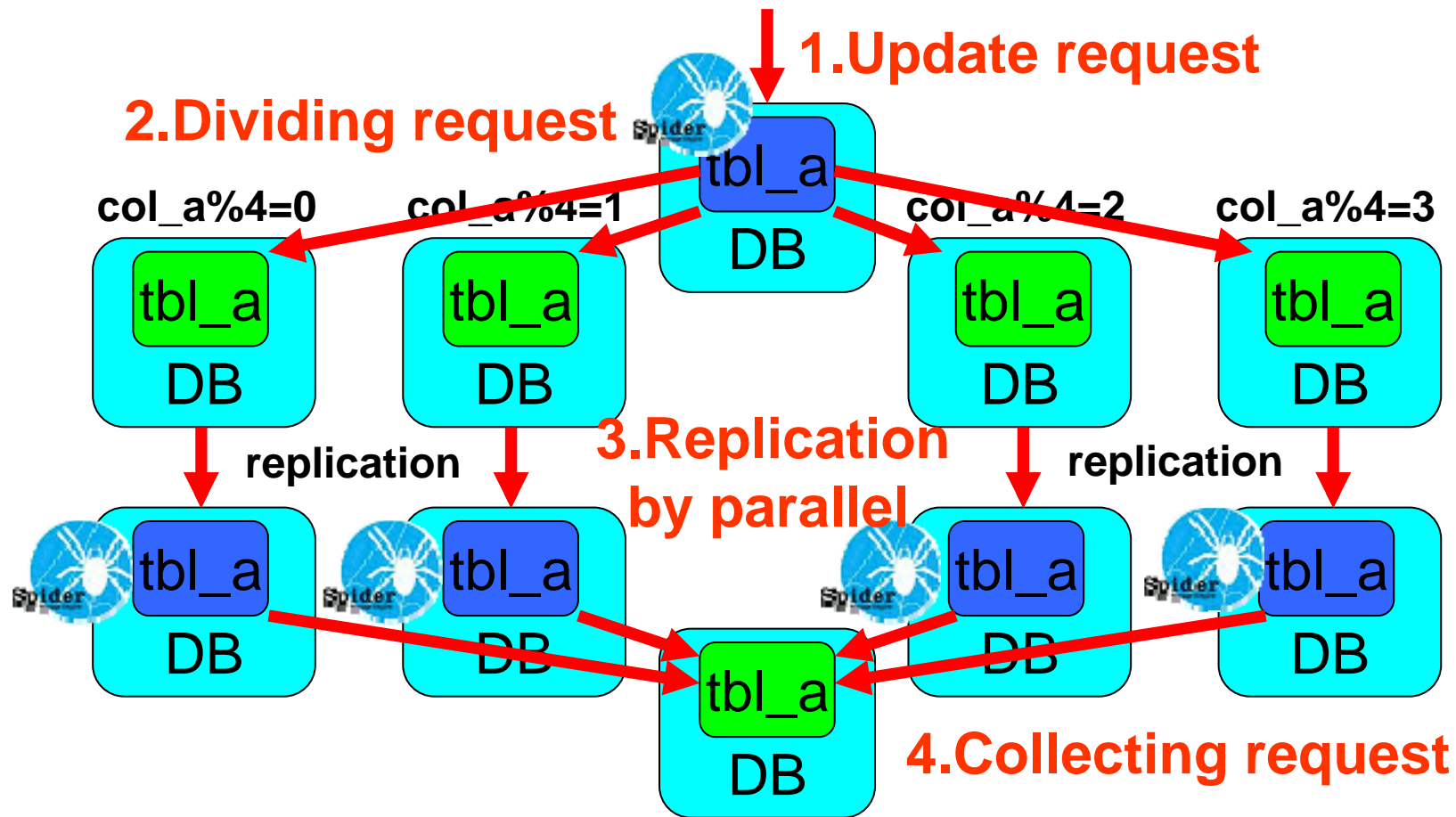


Using Spider...

you can use parallel replication



5: Structure sample of parallel replication

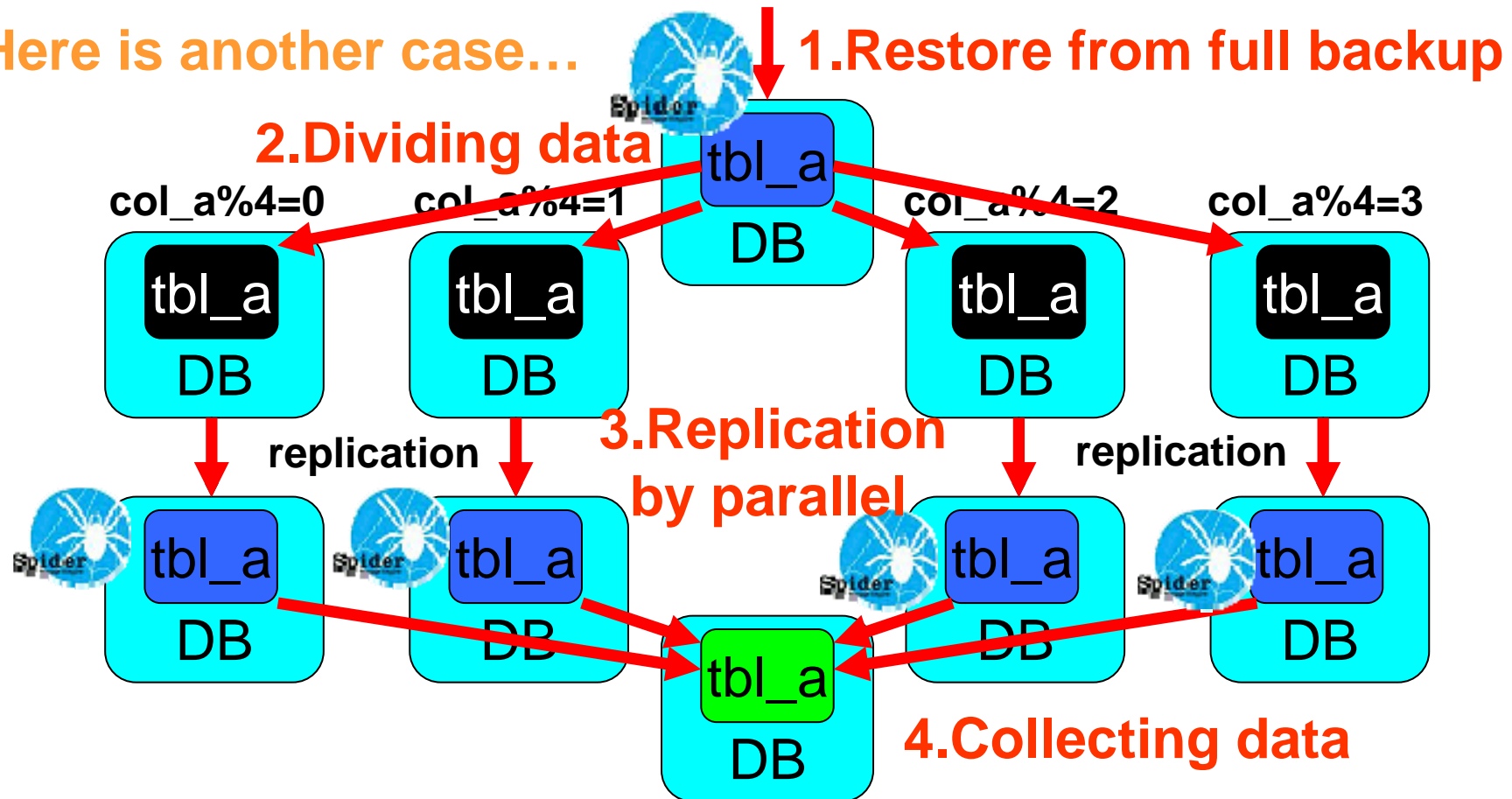


High speed replication.



5: Spider can implement parallel replication in many ways

Here is another case...

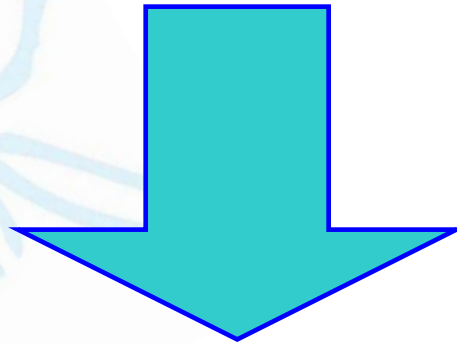


High speed restoring.



6: Synchronous replication

Synchronous replication is not available on MySQL, yet.

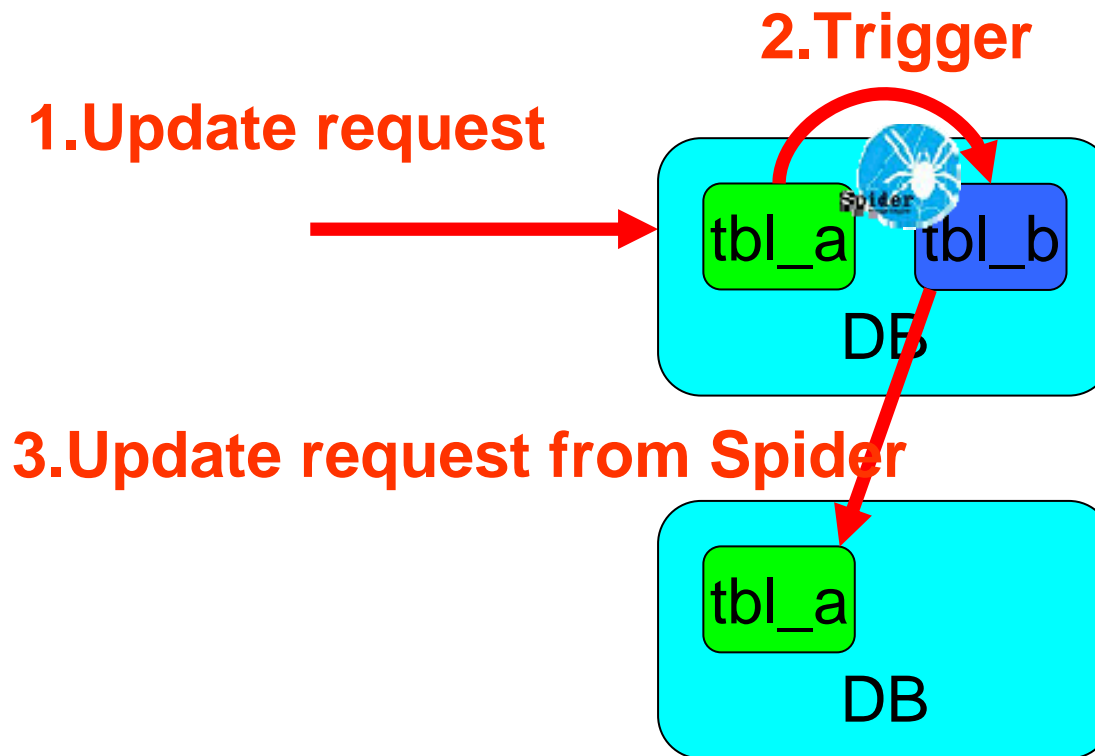


Using Spider...

you can use synchronous replication.



6: Structure sample of synchronous replication

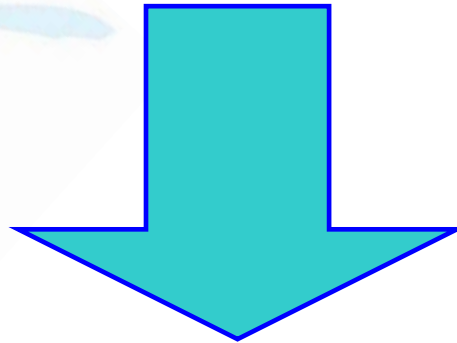


For availability, both servers must keep working,
and if trouble develops among the two servers an error is generated.



7: "Insert delayed" for InnoDB

You can not use "insert delayed" for InnoDB tables.



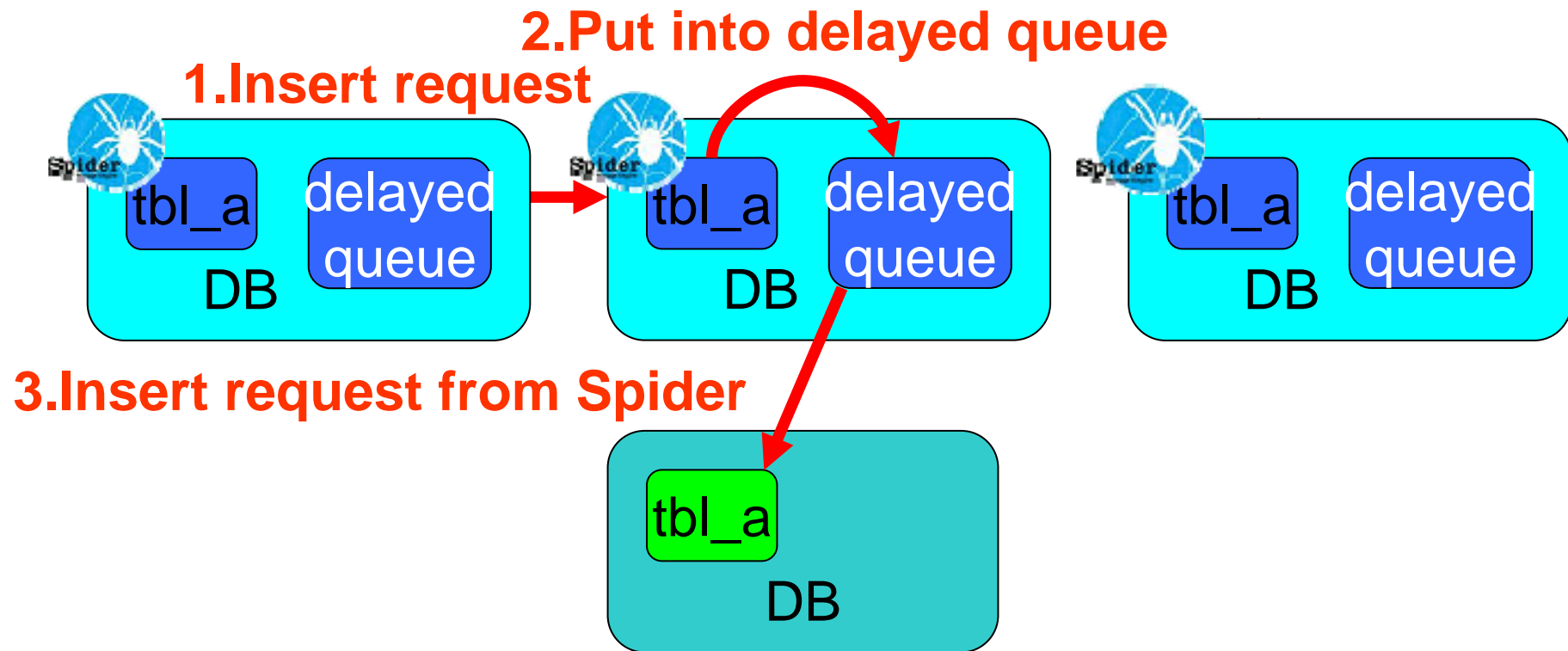
Using Spider...

you can use "insert delayed" for InnoDB tables.

("insert delayed" becomes another transaction.)



7: Structure sample of "insert delayed" for InnoDB



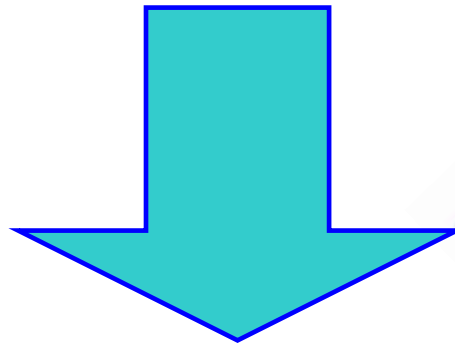
If you can use additional servers...

You can create a big queue.



8: Effective use for query cache

"query cache" cannot be judged "same statement", if all of the words are not the same. The effectiveness of cache falls when complicated "select" statements are multiused, because there is a decrease in "select" statements judged to be the same.



Using Spider...

Spider does not support "query cache", but the effectiveness of cache can be kept high, because MySQL divides and simplifies a "select statement" for each table, and Spider send it to the remote server.



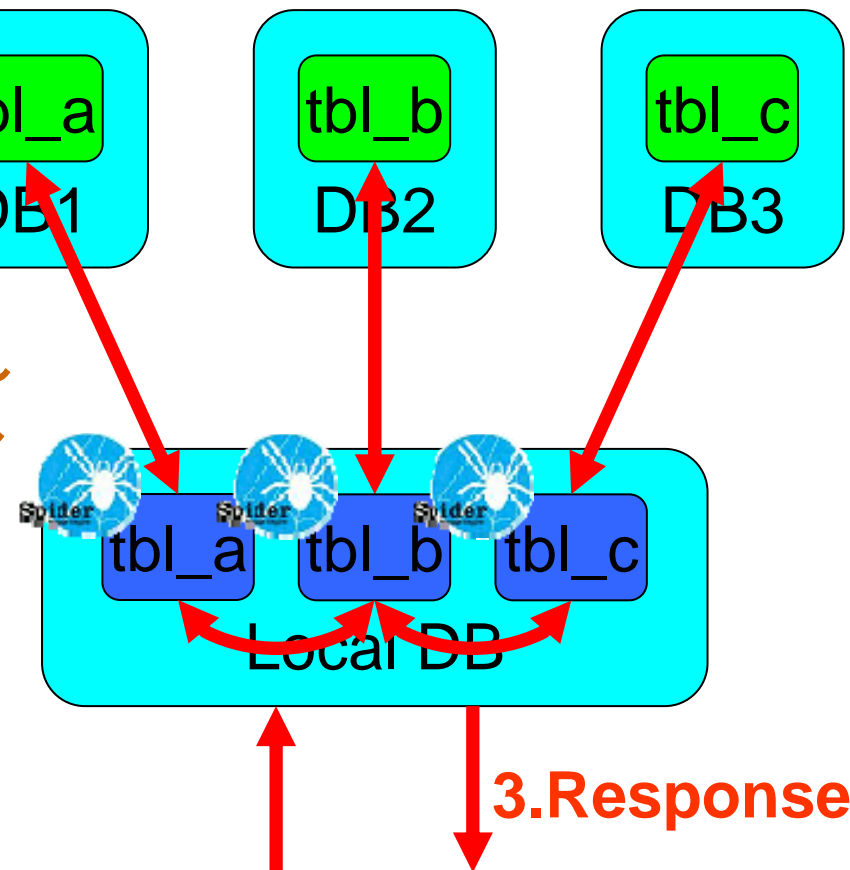
8: Structure sample of effective use for query cache

2. Request from Spider

select ~ from tbl_a where col_a = 1
select ~ from tbl_b where col_b = ~
select ~ from tbl_c where col_c = ~

1. Request

select ~ from tbl_a, tbl_b, tbl_c
where tbl_a.col_a = 1
and tbl_a.col_b = tbl_b.col_b
and tbl_a.col_c = tbl_c.col_c



Query cache is used on DB1, DB2 and DB3.



Spider Storage Engine

Conclusion



Conclusion

Spider Storage Engine

1. **Can reinforce and expand other Storage Engine's features by cooperation.**
2. **Makes it possible to use tables in remote MySQL servers as if they were in local MySQL server.**
3. **Can synchronize an update for remote MySQL servers by XA transaction.**
4. **Supports table partitioning which is available in MySQL 5.1, and Spider can connect different servers for each partition.**

With these four features

Spider can be used for DB sharding with Transaction.

**Spider makes Sharding Easy without losing functionality.
Applications do not need be changed. Spider can be used
only where it's needed.**



Future road map

- Summer 2009

- Available for General Release.
- “Engine-condition-pushdown” will be available.
“Intelligent search” updated and more capable.

- Fall in 2009

- “Savepoint” will be available
Spider will be able to rollback to a save point.
Currently, Spider can only commit or rollback all transaction.
- Spider will be available on drizzle.
Drizzle is a “slimmed down version of MySQL” designed for scalability and performance. (Cloud computing)

- Winter in 2009

- Oracle’s tables will be linked with Spider's.



Any Questions?

**Thank you for taking
your time!!**



ST Global., Inc
Kentoku SHIBA



<http://spiderformysql.com>

