

Cursor功能实现总结

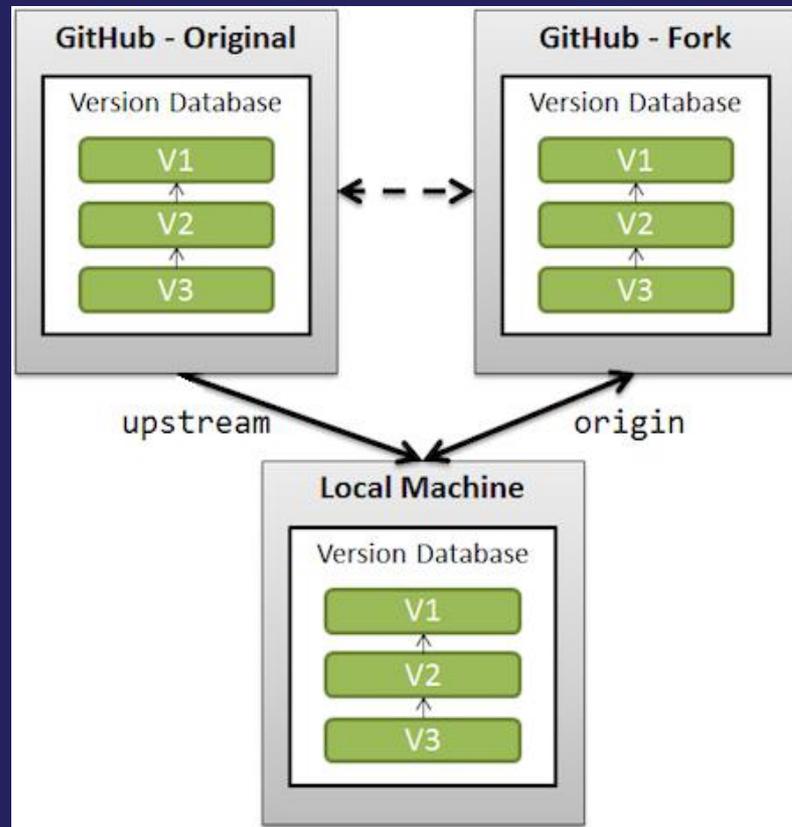
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熟悉GitHub工作流程

- 在GitHub上fork官方的TiDB代码仓库
- 使用git clone将代码下载到本地
- 本地repo的remote origin指向你的fork
- 为了追踪官方的代码仓库，需要手工加入remote upstream
 - git remote add upstream <https://github.com/pingcap/tidb.git>
- 可以通过创建pull request向官方提交贡献



具体流程参考PingCAP的Contribution Guide，最好和文档完全一致，包括环境变量的定义

- <https://github.com/pingcap/tidb/blob/master/CONTRIBUTING.md>
- 建立本地开发环境
- Fork in the cloud
- Clone fork to local storage
 - git remote add upstream <https://github.com/pingcap/tidb.git>
 - Define a pre-commit hook
- 建立分支
- 开发、测试、make dev
- Keep your branch in sync
- 提交
- Push
- 创建pull request
- Code review & commit & push
- 需要遵守Commit message style

MySQL协议文档 COM_STMT_EXECUTE

COM_STMT_EXECUTE:

```
1  COM_STMT_EXECUTE
2  execute a prepared statement
3
4  direction: client -> server
5  response: COM_STMT_EXECUTE Response
6
7  payload:
8  1          [17] COM_STMT_EXECUTE
9  4          stmt-id
10 1          flags
11 4          iteration-count
12   if num-params > 0:
13   n          NULL-bitmap, length: (num-params+7)/8
14 1          new-params-bound-flag
15   if new-params-bound-flag == 1:
16   n          type of each parameter, length: num-params * 2
17   n          value of each parameter
18
19 example:
20 12 00 00 00 17 01 00 00 00 00 01 00 00 00 00 01 .....
21 0f 00 03 66 6f 6f .....foo
```

The iteration-count is always 1.

The flags are:

Flags	Constant Name
0x00	CURSOR_TYPE_NO_CURSOR
0x01	CURSOR_TYPE_READ_ONLY
0x02	CURSOR_TYPE_FOR_UPDATE
0x04	CURSOR_TYPE_SCROLLABLE

MySQL协议文档 [COM_STMT_FETCH](#)

Payload

1	1	[1c] COM_STMT_FETCH
2	4	stmt-id
3	4	num rows

Returns

a COM_STMT_FETCH response

MySQL cursor的限制

- [Restrictions on Server-Side Cursors](#)
- forward-only, read-only

网络抓包，分析MySQL的行为

Time	Source	Destination	Protocol	Length	Details
2576	21.260452	172.20.225.17	172.20.51.61	MySQL	120 Request Prepare Statement
2577	21.261732	172.20.51.61	172.20.225.17	MySQL	369 Response
2578	21.261774	172.20.225.17	172.20.51.61	TCP	66 54099 → 3306 [ACK] Seq=1243
2579	21.263301	172.20.225.17	172.20.51.61	MySQL	88 Request Execute Statement

- ▶ Frame 2576: 120 bytes on wire (960 bits), 120 bytes captured (960 bits) on interface 0
- ▶ Ethernet II, Src: Apple_97:57:9a (60:03:08:97:57:9a), Dst: All-MSRP-routers_3b (00:00:0c:07:ac:3b)
- ▶ Internet Protocol Version 4, Src: 172.20.225.17, Dst: 172.20.51.61
- ▶ Transmission Control Protocol, Src Port: 54099, Dst Port: 3306, Seq: 1189, Ack: 1614, Len: 54
- ▼ MySQL Protocol
 - Packet Length: 50
 - Packet Number: 0
 - ▼ Request Command Prepare Statement
 - Command: Prepare Statement (22)
 - Statement: select * from salaries where salary > ? limit 100

网络抓包，分析MySQL的行为

2577	21.261732	172.20.51.61	172.20.225.17	MySQL	369	Response
2578	21.261774	172.20.225.17	172.20.51.61	TCP	66	54099 → 3306 [
2579	21.263301	172.20.225.17	172.20.51.61	MySQL	88	Request Execut

▶ Frame 2577: 369 bytes on wire (2952 bits), 369 bytes captured (2952 bits) on interface 0

▶ Ethernet II, Src: Cisco_0f:ae:c1 (40:55:39:0f:ae:c1), Dst: Apple_97:57:9a (60:03:08:97:57:9a)

▶ Internet Protocol Version 4, Src: 172.20.51.61, Dst: 172.20.225.17

▶ Transmission Control Protocol, Src Port: 3306, Dst Port: 54099, Seq: 1614, Ack: 1243, Len: 303

▼ MySQL Protocol

- Packet Length: 12
- Packet Number: 1
- Statement ID: 1
- Number of fields: 4
- Number of parameter: 1
- Warnings: 0

▼ MySQL Protocol

- Packet Length: 23
- Packet Number: 2
- Catalog: def
- Database:
- Table:
- Original table:
Name: ?
- Original name:
- Charset number: binary COLLATE binary (63)
- Length: 0
- Type: FIELD_TYPE_VAR_STRING (253)
- ▶ Flags: 0x0080
- Decimals: 0

▼ MySQL Protocol

- Packet Length: 59
- Packet Number: 3

网络抓包，分析MySQL的行为

2579	21.263301	172.20.225.17	172.20.51.61	MySQL	88	Request	Execute	Statement
2580	21.265511	172.20.51.61	172.20.225.17	MySQL	342	Response		

▶ Frame 2579: 88 bytes on wire (704 bits), 88 bytes captured (704 bits) on interface 0

▶ Ethernet II, Src: Apple_97:57:9a (60:03:08:97:57:9a), Dst: All-HSRP-routers_3b (00:00:0c:07:ac:3b)

▶ Internet Protocol Version 4, Src: 172.20.225.17, Dst: 172.20.51.61

▶ Transmission Control Protocol, Src Port: 54099, Dst Port: 3306, Seq: 1243, Ack: 1917, Len: 22

▼ MySQL Protocol

- Packet Length: 18
- Packet Number: 0
- ▼ Request Command Execute Statement
 - Command: Execute Statement (23)
 - Statement ID: 1
 - Flags: Read-only cursor (1)
 - Iterations (unused): 1
 - New parameter bound flag: First call or rebound (1)
- ▼ Parameter
 - Type: FIELD_TYPE_LONG (3)
 - Unsigned: 0
 - Value: 80000

2579	21.263301	172.20.225.17	172.20.51.61	MySQL	88	Request Execute Statement
2580	21.265511	172.20.51.61	172.20.225.17	MySQL	342	Response
2581	21.265591	172.20.225.17	172.20.51.61	TCP	66	54099 → 3306 [ACK] Seq=1265
2582	21.270299	172.20.225.17	172.20.51.61	MySQL	79	Request Fetch Data
2583	21.271387	172.20.51.61	172.20.225.17	MySQL	557	Response


```
Table: salaries
Original table: salaries
Name: to_date
Original name: to_date
Charset number: binary COLLATE binary (63)
Length: 10
Type: FIELD_TYPE_DATE (10)
▶ Flags: 0x1081
  Decimals: 0
▼ MySQL Protocol
  Packet Length: 7
  Packet Number: 6
  EOF marker: 254
  Warnings: 0
  ▼ Server Status: 0x0062
    .... = In transaction: Not set
    ....1. = AUTO_COMMIT: Set
    ....0.. = More results: Not set
    ....0... = Multi query - more resultsets: Not set
    ....0 .... = Bad index used: Not set
    ....1. .... = No index used: Set
    ....1.. .... = Cursor exists: Set
    ....0... .... = Last row sent: Not set
    ....0 .... = database dropped: Not set
    ....0. .... = No backslash escapes: Not set
    ....0.. .... = Session state changed: Not set
    ....0... .... = Query was slow: Not set
    ....0 .... = PS Out Params: Not set
  ▶ Payload: 0000
```

网络抓包，分析MySQL的行为

No.	Time	Source	Destination	Protocol	Length	Info
2582	21.270299	172.20.225.17	172.20.51.61	MySQL	79	Request Fetch Data
2583	21.271387	172.20.51.61	172.20.225.17	MySQL	557	Response
2584	21.271436	172.20.225.17	172.20.51.61	TCP	66	54099 → 3306 [ACK]

▶ Frame 2582: 79 bytes on wire (632 bits), 79 bytes captured (632 bits) on interface 0

▶ Ethernet II, Src: Apple_97:57:9a (60:03:08:97:57:9a), Dst: All-MSRP-routers_3b (00:00:0c:07:ac:3b)

▶ Internet Protocol Version 4, Src: 172.20.225.17, Dst: 172.20.51.61

▶ Transmission Control Protocol, Src Port: 54099, Dst Port: 3306, Seq: 1265, Ack: 2193, Len: 13

▼ MySQL Protocol

- Packet Length: 9
- Packet Number: 0
- ▼ Request Command Fetch Data
 - Command: Fetch Data (28)
 - Statement ID: 1
 - Rows to fetch: 20

网络抓包，分析MySQL的行为

```
2583 21.271387 172.20.51.61 172.20.225.17 MySQL 557 Response
2584 21.271436 172.20.225.17 172.20.51.61 TCP 66 54099 → 3306
  Packet Length: 20
  Packet Number: 18
  Affected Rows: 0
  Last INSERT ID: 21
  ▶ Server Status: 0x0027
  Warnings: 15616
  Message: e\001
▼ MySQL Protocol
  Packet Length: 20
  Packet Number: 19
  Affected Rows: 0
  Last INSERT ID: 21
  ▶ Server Status: 0x0027
  Warnings: 58368
  Message: q\001
▼ MySQL Protocol
  Packet Length: 20
  Packet Number: 20
  Affected Rows: 0
  Last INSERT ID: 23
  ▶ Server Status: 0x0027
  Warnings: 54016
  Message: 8\001
▼ MySQL Protocol
  Packet Length: 7
  Packet Number: 21
  ▶ EOF marker: 254
  Warnings: 0
  ▼ Server Status: 0x0042
    .... = In transaction: Not set
    ...1. = AUTO_COMMIT: Set
    ...0.. = More results: Not set
    ...0... = Multi query - more resultsets: Not set
    ...0... = Bad index used: Not set
    ...0. = No index used: Not set
    ...1... = Cursor exists: Set
    ...0... = Last row sent: Not set
    ...0... = database dropped: Not set
    ...0. = No backslash escapes: Not set
    ...0.. = Session state changed: Not set
    ...0... = Query was slow: Not set
    ...0... = PS Out Params: Not set
  ▶ Payload: 0000
```

网络抓包，分析MySQL的行为

2610	21.303806	172.20.51.61	172.20.225.17	MySQL	77	Response
2611	21.303867	172.20.225.17	172.20.51.61	TCP	66	54099 → 3306 [ACK] Seq=1
2612	21.304153	172.20.225.17	172.20.51.61	MySQL	75	Request Close Statement
2613	21.305902	172.20.225.17	172.20.51.61	MySQL	71	Request Quit

▶ Frame 2610: 77 bytes on wire (616 bits), 77 bytes captured (616 bits) on interface 0

▶ Ethernet II, Src: Cisco_0f:ae:c1 (40:55:39:0f:ae:c1), Dst: Apple_97:57:9a (60:03:08:97:57:9a)

▶ Internet Protocol Version 4, Src: 172.20.51.61, Dst: 172.20.225.17

▶ Transmission Control Protocol, Src Port: 3306, Dst Port: 54099, Seq: 7357, Ack: 1402, Len: 11

▼ MySQL Protocol

- Packet Length: 7
- Packet Number: 1
- ▶ EOF marker: 254
- Warnings: 0
- ▼ Server Status: 0x0082
 - = In transaction: Not set
 -1. = AUTO_COMMIT: Set
 -0.. = More results: Not set
 -0... = Multi query - more resultsets: Not set
 -0 = Bad index used: Not set
 -0. = No index used: Not set
 -0.. = Cursor exists: Not set
 -1... = Last row sent: Set
 -0 = database dropped: Not set
 -0. = No backslash escapes: Not set
 -0.. = Session state changed: Not set
 -0... = Query was slow: Not set
 -0 = PS Out Params: Not set
- ▶ Payload: 0000

- ☞ TiDB的代码结构清晰，功能层次划分合理，容易扩展
- ☞ 缓存ResultSet，在用户请求时按需求返回数据
- ☞ 完全复用现有的执行逻辑
- ☞ 注意资源使用的控制
- ☞ 注意资源的释放

感謝
ขอบคุณ
terima kasih
ありがとう
Thanks
谢谢