GoldenDB

(2023)

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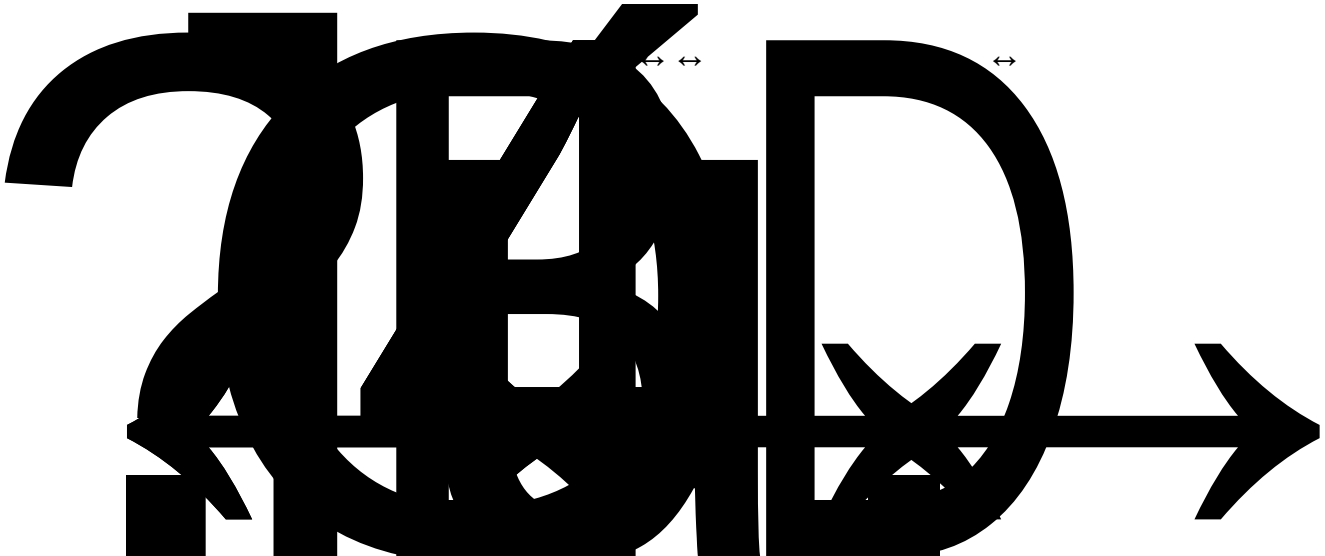

بم 61 U سر SQL .:L

1. ῃ GoldenDB

GoldenDB ɖ خي آ

1.1. خي

GoldenDB ⅎ سر

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(Insight) ـسر

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ĥ 2014 GoldenDB ـ ĥ

ϥ يخي ۱ 10 ╦ ĥ └ GoldenDB7.0

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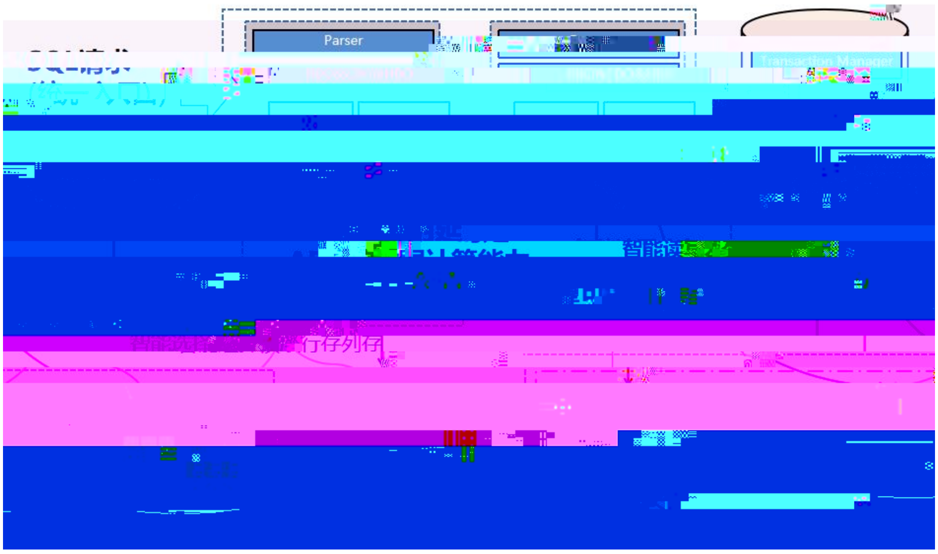

بم 3 GoldenDB HTAP ĩ

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GoldenDB ـ سر GoldenDB `Y ┼

. ẅ GoldenDB

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ῃ n غي Ỵ ŭ̋ GoldenDB ◖

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بھ 4 GoldenDB Cloud

GoldenDB 7.0 Ṣ DBService

Ŭ GoldenDB

L ╥ SQL Ŭ " Â GoldenDB

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+HDD ل . 5

40% Ɣ 30% ۱ 20%

1.3.4. ū

GoldenDB ū SQL92 SQL99 SQL2003 !! `H ū MySQL

ū Oracle DB2

MySQL ū ū MySQL5.7 MySQL8.0 م' ū MySQL ⁄

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Oracle ū ū Oracle بم * Δ ~ م

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UPDATE ـ ـ `H ج ـ Ỵ

* م بم

ـ SQL . `Y . ∑ Ĺ SQL ₈ ū

م PREPARE ↔ '

سر SQL

ODBC/JDBC ₆ C/OCI ₆

ـ MVCC

XA ₆

COPY TABLE

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1.3.5.

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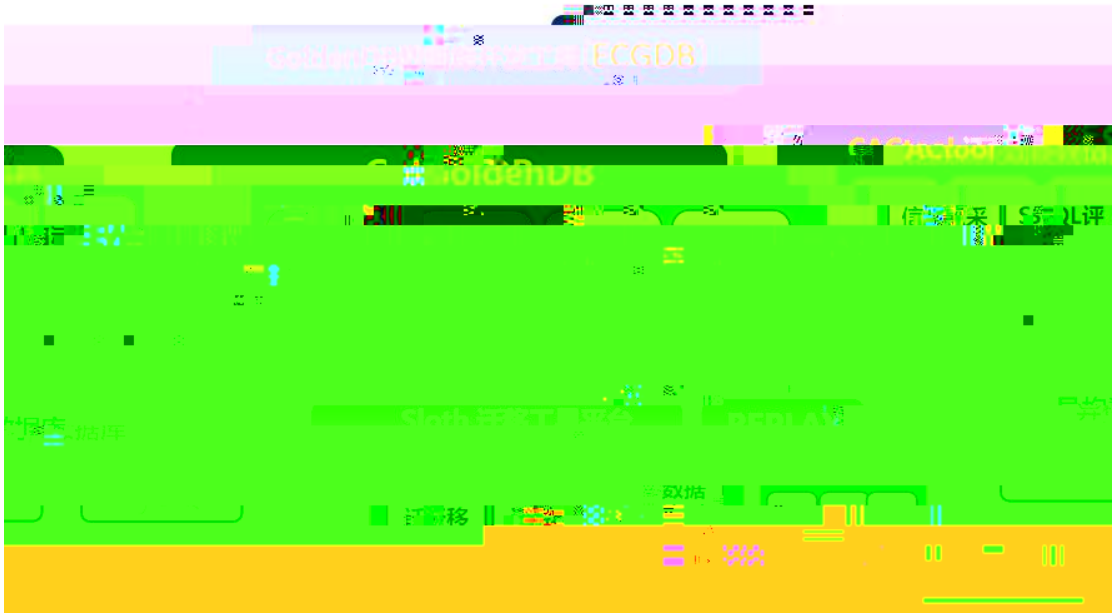

ﺑﻢ 5 GoldenDB ′I

′I (CACtool) CACtool ′I ﻧ ﻧ˜

ŭ DML ﻫ ₴

GoldenDB ﺳﺮ ₴ ˜ ₴ ˜ م ū

ﻓ ˜ U (IO CPU)

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u Sloth˜

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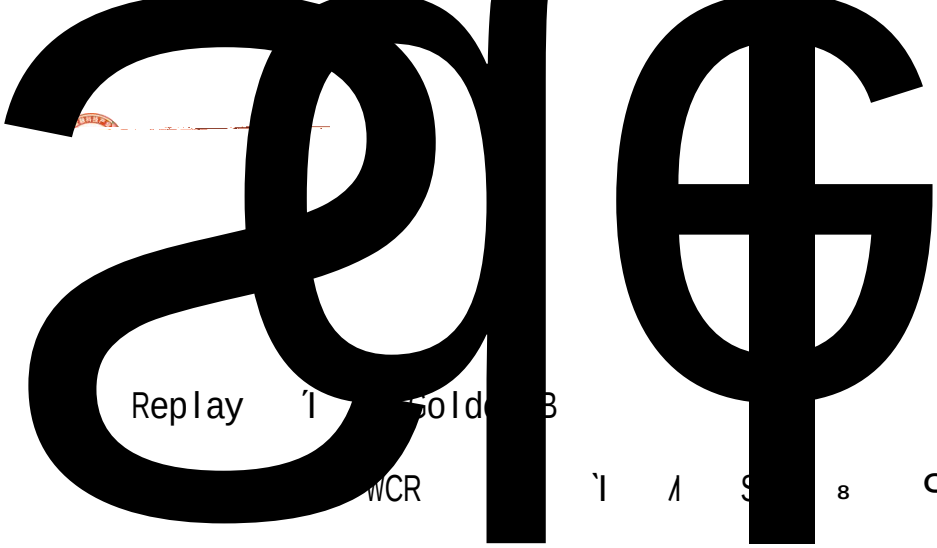
└ GoldenDB u GoldenDB n ﻓﺦ



Replay GoldenDB

WCR GoldenDB

SQL GoldenDB

GoldenDB

1.3.7.

بم 6 GoldenDB Ū

1.4. ↔

3 GoldenDB سر`Y

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ĩ	2023	2024	2025
`Y	HTAP Y . Ɫ `Y SQL /\	Ɫ . لج . م . OCI	₴ `H `H Ͱ ͞ م ⸗ U ⸗ ⸗ FPGA 1 ⸗

2.1. ↔

2.1.1. U ˙ ฃ

CPU

TPS/QPS 2000TPS/20000QPS

4000TPS/40000QPS

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	14	ŋ̃ ẅ ـ لج ڔ ٧ˋˆ ـ لج Ỵ
RAID	**1/2**	ŋ̃ ẅ RAID0 1 RAID10 1/2 RAID5(4 ټ) 3/4 RAID10
(%)	**30%**	ŋ̃ ẅ 30%
٧ˋˆ ـ لج (T)	**9.4**	ẅ ٧ ټ * *RAID *(1-) ₴
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(T)	**4**	ŋ̃ ẅ Ỵ م 7
(T)	**42**	ẅ +
Ⅎ (Ỵ)	**5**	ẅ / ٧ˋˆ ـ لج

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QPS ẅ	240000	ƞ ẅ ₴
∖ TPS	4000	ẅ CPU/`Y / Ẏ ĩ !! 2 24C+384G `Y +SSD Ẏ
∖ QPS	40000	ẅ CPU/`Y / Ẏ ĩ !! 2 24C+384G `Y +SSD Ẏ
TPS ^	6	ẅ TPS ẅ / ∖ TPS
QPS ^	6	ẅ QPS ẅ / ∖ QPS
^ ( )	6	ẅ TPS ρ QPS ^ ΰ ẅ

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TPS ẅ	24000	ƞ ẅ ₴
QPS ẅ	240000	ƞ ẅ ₴
∖ TPS	6000	ẅ CPU/`Y ĩ !! 2 24C+384G `Y
∖ QPS	60000	ẅ CPU/`Y ĩ !! 2 24C+384G `Y
TPS ^	4	ẅ TPS ẅ / ∖ TPS

QPS ` 4 ẅ QPS ẅ / ꞌ QPS

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2.4.

GoldenDB

GoldenDB

2.4.1.

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GTM	◖ ◖
	◖

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n محمد ŭ ⌡

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سر GoldenDB n محمد ŭ 3 5 ـ سر

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GTM	2 ◖ ◖ ˜ ˇ
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2.4.3. غي

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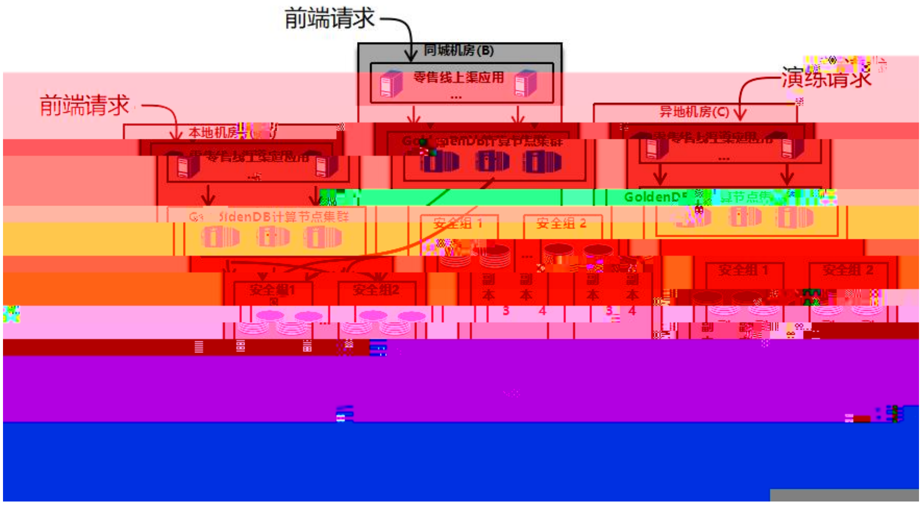

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GoldenDB غي GoldenDB سر غي م n محمد

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GoldenDB ◖ غي غي ┼

n محمد ῦ غي n محمد شج

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	غي n محمد 2
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GTM	غي n محمد 2 ◖ ◖ ˇ ˜ غي 1 ◖ ڤ 1 ◖
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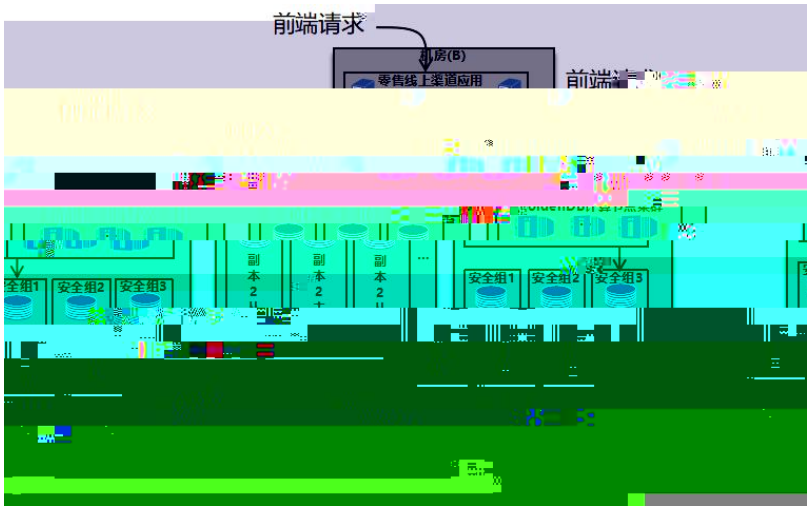

بم 10

سر n L ╥

سر L ˜

GoldenDB TEAM ˜ ا ر

3 ˜ ر 2 ا ₴ ـ

```
    public class ConnectGDB {
       public static void main(String args[]) {
          try {
                Class.forName("com.mysql.jdbc.Driver");// ˊ     GoldenDB
JDBC  ˜
                System.out.println("Success loading Mysql Driver!");
             } catch (Exception e) {
                System.out.println("GoldenDB  ˜ ˊ    ₴          GoldenDB
       ");
                e.printStackTrace();
             }
          try{
             Connection                                conn              =
DriverManager.getConnection("jdbc:mysql:loadbalance://10.229.xxx.xxx:6607
,10.229.xxx.xxx:7707/testdb?", "appuser", "db10$ZTE");
             System.out.println("    GoldenDB        ˙ ");

             PREPAREdStatement ps = null;
             ResultSet rs = null;
             ps=conn.PREPAREStatement("select * from t_area where name
= ?");

             ps.setString(1, "  ѕ M");
             ResultSet rs=ps.executeQuery();

             System.out.println("sql  ₈         1");
```

```
while(rs.next()) {})
```

JDBC

GoldenDB JDBC `H JDBC 4.2

(JDK1.8

6	۱ ñ۱	comStmtBatchFlag=true&rewriteBatchedStatements=true insert values ۱

3.1.3. GoldenDB LoadBalance

GoldenDB “ ” ۷ ۳ شجـ ~

شجـ L LoadBalance ۱ ۱

Failover ۱ fo ـ

`l Proxygroups Ѭ ѧ proxygroup1 proxygroup2..... ѧ Δ Ѭ ˜ Ѭ Ѭ ∑ Ѭ

3.1.5.

javax.sql.DataSource DataSource

ϭ ϭ GoldenDB ū

ϯ C3P0,Druid,DBCP Druid n

ر آ :

```
driverClassName=com.goldendb.jdbc.Driver
url=jdbc:goldendb://10.218.126.208:8881/sysbench?&useCursorFetch=tru
e
initialSize=10
minIdle=10
maxActive=100
testOnBorrow=false
testOnReturn=false
testWhileIdle=true
validationQuery=SELECT 1 FROM DUAL
timeBetweenEvictionRunsMillis=30000
minEvictableIdleTimeMillis=600000
keepAlive=true
```

ï validationQuery keepAlive

3.1.6.

Δ ⌡ latin1

gbk utf8 utf8mb4 م gb18030 ┼ẅ ⊀

غ ⌡ latin1_bin gbk_bin utf8_bin

utf8mb4_bin م gb18030_bin n ⌡ ï

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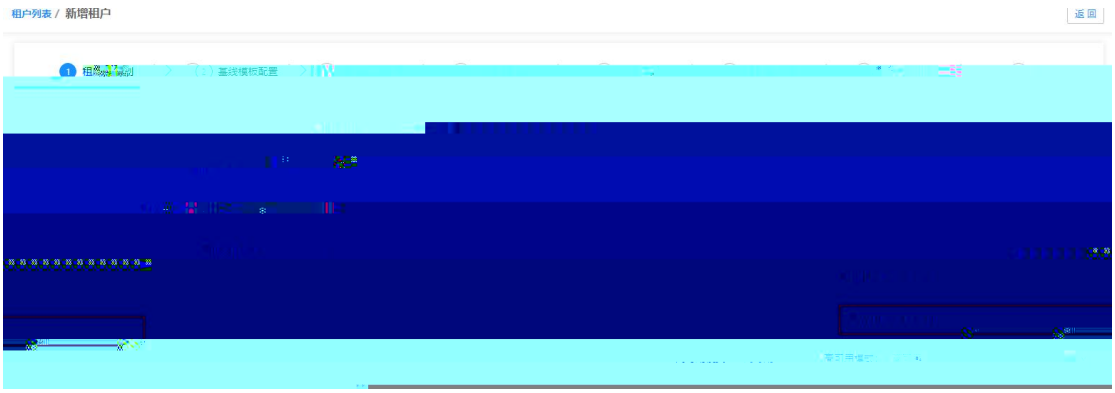

بم 12

8

CREATE DATABASE `db01` CHARACTER SET 'utf8mb4' COLLATE 'utf8mb4_bin';

8 م / t01

utf8, utf8_bin SQL

```
CREA  TABLE  1` (
  `ROL  D` v  r  0) NO  ULL,
  `MENU_ID` varchar(50) NOT NU
  PRIMARY KEY (`ROLE_ID`,`MENU_ID`),
  UNIQUE INDEX `SYS_C00192546` (`ROLE_ID`,`MENU_ID`),
  INDEX `role_id_ix` (`ROLE_ID`)
) DEFAULT CHARSET=utf8 COLLATE=utf8_bin
distributed by hash(ROLE_ID)(g1,g2);
```

Δ t01 MENU_ID Δ utf38mb4,SQL

```
ALTER TABLE t01 MODIFY MENU_ID VARCHAR(255) CHARACTER SET utf8mb4;
```

3.1.7. PREPARE

SQL 8 م GoldenDB

(PREPARE)' ~ SQL 8 م

//

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3.2. `l GoldenDB

3.2.1. ODBC GoldenDB

GoldenDB ODBC unixODBC م

ZXCLOUD-GoldenDB-ALL-ODBCV1.0.1 ´l !! ū

mysql-connector-odbc ¯

```
int main()
{
   short sret; //  fx
   void* henv;  //    8
   void* hdbc;  //    8
   long mode;//
   void* hsmt; //  8 8

   /**         8     **/
   sre
```

```
    sret = SQLDriverConnect(hdbc,NULL,(SQLCHAR*)szConnectString,SQL_NTS,
(SQLCHAR *)szDriverOutput,256,&sDriverOutputLength,SQL_DRIVER_NOPROMPT);
    /** ㅓ    ㅎ ㅎ    **/
    sret = SQLAllocHandle(SQL_HANDLE_STMT,hdbc,&hsmt);
    if(!isSuc(sret))printf("ㅓ    ㅎ ㅎ    ₴  \n");
    /**     create  ㅎ  **/
    printf("execute sql: %s\n\n", szSQLCreate);
    sret = SQLExecDirect(hsmt,(SQLCHAR *)szSQLCreate,256);
    if(!isSuc(sret))printf("exec create sql fail !\n\n");
    else printf("create table t1(new) success !\n\n");

    /**     select  ㅎ  **/
    printf("execute sql: %s\n\n", szSQLSelect);
    sret = SQLExecDirect(hsmt,(SQLCHAR *)szSQLSelect,256);
    if(!isSuc(sret))printf("exec select sql fail !\n\n");
    else printf("select sql exec success !\n\n");

    /**      ㅎ ㅎ    **/
```

```
    printf("The connection will be closed !\nBye !\n");
}
```

3.2.2. OCI GoldenDB

GoldenDB OCI dci.ini

IP مشخغي ۶ آ

```
    //          م          /      ۸
    OCIEnvCreate(&myenvhp, OCI_THREADED|OCI_OBJECT, (dvoid *)0,0, 0, 0,
(size_t) 0, (dvoid **)0);
    //ؽ    ۸لج
    OCIHandleAlloc ((dvoid *)myenvhp, (dvoid **)&mysrvhp,OCI_HTYPE_SERVER,
0, (dvoid **) 0);
    //ؽ      ۸
    OCIHandleAlloc ((dvoid *)myenvhp, (dvoid **)&myerrhp,OCI_HTYPE_ERROR,
0, (dvoid **) 0);
    //ؽ    ۸لج      ۸
    OCIHandleAlloc ((dvoid *)myenvhp, (dvoid **)&mysvchp,OCI_HTYPE_SVCCTX,
0, (dvoid **) 0);
    //      ۸لج      ۸        ۸لج
    OCIAttrSet ((dvoid *)mysvchp, OCI_HTYPE_SVCCTX,(dvoid *)mysrvhp, (ub4)
0, OCI_ATTR_SERVER, myerrhp);
    //ؽ          ۸
    OCIHandleAlloc ((dvoid *)myenvhp, (dvoid **)&myusrhp,OCI_HTYPE_SESSION,
0, (dvoid **) 0);
```

```
//          8               O م

OCIAttrSet ((dvoid *)myusrhp, OCI_HTYPE_SESSION,(dvoid *)username,
(ub4)strlen((char*)username),OCI_ATTR_USERNAME, myerrhp);

OCIAttrSet ((dvoid *)myusrhp, OCI_HTYPE_SESSION,(dvoid *)password,
(ub4)strlen((char*)password),OCI_ATTR_PASSWORD, myerrhp);

//س  ـ  لج
OCIAttrSet ( (dvoid *)mysvchp, OCI_HTYPE_SVCCTX,(dvoid *)myusrhp, (ub4)
0, OCI_ATTR_SESSION, myerrhp);


//drop
// ㅋ    8 8
CheckErr(myerrhp, OCIHandleAlloc(myenvhp, (void**)&stmthp_drop,
OCI_HTYPE_STMT, 0, 0));
// ‼   SQL  8
CheckErr(myerrhp, OCIStmtPREPARE(stmthp_drop, myerrhp, drop,
strlen((char*)drop),OCI_NTV_SYNTAX, OCI_DEFAULT));
status = OCIStmtExecute(mysvchp, stmthp_drop, myerrhp, 1, 0, NULL,
NULL,OCI_DEFAULT);
printf("drop table t1(o'd")sab]e
```

2)

3) 2~3TB 2TB

4) 6~9TB 6TB

5) 1

6) 2

7) JOIN

8)

9) HASH

10)

3.3.2.

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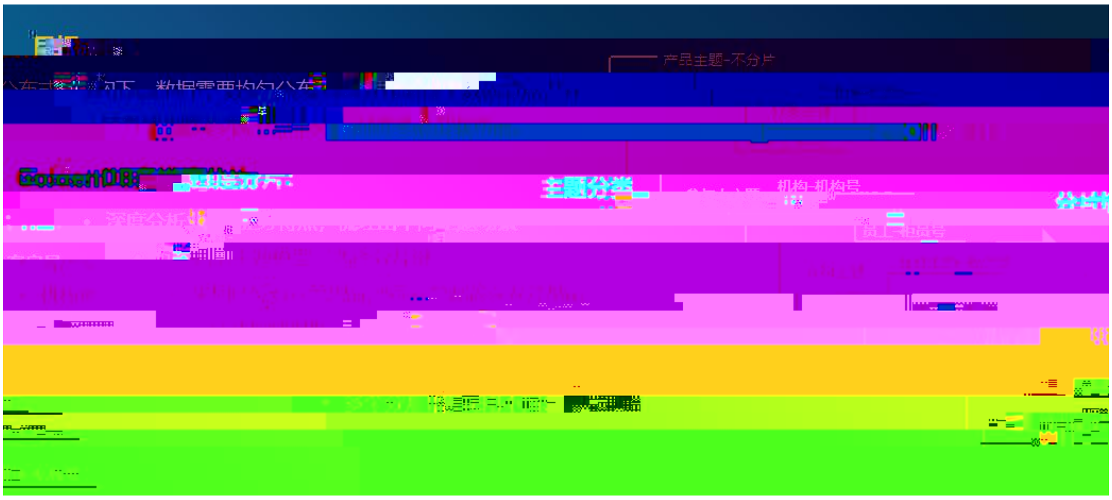

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1) ߵ ߵ

2) ï ˋ RANGE ߵ L

U ٔ ߵ شج u u ˋ HASH

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4) U ܋ ˋ HASH RANGE ߵ

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6) ` RANGE ـ

3.3.3. SQL أ لخم

GoldenDB ـ أ uˆ

ˉ SQL م ـ آ ا گي ـ ّ

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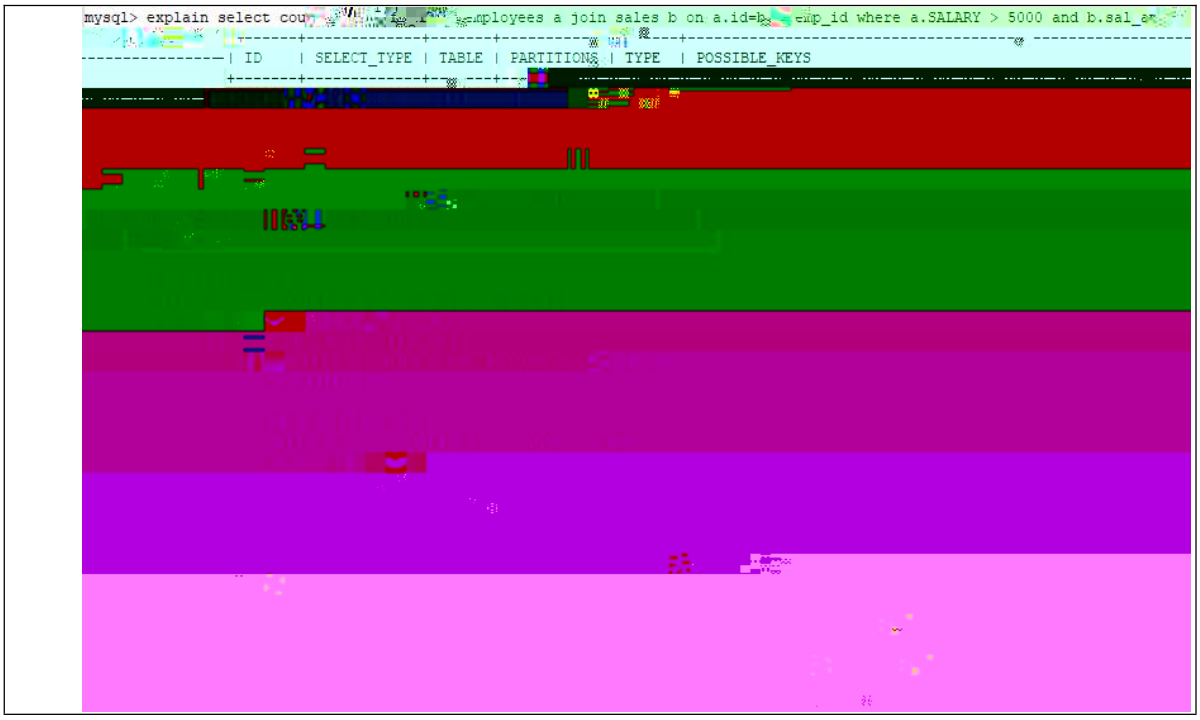
9 ˜ لخم SQL خي GoldenDB ˉ SQL

ّ ـ آ ّ u ق م DDL

```
#u employees u ` ˉ hash ـ
Create Table: CREATE TABLE `employees` (
  `id` int NOT NULL,
  `name` varchar(50) DEFAULT NULL,
  `age` int DEFAULT NULL,
  `salary` float DEFAULT NULL,
  PRIMARY KEY (`id`)
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_bin
 DISTRIBUTED BY HASH(`id`)(g1,g2)

# ق ق ˉ hash ـ
Create Table: CREATE TABLE `sales` (
  `emp_id` int DEFAULT NULL,
  `sal_recid` int NOT NULL,
```



3.3.4.

```
function PREPARE_statements()
   if not sysbench.opt.skip_trx then
      PREPARE_begin()
```

```
      PREPARE_commit()
   end

end

function event()
   local src = sysbench.rand.uniform(1, sysbench.opt.table_size)
   local dest = sysbench.rand.uniform(1, sysbench.opt.table_size)

   if not sysbench.opt.skip_trx then
      begin()  //  Э  ·
   end

   con:query(string.format("select * from zh_fock.account where accno =
'%d'",src))
   con:query(string.format("select * from zh_fock.account where accno =
'%d'",dest))
   //A      ₴
   con:query(string.format("update zh_fock.account set realtimeremain =
realtimeremain - 0.01 where accno = '%d'",src))
  //B      ņ
   con:query(string.format("update zh_fock.account set realtimeremain =
realtimeremain + 0.01 where accno = '%d'",dest))
   con:query(string.format("insert into
journal(flowno,flowdate,amount,debitacc,creditacc)
values(null,now(),0.01,'%d','%d')",src,dest))
```

```
    if not sy    nch.opt.skip_    then
       commit    /  ـ              ـ
    end
end
```

3.4. ٩

3.4.1. ٩

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`l شج` U ẅ ٩ ⅎ ,

2) , ٧ Δ , U Δ ,

U

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U

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3) Δ سر ẅ Δ u ‴Ω̹

4. TEXT BLOB م VARCHAR ╦ BLOB

TEXT VARCHAR لخم Δ ╦ 9

5. U `H `H ˜́ ˥ ˜

U ⅎ ỉ خي where ˜ U ⅎ ỉ ˜́ where

₴ `H `H `H

˜́ سر ⅎ ‴Ω̹ ỉ ˜́ 9 / `H

```
col_name column_definition
GLOBAL [UNIQUE] INDEX
    [index_name] [index_type] (index_col_name,...)
    [index_option] ...
```

2) u ώ ⁄ golbal index

```
CREATE GLOBAL INDEX index_name
    ON tbl_name (index_col_name,...)
| CREATE GLOBAL UNIQUE INDEX index_name
    ON tbl_name (index_col_name,...)

index_col_name:
    col_name [(length)]
```

3) alter table add global index ŉ ًٍ ɥ bb ע

```
ALTER TABLE tbl_name
ADD GLOBAL [UNIQUE] INDEX [index_name]
(index_col_name,...)

index_col_name:
    col_name [(length)]
```

3.4.2. U ɟ V

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3) SQL ⊣ ⋈ Δ

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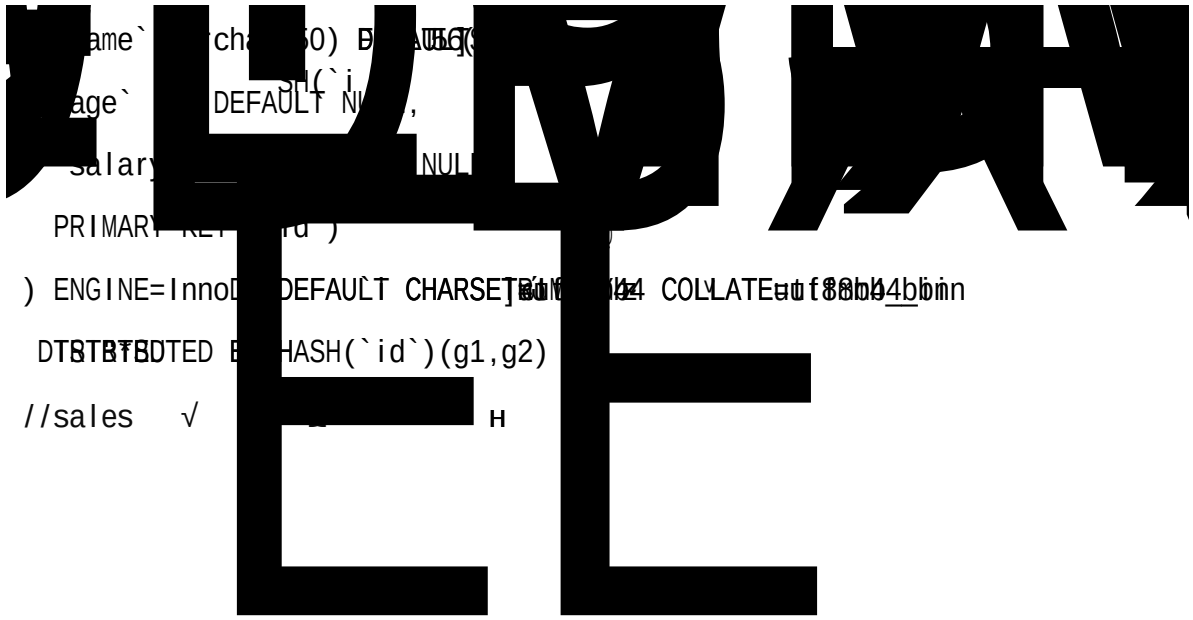
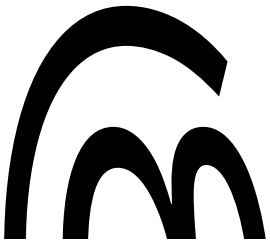
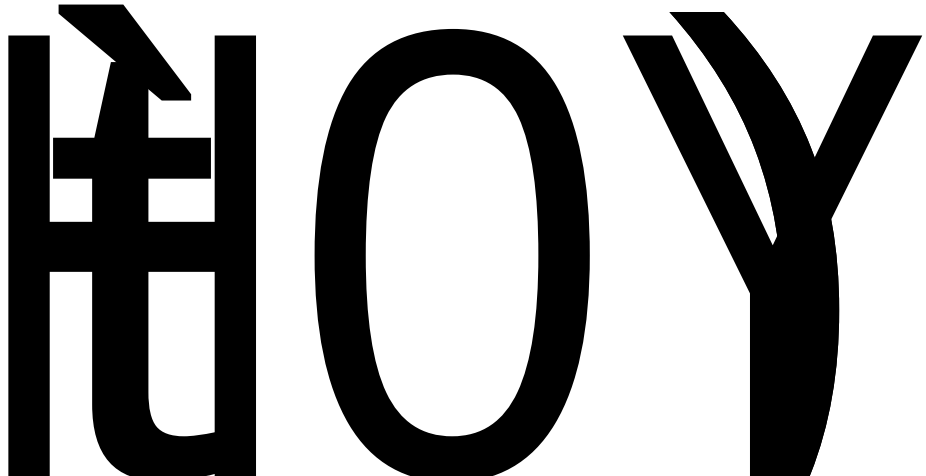
⊣ ⋈ ⊣ ⋈ ∩

5)


ame` ch 0) D
age` DEFAULT N
Salary NUL
PRIMARY KE d`)
) ENGINE=Inno DEFAULT CHARSET
DISTRIBUTED B HASH(`id`)(g1,g2)
//sales √ H





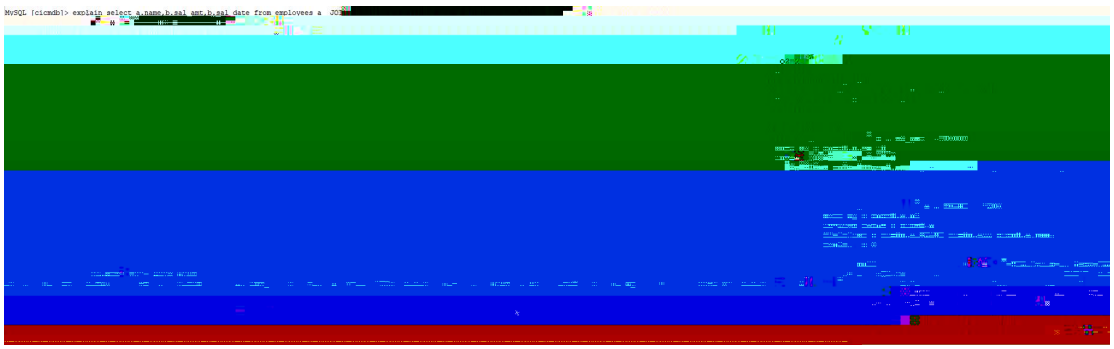


图 14 explain

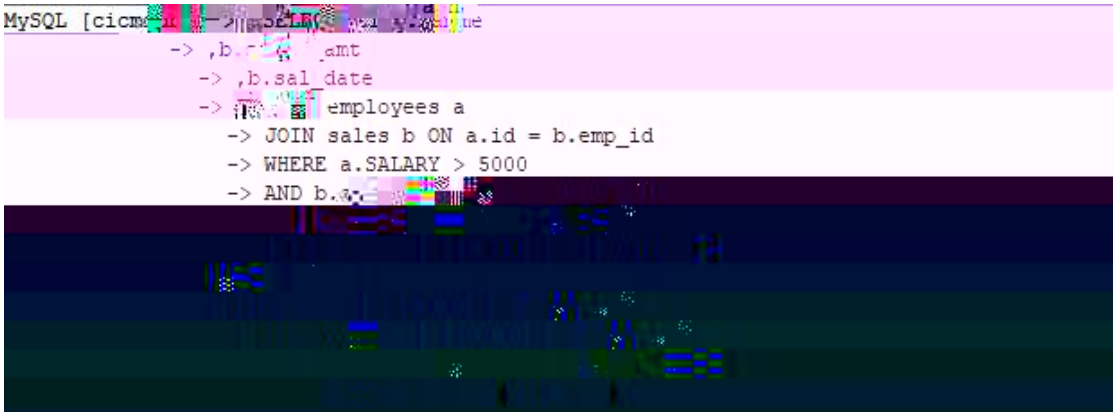


图 15 ( )

. sales

```
//sales √ u ` hash
Create Table: CREATE TABLE `sales` (
  `emp_id` int DEFAULT NULL,
  `sal_recid` varchar(50) NOT NULL,--
  `prod_id` varchar(20) NOT NULL,
  `sal_date` date DEFAULT NULL,
  `sal_amt` float DEFAULT NULL,
  PRIMARY KEY (`sal_recid`)
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_bin
 DISTRIBUTED BY HASH(`emp_id`)(g1,g2)
```

ώ ↔ Ⅎ 𐞂

بم 16 explain (. u)

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بم 17 (. u)

3.4.4.

SQL ۓ لج ΰ̈ ₴ س `Y

فخ ˜ ₴ ڕ 1 ˜

˜ ۓ لج L ΅Ω

˜

1. statement

```
setResultSetType(ResultSet.TYPE_FORWARD_ONLY);
```

2. setFetchSize(Integer.MIN_VALUE);

3.

```java
                System.out.println(rs.getString("job") + "\t" +
rs.getString("ename"));
            }
        } catch (SQLException e) {  e.printStackTrace(); }
        finally {  //
            DBUtils.close(rs);
            DBUtils.close(ps);
            DBUtils.close(conn);
        }
    }
```

3.5. ҷ ἒ

GoldenDB AP ῃ MPP ˜ ҷ

MPP ὤ ⅎ ⌐ ̂ ̵ ﻟﺞ CPU ῢ `Y

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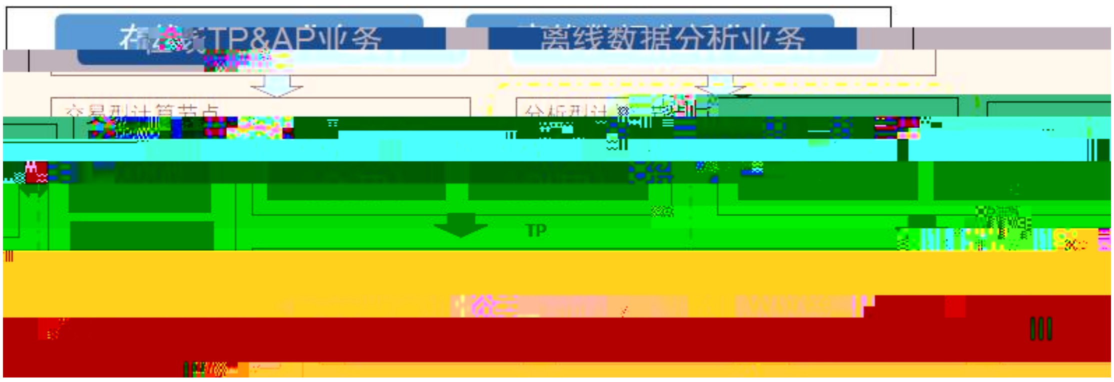
ˋl ⅎ OLAP ̵ ⅎ

ἒ



ﺑﻢ 18 MPP ҷ SQL

˜ ᏈMPP ⁴

```
# proxy.ini
conn_instance_for_mpp=8880 # ╥
ˆ 6 6 ỉ └ mpp
default_parallel_processing_mode = 1 # ∩ ∑
√ 6 mpp
```

3.5.1. ⅎ

Limit ⅎ م where select_list

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1. ⅎ ⅃ ⅎ ╥ id

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ⅎ

2. ₴ ῼ ₴ ώ فخ 8

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˾ SQL:

```
# ʌ SQL
Select db.table.col2 from db.table [ where condition ] [ order by xxx] limit
10000,10;
# .
```

Select id from table [where condition] [order by] limit 10000,10;

Select cols from table WHERE id in (‘ 123 ’ , ’ 456 ’ ...) ;

.

SELECT

```
FROM employees a
JOIN sales_t01 b ON a.id = b.emp_id
WHERE a.SALARY > 5000
   AND b.sal_amt > 500000
   AND b.sal_date BETWEEN '2023/01/01'
   AND '2023/1/31' UR;//UR
```

3.6.

GoldenDB

1\. , , SHOW DISTRIBUTION

FROM table_name table

STORAGEDB

2\. ,

WHERE

, SQL

فخ g1, g2 g3 ـ

2) ـ (g1,g2,g3) Ƨ Pod(ĺ 3)

3) Pod `Y ـ mb_acct نھ select pk from mb_acct; نھ ـ 64 (12 CLIENT)

4) Ƨ 64 work work select ... from CIF_CLIENT iaa, MB_ACCT ia where client_no between ـ i;

5) Ƨ , 2000 فخ PREPAREdStatement.setFetchSize(2000);

6) work ₴ 2000 ώ Ã commit ˚ ( ) L

3.7. ـ ٦

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غي n محمد غي `l غي n محمد

2) ٨ ⌡ ـ سر sql ٨ hint hint

~ TER ADD E READSLAVE

W F

[redacted]

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:open_date

5 (لخم time,˜ ـﻫ): ”_time” u close_time ĩ

6 (لخم datetime ˜ U ـﻫ): ”_dt” ”_datetime” u register_dt ϣ

7 (لخم datetime(6),˜ U ـﻫ): ”_ts” u :create_ts /

8 ẅ : ”_flag” u : ∩ ˜ ر o delete_flag

ر o ر :

1 ج “udx_” o ر o ج

3.9.3. U ῃ

n ῃ , ẅ INSERT ₈ Ⅎ

INSERT ਫ਼ " ῃ ₉ Ṗ ⌡ ⸷

SQL ₈ ,῀ ῃ n ˜

⸷ IO .

```
insert into tablename values(1.2),(2,3),(3 4)
```

3.9.4. ـ

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3.9.5. SQL Ὴ

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IO , ,

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3.9.6. ῀ ΰ ₴ Δ , SELECT *

₈ Ώ select *, Ί ΰ

select * ΰ ₴ Ὴ Δ , : CPU IO

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```
select c1,c2,c3 from t1;
```

:

```
select * from t1;
```

3.9.7. SQL `H

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1000 .

3.9.8. Δ *

ﺍ SQL card_detail (ac,s

3.9.9.

LIKE

"%", SQL

```
select id,val from table where val like '%name';
```

SQL %

```
select id,val from table where val like 'name%';
```

3.9.10.

:1 order by group by distinct ,

2 order by group by distinct SQL

where a=1 order by b, SQL (a,b) 3

order by group by distinct where

1 SQL

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GoldenDB CACtool ´l ɟ

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CACtool ddl/dml/dql/„ ɟ

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ū ɟ `Y ∑ ˝ DDL SQL ď ﻟﻜ

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tmp

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4.2.7. فخ

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INSERT UPDATE DELETE

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INSERT UPDATE DELETE ∩

n ȹ ˜ SQL ȣ ∩ ١

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بم 23 SLOTH

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SLOTH ﻡ Golden

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4.4.2.

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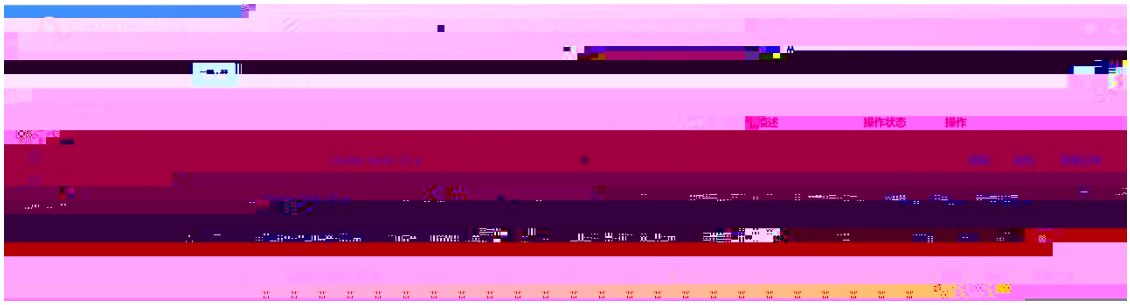
5.1.

سر insight



2

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بم 30 GoldenDB ɥ ⺈̃

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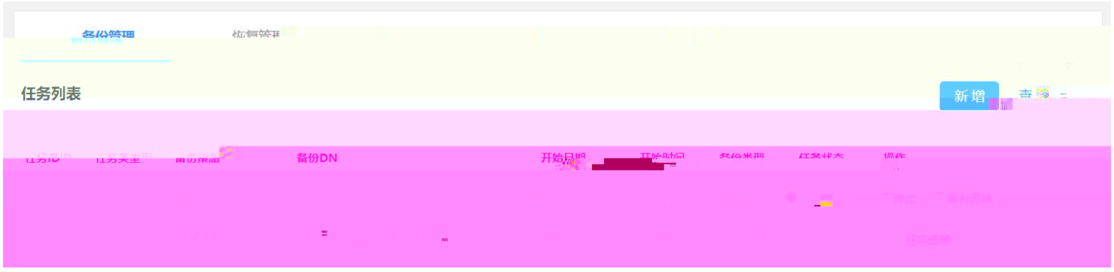
告警管理
权限管理
任务管理
版本库管理
系统
基线管理



بم 37 GoldenDB ـ

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بم 38 GoldenDB ـ

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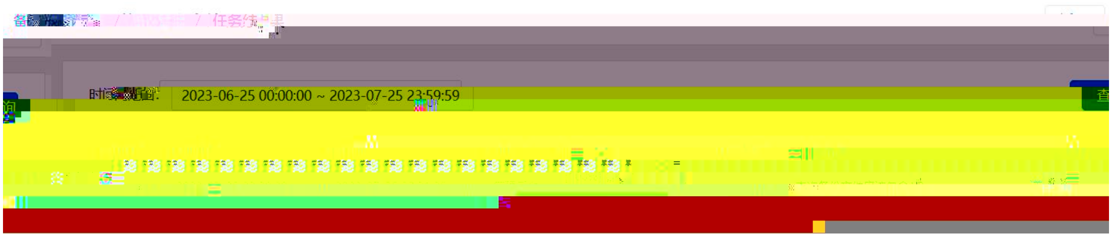

بم 39 ـ

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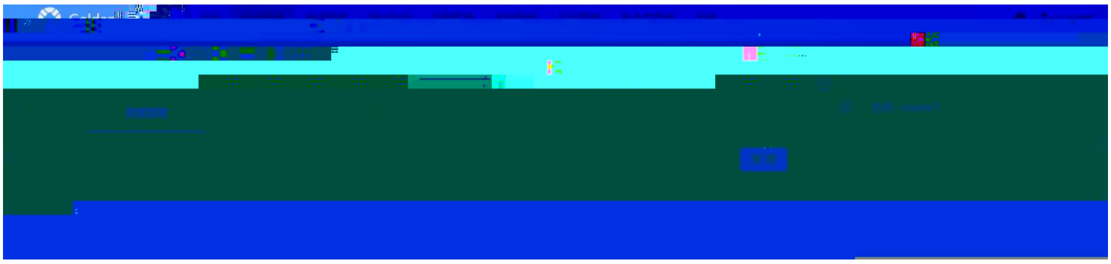

بم 40 GoldenDB

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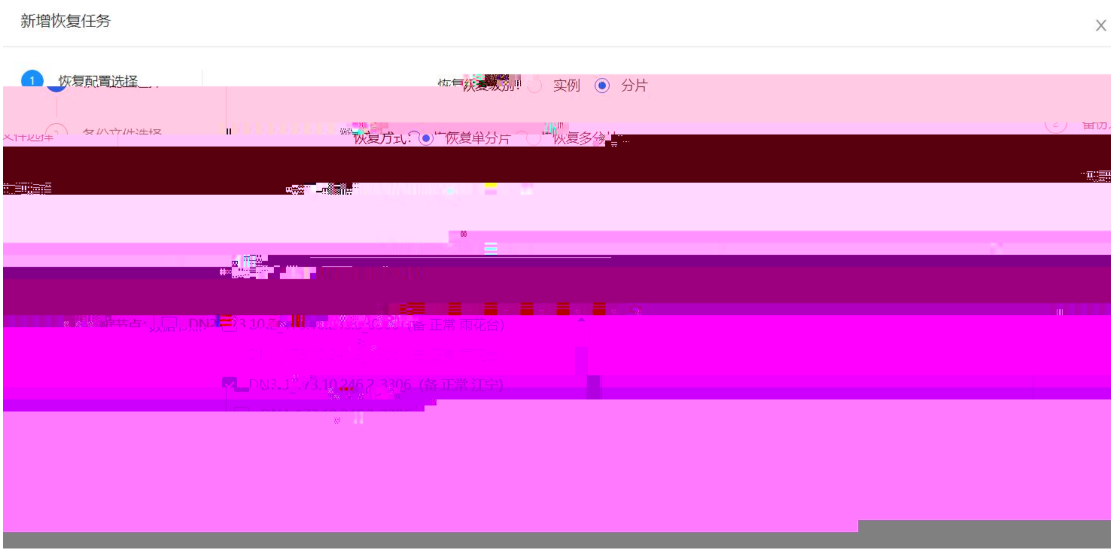

بم 41 ⁄ ؘ

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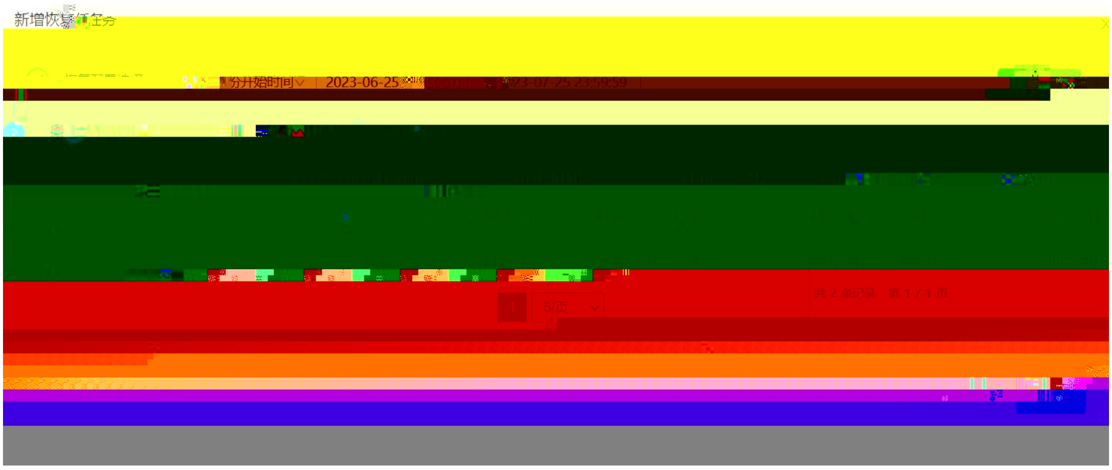

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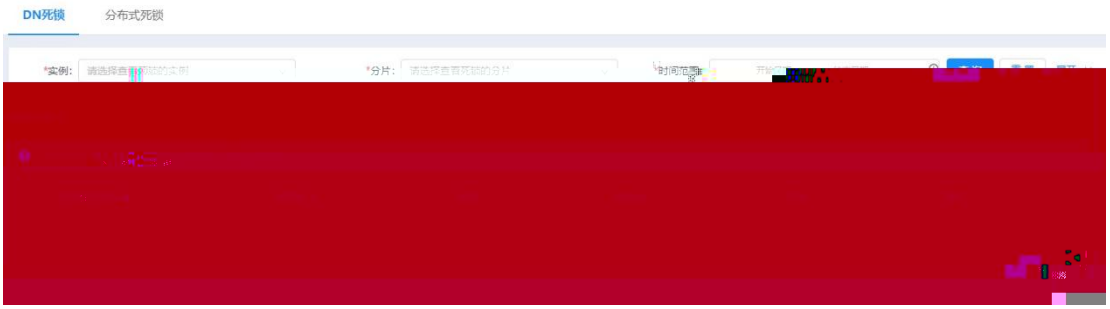
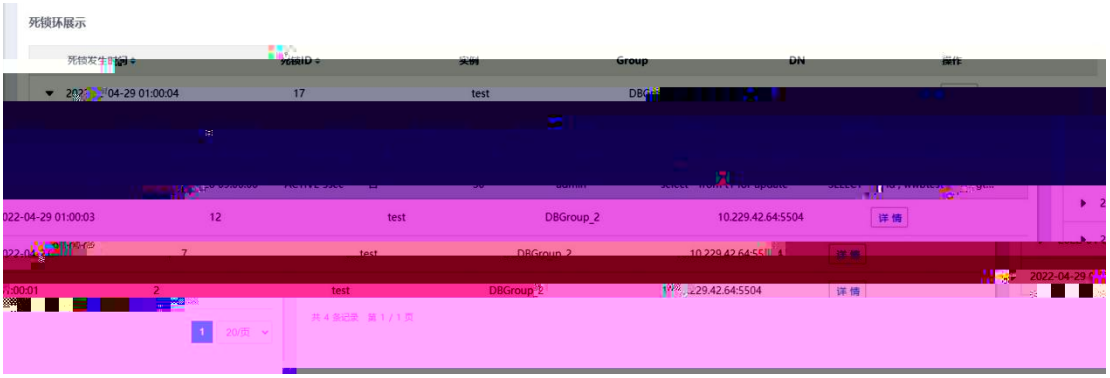


图 46 DN

ID GTM GTID SQL DN ID ID

图 47



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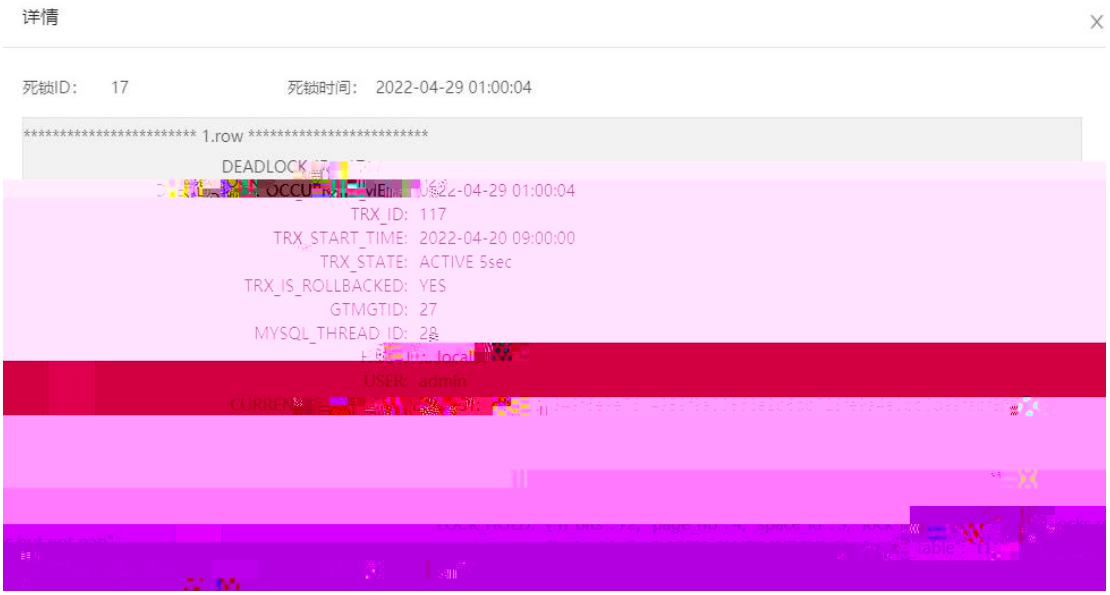

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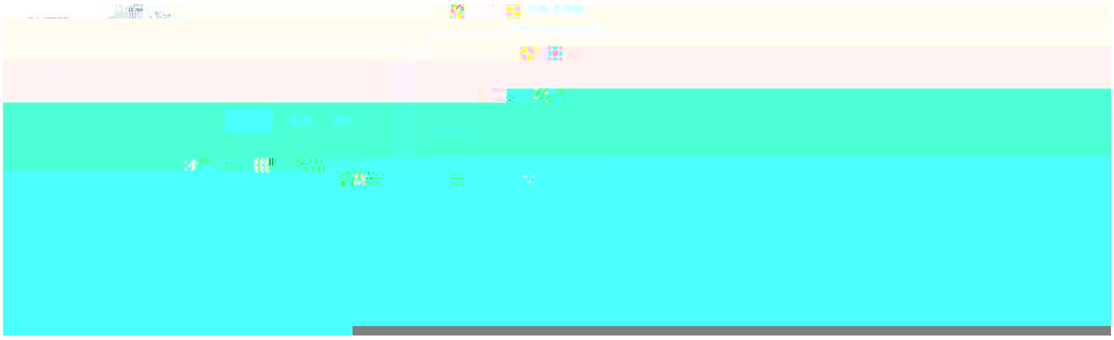

بم 50 Ⅎ

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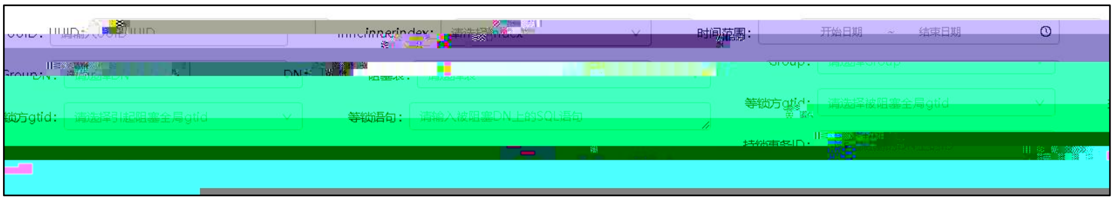
نه Group DN gtid gtid

8 ـُ ID



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55 GoldenDB

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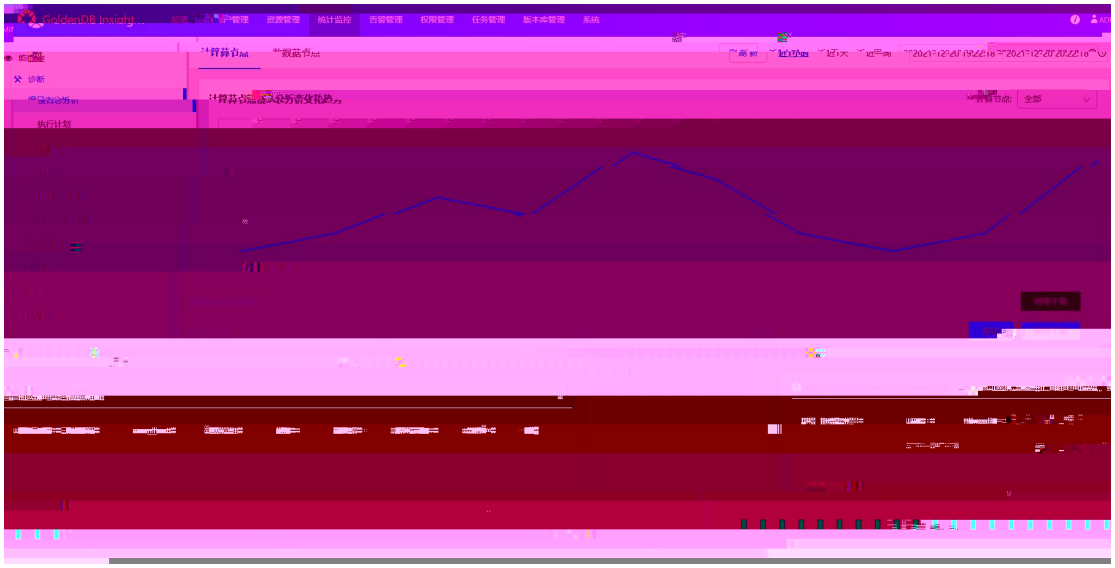

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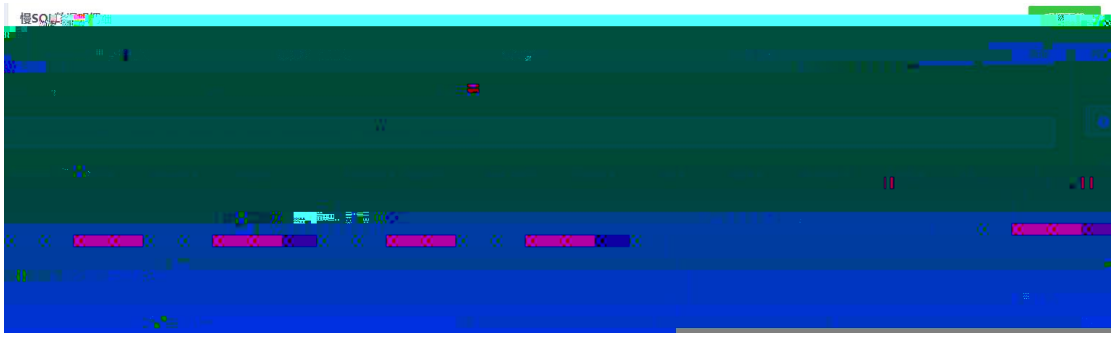

بم 57 SQL

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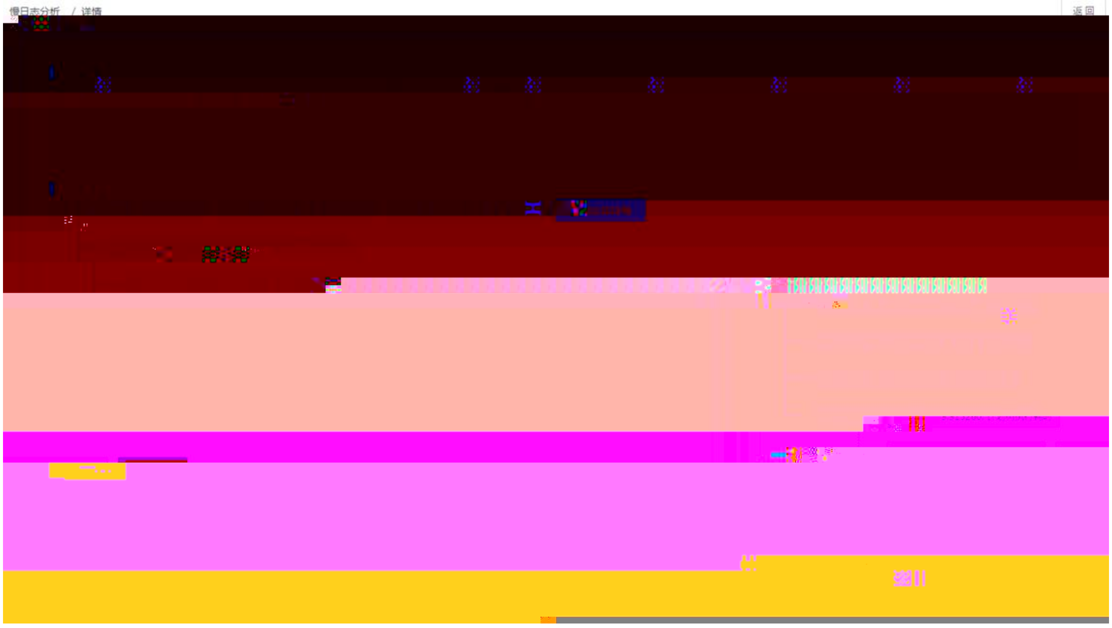
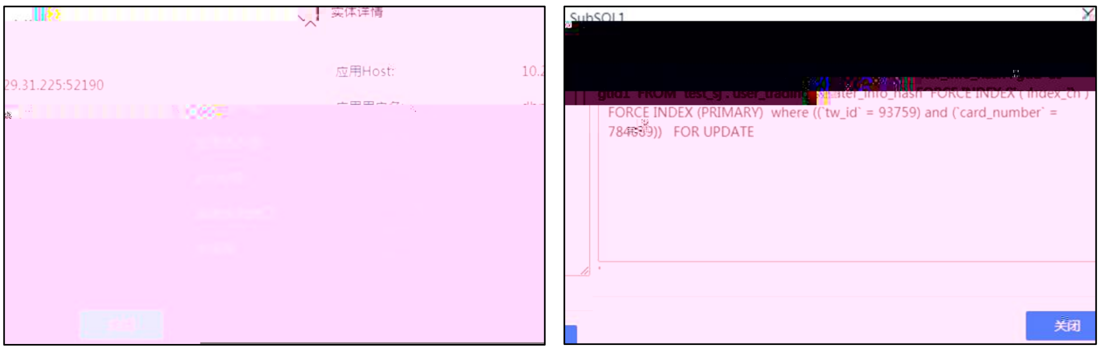
SQL 8



بم 58 SQL

ʎ ₵ Ⅎ

ʎ ₵ SQL Ⅎ ₴ SQL 8



بم 59 Ⅎ

5.7.

insight

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₴ sql ˜ ۷ ₡ً Δ KILL

سر ₴ ۷ ₡ ˜ ۸ سر ـّ

KILL ˆ ۸ ñ o ۷ ۱

۷ ₡ˊ ñ o ۷ سر ₴ ۷ ₡

KILL م ñ o ۷۱ sql ˊ


实时在线事务分析
暂无数据

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insight ـ ـ GTID “ ـ ـ سر ـ

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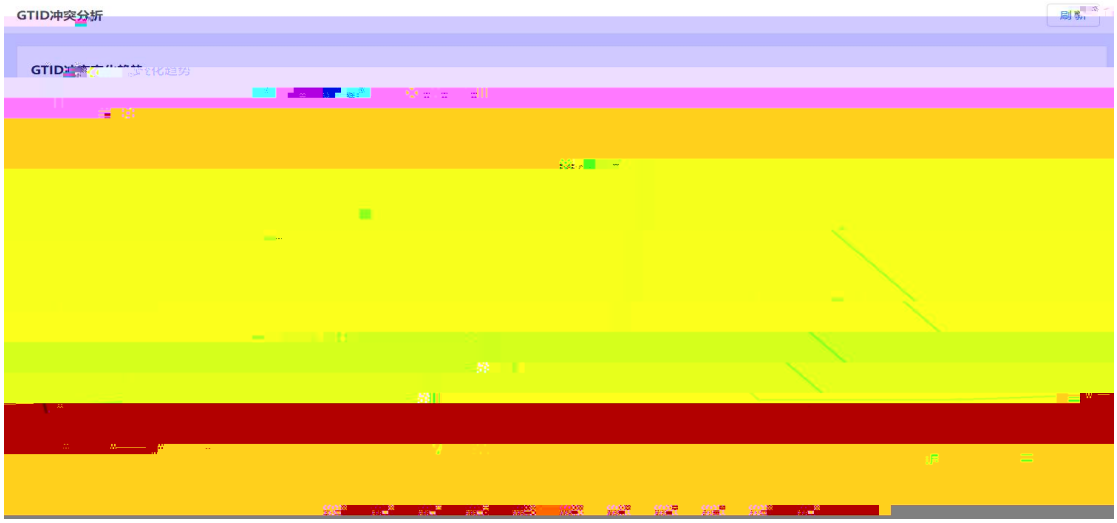

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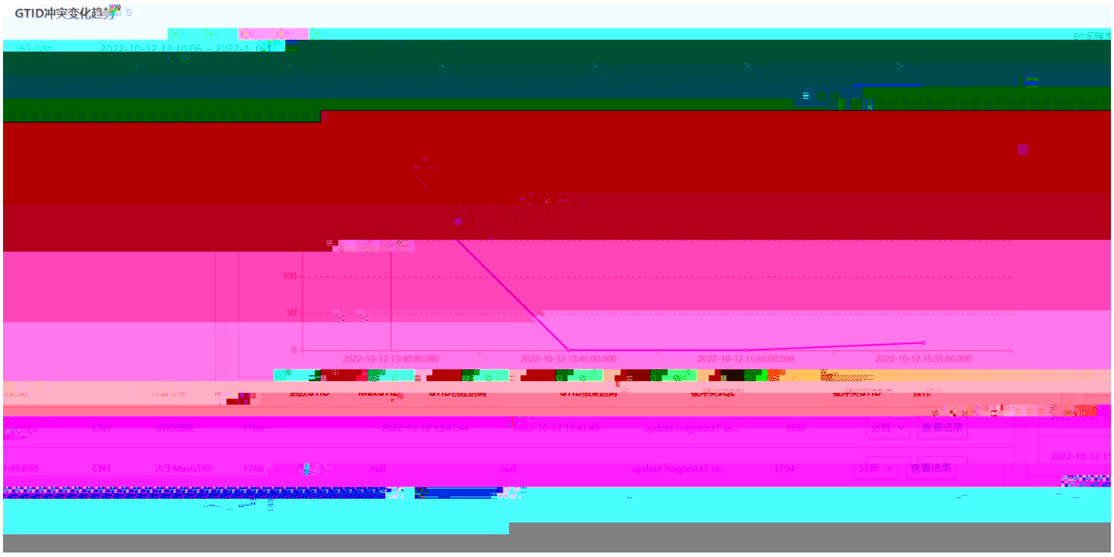

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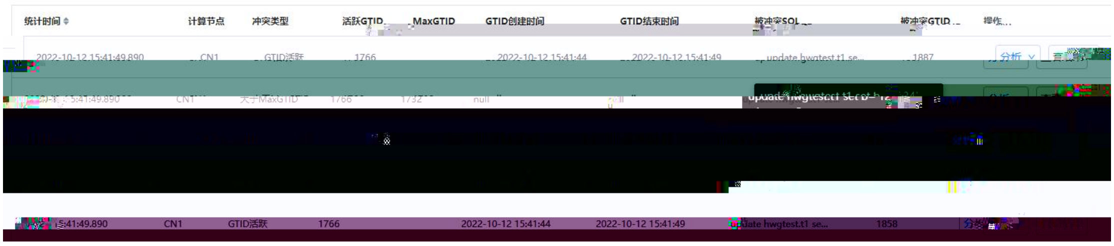

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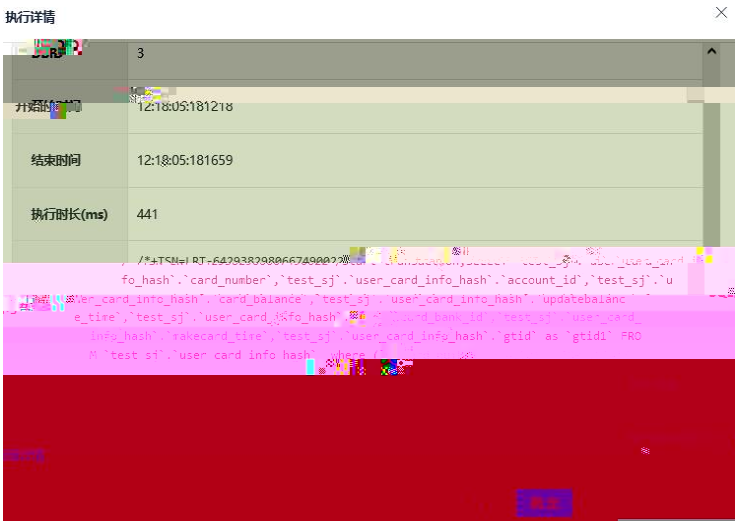

بم 73 سر ɹ `Y

insight ~

خم ϥ

图 75 热点表名

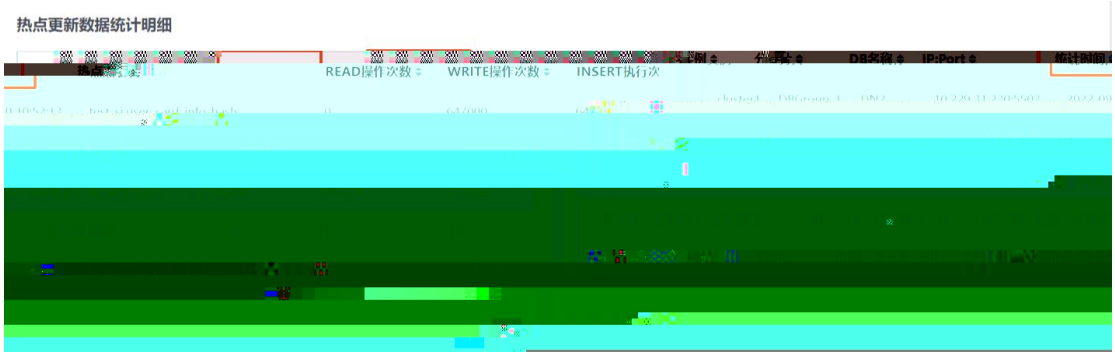

图 76

TOP SQL TOP SQL

insight

بم 78 GoldenDB سر ٦

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بم 79 سر ٦ ـ

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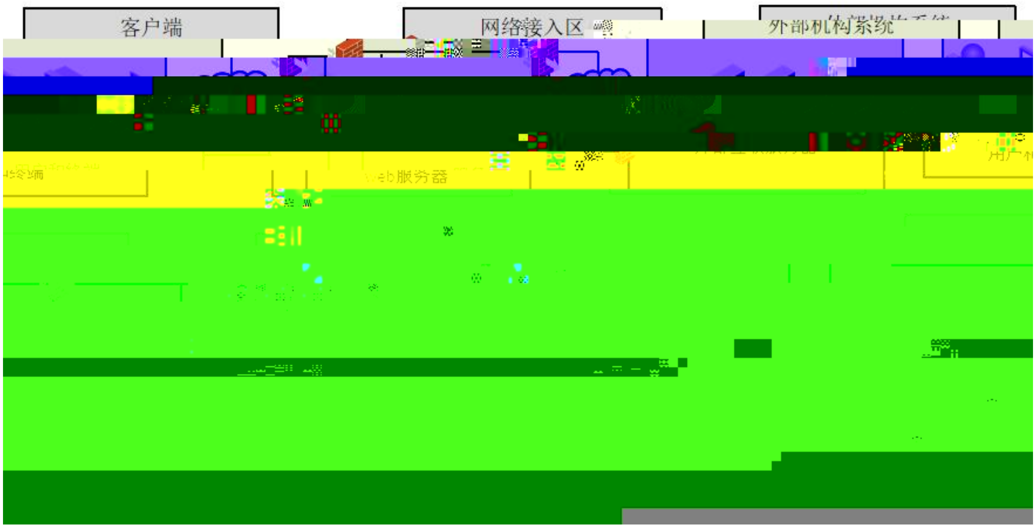

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6.1.1. GoldenDB ₆ Δ

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TCP/IP	3306		, ,
TCP/IP	5018 5600 6151-6200		
TCP/IP	21/22 3306 5012 5518 8021		

	16313 6251-6300		
TCP/IP	21/22 5010 5600 8021 16313 6026-6030 8501-8600	GTM	, GTM,
HTTP	8444		لج Insight
TCP/IP	3309	RDB	
TCP/IP	5004, 6406-6410	MDS	, GTM, ,
TCP/IP	5006, 6006-6010	PM	,
TCP/IP	5008 6016-6020	CM	,

17 GoldenDB ₆ Δ

6.2. ` `H

فخ / ` root ~

root GoldenDB

root

GoldenDB /

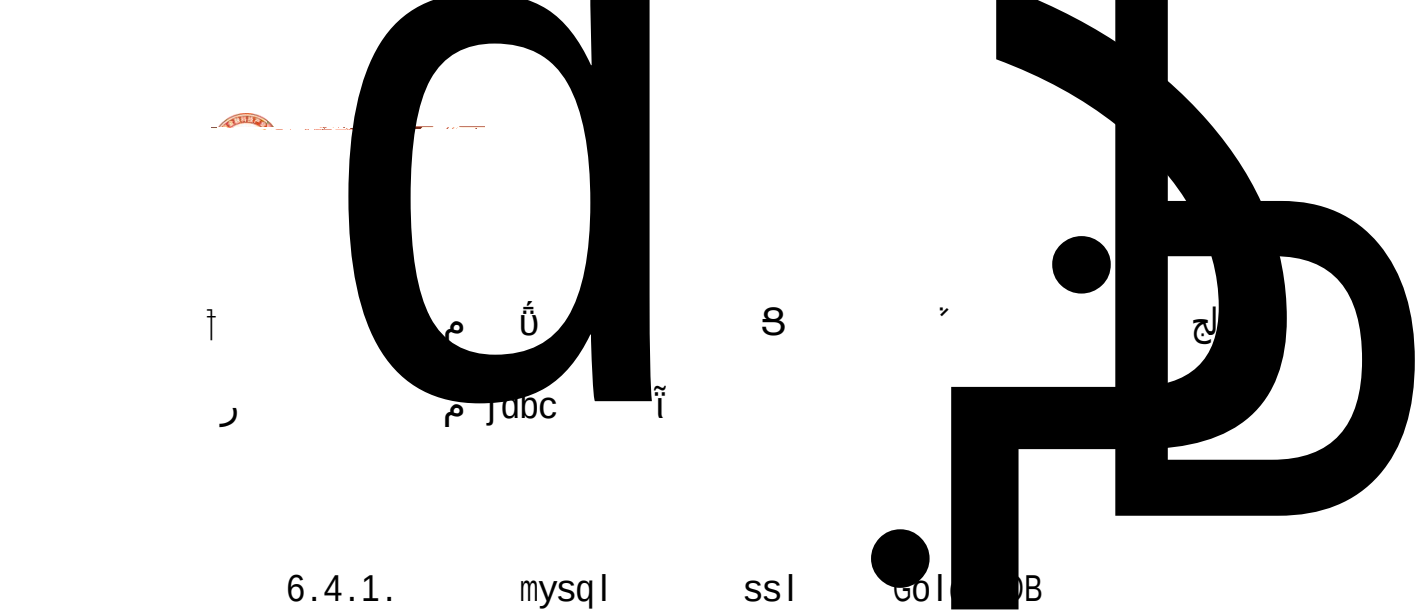
6.3.

GoldenDB

GRANT/REVOKE

```
GRANT UPDATE, DELETE, INSERT, SELECT on app_xxx_1 TO app_user1;
REVOKE UPDATE, DELETE, INSERT, SELECT on app_xxx_2 FROM app_user1
```

6.4.



6.4.1. mysql ssl GoldenDB

```
mysql --ssl-ca="/home/cert/ca.pem" --ssl-cert="/home/cert/client-cert.pem"
--ssl-key="/home/cert/client-key.pem" -h[GoldenDB IP] -uroot -p123456
-P1111
```

ca.pem

client-cert.pem client-key.pem

6.4.2. jdbc ssl GoldenDB

1. truststore

keytool -import -alias mysqlServerCACert -file ca.pem -keystore truststore

truststore

2.

o]?verifyServerCertificate=true&useSSL=true&requireSSL=true";

سر JAVA

...

System.setProperty("javax.net.ssl.trustStore","[truststore]");

System.setProperty("javax.net.ssl.trustStorePassword","[truststore

ñ]");

...

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6.5. Y

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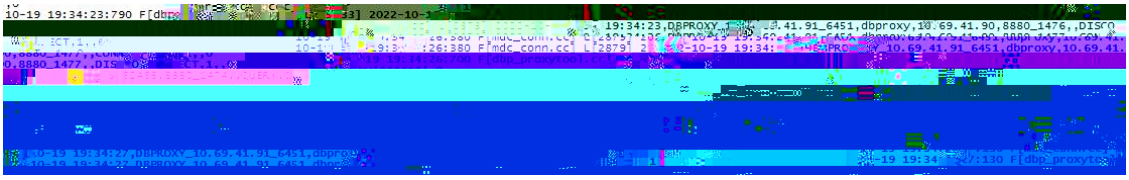

ㅂ 82 GoldenDB

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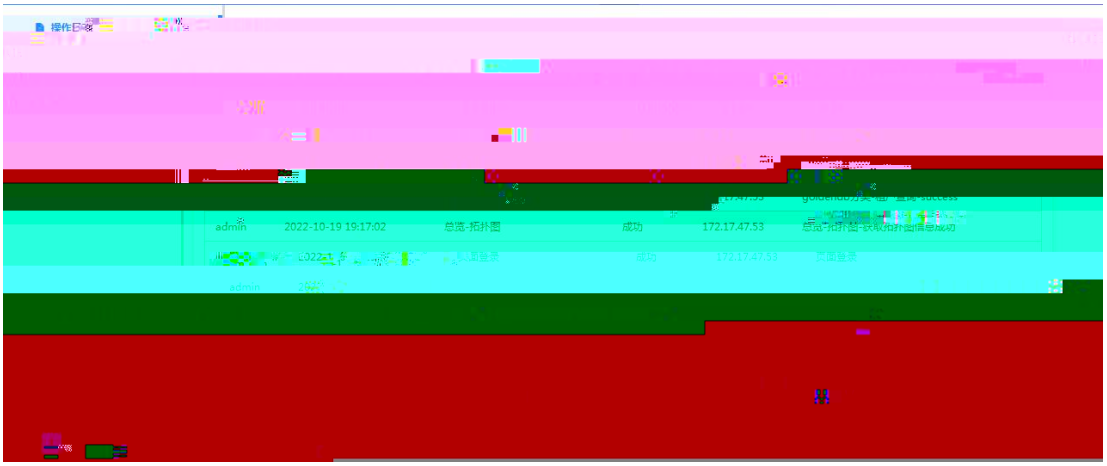
Insight ˇ ĩ ~



ㅂ 83 GoldenDB Insight ˋY

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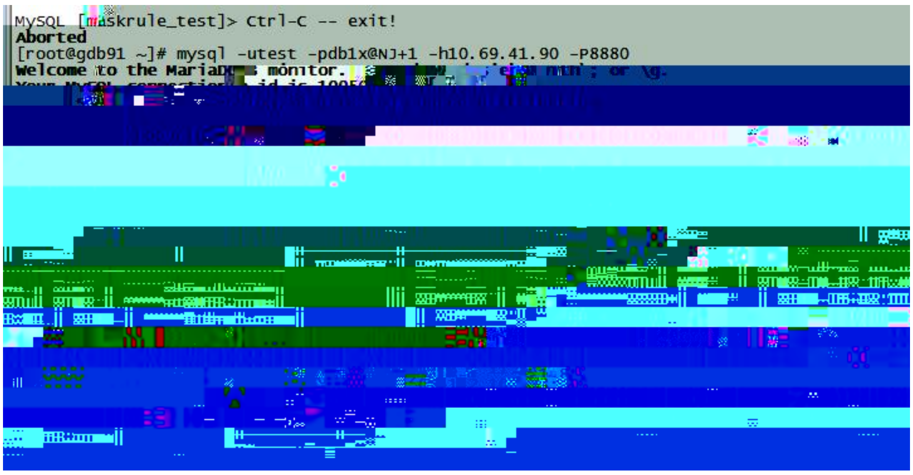

بم 85

6.8. SQL ٦ ٹ

U SQL ݛ

ٹ ٦ SQL

SQL م GoldenDB SQL ỉ ῳ ⅎ

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╥ GoldenDB SQL ΄l u DDL

م SQL

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آ SQL ↔ u SQL ₴ .

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Ⅎ Ⅵ)

D Ⅎ SQL Ⅎ ∑ م SQL ₴

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SQL `H ╕ . آ ₴ ⅃ .

SQL u ∑ ∑ ⅂

SQL ८ DROP ALTER TRUANCATE DELETE GRANT REVOKE ८

∑ L م n SQL

7. GoldenDB

7.1. Ⅎ

سر ـ L Ű Ű GoldenDB

```
[2020-03-18 0[illegible]01.003370[illegible]][DEBUG][311-1-4091-
15844773613726[illegible]][LRT113328288912[illegible]73368|49417|49900|dbp_proxytool.cc:3723||#EXECUTE:Port[illegible]788]Session[4091]TransSerial[LP[illegible]
3328[illegible]88912367[illegible]LinkIP[10.40.102.58]LinkPort[16670][illegible]ProxyName[proxy1]ClusterName[cluster1]TotalExe
cTime[2005025us]BeginTs[04:36:01.375315]EndTs[04:36:03[illegible]
[illegible]s]
SubSQL[1]:TaskID[1]ExecTime[2002880us]BeginTs[04:36:01.375455]Fi
nishTime[2us]Query[illegible]
]SQL[SELECT
`test`.`user_card_info_has[illegible]
[illegible]ber`,`test`.`user_card_info_hash`.`account_id`,`test`.`user_card_info_hash`.`card_balance`,`test`.`user_card_info_hash`.`updatebalance_time`,`test`.`use
r_card_info_hash`.`makecard_bank_id`,`test`.`user_card_info_hash`.`makecard_time`,`test`.`user_card_info_hash`.`gtid` as `gtid1`[illegible] FROM `test`.`user_card
_info_hash` where (`card_number` = 527311) FOR UPDATE]
```

2. ĩ ˊ └/etc/sysctl.conf u sysctl -p ĩ

CPU

```
[root@10 ~]# tuned-adm active
Current active profile: throughput-performance
[root@10 ~]# tuned-adm profile throughput-performance
```

CPU

```
cat /proc/cpuinfo | grep  'physical id' | sort | uniq | wc -l  cpu
cat /proc/cpuinfo | grep 'cpu cores' | sort | uniq  cpu
cat /proc/cpuinfo | grep 'processor' | sort | uniq | wc -l      cpu
cat /proc/cpuinfo | grep 'model name' | sort | uniq(cpu ˺ ڈ)
```

lscpu ر

2. ˋY

NUMA

numactl --hardware ˋY

قح NUMA ˋY ꟻ Ώ سر CPU سر ˋYغي

ꟻ CPU ˋY ꟻ شج CPU ˋY

swap ꟻ ˋY swap

insanity BIOS سر ĩ numa

irqbalance

service irqbalance status

irqbalance . ꟻ Ȣ irqbalance ˖ irqbalance ˝

غي شج` غي ꟻ ĩ ˷ CPU core.

vm.min_free_kbytes م vm.swappiness

[root@10 ~]# echo vm.min_free_kbytes=4194304 >> /etc/sysctl.conf (

128G `Y)

[root@10 ~]# echo vm.swappiness=0 >> /etc/sysctl.conf

[root@10 ~]# sysctl -p

ĩ swap

[root@10 ~]# echo 3 > /proc/sys/vm/drop_caches

overcommit_memory `Y ɹ

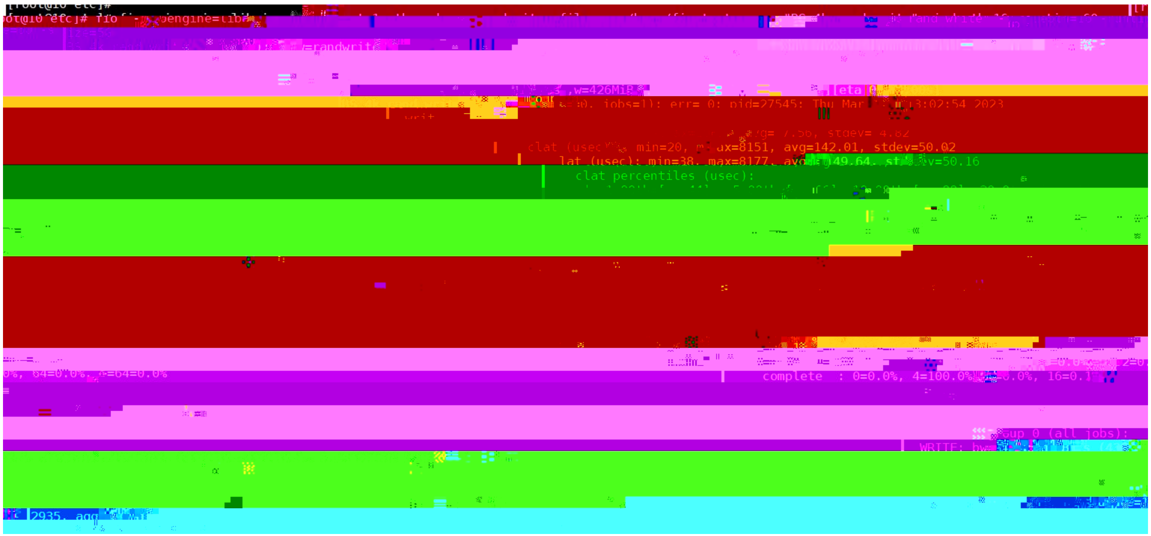
[root@10 ~]# cat /proc/sys/vm/overcommit_memory

0 1 2

3.

io iops م < P

[root@10 ~]# fio -ioengine=libaio -bs=4k -direct=1 -thread -rw=randwrite -filename=/home/fio_test -name="BS 4k rand write" -iodepth=16 -runtime=60 -size=5G



[root@10 etc]#
,w=426MiB
jobs=1): err= 0: pid=27545: Thu Mar
3:02:54 2023
ax=8151, avg=142.01, stdev=50.02
lat (usec): min=38, max=8177
clat percentiles (usec):
complete : 0=0.0%, 4=100.0%

بم 86 fio

ntp ˙ ฝ n

```
systemctl status ntpd
ntpq -p
```

tcp

:

65536 oracle block

max_table_record_si :

ze

SSD

thrbad_pool_sta

sql

4.

7.4. SQL

SQL

1.

2.

3. in/not in/exists/not exists

inner join/left join

1) exists/not exists

```
select * from t1 where exists (select id from t2 where t1.id = t2.id);
```

4. 8 8 SQL

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GoldenDB ﺋﻬ ┼

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8.1. ˙

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ㄱ TPS L شج 53ms سر

`Y ـ ˙ GoldenDB ” ˜ ” ـ

˙ ㄱ ⊢

8.2. ˙

2014 GoldenDB Ợ u سر ` n ˜

ﻕ ـ ˙ `H u GoldenDB 2019

10 سر 1 1.1 شج 36ms 2020

5 سر ˙ 3 ˜ 6 9,

n ˥ 30% GoldenDB سر

˵ ” ECIF م ˋl ˥

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8.6. ڈ ـ

2023 3 ڈ GoldenDB n محمد ǘ

ـ ǘ 5000 3000TPS ˊl

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8.7. ئهـ ƕ

2022 8 ئهـ ƕ GoldenDB

‖ ـ Ⅎ HTAP

⊢ ” ‖ ڈ خي SQL ŋ̃ ˥

خي ˜ 5000w ŋ̃ 60w /s

خي ŋ̃ 792w /s