SQL强化

1. SQL执行顺序

```
--举例:
select
       a.sex,
       b.city,
       count(1) as cnt,
       sum(salary) as sum1
from table1 a
join table2 b on a.id=b.id
where a.name=b.name
group by a.sex,b.city
having cnt>=2
order by a.sex,b.city
limit 10

--或者是
select distinct
       a.sex,
       b.city,
       a.age
from table1 a
join table2 b on a.id=b.id
where a.name=b.name
order by a.sex,b.city
limit 10
```

上面的SQL语句的执行顺序是: from (去加载table1 和 table2这2个表) -> join -> on -> where -> group by->select 后面的普通字段，聚合函数count,sum -> having -> distinct -> order by -> limit

```
--on 和where的先后顺序讨论
--下面用left join 各得到结果，结果不一样。
--下面可知，先执行on，再执行where
select *
from table1 a
left join table2 b
on a.id=b.id
where a.name=b.name;
--下面的条数可能会比上面多。
select *
from table1 a
left join table2 b
```

```
on a.id=b.id
and a.name=b.name;

--下面用inner join 各得到结果，结果是一样的
select *
from table1 a
join table2 b
on a.id=b.id
where a.name=b.name;

select *
from table1 a
join table2 b
on a.id=b.id
and a.name=b.name;
```

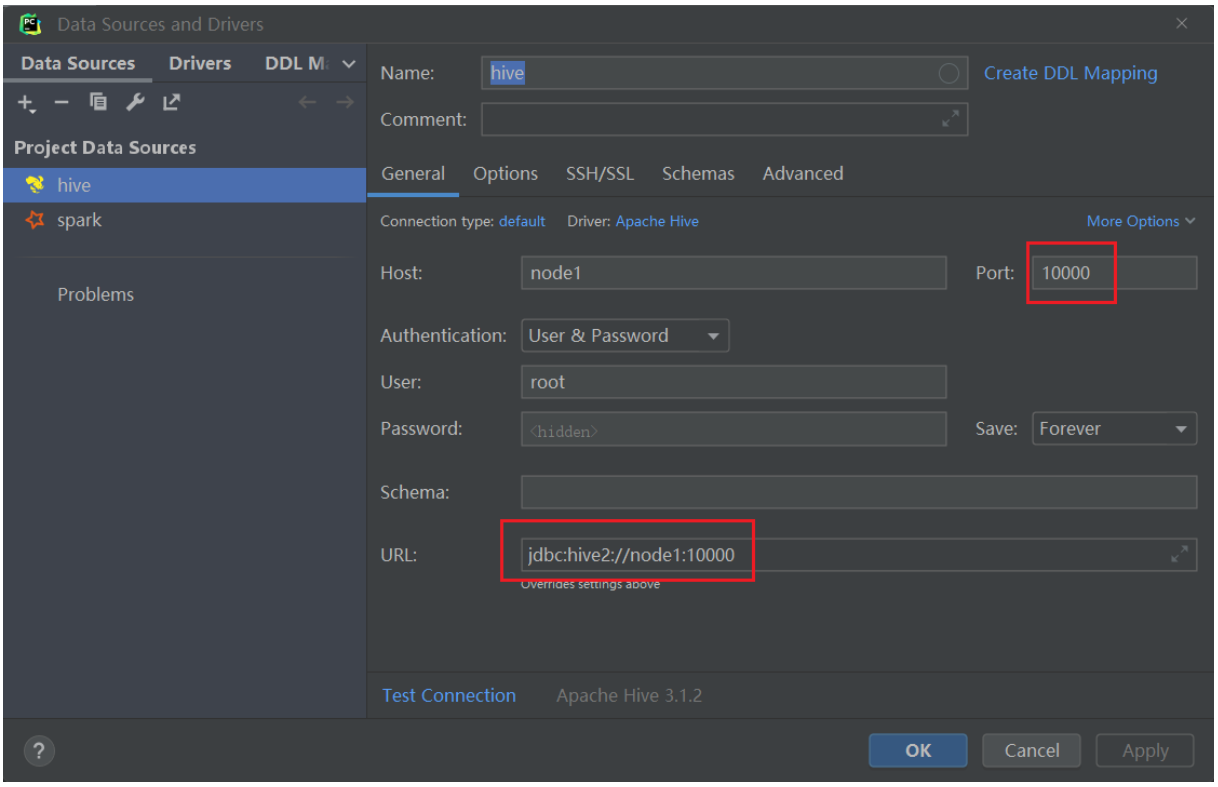
2. hive10题

- 先配置环境
- 在pycharm或datagrip或idea中配置hive数据源。也可以配置一个sparkSQL数据源，来加快速度。
- 如果配置hive数据源：
    - 需要提前启动hdfs和yarn，hive的metastore，hive的hiveserver2

    ```
    #启动hdfs和yarn
    start-all.sh

    # hive的metastore
    nohup /export/server/hive/bin/hive --service metastore  2>&1 > /tmp/hive-
    metastore.log &

    #hive的hiveserver2
    #hiveserver2开启后，等过2分钟后才能生效。
    nohup /export/server/hive/bin/hive --service hiveserver2 2>&1 > /tmp/hive-
    hiveserver2.log &
    ```


Data Sources and Drivers

Name: hive

Connection type: default Driver: Apache Hive

Host: node1 Port: 10000

Authentication: User & Password

User: root

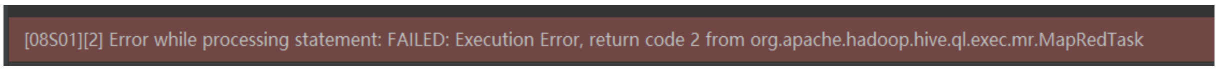
Password: <hidden> Save: Forever

Schema:

URL: jdbc:hive2://node1:10000

Overrides settings above

Test Connection Apache Hive 3.1.2

- 如果遇到下面的问题
- 

  [08S01][2] Error while processing statement: FAILED: Execution Error, return code 2 from org.apache.hadoop.hive.ql.exec.mr.MapRedTask
- 解决办法

  ```
  hive/conf/hive-env.sh中加入
  export HADOOP_CLIENT_OPTS=" -Xmx512m"
  export HADOOP_HEAPSIZE=1024
  改完重启hiveserver2
  ```

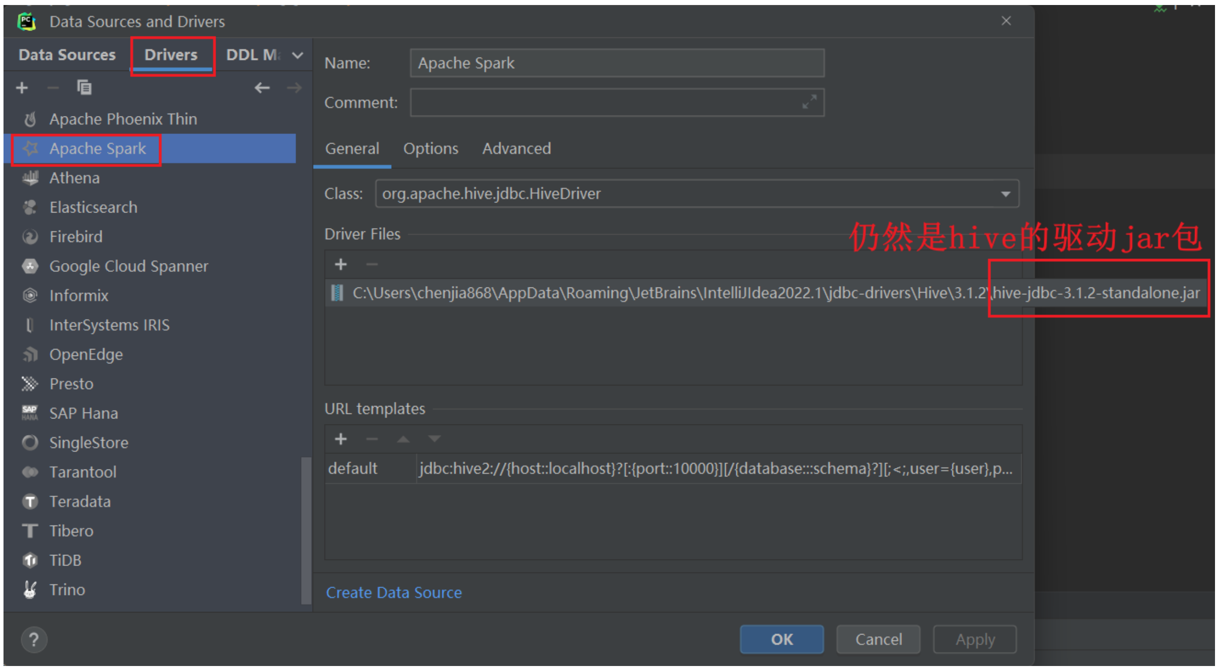
* 如果配置SparkSQL数据源
  - 需要提前启动hdfs，hive的metastore，Spark的Thriftserver服务。

  ```
  #启动hdfs和yarn
  start-all.sh

  # hive的metastore
  nohup /export/server/hive/bin/hive --service metastore  2>&1 > /tmp/hive-
  metastore.log &

  #Spark的Thriftserver服务
  /export/server/spark/sbin/start-thriftserver.sh \
    --hiveconf hive.server2.thrift.port=10001 \
    --hiveconf hive.server2.thrift.bind.host=node1 \
    --master local[*]
  ```

  - 下面是spark3集成hive3需要的jar包，如果是spark2集成hive2，则jar包不一样。


Data Sources and Drivers

Data Sources | Drivers | DDL M

Apache Phoenix Thin
Apache Spark
Athena
Elasticsearch
Firebird
Google Cloud Spanner
Informix
InterSystems IRIS
OpenEdge
Presto
SAP Hana
SingleStore
Tarantool
Teradata
Tibero
TiDB
Trino

Name: Apache Spark
Comment:

General | Options | Advanced

Class: org.apache.hive.jdbc.HiveDriver

Driver Files

C:\Users\chenjia868\AppData\Roaming\JetBrains\IntelliJIdea2022.1\jdbc-drivers\Hive\3.1.2\hive-jdbc-3.1.2-standalone.jar

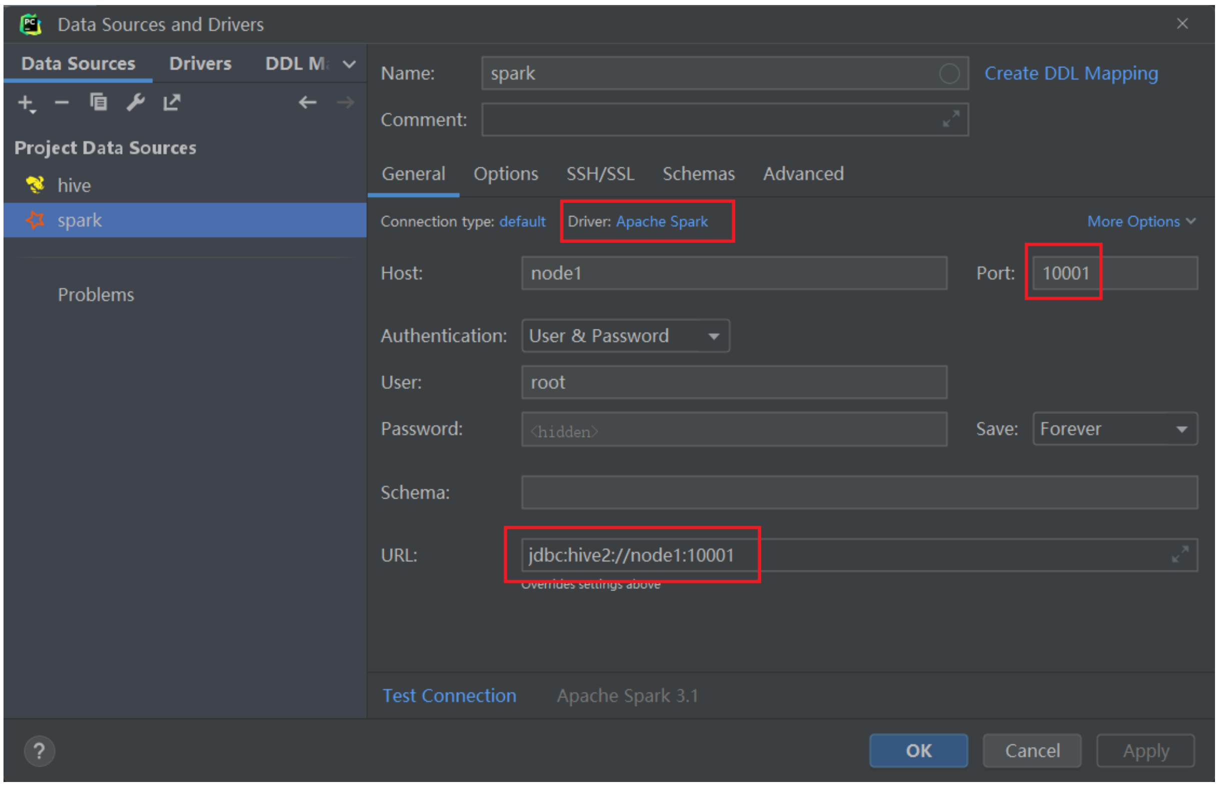
仍然是hive的驱动jar包

URL templates

default	jdbc:hive2://{host::localhost}?[:{port::10000}][/{database:::schema}?][;<;,user={user},p...

Create Data Source

OK | Cancel | Apply

- 
  Data Sources and Drivers

  Data Sources | Drivers | DDL M

  Project Data Sources
  hive
  spark

  Problems

  Name: spark
  Comment:
  Create DDL Mapping

  General | Options | SSH/SSL | Schemas | Advanced

  Connection type: default Driver: Apache Spark More Options

  Host: node1 Port: 10001
  Authentication: User & Password
  User: root
  Password: <hidden> Save: Forever
  Schema:
  URL: jdbc:hive2://node1:10001
  Overrides settings above

  Test Connection Apache Spark 3.1

  OK | Cancel | Apply

```
show databases ;
create database if not exists test_sql;
use test_sql;
-- 一些语句会走 MapReduce，所以慢。 可以开启本地化执行的优化。
set hive.exec.mode.local.auto=true;-- (默认为false)
--第1题：访问量统计
CREATE TABLE test_sql.test1 (
        userId string,
        visitDate string,
        visitCount INT )
```

```
    ROW format delimited FIELDS TERMINATED BY "\t";

INSERT overwrite TABLE test_sql.test1
VALUES
    ( 'u01', '2017/1/21', 5 ),
    ( 'u02', '2017/1/23', 6 ),
    ( 'u03', '2017/1/22', 8 ),
    ( 'u04', '2017/1/20', 3 ),
    ( 'u01', '2017/1/23', 6 ),
    ( 'u01', '2017/2/21', 8 ),
    ( 'u02', '2017/1/23', 6 ),
    ( 'u01', '2017/2/22', 4 );

select *,
       sum(sum1) over(partition by userid order by month1 /*rows between unbounded
preceding and current row*/ ) as `累积`
 from
(select userid,
       date_format(replace(visitdate,'/','-'),'yyyy-MM') as month1,
       sum(visitcount) sum1
from test_sql.test1
group by userid,
         date_format(replace(visitdate,'/','-'),'yyyy-MM')) as t;

-- 第2题：电商场景TopK统计
CREATE TABLE test_sql.test2 (
                         user_id string,
                         shop string )
            ROW format delimited FIELDS TERMINATED BY '\t';
INSERT INTO TABLE test_sql.test2 VALUES
( 'u1', 'a' ),
( 'u2', 'b' ),
( 'u1', 'b' ),
( 'u1', 'a' ),
( 'u3', 'c' ),
( 'u4', 'b' ),
( 'u1', 'a' ),
( 'u2', 'c' ),
( 'u5', 'b' ),
( 'u4', 'b' ),
( 'u6', 'c' ),
( 'u2', 'c' ),
( 'u1', 'b' ),
( 'u2', 'a' ),
( 'u2', 'a' ),
( 'u3', 'a' ),
( 'u5', 'a' ),
( 'u5', 'a' ),
( 'u5', 'a' );
-- （1）每个店铺的UV（访客数）
-- UV和PV
-- PV是访问当前网站所有的次数
-- UV是访问当前网站的客户数(需要去重)
```

```
--(2)每个店铺访问次数top3的访客信息。输出店铺名称、访客id、访问次数
select shop,
       count(distinct user_id) as uv
from test_sql.test2 group by shop ;
--上面的拆解来看，等价于
--distinct后可以接多个字段，表示联合去重
select shop,
       count(user_id) as uv
from
(select distinct shop,
        user_id
from test_sql.test2  ) as t
group by shop ;
--也等价于
select shop,
       count(user_id) as uv
from
(select shop,
        user_id
from test_sql.test2 group by shop, user_id) as t
group by shop ;

select * from
(select *,
       row_number() over (partition by shop order by cnt desc) as rn
from
(select shop,user_id,count(1) as cnt from test_sql.test2 group by  shop,user_id ) as t) t2
where t2.rn<=3;

-- 第3题：订单量统计
CREATE TABLE test_sql.test3 (
            dt string,
            order_id string,
            user_id string,
            amount DECIMAL ( 10, 2 ) )
ROW format delimited FIELDS TERMINATED BY '\t';

INSERT overwrite TABLE test_sql.test3 VALUES
 ('2017-01-01','10029028','1000003251',33.57),
 ('2017-01-01','10029029','1000003251',33.57),
 ('2017-01-01','100290288','1000003252',33.57),
 ('2017-02-02','10029088','1000003251',33.57),
 ('2017-02-02','100290281','1000003251',33.57),
 ('2017-02-02','100290282','1000003253',33.57),
 ('2017-11-02','10290282','100003253',234),
 ('2018-11-02','10290284','100003243',234);

--  (1)给出 2017年每个月的订单数、用户数、总成交金额。
--  (2)给出2017年11月的新客数(指在11月才有第一笔订单)
select date_format(dt,'yyyy-MM') as month1,
       count(distinct order_id) as cnt1,
       count(distinct user_id) as cnt2,
       sum(amount) as amt
```

```
  from test_sql.test3
  where year(dt)=2017
group by date_format(dt,'yyyy-MM');

select count(user_id) cnt from
(select user_id,
       min(date_format(dt,'yyyy-MM')) min_month
from test3 group by user_id) as t where min_month='2017-11';

--统计每个月的新客户数
select min_month,
       count(user_id) cnt
from (select user_id,
             min(date_format(dt, 'yyyy-MM')) min_month
      from test3
      group by user_id) as t
group by min_month;



-- 第4题：大数据排序统计
CREATE TABLE test_sql.test4user
    (user_id string,name string,age int);

CREATE TABLE test_sql.test4log
    (user_id string,url string);

INSERT INTO TABLE test_sql.test4user VALUES('001','u1',10),
('002','u2',15),
('003','u3',15),
('004','u4',20),
('005','u5',25),
('006','u6',35),
('007','u7',40),
('008','u8',45),
('009','u9',50),
('0010','u10',65);
INSERT INTO TABLE test_sql.test4log VALUES('001','url1'),
('002','url1'),
('003','url2'),
('004','url3'),
('005','url3'),
('006','url1'),
('007','url5'),
('008','url7'),
('009','url5'),
('0010','url1');


select * from test_sql.test4user ;
select * from test_sql.test4log ;

--有一个5000万的用户文件(user_id，name，age)，
```

```
-- 一个2亿记录的用户看电影的记录文件(user_id, url), 根据年龄段观看电影的次数进行排序?
--取整函数有 round, floor, ceil
select *,
       round(x,0) as r,--四舍五入
       floor(x) as f,--向下取整
       ceil(x) as c--向上取整
  from
(select 15/10 as x union all
select 18/10 as x union all
select 24/10 as x union all
select 27/10 as x ) as t;

select type,
       sum(cnt) as sum1
from
(select *,
       concat(floor(age/10)*10,'-',floor(age/10)*10+10) as type
from test_sql.test4user as a
-- join前最好提前减小数据量
join (select user_id,count(url) as cnt from test_sql.test4log group by user_id) as b
on a.user_id=b.user_id) as t
group by type
order by sum(cnt) desc;

-- 第5题: 活跃用户统计
CREATE TABLE test5(
dt string,
user_id string,
age int)
ROW format delimited fields terminated BY ',';
INSERT overwrite TABLE test_sql.test5 VALUES ('2019-02-11','test_1',23),
('2019-02-11','test_2',19),
('2019-02-11','test_3',39),
('2019-02-11','test_1',23),
('2019-02-11','test_3',39),
('2019-02-11','test_1',23),
('2019-02-12','test_2',19),
('2019-02-13','test_1',23),
('2019-02-15','test_2',19),
('2019-02-16','test_2',19);
select * from test_sql.test5 order by dt,user_id;
--有日志如下, 请写出代码求得所有用户和活跃用户的总数及平均年龄。 (活跃用户指连续两天都有访问记录的用户)
-- type      总数   平均年龄
-- '所有用户'   3     27
-- '活跃用户'   1     19
with t1 as (select distinct dt, user_id,age from test_sql.test5),
     t2 as (select *,row_number() over (partition by user_id order by dt) as rn from t1 ),
     t3 as (select *,date_sub(dt,rn) as dt2 from t2),
     t4 as (select dt2,user_id,age,count(1) cnt from t3 group by dt2,user_id,age),
     t5 as (select * from t4 where cnt>=2),
     t6 as (select distinct user_id,age from t5)
select '所有用户' as type, count(user_id) cnt,avg(age) as avg_age
from (select distinct user_id,age from test_sql.test5) t union all
```

```
select '活跃用户' as type, count(user_id) cnt,avg(age) as avg_age from t6;

-- 用思路2来分析连续2天登录
with t1 as (select distinct dt, user_id from test_sql.test5),
     t2 as (select *,
                   date_add(dt,1) as dt2,
                   lead(dt,1)over(partition by user_id order by dt) as dt3
              from t1)
select count(distinct user_id) from t2 where dt2=dt3;

-- 第6题：电商购买金额统计实战
CREATE TABLE test_sql.test6 (
        userid string,
        money decimal(10,2),
        paymenttime string,
        orderid string);

INSERT INTO TABLE test_sql.test6 VALUES('001',100,'2017-10-01','123'),
('001',200,'2017-10-02','124'),
('002',500,'2017-10-01','125'),
('001',100,'2017-11-01','126');

select * from test_sql.test6 order by userid,paymenttime;
--请用sql写出所有用户中在今年10月份第一次购买商品的金额，
select userid,paymenttime,money
from
(select *,
       row_number() over (partition by userid order by paymenttime) as rn
       from test_sql.test6 where date_format(paymenttime,'yyyy-MM')='2017-10' ) as t
where t.rn=1
;

-- 第7题：教育领域SQL实战
CREATE TABLE test_sql.book(book_id string,
        `SORT` string,
        book_name string,
         writer string,
         OUTPUT string,
         price decimal(10,2));
INSERT INTO TABLE test_sql.book VALUES
('001','TP391','信息处理','author1','机械工业出版社','20'),
('002','TP392','数据库','author12','科学出版社','15'),
('003','TP393','计算机网络','author3','机械工业出版社','29'),
('004','TP399','微机原理','author4','科学出版社','39'),
('005','C931','管理信息系统','author5','机械工业出版社','40'),
('006','C932','运筹学','author6','科学出版社','55');

CREATE TABLE test_sql.reader (reader_id string,
                company string,
                name string,
                sex string,
                grade string,
                addr string);
```

```
INSERT INTO TABLE test_sql.reader VALUES
('0001','阿里巴巴','jack','男','vp','addr1'),
('0002','百度','robin','男','vp','addr2'),
('0003','腾讯','tony','男','vp','addr3'),
('0004','京东','jasper','男','cfo','addr4'),
('0005','网易','zhangsan','女','ceo','addr5'),
('0006','搜狐','lisi','女','ceo','addr6');


CREATE TABLE test_sql.borrow_log(reader_id string,
                book_id string,
                borrow_date string);

INSERT INTO TABLE test_sql.borrow_log VALUES ('0001','002','2019-10-14'),
('0002','001','2019-10-13'),
('0003','005','2019-09-14'),
('0004','006','2019-08-15'),
('0005','003','2019-10-10'),
('0006','004','2019-17-13');

select * from test_sql.book;
select * from test_sql.reader;
select * from test_sql.borrow_log;

-- (8) 考虑到数据安全的需要，需定时将“借阅记录”中数据进行备份，请使用一条SQL语句，
-- 在备份用户bak下创建与“借阅记录”表结构完全一致的数据表BORROW_LOG_BAK.
-- 井且将“借阅记录”中现有数据全部复制到BORROW_L0G_ BAK中。
create table test_sql.BORROW_LOG_BAK as select * from test_sql.borrow_log;
select * from test_sql.BORROW_LOG_BAK;

-- (9) 现在需要将原Oracle数据库中数据迁移至Hive仓库，
-- 请写出“图书”在Hive中的建表语句（Hive实现，提示：列分隔符|；
-- 数据表数据需要外部导入：分区分别以month＿part、day＿part 命名）
CREATE TABLE test_sql.book2
(
    book_id   string,
    `SORT`    string,
    book_name string,
    writer    string,
    OUTPUT    string,
    price     decimal(10, 2)
)partitioned by (month_part string,day_part string )
    row format delimited fields terminated by '|';

-- (10) Hive中有表A，现在需要将表A的月分区　201505　中
-- user＿id为20000的user＿dinner字段更新为bonc8920，其他用户user＿dinner字段数据不变，
-- 请列出更新的方法步骤。（Hive实现，提示：Hive中无update语法，请通过其他办法进行数据更新）
--A
-- user_id   user_dinner  part
-- 20000        aaaaa     201505
-- 30000        bbbbb     201505

create table A (user_id int,user_dinner string) partitioned by (part string);
```

```
insert overwrite table A partition (part = '201505')
values (20000, 'aaaaa'),
       (30000, 'bbbbb'),
       (40000, 'ccccc');
select * from A;
--update A set user_dinner='bonc8920' where user_id=20000;

insert overwrite table A partition  (part = '201505')
select user_id, 'bonc8920' as user_dinner from A where user_id=20000 and part = '201505'
union all
select user_id, user_dinner from A where user_id!=20000 and part = '201505'  ;


-- 第8题：服务日志SQL统计
CREATE TABLE test_sql.test8(`date` string,
                interface string,
                ip string);

INSERT INTO TABLE test_sql.test8 VALUES
('2016-11-09 11:22:05','/api/user/login','110.23.5.23'),
('2016-11-09 11:23:10','/api/user/detail','57.3.2.16'),
('2016-11-09 23:59:40','/api/user/login','200.6.5.166'),
('2016-11-09 11:14:23','/api/user/login','136.79.47.70'),
('2016-11-09 11:15:23','/api/user/detail','94.144.143.141'),
('2016-11-09 11:16:23','/api/user/login','197.161.8.206'),
('2016-11-09 12:14:23','/api/user/detail','240.227.107.145'),
('2016-11-09 13:14:23','/api/user/login','79.130.122.205'),
('2016-11-09 14:14:23','/api/user/detail','65.228.251.189'),
('2016-11-09 14:15:23','/api/user/detail','245.23.122.44'),
('2016-11-09 14:17:23','/api/user/detail','22.74.142.137'),
('2016-11-09 14:19:23','/api/user/detail','54.93.212.87'),
('2016-11-09 14:20:23','/api/user/detail','218.15.167.248'),
('2016-11-09 14:24:23','/api/user/detail','20.117.19.75'),
('2016-11-09 15:14:23','/api/user/login','183.162.66.97'),
('2016-11-09 16:14:23','/api/user/login','108.181.245.147'),
('2016-11-09 14:17:23','/api/user/login','22.74.142.137'),
('2016-11-09 14:19:23','/api/user/login','22.74.142.137');

select * from test_sql.test8;
--求11月9号下午14点（14-15点），访问/api/user/login接口的top10的ip地址
select ip, count(1) cnt
from test_sql.test8
where date_format(`date`, 'yyyy-MM-dd HH') = '2016-11-09 14'
  and interface = '/api/user/login'
group by ip
order by cnt desc
limit 10
;

-- 第9题：充值日志SQL实战
CREATE TABLE test_sql.test9(
            dist_id string COMMENT '区组id',
            account string COMMENT '账号',
            `money` decimal(10,2) COMMENT '充值金额',
             create_time string COMMENT '订单时间');

INSERT INTO TABLE test_sql.test9 VALUES ('1','11',100006,'2019-01-02 13:00:01'),
 ('1','22',110000,'2019-01-02 13:00:02'),
 ('1','33',102000,'2019-01-02 13:00:03'),
 ('1','44',100300,'2019-01-02 13:00:04'),
 ('1','55',100040,'2019-01-02 13:00:05'),
 ('1','66',100005,'2019-01-02 13:00:06'),
 ('1','77',180000,'2019-01-03 13:00:07'),
 ('1','88',106000,'2019-01-02 13:00:08'),
 ('1','99',100400,'2019-01-02 13:00:09'),
 ('1','12',100030,'2019-01-02 13:00:10'),
 ('1','13',100003,'2019-01-02 13:00:20'),
 ('1','14',100020,'2019-01-02 13:00:30'),
 ('1','15',100500,'2019-01-02 13:00:40'),
 ('1','16',106000,'2019-01-02 13:00:50'),
 ('1','17',100800,'2019-01-02 13:00:59'),
 ('2','18',100800,'2019-01-02 13:00:11'),
 ('2','19',100030,'2019-01-02 13:00:12'),
 ('2','10',100000,'2019-01-02 13:00:13'),
 ('2','45',100010,'2019-01-02 13:00:14'),
 ('2','78',100070,'2019-01-02 13:00:15');

select * from test_sql.test9 order by dist_id , money desc;
--请写出SQL语句，查询充值日志表2019年01月02号每个区组下充值额最大的账号，要求结果：
--区组id，账号，金额，充值时间
select * from
(select *,
       row_number() over (partition by dist_id order by money desc) rn
from  test_sql.test9 where to_date(create_time)='2019-01-02') t
where t.rn=1;

-- 第10题：电商分组TopK实战
CREATE TABLE test_sql.test10(
    `dist_id` string COMMENT '区组id',
    `account` string COMMENT '账号',
    `gold` int COMMENT '金币');

INSERT INTO TABLE test_sql.test10 VALUES ('1','77',18),
 ('1','88',106),
 ('1','99',10),
 ('1','12',13),
 ('1','13',14),
 ('1','14',25),
 ('1','15',36),
 ('1','16',12),
 ('1','17',158),
 ('2','18',12),
 ('2','19',44),
 ('2','10',66),
 ('2','45',80),
 ('2','78',98);
```

```
select * from test_sql.test10;

select * from
(select *,
       row_number() over (partition by dist_id order by gold desc) rn
from  test_sql.test10  ) t
where t.rn<=10;
```

3. 行转列(转置)

- 行转列的常规做法是，group by+sum(if())【或count(if())】

3.1. 华泰证券1

已知

year	month	amount
1991	1	1.1
1991	2	1.2
1991	3	1.3
1991	4	1.4
1992	1	2.1
1992	2	2.2
1992	3	2.3
1992	4	2.4

查成这样一个结果

year	m1	m2	m3	m4
1991	1.1	1.2	1.3	1.4
1992	2.1	2.2	2.3	2.4

解答

-
  ```
  use test_sql;
  set hive.exec.mode.local.auto=true;
  create table table2(year int,month int ,amount double) ;
   insert overwrite table table2 values
            (1991,1,1.1),
  ```

```
             (1991,2,1.2),
             (1991,3,1.3),
             (1991,4,1.4),
             (1992,1,2.1),
             (1992,2,2.2),
             (1992,3,2.3),
             (1992,4,2.4);
select * from table2;


--行转列
--常规做法是，group by+sum(if())
--SQLserver中有pivot专门用来行转列
--原始写法
select year,
       sum(a) as m1,
       sum(b) as m2,
       sum(c) as m3,
       sum(d) as m4
from
    (select *,
            if(month=1,amount,0) a,
            if(month=2,amount,0) b,
            if(month=3,amount,0) c,
            if(month=4,amount,0) d
     from table2) t
group by t.year
;
--简化写法
select year,
       sum(if(month=1,amount,0)) m1,
       sum(if(month=2,amount,0)) m2,
       sum(if(month=3,amount,0)) m3,
       sum(if(month=4,amount,0)) m4
from table2
group by year;
```

3.2. 华泰证券2

- 查询课程编号“2”的成绩比课程编号“1”低的所有同学的学号、姓名。
- 【这是行转列的衍生题】

-
  ```
  create table student(sid int, sname string, gender string, class_id int);
  insert overwrite table student
  values (1, '张三', '女', 1),
         (2, '李四', '女', 1),
         (3, '王五', '男', 2);

  select * from student;

  create table  course (cid int, cname string, teacher_id int);
  insert overwrite table course
  ```

```
values (1, '生物', 1),
       (2, '体育', 1),
       (3, '物理', 2);
select * from course;

create table score (sid int, student_id int, course_id int, number int);
insert overwrite table score
values (1, 1, 1, 58),
       (4, 1, 2, 50),
       (2, 1, 2, 68),
       (3, 2, 2, 89);
select * from score;

with t1 as(
    select student_id,
       sum(if(course_id=2,number,0)) as pe, --体育
       sum(if(course_id=1,number,0)) as bio --生物
from score
group by student_id
having pe<bio)
select sid, sname
from t1
join student
on t1.student_id = sid
;
```

3.3. 腾讯游戏

表table如下：

DDate	shengfu
2015-05-09	胜
2015-05-09	胜
2015-05-09	负
2015-05-09	负
2015-05-10	胜
2015-05-10	负
2015-05-10	负

如果要生成下列结果, 该如何写sql语句?

DDate	胜	负
2015-05-09	2	2
2015-05-10	1	2

```sql
--建表
create table table1(DDate string, shengfu string) ;
insert overwrite table table1 values ('2015-05-09', "胜"),
       ('2015-05-09', "胜"),
       ('2015-05-09', "负"),
       ('2015-05-09', "负"),
       ('2015-05-10', "胜"),
       ('2015-05-10', "负"),
       ('2015-05-10', "负");

select DDate,
       SUM(case when shengfu = '胜' then 1 else 0 end) `胜`,
       SUM(case when shengfu = '负' then 1 else 0 end) `负`
from table1
group by DDate;
```

3.4. 腾讯QQ

假设tableA如表5, tableB如表6,

表5

qq号（字段名：qq）	游戏（字段名：game）
10000	a
10000	b
10000	c
20000	c
20000	d

表6

qq号（字段名：qq）	游戏（字段名：game）
10000	a_b_c
20000	c_d

请写出以下sql逻辑：

a, 将tableA输出为tableB的格式；　【行转列】

b, 将tableB输出为tableA的格式; 【列转行】

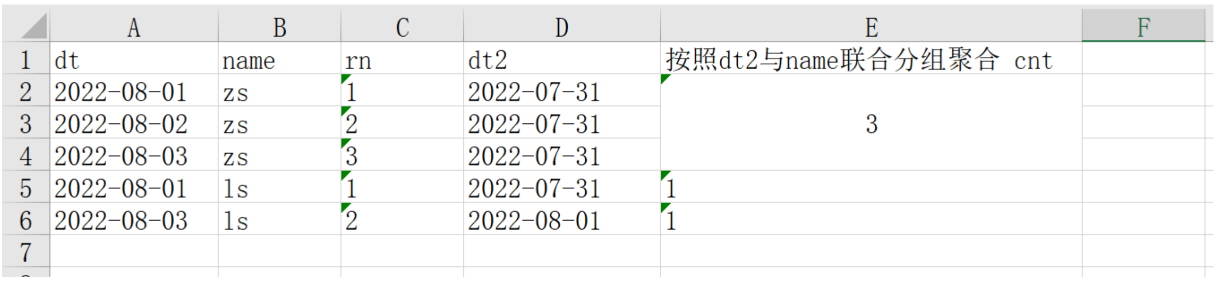
```
create table tableA(qq string, game string)
insert overwrite table tableA values
       (10000, 'a'),
       (10000, 'b'),
       (10000, 'c'),
       (20000, 'c'),
       (20000, 'd');

create table tableB(qq string, game string) ;
insert overwrite table tableB values
(10000, 'a_b_c'),
(20000, 'c_d');

--将tableA输出为tableB的格式;
select qq,
       concat_ws('_', collect_list(game)) game
from tableA
group by qq;

--将tableB输出为tableA的格式;
select qq,
       tmp.game
from tableB lateral view explode(split(game, '_')) tmp as game;
```

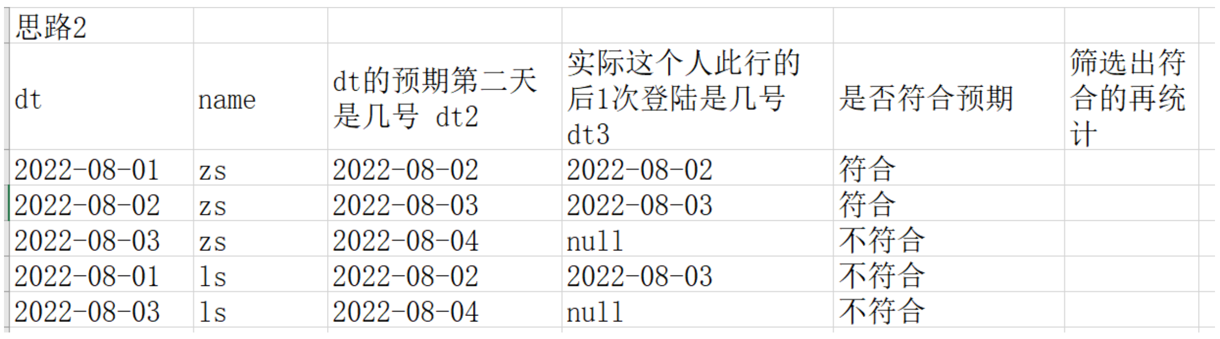
4. 连续N天登陆

- 思路分析过程
  - 

	A	B	C	D	E	F
1	dt	name	rn	dt2	按照dt2与name联合分组聚合 cnt	
2	2022-08-01	zs	1	2022-07-31		
3	2022-08-02	zs	2	2022-07-31	3	
4	2022-08-03	zs	3	2022-07-31		
5	2022-08-01	ls	1	2022-07-31	1	
6	2022-08-03	ls	2	2022-08-01	1	
7						

  -
```
--核心代码
distinct
-> row_number
-> date_sub(dt,rn) as dt2
-> group by dt2,name
-> having count(1)>=N天
-> distinct name
-> count(name)
```

  - 思路2

- 

思路2					
dt	name	dt的预期第二天是几号 dt2	实际这个人此行的后1次登陆是几号dt3	是否符合预期	筛选出符合的再统计
2022-08-01	zs	2022-08-02	2022-08-02	符合	
2022-08-02	zs	2022-08-03	2022-08-03	符合	
2022-08-03	zs	2022-08-04	null	不符合	
2022-08-01	ls	2022-08-02	2022-08-03	不符合	
2022-08-03	ls	2022-08-04	null	不符合	

-
  ```
  --核心代码
  distinct
  -> where date_add(dt,N-1) = lead(dt,N-1) over(partition by name order by dt)
  或者
  where datediff(lead(dt,N-1) over(partition by name order by dt),dt ) = N-1
  -> distinct name
  -> count(name)
  ```

4.1. OPPO

3、以下为用户登陆游戏的日期，用一条sQL语句查询出连续三天登录的人员姓名

name	date
张三	2021-01-01
张三	2021-01-02
张三	2021-01-03
张三	2021-01-02
李四	2021-01-01
李四	2021-01-02
王五	2021-01-03
王五	2021-01-02
王五	2021-01-02

```
create or replace temporary view
    game(name,date) as values
('张三','2021-01-01'),
('张三','2021-01-02'),
('张三','2021-01-03'),
('张三','2021-01-02'),
('李四','2021-01-01'),
```

```
('李四','2021-01-02'),
('王五','2021-01-03'),
('王五','2021-01-02'),
('王五','2021-01-02');

with t1 as ( select distinct  name,date from game),
     t2 as ( select *,
                    row_number() over (partition by name order by date) rn
         from t1),
     t3 as ( select *,date_sub(date,rn) date2 from t2 )
     select distinct name from t3 group by name,date2 having count(1)>=3;
```

4.2. 脉脉

用户每日登陆脉脉会访问app不同的模块，现有两个表

表1记录了每日脉脉活跃用户的uid和不同模块的活跃时长

表2记录了脉脉所有注册用户的一些属性

表1：maimai.dau

d	uid	module	active_duration	列说明
2020-01-01	1	jobs	324	d：活跃的日期uid：用户的唯一编码module：用户活跃模块 actre.duration：该模块下对应的活跃时长（单位：s）
2020-01-01	2	feeds	445	
2020-01-01	3	im	345	
2020-01-02	2	network	765	
2020-01-02	3	jobs	342	
...	...	...	...	

在过去一个月内,曾连续两天活跃的用户

```
-- 建表
-- 表1 dau   记录了每日脉脉活跃用户的uid和不同模块的活跃时长
create table dau(d string, uid int, module string, active_duration int);
insert overwrite table dau
values ('2020-01-01', 1, 'jobs', 324),
       ('2020-01-01', 2, 'feeds', 445),
       ('2020-01-01', 3, 'im', 345),
       ('2020-01-02', 2, 'network', 765),
       ('2020-01-02', 3, 'jobs', 342);
select *from dau;
```

```
with t1 as (
    select DISTINCT d, uid
    from dau),
     t2 as (
        select *,
               date_sub(d, (row_number() over (partition by uid order by d))) dis
        from t1
        where d <= `current_date`()
          and d >= date_sub((`current_date`()), 30))
select uid,
       min(d)   `开始日期`,
       max(d)   `结束日期`,
       count(1) `连续登入天数`
from t2
group by uid,dis
having count(*) >= 2;
```

4.3. 广州银行

有一张表C_T（列举了部分数据）表示持卡人消费记录，表结构如下：

CARD NER	VARCHAR2	卡号,
C_MONTH	NUMBER	消费月份,
C_DATE	DATE	消费月份,
C_TYPEVAR	CHAR2	消费类型
C_ATM	NUMBER	消费金额

每个月每张卡连续消费的最大天数（如卡在当月只有一次消费则为1）。

连续消费天数：指一楼时间内连续每天都有消费，同一天有多笔消费算一天消费，不能跨月份统计。

```
create table c_t
(
    card_nbr string,
    c_month  string,
    c_date   string,
    c_type   string,
    c_atm    decimal
);
insert overwrite table c_t values
                                 (1,'2022-01','2022-01-01','网购',100),
                                 (1,'2022-01','2022-01-02','网购',200),
                                 (1,'2022-01','2022-01-03','网购',300),
                                 (1,'2022-01','2022-01-15','网购',100),
                                 (1,'2022-01','2022-01-16','网购',200),
                                 (2,'2022-01','2022-01-06','网购',500),
                                 (2,'2022-01','2022-01-07','网购',800),
                                 (1,'2022-02','2022-02-01','网购',100),
                                 (1,'2022-02','2022-02-02','网购',200),
                                 (1,'2022-02','2022-02-03','网购',300),
                                 (2,'2022-02','2022-02-06','网购',500),
                                 (2,'2022-02','2022-02-07','网购',800);
with t1 as (select distinct card_nbr,c_month,c_date from c_t),
     t2 as (select *,row_number() over (partition by card_nbr,c_month order by c_date) rn
from t1  ),
     t3 as (select *,date_sub(c_date,rn) dt2 from t2  ),
     t4 as (select  dt2,card_nbr,c_month,count(1) as cnt from t3 group by
dt2,card_nbr,c_month),
     t5 as ( select *,row_number() over (partition by card_nbr,c_month order by cnt desc)
as rn from t4)
select card_nbr,c_month,cnt from t5 where rn=1
```

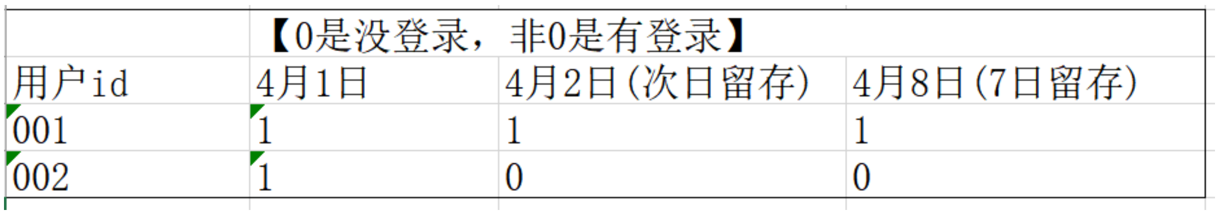
5. N日留存率

- 核心代码

-
  ```
  -> where 日期 in (首日,1天后,7天后)
  -> group by 用户
  ->count(if(日期=首日,1,null))  as cnt
    count(if(日期=1天后,1,null)) as cnt2
    count(if(日期=7天后,1,null)) as cnt8
  ->having cnt>0
  ->count(user_id) as 首日总数
    count(if(cnt2>0,1,null)) as 次日留存数
    count(if(cnt8>0,1,null)) as 7日留存数
  ->次日留存数/首日总数 as 次日留存率
    7日留存数/首日总数 as 7日留存率
  ```
- 先按用户分组，得到每个用户的各相关日期的登录情况。

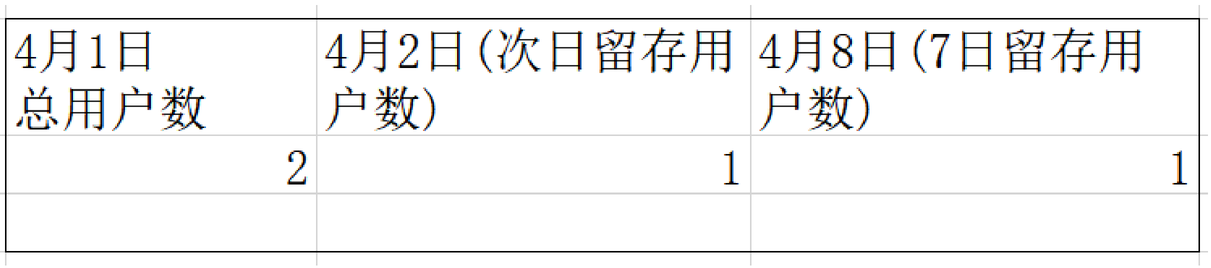
    -
      ```
      select cuid,
             count(if(event_day='2020-04-01',1,null)) as cnt,
             count(if(event_day='2020-04-02',1,null)) as cnt2,
             count(if(event_day='2020-04-08',1,null)) as cnt8
        from tb_cuid_1d
        --提前过滤数据
        where event_day in ('2020-04-01','2020-04-02','2020-04-08')
      group by cuid
      -- 2020-04-01必须登录，剔除掉2020-04-01没登录的
      having cnt>0
      ```

      效果如下
    -



	【0是没登录，非0是有登录】		
用户id	4月1日	4月2日(次日留存)	4月8日(7日留存)
001	1	1	1
002	1	0	0

- 再对上面的用户汇总

  -
    ```
    select count(cnt) as uv,
           count(if(cnt2!=0,1,null)) as uv2,
           count(if(cnt8!=0,1,null)) as uv8
    ```
  - 

4月1日总用户数	4月2日(次日留存用户数)	4月8日(7日留存用户数)
2	1	1
- 最后再用 【后续日期的留存数】除以【首日总数】，就是【留存率】

5.1. 腾讯视频号游戏直播

表：tableA

ds(日期)	device	user_id	is_active
2020-03-01	ios	0001	0
2020--0301	ios	0002	1
2020-03-01	android	0003	1
2020-03-02	ios	0001	0
2020-03-02	ios	0002	0
2020-03-02	android	0003	1

20200301的ios设备用户活跃的次日留存率是多少?

```
use test_sql;
set hive.exec.mode.local.auto=true;
--腾讯视频号游戏直播
drop table if exists tableA;
create table tableA
(ds string comment '(日期)'  ,device string,user_id string,is_active int) ;
insert overwrite table  tableA values
('2020-03-01','ios','0001',0),
('2020-03-01','ios','0002',1),
('2020-03-01','ios','0004',1),
```

```
('2020-03-01','android','0003',1),
('2020-03-02','ios','0001',0),
('2020-03-02','ios','0002',0),
('2020-03-02','android','0003',1),
('2020-03-02','ios','0005',1) ,
('2020-03-02','ios','0004',1) ;



--方案1，过程见下面的顺序编号
with t1 as (
    select user_id,
           --3-一个用户如果在'2020-03-01'活跃，则cnt1>0
           count(if(ds = '2020-03-01', 1, null)) cnt1,
           --4-一个用户如果在'2020-03-02'活跃，则cnt2>0
           count(if(ds = '2020-03-02', 1, null)) cnt2
    from tableA
    --1-预先全局过滤
    where device = 'ios'
      and is_active = 1
      and ds in ('2020-03-01', '2020-03-02')
    --2-按用户分组
    group by user_id
    --6-只筛选'2020-03-01'活跃的用户，他在'2020-03-02'是否活跃，看cnt2=0则不活跃，>0则活跃
    having cnt1 > 0
)
select count(cnt1)                                 sum1,--'2020-03-01'的活跃数
       count(if(cnt2 > 0, user_id, null))          sum2,----并且在次日依然活跃的用户数
       count(if(cnt2 > 0, user_id, null)) / count(cnt1) rate--次日留存率
from t1;
```

5.2. 百度

有两张表

```
create table if not exists tb_cuid_1d
(
    cuid         string comment '用户的唯一标识',
    os           string comment '平台',
    soft_version string comment '版本',
    event_day    string comment '日期',
    timestamp    int comment '用户访问时间戳',
    duration     decimal comment '用户访问时长',
    ext          array<string> comment '扩展字段'
);

create table if not exists tb_account_1d
(
    cuid      string comment '用户的唯一标识',
    uid       string comment '登入用户账号名',
    event_day string comment '日期'
);
```

写出用户表 tb_cuid_1d的 20200401 的次日、次7日留存的具体HQL：

一条sql统计出以下指标 （4.1号uv，4.1号在4.2号的留存uv，4.1号在4.8号的留存uv）；

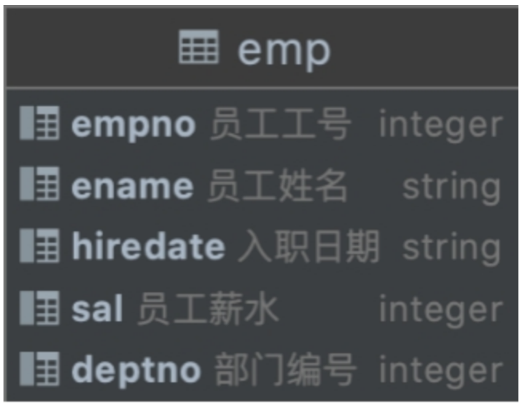
```
--分析
select * from tb_cuid_1d;
select count(a.cuid) as uv,
       count(b.cuid) as uv2,
       count(c.cuid) as uv8
  from    (select * from tb_cuid_1d where event_day='2020-04-01') a
left join (select * from tb_cuid_1d where event_day='2020-04-02') b on a.cuid=b.cuid
left join (select * from tb_cuid_1d where event_day='2020-04-08') c on a.cuid=c.cuid
;
--更通用的做法，效率更快，因为只加载一次表
select count(cnt) as uv,
       count(if(cnt2!=0,1,null)) as uv2,
       count(if(cnt8!=0,1,null)) as uv8
from
(select cuid,
       count(if(event_day='2020-04-01',1,null)) as cnt,
       count(if(event_day='2020-04-02',1,null)) as cnt2,
       count(if(event_day='2020-04-08',1,null)) as cnt8
  from tb_cuid_1d
  --提前过滤数据
  where event_day in ('2020-04-01','2020-04-02','2020-04-08')
group by cuid
-- 2020-04-01必须登录，剔除掉2020-04-01没登录的
having cnt>0
) as t
```

6. 分组内top前几

- 需求常见词：【每组xxx的第一个】【每组xxx的最后一个】【每组xxx的前n个】【每组最xx的前n个】
- 公式：row_number() over(partition by 组名) as rn，再筛选rn<=N名

6.1. 跨越物流

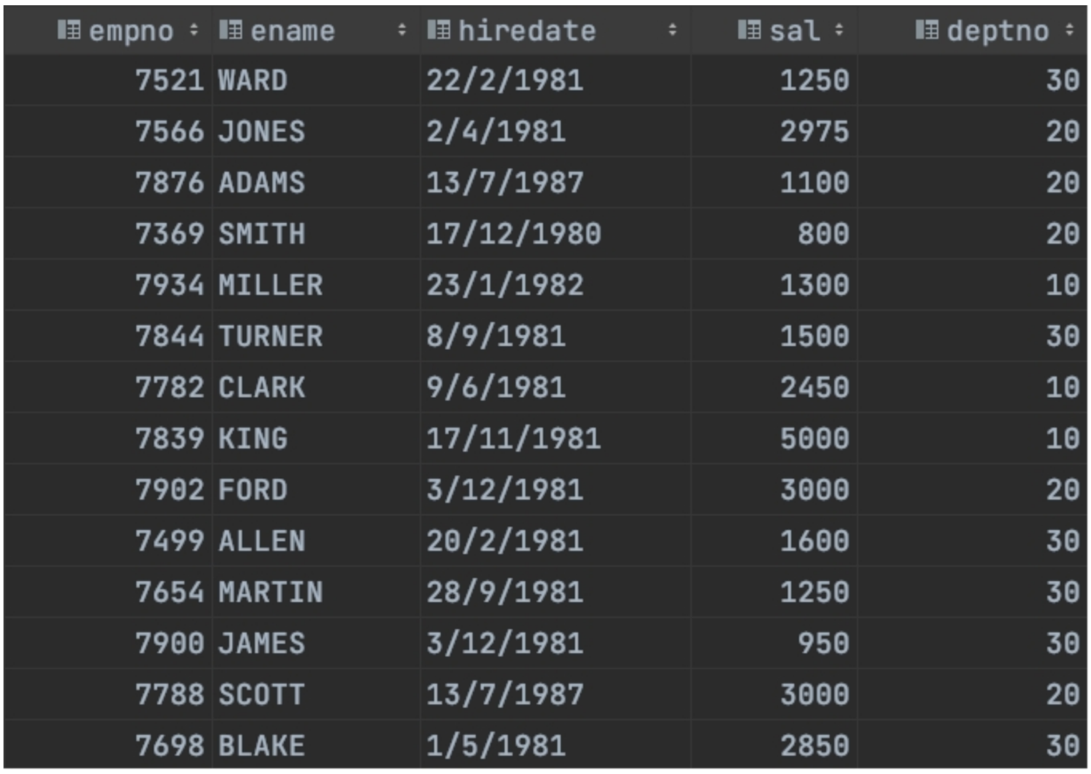
员工表结构



emp

empno	员工工号	integer
ename	员工姓名	string
hiredate	入职日期	string
sal	员工薪水	integer
deptno	部门编号	integer

员工表数据

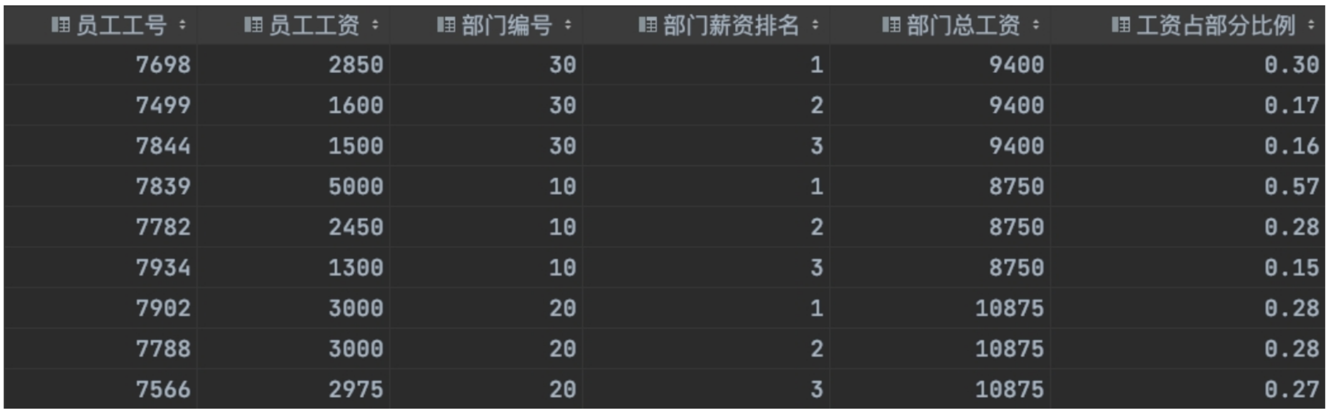


empno	ename	hiredate	sal	deptno
7521	WARD	22/2/1981	1250	30
7566	JONES	2/4/1981	2975	20
7876	ADAMS	13/7/1987	1100	20
7369	SMITH	17/12/1980	800	20
7934	MILLER	23/1/1982	1300	10
7844	TURNER	8/9/1981	1500	30
7782	CLARK	9/6/1981	2450	10
7839	KING	17/11/1981	5000	10
7902	FORD	3/12/1981	3000	20
7499	ALLEN	20/2/1981	1600	30
7654	MARTIN	28/9/1981	1250	30
7900	JAMES	3/12/1981	950	30
7788	SCOTT	13/7/1987	3000	20
7698	BLAKE	1/5/1981	2850	30

题目描述

求出每个部门工资最高的前三名员工，并计算这些员工的工资占所属部门总工资的百分比。

结果



员工工号	员工工资	部门编号	部门薪资排名	部门总工资	工资占部分比例
7698	2850	30	1	9400	0.30
7499	1600	30	2	9400	0.17
7844	1500	30	3	9400	0.16
7839	5000	10	1	8750	0.57
7782	2450	10	2	8750	0.28
7934	1300	10	3	8750	0.15
7902	3000	20	1	10875	0.28
7788	3000	20	2	10875	0.28
7566	2975	20	3	10875	0.27

```
create or replace temporary view emp(empno,ename,hiredate,sal,deptno) as values
( 7521 , 'ward' , '1981-02-22' , 1250 ,30 ),
( 7566 , 'jones' , '1981-04-02' , 2975 ,20 ),
( 7876 , 'adams' , '1987-07-13' , 1100 ,20 )  ;

select * from emp;

--求出每个部门工资最高的前三名员工，并计算这些员工的工资占所属部门总工资的百分比。
select a.empno,
       a.sal,
       a.deptno,
       a.rn,
       a.sum_sal,
       round(a.sal/a.sum_sal,2) as rate
from
(select *,
--每个部门工资排名
         row_number() over (partition by deptno order by sal desc) as rn,
--每个部门的总工资
         sum(sal) over(partition by deptno ) as sum_sal
from emp) a
where rn<=3;
```

6.2. 小米电商

订单表，torder. 字段，user_id, order_id, ctime(10位时间戳)，city id，sale_num，sku_id(商品)

问题：20201201至今每日订单量top10的城市及其订单量(订单量对order id去重)(在线写)

```
create or replace temporary view t_order (user_id, order_id, ctime, city_id, sale_num,
sku_id) as
values (null);
with t1 as (select to_date(ctime) cdate, city_id, count(distinct order_id) cnt
            from t_order
            where to_date(ctime) >= '2020-12-01'
              and to_date(ctime) <= `current_date`()
            group by to_date(ctime), city_id),
     t2 as (select *, row_number() over (partition by cdate order by cnt desc) rn from t1)
select cdate, city_id, cnt
from t2
where rn <= 10;
```

7. 窗口函数

- 聚合类的窗口函数
- 排序类的窗口函数

7.1. 交通银行

Emp表的表数据如下：

NAME	MONTH	AMT
张三	01	100
李四	02	120
王五	03	150
赵六	04	500
张三	05	400
李四	06	350
王五	07	180
赵六	08	400

问题：请写出可以得到以下的结果SQL

NAME	总金额	排名	占比
赵六	900	1	40.91%
张三	500	2	22.73%
李四	470	3	21.36%
王五	330	4	15.00%

```
create temporary view emp(name, month, amt)
as values ('张三', '01', 100),
       ('李四', '02', 120),
       ('王五', '03', 150),
       ('赵六', '04', 500),
       ('张三', '05', 400),
       ('李四', '06', 350),
       ('王五', '07', 180),
       ('赵六', '08', 400);
--rank 1224
--dense_rank 1223
with t1 as (select name,
                   sum(amt) as sum_amt
            from emp
            group by name),
     t2 as (
         select name,
                sum_amt,
                row_number() over (order by sum_amt desc) rn,
                sum_amt/sum(sum_amt) over () as rate
```

```
          from t1
      )
select name, sum_amt, rn, concat(round(rate*100,2),'%') rate from t2
```

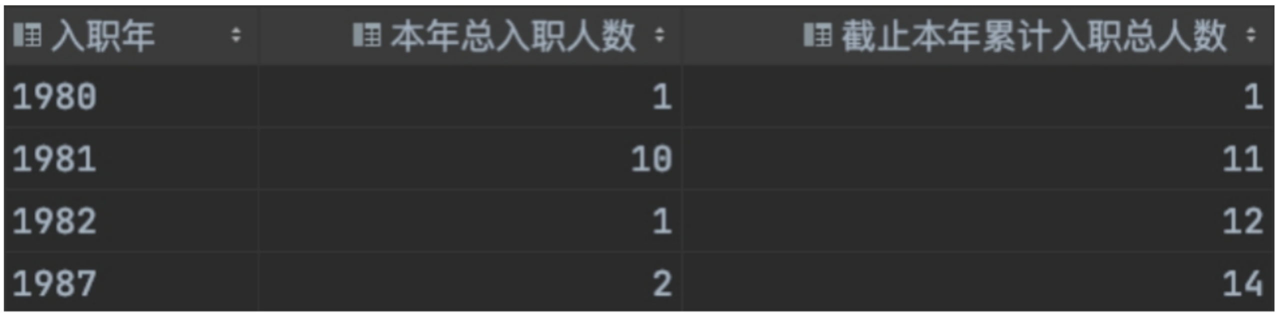
7.2. 跨越物流

题目描述

在第一题员工表的基础上，统计每年入职总数以及截至本年累计入职总人数。

截至本年累计入职总人数=本年总入职人数 + 本年之前所有年的总入职人数之和

结果



入职年	本年总入职人数	截止本年累计入职总人数
1980	1	1
1981	10	11
1982	1	12
1987	2	14

```
select *,
       sum(cnt) over (order by year1) cnt2
from
(select year(hiredate) as year1,
       count(1) as cnt
from emp
group by year(hiredate)) a;
```

8. 带条件的聚合统计

8.1. 腾讯数据提取

用户行为表：t_user_video_action_d分区：ds（格式 yyyyMMdd）

主键：user_id、video_id

含义：一个 user 对一个视频的所有行为聚合，每天增量字段：

字段名	字段含义	类型
user_id	用户 id	string
video_id	视频 id	string
expose_cnt	曝光次数	int
like_cnt	点赞次数	int

视频表：t_video_d

分区：ds（格式 yyyyMMdd）主键：video_id

含义：当天全量视频数据字段：

字段名	字段含义	类型	枚举
video_id	视频 id	string	
video_type	视频类型	string	娱乐、新闻、搞笑
video_user_id	视频创建者 user_id	string	
video_create_time	视频创建时间	bigint	

作者表：t_video_user_d

分区：ds（格式 yyyyMMdd）主键：video_user_id

含义：当天全量视频创建者数据

字段名	字段含义	类型	枚举
video_user_id	视频创建者 user_id	string	
video_user_name	名称	string	
video_user_type	视频创建者类型	string	娱乐、新闻、搞笑

需求方需要视频号搞笑类型视频的曝光点赞时长等数据，请提供一张 ads 表。搞笑类型视频定义：视频类型为搞笑或者视频创建者类型为搞笑

需要产出字段：视频 id，视频创建者 user_id，视频创建者名称、当天曝光次数、当天点赞次数、近 30 天曝光次数、近 30 天点赞次数

```
create table if not exists t_user_video_action_d
(
    user_id    string comment "用户id",
    video_id   string comment "视频id",
    expose_cnt int comment "曝光次数",
    like_cnt   int comment "点赞次数"
) partitioned by (ds string);
```

```
drop table t_video_d;
create table if not exists t_video_d
(
    video_id          string comment '视频id',
    video_type        string comment '视频类型',
    video_user_id     string comment '视频创建者user_id',
    video_create_time bigint comment '视频创建时间'
) partitioned by (ds string);

create table if not exists t_video_user_d
(
    video_user_id   string comment '视频创建者user_id',
    video_user_name string comment '名称',
    video_user_type string comment '视频创建者类型'
) partitioned by (ds string);


--假设当天是2022-08-07
select v.video_id,
       vu.video_user_id,
       video_user_name,
       expose_today,
       like_today,
       expose_30,
       like_30
from (select * from t_video_user_d where ds='2022-08-07' and video_user_type like '%搞笑%' )
vu
join (select * from t_video_d where ds='2022-08-07' and video_type like '%搞笑%') v
    on vu.video_user_id=v.video_user_id
left join (
    --提前缩小数据量
    select video_id,
           sum(if(ds='2022-08-07',expose_cnt,0)) as expose_today, -- 当天曝光次数、
           sum(if(ds='2022-08-07',like_cnt,0)) as like_today,-- 当天点赞次数、
           sum(if(ds>=date_sub('2022-08-07',29) and ds<='2022-08-07' ,expose_cnt,0)) as
expose_30,-- 近 30 天曝光次数、
           sum(if(ds>=date_sub('2022-08-07',29) and ds<='2022-08-07' ,like_cnt,0)) as
like_30-- 近 30 天点赞次数
    from t_user_video_action_d where ds between date_sub('2022-08-07',29) and '2022-08-07'
    group by video_id
) as c on c.video_id=v.video_id ;
```