第三周实验

(1) 验证在1000万个以上记录时索引和不索引时查询时间区别

本次实验实验数据定为1000万,然后针对学生表进行索引和不索引时查询时间的比较,我们针对 phone_number 这一列进行比较,在创建索引之前的话,我们执行下面代码所花费的时间如下图所示:

```
school> select phone_number
from student
where phone_number=17698266260
[2022-12-14 13:42:23] 在 28 s 828 ms (execution: 28 s 812 ms, fetching: 16 ms) 内检索到 0 行
```

我们加上索引:

```
school> alter table student add index idx_phone (phone_number)
[2022-12-14 13:53:44] 在 8 m 53 s 565 ms 内完成
```

再次执行该代码花费时间如下图如所示:

```
school> select phone_number
from student
where phone_number=17698266260
[2022-12-14 14:01:14] 在 21 s 338 ms (execution: 21 s 320 ms, fetching: 18 ms) 内检索到 0 行
```

我们可以清楚的看到索引的时候进行查询,可以减少我们的查询时间,该代码所花费时间一共减少了75492ms,可以看到减少的时间还是挺多的。接下来我们更换另外一组代码进行测试:

有索引:

```
school> select phone_number from student limit 99999999 [2022-12-14 13:43:11] 在 25 s 726 ms (execution: 25 s 697 ms, fetching: 29 ms) 内检索到从 1 开始的 500 行
```

没有索引:

```
school> select phone_number
from student
limit 9999999
[2022-12-14 14:00:43] 在 21 s 640 ms (execution: 21 s 619 ms, fetching: 21 ms) 内检索到从 1 开始的 500 行
```

我们可以看到本次代码的时间也是减少了4s多。

(2) 查询2011年进校年龄大于20岁的男学生的学号和姓名

```
school> select student_id,student_name
from student
where student_id like '11%'
and date(birthday) < '2002-12-14'
and gender = '男'

[2022-12-14 14:17:18] 在 567 ms (execution: 542 ms, fetching: 25 ms) 內检索到从 1 开始的 500 行
```

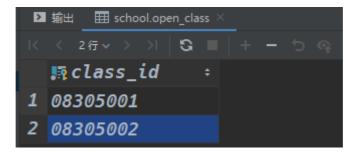
检索结果:

(3) 检索刘晓明不学的课程的课程号

```
school> select open_class.class_id
    from select_class, open_class
    where select_class.term = open_class.term
        and select_class.class_id = open_class.class_id
        and select_class.teacher_id = open_class.teacher_id
        and select_class.student_id = 1102

[2022-12-14 14:31:27] 在 25 ms (execution: 4 ms, fetching: 21 ms) 內检索到从 1 开始的 2 行
```

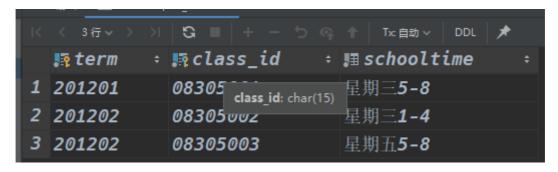
检索结果:



(4) 检索马小红老师所授课程的学年,学期,课程号,上课时间。

```
school> select term, class_id, schooltime
from open_class
where teacher_id = '0102'
[2022-12-14 14:36:43] 在 379 ms (execution: 365 ms, fetching: 14 ms) 内检索到从 1 开始的 3 行
```

检索结果:



(5) 查询计算机学院男生总评成绩及格、教授开设的课程的课程号、课名、开课教师姓名,按开课教师升序,课程号降序排序。

```
1 -- 方法一:
  select distinct select_class.class_id, class.class_name,
    teacher.teacher_name
 3 from select_class, class, teacher
4 where select_class.score >= 60
 5
       and teacher.teacher_id = select_class.teacher_id
       and class.class_id = select_class.class_id
7
   order by teacher.teacher_name asc ,select_class.class_id desc;
8
9
  -- 方法二:
10 | select distinct s.class_id, c.class_name, t.teacher_name
11 from select_class s
12 inner join class c on s.class_id = c.class_id
inner join teacher t on s.teacher_id = t.teacher_id
14 | where s.score >= 60
order by t.teacher_name asc ,s.class_id desc ;
```

```
school> select distinct s.class_id, c.class_name, t.teacher_name
from select_class s
inner join class c on s.class_id = c.class_id
inner join teacher t on s.teacher_id = t.teacher_id
where s.score >= 60
order by t.teacher_name asc ,s.class_id desc

[2022-12-14 15:58:05] 在 18 ms (execution: 4 ms, fetching: 14 ms) 内检索到从 1 开始的 4 行
```

检索结果:



(6) 检索学号比张颖同学大,年龄比张颖同学小的同学学号、姓名。

```
1 | select student_id, student_name
2 | from student
3 | where student_id >= (select student_id from student where student_name = '张 颖')
4 | and date(birthday) > (select date(birthday) from student where student_name = '张颖');
```

检索结果:

(7) 检索同时选修了"08305001"和 "08305002"的学生学号和姓名。

```
select student.student_id, student.student_name
from student
where student.student_id in (select student_id
from select_class
where class_id in ('08305001','08305002')
group by student_id
having count(*) >= 2)
```

检索结果: