《数据库系统原理》实验报告（）					
题目：实验二：DML 语言实验					
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实验环境：Oceanbase，docker

实验步骤及结果截图：

1. 参照以下表格内容，在数据库中建立图书借阅管理系统相关数据表

```
obclient(root@sys)[books]> CREATE TABLE category
    -> (
    ->     No Integer  NOT NULL,
    ->     Name VARCHAR(255) NOT NULL,
    ->     PRIMARY KEY (No)
    -> );
Query OK, 0 rows affected (0.153 sec)

obclient(root@sys)[books]> CREATE TABLE books
    -> (
    ->     No Integer  NOT NULL,
    ->     Title VARCHAR(255) NOT NULL,
    ->     Author VARCHAR(255) NOT NULL,
    ->     publication_year Integer NOT NULL,
    ->     C_no Integer NOT NULL,
    ->     PRIMARY KEY (No),
    ->     FOREIGN KEY (C_no) REFERENCES category(No)
    -> );
Query OK, 0 rows affected (0.087 sec)

obclient(root@sys)[books]> CREATE TABLE readers
    -> (
    ->     No Integer  NOT NULL,
    ->     Name VARCHAR(20) NOT NULL,
    ->     Gender VARCHAR(20) NOT NULL check (Gender in ('Male','Female')),
    ->     Tel VARCHAR(255) NOT NULL,
    ->     PRIMARY KEY (No)
    -> );
Query OK, 0 rows affected (0.128 sec)

obclient(root@sys)[books]> CREATE TABLE borrow_records
    -> (
    ->     No          Integer NOT NULL,
    ->     B_no        Integer NOT NULL,
    ->     R_no        Integer NOT NULL,
    ->     Borrow_date DATE    NOT NULL,
    ->     Return_date DATE,
    ->     PRIMARY KEY (No),
    ->     FOREIGN KEY (B_no) REFERENCES books (No),
    ->     FOREIGN KEY (R_no) REFERENCES readers (No)
    -> );
Query OK, 0 rows affected (0.115 sec)
```

插入数据

```
obclient(root@sys)[books]> INSERT INTO category (No, Name) VALUES
    -> (1, '计算机'),
    -> (2, '文字'),
    -> (3, '历史'),
    -> (4, '科学');
Query OK, 4 rows affected (0.036 sec)
Records: 4  Duplicates: 0  Warnings: 0

obclient(root@sys)[books]> INSERT INTO books (No, Title, Author, publication_year, C_no) VALUES
    -> (1, 'Python编程实战', '张三', 2021, 1),
    -> (2, '百年孤独', '加西亚·马尔克斯', 1967, 2),
    -> (3, '明朝那些事儿', '当年明月', 2006, 3),
    -> (4, '时间简史', '霍金', 1988, 4),
    -> (5, 'Java核心技术', '凯尔霍斯特曼', 2019, 1);
Query OK, 5 rows affected (0.020 sec)
Records: 5  Duplicates: 0  Warnings: 0

obclient(root@sys)[books]> INSERT INTO readers (No, Name, Gender, Tel) VALUES
    -> (1, '小明', 'Male', '13300138000'),
    -> (2, '小红', 'Female', '13300139000'),
    -> (3, '小刚', 'Male', '13600136000'),
    -> (4, '小美', 'Female', '13700137000'),
    -> (5, '小强', 'Male', '13300133000');
Query OK, 5 rows affected (0.019 sec)
Records: 5  Duplicates: 0  Warnings: 0


obclient(root@sys)[books]> INSERT INTO borrow_records (No, B_no, R_no, Borrow_date, Return_date) VALUE
S
    -> (1, 1, 1, '2024-10-01', '2024-10-20'),
    -> (2, 2, 2, '2024-10-05', '2024-10-25'),
    -> (3, 1, 3, '2024-10-10', '2024-10-30'),
    -> (4, 3, 4, '2024-10-15', '2024-11-01'),
    -> (5, 2, 5, '2024-10-20', NULL);
Query OK, 5 rows affected (0.019 sec)
Records: 5  Duplicates: 0  Warnings: 0
```

2.使用比较运算符查询 2020 年以后出版的图书的 Title 和 publication_year。

```
obclient(root@sys)[books]> SELECT Title, publication_year
    -> FROM books
    -> WHERE publication_year > 2020;
+--------------------+------------------+
| Title              | publication_year |
+--------------------+------------------+
| Python编程实战 |             2021 |
+--------------------+------------------+
1 row in set (0.007 sec)
```

3. 查询借阅过编号为 3 的图书的读者的 Name 和 Tel

```
obclient(root@sys)[books]> SELECT R.Name, R.Tel
    -> FROM borrow_records BR
    -> JOIN readers R ON BR.R_no = R.No
    -> WHERE BR.B_no = 3;
+--------+-------------+
| Name   | Tel         |
+--------+-------------+
| 小美 | 13700137000 |
+--------+-------------+
1 row in set (0.042 sec)
```

4. 查询作者姓名中包含“张”字的图书信息。

```
obclient(root@sys)[books]> SELECT *
    -> FROM books
    -> WHERE Author LIKE '%张%';
+------+--------------------+--------+------------------+------+
| No   | Title              | Author | publication_year | C_no |
+------+--------------------+--------+------------------+------+
|    1 | Python编程实战 | 张三 |             2021 |    1 |
+------+--------------------+--------+------------------+------+
1 row in set (0.027 sec)
```

5. 查询所有男性读者的借阅记录，包括读者姓名、借阅图书 Title、借阅日期和归还 日期，结果按借阅日期升序排列。

```
obclient(root@sys)[books]> SELECT R.Name, B.Title, BR.Borrow_date, BR.Return_date
    -> FROM borrow_records BR
    -> JOIN readers R ON BR.R_no = R.No
    -> JOIN books B ON BR.B_no = B.No
    -> WHERE R.Gender = 'Male'
    -> ORDER BY BR.Borrow_date ASC;
+--------+--------------------+-------------+-------------+
| Name   | Title              | Borrow_date | Return_date |
+--------+--------------------+-------------+-------------+
| 小明 | Python编程实战 | 2024-10-01  | 2024-10-20  |
| 小刚 | Python编程实战 | 2024-10-10  | 2024-10-30  |
| 小强 | 百年孤独       | 2024-10-20  | NULL        |
+--------+--------------------+-------------+-------------+
3 rows in set (0.018 sec)
```

6. 查询女性读者的总人数。

```
obclient(root@sys)[books]> SELECT COUNT(No)
    -> FROM readers
    -> WHERE Gender = 'Female';
+-----------+
| COUNT(No) |
+-----------+
|         2 |
+-----------+
1 row in set (0.007 sec)
```

7. 查询借阅时长超过 15 天的借阅记录，包括读者姓名、图书 Title。

```
obclient(root@sys)[books]> SELECT R.Name, B.Title
    -> FROM borrow_records BR
    -> JOIN readers R ON BR.R_no = R.No
    -> JOIN books B ON BR.B_no = B.No
    -> WHERE DATEDIFF(BR.Return_date, BR.Borrow_date) > 15
    -> ;
+--------+--------------------+
| Name   | Title              |
+--------+--------------------+
| 小刚 | Python编程实战 |
| 小红 | 百年孤独       |
| 小美 | 明朝那些事儿 |
| 小明 | Python编程实战 |
+--------+--------------------+
4 rows in set (0.011 sec)
```

8. 向 borrow_records 表中插入一条记录（借阅编号为 6，图书编号为 5，读者编号为 5，借阅日期为 '2025-03-24'，归还日期为空）。

```
obclient(root@sys)[books]> INSERT INTO borrow_records (No, B_no, R_no, Borrow_date, Return_date)
    -> VALUES (6, 5, 5, '2025-03-24', NULL);
Query OK, 1 row affected (0.032 sec)
```

9. 计算每本图书的平均借阅时长，并输出平均借阅时长超过 15 天的图书的 No。

```
obclient(root@sys)[books]> SELECT BR.B_No
    -> FROM borrow_records as BR
    -> GROUP BY BR.B_no
    -> HAVING AVG(DATEDIFF(BR.Return_date, BR.Borrow_date)) > 15;
+------+
| B_No |
+------+
|    1 |
|    2 |
|    3 |
+------+
3 rows in set (0.009 sec)
```

10. 查询借阅过编号为 1 或者编号为 2 图书的读者 No。

```
obclient(root@sys)[books]> SELECT R_no
    -> FROM borrow_records
    -> WHERE B_no IN (1, 2);
+------+
| R_no |
+------+
|    1 |
|    2 |
|    3 |
|    5 |
+------+
4 rows in set (0.006 sec)
```

11. 查询既借阅过编号为 1 又借阅过编号为 3 图书的读者 No。

```
obclient(root@sys)[books]> SELECT R_no
    -> FROM borrow_records
    -> WHERE R_no in ((SELECT R_no FROM borrow_records WHERE B_no = 1)
    -> INTERSECT (SELECT R_no FROM borrow_records WHERE B_no = 3));
Empty set (0.023 sec)
```

12. 建立一个包含图书名字，作者，出版年份和图书类别的视图（赋予列名为 stitle, sauthor, spublicationyear, categoryname）。【create view】

```
obclient(root@sys)[books]> CREATE VIEW   books_view(stitle ,sauthor, spublication_year, categoryname)
    ->     SELECT b.Title, b.Author, b.Publication_year, c.Name
    ->     FROM books as b
    ->     JOIN category as c ON b.C_no = c.No;
Query OK, 0 rows affected (0.086 sec)
```

出现的问题：

1.建立表时错误

```
obclient(root@sys)[books]> CREATE TABLE category
    -> (
    ->     No Integer  NOT NULL,
    ->     Name VARCHAR NOT NULL,
    ->     PRIMARY KEY (No)
    -> );
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your OceanBase
version for the right syntax to use near 'NOT NULL,
    PRIMARY KEY (No)
)' at line 4
[172.17.0.2:2882] [2025-04-15 09:12:23.991526] [YB42AC110002-000632CD8A2C571B-0-0]
```

2.日期是 DATE 类型，无法直接相加减

3.建立视图时报错

```
obclient(root@sys)[books]> CREATE VIEW   books_view(stitle ,sauthor, spublication_year, categoryname) AS
    ->     SELECT b.Title, b.Author, b.Publication_year, c.Name
    ->     FROM books as b
    ->     JOIN category as c ON books.C_no = category.No;
ERROR 1054 (42S22): Unknown column 'books.C_no' in 'on clause'
[172.17.0.2:2882] [2025-04-15 09:36:37.549922] [YB42AC110002-000632CD896C5557-0-0]
```

解决方案：

1.使用 varchar 时必须指定字节数

2.使用 DATEDIFF 计算借阅日期

3.已经将 books 重命名为 b，category 重命名为 c 因此后续的查询不能再使用原来的名字