

《数据库系统原理》实验报告（）					
题目：实验一					
学号	2351753	姓名	黄保翔	日期	4.10
实验环境：docker oceanbase					
<p>实验步骤及结果截图：</p> <p>一、建立相关数据表</p> <p>1.Customer 表</p> <pre>obclient(root@sys)[oceanbase]&gt; CREATE TABLE Customers ( -&gt;   CustomerID INT AUTO_INCREMENT NOT NULL, -&gt;   Name VARCHAR(50) NOT NULL, -&gt;   Email VARCHAR(100) NOT NULL UNIQUE, -&gt;   Phone VARCHAR(20), -&gt;   RegistrationDate DATETIME NOT NULL, -&gt;   CONSTRAINT chk_Email CHECK (Email LIKE '%_@%._%'), -&gt;   PRIMARY KEY (CustomerID) -&gt; );</pre> <p>2、Products 表</p> <pre>obclient(root@sys)[oceanbase]&gt; CREATE TABLE Products ( -&gt;   ProductID INT AUTO_INCREMENT NOT NULL, -&gt;   ProductName VARCHAR(100) NOT NULL, -&gt;   Price DECIMAL(10,2) NOT NULL , -&gt;   StockQuantity INT NOT NULL , -&gt;   CategoryID INT NOT NULL , -&gt;   CONSTRAINT chk_Price CHECK (Price &gt; 0), -&gt;   CONSTRAINT chk_StockQuantity CHECK (StockQuantity &gt; 0), -&gt;   PRIMARY KEY (ProductID), -&gt;   FOREIGN KEY (CategoryID) REFERENCES Categories(CategoryID) -&gt; ); Query OK, 0 rows affected (0.084 sec)</pre> <p>3、建立 Categories 表</p> <pre>obclient(root@sys)[oceanbase]&gt; CREATE TABLE Categories -&gt; ( -&gt;   CategoryID INT AUTO_INCREMENT NOT NULL, -&gt;   CategoryName VARCHAR(50) NOT NULL UNIQUE, -&gt;   PRIMARY KEY (CategoryID) -&gt; ); Query OK, 0 rows affected (0.115 sec)</pre> <p>4、建立 Orders 表</p> <pre>obclient(root@sys)[oceanbase]&gt; CREATE TABLE Orders ( -&gt;   OrderID INT AUTO_INCREMENT NOT NULL, -&gt;   CustomerID INT NOT NULL, -&gt;   OrderDate DATETIME NOT NULL , -&gt;   TotalAmount DECIMAL(10,2) NOT NULL , -&gt;   CONSTRAINT chk_TotalAmount CHECK (TotalAmount &gt; 0), -&gt;   PRIMARY KEY (OrderID), -&gt;   FOREIGN KEY (CustomerID) REFERENCES Customers(CustomerID) -&gt; ); Query OK, 0 rows affected (0.068 sec)</pre>					

## 5、建立 OrderItems 表

```
obclient(root@sys)[oceanbase]> CREATE TABLE OrderItems(
->   OrderItemID INT AUTO_INCREMENT NOT NULL,
->   OrderID INT NOT NULL,
->   ProductID INT NOT NULL,
->   Quantity INT NOT NULL ,
->   Subtotal DECIMAL(10,2) NOT NULL ,
->   CONSTRAINT chk_Quantity CHECK (Quantity > 0),
->   PRIMARY KEY (OrderItemID),
->   FOREIGN KEY (OrderID) REFERENCES Orders(OrderID),
->   FOREIGN KEY (ProductID) REFERENCES Products(ProductID)
-> );
Query OK, 0 rows affected (0.087 sec)
```

## 6、建立触发器，令 subtotal = prices \* Quantity

```
obclient(root@sys)[oceanbase]> CREATE TRIGGER CalculateSubtotalBeforeInsert
-> BEFORE INSERT ON OrderItems
-> FOR EACH ROW
-> SET NEW.Subtotal = (SELECT Price FROM Products WHERE ProductID = NEW.ProductID) * NEW.Quantity;
Query OK, 0 rows affected (0.103 sec)

obclient(root@sys)[oceanbase]> CREATE TRIGGER CalculateSubtotalBeforeUpdate
-> BEFORE UPDATE ON OrderItems
-> FOR EACH ROW
-> SET NEW.Subtotal = (
->   SELECT Price FROM Products WHERE ProductID = NEW.ProductID
-> ) * NEW.Quantity;
Query OK, 0 rows affected (0.066 sec)
```

## 二、进行查询

```
obclient(root@sys)[oceanbase]> DESC Customers;
```

Field	Type	Null	Key	Default	Extra
CustomerID	int(11)	NO	PRI	NULL	auto_increment
Name	varchar(50)	NO		NULL	
Email	varchar(100)	NO	UNI	NULL	
Phone	varchar(20)	YES		NULL	
RegistrationDate	datetime	NO		NULL	

5 rows in set (0.013 sec)

```
obclient(root@sys)[oceanbase]> DESC Products;
```

Field	Type	Null	Key	Default	Extra
ProductID	int(11)	NO	PRI	NULL	auto_increment
ProductName	varchar(100)	NO		NULL	
Price	decimal(10,2)	NO		NULL	
StockQuantity	int(11)	NO		NULL	
CategoryID	int(11)	NO		NULL	

5 rows in set (0.004 sec)

```
obclient(root@sys)[oceanbase]> DESC Categories;
```

Field	Type	Null	Key	Default	Extra
CategoryID	int(11)	NO	PRI	NULL	auto_increment
CategoryName	varchar(50)	NO	UNI	NULL	

2 rows in set (0.006 sec)

```
obclient(root@sys)[oceanbase]> DESC Orders;
```

Field	Type	Null	Key	Default	Extra
OrderID	int(11)	NO	PRI	NULL	auto_increment
CustomerID	int(11)	NO		NULL	
OrderDate	datetime	NO		NULL	
TotalAmount	decimal(10,2)	NO		NULL	

4 rows in set (0.003 sec)

```
obclient(root@sys)[oceanbase]> DESC OrderItems;
```

Field	Type	Null	Key	Default	Extra
OrderItemID	int(11)	NO	PRI	NULL	auto_increment
OrderID	int(11)	NO		NULL	
ProductID	int(11)	NO		NULL	
Quantity	int(11)	NO		NULL	
Subtotal	decimal(10,2)	NO		NULL	

5 rows in set (0.002 sec)

三、使用以下语句查询建立的约束

```
obclient(root@sys)[mydb]> SELECT table_name, constraint_name, constraint_type
-> FROM information_schema.TABLE_CONSTRAINTS
-> WHERE table_name IN ('Customers', 'Products', 'Categories', 'Orders', 'OrderItems');
+-----+-----+-----+
| table_name | constraint_name | constraint_type |
+-----+-----+-----+
| Categories | PRIMARY | PRIMARY KEY |
| Customers | PRIMARY | PRIMARY KEY |
| OrderItems | PRIMARY | PRIMARY KEY |
| Orders | PRIMARY | PRIMARY KEY |
| Products | PRIMARY | PRIMARY KEY |
| Customers | Email | UNIQUE |
| Categories | CategoryName | UNIQUE |
| Customers | chk_Email | CHECK |
| Products | chk_Price | CHECK |
| Products | chk_StockQuantity | CHECK |
| Orders | chk_TotalAmount | CHECK |
| OrderItems | chk_Quantity | CHECK |
| OrderItems | OrderItems_OBFK_1744126047291444 | FOREIGN KEY |
| OrderItems | OrderItems_OBFK_1744126047280381 | FOREIGN KEY |
| Orders | Orders_OBFK_1744126041619039 | FOREIGN KEY |
| Products | Products_OBFK_1744126036012166 | FOREIGN KEY |
+-----+-----+-----+
16 rows in set (0.113 sec)
```

#### 四、表结构修改与操作

1、在 Customers 表中添加一个新字段 EditDate，类型为 DATETIME，当客户每次登录时，该字段更新为某个值（可自行设置，某个固定值即可）。需创建触发器实现此功能。

```
obclient(root@sys)[mydb]> ALTER TABLE Customers ADD EditDate DATETIME;
Query OK, 0 rows affected (0.161 sec)
```

```
obclient(root@sys)[mydb]> DESC Customers
-> ;
```

```
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| CustomerID | int(11) | NO | PRI | NULL | auto_increment |
| Name | varchar(50) | NO | | NULL | |
| Email | varchar(100) | NO | UNI | NULL | |
| Phone | varchar(20) | YES | | NULL | |
| RegistrationDate | datetime | NO | | NULL | |
| EditDate | datetime | YES | | NULL | |
+-----+-----+-----+-----+-----+-----+
6 rows in set (0.010 sec)
```

```
obclient(root@sys)[mydb]> CREATE TRIGGER UpdateEditDateBeforeUpdate
-> BEFORE UPDATE ON Customers
-> FOR EACH ROW
-> SET NEW.EditDate = CURRENT_TIMESTAMP;
Query OK, 0 rows affected (0.097 sec)
```

2、将 Customers 中的 name 由 varchar 改为 char(15)。

```
obclient(root@sys)[mydb]> ALTER TABLE Customers MODIFY Name char(15);
Query OK, 0 rows affected (1.039 sec)
```

```
obclient(root@sys)[mydb]> desc Customers
-> ;
```

Field	Type	Null	Key	Default	Extra
CustomerID	int(11)	NO	PRI	NULL	auto_increment
Name	char(15)	YES		NULL	
Email	varchar(100)	NO	UNI	NULL	
Phone	varchar(20)	YES		NULL	
RegistrationDate	datetime	NO		NULL	
EditDate	datetime	YES		NULL	

6 rows in set (0.017 sec)

3、修改 Products 表，添加一个 IsFeatured 字段，类型为 BOOLEAN，默认值为 FALSE。同时，创建一个索引，用于快速查询特色商品（IsFeatured 为 TRUE 的商品）

```
obclient(root@sys)[mydb]> ALTER TABLE Products ADD IsFeatured BOOLEAN DEFAULT FALSE;
Query OK, 0 rows affected (0.053 sec)
```

```
obclient(root@sys)[mydb]> desc Products
-> ;
```

Field	Type	Null	Key	Default	Extra
ProductID	int(11)	NO	PRI	NULL	auto_increment
ProductName	varchar(100)	NO		NULL	
Price	decimal(10,2)	NO		NULL	
StockQuantity	int(11)	NO		NULL	
CategoryID	int(11)	NO		NULL	
IsFeatured	tinyint(1)	YES		0	

6 rows in set (0.004 sec)

```
obclient(root@sys)[mydb]> CREATE INDEX idx_IsFeatured ON Products (IsFeatured);
Query OK, 0 rows affected (0.287 sec)
```

```
obclient(root@sys)[mydb]> SHOW INDEX FROM Products;
```

Table	Non_unique	Key_name	Seq_in_index	Column_name	Collation	Cardinality	Sub_part
Products	0	PRIMARY	1	ProductID	A	NULL	NULL
Products	1	idx_IsFeatured	1	IsFeatured	A	NULL	NULL

2 rows in set (0.032 sec)

出现的问题：

1. Products 表不能建立提示不存在表

```
obclient(root@sys)[oceanbase]> CREATE TABLE Products (
-> ProductID INT AUTO_INCREMENT NOT NULL,
-> ProductName VARCHAR(100) NOT NULL,
-> Price DECIMAL(10,2) NOT NULL ,
-> StockQuantity INT NOT NULL ,
-> CategoryID INT NOT NULL ,
-> CONSTRAINT chk_Price CHECK (Price > 0),
-> CONSTRAINT chk_StockQuantity CHECK (StockQuantity > 0),
-> PRIMARY KEY (ProductID),
-> FOREIGN KEY (CategoryID) REFERENCES Categories(CategoryID)
-> );
ERROR 1146 (42S02): Table doesn't exist
```

## 2. 查询表出错

```
obclient(root@sys)[oceanbase]> DESC <Customers>;
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 '<Customers>' at line 1
[172.17.0.2:2882] [2025-04-08 15:05:21.652941] [YB42AC110002-000632456C70FF94-0-0]
```

## 3. 查找约束出错

```
obclient(root@sys)[oceanbase]> SELECT table_name, constraint_name, constraint_type
-> FROM information_schema.TABLE_CONSTRAINTS
-> WHERE table_name=<Customers/Products/Categories/Orders/OrderItems>;
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 '<Customers/Products/Categories/Orders/OrderItems>' at line 3
```

### 解决方案:

1. 在建立 Product 表之前先建立 Categories 表
2. 在进行查询时不能有<>
3. 另重新创建一个数据库，重新在新的数据库中建立表