

华东师范大学数据科学与工程学院实验报告

课程名称：当代数据管理系统	年级：2018	上机实践成绩：
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上机实践名称：在线书店 bookstore		上机实践日期：2021/1
上机实践编号：	组号：	上机实践时间：

一、实验目的

实现一个提供网上购书功能的网站后端。

二、实验任务

网站支持书商在上面开商店，购买者可能通过网站购买。

买家和卖家都可以注册自己的账号。

一个卖家可以开一个或多个网上商店， 买家可以为自己的账户充值，在任意商店购买图书。

支持下单->付款->发货->收货，流程。

其中包括：

1)用户权限接口，如注册、登录、登出、注销

2)买家用户接口，如充值、下单、付款

3)卖家用户接口，如创建店铺、填加书籍信息及描述、增加库存

4)发货 -> 收货

5)搜索图书。用户可以通过关键字搜索，参数化的搜索方式； 如搜索范围包括，题目，标签，目录，内容；全站搜索或是当前店铺搜索

6)订单状态，订单查询和取消定单

用户可以查自己的历史订单，用户也可以取消订单。

任务分工：

基础功能：陈郅睿、曾国龙、俞泽恺

搜索功能、报告、演讲：俞泽恺

收货发货、取消订单：陈郅睿

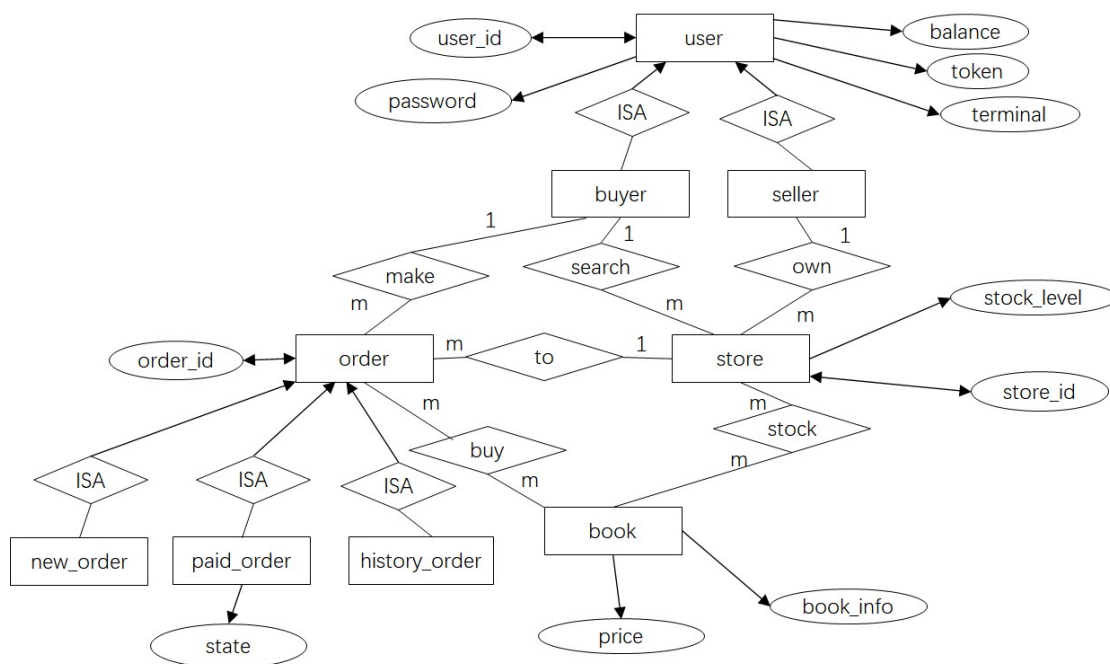
测试：曾国龙

三、使用环境

Python3

四、实验过程

ER 图：



ER 图的实体类主要有：用户 订单 商店 书本

用户包括买家和卖家，拥有自己的 id password 等信息

卖家拥有自己的商店，有自己的库存

商店中存放书本，书本有自己的 price 等信息

买家可以下订单，为了实现所需功能，可以将订单分为三类（新订单、已付款订单和历史订单），其中，新订单是用户下单后生成的，已付款订单是付款后生成的，记录商品的状态（待发货和发货中），而历史订单是由新订单或者已付款订单生成的

对应关系：一个用户可以下多个订单，一个订单只能由一个用户生成；一个订单只能访问一家商店，一家商店可以有多个订单；一个订单可以买多本书，一本书也可以出现在不同订单中（同一本书可以有很多库存）；一家商店可以存多本书，一本书也可以出现在不同商店；一个商家可以拥有多个商店，一个商店只能被一个人拥有

数据库设计（共 9 张表）：

users

user_id [PK] text	password text	balance integer	token text	terminal text
-----------------------------	-------------------------	---------------------------	----------------------	-------------------------

user_store

user_id [PK] text	store_id [PK] text
-----------------------------	------------------------------

store

store_id [PK] text	book_id [PK] text	book_info text	stock_level integer
------------------------------	-----------------------------	--------------------------	-------------------------------

new_order/history_order (schema 相同)

order_id [PK] text	user_id text	store_id text
------------------------------	------------------------	-------------------------

paid_order

order_id [PK] text	user_id text	store_id text	state text
------------------------------	------------------------	-------------------------	----------------------

new_order_detail/paid_order_detail/history_order_detail (schema 相同)

order_id [PK] text	book_id [PK] text	count integer	price integer
------------------------------	-----------------------------	-------------------------	-------------------------

介绍分表原因：

买家对于看中的书可以进行下单，订单存在 new_order/new_order_detail 中，此时还未进行付款

付款后，订单信息会转存到 paid_order/paid_order_detail 中（new_order 中信息删除），此时多了一个 state 位，用于记录发货信息，初始化为“未发货”。商家在买家付款后便可对其进行发货处理

发货后，买家收到货物，订单信息会转存到 history_order/history_order_detail（paid_order 中信息删除）中，以供用户查询历史订单

索引：对每个表中搜索时最常用到的键（id 等）建立了 B 树索引。

基础功能部分：

注册功能：

传入用户名和密码，插入数据库。若用户名已存在则无法插入。

```
def register(self, user_id: str, password: str):
    try:
        terminal = "terminal_{}".format(str(time.time()))
        token = jwt_encode(user_id, terminal)
        self.conn.execute(
            "INSERT into users(user_id, password, balance, token, terminal) "
            "VALUES (%s, %s, %s, %s, %s);",
            (user_id, password, 0, token, terminal), )
        #self.conn.commit()
    except pg.Error:
        return error.error_exist_user_id(user_id)
    return 200, "ok"
```

检查用户 token：

根据用户名取出并比对。

```
def check_token(self, user_id: str, token: str) -> (int, str):
    cursor = self.conn.execute("SELECT token from users where user_id=%s", (user_id,))
    row = self.conn.fetchone()
    if row is None:
        return error.error_authorization_fail()
    db_token = row['token']
    if not self.__check_token(user_id, db_token, token):
        return error.error_authorization_fail()
    return 200, "ok"
```

检查密码：

根据用户名取出并比对。

```
def check_password(self, user_id: str, password: str) -> (int, str):
    self.conn.execute("SELECT password from users where user_id=%s", (user_id,))
    row = self.conn.fetchone()
    if row is None:
        return error.error_authorization_fail()

    if password != row['password']:
        return error.error_authorization_fail()

    return 200, "ok"
```

登陆功能：

检查用户名和密码是否匹配，更新用户 token，返回 token。

```

def login(self, user_id: str, password: str, terminal: str) -> (int, str, str):
    token = ""
    try:
        code, message = self.check_password(user_id, password)
        if code != 200:
            return code, message, ""

        token = jwt_encode(user_id, terminal)
        cursor = self.conn.execute(
            "UPDATE users set token= %s , terminal = %s where user_id = %s",
            (token, terminal, user_id), )
        """if cursor.rowcount == 0:
            return error.error_authorization_fail() + ("", )"""
        # self.conn.commit()
    except pg.Error as e:
        print(e)
        return 528, "{}".format(str(e)), ""
    except BaseException as e:
        print(e)
        return 530, "{}".format(str(e)), ""
    return 200, "ok", token

```

登出功能:

检查用户名和 token 是否匹配, 更新 token。

```

def logout(self, user_id: str, token: str) -> bool:
    try:
        code, message = self.check_token(user_id, token)
        if code != 200:
            return code, message

        terminal = "terminal_{}".format(str(time.time()))
        dummy_token = jwt_encode(user_id, terminal)

        cursor = self.conn.execute(
            "UPDATE users SET token = %s, terminal = %s WHERE user_id=%s",
            (dummy_token, terminal, user_id), )
        """if cursor.rowcount == 0:
            return error.error_authorization_fail()

        self.conn.commit()"""
    except pg.Error as e:
        return 528, "{}".format(str(e))
    except BaseException as e:
        return 530, "{}".format(str(e))
    return 200, "ok"

```

注销用户功能:

检查用户名和密码是否匹配。删除用户信息。

```
def unregister(self, user_id: str, password: str) -> (int, str):
    try:
        code, message = self.check_password(user_id, password)
        if code != 200:
            return code, message

        cursor = self.conn.execute("DELETE from users where user_id=%s", (user_id,))
        """if self.conn.rowcount == 1:
            self.conn.commit()
        else:
            return error.error_authorization_fail()"""
    except pg.Error as e:
        return 528, "{}".format(str(e))
    except BaseException as e:
        return 530, "{}".format(str(e))
    return 200, "ok"
```

修改密码：

检查用户名和密码是否匹配。更新用户信息。

```
def change_password(self, user_id: str, old_password: str, new_password: str) -> bool:
    try:
        code, message = self.check_password(user_id, old_password)
        if code != 200:
            return code, message

        terminal = "terminal_{}".format(str(time.time()))
        token = jwt_encode(user_id, terminal)
        cursor = self.conn.execute(
            "UPDATE users set password = %s, token= %s , terminal = %s where user_id = %s",
            (new_password, token, terminal, user_id), )
        """if cursor.rowcount == 0:
            return error.error_authorization_fail()

        self.conn.commit()"""
    except pg.Error as e:
        return 528, "{}".format(str(e))
    except BaseException as e:
        return 530, "{}".format(str(e))
    return 200, "ok"
```

创建新订单：

检查参数是否合法，修改库存，创建订单。

```
def new_order(self, user_id: str, store_id: str, id_and_count: [(str, int)]) -> (int, str, str):
    order_id = ""
    try:
        #检查 id 是否存在
```

```
if not self.user_id_exist(user_id):
    return error.error_non_exist_user_id(user_id) + (order_id, )
if not self.store_id_exist(store_id):
    return error.error_non_exist_store_id(store_id) + (order_id, )
uid = "{}_{}_{}".format(user_id, store_id, str(uuid.uuid1()))

for book_id, count in id_and_count:
    cursor = self.conn.execute(
        "SELECT book_id, stock_level, book_info FROM store "
        "WHERE store_id = %s AND book_id = %s;",
        (store_id, book_id))
    row = self.conn.fetchone()
    #检查商店和书是否存在
    if row is None:
        return error.error_non_exist_book_id(book_id) + (order_id, )

    stock_level = row['stock_level']
    book_info = row['book_info']
    book_info_json = json.loads(book_info)
    price = book_info_json.get("price")
    #检查库存是否充足
    if stock_level < count:
        return error.error_stock_level_low(book_id) + (order_id, )
    #更改库存数量
    cursor = self.conn.execute(
        "UPDATE store set stock_level = stock_level - %s "
        "WHERE store_id = %s and book_id = %s and stock_level >= %s; ",
        (count, store_id, book_id, count))
    """if cursor.rowcount == 0:
        return error.error_stock_level_low(book_id) + (order_id, )"""

    self.conn.execute(
        "INSERT INTO new_order_detail(order_id, book_id, count, price) "
        "VALUES(%s, %s, %s, %s);",
        (uid, book_id, count, price))

    self.conn.execute(
        "INSERT INTO new_order(order_id, store_id, user_id) "
        "VALUES(%s, %s, %s);",
        (uid, store_id, user_id))
    #self.conn.commit()
    order_id = uid
except pg.Error as e:
    logging.info("528, {}".format(str(e)))
    return 528, "{}".format(str(e)), ""
except BaseException as e:
    logging.info("530, {}".format(str(e)))
```

```
return 530, "{}".format(str(e)), ""  
  
return 200, "ok", order_id
```

支付某个订单的钱款：

检查参数是否合法，修改买方卖方信息，修改订单状态信息。

```
def payment(self, user_id: str, password: str, order_id: str) -> (int, str):  
    conn = self.conn  
    try:  
        #检查订单是否存在  
        cursor = conn.execute("SELECT order_id, user_id, store_id FROM new_order WHERE  
order_id = %s", (order_id,))  
        row = conn.fetchone()  
        if row is None:  
            return error.error_invalid_order_id(order_id)  
  
        order_id = row['order_id']  
        buyer_id = row['user_id']  
        store_id = row['store_id']  
        #检查买家信息  
        if buyer_id != user_id:  
            return error.error_authorization_fail()  
        #核对账户密码  
        cursor = conn.execute("SELECT balance, password FROM users WHERE user_id = %s;",  
(buyer_id,))  
        row = conn.fetchone()  
        if row is None:  
            return error.error_non_exist_user_id(buyer_id)  
        balance = row['balance']  
        if password != row['password']:  
            return error.error_authorization_fail()  
  
        #核对店铺信息  
        cursor = conn.execute("SELECT store_id, user_id FROM user_store WHERE store_id  
= %s;", (store_id,))  
        row = conn.fetchone()  
        if row is None:  
            return error.error_non_exist_store_id(store_id)  
  
        seller_id = row['user_id']  
  
        if not self.user_id_exist(seller_id):  
            return error.error_non_exist_user_id(seller_id)  
  
        conn.execute("SELECT book_id, count, price FROM new_order_detail WHERE order_id  
= %s;", (order_id,))  
        cursor=conn.fetchall()
```



```
total_price = 0
bookids=[]
counts=[]
prices=[]
for row in cursor:
    bookids.append(row['book_id'])
    counts.append(row['count'])
    prices.append(row['price'])
    count = row['count']
    price = row['price']
    total_price = total_price + price * count

if balance < total_price:
    return error.error_not_sufficient_funds(order_id)
#买家扣除相应钱款
cursor = conn.execute("UPDATE users set balance = balance - %s"
                        "WHERE user_id = %s AND balance >= %s",
                        (total_price, buyer_id, total_price))

"""if cursor.rowcount == 0:
    return error.error_not_sufficient_funds(order_id)"""
#卖家增加相应钱款
cursor = conn.execute("UPDATE users set balance = balance + %s"
                        "WHERE user_id = %s",
                        (total_price, seller_id))

"""if cursor.rowcount == 0:
    return error.error_non_exist_user_id(buyer_id)"""
#删除订单信息
cursor = conn.execute("DELETE FROM new_order WHERE order_id = %s", (order_id, ))
"""if cursor.rowcount == 0:
    return error.error_invalid_order_id(order_id)"""

cursor = conn.execute("DELETE FROM new_order_detail where order_id = %s",
(order_id, ))
"""if cursor.rowcount == 0:
    return error.error_invalid_order_id(order_id)"""

#增加状态信息
cursor = conn.execute(
    "INSERT INTO paid_order(order_id,user_id,store_id,state) "
    "VALUES(%s, %s, %s, '待发货');",
    (order_id, user_id, store_id))

for i in range(len(bookids)):
    cursor=conn.execute(
        "INSERT INTO paid_order_detail(order_id,book_id,count,price) "
        "VALUES(%s, %s, %s, %s);",
```

```

        (order_id,bookids[i],counts[i],prices[i]))
    #conn.commit()

except pg.Error as e:
    return 528, "{}".format(str(e))

except BaseException as e:
    return 530, "{}".format(str(e))

return 200, "ok"

```

给买方增加资金：

```

def add_funds(self, user_id, password, add_value) -> (int, str):
    try:

        cursor = self.conn.execute("SELECT password  from users where user_id=%s",
(user_id,))
        row = self.conn.fetchone()
        if row is None:
            return error.error_authorization_fail()
        #核对密码信息
        if row['password'] != password:
            return error.error_authorization_fail()
        #充值
        cursor = self.conn.execute(
            "UPDATE users SET balance = balance + %s WHERE user_id = %s",
            (add_value, user_id))
        """if cursor.rowcount == 0:
            return error.error_non_exist_user_id(user_id)

        self.conn.commit()"""
    except pg.Error as e:
        return 528, "{}".format(str(e))
    except BaseException as e:
        return 530, "{}".format(str(e))

    return 200, "ok"

```

卖方添加书：

#添加书的信息。从 user_store\store\users 中查询 id 是否存在。书的信息不能已经存在。
 #向 store 中插入书的信息，包括卖家 id、书 id、书信息（结构体）、库存数量。

```

def add_book(self, user_id: str, store_id: str, book_id: str, book_json_str: str, stock_level: int):
    try:
        if not self.user_id_exist(user_id):
            return error.error_non_exist_user_id(user_id)
        if not self.store_id_exist(store_id):

```

```

        return error.error_non_exist_store_id(store_id)
    if self.book_id_exist(store_id, book_id):
        return error.error_exist_book_id(book_id)

    self.conn.execute("INSERT into store(store_id, book_id, book_info, stock_level)"
                      "VALUES (%s, %s, %s, %s)", (store_id, book_id, book_json_str,
stock_level))
    #self.conn.commit()
    except pg.Error as e:
        return 528, "{}".format(str(e))
    except BaseException as e:
        return 530, "{}".format(str(e))
    return 200, "ok"

```

增加库存:

#增加书的库存水平。用户、店铺、书必须存在。将指定店铺中指定书籍的库存容量增加 add_stock_level 个。

```

def add_stock_level(self, user_id: str, store_id: str, book_id: str, add_stock_level: int):
    try:
        if not self.user_id_exist(user_id):
            return error.error_non_exist_user_id(user_id)
        if not self.store_id_exist(store_id):
            return error.error_non_exist_store_id(store_id)
        if not self.book_id_exist(store_id, book_id):
            return error.error_non_exist_book_id(book_id)

        self.conn.execute("UPDATE store SET stock_level = stock_level + %s "
                          "WHERE store_id = %s AND book_id = %s", (add_stock_level,
store_id, book_id))
        #self.conn.commit()
    except pg.Error as e:
        return 528, "{}".format(str(e))
    except BaseException as e:
        return 530, "{}".format(str(e))
    return 200, "ok"

```

创建店铺:

#创建店铺。用户 id 不能不存在，店铺 id 不能已经存在。向 user_store 中插入（店铺，用户）对

```

def create_store(self, user_id: str, store_id: str) -> (int, str):
    try:
        if not self.user_id_exist(user_id):
            return error.error_non_exist_user_id(user_id)
        if self.store_id_exist(store_id):
            return error.error_exist_store_id(store_id)
        self.conn.execute("INSERT into user_store(store_id, user_id)"
                          "VALUES (%s, %s)", (store_id, user_id))

```

```

        #self.conn.commit()
    except pg.Error as e:
        return 528, "{}".format(str(e))
    except BaseException as e:
        return 530, "{}".format(str(e))
    return 200, "ok"

```

收货发货功能实现：

为卖家提供一个发货接口，对于已经付款的订单（存在 paid_order 中），确认信息之后进行发货，改变 paid_id 状态位（“待发货”——“发货中”）

函数实现：

```

def send_item(self, user_id: str, order_id: str) -> (int, str):
    try:
        if not self.user_id_exist(user_id):
            return error.error_non_exist_user_id(user_id)
        #检查发货人信息
        cursor = self.conn.execute("SELECT store_id,state FROM paid_order WHERE order_id = %s", (order_id,))
        row = self.conn.fetchone()
        if row is None:
            return error.error_invalid_order_id(order_id)
        store_id = row['store_id']
        state=row['state']
        cursor = self.conn.execute("SELECT user_id FROM user_store WHERE store_id = %s", (store_id,))
        row = self.conn.fetchone()
        seller_id = row['user_id']
        if seller_id != user_id:
            return error.error_authorization_fail()
        if state=='发货中':
            return error.error_repeatsend()
        self.conn.execute("UPDATE paid_order SET state = %s "
                           "WHERE order_id = %s ", ('发货中',order_id))

    except pg.Error as e:
        return 528, "{}".format(str(e))
    except BaseException as e:
        return 530, "{}".format(str(e))
    return 200, "ok"

```

检查完用户和订单信息之后，还要检查 state 位，如果该货物已经在发货中则报错

为买家提供一个收货接口，收货之后，该订单变为历史订单，存入 history_order/history_order_detail（paid_order 中信息删除）中
函数实现：

```
def receive_item(self, user_id: str, order_id: str) -> (int, str):
    try:
        if not self.user_id_exist(user_id):
            return error.error_non_exist_user_id(user_id)

        # 检查收货人信息
        cursor = self.conn.execute("SELECT user_id,store_id,state FROM paid_order WHERE
order_id = %s", (order_id,))
        row = self.conn.fetchone()
        if row is None:
            return error.error_invalid_order_id(order_id)

        buyer_id = row['user_id']
        state = row['state']
        store_id = row['store_id']
        if buyer_id != user_id:
            return error.error_authorization_fail()

        if state == '待发货':
            return error.error_receive_fail()

        # 收货完成，该订单记录为历史订单
        cursor = self.conn.execute(
            "INSERT INTO history_order(order_id,user_id,store_id) "
            "VALUES(%s, %s, %s);",
            (order_id, user_id, store_id))

        self.conn.execute("SELECT book_id, count, price FROM paid_order_detail WHERE
order_id = %s;", (order_id,))
        cursor = self.conn.fetchall()
        total_price = 0
        bookids = []
        counts = []
        prices = []
        for row in cursor:
            bookids.append(row['book_id'])
            counts.append(row['count'])
            prices.append(row['price'])

        for i in range(len(bookids)):
            cursor = self.conn.execute(
```

```

        "INSERT INTO history_order_detail(order_id,book_id,count,price) "
        "VALUES(%s, %s, %s, %s);",
        (order_id, bookids[i], counts[i], prices[i]))

    # 删除订单信息
    cursor = self.conn.execute("DELETE FROM paid_order WHERE order_id = %s", (order_id,))
    cursor = self.conn.execute("DELETE FROM paid_order_detail where order_id = %s",
    (order_id,))

    # self.conn.commit()
except pg.Error as e:
    return 528, "{}".format(str(e))
except BaseException as e:
    return 530, "{}".format(str(e))
return 200, "ok"

```

订单查询实现：

由于订单可能出现在三个表中（new_order、paid_order、history_order）所以首先执行三个sql语句查询订单当前进度（位于哪个表中），并从对应的xxx_order_detail中提取订单详细信息，最后加上一个状态位返回给用户（未付款、待发货、发货中、已完成四种）

函数实现：

查询历史订单

```

def query(self, user_id: str, order_id: str) -> (int, str, str):
    conn = self.conn
    try:
        # 检查订单进度（未付款、已付款、已交付）
        cursor = conn.execute("SELECT user_id, store_id FROM new_order WHERE order_id
= %s",
                                (order_id,))
        row_new = conn.fetchone()
        cursor = conn.execute("SELECT user_id, store_id,state FROM paid_order WHERE order_id
= %s",
                                (order_id,))
        row_paid = conn.fetchone()
        cursor = conn.execute("SELECT user_id, store_id FROM history_order WHERE order_id
= %s",
                                (order_id,))
        row_history = conn.fetchone()

        if row_new is None and row_paid is None and row_history is None:
            return error.error_invalid_order_id(order_id)
        elif row_new is not None:
            print('new')
            buyer_id = row_new['user_id']
            store_id = row_new['store_id']
            if buyer_id != user_id:

```

```
        return error.error_authorization_fail()

    conn.execute("SELECT book_id, count FROM new_order_detail WHERE order_id
= %s;", (order_id,))
    cursor = conn.fetchall()

    books = []
    for row in cursor:
        dict = {}
        dict["id"] = row['book_id']
        dict["count"] = row['count']
        books.append(dict)
    json_text = {}
    json_text["user_id"] = buyer_id
    json_text["store_id"] = store_id
    json_text["books"] = books
    json_text["order_state"] = "unpaid"
    return 200, "ok", str(json_text)
elif row_paid is not None:
    print('paid')
    buyer_id = row_paid['user_id']
    store_id = row_paid['store_id']
    state = row_paid['state']
    if buyer_id != user_id:
        return error.error_authorization_fail()

    conn.execute("SELECT book_id, count FROM paid_order_detail WHERE order_id
= %s;", (order_id,))
    cursor = conn.fetchall()

    books = []
    for row in cursor:
        dict = {}
        dict["id"] = row['book_id']
        dict["count"] = row['count']
        books.append(dict)
    json_text = {}
    json_text["user_id"] = buyer_id
    json_text["store_id"] = store_id
    json_text["books"] = books
    json_text["order_state"] = state
    return 200, "ok", str(json_text)
elif row_history is not None:
    print('his')
    buyer_id = row_history['user_id']
    store_id = row_history['store_id']
    if buyer_id != user_id:
```

```

        return error.error_authorization_fail()

    conn.execute("SELECT book_id, count FROM history_order_detail WHERE order_id
= %s;", (order_id,))
    cursor = conn.fetchall()

    books = []
    for row in cursor:
        dict = {}
        dict["id"] = row['book_id']
        dict["count"] = row['count']
        print(dict)
        books.append(dict)
    json_text = {}
    json_text["user_id"] = buyer_id
    json_text["store_id"] = store_id
    json_text["books"] = books
    json_text["order_state"] = "finished"
    print(json_text)
    return 200, "ok", str(json_text)

except pg.Error as e:
    return 528, "{}".format(str(e))

except BaseException as e:
    return 530, "{}".format(str(e))

```

取消订单实现：

做出以下规定——只有未付款或者是已付款但未发货的用户才能取消订单，付款后已发货的用户无法取消订单。如果已经付款，则会退回相应钱款数目。取消后的订单存放在 history_order 中供用户查询。

```

def cancel(self, user_id: str, order_id: str) -> (int, str):
    conn = self.conn
    try:

        cursor = conn.execute("SELECT user_id, store_id FROM new_order WHERE order_id
= %s",
                                (order_id,))
        row_new = conn.fetchone()
        cursor = conn.execute("SELECT user_id, store_id, state FROM paid_order WHERE order_id
= %s",
                                (order_id,))
        row_paid = conn.fetchone()
        if row_new is None and row_paid is None:
            return error.error_invalid_order_id(order_id)
        elif row_new is not None:
            buyer_id = row_new['user_id']

```



```
store_id = row_new['store_id']
cursor = conn.execute("SELECT store_id, user_id FROM user_store WHERE store_id
= %s;", (store_id,))
row = conn.fetchone()
seller_id = row['user_id']

if not self.user_id_exist(seller_id):
    return error.error_non_exist_user_id(seller_id)
if buyer_id != user_id:
    return error.error_authorization_fail()

# 订单未付款，接受取消操作，该订单写入历史订单
cursor = self.conn.execute(
    "INSERT INTO history_order(order_id,user_id,store_id) "
    "VALUES(%s, %s, %s);",
    (order_id, user_id, store_id))

self.conn.execute("SELECT book_id, count, price FROM new_order_detail WHERE
order_id = %s;",
                    (order_id,))
cursor = self.conn.fetchall()

bookids = []
counts = []
prices = []

for row in cursor:
    bookids.append(row['book_id'])
    counts.append(row['count'])
    prices.append(row['price'])

for i in range(len(bookids)):
    cursor = self.conn.execute(
        "INSERT INTO history_order_detail(order_id,book_id,count,price) "
        "VALUES(%s, %s, %s, %s);",
        (order_id, bookids[i], counts[i], prices[i]))

# 删除订单信息
cursor = self.conn.execute("DELETE FROM new_order WHERE order_id = %s",
(order_id,))
cursor = self.conn.execute("DELETE FROM new_order_detail where order_id = %s",
(order_id,))

return 200, "ok"
elif row_paid is not None:
```



```

# 卖家减少相应钱款
cursor = conn.execute("UPDATE users set balance = balance - %s"
                        "WHERE user_id = %s",
                        (total_price, seller_id))

# 删除订单信息
cursor = self.conn.execute("DELETE FROM paid_order WHERE order_id = %s",
(order_id,))
cursor = self.conn.execute("DELETE FROM paid_order_detail where order_id = %s",
(order_id,))

return 200, "ok"

except pg.Error as e:
    return 528, "{}".format(str(e))

except BaseException as e:
    return 530, "{}".format(str(e))

```

搜索功能：

参数化的搜索。可搜索的参数和 `store` 及 `book_info` 中参数一致，每个检索条件以列表形式传入（也可不传入），返回匹配满足条件的所有结果。对 `tags`，要求结果满足包含传入参数的所有元素。对其他参数，要求结果满足包含传入参数中的至少一个。

例如，传入参数

`target_store_id=['store1','store2'],target_title=['book1','book2'],target_tags=['tags1','tags2','tags3']`，则查询的对象为 `store1` 和 `store2` 中书标题为 `book1` 或 `book2`、且书的 `tags` 包含全部三者的条目。

```

def
search_by_arguments(self,target_store_id:list=None,target_id:list=None,target_title:list=None,ta
get_tags:list=None,

target_author:list=None,target_publisher:list=None,target_original_title:list=None,target_translat
or:list=None,

target_pub_year:list=None,target_pages:list=None,target_price:list=None,target_binding:list=Non
e,

target_isbn:list=None,target_author_intro:list=None,target_book_intro:list=None,target_content:li
st=None,

                        target_stock_level:int=None
                    ):
    if target_store_id == None or target_store_id==[]: #全站搜索
        self.conn.execute("""
            select * from store
            """)

```

```

else:#指定店铺
    if len(target_store_id)==1:
        self.conn.execute("""
            select * from store where store_id=%s
            """, (target_store_id[0],))
    else:
        cond='store_id='+\'\"'+target_store_id[0]+\'\"
        for x in target_store_id[1:]:
            cond+=' or store_id='+\'\"'+x+\'\"
        print(cond)
        self.conn.execute("""
            select * from store where {
            """.format(cond,))

ans = self.conn.fetchall()
ret = []
for entry in ans:
    flag = 1
    store_id = entry['store_id']
    stock_level = entry['stock_level']
    book_info = entry['book_info']
    book_info = json.loads(book_info)
    tags = book_info['tags']
    pictures = book_info['pictures']
    id = book_info['id']
    title = book_info['title']
    author = book_info['author']
    publisher = book_info['publisher']
    original_title = book_info['original_title']
    translator = book_info['translator']
    pub_year = book_info['pub_year']
    pages = book_info['pages']
    price = book_info['price']
    binding = book_info['binding']
    isbn = book_info['isbn']
    author_intro = book_info['author_intro']
    book_intro = book_info['book_intro']
    content = book_info['content']
    if target_id!=None and target_id!=[] and not any(item in id for item in target_id):#id 任意
        满足

        continue
    if target_tags != None and target_tags !=[] and not all(item in tags for item in
target_tags):#tag 要全部满足
        flag = 0
        continue
    if target_title!=None and target_title!=[] and not any(item in title for item in target_title):

```

```
        continue
        if target_author!=None and target_author!=[] and not any(i in author for i in
target_author):

            continue
            if target_publisher!=None and target_publisher!=[] and not any(i in publisher for i in
target_publisher):

                continue
                if target_original_title!=None and target_original_title!=[] and not any(i in original_title
for i in target_original_title):

                    continue
                    if target_translator!=None and target_translator!=[] and not any(i in translator for i in
target_translator):

                        continue
                        if target_pub_year!=None and target_pub_year!=[] and not any(i in pub_year for i in
target_pub_year):

                            continue
                            if target_pages!=None and target_pages!=[] and not any(i in pages for i in target_pages):

                                continue
                                if target_price!=None and target_price!=[] and not any(i in price for i in target_price):

                                    continue
                                    if target_binding!=None and target_binding!=[] and not any(i in binding for i in
target_binding):

                                        continue
                                        if target_isbn!=None and target_isbn!=[] and not any(i in isbn for i in target_isbn):

                                            continue
                                            if target_author_intro!=None and target_author_intro!=[] and not any(i in author_intro
for i in target_author_intro):

                                                continue
                                                if target_book_intro!=None and target_book_intro!=[] and not any(i in book_intro for i in
target_book_intro):

                                                    continue
                                                    if target_content!=None and target_content!=[] and not any(i in content for i in
target_content):

                                                        continue
                                                        if target_stock_level!=None and target_stock_level!=[] and target_stock_level >
```

stock_level:

```

        continue
    if flag==1:
        ret.append(dict(entry))

    return 200, ret

```

Pytest:

The screenshot shows the PyCharm IDE interface with the following details:

- Project:** bookstore-master 2
- File:** store.py
- Terminal Output:**

```

fe/test/test_new_order.py::TestNewOrder::test_ok PASSED [ 49%]
fe/test/test_new_order.py::TestNewOrder::test_non_exist_user_id PASSED [ 50%]
fe/test/test_new_order.py::TestNewOrder::test_non_exist_store_id PASSED [ 52%]
fe/test/test_password.py::TestPassword::test_ok PASSED [ 54%]
fe/test/test_password.py::TestPassword::test_error_password PASSED [ 56%]
fe/test/test_password.py::TestPassword::test_error_user_id PASSED [ 58%]
fe/test/test_payment.py::TestPayment::test_ok PASSED [ 60%]
fe/test/test_payment.py::TestPayment::test_authorization_error PASSED [ 62%]
fe/test/test_payment.py::TestPayment::test_not_suff_funds PASSED [ 64%]
fe/test/test_payment.py::TestPayment::test_repeat_pay PASSED [ 66%]
fe/test/test_query.py::TestQuery::test_ok PASSED [ 67%]
fe/test/test_query.py::TestQuery::test_error_authorization_fail PASSED [ 69%]
fe/test/test_query.py::TestQuery::test_error_invalid_order_id PASSED [ 71%]
fe/test/test_receive_item.py::TestSendItem::test_receive_item_ok PASSED [ 73%]
fe/test/test_receive_item.py::TestSendItem::test_error_authorization_fail PASSED [ 75%]
fe/test/test_receive_item.py::TestSendItem::test_error_receive_fail PASSED [ 77%]
fe/test/test_receive_item.py::TestSendItem::test_error_repeatreceive PASSED [ 79%]
fe/test/test_register.py::TestRegister::test_register_ok PASSED [ 81%]
fe/test/test_register.py::TestRegister::test_unregister_ok PASSED [ 83%]
fe/test/test_register.py::TestRegister::test_unregister_error_authorization PASSED [ 84%]
fe/test/test_register.py::TestRegister::test_register_error_exist_user_id PASSED [ 86%]
fe/test/test_send_item.py::TestSendItem::test_send_item_ok PASSED [ 88%]
fe/test/test_send_item.py::TestSendItem::test_error_repeat_send PASSED [ 90%]
fe/test/test_send_item.py::TestSendItem::test_error_send_fail PASSED [ 92%]
fe/test/test_send_item.py::TestSendItem::test_error_authorization_fail PASSED [ 94%]
fe/test/test_send_item.py::TestSendItem::test_error_invalid_order_id PASSED [ 96%]
fe/test/test_serch_by_args.py::TestSearchByArgs::test_ok1 PASSED [ 98%]
fe/test/test_serch_by_args.py::TestSearchByArgs::test_ok2 PASSED [100%]

===== 53 passed in 143.90s (0:02:23) =====

```
- Summary:** 53 passed in 143.90s (0:02:23)

File	Lines	Missed	Failed	Skipped	Coverage
fe/access/book.py	71	1	12	2	96%
fe/access/buyer.py	54	0	2	0	100%
fe/access/new_buyer.py	8	0	0	0	100%
fe/access/new_seller.py	8	0	0	0	100%
fe/access/seller.py	37	0	0	0	100%
fe/bench/__init__.py	0	0	0	0	100%
fe/bench/run.py	13	0	6	0	100%
fe/bench/session.py	47	0	12	1	98%
fe/bench/workload.py	125	1	22	2	98%
fe/conf.py	11	0	0	0	100%
fe/conftest.py	17	0	0	0	100%
fe/test/__init__.py	0	0	0	0	100%
fe/test/gen_book_data.py	48	1	16	1	97%
fe/test/test_add_book.py	36	0	10	0	100%
fe/test/test_add_funds.py	23	0	0	0	100%
fe/test/test_add_stock_level.py	39	0	10	0	100%
fe/test/test_bench.py	6	2	0	0	67%
fe/test/test_candle.py	74	1	4	1	97%
fe/test/test_create_store.py	20	0	0	0	100%
fe/test/test_login.py	28	0	0	0	100%
fe/test/test_new_order.py	40	0	0	0	100%
fe/test/test_password.py	33	0	0	0	100%
fe/test/test_payment.py	60	1	4	1	97%
fe/test/test_query.py	95	1	4	1	98%
fe/test/test_receive_item.py	80	1	4	1	98%
fe/test/test_register.py	31	0	0	0	100%
fe/test/test_send_item.py	89	1	4	1	98%
fe/test/test_serch_by_args.py	123	0	6	0	100%
TOTAL	2118	111	369	69	92%

覆盖率 92%

其他:

创建了 github 组织并提交了项目代码

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YuZekai dbms2020 YZKCZRZGL 1dF9860 24 seconds ago 1 commit

be	dbms2020 YZKCZRZGL	24 seconds ago
doc	dbms2020 YZKCZRZGL	24 seconds ago
fe	dbms2020 YZKCZRZGL	24 seconds ago
script	dbms2020 YZKCZRZGL	24 seconds ago
.DS_Store	dbms2020 YZKCZRZGL	24 seconds ago
.gitignore	dbms2020 YZKCZRZGL	24 seconds ago
.pre-commit-config.yaml	dbms2020 YZKCZRZGL	24 seconds ago
.travis.yml	dbms2020 YZKCZRZGL	24 seconds ago
1.txt	dbms2020 YZKCZRZGL	24 seconds ago
README.md	dbms2020 YZKCZRZGL	24 seconds ago
README2.md	dbms2020 YZKCZRZGL	24 seconds ago
requirements.txt	dbms2020 YZKCZRZGL	24 seconds ago
setup.py	dbms2020 YZKCZRZGL	24 seconds ago

五、总结

本次项目使我们更好地了解了关系型数据库的设计和使用，也进一步熟悉了 flask 架构和 pytest 代码测试等。由于时间和水平有限，项目还有很多可以改进的空间，例如使用 ORM、优化表的设计、实现更多功能等等，如有机会将继续改进。