grpc书籍信息管理系统

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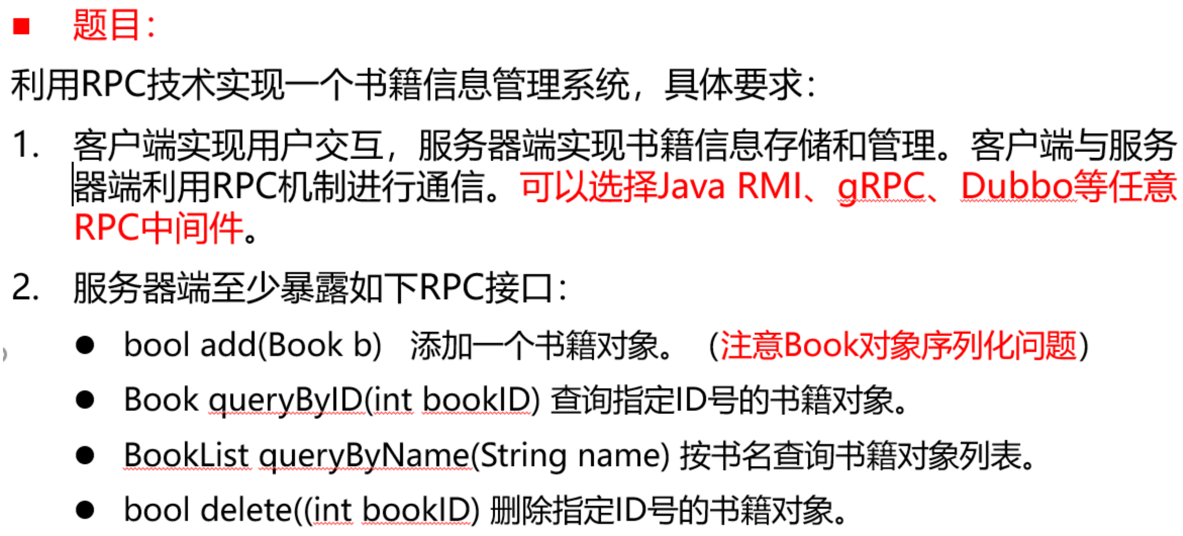


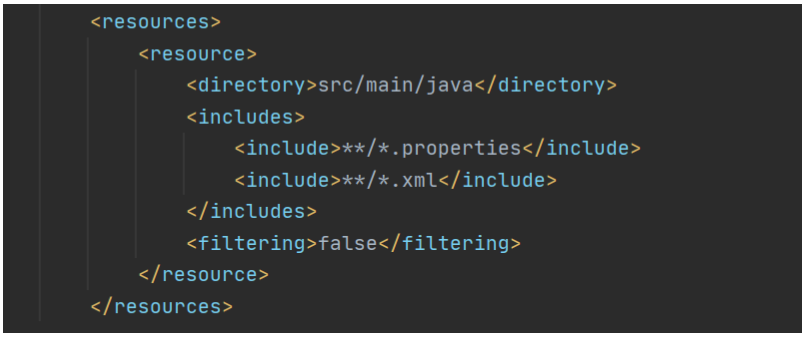
■ 题目：

利用RPC技术实现一个书籍信息管理系统，具体要求：

1. 客户端实现用户交互，服务器端实现书籍信息存储和管理。客户端与服务器端利用RPC机制进行通信。可以选择Java RMI、gRPC、Dubbo等任意RPC中间件。
2. 服务器端至少暴露如下RPC接口：
   - bool add(Book b) 添加一个书籍对象。 （注意Book对象序列化问题）
   - Book queryByID(int bookID) 查询指定ID号的书籍对象。
   - BookList queryByName(String name) 按书名查询书籍对象列表。
   - bool delete((int bookID) 删除指定ID号的书籍对象。

问题分析

1. 选择的中间件为grpc
2. 先配置pom.xml(根据老师给的示例，代码比较多，不完全展示)



```
<resources>
    <resource>
        <directory>src/main/java</directory>
        <includes>
            <include>**/*.properties</include>
            <include>**/*.xml</include>
        </includes>
        <filtering>false</filtering>
    </resource>
</resources>
```

3. 配置proto文件

- 需求分析

> 1.添加书籍
> 2.根据书籍ID查书的信息
> 3.根据书名查书的信息
> 4.根据书籍ID删除书籍
> 5.所有图书图书

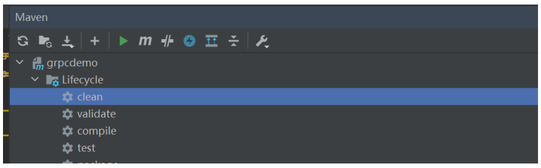
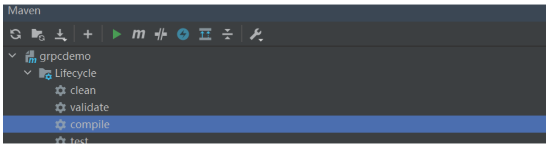
```
rpc addBook(bookInformation) returns(bookID){};              //添加书籍
rpc searchByID(bookID) returns(bookInformation){};           //根据书籍ID查书的信息
rpc searchByName(bookName) returns(bookID){};    //根据书名查书的信息
rpc deleteByID(bookID) returns(bookInformation){};           //根据书籍ID删除书籍
rpc showBooks(bookID) returns(bookInformation){};             //所有图书
```

> 三个信息类型
>
> 1.书籍ID   2.书籍名字   3.书籍信息（ID ,名字)

```
//书籍ID
message bookID{
    string ID = 1;
}
//书籍名字
message bookName{
    string name = 1;
}
//书籍信息
message bookInformation{
    string ID = 1;
    string name = 2;
}
```

4. 在Impl.JAVA文件中重写方法

先用Maven

 Maven grpcdemo Lifecycle clean validate compile test	 Maven grpcdemo Lifecycle clean validate compile test

> addBook() searchByID()   searchByName() deleteByID() showBooks()

我先定义了一个book对象，然后定义一个对象数组

```
class book{
    private String id;
    private String name;
    public book(String id, String name){
        this.id = id;
        this.name = name;
    }
    public String getID() {return id;}
    public String getName() {return name;}
}
```

```
ArrayList<book> bookshelf = new ArrayList<book>();
```

添加书籍addbook()

```
public void addBook(bookInformation request, StreamObserver<bookID> responseObserver) {
        String id = request.getID();//插入的书籍ID
        String name = request.getName();//插入的书籍名字
        int search = 0;  //来判断该书ID是否已存在
        for(int i = 0;i<bookshelf.size();i++){//遍历判断
            if(bookshelf.get(i).getID().equals(id)){
                search = 1;
        bookID b1 = bookID.newBuilder().setID("不好意思，该书ID已存在").build();
        responseObserver.onNext(b1);
        responseObserver.onCompleted();
      }
    }
    if(search==0){ //书籍ID不存在，可以插入
      bookshelf.add(new book(id,name));//添加书籍
      bookID id1 = bookID.newBuilder().setID(id).build();
      responseObserver.onNext(id1);//返回信息
      responseObserver.onCompleted();
    }
  }
```

根据ID来搜索书籍信息searchByID()

```
public void searchByID(bookID request, StreamObserver<bookInformation> responseObserver) {
    String id = request.getID();
    int search = 0;
    for(int i = 0;i<bookshelf.size();i++){
      if(bookshelf.get(i).getID().equals(id)){//遍历查询
        search = 1;
        bookInformation b1 = bookInformation.newBuilder().setID(bookshelf.get(i).getID()).
            setName(bookshelf.get(i).getName()).build();
        responseObserver.onNext(b1);
        responseObserver.onCompleted();
      }
    }
    if(search == 0){//没有相应的信息
      bookInformation b2 = bookInformation.newBuilder().setID("同学你好").
          setName("未检索到你查询的图书").build();
      responseObserver.onNext(b2);
      responseObserver.onCompleted();
    }
  }
```

根据书籍名字来查找书籍ID searchByName()

```
public void searchByName(bookName request, StreamObserver<bookID> responseObserver) {
    String bookname = request.getName();
    String bookid = "";
    int search = 0;
    for(int i = 0;i<bookshelf.size();i++){//遍历查询
      if(bookshelf.get(i).getName().equals(bookname)){
        search = 1;
        bookid = bookid + " "+ bookshelf.get(i).getID();
      }
    }
    if(search==1){//查询到，传输图书ID
      bookID id = bookID.newBuilder().setID(bookid).build();
      responseObserver.onNext(id);
      responseObserver.onCompleted();
```

```
        }else {//查不到信息
            bookID id = bookID.newBuilder().setID("未查到书籍信息").build();
            responseObserver.onNext(id);
            responseObserver.onCompleted();
        }
    }
```

根据书籍id删除书籍 deleteByID()

```
public void deleteByID(bookID request, StreamObserver<bookInformation> responseObserver) {
        String bookid = request.getID();
        int search = 0;
        for (book book : bookshelf) {
            if(book.getID().equals(bookid)){//遍历查询
                search = 1;
                bookshelf.remove(book);//删除book对象
                bookInformation del_book = bookInformation.newBuilder().setID(book.getID()).
                        setName(book.getName()).build();
                responseObserver.onNext(del_book);
                responseObserver.onCompleted();
            }
        }
        if(search==0){//没有查到
            bookInformation del_book = bookInformation.newBuilder().setID(request.getID()).
                    setName("没有书籍信息").build();
            responseObserver.onNext(del_book);
            responseObserver.onCompleted();
        }

    }
```

显示所有图书信息 showBooks()

```
public void showBooks(bookID request, StreamObserver<bookInformation> responseObserver) {
        String information = "";
        for(int i = 0;i<bookshelf.size();i++){//遍历查询
            information =  information + bookshelf.get(i).getID() +" "
                    + bookshelf.get(i).getName()+ "\n" ;
        }
        bookInformation books = bookInformation.newBuilder().setID("").
                setName(information).build();
        responseObserver.onNext(books);
        responseObserver.onCompleted();
    }
```

5. server.java 的配置

> 基本上和示例的代码相同·，提供连接服务。

```java
private static final int port=9999;
    public static void main(String argc[]) throws IOException, InterruptedException {
        Server server= ServerBuilder.forPort(port).addService(new CalculatorServiceImpl())
                .build().start();
        System.out.println("grpc server started, port="+port);
        server.awaitTermination();
```

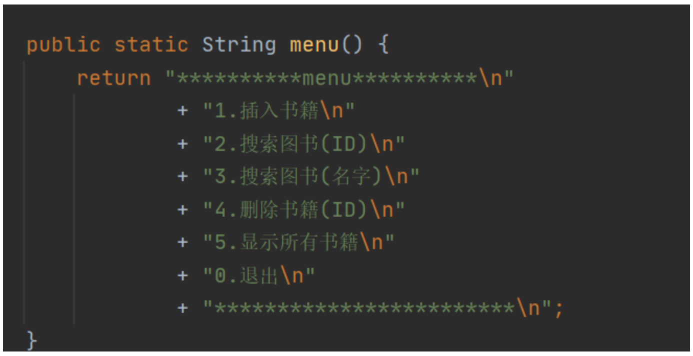
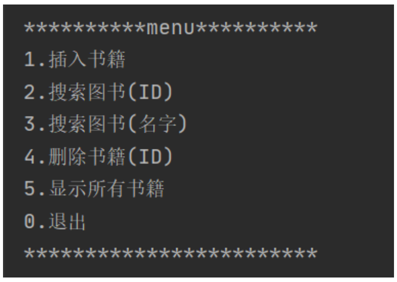
6. client.java

先建立连接

```java
 ManagedChannel managedChannel = ManagedChannelBuilder.forAddress(host, serverport).usePlaintext().build();
        try {
            //建立连接
            CalculatorServiceGrpc.CalculatorServiceBlockingStub calService = CalculatorServiceGrpc.newBlockingStub(managedChannel);
```

用switch来选择服务，先写一个菜单说明

菜单说明	图像显示

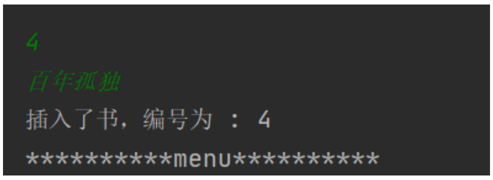
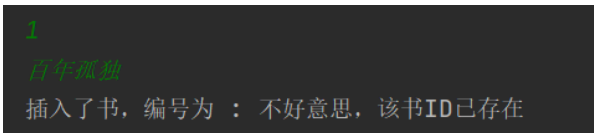

public static String menu() {
    return "**********menu**********\n"
            + "1.插入书籍\n"
            + "2.搜索图书(ID)\n"
            + "3.搜索图书(名字)\n"
            + "4.删除书籍(ID)\n"
            + "5.显示所有书籍\n"
            + "0.退出\n"
            + "************************\n";
}
	
	**********menu**********
	1.插入书籍
	2.搜索图书(ID)
	3.搜索图书(名字)
	4.删除书籍(ID)
	5.显示所有书籍
	0.退出
	************************

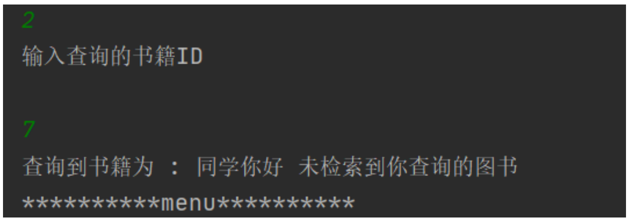
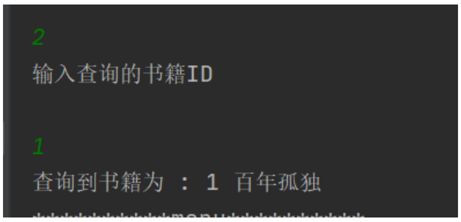
来使用switch来选择服务

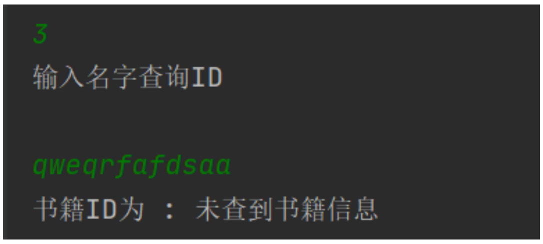
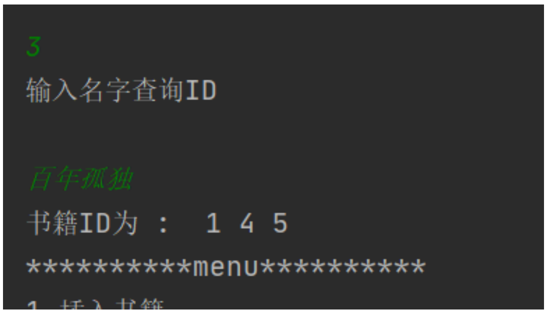
```java
Scanner input = new Scanner(System.in);
System.out.println(menu());
int choose = input.nextInt();
while (choose != 0) {
   switch(choose) {
      case 1: System.out.println("输入插入的书籍ID 书籍名称\n");
      String newBookID = input.next();
      String newName = input.next();
      bookID book_id = calService.addBook(bookInformation.newBuilder().
      setID(newBookID).setName(newName).build());
      System.out.println("插入了书，编号为 : "+book_id.getID()+" ");
      break;
      case 2: System.out.println("输入查询的书籍ID\n");
      String searchBookID = input.next();
      bookInformation book_information = calService.
      searchByID(bookID.newBuilder().setID(searchBookID).build());
      System.out.println("查询到书籍为 : "+book_information.getID()+" "+book_information.getName());
       break;
```

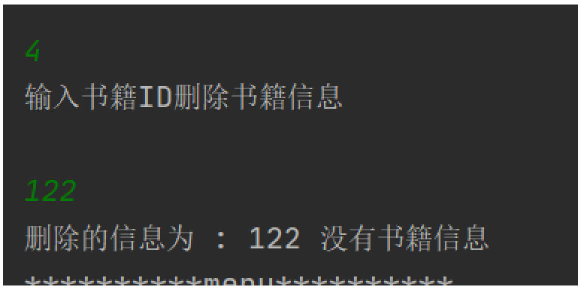
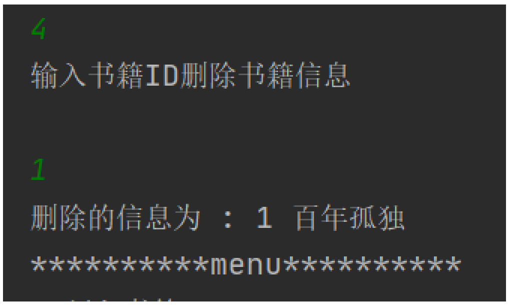
```
        case 3: System.out.println("输入名字查询ID\n");
        String searchBookName = input.next();
        bookID bookid = calService.
searchByName(bookName.newBuilder().setName(searchBookName).build());
        System.out.println("书籍ID为 : "+bookid.getID()+" ");
        break;
        case 4: System.out.println("输入书籍ID删除书籍信息\n");
        String deleteBookID = input.next();
        bookInformation information = calService.
deleteByID(bookID.newBuilder().setID(deleteBookID).build());
        System.out.println("删除的信息为 : "+information.getID()+"
"+information.getName());
         break;
         case 5: System.out.println("输出所有书籍信息(输入任意信息)\n");
         String noting = input.next();
         bookInformation information1 = calService.
         showBooks(bookID.newBuilder().setID(noting).build());
         System.out.println("所有书籍信息 : "+information1.getID()+"\n"+"ID
"+"书名"+"\n"+information1.getName());
          break;
          default: System.out.println("再次输入!\n");
          break;
}
          System.out.println(menu());
           choose = input.nextInt();
 }
```

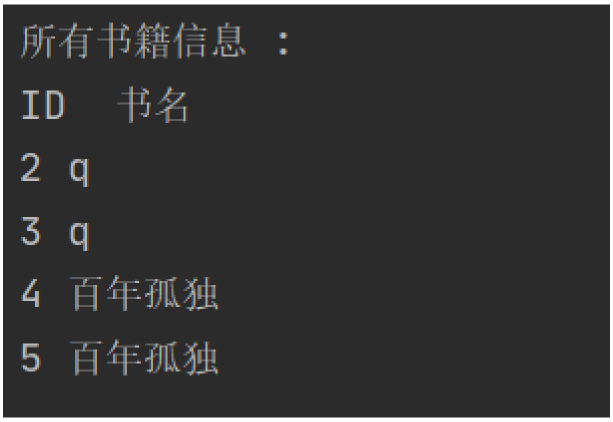
运行示范

插入书籍（ID不存在）	插入书籍（ID已存在）
 4 百年孤独 插入了书，编号为 ： 4 **********menu**********	 1 百年孤独 插入了书，编号为 ： 不好意思，该书ID已存在

搜索书籍（ID不存在）	搜索书籍（ID已存在）
 2 输入查询的书籍ID 7 查询到书籍为 ： 同学你好 未检索到你查询的图书 **********menu**********	 2 输入查询的书籍ID 1 查询到书籍为 ： 1 百年孤独

搜索书籍（名字不存在）	搜索书籍（名字存在）
 3 输入名字查询ID qweqrfafdsaa 书籍ID为 ： 未查到书籍信息	 3 输入名字查询ID 百年孤独 书籍ID为 ： 1 4 5 *********menu********** 1 插入书籍

删除书籍（ID不存在）	删除书籍（ID已存在）
 4 输入书籍ID删除书籍信息 122 删除的信息为 ： 122 没有书籍信息 ***********menu***********	 4 输入书籍ID删除书籍信息 1 删除的信息为 ： 1 百年孤独 **********menu*********** 1 插入书籍

显示所有的图书
 所有书籍信息 ： ID 书名 2 q 3 q 4 百年孤独 5 百年孤独