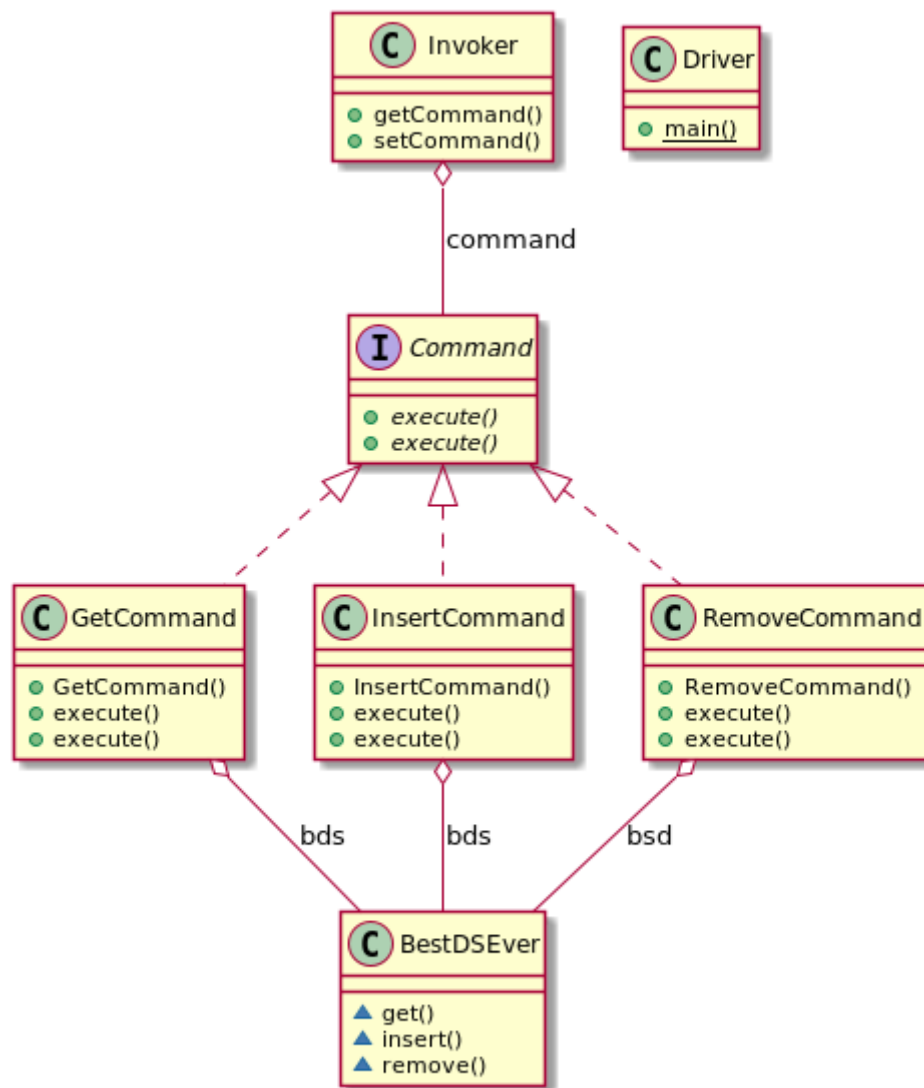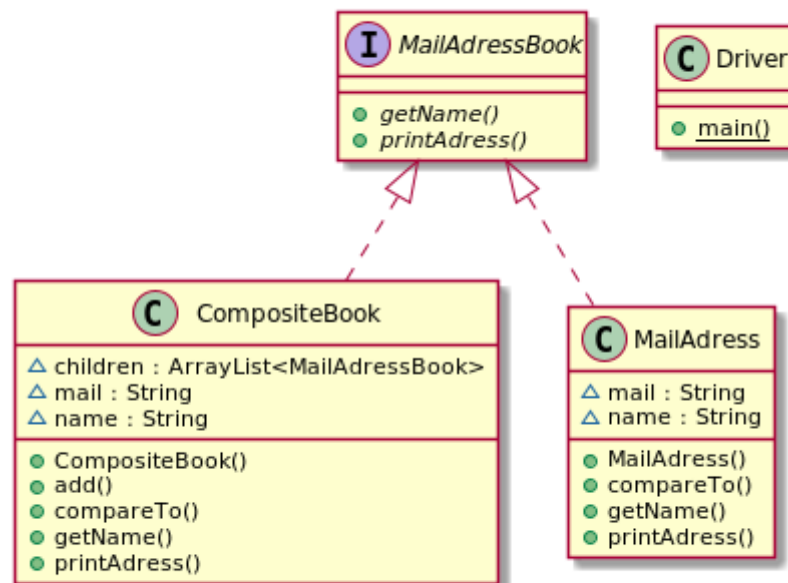Question 1)

For the first question, I chose command desing pattern to render BestDSEver thread-safe without modifying the original class. My client is Driver class and it creates command instances and invoker instance. Using setCommand method of the invoker I changed the commands that invoker has forho each method. To make BestDSEver methods thread safe, I wrapped the methods with synchronized block within the commands execute method. There is two execute command because signature of the get method is different from the others.

Question 2)

Question 2 Class Diagram

I MailAdressBook
- getName()
- printAdress()

C Driver
- main()

C CompositeBook
- △ children : ArrayList<MailAdressBook>
- △ mail : String
- △ name : String
- ● CompositeBook()
- ● add()
- ● compareTo()
- ● getName()
- ● printAdress()

C MailAdress
- △ mail : String
- △ name : String
- ● MailAdress()
- ● compareTo()
- ● getName()
- ● printAdress()

For the second question, I used composite design pattern. MailAdressBook is implemented as component, CompositeBook is implement as Composite and MailAdress is implemented as Leaf.

CompositeBook has Arraylist of MailAdressBook to create tree structure. Each node and leaf has a name and a mail. I used java.util.Iterator to travarse nodes of the tree. MailAdressBook also extends Comparable interface to compare names with compareTo method and I sorted the names according to this comparision.

```java
public class Driver {
    public static void main(String[] args) {

        MailAdress m1 = new MailAdress( mail: "abc@gtu.edu.tr",  name: "abc");
        MailAdress m2 = new MailAdress( mail: "bcd@gtu.edu.tr",  name: "bcd");
        MailAdress m3 = new MailAdress( mail: "cde@gtu.edu.tr",  name: "cde");

        CompositeBook c1 = new CompositeBook( mail: "students@gtu.edu.tr",  name: "students");
        c1.add(m3);
        c1.add(m2);
        c1.add(m1);

        MailAdress m4 = new MailAdress( mail: "def@gtu.edu.tr",  name: "def");
        MailAdress m5 = new MailAdress( mail: "efg@gtu.edu.tr",  name: "efg");
        MailAdress m6 = new MailAdress( mail: "fgh@gtu.edu.tr",  name: "fgh");

        CompositeBook c2 = new CompositeBook( mail: "cengStudents@gtu.edu.tr",  name: "cengStudents");
        c2.add(m6);
        c2.add(m5);
        c2.add(m4);

        MailAdress m7 = new MailAdress( mail: "ghj@gtu.edu.tr",  name: "ghj");
        MailAdress m8 = new MailAdress( mail: "hjk@gtu.edu.tr",  name: "hjk");
        MailAdress m9 = new MailAdress( mail: "jkl@gtu.edu.tr",  name: "jkl");

        CompositeBook c3 = new CompositeBook( mail: "mechStudents@gtu.edu.tr",  name: "mechStudents");
        c3.add(m9);
        c3.add(m8);
        c3.add(m7);

        c1.add(c3);
        c1.add(c2);
        c1.printAdress();
    }
}
```

```
Run
Run:   Driver
    /usr/lib/jvm/jdk-15.0.1/bin/java -javaagent:/snap/intellij-idea-ultimate/333
    ************************************************************
    Group mail: students@gtu.edu.tr Group name: students
    abc@gtu.edu.tr abc
    bcd@gtu.edu.tr bcd
    cde@gtu.edu.tr cde
    ************************************************************
    Group mail: cengStudents@gtu.edu.tr Group name: cengStudents
    def@gtu.edu.tr def
    efg@gtu.edu.tr efg
    fgh@gtu.edu.tr fgh
    ************************************************************
    Group mail: mechStudents@gtu.edu.tr Group name: mechStudents
    ghj@gtu.edu.tr ghj
    hjk@gtu.edu.tr hjk
    jkl@gtu.edu.tr jkl

    Process finished with exit code 0
```