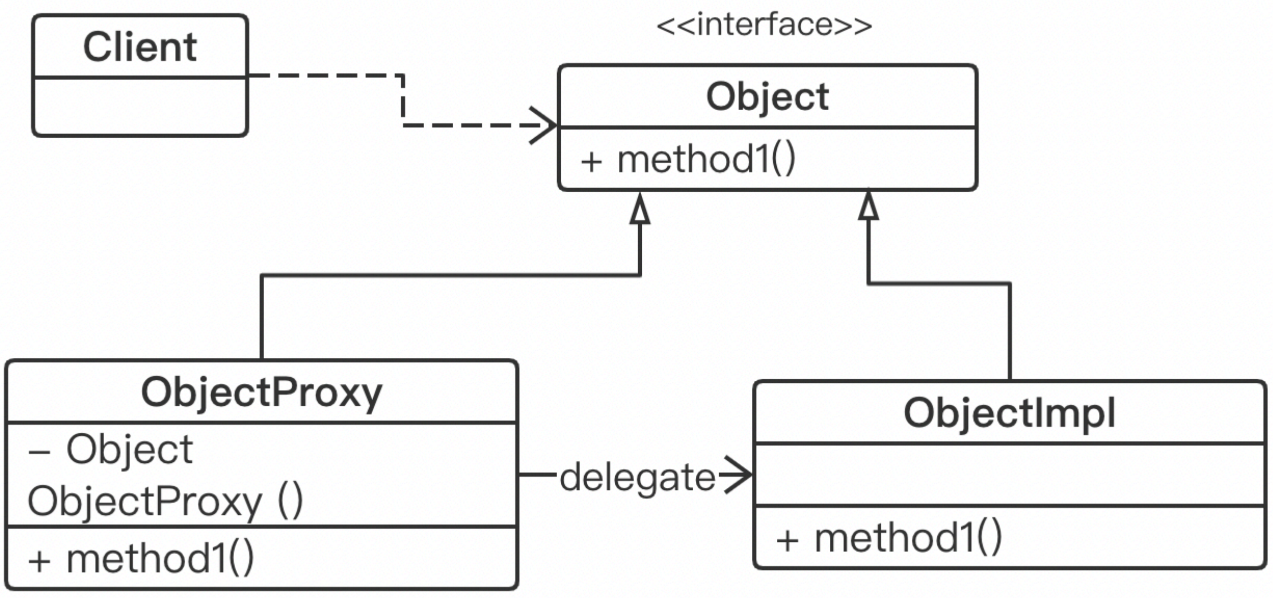
Examen_2020 Programmation Avancée

Exercice 1

1. The design pattern we have used here is `Dynamic Proxy`.

   We take the static proxy as an example to draw the following class diagram:



2. Implementing a proxy only requires calling the `newProxyInstance()`:

```
// 生成一个目标函数的代理对象
  // 1. ClassLoader loader : 指定当前目标对象使用的类加载器 Specifies the class loader used by
the current target object
  // 2. Class<?>[] interface : 目标对象实现的接口类型，使用泛型方法确认类型 The interface type
implemented by the target object, use the generic method to confirm the type
  // 3. InvocationHandler handler : 事件处理，执行目标对象的方法时，会触发事件处理器方法 Event
processing, when the method of the target object is executed, the event handler method will
be triggered
static Object newProxyInstance(ClassLoader loader,
                              Class<?>[] interfaces, // 传入目标对象
                              InvocationHandler handler);
```

```
List<Integer> nonModifiable = (List<Integer>)
      Proxy.newProxyInstance(List.class.getClassLoader(),
          new Class[] { List.class },
          // 在这里写功能增强的函数 Handler
          new ProtectionHandler(nombres, "add", "remove", "clear"));
public ProtectionHandler(Object recepteur, String... methodesInterdites) {
    this.recepteur = recepteur;
    this.methodesInterdites = new TreeSet<>();
    Collections.addAll(this.methodesInterdites, methodesInterdites);
  }
public Object invoke(Object proxy, Method method, Object[] args) throws Throwable {
  if (methodesInterdites.contains(method.getName())) {
    throw new UnsupportedOperationException();
  }
  return method.invoke(this.recepteur, args);
}
```

Exercice 2

1. In python, `@xxx` means decorator. A decorator is a function that takes a function (the decorated function) as a parameter and returns a function. It can add other functions to the function without changing the original function.
2. We can give a decorator's mechanism as an example:

```python
def decorator(decoratedFunc):
  def wrapper(*args, **kwargs):
    print('TODO before executing the decoratedFunc')
    decoratedFunc(*args, **kwargs)
    print('TODO after executing the decoratedFunc')
  return wrapper
```

3. In java, `@xxx` is an annotation. It can annotate classes, methods, variables, parameters and packages of the Java language. At compile or run time, the annotation annotates the processing of the content information

Exercice 3

IoC(Inversion of Control) is a design principle in OOP to reduce the coupling between the code. The basic idea is to achieve decoupling between objects with dependencies with the help of a "third party". We can implement Inversion of Control using Dependency Injection

Take the most common spring framework as an example:
The beanFactory in spring is the "third party" we mentioned above, which stores instances (beans) not created by us, and creates objects through reflection when needed.
We can use the annotation `@Component` to declare an instance (bean) in a beanFactory

```java
package fr.n7.gdai.spring
@Component("account")
public class Account{
  @Value("1")
  private Integer id;
  @Value("gdai")
  private String name;
  @Value("24")
  private Integer age;
  @Autowired
  private Order order;
}
```

```java
package fr.n7.gdai.spring
@Component("order")
public class Order{
  @Value("000001")
  private String orderID;
  @Value("1000.0")
  private float price;
}
```

```java
public class Test{
  public static void main(String[] args){
    ApplicationContext context =
      new AnnotationConfigApplicationContext("fr.n7.gdai.spring.*");
    System.out.print(context.getBean("account"));
  }
}
```

```
Account(id=1, name=gdai, age=24, order=Order(orderID=000001, price=1000.0))
```