SOLID
Interface Segregation Principle

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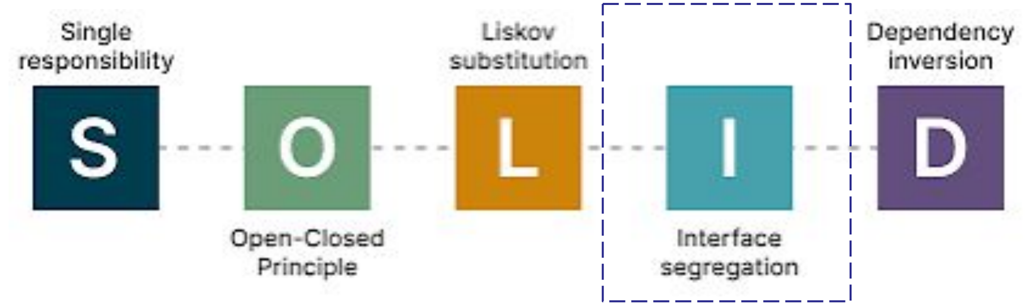
CONTENT

1. What is Interface Segregation Principle (ISP) ?
2. Why needs to ISP ?
3. How to use ISP ?
4. Where to use ISP ?
5. SOURCE code (github)

1.What is Interface Segregation Principle (ISP) ?



- **Robert Martin** introduced them in the book Agile Software Development, Principles, Patterns, and Practices
- **SOLID** is a mnemonic for five design principles intended to make software designs more understandable, flexible and maintainable.

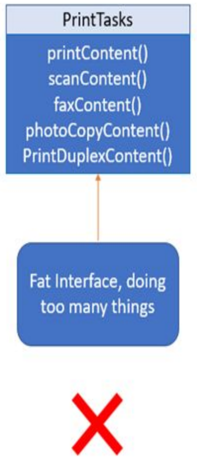
Interface segregation principle states:

- A client should never be forced to implement an interface that it doesn't use or clients shouldn't be forced to depend on methods they do not use. (*First defined by Robert C. Martin*)

2. Why needs to ISP?

By violating the ISP, we face the following problems in our code:

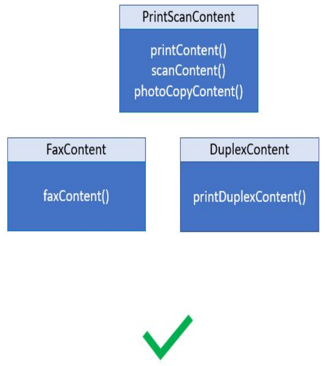
1. Client developers are confused by the methods they don't need.
2. Maintenance becomes harder because of side effects: a change in an interface forces us to change classes that don't implement the interface.
3. Implementing FAT interface with its unwanted methods and values could lead to many side effects.



** FAT Interface - is an interface which contains many unrelated values and methods inside it*

3. How to use ISP ?

1. Split large interfaces into smaller ones.
2. Inherit multiple small interfaces if required.
3. Use the adapter design pattern for the third-party large interface so that your code can work with the adapter.



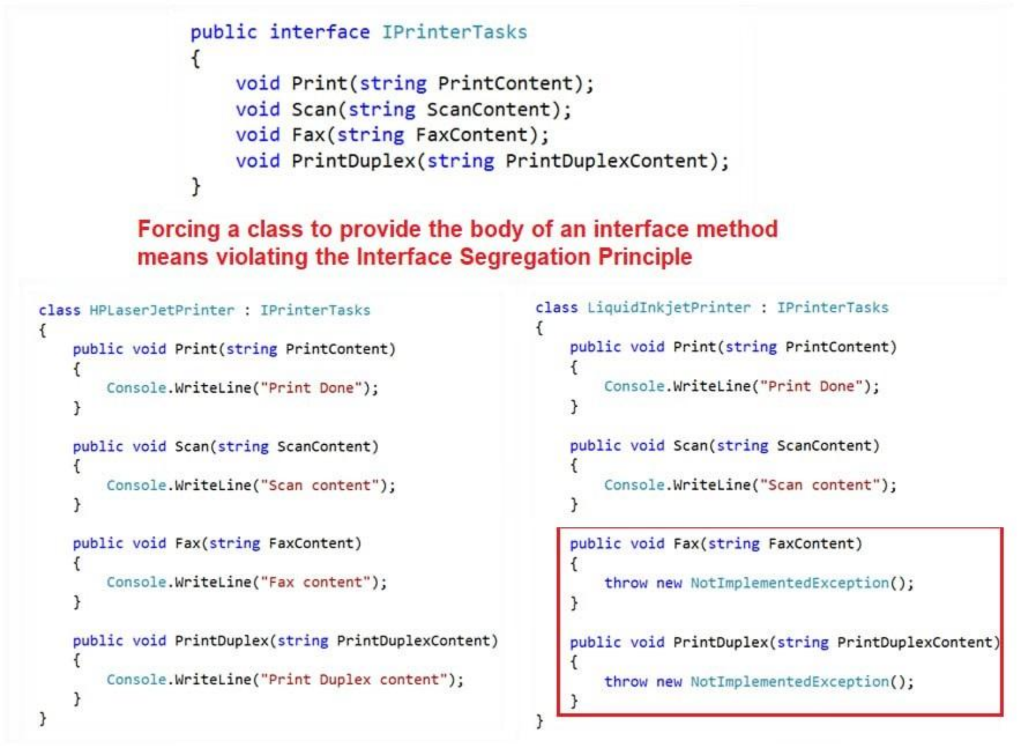
4. Where to use ISP?

Advantages:

1. **Flexibility:** In absence of ISP, you have one Generic FAT interface and many classes implementing it. Assume that you had 1 interface and 50 classes. If there is a change in interface, all 50 classes have to change their implementation. With ISP, you will divide generic FAT interface into fine granular small interfaces. If there is a change in small granular interface, only the classes implementing that interface will be affected.
2. **Maintainability and Ease of use:** Since changes are limited to fine granular interface instead of generic FACT interface, code maintenance is easier. Unrelated code is no longer part of implementation classes.

** FACT interface - is an interface which contains from only specific values and methods that are related to each other*

5. SOURCE code?



```
public interface IPrinterTasks
{
    void Print(string PrintContent);
    void Scan(string ScanContent);
    void Fax(string FaxContent);
    void PrintDuplex(string PrintDuplexContent);
}
```

Forcing a class to provide the body of an interface method means violating the Interface Segregation Principle

```
class HPLaserJetPrinter : IPrinterTasks
{
    public void Print(string PrintContent)
    {
        Console.WriteLine("Print Done");
    }

    public void Scan(string ScanContent)
    {
        Console.WriteLine("Scan content");
    }

    public void Fax(string FaxContent)
    {
        Console.WriteLine("Fax content");
    }

    public void PrintDuplex(string PrintDuplexContent)
    {
        Console.WriteLine("Print Duplex content");
    }
}
```

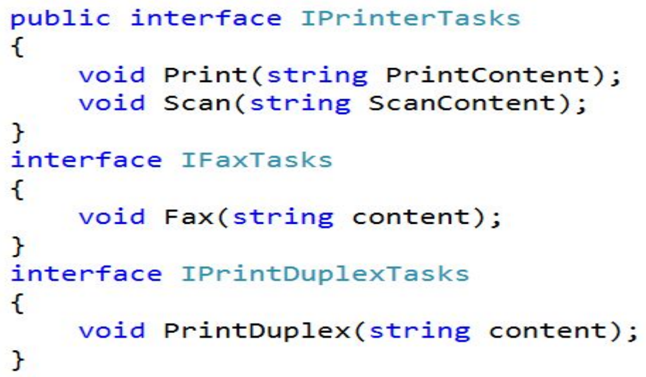
```
class LiquidInkjetPrinter : IPrinterTasks
{
    public void Print(string PrintContent)
    {
        Console.WriteLine("Print Done");
    }

    public void Scan(string ScanContent)
    {
        Console.WriteLine("Scan content");
    }

    public void Fax(string FaxContent)
    {
        throw new NotImplementedException();
    }

    public void PrintDuplex(string PrintDuplexContent)
    {
        throw new NotImplementedException();
    }
}
```

5. SOURCE code?



```
public interface IPrinterTasks
{
    void Print(string PrintContent);
    void Scan(string ScanContent);
}
interface IFaxTasks
{
    void Fax(string content);
}
interface IPrintDuplexTasks
{
    void PrintDuplex(string content);
}
```

Splitting a big interface into smaller ones

Summary

- The ISP is a straightforward principle that is also easy to violate by adding methods to existing interfaces that the clients don’t need.
- ISP is also closely related to other SOLID principles.
- **Advantages:**
  1. Flexibility
  2. Maintainability and Ease of use

Reference Resources?

1. **Dive into design pattern compression (book)**
2. SOLID Design Principles Explained: Dependency Inversion Principle with Code Examples
3. Interface Segregation Principle in Java

Thank you!

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