软件工程

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4.2 Coupling

Coupling

- **Degree of interaction between modules**
- **Five categories or levels of coupling**

5.	Data coupling	(Good)
4.	Stamp coupling	
3.	Control coupling	
2.	Common coupling	
1.	Content coupling	(Bad)

1. Content Coupling

- **Two modules are content coupled if one directly references contents of the other.**

Why Is Content Coupling So Bad?

```
public class Product {
    public float unitPrice;
    ……
}

public class Order {
    private Product myProduct=new Product();
    public void setItem() {
        myProduct.unitPrice = 100.0;
    }
}
```

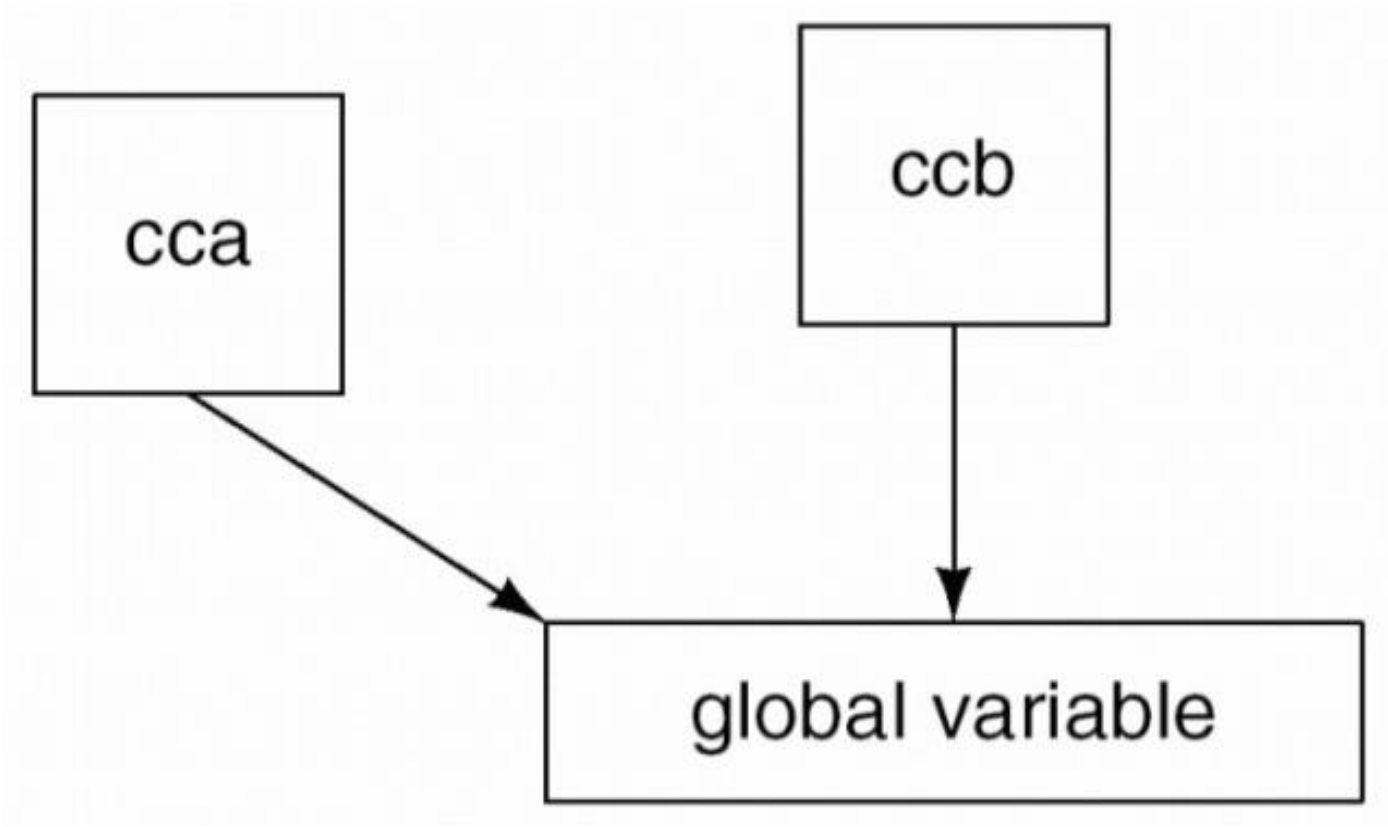
Why Is Content Coupling So Bad?

```
public class Product {
    private float unitPrice;
    public void setUnitPrice(float pUnitPrice){ … }
}

public class Order {
        private Product myProduct=new Product();
        public void setItem() {
                myProduct.setUnitPrice (100.0);
        }
}
```

2. Common Coupling

- **Two modules are common coupled if they have write access to global data.**

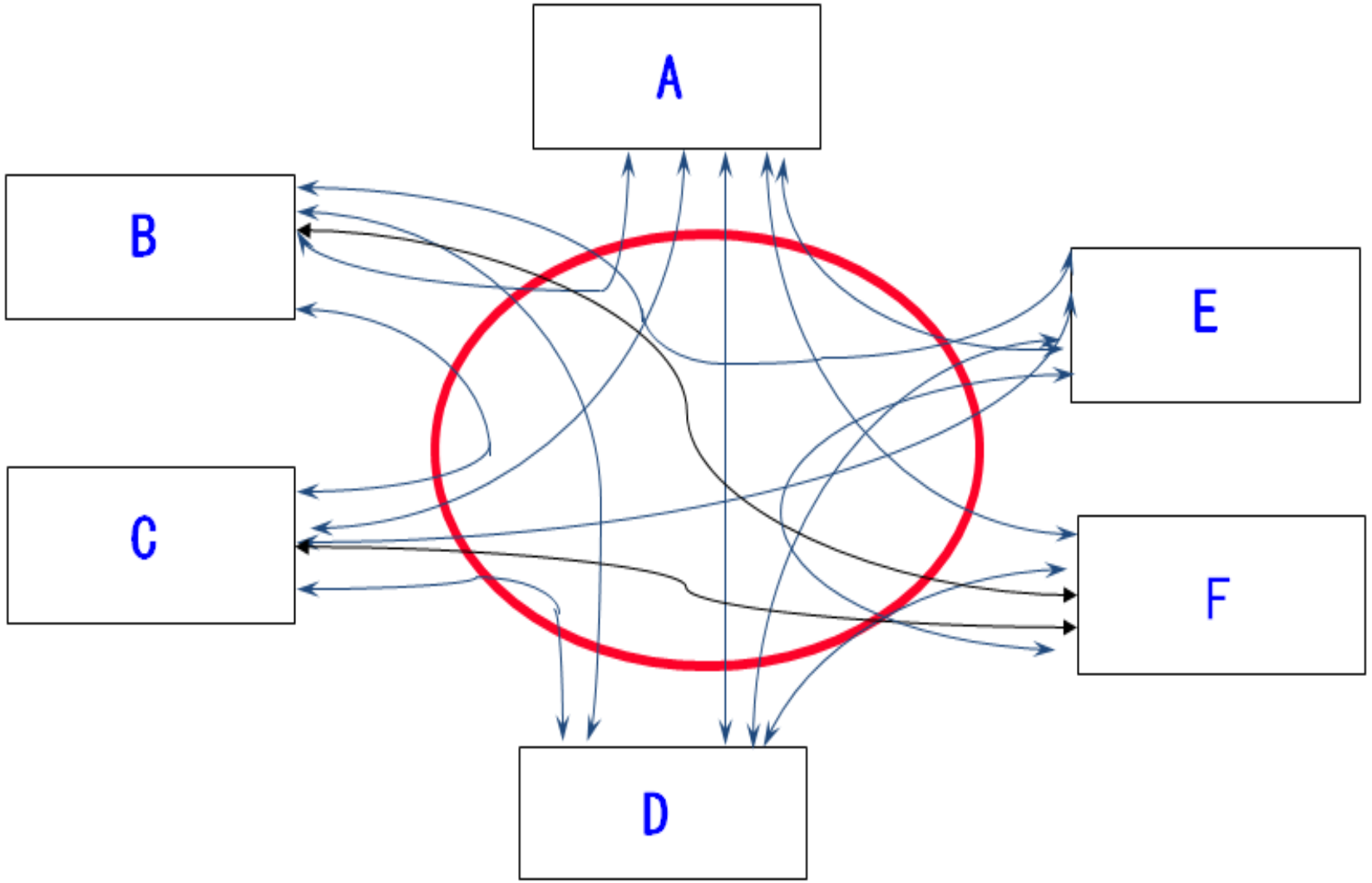


Why Is Common Coupling So Bad?

- **Contradicts the spirit of structured programming**
  - **The resulting code is virtually unreadable**

```
while (global variable == 0)
{
   if (argument xyz > 25)
      module 3 ();
   else
      module 4 ();
}
```

Why Is Common Coupling So Bad?



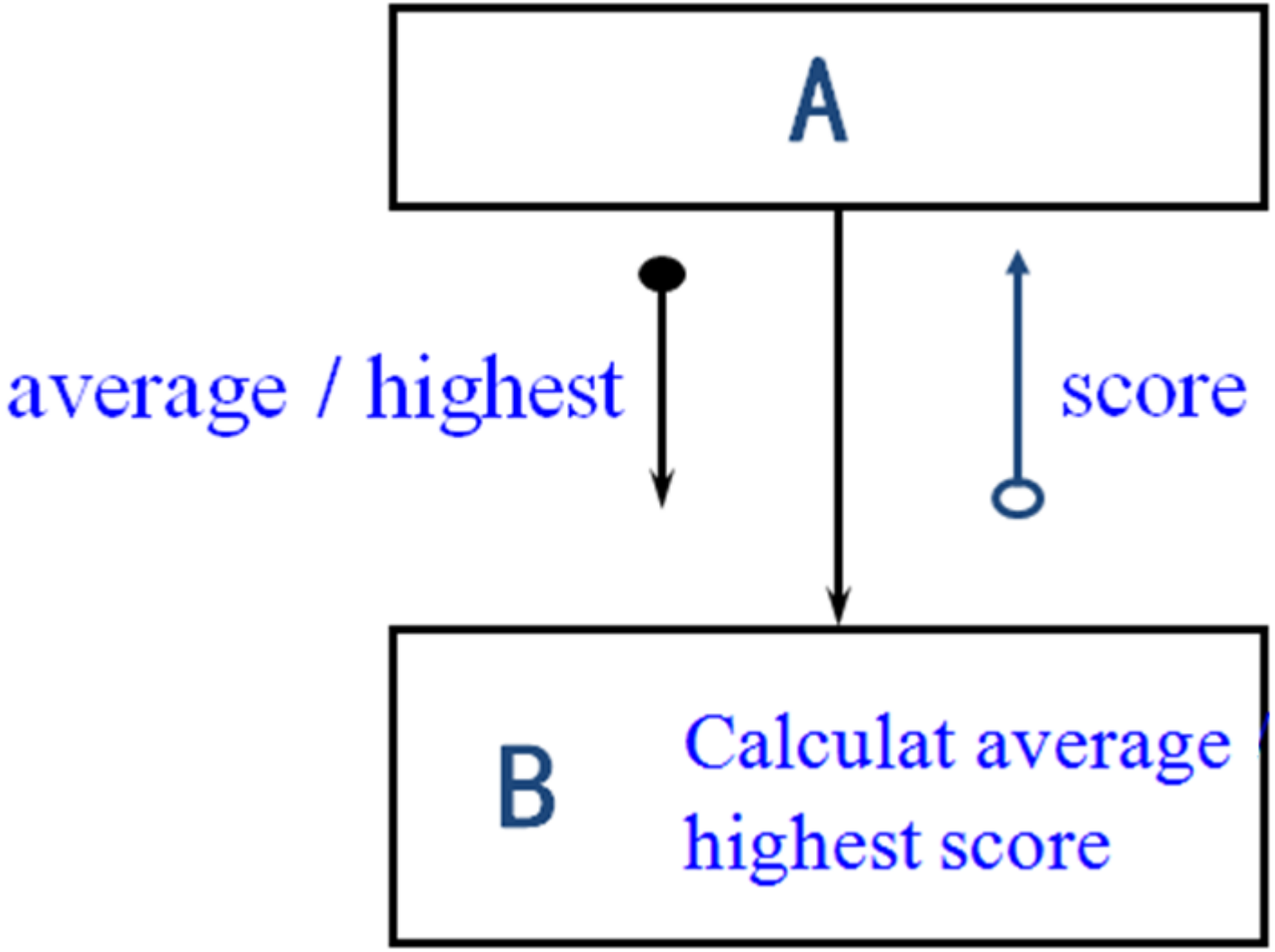
3. Control Coupling

- **Two modules are control coupled if one passes an element of control to the other.**
- **Example**
  - ***Control-switch passed as argument***

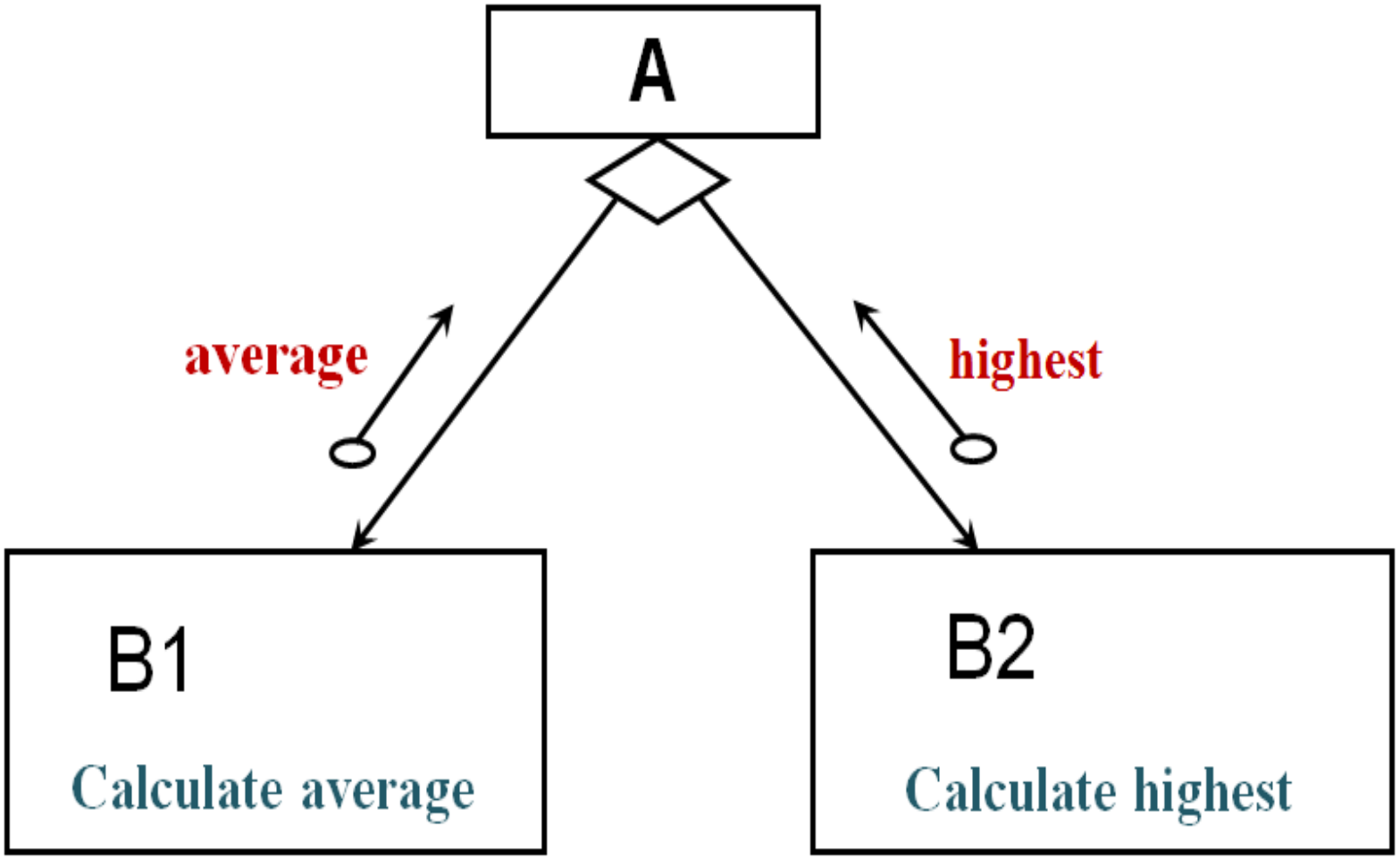
Why Is Control Coupling So Bad?

- **Modules are not independent; module *b* (the called module) must know internal structure and logic of module *a* (the calling module).**
  - **Affects reusability**
- **Associated with modules of logical cohesion**

3. Control Coupling



3. Control Coupling



4. Stamp Coupling

- **Some languages allow only simple variables as parameters**
  - ***quantity***
  - ***studentName***
  - ***unitPrice***
- **Many languages also support passing of data structures**
  - ***Record***
  - ***ResultSet***
  - ***HashMap***

4. Stamp Coupling

- **Two modules are stamp coupled if a data structure is passed as a parameter, but the called module operates on some but not all of the individual components of the data structure.**

Why Is Stamp Coupling So Bad?

```
function  printFirstStudent(Student[ ]){
    ……
    printf (“The first student is ” + Student[0]);
    ……
}
```

Why Is Stamp Coupling So Bad?

- It is not clear, without reading the entire module, which fields of a record are accessed or changed.
- Difficult to understand
- Unlikely to be reusable

Why Is Stamp Coupling So Bad?

- **More data than necessary is passed**
  - ***Uncontrolled data access can lead to computer crime***
- **There is nothing wrong with passing a data structure as a parameter, provided all the components of the data structure are accessed and/or changed.**
  - ***invert matrix (original matrix, inverted matrix);***
  - ***print inventory record (warehouse record);***

5. Data Coupling

- **Two modules are data coupled if all parameters are homogeneous data items. That is, every argument is either a simple argument, or data structures all of whose elements are used by called module.**
- **Examples**
  - ***display time of arrival (FlightNo);***
  - ***computeTotalPrice(UnitPrice, Qty);***
  - ***get job with highest priority (JobQueue);***

Why Is Data Coupling So Good?

- The difficulties of content, common, control, and stamp coupling are not present.
- Maintenance is easier.

***Good* design has**

high cohesion

&

low coupling