COHESION

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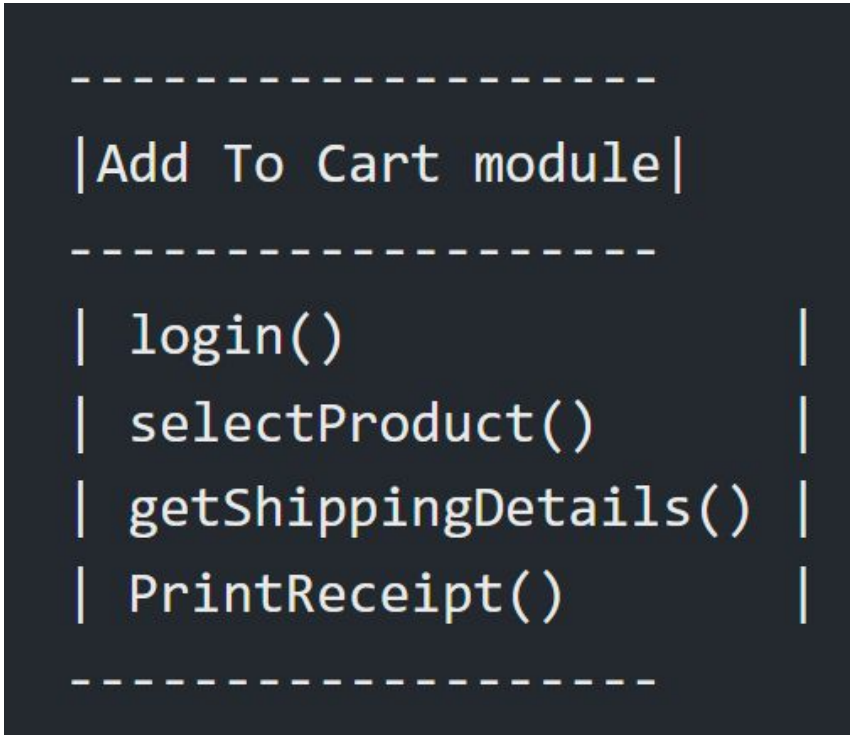
- Tools for automatic cohesion calculation

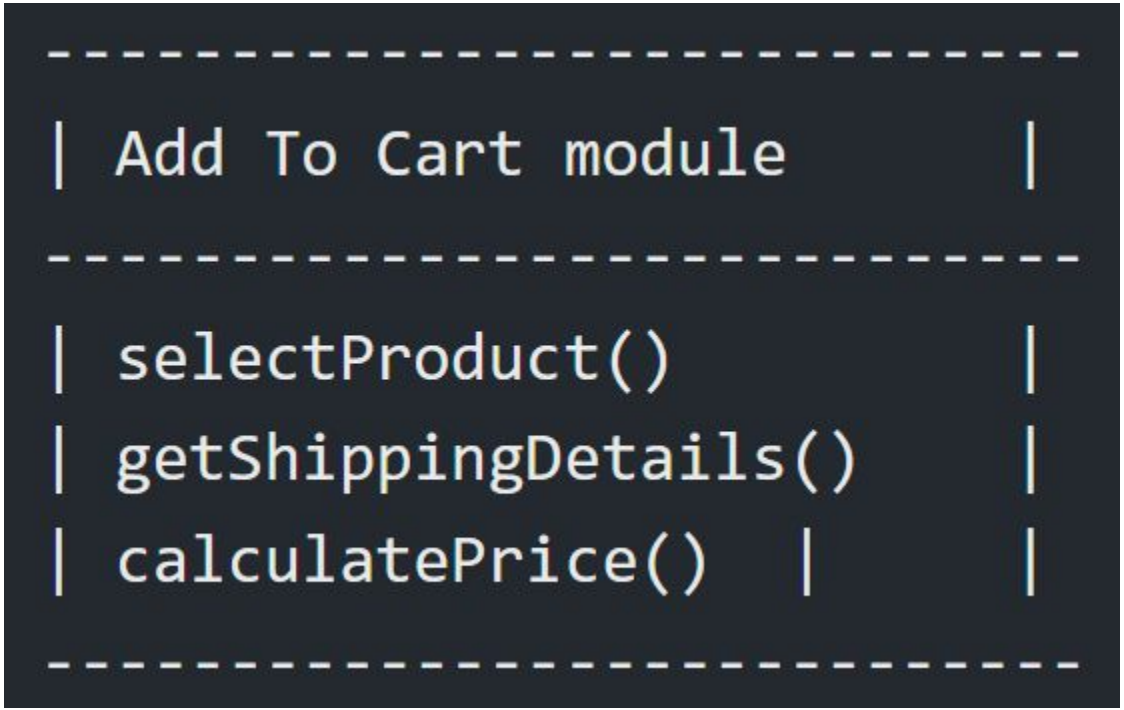
WHAT IS COHESION?

Cohesion refers to the degree to which the elements within a module work together to fulfill a single, well-defined purpose.

LOW COHESION



HIGH COHESION



TYPES OF COHESION

- Functional Cohesion
- Sequential Cohesion
- Communicational Cohesion
- Procedural Cohesion
- Coincidental Cohesion

How to measure cohesion

- LCOM4 (Lack of Cohesion in methods) counts the number of disjoint sets of methods that do not share any instance variables
- A lower LCOM4 value indicates higher cohesion, meaning methods within the class work together more closely
- CBO (Coupling Between Objects) measures the degree of coupling between classes in a software system, indicating how many other classes a particular class relies on
- A higher CBO value indicates higher coupling, meaning the class is more dependent on other classes

LCOM4 Example

```java
public class Student {  no usages
    private String name;  2 usages
    private int age;  2 usages

    public void setName(String newName) {  no usages
        name = newName;
    }

    public void setAge(int newAge) {  no usages
        age = newAge;
    }

    public void printInfo() {  no usages
        System.out.println("Name: " + name);
        System.out.println("Age: " + age);
    }
}
```

$$LCOM4 = \frac{m}{1 - \frac{E}{V}}$$

LCOM4 value is 1, indicating good cohesion.

This means that the methods are working together effectively

- E is the number of pairs of methods in the class that do not share any instance variables
- M is the number of disjoint sets of methods in the class
- V is the number of pairs of methods in the class

TOOLS FOR AUTOMATIC COHESION CALCULATION

- CodeScene
- NDepend