Coupling and Cohesion Level Review

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## 1. Coupling

### 1.1. Content Coupling

|  |  |  |
| --- | --- | --- |
| Related modules | Description | Improvement Direction |
| Order.getlstOrderMedia() | Returns this.lstOrderMedia  Any module that has access to lstOrderMedia can modify it by method add(), remove() | Make getter return the unmodifiable version of the list.  Use separates method for modifying the list |
| Order.setlstOrderMedia(List lstOrderMedia) | Any external module can completely directly change listOrderMedia attribute | remove the method |
| Order.setShippingFees(int shippingFees) | Any external module can completely directly change shippingFees attribute.  This is unnecessary since shippingFee can be calculated using lstOrderMedia and deliveryInfo | Remove the method |
| Order.getDeliveryInfo() | Any module that has access to deliveryInfo can modify it by method put(). | Make getter return the (key, value) instead. Use a separate method for modifying deliveryInfo |
| Order.setDeliveryInfo(HashMap deliveryInfo) | Any external module can completely directly change deliveryInfo attribute | remove the method |
| Order.setId(Integer Id) | Any external module can completely directly change Id attribute | remove the method |

### 1.2. Common Coupling

|  |  |  |
| --- | --- | --- |
| Related modules | Description | Improvement Direction |
|  |  |  |

### 1.3. Control Coupling

|  |  |  |
| --- | --- | --- |
| Related modules | Description | Improvement Direction |
| calculateShippingFee(order Order) | Calculates the shippingFee based on the condition of the Order | Use separate classes to calculate the shipping fee for each type of order. |

### 1.4. Stamp Coupling

|  |  |  |
| --- | --- | --- |
| Related modules | Description | Improvement Direction |
| Cart.checkMediaInCart(Media media) | Only need the id to check, but pass media as argument instead | Change the argument into Integer id. |

### 1.5. Data Coupling

|  |  |  |
| --- | --- | --- |
| Related modules | Description | Improvement Direction |
| Cart.addCartMedia(CartMedia cm) | only use CartMedia as required argument |  |
| Cart.removeCartMedia(CartMedia cm) | only use CartMedia as required argument |  |
| CartMedia(Media media, Cart cart, int quantity, int price) | Only use required argument to instantiate CartMedia |  |

## 2. Cohesion

### 2.1. Coincidental Cohesion

|  |  |  |
| --- | --- | --- |
| Related modules | Description | Improvement Direction |
| Utils | Contains multiple unrelated utils: date formatting, currency formatting, md5 encoding, create logger. | Separate utils into different classes. |
| Configs | Contains multiple unrelated configs: API constants, demo data, database configs, static resources. | Separate configs into separate classes. |

### 2.2. Logical Cohesion

|  |  |  |
| --- | --- | --- |
| Related modules | Description | Improvement Direction |
| MyMap | All methods are logically related to handling JSON data, but perform different tasks such as conversion, parsing, and mapping. | Use a separate class for each method |

### 2.3. Temporal Cohesion

|  |  |  |
| --- | --- | --- |
| Related modules | Description | Improvement Direction |
|  |  |  |

### 2.4. Procedural Cohesion

|  |  |  |
| --- | --- | --- |
| Related modules | Description | Improvement Direction |
| validateName(string Name), validatePhoneNumber(string phoneNumber), validateAddress(string address)  in class PlaceOrderController | All methods are steps to validate delivery info |  |
| payOrder(int amount, String orderInfo), onTransactionCompleted(PaymentTransaction transactionResult), emptyCart()  in class PaymentController | All methods are steps for the payment process |  |

### 2.5. Communicational Cohesion

|  |  |  |
| --- | --- | --- |
| Related modules | Description | Improvement Direction |
| createInvoice(Order order), calculateShippingFee(Order order)  in class PlaceOrderController | All methods share the same input |  |
| Md5(String message), Sha256(String message)  In class VnPayConfig | Encode a string, work on the same input |  |
| addOrderMedia(OrderMedia om), removeOrderMedia(OrderMedia om)  in class Order | Manage OrderMedia, work on the same input |  |

### 2.6. Sequential Cohesion

|  |  |  |
| --- | --- | --- |
| Related modules | Description | Improvement Direction |
| createOrder(), createInvoice(Order order)  in class PlaceOrderController | createOrder returns an order, which is input to createInvoice |  |

### 2.7. Functional Cohesion

|  |  |  |
| --- | --- | --- |
| Related modules | Description | Improvement Direction |
| CartMedia | All methods help define a CartMedia object and extract its characteristics |  |
| Cart | All methods help manage a cart and its items. |  |
| DBConnection | All attributes and method help manage the connection to the database |  |
| Invoice | All attributes and methods help manage the invoice |  |
| User | All attributes and methods help manage user information |  |
| Request | Attributes and methods focus on building the url request |  |
| Response | Attributes and methods focus on handling the response string |  |
| PaymentTransaction | Attributes and methods focus on handling payment transactions |  |
| API | Methods focus on providing API requests |  |