

CS5004 Lab03 Report

Rong Huang

Lab 03: Automated House Factory

1. Reflection(What did you learn?)

1) Abstraction and Inheritance:

Learned how to use abstract classes like Block to create a blueprint for WoodBlock, StoneBlock, and HouseBlock. This helped me see how inheritance lets us reuse code and create a hierarchy of classes that share common traits but also have their unique behaviors.

2) Interfaces and Polymorphism:

Implementing the Factory interface taught me how different factories can follow the same structure but have different implementations. This concept, known as polymorphism, is crucial for creating flexible code components.

3) Enums for Clarity:

Using enums (ResourceType) made the code cleaner and prevented errors related to resource types.

4) Defensive Programming:

Adding checks and validations in the factory classes to ensure correct resource handling taught me the importance of anticipating potential errors and protecting the program from crashing.

2. How did this design incorporate future growth?

The way I built this project makes it easy to add new stuff later on. For example, if we want to make new kinds of blocks, like maybe a glass block, we can just make a new class that's a kind of "Block" and tweak it how we need. It's like using a basic recipe and then adding your own ingredients to make it different. Also, with the factory part where we make the blocks, it's set up so we can easily add new kinds of factories that make different things. This setup helps the project grow without a lot of headaches because we've got a good foundation that lets us add new parts easily.

3. Did you change up the driver at all? If so, how?

Yeah, I changed the driver code a bit. In our game where we're building houses, sometimes the code could crash if it tried to build a house but didn't have all the resources it needed. To keep the game going, I added some try-catch blocks. This way, if we don't have enough resources and get a null back, the game doesn't just stop. Instead, it skips over that bit and keeps trying to build houses.

4. Extensions (What extensions are you requesting?)

1) Create a JUnit test file for all of my Block Classes

```
Run StoneBlockTest x
✓ StoneBlockTest 2 ms
  ✓ testBreakBlock 2 ms
  ✓ testConstructorWithArgument 0 ms
  ✓ testDefaultConstructor 0 ms
Tests passed: 3 of 3 tests - 2 ms
/Library/Java/JavaVirtualMachines/jdk-21.jdk/Contents/Home/bin/java ...
Process finished with exit code 0
```

```
Run WoodBlockTest x
✓ WoodBlockTest 2 ms
  ✓ testBreakBlock 2 ms
  ✓ testConstructorWithArgument 0 ms
  ✓ testDefaultConstructor 0 ms
Tests passed: 3 of 3 tests - 2 ms
/Library/Java/JavaVirtualMachines/jdk-21.jdk/Contents/Home/bin/java ...
Process finished with exit code 0
```

```
Run HouseBlockTest x
✓ HouseBlockTest 8 ms
  ✓ testConstructorWithSufficient 3 ms
  ✓ testConstructorWithInsufficient 5 ms
  ✓ testBreakBlock 0 ms
  ✓ testConstructorWithInsufficient 0 ms
Tests passed: 4 of 4 tests - 8 ms
/Library/Java/JavaVirtualMachines/jdk-21.jdk/Contents/Home/bin/java ...
Process finished with exit code 0
```

2) Add useful comments to the provided driver

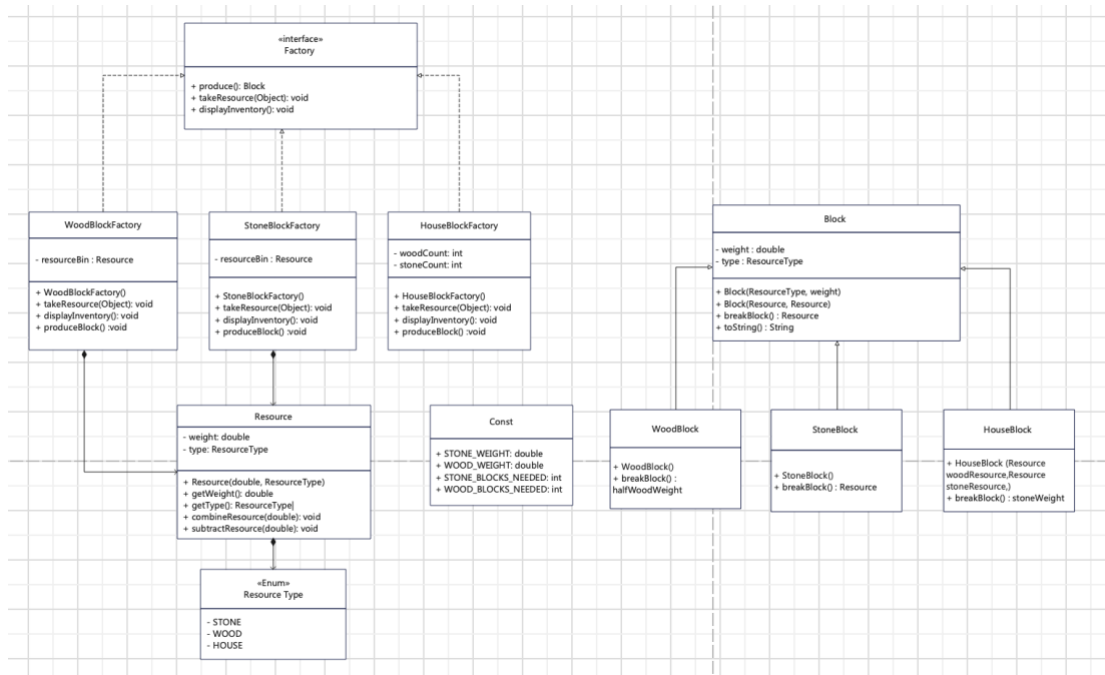
I add some useful comments to explain how the automated house factory works and all of my code have suitable Javadoc style comments.

3) An explanation of what all of this code does.

In our automated house factory, the process starts with collecting raw materials, which are either stone or wood. These materials are identified by their type and sent to their respective factories: a stone block factory for stone and a wood block factory for wood. In these factories, the raw materials undergo processing, which may involve refining or combining them to increase their quantity or weight, turning them into usable blocks.

Once we have the necessary blocks, they're transported to the house factory. Here, the factory evaluates whether there are enough stone and wood blocks available to construct a house. If the criteria are met, indicating there's sufficient material for construction, the house factory proceeds to create a house block, symbolizing the completion of a house.

5. Recitation UML diagram



6. Grading Statement (Based on the rubric, what grade do you feel your work should be? Be honest, don't be humble, and use the rubric.)

Objective 1: Enum ResourceType 3*1

Objective 2: Class Object Const(2.1-2.2) 3*2

Objective 3 : Class Object Resource(3.1-3.4) 3*4

Objective 4 : Class Object Block(4.1-4.4)3*4

Objective 5 : Wood and Stone Blocks(5.1-5.2)3*2

Objective 6 : House Blocks(6.1-6.3)3*3

Objective 7 : Factory Interface 3*1

Objective 8 : Stone and Wood Block Factories(8.1-8.3) 3*3

Objective 9 : House Factory(9.1-9.3)3*3

Objective 10 : Run the Simulator 5

Report 5

Code Quality (correct indentation, comment blocks, variable naming, etc) 10

Extensions 10

Creative or went above and beyond 10

TOTAL POINTS POSSIBLE out of 100

7. Academic Integrity Statement

I understand that my learning is dependent on individual effort and struggle, and I acknowledge that this assignment is a 100% original work and that I received no other assistance other than what is listed here.

Acknowledgements and assistance received:

TA: Josh Will

Canvas module 3, module 4

Fundamental Concepts of Object Oriented Programming:

https://www.youtube.com/watch?v=m_MQYyJpljg&list=RDCMUCSX3MR0gnKDxyXAYljWzm0Q&start_radio=1&rv=m_MQYyJpljg&t=12

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Name: Rong Huang	Date: 2/14/2024
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