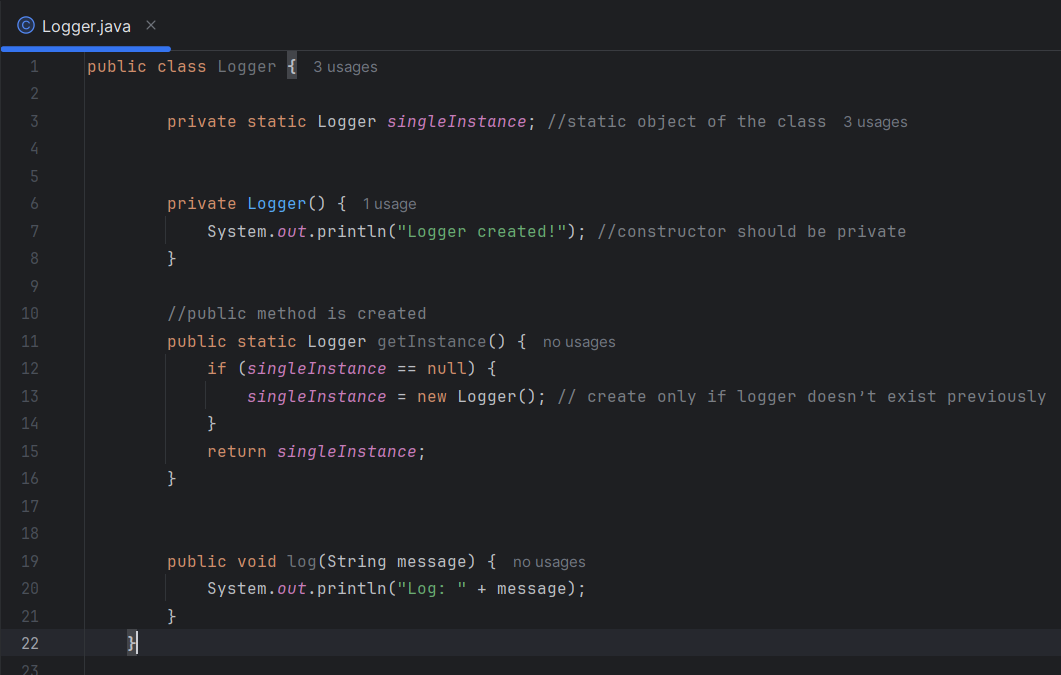
**Cognizant - DN 4.0 Deep Skilling Stage**

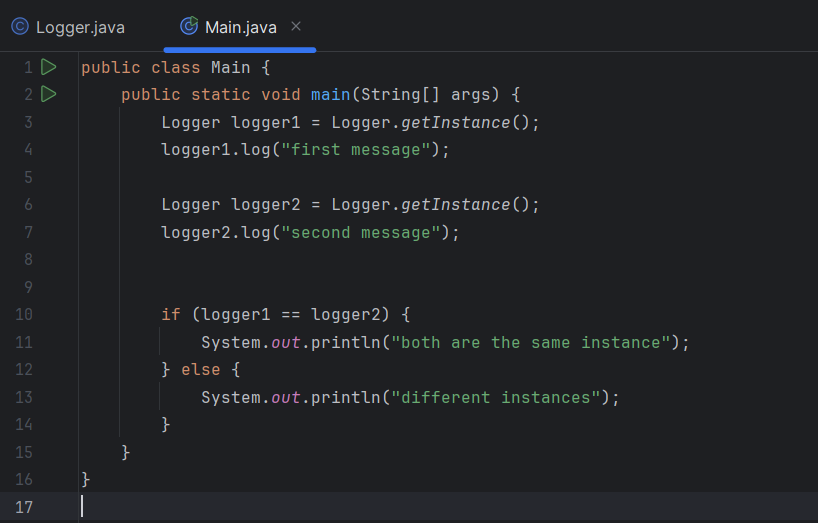
**Mandatory Hands-On Week 1 Solutions**

1. **Design Patterns And Principles**

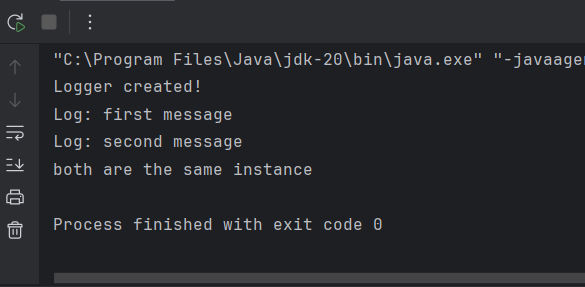
Exercise 1: Implementing Singleton Pattern

**CODE:**





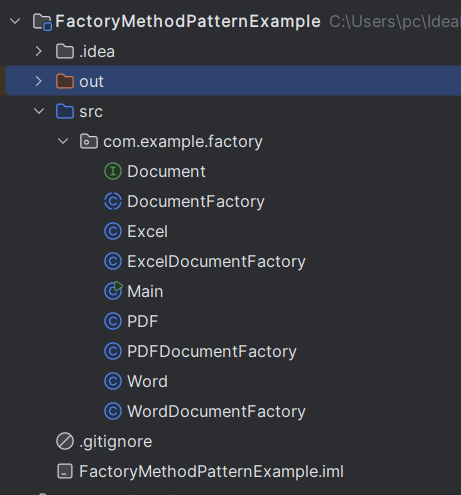
**Output:**

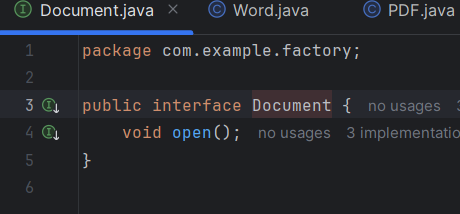


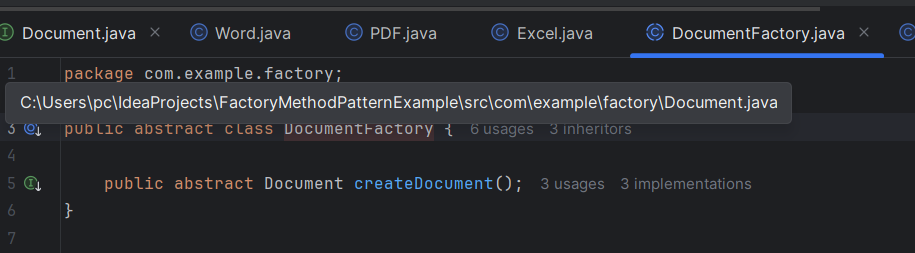
Exercise 2: Implementing the Factory Method Pattern

**CODE:**

**Hierarchy:**

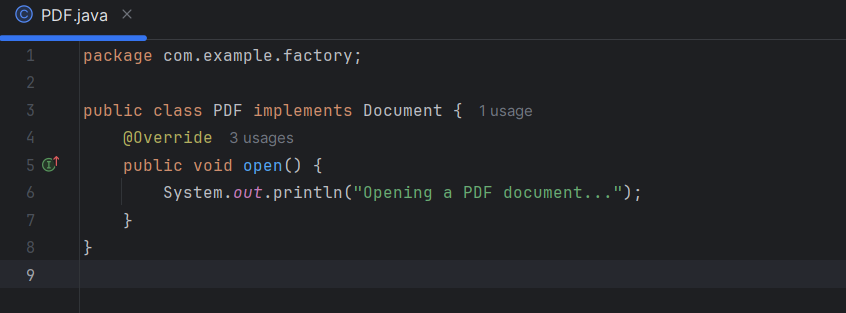
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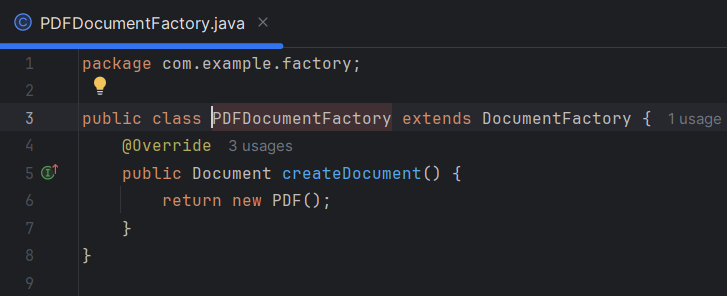
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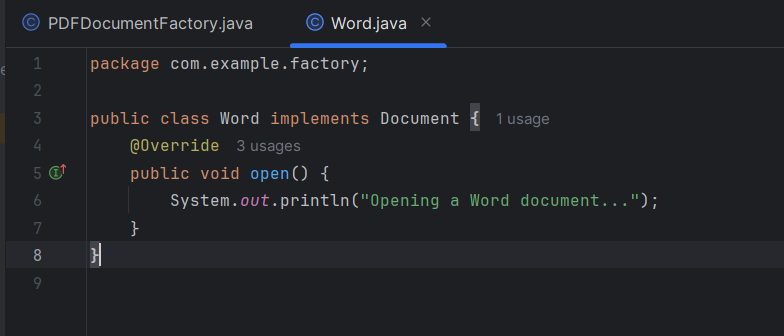
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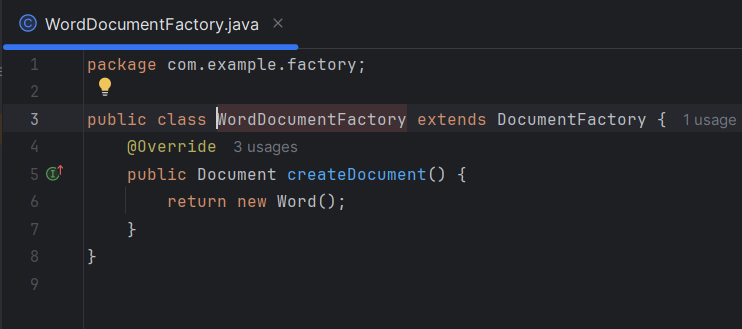
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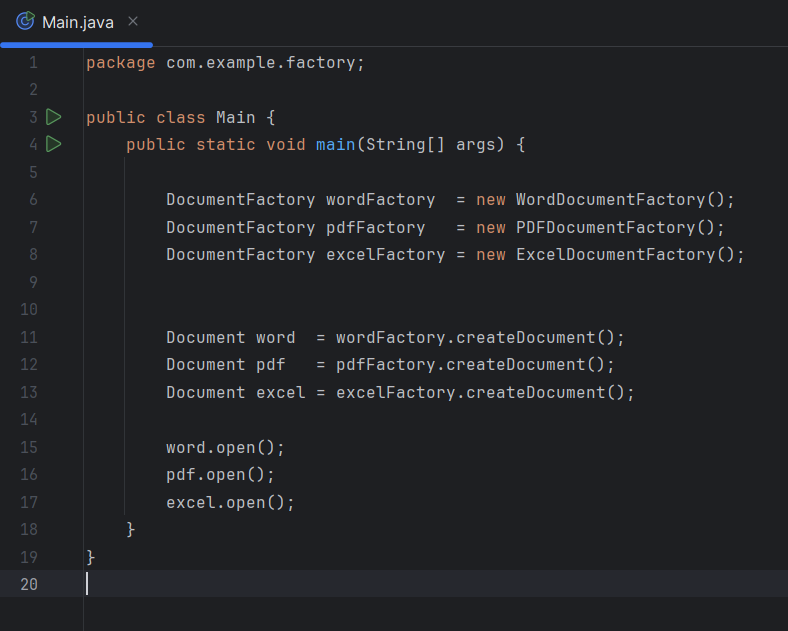
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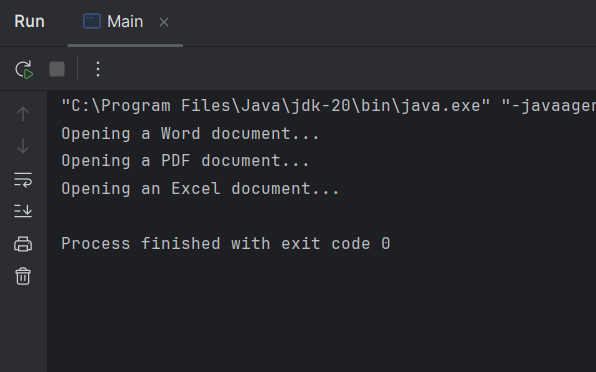
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**OUTPUT:**

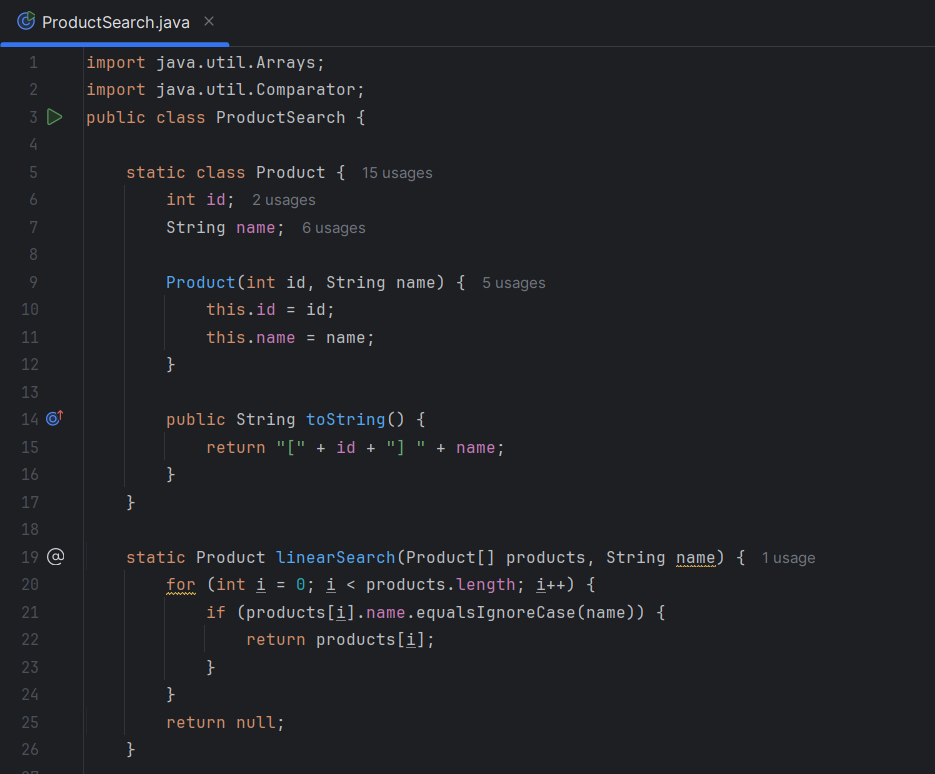
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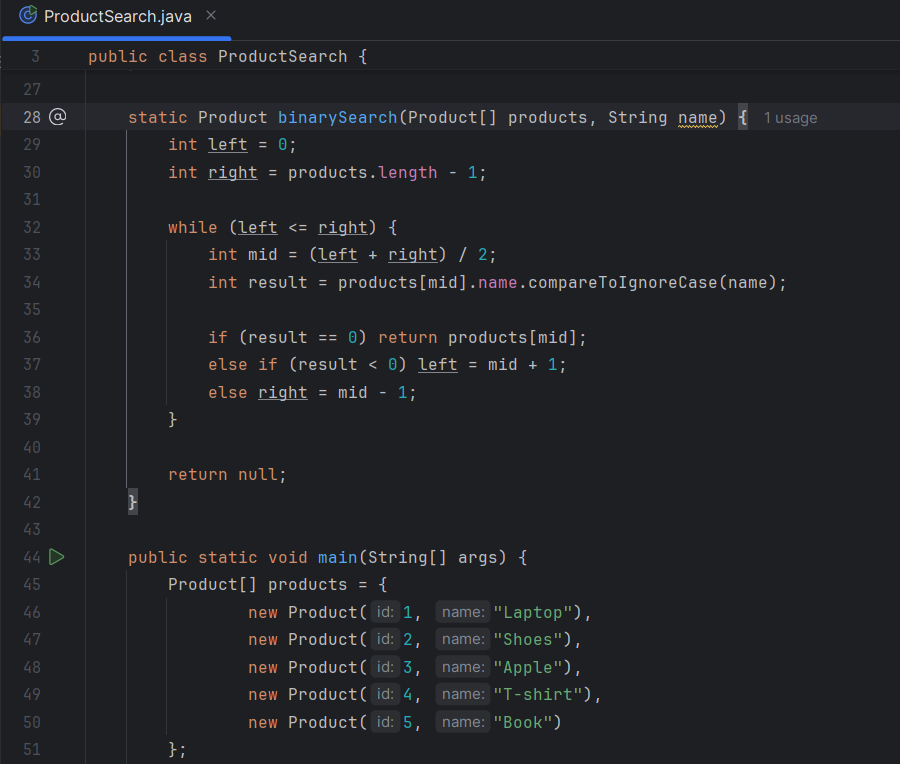
1. **Data structures and Algorithms**

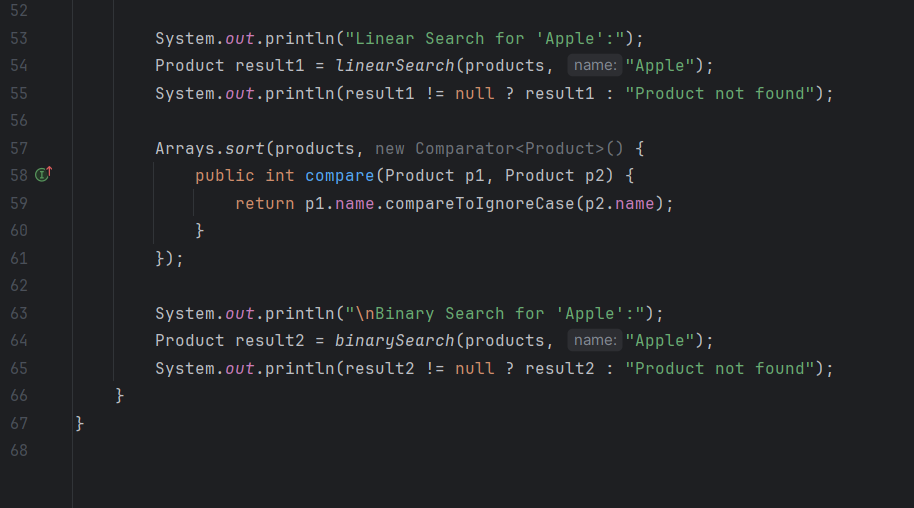
Exercise 1: E-commerce Platform Search Function

**Big O notation** describes how the performance of an algorithm scales with input size n. It helps developers choose faster, more efficient algorithms.

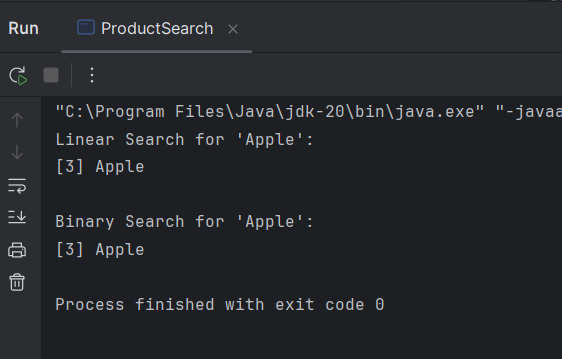
**Code:**

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**Output:**

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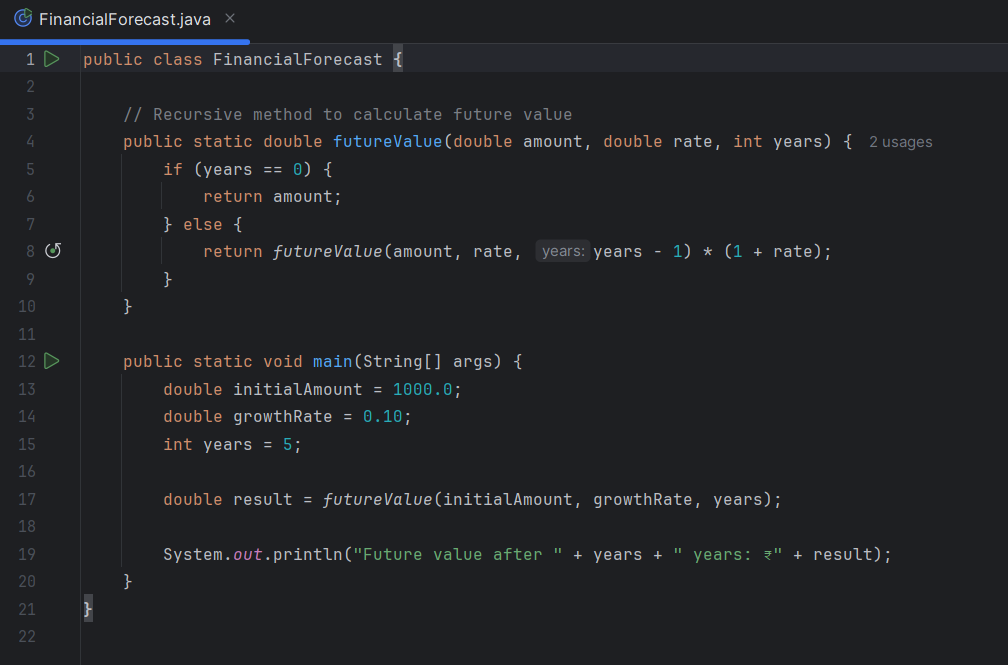
Exercise 2: Financial Forecasting

**Recursion** is when a method calls **itself** to solve smaller versions of the same problem.

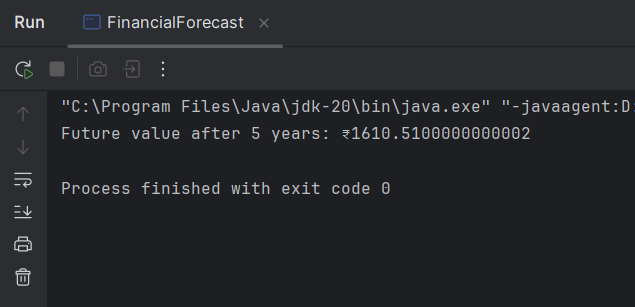
Predicting Future Value Recursively

1.Use an initial amount ( ₹1000)  
2.Apply a growth rate (10% or 0.10)  
3. Predict how much it grows over n years

**Code:**

****

**Output:**

****

## Time Complexity

Recursive calls = n (one call per year)  
Time Complexity: O(n)  
Space Complexity: O(n) due to call stack

**Can be optimized using iteration. (uses less space)**