

8 Geeky Covid Billboard - Silicon Valley

Monday, October 12, 2020 8:26 AM



8 Immutable Types in Java - Example

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<u>Fraction</u> 3/7
Attributes - <u>int</u> numerator - <u>int</u> denominator
Methods Constructors + Fraction(int) public + Fraction(int, int)
Accessors + <u>int</u> getNumerator() + <u>int</u> getDenominator()
Operations + <u>double</u> toValue() + <u>void</u> multiply(Fraction) + <u>boolean</u> equals(Fraction) - <u>void</u> normalize() - <u>int</u> gcd(int, int)
Print Method + String toString()

Fraction f1 = new Fraction(3,7);

Fraction f2 = new Fraction(2,11)

~~int~~ x = f1.getNumerator();

double v = f1.toValue();

f1.multiply(f2);

~~f1.numerator = 7;~~

8 Immutable Types in Java - Example

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Fraction	
Attributes - <u>int</u> numerator - <u>int</u> denominator	<pre>public class Fraction { // Attributes private int numerator, denominator; // Constructors</pre>
Methods Constructors + Fraction(int) + Fraction(int, int)	<pre> // Constructors public Fraction(int n) { numerator = n; denominator = 1; } // Fraction() public Fraction(int n, int d) { numerator = n; denominator = d; normalize(); } // Fraction()</pre>
Accessors + <u>int</u> getNumerator() + <u>int</u> getDenominator()	<pre> // Accessors public int getNumerator() { return numerator; } // getNumerator() public int getDenominator() { return denominator; } // getDenominator()</pre>
Operations + <u>double</u> toValue() + <u>void</u> multiply(Fraction)	<pre> // Operations public double toValue() { ... } // normalize() public void multiply(Fraction f) { numerator *= f.getNumerator(); denominator *= f.getDenominator(); normalize(); } // normalize()</pre>
+ <u>boolean</u> equals(Fraction) - <u>void</u> normalize() - <u>int</u> gcd(int, int)	<pre> public boolean equals(Fraction f) { ... } // equals() private void normalize() { ... } // normalize() private int gcd(int a, int b) { ... } // gcd() // Print Method</pre>
Print Method + String toString()	<pre> public String toString() { ... } // toString() // Private operations } // Fraction</pre>

8 Immutable Types in Java - Example

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Fraction	
Attributes	
- <u>int</u> numerator	
- <u>int</u> denominator	
Methods	
Constructors	
+ Fraction(int)	
+ Fraction(int, int)	
Accessors	
+ <u>int</u> getNumerator()	
+ <u>int</u> getDenominator()	
Operations	
+ <u>double</u> toValue()	
+ <u>void</u> multiply(Fraction)	
+ <u>boolean</u> equals(Fraction)	
- <u>void</u> normalize()	
- <u>int</u> gcd(int, int)	
Print Method	
+ String toString()	

Fraction multiply (Fraction f)

Fraction f3 = f1.multiply(f2);
f1 = f1.multiply(f2);

```
// mutable
public void multiply(Fraction f) {
    numerator *= f.getNumerator();
    denominator *= f.getDenominator();
    normalize();
} // normalize()
```

```
// immutable
public Fraction multiply(Fraction f) {
    Fraction result = new
        Fraction(numerator*f.numerator,
                denominator*f.denominator);
    Return result;
} // normalize()
```