CPP-A16: Type Conversion

Problem 1: Convert Basic Data Type to Class Object

📌 **Problem Statement:**

Create a class **Temperature** that stores temperature in **Celsius**. Write a constructor that converts a given **double value (Fahrenheit)** to **Celsius** when an object is created.

🔷 **Formula:**

$$Celsius = (Fahrenheit - 32) \times \frac{5}{9}$$

🔷 **Example Usage:**

```
Temperature t = 98.6;  // Convert Fahrenheit to Celsius
t.display();
```

Problem 2: Convert Class Object to Basic Data Type

📌 **Problem Statement:**

Create a class **Distance** that stores distance in meters. Overload the **float()** type conversion operator to return the distance in **kilometers**.

🔷 **Formula:**

$$1 \text{ km} = 1000 \text{ meters}$$

🔷 **Example Usage:**

```
Distance d(1500);
float km = d;  // Convert meters to kilometers
cout << "Distance in km: " << km << endl;
```

Problem 3: Convert One Class Object to Another Class

📌 **Problem Statement:**

Create two classes:

- **Rectangle** (stores length and breadth)
- **Square** (stores only side length)

Write a conversion function to convert a **Rectangle object to a Square object** (using a constructor in the **Square** class). The square's side should be the **smaller of length and breadth** of the rectangle.

🔷 **Example Usage:**

```
Rectangle r(10, 5);
Square s = r;  // Convert rectangle to square
s.display();
```

Problem 4: Convert One Class to Another Using Conversion Operator

📌 **Problem Statement:**

Create two classes:

- **Time12** (12-hour format with AM/PM)
- **Time24** (24-hour format)

Overload the **type conversion operator in Time12** so that a **Time12 object** can be converted into a **Time24 object**.

🔷 **Example Usage:**

```
Time12 t1(10, 30, "PM");
Time24 t2 = t1;  // Convert 12-hour format to 24-hour format
t2.display();
```

Problem 5: Convert Class Object to Another Using Explicit Conversion Function

📌 **Problem Statement:**

Create two classes:

- **Weight_KG** (stores weight in kilograms)

- **Weight_Pounds** (stores weight in pounds)

Write an explicit function in **Weight_KG** to convert it into **Weight_Pounds** using:

1 kg=2.20462 pounds1 \text{ kg} = 2.20462 \text{ pounds}

🔷 **Example Usage:**

```
Weight_KG w1(50);
Weight_Pounds w2 = w1.toPounds();
w2.display();
```

Problem 6: Convert Integer to Fraction Class

📌 **Problem Statement:**

Create a class **Fraction** that stores a fraction as **numerator/denominator**. Overload the **constructor** to convert an integer into a fraction (integer becomes the numerator and denominator is 1).

🔷 **Example Usage:**

```
Fraction f = 7;  // Convert integer 7 to 7/1
f.display();
```

Problem 7: Convert Fraction Class to Double

📌 **Problem Statement:**

Modify the **Fraction** class from the previous problem and overload the **double() operator** to return the decimal value of the fraction.

🔷 **Example Usage:**

```
Fraction f(3, 4);
double val = f;  // Convert fraction to decimal
cout << "Decimal Value: " << val << endl;
```

Problem 8: Convert Class Object to Boolean

📌 **Problem Statement:**

Create a class **BankAccount** with attributes **balance** and **accountNumber**. Overload the **bool() operator** so that an account object returns **true** if the balance is non-zero and **false** otherwise.

🔷 **Example Usage:**

```
BankAccount acc1(1000, 101);
if (acc1) cout << "Account is active" << endl;
```

Problem 9: Convert String to Class Object

📌 **Problem Statement:**

Create a class **IPAddress** that stores an **IP address** in four parts (octets). Overload the constructor to accept a **string ("192.168.1.1")** and split it into four integer octets.

🔷 **Example Usage:**

```
IPAddress ip("192.168.1.1");
ip.display();
```

Problem 10: Convert Class Object to String

📌 **Problem Statement:**

Modify the **IPAddress** class and overload the **string() operator** to return the **IP address as a string**.

🔷 **Example Usage:**

```
IPAddress ip(192, 168, 1, 1);
string strIp = ip;  // Convert object to string
cout << "IP Address: " << strIp << endl;
```

Happy Coding!