Session 14 : SCALA Session III

Assignment 1

**Problem Statement**

Create a calculator to work with rational numbers.

Requirements:

○ It should provide capability to add, subtract, divide and multiply rational

numbers

○ Create a method to compute GCD (this will come in handy during operations on

rational)

Add option to work with whole numbers which are also rational numbers i.e. (n/1)

- achieve the above using auxiliary constructors

- enable method overloading to enable each function to work with numbers and rational.

**Solution:-**

Scala Project - 

Code –

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\* This class is used to store a rational number

\* Also supports storing integer by using its auxiliary constructor

\*

\* Provides methods to add, subtract, multiply

\* and divide rational numbers and integers

\*

\*/

**class** Fraction(n: Int, d: Int) {

// It makes no sense to have the denominator 0

require(d != 0)

**private** **val** g = gcd(n, d);

**val** numerator : Int = n / g;

**val** denominator : Int = d / g;

// Determines the greatest common divisor of two numbers

**private** **def** gcd(a: Int, b: Int) : Int ={

**if** (b == 0)

a;

**else**

gcd(b, a % b);

}

//Print only numerator if number is integer i.e. denominator == 1

**override** **def** toString ={

**if**(denominator==1)

{

numerator+"";

}

**else**

{

numerator + "/" + denominator;

}

}

//Auxiliary constructor to store an integer

**def** **this**(num : Int){

**this**(num, 1);

}

//Rational number addition

**def** sum(a: Fraction, b: Fraction) : Fraction ={

**var** n1: Int = a.numerator \* b.denominator;

**var** n2: Int = b.numerator \* a.denominator;

**var** d: Int = a.denominator \* b.denominator;

**var** n: Int = n1+n2;

**var** retFraction: Fraction = **new** Fraction(n,d);

**return** retFraction;

}

//Integer addition

**def** sum(a: Int, b: Int) : Int ={

**var** n1: Fraction = **new** Fraction(a);

**var** n2: Fraction = **new** Fraction(b);

**var** retInt = n1.numerator + n2.numerator;

**return** retInt;

}

//Rational number difference

**def** subtract(a: Fraction, b: Fraction) : Fraction ={

**var** n1: Int = a.numerator \* b.denominator;

**var** n2: Int = b.numerator \* a.denominator;

**var** d: Int = a.denominator \* b.denominator;

**var** n: Int = n1-n2;

**var** retFraction: Fraction = **new** Fraction(n,d);

**return** retFraction;

}

//Integer difference

**def** subtract(a: Int, b: Int) : Int ={

**var** n1: Fraction = **new** Fraction(a);

**var** n2: Fraction = **new** Fraction(b);

**var** retInt = n1.numerator - n2.numerator;

**return** retInt;

}

//Rational number multiplication

**def** multiply(a: Fraction, b: Fraction) : Fraction ={

**var** n: Int = a.numerator \* b.numerator;

**var** d: Int = a.denominator \* b.denominator;

**var** retFraction: Fraction = **new** Fraction(n,d);

**return** retFraction;

}

//Integer multiplication

**def** multiply(a: Int, b: Int) : Int ={

**var** n1: Fraction = **new** Fraction(a);

**var** n2: Fraction = **new** Fraction(b);

**var** retInt = n1.numerator \* n2.numerator;

**return** retInt;

}

//Rational number division

**def** divide(a: Fraction, b: Fraction) : Fraction ={

**var** n: Int = a.numerator \* b.denominator;

**var** d: Int = a.denominator \* b.numerator;

**var** retFraction: Fraction = **new** Fraction(n,d);

**return** retFraction;

}

//Integer division

**def** divide(a: Int, b: Int) : Double ={

**var** n1: Fraction = **new** Fraction(a);

**var** n2: Fraction = **new** Fraction(b);

**var** retDbl: Double = n1.numerator / n2.numerator;

**return** retDbl;

}

}

//Main object

**object** mainObj

{

**def** main(args: Array[String]) {

**var** f1: Fraction = **new** Fraction(4,10);

**var** f2: Fraction = **new** Fraction(9,27);

**var** n1: Int = 36;

**var** n2: Int = 9;

println("Sum of rational numbers is : "+ f1.sum(f1, f2));

println("Sum of integers is : "+ f1.sum(n1, n2));

println("Difference of rational numbers is : "+ f1.subtract(f1, f2));

println("Difference of integers is : "+ f1.subtract(n1, n2));

println("Product of rational numbers is : "+ f1.multiply(f1, f2));

println("Product of integers is : "+ f1.multiply(n1, n2));

println("Division result of rational numbers is : "+ f1.divide(f1, f2));

println("Division result of integers is : "+ f1.divide(n1, n2));

}

}

**Output screenshot:-**



