

Jordan University of Science and Technology
Faculty of Computer Information Technology
Software Engineering Department
Software Engineering Lab 2 (SE325)
Task4: Reading & Writing Text Files

In Lab:
PART 1:

Problem Description: The Complex class.

The value of $\sqrt{-1}$ was not naturally defined, so a complex number was invented. A complex number is an expression (or a number) of the form $a + bi$, where a and b are real numbers and $i = \sqrt{-1}$, therefore, it satisfies the property that $i^2 = -1$. The component a is known as the *real part*, and b is known as the *imaginary part* of the complex number. All primitive mathematical operations are allowed on complex numbers, using the following formulae:

add $a + bi + c + di = (a + c) + (b + d)i$

sub $a + bi - (c + di) = (a - c) + (b - d)i$

mul $(a + bi) * (c + di) = (ac - bd) + (bc + ad)i$

div $(a + bi)/(c + di) = (ac + bd)/(c^2 + d^2) + (bc - ad)i/(c^2 + d^2)$

abs $|a + bi| = \sqrt{a^2 + b^2}$

Design a class, name it **Complex**, that represents a complex number as defined above, along with methods add, subtract, multiply, divide, and abs for performing complex number operations.

	Data Member	
1	a	double
2	b	double
	Methods	
1	Add(Complex Num2)	Add Method to add to numbers. Suppose : Num1= a+bi Num2=c+di Sum=(a+c)+(b+d)i
2	Sub(Complex Num2)	Sub Method to subtract to numbers. Suppose : Num1= a+bi Num2=c+di Sub=(a-c)+(b-d)i
3	Mul(Complex Num2)	Mul Method to multiply to numbers. Suppose : Num1= a+bi Num2=c+di Mul=(a*c-b*d)+(b*c+a*d)i
4	Div(Complex Num2)	Div Method to divide to numbers. Suppose : Num1= a+bi Num2=c+di Div=(a*c+b*d)/(c*c+d*d)+(b*c-a*d)/(c*c+d*d)i
	ABS()	The method ABS() return the absolute value for the complex number <div style="border: 2px solid red; padding: 5px; display: inline-block;"> $\sqrt{a^2 + b^2}.$ </div>

PART 2: Test the Complex Class

Build a simple windows form that allow the user to perform the Following:

1. Read A text File (*.txt) that contains complex number
 - The input file is selected from the open file dialog.
 - The Path of the File has to be displayed on a Text Box.
2. The complex numbers in the text file are separated by “ , ”
 - Split the Text you read based on the following delimiters:

{ ' ', ',', '\n', '\r' }

- Then each item generated after the split have to be represent a complex number.

Example 1:

3.5+2.9i

The real part (a) =3.5.

The imaginary part (b) =2.9.

Example 2:

3.5-2.9i

The real part (a) =3.5.

The imaginary part (b) =-2.9.

3. You have to add all results (Complex number) to a list of Complex objects.
4. Allow user to sort all result based on real part.
5. Allow user to sort all result based on Imaginary part.

Hint: You have to re-implement the IComparable.CompareTo method.

6. Allow user to calculate the sum of all complex numbers.
7. Allow user to calculate the subtraction of all complex numbers.
8. Allow user to calculate the multiplication of all complex numbers.
9. Allow user to find the maximum complex number :

Hint: Max Complex Have the Max Absolute Value

- 10 Save Real Parts of All Complex numbers in a text file, the file is selected from the save file dialog.

The screenshot shows a Windows application window titled "LAB 4". The interface is yellow and contains several components:

- Import COMPLEX Numbers:** A button in the top left.
- File Path:** A text box displaying "C:\Users\hp\Documents\material\325_DropBox\2020\4\4-1.txt".
- Sort Options:** Two radio buttons: "Sort By Real Part" (unselected) and "Sort By Imaginary Part" (selected).
- Complex Number List:** A list box containing 20 complex numbers, sorted by imaginary part: 2.6+-3.9 i, 2.6+-3.9 i, 2.6+-3.9 i, 8.6+-1.6 i, 0.2+-1.6 i, 0.2+-1.6 i, 6.6+-1.2 i, 0.6+-1.2 i, 0.6+-1.2 i, 3+-0.2 i, 1+-0.2 i, 0.1+0.1 i, 0.2+0.3 i, 0.1+0.5 i, 7+2 i, 1.7+2 i, 2.2+2.2 i, 2.2+2.2 i.
- Operations and Results:** A series of buttons and text boxes on the right:
 - SUM:** 79+61.9 i
 - Difference:** -78.8+-56.9 i
 - Multiplication:** -55956932778810.5+-59910670273566.7 i
 - MAX:** 32.39 (Real part) and Max Complex Number Is : 5+32 i (Complex number)
 - SAVE:** A button at the bottom.