OBJECT ORIENTED ANALYSIS AND DESIGN HW2

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PART1:DFT&DCT Transformation -Template Design Pattern

PART2:METIN-ALI-FEYYAZ and KEZBAN synchronized Operations

CONTENTS:

PART1-AIMS AND DFT / DCT formulas

- Our aims perform dft and dct operations in accordance with the relevant design pattern(Template Design Pattern)
- Read double numbers and produce double numbers by applying the DCT formulas and produce complex numbers by applying the DFT formulas.

1D-DFT Formulas:

$$F(k) = \frac{1}{\sqrt{N}} \sum_{n=0}^{N-1} f(n) e^{-j2\pi kn/N}$$

In digital signal processing, the function is any quantity or signal that varies over time, such as the pressure of a sound wave, a radio signal, or daily temperature readings, sampled over a finite time interval (often defined by a window function[2]). In image processing, the samples can be the values of pixels along a row or column of a raster image. The DFT is also used to efficiently solve partial differential equations, and to perform other operations such as convolutions or multiplying large integers.

1D-DCT Formulas:

$$F(u) = \left(\frac{2}{N}\right)^{\frac{1}{2}} \sum_{i=0}^{N-1} \Lambda(i).cos\left[\frac{\pi.u}{2.N}(2i+1)\right] f(i)$$

The discrete cosine transform (DCT) helps separate the image into parts (or spectral sub-bands) of differing importance (with respect to the image's visual quality). The DCT is similar to the discrete Fourier transform: it transforms a signal or image from the spatial domain to the frequency domain

PART1- Testing and Input File /Output File Formats

FOR DFT:

```
//Testing for PART1

AbstractOperations op1 = new DFT();
op1.readFileOperation("input.txt");
op1.mainOperation();
op1.writeFileOperation("output.txt");

AbstractOperations op2 = new DCT();
op2.readFileOperation("input.txt");
op2.mainOperation();
op2.writeFileOperation("output.txt");
```

Input File Content :

```
1.2
2.3
3.4
1.5
2.2
2.7
```

Output File Content:

```
13.3 0.0i
-0.5999999999999999 -0.69282032302755507i
-2.5999999999999988 1.3856406460551005i
0.2999999999999998 -5.371747461979932E-15i
-2.6000000000000028 -1.3856406460551051i
-0.600000000000003 0.69282032302754544i
```

FOR DCT:

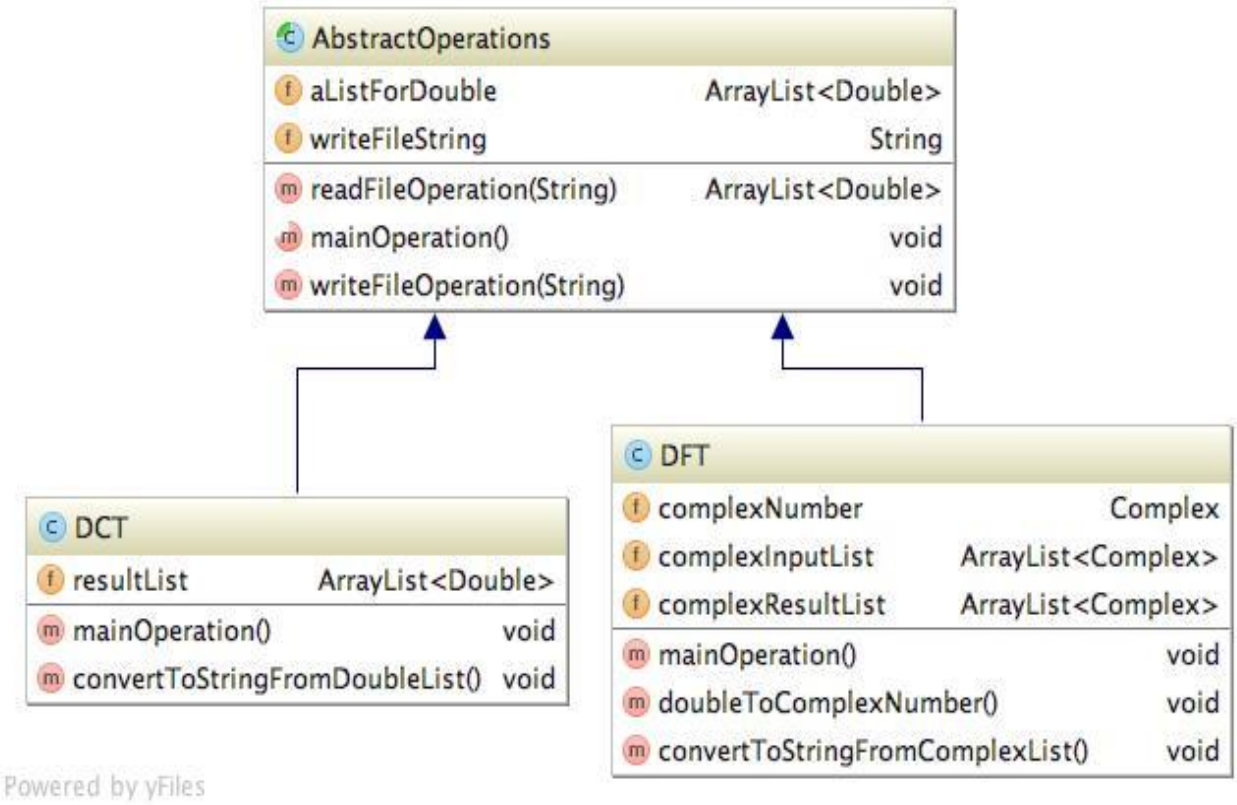
Input File Content:

```
1.2
2.3
3.4
1.5
2.2
2.7
```

Output File Content:

```
13.3
-0.8864218756201572
-0.8660254037844393
-2.4748737341529132
-0.10000000000000364
1.3763198241767949
```

Part1- UML Diagram



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*Abstract Operations olarak belirtilen class ABSTRACT yapıdadır.

PART2-Aims and Synchronized Mechanism

- Our aims in this part are being able to provide synchronized structure in Java using condition variables.
- Firstly , I created 4 threads for METIN , ALI,FEYYAZ AND KEZBAN .Then I started them.
- Then according to their situation –input and object / input and output / output and object , I active related thread.
  Kezban's thread generate random numbers and determine their situation.
- This time I used lists. And according to the situation ,I added to the list and subtracted.

PART2-Testing and Outputs

```
Ali has delivered the outputs
Ali is waiting for a transformer and an output file
Metin is waiting for an input file and output file
Feyyaz is waiting for an input file and an output file
Kezban is waiting for the outputs to be calculated
Kezban brough an input file and an object
FEYYAZ
Kezban has taken the outputs and left
Feyyaz grapped input file and a transformer
Feyyaz is calculating the outputs
Feyyaz has delivered the outputs
Feyyaz is waiting for an input file and an output file
Metin is waiting for an input file and output file
Ali is waiting for a transformer and an output file
Kezban is waiting for the outputs to be calculated
METIN
Kezban brought an object and output file
Kezban has taken the outputs and left
Metin grapped output file and a transformer
Metin is calculating the outputs
Metin has delivered the outputs
Metin is waiting for an input file and output file
Feyyaz is waiting for an input file and an output file
Ali is waiting for a transformer and an output file
Kezban is waiting for the outputs to be calculated
ALI
Kezban brought an input file and an output file
Kezban has taken the outputs and left
Ali grabbed an input file and a output
Ali is calculating the outputs
Ali has delivered the outputs
Ali is waiting for a transformer and an output file
Feyyaz is waiting for an input file and an output file
Metin is waiting for an input file and output file
Kezban is waiting for the outputs to be calculated
Kezban brought an input file and an output file
Kezban has taken the outputs and left
ALI
Ali grabbed an input file and a output
Ali is calculating the outputs
Ali has delivered the outputs
Ali is waiting for a transformer and an output file
Feyyaz is waiting for an input file and an output file
Metin is waiting for an input file and output file
Kezban is waiting for the outputs to be calculated
Kezban brought an input file and an output file
Kezban has taken the outputs and left
ALI
Ali grabbed an input file and a output
Ali is calculating the outputs
Ali has delivered the outputs
Metin is waiting for an input file and output file
Feyyaz is waiting for an input file and an output file
Ali is waiting for a transformer and an output file
Kezban is waiting for the outputs to be calculated
```

HW2_MERCAN_KARACABEY_131044034 (run)