Akdeniz University
Department of Computer Engineering
Data Structures
Homework 2

Due Date: 29/11/2021 - 01:00 am

1   Overview

Write a program that takes input[s] which is[are] either int, string or double from user, converts them to bit sequences using 64-bit memory cost model and performs bitwise operation; or(|), and(&), xor(^), complement($\smile$), right shift operator ($>>$) and left shift operator ($<<$).

To facilitate the execution of this program, you will write (at minimum) the following methods;

1. public String or(String, String)

2. public String and(String, String)

3. public String xor(String, String)

4. public String complement(String)

5. public String rs(String, int)

6. public String ls(String, int)

For each data types, you implement bitwise operators like below;

for int $->$ 1, 2, 3, 4, 5, 6
for string $->$ 1, 2, 3
for double $->$ 1, 2, 3

2 Screenshots

You need to also implement menu to perform above operations.

```
Give the type of input? int=0, string=1, double=2
0
Give the type of input? or=0, and=1, xor=2, complement=3, right shift=4, left shift=5
0
First Integer Number :
10
Second Integer Number :
14
00000000 00000000 00000000 00001010 |
00000000 00000000 00000000 00001110
-----------------------------------
00000000 00000000 00000000 00001110  = 14

Process finished with exit code 0
```

Figure 1: Integer - or

```
Give the type of input? int=0, string=1, double=2
0
Give the type of input? or=0, and=1, xor=2, complement=3, right shift=4, left shift=5
1
First Integer Number :
14
Second Integer Number :
10
00000000 00000000 00000000 00001110 &
00000000 00000000 00000000 00001010
-----------------------------------
00000000 00000000 00000000 00001010  = 10

Process finished with exit code 0
.
```

Figure 2: Integer - And

```
Give the type of input? int=0, string=1, double=2
0
Give the type of input? or=0, and=1, xor=2, complement=3, right shift=4, left shift=5
3
Integer Number :
234
~00000000 00000000 00000000 11101010  = 11111111 11111111 11111111 00010101  = -235

Process finished with exit code 0
```

Figure 3: Integer - Complement

```
Give the type of input? int=0, string=1, double=2
0
Give the type of input? or=0, and=1, xor=2, complement=3, right shift=4, left shift=5
4
Integer Number :
100
Shift Number
4
100 >> 4 = 00000000 00000000 00000000 00000110  = 6

Process finished with exit code 0
```

Figure 4: Integer - Right Shift

```
Give the type of input? int=0, string=1, double=2
0
Give the type of input? or=0, and=1, xor=2, complement=3, right shift=4, left shift=5
5
Integer Number :
10
Shift Number
5
10 << 5 = 00000000 00000000 00000001 01000000  = 320

Process finished with exit code 0
```

Figure 5: Integer - Left Shift

```
Give the type of input? int=0, string=1, double=2
1
Give the type of input? or=0, and=1, xor=2, complement=3, right shift=4, left shift=5
0
First String :
emre
Second String :
aydogan
00000000 00000000 00000000 01100101 01101101 01110010 01100101 |
01100001 01111001 01100100 01101111 01100111 01100001 01101110
─────────────────────────────────────────────────────────────────
01100001 01111001 01100100 01101111 01101111 01110011 01101111  = aydooso

Process finished with exit code 0
```

Figure 6: String - or

```
Give the type of input? int=0, string=1, double=2
1
Give the type of input? or=0, and=1, xor=2, complement=3, right shift=4, left shift=5
1
First String :
akdeniz
Second String :
üniversitesi
00000000 00000000 00000000 00000000 00000000 01100001 01101011 01100100 01100101 01101110 01101001 01111010 &
11111100 01101110 01101001 01110110 01100101 01110010 01110011 01101001 01110100 01100101 01110011 01101001
─────────────────────────────────────────────────────────────────
00000000 00000000 00000000 00000000 00000000 01100000 01100011 01100000 01100100 01100100 01100001 01101000  = □□□□□`c`ddah

Process finished with exit code 0
```

Figure 7: String - And

```
Give the type of input? int=0, string=1, double=2
2
Give the type of input? or=0, and=1, xor=2, complement=3, right shift=4, left shift=5
0
First Double Number :
1.25
Second Double Number :
1234.5412
00111111 11110100 00000000 00000000 00000000 00000000 00000000 00000000 |
01000000 10010011 01001010 00101010 00110000 01010101 00110010 01100001
─────────────────────────────────────────────────────────────────
01111111 11110111 01001010 00101010 00110000 01010101 00110010 01100001
Process finished with exit code 0
```

Figure 8: Double - or

```
Give the type of input? int=0, string=1, double=2
2
Give the type of input? or=0, and=1, xor=2, complement=3, right shift=4, left shift=5
1
First Double Number :
543.123
Second Double Number :
5.0
01000000 10000000 11111000 11111011 11100111 01101100 10001011 01000100 |
01000000 00010100 00000000 00000000 00000000 00000000 00000000 00000000
———————————————————————————————————————————————————————————————————
01000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
Process finished with exit code 0
```

Figure 9: Double - And

3 Notes

1. You must develop your homework according to the object-oriented paradigm and use arrays.

2. You need to submit java code and javadoc files. You can check reference [1] to understand how to write javadoc comments. You must clearly write a comment for each methods and classes.

3. You can ask questions about the homework via Microsoft Teams group.

4. Late submission will not be accepted!

5. You must obey the submission format. If you send your homework in different format, you will not get credit.

6. You are going to submit your report to Microsoft Teams:
   The submission format is given below:
   <StudentNumber>.zip
   −javadoc/
   −−Related javadoc documents
   −HW2_<studentnumber>.java

4 Policy

All work on assignments must be done with your own unless stated otherwise. You are encouraged to discuss with your classmates about the given assignments, but these discussions should be carried out in an abstract way. That is, discussions related to a particular solution to a specific problem (either in actual code or in the pseudocode) will not be tolerated. In short, turning in someone elses work(from internet), in whole or in part, as your own will be considered as a violation of academic integrity. Please note that the former condition also holds for the material found on the web as everything on the web has been written by someone else.

5 Reference

1. https://www.oracle.com/technetwork/java/javase/tech/index-137868.html