SECOND THEORICAL WORK

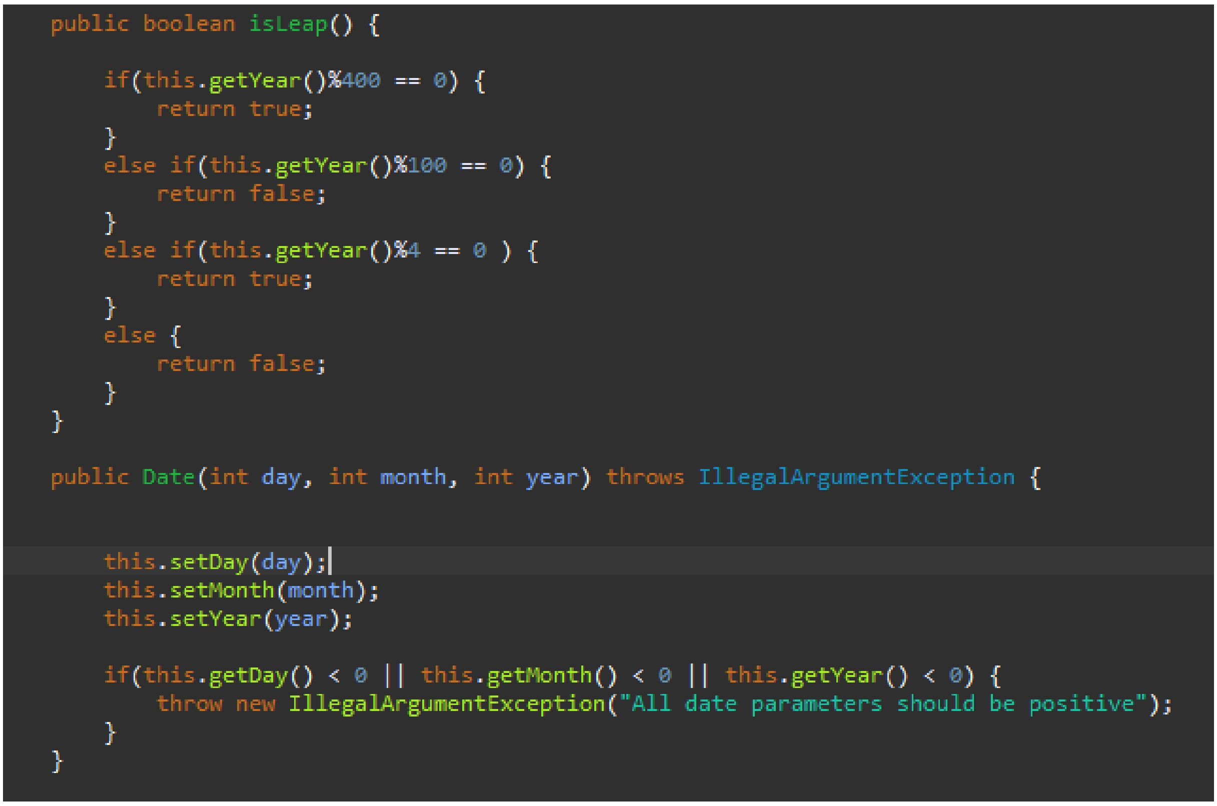
Exercise 1

GROUP: ISO2-2022-A01

MEMBERS: JAKUB KONIECZNY

Contents

1. Code of the identified method



```
public boolean isLeap() {

    if(this.getYear()%400 == 0) {
        return true;
    }
    else if(this.getYear()%100 == 0) {
        return false;
    }
    else if(this.getYear()%4 == 0 ) {
        return true;
    }
    else {
        return false;
    }
}

public Date(int day, int month, int year) throws IllegalArgumentException {


    this.setDay(day);
    this.setMonth(month);
    this.setYear(year);

    if(this.getDay() < 0 || this.getMonth() < 0 || this.getYear() < 0) {
        throw new IllegalArgumentException("All date parameters should be positive");
    }
}
```

2. Variables that must be considered to test the method.

We have consider 3 variables: day, month and year.

3. Identifying the test values

Parameter	Equivalence Class	Values	Boundary Values (lightweight variant)
date.getDay()	(-∞, 0] (0, ∞)	-1, 1	0
date.getMonth()	(-∞, 0] (0, ∞)	-1, 1	0
date.getYear()	(-∞, 0] (0k, 4k) [4k – 100i] [100k – 400i] [400k] Where i and k are positive natural numbers	-1, 1, 12, 100, 2000	0, 4, 100, 2000

4. Possible number of test cases

The maximum number of test cases that could generated from the test values is 3*3* 7 = 63.

5. Definition of some test suites using each use

CP1: { -1, 1, 1}

CP2: {0, -1, 0}

CP3: {1 ,1, 12}

CP4: {1, 1, 4)}

CP5: {1, 0, 100}

CP6: {1, 10, -1}

CP7: {1, 0, 2000}

6. Definition of test suites to achieve pairwise coverage

date.getDay()	date.getMonth()	date.getMonth()
-1	0	0
1	0	100
1	-1	-1
-1	1	100
1	1	12
0	1	0
0	-1	100
1	-1	1
1	-1	0
-1	-1	12
1	1	2000
0	0	2000
0	1	-1
-1	1	1
0	0	12
0	0	1
-1	0	-1
-1	1	4
0	0	4

1	-1	4
-1	-1	400

7. A set of test cases to achieve coverage of decisions

```
if(this.getDay() < 0 || this.getMonth() < 0 || this.getYear() < 0)
```

A	B	C	A or B or C	Dominant Condidton
T	T	T	T	A,B,C
T	T	F	T	A,B
T	F	T	T	A,C
T	F	F	T	A
F	T	T	T	B,C
F	T	F	T	B
F	F	T	T	C
F	F	F	F	A,B,C

this.getDay()	this.getMonth()	this.getYear()
1	1	1
-1	-1	-1

```
if(this.getYear()%400 == 0)
```

D	**Dominant Condition**
T	D
F	D

this.getDay()	this.getMonth()	this.getYear()
-	-	2000
-	-	1

```
else if(this.getYear()%100 == 0)
```

E	**Dominant Condition**
T	E
F	E

this.getDay()	this.getMonth()	this.getYear()
-	-	100
-	-	1

else if(this.getYear()%4 == 0)

F	Dominant Condition
T	F
F	F

this.getDay()	this.getMonth()	this.getYear()
-	-	4
-	-	1

else

Not D	Not E	Not F	Not D and Not E and Not F	Dominant Condidton
T	T	T	T	D,E,F
T	T	F	F	F
T	F	T	F	E
T	F	F	F	E,F
F	T	T	F	D
F	T	F	F	D,F
F	F	T	F	D,E
F	F	F	F	D,E,F

this.getDay()	this.getMonth()	this.getYear()
-	-	1
-	-	4

8. A set of test cases to achieve MC/DC coverage

if(this.getDay() < 0 || this.getMonth() < 0 || this.getYear() < 0)

A	B	C	A or B or C	Dominant Condidton
T	T	T	T	A,B,C
T	T	F	T	A,B
T	F	T	T	A,C
T	F	F	T	A
F	T	T	T	B,C
F	T	F	T	B
F	F	T	T	C
F	F	F	F	A,B,C

this.getDay()	this.getMonth()	this.getYear()
1	-1	-1
-1	1	-1
-1	-1	1
-1	-1	-1

```
if(this.getYear()%400 == 0)
```

D	Dominant Condition
T	D
F	D

this.getDay()	this.getMonth()	this.getYear()
-	-	2000
-	-	1

```
else if(this.getYear()%100 == 0)
```

E	Dominant Condition
T	E
F	E

this.getDay()	this.getMonth()	this.getYear()
-	-	100
-	-	1

```
else if(this.getYear()%4 == 0)
```

F	Dominant Condition
T	F
F	F

this.getDay()	this.getMonth()	this.getYear()
-	-	4
-	-	1

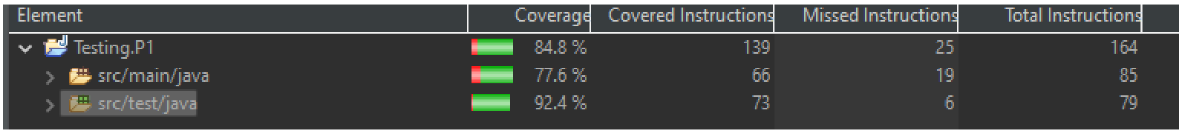
```
else
```

Not D	Not E	Not F	Not D and Not E and Not F	Dominant Condidton
T	T	T	T	D,E,F
T	T	F	F	F
T	F	T	F	E
T	F	F	F	E,F
F	T	T	F	D
F	T	F	F	D,F
F	F	T	F	D,E
F	F	F	F	D,E,F

this.getDay()	this.getMonth()	this.getYear()
-	-	1
-	-	4
-	-	100
-	-	2000

9. Conclusions

We can see that maximum number of tests is 63, however in both each case and pairwaise method results were much lower, respectively 7 and 21.



Element	Coverage	Covered Instructions	Missed Instructions	Total Instructions
Testing.P1	84.8 %	139	25	164
src/main/java	77.6 %	66	19	85
src/test/java	92.4 %	73	6	79

Achieved coverage is on the high level.