VILNIUS UNIVERSITY
ŠIAULIAI ACADEMY

BACHELOR PROGRAMME SOFTWARE ENGINEERING

Object Oriented Programming

Practical 3 (Three).

Student: Sunday Emmanuel Sanni

Lecturer: Prof. Donatas Dervinis

Šiauliai,

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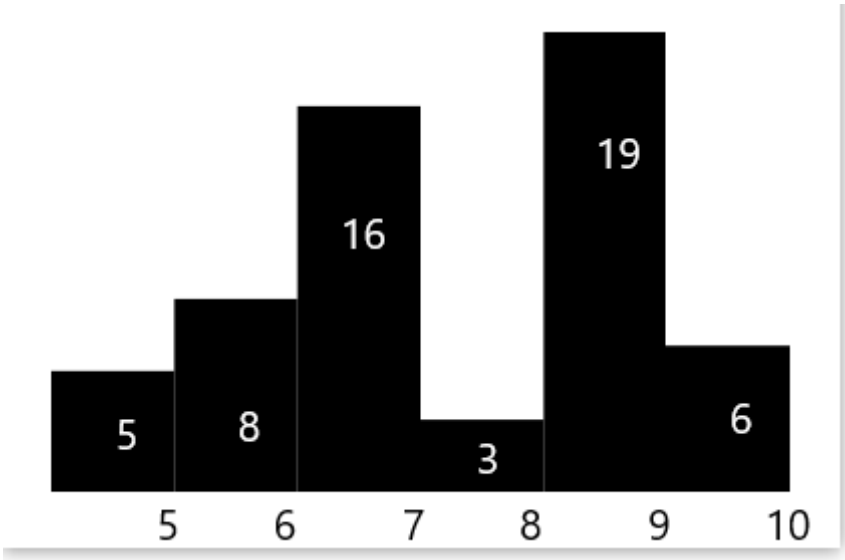
1. **Create a child class (inheritance) based on the class of the previous task (3x+1) by adding new method which can calculate statistics (histogram) of function 3x+1 iteration values from interval [n;m] :** In the image below, I set the new child class to inherit functions that have been declared as private in the parent class. These functions were returned from by public functions in the child class.

```php
class HistoGRAM extends CollatzProperties
{
    public function Y_Axis_Histogram()
    {
        $height = $this->getCount();
        return $height;
    }
    public function X_Axis_Histogram()
    {
        $width = $this->getlowerBound();
        return $width;
    }
}
```

Figure 1: A screenshot of PHP part of the program, showinga child class with functions that inherits private properties from the parent class, and make them availabl through a public function.

```php
class CollatzProperties
{
    private $lowerBound;
    private $highest;
    private $dataArray;
    function __construct($lowerBound)
    {
        $this->lowerBound = $lowerBound;
    }
    function getValue()
    {
        return $this->lowerBound;
    }
    function generateSequence()
    {
        $this->dataArray = array();
        array_push($this->dataArray, $this->lowerBound);
        while ($this->lowerBound != 1) {
            if ($this->lowerBound % 2 == 0) {
                $this->lowerBound = $this->lowerBound / 2;
            } else {
                $this->lowerBound = ((3 * $this->lowerBound) + 1);
            }
            array_push($this->dataArray, $this->lowerBound);
        }
```

Figure 2: Parent Class with private access modifiers.



Number	Highest Value	Stopping Time
5	16	5
6	16	8
7	52	16
8	8	3
9	52	19
10	16	6

Figure 3: Histogram generated from the table beside it. Numbers of the Collatz sequence are on the x-axis and numbers of iterations are in the vertical axis

2. **Base draw.io draw UML class diagram:**

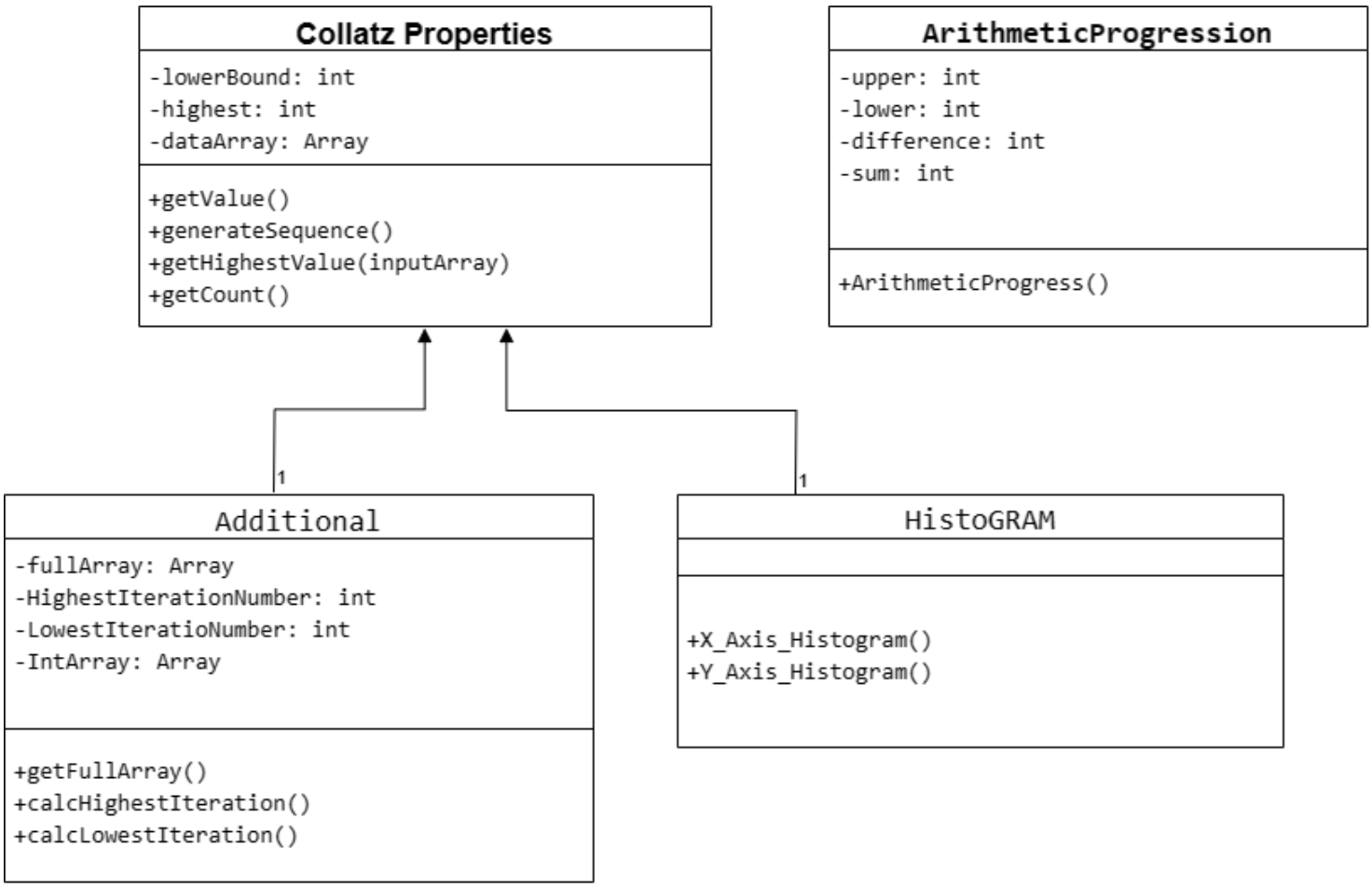


Figure 4: A UML diagram for 2 parent classes and two child classes showing inheritance from to one of the parent classes.