# Lab: Encapsulation and Inheritance

Tasks for exercise in class and for homework to the course  ["Programming Advanced for QA" @ SoftUni](https://softuni.bg/trainings/4257/programming-advanced-for-qa-november-2023).

Test your tasks in the Judge system: <https://judge.softuni.org/Contests/4461/Encapsulation-Inheritance-Lab>

# Person Info

Make sure to use the **provided resources** for the following problems.

Create a class Person, which should have **public** **properties** with **private** **setters** for:

* FirstName: string
* LastName: string
* Age: int

Each property needs **proper validation**.

* Name must be at **least 3 symbols.**
* Age must **not** be **zero** **or** **negative.**

If some of the properties are **NOT valid** throw ArgumentExeption with the following **messages**:

* "**Age cannot be zero or a negative integer!**"
* "**First name cannot contain fewer than 3 symbols!**"
* "**Last name cannot contain fewer than 3 symbols!**"

Next add a **method**:

ToString(): string – **override**

Here is an **example** of how the **string** should look like: "Tomas Anderson is 20 years old.".

**Hint**: Because of the **private** **setters** you will need a **constructor** with **3 parameters**.

## Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 5  Brandi Anderson 65  Andrew Williams 57  Newton Holland 27  Andrew Clark 44  Brandi Scott 35 | Andrew Clark is 44 years old.  Andrew Williams is 57 years old.  Brandi Scott is 35 years old.  Brandi Anderson is 65 years old.  Newton Holland is 27 years old. |

# Box Data

Create a class **Box**, with the following properties:

Length – **double**, should **not be zero** or **negative number**.

Width – **double**, should **not be zero** or **negative number**.

Height – **double**, should **not be zero** or **negative number**.

If one of the properties **IS a zero or negative number** throw an ArgumentException with the message:

"{propertyName} **cannot be zero or negative.**"

All **properties** are **set by the constructor** and when **set**, they **cannot** be **modified**.

Finally implement the **following methods**:

* double SurfaceArea(): Calculate and return the **surface area** of the **Box**. (2\*L\*W + 2\*L\*H + 2\*W\*H)
* double Volume():Calculate and return the **volume** of the **Box**. (L\*W\*H)
* string ToString():
  + "**Surface Area –** {area}"
  + "**Volume –** {volume}"

## Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 2  3  4 | Surface Area - 52.00  Volume - 24.00 |
| 1.3  1  6 | Surface Area - 30.20  Volume - 7.80 |
| 2  -3  4 | Width cannot be zero or negative. |

# Players and Monsters

Your task is to create the following game hierarchy:

A diagram of a knight

Description automatically generated

Create a class Hero. It should contain the following members:

* A constructor, which accepts:
  + **username – string**
  + **level – int**
* The following properties:
  + **Username - string**
  + **Level – int**
* **ToString()** method

Hint: Override **ToString()** of the base class in the following way:

|  |
| --- |
|  |
| public override string ToString()  {  return $"Type: {this.GetType().Name} Username: {this.Username} Level: {this.Level}";  } |

# Zoo

Create a class hierarchy **Zoo**. It needs to contain the following structure:

A diagram of a snake and snake

Description automatically generated

Follow the diagram and create all the classes. **Each** of them, except the **Animal** class, should **inherit** from **another** **class**. Every class should have:

* A constructor, which accepts one parameter: **name**.
* Property **Name - string**.