University of Technology, Jamaica
School of Computing and Information Technology

OOP Principles Tutorial One - Introduction to OOP

Objective:
The objectives of this tutorial are to allow students to be able to:

- perform object-oriented analysis on a set of requirements
- construct a model using the UML modeling language
- implement the model in an object-oriented programming language

Exercise One - Worked Example

CenterPath Games requires you to build a flight simulator. The flight simulator tracks the wind speed and direction. It will be able to take-off, ascend, descend, turn left, turn right and land.

Perform an object-oriented analysis on the above paragraph showing the classes, attributes and methods. Build an object-oriented model using UML, then implement the model in an object-oriented programming language language.

Sample Answer for Exercise One

Object-oriented Analysis

Nouns: CenterPath Games, flight simulator, wind speed, direction

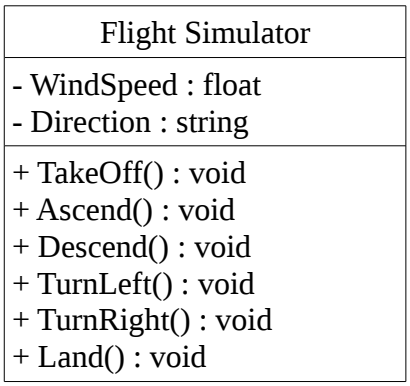
Verbs: build, tracks, take-off, ascend, descend, turn left, turn right, land

Classes: flight simulator

Attributes: wind speed, direction

Methods: take-off, ascend, descend, turn left, turn right, land

Design using UML



Implementation

C++ Implementation

```
class FlightSimulator
{
	private:
		float WindSpeed;
		String Direction;
	public:
		void TakeOff()
		{
		}
		void Ascend()
		{
		}
		void Descend()
		{
		}
		void TurnLeft()
		{
		}
		void TurnRight()
		{
		}
		void Land()
		{
		}
};
```

Java Implementation

```
public class FlightSimulator
{

	float WindSpeed;
	String Direction;

	public void TakeOff()
	{
	}
	public void Ascend()
	{
	}
	public void Descend()
	{
	}
	public void TurnLeft()
	{
	}
	public void TurnRight()
	{
	}
	public void Land()
	{
	}
}
```

Exercise Two - Classwork

A TV remote manufactured in China by Beijing Industries has two functions – move channel up and move channel down. Move channel up increments the channel number by one while move channel down decrements the channel number by one. There are 1000 channels (0 to 999). When the channel is 0, move channel down sets the channel to 999. When the channel is 999 move channel up sets the channel to 0.

Perform an object-oriented analysis on the above paragraph showing the classes, attributes and methods. Build an object-oriented model using UML, then implement the model in an object-oriented programming language language.

Exercise Three - Homework

A traffic light from France displays the current light which can be either red, green or amber in order. Internally, the current light is represented as 0 for red, 1 for green and 2 for amber. When the traffic light receives the change light signal, it sets the current light to the next light in sequence (0, 1, 2). When the current light is 2 and the change light signal is received, the current light wraps around to 0.

Perform an object-oriented analysis on the above paragraph showing the classes, attributes and methods. Build an object-oriented model using UML, then implement the model in an object-oriented programming language language.

Exercise Four - Homework

An A contains and X which is an integer, a Y which is a string, and a Z which is a floating point number. It also has the operations M and N. Another entity B contains I and J which are both floating point numbers, and the operation K.

Perform an object-oriented analysis on the above paragraph showing the classes, attributes and methods. Build an object-oriented model using UML, then implement the model in an object-oriented programming language language.