Faculty of Mathematics and Physics
Charles University in Prague
9th March 2015

C# Made Easy!

Programming II

Workshop 4 – The Snake and OOP

Workshop 4
Outline

1. (No) Test
2. The Snake - Reloded

(No) Test 04
Quick Warm up!

Find the test here (no-ads):
http://goo.gl/47o7Qf

Permanent link:
https://docs.google.com/forms/d/1J7conw6bb9ThJiVSunhrz-NIPl8qOcLFmGzx2hKVU54/viewform

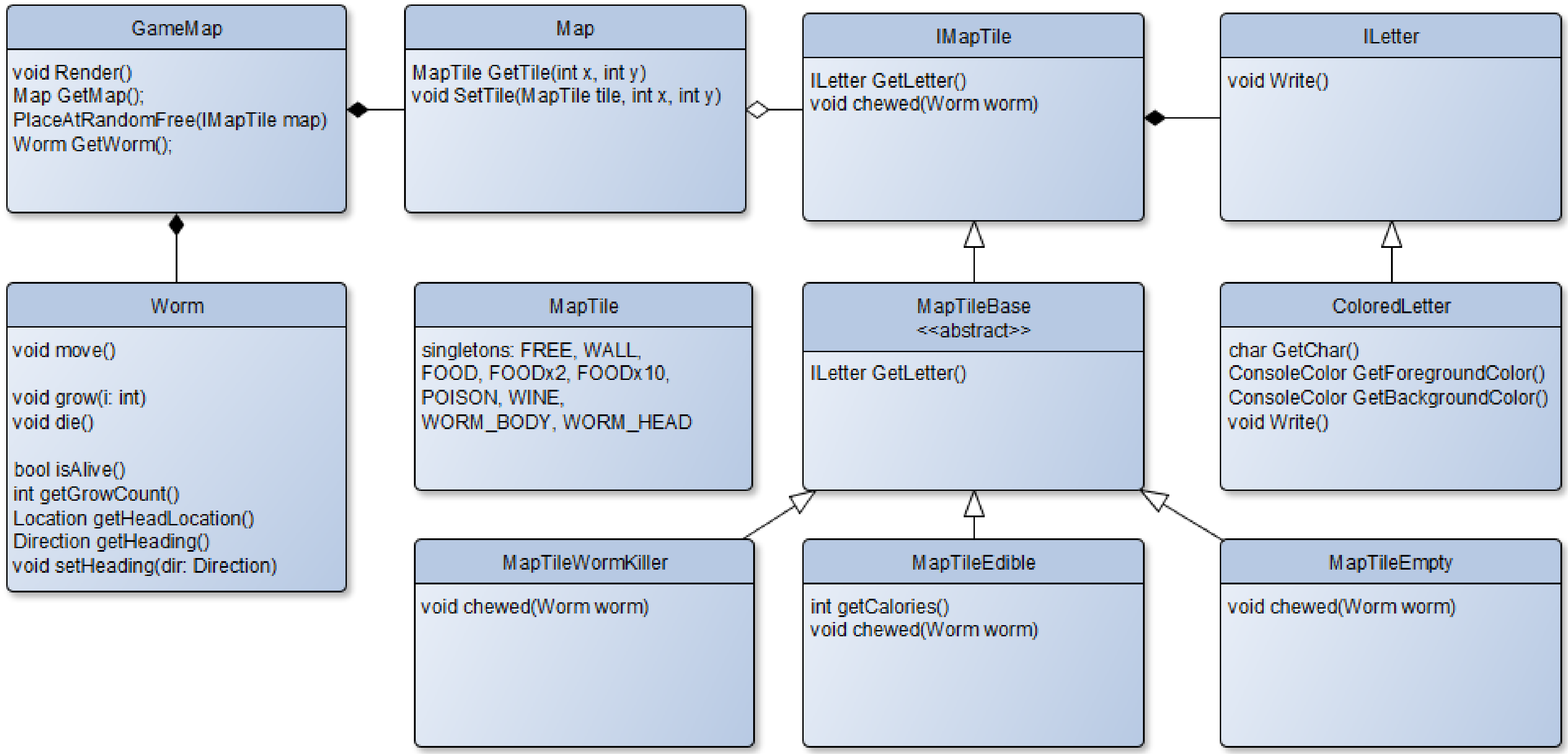
Time for no-test:
5 min

Assignment (3+)4
Create “The Snake” aka “The Worm” game

- Console application (text-based game)
  - Snake is controlled either by WSAD, or arrows, or 8246 numbers
  - You have to display “snake’s length” and “time elapsed” somewhere at “bottom status line”
  - Escape key terminates the game
  - Implement tiles: Empty, Wall, Food, Posion, Wine, “Snake”
  - Snake movement speed should be increasing every N food eaten (regardless their calories)
- Provide solution that can easily change
  - Map dimensions
    - Ask me on how big map I want to play (max 80 x 40)
  - Food effects
    - Adding new food should be as easy as creating and „registering“ a new Food object
  - Both POISON and WALL kill the snake
  - Implement WINE so it reverse the controls (UP<->DOWN, LEFT<->RIGHT)
- Points:
  - 10, if finished till 15.3.2015, 23:59
  - 5, if finished later on
- Bonus:
  - Provide different visualization for the snake’s body using
    - <, v, >, ^ as a head … -, | as a straight body and / \ at “turning points”
    - 3 points

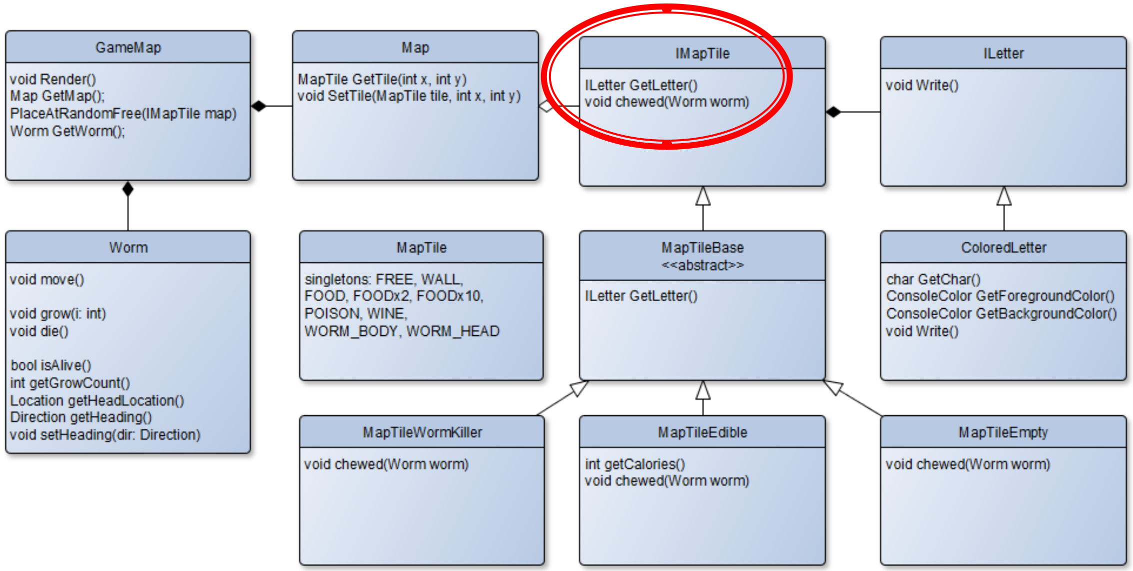
Assignment 4

Representing the Game Model + View



Assignment 4
Representing the Game Model + View

```
using System;

namespace Programko
{
    public interface IMapTile
    {
        ILetter GetLetter();
        void chewed(Worm worm);
    }
}
```

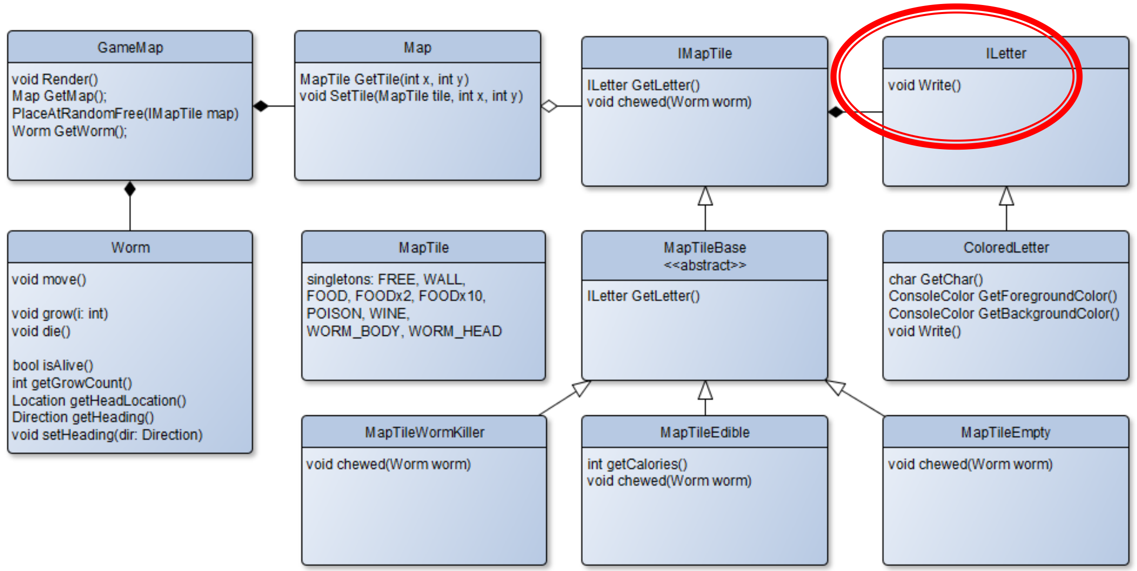


We're going to have "generic" tile described by "letter" and "what happens when the Snake chews the tile".

Assignment 4

Representing the Game Model + View

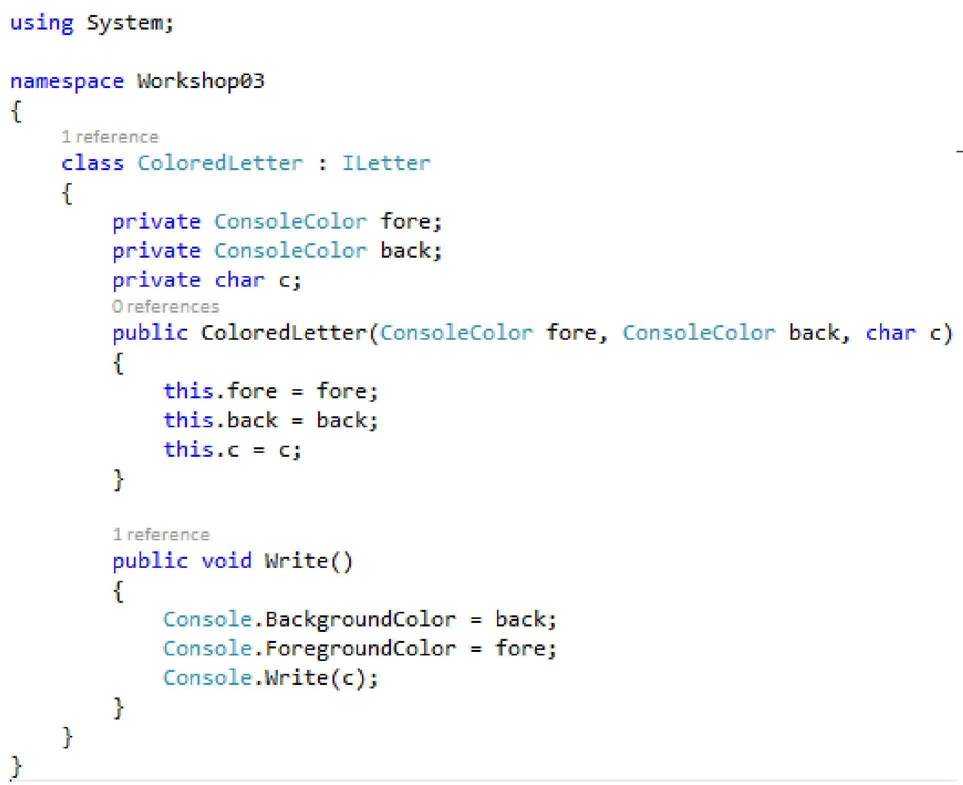
```
using System;

namespace Programko
{
    public interface ILetter
    {
        void Write();
    }
}
```



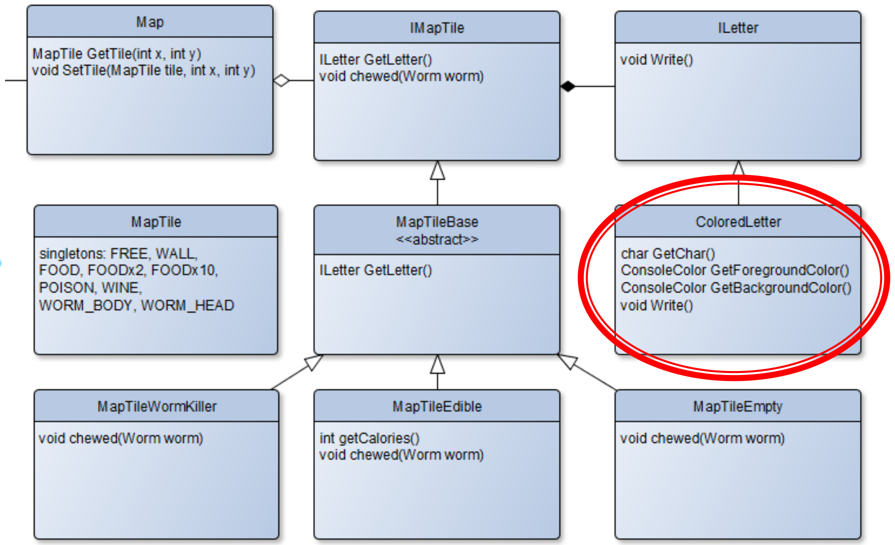
And the “letter” will in-fact be anything that can “output” some character to a screen. Again, we’re trying to embrace “procedural knowledge” here rather then “symbolic” one.

Assignment 4

Representing the Game Model + View



```
using System;

namespace Workshop03
{
    1 reference
    class ColoredLetter : ILetter
    {
        private ConsoleColor fore;
        private ConsoleColor back;
        private char c;
        0 references
        public ColoredLetter(ConsoleColor fore, ConsoleColor back, char c)
        {
            this.fore = fore;
            this.back = back;
            this.c = c;
        }

        1 reference
        public void Write()
        {
            Console.BackgroundColor = back;
            Console.ForegroundColor = fore;
            Console.Write(c);
        }
    }
}
```

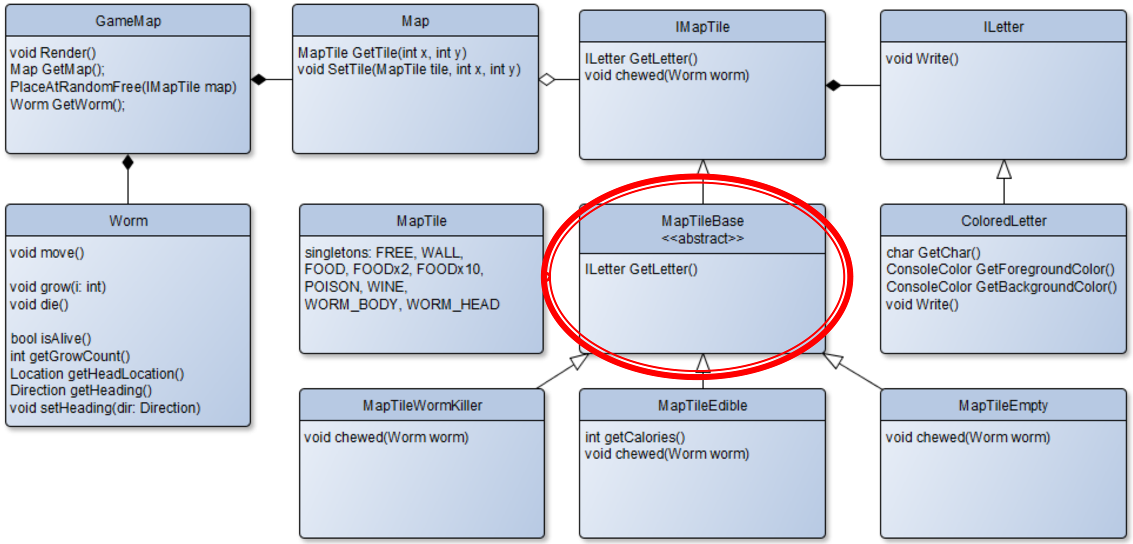


And thus we can have an implementation that outputs some character in chosen colors. The trick is, that the "ILetter" is oblivious to what "IMapTile" does … thus you can pair "visual style of the tile" with "its implementation of chewed()" as you see fit!

Assignment 4

Representing the Game Model + View

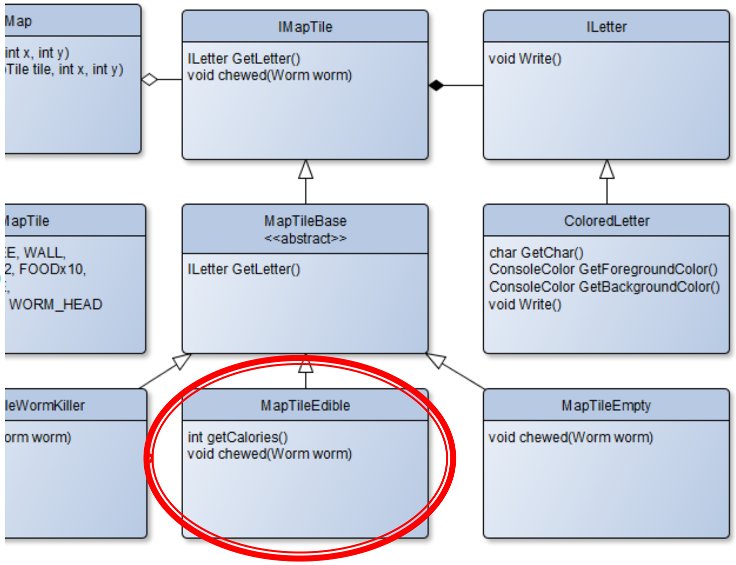
```
using System;

namespace Workshop03
{
    7 references
    abstract class MapTileBase : IMapTile
    {
        ILetter graphics;
        3 references
        public MapTileBase(ILetter graphics)
        {
            this.graphics = graphics;
        }

        1 reference
        public ILetter getGraphics()
        {
            return graphics;
        }

    }
}
```



So, let's define our "abstract" base for all tiles… you know, every tile will need to specify it's ILetter … composition over inheritance here!

Assignment 4
Representing the Game Model + View

```
using System;

namespace Workshop03
{
    6 references
    class MapTileEdible : MapTileBase
    {
        private int calories;

        5 references
        public MapTileEdible(ILetter graphics, int calories) : base(graphics)
        {
            this.calories = calories;
        }

        0 references
        public void chewed(Worm worm)
        {
            worm.grow(calories);
        }

    }
}
```



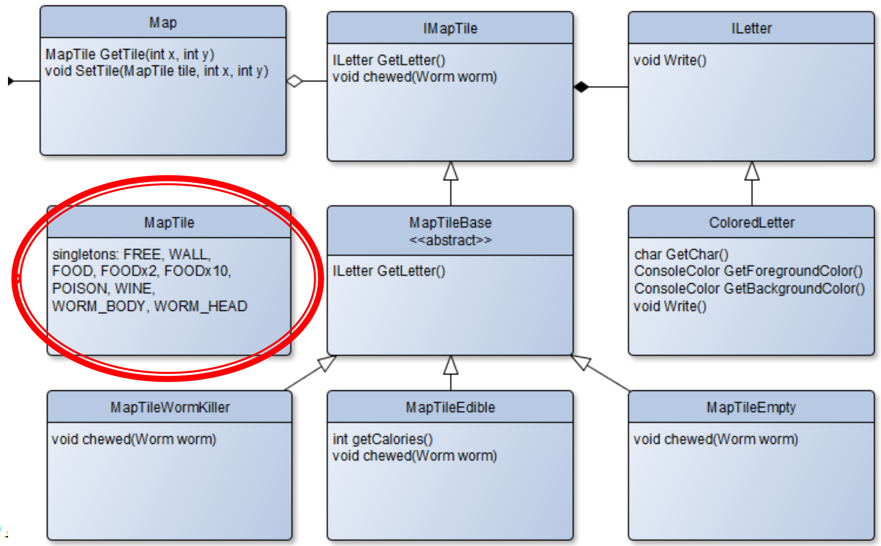
Now the real deal… MapTileEdible … here we specify "what" should happen when "the Snake chewes" the tile.

Note that apart from "grow" we should place a new food into the map as well!

Assignment 4

Representing the Game Model + View

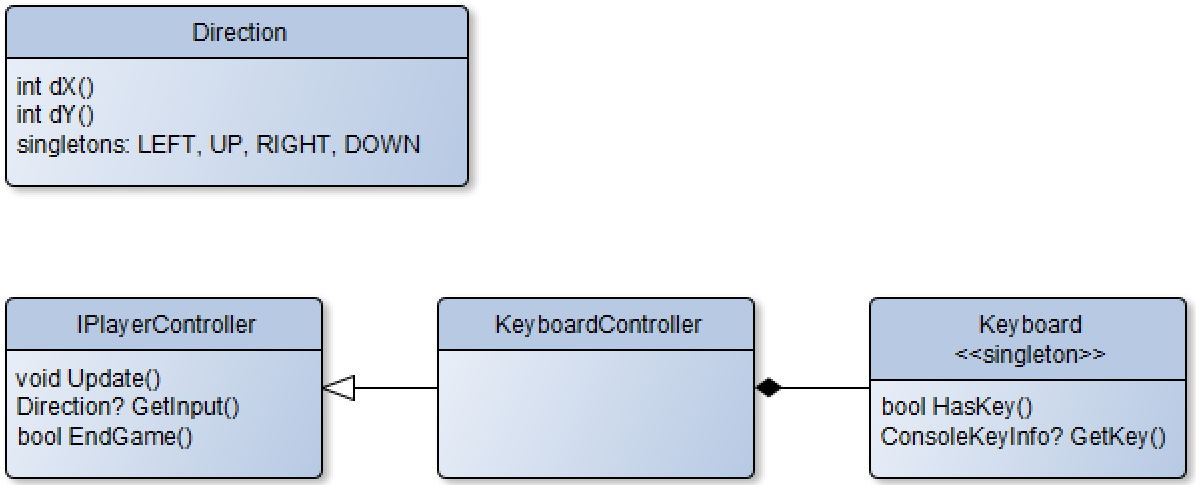
```
using System;

namespace Workshop03
{
    4 references
    class MapTile
    {
        public const IMapTile FOOD =
            new MapTileEdible(
                new ColoredLetter(ConsoleColor.Blue, ConsoleColor.Green, '+'),
                1
            );

        public const IMapTile FOODx2 =
            new MapTileEdible(
                new ColoredLetter(ConsoleColor.Green, ConsoleColor.Blue, 'x'),
                2
            );

        public const IMapTile FOODx10 =
            new MapTileEdible(
                new ColoredLetter(ConsoleColor.Black, ConsoleColor.Green, 'X'),
                10
            );
    }
}
```



Thus, we can easily define any type of food we can ever dream of … almost.

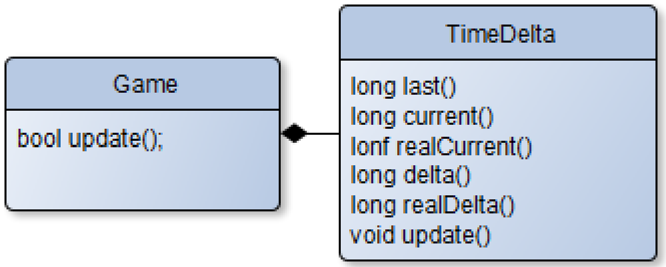
Assignment 3

Getting Player's Input



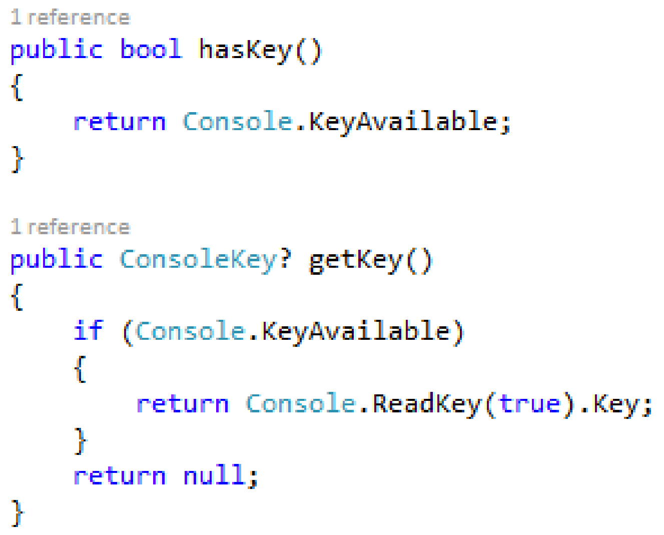
Assignment 3

Timing the Game



CheatSheet

Reading Inputs from Keyboard



```
1 reference
public bool hasKey()
{
    return Console.KeyAvailable;
}

1 reference
public ConsoleKey? getKey()
{
    if (Console.KeyAvailable)
    {
        return Console.ReadKey(true).Key;
    }
    return null;
}
```

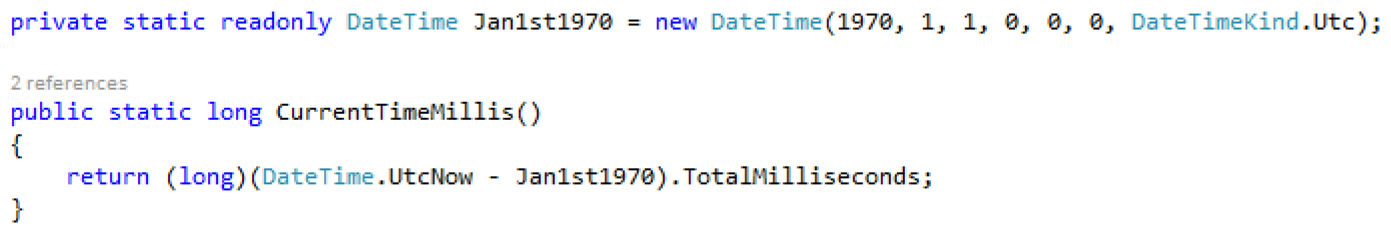
CheatSheet

Changing Console Output Color

- Google: C# Console Colors
  - Google – The Best Programmer’s Friend
  - Keep in mind the limit of “Googling” for “Code”

CheatSheet

Timing your Snake

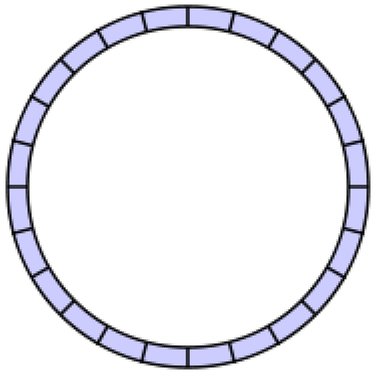


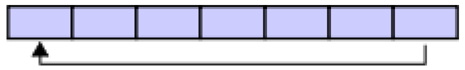
```
private static readonly DateTime Jan1st1970 = new DateTime(1970, 1, 1, 0, 0, 0, DateTimeKind.Utc);

2 references
public static long CurrentTimeMillis()
{
    return (long)(DateTime.UtcNow - Jan1st1970).TotalMilliseconds;
}
```

CheatSheet

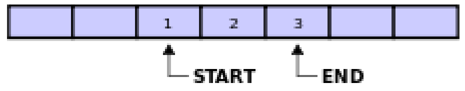
Implementing the Snake's body

- Circular array / buffer

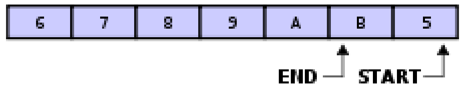




- Array



- Holding „start“ and „end“ index

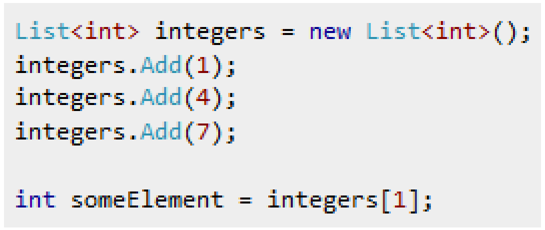


- Which can overflow…

CheatSheet

Implementing the Snake's body

- Or just use „List“ – array that can change its size automatically



```
List<int> integers = new List<int>();
integers.Add(1);
integers.Add(4);
integers.Add(7);

int someElement = integers[1];
```

Assignment 4
Send me an email

- Email: jakub.gemrot@gmail.com
- Subject: **Programming II – 2015 – Assignment 04**
- Zip up the whole project and send it
- You WILL NOT find the assignment in CoDex!
- Deadline: **15.3.2015 23:59**

Questions?
I sense a soul in search of answers…

- Sadly, I do not own the patent for perfection (and will never do)
- In case of doubts about the assignment or some other problems don't hesitate to contact me!
  - Jakub Gemrot
    - jakub.gemrot@gmail.com