Faculty of Mathematics and Physics
Charles University in Prague
28th April 2016

C# Made Easy!

Programming II

Workshop 09 – GDI+

Workshop 09
Outline

1. Test
2. Fun with Graphics!
3. Homework

Test 09

Test

Find the test here (no-ads):

https://goo.gl/SLwus2

`0 vs. O, i vs. l vs. 1`

Permanent link:

https://docs.google.com/forms/d/1vWDu9hXcFnVnuBZVn3ANn_dyousdrADfZ7QS6mdYy6I/viewform

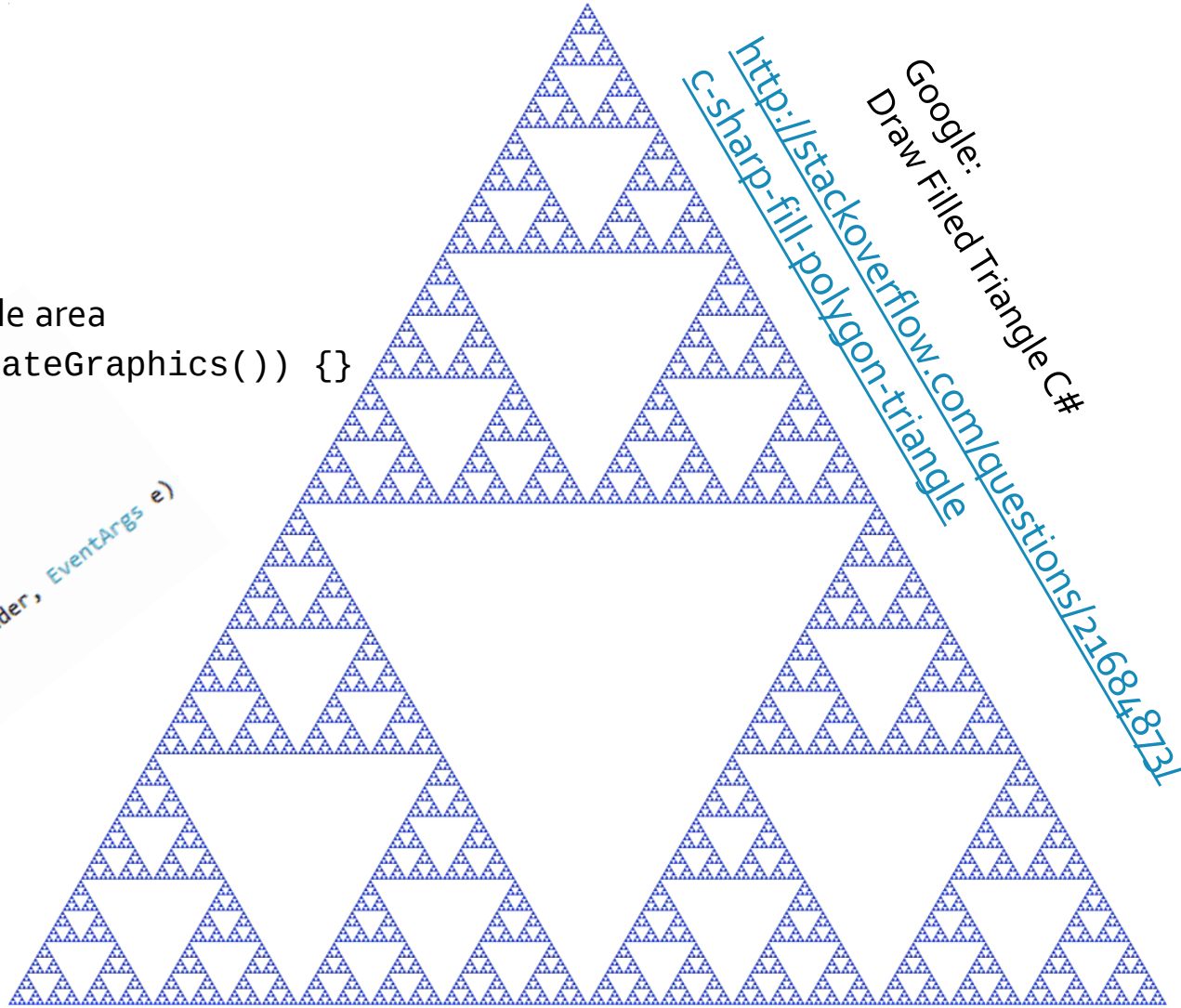
Time for the test:

15 min

Task 09.1 (or Homework)
Sierpinsky Triangle

- Let's draw this beast!
- **Good to know**
  - `Form.ClientSize`
    - Determining drawable area
  - `Using (g = this.CreateGraphics()) {}`
  - `Form.ResizeEnd` event
  - Polygon drawing

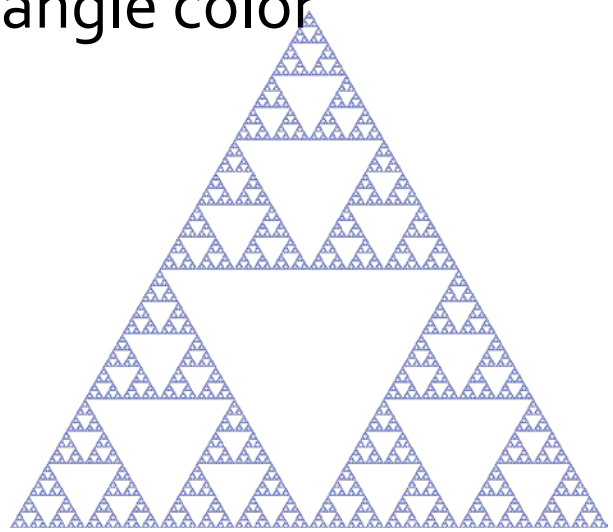
```
1 reference
public Form1()
{
    InitializeComponent();
    this.ResizeEnd += ResizeEnd_Event;
}

1 reference
private void ResizeEnd_Event(object sender, EventArgs e)
{
}
```



Google:
Draw Filled Triangle C#
http://stackoverflow.com/questions/2168487/c-sharp-fill-polygon-triangle

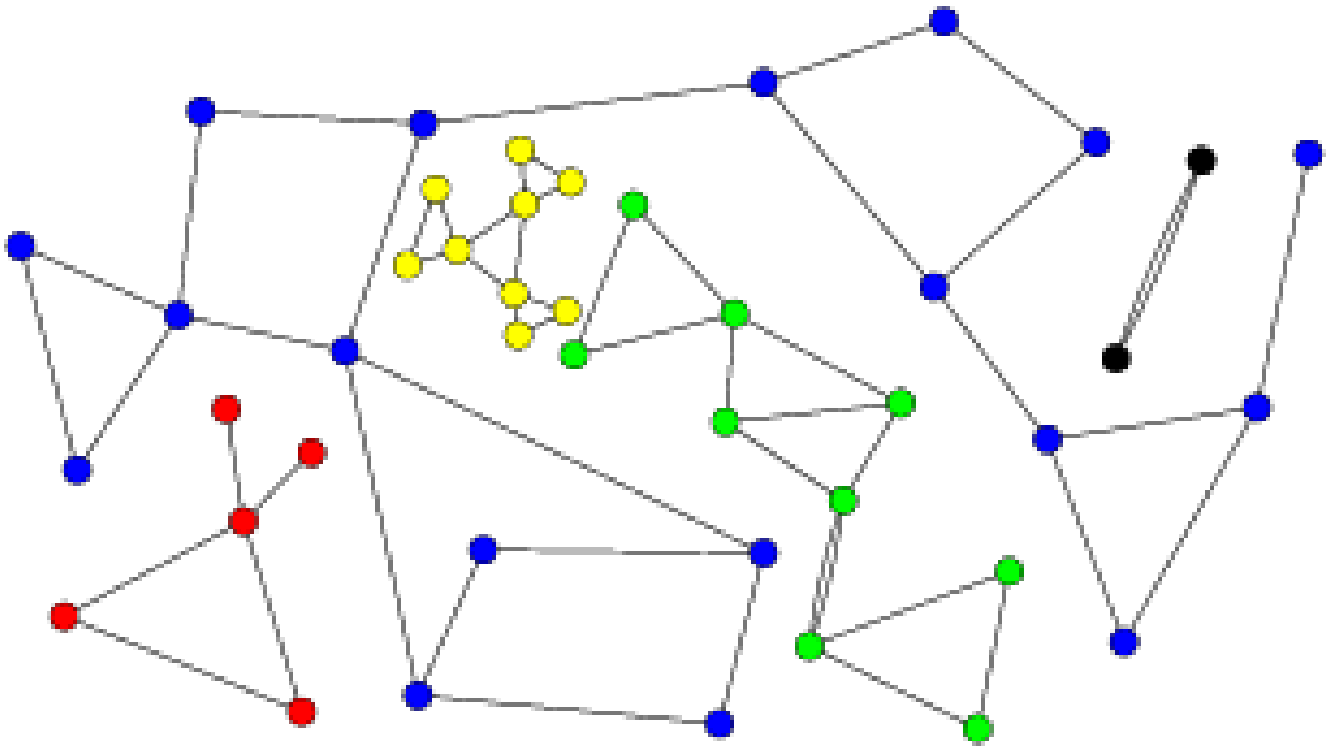
Task 09.1 (or Homework)
Sierpinsky Triangle

- Start from here: `http://alturl.com/vpvri`
- Redraw on screen resize (full width + height)
- Provide edit box that allows to set the "recursion step"
  - Watch out for exceptions! *[You shall not fail!]*
  - https://msdn.microsoft.com/en-us/library/b3h1hf19%28v=vs.110%29.aspx
- Provide color picker box to select the triangle color
  - Google: `ColorDialog`
- 5 points
- Deadline: 5.5.2016 23:59



Graph Algorithms

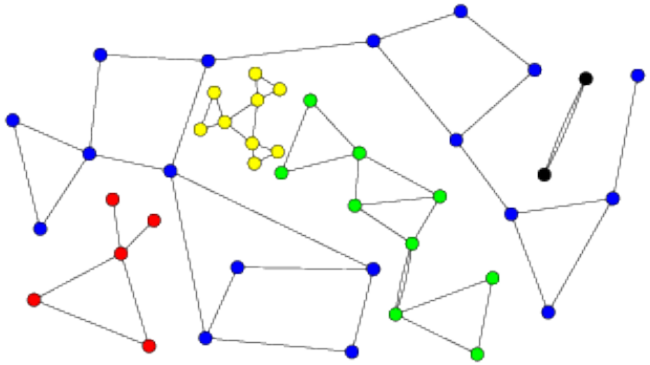
1. Components



Graph Algorithms

1. Components

Algorithm?



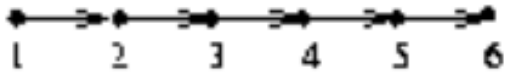
Use BFS or DFS to label nodes of single component, always start from unlabelled node.

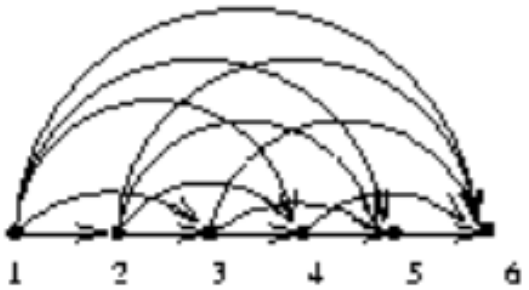
Repeat it as long as there are any unlabelled nodes in the graph.

Complexity?

Graph Algorithms

2. Graph transitive closure

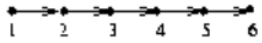


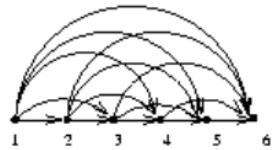


Graph Algorithms

2. Graph transitive closure

Algorithm?



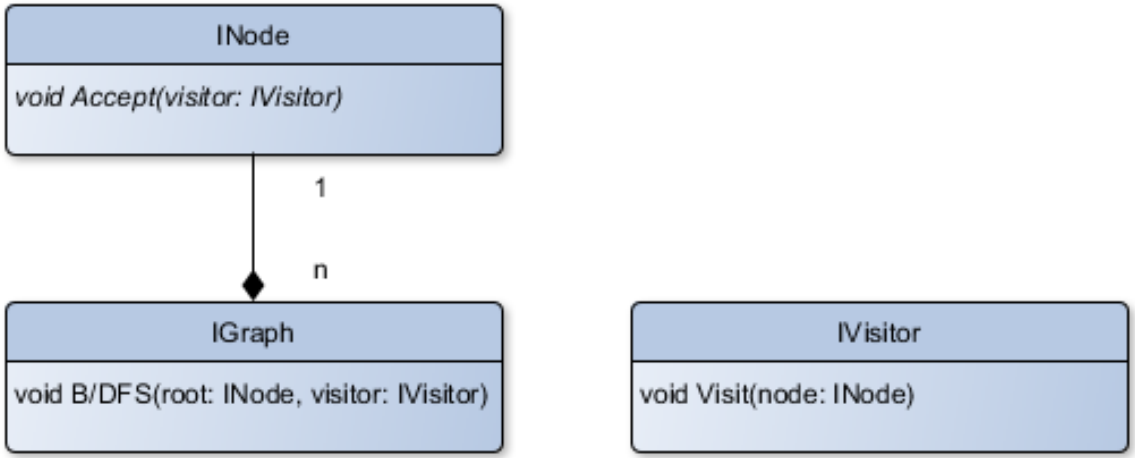


For every Vertex:
Launch DFS or BFS and introduce new edges
when new vertex is reached.

Complexity?

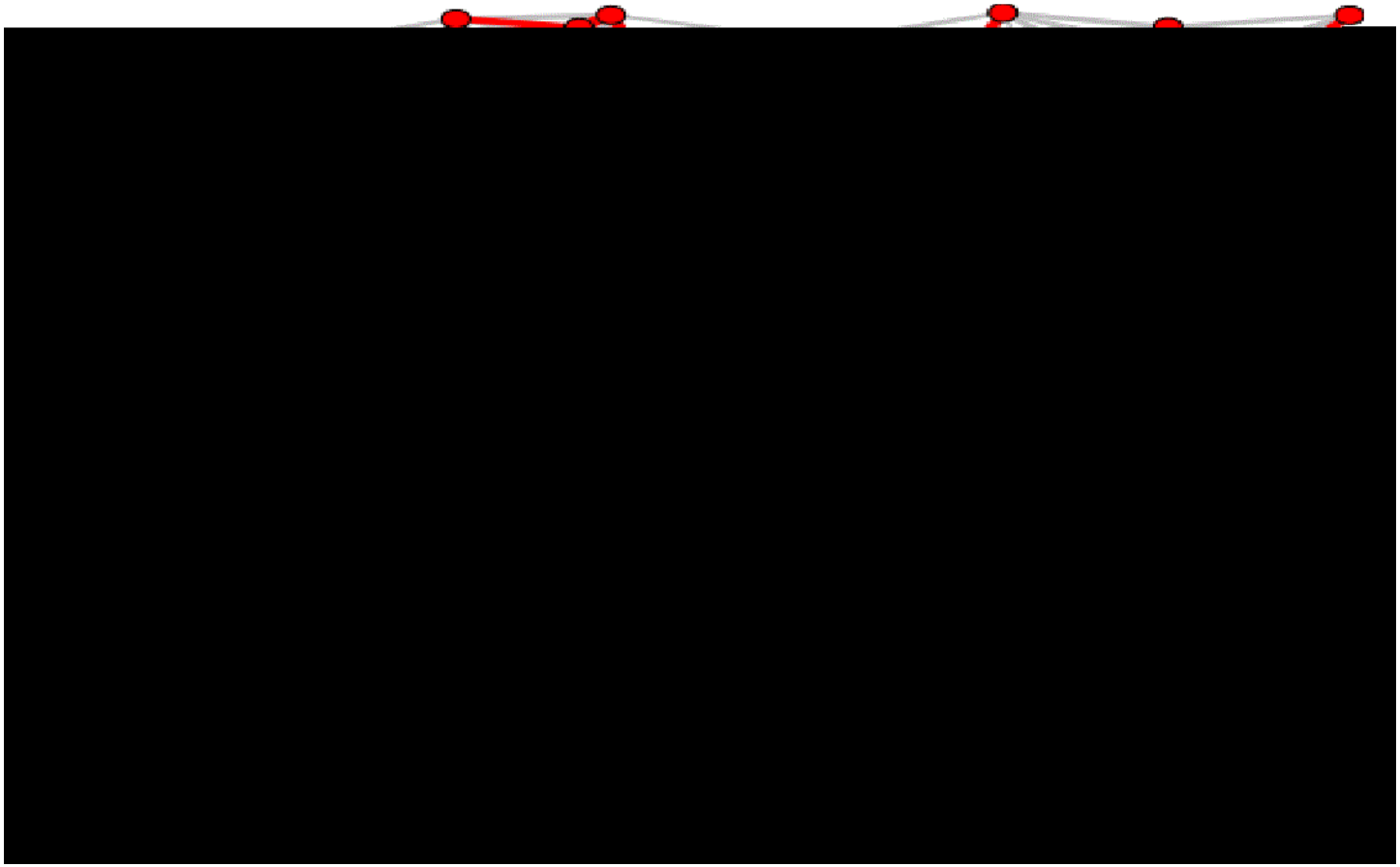
Graph Algorithms
1+2 Implementation?

- We have two graph algorithms using B/DFS … can we somehow split the implementation between "bare" B/DFS and "algorithm internals" ?

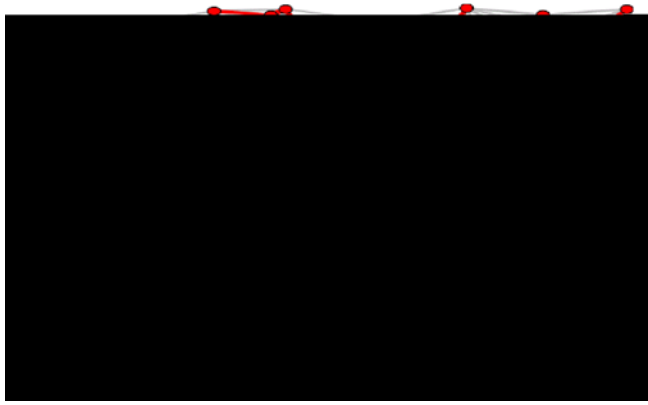


Graph Algorithms

3. Minimum spanning tree



Graph Algorithms
3. Minimum spanning tree



Algorithm?

Kruskal's hungry algorithm:

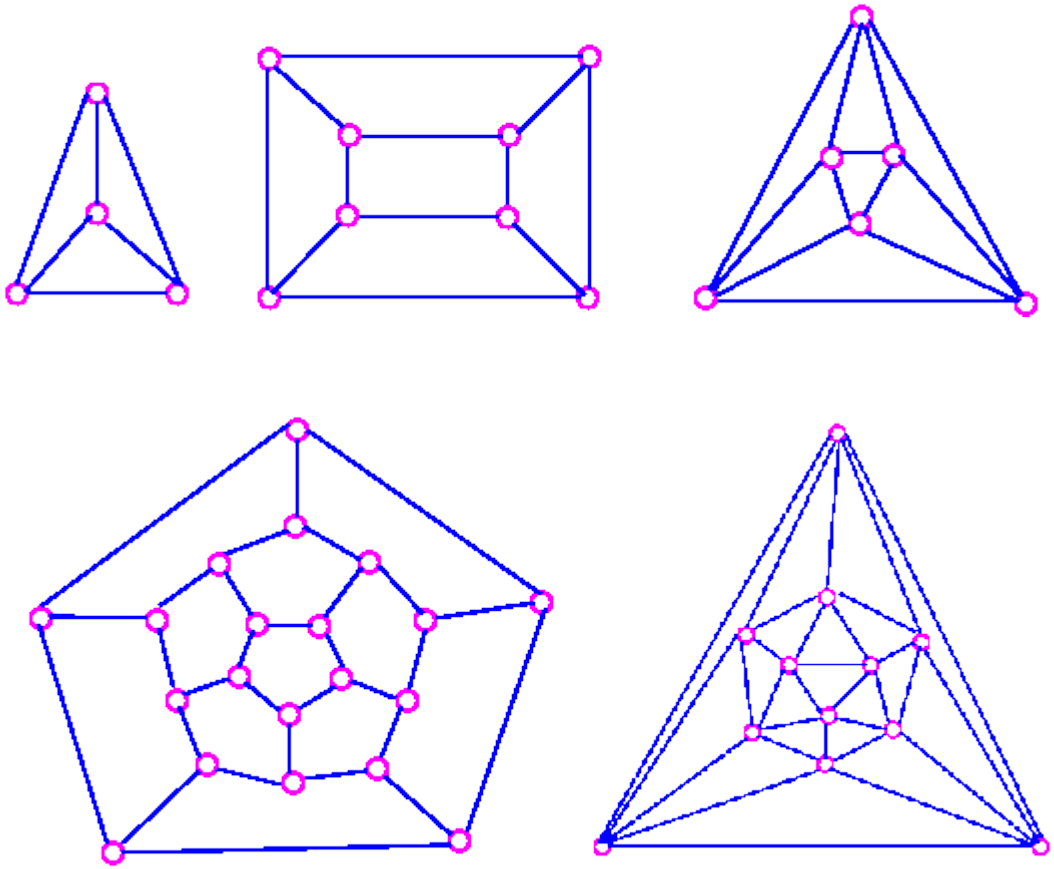
For every component:

1. Order edges according to their value
2. For each edge … add it to the result if it does not form the circle with already included edges

Complexity?

Graph Algorithms

4. Drawing planar graph

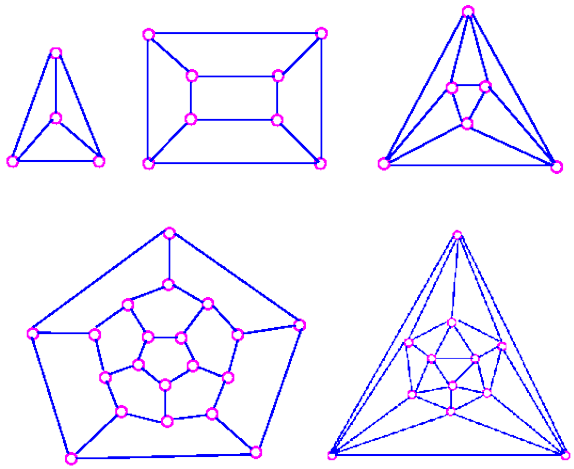


Graph Algorithms

4. Drawing planar graph

Approximate Algorithm?

"Springy"!



Assignment 09.2
Graph algorithms

- Implement a GUI application that provides visualization of the graph via spring-algorithm
- Up to 10 points + 5 bonus points
- Provide buttons for computing:
  - Component labeling (5 points)
  - Graph transitive closure of all components (5 points)
  - [BONUS] Minimum spanning tree of all components (5 bonus points)
- Deadline: 12.5.2016 23:59

Assignment 09.1 / 09.2
Send me an email

- Email: jakub.gemrot@gmail.com
- Subject: **Programming II – 2016 – Assignment 09.1/09.2**
- Zip up the whole project and send it
- You WILL NOT find the assignment in CoDex!
- Deadline:
  - **09.1: 5.5.2016 23:59**
  - **09.2: 12.5.2016 23:59**

Questions?

I sense a soul in search of answers…

- In case of doubts about the assignment or some other problems don't hesitate to contact me!
  - Jakub Gemrot
    - gemrot@gamedev.cuni.cz