Programming with Visual Output
Processing, Java, Elementary Tricks

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Programming
Visual Output

Java syntax: repetition / whole picture

Processing examples explained

Exercise
punctuation characters cannot be changed

words can

exception:

keywords (for, if, int, return, ...)

and all other built-in data types:

int, double, ...

http://docs.oracle.com/javase/tutorial/java/nutsandbolts/_keywords.html
Java Syntax

Punctuation Characters

Block {...}
Parameters(…)
List[...]/* comment */

Class
for loop
while loop
if / else
conditions
function (also called "method")

public class Rectangle {
}
for (int i = 0; i < width; i++){
}
int i = 2;
while (i < 5){
}
if (false) {
} else if (true) {
} else {
}
public static void main(String[] args) {
    System.out.println("Hello World!");
    int length = 10;
    double values[] = new double[length];
    for (int i = 0; i < length; i++){
      // don't divide by 0!
      values[i] = 2.5 / (i + 1);
    }
    System.out.println(Arrays.toString(values));
}

int a = 1;
using operators

initializing an array
using a for-loop to fill it with values
explain code with comments
print the array

Assignment
Calculation
Condition
Logic

Statement
Block
short cut in for loops using:

for special data types the if/else if/else block can be replaced with a switch statement, (old concept from C language)

goto statements = very, very old concept (not supported anymore in Java)

goto = jump to another position in code

Once software programs got a bit more complex in the 70/80ies, code with “goto” statements turned out to be not understandable anymore. Such code was called “spaghetti code” - too complex to follow.

Therefore computer scientists invented first functions (C) and later the concept of object oriented programming (C++)
Functions in Java called methods

return (result can be assigned to a variable)

return type (type of the returned value)
punctuation characters cannot be changed

words can

exception:

keywords (for, if, int, return, ...)  

and all other built-in data types:

int, double, ...

method name

parameter declaration

same method name  
same parameter declaration = error

different parameter declaration
Objects / Classes

Define your own data types

```java
public static void main(String[] args) {
    Student lukas = new Student("Lukas");
    lukas.sayHello();
}
```

This makes our code more readable.

Objects are being created by creating an instance of a class.
Casting
Convert from one type to another if possible

double d = 4.987;
int i = (int) d;
System.out.println(i);

Student lukas = (Student) new GermanStudent();
lukas.sayHello();

((GermanStudent) lukas).saysSomethingGerman();
Processing

Examples 1: Array

https://processing.org/examples/array.html
Processing
Examples 2: Array2D

https://processing.org/examples/array2d.html
Processing Examples 3: Particles

```java
package processing.ORDER;

public class Particles extends PApplet {

private static final long serialVersionUID = -31;

class Particle {
  int x;
  int y;

  public Particle(int x, int y) {
    this.x = x;
    this.y = y;
  }

  public void update() {
    // Update particle's position
  }

  public void display() {
    // Display particle on the screen
  }
}

Particle[] particles;

public void setup() {
  size(640, 360);
  for (int i = 0; i < 100; i++) {
    Particle p = new Particle(random(width), random(height));
    particles[i] = p;
  }
}

public void draw() {
  background(0);
  stroke(255);
  for (Particle p : particles) {
    fill(p.x, p.y);
    ellipse(p.x, p.y, 6, 6);
  }
}
```
Home Task

a) Modify the Array2D example. Make the black hole follow the mouse.

b) Create a Processing Applet in which at least 3 different geometric forms are moving.
   (If we find out the code was copied from the internet → 0 pts)

Due 25.10.2015,
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