Scope of Variables, Compound Assignment Statements, Printing

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Topics List

- Use of println(), text() in Processing
- Variable Scope
- Compound Assignment Statements

println() and text() in Processing

- To print a message to the console in Processing, use print() or println().
- Both take a String as input, (more later)..for now

```
println(“Hello World”);

println(“Hello ” + “World”);

println(“Hell” + “o World”);
```

All will produce the same output.

println() and text() in Processing

- Two strings can be joined together with the plus symbol (+);

- When using this symbol for this purpose it is known as the **concatenation operator**.

println() contd.

- We can introduce variables in the print statement also:

```
int myAge = 20;

println(“I am ” + myAge + “years of age”);
```

text() in processing

- text() can be used to draw text to the screen

```
textSize(32);
text("word", 10, 30);
fill(0, 102, 153);
text("word", 10, 60);
fill(0, 102, 153, 51);
text("word", 10, 90);
```

Text to be written (also in String format)

x, y co-ordinates on screen

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- Use of println(), text() in Processing
- Variable Scope
- Compound Assignment Statements

Recap: Processing Example

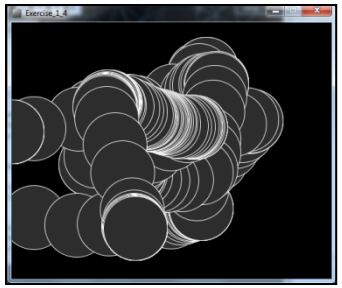
sketch_191126b | Processing 3.0b6

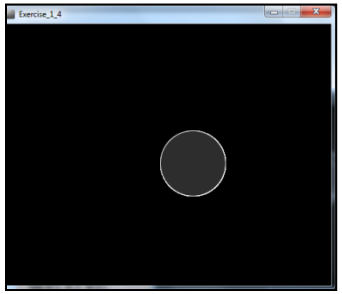
File Edit Sketch Debug Tools Help

Java ▾

sketch_191126b

```
1
2  void setup()
3  {
4    size(500,400);
5    background(0);
6    stroke(255);
7    fill(45,45,45);
8  }
9
10 void draw()
11 {
12   if (mousePressed == true)
13   {
14     background(0);
15   }
16
17   ellipse(mouseX, mouseY, 100, 100);
18 }
19
20
```





https://processing.org/tutorials/interactivity/

Variable Scope Example 1

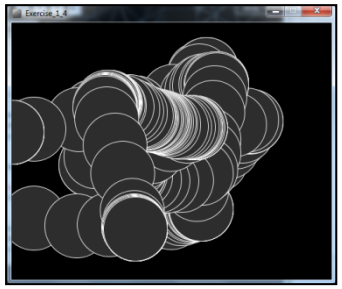
sketch_191126b | Processing 3.0b6

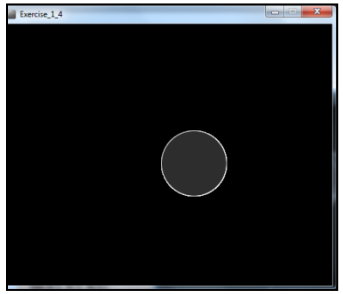
File Edit Sketch Debug Tools Help

Java ▾

sketch_191126b

```
1
2  void setup()
3  {
4    size(500,400);
5    background(0);
6    stroke(255);
7    fill(45,45,45);
8  }
9
10 void draw()
11 {
12   int diameter = 100;
13
14   if (mousePressed == true)
15   {
16     background(0);
17   }
18
19   ellipse(mouseX, mouseY, diameter, diameter);
20 }
21
```





https://processing.org/tutorials/interactivity/

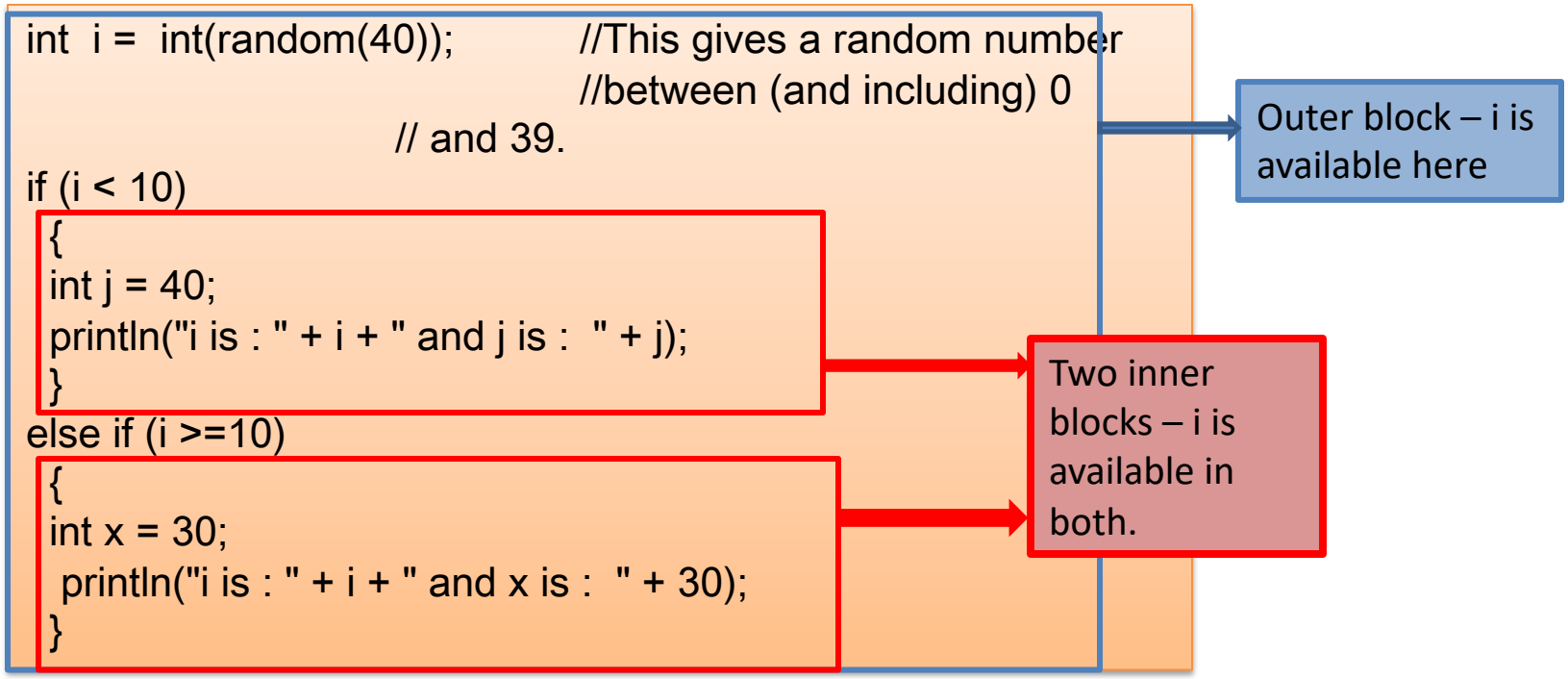
Local Scope – Diameter Variable

- The scope of a local variable is the block it is declared in.
- The diameter variable is declared in the draw() function i.e. it is a local variable.
- It is only "alive" while the draw() function is running.
- Each time the draw() function:
  - finishes running, the diameter variable is destroyed.
  - is called, the diameter variable is re-created.

```
void draw() {
  int diameter = 100;
  if (mousePressed == true)
{
    background(0);
  }
  ellipse(mouseX, mouseY, diameter, diameter);
}
```

Local variables – scope rules!

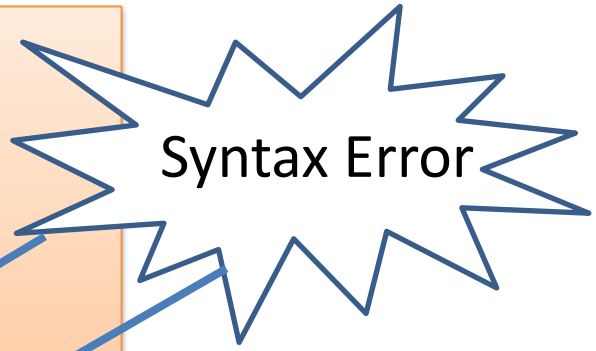
- The scope of a local variable is the block it is declared in. A block is delimited by the curly braces {}.
- A program can have many nested blocks.
- A variable must be declared before it is used.



Local variables – scope rules .. Contd.

- The lifetime of a local variable is the time of execution of the block it is declared in.
- Trying to access a local variable outside its scope will trigger a syntax error e.g.:

```
void draw()
{
    if (mousePressed == true)
    {
        int diameter = 100;
        background(0);
     }
     ellipse(mouseX, mouseY, diameter, diameter);
}
```



Variable Scope Example 2

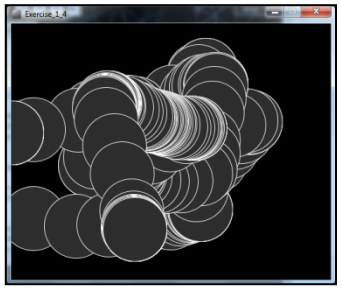
sketch_191126b | Processing 3.0b6

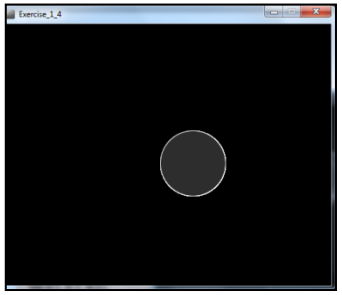
File Edit Sketch Debug Tools Help

sketch_191126b

```
1
2  void setup()
3  {
4    size(500,400);
5    background(0);
6    stroke(255);
7    fill(45,45,45);
8  }
9
10 void draw()
11 {
12   int diameter = 100;
13
14   if (mousePressed == true)
15   {
16     diameter = diameter - 10;
17     background(0);
18   }
19
20   ellipse(mouseX, mouseY, diameter, diameter);
21 }
22
```

We now want to reduce the diameter size by 10 each time the mouse is pressed. ***Q. Is this correct?***





https://processing.org/tutorials/interactivity/

Variable Scope Example 2

We have a bug in our logic.

- The diameter variable is re-created each time draw() is called.
- Its value will be set to 100 the first time it is called and then decremented by 10 (to 90).
- However the next time draw executed the variable diameter is re-set back to 100.
- Therefore we will lose our decrement of 10.

- **Solution** – make the local variable a global variable.

Global Variables – Scope Rules!

- The scope of the diameter variable is too narrow; as soon as draw() finishes running, the local variable is destroyed and we loose all data.

- We need a diameter variable that lives for the lifetime of the sketch i.e. a global variable.

Variable Scope Example 3

sketch_191126b | Processing 3.0b6

File Edit Sketch Debug Tools Help

Java ▾

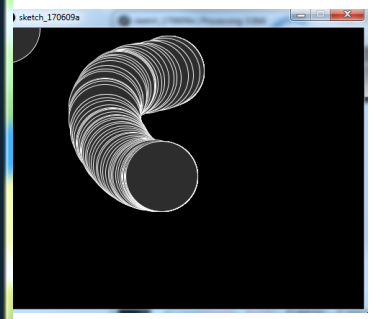
sketch_191126b

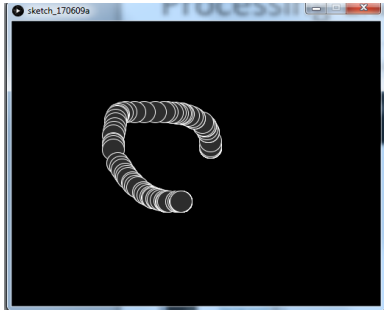
```
1  int diameter = 100;  // globe variable called diameter
2
3  void setup()
4  {
5    size(500,400);
6    background(0);
7    stroke(255);
8    fill(45,45,45);
9  }
10
11 void draw()
12 {
13
14
15   if (mousePressed == true)
16   {
17     diameter = diameter - 10;
18     background(0);
19   }
20
21   ellipse(mouseX, mouseY, diameter, diameter);
22 }
23
```

The diameter variable is decreased each time we press the mouse. Correct!

However we still have a bug in our logic.

What happens when we reach zero?





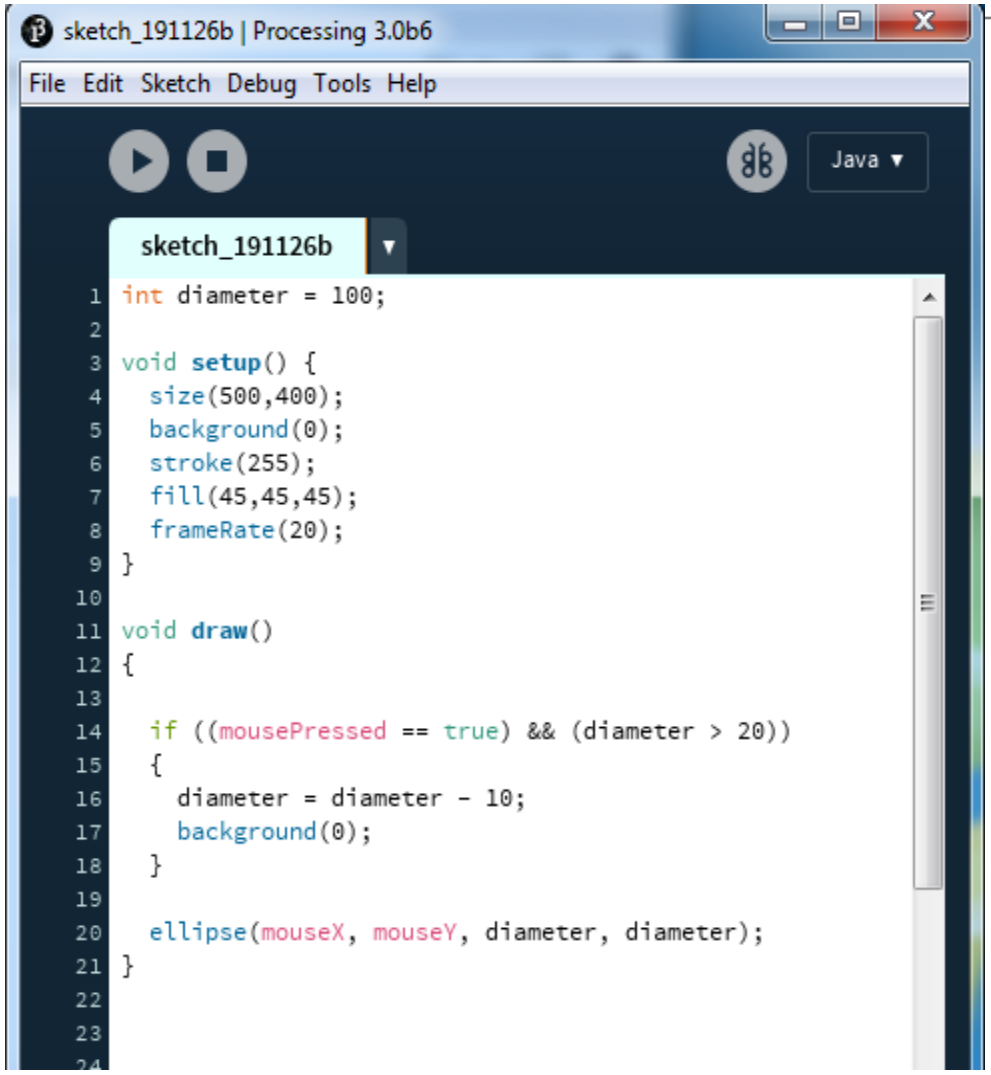
Variable Scope Example 3b


```
1  int diameter = 100;
2
3  void setup()
4  {
5    size(500,400);
6    background(0);
7    stroke(255);
8    fill(45,45,45);
9  }
10
11 void draw()
12 {
13
14   if ((mousePressed == true) && (diameter > 20))
15   {
16     diameter = diameter - 10;
17     background(0);
18   }
19
20   ellipse(mouseX, mouseY, diameter, diameter);
21 }
22
23
```

In ellipse, the width and height are absolute values (negative sign is dropped).

To handle this logic bug, we need to stop reducing by 10 when we reach a certain value, say 20.

Variable Scope Example 3c



Did you notice that it seems the reduction is larger than 10 when we press the mouse?

Why? The default frame rate is 60 refreshes of the screen per second i.e. draw() is called 60 times per second.

You can change the frame rate by calling the frameRate() function.

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Compound Assignment Statements

	Full statement	Shortcut
Mathematical shortcuts	x = x + a;	x += a;
	x = x - a;	x -= a;
	x = x * a;	x *= a;
	x = x/a;	x /=a;
Increment shortcut	x = x+1;	x++;
Decrement shortcut	x = x - 1;	x--;

Questions?

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