



FALMOUTH
UNIVERSITY

COMP120: Creative Computing: Tinkering
1: Python, Pairs, & PyGame

Learning Outcomes

- ▶ Explain the role and basic functions of the IDE
- ▶ Produce some basic Python programs
- ▶ **Apply** pair programming practices to solve simple problems

Professional Development



Continuing Professional Development

- ▶ Games industry is fast-moving
- ▶ Learning does not end at school and university
- ▶ A goal of this course is to facilitate your development as self-regulated learners
- ▶ Gradually, more independence across each year of study
- ▶ This is a science degree, which means you will become a producer of knowledge, not just a consumer of knowledge!

Continuing Professional Development

- ▶ It isn't easy!
- ▶ Many of you will encounter programming anxiety
- ▶ Some will experience a sense of fear or a sense of hopelessness — it is more common than you think
- ▶ Some will need more support than others — this isn't a bad thing
- ▶ Everyone who puts in the time and effort will eventually achieve mastery

The PyCharm IDE



Integrated Development Environment (IDE)

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 - ▶ Version control

Setting up your own PC

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- ▶ Other Python IDEs are available

PyCharm in the Lab

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- ▶ Run PyCharm and select **License server**
- ▶ In the **License server address** enter the following
<http://trlicefal.fal.ac.uk>
- ▶ This will be added to your user profile and you will not need to do this again

Getting started with PyCharm

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- ▶ Right-click the project in the panel on the left, and choose “New → Python File”
- ▶ Write some code!
- ▶ First run: click “Run → Run...” and choose the Python file

Getting started with PyCharm

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- ▶ We want a “Pure Python” project
- ▶ Right-click the project in the panel on the left, and choose “New → Python File”
- ▶ Write some code!
- ▶ First run: click “Run → Run...” and choose the Python file
- ▶ Subsequent runs: click the ▶ button

Basic Python programs



Your first Python program

```
print "Hello, world!"
```

Your second Python program

```
print "This is a very long line of code which had to  ↵  
    be split to fit on the slide, but you should type  ↵  
    it as a single line."  
print "This is the second line of code."
```

Assigning to variables

```
a = 10  
print a
```

Assigning to variables

```
a = 10  
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```

Variable	Value
a	

Remember!

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- ▶ A program is a **sequence of instructions**
- ▶ The Python interpreter executes the **first line** of your program, then the **second line**, and so on
- ▶ When it reaches the end of the file, it **stops**

Reassigning variables (1)

Socrative room code: FALCOMPED

```
a = 10  
b = 20  
b = a  
print a  
print b
```

Reassigning variables (1)

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```
a = 10  
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Variable	Value
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Reassigning variables (2)

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```

Variable	Value
a	
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Reassigning variables (3)

Socrative room code: FALCOMPED

```
big = 10  
small = 20  
big = small  
print big  
print small
```

Reassigning variables (3)

Socrative room code: FALCOMPED

```
big = 10  
small = 20  
big = small  
print big  
print small
```

Variable	Value
big	
small	

Reassigning variables (4)

Socrative room code: FALCOMPED

```
a = 10  
b = 20  
a = b  
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Reassigning variables (4)

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```
a = 10  
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print a  
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```

Variable	Value
a	
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Reassigning variables (5)

Socrative room code: FALCOMPED

```
a = 10
```

```
b = 20
```

```
c = 30
```

```
a = b
```

```
b = c
```

```
print a
```

```
print b
```

```
print c
```

Reassigning variables (5)

Socrative room code: FALCOMPED

```
a = 10
b = 20
c = 30

a = b
b = c

print a
print b
print c
```

Variable	Value
a	
b	
c	

Reading input

Reading input

```
print "Enter your name:"  
name = raw_input()  
  
print "Enter your age:"  
age = int(raw_input())  
  
print "Hello", name  
print "On your next birthday, you will be", age + 1, " ←  
years old"
```

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```

- ▶ `raw_input()` reads a **string** as text from the command line
- ▶ `int(...)` converts a **string** into an **integer** (a number)

Conditionals (1)

Socrative room code: FALCOMPED

```
a = int(raw_input())  
b = 30  
  
if a < 15:  
    b = a  
  
print a  
print b
```


Conditionals (1)

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- ▶ PEP-8 recommends **4 spaces** for indentation
 - ▶ Some programmers use a tab character
 - ▶ **Never** mix tabs and spaces in the same file!
 - ▶ PyCharm inserts 4 spaces by default when you press the tab key; other IDEs and text editors can be configured to do this

Conditionals (2)

Socrative room code: FALCOMPED

```
a = int(raw_input())  
b = 0  
  
if a < 20:  
    b = a + 1  
elif a == 20:  
    b = a * 2  
else:  
    a = 20  
    b = 20  
  
print a  
print b
```

Conditionals (2)

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In that order!

Mathematical operators

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► + add

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- ▶ + add
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Mathematical operators

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Order of operations: **BIDMAS**

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Order of operations: **BIDMAS**

- ▶ Brackets first

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Order of operations: **BIDMAS**

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- ▶ Then Indices (powers)

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Order of operations: **BIDMAS**

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- ▶ Then Indices (powers)
- ▶ Then Division and Multiplication (left to right)

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Note the difference between `=` and `==`

Comparison operators

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Note the difference between $=$ and $==$

- ▶ $a = b$ means “make a be equal to b ”

Comparison operators

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- ▶ `!=` not equal to

Note the difference between `=` and `==`

- ▶ `a = b` means “make `a` be equal to `b`”
- ▶ `a == b` means “is `a` equal to `b`?”

For loops and ranges

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for i in xrange(5):  
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- ▶ The `for` loop iterates through the items in a sequence **in order**

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- ▶ So `xrange(5)` is the **sequence** $0, 1, 2, 3, 4$
- ▶ Note: `xrange(n)` **does not include** n
- ▶ The `for` loop iterates through the items in a sequence **in order**
- ▶ Can also use `range` instead of `xrange`, but `range` is less efficient
 - ▶ Homework (advanced): what is the difference between `range` and `xrange`?

For loops (1)

Socrative room code: FALCOMPED

```
a = 0
b = 0

for i in xrange(5):
    a = i
    b = b + i

print a
print b
```

For loops (1)

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a = 0
b = 0

for i in xrange(5):
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print a
print b
```

Variable	Value
a	
b	
i	

For loops (2)

Socrative room code: FALCOMPED

```
a = 0
b = 0

for i in xrange(10):
    if i < 3 or i > 7:
        a += i
    else:
        b += i

print a
print b
```

For loops (2)

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a = 0
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for i in xrange(10):
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        a += i
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print a
print b
```

Variable	Value
a	
b	
i	

While loops

Socrative room code: FALCOMPED

The **while** loop keeps executing while the condition is **true**

```
a = 1  
  
while a < 100:  
    a = a * 2  
  
print a
```

While loops

Socrative room code: FALCOMPED

The **while** loop keeps executing while the condition is **true**

```
a = 1  
  
while a < 100:  
    a = a * 2  
  
print a
```

Variable	Value
a	

Looping forever

```
a = 1  
  
while True:  
    a = a * 2  
    print a
```

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We have seen some basic code constructions in Python

- ▶ `print` and `raw_input` for command-line input and output
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Summary

We have seen some basic code constructions in Python

- ▶ `print` and `raw_input` for command-line input and output
- ▶ Variable assignment using `=`
- ▶ `if` statements for choosing whether or not to execute a block of code
- ▶ `for` loops to execute a block of code a specified number of times
- ▶ `while` loops to execute a block of code until a condition is no longer true

Summary

We have seen some basic code constructions in Python

- ▶ `print` and `raw_input` for command-line input and output
- ▶ Variable assignment using `=`
- ▶ `if` statements for choosing whether or not to execute a block of code
- ▶ `for` loops to execute a block of code a specified number of times
- ▶ `while` loops to execute a block of code until a condition is no longer true

These are enough to write some simple programs, but you will see several more in coming weeks...

Professional Practice



Pair Programming

Pair programming is an agile software development technique in which two programmers work together at one workstation.

One, the driver, writes code while the other, the observer or navigator, reviews each line of code as it is typed in.

The two programmers switch roles frequently.

Pair Programming

Watch the video at:

<https://www.youtube.com/watch?v=ET3Q6zNK3Io>

(5 minutes)

Pair Programming

Review the guidelines at:

<http://www.pairprogramming.co.uk/>

(10 minutes)

Pair Programming

Watch the video at:

https://www.youtube.com/watch?v=ONnYCT_LJio

(5 minutes)

Pair Programming Challenge

- ▶ In pairs
- ▶ **Implement** the code excerpt
- ▶ **Fix** the errors in the code excerpt
- ▶ **Modify** the code excerpt to incorporate functions and arguments
- ▶ **Post** your solution to the `#comp120` slack channel

You can learn more about functions and arguments at:

`https://docs.python.org/3/tutorial/controlflow.html#defining-functions`

(20 minutes)

Pair Programming Challenge

The function:

```
def madlib()
```

Should become:

```
def madlib(name, pet, verb, snack)
```


Pair Programming Challenge

```
def madlib():
    name = 'Link'
    pet = 'Spyro'
    verb = 'ate'
    snack = 'doughnuts'
    line1 = 'once upon a time,' + name + ' walked'
    line2 = ' with ' + pet + ', a trained dragon.'
    line3 = 'Suddenly, ' + pet + ' announced,'
    line4 = 'I really want some ' + snack + '!'
    line5 = name + ' complained. Where am I going to  ←
        get that?'
    line6 = 'Then ' + name + 'found a wizard's wand.'
    line 7 = 'With a wave of the wand, '
    line8 = pet + ' got ' + snack + '. '
    line9 = 'Perhaps surprisingly, ' + pet + ' ' +  ←
        verb + ' ' + snack
    print line1 + line2 + line3 + line4
    print line5 + line6 + line7 + line8 + line9
```

Stretch Goal — PyGame

- ▶ In pairs
- ▶ **Incorporate** your code into the PyGame framework
- ▶ **Post** your solution to the `#comp120` slack channel

Stretch Goal — PyGame

```
import pygame

pygame.init()
screen = pygame.display.set_mode((640, 480))
font = pygame.font.SysFont(None, 14)
text = font.render(madlib(), True, (0, 128, 0))

done = False
while not done:
    for event in pygame.event.get():
        if event.type == pygame.QUIT:
            done = True
        if event.type == pygame.KEYDOWN and event.key == pygame.K_ESCAPE:
            done = True

    screen.fill((255, 255, 255))
    screen.blit(text, (0,0))
    pygame.display.flip()
```