

Programming Thinking

Session 3

Pepe García jgarciah@faculty.ie.edu



SCHOOL OF
SCIENCE &
TECHNOLOGY

Plan for this session

- Python basic datatypes

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- Variables

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- Operators



Plan for this session

- Python basic datatypes
- Variables
- Operators
- Basic functions



Datatypes tell Python how we want to use the data. There are several primitive data types in Python such as **bool**, **int**, **str**, **float**.

Integers

Integers (or ints) represent whole numbers. We create them by using their numeric representation directly.

1

234

432432



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Demo



Floating point numbers

Floats represent numbers that have a fractional part. We use a dot to separate the integer and fractional parts:

3.14

1.0

33.33



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Strings

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'this is a string'

"this is another string"

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Why can one use either double or single quotes? why just not agree on one of them?

Booleans

Booleans represent truthiness. There are only two values in for the bool type in Python: **True** and **False**

True

False



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True

False

Demo



Getting the type of a value

We can always get the type of a value using the **type(value)** function

```
type("patata")
```

Getting the type of a value

Practice

Inside Spyder, check what's the type of the following expressions:

- `"there is some text here"`
- `1`
- `True`
- `44.4`
- `'true'`
- `'False'`
- `2`
- `'33.3'`



Operators are symbols in the language that perform different kinds of computations on values

They're **binary**, they will operate on two values.

Arithmetic Operators

symbol	meaning
+	sum
-	subtraction
*	multiplication
/	division
**	exponentiation
//	floored division
%	modulus



Rules of precedence

- Parentheses

Demo



Rules of precedence

- Parentheses
- Exponentiation

Demo



Rules of precedence

- Parentheses
- Exponentiation
- Multiplication/Division

Demo



Rules of precedence

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- Sum/Substraction

Demo



Rules of precedence

- Parentheses
- Exponentiation
- Multiplication/Division
- Sum/Substraction
- when operators have the same precedence, evaluate left to right

Demo



String operators

Sum and multiplication operators work on strings too. They're used to concatenate and multiply strings, respectively.

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Demo

Variables are names that point to values in Python. We declare them using the assignment operator (=).

```
variable_name = "value"
```

Naming variables

It's important to be as descriptive as possible when naming variables
There are some naming rules we should obey



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Rules

- variable names can't start with a number
- variable names can't contain special characters such as `!`, `@`, `.`
- Can't be one of the reserved words

Reserved words

and	del	from	None	True
as	elif	global	nonlocal	try
assert	else	if	not	while
break	except	import	or	with
class	False	in	pass	yield
continue	finally	is	raise	
def	for	lambda	return	

Mutability

In Python variables are mutable. This means that we can change their value at any time

```
name = "Pepe"  
print(name)
```

```
name = "Jose"  
print(name)
```

Converting values

There are some times when we need to convert a value from one type to another.

We use the **int()**, **bool()**, **str()**, and **float()** functions for that

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```
int('23')
```

```
bool(1)
```

```
bool(0)
```

```
str(True)
```

```
float("3.2")
```



Printing output

One can print output using the **print()** function



There is a handy function **input()** that allows us to capture input from the user

```
name = input("Tell me your name: ")  
  
print("hello, " + name)
```

- Datatypes (int, float, bool, str)



Recap

- Datatypes (int, float, bool, str)
- Variables (naming, mutability)



Recap

- Datatypes (int, float, bool, str)
- Variables (naming, mutability)
- Operators (arithmetic, precedence, string operators)



- Datatypes (int, float, bool, str)
- Variables (naming, mutability)
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- Converting values
- User input

Exercises

- 1 Create a program that calculates the total number of seconds in an hour
- 2 How does the following expression evaluate?

`2 + (3 + 4) + (5 * 33 ** 34)`

- 3 Create a program that asks the user for their age and their mother's age and calculate the age difference
- 4 What are the results and result types of the following expressions?
think it yourself, do not use the Python console for this

`3 * 5 * 2`

`3 / 11`

`3 // 11`

`25 % 2`

- 5 Make the following expressions work (use Python console for this one)
`3 + "3" 'there are' + 4 ' dogs barking'`

