Programming: Writing a Program

CPSC 217: Introduction to Computer Science for Multidisciplinary Studies I
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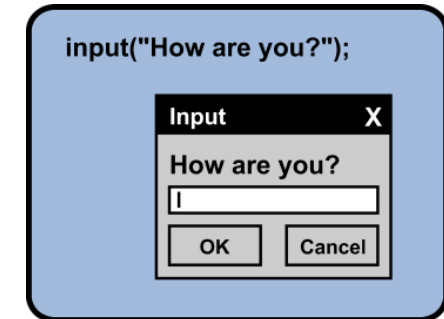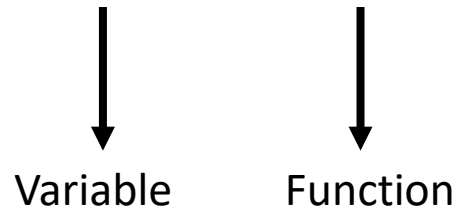University of Calgary

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Input

- A built-in function to get an input form the user.

- **sName = input("Please enter your name: ")**

  Variable   Function

```
input("How are you?");
```

Input   X

How are you?

OK   Cancel

- **The obtained value will be stored in the variable in string form**.

- You need to convert the value type if necessary.

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Meaningful sentences

- Provide meaningful sentences to communicate questions and results to the user.

```
sFahrenheit  = input("Please enter the degree in fahrenheit : ")
print ("The degree in celsius is: ", fCelsius)
```
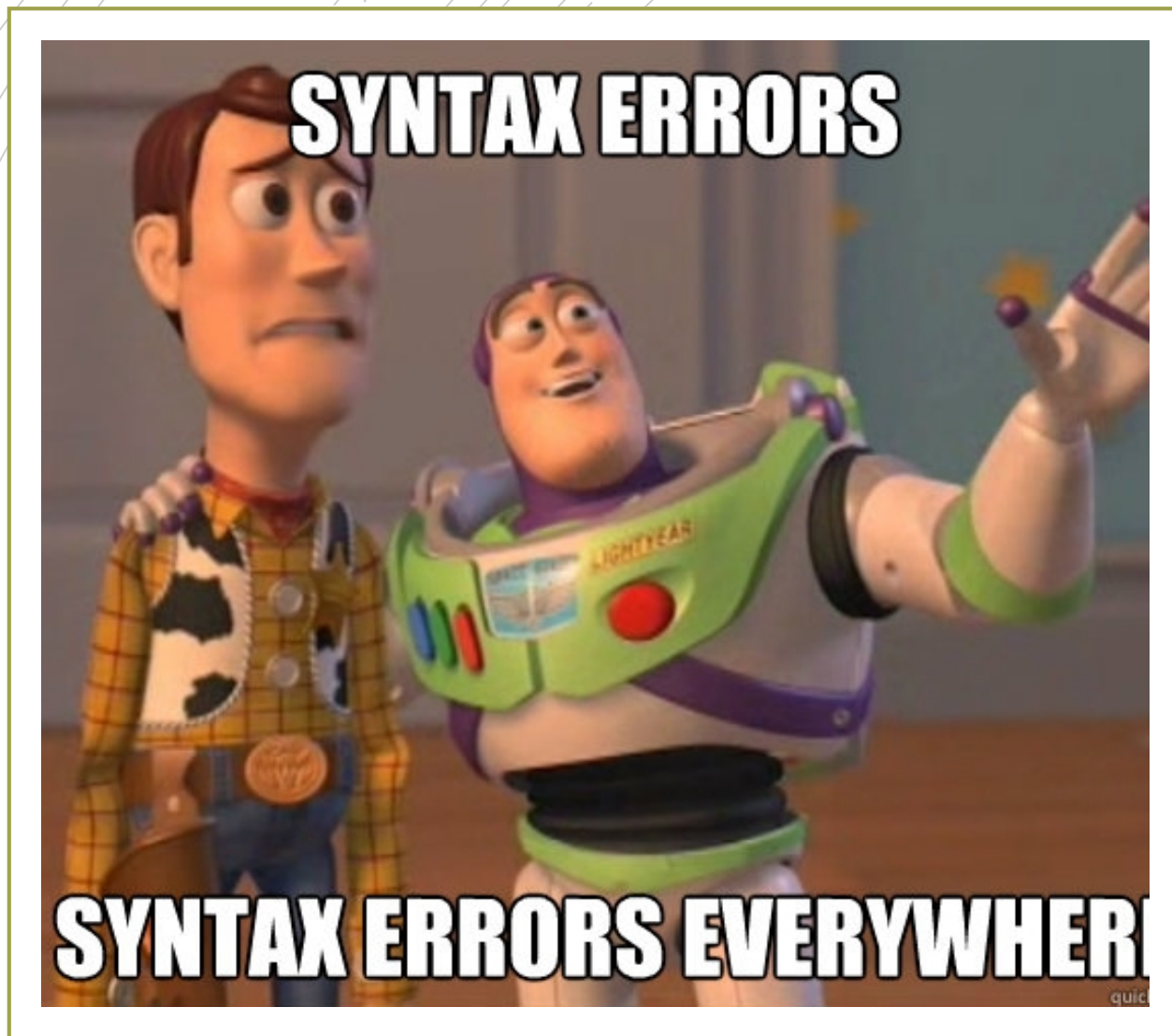
```
sFahrenheit  = input("degree")
print (fCelsius)
```

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Errors

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Types of Errors

- Three categories
    1. Syntax
    2. Runtime
    3. Logic

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Syntax errors

- **Syntax** refers to the structure of a program and the rules about that structure.

- Easiest to find (your program will not begin to run)

- Python is not so forgiving → displays an error message and quit.

- The compiler / interpreter finds syntax errors

- Example:
    name = "Jim
    print(77

Runtime errors

Does not appear until the program is run (harder to find)

Also called exceptions

Example:

callMe = "Maybe"
print(callme)

Semantic/Logic Errors

Program will run successfully

It does not produce the correct answer:

- It does what you told it to do
- **The hardest to find!**

Result of a wrong algorithm

Identifying is tricky!

Example:

- **x = 3**
- **y = 4**
- **average = x + y / 2**
- **print(average)**

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Remember

- Getting errors in your code does not make you a bad programmer.

Submitting code with error does!

- Errorless code is the minimum requirement
- You need to debug your code
- Add comments to your code

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Explore First Program

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What Does this Program Do?

```
x = float(input())
y = (x - 32) * 5/9
print(y)
```

- What's wrong with this program?

Fahrenheit to Celsius

Comments

- Notes and explanations in natural language

- Intended only for the human reader → Completely ignored by the interpreter

- # token starts a comment

- **Commenting is necessary!**

```python
#Jonathan Hudson
#Student Number 12347890
#Date: 2020-08-26
#Lecture Practice

#Calculating Fahrenheit to Celsius
OFFSET = 32
RATIO_CHANGE = 5/9

#Obtaining Fahrenheit degree
sFahrenheit  = input("Please enter the degree in Fahrenheit : ")

#Converting the input to float
iFahrenheit  = float(sFahrenheit)

#Calculating the Celsius
fCelsius = (iFahrenheit - OFFSET) * RATIO_CHANGE

#Printing the result
print ("The degree in Celsius is: ", fCelsius)
```

Importing

Import

- **import <Module Name>**
- Import the packages that you need only!

- Example:
  import math
  import turtle

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Math Functions

- Many additional math functions are available

- Located in the math library
  - Import the math library
    - Precede the name of the function with **math.**
  - Examples:
    - **math.sqrt(x)**
    - **math.floor(x)**
    - **math.ceil(x)**
    - **math.cos(x)**

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Area of a circle

Data Types

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Data Types

Some operations are only well defined for certain types

- **1 + 2**
- **"Hello" + " World"**
- **1 + "Hello"**
- **2 + "4"**
- **1 / 3**
- **2.0 / 4**
- **"Hello"*3**

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Data Types

Some operations are only well defined for certain types

- **1 + 2** → GOOD
- **"Hello" + " World"** → GOOD
- **1 + "Hello"** → TYPE ERROR
- **2 + "4"** → TYPE ERROR
- **1 / 3** → GOOD
- **2.0 / 4** → GOOD
- **"Hello"*3** → GOOD

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Type Conversions (Casting)

Python permits you to convert from one type to another

"1.0" / "3.0" → Makes no sense to python

float("1.0") / float("3.0") → But this does

float("asdf") → However this doesn't

Other type conversions: int, bool, str

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Type Conversions (Casting)

Python permits you to convert from one type to another

int("1")   → 1

str(1)   → "1"

float("1.0")   → 1.0

bool("True")   → True

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Formatting

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Formatting

Sometimes print doesn't display things the way we would like

print(1 / 3.0) gives 0.333333333333

What if we want 0.33?

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Formatting

Basic python format method can be used to format floats

Parts

A string	**"pi is %.2f"**
Format **float** to **2** decimals	**%.2f**
Format symbol for strings	**%**
The value(s) to format	**(math.pi)**

Example:

```
import math
print("pi is %.2f when" % (math.pi))
print("rounded to 2 decimal places")
```

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Turtle - Drawing

Alex the turtle

Onward to … information and data.

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