

Programming: Writing a Program

CPSC 231: Introduction to Computer Science for Computer Science Majors I
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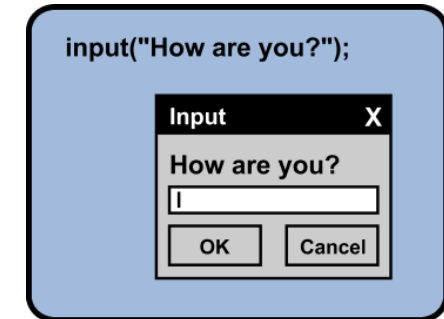
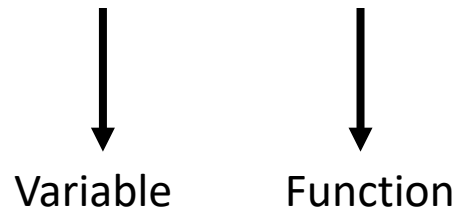


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Input



- A built-in function to get an input from the user.
- `sName = input("Please enter your name: ")`



- The obtained value will be stored in the variable in **string** form.
- You need to convert the value type if necessary.

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)
```

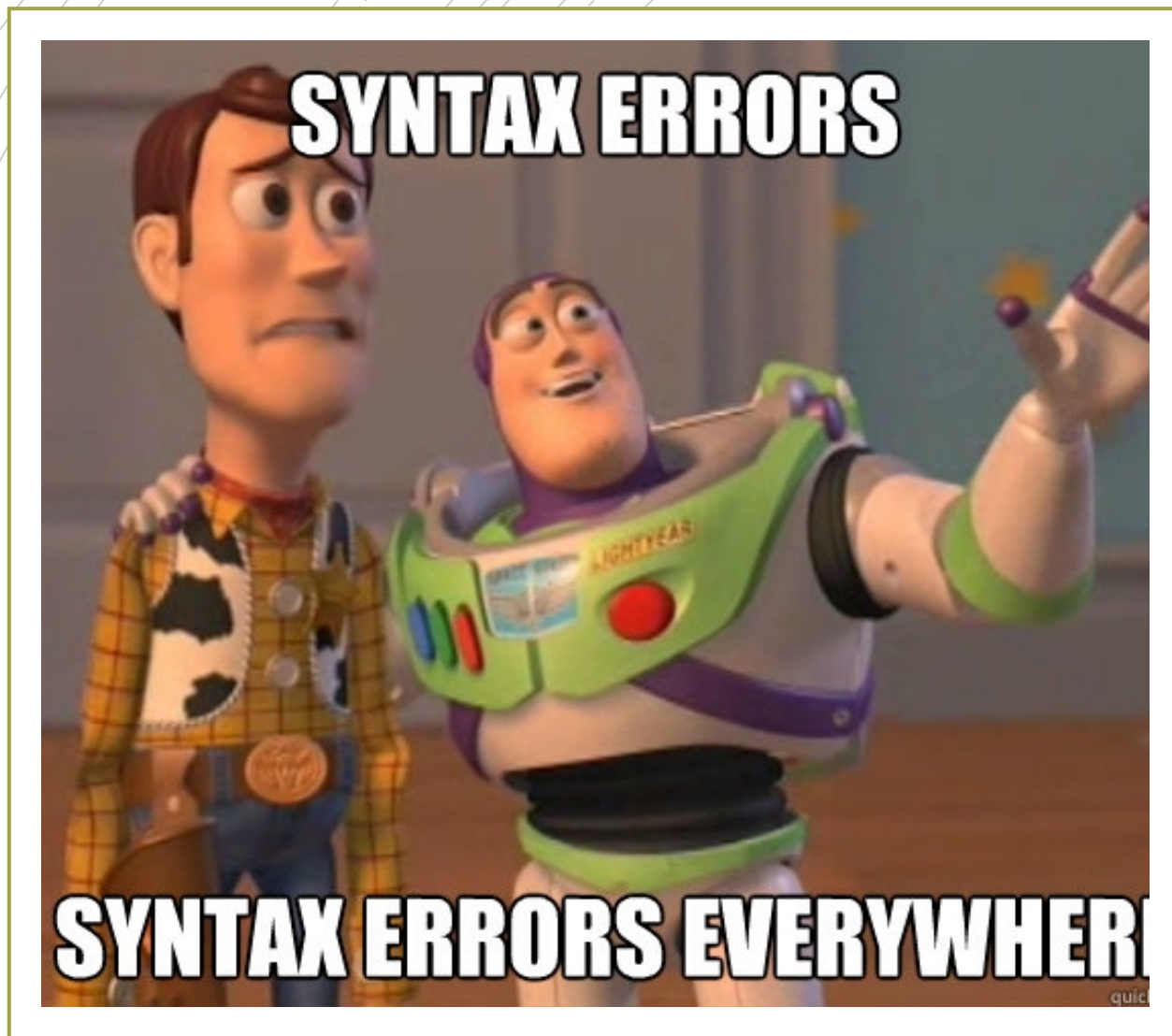


Errors



Types of Errors

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



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:

- $x = 3$
- $y = 4$
- $\text{average} = x + y / 2$
- `print(average)`

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

Explore First Program

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!**

```
#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
```

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:
import math
math.sqrt(x)
math.floor(x)
math.ceil(x)
math.cos(x)

Area of a circle

Data Types

Data Types

Some operations are only well defined for certain types

- $1 + 2$
- "Hello" + " World"
- $1 + \text{"Hello"}$
- $2 + \text{"4"}$
- $1 / 3$
- $2.0 / 4$
- "Hello"*3

Data Types

Some operations are only well defined for certain types

- $1 + 2$ → GOOD
- "Hello" + " World" → GOOD
- $1 + \text{"Hello"}$ → TYPE ERROR
- $2 + \text{"4"}$ → TYPE ERROR
- $1 / 3$ → GOOD
- $2.0 / 4$ → GOOD
- "Hello"*3 → GOOD

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

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

Formatting

Formatting

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

```
print(1 / 3.0) gives 0.33333333333333
```

What if we want 0.33?

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 rounded to 2 decimal places” % (math.pi))
```

Formatting

types

f – float

g – scientific notation

s – string

d – integer

[width].[precision][type]

width – total characters in final result ("" is default) (add 0 in front to pad 0's)

precision – how many decimal points

Ex. 05.3f

float, pad with 0s if shorter than 5 to get width of 5, but only after showing precision of 3

Turtle - Drawing

Alex the turtle

Onward to ... information and data.

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