BUREAUTIQUE

Python Programming

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Chapter 1

Introduction to Python

What is Python?

Python is a popular programming language known for its simplicity and readability. It is used for various tasks, from web development and data analysis to artificial intelligence and automation. Python is a great language for beginners because its **syntax** (the rules for writing code) is easy to learn and understand.

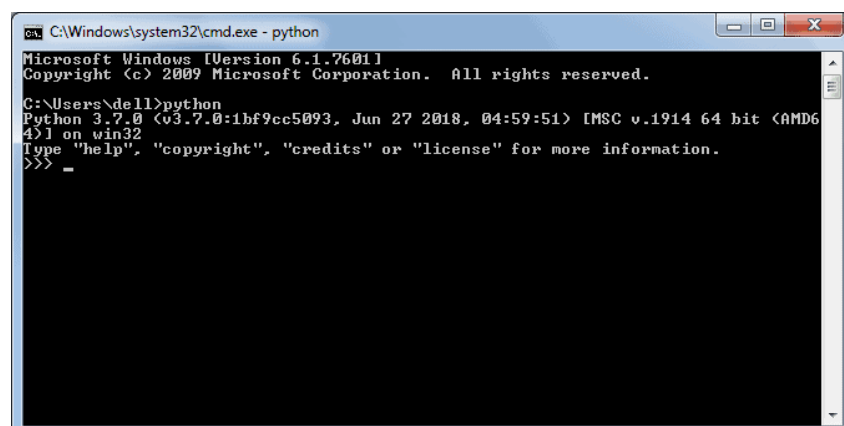Here is a simple example of a Python program:

```python
# A simple program to greet the user
name = input("Enter your name: ")
print("Hello, " + name + "!")
```

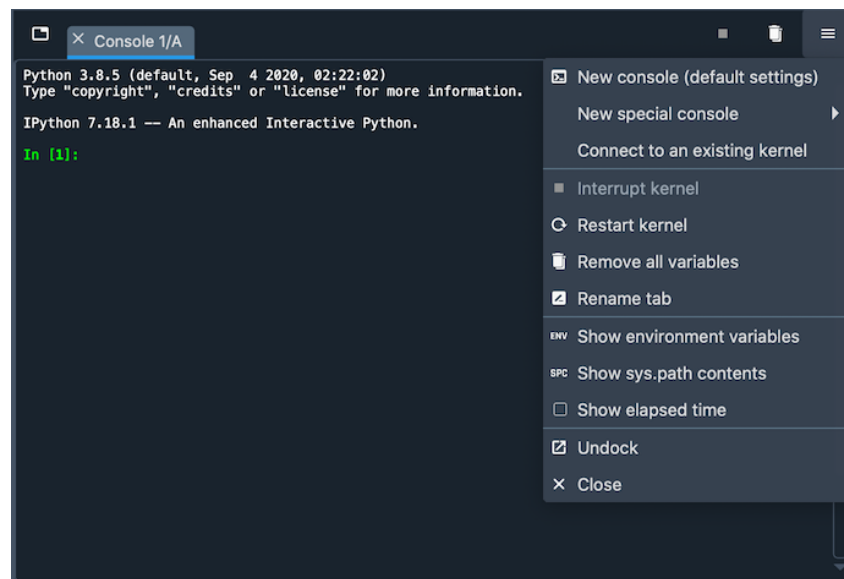In this example, the program asks for your name and then greets you.

What is a Console?

The console, also known as the command line or terminal, is a text-based interface used to run programs and display output.

Here is an example of what a console might look like on windows:

Here is an example of what a console might look like on Spyder:

When you write a Python program, you can run it in the console to see the results.

1.1 My First Python Code!

- **Example:**

```python
print("Hello, World!")
```

- **Output:**

```
Hello, World!
```

- **Description:**
  - The ritual for programmers when they start coding with a new language is to output **Hello, World!** on the **console**.

1.2   Comments in Python

- **Syntax:**

```
# This is a comment
```

- **Description:**
    - Comments start with a **#** and are ignored by the **Python interpreter** and automatically goes to the next line.
    - Comments are used to organize our work and allow it to be understood by readers.
    - Comments don't output anything

1.3   Outputs

- **Syntax:**

```
print(value)
```

- **Description:**
    - The `print()` function is used to output a value to the console.

- **Example usage:**

```
print("Hello")
print(42)
```

- **Output:**

```
Hello, World!
42
```

4. Variables and Variable Types

- **Syntax:**
    - For `int` (whole number) value:

```
x = 5
```

– For `str` (string, text) value:

```python
#We can use both " " or ' ' for str
name = "Alice"
surname = 'Johnson'
```

– For `float` (decimal number) value:

```python
#We use a . and not a ,
pi = 3.14
```

- **Description:**

  – Variables are used to store data.

  – As opposed to C, where variable types must be explicitly declared (e.g., `int`, `float`, `char`), Python does not require type declaration, making it more flexible.

- **Example usage:**

```python
x = 42                 # Integer
print(x)

pi = 3.14159           # Float
print(pi)

name = "Bob"           # String
print(name)

is_student = False     # Boolean
print(is_student)
```

- **Output:**

```
42
3.14159
Bob
False
```

- **Important Note:**
  - To print the type of a **value/variable** we use the function `type()`:
    Syntax:
    ```
    print(type(value))
    ```

    Example Usage:
    ```
    x = 5
    #print type of a variable
    print(type(x))
    #print type of a value
    print(type(1.44))
    ```

    Output:
    ```
    <class 'int'>
    <class 'float'>
    ```

5. Operations on Values and Variables

- **Arithmetic Operations:**
  - **Addition:** `x + y`
    ```
    result = x + y
    print(result)
    ```

  - **Subtraction:** `x - y`
    ```
    result = x - y
    print(result)
    ```

  - **Multiplication:** `x * y`
    ```
    result = x * y
    print(result)
    ```

  - **Division:** `x / y` (always returns x float)
    ```
    result = x / y
    print(result)
    ```

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– **Euclidean Division:** x // y (returns an integer)

```
result = x // y
print(result)
```

– **Modulus (remainder):** x % y

```
result = x % y
print(result)
```

– **Power:** x ** y

```
result = x ** y
print(result)
```

- **Example Usage:**

```
x = 10
y = 3
print(x + y)   # Addition
print(x - y)   # Subtraction
print(x * y)   # Multiplication
print(x / y)   # Division
print(x // y)  # Floor Division
print(x % y)   # Modulus
print(x ** y)  # Exponentiation
```

- **Output:**

```
13
7
30
3.3333333333333335
3
1
1000
```

6. Input

- **Syntax:**

```python
x = input("Ask user to input something: ")
```

Or alternatively:

```python
print("Ask user to input something: ")
x = input()
```

- **Description:**

  - The `input()` function reads user input from the console. It displays a message and waits for the user to type something and press Enter. The input is always stored as a string.

- **Example usage:**

```python
name = input("Enter your name: ")
print("Hello, " + name)
```

- **Output:**

```
Enter your name: Alice
Hello, Alice
```

- **Important Note:**

  - The value read using the `input()` function is always a string. To use it as a different data type, such as an integer, you need to convert it using type casting.

  - If you don't convert your value, you won't be able to use the arithmetic operations such as +.

  - **Example:**

```python
x = input("Enter a number: ")
y = input("Enter another number: ")
result = x + y
print(result)
# or alternatively
# print(x+y)
```

– **Output:**

```
Enter a number: 5
Enter another number: 3
53
```

– To cast a string to an integer, use the `int()` function.

– To cast a string to a float, use the `float()` function.

– **Example Usage:**

```python
x = int(input("Enter a number: "))
y = int(input("Enter another number: "))
# or alternatively
# x = input("Enter a number: ")
# y = input("Enter another number: ")
# x = int(x)
# y = int(y)
result = x + y
print(result)
```

– **Output:**

```
Enter a number: 5
Enter another number: 3
8
```