




Welcome to the CoGrammar

Skills Bootcamp: Variables, String and Numerical Data Types

The session will start shortly...

Questions? Drop them in the chat. We'll have dedicated moderators answering questions.



Cyber Security Session Housekeeping

- The use of disrespectful language is prohibited in the questions, this is a supportive, learning environment for all - please engage accordingly.
(Fundamental British Values: Mutual Respect and Tolerance)
- No question is daft or silly - **ask them!**
- There are **Q&A sessions** midway and at the end of the session, should you wish to ask any follow-up questions. Moderators are going to be answering questions as the session progresses as well.
- If you have any questions outside of this lecture, or that are not answered during this lecture, please do submit these for upcoming Academic Sessions. You can submit these questions here: [Questions](#)

Cyber Security Session Housekeeping cont.

- For all **non-academic questions**, please submit a query: www.hyperiondev.com/support
- We would love your **feedback** on lectures: [Feedback on Lectures](#)
- Find all the lecture **content** in you [Lecture Backpack](#) on GitHub.

Safeguarding & Welfare

We are committed to all our students and staff feeling safe and happy; we want to make sure there is always someone you can turn to if you are worried about anything.

If you are feeling upset or unsafe, are worried about a friend, student or family member, or you feel like something isn't right, speak to our safeguarding team:



Ian Wyles
Designated Safeguarding
Lead



Simone Botes



Rafiq Manan



Charlotte Witcher



Nurhaan Snyman



Ronald Munodawafa



Tevin Pitts

Scan to report a
safeguarding concern



or email the Designated
Safeguarding Lead:
Ian Wyles

safeguarding@hyperiondev.com

Learning Objectives & Outcomes

- Define variables, strings, and numerical data types
- Explain the differences between variables, strings, and numerical data types.
- Write basic code that declares and initialises variables, strings, and numerical data types.
- Compare the use of strings and numerical data types in different programming contexts.
- Perform operations on numerical data.
- Assess the correct use of data types for specific programming problems.
- Design a basic program that uses variables, strings, and numerical data types effectively.

**SKILLS
FOR LIFE**
SKILLS BOOTCAMPS



Department
for Education

CoGrammar

CyberSecurity

October 2024

CyberSecurity

How do we **organise** and **store** different types of information in real life? For example, how do you write down someone's name versus their phone number?



Polls

Please have a look at the poll notification and select an option.

Have you ever worked with variables before?

- A. Yes
- B. Unsure
- C. Never

Polls

Please have a look at the poll notification and select an option.

What do you think a variable is?

- A. A storage location for data
- B. A mathematical concept
- C. A type of function
- D. A constant value that cannot change

INTRODUCTION TO PROGRAMMING WITH PYTHON

- Python is an interpreted, object oriented, high level programming language with dynamic semantics.
- Its design philosophy emphasizes code readability with the use of significant indentation

Python Use Cases

- Web Development
- Data Science and Analytics
- Machine Learning and Artificial Intelligence
- Cybersecurity and penetration testing
- Automation and Scripting

Python Basics: Variables

- **Definition:** named location in memory that stores data which can be modified during program execution. It acts as a container for data values.

```
variable_name = value_you_want_to_store
```

Example:

```
num = 2
```

- In the above example, num is the variable declaration while 2 is the value assigned to the variable.

Variable Naming Rules

- Must start with a letter or an underscore, but cannot start with a number.
- Can only contain letters, numbers and underscores.
- Variables are case-sensitive.
- Cannot use reserved keywords (e.g `for`, `while`, `if`).

Python Basics: Data Types

- **Definition:** The type of data a variable can hold. It specifies the kind of operations that can be performed on the data.
- Categories:
 - **Primitive Data Types: (Basic Data types):** Built into the language
 - **Non-Primitive Data Types:** Created from primitive types.

Primitive Data Types

- **String:** A string is a sequence of characters enclosed in either single (') or double (") quotes
- **Integer:** An integer is a whole number without any fractions
- **Floating-Point (float/double):** A floating-point (or float) number is a number that has a decimal point.
- **Boolean:** A boolean is a data type that can hold one of two values: **True** or **False**

**Let's take a break
To stretch and relax**



Strings



Strings

- A string is a **list of letters, numerals, symbols, and special characters** that are put together.
- Strings must be written **within quotation marks (" ")**.
- Strings can comprise of surname, name, address of a person e.t.c...
- Multi-line strings (long strings) are written **within triple single quotes ("'" "')**.

Strings

- **Examples:**

```
name = "Linda"
```

```
song = "The Bird Song",
```

```
licence_plate = " This is a long string
```

```
using triple quotes preserves everything inside it as a string
```

```
even on different lines and with different spacing. '''
```

String Manipulation

- Common actions that can be performed on strings:
 - **Indexing:** Access individual characters in a string
 - **Slicing:** Extract a substring from a string
 - **Extended slicing:** Extract a substring with a specific step
 - **Using string methods:** Utilise built-in methods to manipulate and analyse strings.
 - **Concatenation:** Combining two or more strings using the + operator.

String Manipulation

```
index.py

1  #String indexing
2  name = 'Walobwa'
3  print(name[0]) #-> Outputs: W
4
5  #String Slicing
6  name = 'Walobwa'
7  print(name[0:3]) #-> Outputs: Wal
8
9  #String Concatenation
10 first_name = 'Dan'
11 last_name = 'Walobwa'
12 full_name = first_name + ' ' + last_name
13 print(full_name) #-> Outputs: Dan Walobwa
14
15 #String Extended Slicing
16 name = 'Walobwa'
17 print(name[0:6:2]) #-> Outputs: Wl
18
19
```

Snipped

String Methods

- Python provides built-in functions to manipulate strings.
- Common methods used:
 - **.upper()**: Convert a string to all uppercase letters
 - **.lower()**: Convert a string to all lowercase letters
 - **.format()**: Insert values using placeholders ({})
 - **.strip()**: Remove all white spaces from a string.

String Methods

index.py

```
1  #String Methods
2  #.upper() - Converts all characters in a string to uppercase
3  name = "Walobwa"
4  print(name.upper()) #Output: WALOBWA
5
6  #.lower() - Converts all characters in a string to lowercase
7  name = "WALOBWA"
8  print(name.lower()) #Output: walobwa
9
10 #.format() - Formats specified values in a string
11 first_name = "Dan"
12 last_name = "Walobwa"
13 full_name = "My name is {} {}".format(first_name, last_name)
14
15 name = "  Walobwa  "
16 print(name.strip()) #Output: Walobwa
17
```

Snipped

Numbers



Numbers

- **Types:**
 - **Integers:** Represents whole numbers, both positive and negative, without a fractional part.
 - **Floating-Point(float):** Represents numbers with decimal (floating-point) part.
 - **Complex Numbers:** Represents complex numbers, which have both a real part and an imaginary part.

Numbers

```
index.py

1  #NUMBERS
2  #Integers
3  num1 = 1
4  num2 = 2001
5
6  #Floats
7  num3 = 3.14
8  num4 = 2001.0
9
10 #Complex
11 num5 = 1 + 2j
12 num6 = 2001 + 2001j
```

Snipped

Basic Arithmetic Operations

- Python provides the following basic arithmetic operations that can be performed on numbers.
 - `+` : Addition
 - `-` : Subtraction
 - `*` : Multiplication
 - `/` : Division (floating point)
 - `//` : Floor division (integer)
 - `%` : Modulus (remainnder)
 - `**` : Exponentiation (power)

Basic Arithmetic Operations

index.py

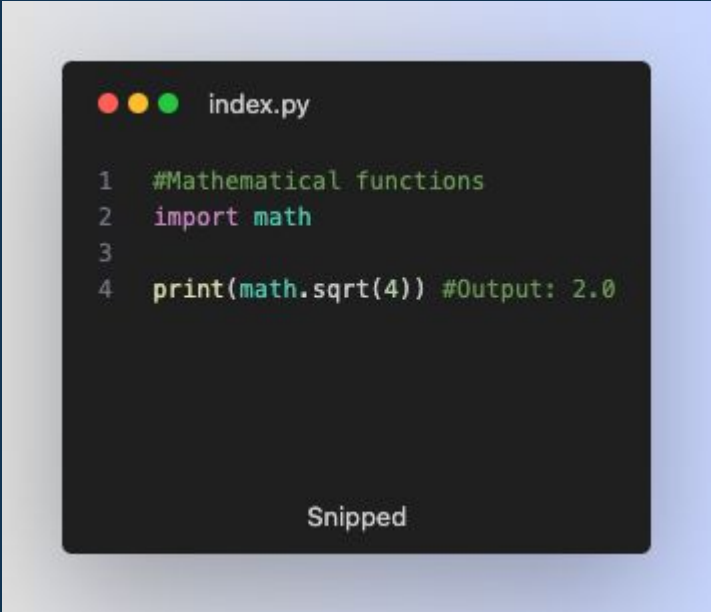
```
1  #Arithmetic Operations
2
3  #Addition
4  print(2+3)
5
6  #Subtraction
7  print(2-3)
8
9  #Multiplication
10 print(2*3)
11
12 #Division
13 print(2/3)
14
15 #Modulus
16 print(2%3)
17
18 #Exponentiation
19 print(2**3)
20
21 #Floor Division
22 print(2//3)
23
24
```

Snipped

Mathematical Functions

- Python's built-in math module provides various mathematical functions to perform more complex calculations.
- Common functions:
 - `math.sqrt(x)`
 - `math.pow(x, y)`
 - `math.log(x, base)`

Mathematical Functions



```
index.py

1  #Mathematical functions
2  import math
3
4  print(math.sqrt(4)) #Output: 2.0
```

Snipped

Type checking and casting

- The `type()` method is a built-in python function that returns the data type of an object.
- You can convert between different numeric types using built-in functions: `int()`, `float()` and `complex()`
- You can convert other data types into a string using the `str()` function.

Polls

Please have a look at the poll notification and select an option.

Which of the following methods is used to find the length of a string in most programming languages.

- A. `string.length()`
- B. `len(string)`
- C. `string.len()`
- D. `length(string)`

Polls

Please have a look at the poll notification and select an option.

Which of the following is NOT valid numerical data type in python

- A. int
- B. float
- C. double
- D. complex

Polls

Please have a look at the poll notification and select an option.

Which of the following string operations is NOT valid in Python

- A. Concatenating two string using (+)
- B. Multiplying a string by an integer
- C. Accessing individual characters using indexing
- D. Modifying individual characters of a string using indexing.

Summary

- Variables are named location in memory that stores data which can be modified during program execution. It acts as a container for data values.
- Strings are immutable sequences of characters that support operations like concatenation, slicing, and various methods (`upper()`, `replace()`, etc.).
- Numerical Data Types include integers (`int`), floating-point numbers (`float`), and complex numbers (`complex`), supporting basic arithmetic operations.
- Type Conversion allows converting between data types using functions like `int()`, `float()`, and `str()`.
- Common Operations for variables, strings, and numbers include indexing, arithmetic, and string manipulation with methods like `split()` and `join()`.

Stay Safe Series:

Mastering Online Safety One week at a Time

While the digital world can be a wonderful place to make education and learning accessible to all, it is unfortunately also a space where harmful threats like online radicalization, extremist propaganda, phishing scams, online blackmail and hackers can flourish.

As a component of this BootCamp the ***Stay Safe Series*** will guide you through essential measures in order to protect yourself & your community from online dangers, whether they target your privacy, personal information or even attempt to manipulate your beliefs.

Trustworthy Websites: How to Spot Secure Sites

- When browsing the web, it's crucial to ensure you're visiting trustworthy websites to protect your personal information. A secure site can be identified by a few key factors.
- First, look for "https://" in the URL—the "s" stands for secure, meaning the site encrypts your data. A padlock symbol near the URL is another sign of security.
- Reputable sites also provide clear contact information, privacy policies, and avoid requesting excessive personal details. Be wary of websites with numerous pop-ups, poor design, or misspelled content, as these can signal fraud or malware.
- Additionally, checking online reviews or using tools like security software can help you verify the site's legitimacy, keeping you safe while browsing online.

Questions and Answers



Thank you for attending



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