Basics Of Python

Master in Python From Zero

What is Python?

- **Python:** A programming language used to instruct computers to perform tasks. It's based on the CPython interpreter which translates the Python code into something the machine can read.
- **Interpreted:** Executes code line by line at runtime.
- **Object-Oriented:** Supports concepts like classes and objects.
- **High-Level:** Abstracts away complex details, making it easier to code.
- **Beginner-Friendly:** Simple syntax, ideal for new programmers.
- **Readability Focus:** Designed for easy reading and understanding.
- **Efficient:** Reduces the amount of code needed to accomplish tasks.

History Of Python

- **1980s:** Python was created by Guido van Rossum at the National Research Institute for Mathematics and Computer Science in the Netherlands.
- **1991:** The first version of Python was released with basic data types and functionality.
- **1994:** Python 1.0 introduced features like map, lambda, and filter.
- **2000:** Python 2.0 was released.
- **2008:** Python 3.0 introduced major updates and improvements.
- **2022:** Python 3.11, was released with enhanced performance.
- **2023:** The latest version, 3.12 was released.
- **Popularity:** Python is now widely used in machine learning, AI, data analysis, web development, and more, offering lucrative career opportunities.

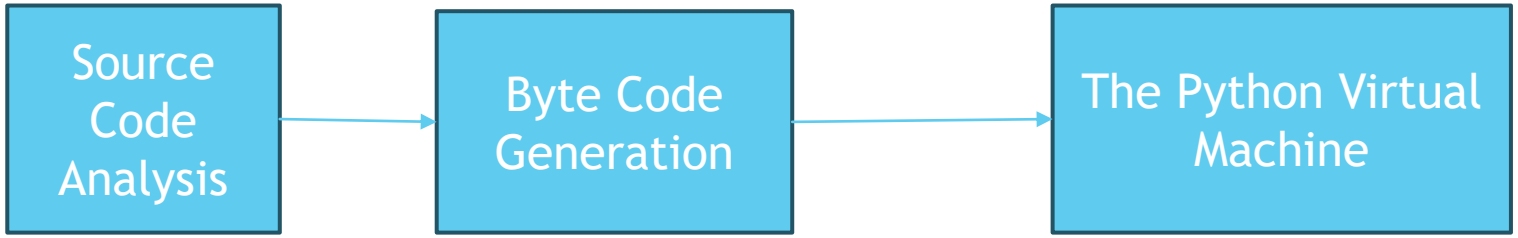
Python Syntax

- **Syntax:** Standard rules for writing statements in a programming language.
- **Printing in Python:** Use the print() function to display output . Example: print(“Hello World”)
- Unlike Python2, which did not require you to put a parenthesis, in Python3, a parenthesis is a must else it will raise a syntax error

Features Of Python

- *Easy to read and understand*
- *Interpreted language*
- *Object-oriented programming language*
- *Hundreds of libraries and frameworks*
- *Multi-platform*
- *Dynamically typed*

How Does the Python Interpreter Work?



- **CPython:** The default Python interpreter, written in C.
- **Source Code Analysis:** The interpreter checks syntax and converts source code into tokens (lexical analysis).
- **Byte Code Generation:** The tokens are compiled into bytecode, which can be saved as .pyc files.
- **PVM Execution:** The Python Virtual Machine (PVM) converts bytecode into executable machine code, which is then executed.

What Is The Difference Between .Py And .Pyc Files?

Feature	.py Files	.pyc Files
Content	Contains Python source code	Contains compiled Python bytecode.
Human-readable	Yes	No
Editability	Can be edited with any text editor or IDE	Not meant to be edited
Generation	Created manually by the programmer	Automatically generated by the Python interpreter when a .py file is run
Execution	Must be compiled to bytecode by the Python interpreter before execution	Directly executable by the Python virtual machine
Purpose	For writing and editing Python code	For faster execution and to save bytecode

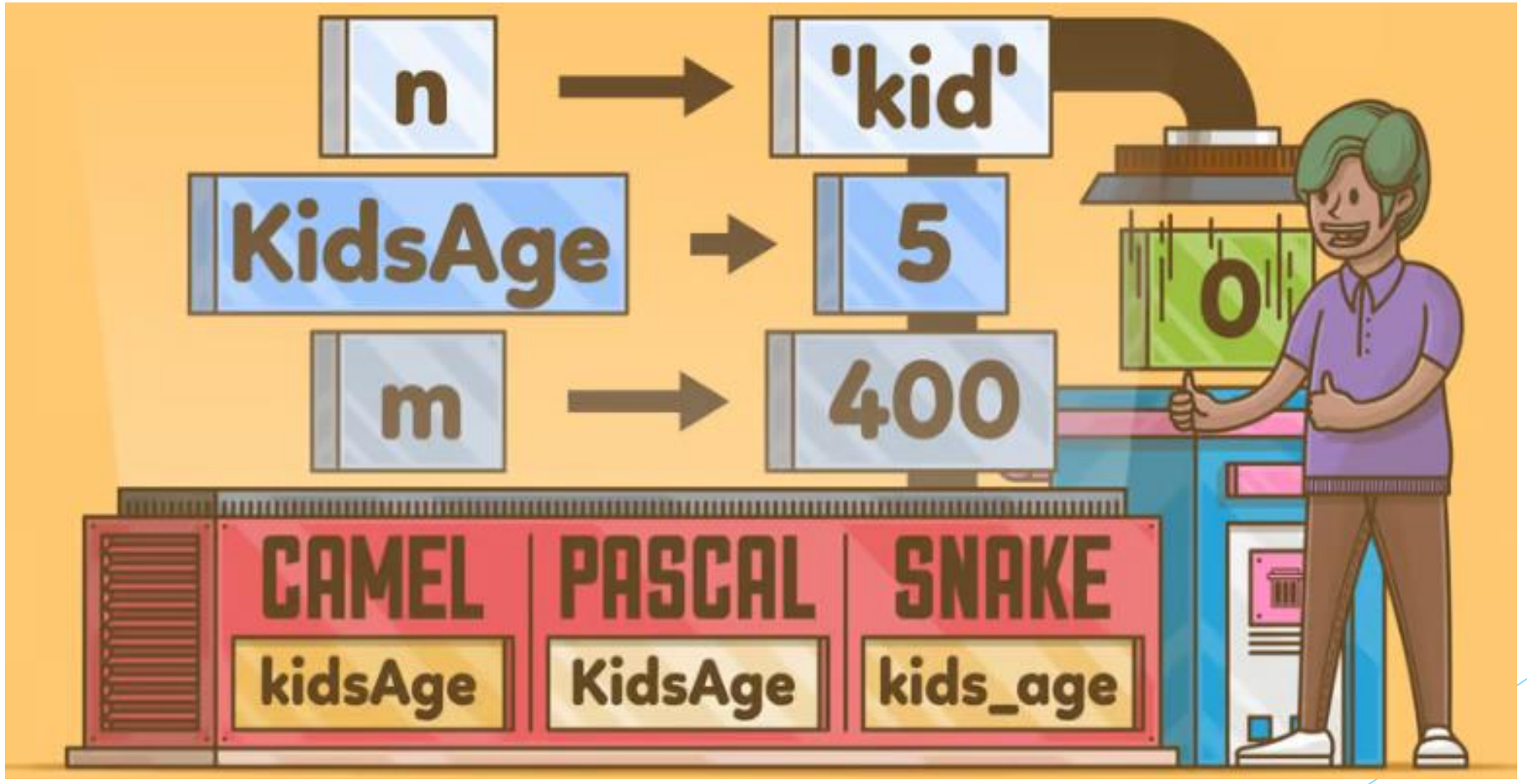
Python First Program

- Print(“Hello,World!”)
- Python print() function prints the message to the screen or any other standard output device.
- **How print() works in Python?**
- You can pass variables, strings, numbers, or other data types as one or more parameters when using the print() function. Then, these parameters are represented as strings by their respective str() functions. To create a single output string, the transformed strings are concatenated with spaces between them.

Python Variables

- Python Variable are containers that store values.
- In Python, variables need not be declared or defined in advance, as is the case in many other programming languages.
- To create a variable, just assign it a value and start using it. An assignment is done with a single equals sign (=). Ex. N=300

Rules to define Variables



Python Keywords

- There is one more restriction on identifier names. The Python language reserves a small set of keywords that designate special language functionality. No object can have the same name as a reserved word.
- In Python 3, there are 33 reserved keywords you can see in the next slide. Each keyword has a different meaning and we can not use the keyword as a variable name.

Reserve Words

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

Python Literals

- Literals are representations of fixed values in a program. They can be numbers, characters, or strings, etc.

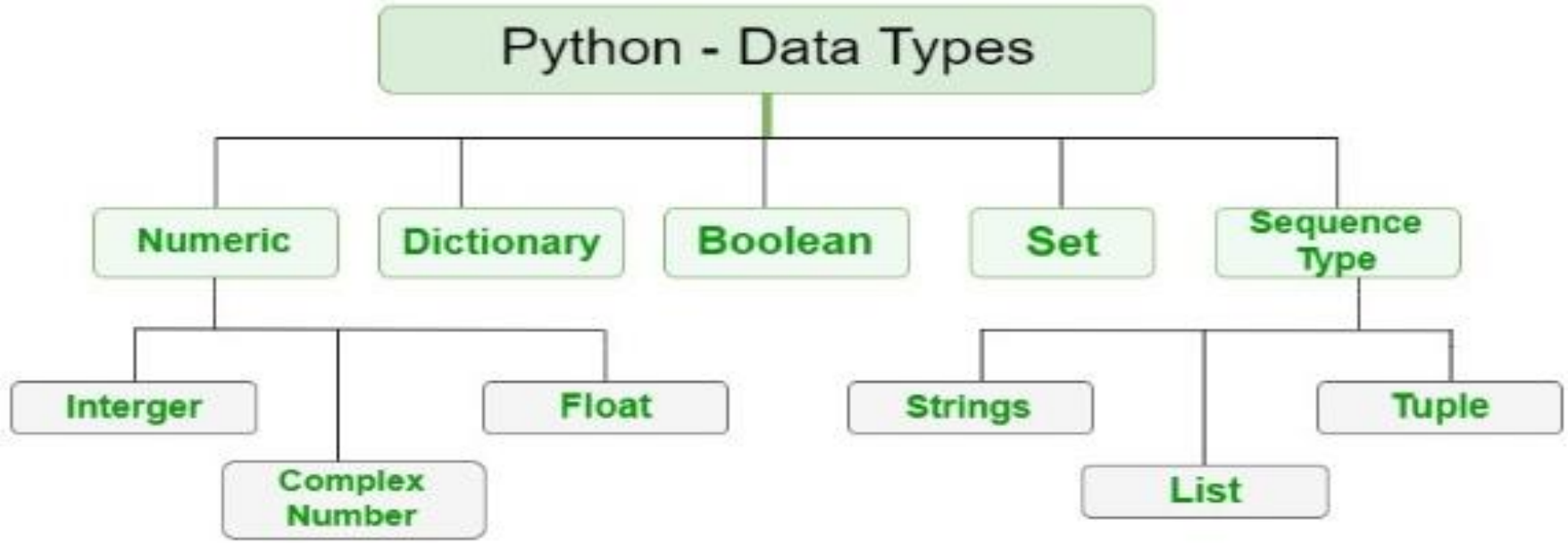
```
site_name = 'apple.com'
```

- In above example we can see site_name is variable and ‘apple.com’ is a literal.

Types of Literals :

1. **Integer Literals**
2. **Floating-Point Literals**
3. **Complex Literals**
4. **Python String Literals**

Data Types in Python



Comments in Python

- Comments are hints that we add to our code to make it easier to understand. Python comments start with #.
- Comments are completely ignored and not executed by code editors.
- **Single-line Comment :** We use the **hash (#)** symbol to write a single-line comment.
- **Multiline Comments :** we can achieve the same effect by using the hash (#) symbol at the beginning of each line.
- We can also use multiline strings as comments like ‘’’ ‘’’.
- If we encounter an error while running a program, instead of removing code segments, we can comment them out to prevent execution.

Why Use Comments?

- For future references, as comments make our code readable.
- For debugging.
- For code collaboration, comments help peer developers to understand each other's code.

Note: Comments are not and should not be used as a substitute to explain poorly written code. Always try to write clean, understandable code, and then use comments as an addition.

Operators in Python

- Operators are special symbols that perform operations on variables and values.

```
print(5 + 6)   # 11
```

Run Code

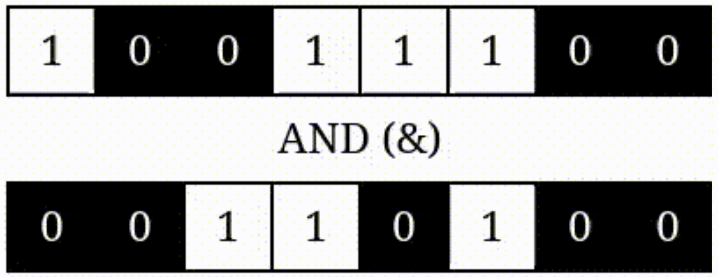
Here, `+` is an operator that adds two numbers: **5** and **6**.

Types of Python Operators

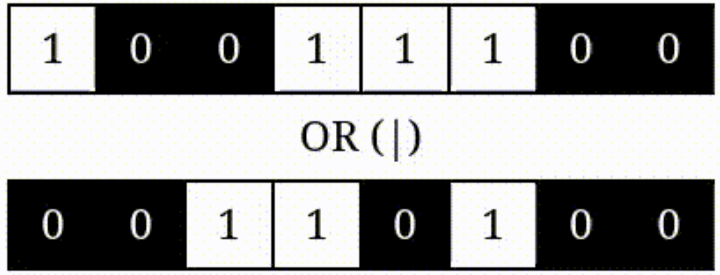
1. Arithmetic Operators - Arithmetic operators are used to perform mathematical operations like +,-,*,/,//,%,**
2. Assignment Operators - Assignment operators are used to assign values to variables like =,+=,-=,*=,/=,%=,//=,**=
3. Comparison Operators - Comparison operators compare two values/variables and return a boolean result: **True** or **False** like ==,!=,>=,<=,>,<
4. Logical Operators - Logical operators are used to check whether an expression is **True** or **False** like and, Or, Not
5. Bitwise Operators - Bitwise operators act on operands as if they were strings of binary digits. They operate bit by bit like &,|,~.
6. Special Operators - Python language offers some special types of operators like the **identity** operator and the **membership** operator.

Bitwise Operators

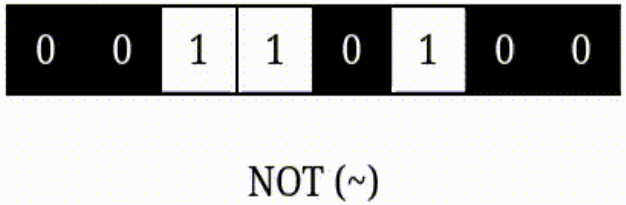
Bitwise AND



Bitwise OR



Bitwise NOT



Precedence of Python Operators

- The combination of values, variables, operators, and function calls is termed as an expression. The Python interpreter can evaluate a valid expression.

```
>>> 5 - 7
-2
```

Here `5 - 7` is an expression. There can be more than one operator in an expression.

- To evaluate these types of expressions there is a rule of precedence in Python. It guides the order in which these operations are carried out.

For example, multiplication has higher precedence than subtraction.

```
# Multiplication has higher precedence
# than subtraction
>>> 10 - 4 * 2
2
```

But we can change this order using parentheses `()` as it has higher precedence than multiplication.

```
# Parentheses () has higher precedence
>>> (10 - 4) * 2
12
```

THANK YOU