



TC-RESEARCH

Python Programming

Python has become one of the most popular programming languages in the research community due to its simplicity, versatility, and powerful libraries.

What will we learn?

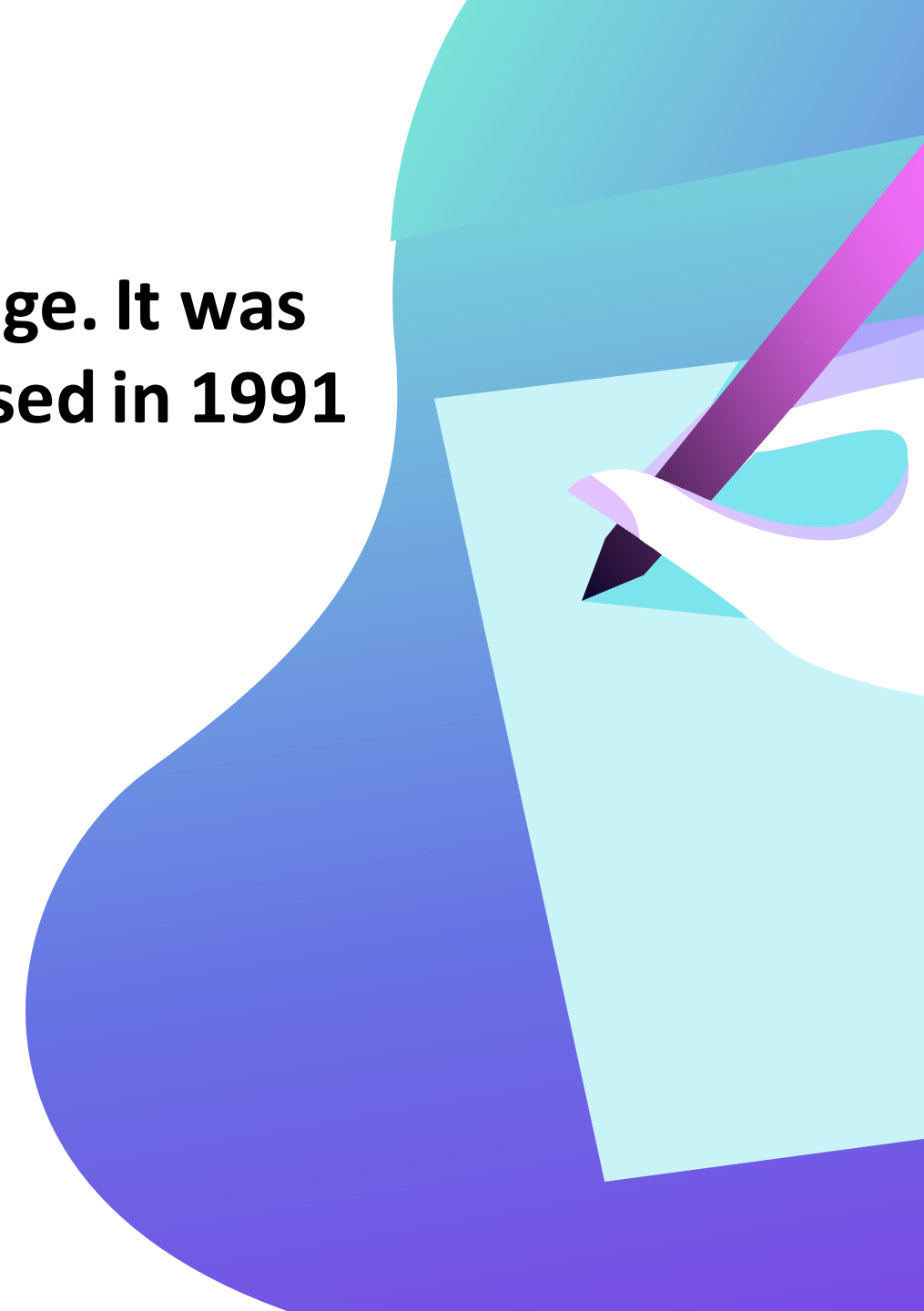
- Introduction of Programming and Python
- Importance of Programming In Research
- Data Types, variables and Casting
- **Operators and Conditional Statements**
- **Loops, and Switch Cases**
- **Array and functions**
- **Try Except**
- **File Handling**
- **All OOPs Concept**
- **Intro of Modules/Packages/Frameworks**
- **Some Modules:**
 - **Math, Numpy, Pandas and Scipy**
 - **Matplotlib and seaborn**
- **Some AI/ML Concept**



What is Python?

Python is a popular programming language. It was created by Guido van Rossum, and released in 1991 AD.

Python is a high-level, general-purpose, and very popular programming language. Python programming language (latest Python 3) is being used in web development, and Machine Learning applications, desktop software development, AI, DL, along with all cutting-edge technology in Software Industry.

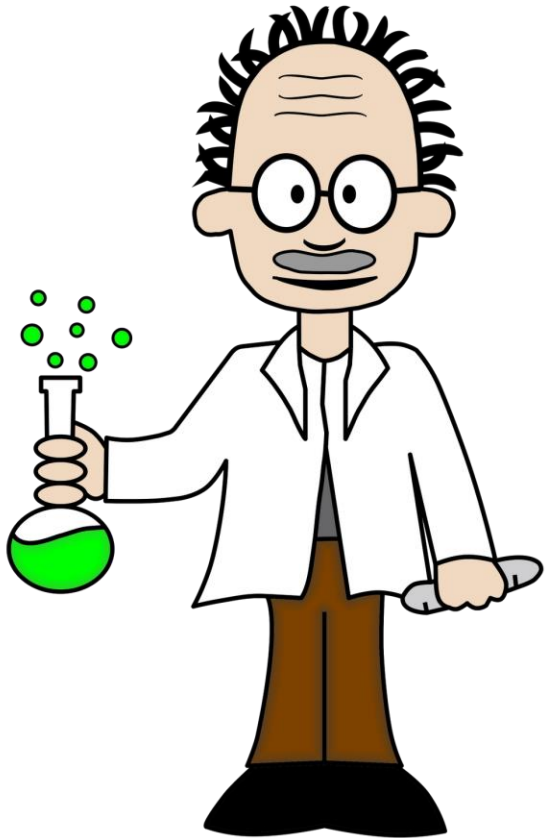


Why We Choose Python?

- Python works on different platforms (Windows, Mac, Linux, Raspberry Pi, Android, etc).
- Python has a simple syntax similar to the English language.
- Python has syntax that allows developers to write programs with fewer lines than some other programming languages.
- Python can be treated in a procedural way, an object-oriented way or a functional way.
- Wide support community and large strong libraries.
- Popular and high level programming language which helps to write code easily, etc.



Importance of Python In Research



- Data Manipulation
- Data Visualization
- Statistical Analysis
- **Machine Learning**
- **Data Cleaning**
- **Handling Big Data**
- **Automation of Experiments**
- **Simulations and Modeling**
- **Numerical Computation**
- **Algebraic Geometry and Number Theory**
- **Image Analysis in Biology**
- **Drug Discovery and Design in Chemistry and Biology**

First Program In Python

Print("Hello World")

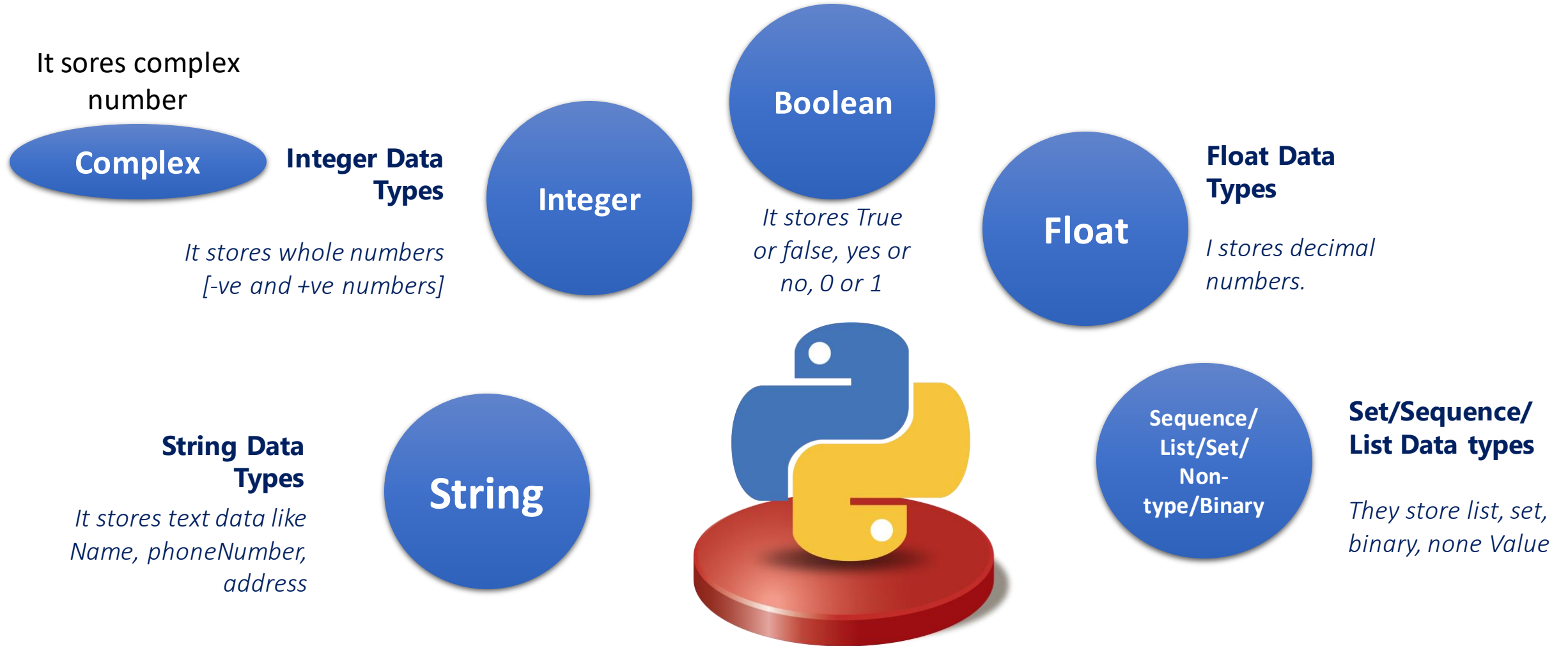
Print: It is a function that allows to print data on screen.

Hello World, is the text to print

**"Hello
World"**

Data Types, Variable and Constant

Variables can store the different values with different data types.



Python Data Types and Variable

Comments on Python

Comments starts with a #, and Python will ignore them,

```
#Print("Hello World")
```

You can add a multiline string (triple quotes) in your code, and place your comment inside it,

```
'''  
    A = 5  
    B = 6  
    Print(A, B)  
'''
```


+	v	!	=
-	^	&	v-
*	==		^
/	v=	&&	
^	>=		
%%	!=		
%/%			

Arithmetic Operators

Relational Operators

Logical Operators


Assignment Operators

Operators

- ✓ Arithmetic operators
- ✓ Assignment operators
- ✓ Comparison operators
- ✓ Logical operators
- ✓ Identity operators
- ✓ Membership operators
- ✓ Bitwise operators[for binary comparison]

Python Arithmetic Operators

Operator	Name	Example
+	Addition	$x + y$
-	Subtraction	$x - y$
*	Multiplication	$x * y$
/	Division	x / y
%	Modulus	$x \% y$
**	Exponentiation	$x ** y$
//	Floor division	$x // y$



Operator	Example	Same As
=	x = 5	x = 5
+=	x += 3	x = x + 3
-=	x -= 3	x = x - 3
*=	x *= 3	x = x * 3
/=	x /= 3	x = x / 3
%=	x %= 3	x = x % 3
//=	x //= 3	x = x // 3
**=	x **= 3	x = x ** 3
&=	x &= 3	x = x & 3
=	x = 3	x = x 3
^=	x ^= 3	x = x ^ 3
>>=	x >>= 3	x = x >> 3
<<=	x <<= 3	x = x << 3
:=	print(x := 3)	x = 3 print(x)



Python Assignment Operators

Operator	Name	Example
==	Equal	x == y
!=	Not equal	x != y
>	Greater than	x > y
<	Less than	x < y
>=	Greater than or equal to	x >= y
<=	Less than or equal to	x <= y

Comparison Operators

Operator	Description	Example
and	Returns True if both statements are true	<code>x < 5 and x < 10</code>
or	Returns True if one of the statements is true	<code>x < 5 or x < 4</code>
not	Reverse the result, returns False if the result is true	<code>not(x < 5 and x < 10)</code>

Logical operators

✓ Identity operators

Operator	Description	Example
in	Returns True if a sequence with the specified value is present in the object	x in y
not in	Returns True if a sequence with the specified value is not present in the object	x not in y

✓ Membership operators

Operator	Description	Example
is	Returns True if both variables are the same object	x is y
is not	Returns True if both variables are not the same object	x is not y

Conditional Statements



if

If

```
if b > a:  
    print("b is greater than a")
```

If else

If else

```
if a == b:  
    print("a and b are equal")  
else:  
    print("a is greater than b")
```

elif

If elif

```
if b > a:  
    print("b is greater than a")  
elif a == b:  
    print("a and b are equal")
```

If elif else

If elif else

```
if b > a:  
    print("b is greater than a")  
elif a == b:  
    print("a and b are equal")  
else:  
    print("a is greater than b")
```

Loops In Python



Intro

While

For

Nested

What is loop?

A loop is a sequence of instructions that repeat until a certain condition is reached or a desired process is complete.

While Loop

```
i = 1
while i < 6:
    print(i)
    i += 1
```

For Loop

```
fruits = ["apple", "banana", "cherry"]
for x in fruits:
    print(x)
```

Nested

```
adj = ["red", "big", "tasty"]
fruits = ["apple", "banana", "cherry"]
for x in adj:
    for y in fruits:
        print(x, y)
```


Functions In Python

- ✓ A function is a block of code which only runs when it is called.
- ✓ You can pass data, known as parameters, into a function.
- ✓ A function can return data as a result.

How to Create Function

```
def my_function():  
    print("Hello from a function")
```

How to Call Function

```
def my_function():  
    print("Hello from a function")  
  
my_function()
```

Types of Function

See on Code



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Thank You !

Contd.... !

"Python For Research"

By
Janak Singh Dhami

BSc. IInd Year | Tri-Chandra Multiple Campus

