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.

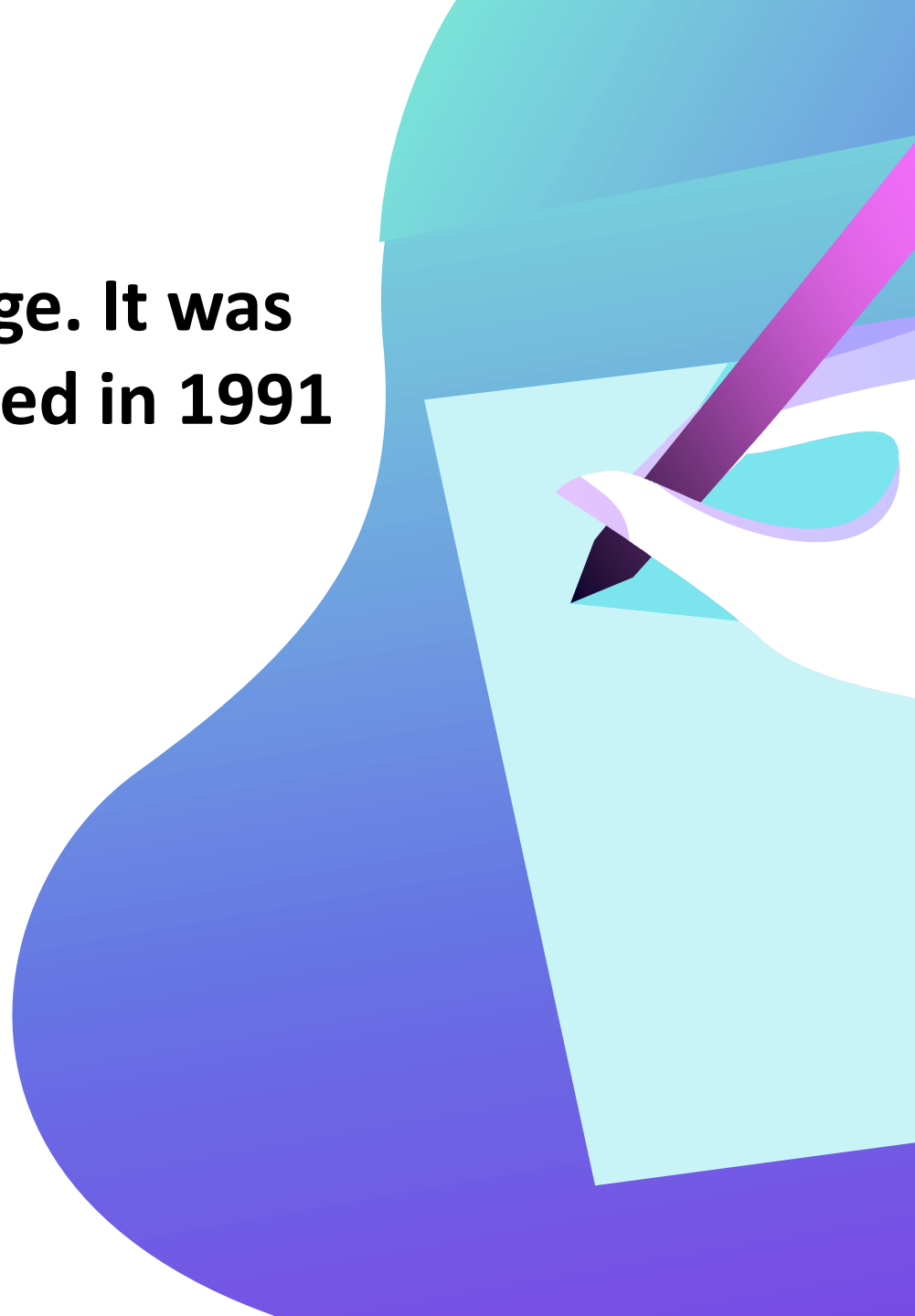
What will we learn?

- 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.

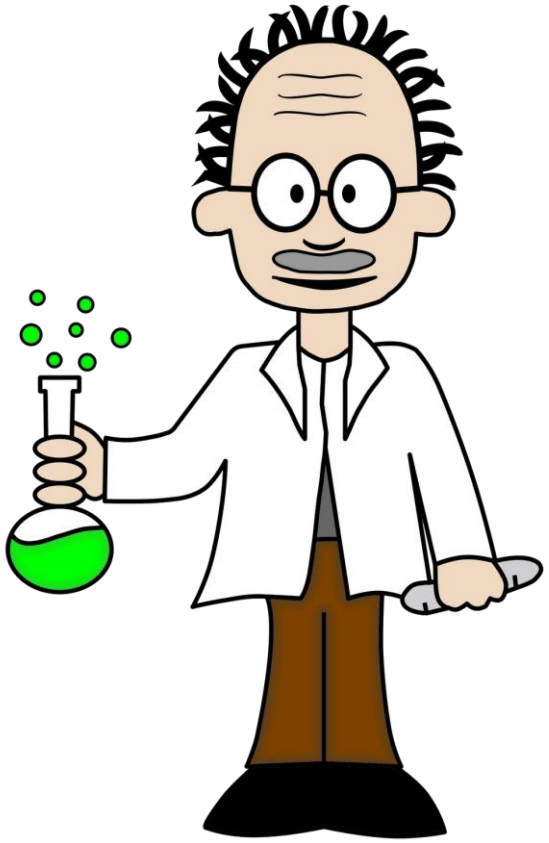
Python is a high-level, general-purpose, and very popular programming language. Python programming language (latest Python 3) is being used in web development, and Machine Learning applications, desktop software development, AI, DL, along with all cutting-edge technology in Software Industry.



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



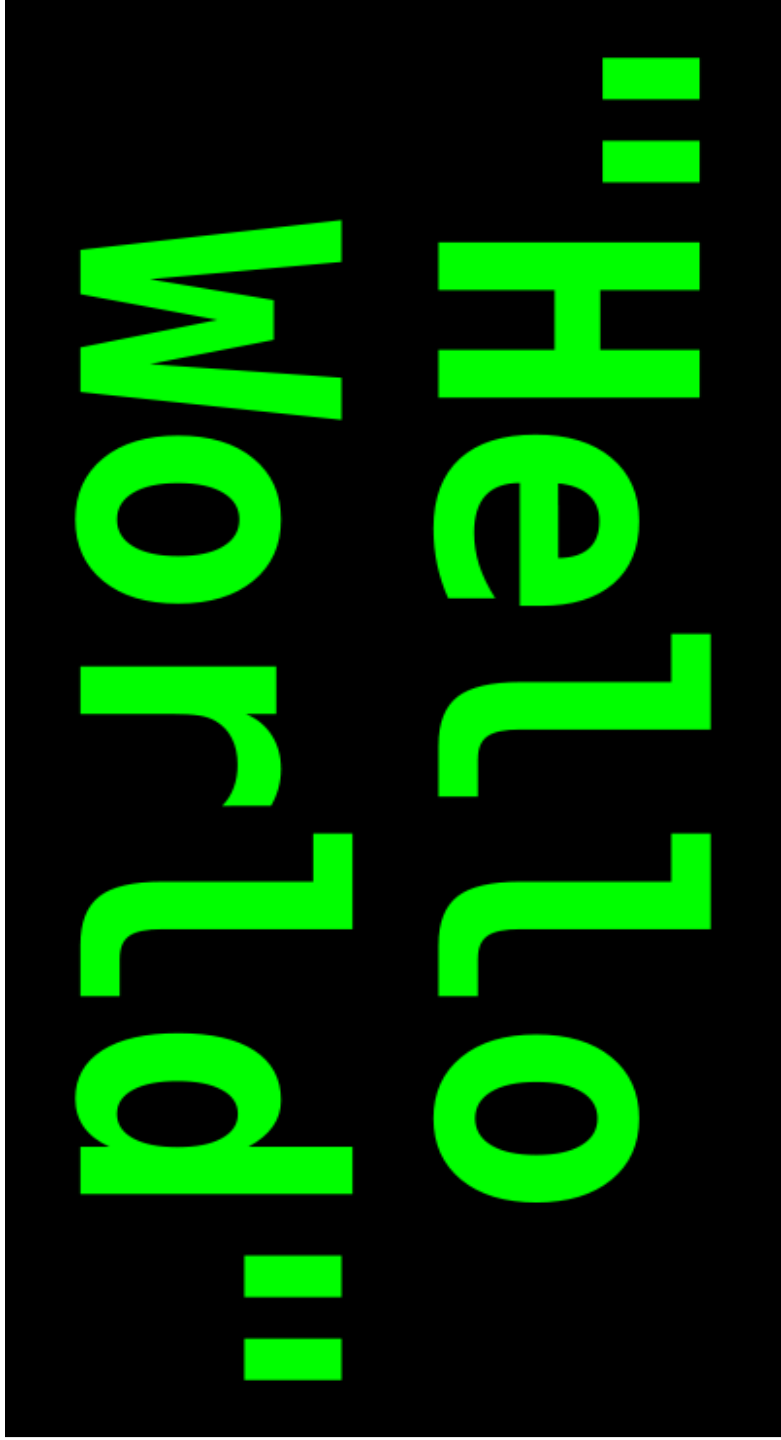
- Data Manipulation
- Data Visualization
- Statistical Analysis
- **Machine Learning**
- **Data Cleaning**
- **Handling Big Data**
- **Automation of Experiments**
- **Simulations and Modeling**
- **Numerical Computation**
- **Algebraic Geometry and Number Theory**
- **Image Analysis in Biology**
- Drug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



Data Types, Variable and Constant

Variables can store the different values with different data types.

It sores complex number

Complex

Integer Data Types

It stores whole numbers [-ve and +ve numbers]

Integer

Boolean

It stores True or false, yes or no, 0 or 1

Float

Float Data Types

I stores decimal numbers.

String Data Types

It stores text data like Name, phoneNumber, address

String

Sequence/ List/Set/ Non-type/Binary

Set/Sequence/ List Data types

They store list, set, binary, none Value

Python Data Types and Variable

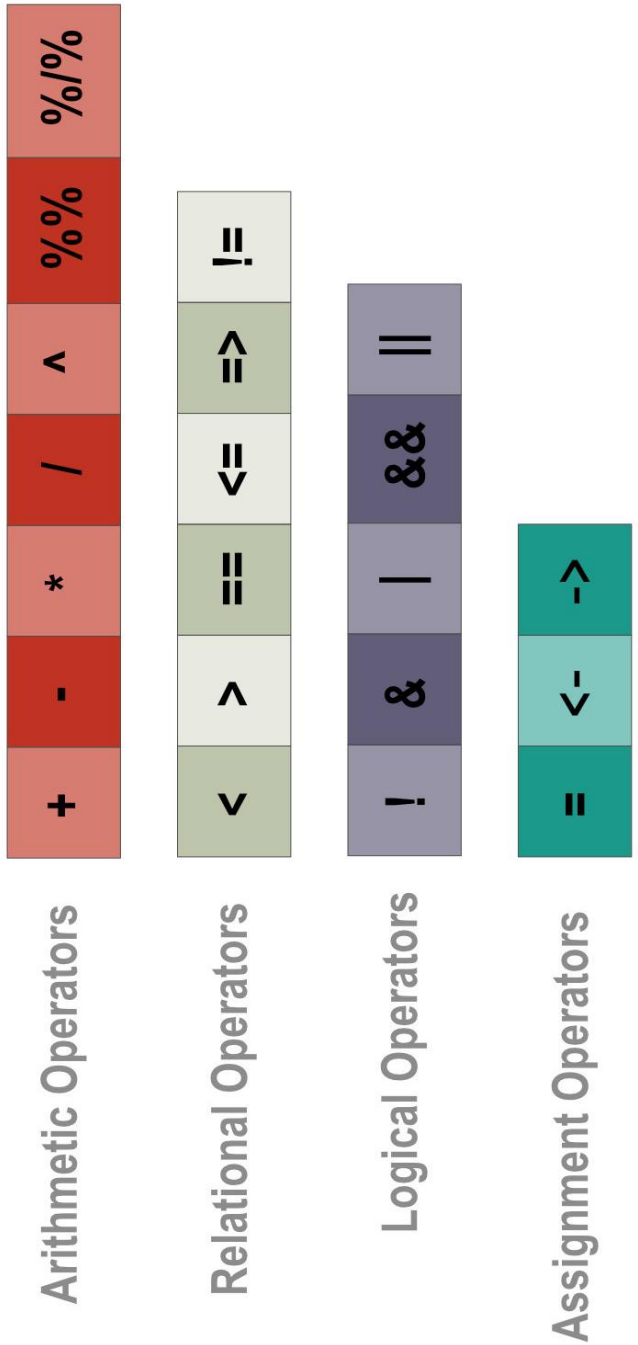
Comments on Python

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)
'''
```



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	x < 5 and x < 10
or	Returns True if one of the statements is true	x < 5 or x < 4
not	Reverse the result, returns False if the result is true	not(x < 5 and x < 10)

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

If else

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

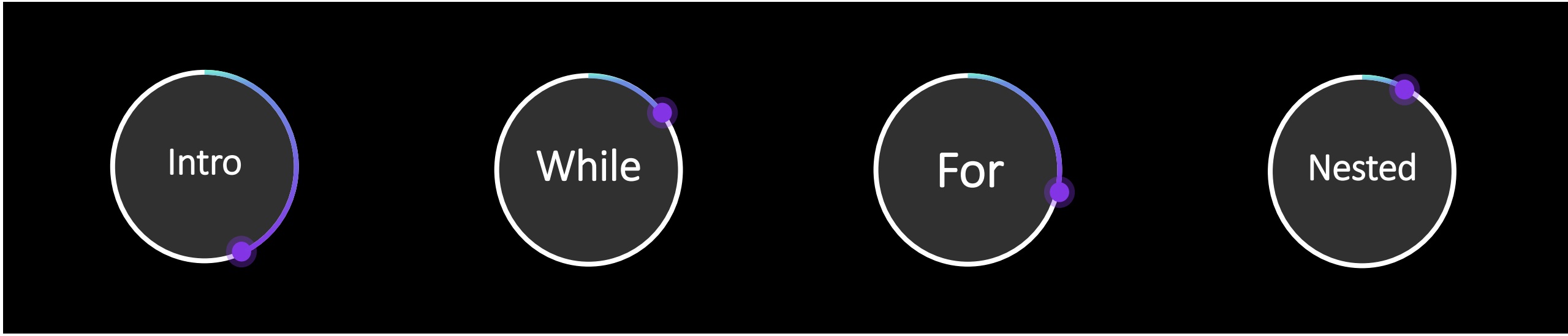
If elif

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

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



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

JOIN DISCORD SERVER

- ✓ Join Discord Server for being Updated
- ✓ Share your daily research and learn activities
- ✓ For Joining Online Meeting
- ✓ For Talking with community members
- ✓ Helping for study problems

Thank You !

Contd.... !

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