SNS COLLEGE OF ENGINEERING
Kurumbapalayam (Po), Coimbatore – 641 107

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

19IT103 – COMPUTATIONAL THINKING AND PYTHON PROGRAMMING

- **A readable, dynamic, pleasant, flexible, fast and powerful language**

Recap

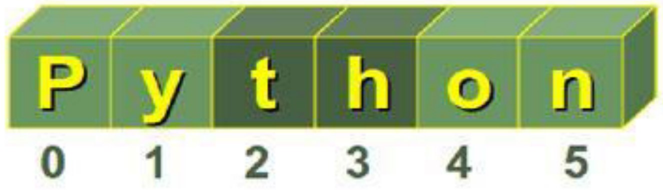
- Strings Read/Convert
- Indexing strings using []
- Looping through strings with for and while
- Concatenating strings with +
- Strings are immutable

Agenda

- Slicing Strings
- String Functions and Methods
- Sting Module
- Lists as arrays

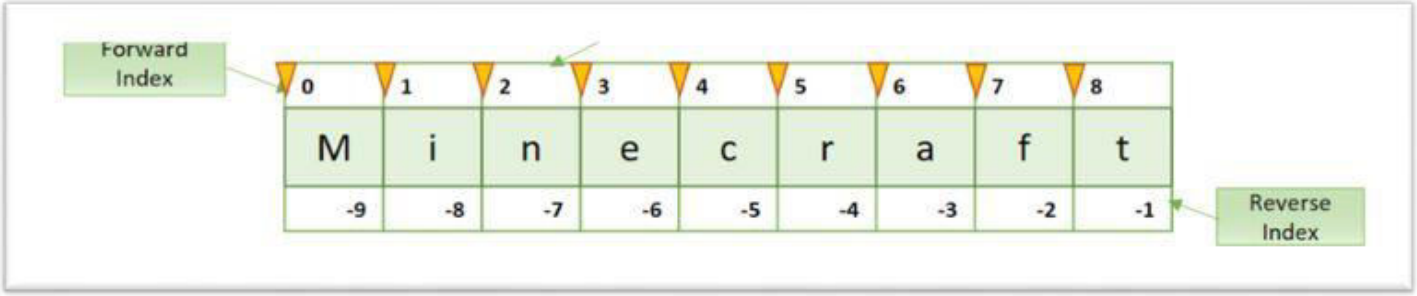
Slicing Strings – What is it?

- Slicing means taking part of a string as in cutting it up
- It is often useful to take part of a string or analyse it or use it is another part of the code.
- Example:
  - you have been asked to write a program to check if a string contains a valid email address.
  - One of the checks will mean that you need to slice the string taking all the characters from the left hand part of the string up to the @ character



Slicing Strings –How to do it

- Strings have indices just like lists:
  - Forward index starts at 0 from the LHS
  - Reverse index starts at -1 from the RHS



- To specify a slice you need to
  - give the START position from the left hand side
  - give the END position from the left hand side
  - Separate the two values with a colon
- Example:

```
newString = myString [1:3]
```

Slicing Strings –Some Rules

- If you don't specify a **START** it defaults to the beginning:

```
newString = myString [:3]
```

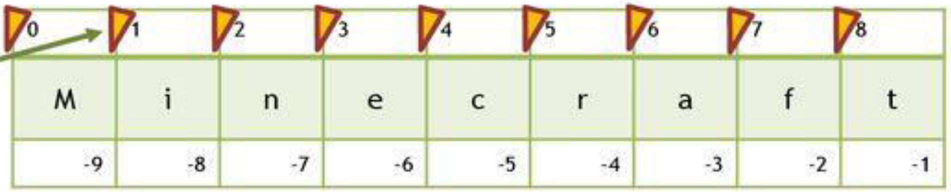
This means start at position 0 end at position 3

- If you don't specify a END it defaults to the end:

```
newString = myString [3:]
```

This means start at position until the end

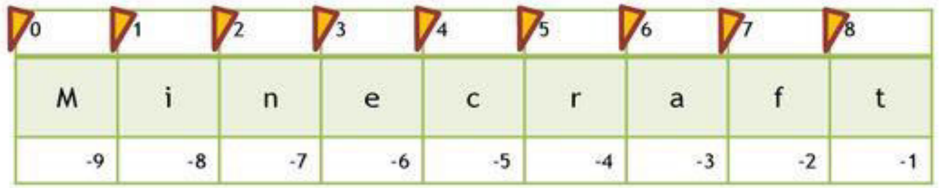
When SLICING, think of the index as pointing to the character to the left of the arrow



```
newString = myString [1:3]
```

The content of newString would be:
in

Slicing Strings – Quickstart



- First Character

```
firstChar = myString [0]
```

```
M
```

- Last Character:

```
firstChar = myString [-1]
```

```
t
```

- All characters but the first:

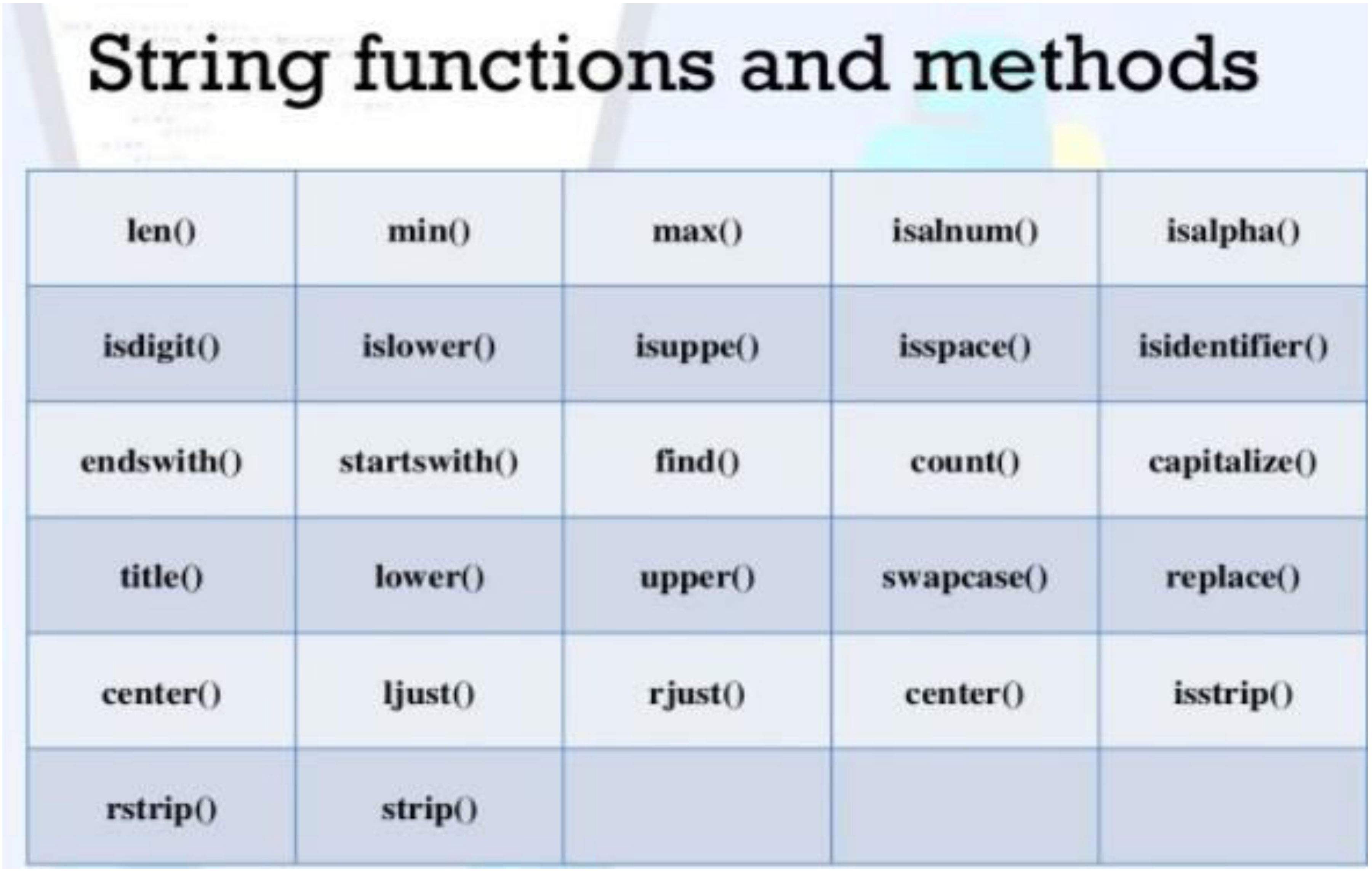
```
slice = myString[1:]
```

```
inecraft
```

- All characters but the last:

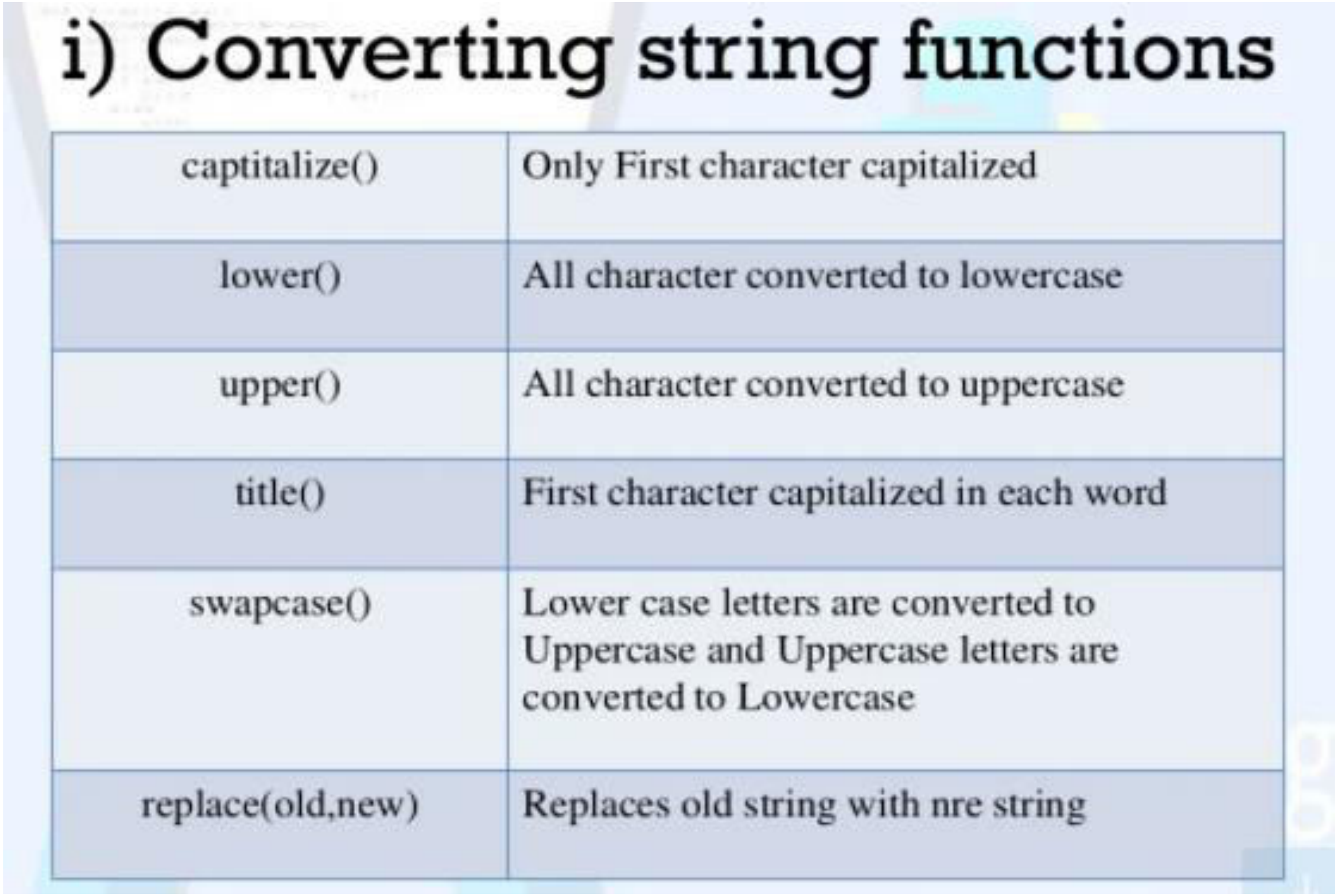
```
slice = myString[:-1]
```

```
Minecraf
```



String functions and methods

len()	min()	max()	isalnum()	isalpha()
isdigit()	islower()	isuppe()	isspace()	isidentifier()
endswith()	startswith()	find()	count()	capitalize()
title()	lower()	upper()	swapcase()	replace()
center()	ljust()	rjust()	center()	isstrip()
rstrip()	strip()			



i) Converting string functions

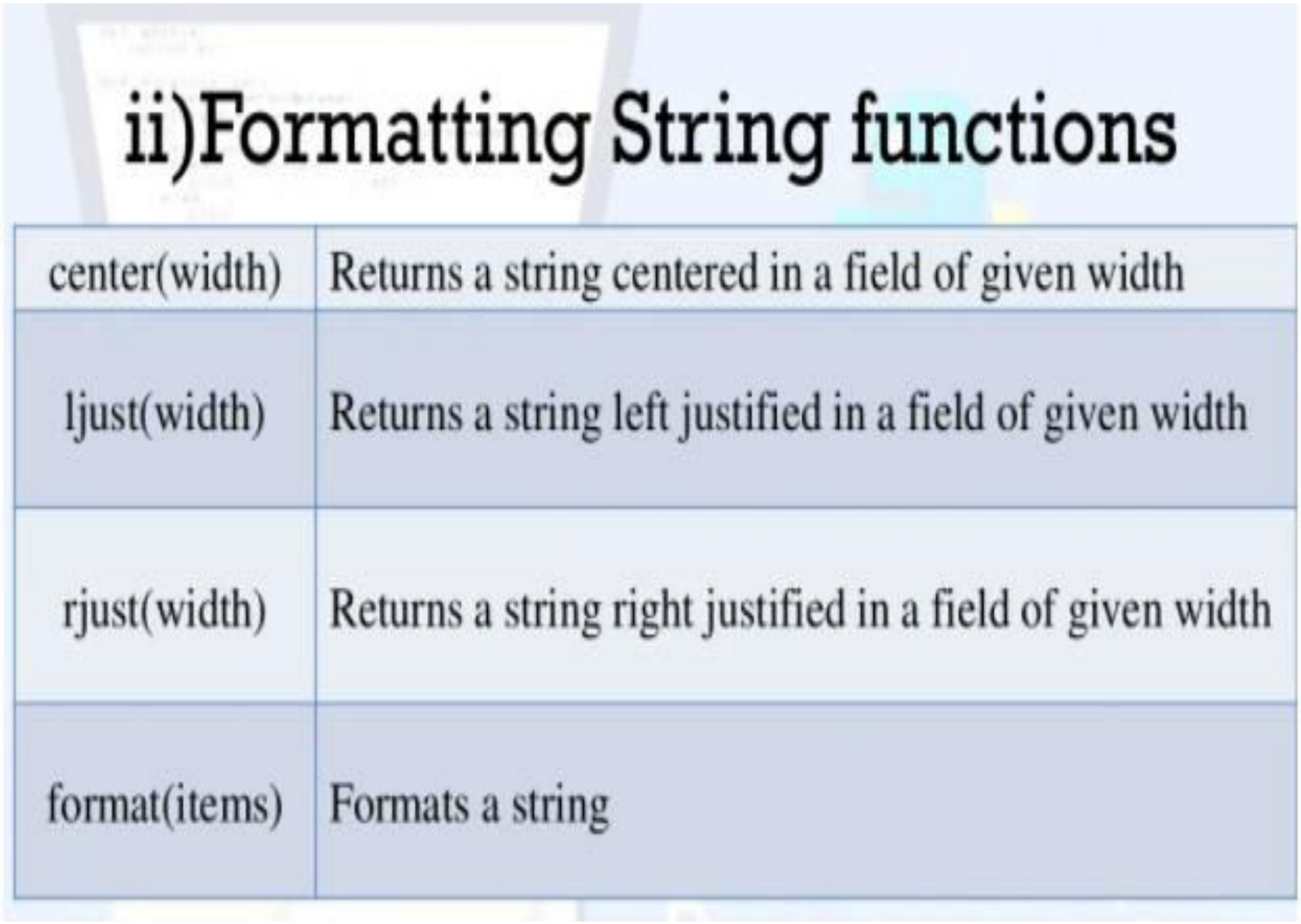
captitalize()	Only First character capitalized
lower()	All character converted to lowercase
upper()	All character converted to uppercase
title()	First character capitalized in each word
swapcase()	Lower case letters are converted to Uppercase and Uppercase letters are converted to Lowercase
replace(old,new)	Replaces old string with nre string

Program:

```
str=input("Enter any string:")
print("String Capitalized:", str.capitalize())
print("String lower case:", str.lower())
print("String upper case:", str.upper())
print("String title case:", str.title())
print("String swap case:", str.swapcase())
print("String replace  case:",str.replace("python","python programming"))
```

Output:

```
Enter any string: Welcome to python
String Capitalized: Welcome to python
String lower case: welcome to python
String upper case: WELCOME TO PYTHON
String title case: Welcome To Python
String swap case: wELCOME TO PYTHON
String replace  case: Welcome to python programming
```



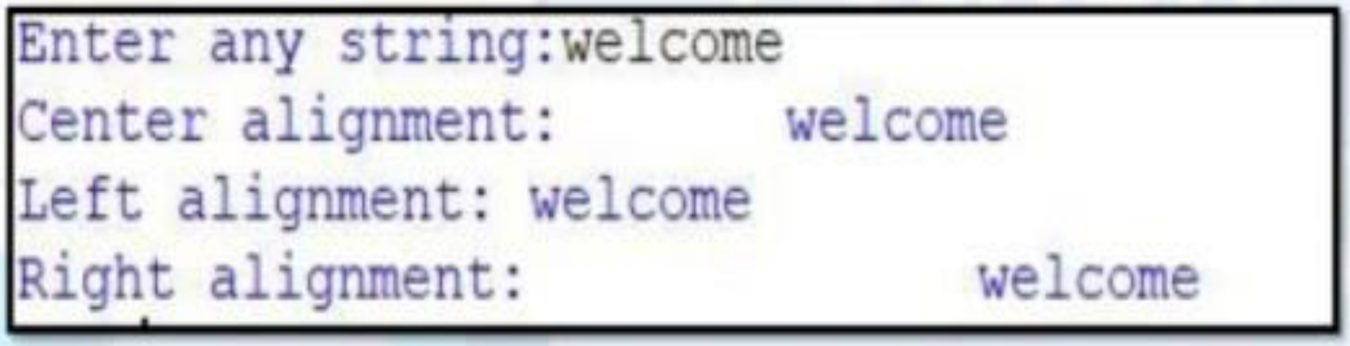
ii)Formatting String functions

center(width)	Returns a string centered in a field of given width
ljust(width)	Returns a string left justified in a field of given width
rjust(width)	Returns a string right justified in a field of given width
format(items)	Formats a string

Program:

```python
a=input("Enter any string:")
print("Center alignment:", a.center(20))
print("Left alignment:", a.ljust(20))
print("Right alignment:", a.rjust(20))
```

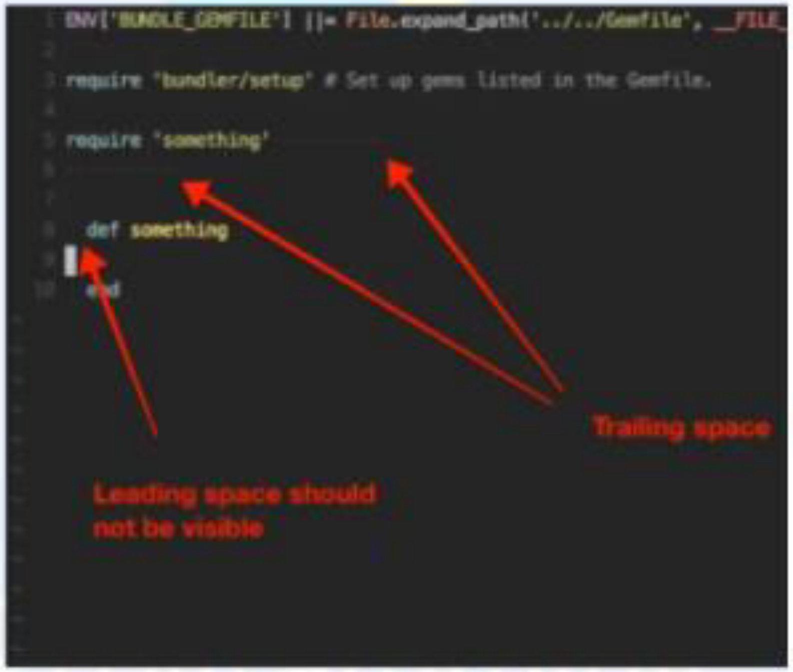
Output:



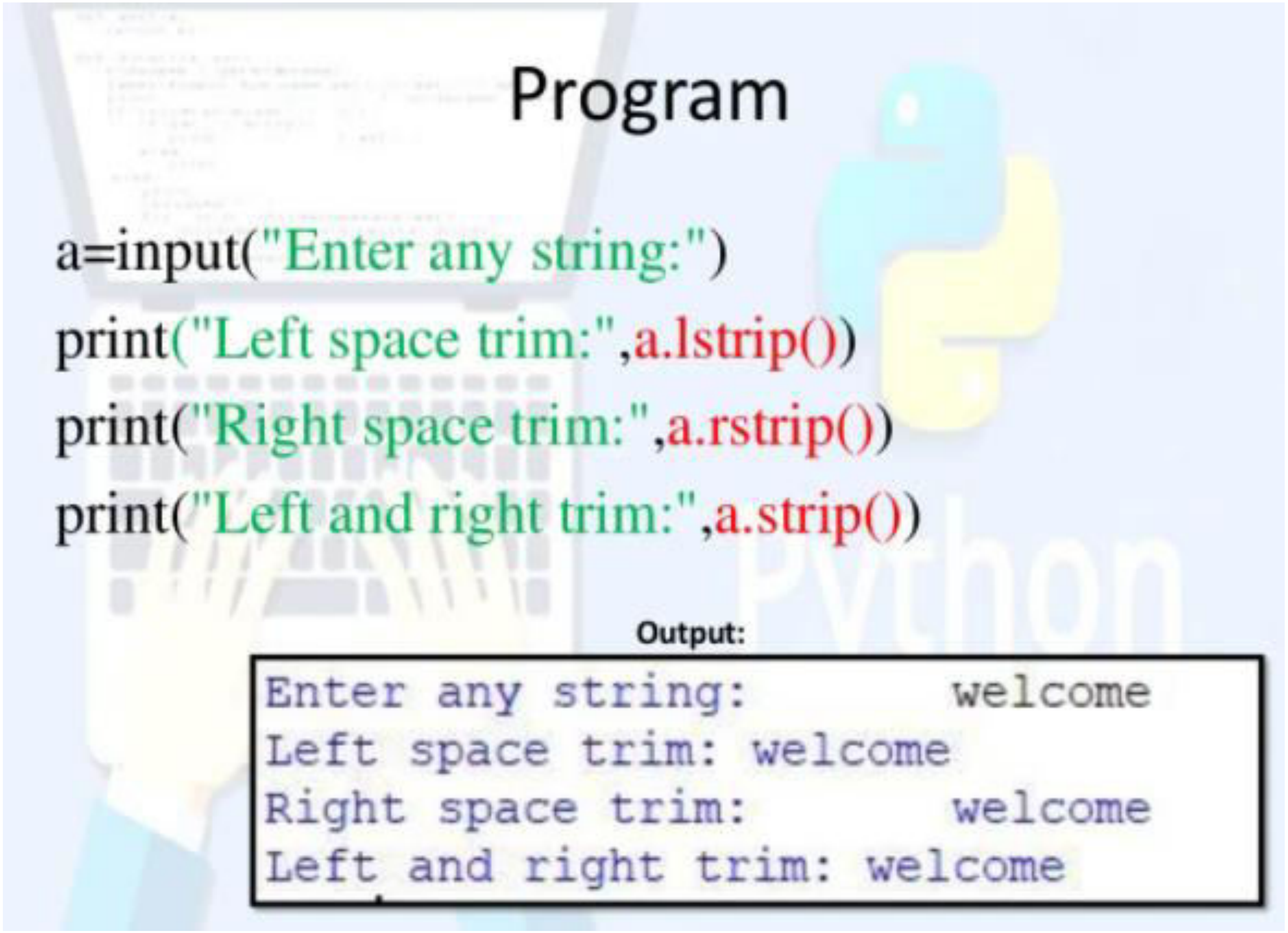
```
Enter any string:welcome
Center alignment:       welcome
Left alignment: welcome
Right alignment:              welcome
```

iii) Removing whitespace characters

lstrip()	Returns a string with leading whitespace characters removed
rstrip()	Returns a string with trailing whitespace characters removed
strip()	Returns a string with leading and trailing whitespace characters removed



```
ENV['BUNDLE_GEMFILE'] ||= File.expand_path('../../Gemfile', __FILE_

require 'bundler/setup' # Set up gems listed in the Gemfile.

require 'something'



  def something

  end
```

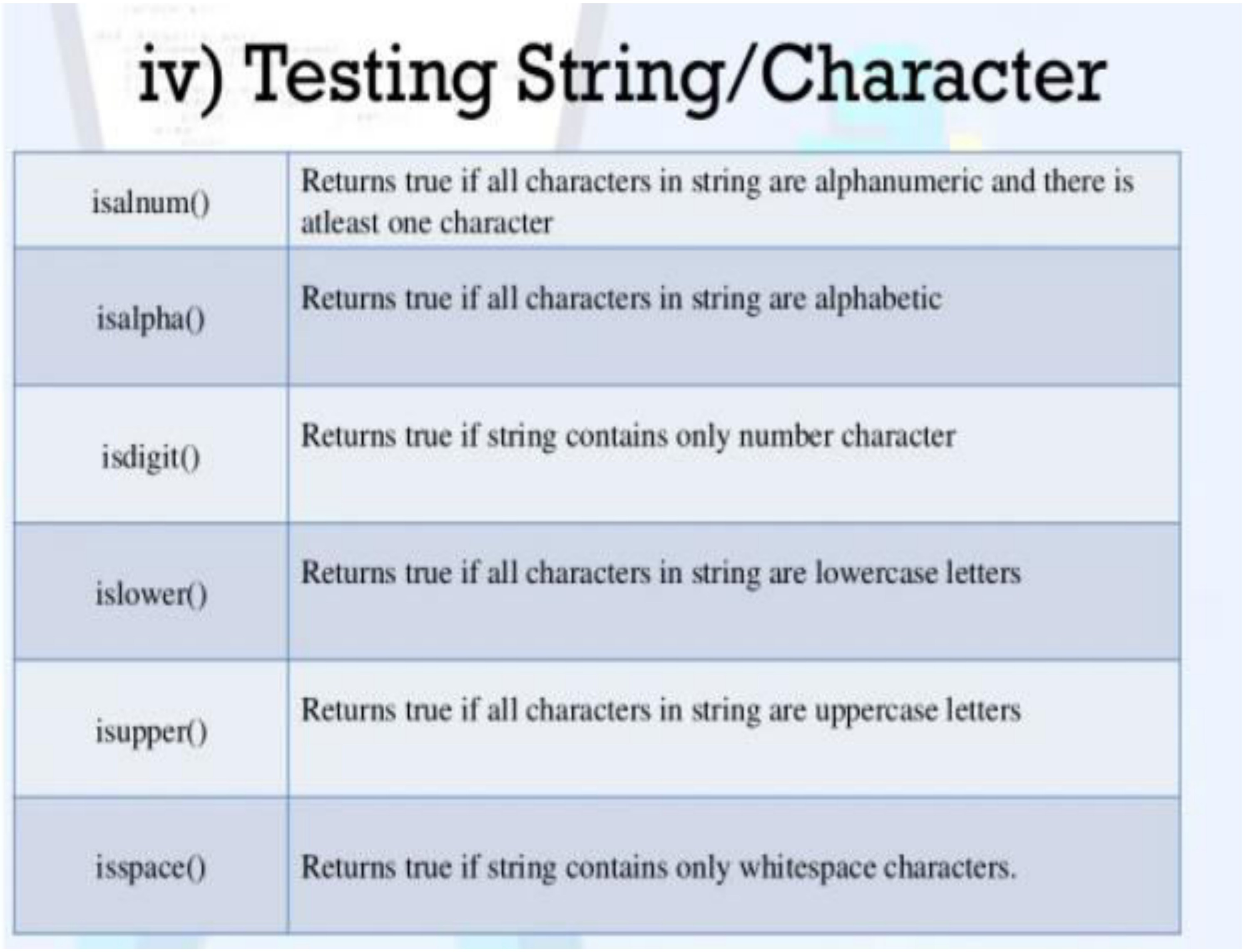


Program

```python
a=input("Enter any string:")
print("Left space trim:",a.lstrip())
print("Right space trim:",a.rstrip())
print("Left and right trim:",a.strip())
```

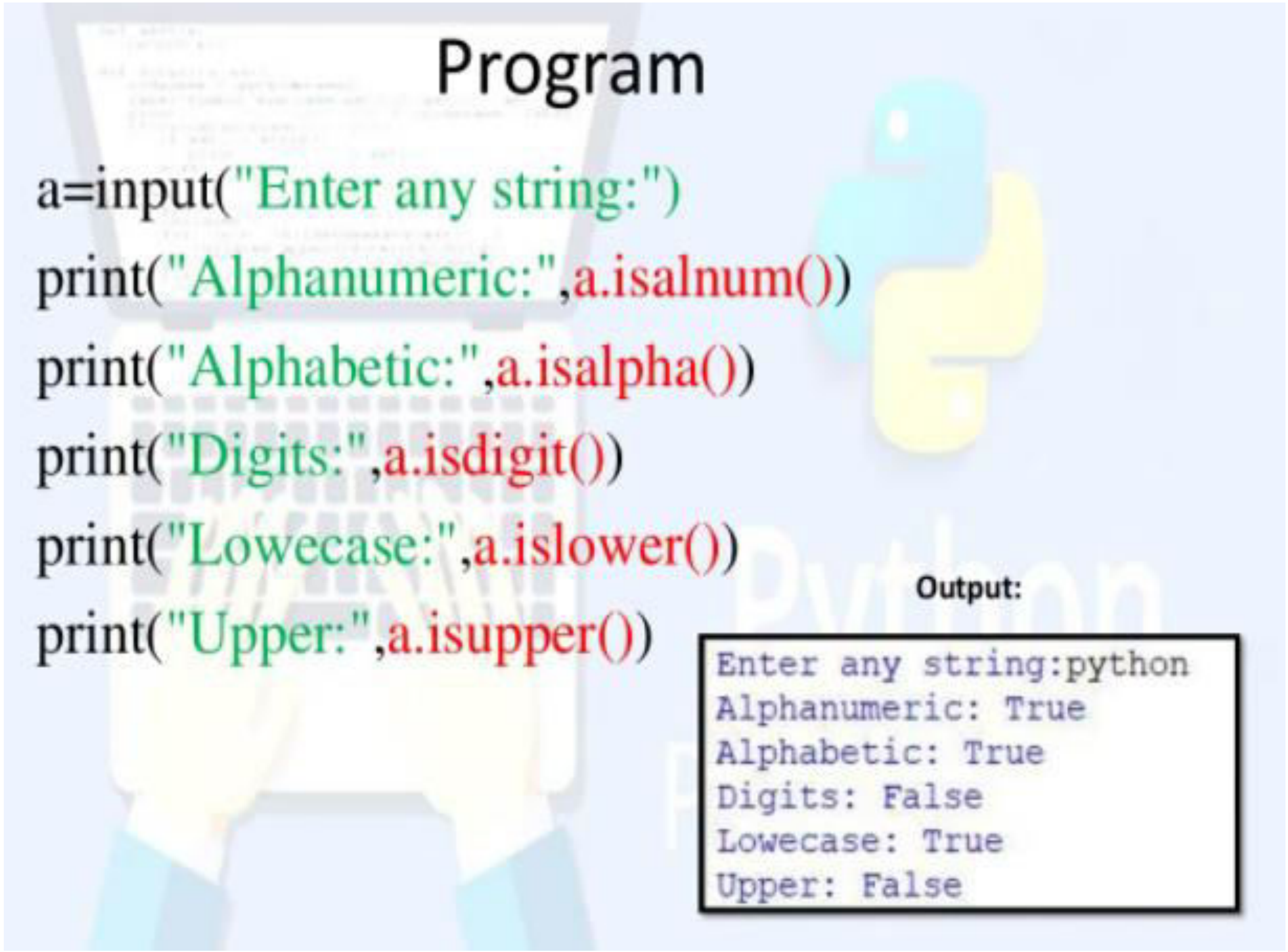
Output:

```
Enter any string:      welcome
Left space trim: welcome
Right space trim:      welcome
Left and right trim: welcome
```



iv) Testing String/Character

isalnum()	Returns true if all characters in string are alphanumeric and there is atleast one character
isalpha()	Returns true if all characters in string are alphabetic
isdigit()	Returns true if string contains only number character
islower()	Returns true if all characters in string are lowercase letters
isupper()	Returns true if all characters in string are uppercase letters
isspace()	Returns true if string contains only whitespace characters.

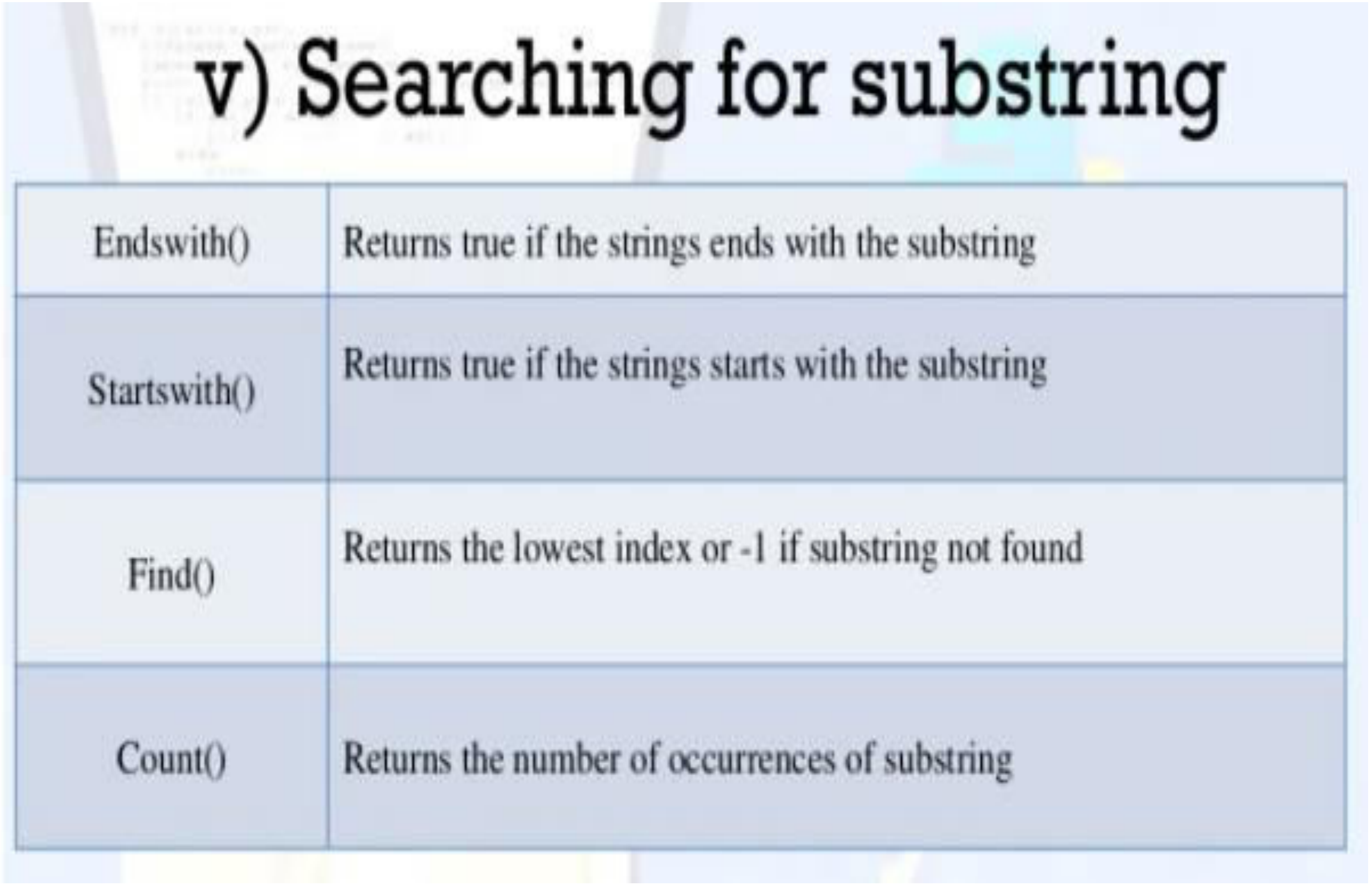


Program

```
a=input("Enter any string:")
print("Alphanumeric:",a.isalnum())
print("Alphabetic:",a.isalpha())
print("Digits:",a.isdigit())
print("Lowecase:",a.islower())
print("Upper:",a.isupper())
```

Output:

```
Enter any string:python
Alphanumeric: True
Alphabetic: True
Digits: False
Lowecase: True
Upper: False
```



v) Searching for substring

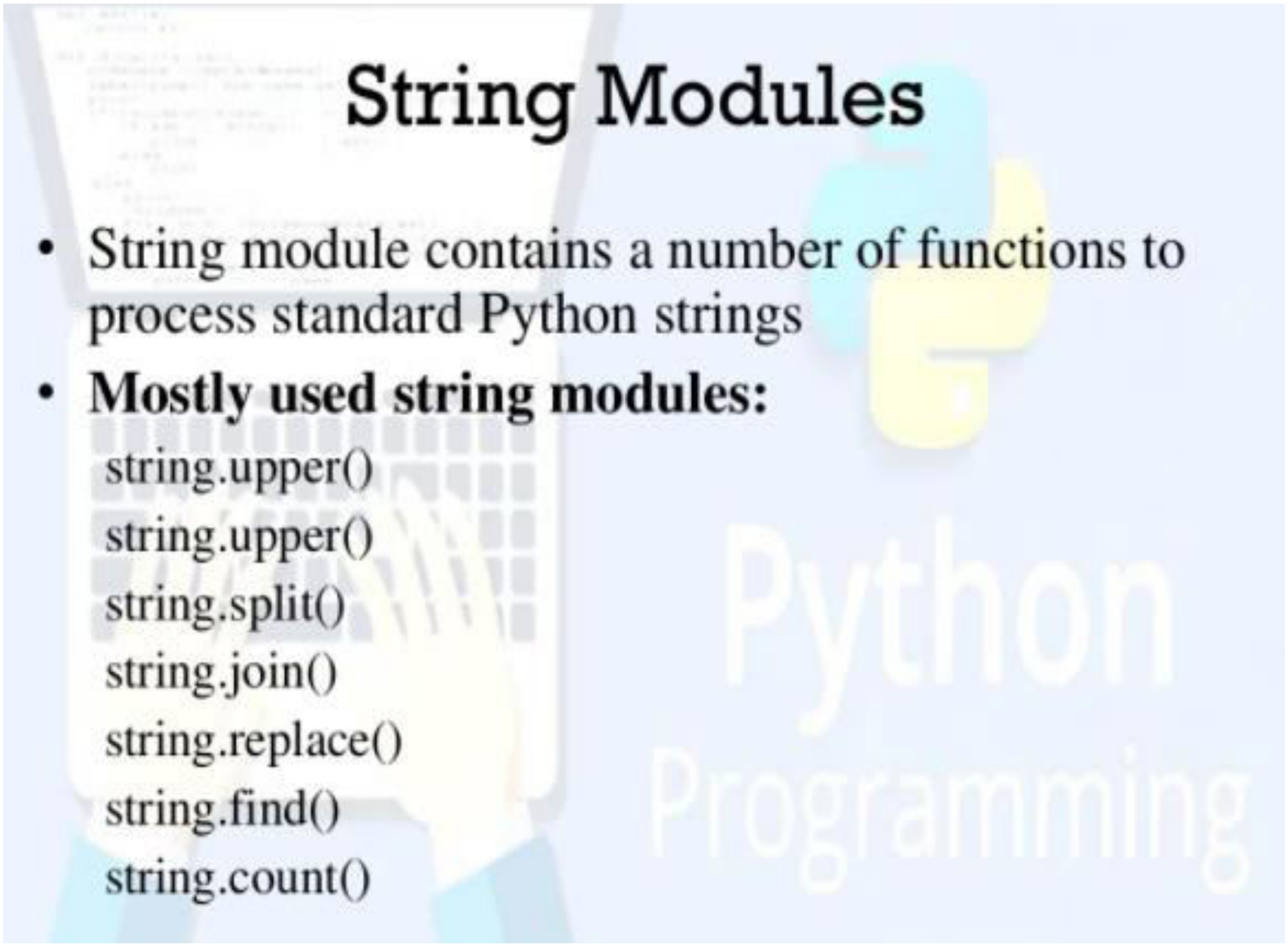
Endswith()	Returns true if the strings ends with the substring
Startswith()	Returns true if the strings starts with the substring
Find()	Returns the lowest index or -1 if substring not found
Count()	Returns the number of occurrences of substring

Program

```
a=input("Enter any string:")
print("Is string ends with thon:", a.endswith("thon"))
print("Is string starts with good:", a.startswith("good"))
print("Find:", a.find("ython"))
print("Count:", a.count(“o"))
```

Output:

```
Enter any string : welcome to python
Is string ends with thon: True
Is string starts with good: False
Find: 12
Count: 3
```



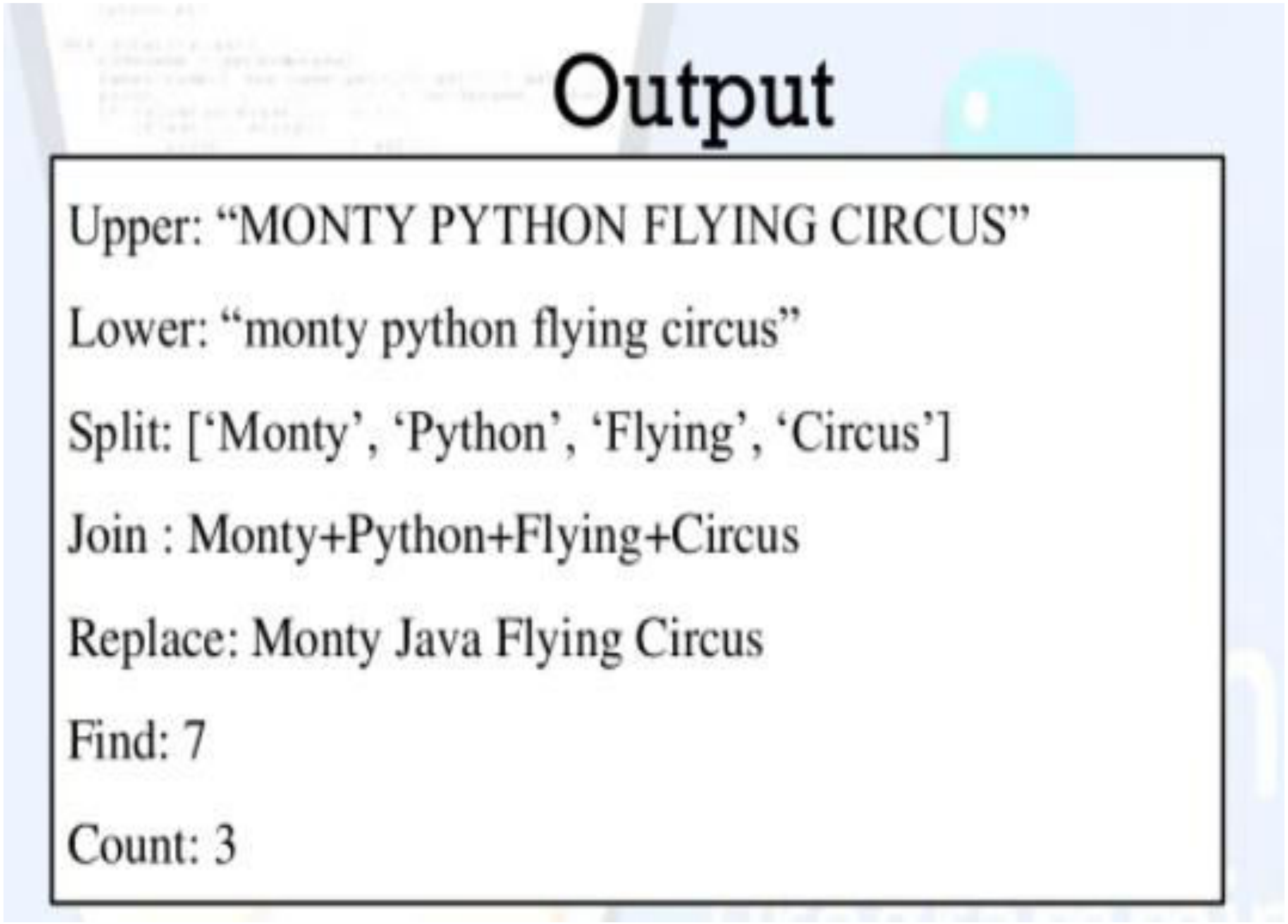
String Modules

- String module contains a number of functions to process standard Python strings
- **Mostly used string modules:**

  string.upper()
  string.upper()
  string.split()
  string.join()
  string.replace()
  string.find()
  string.count()

Example

```
import string
text="Monty Python Flying Circus"
print("Upper:", string.upper(text))
print("Lower:", string.lower(text))
print("Split:", string.split(text))
print("Join:", string.join(string.split(test),"+"))
print("Replace:", string.replace(text,"Python", "Java"))
print("Find:", string.find(text,"Python"))
print("Count", string.count(text,"n"))
```



Output

```
Upper: “MONTY PYTHON FLYING CIRCUS”

Lower: “monty python flying circus”

Split: [‘Monty’, ‘Python’, ‘Flying’, ‘Circus’]

Join : Monty+Python+Flying+Circus

Replace: Monty Java Flying Circus

Find: 7

Count: 3
```

Lists as arrays

- Both lists and arrays are used to store data in Python.
- Also these data structures allow indexing, slicing, and iterating.
- List is a built-in data structure whereas the *array* data structure belongs to the "must-import" category.
- ***NumPy* package** or the ***array* module** has the array functions.

Lists as arrays

Features of Lists	Features of Arrays
List items are enclosed in **square brackets**	Array items are enclosed in **square brackets**
Lists are **ordered**	Arrays are **ordered**
Lists are **mutable**	Arrays are **mutable**
List elements **do not need to be unique**	Array elements **do not need to be unique**
Elements can be of **different data types**	Depends on the **kind of array** used
Lists need not to be **declared**	Arrays need to be **declared**
Lists are **not efficient** storage structure for large amount of data	Arrays can store data very **compactly**
Lists **cannot** directly handle **math operations**	Arrays are great for **numerical operations**

Lists as arrays

Array module supports unique types

Program:

```
import array as arr
array_1 = arr.array("i", [3, 6, 9, 12])
print(array_1)
print(type(array_1))
```

List can be converted into arrays

Unicode character (b, B, u, h, H, i, I, l, L, q, Q, f or d)

Output:

```
array('i', [3, 6, 9, 12])
<class 'array.array'>
```

Lists as arrays

Example:

numpy supports different types

```
import numpy as np
array_2 = np.array(["numbers", 3, 6, 9, 12])
print (array_2)
print(type(array_2))
```

Output:

```
['numbers' '3' '6' '9' '12']
<class 'numpy.ndarray'>
```

Lists as arrays

Example:

```python
import numpy as np
array = np.array([3, 6, 9, 12])
division = array/3
print(division)
print (type(division))
```

arrays can handle math operations directly

Output:

```
[1. 2. 3. 4.]
<class 'numpy.ndarray'>
```

Summary

- Slicing means taking part of a string.
- To separate the starting and ending index of the slice “:” should be used.
- String functions and methods are categorized into converting, formatting, removing white space, testing and searching functions.
- String module has additional methods to support string operations.
- List is a built-in data structure whereas the *array* data structure belongs to the "must-import" category.
- List can easily be converted into arrays.

THANK YOU