Lab 01 (2 hrs): Programming Basics

Program 1: Type Hint, String, Bytes, Hex, Base64

In this program, you are required to learn basic concepts of Python 3.

Type hints is a feature to specify the type of a variable, which is useful for write correct codes. In all lab assignments, you are **required** to write Python 3 code with type hints feature. Recall that you are required to use **at least** Python 3.10, otherwise you might suffer from issues brings by type hints as PEP 563 has not become the default option until Python 3.10.

Your programs does the following:

- Read a byte array from the console input, where the byte array is expressed as a hex string (`str`). The console input is:

  ```
  deadbeef
  ```

- Decode the hex string as the byte array (`bytes`)
- Print each byte in the byte array as a decimal integer, with a space as the separator, i.e.:

  ```
  def output_bytes(in_bytes:bytes):
      for ch in in_bytes:
          print(ch, end=' ')
      print()
  ```

- Print each byte in the byte array as a hexadecimal integer, with a space as the separator
- Encode the byte array as a Base64 string(`str`), and output the string
- Read another byte array from the console input, where the byte array is expressed as a hex string (`str`). The console input is:

  ```
  4445414442454546
  ```

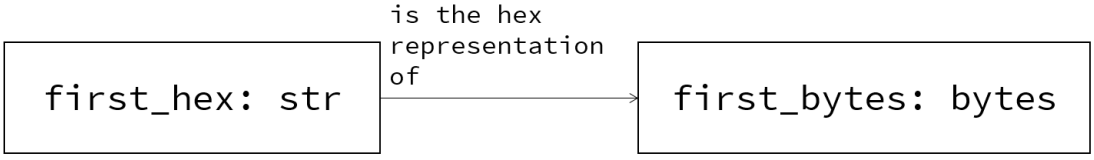
- Decode the hex string as the byte array (`bytes`)
- As the decoded byte array **happens to be** a UTF-8 (or, ASCII) encoded bytes, decode the byte array to the text string(`str`):

  ```
  def decode_utf8(in_bytes:bytes)->str:
      return in_bytes.decode('utf-8')
  ```

- Print the decoded text string

In your `readme.pdf` file, apart from the general information, it should include:

- A figure representing the relationship between all the variables in your program with type `bytes` and `str` . You may draw the figure either by hand or by the computer. Example here:



```
first_hex:str = input()
first_bytes:bytes = bytes.fromhex(first_hex)
```