Papers Dock

Dictionary

```
studentdict = {
    "Leon" : 27,
    "Ahmad" : 78,
    "Susie" : 64
}
```

PYTHON

9618

BINARY SEARCHING

Recap Of Linear Searching

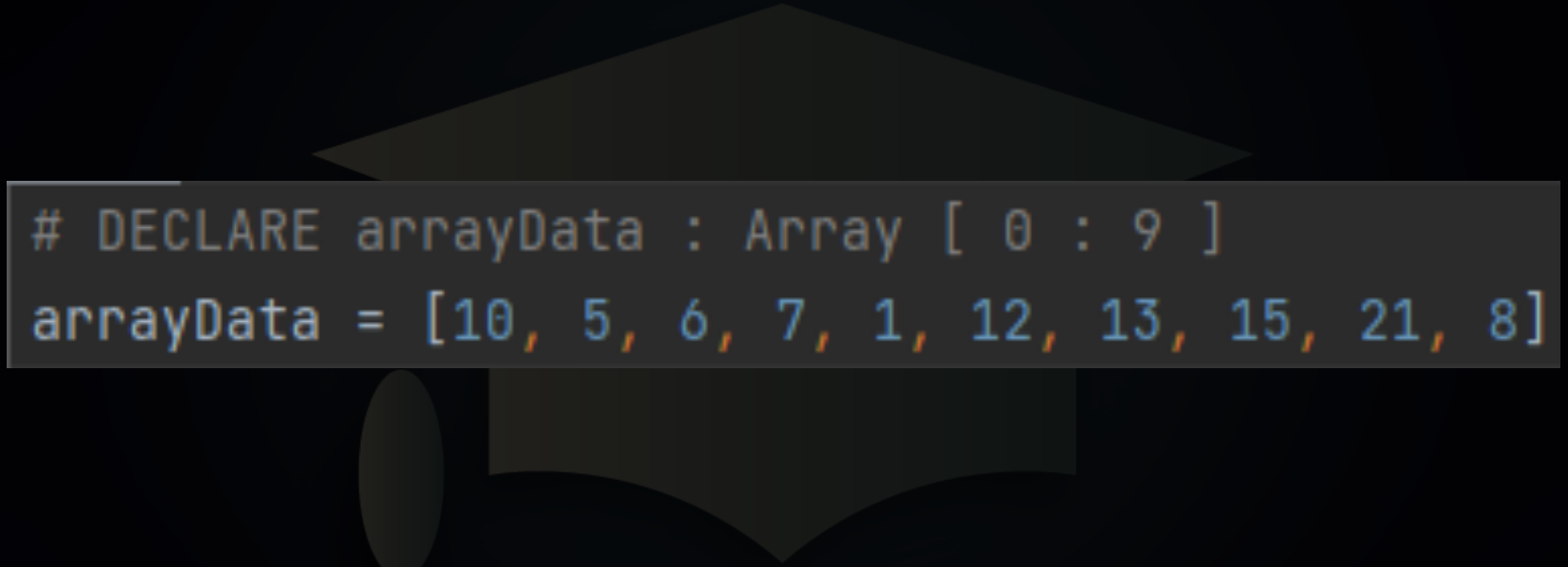
In this each element of an array is compared with the value to be found in order from lower bound to upper bound until the item is found or upper bound is reached

2 A program stores the following ten integers in a 1D array with the identifier `arrayData`.

10	5	6	7	1	12	13	15	21	8

(a) Write program code for a **new program** to:

- declare the global 1D array, `arrayData`, with ten elements
- initialise `arrayData` in the main program using the data values shown.


# DECLARE arrayData : Array [0 : 9]
arrayData = [10, 5, 6, 7, 1, 12, 13, 15, 21, 8]

(b) (i) A function, `linearSearch()`, takes an integer as a parameter and performs a linear search on `arrayData` to find the parameter value. It returns `True` if it was found and `False` if it was not found.

Write program code for the function `linearSearch()`.

```
def linearSearch(number):
    for x in range(0, 10):
        if arrayData[x] == number:
            return True
    return False
```

(ii) Edit the main program to:

- allow the user to input an integer value
- pass the value to `linearSearch()` as the parameter
- output an appropriate message to tell the user whether the search value was found

```
# DECLARE arrayData : Array [ 0 : 9 ]
arrayData = [10, 5, 6, 7, 1, 12, 13, 15, 21, 8]
value = int(input("Enter the Number"))
found = linearSearch(value)
if found == True:
    print("It was found")
else:
    print("Not Found")
```

Binary Searching

We find the mid value of an array

There could be 3 cases

1) Data is at mid-position
2) Data is < value at mid position
3) Data is > value at mid poisition

If the value required is > mid value then

Lowerbound = Midpoint + 1

If the value required is < mid value then

Upperbound = Midpoint - 1

arrayData = [10, 5, 6, 7, 1, 12, 13, 15, 21, 8]

Write the Binary Search Function and take the integer to be found as Parameter and return True if found and false if not found

```
# DECLARE arrayData : Array [ 0 : 9 ]
Data = [10, 5, 6, 7, 1, 12, 13, 15, 21, 8]
arrayData = [1, 5, 6, 7, 8, 10, 12, 13, 15, 21]

def BinarySearch(number):
    upperbound = 9 # len(arraydata) - 1
    lowerbound = 0
    valuefound = False
    notinlist = False

    while valuefound == False and notinlist == False:
        midpoint = int((upperbound + lowerbound) / 2)

        if arrayData[midpoint] == number:
            valuefound = True
            return True
        elif arrayData[midpoint] < number:
            lowerbound = midpoint + 1
        else:
            upperbound = midpoint - 1

        if lowerbound > upperbound:
            notinlist = True
            return False
```

* The array must be sorted to perform binary searching