Programming and Scripting

Lab Topic 05-Data Structures

## Introduction.

The first activity is a quiz, answers are at the end of this lab sheet.

For the programs in the other activities, I would suggest that you create a folder called labs and a subdirectory **Topic05-datastructures**, in the directory you push up to GitHub.

You can save the programs you create in this lab in there.

## Quiz:

1. look at this code and answer the questions below, answers at the end of the lab sheet

numberOfQuestions = 5

averageAge = 23.4

debugMode = True

name = "joe"

ages = []

months = ('Jan', 'Feb', 'Mar')

book = {}

stuff = [ 12 , 'Fred', False, {}]

someone = dict(firstname = "joe")

me = {

    "firstName" : "Andrew",

    "teaching"  : [{

        "courseName" : "programming",

        "semester" : 1

    },{

        "courseName" : "Data Representation",

        "semester" : 2

    }

    ]

}

Questions

What are the variable types of the following variables in the code above

* 1. numberOfQuestions
  2. averageAge
  3. debugMode
  4. name
  5. ages
  6. months
  7. months[1]
  8. book
  9. stuff
  10. stuff[2]
  11. someone
  12. someone["firstname"]
  13. me
  14. me["teaching"]
  15. me["teaching"][0]["semester"]

p is a trick question look at it carefully

* 1. me["teaching"][0]["coursename"]

1. Create a tuple that stores the months of the year, from that tuple create another tuple with just the summer months (May, June, July), print out the summer months one at a time.

May

June

july

Answer

months =("January",

            "February",

            "March",

            "April",

            "May",

            "June",

            "july",

            "August",

            "September",

            "October",

            "November",

            "December"

)

summer = months[4:7]

for month in summer:

    print(month)

1. Create a program that puts 10 random numbers into a queue(list), the program should then output all the values in the queue, then take the numbers from the queue one at a time, print it and the current numbers still in the queue. (the command pop(0) takes the first element out of a list)

queue is [17, 73, 31, 89, 42, 19, 83, 86, 49, 62]

current Number is 17 and the queue is [73, 31, 89, 42, 19, 83, 86, 49, 62]

current Number is 73 and the queue is [31, 89, 42, 19, 83, 86, 49, 62]

current Number is 31 and the queue is [89, 42, 19, 83, 86, 49, 62]

current Number is 89 and the queue is [42, 19, 83, 86, 49, 62]

current Number is 42 and the queue is [19, 83, 86, 49, 62]

current Number is 19 and the queue is [83, 86, 49, 62]

current Number is 83 and the queue is [86, 49, 62]

current Number is 86 and the queue is [49, 62]

current Number is 49 and the queue is [62]

current Number is 62 and the queue is []

the queue is now empty

Answer

import random

queue = []

numberOfNumbers=10

rangeTo=100

for n in range(0,numberOfNumbers):

    queue.append(random.randint(0,rangeTo))

print ("queue is {}".format(queue))

while len(queue) != 0:

    currentNumber = queue.pop(0)

    print ("current Number is {} and the queue is {} ".format(currentNumber, queue))

print ("the queue is now empty")

1. Write a program that stores a student name and a list of her courses and grades in a dict, the program should then print out her data.

The number of course she has could change.

We can hard code the values in this dict for this example

Student: Mary

Programming : 45

History : 99

Answer

student = {

    "name":"Mary",

    "modules": [

        {

            "courseName":"Programming",

            "grade": 45

        },

        {

            "courseName":"History",

            "grade":99

        }

    ]

}

print ("Student: {}".format(student["name"]))

for module in student["modules"]:

    print("\t {} \t: {}".format(module["courseName"], module["grade"]))

## Answers to Question 1

## 

1. int
2. float
3. boolean
4. str
5. array
6. tuple
7. str
8. dict
9. array
10. boolean (False)
11. dict
12. str
13. dict
14. array (is is nested in the dict)
15. int
16. undefined (the code has a capital N in courseName)