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List

Logic Algorithm

Tri Hadiah Muliawati

Politeknik Elektronika Negeri Surabaya
Department of Informatics and Computer Engineering,

Objectives:

1. Students able to understand the concept of list
2. Students able to implement the concept of list into flowchart and pseudocode

Subject:

1. Overview
2. Implementing list in flowchart and pseudocode

Overview

List

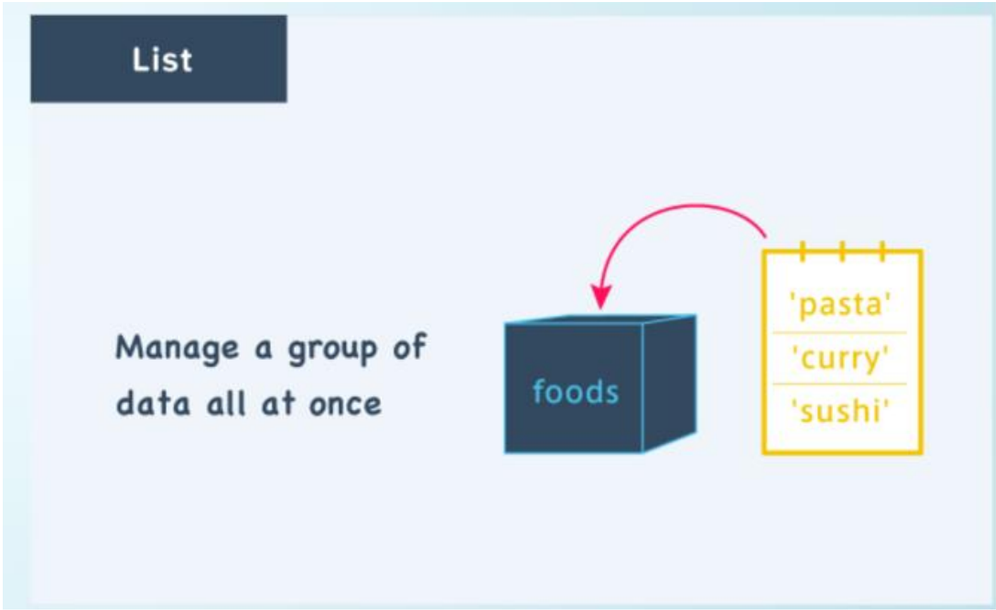
- A list is a sequence of several variables, grouped together under a single name.
- Commonly, it is used to store a collection of similar data items.
- Instead of storing a single item in each variable, we can group together several items into a single name and identify each item using index.

List vs Variable

Imagine you have three menus in your restaurant, which is "`pasta`", "`curry`", and "`sushi`". Instead of storing each menu in different variables (`food1`, `food2`, and `food3`), we can group them together using a list named `foods`.

List usage

- List of groceries
- List of menus
- List of students' scores
- List of students' name
- etc



Example

Objective:

A lecturer has to store her/his students score and calculate the class average score.

Answer

Objective:

A lecturer has to store her/his students score and print the class average score.

Algorithm

- Input N number of students
- For each student (1 … N) input his/her score
- Calculate the total score by adding each student's score
- Calculate the class average score by dividing the total score by N number of students
- Print the class average score

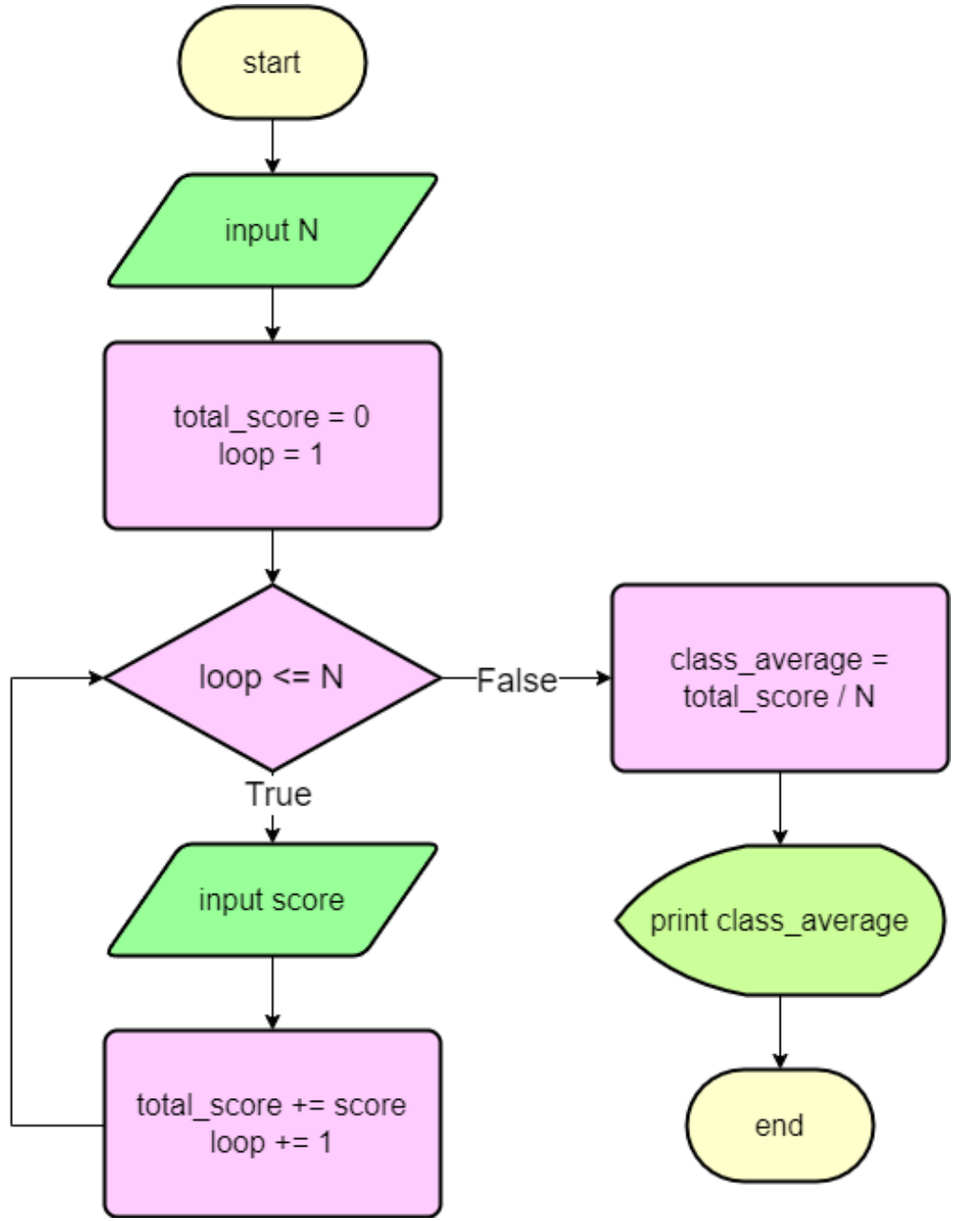
Answer

Objective:

A lecturer has to store her/his students score and print the class average score.

Algorithm

- Input N number of students
- For each student (1 … N) input his/her score and calculate the total score by adding each student's score
- Calculate the class average score by dividing the total score by N number of students
- Print the class average score



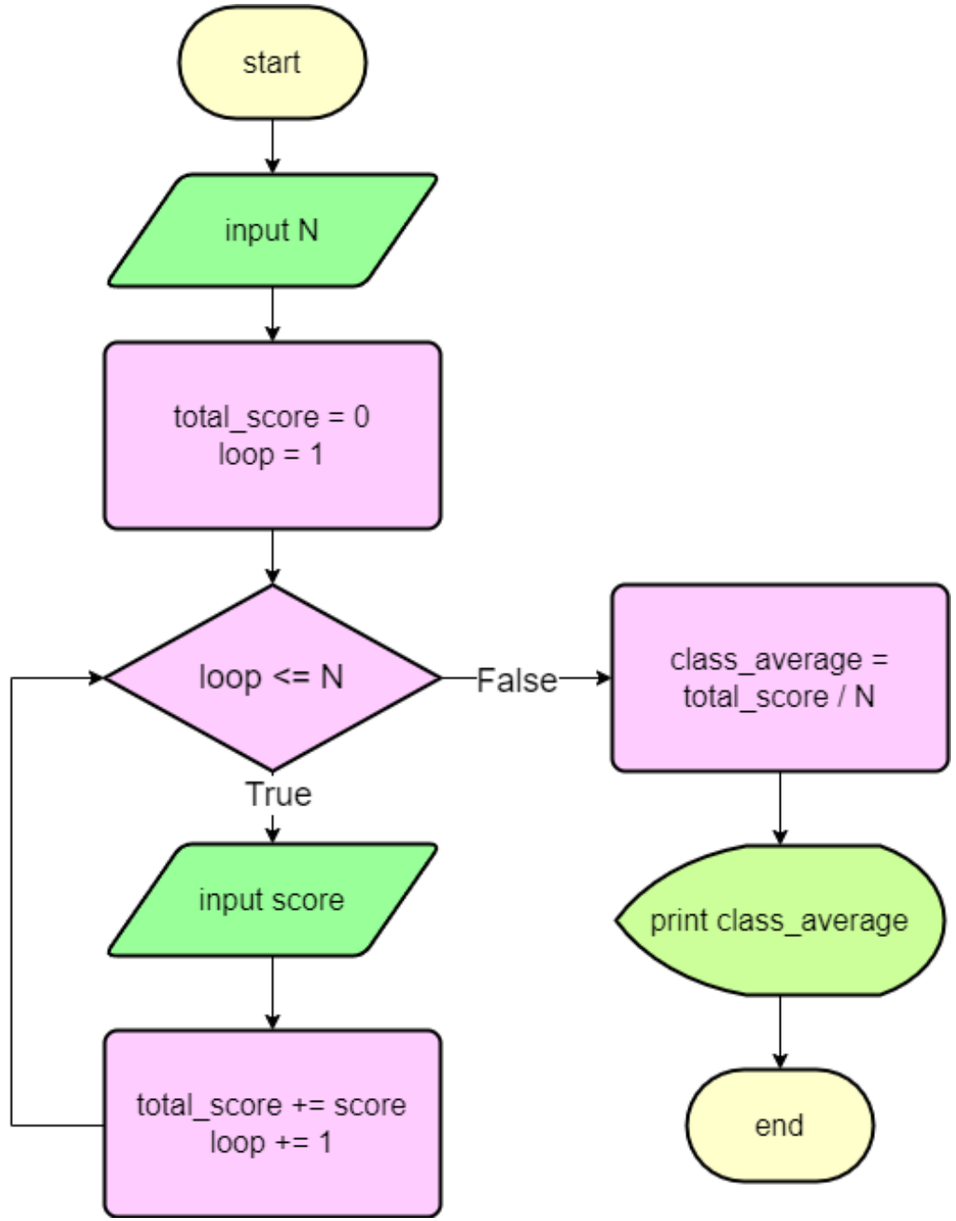
Answer

Objective:

A lecturer has to store her/his students score and print the class average score.

Pseudocode

- INPUT *N*
- *total_score* ← 0
- *loop* ← 1
- FOR *loop* in 1 to N then
- INPUT *score*
- *total_score* ← *total_score + score*
- *class_average* ← *total_score / N*
- PRINT *class_average*



Example

Objectives:

- A lecturer has to store her/his students score and calculate the class average score.
- In addition, he/she needs to display whether a certain student score is higher / lower / equal to the class average.

- In this case, using the previous approach (using `score` variable to store student's score) is not sufficient. Because the value of `score` variable is updated in each iteration.
- By the end of loop statement, `score` variable only stores the last imputed value. So we cannot retrieve other students' scores which have been imputed beforehand.
- To solve this problem, we can store students' scores in a collection namely list.

Answer

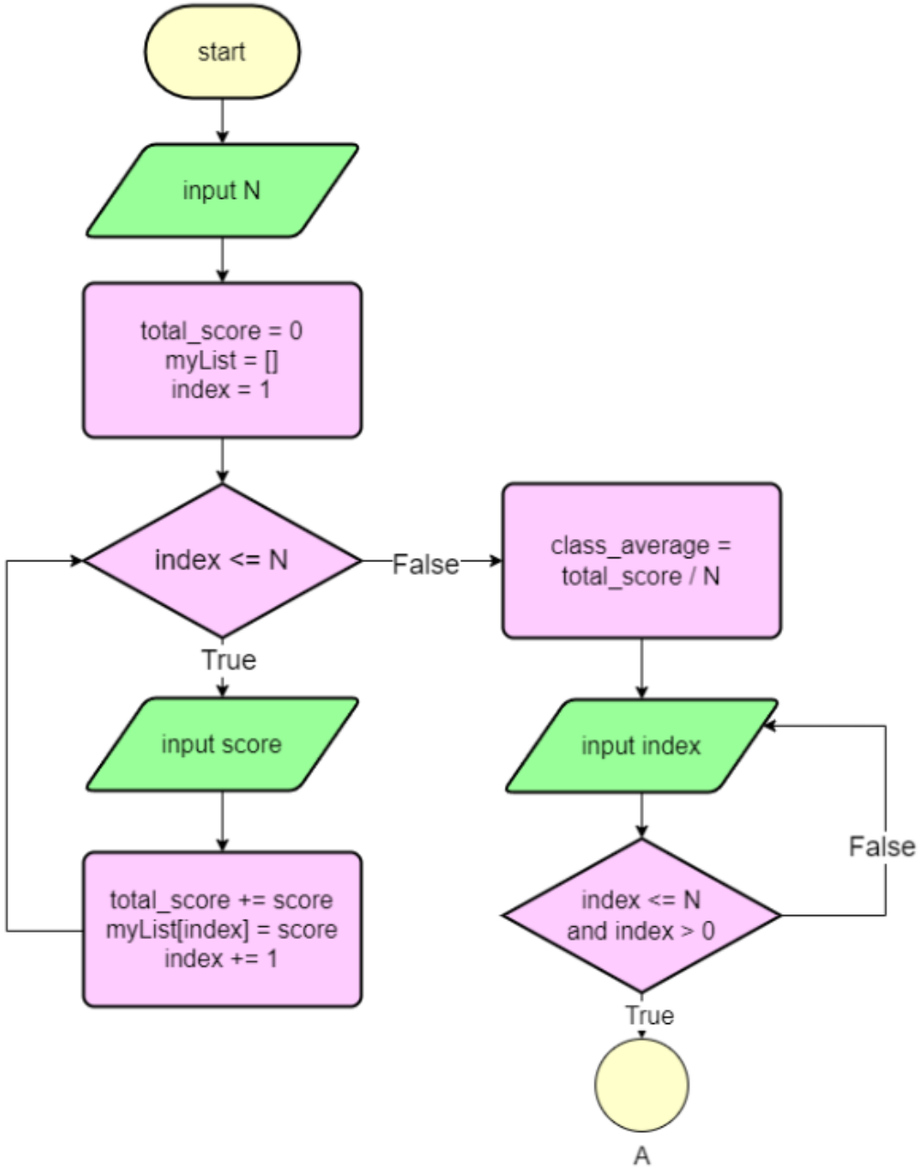
Algorithm:

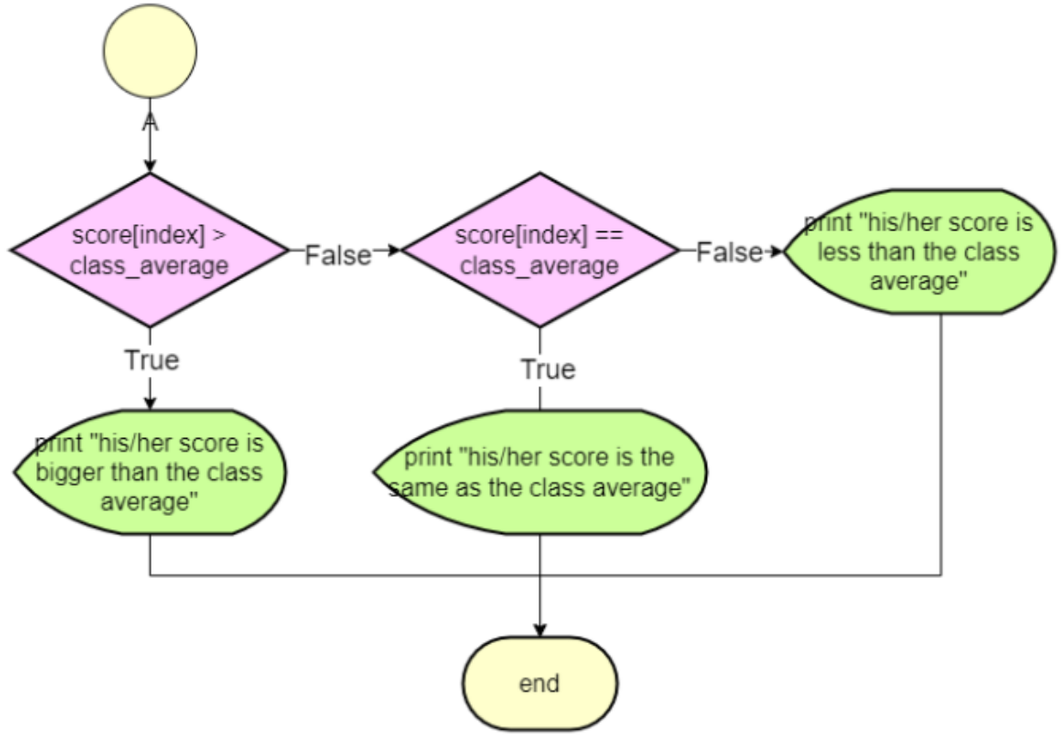
1. Input N number of students
2. Create a new list named myList
3. For each student (1 … N)
4. Input his/her score and save it into myList
5. Calculate the total score by adding each student's score
6. Calculate the class average score by dividing the total score by N number of students
7. Input student index
8. If index is not valid, ask user to re-enter the index
9. Else get student's score using its index and compare it to the class average score
10. Print the message accordingly

Answer

Pseudocode:

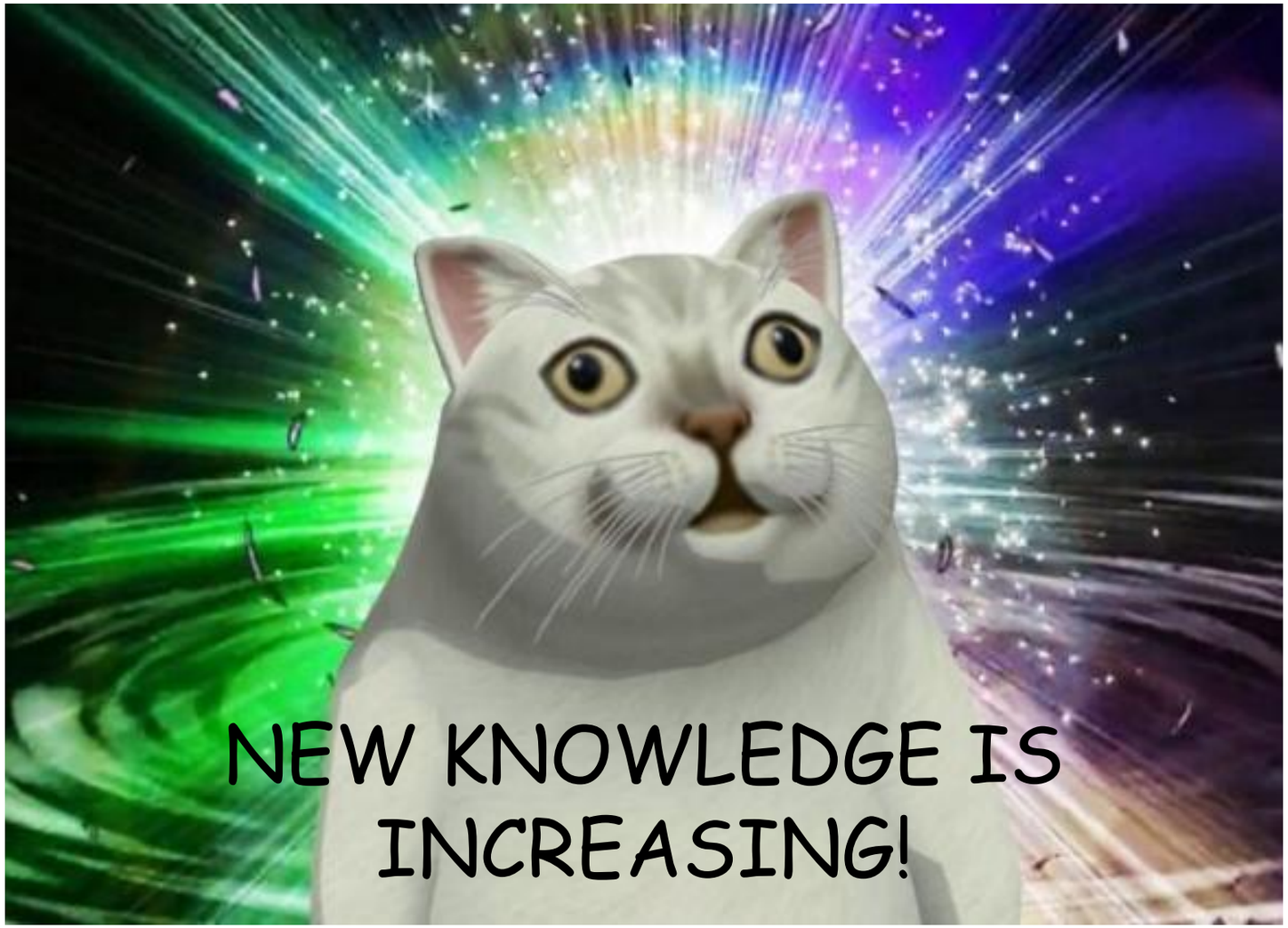
1. INPUT *N*
2. *myList* ← []
3. *total_score* = 0
4. FOR *index* in 1 to N THEN
5. INPUT *score*
6. *myList[index]* ← score
7. *total_score* = *total_score* + *score*
8. *class_average* = *total_score / N*
9. INPUT *Index*
10. IF *index* not in 1 to N, repeat step 9
11. IF *myList[index]* > *class_average*, PRINT “her/his score is bigger than the class average score”
12. ELSE IF *myList[index]* == *class_average*, PRINT “her/his score is the same as the class average score”
13. ELSE PRINT “her/his score is the same as the class average score”


start
input N
total_score = 0
myList = []
index = 1
index <= N
False
True
input score
total_score += score
myList[index] = score
index += 1
class_average =
total_score / N
input index
index <= N
and index > 0
False
True
A


A
score[index] >
class_average
False
score[index] ==
class_average
False
print "his/her score is
less than the class
average"
True
True
print "his/her score is
bigger than the class
average"
print "his/her score is the
same as the class average"
end

Summary

- A list is a sequence of several variables, grouped together under a single name and commonly used to store a collection of similar data items.
- List implementation utilizes loop / iteration


NEW KNOWLEDGE IS
INCREASING!

Reference

- Karl, Beecher. "Computational Thinking: A Beginner's Guide to Problem-Solving and Programming." Swindon, UK: BCS, The Chartered Institute for IT (2017).

Task

Create a solution to the following problem using Algorithms, Pseudocode, and Flowcharts.

An online store records the number of items sold each day for the past month. The manager wants to analyze the sales data using the following rules:

1. Find the highest value and the day on which the sale occurred.
2. Find the lowest value and the day on which the sale occurred.
3. Calculate the average sales for the month.

THANK YOU!