LECTURE 06
PROGRAM DESIGN

Lists

Lecture Overview

- Introduction to Lists [Arrays]
- Flowchart representation of Lists [Arrays]
- Pseudocode representation of Lists [Arrays]

Example 1– Process student marks

Design a program that will prompt for and receive 10 examination marks from a mathematics test, compute the class average, and display all the marks and the class average to the screen.

Lists – Data Structure

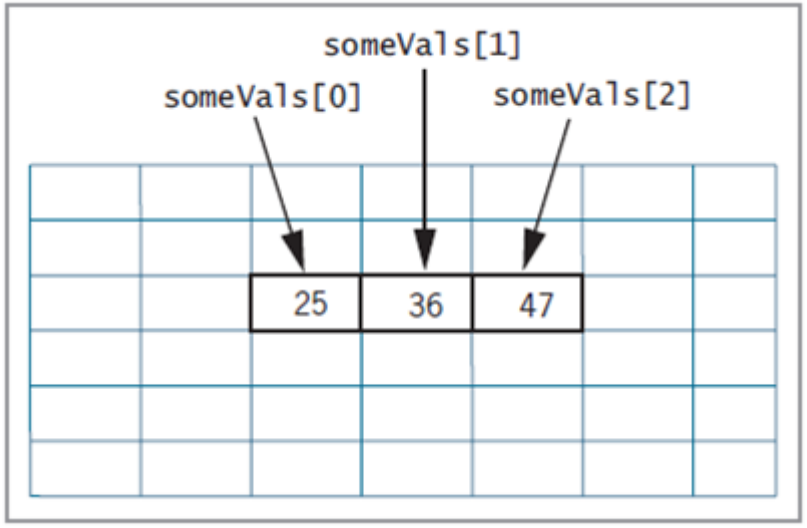
Lists

- Series or list of variables in computer memory
- All variables share the same name
- Each variable has a different index

- Index (or Subscript)
  - Position number of an item in a list
  - Indexes are always a sequence of integers

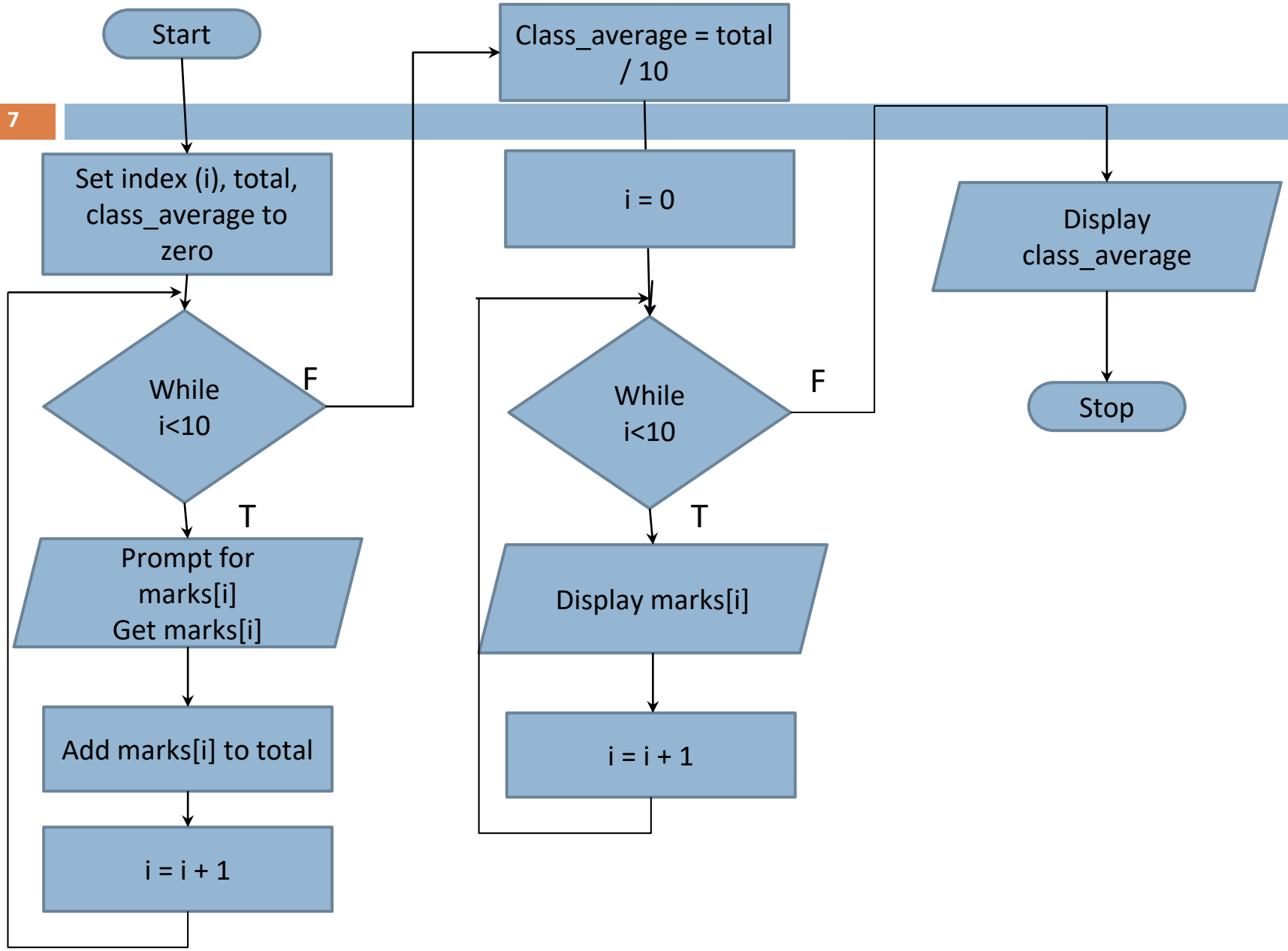
How List Occupy Computer Memory

- Each item has same name
- Element: an item in the list
- List elements are contiguous in memory
- Size of the list: number of elements it will hold



Structures used

- An array to store exam marks – “marks”
- An index to identify the element – index
- A DOWHILE loop to accept scores
- Another DOWHILE loop to display the scores.


Start
Set index (i), total, class_average to zero
While i<10
F
T
Prompt for marks[i]
Get marks[i]
Add marks[i] to total
i = i + 1
Class_average = total / 10
i = 0
While i<10
F
T
Display marks[i]
i = i + 1
Display class_average
Stop

Pseudocode


```
Calculate_class_average
1.          Set total, class_average to zero
2           Set i to zero
3           DOWHILE  i < 10
4                       Prompt for marks[i]
5                       Get marks[i]
6                       Add marks[i] to total
7                       Add 1 to i
            ENDDO
8            class_average = total / 10
9           Set i to zero
            DOWHILE  i < 10
10                      Display marks[i]
11                      Add 1 to i
            ENDDO
12          Display class_average
END
```

Example 2 – Process Temperature

Design a program that will prompt for and receive 15 Fahrenheit temperatures to be converted to Celsius temperatures.

The program is expected to display all the Celsius temperatures along with the average Celsius temperature to the screen.

Draw a flowchart & a Pseudocode for the above algorithm.

Example 3 – Process Student Marks

Write a Pseudocode for a program that will receive a list of 20 test marks through the keyboard and finds the highest test marks and finds the number of the students whose score is 50 or above. Print the 20 test marks, highest mark and the number of student count who has scored more than 50 to the screen.

Draw the flowchart for the above scenario

Example 4 – Process Numbers

You are required to write a Pseudocode for a program to accept 10 numbers.

(i) Modify the above to display the numbers entered in reverse order.

(ii) Modify the Pseudocode to search whether a given number is in the list. If the number is found return message “The number x is found in the list” otherwise “Sorry number is not found” to the screen.