Objectives are to:
1.   Continue to practise on the use of arrays, repetition, decisions and functions in solving bigger problems.
2.   Also, continue to practise on use of flowcharts.

Que. 1. For the following problem, give the structure chart, programs and flowcharts.

The class quiz consists of 20 True/False questions. There are 50 students who wrote the test. You are required to write a program to calculate the students' grades based on the following. If a student gets 90% or more, he gets an A, but a total score of 80% to 89% receives a B. A score of 70% to 79% receives a C grade, while a score of 60% to 69% receives a D. Anything lower than 60% gets a grade of an F.
Each student's ID and test answers will be entered. The output will be each student's ID, number correct, and grade, along with the single highest score for the class. Hint: You can use four one-dimensional arrays and any other needed structures.

Hints on how to solve

i. In understanding the problem, the following shows the sample input data and output data from the problem description.

ID[4][10]	Answer [4][20]					Numcrrt[4]	Grade[4]
20031	0	1	.....	0	0	19	A
20032	1	1	.....	0	1	14	C
20033	0	1	.....	0	1	10	F
20034	1	0	......	0	0	12	D

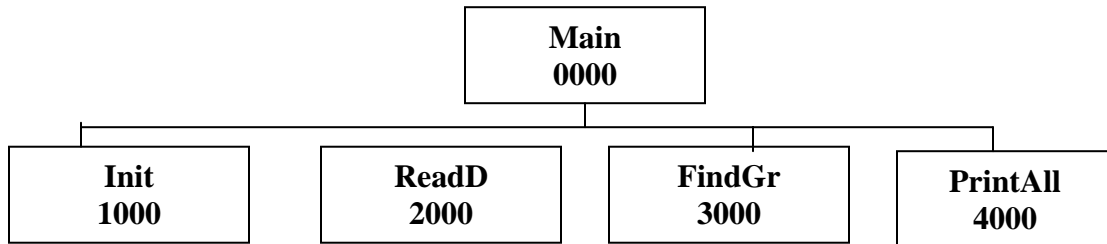| Anskey[20]					highestscore
0	1	......	0	0	19

ii.   To be able to test the program, use smaller sized data. Use only 2 students and 5 test questions and test your program with the following sample data:

```
20031
1  0 1 1 1
20032
0  0 0 1 1
1  0 1 1 0
```

iii.　　You may use the following structure chart.

- Use the Init function to initialize Number_correct array to 0.
- Use the ReadD function to read input data (ID, Answer, Anskey).
- Use the FindGr function to compute the grade for each student and the highest score.
- Use the function PrintAll to print all output.

iv.　　Type in the following part of the solution, which only reads in the input data with the function ReadD and prints only the ID, Answers and Anskey read with the function PrintAll. Your job is to first type and run this program to ensure that you are reading your data well, then, complete the program by writing the function prototypes, calls and definitions for the functions Init, FindGr and PrintAll that will solve the given problem.

```
/*To be able to test the program, I am substituting  2 for 50 students and 5
for 20 questions. Thus,  2 students write 5 True/False questions
Calculate grades based on the scale:
 A: 90% to 100%
 B: 80% to 89%
 C: 70% to 79%
 D: 60% to 69%
 F: below 60%                                        */

#define    numrow  2
#define    numcol   5
#include <stdio.h>
/*declare function prototypes*/
void ReadD (char [][10], int [][numcol], int []);
void PrintAll (char [][10], int [][numcol], int []);

int main () {
```

```c
    char ID[numrow][10];
    int answers[numrow][numcol], anskey[numcol];

    ReadD (ID, answers, anskey);
    PrintAll (ID, answers, anskey);
    return 0;
   }

  /* Here is function definition for ReadD                    */
  /*read data into arrays of studentID, answers, answer key */
  void ReadD (char ID[][10], int answers[][numcol], int anskey[])
  {
   int r, c;
  for (r=0; r<numrow; r++) {
     scanf ("%s", ID[r]);
    for (c=0; c<numcol; c++){
      scanf ("%d", &answers[r][c]);
  }
   }  /* end of outer for r  */
  for (c=0; c<numcol; c++)
     scanf ("%d", &anskey[c]);

  } /* end of function ReadD  */


  /*The PrintAll function here is used to print only data read */
  void PrintAll (char ID[][10], int answers[][5], int anskey[])
  {
   int r, c;
   printf ("ID     Answers \n");
   for (r=0; r<numrow; r++){
    printf("%s", ID[r]);
    for (c=0; c<numcol; c++) {
                 printf ("%d", answers[r][c]);}
         printf(" \n");       }          /* end of outer for r */
   printf("The answer key is: \n");
   for (c=0; c<numcol; c++) {
                 printf ("%d", anskey[c]);} /* end of for c */
  }                 /* end of function PrintAll  */
```

iv. When you run the above sample program, you need to type in input data at the keyboard in the order you asked for them to be read in the function ReadD. You should type each ID on a separate line, followed by the 5 answers for this ID on the next line. At the end, you should type the 5 answers in the answer key. The input at the keyboard should look like the following:

```
20031
1  0 1 1 1
20032
1  0 0 1 1
1 0 1 1 0
```

Hand in your completed work to lab instructor and GA in a script file.

Que. 2. Solve any of the string processing questions in section 8.8 of book, questions 8, 9, 10, 11.