**SSN COLLEGE OF ENGINEERING (Autonomous)**

**Affiliated to Anna University**

**DEPARTMENT OF CSE**

**UCS 1211 PROGRAMMING IN C LABORATORY**

**A3: Array handling in C**

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**CLASS: CSE-B (SEMESTER-2)**

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***1. The number 138 is called well ordered because the digits in the number (1,3,8) increase from left to right. (1 < 3 < 8). The number 365 is not well ordered. Write a program that will find and display all possible three digit well-ordered numbers. Also display the total number of three digit well-ordered numbers. Make use of Arrays.***

**PROGRAM:**

#include<stdio.h>

void main()

{

int n;

int num[500],x,y=0;

int con(int m);

printf("Enter the number of terms:");

scanf("%d",&n);

for(int i=0;i<n;i++)

{

printf("Enter the %dth three digit number:",i+1);

scanf("%d",&num[i]);

}

num[n]='\0';

for (int j=0;j<n;j++)

{

int m=num[j];

x=con(m);

if (x==0)

{

y+=0;

}

else

{

y+=1;

printf("well ordered no:%d\n",m);

}

}

printf("Number of well ordered numbers are:%d\n",y);

}

int con(int m)

{

int a=0,b=9,flag;

for (int i=0;i<3;i++)

{

a=m%10;

if (a<=b)

{

m=m/10;

flag=1;

b=a;

}

else

{

flag=0;

break;

}

}

return flag;

}

**OUTPUT:**

cseb121@jtl-19:~$gcc wellordered.c –o a3\_1

cseb121@jtl-19:~$./ a3\_1

Enter the number of terms:5

Enter the 1th three digit number:123

Enter the 2th three digit number:679

Enter the 3th three digit number:565

Enter the 4th three digit number:378

Enter the 5th three digit number:512

well ordered no:123

well ordered no:679

well ordered no:378

Number of well ordered numbers are:3

***2. Write a program that accepts a set of digits (0 to 9) as input and prints a vertical histogram representing the occurrences of each digit. Test your program with the set of 13 digits: 1, 7, 2 , 9, 6, 7, 1, 3, 7, 5, 7, 9, 0***

**PROGRAM:**

#include<stdio.h>

void main()

{

int str1[20],str2[10];

int n;

printf("Enter number of terms in array:");

scanf("%d",&n);

for (int i=0;i<n;i++)

{

printf("Enter the %d th term:",i+1);

scanf("%d",&str1[i]);

}

str1[n]='\0';

for (int i=0;i<10;i++)

{

str2[i]=0;

}

str2[10]='\0';

for(int i=0;i<n;i++)

{

if(str1[i]==0)

{

str2[0]+=1;

}

else if(str1[i]==1)

{

str2[1]+=1;

}

else if(str1[i]==2)

{

str2[2]+=1;

}

else if(str1[i]==3)

{

str2[3]+=1;

}

else if(str1[i]==4)

{

str2[4]+=1;

}

else if(str1[i]==5)

{

str2[5]+=1;

}

else if(str1[6]==1)

{

str2[6]+=1;

}

else if(str1[i]==6)

{

str2[7]+=1;

}

else if(str1[i]==8)

{

str2[8]+=1;

}

else if(str1[i]==9)

{

str2[9]+=1;

}

}

int a=0;

for (int i=0;i<n;i++)

{

if (str2[i]>a)

{

a=str2[i];

}

else

{

a=a;

}

}

for (int i=a;i>0;i--)

{

for(int j=0;j<10;j++)

{

if(str2[j]>=i)

{

printf("\*");

}

else

{

printf(" ");

}

}

printf("\n");

}

for (int i=0;i<10;i++)

{

printf("%d",i);

}

printf("\n");

}

**OUTPUT:**

cseb121@jtl-19:~$gcc verticalhistogram.c –o a3\_2

cseb121@jtl-19:~$./ a3\_2

Enter number of terms in array:7

Enter the 1 th term:1

Enter the 2 th term:2

Enter the 3 th term:3

Enter the 4 th term:4

Enter the 5 th term:3

Enter the 6 th term:2

Enter the 7 th term:8

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\*\*\*\* \*

0123456789

***3. Given an array of integers, push all the zero’s of a given array to the end of the array. Write a program in C that implements the function pushZerosToEnd(int arr[], int n).***

**PROGRAM:**

#include<stdio.h>

void pushZeroToEnd(int arr[],int n);

void main()

{

int n,arr[100];

printf("Enter the number of terms:");

scanf("%d",&n);

for (int i=0;i<n;i++)

{

printf("Enter the %d th number:",i+1);

scanf("%d",&arr[i]);

}

arr[n]='\0';

printf("Elements of the old array:\n");

for (int i=0;i<n;i++)

{

printf("%dth element is:%d\n",i+1,arr[i]);

}

pushZeroToEnd(arr,n);

}

void pushZeroToEnd(int arr[],int n)

{

for (int i=0;i<n;i++)

{

for (int j=0;j<n;j++)

{

if(arr[j+1]!='\0')

{

if(arr[j]==0)

{

arr[j]=arr[j+1];

arr[j+1]=0;

j+=1;

}

else

{

arr[j]=arr[j];

}

}

}

}

printf("Elements of the new array:\n");

for(int i=0;i<n;i++)

{

printf("%dth element is:%d\n",i+1,arr[i]);

}

}

**OUTPUT:**

cseb121@jtl-19:~$gcc pushzero.c –o a3\_3

cseb121@jtl-19:~$./ a3\_3

Enter the number of terms:6

Enter the 1 th number:1

Enter the 2 th number:0

Enter the 3 th number:5

Enter the 4 th number:0

Enter the 5 th number:4

Enter the 6 th number:0

Elements of the old array:

1th element is:1

2th element is:0

3th element is:5

4th element is:0

5th element is:4

6th element is:0

Elements of the new array:

1th element is:1

2th element is:5

3th element is:4

4th element is:0

5th element is:0

6th element is:0

***4. Write an interactive C program to process the exam scores for a group of students in a C programming course. Begin by specifying the number of exam scores for each student (assume this value is the same for all students in the class). Then enter each student’s name and exam scores. Calculate an average score for each student, and an overall class average (an average of the individual student averages). Display the overall class average, followed by the name, the individual exam scores and the average score for each student. Store the student names in a twodimensional character array, and store the exam scores in a two-dimensional floating-point array. Make the program as general as possible. Label the output clearly***

**PROGRAM:**

#include<stdio.h>

#include<string.h>

void display(char names[50][15],int marks[50][6],int n);

void main()

{

int n;

printf("Enter the number of students:");

scanf("%d",&n);

char names[50][15];

int marks[50][6];

for (int i=0;i<n;i++)

{

printf("Enter the %d student name:",i+1);

scanf("%s",names[i]);

}

for (int i=0;i<n;i++)

{

for (int j=0;j<6;j++)

{

printf("Enter the %d student's %dth mark:",i+1,j+1);

scanf("%d",&marks[i][j]);

}

}

display(names,marks,n);

}

void display(char names[50][15],int marks[50][6],int n)

{

float av=0,classav=0;

for (int i=0;i<n;i++)

{

printf("%s\t",names[i]);

for (int j=0;j<6;j++)

{

printf("%d\t",marks[i][j]);

av+=marks[i][j];

}

printf("Average:%.2f",av/6);

classav+=av/6;

av=0;

printf("\n");

}

printf("Class Average is:%.2f",classav/n);

}

**OUTPUT:**

cseb121@jtl-19:~$gcc smarks.c –o a3\_4

cseb121@jtl-19:~$./ a3\_4

Enter the number of students:6

Enter the 1 student name:Adams

Enter the 2 student name:Brown

Enter the 3 student name:Rohit

Enter the 4 student name:Raina

Enter the 5 student name:Kohli

Enter the 6 student name:Fisher

Enter the 1 student's 1th mark:67

Enter the 1 student's 2th mark:78

Enter the 1 student's 3th mark:89

Enter the 1 student's 4th mark:76

Enter the 1 student's 5th mark:98

Enter the 1 student's 6th mark:98

Enter the 2 student's 1th mark:87

Enter the 2 student's 2th mark:67

Enter the 2 student's 3th mark:89

Enter the 2 student's 4th mark:78

Enter the 2 student's 5th mark:89

Enter the 2 student's 6th mark:87

Enter the 3 student's 1th mark:67

Enter the 3 student's 2th mark:98

Enter the 3 student's 3th mark:87

Enter the 3 student's 4th mark:67

Enter the 3 student's 5th mark:89

Enter the 3 student's 6th mark:78

Enter the 4 student's 1th mark:67

Enter the 4 student's 2th mark:89

Enter the 4 student's 3th mark:65

Enter the 4 student's 4th mark:78

Enter the 4 student's 5th mark:89

Enter the 4 student's 6th mark:78

Enter the 5 student's 1th mark:2

Enter the 5 student's 2th mark:1

Enter the 5 student's 3th mark:4

Enter the 5 student's 4th mark:5

Enter the 5 student's 5th mark:56

Enter the 5 student's 6th mark:4

Enter the 6 student's 1th mark:65

Enter the 6 student's 2th mark:76

Enter the 6 student's 3th mark:87

Enter the 6 student's 4th mark:98

Enter the 6 student's 5th mark:56

Enter the 6 student's 6th mark:34

name mark1 mark2 mark3 mark4 mark5 mark6 Average

Adams 67 78 89 76 98 98 84.33

Brown 87 67 89 78 89 87 82.83

Rohit 67 98 87 67 89 78 81.00

Raina 67 89 65 78 89 78 77.66

Kohli 99 99 99 99 99 99 99.00

Fisher 65 76 87 98 56 34 69.33

Class Average is:82.360

***a) Modify this program to allow for unequal weighting of the individual exam scores. In particular, assume that each of the first four exams contributes 15 percent to the final score, and each of the last two exams contributes 20 percent.***

**PROGRAM:**

#include<stdio.h>

#include<string.h>

void display(char names[50][15],int marks[50][6],int n);

void main()

{

int n;

printf("Enter the number of students:");

scanf("%d",&n);

char names[50][15];

int marks[50][6];

for (int i=0;i<n;i++)

{

printf("Enter the %d student name:",i+1);

scanf("%s",names[i]);

}

for (int i=0;i<n;i++)

{

for (int j=0;j<6;j++)

{

printf("Enter the %d student's %dth mark:",i+1,j+1);

scanf("%d",&marks[i][j]);

}

}

display(names,marks,n);

}

void display(char names[50][15],int marks[50][6],int n)

{

float av=0,classav=0;

printf("name\t");

for(int k=0;k<6;k++)

{

printf("mark%d\t",k+1);

}

printf("Final Score\n");

for (int i=0;i<n;i++)

{

printf("%s\t",names[i]);

for (int j=0;j<6;j++)

{

printf("%d\t",marks[i][j]);

if(j<4)

{

av+=0.15\*marks[i][j];

}

else

{

av+=0.20\*marks[i][j];

}

}

printf("%.2f",av);

classav+=av;

av=0;

printf("\n");

}

printf("Class Average is:%.2f",classav/n);

}

**OUTPUT:**

cseb121@jtl-19:~$gcc smarks.c –o a3\_4\_1

cseb121@jtl-19:~$./ a3\_4\_1

Enter the number of students:4

Enter the 1 student name:Prince

Enter the 2 student name:Richards

Enter the 3 student name:Smith

Enter the 4 student name:Thomas

Enter the 1 student's 1th mark:85

Enter the 1 student's 2th mark:75

Enter the 1 student's 3th mark:60

Enter the 1 student's 4th mark:85

Enter the 1 student's 5th mark:90

Enter the 1 student's 6th mark:100

Enter the 2 student's 1th mark:50

Enter the 2 student's 2th mark:60

Enter the 2 student's 3th mark:50

Enter the 2 student's 4th mark:35

Enter the 2 student's 5th mark:65

Enter the 2 student's 6th mark:70

Enter the 3 student's 1th mark:10

Enter the 3 student's 2th mark:20

Enter the 3 student's 3th mark:55

Enter the 3 student's 4th mark:45

Enter the 3 student's 5th mark:75

Enter the 3 student's 6th mark:45

Enter the 4 student's 1th mark:25

Enter the 4 student's 2th mark:85

Enter the 4 student's 3th mark:75

Enter the 4 student's 4th mark:65

Enter the 4 student's 5th mark:45

Enter the 4 student's 6th mark:35

name mark1 mark2 mark3 mark4 mark5 mark6 Final Score

Prince 85 75 60 85 90 100 83.75

Richards 50 60 50 35 65 70 56.25

Smith 10 20 55 45 75 45 43.50

Thomas 25 85 75 65 45 35 53.50

Class Average is:59.25

***b) Extend the program so that the deviation of each student's average from the overall class average can be determined. Display the class average, followed by each student's name, individual exam scores, final score, and the deviation from the class average. Be sure that the output is logically organized and clearly labelled.***

**PROGRAM:**

#include<stdio.h>

#include<string.h>

void display(char names[50][15],int marks[50][6],int n);

void main()

{

int n;

printf("Enter the number of students:");

scanf("%d",&n);

char names[50][15];

int marks[50][6];

for (int i=0;i<n;i++)

{

printf("Enter the %d student name:",i+1);

scanf("%s",names[i]);

}

for (int i=0;i<n;i++)

{

for (int j=0;j<6;j++)

{

printf("Enter the %d student's %dth mark:",i+1,j+1);

scanf("%d",&marks[i][j]);

}

}

display(names,marks,n);

}

void display(char names[50][15],int marks[50][6],int n)

{

float av=0,classav=0,average[6],sd;

int i;

for (i=0;i<n;i++)

{

for (int j=0;j<6;j++)

{

if(j<4)

{

av+=0.15\*marks[i][j];

}

else

{

av+=0.20\*marks[i][j];

}

}

average[i]=av;

classav+=av;

av=0;

}

classav=classav/n;

printf("Class Average is:%.2f\n",classav);

printf("name\t");

for(int k=0;k<6;k++)

{

printf("mark%d\t",k+1);

}

printf("Average\t");

printf("Std Deviation\n");

for (int i=0;i<n;i++)

{

printf("%s\t",names[i]);

for (int j=0;j<6;j++)

{

printf("%d\t",marks[i][j]);

}

printf("%.2f\t",average[i]);

sd=classav-average[i];

printf("%.2f\n",sd);

}

}

**OUTPUT:**

cseb121@jtl-19:~$gcc smarks1.c –o a3\_4\_2

cseb121@jtl-19:~$./ a3\_4\_2

Enter the number of students:4

Enter the 1 student name:Rahul

Enter the 2 student name:Krish

Enter the 3 student name:Prakash

Enter the 4 student name:Kamal

Enter the 1 student's 1th mark:95

Enter the 1 student's 2th mark:85

Enter the 1 student's 3th mark:75

Enter the 1 student's 4th mark:85

Enter the 1 student's 5th mark:85

Enter the 1 student's 6th mark:75

Enter the 2 student's 1th mark:45

Enter the 2 student's 2th mark:95

Enter the 2 student's 3th mark:95

Enter the 2 student's 4th mark:85

Enter the 2 student's 5th mark:85

Enter the 2 student's 6th mark:65

Enter the 3 student's 1th mark:80

Enter the 3 student's 2th mark:90

Enter the 3 student's 3th mark:85

Enter the 3 student's 4th mark:70

Enter the 3 student's 5th mark:60

Enter the 3 student's 6th mark:65

Enter the 4 student's 1th mark:80

Enter the 4 student's 2th mark:90

Enter the 4 student's 3th mark:40

Enter the 4 student's 4th mark:50

Enter the 4 student's 5th mark:70

Enter the 4 student's 6th mark:90

Class Average is:76.43

name mark1 mark2 mark3 mark4 mark5 mark6 Average Std Deviation

Rahul 95 85 75 85 85 75 83.00 -6.56

Krish 45 95 95 85 85 65 78.00 -1.56

Prakash 80 90 85 70 60 65 73.75 2.69

Kamal 80 90 40 50 70 90 71.00 5.44

***6. Implement the children's hand game Rock-paper-scissors: Rock Paper Scissors is a two player game. Each player chooses one of rock, paper or scissors, without knowing the other player's choice. The winner is decided by a set of rules: Rock's strength is doubled (temporarily) when fighting scissors, but halved (temporarily) when fighting paper. In the same way, paper has the advantage against rock, and scissors against paper If both players choose the same thing, there is no winner for that round. For this task, the computer will be one of the players. Make 10 rounds of choice, display the score and winner.***

**PROGRAM:**

#include<stdio.h>

void

main()

{

int a[10],b[10],user=0,cpu=0,draw=0;

printf("Choose 1 for Rock\n"

"Choose 2 for Paper\n"

"Choose 3 for Scissor\n");

for (int i=0;i<10;i++)

{

printf("Enter the %dth choice:",i+1);

scanf("%d",&a[i]);

}

srand(time(0));

for (int i=0;i<10;i++)

{

b[i]=(rand()%3)+1;

}

for (int i=0;i<10;i++)

{

switch(a[i])

{

case '1':

if (b[i]==2)

{

cpu+=1;

}

else if(b[i]==1)

{

draw+=1;

}

else

{

user+=1;

}

case '2':

if (b[i]==2)

{

draw+=1;

}

else if(b[i]==1)

{

user+=1;

}

else

{

cpu+=1;

}

default:

if (b[i]==3)

{

draw+=1;

}

else if(b[i]==2)

{

user+=1;

}

else

{

cpu+=1;

}

}

}

printf("Your score:%d""\n",user);

printf("CPU's score:%d""\n",cpu);

printf("No of draws:%d""\n",draw);

if(user>cpu)

{

printf("You win");

}

else if(user==cpu)

{

printf("Its a Tie");

}

else

{

printf("CPU Wins");

}

printf("\n");

}

**OUTPUT:**

cseb121@jtl-19:~$gcc rockpaperscissor.c –o a3\_6

cseb121@jtl-19:~$./ a3\_6

Choose 1 for Rock

Choose 2 for Paper

Choose 3 for Scissor

Enter the 1th choice:2

Enter the 2th choice:1

Enter the 3th choice:3

Enter the 4th choice:2

Enter the 5th choice:1

Enter the 6th choice:2

Enter the 7th choice:3

Enter the 8th choice:2

Enter the 9th choice:1

Enter the 10th choice:3

Your score:4

CPU's score:5

No of draws:1

CPU Wins