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COURSE CODE: - 1CS501

SUBJECT: - COMPUTER PROGRAMMING

PRACTICAL NO 5: C programs to show the working of arrays.

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a. Build a program

i. To read data from keyboard and store into 1-D array

ii. To read data from array and copy its square back to another array

iii. To reverse all elements of original array

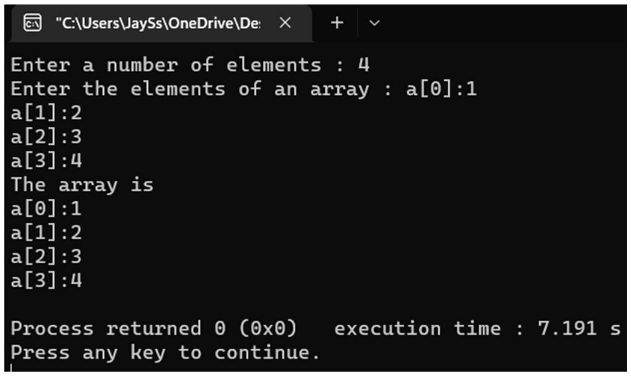
iv. To find out maximum element of an original array and print its location

I.

Code :

```
#include <stdio.h>
int main() {
  int n, i;
  printf("Enter a number of elements : ");
  scanf("%d", &n);
  int a[n];
  printf("Enter the elements of an array : ");
  for (i = 0; i < n; i++) {
    printf("a[%d]:", i);
    scanf("%d", &a[i]);
  }
  printf("The array is \n");
  for (i = 0; i < n; i++) {
    printf("a[%d]:%d\n", i, a[i]);
  }
  return 0;
}
```

Output:



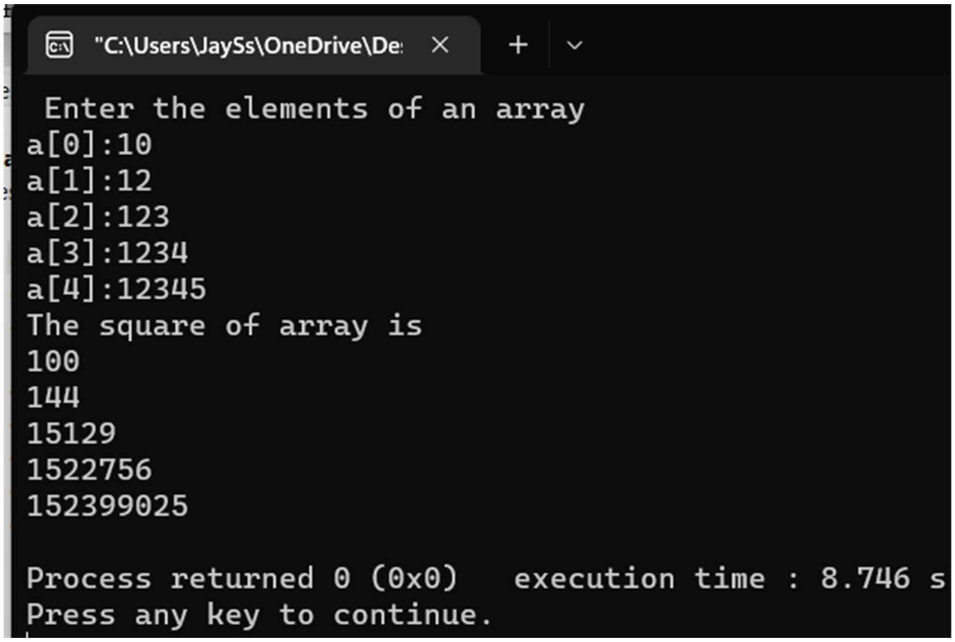
```
Enter a number of elements : 4
Enter the elements of an array : a[0]:1
a[1]:2
a[2]:3
a[3]:4
The array is
a[0]:1
a[1]:2
a[2]:3
a[3]:4

Process returned 0 (0x0)   execution time : 7.191 s
Press any key to continue.
```

II.

Code:

```
#include <stdio.h>

int main() {

 int i, a[5], a1[5];

 printf(" Enter the elements of an array \n");

 for (i = 0; i < 5; i++) {

  printf("a[%d]:", i);

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

 }

 printf("The square of array is \n");

 for (i = 0; i < 5; i++) {

  a1[i] = a[i] * a[i];

  printf("%d\n", a1[i]);

 }

 return 0;

}
```

Output:



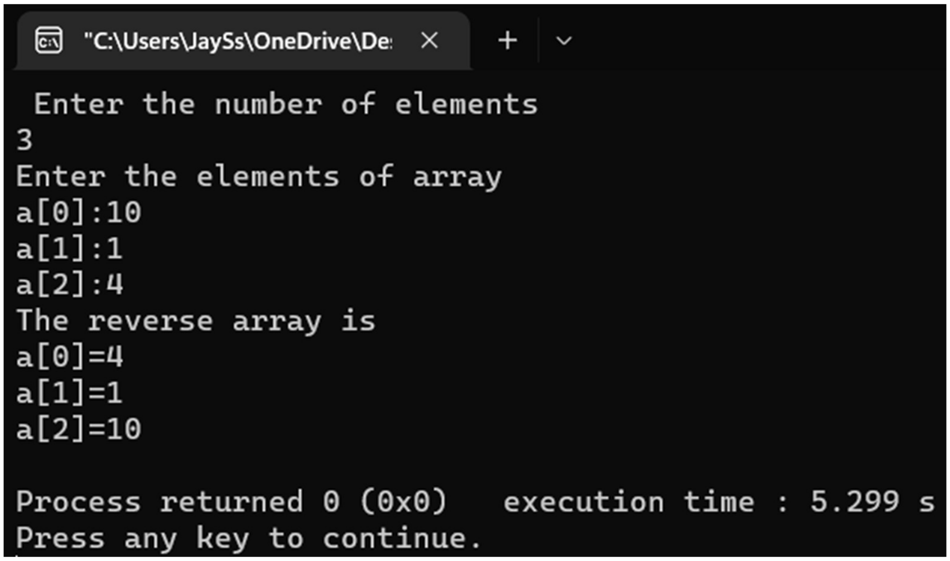
```
 Enter the elements of an array
a[0]:10
a[1]:12
a[2]:123
a[3]:1234
a[4]:12345
The square of array is
100
144
15129
1522756
152399025

Process returned 0 (0x0)   execution time : 8.746 s
Press any key to continue.
```

III.

Code:

```
#include <stdio.h>

int main() {
  int n, i, j, temp;
  printf(" Enter the number of elements \n");
  scanf("%d", &n);
  int a[n];
  printf("Enter the elements of array\n");
  for (i = 0; i < n; i++) {
    printf("a[%d]:", i);
    scanf("%d", &a[i]);
  }
  j = n - 1;
  i = 0;
  printf("The reverse array is\n");
  while (i < j) {
    temp = a[i];
    a[i] = a[j];
    a[j] = temp;
    i++;
    j--;
  }
  for (i = 0; i < n; i++)
    printf("a[%d]=%d\n", i, a[i]);
  return 0;
}
```

Output:



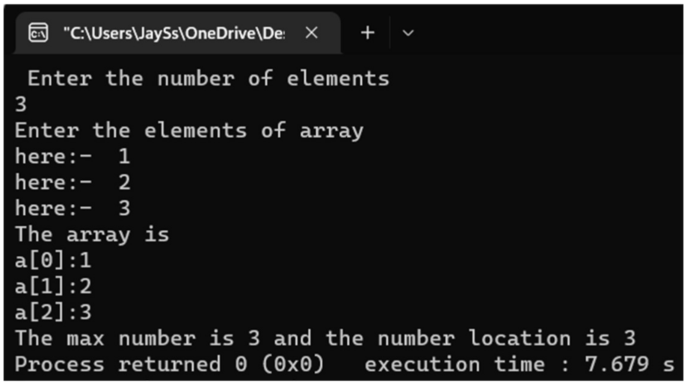
```
 Enter the number of elements
3
Enter the elements of array
a[0]:10
a[1]:1
a[2]:4
The reverse array is
a[0]=4
a[1]=1
a[2]=10

Process returned 0 (0x0)   execution time : 5.299 s
Press any key to continue.
```

IV.

Code:

```
#include <stdio.h>

int main() {

 int n, i, j, max;

 printf(" Enter the number of elements \n");

 scanf("%d", &n);

 int a[n];

 int index;

 printf("Enter the elements of array\n");

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

  printf("here:-\t");

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

 }

 printf("The array is\n");

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

  printf("a[%d]:%d\n", i, a[i]);

 }

 max = a[0];

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

  if (max <= a[i]) {

   max = a[i];

   index = i + 1;

  }

 }

 printf("The max number is %d and the number location is %d", max, index);

 return 0;

}
```

Output:



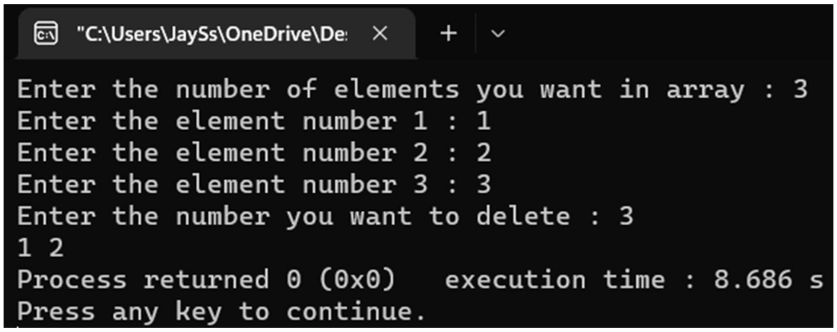
```
 Enter the number of elements
3
Enter the elements of array
here:-  1
here:-  2
here:-  3
The array is
a[0]:1
a[1]:2
a[2]:3
The max number is 3 and the number location is 3
Process returned 0 (0x0)   execution time : 7.679 s
```

b) Build a program to delete an element from 1-D array.

Code:

```
#include <stdio.h>


int main() {
  char arr[100];
  int element, num_array;
  printf("Enter the number of elements you want in array : ");
  scanf("%d", &num_array);
  for (int i = 0; i < num_array; i++) {
    printf("Enter the element number %d : ", i + 1);
    scanf("%d", &element);
    arr[i] = element;
  }
  printf("Enter the number you want to delete : ");
  scanf("%d", &element);
  for (int i = 0; i < num_array; i++) {
    if (arr[i] == element) {
      for (int j = i; j < num_array - 1; j++) {
        arr[j] = arr[j + 1];
      }
    }
  }
  for (int i = 0; i < num_array - 1; i++) {
    printf("%d ", arr[i]);
  }
  return 0;
}
```

Output:



```
Enter the number of elements you want in array : 3
Enter the element number 1 : 1
Enter the element number 2 : 2
Enter the element number 3 : 3
Enter the number you want to delete : 3
1 2
Process returned 0 (0x0)   execution time : 8.686 s
Press any key to continue.
```

c. Build a program that fills a 5 x 5 matrix with the following data:

i. Upper left triangle with -1

ii. Lower right triangle with 1

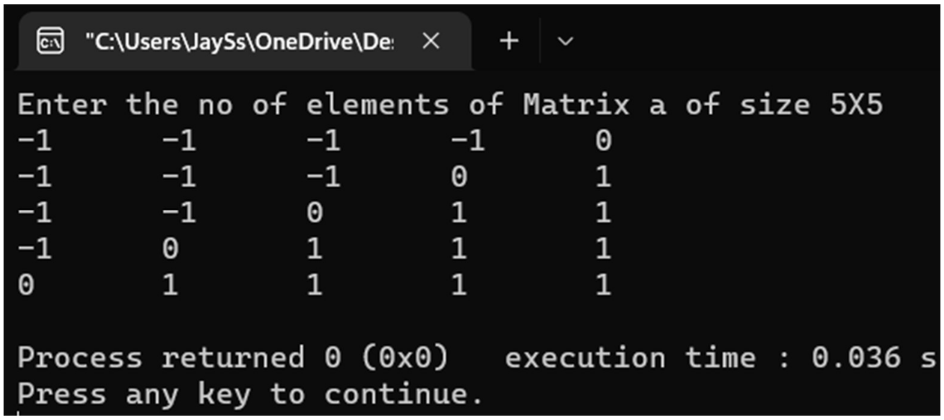
iii. Right to left diagonal with 0

Display the matrix on the screen.

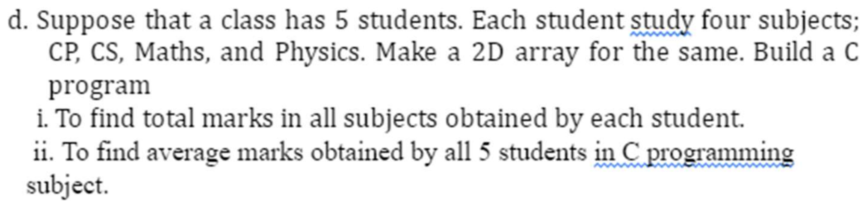
Code:

```
#include <stdio.h>
int main() {
  int a[5][5], i, j;
  printf("Enter the no of elements of Matrix a of size 5X5\n");
  for (i = 0; i < 5; i++) {
    for (j = 0; j < 5; j++) {
      if (i + j == 4) {
        a[i][j] = 0;
      }
      if (i + j < 4) {
        a[i][j] = -1;
      }
      if (i + j > 4) {
        a[i][j] = 1;
      }
    }
  }
  for (i = 0; i < 5; i++) {
    for (j = 0; j < 5; j++) {
      printf("%d\t", a[i][j]);
    }
    printf("\n");
  }

  return 0;
}
```

Output:



```
Enter the no of elements of Matrix a of size 5X5
-1      -1      -1      -1      0
-1      -1      -1      0       1
-1      -1      0       1       1
-1      0       1       1       1
0       1       1       1       1

Process returned 0 (0x0)   execution time : 0.036 s
Press any key to continue.
```



d. Suppose that a class has 5 students. Each student study four subjects; CP, CS, Maths, and Physics. Make a 2D array for the same. Build a C program

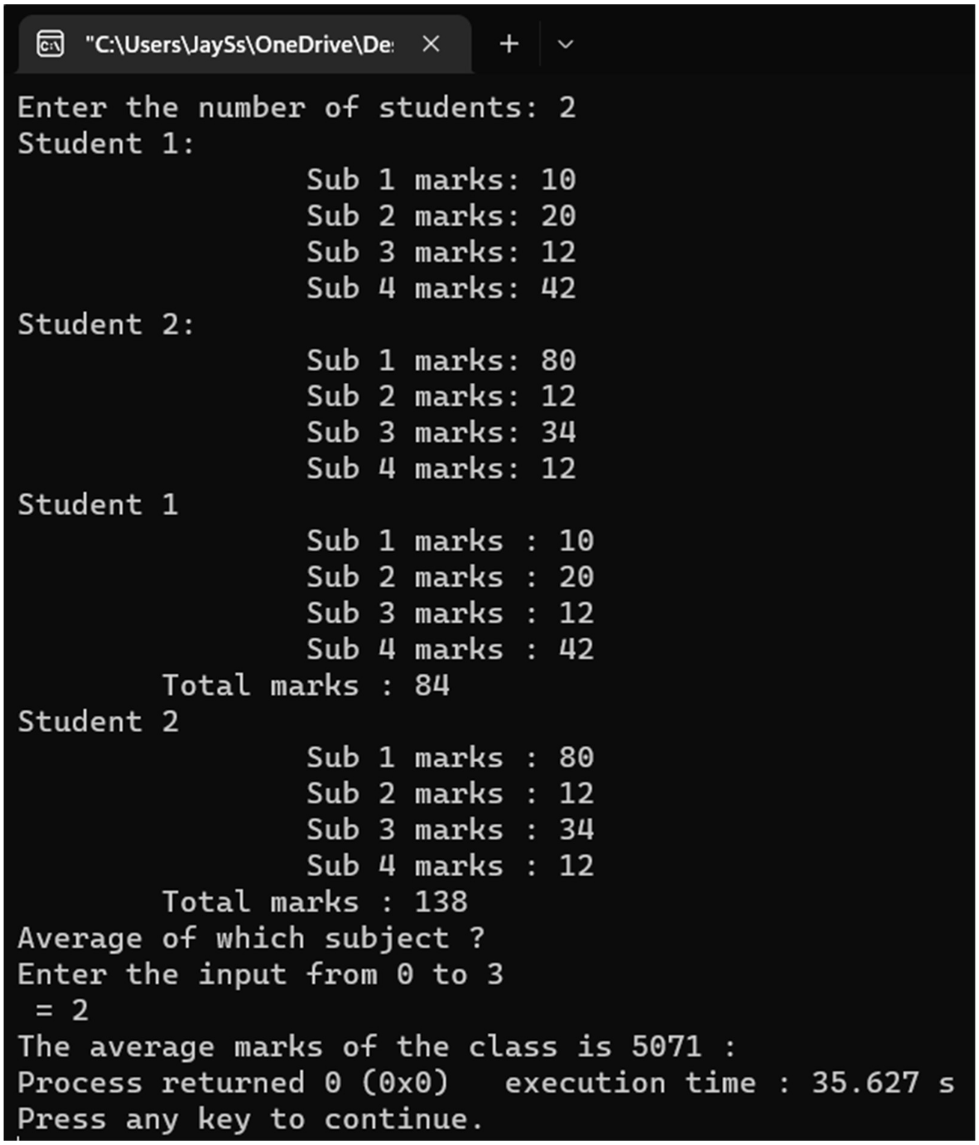
i. To find total marks in all subjects obtained by each student.

ii. To find average marks obtained by all 5 students in C programming subject.

Code

```
#include <stdio.h>


int main() {
  int number_of_students, sub = 4;
  char arr[100][100];
  printf("Enter the number of students: ");
  scanf("%d", &number_of_students);

  for (int i = 0; i < number_of_students; i++) {
    printf("Student %d: \n", i + 1);
    for (int j = 0; j < sub; j++) {
      int marks;
      printf("\t\tSub %d marks: ", j + 1);
      scanf("%d", &marks);
      arr[i][j] = marks;
    }
  }
  for (int i = 0; i < number_of_students; i++) {
    printf("Student %d\n", i + 1);
    int total_marks = 0;
    for (int j = 0; j < sub; j++) {
      printf("\t\tSub %d marks : %d\n", j + 1, arr[i][j]);
      total_marks += arr[i][j];
    }
    printf("\tTotal marks : %d\n", total_marks);
  }
  int teacher_input, total_of_that;
  printf("Average of which subject ?\nEnter the input from 0 to 3\n = ");
  scanf("%d", &teacher_input);
  for (int i = 0; i < number_of_students; i++) {
   total_of_that += arr[i][teacher_input];
  }
  printf("The average marks of the class is %d :",
       total_of_that / number_of_students);
  return 0;
}
```

Output:



```
Enter the number of students: 2
Student 1:
                Sub 1 marks: 10
                Sub 2 marks: 20
                Sub 3 marks: 12
                Sub 4 marks: 42
Student 2:
                Sub 1 marks: 80
                Sub 2 marks: 12
                Sub 3 marks: 34
                Sub 4 marks: 12
Student 1
                Sub 1 marks : 10
                Sub 2 marks : 20
                Sub 3 marks : 12
                Sub 4 marks : 42
        Total marks : 84
Student 2
                Sub 1 marks : 80
                Sub 2 marks : 12
                Sub 3 marks : 34
                Sub 4 marks : 12
        Total marks : 138
Average of which subject ?
Enter the input from 0 to 3
 = 2
The average marks of the class is 5071 :
Process returned 0 (0x0)   execution time : 35.627 s
Press any key to continue.
```