Online Discussion session

One Dimensional Array

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ARRAY

- Collection of data values of similar type
- Stored in consecutive memory location
- Index of array starts from 0 and proceeds upto [size-1]

ARRAY

- **Types of Array**

- One Dimensional Array
- Multi Dimensional Array

ARRAY

int A[5];

A[0]	A[1]	A[2]	A[3]	A[4]
2000(say)	2004	2008	2012	2016
First element				Last element

One Dimensional Array

- Initialization of 1D array

➢ Compile time initialization:

Syntax:

datatype arrayName[size]={value1,value2,…};

Example:

int rollNumber[5]={1,2,3,4,5};

or,

int rollNumber[5];

rollNumber[0]=1;

rollNumber [1]=2;

➢ Run time initialization:

Syntax:

```
for(i=0;i<=(size-1);i++)
 {
        scanf("%d", &variablename[i]);
 }
```

Run time initialization

int A[5];

A[0]	A[1]	A[2]	A[3]	A[4]
2000(say)	2004	2008	2012	2016
First element				Last element

```
for(i=0;i<5;i++)
  {
  scanf("%d",&A[i]);
  }

for(i=0;i<5;i++)
  {
  printf("\t%d\t",A[i]);
  }
```

1. Program to input n elements in an array and display them

```
#include<stdio.h>
#include<conio.h>


void main()
{
int a[100],i,n;
printf("Enter number of  elements in an array");
scanf("%d",&n);
printf("Enter %d elements in an array",n);
for(i=0;i<n;i++)
{
scanf("%d",&a[i]);
}
```

1. Program to input n elements in an array and display them

- printf("The array elements are\n");
- for(i=0;i<n;i++)
- {
- printf("%d\n",a[i]);
- }
- getch();
- }

2. Program to input n elements in an array and print them in reverse order

```
#include<stdio.h>
#include<conio.h>


void main()
{
int a[100],i,n;
printf("Enter number of  elements in an array");
scanf("%d",&n);
printf("Enter %d elements in an array",n);
for(i=0;i<n;i++)
{
scanf("%d",&a[i]);
}
```

2. Program to input n elements in an array and print them in reverse order

- printf("The array elements are\n");
- for(i=0;i<n;i++)
- {
- printf("%d\n",a[i]);
- }

- printf("\nThe array elements in reverse order are:\n");
- for(i=n-1;i>=0;i--)
- {
- printf("%d\n",a[i]);
- }
- getch();
- }

3. Program to input n elements in an array and copy them in another array in reverse order

```
#include<stdio.h>
#include<conio.h>


void main()
{
int a[100],b[100],i,j,n;
printf("Enter number of  elements in an array");
scanf("%d",&n);
printf("Enter %d elements in an array",n);
for(i=0;i<n;i++)
{
scanf("%d",&a[i]);
}
```

3. Program to input n elements in an array and copy them in another array in reverse order

```
printf("The array elements are\n");
for(i=0;i<n;i++)
{
printf("%d\n",a[i]);
}
for(i=n-1,j=0;i>=0;i--,j++)
{
b[j]=a[i];
}
```

```
printf("\nThe resultant array elements are:\n");
for(i=0;i<n;i++)
{
printf("%d\n",b[i]);
}
getch();
}
```

4. Program to input n elements in an array and calculate the sum and average of it's data elements

```
#include<stdio.h>
#include<conio.h>


void main()
{
int a[100],i,n,sum=0;
float avg;
printf("Enter number of elements in an array");
scanf("%d",&n);
printf("Enter %d elements in an array",n);
for(i=0;i<n;i++)
{
scanf("%d",&a[i]);
}
```

4. Program to input n elements in an array and calculate the sum and average of it's data elements

- printf("The array elements are\n");
- for(i=0;i<n;i++)
- {
- printf("%d\n",a[i]);
- }
- for(i=0;i<n;i++)
- {
- sum+=a[i];
- }
- avg=(sum*1.0)/n;
- printf("Sum=%d\nAverage=%.2f",sum,avg);
- getch();
- }

5. Program to input n elements in an array and find out the minimum,maximum and average value of it's data elements

```
#include<stdio.h>
#include<conio.h>


void main()
{
int a[100],i,n,max,min,sum=0;
float avg;
printf("Enter number of elements in an array");
scanf("%d",&n);
printf("Enter %d elements in an array",n);
for(i=0;i<n;i++)
{
scanf("%d",&a[i]);
}
printf("The array elements are\n");
for(i=0;i<n;i++)
{
printf("%d\n",a[i]);
}
```

5. Program to input n elements in an array and find out the minimum,maximum and average value of it's data elements

```
max=a[0];
min=a[0];
for(i=0;i<n;i++)
{
 if(max<a[i])
   max=a[i];
 if(min>a[i])
   min=a[i];
 sum+=a[i];
}
avg=(sum*1.0)/n;
printf("\nMaximum element=%d\nMinimum element=%d\nAverage=%.2f",max,min,avg);
getch();
}
```

6. Program to input n elements in an array and calculate the sum of odd and even elements separately. Also display the number of odd and even elements in the array.

```
#include<stdio.h>
#include<conio.h>

void main()
{
int a[100],i,n,esum=0,osum=0,ecount=0,ocount=0;
printf("Enter number of elements in an array");
scanf("%d",&n);
printf("Enter %d elements in an array",n);
for(i=0;i<n;i++)
{
scanf("%d",&a[i]);
}
printf("The array elements are\n");
for(i=0;i<n;i++)
{
printf("%d\n",a[i]);
}
```

6. Program to input n elements in an array and calculate the sum of odd and even elements separately. Also display the number of odd and even elements in the array.

```
for(i=0;i<n;i++)
{
 if(a[i]%2==0)
   {
   esum+=a[i];
     ecount++;
   }
else
   {
   osum+=a[i];
     ocount++;
   }
}
printf("\nTotal number of even elements=%d and their sum=%d\nTotal number of odd elements=%d and their sum=%d\n",ecount,esum,ocount,osum);
getch();
}
```

7. Program to input n elements in an array and check whether a particular number is present in an array or not. If present, also display it's position.

```
#include<stdio.h>
#include<conio.h>


void main()
{
int a[100],i,n,num,flag=0;
printf("Enter number of elements in an array");
scanf("%d",&n);
printf("Enter %d elements in an array",n);
for(i=0;i<n;i++)
{
scanf("%d",&a[i]);
}
printf("The array elements are\n");
for(i=0;i<n;i++)
{
printf("%d\n",a[i]);
}
```

7. Program to input n elements in an array and check whether a particular number is present in an array or not. If present, also display it's position.

```
printf("\nEnter a number that you want to search for:");
scanf("%d",&num);
for(i=0;i<n;i++)
{
  if(a[i]==num)
  {
      flag++;
    printf("%d is present and it's position is a[%d]\n",num,i);
  }
}
if (flag==0)
  {
  printf("%d is not present",num);
  }
getch();
}
```

8. Program to display third array after adding two arrays.

```
#include<stdio.h>
#include<conio.h>

void main()
{
int a[100],b[100],c[100],i,n;
printf("Enter number of elements in arrays");
scanf("%d",&n);
printf("Enter %d elements in first array",n);
for(i=0;i<n;i++)
{
  scanf("%d",&a[i]);
}
printf("Enter %d elements in second array",n);
for(i=0;i<n;i++)
{
  scanf("%d",&b[i]);
}
```

8. Program to display third array after adding two arrays.

```
printf("\nThe elements of first array are\n");
for(i=0;i<n;i++)
{
  printf("%d\t",a[i]);
}
printf("The elements of second array are\n");
for(i=0;i<n;i++)
{
  printf("%d\t",b[i]);
}
printf("\nThe resultant array after addition is:\n");
for(i=0;i<n;i++)
{
  c[i]=a[i]+b[i];
  printf("%d\t",c[i]);
}
getch();
}
```

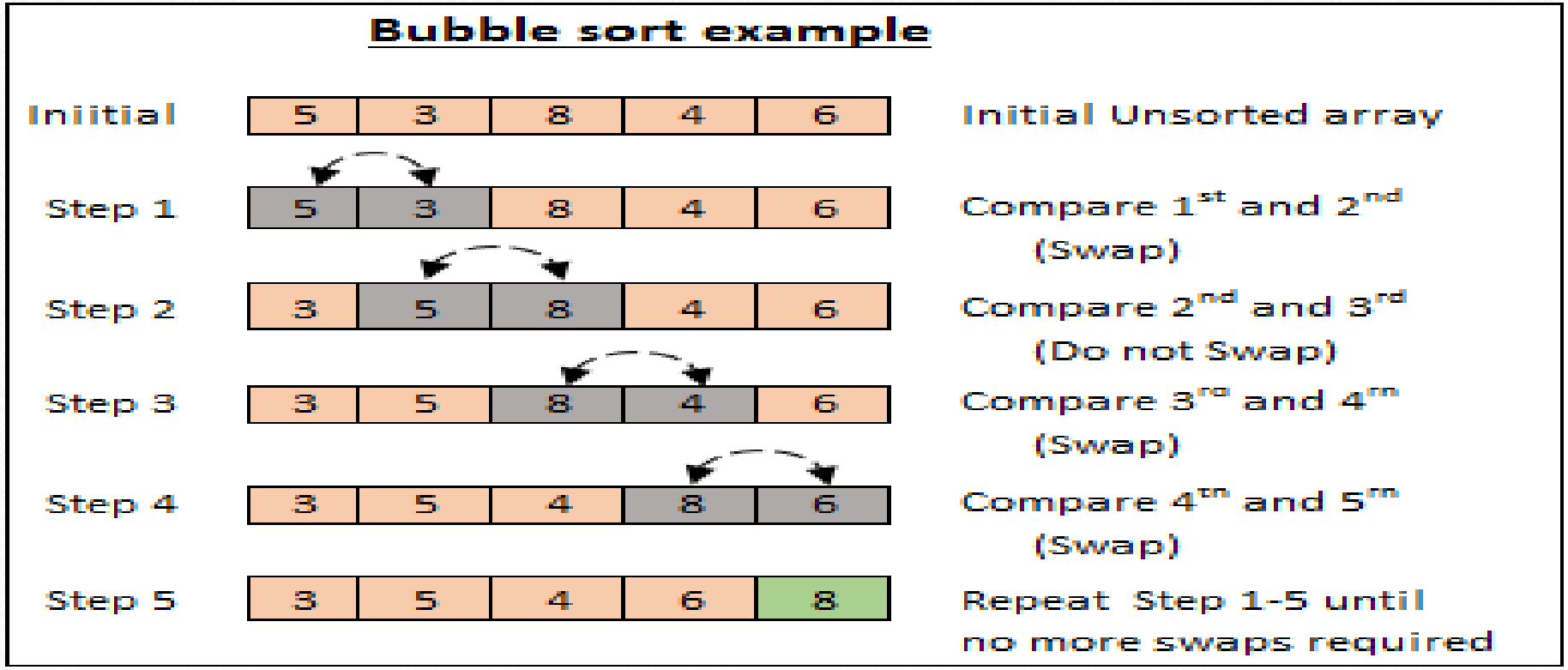
Sorting

- Arrangement of data elements in an array either in ascending or descending order.

Types of Sorting

- Bubble Sort
- Selection Sort

Bubble Sort


Bubble sort example
Iniitial
5 3 8 4 6
Initial Unsorted array
Step 1
5 3 8 4 6
Compare 1st and 2nd
(Swap)
Step 2
3 5 8 4 6
Compare 2nd and 3rd
(Do not Swap)
Step 3
3 5 8 4 6
Compare 3rd and 4th
(Swap)
Step 4
3 5 4 8 6
Compare 4th and 5th
(Swap)
Step 5
3 5 4 6 8
Repeat Step 1-5 until
no more swaps required

Bubble Sort

```
for(i=0;i<n-1;i++)
{
  for(j=0;j<n-1-i;j++)
   {
      if(a[j+1]<a[j])
     {
        temp=a[j];
        a[j]=a[j+1];
        a[j+1]=temp;
        }
    }
}
```

9. Program to sort data elements in an array in ascending order using bubble sort

```
#include<stdio.h>
#include<conio.h>

void main()
{
int a[100],i,j,n,temp;
printf("Enter number of elements in an array");
scanf("%d",&n);
printf("Enter %d elements in an array",n);
for(i=0;i<n;i++)
{
scanf("%d",&a[i]);
}
printf("The array elements are\n");
for(i=0;i<n;i++)
{
printf("%d\n",a[i]);
}
```

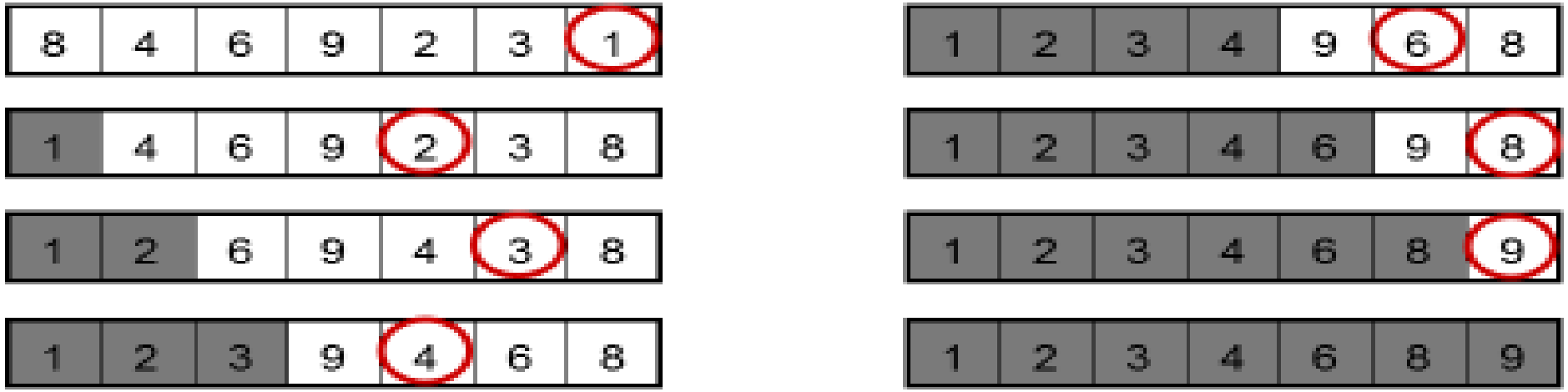
9. Program to sort data elements in an array in ascending order using bubble sort

```
for(i=0;i<n-1;i++)
{
  for(j=0;j<n-1-i;j++)
   {
       if(a[j+1]<a[j])
      {
temp=a[j];
       a[j]=a[j+1];
       a[j+1]=temp;
       }
   }
}
```

9. Program to sort data elements in an array in ascending order using bubble sort

```
printf("The sorted array elements in ascending order are\n");
for(i=0;i<n;i++)
{
printf("%d\n",a[i]);
}
getch();
}
```

Selection Sort



Selection Sort

```
for(i=0;i<n-1;i++)
{
  for(j=i+1;j<n;j++)
   {
      if(a[i]>a[j])
     {
        temp=a[i];
        a[i]=a[j];
        a[j]=temp;
        }
    }
}
```

9. Program to sort data elements in an array in ascending order using selection sort

```
#include<stdio.h>
#include<conio.h>

void main()
{
int a[100],i,j,n,temp;
printf("Enter number of elements in an array");
scanf("%d",&n);
printf("Enter %d elements in an array",n);
for(i=0;i<n;i++)
{
scanf("%d",&a[i]);
}
printf("The array elements are\n");
for(i=0;i<n;i++)
{
printf("%d\n",a[i]);
}
```

9. Program to sort data elements in an array in ascending order using selection sort

```
for(i=0;i<n-1;i++)
{
  for(j=i+1;j<n;j++)
   {
      if(a[i]>a[j])
     {
          temp=a[i];
          a[i]=a[j];
          a[j]=temp;
          }
     }
}
```

9. Program to sort data elements in an array in ascending order using selection sort

```
printf("The sorted array elements in ascending order are\n");
for(i=0;i<n;i++)
{
printf("%d\n",a[i]);
}
getch();
}
```

Practice Questions

1. Program to input the marks of 10 students in percentage. Calculate and display the average percentage and deviation percentage of each student from average.

   Hint: Deviation percentage=Obtained percentage-Average percentage

2. Program to read marks of n students and print top five marks among them.
3. Program to input n numbers and find the third highest and second lowest number.

   Hint: After sorting in ascending order,

   Third highest : a[2]

   Second lowest : a[n-2]


thank you!