Data Structures and Algorithm

Customize Implementation of Array Data Structure

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Implementation: Customize ArrayADT using C

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ArrayADT.c

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

struct ArrayADT
{
    int capacity;
    int lastindex;
    int *ptr;
};
```

```
struct ArrayADT* createArray(int cap)
{
   struct ArrayADT *arr = (struct ArrayADT*)malloc(sizeof(struct ArrayADT));
   arr->capacity = cap;
   arr->lastindex = -1;
   arr->ptr = (int*)malloc(sizeof(int)*cap);
   return arr;
}


void append(struct ArrayADT *arr,int data)
{
   if(arr->lastindex==arr->capacity-1)
      printf("Overflow");
   else if(arr->lastindex<arr->capacity-1)
   {
       arr->lastindex+=1;
       arr->ptr[arr->lastindex] = data;
   }
}


void insert(struct ArrayADT *arr,int index,int data)
```

```
{
   if(arr->lastindex==arr->capacity-1)
     printf("Overflow");
   else{
      int i;
      if(index>=0 && index<=arr->lastindex+1)
      {
         for(i=arr->lastindex+1;i>index;i--)
            arr->ptr[i] = arr->ptr[i-1];
         arr->ptr[i] = data;
         arr->lastindex+=1;
      }
   }
}

void removeElement(struct ArrayADT *arr,int index)
{
   if(arr->lastindex==-1)
     printf("Underflow");
   else
   {
      if(index<=arr->lastindex)
      {
         int i;
```

```
            for(i=index;i<arr->lastindex;i++)
               arr->ptr[i]=arr->ptr[i+1];
            arr->lastindex-=1;
        }
    }
}

int getItem(struct ArrayADT *arr,int index)
{
    if(index>=0 && index<=arr->lastindex)
       return arr->ptr[index];
}

int searchItem(struct ArrayADT *arr,int data)
{
    int i;
    for(i=0;i<=arr->lastindex;i++)
       if(arr->ptr[i]==data)
         return i;
    return -1;
}
```

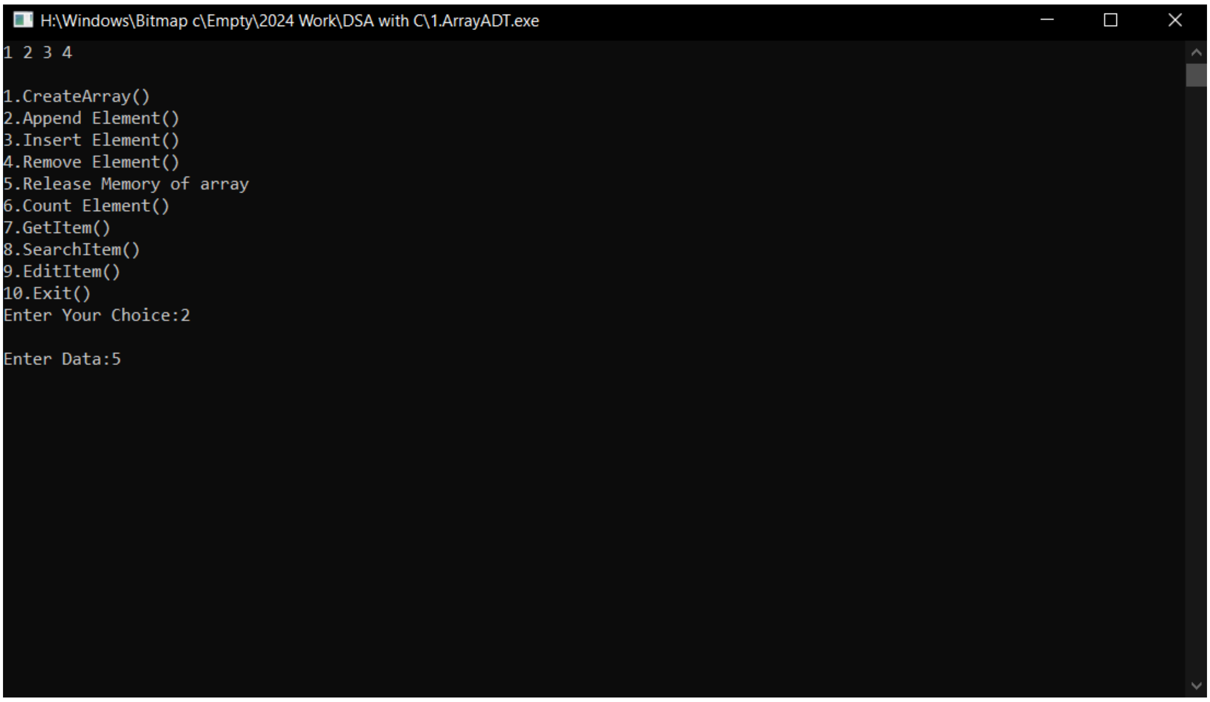
```
void release(struct ArrayADT *arr)
{
   free(arr->ptr);
   free(arr);
}

int count(struct ArrayADT *arr)
{
   return arr->lastindex+1;
}

void editItem(struct ArrayADT *arr,int index,int data)
{
   if(index>=0 && index<=arr->lastindex)
      arr->ptr[index] = data;
}

void display(struct ArrayADT *arr)
{
   if(arr==NULL || arr->lastindex==-1)
      printf("ArrayADT is Empty");
   else
   {
      int i;
```

```
        for(i=0;i<=arr->lastindex;i++)
            printf("%d ",arr->ptr[i]);
    }
        printf("\n");
}

int menu()
{
    int choice;
    printf("\n1.CreateArray()");
    printf("\n2.Append Element()");
    printf("\n3.Insert Element()");
    printf("\n4.Remove Element()");
    printf("\n5.Release Memory of array");
    printf("\n6.Count Element()");
    printf("\n7.GetItem()");
    printf("\n8.SearchItem()");
    printf("\n9.EditItem()");
    printf("\n10.Exit()");
    printf("\nEnter Your Choice:");
    scanf("%d",&choice);
    return choice;
}
```

```
void main()
{
    struct ArrayADT *arr = NULL;
    int size,data,index,c=-1;
    while(1)
    {
        system("cls");
        if(c!=-1)
        {
          printf("%d ",c);
          c=-1;
        }
        else
            display(arr);
        switch(menu())
        {
            case 1:
                printf("\nEnter Size to Create Array:");
                scanf("%d",&size);
                arr = createArray(size);
                break;

            case 2:
                printf("\nEnter Data:");
                scanf("%d",&data);
                append(arr,data);
                break;

            case 3:
                printf("\nEnter Index:");
                scanf("%d",&index);
                printf("Enter Data to Insert:");
                scanf("%d",&data);
                insert(arr,index,data);
                break;

            case 4:
                printf("Enter Index to remove Element:");
                scanf("%d",&index);
                removeElement(arr,index);
                break;

            case 5:
                release(arr);
                break;

            case 6:
                c = count(arr);
                break;

            case 7:
                printf("Enter Index to get Element:");
                scanf("%d",&index);
                c = getItem(arr,index);
                break;

            case 8:
                printf("Enter Data:");
                scanf("%d",&data);
                c = searchItem(arr,data);
                break;

            case 9:
                printf("Enter Index to edit Data:");
                scanf("%d",&index);
                printf("Enter Data:");
                scanf("%d",&data);
                editItem(arr,index,data);
                break;

            case 10:
                exit(1);
```

```
        }
    }
}
```

Output :-


H:\Windows\Bitmap c\Empty\2024 Work\DSA with C\1.ArrayADT.exe

```
1 2 3 4

1.CreateArray()
2.Append Element()
3.Insert Element()
4.Remove Element()
5.Release Memory of array
6.Count Element()
7.GetItem()
8.SearchItem()
9.EditItem()
10.Exit()
Enter Your Choice:2

Enter Data:5
```