فصل هفتم: اشاره‌گرها

```
// S07-01.cpp
// استفاده از اشاره گر ها



#include "stdafx.h"
#include "iostream"

using namespace std;

int main(void)
{
 int y,*yptr;
 y=5;
 yptr=&y;
 cout<<"y = "<<y<<"\n";
 cout<<"*yptr = "<<*yptr;
 cout<<endl;
 system("pause");
 return 0;
}
```

```
y = 5
*yptr = 5
Press any key to continue . . .
```

```
// S07-02.cpp
// عملگرهای & و *

#include "stdafx.h"
#include "iostream"

using namespace std;

int main(void)
{
int a;
int *aPtr;
a=12;
aPtr=&a;
cout<<"&a = "<<&a;
cout<<"\naPtr = "<<aPtr;
cout<<"\na = "<<a;
cout<<"\n*aPtr = "<<*aPtr;
cout<<"\n*&aPtr = "<<*&aPtr;
cout<<"\n&*aPtr = "<<&*aPtr;
cout<<"\n*&a = "<<*&a;
cout<<endl;
system("pause");
return 0;
}
```

```
&a = 0012F3CC
aPtr = 0012F3CC
a = 12
*aPtr = 12
*&aPtr = 0012F3CC
&*aPtr = 0012F3CC
*&a = 12
Press any key to continue . . .
```

```
// S07-03.cpp
// تاثیر استفاده از نوع اشاره گر های مغایر با نوع داده ها

#include "stdafx.h"
#include "iostream"

using namespace std;

int main(void)
{
 int num1,*pnum1,*pnum2;
 double num2;
 num1=1357;
 num2=1380.1021;
 pnum1=&num1;
 pnum2=&num2;
 cout<<"num1 = "<<num1<<"  *pnum1 = "<<*pnum1;
 cout<<"\nnum2 = "<<num2<<"  *pnum2 = "<<*pnum2;
 cout<<endl;
 system("pause");
 return 0;
}
```

Error
Can not Convert from 'double *' to 'int *'

```
// S07-04.cpp
// تابعی که دو عدد را با استفاده از اشاره گر ها بگیرد و جابجا کند

#include "stdafx.h"
#include "iostream"

using namespace std;

void exchange(int  *x , int  *y)
{
 int temp;
 temp = *x;
 *x = *y;
 *y = temp;
}
int main(void)
{
 int n1,n2;
 cout<<"Enter two number : ";
 cin>>n1>>n2;
 exchange(&n1,&n2);
 cout<<"numbers exchange : ";
 cout<<n1<<"\t"<<n2;
 cout<<endl;
 system("pause");
 return 0;
}
```

```
Enter two number : 2 7
numbers exchange : 7   2
Press any key to continue . . .
```

```
// S07-05.cpp
// محیط و مساحت دایره با اشاره گر ها

#include "stdafx.h"
#include "iostream"

using namespace std;

#define PI 3.14

void circle(double r,double *a,double *p)
 {
  *a=PI*r*r;
  *p=2*PI*r;
 }

int main(void)
{
double radius,area,perime;
cout<<"Enter the Radius : ";
cin>>radius;
circle(radius,&area,&perime);
cout<<"Area is : "<<area<<"\tPerime is : "<<perime;
cout<<endl;
system("pause");
return 0;
}
```

Enter the Radius : 3
Area is : 28.26 Perime is : 18.84
Press any key to continue . . .

```
// S07-06.cpp
// چاپ آرایه ۱۰ عنصری با استفاده از اشاره گر ها

#include "stdafx.h"
#include "iostream"

using namespace std;

int main(void)
{
 int A[10]={1,2,3,4,5,6,7,8,9,10},i;
 for(i=0;i<10;i++)
    cout<<*(A+i)<<" ";
 cout<<endl;
 system("pause");
 return 0;
}
```

```
1 2 3 4 5 6 7 8 9 10
Press any key to continue . . .
```

```
// S07-08.cpp
// تعداد بایت های اختصاصی به اشاره گر های انواع داده ای مختلف

#include "stdafx.h"
#include "iostream"

using namespace std;

int main(void)
{
 int *i;
 double *d;
 char *ch;
 char *str;
 cout<<"Size of pointer to int : "<<sizeof(i);
 cout<<"\nSize of pointer to double : "<<sizeof(d);
 cout<<"\nSize of pointer to char : "<<sizeof(ch);
 cout<<"\nSize of pointer to str : "<<sizeof(str);
 cout<<endl;
 system("pause");
 return 0;
}
```

```
Size of pointer to int : 4
Size of pointer to double : 4
Size of pointer to char : 4
Size of pointer to str : 4
Press any key to continue . . .
```

```
// S07-09.cpp
// کپی رشته دوم  در رشته اول با استفاده از اشاره گر ها

#include "stdafx.h"
#include "iostream"

using namespace std;

void pstrcpy(char *str2,char *str1)
{
int i=0;
while((*(str1+i))!='\0')
   {
    *(str2+i)=*(str1+i);
    i++;
   }
*(str2+i)='\0';
}

int main(void)
{
 char str1[50],str2[50];
 cout<<"Enter a String : ";
 cin>>str1;
 pstrcpy(str2,str1);
 cout<<"String is Copy : ";
 cout<<str2;
 cout<<endl;
 system("pause");
 return 0;
}
```

```
Enter a String : Hooman
String is Copy : Hooman
Press any key to continue . . .
```

```
// S07-10.cpp
// دریافت ۲ رشته و اتصال آنها با اشاره گر ها

#include "stdafx.h"
#include "iostream"

using namespace std;

void pstrcat(char *str1,char *str2)
{
int i=0,j=0;
while(*(str1+i)!='\0')
  i++;
while(*(str2+j)!='\0')
   {
    *(str1+i)=*(str2+j);
    i++;
    j++;
   }
*(str1+i)='\0';
}

int main(void)
{
 char str1[50],str2[50];
 cout<<"Enter a String : ";
 cin>>str1;
 cout<<"Enter a String : ";
 cin>>str2;
 pstrcat(str1,str2);
 cout<<"strcat is : ";
 cout<<str1;
 cout<<endl;
 system("pause");
 return 0;
}
```

```
Enter a String : Hooman
Enter a String : Sayyari
strcat is : HoomanSayyari
Press any key to continue . . .
```

```
// S07-11.cpp
// اتصال دو رشته با مقادیر اولیه

#include "stdafx.h"
#include "iostream"

using namespace std;

int main(void)
{
char str1[]="ali",str2[]="reza";
cout<<"String are : "<<str1<<"  "<<str2;
strcat(str1,str2);
cout<<"\nstrcat is : "<<str1;
cout<<endl;
system("pause");
return 0;
}
```

```
String are : ali  reza
strcat is : alireza
Press any key to continue . . .
```

```
// S07-12.cpp
// گرفتن آرایه ای از اشاره گر ها و مرتب کردن آنها

#include "stdafx.h"
#include "iostream"

using namespace std;

int main(void)
{
int i,j,temp,*A[10];
cout<<"Enter 10 numbers : \n";
for(i=0;i<10;i++)
 cin>>*A[i];
for(i=0;i<10;i++)
 for(j=i;j<10;j++)
 {
  if(*A[i]>*A[j])
  {
  temp=*A[i];
  *A[i]=*A[j];
  *A[j]=temp;
  }
 }
cout<<"\nSorted numbers are :\n";
for(i=0;i<10;i++)
   cout<<*A[i]<<" ";
cout<<endl;
system("pause");
return 0;
}
```

Error

```
// S07-13.cpp
// دریافت ۲ مقدار و یافتن بزرگترین آن با استفاده از حافظه پویا

#include "stdafx.h"
#include "iostream"

using namespace std;

int main(void)
{
int *x,*y;
x=new int;
if(!x)
   {
    cout<<"Allocation failure.";
    exit(0);
   }
y=new int;
if(!y)
   {
    cout<<"Allocation failure.";
    exit(1);
   }
cout<<"Enter two numbers : ";
cin>>*x;
cin>>*y;
cout<<"Maximum is : ";
if(*x>*y)
  cout<<*x;
else
  cout<<*y;
cout<<endl;
system("pause");
return 0;
}
```

Enter two numbers : 2 8
Maximum is : 8
Press any key to continue . . .

```
// S07-14.cpp
// دریافت n عدد و ذخیره در آرایه و چاپ بزرگترین عدد

#include "stdafx.h"
#include "iostream"

using namespace std;

int main(void)
{
 int *A,n,max,i;
 cout<<"Enter number of items : ";
 cin>>n;
 A=new int[n];
 if(!A)
    {
     cout<<"Allocation Failure!";
     system("pause");
     exit(1);
    }
 cout<<"Enter one number : ";
 cin>>A[0];
 max=A[0];
 for(i=1;i<n;i++)
    {
    cout<<"Enter one number : ";
    cin>>A[i];
    if(max<A[i])
        max=A[i];
    }
 delete [] A;
 cout<<"Maximum Number is : ";
 cout<<max;
 cout<<endl;
 system("pause");
 return 0;
}
```

```
Enter number of items : 3
Enter one number : 2
Enter one number : 6
Enter one number : 7
Maximum Number is : 7
Press any key to continue . . .
```

```
// S07-15.cpp
// اشاره گر به اشاره گر

#include "stdafx.h"
#include "iostream"

using namespace std;

int main(void)
{
int num=10,*m,**n;
m=&num;
n=&m;
cout<<"\n num = "<<num;
cout<<"\n *m = "<<*m;
cout<<"\n **n = "<<**n;
cout<<endl;
system("pause");
return 0;
}
```

```
num = 10
*m = 10
**n = 10
Press any key to continue . . .
```

```
// S07-16.cpp
// مقایسه ۲ رشته با استفاده از اشاره گری به تابع strcmp

#include "stdafx.h"
#include "iostream"

using namespace std;

int main(void)
{
char s1[50],s2[50];
int (*p)(const char *,const char *);
cout<<"Enter first string : ";
cin>>s1;
cout<<"Enter Second string : ";
cin>>s2;
p=strcmp;
if((p)(s1,s2)==0)
   cout<<"Strings are equal.";
else
   cout<<"Strings are not equal.";
cout<<endl;
system("pause");
return 0;
}
```

```
Enter first string : Hooman
Enter Second string : Sayyari
Strings are not equal.
Press any key to continue . . .
```

```
// S07-17.cpp
// مثال قبل به اضافه ارسال اشاره گر تابع به عنوان آرگومان به تابع

#include "stdafx.h"
#include "iostream"

using namespace std;

void check(char s1[],char s2[],int (*p)(const char * ,const char *))
{
if((p)(s1,s2)==0)
 cout<<"Strings are equal.";
else
 cout<<"Strings are not equal.";
}

int main(void)
{
char s1[50],s2[50];
int (*p)(const char *, const char *);
cout<<"Enter first string : ";
cin>>s1;
cout<<"Enter Second string : ";
cin>>s2;
p=strcmp;
check(s1,s2,p);
cout<<endl;
system("pause");
return 0;
}
```

```
Enter first string : Hooman
Enter Second string : Sayyari
Strings are not equal.
Press any key to continue . . .
```

```
// S07-18.cpp
// آرایه ای از اشاره گر به تابع

#include "stdafx.h"
#include "iostream"

using namespace std;

void function0(int);
void function1(int);
void function2(int);

int main()
{
void(*f[3])(int)={function0,function1,function2};
int choice;
cout<<"Enter a number between 0 and 3 to end: ";
cin>>choice;
while((choice>=0)&&(choice<3))
 {
 (*f[choice])(choice);
 cout<<"Enter a number between 0 and 3 to end: ";
 cin>>choice;
 }
cout<<"Program execution completed."<<endl;
system("pause");
return 0;
}


void function0(int a)
{
 cout<<"function0 was called.\n";
}

void function1(int b)
{
 cout<<"function1 was called.\n";
}

void function2(int c)
{
 cout<<"function2 was called.\n";
}
```

```
Enter a number between 0 and 3 to end: 2
function2 was called.
Enter a number between 0 and 3 to end: 1
function1 was called.
Enter a number between 0 and 3 to end: 0
function0 was called.
Enter a number between 0 and 3 to end: 3
Program execution completed.
Press any key to continue . . .
```

```
// S07-19.cpp
// ارسال ۲ عدد به عنوان آرگومان به main و جمع آنها

#include "stdafx.h"
#include "iostream"

using namespace std;

int main(int argc,char *argv[])
{
int x,y,s;
if(argc<=2)
   {
    cout<<"Number of parameter is warning.";
    cout<<endl;
    exit(0);
   }
x=atoi(argv[1]);
y=atoi(argv[2]);
s=x+y;
cout<<"Sum is : "<<s;
cout<<endl;
system("pause");
return 0;
}
```

```
D:\Projects\C++\S07-19\debug\S07-19.exe 12 15
Sum is : 27
Press any key to continue . . .
```

```
// P07-01.cpp
// اشاره گر ها

#include "stdafx.h"
#include "iostream"

using namespace std;

const int Length=3;

int main(void)
{
int A[Length]={4,7,1};
cout<<"The address of the array : ";
cout<<A<<"\n";
cout<<"The address of the first element : ";
cout<<&A[0]<<endl;
cout<<"The value of the first element : ";
cout<<*A<<"\n";
cout<<"The value of the first element : ";
cout<<A[0]<<endl;
system("pause");
return 0;
}
```

```
The address of the array : 0012F3C4
The address of the first element : 0012F3C4
The value of the first element : 4
The value of the first element : 4
Press any key to continue . . .
```

```
// P07-02.cpp
// چاپ آدرس و مقادیر موجود در عناصر آرایه

#include "stdafx.h"
#include "iostream"

using namespace std;

const int Length=3;

int main(void)
{
int A[Length]={4,7,1};
for(int i=0;i<Length;i++)
   {
    cout<<"The address of index "<<i<<" : ";
    cout<<&A[i]<<endl;
    cout<<"The value at index "<<i<<" : ";
    cout<<A[i]<<endl;
   }
system("pause");
return 0;
}
```

```
The address of index 0 : 0012F3C4
The value at index 0 : 4
The address of index 1 : 0012F3C8
The value at index 1 : 7
The address of index 2 : 0012F3CC
The value at index 2 : 1
Press any key to continue . . .
```

```
// P07-03.cpp
// اشاره گر ها

#include "stdafx.h"
#include "iostream"

using namespace std;

const int Length=3;

int main(void)
{
 int A[Length]={4,7,1};
 int* P=A;
 for(int i=0;i<Length;i++,P++)
   {
    cout<<"The address of index "<<i<<" : "<<P<<endl;
    cout<<"The value at index "<<i<<" : "<<*P<<endl;
   }
 system("pause");
 return 0;
}
```

```
The address of index 0 : 0012F3C0
The value at index 0 : 4
The address of index 1 : 0012F3C4
The value at index 1 : 7
The address of index 2 : 0012F3C8
The value at index 2 : 1
Press any key to continue . . .
```

```
// P07-04.cpp
// Null اشاره گر به

#include "stdafx.h"
#include "iostream"

using namespace std;

int main(void)
{
int* P;
P=NULL;
cout<<"The value of P is "<<P<<endl;
system("pause");
return 0;
}
```

```
The value of P is 00000000
Press any key to continue . . .
```

```
// P07-05.cpp
// تبدیل رشته عددی به مقدار عددی

#include "stdafx.h"
#include "iostream"

using namespace std;

void AsciiToint(char *,int *);

int main(void)
{
 int num;
 char str[10];
 cout<<"Enter Numeric String : ";
 cin>>str;
 AsciiToint(str,&num);
 cout<<"Numeric Value is : "<<num;
 cout<<endl;
 system("pause");
 return 0;
}

void AsciiToint(char *str,int *num)
{
 int sign=1;
 *num=0;
 while(*str==' ')
  str++;
 if(*str=='-' || *str=='+')
   sign=(*str++=='-')?-1:1;
 while(*str)
  if((*str>='0')&&(*str<='9'))
   *num=(*num*10)+(*str++ -48);
  else
   {
    cout<<"Wrnimg:the "<<*str<<" is invalid char";
    break;
   }
 *num*=sign;
}
```

Enter Numeric String : 123d456
Wrnimg:the d is invalid charNumeric Value is : 123

Enter Numeric String : 123456
Numeric Value is : 123456
Press any key to continue . . .

```
// P07-06.cpp
چاپ آرایه ای از اعداد به صورت مرتب (نزولی یا صعودی) با استفاده از اشاره گر به
// تابع

#include "stdafx.h"
#include "iostream"
#include "iomanip"

using namespace std;

void selectionSort(int [],const  int,    bool(*)(int,int));
void swap( int * const,int * const );
bool ascending(int,int);
bool descending(int,int);

int main(void)
{
 const int arraySize=10;
 int order;
 int counter;
 int a[arraySize]={2,6,4,8,10,12,89,68,45,37};
 cout<<"Enter 1 to sort in ascending order,\n";
 cout<<"Enter 2 to sort in descending order: ";
 cin>>order;
 cout<<"\nData items in original order\n";
 for(counter=0;counter<arraySize;counter++)
      cout<<setw(4)<<a[counter];
 if(order==1)
     {
     selectionSort(a,arraySize,ascending);
     cout<<"\nData items in ascending order\n";
     }
 else
     {
     selectionSort(a,arraySize,descending);
     cout<<"\nData items in descending order\n";
     }
 for(counter=0;counter<arraySize;counter++)
     cout<<setw(4)<<a[counter];
 cout<<endl;
 system("pause");
 return 0;
}



void selectionSort( int work[],const int size,bool(*compare)(int,int))
{
 int sOrl;
 for(int i=0;i<size-1;i++)
   {
   sOrl=i;
   for(int index=i+1;index<size;index++)
      if(!(*compare)(work[sOrl],work[index]))
         {
         sOrl=index;
         swap(&work[sOrl],&work[i]);
         }
```

```
   }
}
```

```
void swap(int *const element1Ptr,int * const element2Ptr )
{
 int hold=*element1Ptr;
 *element1Ptr=*element2Ptr;
 *element2Ptr=hold;
}
```

```
bool ascending(int a,int b)
{
 return a<b;
}
```

```
bool descending(int a,int b)
{
 return a>b;
}
```

```
Enter 1 to sort in ascending order,
Enter 2 to sort in descending order: 1

Data items in original order
  2  6  4  8  10  12  89  68  45  37
Data items in ascending order
  2  4  6  8  10  12  37  45  68  89

Enter 1 to sort in ascending order,
Enter 2 to sort in descending order: 2

Data items in original order
  2  6  4  8  10  12  89  68  45  37
Data items in descending order
 68  45  37  89  12  10  8  4  6  2
Press any key to continue . . .
```