Phill-C++5

Pointer 指標

一種變數, 放記憶體位址(address), 對記憶體位址 做取值 賦值的動作

```
#include <iostream>
using namespace std;

int main()
{
    string phill = "advantech";

    cout << &phill; // & -> address operator

    return 0;
}
```

```
#include <iostream>
using namespace std;

int main()
{
    string phill = "advantech";

    string* ptr_phill = &phill;

    cout << &phill << endl; // & -> address operator
    cout << ptr_phill <<endl;

    cout << *ptr_phill <<endl; //取值

    return 0;
}
```

範例

a ← → b

```
#include <iostream>
using namespace std;

int main()
{
    int a=10, b=100;
    int tmp;
```

```
    tmp = a;
    a = b;
    b = tmp;

    cout << a<< endl;
    cout << b<< endl;


    return 0;
}
```

```
#include <iostream>
using namespace std;

int main()
{
    int a=10, b=100;
    int tmp;
    int *ptr_a, *ptr_b;

    ptr_a = &a;
    ptr_b = &b;

    //tmp = a;
    tmp = *ptr_a; //rvalue -> 取值

    // a = b;
    *ptr_a  = *ptr_b; //lvalue -> 賦值

    // b = tmp
    *ptr_b = tmp;

    cout << a<< endl;
    cout << b<< endl;


    return 0;
}
```

練習

三個value a, b, c

a← b, b←c , c←a

用 pointer 來做

```
#include <iostream>
using namespace std;

int main()
```

```
{
   int a=1;
   int b=10;
   int c=100;
   int tmp;

   int* prt_a=&a;
   int* prt_b=&b;
   int* prt_c=&c;

    tmp=*prt_a;
   *prt_a=*prt_b;
   *prt_b=*prt_c;
   *prt_c=tmp;

   cout <<a<<endl;
   cout <<b<<endl;
   cout <<c<<endl;



    return 0;
}
```

應用

- 陣列做搭配

```
#include <iostream>
using namespace std;

int main()
{
  //char a[]="Phill is working for Advantech";
  int a[]={10,100,1000};

  //cout << a[0]<< a[4] <<endl; //陣列 index 來取值

  printf("%p\n", a);//陣列的名字本身就是 address

  //char *ptr_a = a;
  int *ptr_a =a;
  printf("%p\n", ptr_a);

  printf("%d\n", *ptr_a);
  printf("%d\n", *(ptr_a+1));
  printf("%d\n", *(ptr_a+2));
  //printf("%c\n", *(ptr_a+3));

  return 0;
}
```

範例

- 反轉字串

```
#include <iostream>
using namespace std;

int main()
{
  char abc[]="Phill is good!"; //"xyz"

  char *start=abc;
  char *end=abc+strlen(abc)-1;

  return 0;
}
```

```
#include <iostream>
#include <cstring>
using namespace std;

int main()
{
  char abc[]="Phill is good!"; //"xyz"

  char *start=abc;
  char *end=abc+strlen(abc)-1;

  while(start < end){
    char tmp = *start;
    *start = *end;
    *end = tmp;

    ++start;
    --end;
  }
  cout<< abc <<end;

  return 0;
}
```