

C Programming

Lab 9: Pointers

Lecturer: *Dr. Wan-Lei Zhao*
Spring Semester 2022

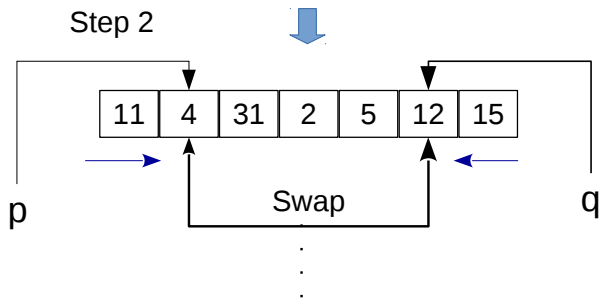
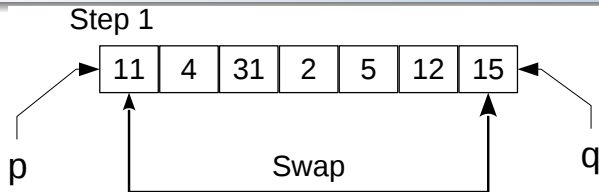
1 Pointer

2 File

Pointer: flip (1)

- Define a function to flip the elements of an array
- For instance: $a[7] = \{11, 4, 31, 2, 5, 12, 15\}$
- Change to $a[7] = \{15, 12, 5, 2, 31, 4, 11\}$
- Requirements
 - ① Function looks like: `void flip(int *a, int sz)`
 - ② `*a` is the pointer pointing to array, `sz` is the length of array
 - ③ You should use pointer to visit the elements in the array
 - ④ Define a function `void print(int *a, int sz)`
 - ⑤ Display the input array **before** and **after** you call **flip**

Pointer: flip (2)



Pointer: flip (3)

```
1 #include <stdio.h>
2 void flip(int *a, int sz){
3 {
4     int *ps = a, i = 0, t;
5     int *pe = a+sz-1;
6     for(i = 0; i < sz/2; i++)
7     {
8         t    = *ps;
9         *ps = *pe;
10        *pe = t;
11    }
12 }
```

```
13 void print(int *a, int sz)
14 {
15     int *p = a, i;
16     for(i = 0; i < sz; i++, p++)
17     {
18         printf("%d_", *p);
19         printf("\n");
20     }
21 }
22 int main()
23 {
24     int a[7] = {11,4,31,2,5,12,15};
25     print(a, 7);
26     flip(a, 7);
27     print(a, 7);
28     return 0;
29 }
```

Count frequency of each character in a string (1)

- Given a string `char str[] = "abcesZzwmwrlmAnersfdasaf"`
- Count the number of occurrence of each alphabet
- Upper case and lower case are viewed as the same
- Output non-zero occurrences
- Hints
 - Use an integer array of 26 length to keep the counts
 - Try to implement `toLowerCase(char str[])` by yourself

Count frequency of each character in a string (2)

```
1 #include <stdio.h>
2 #include <ctype.h>
3 int main()
4 {
5     char str[]="abcEsZzmwr";
6     int *p = str, i = 0;
7     int counts[26] = {0};
8     toLower(str);
9     while(*p != '\0')
10    {
11        i = *p-'a';
12        counts[i]=counts[i]+1;
13        p++;
14    }
```

```
1     for(i = 0; i < 26; i++)
2     {
3         if(counts[i])
4             printf("%c: %d\n", 'a'+i,
5                     counts[i]);
6     }
7     return 0;
8 }
```

Count frequency of each character in a string (3)

```
1 #include <stdio.h>
2 #include <ctype.h>
3 void toLower(char str[])
4 {
5     char *p = str;
6     while(*p != '\0')
7     {
8         *p = tolower(*p);
9         p++;
10    }
11 }
```

- Put this function before “main()”
- **tolower**(char ch): convert one character to lower case

Count frequency of each alphabet in a string (4)

- How about the code is now case-sensitive
- Count the number of occurrence of each alphabet
- Output non-zero occurrences
- Hints
 - Use an 2D integer array of 26×2 length to keep the counts
 - `int counts[26][2]`

Outline

1 Pointer

2 File

File operation

- Open a file "hi.txt"
- Write down "hello this is **your name**"
- Close the file
- Hints
 - `FILE *fp = fopen("C:/MyDocuments/hi.txt", "w");`
 - `fprintf(fp, "hello this is xxx");`
 - `fclose(fp);`

File operation: open and write

```
1 #include <stdio.h>
2 int main()
3 {
4     char str[]="hello_this_is_xxx";
5     FILE *fp = fopen("C:/MyDocuments/hi.txt", "w");
6     if(fp == NULL)
7     {
8         printf("File cannot open!\n");
9         return 0;
10    }
11    fprintf(fp, str);
12    fclose(fp);
13 }
```

File operation: open and read

```
1 #include <stdio.h>
2 int main()
3 {
4     char str[64] = "";
5     FILE *fp = fopen("C:/MyDocuments/hi.txt", "r");
6     if(fp == NULL){
7         printf("File cannot open!\n");
8         return 0;
9     }
10    fscanf(fp, str);
11    fclose(fp);
12    printf("%s\n", str);
13 }
```