計算機概論與程式設計

Lab 12 2022/12/19 李雍皓

Function Pointer

- Variable that point to function.
- Note:
 - o int (*pfunc)(int) is a declaration of function pointer pointing to int func(int)
 - o **int* pfunc(int)** is a declaration of function that return int pointer
- So why bother using function pointer when you can call it?
- We can pass function pointer as a parameter of another function.

qsort Function pointer

A sorting function written in stdlib.h



- void qsort(void *base, size_t nitems, size_t size, int (*compare)(const void *, const void*))
 - base: The pointer to the first element of the array to be sorted.
 - o nitems: Number of elements in the array pointed by base.
 - size: Size in bytes of each element in the array.
 - o compare: The function that compares two elements.
- You should self define the rule of comparison in order to use qsort.

Two issue of qsort

- How to decide the order of sorting?
 - When comparing two element a and b, the relationship between order and return value is:
 - Return value < 0 -> Place a before b.
 - Return value == 0 -> ignore.
 - Return value > 0 -> Place a after b.

Type conversion?

- Since the parameter type of cmpFunction is const void*, const void*.
- You should convert the type to origin type of data by yourself

```
void ptr*;
int* iptr = (int*) ptr;
```

Lab 12-1 Sort integer list with qsort

- Given a list of integer, sort the list in both way.
 - Ascending and decending
 - Non-determined length

Sample Input #1

10 5 92 85 231 59 581 129 13 583

Sample Output #1

5 10 13 59 85 92 129 231 581 583 583 581 231 129 92 85 59 13 10 5

Lab 12-2 Bit operation

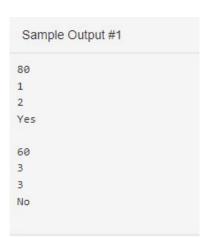
- Given four integer n ,k a, b, use bit operation to find the followings
- 1. Simulate multiply, divide and mod operation of power of 2.
 - a. Find out n * 2^k, n / 2^k, n % 2^k.
 - b. Using for loop and +, operator is forbidden.
- 2. Find if a and b is equal without using arithmetic operation.
 - a. Something like a b == 0 or a == b is forbidden.
 - b. You must only use bit operation and equal operator to solve this.

```
Sample Input #1

2

10 3 5 5

15 2 9 10
```



Grading

- If you pass TA's demo, you will get score of Formosa OJ.
 - o Lab12-1 (60%)
 - You must use qsort in order to get points.
 - o Lab12-2 (40%)
 - You must use bit operation to calculate the result in order to get points.

- Total: 100%
- Formosa OJ