《计算机程序设计》作业№-06及第5次上机

作业四内容要点： 数组应用、调试方法

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【要求】

(一)在计算机上编程程序，加上必要的注释。
(二)上机实验，经助教检查通过后，复制源码并记录实验结果，完成报告。
(三)实验报告：记录调试及改错过程；知识点或方法技巧的收获心得.

1 、找零问题

某人购买物品一共花了x元（x<=100），用100元现金去支付，售货员需要找零，请设计程序给出一个找零方案，并使找零的张数最少。设现有人民币面值包括：100元、50元、20元、10元、5元、1元、5角和1角。

编程要求：

输入购买物品的费用x，并判断其合理性（ 0.0 ~ 100.0）

对输入合理的费用，给出找零的方案（即每种钱币的数量），使之找零的钱币张数最少

当x包含1角以下的金额时，按照四舍五入到角之后再进行找零。

程序运行示例：

输入（单位 元）：12.34

输出： 共找零87.7元：50元1张 20元1张 10元1张 5元1张 1元2张 5角1张 1角2张

(一)【源码】

```
//
//  main.c
//  120601
//
//  Created by 李佩哲 on 2021/11/2.
//

#include <stdio.h>

float change(float x){
    x*=100;
    int i = (int)x;
```

```
    if((i%10)>=5){
        i+=10;
    }
    return i/10;
}

int main() {
    float x;
    int money[8]={1000,500,200,100,50,10,5,1};
    int charge[8]={0,0,0,0,0,0,0,0};
    for(;;){
        printf("x=");
        scanf("%f",&x);
        if (x<0.0||x>100.0){
            printf("请输入正确的x! \n");
            continue;
        }
        int t=change(100-x);
        printf("共找零%.1f元:\n",100-x);
        for (int i=0; i<8; i++) {
            charge[i]=(int)(t/money[i]);
            t-=charge[i]*money[i];
            if(i<6&&charge[i]!=0){
                printf("%d张%d元\n",charge[i],money[i]/10);
            }
            else{
                if (charge[i]!=0){
                    printf("%d张%d角\n",charge[i],money[i]);
                }
            }
        }
        break;
    }
    return 0;
}
```

(二)【运行结果】

```
x=12.34
共找零87.7元:
1张50元
1张20元
1张10元
1张5元
2张1元
1张5角
2张1角
Program ended with exit code: 0
```

(三)【实验报告】

把角化为元然后在输出时再变为角

2 、顺序查找和二分查找的比较

现有500个随机数 [0 .. 1999] 存放于文本文件rand500.txt中。请编程序, 利用输入重定向读入这500个随机数；另设定一个数组 int key[10] ={ *10*个整型常量，取值范围*[0, .. , 1999]*，取值尽量随机分布 }；然后完成以下任务：

1). 用**顺序查找**的方法，在500个随机数中分别查找key[0] .. key[9] , 并记录查找过程中进行了多少次比较。分别计算并输出：当key值存在和不存在时，查找一个key值平均进行了多少次比较?

2）. 对500个随机数进行排序（方法任选一种：冒泡法、选择法、插入法）

3). 用**二分查找**的方法： 在排序后的500个随机数中分别查找key[0] .. key[9] , 并记录查找过程中进行了多少次比较。分别计算并输出：当key值存在和不存在时，查找一个key值平均进行了多少次比较?

(一)【源码】

```
//
//  main.c
//  120602
//
//  Created by 李佩哲 on 2021/11/2.
//

#include <stdio.h>
#include <stdlib.h>
#include <time.h>
#include <unistd.h>

int
a,num[500],key[10],s=0,b=0,p=0,q1=0,q2=0,u1=0,u2=0,n=1,m1,m2,m3,m4,
c=0;
float x1,x2,x3,x4,x5,x6,_x1,_x2,_x3,_x4,_x5,_x6;
FILE *fp;

int main(int argc, const char * argv[]) {
    int Random(void);
```

```
    int getInput(void);
    float find_1(void);
    int order(void);
    float find_2(void);

    printf("请输入要循环的次数: ");
    scanf("%d",&n);
    m1=m2=m3=m4=n;
    getInput();
    for (int i=0; i<n; i++) {
        Random();
        find_1();
        printf("test1-%d\n",i+1);
        _x1+=(x1/m1);
        _x2+=(x2/m2);
        _x3+=(x3/n);
        sleep(1);
    }
    printf("Test1 Over.\n");
    order();
    for (int i=0; i<n; i++) {
        Random();
        find_2();
        printf("test2-%d\n",i+1);
        _x4+=(x4/m3);
        _x5+=(x5/m4);
        _x6+=(x6/n);
        sleep(1);
    }
    printf("Test2 Over.\n\nResult:\n");
    printf("找到存在的key平均%f次/个\n找到不存在的key一定是%f次/个\n遍历10个key平均%f次/个\n找到存在的key平均%f次/个\n找到不存在的key平均%f次/个\n遍历10个key平均%f次/个\n",_x1,_x2,_x3,_x4,_x5,_x6);

    return 0;
}

int Random(void){
    time_t t;
    srand((unsigned) time(&t));
    for (int i=0; i<10; i++) {
        a=rand()%2000;
        key[i]=a;
    }
    return 0;
}

int getInput(void){
    fp=freopen("/Users/page/Documents/4-app/Homework/All_Homework_c/120602/120602/rand500.txt", "r", stdin);
    for(int i=0;(fscanf(fp,"%d",&num[i])!=EOF)&&i<500;i++){}
    return 0;
```

```
}

float find_1(void){
    s=0;//总次数
    b=0;//不存在的个数
    c=0;//存在的个数
    for (int r=0,i=0; r<10&&i<500; s++) {
        if(key[r]==num[i]){
            r++;
            i=0;
            c++;
        }
        else i++;
        if(i==500){
            i=0;
            r++;
            b++;
        }
    }
    if(c)x1=(float)(s-b*500)/(10-b);
    else m1--;
    if(b)x2=500;
    else m2--;
    x3=(float)s/10;
    return 0;
}

int order(void){
    int c;
    for(int j = 0; j < 499; j++)
        for(int i = 0; i < 499 - j; i++)
            if(num[i] > num[i + 1]) {
                c = num[i];
                num[i] = num[i + 1];
                num[i + 1] = c;
            }
    /*printf("排序后：\n");
    for(int i = 0; i < 500; i++) {
        printf("%d", num[i]) ;
        if(i < 499)printf(",");
        else printf("\n");
    }*///打印排序后的num[]
    return 0;
}

float find_2(void){
    p=0;//查找每个数经过的次数
    q1=0;//存在的数的总次数
    q2=0;//不存在的数的总次数
    u1=0;//存在的总个数
    u2=0;//不存在的总个数
```

```
    int max=499,min=0;
    for (int r=0,i=250; r<10; p++) {
        if(max<min){
            u2++;
            q2+=(p++);
            p=-1;
            r++;
            i=250;
            max=499;
            min=0;
            continue;
        }
        if (key[r]>num[i]){
            min=i+1;
            i=(max+min)/2;
        }
        else if (key[r]<num[i]){
            max=i-1;
            i=(max+min)/2;
        }
        else{
            u1++;
            q1+=(p++);
            p=-1;
            r++;
            i=250;
            max=499;
            min=0;
        }
    }
    if(u1)x4=(float)q1/u1;
    else m3--;
    if(u2)x5=(float)q2/u2;
    else m4--;
    x6=(float)(q1+q2)/10;
    return 0;
}
```

(二)【运行结果】

```
请输入要循环的次数：500
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test1-2
test1-3
test1-4
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Test2 Over.

Result:
找到存在的key平均251.845657次/个
找到不存在的key一定是500.000000次/个
遍历10个key平均443.138245次/个
找到存在的key平均7.232275次/个
找到不存在的key平均8.987890次/个
遍历10个key平均8.537199次/个
Program ended with exit code: 0
```

(三)【实验报告】

多次取值以趋向于理论值