ICS Tutorial

2016/9/29

Homework

- 大部分同学都做的不错
- 简单讲解一下

Homework 1

- x = x ^ (x >> 16);
  x = x ^ (x >> 8);
  x = x ^ (x >> 4);
  x = x ^ (x >> 2);
  x = x ^ (x >> 1);

- x = x ^ (x >> 1);
  x = x ^ (x >> 2);
  x = x ^ (x >> 4);
  x = x ^ (x >> 8);
  x = x ^ (x >> 16);

Homework 2

- 1. Intel extended
- 2. div 2
- 3. int to float

Data Lab

- Most students get full score in data lab
- Challenging questions

Conditional

- Zhengping Jiang
- int conditional(int x, int y, int z) {
- 	int a = 0;
- 	x = !x;
- 	a = x << 31 >> 31;
- 	return ((~a) & y) | (a & z);
- }

anyOddBit

- Quzhe Huang
- int anyOddBit(int x) {
- int mask = 0xAA + (0xAA << 8);
- mask = mask + (mask << 16);
- return !!(x & mask);
- }

isGreater

- **Ying Lan**
- int isGreater(int x, int y) {
- //分为同号异号考虑，注意相等情况
- int v1=(((x^y)&y)>>31)&1;//异号
- int v2=(!((x^y)>>31))&(!((x+(~y)+1)>>31))&(!!(x^y));//同号，以及零
- return v1+v2;
- }

isGreater

- **Zihao Yin**
- int isGreater(int x, int y) {
- int minusx = ~x;
- return ((((y + minusx + 1) & (y^ minusx)) | (y & minusx)) >> 31) & 1;
- }

Better isGreater?

```
int isGreater(int x, int y) {
    return ((x +
            ~(((x ^ y) >> 31) | y)) >> 31) + 1;
}
```

Better isGreater?

- int isGreater(int x, int y) {
- long long a = x;
- long long b = y;
- int z = (a + ~b) >> 63;
- return z + 1;
- }

IsNotEqual

- Yuhan Hua
- int isNotEqual(int x, int y) {
- return !(!(~((~x)^y)));
- }

IsNotEqual

- **Zheng Sun**

- int isNotEqual(int x, int y) {
- return !!(x^y);
- }

HowManyBits

- Ruixuan Luo

```
int howManyBits(int x) {
  int ans=0,y=16,z; //二分答案，(x<<y)>>y==x表明x的前方有大于y个相同数字
  z=!(((x<<y)>>y)^x);
  ans=ans^(z<<4);
  y=ans|8;
  z=!(((x<<y)>>y)^x);
  ans=ans^(z<<3);
  y=ans|4;
  z=!(((x<<y)>>y)^x);
  ans=ans^(z<<2);
  y=ans|2;
  z=!(((x<<y)>>y)^x);
  ans=ans^(z<<1);
  y=ans|1;
  z=!(((x<<y)>>y)^x);
  ans=ans^z;
    return (ans^31)+1;
}
```

HowManyBits

- Seter

```
298 int howManyBits(int y) {
299     int global_4 = ~0x5B;
300     int ans;
301     long long x = y; // need 1 more op only using int
302     x = x ^ (x << 2);
303     ans = (!(x >> 17)) << 4;
304     ans ^= 25;
305     ans ^= (!(x >> ans)) << 3;
306     ans ^= 4;
307     ans ^= (!(x >> ans)) << 2;
308     ans += (global_4 >> ((x >> ans) & 30)) & 3;
309     return ans;
310 }
```

gdb

- gnu debugger
  - b name
  - r
  - info breakpoints
  - disable 1
  - next / step / **stepi**
  - **jump**

Happy National Day!