

计算机和编程语言

翁恺

计算机是生活必需品

- 如果想要自己设计一些功能和行为，让计算机按照你的意图做事情，就需要写程序了
- 本课程的主要的目的是通过学习编程，来理解计算机是如何解决问题的，理解计算机的能与不能，擅长与非擅长

计算机如何解决问题

- “请给我一杯水”
 1. 转身走到厨房；
 2. 找到一个杯子；
 3. 找到一个水壶；
 4. 在杯子中倒入一些水；
 5. 拿着杯子走回桌子。

人：What to do
计算机：How to do

计算机语言

- 程序是用特殊的编程语言写出来表达如何解决问题的
- 不是用编程语言来和计算机交谈，而是描述要求它如何做事情的过程或方法

计算机的语言

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61	6D	65	00	00	00	00	00	00	5F	5F	54	45	58	54	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
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20	00	00	00	C7	45	F4	1A	00	00	00	81	7D	F4	00	00	00	00	0F	84	1B	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
F8	8B	45	F0	89	45	F4	E9	D8	FF	FF	FF	48	8D	3D	00	00	00	00	8B	75	F8	B0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
48	83	C4	20	5D	C3	25	64	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
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00	00	00	00	00	07	00	00	00	01	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
69	6E	2E	65	68	00	4C	5F	2E	73	74	72	00	45	48	5F	66	72	61	6D	65	30	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

```
int u = 32;
int v = 26;
while ( v!= 0 ) {
    int temp = u%v;
    u = v;
    v = temp;
}
printf("%d",u);
printf("%d",v);
```

辗转相除法

```
int u = 32;  
int v = 26;  
while ( v!= 0 ) {  
    int temp = u%v;  
    u = v;  
    v = temp;  
}  
printf("%d",u);
```

1. 如果 v 等于0，计算结束， u 就是最大公约数；
2. 如果 v 不等于0，那么计算 u 除以 v 的余数，让 u 等于 v ，而 v 等于那个余数；
3. 回到第一步。

计算机-程序-算法

```
int u = 32;
int v = 26;
while ( v!= 0 ) {
    int temp = u%v;
    u = v;
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算法

- 我们要让计算机做计算,就需要像这样找出计算的步骤,然后用编程语言写出来
- 计算机做的所有的事情都叫做计算

计算机的思维

- $2x+6=20$
 - 解方程
 - 枚举
 - 二分搜索

枚举求最大公约数

1. 设 t 为2;
2. 如果 u 和 v 都能被 t 整除，则记下这个 t
3. t 加1后重复第2步，直到 t 等于 u 或 v ;
4. 那么，曾经记下的最大的可以同时整除 u 和 v 的 t 就是gcd

程序的执行

- 解释：借助一个程序，那个程序能试图理解你的程序，然后按照你的要求执行
- 编译：借助一个程序，就像一个翻译，把你的程序翻译成计算机真正能懂的语言——机器语言——写的程序，然后，这个机器语言写的程序就能直接执行了

解释语言vs编译语言

- 语言本无编译/解释之分
- 常用的执行方式而已
- 解释型语言有特殊的计算能力
- 编译型语言有确定的运算性能