朱梦
主 github：https://github.com/mengzhu0308/mengzhu
副 github1：https://github.com/mengzhu030801/mengzhu01
公众号：梦梦的分享

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分而治之为上策 (1)

笔者每次看算法之类的书籍，总会坚持不下去。但是，笔者认为，经典算法还是得静下心来品味一番。摘自《算法之道第 2 版》，分而治之为上策：

- 将问题分解为若干个小的子问题。每个子问题与大问题同型，但规模更小。
- 递归解决这些问题。
- 将子问题的解答合并，获得大问题的解答。

笔者就不班门弄斧，阐述文字了，否则就要贻笑大方了。参考书籍：《算法之道第 2 版》和《算法导论》。这里，笔者借“乘方运算”：对于 $n \in \boldsymbol{R}$，计算 a^n，来展开。

1 C++

```cpp
#include<iostream>
#include<ctime>

using namespace std;

double spower(double a, int n) {
    double rst = 1.;
    for (int i = 0; i < n; i++)
    rst *= a;

    return rst;
}

//快速乘方运算
double fpower(double a, int n) {
    if (n == 0) return 1.;
    if (n & 1) {
        double t = fpower(a, (n - 1) >> 1);
        return t * t * a;
    }
```

```
21      else {
22          double t = fpower(a, n >> 1);
23          return t * t;
24      }
25  }
26
27  int main() {
28      clock_t start_time, end_time;
29      double a = 1.000000000001;
30      int n = 10000;
31      double rst;
32
33      start_time = clock();
34      for (int i = 0; i < n; i++)
35      rst = spower(a, n);
36      cout << rst << endl;
37      end_time = clock();
38      cout << end_time - start_time << " ms" << endl;
39
40      start_time = clock();
41      for (int i = 0; i < n; i++)
42      rst = fpower(a, n);
43      cout << rst << endl;
44      end_time = clock();
45      cout << end_time - start_time << " ms" << endl;
46
47      return 0;
48  }
```

2 Python

```
1  from timeit import default_timer as timer
2
3  def spower(a: float, n: int):
4      rst = 1.
5      for i in range(n):
6          rst *= a
7
8      return rst
9
```

```python
# 快速乘方运算
def fpower(a: float, n: int):
    if n == 0: return 1.
    if n & 1:
        t = fpower(a, (n - 1) >> 1)
        return t * t * a
    else:
        t = fpower(a, n >> 1)
        return t * t

if __name__ == '__main__':
    a, n = 1.000000000001, 10000

    start_time = timer()
    rst = None
    for i in range(n):
        rst = spower(a, n)
    print(rst)
    end_time = timer()
    print(f'{(end_time - start_time) * 1000} ms')

    start_time = timer()
    rst = None
    for i in range(n):
        rst = fpower(a, n)
    print(rst)
    end_time = timer()
    print(f'{(end_time - start_time) * 1000} ms')
```

3 结语

又水了一篇博客，哈哈！