

绪论

复杂度分析：封底估算

He calculated just as men breathe, as eagles
sustain themselves in the air.

我仿佛是横越三世来见你的，而你却不在

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Back-Of-The-Envelope Calculation

$$\begin{aligned}\diamond \text{地球 (赤道) 周长} &\approx 787 \times 360 / 7.2 \\ &= 787 \times 50 = 39,350 \text{ km}\end{aligned}$$

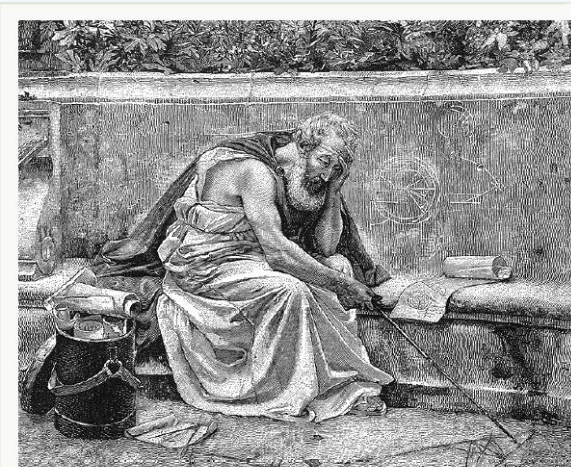
$$\begin{aligned}\diamond 1\text{天} &= 24\text{hr} \times 60\text{min} \times 60\text{sec} \\ &\approx 25 \times 4000 = 10^5 \text{ sec}\end{aligned}$$

$$\diamond 1\text{生} \approx 1\text{世纪} = 100\text{yr} \times 365 = 3 \times 10^4 \text{ day} = 3 \times 10^9 \text{ sec}$$

$$\diamond \text{“为祖国健康工作五十年”} \approx 1.6 \times 10^9 \text{ sec}$$

$$\diamond \text{“三生三世”} \approx 300 \text{ yr} = 10^{10} = (1 \text{ googol})^{(1/10)} \text{ sec}$$

$$\diamond \text{宇宙大爆炸至今} = 4 \times 10^{17} > 10^8 \times \text{一生}$$



Eratosthenes
(276 ~ 194 B.C.)



Enrico Fermi
(1901 - 1954)

实例：全国人口普查数据的排序

| $n = 1.4^+ \times 10^9$ $\mathcal{O}(10^9)$ | 算法 | |
|--|--|---|
| | Bubblesort $(10^9)^2$ 10^{18} | Mergesort $10^9 \times \log(10^9)$ 30×10^9 |
| 硬件 | 普通PC 1GHz 10^9 flops 10^9 sec 30 yr | 30 sec |
| | 天河1A 千万亿次 = 1P 10^{15} flops 10^3 sec 20 min | 0.03 ms |