

排序

希尔排序: Pratt序列

14-C4

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## Pratt's Sequence, 1971

$$\begin{aligned}\mathcal{H}_{pratt} &= \{ 2^p \cdot 3^q \mid p, q \in \mathcal{N} \} \\ &= \{ 1, 2, 3, 4, 6, 8, 9, 12, 16, 18, 24, 27, 32, 36, \dots \}\end{aligned}$$

❖ Note that

- adjacent items are **NOT** always relatively prime and
- there are  $\mathcal{O}(\log^2 n)$  items no greater than  $n$

❖ With  $\mathcal{H}_{pratt}$ ,

Shellsort sorts a sequence of length  $n$  in  $\mathcal{O}(n \cdot \log^2 n)$  time ...

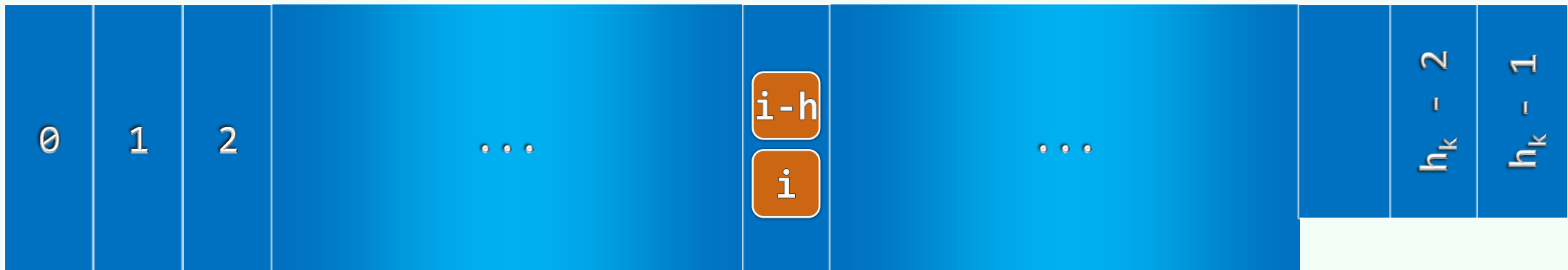
## From (2,3)-ordered to 1-ordered

$$\because x(\textcolor{red}{2}, \textcolor{red}{3}) = 2 \cdot 3 - 2 - 3 = \textcolor{red}{1}$$

$\therefore$  To the **LEFT** of each element in a (2,3)-ordered sequence,

only the **NEXT** element can be smaller

$\therefore$  It costs  $\mathcal{O}(n)$  time to sort such a sequence



## From $(2 \cdot h_k, 3 \cdot h_k)$ -ordered to $h_k$ -ordered

❖ Divide  $S$  into  $h_k$  subsequences, each of which is  $(2, 3)$ -ordered

$\therefore$  it costs altogether  $\mathcal{O}(n)$  time to sort them resp.

❖  $\therefore$  there are altogether  $\mathcal{O}(\log^2 n)$  iterations

$\therefore$  we need  $\mathcal{O}(n \cdot \log^2 n)$  time

