

17	21	25	87	96	∞
7	37	40	71	76	∞

7→



17	21	25	87	96	∞
7	37	40	71	76	∞

17→



17	21	25	87	96	∞
7	37	40	71	76	∞

21→



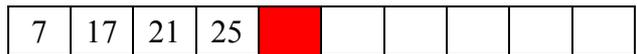
17	21	25	87	96	∞
7	37	40	71	76	∞

25→



17	21	25	87	96	∞
7	37	40	71	76	∞

37→



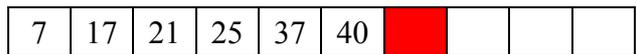
17	21	25	87	96	∞
7	37	40	71	76	∞

40→



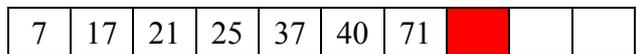
17	21	25	87	96	∞
7	37	40	71	76	∞

71→



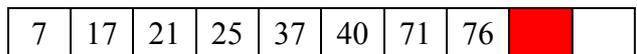
17	21	25	87	96	∞
7	37	40	71	76	∞

76→



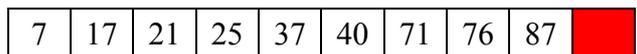
17	21	25	87	96	∞
7	37	40	71	76	∞

87→

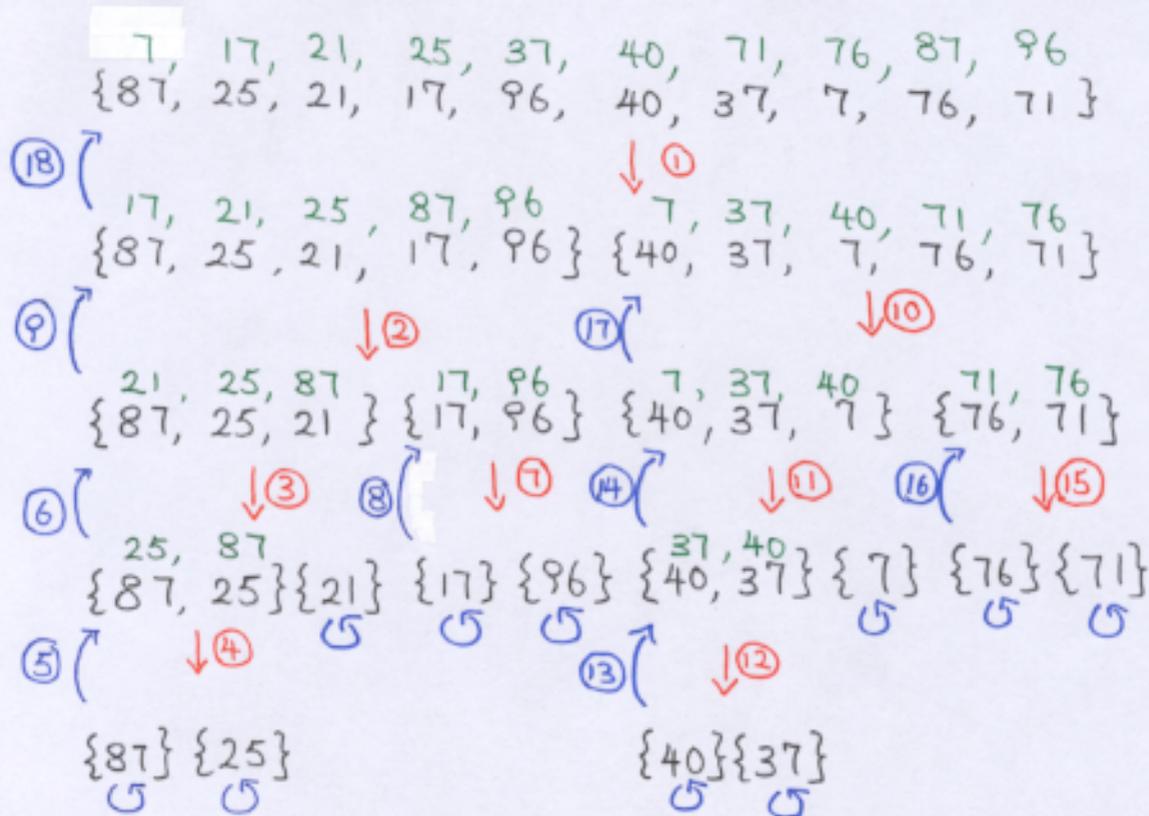


17	21	25	87	96	∞
7	37	40	71	76	∞

96→



# COMP 171 Tutorial 3 : How merge sort works



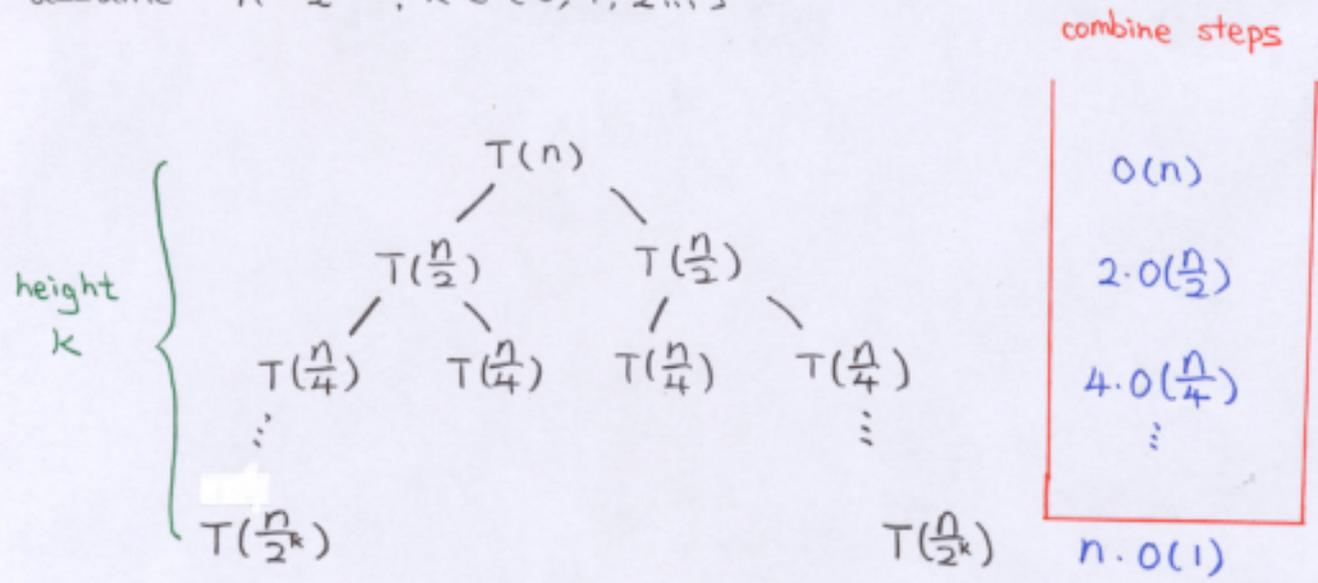
→ divide step

→ combine step

{ } array before sorting

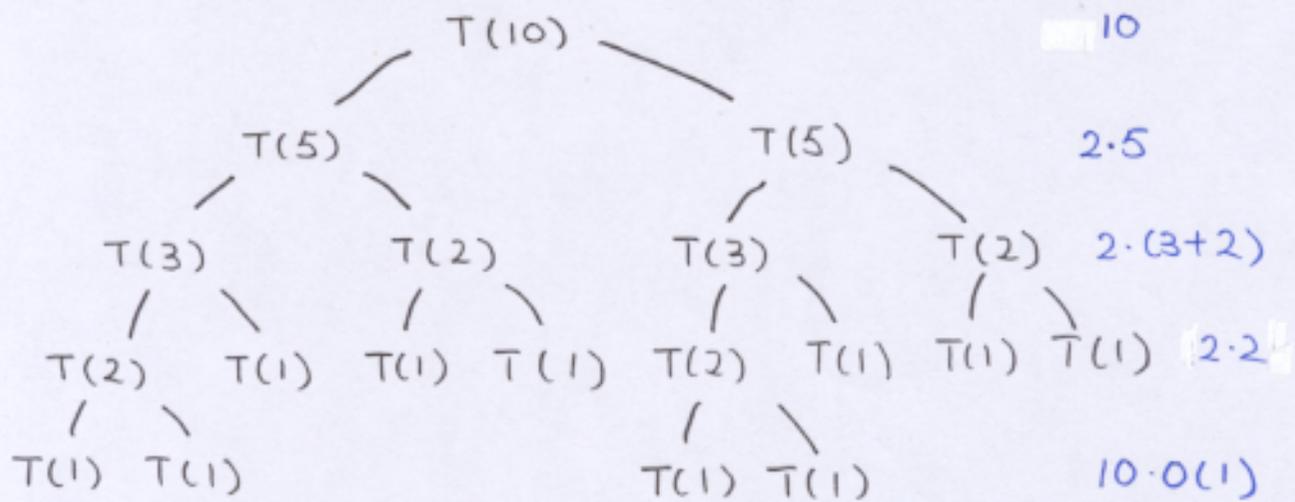
{ } array after sorting

assume  $n = 2^k, k \in \{0, 1, 2, \dots\}$



$$\begin{aligned}
 T(n) &= k \cdot O(n) + n \cdot O(1) \\
 &= k \cdot O(n) + O(n) \\
 &= \log_2 n \cdot O(n) + O(n) \\
 &= O(n \log n)
 \end{aligned}$$

what if  $2^{k-1} < n < 2^k, k \in \{2, 3, \dots\}$  ?



$$\text{height} = 4 = \lceil \log_2 10 \rceil$$

87	25	21	17	96	40	37	7	76	71
----	----	----	----	----	----	----	---	----	----

87	25	21	17	96	40	37	7	76	71
----	----	----	----	----	----	----	---	----	----

25	87	21	17	96	40	37	7	76	71
----	----	----	----	----	----	----	---	----	----

25	21	87	17	96	40	37	7	76	71
----	----	----	----	----	----	----	---	----	----

25	21	17	87	96	40	37	7	76	71
----	----	----	----	----	----	----	---	----	----

25	21	17	87	96	40	37	7	76	71
----	----	----	----	----	----	----	---	----	----

25	21	17	40	96	87	37	7	76	71
----	----	----	----	----	----	----	---	----	----

25	21	17	40	37	87	96	7	76	71
----	----	----	----	----	----	----	---	----	----

25	21	17	40	37	7	96	87	76	71
----	----	----	----	----	---	----	----	----	----

25	21	17	40	37	7	96	87	76	71
----	----	----	----	----	---	----	----	----	----

25	21	17	40	37	7	71	87	76	96
----	----	----	----	----	---	----	----	----	----

