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Bubble Sort:

19	5	12	7
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void bubbleSort (int arr, int n)

{
for (int j = 0; j < n-1; j++)

19	5	12	7
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{
for (int j = 0; j < n-i-1; j++)

if (arr[j] > arr[j+1])

{
swap(arr[j], arr[j+1]);

5	19	12	7
---	----	----	---

i=0 j=0 1 2 3

for (int j = 0; j < n-1; j++)

5	19	12	7
---	----	----	---

{
for (int j = 0; j < n-i-1; j++)

if (arr[j] > arr[j+1])

{
swap(arr[j], arr[j+1]);

5	12	19	7
---	----	----	---

i=1 j=1 2 3

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again repeat for loop;
 $\text{for (int } i = 0; i < n - 1; i++)$
 $\{$
 $\text{for (int } j = 0; j < n - i - 1; j++)$

19 | 5 | 12 | 7

void bubbleSort (int arr, int n)
 $\text{for (int } i = 0; i < n - 1; i++)$

$\{$
 $\text{for (int } j = 0; j < n - i - 1; j++)$

$\text{if (arr[j] > arr[j+1])}$
 $\{$
 $\text{swap(arr[j], arr[j+1])}$
 $\}$

again repeat for loop of j.

$\text{for (int } j = 0; j < n - i - 1; j++)$
 $\text{if (arr[j] > arr[j+1])}$

$\{$
 $\text{swap(arr[j], arr[j+1])}$
 $\}$

$$\begin{array}{|c|c|c|} \hline 5 & 12 & 19 & 7 \\ \hline \end{array}$$

$$\begin{array}{cc} 2 & 3 \\ i=0 & j=1 \end{array}$$

Again repeat for loop of j

$$\begin{array}{|c|c|c|c|} \hline 5 & 12 & 19 & 7 \\ \hline \end{array}$$

$$\begin{array}{ccc} 0 & 1 & 2 & 3 \\ i=0 & j=2 \end{array}$$

$$\text{if } arr[j] > arr[j+1]$$

$$\{ \text{swap}(arr[j], arr[j+1])$$

$$\begin{array}{|c|c|c|c|} \hline 5 & 12 & 7 & 19 \\ \hline \end{array}$$

$$\begin{array}{ccc} 0 & 1 & 2 & 3 \\ i=0 & j=2 \end{array}$$

Again repeat for loop of j

$$\text{for } (int\ j=0; j < n-i-1; j++)$$

$$\text{false skip for loop of j}$$

$$\text{for } (int\ i=0; i < n-1; i++)$$

$$\begin{array}{|c|c|c|c|} \hline 5 & 12 & 7 & 19 \\ \hline \end{array}$$

$$\begin{array}{ccc} 0 & 1 & 2 & 3 \\ i=0 & j=1 & i=1 & j=3 \end{array}$$

$$\text{false skip}$$

$$\text{for } (int\ i=0; i < n-1; i++)$$

$$\text{for } (int\ j=0; j < n-1-j; j++)$$

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// change loop boundary

5	12	7	19
0	1	2	3
j=0	i=1		

for (int j=0; j < n-i-1; j++)

{
if (arr[j] > arr[j+1]) { // false

for (int j=0; j < n-i-1; j++)

5	12	7	19
0	1	2	3
	i=1		

swap(arr[j], arr[j+1]);

5	7	12	19
0	1	2	3
	i=1		

for (int i=0; i < n-1; i++)

{
if (arr[i] > arr[i+1]) {

skip

5	7	12	19
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5	7	12	19
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