

□ Counting Sort

	1	2	3	4	5	6	7	8
A	2	5	3	0	2	3	0	3

	0	1	2	3	4	5
C	0	0	0	0	0	0

for $i = 0$ to k
 0 to 5

$$c[i] = 0$$

for $j = 1$ to $A.length \Rightarrow 1 \rightarrow 8$

$$c[A[j]] = c[A[j]] + 1$$

$$j=1 \quad c[2] = c[2] + 1$$

	0	1	2	3	4	5
C	0	0	0 1	0	0	0

$$j=2 \quad c[A[2]] = c[A[2]] + 1$$

$$c[5] = c[5] + 1$$

	0	1	2	3	4	5
C	0	0	1	0	0	0 1

In this way we get count

	0	1	2	3	4	5
C	2	0	2	3	0	1

for $i=1$ to k

$$c[i] = c[i] + c[i-1]$$

0	1	2	3	4	5
2	0	2	3	0	1

$i=1$

$i=2$

$i=3$

$i=4$

$i=5$

0	1	2	3	4	5
2	2	4	7	7	8

for $j=A.length$ down to 1

$j=8$ down to 1

$j=8$ $j=7$ $j=6$ - - - - - $j=1$

$j=8$ $B[c[A[j]]] = A[j]$

$$c[A[j]] = c[A[j]] - 1$$

	1	2	3	4	5	6	7	8
A	2	5	3	0	2	3	0	3

B							3	
---	--	--	--	--	--	--	---	--

$$B[c[A[8]]] = A[8]$$

$$B[c[3]] = A[8]$$

$$B[7] = 3$$

$$c[3] = c[3] - 1$$

$$= 7 - 1 = 6$$

0	1	2	3	4	5
2	2	4	6	7	8

$$\underline{j=7}$$

0	1	2	3	4	5	6	7	8
2	2	4	7	6	7	8		

$$B[e[A[7]]] = A[7]$$

$$B[e[0]] = 0$$

$$c[0] = c[0] - 1 \\ = 2 - 1 = 1$$

$$B[2] = 0$$

	1	2	3	4	5	6	7	8
B		0					3	

	0	1	2	3	4	5
C	1	2	4	6	7	8

$$\underline{j=6}$$

$$B[e[A[6]]] = A[6]$$

$$B[c[3]] = 3$$

$$B[6] = 3$$

$$c[A[6]] = c[A[6]] - 1$$

$$c[3] = c[3] - 1 \\ = 6 - 1 \\ = 5$$

	1	2	3	4	5	6	7	8
B		0				3	3	

	0	1	2	3	4	5
C	1	2	4	5	7	8

$j=5$

$$B[C[A[5]]] = A[5]$$

$$B[C[2]] = 2$$

$$B[4] = 2$$

$$C[A[5]] = C[A[5]] - 1$$

$$C[2] = 4 - 1 = 3$$

	1	2	3	4	5	6	7	8
B		0		2		3	3	

	0	1	2	3	4	5
C	1	2	3	5	7	8

$j=4$

$$B[C[A[4]]] = A[4]$$

$$B[C[0]] = 0$$

$$B[1] = 0$$

$$C[A[4]] = C[A[4]] - 1$$

$$C[0] = 1 - 1 = 0$$

	1	2	3	4	5	6	7	8
B	0	0		2		3	3	

	0	1	2	3	4	5
C	0	2	3	5	7	8

$j=3$

$$B[C[A[3]]] = A[3]$$

$$B[C[3]] = 3$$

$$B[5] = 3$$

$$C[A[3]] = C[A[3]] - 1$$

$$C[3] = 5 - 1 = 4$$

	1	2	3	4	5	6	7	8
B	0	0		2	3	3	3	

	0	1	2	3	4	5
C	0	2	3	4	7	8

j=2

$$B[c[A[2]]] = A[2]$$

$$B[c[5]] = 5$$

$$B[8] = 5$$

$$c[A[2]] = c[A[2]] - 1$$

$$c[5] = c[5] - 1$$

$$c[5] = 8 - 1 = 7$$

	1	2	3	4	5	6	7	8
B	0	0		2	3	3	3	5

	0	1	2	3	4	5
c	0	2	3	4	7	7

j=1

$$B[c[A[1]]] = A[1]$$

$$B[c[2]] = 2$$

$$B[3] = 2$$

$$c[A[1]] = c[A[1]] - 1$$

$$c[2] = c[2] - 1$$

$$c[2] = 3 - 1 = 2$$

	1	2	3	4	5	6	7	8
B	0	0	2	2	3	3	3	5

	0	1	2	3	4	5
c	0	2	2	4	7	7