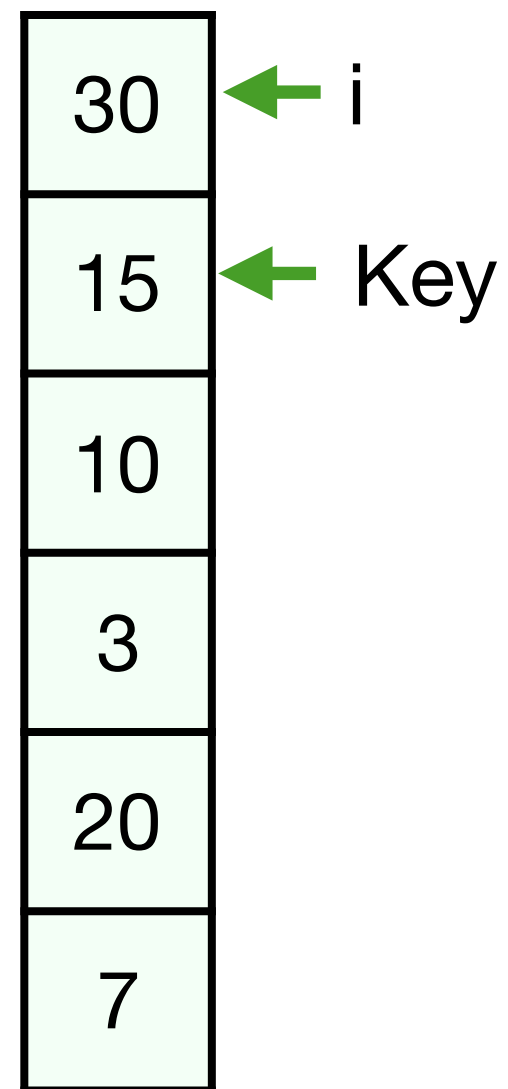# UCSC Silicon Valley Extension

Advanced C Programming

Insertion Sort
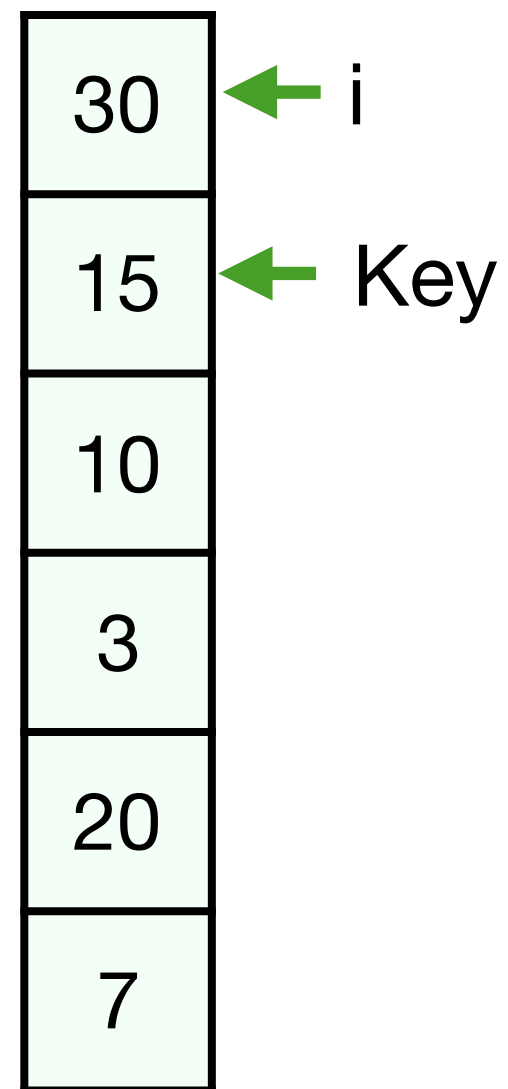
Instructor: Radhika Grover

Insertion sort

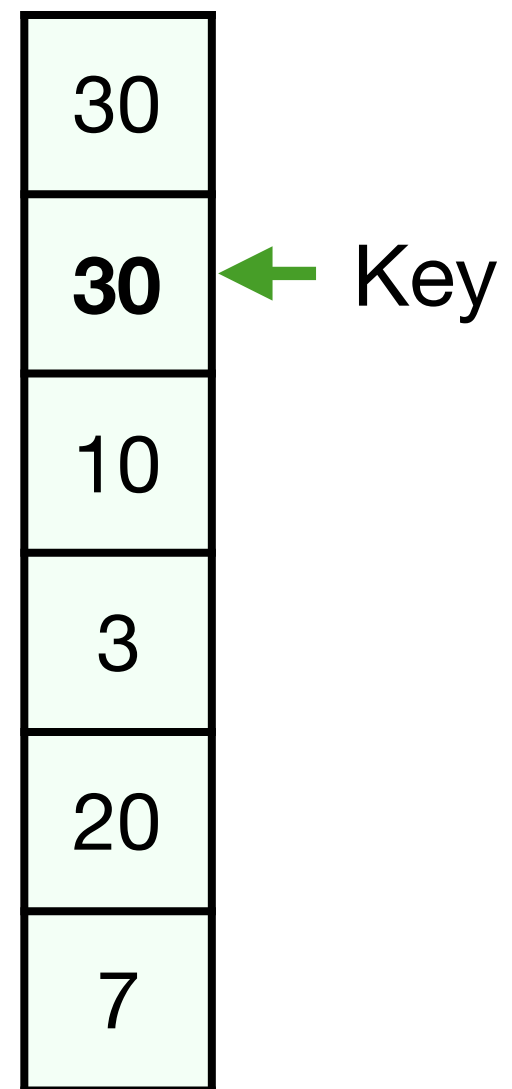|	
30	← i
15	← Key
10	
3	
20	
7	

Insertion sort

Key = 15

```
┌──────┐
│  30  │ ← i
├──────┤
│  15  │ ← Key
├──────┤
│  10  │
├──────┤
│   3  │
├──────┤
│  20  │
├──────┤
│   7  │
└──────┘
```

30 > key, shift 30 down

Insertion sort

Key = 15

30
30
10
3
20
7

← Key

i < 0 move key value (15) to i+1

Insertion sort

15
30 ← i
10 ← Key
3
20
7
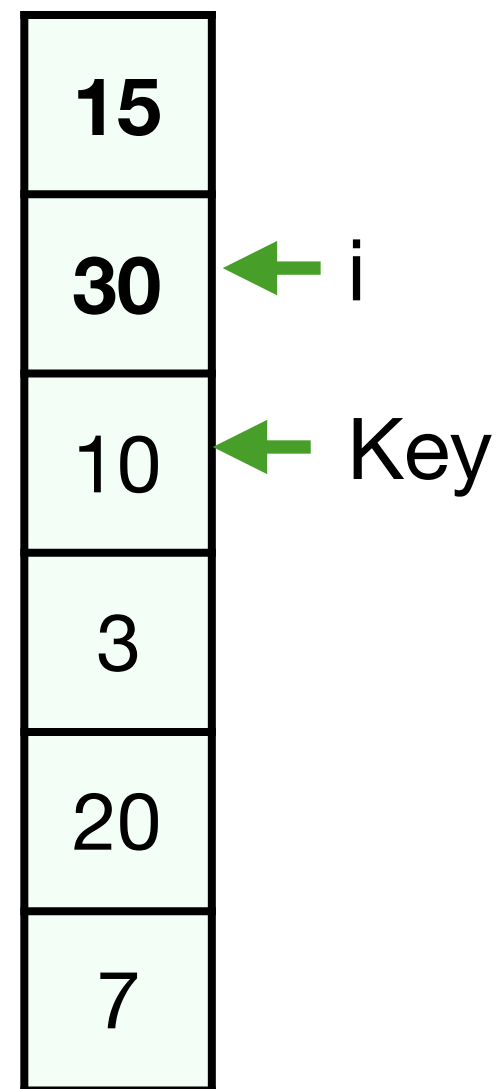
finished 1st pass move key down

Insertion sort

Key = 10

15
30	← i
10	← Key
3
20
7

30 > key, shift 30 down

Insertion sort

Key = 10

15 ← i

30

30 ← Key

3

20

7
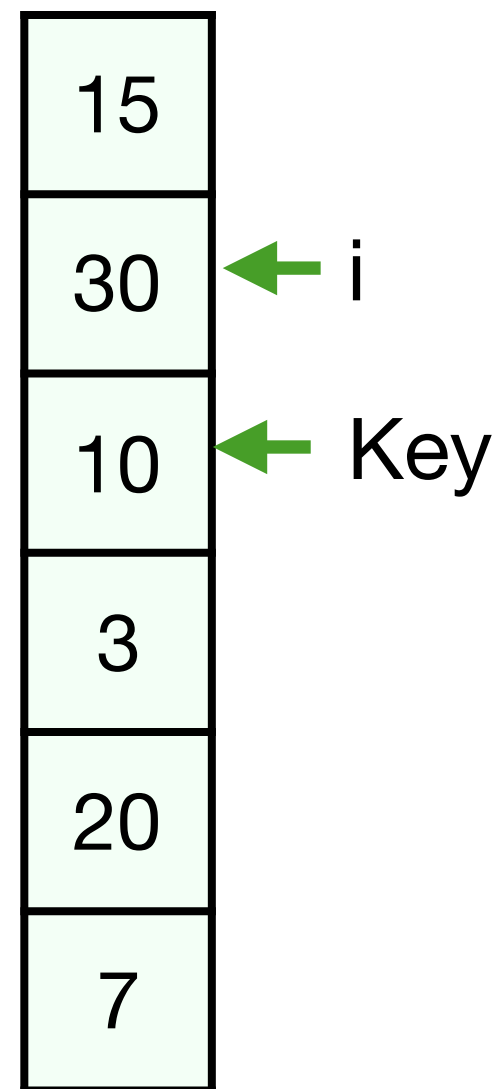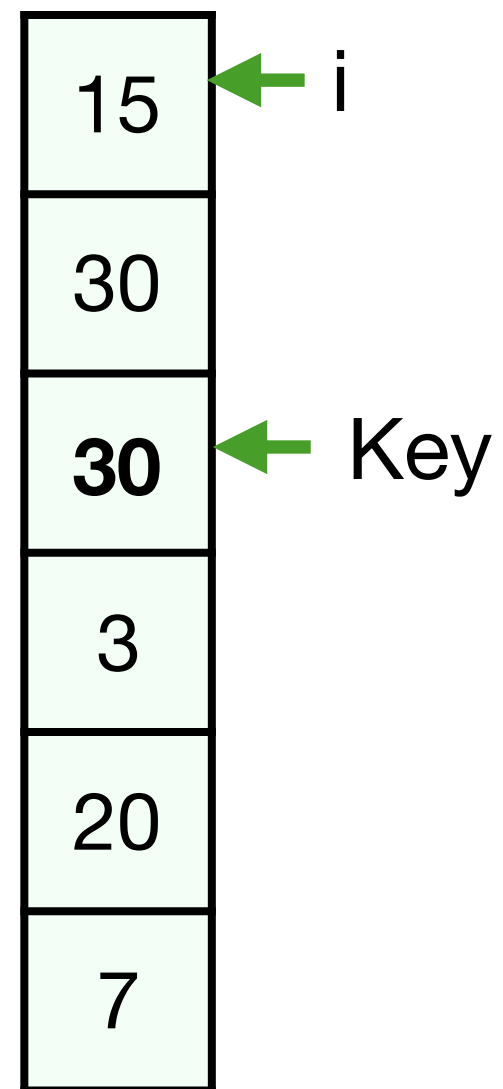
15 > key, shift 15 down

Insertion sort

Key = 10

15
15
30
3
20
7

i < 0 move key value (10) to i+1

Insertion sort

10
15
30 ← i
3 ← Key
20
7
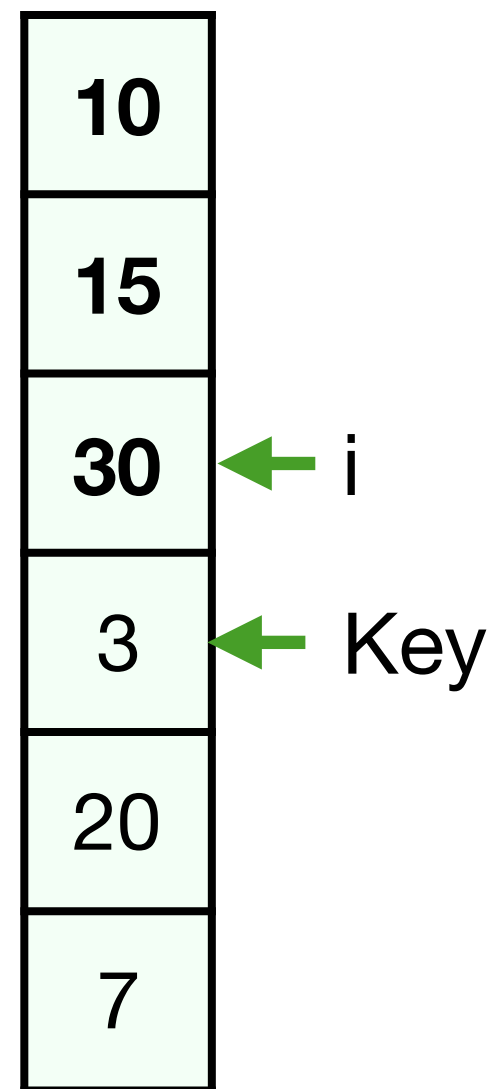
finished 2nd pass move key down
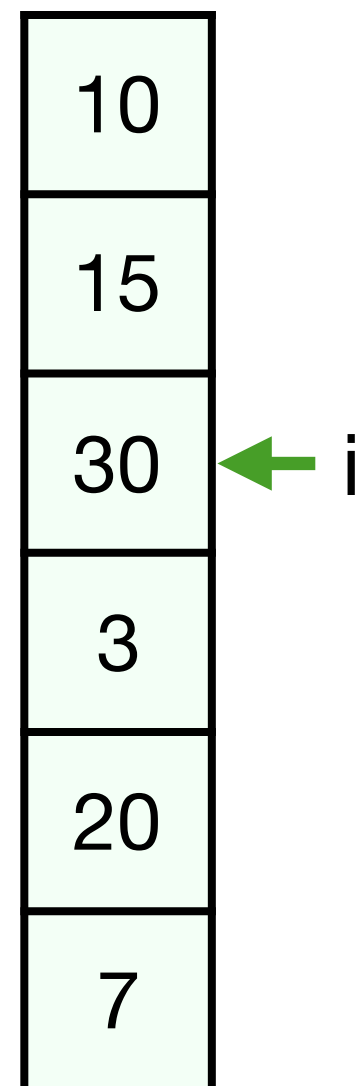
Insertion sort

Key = 3

10
15
30	← i
3
20
7

30 > key, shift 30 down

Insertion sort

Key = 3

10
15	← i
30
30
20
7

15> key, shift 15 down

Insertion sort

Key = 3

10	← i
15
15
30
20
7
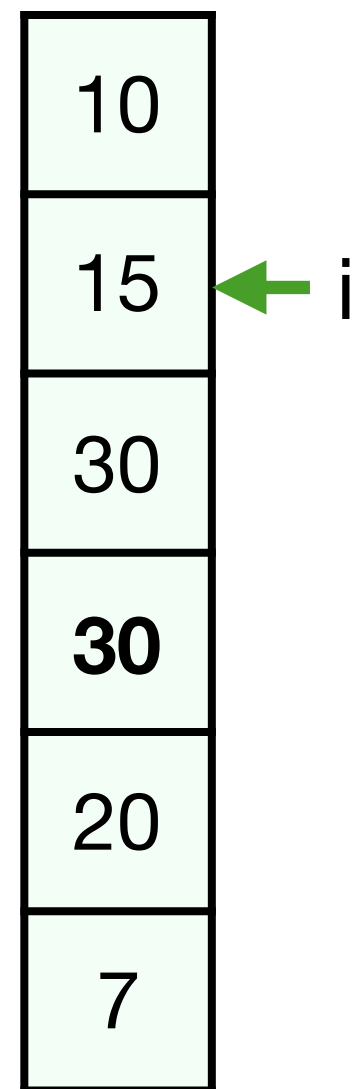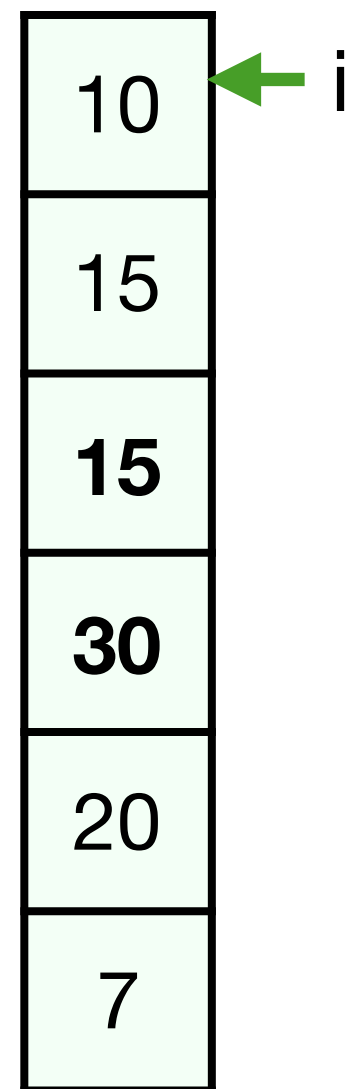
10 > key, shift 10 down

Insertion sort

Key = 3

10
10
15
30
20
7

i < 0 move key value (3) to i+1

Insertion sort

3
10
15
30 ← i
20 ← Key
7
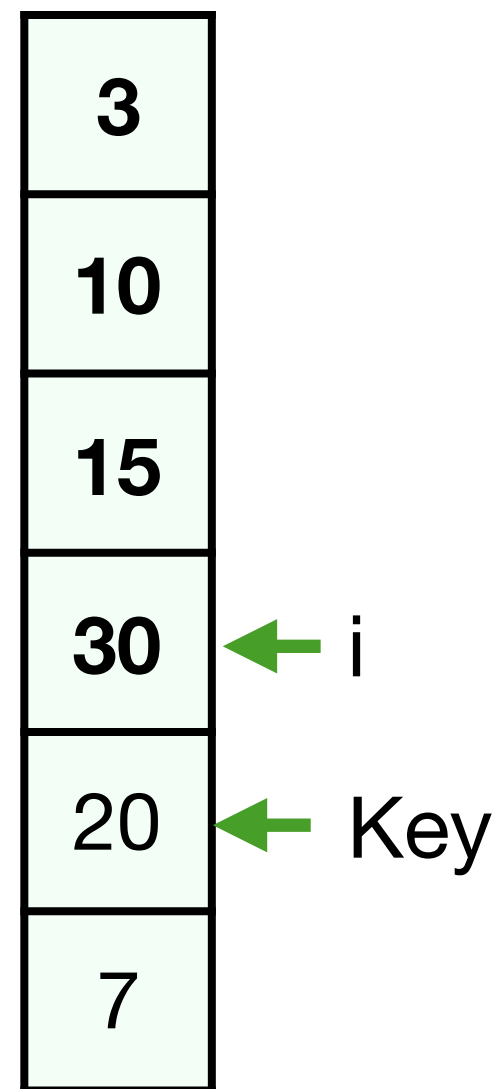
finished 3rd pass move key down

14

Insertion sort

Key = 20

3
10
15
30	← i
20	← Key
7

30 > key, shift 30 down

Insertion sort

Key = 20

3
10
15	← i
30
30	← Key
7
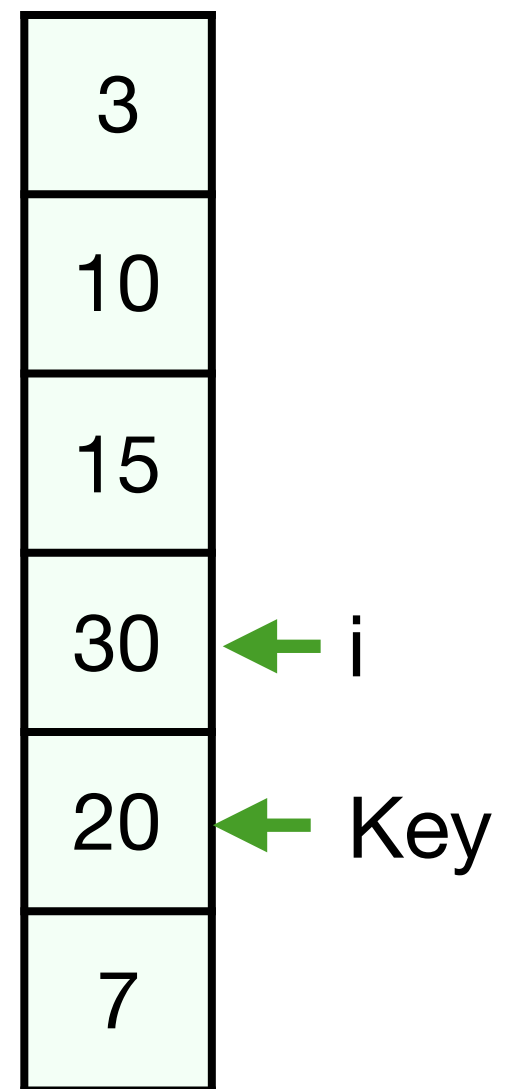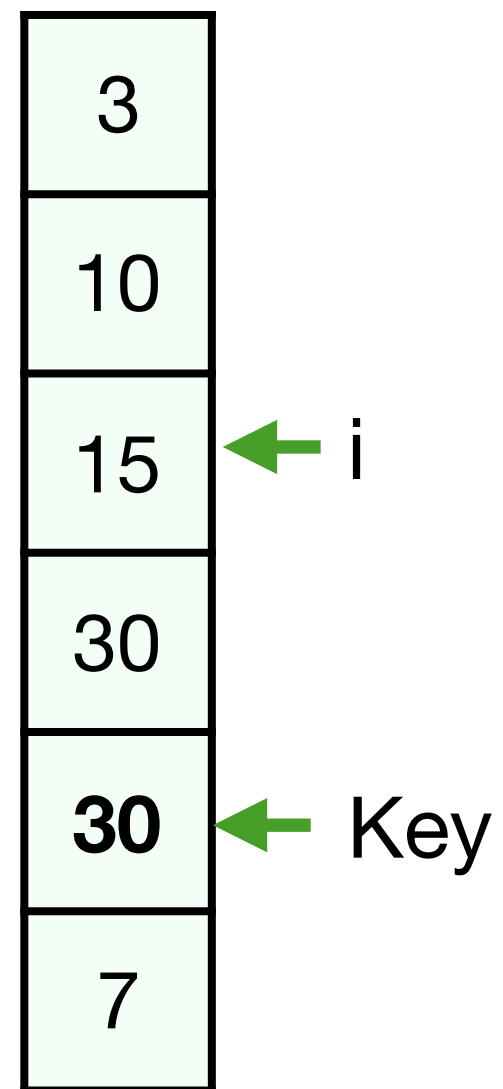
15 > key ? No => move key (20) to i+1

Insertion sort

Key = 20

3
10
15
20
30 ← i
7 ← Key
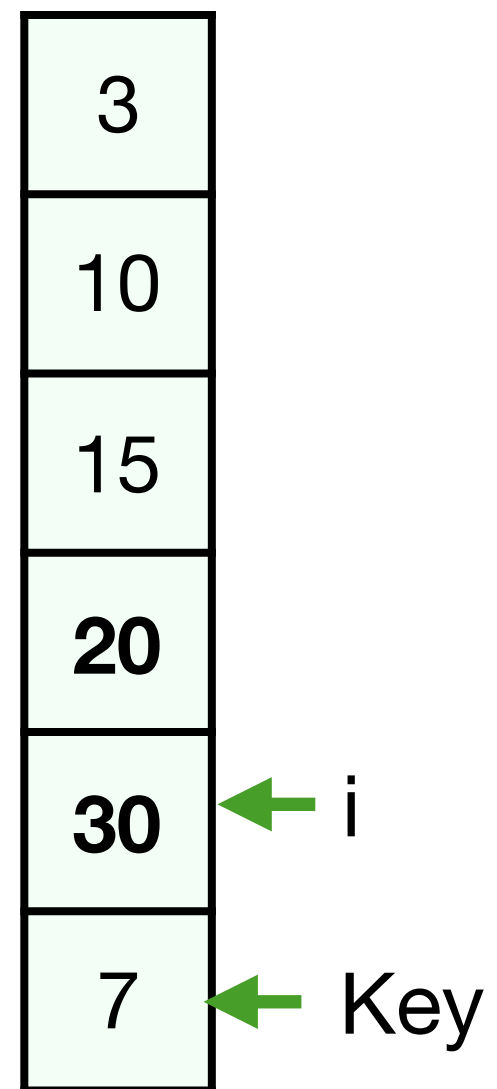
finished 4th pass move key down

Insertion sort

Key = 7

3
10
15
20
30	← i
7	← Key

30 > key, shift 30 down

Insertion sort

Key = 7

3
10
15
20	← i
30
30	← Key
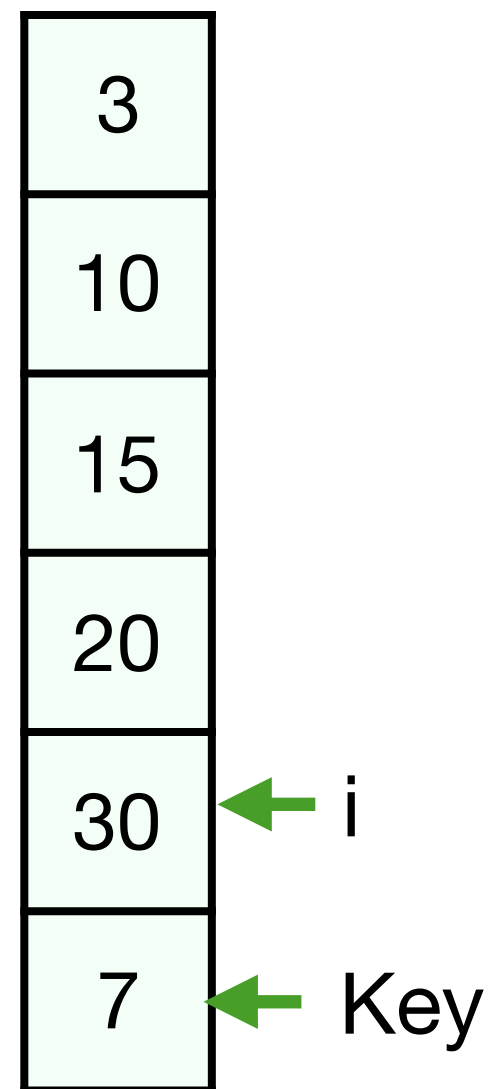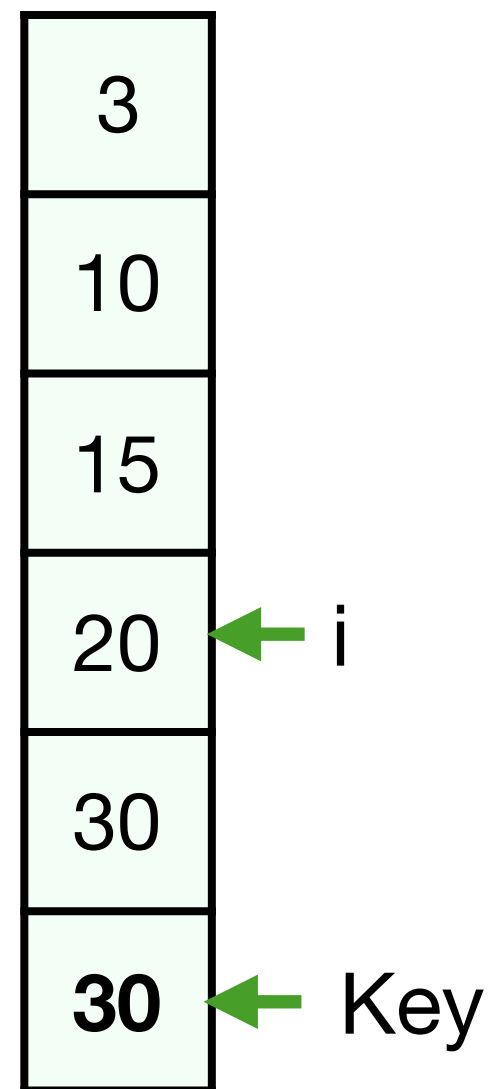
20 > key, shift 20 down

Insertion sort

Key = 7

3
10
15	← i
20
20
30	← Key

15 > key, shift 15 down

Insertion sort

Key = 7

3
10	← i
15
15
20
30	← Key

10 > key, shift 10 down

Insertion sort

Key = 7

3 ← i
10
10
15
20
30 ← Key
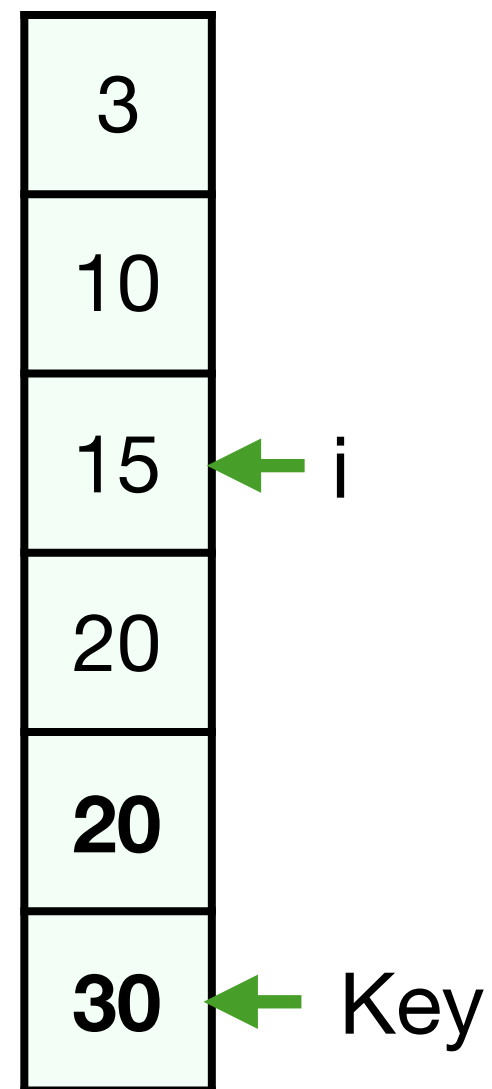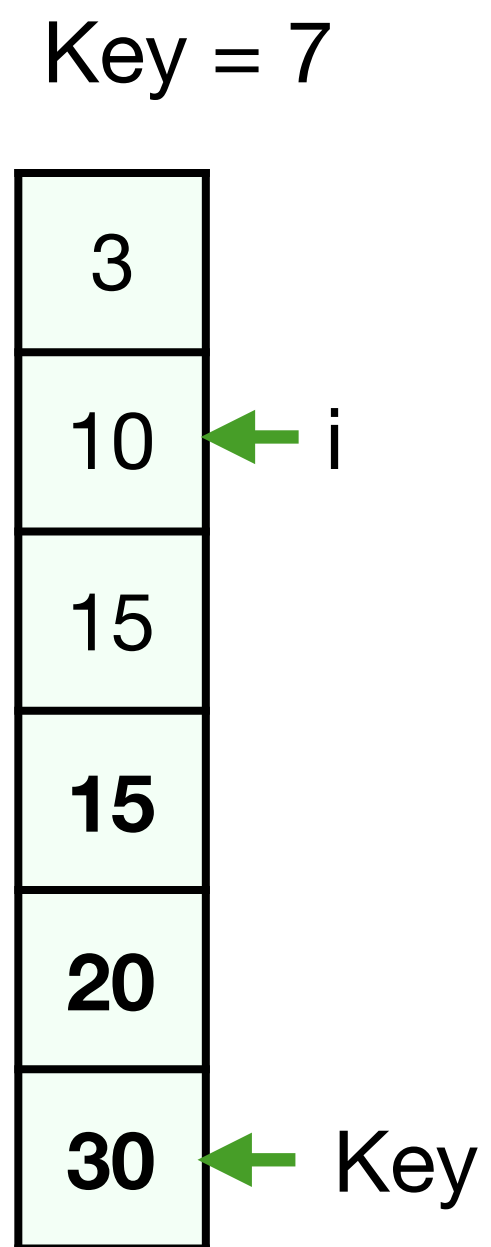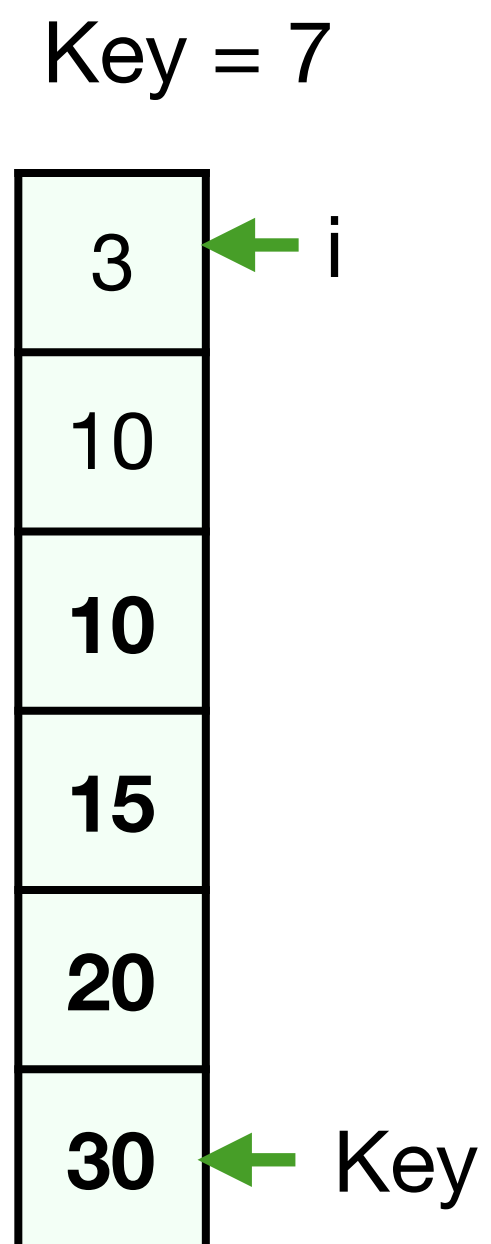
15 > key ? No => move key (7) to i+1

Insertion sort

3
7
10
15
20
30

finished 5th pass

3
7
10
15
20
30

Solution