Bin Sort

A quirky sorting algorithm

Declare the bin array.

```
int bin[] = {0, 0, 0, 0};

for (int i = 0 ; i < a.length ; i++){
    bin [a [i]]++;
}

int index = 0;
int counter = 0;
for (int i = 0 ; i < 4 ; i++){
    counter = bin [i];
    while (counter > 0){
        a [index] = i;
        counter--;
        index++;
    }
}
```

The Array to be Sorted:

[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
1	1	2	0	2	3	0	3	0	3	3	1

The Bin Array:

[0]	[1]	[2]	[3]
0	0	0	0

Go through the array and count the items.

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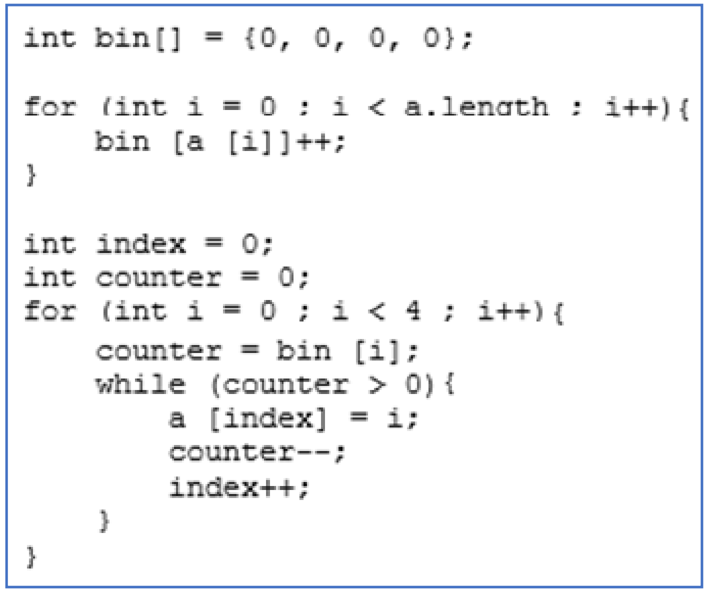
Go through the array and count the items.



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Go through the array and count the items.

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int bin[] = {0, 0, 0, 0};

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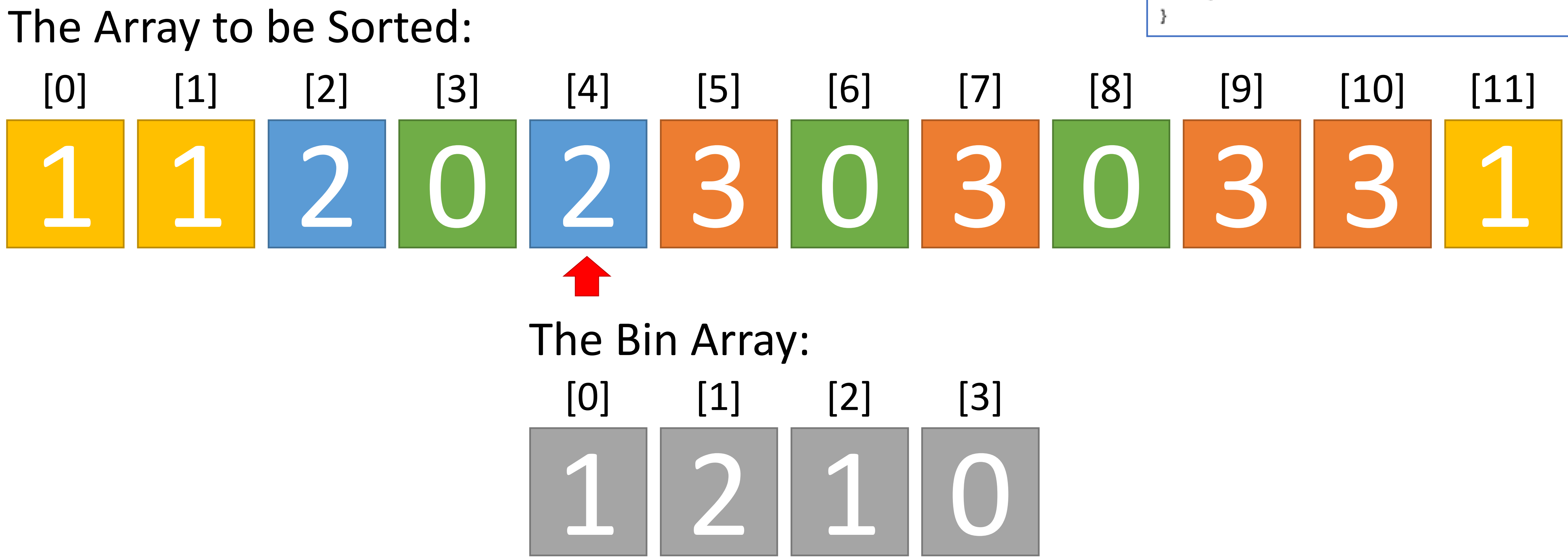

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Go through the array and count the items.

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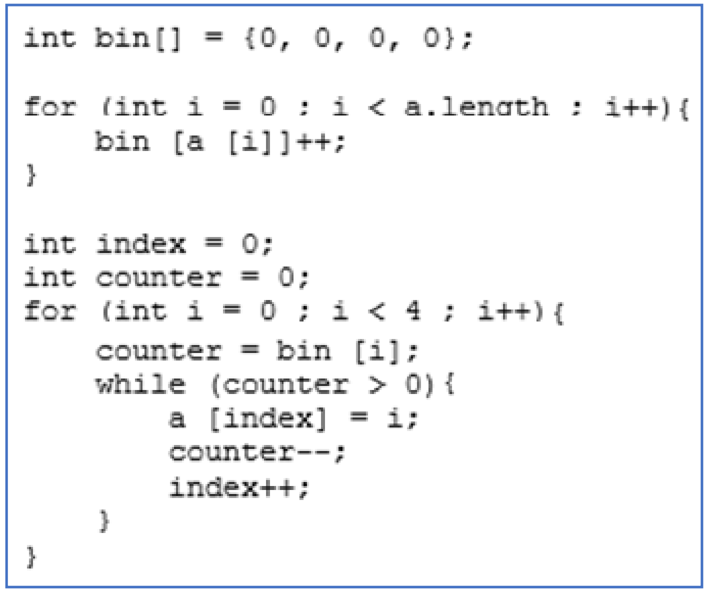
1	1	2	0	2	3	0	3	0	3	3	1

The Bin Array:

[0]	[1]	[2]	[3]
3	2	2	4

Erase the old array and print out the correct number of each item.



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The Bin Array:

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```
public class binsort
{
    public static void main (String args[])
    {
        new binsort ();
    }


    public binsort ()
    {
        int a[] = {2, 3, 1, 1, 0, 1, 3, 0, 2, 2};
        System.out.println ("The array before: ");
        printarray (a);


        int bin[] = {0, 0, 0, 0};

        for (int i = 0 ; i < a.length ; i++)
        {
            bin [a [i]]++;
        }

        int index = 0;
        int counter = 0;
        for (int i = 0 ; i < 4 ; i++)
        {
            counter = bin [i];
            while (counter > 0)
            {
                a [index] = i;
                counter--;
                index++;
            }
        }
        System.out.println ("The array after: ");
        printarray (a);
    }
```

Bin Sort Algorithm

****Circle and label each of these steps in the adjacent code****

0. Look at the array-to-sort (it is named 'a') What numbers are in it?

_____, _____, _____, _____.

1. Declare your bins in an array. Allocate an element for each number in the array-to-sort.

2. Go through the array-to-sort, counting the how many times each number appears. Store the count in the bins.

bin[]	[0]	[1]	[2]	[3]

3. Use the bin array to re-make the array-to-sort. Use the count in each bin to fill the appropriate number of elements.

4. Print the sorted array.

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public class binsort
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     public static void main (String args[])
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          new binsort ();
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1         int bin[] = {0, 0, 0, 0};

          for (int i = 0 ; i < a.length ; i++)
          {
               bin [a [i]]++;
          }

          int index = 0;
          int counter = 0;
          for (int i = 0 ; i < 4 ; i++)
          {
               counter = bin [i];
               while (counter > 0)
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                    a [index] = i;
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          }
          System.out.println ("The array after: ");
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            for (int i = 0 ; i < a.length ; i++)
            {
2               bin [a [i]]++;
            }

            int index = 0;
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            for (int i = 0 ; i < 4 ; i++)
            {
                counter = bin [i];
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<u>0</u>, <u>1</u>, <u>2</u>, <u>3</u>.

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Bin Sort Characteristics

- Bin sort cheats! It is a specialized sort made for a very specific situation. It gains it's speed by being specialized.
- Bin sort also requires extra memory for the bins.
- Bin sort also doesn't preserve the data and swap it around. It erases it and starts over.
- Bin sort speed = ____________
- Bin sort only works for ___________ ________ type data that falls in a _________ range.
- It cannot be used with __________, __________, or ______________ data.

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- It cannot be used with __________, __________, or _____________ data.

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- Bin sort speed = O(n)
- Bin sort only works for positive int type data that falls in a small range.
- It cannot be used with double, char, or String data.

1. Trace Bin Sort on the following arrays:

(a) Starting Array:

[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]
1	2	4	0	3	4	3	2	1	2	3	4	0	0	1

Bins:

[0]	[1]	[2]	[3]	[4]

Final Array:

[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]

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

Bins:

[0]	[1]	[2]	[3]	[4]
3	3	3	3	3

Final Array:

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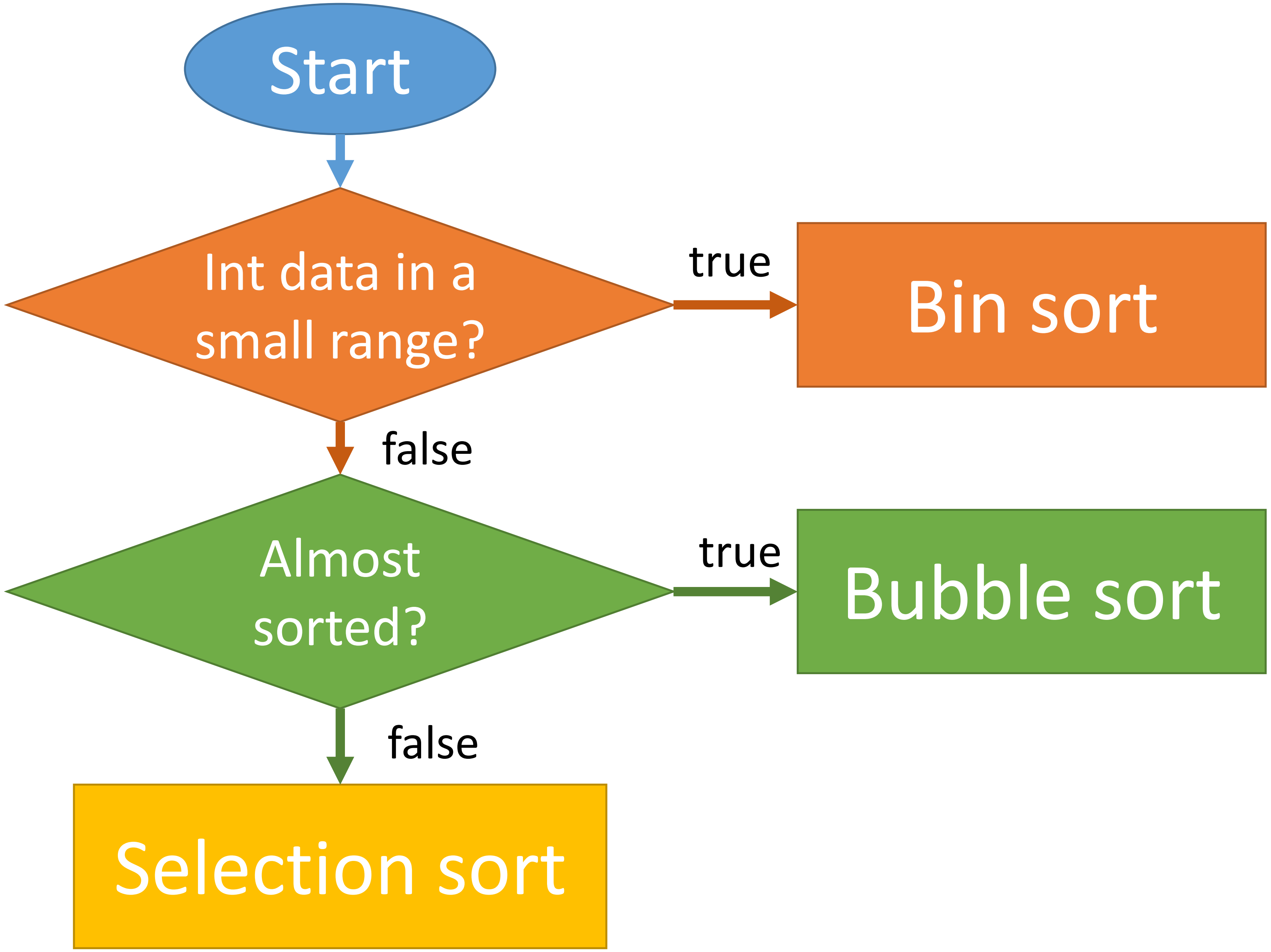
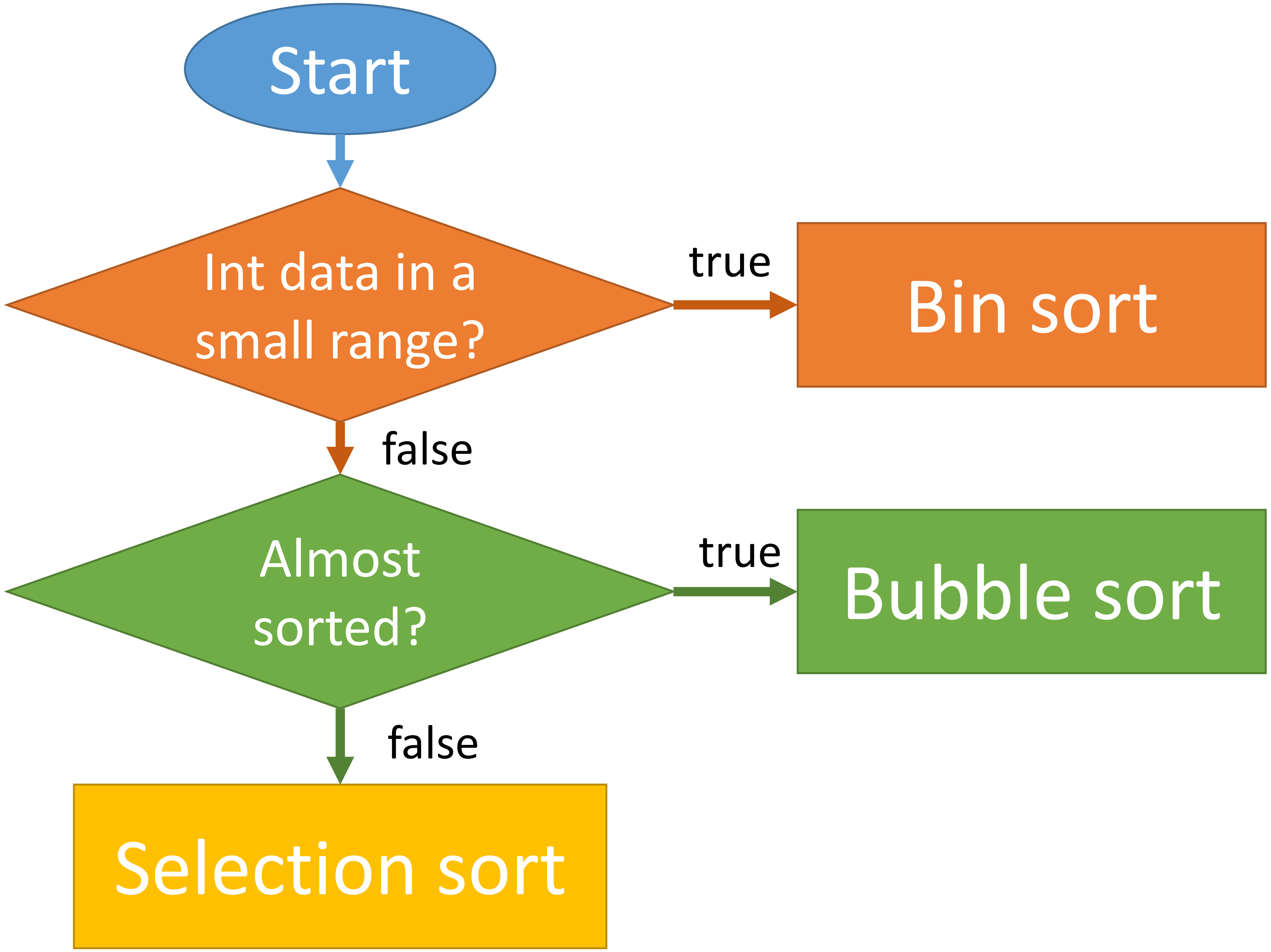
0	0	0	1	1	1	2	2	2	3	3	3	4	4	4

Which sorting algorithm should you use?



You have an array of doubles in reverse order.


Start
Int data in a small range?
true
Bin sort
false
Almost sorted?
true
Bubble sort
false
Selection sort