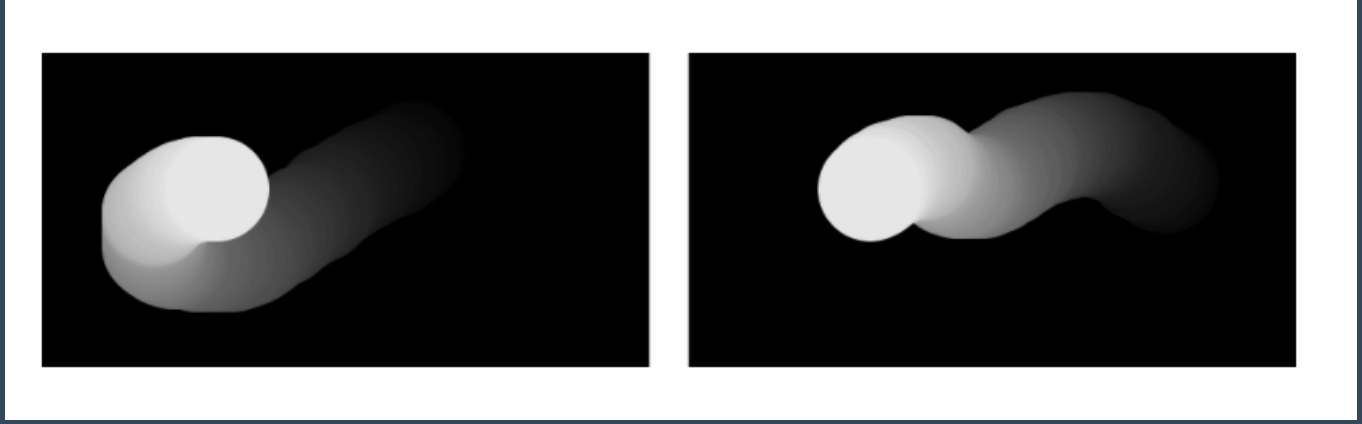
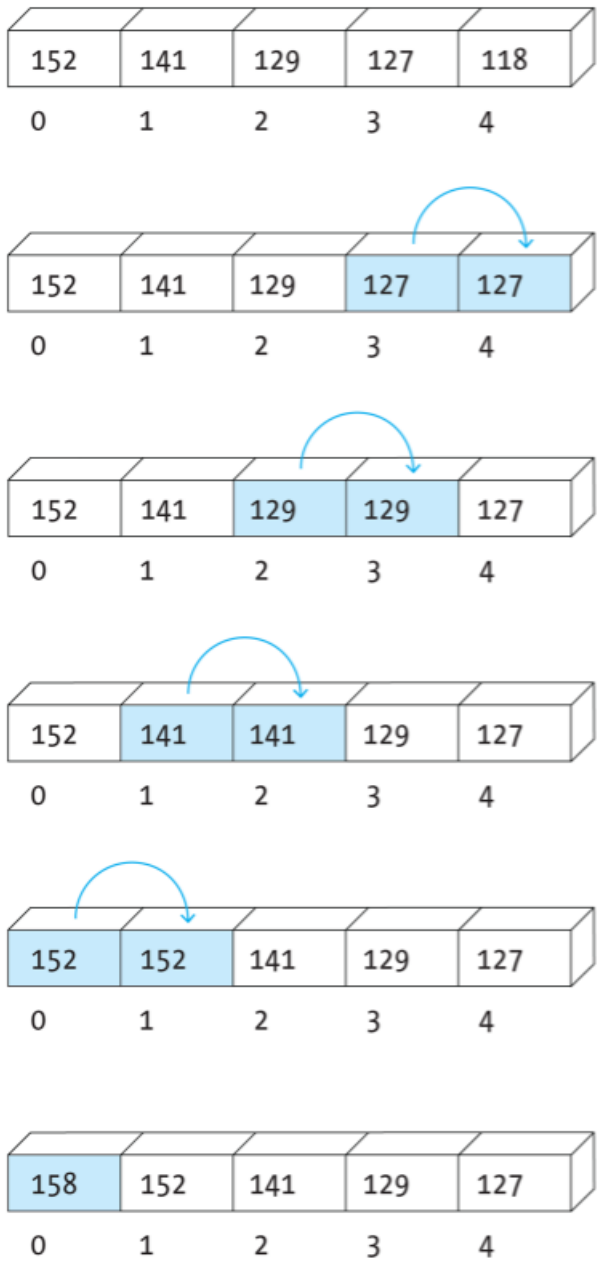
Example 11-9

Storing a shifting buffer of numbers in an array

So cool, right?



How does it happen?



Original array

Start the loop, copy the second-to-last value into the last position, this is element 3 into element 4

Second time through the loop, copy element 2 into element 3

Third time through the loop, copy element 1 into element 2

Fourth and last time through the loop, copy element 0 into element 1

Copy the new mouseX value into element 0

This is a conceptual, step-by-step figure showing how this algorithm works using a simplified array with just 5 elements.

Let's look at how the code does this!

```
int num = 60;
int[] x = new int[num];
int[] y = new int[num];

void setup() {
  size(240, 120);
  noStroke();
}

void draw() {
  background(0);
  // Copy array values from back to front
  for (int i = x.length-1; i > 0; i--) {
    x[i] = x[i-1];
    y[i] = y[i-1];
  }
  x[0] = mouseX;  // Set the first element
  y[0] = mouseY;  // Set the first element
  for (int i = 0; i < x.length; i++) {
    fill(i * 4);
    ellipse(x[i], y[i], 40, 40);
  }
}
```

Here, two integer arrays (x and y) are being declared and instantiated. The integer variable num has already been initialized to 60, so there will be 60 elements in each array.

Let's look at how the code does this!

```
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}

void draw() {
  background(0);
  // Copy array values from back to front
  for (int i = x.length-1; i > 0; i--) {
    x[i] = x[i-1];
    y[i] = y[i-1];
  }
  x[0] = mouseX;  // Set the first element
  y[0] = mouseY;  // Set the first element
  for (int i = 0; i < x.length; i++) {
    fill(i * 4);
    ellipse(x[i], y[i], 40, 40);
  }
}
```

This loop takes care of *most* of the moving of elements.

For integers from `x.length-1` (so, 59) up to but **not including** 0 (so, 1), subtracting 1 from i each time the loop runs:

`x[i]` will be replaced with the element from `x[i-1]`, and

`y[i]` will be replaced with the element from `y[i-1]`.

*Note that this loop will NOT replace the `x[0]` or `y[0]` element! That's coming up…

Let's look at how the code does this!

```
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}

void draw() {
  background(0);
  // Copy array values from back to front
  for (int i = x.length-1; i > 0; i--) {
    x[i] = x[i-1];
    y[i] = y[i-1];
  }
  x[0] = mouseX;  // Set the first element
  y[0] = mouseY;  // Set the first element
  for (int i = 0; i < x.length; i++) {
    fill(i * 4);
    ellipse(x[i], y[i], 40, 40);
  }
}
```

Here, the elements for `x[0]` and `y[0]` are set to be the values of `mouseX` and `mouseY`, respectively.

Let's look at how the code does this!

```
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  }
  x[0] = mouseX;  // Set the first element
  y[0] = mouseY;  // Set the first element
  for (int i = 0; i < x.length; i++) {
    fill(i * 4);
    ellipse(x[i], y[i], 40, 40);
  }
}
```

This `for` loop takes care of drawing the circles. It will draw 60 circles as it goes from i=60 to i=59.

Why are the circles near end of the "trail" so much closer to white, and why does the trail seem to fade into the mouse position?

Check out that fill! `x[0]` and `y[0]`, which store the mouse position, will result in a fill of 0 *4 = 0 (black), whereas the last position stored, `x[59]` and `y[59]`, will result in a fill of 59*4 = 236, which is approaching 255 (white)!