

Moving Data Within Arrays

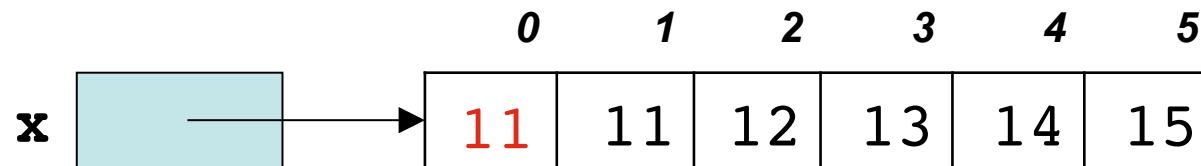
15-110 Summer 2010

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Bad swap of x[0] and x[1]

```
x[0] = x[1];  
x[1] = x[0];
```

NO!



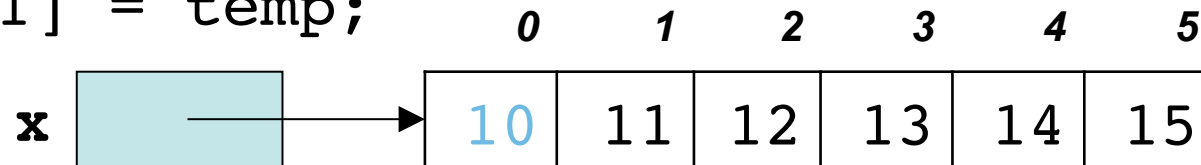
Why is the code bad?

Swap $x[0]$ and $x[1]$

```
temp = x[0];
```

```
x[0] = x[1];
```

```
x[1] = temp;
```



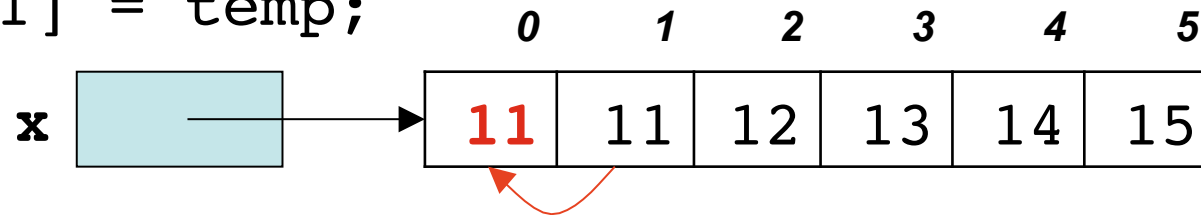
First copy $x[0]$ to $temp$

Swap $x[0]$ and $x[1]$

```
temp = x[0];
```

```
x[0] = x[1];
```

```
x[1] = temp;
```



temp 10

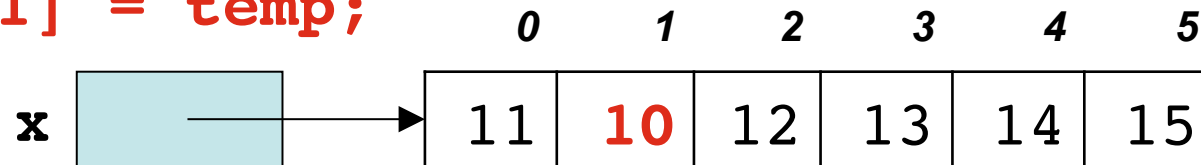
Next, copy $x[1]$ to $x[0]$

Swap x[0] and x[1]

```
temp = x[0];
```

```
x[0] = x[1];
```

```
x[1] = temp;
```

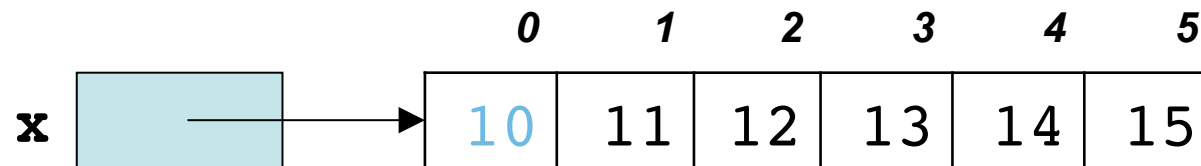


`temp` 10

Finally, copy `temp` to `x[1]`

Move first value to the end

```
temp = x[0];
```

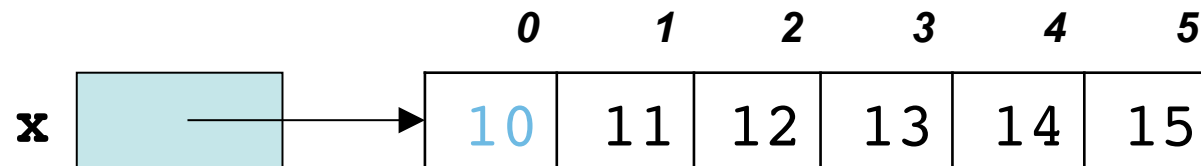


`temp` 10

First, copy `x[0]` into a temporary variable, so that we can shift the remaining values towards the front of the array.

Move first value to the end

```
temp = x[0];
```



`temp` 10

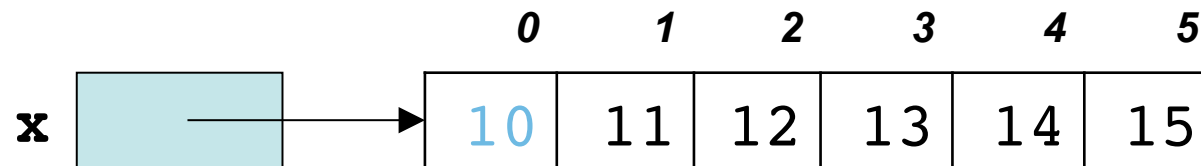
What elements do we want to shift toward the front?

Which element needs to move first?

Move first value to the end

```
temp = x[0];
```

x.length-1

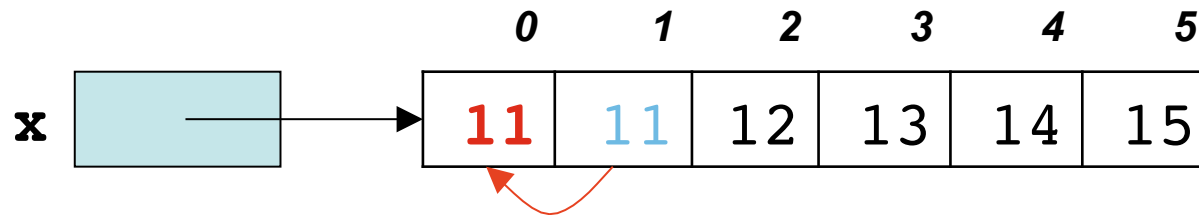


<u>To</u>		<u>From</u>
x[0]	←	x[1]
x[1]	←	x[2]
x[2]	←	x[3]
x[3]	←	x[4]
x[4]	←	x[5]

Move first value to the end

```
for (int from = 1; from <= 5; from++)  
    x[from-1] = x[from];
```

from
1



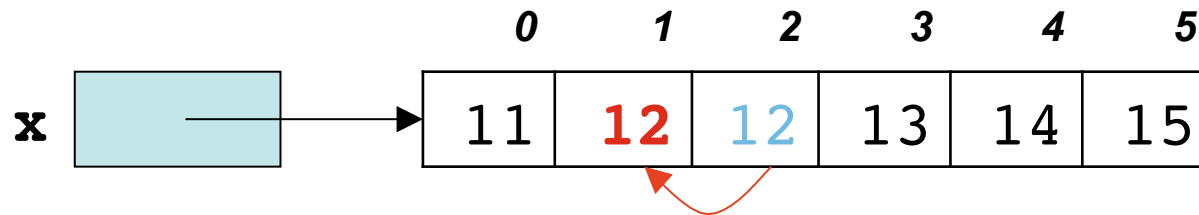
temp 10

Copy `x[1]` to `x[0]`. Now
there is a hole at `x[1]`.

Move first value to the end

```
for (int from = 1; from <= 5; from++)  
    x[from-1] = x[from];
```

from
2



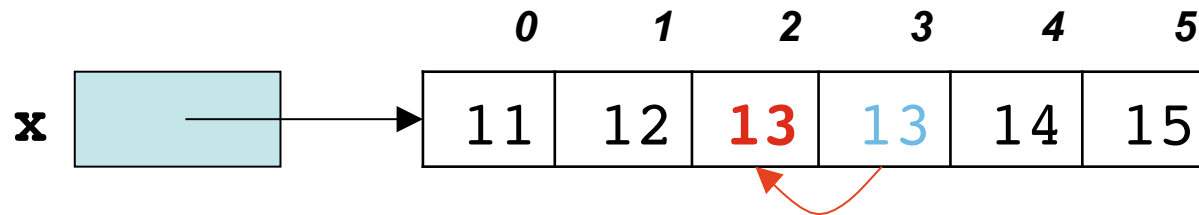
temp 10

Copy `x[2]` to `x[1]`. Now
there is a hole at `x[2]`.

Move first value to the end

```
for (int from = 1; from <= 5; from++)  
    x[from-1] = x[from];
```

from
3



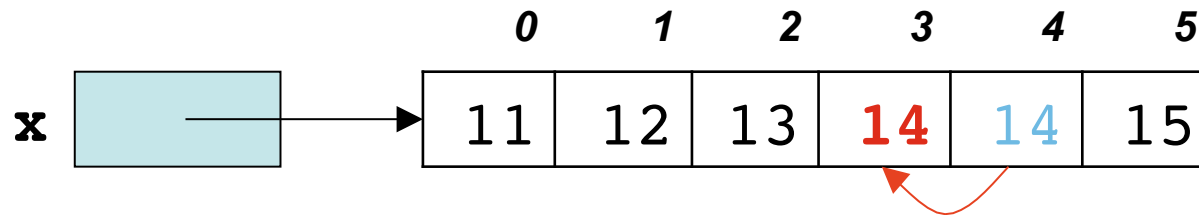
`temp` 10

Copy `x[3]` to `x[2]`. Now there is a hole at `x[3]`.

Move first value to the end

```
for (int from = 1; from <= 5; from++)  
    x[from-1] = x[from];
```

from
4



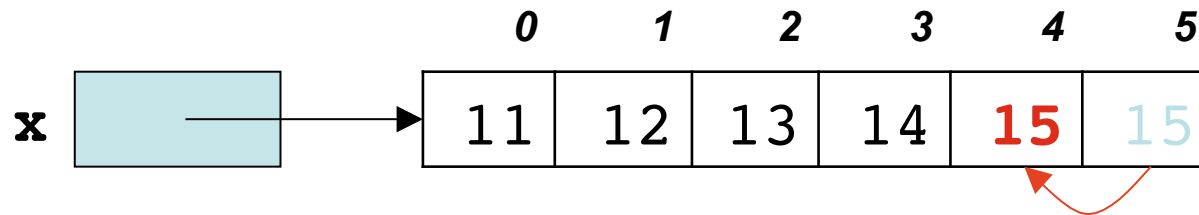
`temp` 10

Copy `x[4]` to `x[3]`. Now
there is a hole at `x[4]`.

Move first value to the end

```
for (int from = 1; from <= 5; from++)  
    x[from-1] = x[from];
```

from
5



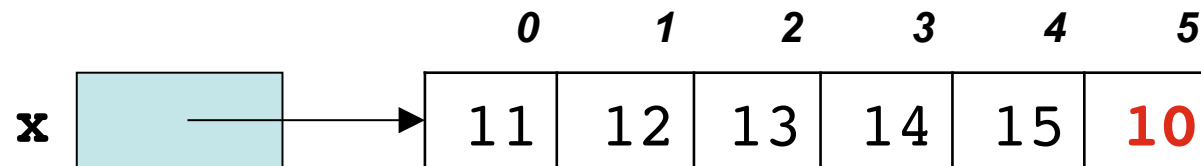
temp 10

Copy `x[5]` to `x[4]`. Now there is a hole at `x[5]`.

Move first value to the end

x[5] = temp;

from
6(exit)



temp 10

Copy temp to x[5].

Shift to the front

```
for (int from = 1; from <= 5; from++)  
    x[from-1] = x[from];
```

time ↓

	0	1	2	3	4	5
<u>from</u>	10	11	12	13	14	15
1	11	11	12	13	14	15
2	11	12	12	13	14	15
3	11	12	13	13	14	15
4	11	12	13	14	14	15
5	11	12	13	14	15	15

Move first value to the end

```
// save x[0] in temporary
int temp = x[0];

// shift remaining values to the front of the array
for (int from = 1; from < x.length; from++) {
    int to = from - 1;
    x[to] = x[from];
}

// put x[0] saved in temp into last entry
x[x.length-1] = temp;
```