# Moving Data Within Arrays

15-110 Summer 2010
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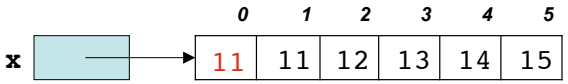
## Bad swap of x[0] and x[1]

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

NO!

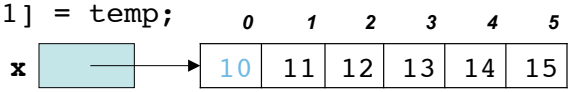



Why is the code bad?



## Swap x[0] and x[1]

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



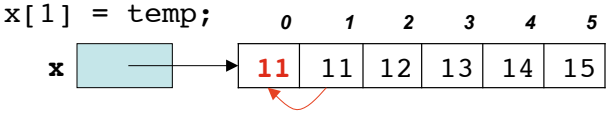


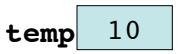
First copy `x[0]` to `temp`



## Swap x[0] and x[1]

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

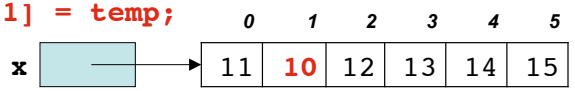


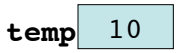




Next, copy `x[1]` to `x[0]`

# Swap x[0] and x[1]

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



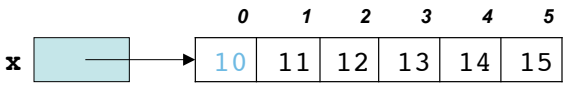




Finally, copy `temp` to `x[1]`



# Move first value to the end

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



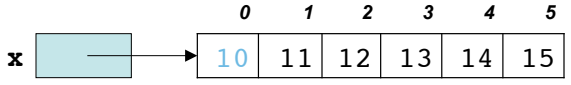


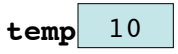
First, copy `x[0]` into a temporary variable, so that we can shift the remaining values towards the front of the array.



# Move first value to the end

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



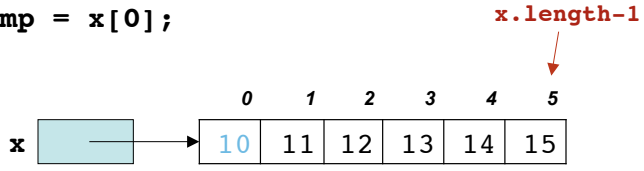

*What elements do we want to shift toward the front?*

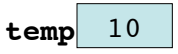
*Which element needs to move first?*



# Move first value to the end

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



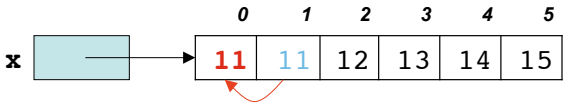




| To | From |
|---|---|
| x[0] | x[1] |
| x[1] | x[2] |
| x[2] | x[3] |
| x[3] | x[4] |
| x[4] | x[5] |

# Move first value to the end

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

from 1




temp 10

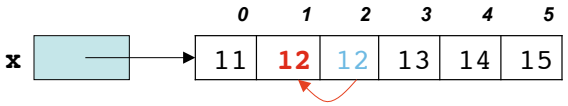
Copy `x[1]` to `x[0]`. Now there is a hole at `x[1]`.



# Move first value to the end

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

from 2




temp 10

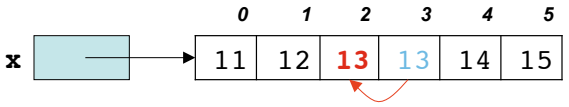
Copy `x[2]` to `x[1]`. Now there is a hole at `x[2]`.



# Move first value to the end

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

from 3




temp 10

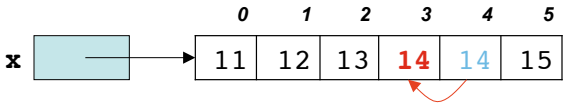
Copy `x[3]` to `x[2]`. Now there is a hole at `x[3]`.



# Move first value to the end

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

from 4



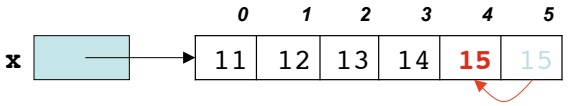

temp 10

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

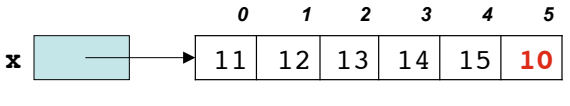
Copy `x[5]` to `x[4]`. Now there is a hole at `x[5]`.



# 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];
```

| | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| from | 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 |

time ↓



# 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;
```