Moving Data Within Arrays

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

\[
x[0] = x[1]; \quad \text{NO!}
\]

\[
x[1] = x[0];
\]

Why is the code bad?

Swap x[0] and x[1]

\[
\text{temp = x[0];}
\]

\[
x[0] = x[1];
\]

\[
x[1] = \text{temp;}
\]

temp \[10\]
First copy x[0] to temp

Swap x[0] and x[1]

\[
\text{temp = x[0];}
\]

\[
x[0] = x[1];
\]

\[
x[1] = \text{temp;}
\]

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;
```

Finally, copy temp to x[1]

```
temp
```

Move first value to the end

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

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

```
temp
```

What elements do we want to shift toward the front?

Which element needs to move first?

```
temp
```

To From
x[0] ← x[1]
x[1] ← x[2]
Copy $x[1]$ to $x[0]$. Now there is a hole at $x[1]$. 


for (int from = 1; from <= 5; from++)
    $x[from-1] = x[from]$;
Move first value to the end

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


Shift to the front

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

```markdown
<table>
<thead>
<tr>
<th>time</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>11</td>
<td>12</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>13</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>
```

Move first value to the end

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

// shift remaining values to the front of the array
```java
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
```java
x[x.length-1] = temp;
```