COMS W1114 - Java Lab

Lab 3
Wednesday, February 11, 2004
&
Thursday, February 12, 2004

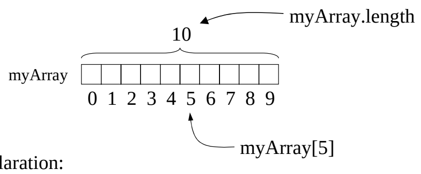
Note

- Reading:
  - Theory: Ch 0, 5.1-5.3, 1.1-1.6, **4.1-4.4**
  - Programming: Ch 1, Ch 2, 3.1, **3.1-3.7**
- HW1 due today, February 12 at 5p
  - submit programming online
- HW2 is out. Due XX/XX/04.
  - start soon! It's longer that HW1 and will take more time.

What we are covering today

- Quick review from lab 2
  - Casting
  - Arrays
- `If…else`
- Iteration/Looping
  - `while` statements
  - `do` statements
  - `for` statements

Arrays (1)



- Declaration:

```
int[] myArray = new int[10];
```

- Trying to grab cell outside the array bounds causes an error (runtime)

`myArray[10] = 4;` // error: arrayoutofboundsexception

Arrays (2)

Declaring and Initializing an array :

```
int[] myArray = new int[5];
//initialize myArray
myArray[0] = 0;
myArray[1] = 10;
myArray[2] = 20;
myArray[3] = 30;
myArray[4] = 40;
```

`if`

```
if (condition) {
   <statement1>
   <statement2>
}
```

- Recall a `condition` evaluates to a value. **`true`** /**`false`**
- Try it

```
if (myArray.length>0) {
  System.out.println("Inside if.
     Setting myArray[0] to 10.");
  myArray[0]=10;
}
```

if…else

```
if (condition){
  <statement1>
  <statement2>
}
else {
  <statement3>
  <statement4>
}
```

```
if (myArray.length>0) {
  myArray[0]=10;
}
else {
  System.out.println(
   “myArray length is “ +
    myArray.length);
}
```

if…else…if

```
if (condition){
  <statement1>
  <statement2>
}
else if (condition){
     <statement3>
     <statement4>
}
```

```
if (myArray.length<5) {
  myArray[2]=100;
}
else if(myArray.length==5){
      myArray[2]=50;
  }
}
```

Iteration/Looping

- Often, we want to do things many times.
- Repetitive tasks often have a structure. Exploit it using loops.
- Let’s look at our array initialization from before:

```
myArray[0] = 0;
myArray[1] = 10;
myArray[2] = 20;
myArray[3] = 30;
myArray[4] = 40;
```

  – Is there a pattern?

The `while` loop (1)

- "While 'condition' is true, run my statements."

```
while (condition){
  <statement1>
  <statement2>
}
```

- Similar to the `if` structure
- What makes it stop?
  - You must do something to make condition evaluate to false!

The `while` loop (2)

- Let's solve our array initialization problem using `while`

```
while (what is true?) {
   <do what?>
   }
```

Think about our pattern…

The `while` loop (3)

- What do we want to do?

```
while (what is true?) {
   myArray[i]=i*10;
   }
```

The `while` loop (4)

- When do we stop?

```
while (we have not looked at all cells) {
   myArray[i]=i*10;
   }
```

- **How many cells are there?**
  - **5 (actually myArray.length)**
- **Where do we start?**
  - **0 (beginning of myArray indices)**
- **How does the index “a” change?**
  - **increment by 1**

The `while` loop (4)

- Put it all together

```
int i = 0;
while (i < myArray.length) {
   myArray[i]=i*10;
   i=i+1;
   }
```

The `while` loop (5)

Try it:

```
int i = 0;
while (i < myArray.length) {
   myArray[i]=i*10;
   System.out.println(
   “i=“ +i+ ” and myArray[“+i+”] is
     “+myArray[i]);
   i=i+1;
   }
```

The do loop (1)

```
do {
   <statement1>
   <statement2>
   …
} while (condition);
```

- Similar to `while` statement. So what's the difference?

The do loop (1)

```
do {
   <statement1>
   <statement2>
   …
} while (condition);
```

- Similar to `while` statement. So what's the difference?

  – The <statement>s are guaranteed to run at least once.

The do loop (2)

- Can we populate myArray as before using a do loop instead?
  – Yes!

  What do we need?
- An index.
  `i = 0;  //reuse index i`
- Statement.
  `myArray[i]=i*10;`
- Increment.
  `i++;  //same as i=i+1`
- Condition.
  `i<myArray.length`

The `do` loop (3)

```
i=0; //reusing prior index
do {
   myArray[i]=i*10;
   i++;
} while (i<myArray.length);
```

- Potential problems?

The `for` loop (1)

- What have we seen is needed for looping?
  - a looping variables (`i` in previous examples)
  - a start value for looping variable
  - a stop condition
  - a way to change the looping variable so we reach our stop condition
- The `for` loop is no different. Just a different structure.
  - not based on the 'if'

The `for` loop (2)

```
for (int var = start; check; update) {
   <statement1>
   <statement2>
}
```

- `int var = start` (creating our loop variable)
- `check` (our condition)
- `update` (our changing the loop variable)

The `for` loop (3)

Let’s do our `myArray` changes again with `for`:

```
for (int i = 0; i<myArray.length; i++) {
  myArray[i]=i*100;
}
```

The `for` loop (3)

Let’s do our `myArray` changes again with `for`:

```
for (int i = 0; i<myArray.length; i++) {
  myArray[i]=i*100;
}
```

`int var = start` (creating our loop variable)

The `for` loop (3)

Let’s do our `myArray` changes again with `for`:

```
for (int i = 0; i<myArray.length; i++) {
  myArray[i]=i*100;
}
```

`check` (our condition)

The `for` loop (3)

Let’s do our `myArray` changes again with `for`:

```
for (int i = 0; i<myArray.length; i++) {
   myArray[i]=i*100;
}
```

`update` (our changing the loop variable)

The `for` loop (3)

Let’s do our `myArray` changes again with `for`:

```
for (int i = 0; i<myArray.length; i++) {
   myArray[i]=i*100;
}
```

Our Statement.
That’s it!

Some things to think about

- How would we loop backwards using a for loop?
  - with a while? or do…while?
- Do we always have to change the condition variable by 1?
- Can we have complex conditions? (&&, ||, !, etc.)

Wrap up

- Next time:
  - Methods
  - More decision and control statements
  - Basic Input/Output (I/O)
- HW2 is out. Due TUESDAY XX/XX/04
  - Get started. Longer than HW1.