

Computing Tutorial: Week 6

Arrays and ROT-13

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Objectives Today

- Arrays (20 mins)
- ROT-13 (30 mins)
- **You can suggest topics to cover at any time over email or at the end of the class.**

Arrays

- Arrays are portions of memory where data items of the same type are stored side-by-side and accessed using an index.
- An array will always have a fixed size.
 - Any attempt to access an item outside of this space will cause an error.
- If an array needs to be bigger, it is often necessary to create a larger array and to copy data over.

Creating Arrays

- You need to tell Java to create some space in memory and to create a label for you to use.
- Java has a strange way of doing this:
 - `int[] array = new int[99];`
- It is perfectly allowable to create just the label first, without knowing how big the array will be:
 - `int[] array;`
- You can also create an array of Objects, but you must first create the array, then create individual objects in the array.
 - `Person[] people = new Person[9];`
 - `people[0] = new Person("Bob");`

Accessing Arrays

- Accessing arrays requires that you know the index in advance.
 - `println("Person 5's name is " + person[4].getName());`
- You can do this in a loop, using a for loop.
- Class exercise:
 - Using a for loop that accesses an array of ints, create a method that returns the total, average, max and min of the values.

Converting a String to an Array

- As you found out in the labs, the String class contains methods that can return the bytes or chars from a String.
 - `char[] characters;`
 - `characters = s.toCharArray();`
- It creates the array for you, you just need to give the array a name in order to be able to work with it.
- You also found that the array was of the wrong type.
 - You cannot convert directly.
 - You need to create a new array of the new type, and then use a loop to copy and cast the values.

Dealing with ASCII arrays

- When you are dealing with the individual characters from a string, Java is already storing them in ASCII code.
- There is no need to convert.
- Java will assume that a 'char' will be displayed as a character and other types (like 'int') will be displayed as numbers.
- You can force java to store a character code by wrapping a character in single quotes.
 - char test = 'b';
- Be careful when working with letters! Add or subtract a number and you might not end up with a proper letter.

ROT-13

- ROT-13 is an example of a rotational cipher.
- It is very weak, but was quite popular a few years ago on Usenet.
- People used it to hide spoilers and answers to quizzes.
- All ROT-13 does is rotate each letter by 13 letters. It does not really matter which way you go...
- You must however be careful with the boundaries of the letters in the ASCII code. You need to know where the alphabetical ranges start and end (there are two ranges!).

Exercise:

- Write a class that takes a String, converts it into an array, performs ROT-13, and then returns a new String with the result.
- The answer will be demonstrated using BlueJ.

That's All Folks...

- Any questions?
- Slides will go online to <http://www.tonychung.net/>
- Questions and tutorial suggestions to a.chung@lancaster.ac.uk