Searching and Sorting

Lecture 26

Borrowing from slides by Alan Hu, Kurt Eiselt, Paul Carter, and Tamara Munzner
News

- Wednesday is a holiday (Remembrance Day)
  - No lectures
- No labs / tutorials this week
Reading Assignments

- Reading for this week: sorting & searching
  - Edition 3: Ch 14.1, 14.3
  - Edition 2: Ch 19.1, 19.3
Recap:
Maintain List of Pop Machines (V1)

<table>
<thead>
<tr>
<th>cansSold</th>
<th>cashIn</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 185</td>
<td>0 201.25</td>
</tr>
<tr>
<td>1 92</td>
<td>1 100.50</td>
</tr>
<tr>
<td>2 370</td>
<td>2 412.75</td>
</tr>
<tr>
<td>3 485</td>
<td>3 555.25</td>
</tr>
<tr>
<td>4 209</td>
<td>4 195.00</td>
</tr>
<tr>
<td>5 128</td>
<td>5 160.00</td>
</tr>
<tr>
<td>6 84</td>
<td>6 105.00</td>
</tr>
<tr>
<td>7 151</td>
<td>7 188.75</td>
</tr>
<tr>
<td>8 32</td>
<td>8 40.00</td>
</tr>
<tr>
<td>9 563</td>
<td>9 703.75</td>
</tr>
</tbody>
</table>

Each individual String object in the array of course has all the String methods available. For example

`location[2].length()`

would return what?
Note also that because an array of any kind is itself an object, a more accurate picture would look like this.
public class CokematicTester
{
    public static void main (String[] args)
    {
        Cokematic[] mymachines = new Cokematic[10];
        mymachines[0] = new Cokematic(100, "Chan Centre", 185, 201.25);
        mymachines[1] = new Cokematic(150, "Law School", 92, 100.50);
        mymachines[2] = new Cokematic(200, "Main Library", 370, 412.75);

        for(int i = 0; i < mymachines.length; i++)
        {
            mymachines[i].buyCoke();
            System.out.println(mymachines[i]);
        }
    }
}
Recap: NULL Pointers

A NULL pointer is a special reference that indicates “no object”

• Every newly declared variable of a class type initially has the value “null”, until we assign a reference to a real object to it

• We can use this in arrays to detect how many elements we have already initialized

• In our example:
  – Can have at most 10 pop machines (length of array)
  – But maybe I have only 3 installed right now...
public class CokematicTester2
{
    public static void main (String[] args)
    {
        Cokematic[] mymachines = new Cokematic[10];
        mymachines[0] = new Cokematic(100, "Chan Centre", 185, 201.25);
        mymachines[1] = new Cokematic(150, "Law School", 92, 100.50);
        mymachines[2] = new Cokematic(200, "Main Library", 370, 412.75);

        for(int i = 0; i < mymachines.length; i++)
        {
            if (mymachines[i] != null)
            {
                mymachines[i].buyCoke();
                System.out.println(mymachines[i]);
            }
        }
    }
}
Recap:
Maintain List of Pop Machines (V3)

- Avoid potential misuse of the partially populated array
- Put the array itself into its own class (CokeEmpire):
  - Maintains array of machines
  - Allows adding new machines (until max number is reached)
  - Allows for finding machines by location
Objectives for Today

- Get acquainted with searching, sorting
- Practice more programming with loops, conditionals, arrays
Searching

- How do you find your homework in the pile outside my door?
- How would the police search for stolen property that the suspect hid at a motel?
- How do you write a program to find something in an array?
Searching – Word Count

- Want program that
  - reads text (or java) file
  - asks user for a word
  - outputs how often the word occurs in the text

- What is different in this problem compared to the search problems we have already seen (CokeEmpire, CPSC111Student)?
Searching – Word Count

- Want program that
  - reads text (or java) file
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- What is different in this problem compared to the search problems we have already seen (CokeEmpire, CPSC111Student)?
  - Every search term can occur multiple times…
Word Count – Solution 1

First attempt:
- read all words, store them in array
- for each user query, traverse full array
  - compare word against reference
  - count number or instances