CompSci 4
Java 1
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Announcements

• Assignment 7 out
• What we will do today
  – Compare Alice and Java
  – Learn a little Java
  – Experiment with Java
Chap. 11 – What’s Next? Java

• Java – object-oriented programming language
  – Classes, objects, inheritance
  – Control structures (if, while)
  – Functions, methods
  – Data types (integers, doubles, strings, arrays, lists)

• Sound familiar?
Some Data Types in Java

• integer
  – Declare and initialize
    ```java
    int value = 0;  // variable is value
    ```
  – Update/modify
    ```java
    value = value + 2;
    ```

• Real numbers
  ```java
  double number = 4.5;
  number = number * 2.0; // multiply by 2
  ```

• Careful with operations
  ```java
  value = 6/4;  // what is value?
  ```
String data type in Java

- `String` is a class
- Declare String variable and initialize
  ```java
  String phrase = "";
  phrase = "CompSci 4";
  ```
- Convert String to array of characters
  ```java
  phrase.toCharArray();
  ```
- `CompSci 4` as a character array:
  ```java
  char[] array = phrase.toCharArray();
  ```
<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>o</td>
<td>m</td>
<td>p</td>
<td>S</td>
</tr>
<tr>
<td>c</td>
<td>i</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
char type in Java

- char is for one character
- Note char uses single quotes, string uses double quotes

```java
char ch = 'a';
if (ch == 'a')
{
    return "found match";
}
else
{
    return "no match";
}
```
Some String member functions

• String is a class, so has member functions

\[
\text{phrase} = \text{“CompSci 4”};
\]

• \text{length()} - returns number of characters in String

\[
\text{int size} = \text{phrase.length()};
\]

• \text{toCharArray()} – converts string to array of characters and returns the array

• \text{charAt(int position)} – returns the character in an array at position

\[
\text{char ch} = \text{phrase.charAt(2)};
\]
Looping over a String

• Collections loop – converts the String letters to a character array and iterates over the array with ch being one character from the array each time.

for (char ch: letters.toCharArray())
{
    // do something here
}
Conditionals – Format of “if”

```plaintext
if ( condition) {
    // do if condition is true
}
else {
    // do if condition is false
}
```
Relational/Logic Operators

- Relational operators
  
  `<  >  <=  >=  ==  !=`

- Logic Operators
  - `&&` (and)
  - `||` (or)
  - `!` (not)

```java
if ((x > 0) && (y != 3))
{
    // do something
}
```
Problem 1 to Solve in Java

• Bioinformatics
  – Area of computer science
  – Application of computational techniques to the management and analysis of biological information

• Problem: Given a strand of DNA, determine the number of cytosine nucleotides present
Problem: Rewritten for CompSci

• DNA is a string – array of characters
  – Only has letters c, t, a and g

• Problem restated: how many c’s in a string?

• Example: “catacgtagtc”
  – Answer: 3 c’s

• Write a method to return this number
  – See sheet for problem DNA-1
What does code mean?

- Name of class
- Name of method in class
- Return value (int is integer or number)
- One parameter (type and name)

```java
class DNAProfile {
  public int count(String dna) {
    // fill in code here
  }
}
```
public class DNAprofile
{
    public int count(String dna)
    {
        // fill in code here
    }
}
How We Will Solve Problems in Java

- Write methods and test with testing interface: APT
  - Not a whole Java program, just a small part
- Write a complete Java program
  - Not yet

- Use a programming environment Eclipse to make it easier
- Use submission tool Ambient
Eclipse (and Ambient)

- See resources page on CompSci 4 web site to download Eclipse (and Ambient – built-into Eclipse)
Solve this Problem

• Write a method and test it on the APT
  – Type our solution into Eclipse

  – Load the file into APT and submit

CompSci 4 FALL 2006, APT

• Choose the problem you want to submit/test. You should look at the code to see how it works. After you've tested it, the online testing matrix will allow you to test it.
• Click Browse... to choose the file on your local system you'll submit.
• Click Test/run to test the program.

If you use this page again, you may have to reload/rebrowse for the results.
Create a New Project in Eclipse

• Start Eclipse
• Select File -> New -> Project
  – Select Java Project and Next
  – Enter Project Name CPS4Sec1DNA
Create a Class and Method

• Click on project CPS4Sec1DNA
  – Select File -> New -> Class
  – Enter name DNAprofile
  – Select Finish
  – DNAprofile window appears
  – Cut and delete all the text from it so it is empty
  – Cut and paste starting code for problem
  – Complete the method
Testing a method using APT

- Use APT to test method
- All green means correct!
- Class laptops – file is in C: workspace
Submitting Java classwork for grade

- In Eclipse, select “Ambient”, then “submit a project for grading”
- Select “+” beside CPS 004
- Then select date of classwork – classNov16
- Then select today’s project to submit
  – CPS4SecXDNA
- You will be prompted for your duke password
Saving your work to your Duke Account

- Check in your project by selecting “Ambient”, “Check in project”
- First time only (Window -> preferences -> ambient -> checkin/checkout -> setup CVS)
- Enter your Duke account password
- If partner wants to save after one has saved, must click on project, select “Team”, then “disconnect”, then partner can try to save
Turn Alice code into Java Code

- Select Edit Preferences

- Must restart Alice
Classwork today

• Solve the two APTs on the CompSci 4 APT web page (create one Java project with two classes)
  – DNA-1 CGTA counting
  – DNA-2 CG counting

• Submit work for grading (Ambient)
  – One submission for pair of partners
  – Include a README file in your project
    • Select “File” -> New -> File
    • enter name README.txt (both names in here)

• Save files on Duke account
  – Ambient check in
    – FIRST TIME only (window -> preferences -> ambient -> checkin/checkout - setup CVS repository)