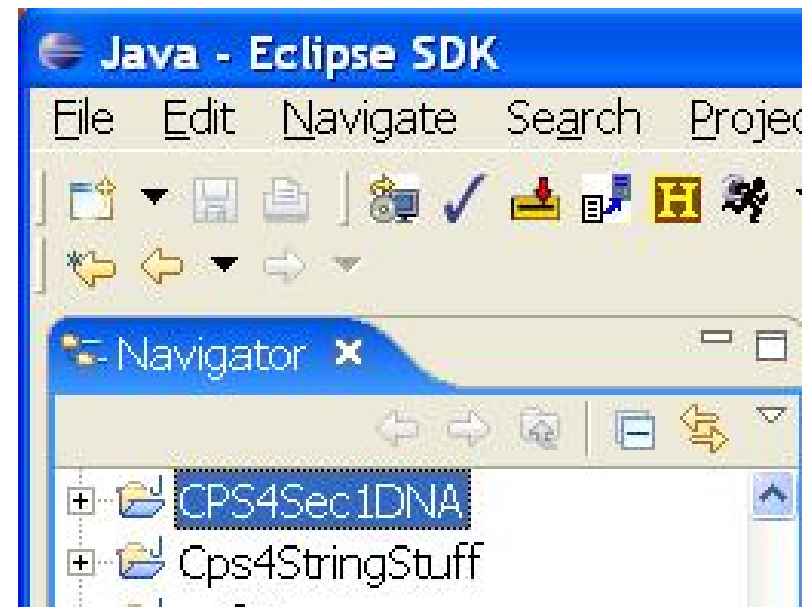# CompSci 4
Java 1
Nov 15, 2007

Prof. Susan Rodger

Announcements

- Assignment 7 questions?
  - Beware having two events that kick in at the same time!
  - Beware of infinite loops!
- 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?

Turn Alice code into Java Code

- Select Edit Preferences
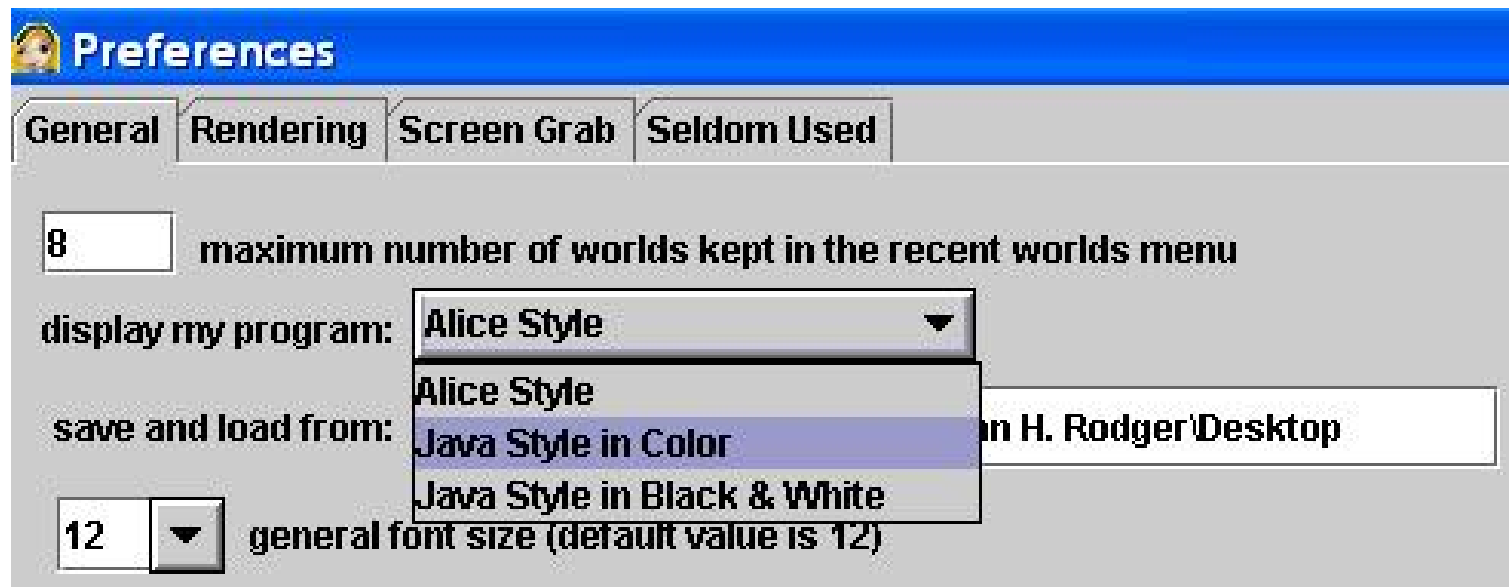
- Must restart Alice

Some Data Types in Java

- integer
  - Declare and initialize

```
int value = 0;   // variable is value
```

  - Update/modify

```
value = value + 2;
```

- Real numbers

```
double number = 4.5;
number = number * 2.0; // multiply by 2
```

- Careful with operations

```
value = 6/4;       // what is value?
```

String data type in Java

- `String` is a class
- Declare String variable and initialize
  `String phrase = "";`
  `phrase = "CompSci 4";`
- Convert String to array of characters
  `phrase.toCharArray()`

C	o	m	p	S	c	i		4

  0 1 2 3 4 5 6 7 8

char type in Java

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

```
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

```
phrase = "CompSci 4";
```

- length() - returns number of characters in String

```
int size = phrase.length();
```

- toCharArray() – converts string to array of characters and returns the array

- charAt(int position) – returns the character in an array at position

```
char ch = 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.
- Like Alice, getting one item-from-list at a time

```
for (char ch: letters.toCharArray())
{
    // do something here with ch
}
```
  Must have Java 1.5 for collections loop!

Looping over a String – Java 1.4 or less

- Can't use Collections loop
- Use for loop instead – like complicated loop in Alice
- Like Alice, getting one item-from-list at a time
- Assume string variable is called *words*

```
for (int item=0; item< words.length(); item = item+1)
{
    // do something here with words.charAt(item)
    // that is one character from words at a time
}
```

Conditionals – Format of "if"

- Must have ( )'s around condition!
- Can leave "else" part off

```
if ( condition)
{
    // do if condition is true
}
else   // can leave off if no else part
{
    // do if condition is false
}
```

Relational/Logic Operators

- Relational operators

  <   >   <=   >=   ==   !=

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

```
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: "catacgtatagtc"
  - 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)

```
public class DNAprofile
{
    public int count(String dna)
    {
        // fill in code here
    }
}
```

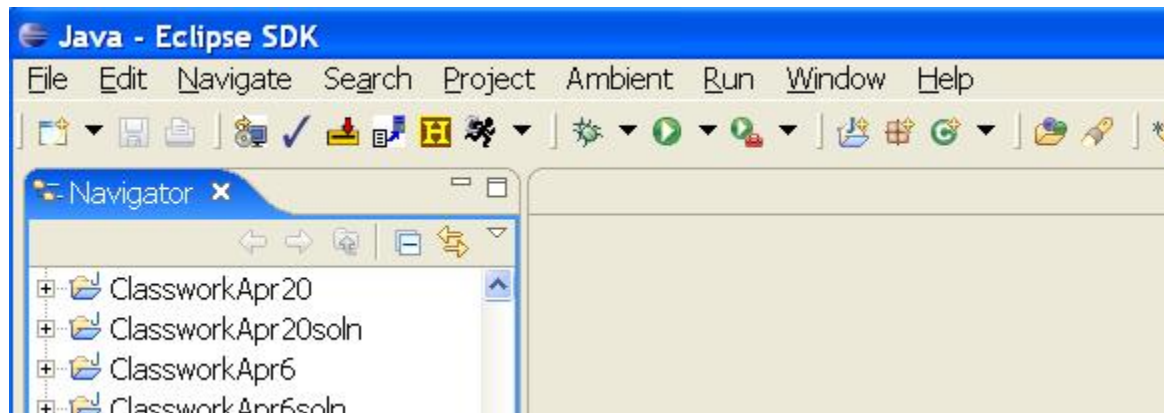# Solve Problem on Paper

```
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
- See CompSci 4 resources page to install!

Solve this Problem

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

  - Load the file into APT (web page) and submit

Create a New Project in Eclipse

- Start Eclipse
- Select File -> New -> Project
  - Select Java Project and Next
  - Enter Project Name   CPS4Sec1DNA (or Sec2)

Create a Class and Method

- Click on project CPS4Sec1DNA
  - Select File -> New -> Class
  - Enter name   DNAprofile
  - Select Finish
  - DNAprofile window appears
  - Cut and paste the method "count" from the web page to the class
  - Complete the method
- Put both classes you create today in the same project!

Testing a method using APT

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

Compsci 4 FALL 2007, APT

- Choose the problem you want to submit/test --- you should look at the problem statement, think about how to solve it, then write code to solve it. After you've tested via the online testing mechanism you'll need to submit the code for grading via Eclipse/submit.
- Click *Browse...* to choose the file on your local system you'll test online.
- Click *test/run* to test the program.

If you use this page again you may have to reload/rebrowse for the program **and reselect** the problem.

DNA-2, CG Ratio ▾

Main file: C:\Documents and Settings\Susan H. Rodge Browse...
Programming language: Java ▾
test/run

Problem Statements

1. DNA-1, Count C's
2. DNA-2, CG Ratio

No Checkoff – Instead Submit Java classwork for grade

- In Eclipse, select "Ambient", then "submit a project for grading"
- Select "+" beside CPS 004
- Then select date of classwork – classNov15
- Then select today's project to submit
  - CPS4Sec1DNA (or Sec2)
- You will be prompted for your duke password

Saving your work to your Duke Account – if on class laptop

- 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

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