CompSci 4
Java 1
Nov 15, 2007

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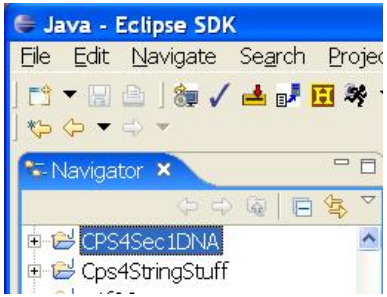


Announcements

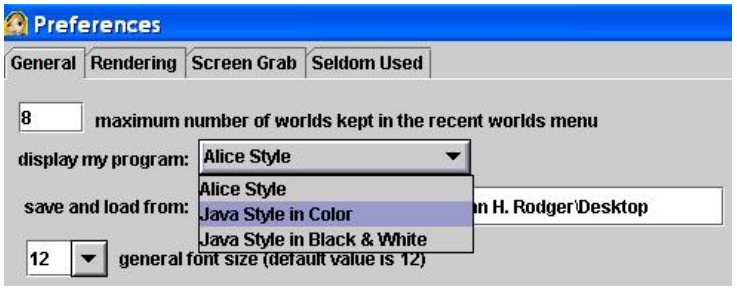
- Assignment 7 questions?
  - Beware having two events that kick in at the same time!
  - Beware of infinite loops!
- What we will do today
  - Compare Alice and Java
  - Learn a little Java
  - Experiment with Java

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?
```

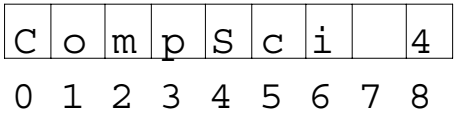
String data type in Java

- `String` is a class
- Declare String variable and initialize

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

- Convert String to array of characters

```
phrase.toCharArray()
```

- 

`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

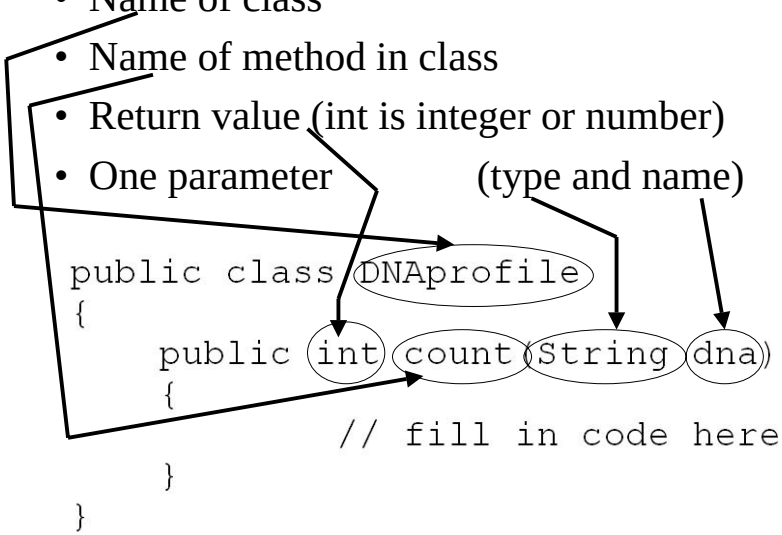
- Bioinformatics
  - Area of computer science
  - Application of computational techniques to the management and analysis of biological information
- Problem: Given a strand of DNA, determine the number of cytosine nucleotides present

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)



Solve Problem on Paper

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

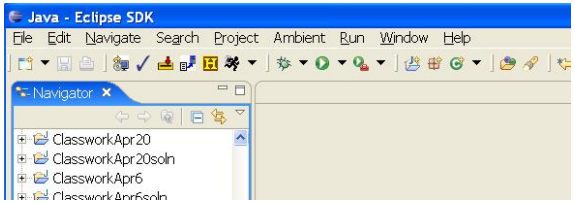
How We Will Solve Problems in Java

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

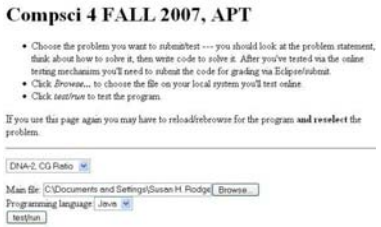
- Use a programming environment Eclipse to make it easier
- Use submission tool Ambient
- See CompSci 4 resources page to install!

Solve this Problem

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

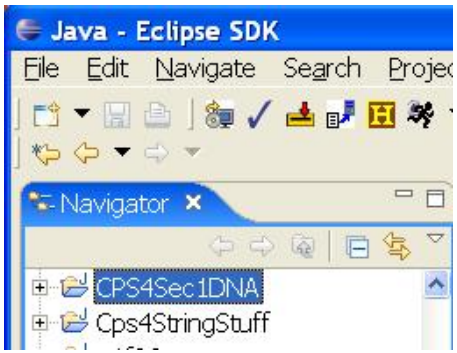


  - Load the file into APT (web page) and submit



Create a New Project in Eclipse

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

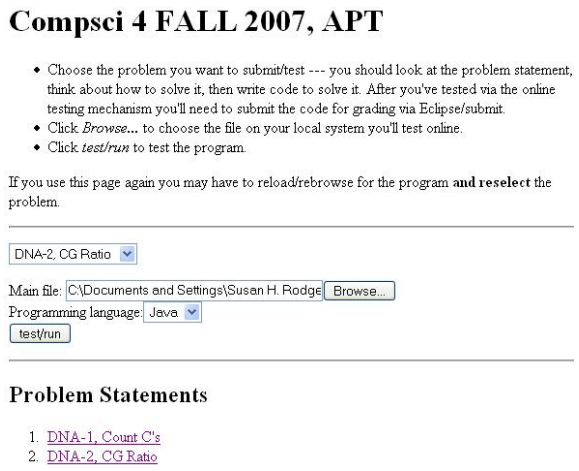


Create a Class and Method

- 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



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