59/60 = 98/100 1-8

CS 1401, Exam #1, MW 12-1:20 version

Date: Wednesday, September 18, 2013
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1. On September 18, 1998, the International Corporation for Assigned Names and Numbers (ICANN) was started, an organization that controls the naming of websites.

- Explain how Java is different from all other programming languages, and how this difference helps to transfer computations from one computer to another.
- What programming language(s) was Java based on?

9+3/10

For extra credit: describe one more event from the history of computing.

Java is different because the .java file that the programmer writes is translated to byte-code into a .class file by the Java ~~Virtual Machine (JVM)~~ compiler and this byte-code can run anywhere where a Java interpreter is available or installed. This difference helps transfer computations across computers because the Java interpreter or the Java Virtual Machine translates or interprets the byte-code for the operating system, telling it what to do regardless of where the byte-code came from.

Java was based on the programming language started by Sun microsystems. → C, C++ unix in general

Extra: A woman named Ada is considered to be the first programmer. There is a programming language named after her which is mainly used by the government.

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2. For each of the following sequences of symbols, describe which can be valid Java identifiers and which cannot be; if you believe they cannot be, briefly explain why (e.g., "is a reserved word" or "does not start with a letter"):

- ICANN Valid
- double Invalid, "double" is a type, a reserved word
- 1998 Invalid, an identifier may not start with a number
- 18September Invalid, an identifier may not start with a number.
- Sept-18-1998 ~~Valid~~ No dashes not allowed

10/10

3. The following formula enables us to compute the area a of a right triangle with sides x and y:

$$a = \frac{1}{2} xy$$

Assuming that x and y are already placed in the corresponding variables of type double, write a Java code statement for assigning the corresponding value to the variable a of type double. Explain, step-by-step, which arithmetic operations will be performed first, which next, etc., and trace the computations on the above example. Describe two different ways to avoid getting 0 as the result of evaluating 1/2. Explain what happens if you simply write xy in your Java code.

```
a=(1.0/2)*x*y
```

Step 1: Due to the parenthesis the division takes place first, (1.0/2) since there is a value of type double, the result is 0.5

Step 2: Since the rest of the operations are multiplications, they are carried out in left to right order, so 0.5 is multiplied by the value in "x"

Step 3: The result from the previous step is multiplied by the value in "y"

Trace:

Assuming x=2.0 and y=3.0

a=(1.0/2)*x*y

a=0.5*x*y

a=0.5*2.0*y

a=1.0*y

a=1.0*3.0

a=3.0

Avoid getting 0 ex. 1/2:

use a double

Method 1: 1.0/2

type cast to double

Method 2: ((double) 1)/2

What happens with "xy"?

"xy" would be read as an identifier by the compiler, which is undeclared, resulting in an error.

4-5. To register a website for several years, you need to pay a per-year registration fee. For simplicity, let us take $35 as this fee. Write the main method which asks the user for the URL of the website, asks for how many years we want to register this website, and prints a memo describing the price. For example, if we want to register CS website http://www.cs.utep.edu for 3 years, your program should print the following message:

```
From: ICANN

To register your website http://www.cs.utep.edu, you need to pay
$35 X 3 = $105.
```

Declare 35 as an integer constant, so that it will be easy to change if needed.

Reminder: to read from the keyboard, you can define the reader as follows:

```
Scanner reader = new Scanner(System.in);
```

the header of the *main* method is:

```
public static void main(String[] args){
```

```
// import the Scanner class
import java.util.Scanner;

class website {
    public static void main(String[] args) {
    final int Fee = 35;          // all caps
    int years;
    String website;
    Scanner input = new Scanner(System.in);
    int cost;
    System.out.println("Enter the URL of the website you want to register");
    //
    website = input.next()       // Line
    System.out.println("Enter the number of years for which you want to register the website");
    years = input.nextInt();
    // code continues on the back
```

```
//continuation
cost = Fee * years;
System.out.println("From: \fICANN \n");
System.out.println("To register your website " + website +
                   ", you need to pay $" + Fee + " x " +
                   years + " = $" + cost);
```

10/10

6. Suppose that would like to add 2 to the number of years. If the number of years is stored in the integer variable *years*, which of the two lines of code leads to a correct increase:

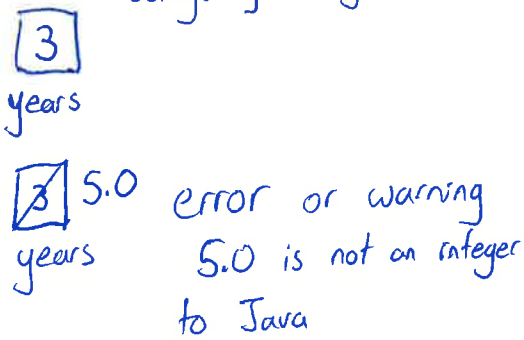
- years = years + 2.0;
- → years = years + 2;

The second one, the first would output an error because Java doesn't implicitly convert to less precise types.

If originally, before each line, we had 3 years, explain what will happen after each of these lines is implemented by Java. What is a clearer way (different from those above) to add 2 to the variable *years*?

Diagram:

using: years = years + 2.0;



using: years = years + 2;

Clearer way to add 2:

```
years += 2;
```