Chapter 2: Beginning to Program

CS1: Java Programming
Colorado State University

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Announcements

Upcoming ACM & ACM-W Events

- Internship Panel 29 Jan
  CSB 130 @ 6pm
- HPE Data Center Visit 7 Feb
  https://forms.gle/pAfp1FRS3eQXLFw7
- T9Hacks 7 - 8 Feb
  https://forms.gle/xkpTkReR59TZhgsZE6
- RamRide Fundraiser 14 Feb
  https://forms.gle/vf2F27K1k6DZovWV9
- HackCU 22 Feb
  https://forms.gle/fv1gkSwqbdTP6DTP6
Motivations

- Solve practical problems programmatically
- Java primitive data types
- Strings
- Input/Output
- Constants
Variables

A named container that holds a specific piece of data.

Variables have a type (set of values). Some Java types are:
  - int, double, char, String
(more later)
Declaring Variables

```java
int x;         // Declare x to be an integer variable;

double radius; // Declare radius to be a double variable;

char a;        // Declare a to be a character variable;

String s;      // Declare s to be a String variable;
```
Assignment Statements

x = 1;          // Assign 1 to x;

radius = 1.0;   // Assign 1.0 to radius;

a = 'A';        // Assign 'A' to a;

s = "Java";     // Assign "Java" to s
Declaring and Initializing in One Step

- int x = 1;
- double d = 1.4;
- String s = "Java";
Variable names

- A variable name is a sequence of characters that consist of letters, digits, underscores (_), and dollar signs ($).
- A variable name must start with a letter, an underscore (_), or a dollar sign ($). It cannot start with a digit.
- A variable name cannot be a reserved word. (See Appendix A, “Java Keywords,” for a list of reserved words).
- A variable name cannot be true, false, or null.
- A variable name can be of any length.
# Numerical Data Types

<table>
<thead>
<tr>
<th>Name</th>
<th>Range</th>
<th>Storage Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>byte</td>
<td>$-2^7$ to $2^7 - 1$ (-128 to 127)</td>
<td>8-bit signed</td>
</tr>
<tr>
<td>short</td>
<td>$-2^{15}$ to $2^{15} - 1$ (-32768 to 32767)</td>
<td>16-bit signed</td>
</tr>
<tr>
<td>int</td>
<td>$-2^{31}$ to $2^{31} - 1$ (-2147483648 to 2147483647)</td>
<td>32-bit signed</td>
</tr>
<tr>
<td>long</td>
<td>$-2^{63}$ to $2^{63} - 1$ (i.e., -9223372036854775808 to 9223372036854775807)</td>
<td>64-bit signed</td>
</tr>
</tbody>
</table>
| float | Negative range: -3.4028235E+38 to -1.4E-45  
Positive range: 1.4E-45 to 3.4028235E+38 | 32-bit IEEE 754 |
| double | Negative range: -1.7976931348623157E+308 to -4.9E-324  
Positive range: 4.9E-324 to 1.7976931348623157E+308 | 64-bit IEEE 754 |
System.out.println("Hello World");

- get the computer to print something to the console
- println prints a line and adds a new line at the end
- print prints the line and continues on the same line
- use for DEBUGGING!!
Simple String Operations

Concatenation:

Use the “+” (plus sign) to concatenate strings

System.out.println(mm + " " + yy);
Simple String Operations

The `length()` method

```java
String theName = "Donald Duck";
int len = theName.length();
```

What is returned by `length()`?
Reading Input from the Console

1. Create a Scanner object

   ```java
   Scanner input = new Scanner(System.in);
   ```

2. Use the method `nextDouble()` to obtain a double value. For example,

   ```java
   System.out.print("Enter a double value: ");
   Scanner input = new Scanner(System.in);
   double d = input.nextDouble();
   ```

Let’s play with IO in Eclipse
Reading Numbers from the Keyboard

Scanner input = new Scanner(System.in);
int value = input.nextInt();

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>nextByte()</td>
<td>reads an integer of the byte type.</td>
</tr>
<tr>
<td>nextShort()</td>
<td>reads an integer of the short type.</td>
</tr>
<tr>
<td>nextInt()</td>
<td>reads an integer of the int type.</td>
</tr>
<tr>
<td>nextLong()</td>
<td>reads an integer of the long type.</td>
</tr>
<tr>
<td>nextFloat()</td>
<td>reads a number of the float type.</td>
</tr>
<tr>
<td>nextDouble()</td>
<td>reads a number of the double type.</td>
</tr>
</tbody>
</table>
Variables

// Compute the first area
radius = 1.0;
area = radius * radius * 3.14159;
System.out.println("The area is " + area + " for radius "+radius);

// Compute the second area
radius = 2.0;
area = radius * radius * 3.14159;
System.out.println("The area is " + area + " for radius "+radius);
public class ComputeArea {
    /** Main method */
    public static void main(String[] args) {
        double radius;
        double area;

        // Assign a radius
        radius = 20;

        // Compute area
        area = radius * radius * 3.14159;

        // Display results
        System.out.println("The area for the circle of radius " +
                          radius + " is " + area);
    }
}
Trace a Program Execution

public class ComputeArea {
    /** Main method */
    public static void main(String[] args) {
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        double area;

        // Assign a radius
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    radius = 20;

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    area = radius * radius * 3.14159;

    // Display results
    System.out.println("The area for the circle of radius " +
    radius + " is " + area);
}
}
Your Turn!

Write code in which a String variable `message` contains “The number of rabbits is”. An integer variable `num` has a value of 129. Concatenate these variables into a String called `report`. Then print, using `report`:

The number of rabbits is 129!!