CSE 142 Introduction to Iteration (c) University of Washington CSE 2001-2

Introduction · Doing some action repeatedly · Loop statements - while · Dugan notes: ch. 15 • Niño & Hosch : first part of ch. 12

Repeating Actions

- · Think of the following algorithms:
- · Drive until you see a fork in the road.
- · Give a cookie to each of your instructors.
- · Bake the roast until it has an internal temperature of 220 degrees.
- · While there are still donuts in the box, eat one.
- · Lather, rinse, repeat.
- · They all call for us to repeat some action for a period of time. Repeating is also called iterating.
- In Java, loop statements provide us with a way to execute a block of statements repeatedly.

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Computing an Average (1)

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- · Suppose we want to calculate the average of a set of numbers
- · We need to know:

Topics

Reading

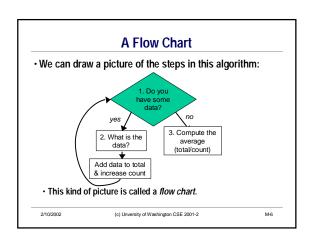
- · Total of all the numbers
- · How many numbers there were
- · But when we write our program we won't know how much data there is!
- · Solution: keep asking for new numbers...

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Computing an Average (2)

- · An algorithm:
 - 1. Ask the user if they have more data to enter.
 - 2. If they have more, then ask for the amount, add it to the running total, increase the count of how much data we've read, and go back to step 1.
 - 3. Otherwise, we're done. Compute the average.

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A Rephrasing

· Another way to say this algorithm:

While the user has data to enter, Ask the user for the amount. Add it to the rain gauge running total. Add 1 to the count of data read Then go back to the top. Otherwise, we're done. Compute the average.

· Detail: need to set the running total and count to 0 before we start

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The Java Version

· We can translate this directly to Java code:

```
Input input = new Input();
double total = 0.0:
                                    // sum of numbers read so far
int inputCount = 0;
                                    // count of numbers read so far
while ( input.readBoolean("Do you have data to enter?") == true ) {
   double amount = input.readDouble("What is the amount?");
    total = total + amount;
   inputCount = inputCount + 1;
```

double average = total/inputCount;

· A while statement in Java is a way to express a loop

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The While Loop Pattern

· New Java statement to repeatedly execute other statements:

while (<test-expression>) {

dy-statements>

- · Meaning: repeatedly do the following
- Evaluate < test-expression > (a boolean expression)
- · If <test-expression> is true, execute <body-statements>, and then restart from the top, reevaluating <test-expression> etc.
- · If <test-expression> is false, then quit without executing body

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A Problem: Computing Interest

- · Problem: how many years will it take, at 10% interest per year, for your money to double?
- · What's the algorithm, in English?
- · What's the flow chart?
- · What's the Java code?

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Solution

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Solution

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