Lesson 7-2: Do Loops

Computer Science 46A: Introduction to Programming

San José State University

Announcements

- Homework #7 (Homework 4 in Canvas) is posted
- Lab #7 is tomorrow (3/14)
- Changed being made to InClassParticipation – they are due by 1:30pm same day

Learning Objectives

By the end of this lesson, you should be able to:

1. Write a do loop to process a series of commands
2. Re-write a do loop as a while loop
3. Use a sentinel value to signal the end of a stream of data

Incrementing

i++ vs ++i

- In loops, we often use the shorthand i++ to increment i
- There is also an option to use ++i
  - i++ is called a *post-increment* and adds 1 and returning i
  - ++i is called the pre-increment and add 1 before returning i
- It does not matter which increment you use in a for loop statement

Example: `IncrementOrder`

The do Loop

Recall: Loops

- A loop is a code block that that is repeated many times
- Its one of the most powerful components of programming
- There are a few implementation of loops in different languages
- In Java, there are three different implementations of loops:
  - While loop – if a condition is met, keep doing something
  - For loop – do something a certain amount of times
  - Do loop – do something, and then keep doing it if a condition is met

The do loop defined

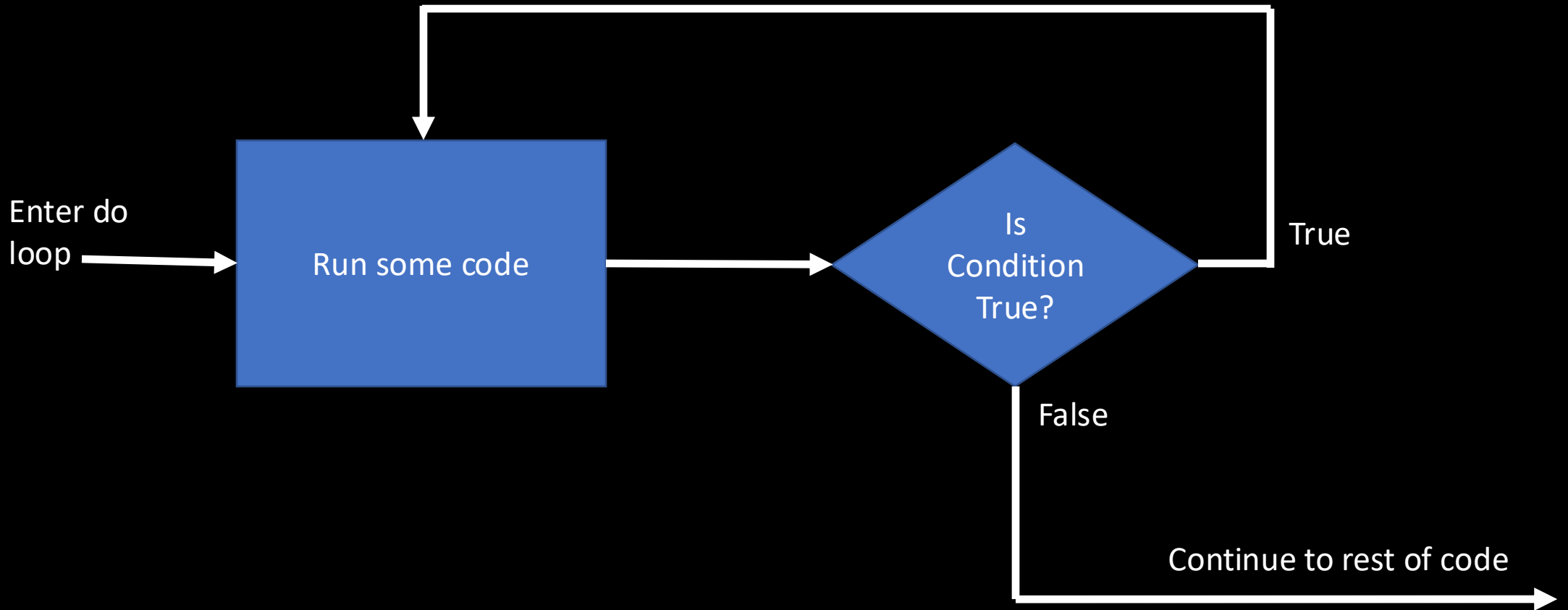
- A do loop is very similar to a while loop – the only difference is that the code block is run *before* entering the loop
- Then, the while loop progresses as a usual while loop (a code block that repeats a command *while* a particular condition is true)
- Syntax:

```
do
{
    // do this command
}
while (condition);
```

do this first

as long as this is true, keep doing the code block above

The **do** loop flow chart



Example: EvenIntegers

- Program will ask for an even number
- As a long as the number is even, the loop will continue

```
Enter an even number integer: 10
Enter an even number integer: 82
Enter an even number integer: 6
Enter an even number integer: 17
17 is not an even number - exited do loop
```

do loops vs while loops

Rewriting a do loop as a while loop

- A do loop can be re-written as a while loop
- These codes are equivalent:

```
do
{
    // do command A
}
while (condition);
```

```
// do command A

while (condition);
{
    // do command A
}
```

See example code in **EvenNumbersWhile**

Poll Everywhere: Question 1

What is the output of the following code?

```
int number = 1;
int counter = 1
int power = 12;
do
{
    number = number * 10;
    counter ++;
}
while (counter < power);
System.out.println("10^"+power+" = "+number);
```

A) 10^12 = 1000000000000

B) 10^12 = 1215752192

C) Infinite Loop

D) -727379968

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Sentinel Values

Recall: User inputs with a Scanner Object

- With a Scanner object we have
  - Received one or two inputs from the user
  - Terminated programs if the input was not correct
  - Used Scanner objects in a loop
- What if we wanted to continue receiving inputs until the user says to stop?
- Answer: Sentinel Values

Sentinel Values Defined

- A ”sentinel” (in military speak) is like a guard
- A sentinel value is a value in a stream of data that indicates the end of the stream
- A sentinel value can be used as a signal to stop receiving values in a loop

Example: SayUncle

- A sentinel value can be used to terminate a loop
- In this example, the word “Uncle” will signal an end to the loop

```
Say "Uncle": No!
Say "Uncle": Never!
Say "Uncle": Grr!
Say "Uncle": Ok, Uncle...
I win
```

Poll Everywhere: Question 2

Which of these escape characters is not the same type as the other input variables?

A)
```
Enter a number or 5 to quit: 0
Enter a number or 5 to quit: 8
Enter a number or 5 to quit: 5
Loop Exited
```

B)
```
Enter a double or 0.0 to quit: 6.8193232
Enter a double or 0.0 to quit: 0.7423837
Enter a double or 0.0 to quit: 0.0
Loop Exited
```

C)
```
Enter a character or Q to quit: k
Enter a character or Q to quit: a
Enter a character or Q to quit: Q
Loop Exited
```

D)
```
Enter a number or Q to quit: 18
Enter a number or Q to quit: 11
Enter a number or Q to quit: Q
Loop Exited
```


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Participation Exercise 7-2a: GuessMyNumber

Goal: Ask the user to guess a number. If they guess wrong, tell them they are too high or too low. If they guess right, then give them a nice message.

```
Guess a number: 50
Nope! 50 is too high.
Guess a number: 25
Nope! 25 is too high.
Guess a number: 10
Nope! 10 is too low.
Guess a number: 15
Nope! 15 is too low.
Guess a number: 17
You guessed it! The magic number is 17!
```

The output of GuessMyNumber

Codecheck Link: HERE and on Canvas

Participation Exercise 7-2b: AverageWithSentinel

Goal: Take a list of inputs from the user until they enter -500. Then, print the average of the integers provided.

```
Enter an integer, -500 to stop: 67
Enter an integer, -500 to stop: 81
Enter an integer, -500 to stop: 14
Enter an integer, -500 to stop: 91
Enter an integer, -500 to stop: -500
The average of the 4 integers is 63.2500.
```

The output of AverageWithSentinel

Solution must use a do loop!

Codecheck Link: HERE and on Canvas