Logical Operators and While Loops

CS303E: Elements of Computers and Programming
June 15, 2012

Quote of the Day

Optimism is an occupational hazard of programming: testing is the treatment. - K. Beck

Logical Operators: What are they?

- Operators that act on boolean expressions
 - We'll use them mainly on comparisons
- The result is a boolean
- and, or, and not

Logical Operators: How do they work?

Logical Operator Expression	Result
p and q	True if p and q are both true, otherwise False
p or q	True if p, q, or both p and q are True, False if both are False
not p	True if p is False, False if p is True

Logical Operators: When do we use them?

- Decisions (if-elif-else)
- Loops ...

Examples

```
i = 14
j = 18
test = i<j
test = i<j and i==i
test = not(i<j)
test = i<j or j<i
test = i<j and j<i</pre>
```

Examples

```
What about:
   a or not b and c
?

a or ((not b) and c)

Precedence:
   not
   and
   or
```

iClicker Question: Logical Operators

```
What is the expected output?

i=23

j=5

k=-19

if(i>20 and k>0):

print "i and k"

elif(i>20 or j<0):

print "i or j"

print "i or j"

neither one

else:

print "neither one"
```

Loops: What are they?

- How we tell the computer to repeat a set of commands
 - Each repetition is called an iteration
- Two types:
 - Definite: loop a certain number of times
 Next week
 - Sentinel (Indefinite): loop until the sentinel value is read
 - while loop

While Loops: Examples

while I'm hungry: eat another bite

while there are more lines of text in the input file: read the next line from the file

While Loops: When do we use them?

- Whenever we are unsure how many times the loop should execute:
 - Reading lists from the user
 - Reading information from a file
 - Converging on a solution (math, chemistry, ...)
- Typically, sentinel loops, where the loop gets and processes values until seeing a special value called the sentinel, that indicates processing should stop.

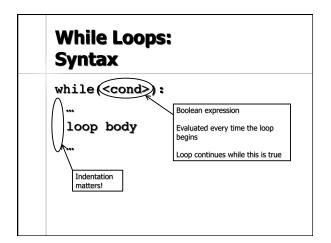
While Loops: How do they work?

Execute a block of code repeatedly as long as the associated condition is true

- Is the condition true?
 - Yes, then execute action, then evaluate the condition, if true, execute the action, then evaluate the condition...
 - No, then skip the loop body and continue with the rest of the code

While Loops: Typical Pseudocode

get initial value
while value is not the sentinel:
 process the value
 get the next value
continue with regular code



While Loops: Examples

count = 1
while(count<=5):
 count=count+1
print count</pre>

While Loops: Examples

#initialize variables to use in the loop num = 1 sum = 0

#as long as num is at most 5, add num to sum
while num <= 5:</pre>

sum = sum+num

num = num+1 #update the loop variable!
#What happens if you forget?

print "The sum of the first five positive\
 integers is ", sum

While Loops: Examples

userVal=input("Enter a value or -1 to quit")
sum=0
while(userVal != -1):
 sum=sum+userVal
 userVal=input("Enter a value or -1 to quit")
print sum

Loops: Coding Hints

To create a loop, ask yourself these three questions:

- 1. Where does it start?
- 2. Where does it end?
- 3. How do I go from one iteration to the next?

Exercises

- Write a program that prints the integers from 1 to 15, one number per line.
- Write a program that reads a number n from the keyboard and prints the sum of the first n positive integers
- Write a program that reads integers from the keyboard and then prints the max and min to the screen

Exercises

 Prompt the user to enter exam scores, entering a negative number to quit.
 Find the average and print it.

iClicker Question: While Loops

What is the expected output?

count=5
while(count>0):
 print count,
 count = count - 1

A. 5 4 3 2 1 0 B. 5 4 3 2 1

C. 12345 D. 012345

Announcements

- Assignment 2 posted today
- Exam in TWO weeks
- On Monday, my office hours will be from 2p-3p NOT 10a-11a
 - this is a ONE time change
- Next week, PAI 5.38 is reserved 9a-11 all week (You can use the labs in ENS.)