COMP 141

if, if-else, relational operators

Rhodes College

Announcements

- Reminders:
  - Program #1 due on 1/30 by 11:55pm
  - Tutors have started
    - Sun-Thurs 7-10pm in Briggs 019
  - Keep up with the zyBooks assignments
    - Posted on course website and in zyBooks
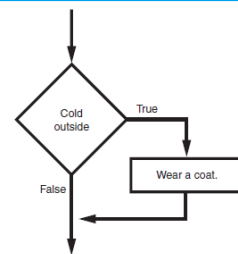 - First quiz will be on Wednesday at the beginning of class.

2

Practice (#3 on in-class lab from Friday)

Write a program, saved as a file called **quadratic.py**, that lets the user input integers **a**, **b**, and **c**, and prints out the two solutions to the equation
$$ax^2 + bx + c = 0.$$

The `if` Statement

Figure 4-1 A simple decision structure

4

The `if` Statement

- **Python syntax:**
  ```
  if condition:
      Statement
      Statement
  ```
- **First line known as the `if` clause**
  - Includes the keyword `if` followed by condition
    - The condition can be true or false
    - When the `if` statement executes, the condition is tested, and if it is true the block statements are executed. Otherwise, block statements are skipped

5

`if` Statement Examples

```
if a < b:
    print("a is less than b")

if a > b:
    print("a is greater than than b")

if a <= b:
    print("a is less than or equal to b")

if a >= b:
    print("a is greater than or equal to b")
```

6

Boolean Expressions and Relational Operators

- **Boolean expression:** expression tested by if statement to determine if it is true or false
  - Example: a > b
    - `true` if a is greater than b; `false` otherwise
- **Relational operator:** determines whether a specific relationship exists between two values
  - Example: greater than (>)

7

Boolean Expressions and Relational Operators

Table 4-2 Boolean expressions using relational operators

Expression	Meaning
x > y	Is x greater than y?
x < y	Is x less than y?
x >= y	Is x greater than or equal to y?
x <= y	Is x less than or equal to y?
x == y	Is x equal to y?
x != y	Is x not equal to y?

== operator determines whether the two operands are equal to one another
    Do not confuse with assignment operator (=)

8

Boolean Expressions and Relational Operators

Any relational operator can be used in a decision block
- Example: `if balance == 0:`
- Example: `if payment != balance:`

9

Code with an if-Statement

```
# This program calculates your exam average.

exam1 = int(input("What is your first exam score? "))
exam2 = int(input("What is your second exam score? "))
exam3 = int(input("What is your third exam score? "))
average = (exam1 + exam2 + exam3) / 3

choice = input("Did you do the extra assignment? (yes or no)")
if choice == "yes":
    average = average + 5

print("Your exam average is", average)
```
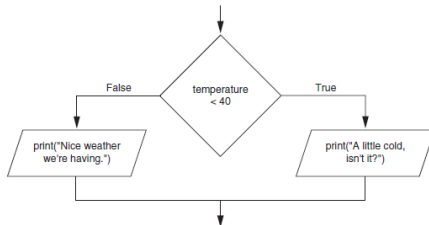
Saved as exam-if.py in my code directory
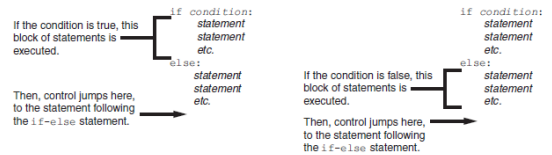
10

The `if-else` Statement

Figure 4-6   A dual alternative decision structure

11

The `if-else` Statement

Figure 4-7   Conditional execution in an `if-else` statement

12

3

if-else Example

```
# This program calculates your exam average.

exam1 = int(input("What is your first exam score? "))
exam2 = int(input("What is your second exam score? "))
exam3 = int(input("What is your third exam score? "))
average = (exam1 + exam2 + exam3) / 3

choice = input("Did you do the extra assignment? ")
if choice == "yes":
  print("Your exam average is", average + 5)
else:
  print("Your exam average is", average)
```

Saved as exam-if-else.py in my code directory

13

Comparing Strings

- Strings can be compared using the == and != operators
- String comparisons are **case sensitive**
- Strings can be compared using >, <, >=, and <=
  – Compared character by character based on the ASCII values for each character
  – If shorter word is substring of longer word, longer word is greater than shorter word

M	a	r	y
77	97	114	121

77	97	114	107
M	a	r	k

14

Using String Comparisons

```
#This program takes in 2 names and prints them out
#in alphabetical order

name1 = input("Enter name 1: ")
name2 = input("Enter name 2: ")

print("Here are the names, listed alphabetically.")

if name1 < name2:
    print(name1)
    print(name2)
else:
    print(name2)
    print(name1)
```

Saved as compareNames.py in my code directory

15

Trace this Code

```
x = 1
y = 2
z = 3
if x < y:
    x = x + 1
    z = x - 1
if y < z:
    y = y - 1
if x < y:
    x = x + 1
else:
    z = z + x + 1
print(x, y, z)
```

Practice

1. Write a program that prompts a user for his or her age and prints out whether or not they are (legally) allowed to drink alcohol.

2. Write a program that asks the user if they want to calculate the area of a square or a triangle. (The user will type in square or triangle.)
   - If they enter square, then ask the user for the length of a side and print the area.
   - If they enter triangle, then ask the user for the base and height and print the area.

17