

CISS450: Artificial Intelligence

Lecture 9: Branching

Yihsiang Liow

Compound Statement

- The `if` statement is a compound statement
- Compound statements look like:
 `<header>:`
 `<stmt>`
- `<stmt>` can be a block of statements. If so, they must all have the same indentation.
- When `<stmt>` is a single line, you can write
 `<header>: <stmt>`

First Format

- ♦ Format:

```
if <bool expr>:
    <stmt>
```

- ♦ Example:

```
age = int(input("Enter your age: "))
if age > 50:
    print("It's never too late to Python!")
if age > 50:
    print("Yep, it's not too late!")
```

- ♦ Example:

```
x = 0
if x == 0:
    x = 100
    y = 200
print(x, y)
```

Second Format

- ♦ **Format:**

```
if <bool expr>:
    <stmt-1>
else:
    <stmt-2>
```

- ♦ **Example:**

```
age = int(input("Enter your age: "))
if age > 50:
    print("It's never too late to Python!")
else:
    print("What are you waiting for? Python on!")
```

Third Format

- ♦ **Format:**

```
if <bool expr-1>:
    <stmt-1>
elif <bool expr-2>:
    <stmt-2>
else:
    <stmt-3>
```

- ♦ **Example:**

```
if age > 50:
    print("It's never too late to Python!")
elif age > 30:
    print("Lot's of time left to Python!")
else:
    print("What are you waiting for? Python on!")
```

Third Format

- You can have as many `elif`s as you like:

```
bank_acct = int(input("Enter bank account: "))
if bank_acct > 1000:
    print("Are you rich or what?")
elif bank_acct > 600:
    print("Get a new PC")
elif bank_acct > 300:
    print("How about a digital camera?")
else:
    print("Well ...")
```

Third Format

- You can leave the `else` case out although that's rare:

```
x = 5
if x == 0:
    print("A")
elif x == 1:
    print("B")
```

Example

```
x = int(input("Enter integer 1: "))  
y = int(input("Enter integer 2: "))  
z = int(input("Enter integer 3: "))
```

```
max = x  
if max < y: max = y  
if max < z: max = z
```

```
print("Max of", x, ",", y, ",", z, "is", max)
```

```
astring = input("Enter a string: ")  
print(astring)
```


Miscellaneous

- ♦ Long bool expr:

```

        if dice0==6 and dice1==6 and \
           dice2==6 and dice3==6:
            print("Lucky guy aren't you?")
            total += 1000
    
```
- ♦ You can put an `if` in an `if`:

```

        valid_age = 0
        winning_ticket = 0
        if 21 < age < 35:
            valid_age = 1
            if ticket == 12345678:
                winning_ticket = 1
    
```

Miscellaneous

- ♦ The following are the same:

```
# version 1
if x > 0:
    if y > 0:
        print("first quadrant")
```

```
# version 2: easier to read
if x > 0 and y > 0:
    print("first quadrant")
```

Miscellaneous

- ♦ Optimization: put the most likely condition first

```
# BAD
if dice == 6:
    print("You win!")
else:
    print("You lose")
```

```
# GOOD
if dice < 6:
    print("You lose")
else:
    print("You win!")
```

Miscellaneous

- You can use `else` to trap logic errors:

```
# version 1
if dice == 1 or dice == 2:
    print("1 or 2: You gain $1")
elif dice == 3 or dice == 4:
    print("3 or 4: You lose $0.50")
else:
    print("5 or 6: You gain $2")
```

```
#version 2
if dice == 1 or dice == 2:
    print("1 or 2: You gain $1")
elif dice == 3 or dice == 4:
    print("3 or 4: You lose $0.50")
elif dice == 5 or dice == 6:
    print("5 or 6: You gain $2")
else:
    print("ERROR IN PROGRAM! dice = ", dice)
```