Nested Control

Combinations of Nesting

Any combination of nested control may be used, to any level of nesting.

- Nested if statements
- Nested loops
- Any combination of these

Nested If Statements

Our previous example of nested if statements:

```
if grade on exam is >= 90
    if grade >= 97
        grade is A+
    else
    if grade >= 93
        grade is A
    else
    if grade >= 90
        grade is an A-
else
if grade on exam is >= 80
    if grade >= 87
        grade is B+
etc.
```

Nested If Statements (cont.)

If Bill shows up, then I am going to ask him where the money is. If he tells me that he lost it, then I am going to ask him if he will pay me back. If he says "no", then I am going to kick him out of the dorm room.

If he tells me that he bought the tickets, then I am going to ask him to give me my ticket right now. If he says "no" again, I am going to go through his wallet when he is sleeping and take my ticket. If I can't find the tickets in his wallet, then I am going to take all his money!

Volunteer? Extra point on next exam.

In a program, this would be structured as:

```
if Bill shows up
    Ask "Where is the money?"
    if Bill says he lost it
        Ask "Will you pay me back?"
        if Bill says no
            Kick him out of the dorm
        else leave him alone
    else
    if Bill says he bought the tickets
        Ask "Can I have my ticket now?"
        if Bill says "no"
            if find ticket in Bill's wallet
                Take ticket
            else
                Take all his money
```

Nested Loops (cont.)

While Ann hasn't shown up for her birthday party, I am going to blow up as many of these 100 balloons as possible. If I end up blowing up all the balloons before she arrives, I'm going to get myself a beer!

Volunteer? Extra point on next exam.

In a program, this would be structured as:

```
numBalloons = 0
while Ann not show up
    while numBalloons < 100
        blow up balloon
        numBalloons = numBalloons + 1

        I'm getting a beer!
```

Nested Loop and Selection

I am going to go out in the boat for a couple of hours. If it gets cloudy, or if I see a lot of other boats going in, then I will bring the boat in.

In a program, this would be structured as:

```
timeBoating = 0
timeOver = False

While not timeOver
    ride in boat for another 15 minutes

    if cloudy or many boats returning or
       timeBoating > 180
            timeOver = True

    timeBoating = timeBoating + 15

Bring boat in
```