CS 161
Intro to CS I
More Decisions/Repetition
Chap. 2.1-2.2
Decisions in our programs

• Use an if/else
  
  if (<expression>) {
    <statement>;
    ...
    <statement>;
  }
  
  else {
    <statement>;
    ...
  }
What is the <expression>?

Could be a relational expression:

<expression> <relational op> <expression>

- Relational Ops
  
  == - equal to
  
  != - not equal to
  
  < - less than
  
  > - greater than
  
  <= - less than or equal to
  
  >= - greater than or equal to
Examples

• if(2 + 1)  //expression
• if(2 − 4)  //expression
• if(2 − 2)  //expression
• if(4 == 4)  //expression relational op expression
• if((2+1) == 4)  //expression relational op expression
• if(4.1 != 4)  //expression relational op expression
• if(3 <= 4)  //...
• if(4 >= 4)
• if(3.5 > 4)
• if(4 < 4)
• if(3+2*2 > 9)
• if((3+2)*2 > 9)
Logical Operators

• **AND**: if((1>2) && (2<5))
• **OR**: if((1>2) || (2<5))
• **NOT**: if(!(1>2) && (2<5))

• Precedence of Operators: pg. 51 - 52
Quiz #2...

• How will you solve this?
  – Write a program that calculates the total grade for N classroom exercises as a percentage. The user should input the value for N followed by each of the N scores and totals. Calculate the overall percentage (sum of the total points earned divided by the total points possible) and output it as a percentage
User Input...

• Include Input/Output library
  ```cpp
  #include <iostream>
  ```
• Create variable to hold user input
  ```cpp
  int num_exercises;
  ```
• Prompt the user
  ```cpp
  cout << "Please enter number of exercises: ";
  ```
• Read value from user
  ```cpp
  cin >> num_exercises;
  ```
How do we get **N** exercises?

```cpp
if(num_exercises--) {
    cout << "Enter the score:";  
cin >> score;
    cout << "Enter possible points:";  
cin >> points;
}

total_score = total_score + score;
total_points = total_points + points;
...
```cpp
#include <iostream>
using namespace std;

int main () {
  int num_exercises, score, points;
  int total_score=0, total_points=0;

  cout << "Enter number of exercises under 3: " << endl;
cin >> num_exercises;

  if(num_exercises--) {
    cout << "Enter the score: ";
cin >> score;
cout << "Enter possible points: ";
cin >> points;
  }

  total_score+=score;
total_points+=points;

  if(num_exercises--) {
    cout << "Enter the score: ";
cin >> score;
cout << "Enter possible points: ";
cin >> points;
  }

  total_score+=score;
total_points+=points;

  cout << "Percent is: " << (double)total_score/total_points << endl;
cout << "Num exercises: " << num_exercises << endl;
  return 0;
```

Multiple Decisions

• What if I want to make these same decisions for the whole year?
  - If it is sunny today
    - then I’ll go to the beach
    - if it is windy at the beach
      - then I’ll fly a kite
    - else if it is not windy at the beach
      - then I’ll walk on the shore
  - Else if it is raining today
    - then I’ll stay inside and read a book
  - Else if it is snowing
    - then I’ll go to the mountains to ski

• Repeat the process for 365 days
How do we do this?

• Repetition: for loops
  – Semantics
    • Repeat for a specific # of iterations w/ starting point, ending point, and an increment
  – Syntax
    for(x=1; x <= 365; x++) {
      <statement>;
      <statement>;
      ...
    }

The for Loop

for(x=1; x <= 365; x++) {
    <statement>;
    <statement>;
    ...
}

Starting point: Initialization
The for Loop

for(x=1; x <= 365; x++) {
    <statement>;
    <statement>;
    ...
}
The for Loop

for(x=1; x <= 365; x++) {
  <statement>;
  <statement>;
  ...
}

• What do you notice about order?
The for Loop

for(x=1; x <= 365; x++) {
    <statement>;
    <statement>;
    ...
}

• Same as x = x+1
• What about x = x + 2?
The for Loop

for(x=1; x <= 365; x++) {
    <statement>;
    <statement>;
...
}

• What do you notice about order?
The for Loop

```c
for(x=1; x <= 365; x++) {
    <statement>;
    <statement>;
    ...
}
```

Test is False: Execution after loop
#include <iostream>
using namespace std;

int main () {
    int num_exercises, score, points;
    int total_score=0, total_points=0;

    cout << "Enter number of exercises: " << endl;
    cin >> num_exercises;

    for(x=1; x<=num_exercises; x++) {
        cout << "Enter the score: ";
        cin >> score;
        cout << "Enter possible points: ";
        cin >> points;

        total_score+=score;
        total_points+=points;
    }

    cout << "Percent is: " << (double)total_score/total_points << endl;
    cout << "Num exercises: " << num_exercises << endl;
    return 0;
}
The while loop

for(x=1; x <= 100; x++)
    cout << "hello world\n";

VS.

int x=1;
while(x<=100) {
    cout << "hello world\n";
    x++;
}
Common Mistakes

int x=1;
while(x<=100) {
    cout << "hello world\n";
    x++;
}

What if we forget this?

What if we forget this?
The do/while loop

int x=1;
do {
    cout << “hello world\n”;
    x++;
} while(x<=100);

• Difference b/w while and do/while?
Reading/Assignments

• Read Chap. 2.3
• Keep working on Assignment #2...
• Monday Study Session...