MIT-IIT Robotics Program

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Outline

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Booleans

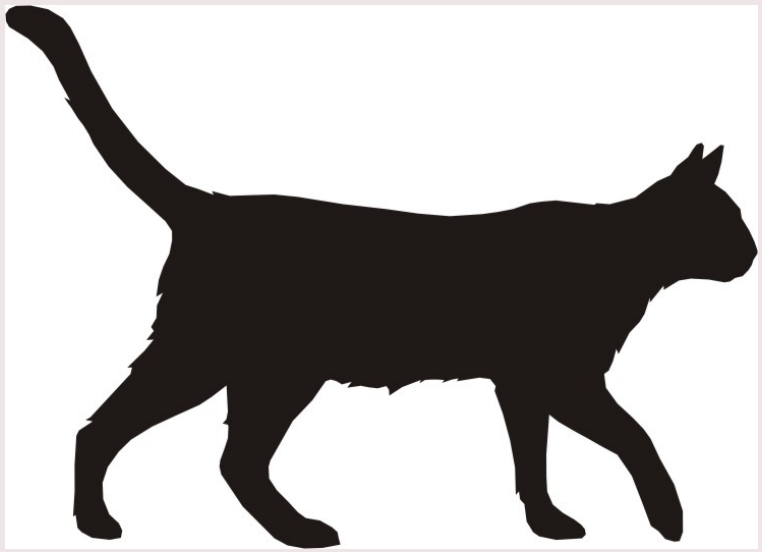
A New Data Type

Booleans only have two possible values – True or False

Statement
Schrodinger's cat is dead !

True

False



Booleans

A New Data Type

- In C++ we have a **bool** data-type

```
bool var = true;
```

- Actually stored as integer (**true** is 1 and **false** is 0)

Booleans

A New Data Type

- In C++ we have a **bool** data-type

```
bool var = true;
```

- Actually stored as integer (**true** is 1 and **false** is 0)
- In the other direction
  - Zero value is **true**
  - Non-Zero value is **false**

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Relational Operators

Operation	Common Symbol	C++ Symbol	Expression
Equals	$=$	$==$	$(a == b)$
Not Equals	$\neq$	$!=$	$(a != b)$
Less Than	$<$	$<$	$(a < b)$
Greater Than	$>$	$>$	$(a > b)$
Less Than Equals	$\leq$	$<=$	$(a <= b)$
Greater Than Equals	$\geq$	$>=$	$(a >= b)$

Logical Operators

Operation	Symbol	Expression
And	&&	$(a \mathrel{!}= b)$ && $(a\%2 == 0)$
Or	||	$(a > b)$ || $(a/2 > 4)$
Not	!	$!(a == b)$

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If and Else

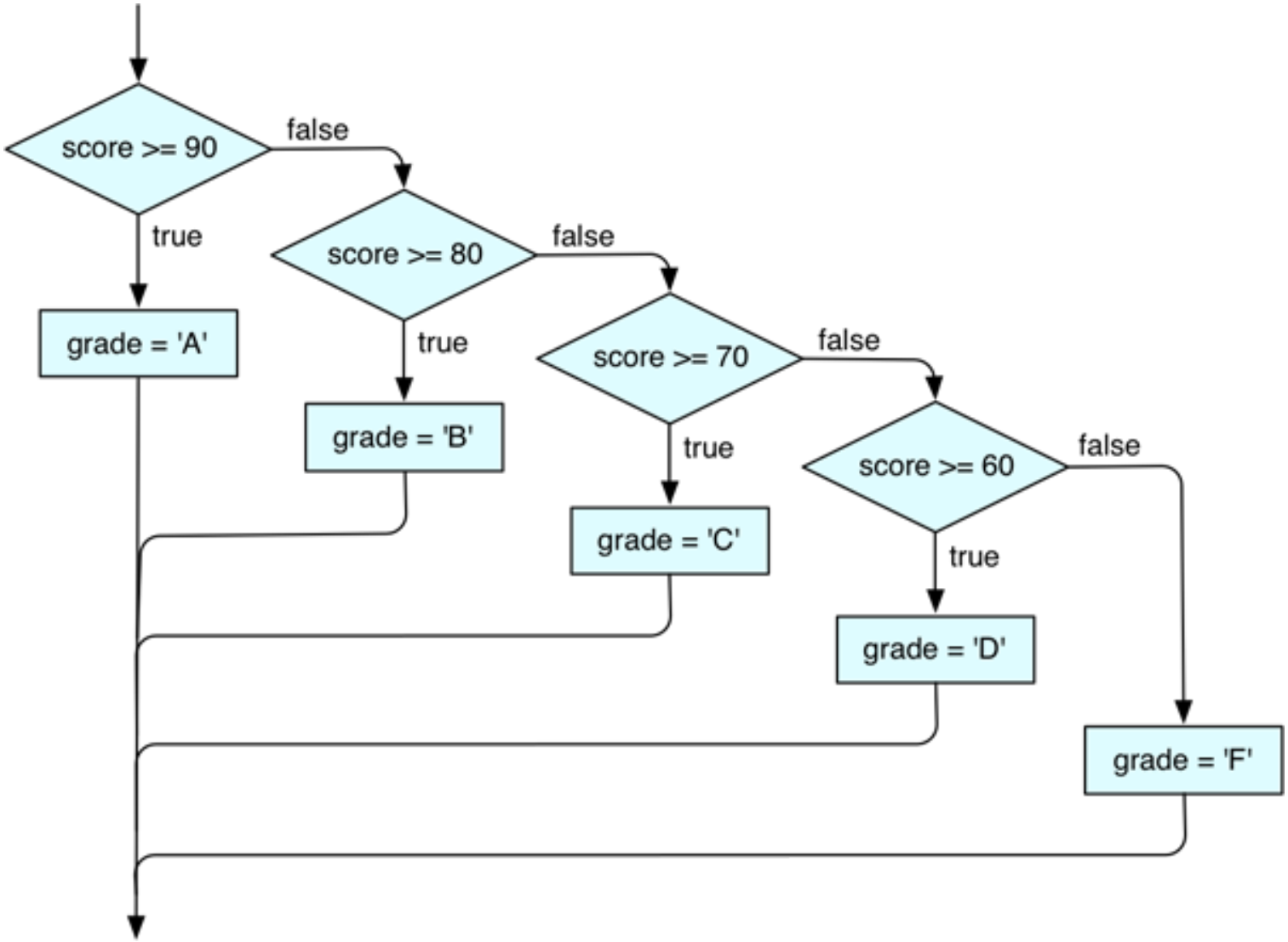
The **else** statement is optional.

```
if (temperature >= 38)
    cout << "Buy an ice ceam cone" << endl;
else
    cout << "Buy a lollipop" << endl;
```

Must use a block (surrounded by curly braces) for more than one line.

```
if (number_of_lines > 1) {
    cout << "More than one line.";
    cout << "Have to use a block.";
}
else{
    cout << "Curly braces are optional.";
}
```

The **if...else if...else** Statement



The **if...else if...else** Statement

To test multiple conditions, we can cascade if statements

```
if (temperature >= 35) {
    cout << "Buy an ice ceam cone" << endl;
}
else if (temperature >= 25) {
    cout << "Buy a lollipop" << endl;
}
else if (temperature >= 15) {
    cout << "Buy a coffee" << endl;
}
else {
    cout << "Buy a sweater !" << endl;
}
```

The **if...else if...else** Statement

- The first statement must be an *if*.
- After this, there can be any number of *if else* statements.
- At the end, there can be one (or zero) *else* statement.

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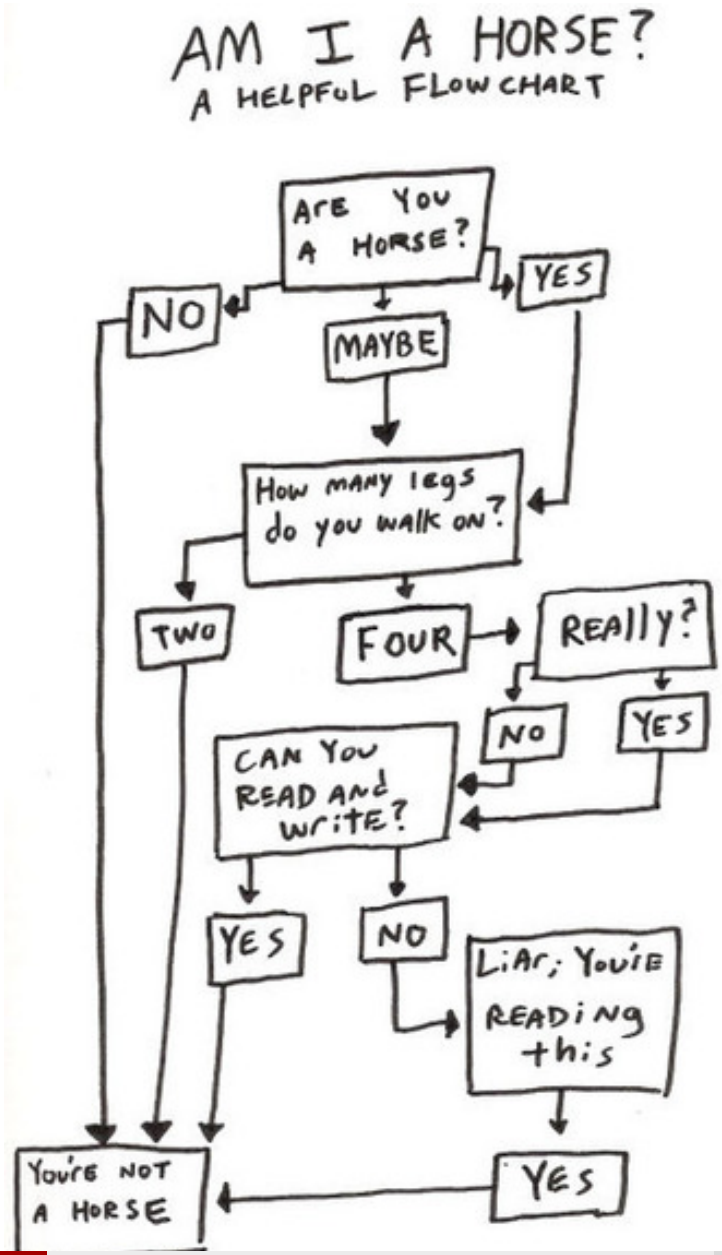
Nested Conditionals



Nested Conditionals

```
if (temperature >= 35) {
    if (money >= 45) {
        cout << "Buy a Cornetto" << endl;
        money -= 45;
        if (money > 0) {
            cout << "Buy a candy" << endl;
        }
        else
            cout << "Out of Money :(" << endl;
    }
    else
        cout << "Buy a Pepsi" << endl;
}
else {
    cout << "Buy a lollipop" << endl;
}
```

Lab Time !

Write programs for each of the following specifications

Input	Output
Four integers	Maximum and second max value
Three points (vertices of triangle) in terms of (x, y) coordinates	Whether the triangle is equilateral, isosceles, or scalene
Cutoff for A, B, C grades, and also marks of one student (out of 100)	Whether the cutoffs are valid, and what grade the student received.
c	d
c	d

Age Guessing Game

Write a program that asks the user qustions of the form " Is your age less than 50". The user can only respond with 1 (yes) or 0 (no).
Challenge – Guess age in seven questions or less.