

# **If Construct in C++**

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# Making Decisions

- Computers can made decisions, example
  - Display greeting Mr. or Ms. base on user's gender
  - Display AM or PM base on time
  - Display advertising base on interest (google/facebook)
  - Check if user's name and password matches
  - (and much more...)
  - So how do we get our programs to decide things?

# If statement

- If something happened then we can make computer perform a task.
- Example:
  - If number is odd then print out that number is odd
  - If the age is 67 then print out the person can retire
  - If password doesn't match ask the user again

# If Statement Model

- Model:  
if ( *comparison\_is\_true* )  
{  
    //do something here  
}

Example:

```
if ( number % 2 == 1 )  
{  
    cout << number << " is odd." << endl;  
}
```

# Conditional Comparison

What I want to compare	Code in C++
Is x equal to y?	<code>x == y</code>
Is x not equal to y?	<code>x != y</code>
Is x less than y?	<code>x &lt; y</code>
Is x less than or equal to y?	<code>x &lt;= y</code>
Is x greater than y?	<code>x &gt; y</code>
Is x greater than or equal to y?	<code>x &gt;= y</code>

# Single statement vs. Block of Code

- There is a shortcut build into if statements:
  - If you only have one instruction to execute
    - ( *ending with ;* )
  - You do not need to type out the { } enclosing curly brackets
- Example:
  - if ( number % 2 == 1 )
    - cout << number << " is odd." << endl;

# If statement using a block of code

- Sometimes multiple instructions needs to be executed if a condition was true, in which case the { } inclosing block MUST be provided.
- My advice: know both ways, and always use { }
- Example:

```
if ( number % 2 == 1 )  
{  
    cout << number;           //first  
    cout << " is odd." << endl; //second  
}
```

# If not? Else what?

- If our initial query was not true, what else can we do?
- We simply do nothing  
or
- We can fall back to a default – else  
or
- We ask another question – else if



# If / Else Model

- Model:

```
if ( comparison_is_true )  
{  
    //do something here  
}  
else  
{  
    //do something else here  
}
```

# If / Else Example

- Example:

```
if ( number % 2 == 1 )
```

```
{
```

```
    cout << number << " is odd." << endl;
```

```
}
```

```
else
```

```
{
```

```
    cout << number << " is even." << endl
```

```
}
```

# If / Else If / Else Model

- Model:  

```
if ( comparison_is_true )  
{  
    //do something here  
}  
else if ( another_comparison_is_true )  
{  
    //do something else here  
}  
else  
{  
    //do yet something else here  
}
```
- Note: else if block can be repeated as many times as needed to detect all the conditions that needs to be picked up.

# If / Else If / Else Model Example

- Example:

```
if ( number % 3 == 0 )  
{  
    cout << number << " is divisible by 3." << endl;  
}  
else if ( number % 3 == 1 )  
{  
    cout << number << " has reminder of 1." << endl;  
}  
else  
{  
    cout << number << " has reminder of 2." << endl  
}
```

# Chain of if statements

- It seems like if and else if serve the same purpose
- Example 1, using if only:

```
if ( number % 3 == 0 )
```

```
    cout << "divisible by 3" << endl;
```

```
if ( number % 3 == 1 )
```

```
    cout << "remainder of 1" << endl;
```

```
if ( number % 3 == 2 )
```

```
    cout << "remainder of 2" << endl;
```

- What would be the output if number was 5?

# Chain of if / else if statements

- It seems like if and else if serve the same purpose
- Example 1, using if only:

```
if ( number % 3 == 0 )
```

```
    cout << "divisible by 3" << endl;
```

```
else if ( number % 3 == 1 )
```

```
    cout << "remainder of 1" << endl;
```

```
else if ( number % 3 == 2 )
```

```
    cout << "remainder of 2" << endl;
```

- What would be the output if number was 5?

# Are if statements enough?

- Example 2, using only if statements :  
if ( grade >= 97 )  
    cout << "A+" << endl;  
if ( grade >= 92 )  
    cout << "A" << endl;  
if ( grade >=90 )  
    cout << "A-" << endl;
- What's this output if the grade is 100?

# When chaining is required

- Example 2, using if and else if statements:

```
if ( grade >= 97 )
```

```
    cout << "A+" << endl;
```

```
else if ( grade >= 92 )
```

```
    cout << "A" << endl;
```

```
else if ( grade >= 90 )
```

```
    cout << "A-" << endl;
```

- What's this output if the grade is 100?