

# Introduction to C++

Language basics – flow of control



# Flow of Control

- Normally from one line to the next
- Standard constructs in almost every language
  - if
  - while
  - return
  - Calling a function
- Different in C++
  - for
  - switch
  - Immediate if
  - break
  - goto

# If

- **if (condition) action**

- Round brackets are not optional
- Condition can be any expression (even a number)

```
if (x>3) y=7;
```

```
if (x>3)  
    y=7;
```

- **When “action” is multiple lines, use braces**

- Best practice: use them anyway

```
if (x>3)  
{  
    y=7;  
}
```

- **else is optional**

# While

`while (condition) action`

- **Check is before first time it runs**
  - May not run at all
  - Same rules as if – round brackets, braces
- **Can exit early using break**

# For

- **Initializer**
  - May declare a variable or use an existing one
  - Scope matters
- **Condition**
  - Same expressions as if and while
- **Loop expression**
  - Change the value used in the condition

```
for (int i=0; i < 10; i = i + 1)
```

# Switch

- Equivalent to a number of if statements in a row
- Less nesting than if/else

```
switch(expression)
{
case value1:
    action
    break;
default:
    action
}
```
- Expression and values must be integral type or enum

# Functions

- **Declare before you use**
  - Include header in multiple places
- **Implement once**
- **Not much different for member functions and “free functions”**
- **Can take parameters by value or reference**
- **Can also return by value or reference**
  - Dangling reference

# Understanding Error Messages

- **When you call a function, two different checks are made**
  - Have you declared (usually in a .h) that function?
    - compiler
  - Have you implemented (usually in a .cpp) that function?
    - linker
- **Different mistakes, different errors**
  - Typed the name wrong when calling it
  - Passed the wrong number or types of parameters when calling it
  - Mistake declaring
  - Mistake implementing
  - Forgot to implement
  - Forgot to include header when calling
  - Forgot to include header when implementing
  - Forgot to add implementation file to project



# Immediate If

- **You could write:**

```
if (something)
    result = 7;
else
    result = 302;
```

- **Instead:**

```
result = something? 7 : 302;
```

- **Can use any expressions in the two possibilities**

# Summary

- **C++ has the usual flow-of-control constructs**
- **Compiler will help you with syntax of for and switch**
- **They can all be built from each other, so use according to idiom**
- **for/while:**
  - Do you know the number of iterations in advance?
- **switch/series of if**
  - 3 or more use a switch
- **Immediate if**
  - Are all three parts short enough to fit on one line?
- **Functions**
  - Free functions
  - Member functions
- **Taking and returning by value or reference**