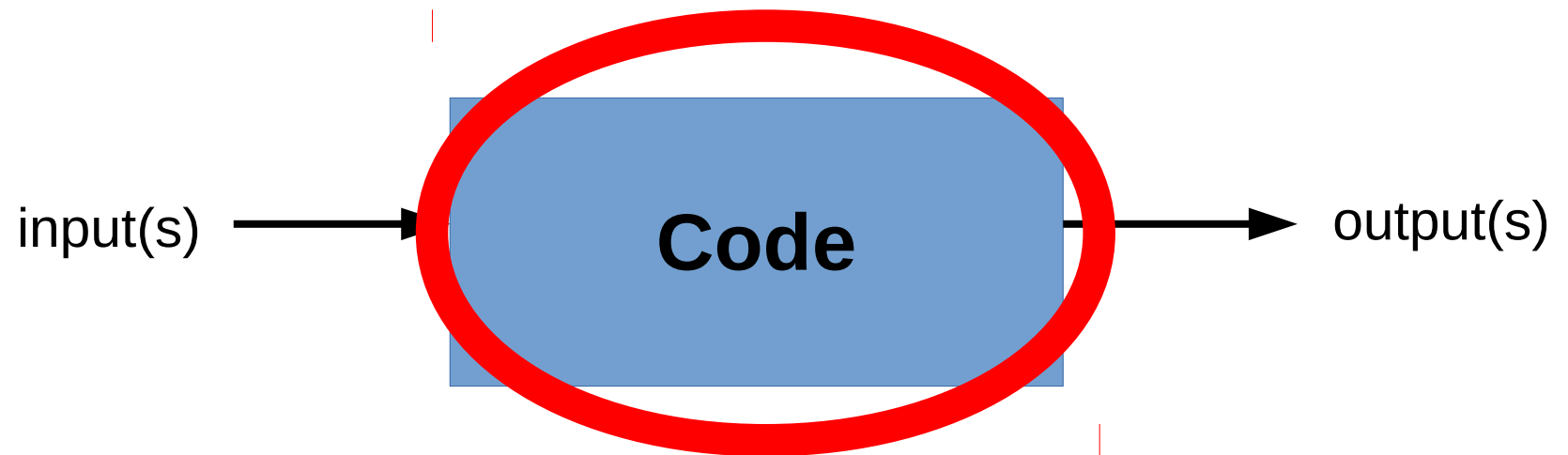


Basics of Programming in C++

Computation



What you are trying to compute

sub
computation 1

...

sub
computation n



while

variables

functions

conditionals

arithmetic
operations

...

Structure of a C++ Program

```
int main()  
{  
    return 0;  
}
```

Structure of a C++ Program

- Literals

- Value written in source code

```
26
```

```
true
```

```
"Hello, world!"
```

- Types

- int - (e.g., 3, -5)
- float - (e.g., 3.0, 5.3, -25.4)
- bool - true/false

- Variables

- Data storage

- `<type> <identifier> [= <value>];`

- Declare, initialize

```
int weight = 10;
```

- Operators

- Type safety

- Constants

```
const <type> <identifier> [= <value>];
```

Structure of a C++ Program

- Operators
 - Arithmetic: +, -, *, /, %
- Operands
- Expressions
 - Sequence of operators and operands that specifies a computation
 - Order of operations (precedence)
- Statements

Structure of a C++ Program

- Syntax
 - Legal expressions
- Semantics
 - Meaningful program
 - Program has intended meaning

```
int msg = "hello, world" + 5
```
- Errors
 - Compile time
 - Run time

Iteration

- Repeat a block of statements
- Examples
 - Do this until you are done
 - While the sun shines make hay
- `while (expression) {}`

Selection

- “Select” an action amongst a number of possibilities
- Example
 - If this is true, do something, else do something else
- Syntax

```
if (expression) {  
    ...  
} else {  
    ...  
}
```

Function

```
<return type> <identifier> ( parameters )
```

- Example

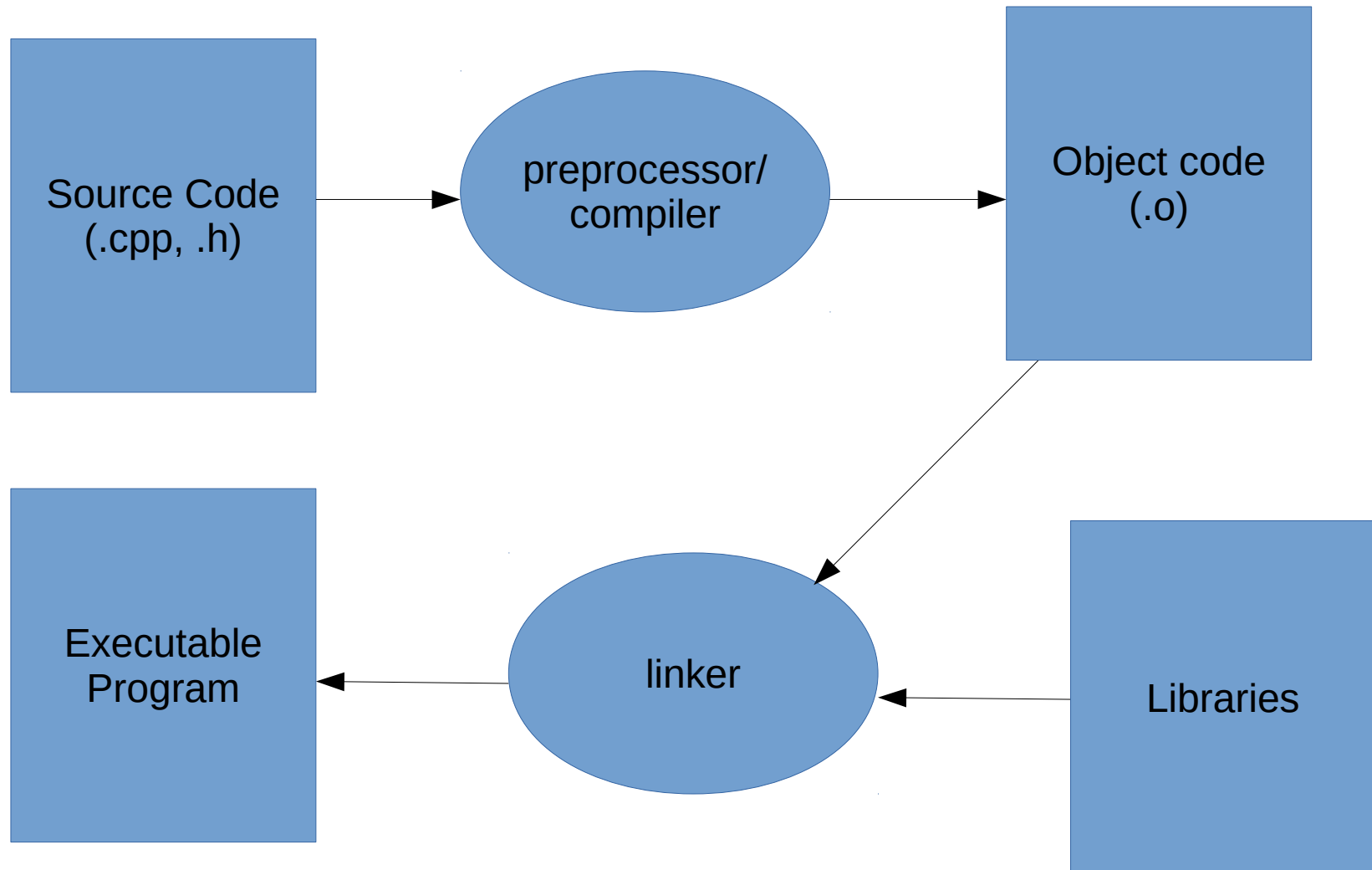
```
int main()  
{  
    return 0;  
}
```

- Named set of statements used to accomplish a specific task
- Why?
 - Code used in multiple instances of our program
 - Allows a program to be divided
 - Organization
 - Distributing work
 - Eases testing

Example

- Compute the maximum of two integers

Building and Running a C++ Program



Building and Running a C++ Program

- Pre-processing
 - The `#include` directive is an example of a pre-processor directive (anything starting with `#`).
 - `#include <iostream>` tells the preprocessor to copy the standard I/O stream library header file into the program
- Compiling
 - Syntax checking, translation of source code into object code (i.e. machine language). Not yet an executable program
- Linking
 - Puts together any object code files that make up a program, as well as attaching pre-compiled library implementation code (like the standard I/O library implementation, in this example)
 - End result is a final target -- like an executable program
- Run it!

Programming Strategies

- How do I go about writing a program?
- Top-down programming
 - Start with description and divide it into sufficiently small units corresponding to available components
- Bottom-up programming
 - Start with small components and build from them

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Next Class

- Quiz
- Debugging