

Introduction to Computation and Programming

Lecture 1



Outline

- High-level view of a computer
- A focus on main memory
- Executing programs: compilers, linkers



First and Foremost...

Thanks to Prof. Wiseman for the COMP128 content



myfoxboston.com/clip/10550913/how-hackers-steal-your-personal-information



What Makes Up a Computer?

Hardware

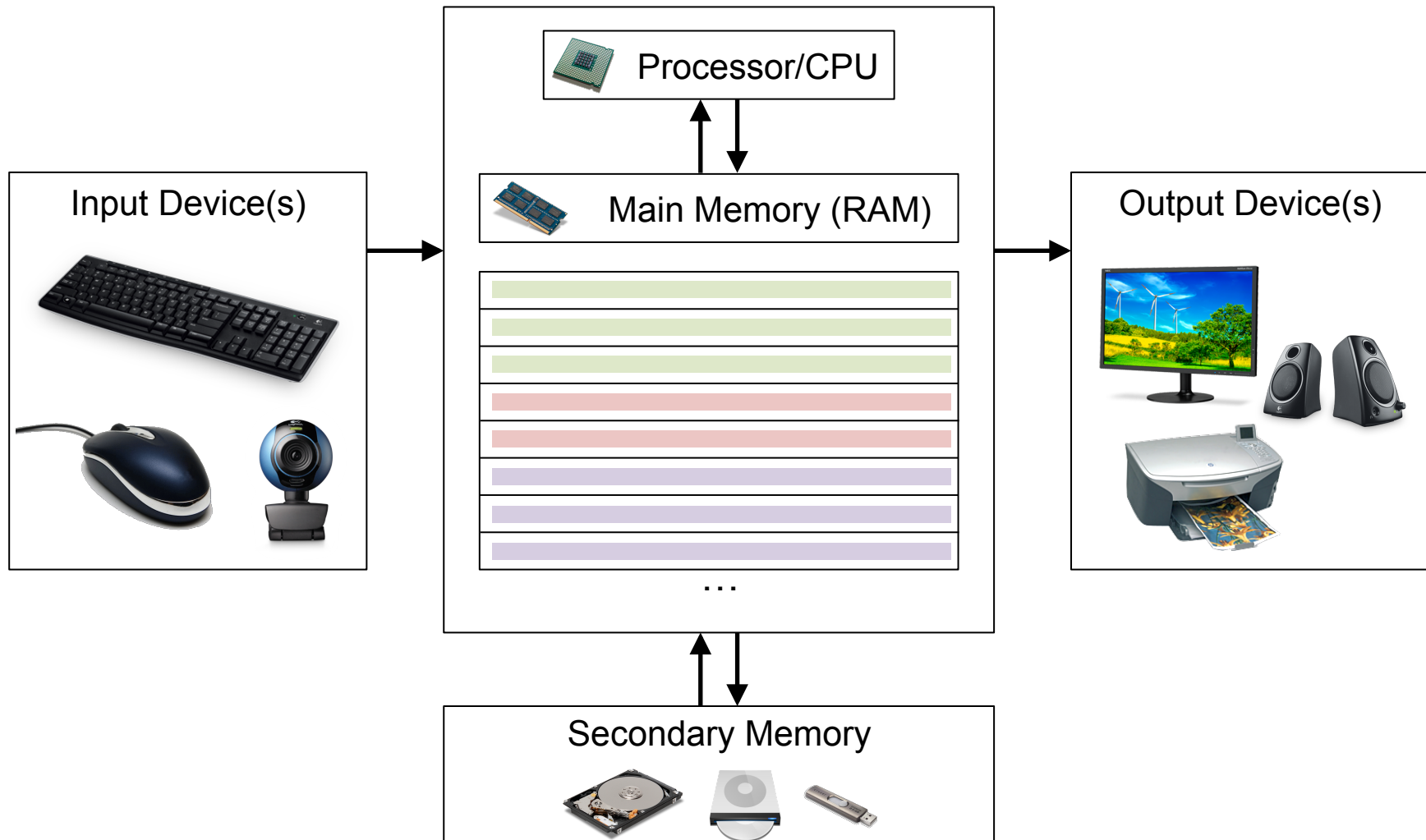
- Physical machines
- Wide variety, conceptually simple [in this class]
- Most of this lecture

Software

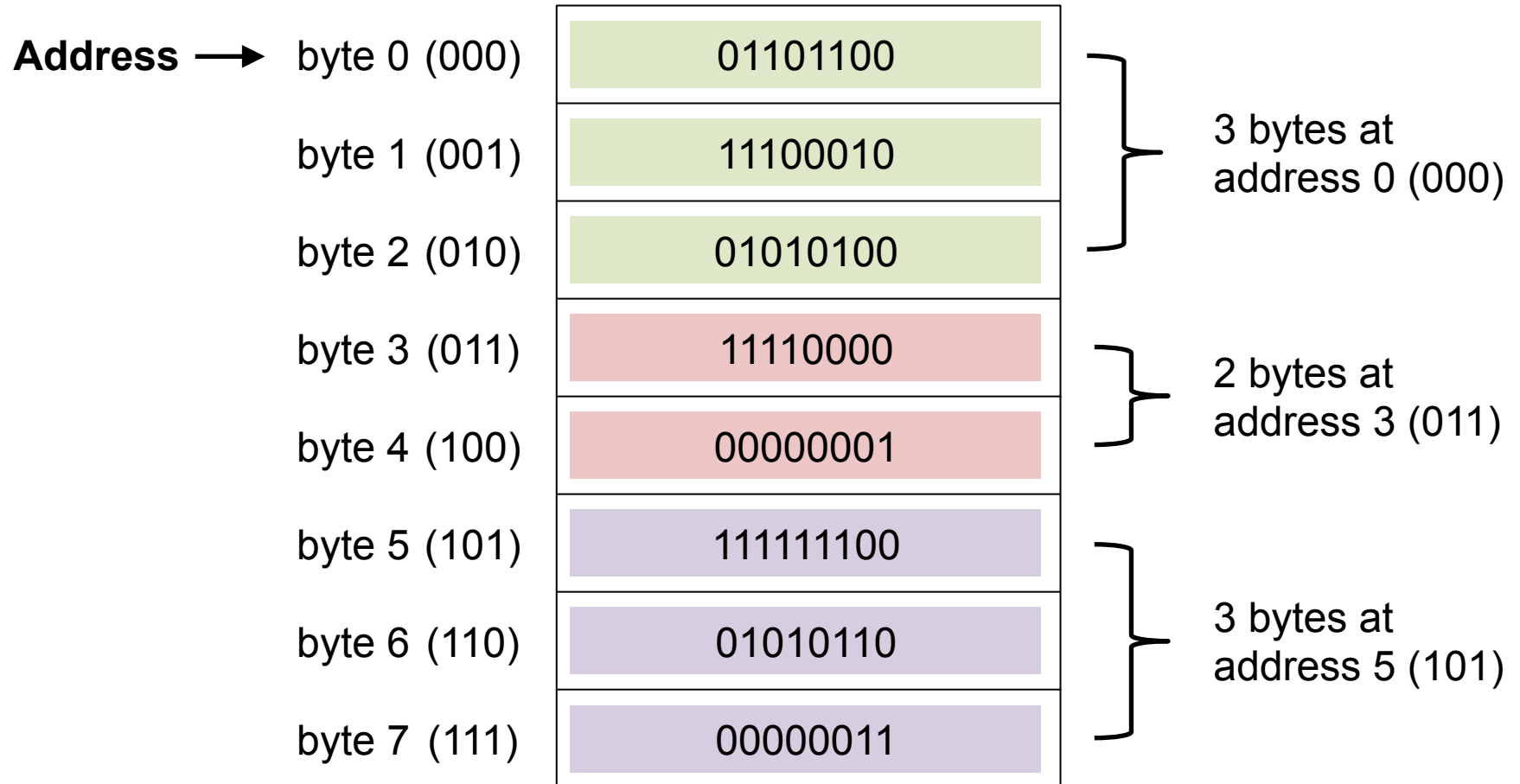
- Collection of **programs** (set of instructions)
- Wide variety: OS, editors, browsers, ...
- Most of this course



High-Level View of Hardware



Main Memory (RAM)



Quick Check

If a computer holds 1 byte in each memory location, what is its total memory capacity if it uses 8 bits to represent each address?

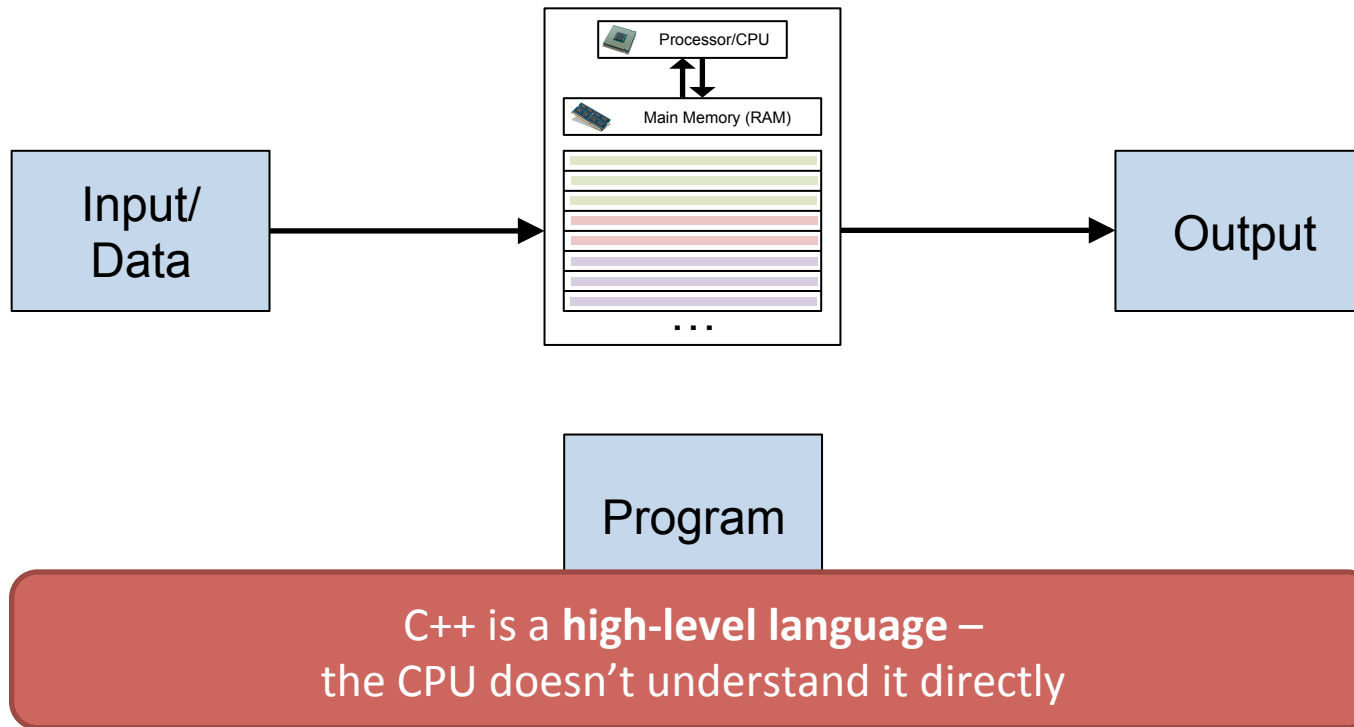
byte 0	01101100
byte 1	11100010
byte 2	01010100
byte 3	11110000
byte 4	00000001
byte 5	11111110
byte 6	01010110
byte 7	00000011

...

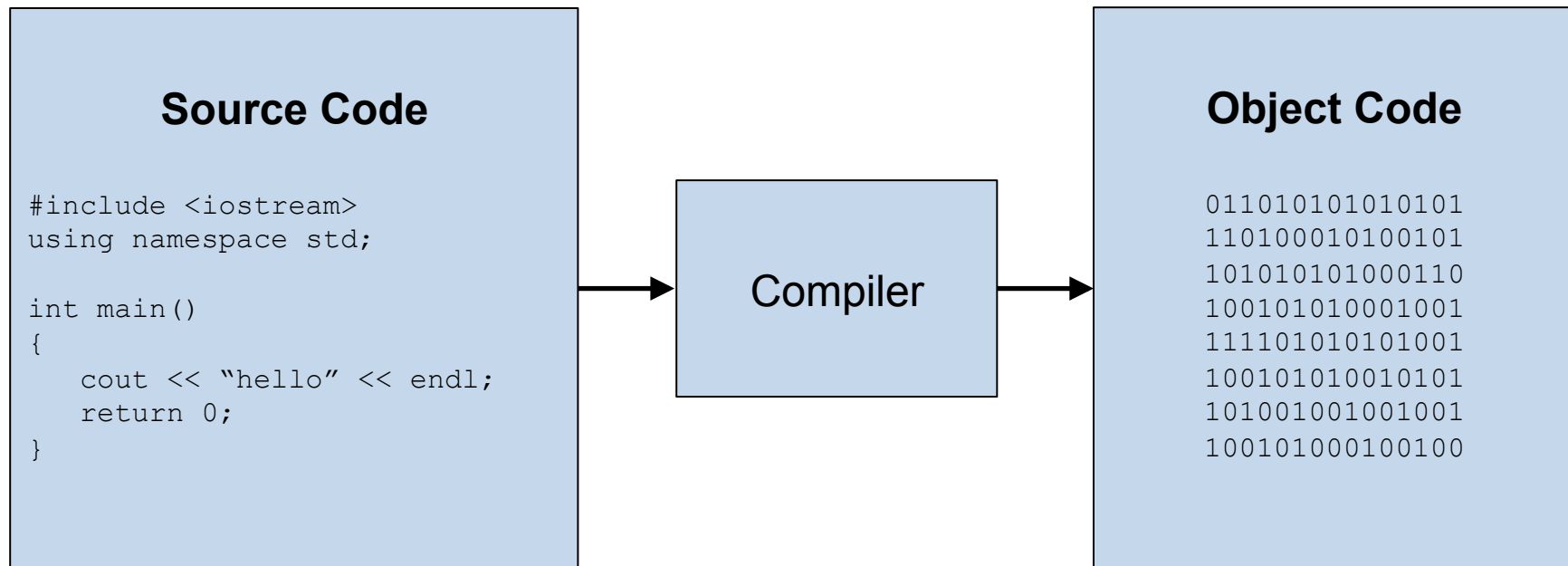
If a computer holds 1 byte in each memory location and needs to have 4GB capacity, how many bits must it use to represent addresses?



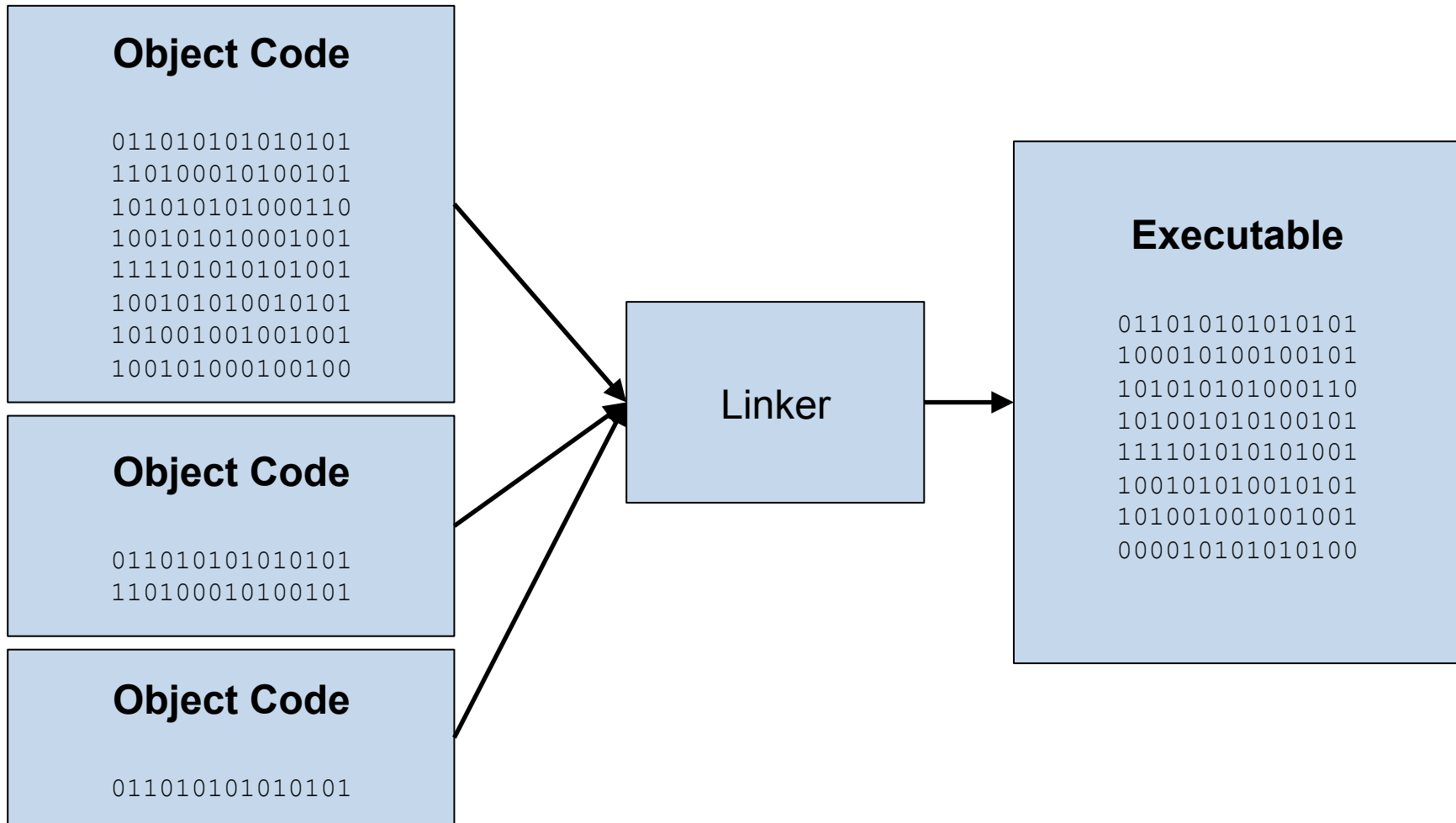
Running a Program



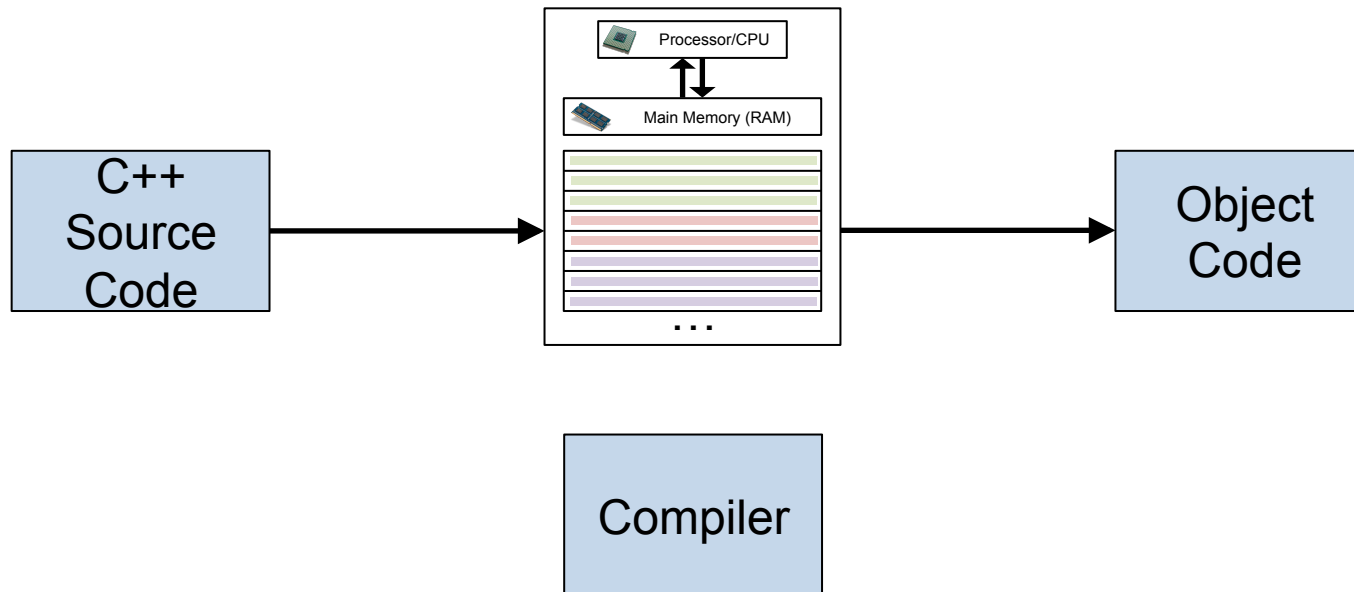
Compilers



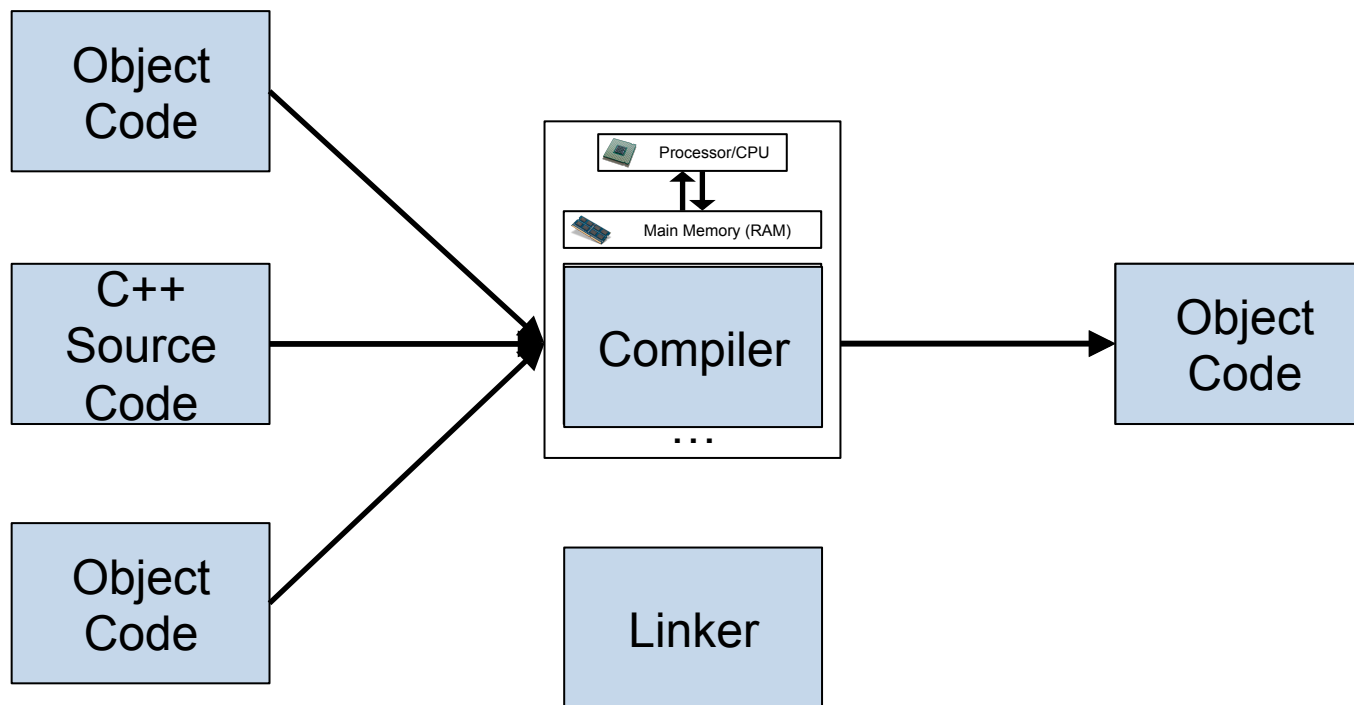
Linkers



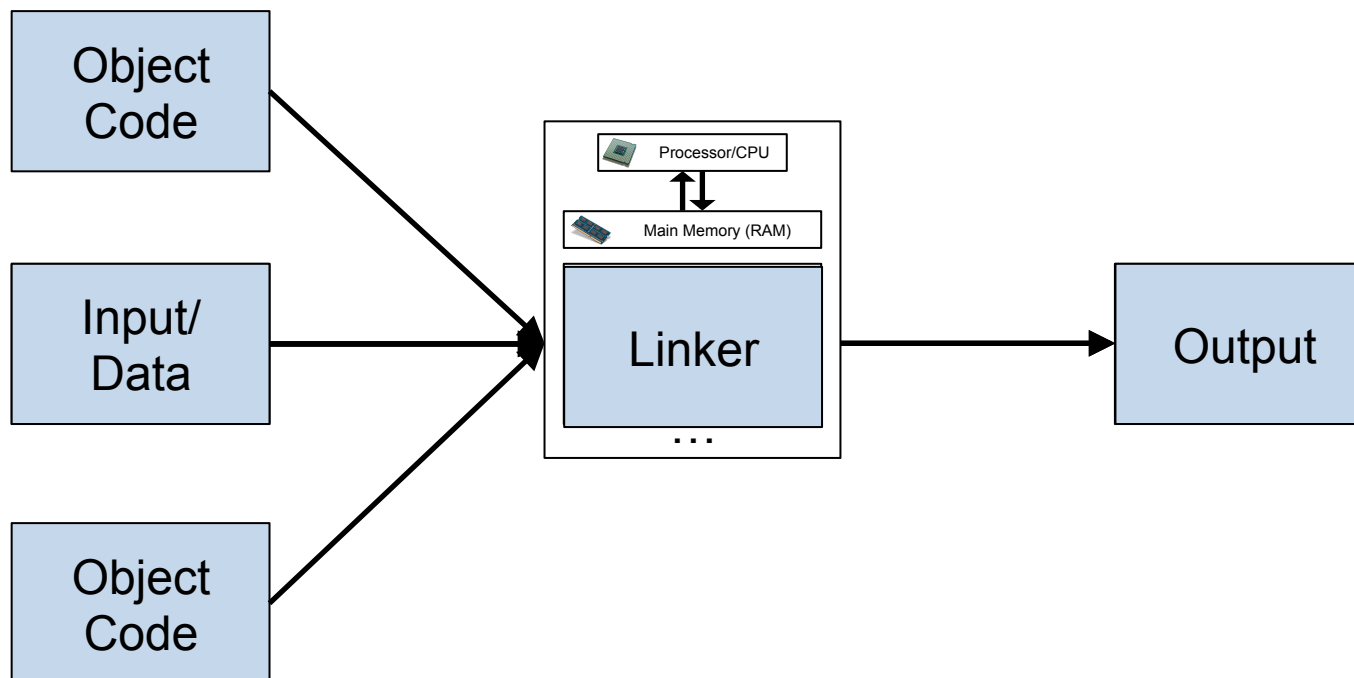
Build and Run (1)



Build and Run (2)



Build and Run (3)



Wrap Up

- Computer hardware is conceptually divided into 5 components
 - Processor, main memory (RAM), secondary storage, input devices, output devices
- 1 byte = 8 bits
- Main memory is a sequence of bytes, each with a memory address
- Compilers turn source code into object code
- Linkers combine object code to form an executable program

