Department of Computer Science
UNIVERSITY OF COLORADO BOULDER

Design and Analysis of Operating Systems CSCI 3753

Dr. David Knox
University of Colorado Boulder

These slides adapted from materials provided by the textbook authors.

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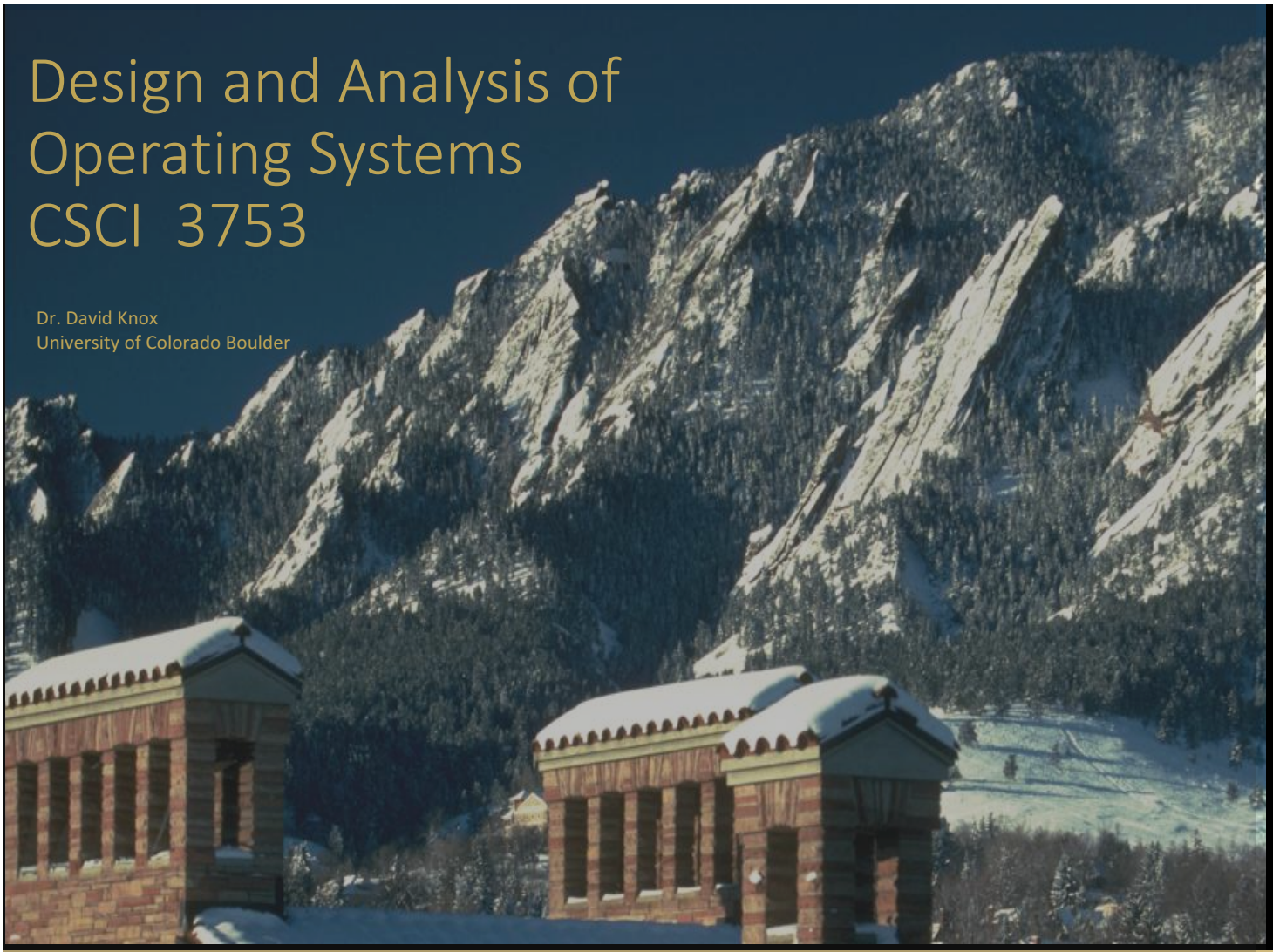

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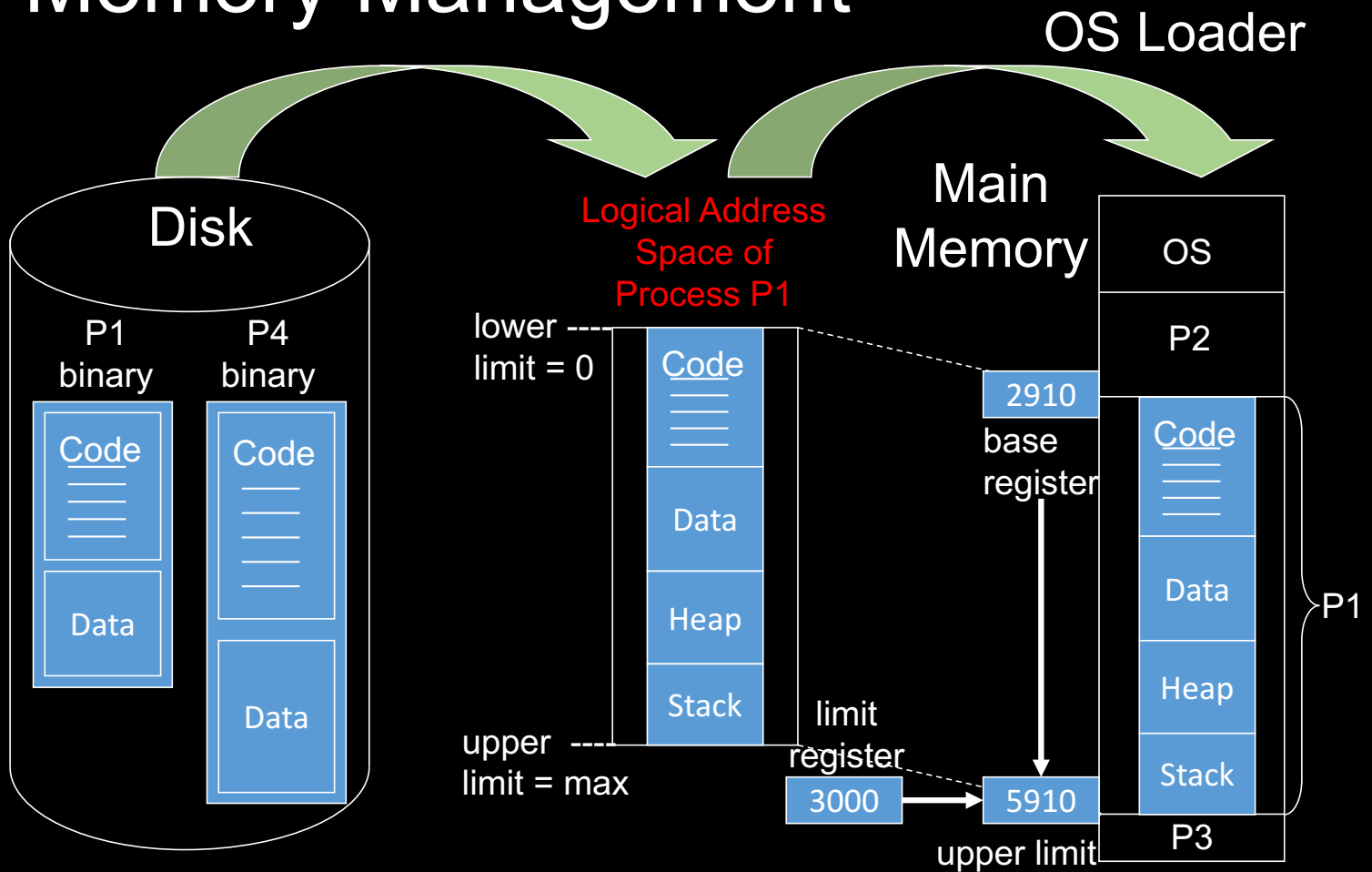
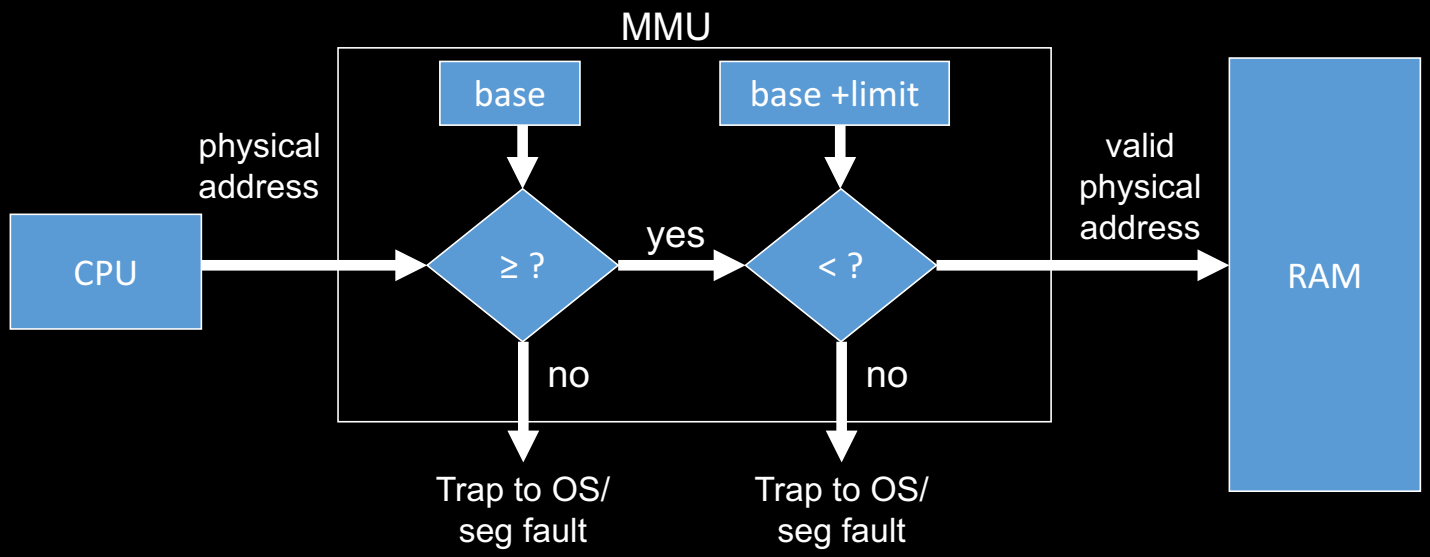
Memory Management
Address Binding

Memory Management



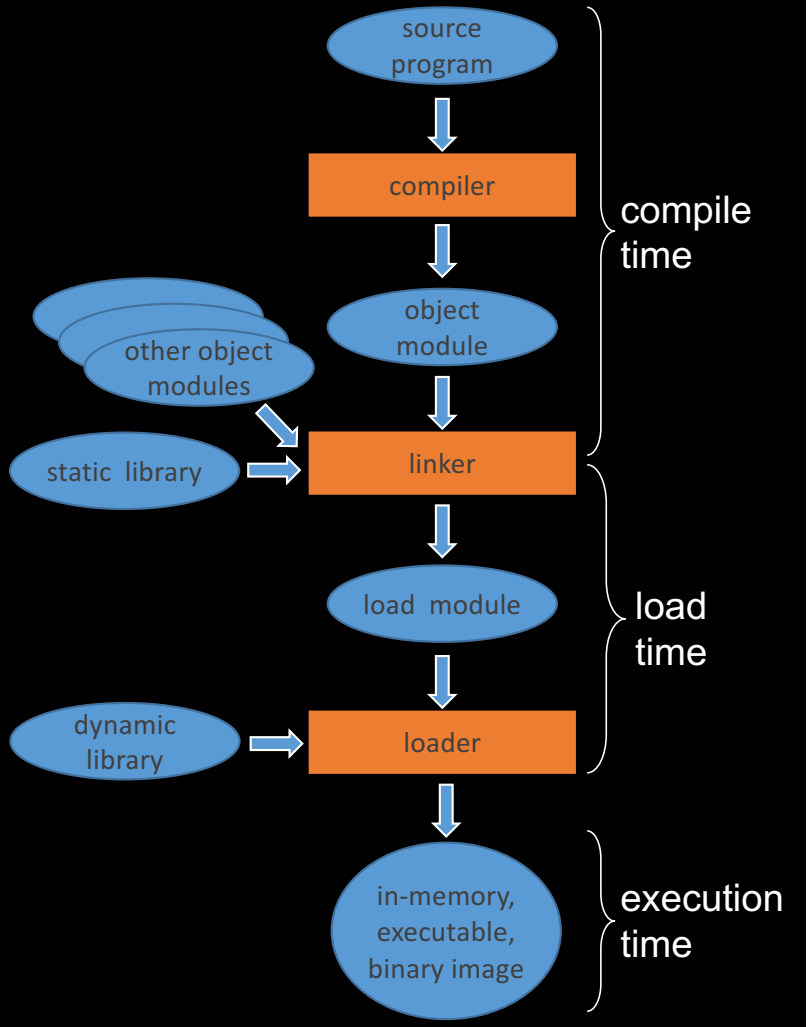
Memory Management Unit

- MMU needs to check if physical memory access is within task bounds



How do we know the addresses we want to access?

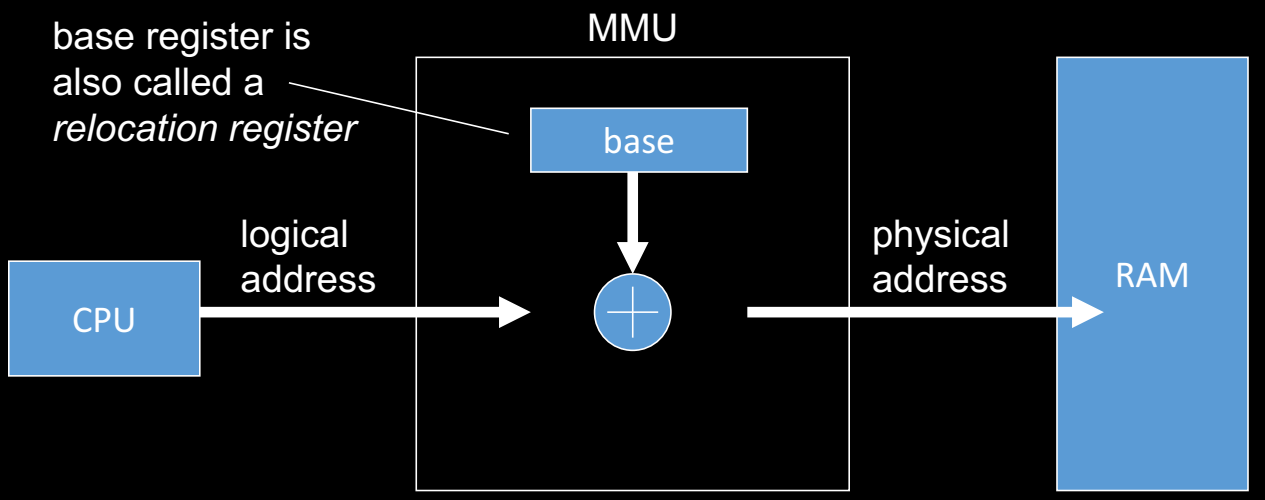
- Binding at compile time
- Binding at load time
- Binding at execution time



multistep creation of an executable program

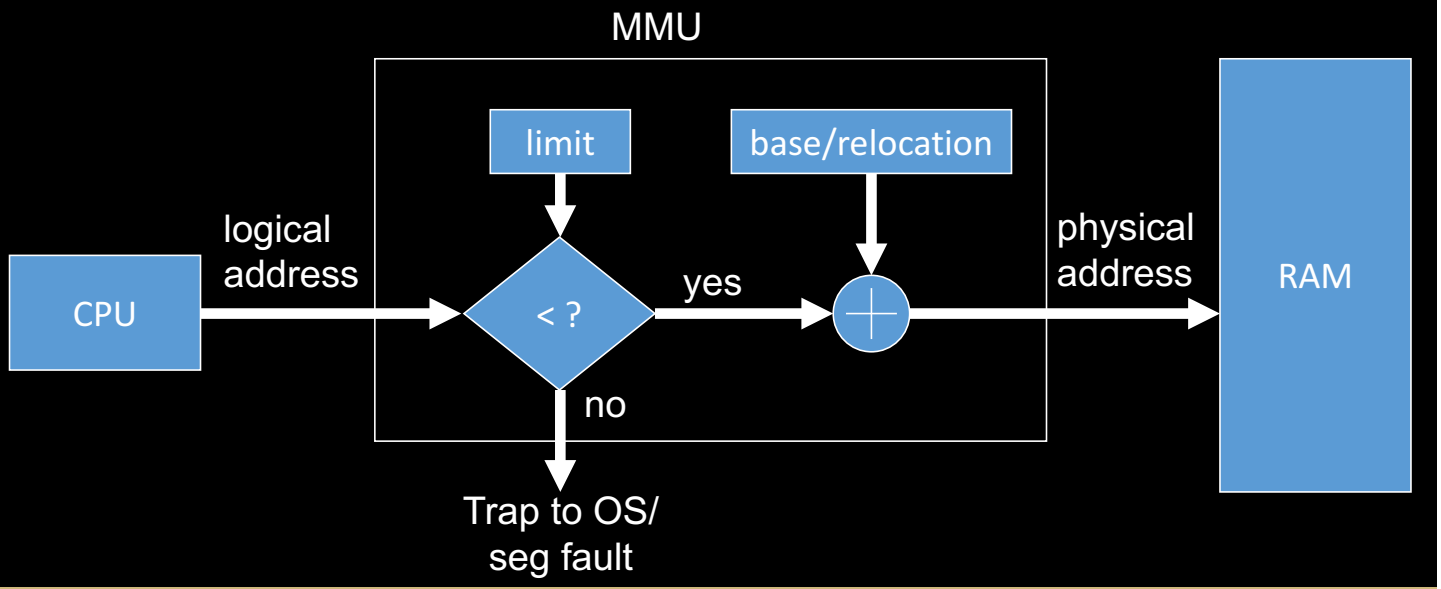
MMU needs to perform run-time *mapping* of logical addresses to physical addresses

- For run-time address binding,
  - each logical address is *relocated or translated* by MMU to a physical address that is used to access main memory/RAM
  - thus the application program never sees the actual physical memory - it just presents a logical address to MMU



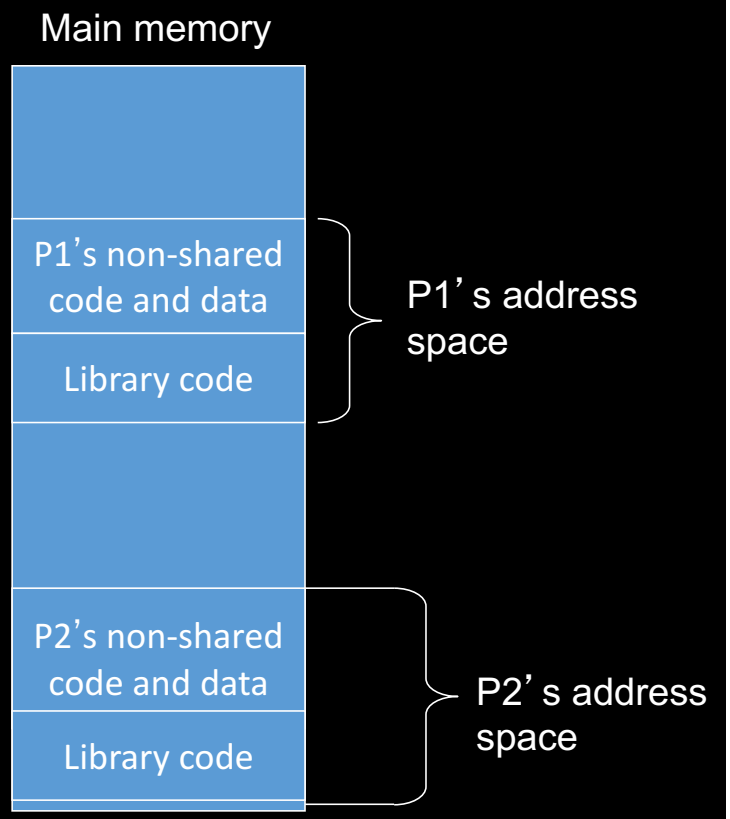
Memory Management

- Let's combine the MMU's two tasks (bounds checking, and memory mapping) into one figure
  - since logical addresses can't be negative, then lower bound check is unnecessary - just check the upper bound by comparing to the limit register
  - Also, by checking the limit first, no need to do relocation if out of bounds



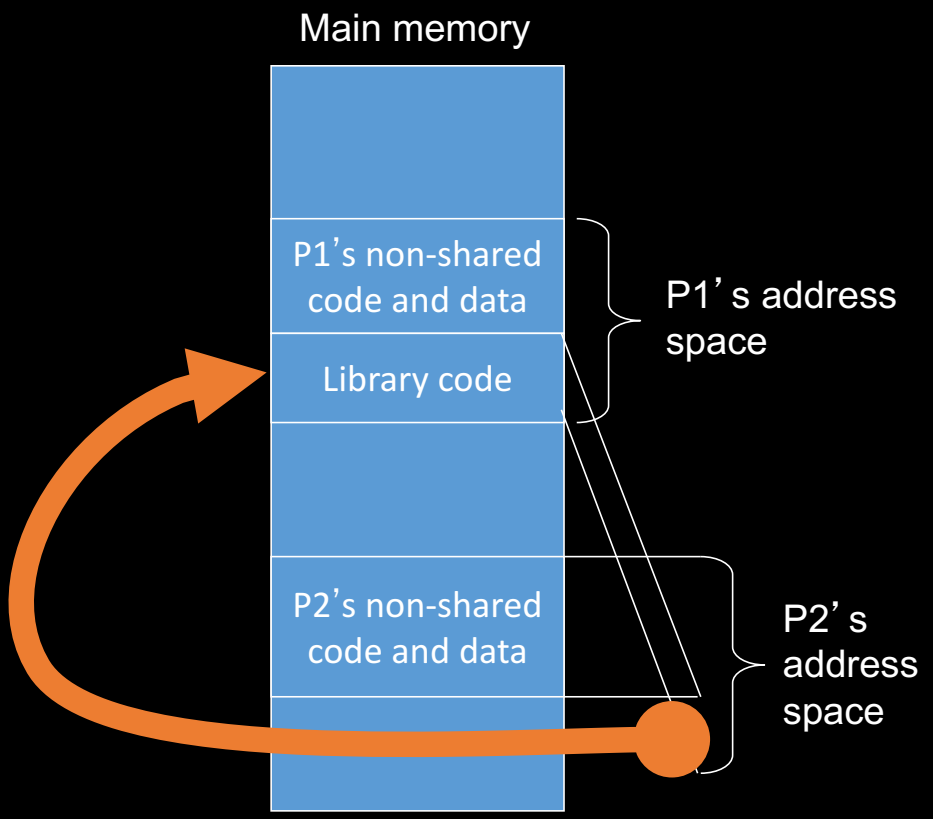
Run Time Binding with Static Linking

- Advantages of static linking:
  - Applications have access to the same library code even if it has changed recently
  - Can move to machines without the library
  - Self contained processes



Run Time Binding with Dynamic Linking

- Advantages of dynamic linking:
  - Applications have access to the latest code at run-time, e.g. most recent patched dlls
  - Smaller size – stubs stay stubs unless activated
  - Can have only one copy of the code that is shared among all applications
    - We'll see later how code is shared between address spaces using page tables



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