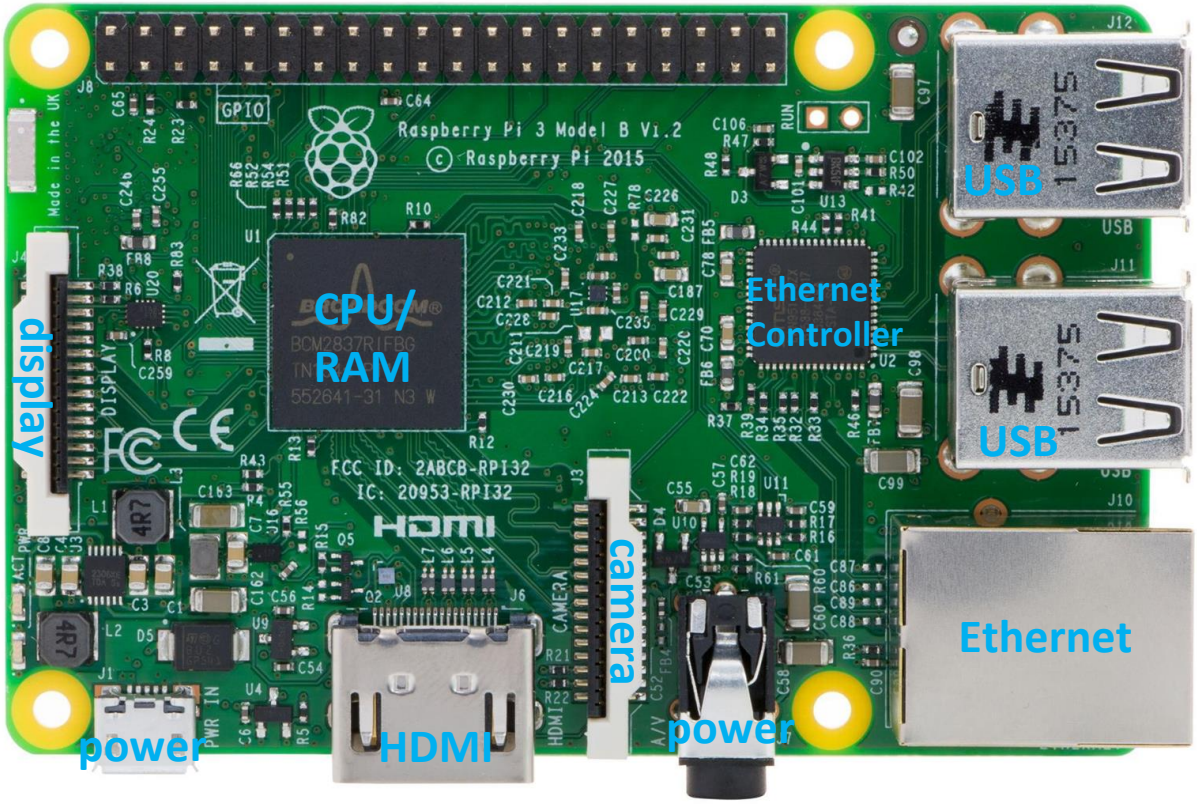
An Introduction to Parallel Computing on the Raspberry Pi

Suzanne J. Matthews, West Point
Richard A. Brown, St. Olaf
Joel C. Adams, Calvin College
Elizabeth Shoop, Macalester College

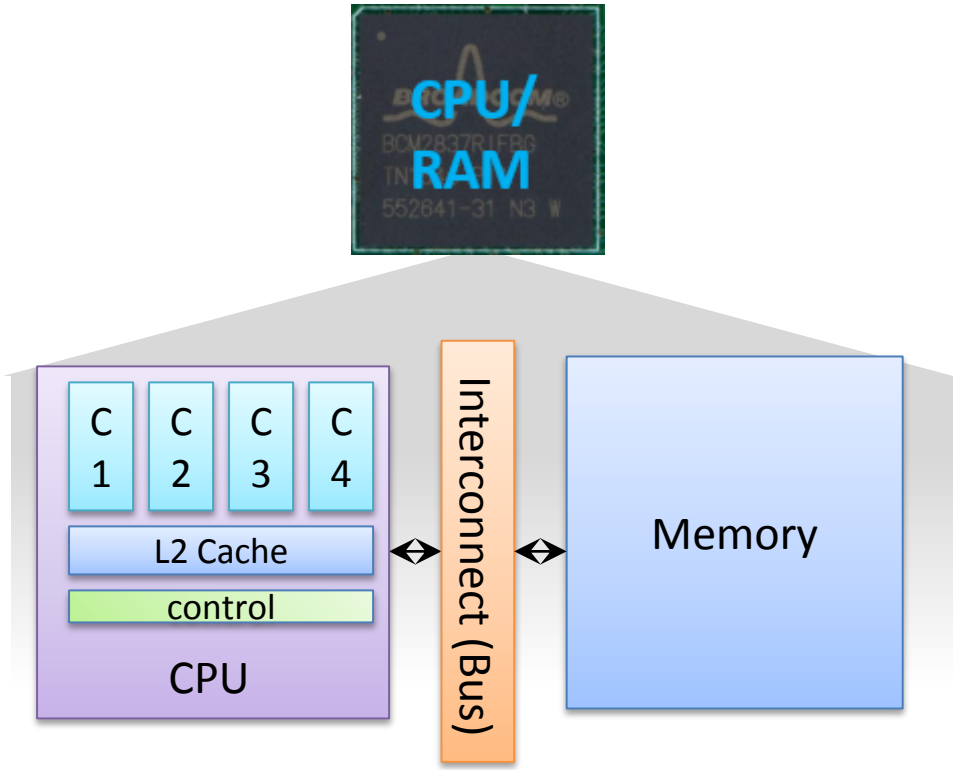
Getting to Know the Pimeroni

A Closer Look at the Raspberry Pi

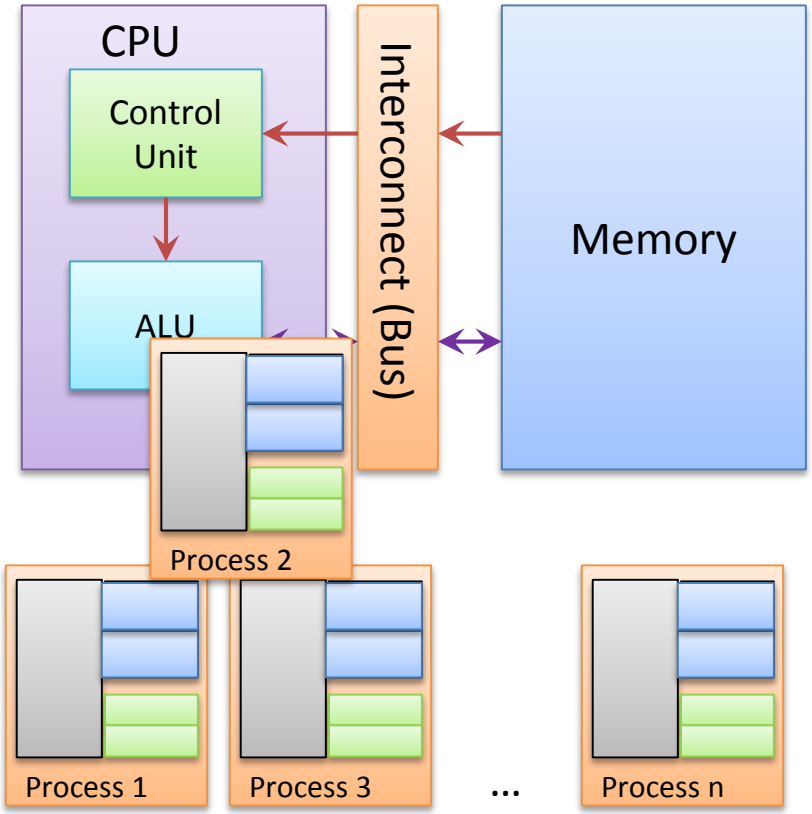


Single Board Computer
Quad-Core Multicore CPU
1 GB RAM
$35.00

What is a Multicore CPU?

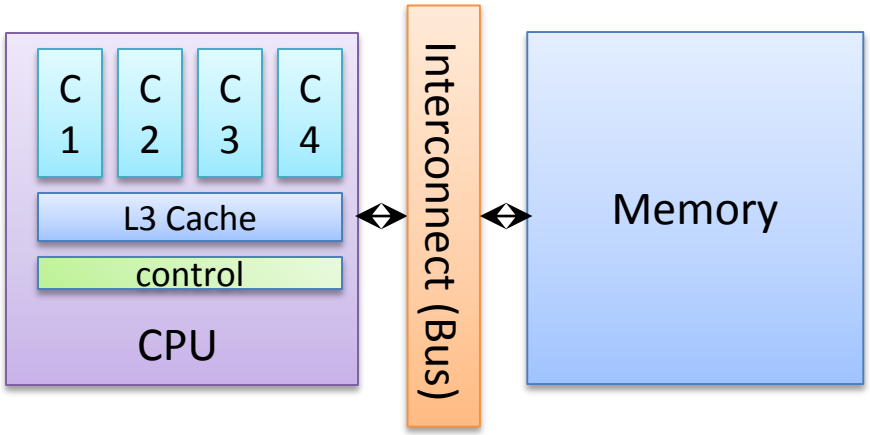


Advantage of Multicore

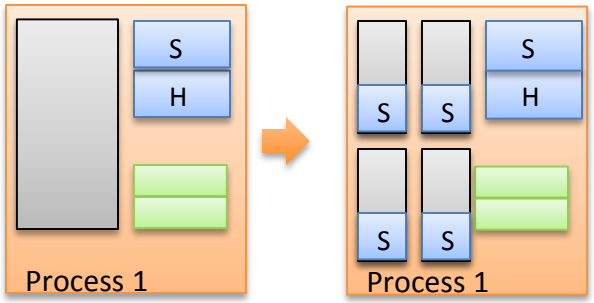


- A process is the abstraction of a running program.
  - Processes do not share memory with each other.
- A single-core CPU only operates on one process at a time.
  - Round-Robin Scheduling Algorithm
- More CPU cores = OS can execute more processes at once! (Concurrency)
  - Increases throughput of system.
  - Does this shorten the amount of time it takes to execute a single process?

Programming Multicore Architectures



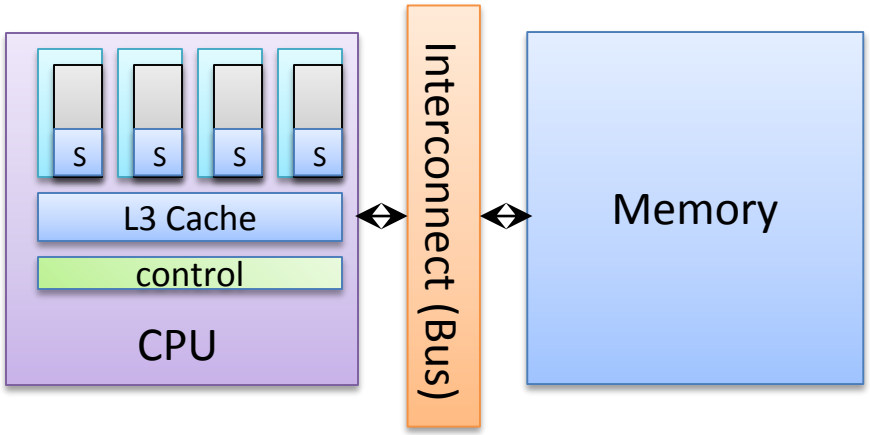
- Thread: a lightweight process that allows a single executable/process to be decomposed to smaller, independent parts.
  - All threads share the common memory of the process they belong to.

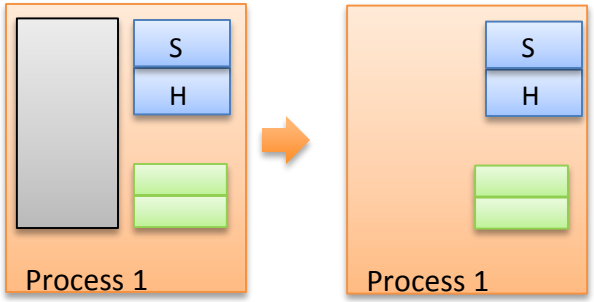


Multithreaded process

- An OS will schedule threads on separate cores/CPUs, as available.

Programming Multicore Architectures





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Programming Multicore Architectures

There are many libraries/languages available:

- POSIX Threads
- OpenMP
- C++11 threads, TBB, …

In today's workshop, we will cover OpenMP

- Industry standard since late 1990s.
- Native support with GCC compilers (> 4.3.x)
- Easier to program than POSIX threads.