An Introduction to Parallel Computing on the Raspberry Pi

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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.

- An OS will schedule threads on separate cores/CPU's, as available.
Programming Multicore Architectures

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**Multithreaded process**

![Diagram showing L3 Cache, control, CPU, Interconnect (Bus), Memory, and Process 1]
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.