Faculty of Electronics, Telecommunications
and Information Technology

Parallel Programming

On embedded multi-core System ESP32

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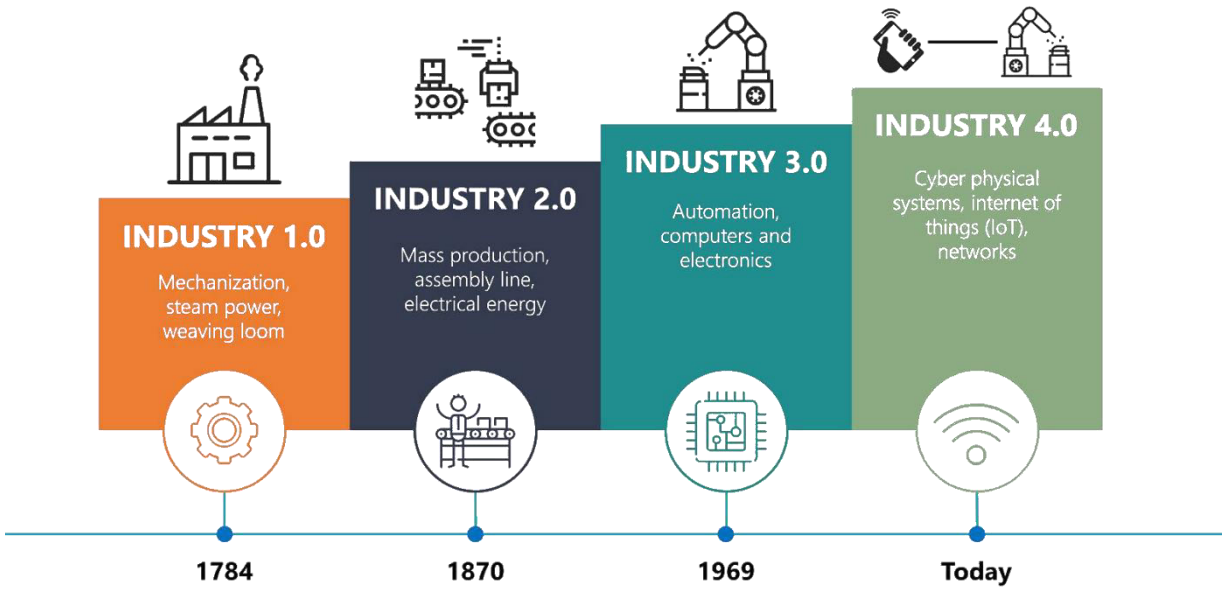
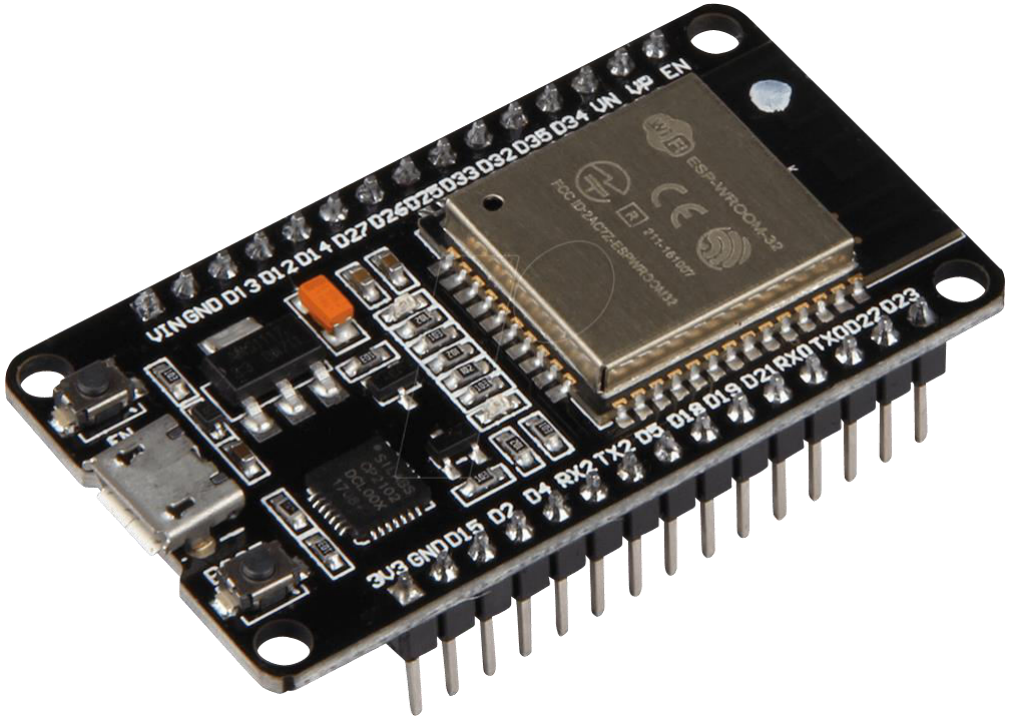
Introduction

- **Multicore Systems** are becoming increasingly popular as part of digitalization and ***Industry 4.0*** ⟶ ***important role in data processing and process automation***



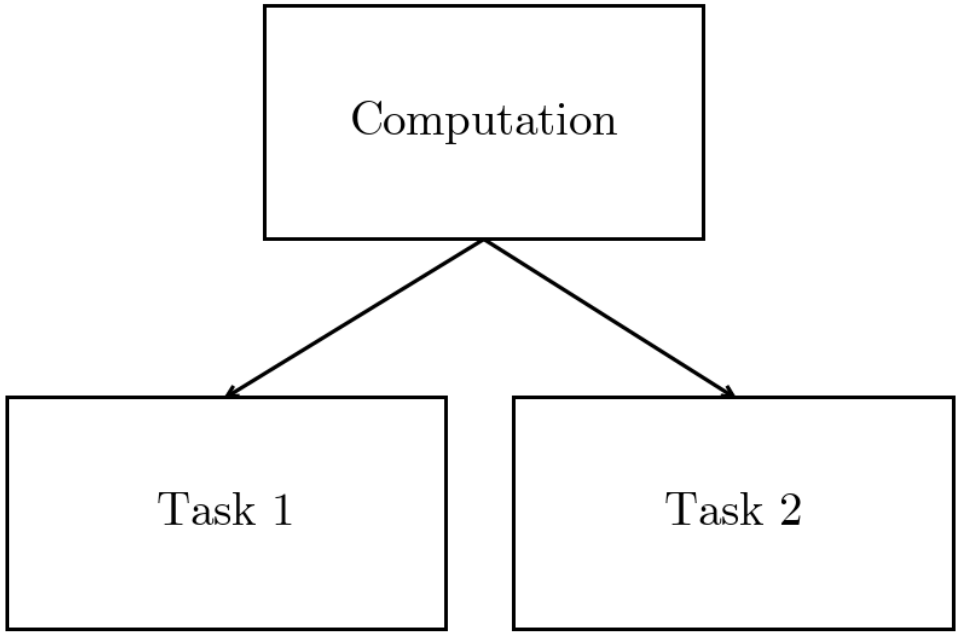
Problem Definition

- ***ESP32*** it is an ***multi-core embedded hardware platforms*** that reduces *execution time* and *power consumption* with it's ability to develop advanced parallel computing softwares.
- In order to develop an ***optimal solution***, the hardware platform must be included in addition to the *mathematical model* of the problem itself.

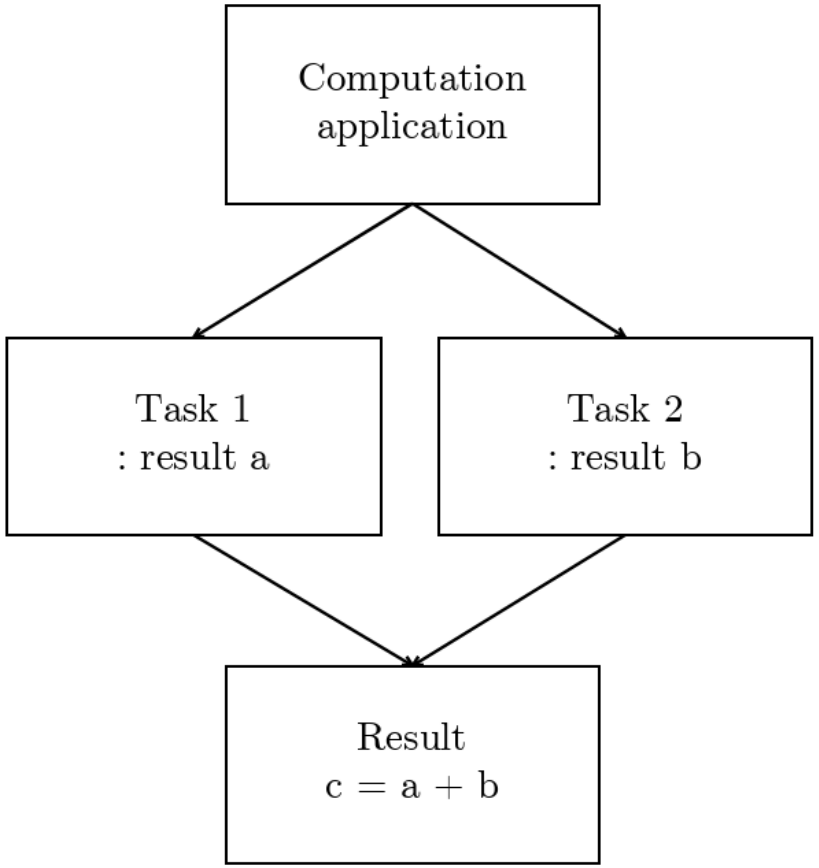


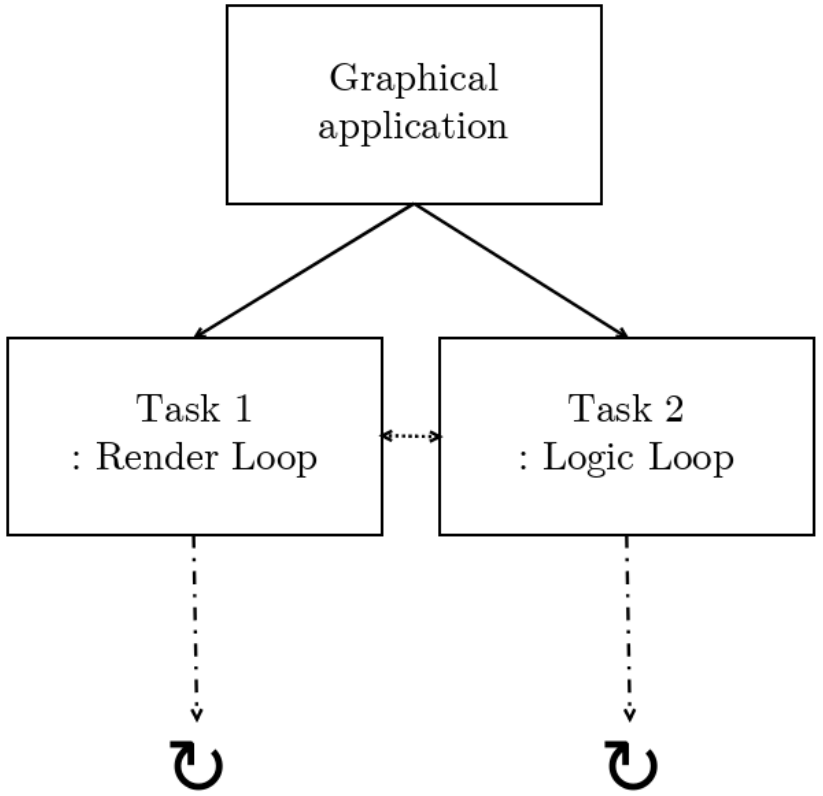
Basic Concept of Parallel Programming

- The ***aim*** of parallelism is to ***reduce*** the ***execution time*** and is one of the most important objectives in concurrency to make applications more ***efficient***.



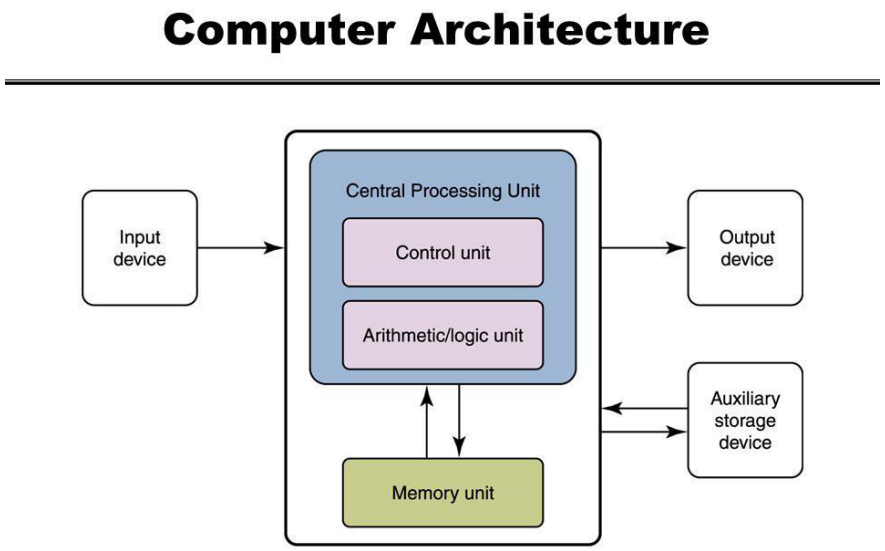
Basic Concept of Parallel Programming





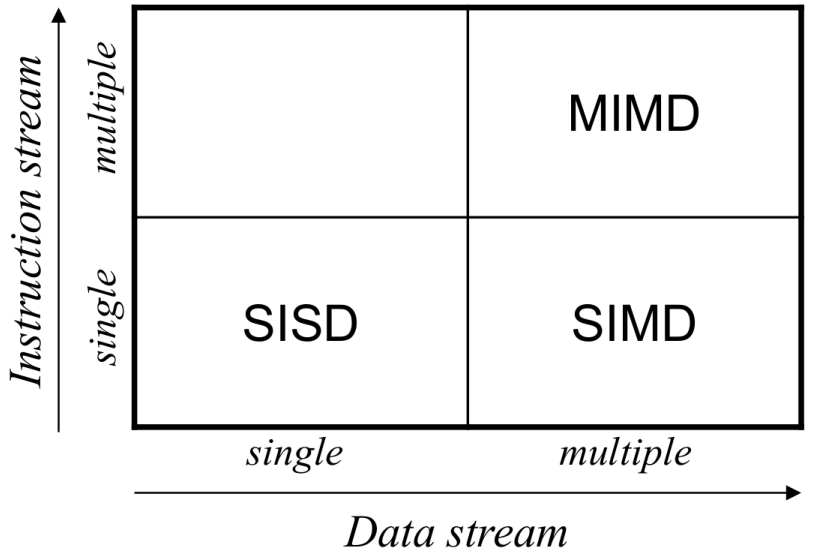
Parallel Programming Architecture

- ***Computer architecture*** ⟹ *structure of a computer*. Computer architect's task is to write an suitable program code for the machine, understanding all the factors like state-of-the-art technologies at each design level and changing those designs ***tradeoffs*** for their specific applications



Parallel Programming Architecture

- ***Flynn's classication*** ⟹ a scheme which is based on the notion of information stream
- ***"Stream"*** ⟹ defines a sequence or flow containing one of both existent types of information which flows and are operated into a processor: instructions or data
- Types of Parallelism:
  - Bit-level parallelism
  - Instruction-level parallelism
  - Task/Thread parallelism



Thank you!