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Processing Unit

A Processing Unit (PU) is an electronic system within a computer that carries out instructions of a program by performing the basic arithmetic, logic, controlling, and I/O operations specified by instructions. Instruction-level parallelism is a measure of how many instructions in a computer can be executed simultaneously. The PU is contained on a single Metal Oxide Semiconductor (MOS) Integrated Circuit (IC).

Peripheral Devices

The Peripheral Devices (PD) are systems that perform a specific function within a larger system (System on Chip). PDs need a PU and a SoC to work on their specific task.

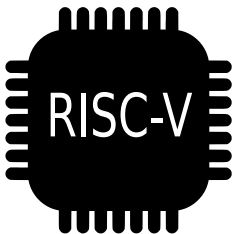| DBG	UART	MPI
DMA	MSI	MPRAM
SPRAM	GPIO	NoC
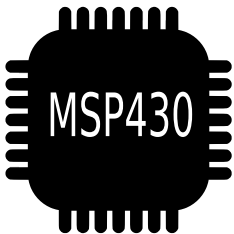
PU-MSP430

The MSP430 implementation has a 16 bit Microarchitecture, 3 stages data pipeline and an Instruction Set Architecture based on Reduced Instruction Set Computer. Compatible with Wishbone Bus. Only For Researching.
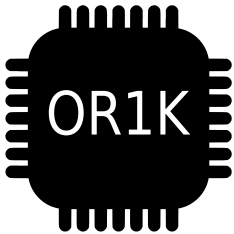
PU-OR1K

The OpenRISC implementation has a 32/64 bit Microarchitecture, 5 stages data pipeline and an Instruction Set Architecture based on Reduced Instruction Set Computer. Compatible with Wishbone Bus. Only For Researching.

PU-RISCV

The RISC-V implementation has a 32/64/128 bit Microarchitecture, 6 stages data pipeline and an Instruction Set Architecture based on Reduced Instruction Set Computer. Compatible with AMBA and Wishbone Buses. For Researching and Developing.

There are three levels of system organization:

· **PU Level**: this is the brain of the system.
· **SoC Level**: the brain and peripherals are integrated at this level.
· **MPSoC Level**: this is a communications system based on a Network on Chip (NoC).
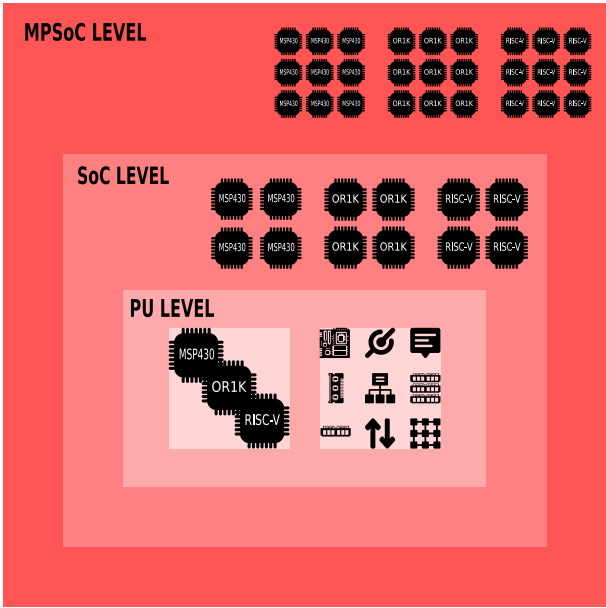
System on Chip

A System on Chip (SoC) is an integrated circuit that integrates components of a computer system (PU, RAM, GPIO, etc). As they are integrated on a single substrate, SoCs consume much less power and take up much less area than multi-chip designs with equivalent functionality. SoCs are common in the mobile computing, embedded systems and the Internet of Things.
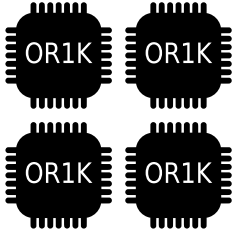
Multi-Processor System on Chip

A Multi-Processor System on Chip (MPSoC) is a System on Chip (SoC) which includes multiple Processing Units (PU). As such, it is a Multi-Core System-on-Chip. All PUs are linked to each other by a Network on Chip (NoC). These technologies meet the performance needs of multimedia applications, telecommunication architectures or network security.
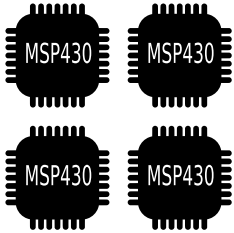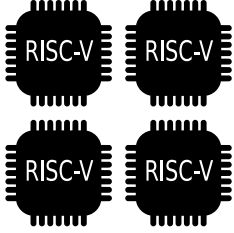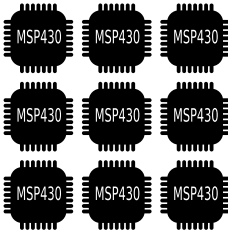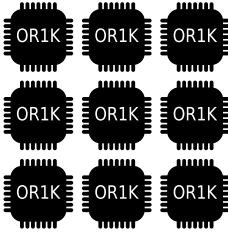
SoC-MSP430

System on Chip with MSP430-16

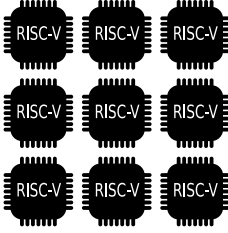### MPSoC-MSP430

Multi-Processor System on Chip with MSP430-16

SoC-OR1K

System on Chip with OR1K-32

MPSoC-OR1K

Multi-Processor System on Chip with OR1K-32

SoC-RISCV

System on Chip with RISCV-64

MPSoC-RISCV

Multi-Processor System on Chip with RISCV-64