

Lecture 04 (System Architecture contd.)

Raspberry Pi 4B has an 8GB RAM :O

1 Instruction Set

1. Complex Instruction Set Computing (CISC)
 - intel
 - single instruction used for loading, evaluating and storing operations
 - minimizes the number of instructions per program
 - increases the number of cycles per instruction
2. Reduced Instruction Set Computing (RISC)
 - ARM
 - basic instructions for loading, evaluating and storing
 - increases the number of instructions
 - reduces the number of cycles per instruction

For embedded systems, RISC architecture is better:

1. Can't have a large ISA
2. Modularity
3. RISC utilises the processor more efficiently (compared to CISC which utilises the memory better)
4. Gives flexibility of order of instructions

2 Processor

1. Scalar
 - simple implementation
 - slow
2. Superscalar (literally COL718)
 - supports parallel execution of instructions
 - multiple copies of functional units
 - > 1 instructions per cycle

3 Memory

1. Resources that have addresses:
 - i. DRAM
 - ii. Interrupt controllers
 - iii. I/O devices
2. Usage:
 - i. processor generates a load/store
 - ii. address is decoded by memory address decoder
 - iii. routed to appropriate physical device
3. Address range:
 - i. Main Memory Address Range: DRAM address
 - ii. MMIO Range

3.1 MMIO Address Range

1. Fixed Address Memory Mapped Address:
 - i. BIOS
 - ii. Timers
 - iii. Interrupt Controllers
2. Peripheral Component Interconnect Bus