

# PSI3441 – Arquitetura de Sistemas Embarcados

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## Bus (Barramento)

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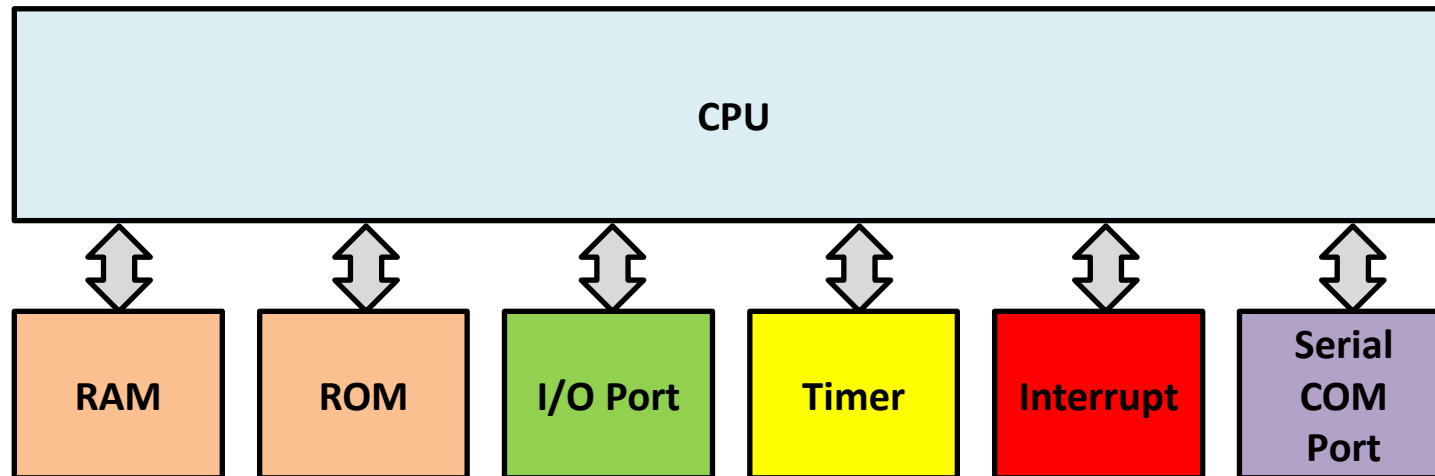
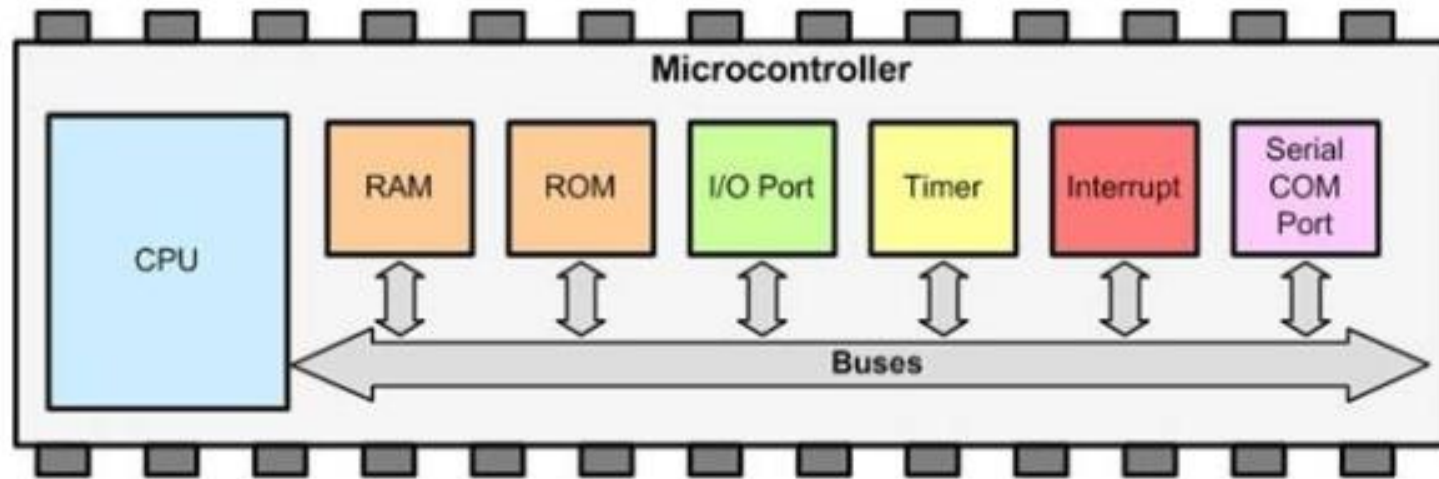
Escola Politécnica da Universidade de São Paulo

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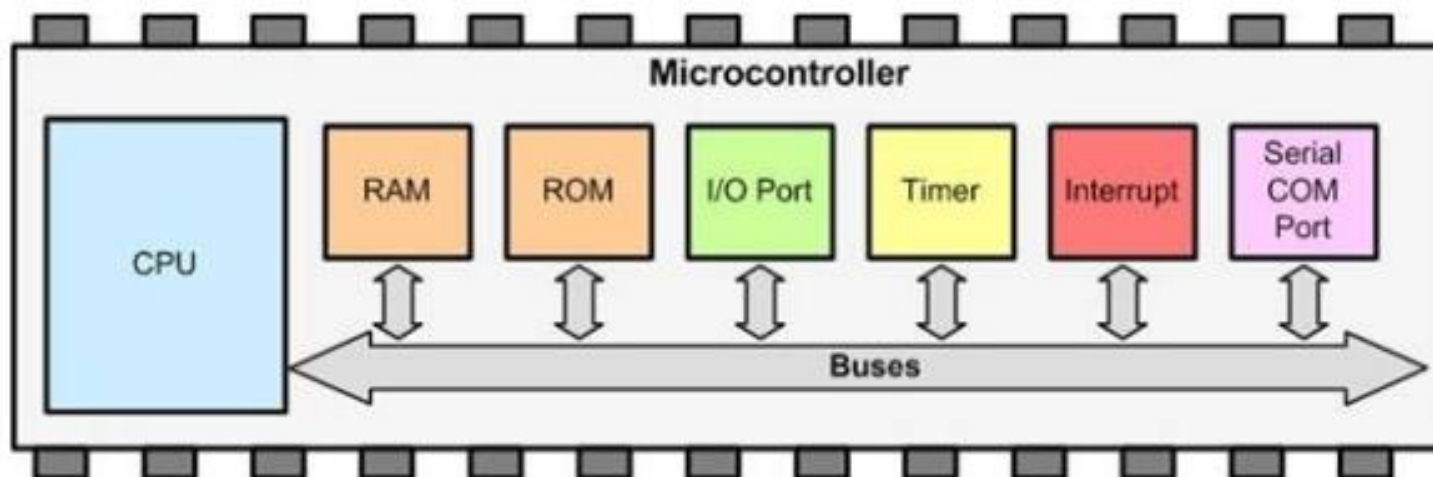
# Por que os Microcontroladores usam Bus?





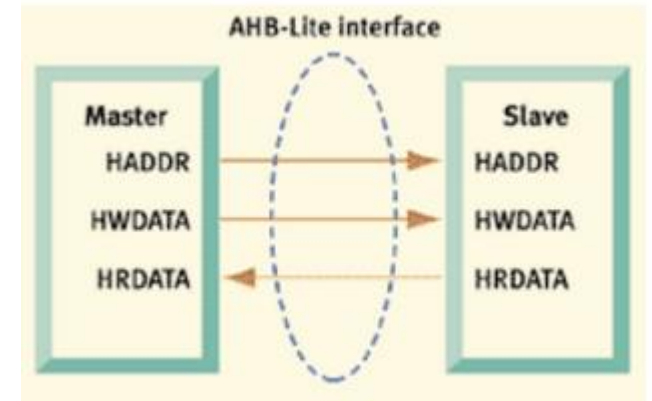
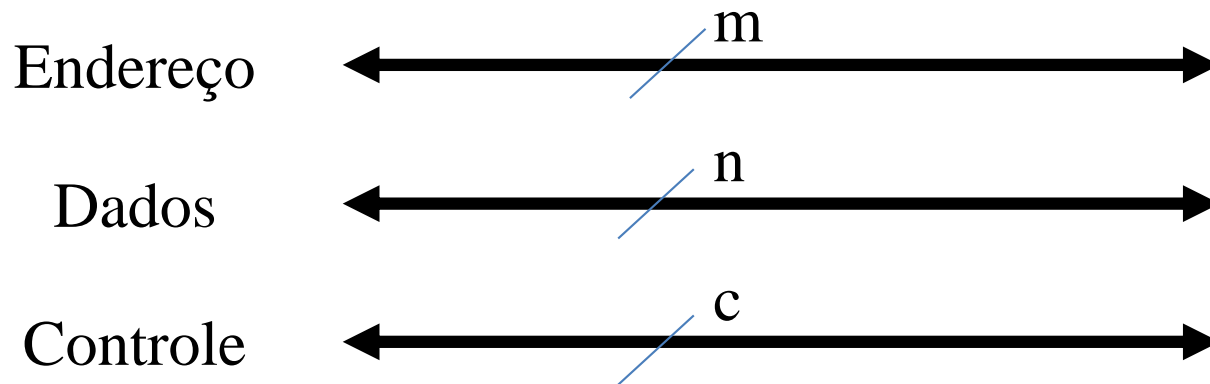
# Bus (Barramento)

- Mecanismo com o qual o CPU comunica com a memória e dispositivos de I/O;
- Trilha (fios) em paralelo;
- Protocolo de comunicação entre dispositivos.





# Estrutura de um Bus Genérico



- **Trilhas de Controle:**
  - Estabelece o protocolo de transição de dados
  - Requerimento e Reconhecimento de Sinais
  - Indica que tipo de informação esta nas trilhas de dados
- **Trilhas de Dados:**
  - Transporta Dados e Endereços da fonte para o destino (endereço são uma forma de dados)
  - Transporta comandos complexos



# Estrutura simples de um Barramento – Port Mapped I/O

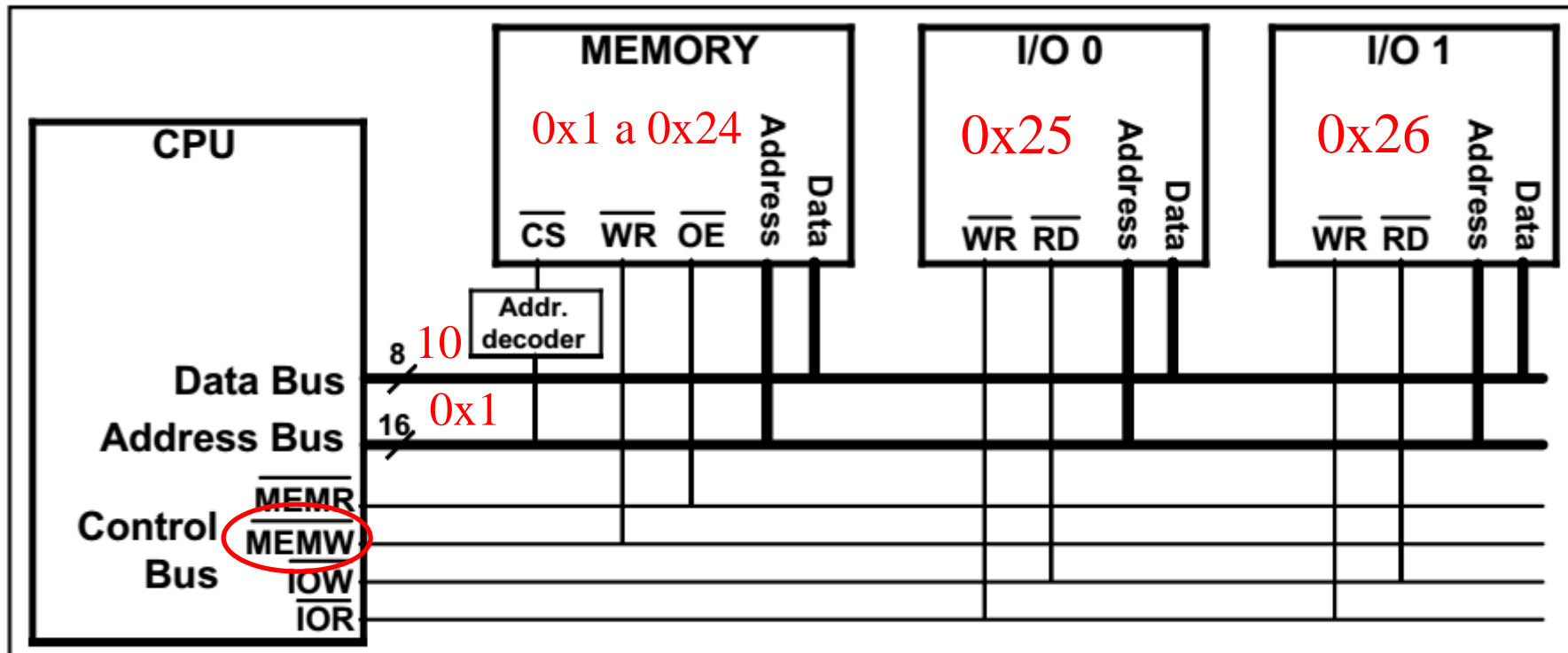
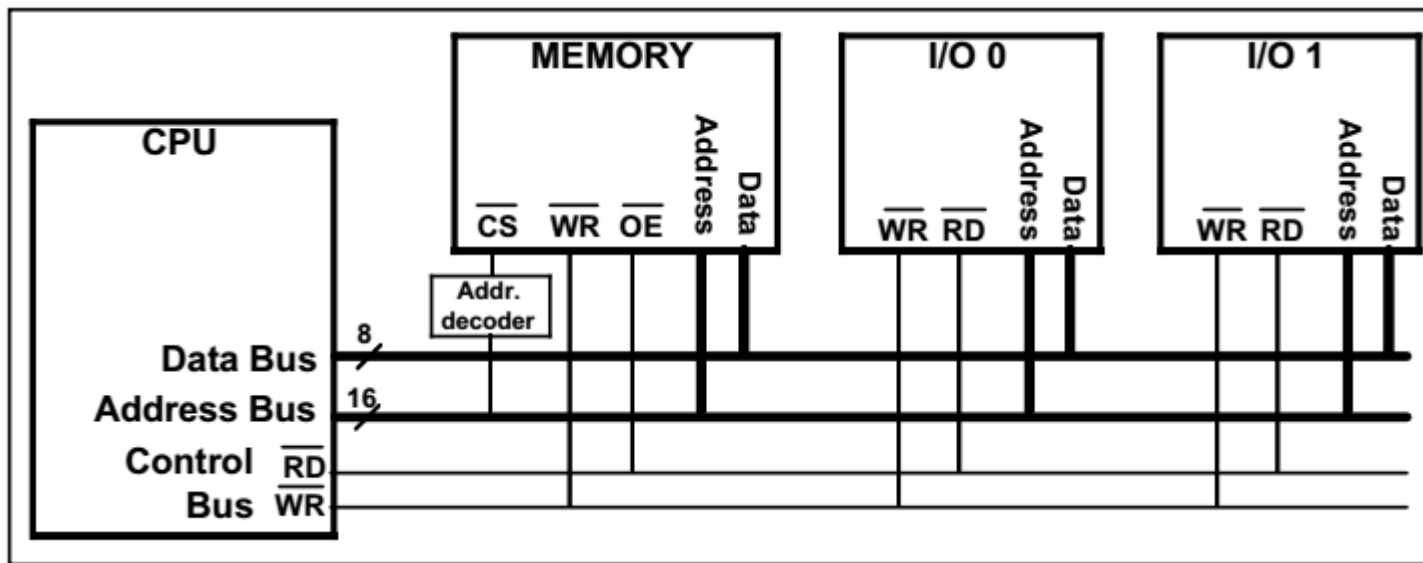


Figure 0-17. A Simple System Using Peripheral I/O



# Estrutura simples de um Barramento – Memory Mapped I/O



# Decodificação do Endereço - Memória

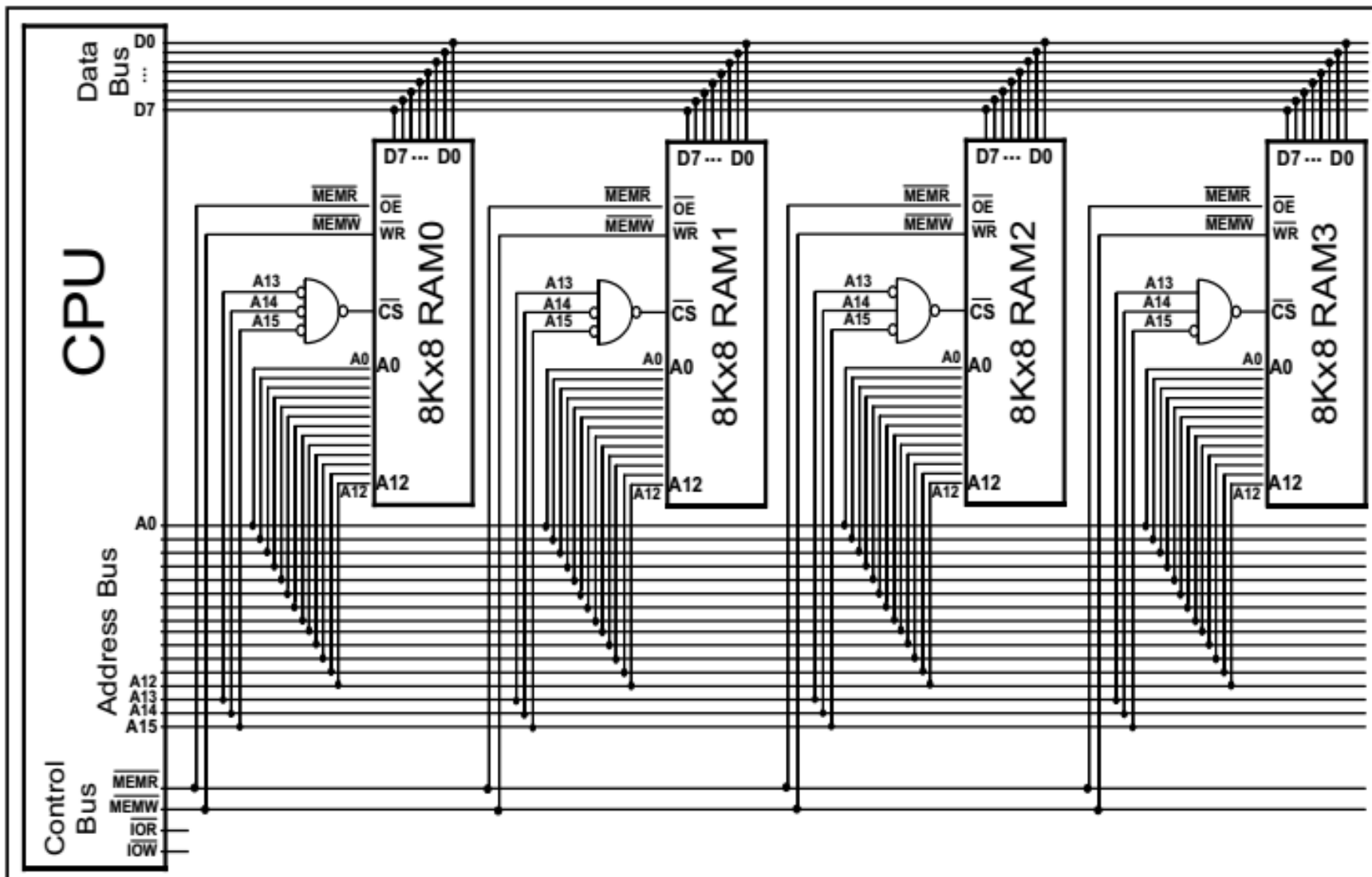


Figure 0-20. Connecting Four Memory Chips to the CPU

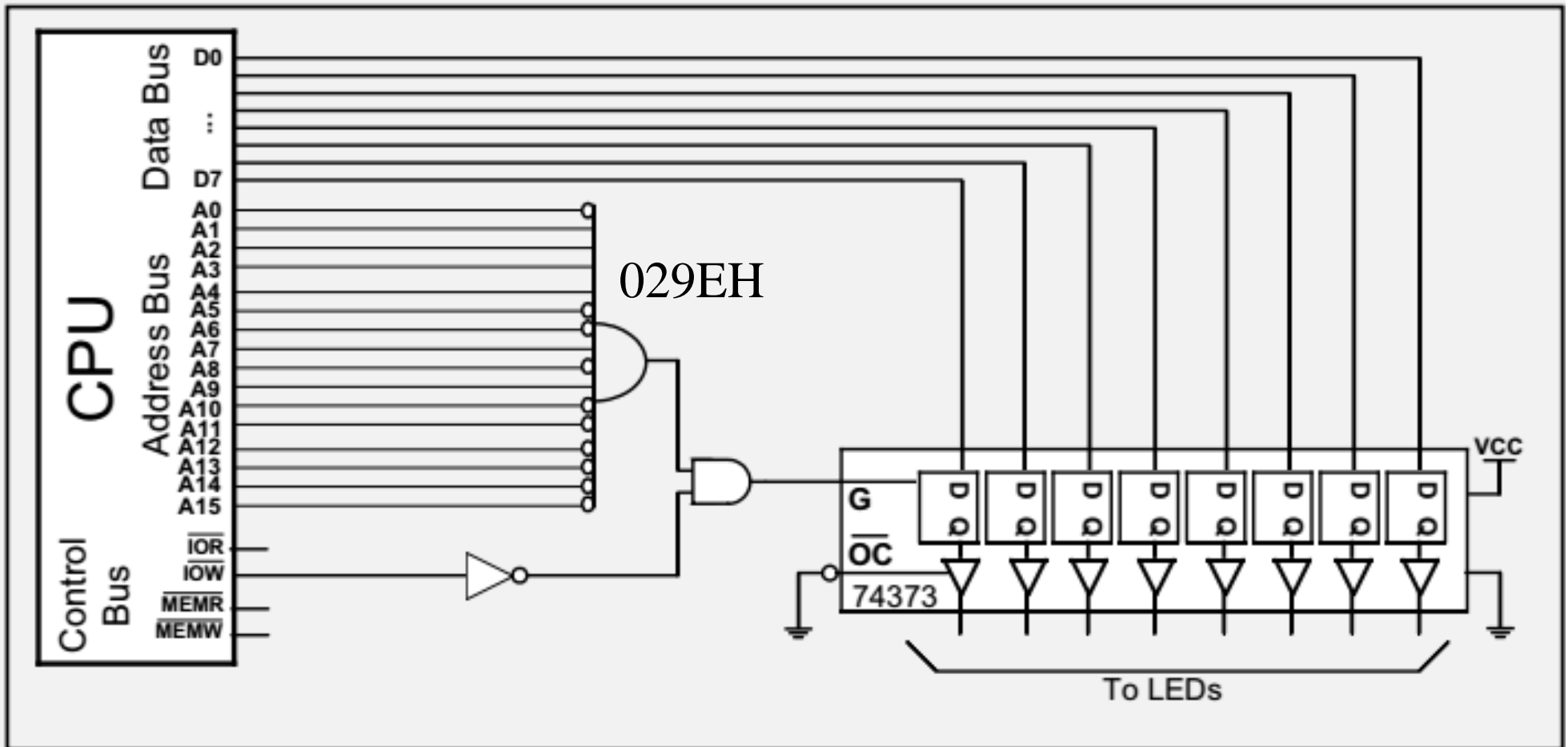
CS – Chip Select

OE – Output Enable

WR – Write Enable



# Decodificação do Endereço – I/O

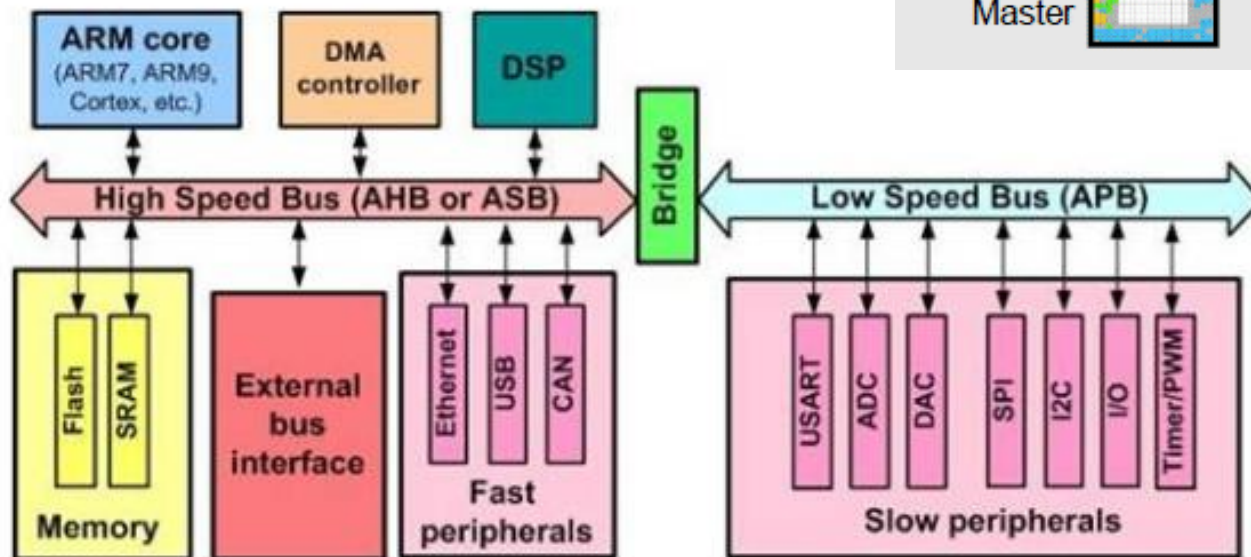
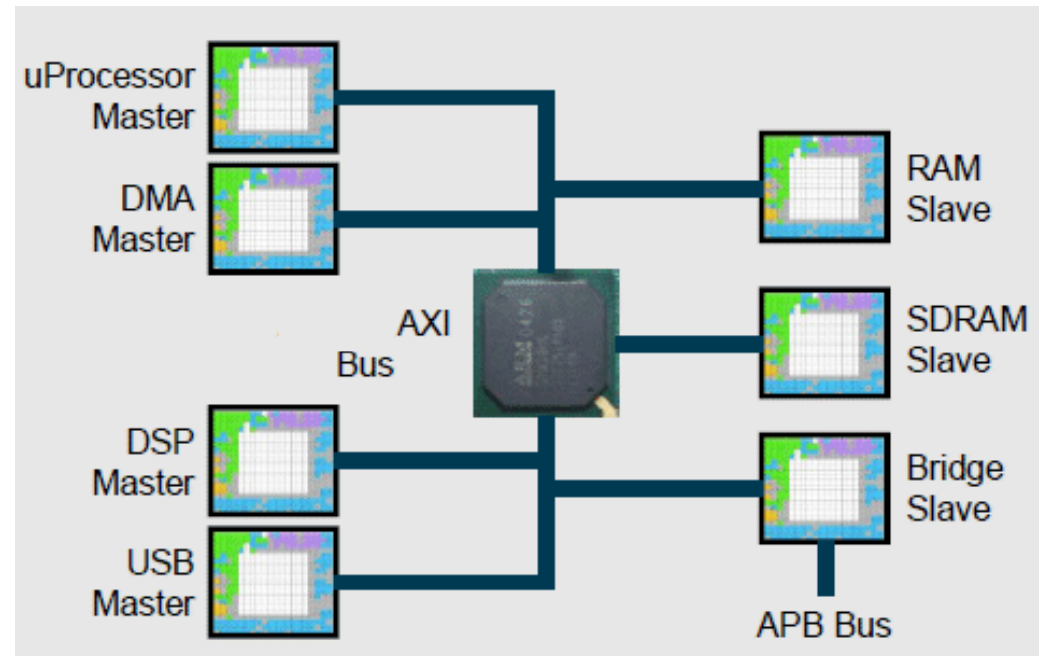






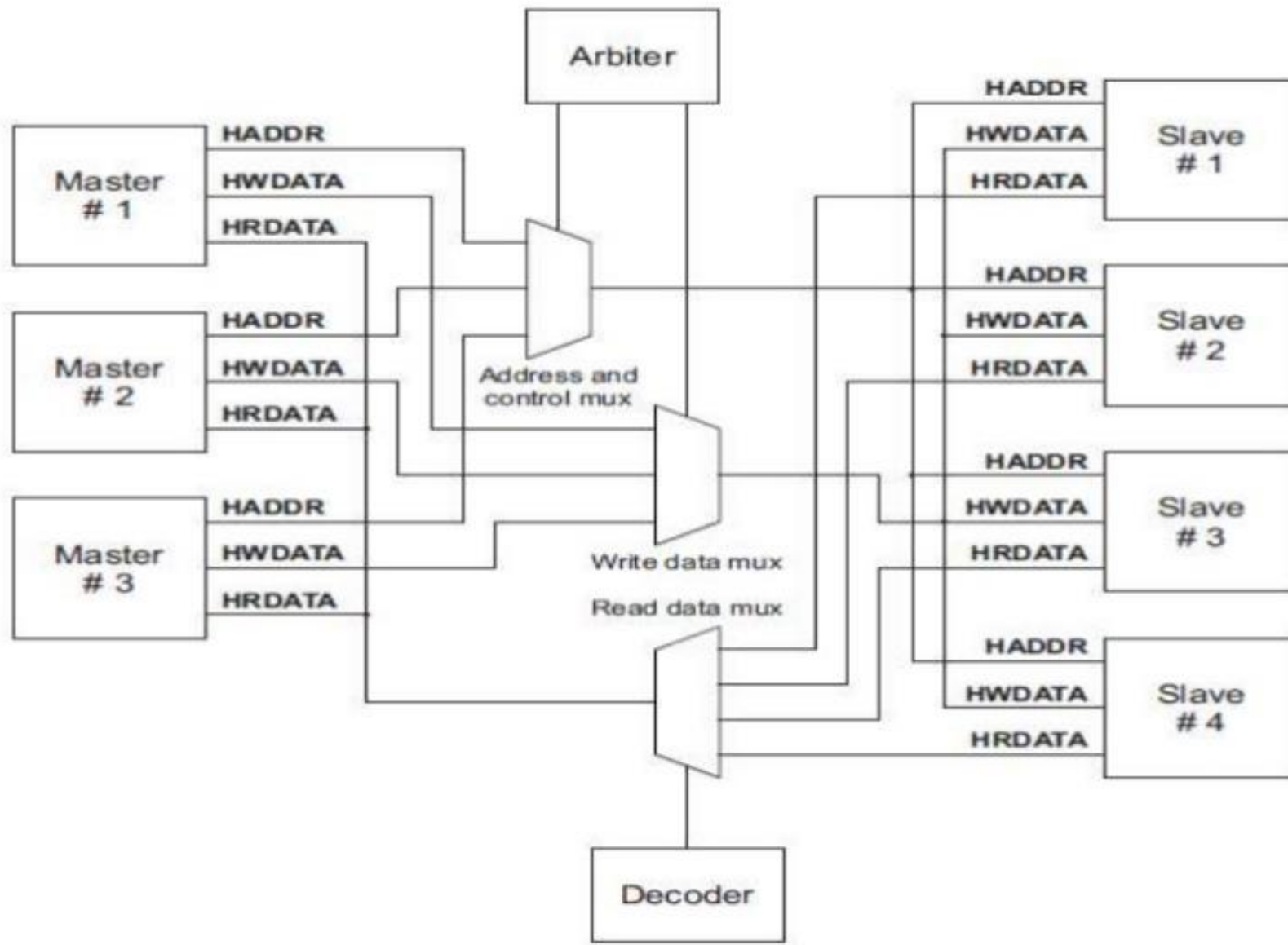
# Barramento do Cortex M

- Advanced Microcontroller Bus Architecture (AMBA)
- 2 Buses AMBA 3
  - (AHB-Lite e APB) – 32 bits



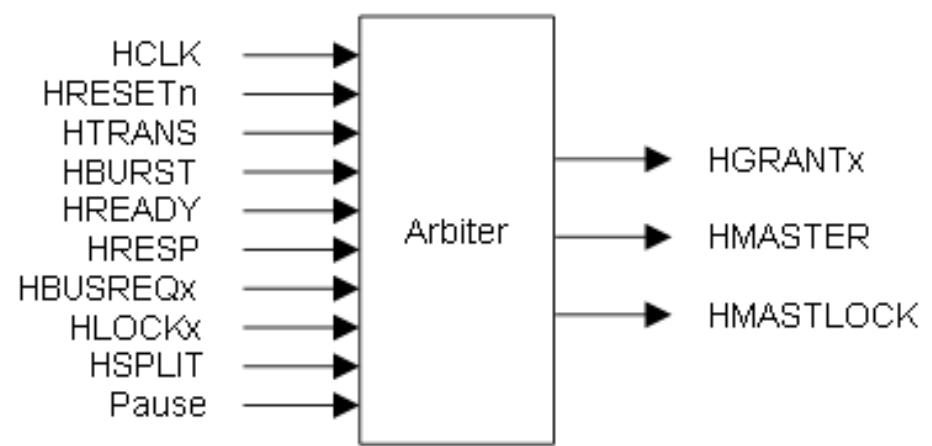
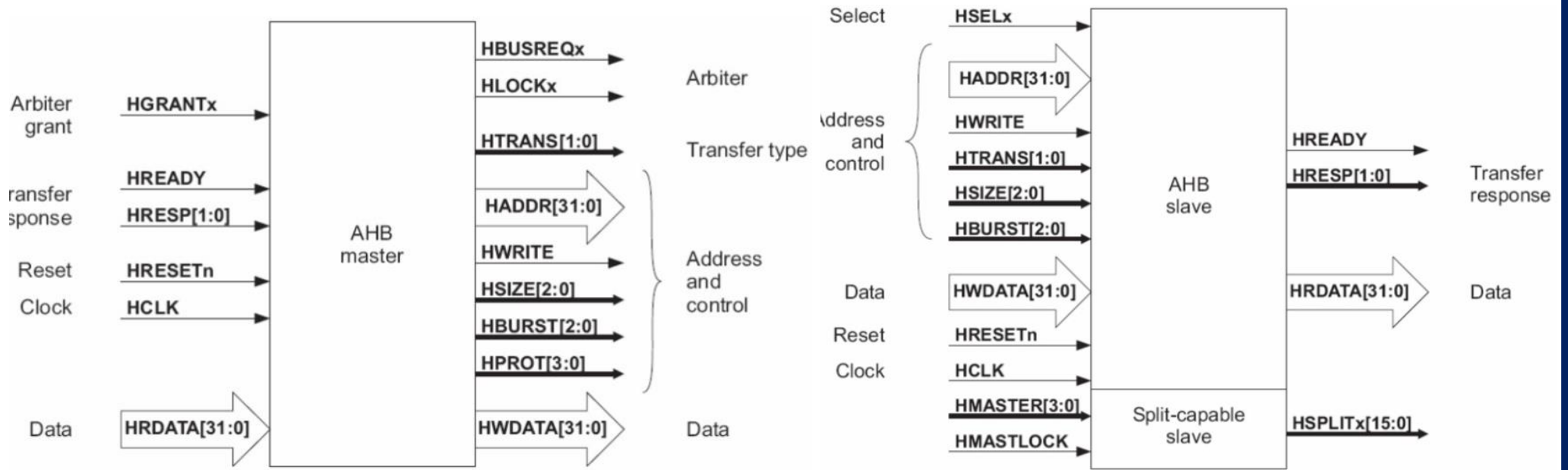


# Estrutura do Barramento AMBA





# Interfaces





# Protocolo de Transferência

- **Basic transfer**

