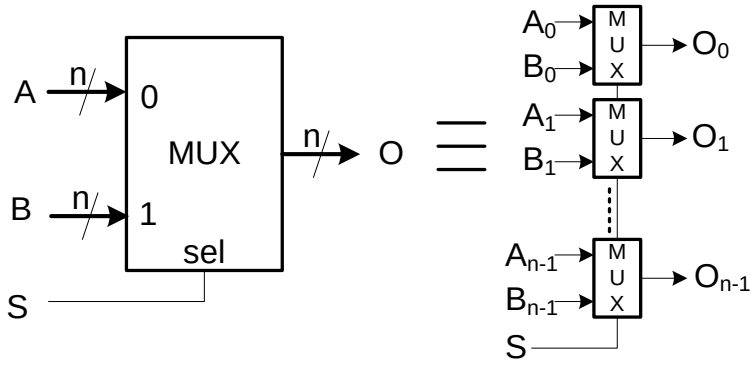
Arquitetura de Computadores

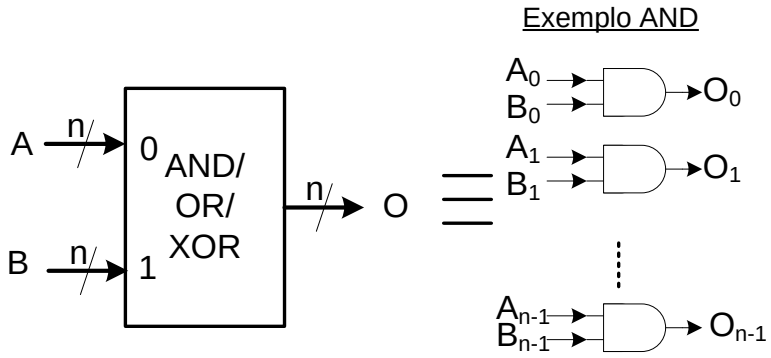
Aula 2 – Unidade de processamento de um CPU

1. Descrição funcional de módulos RTL: Multiplexer, operadores lógicos, operadores aritméticos, unidade lógica e aritmética (ALU), registo, bando de registos, RAM e ROM.

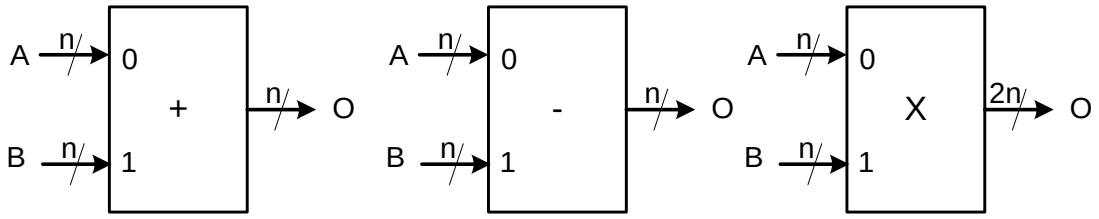
   Multiplexer:



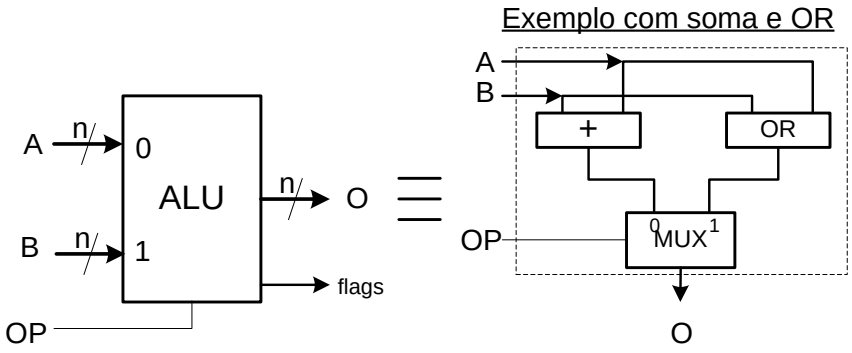
   Operadores lógicos:



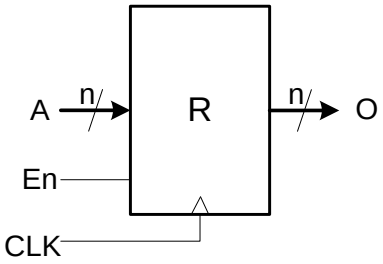
   Operadores aritméticos:



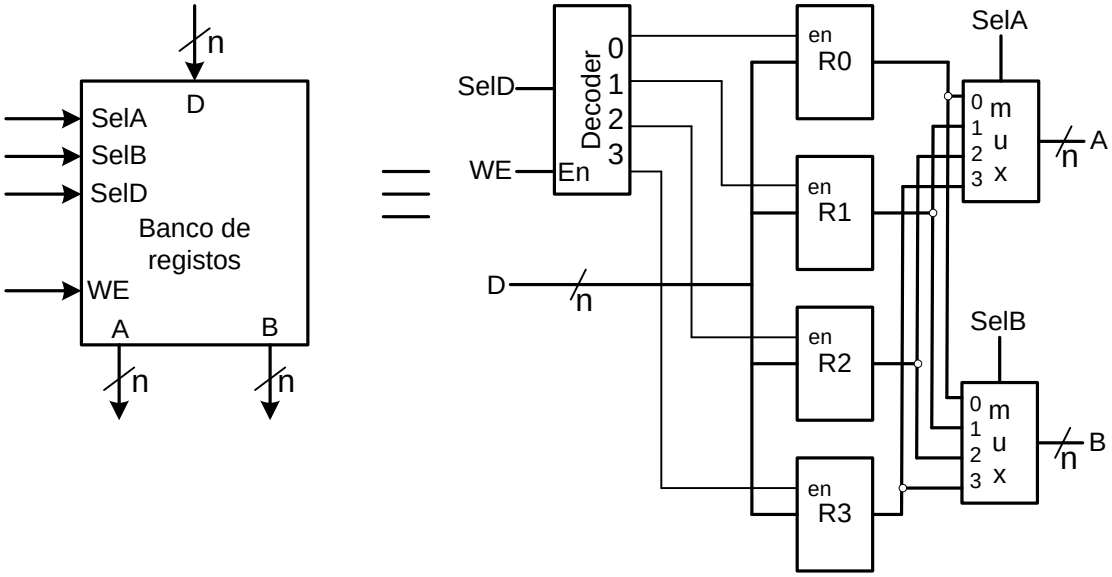
   Unidade Lógica e Aritmética:



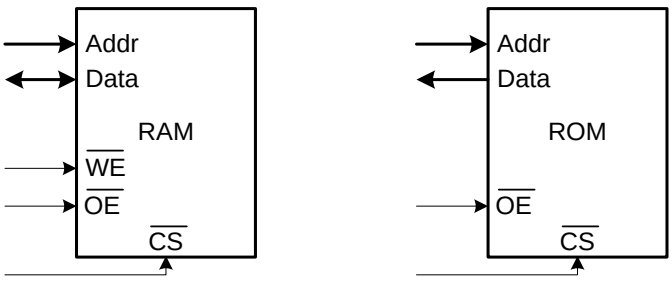
Registo:



Banco de registos:

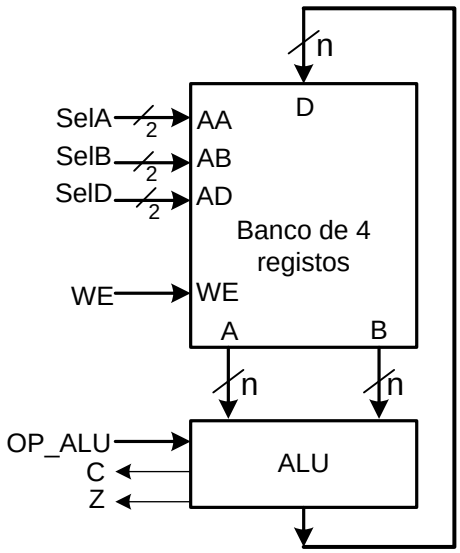


Memória RAM e ROM:



2. Unidade de processamento sem memória RAM

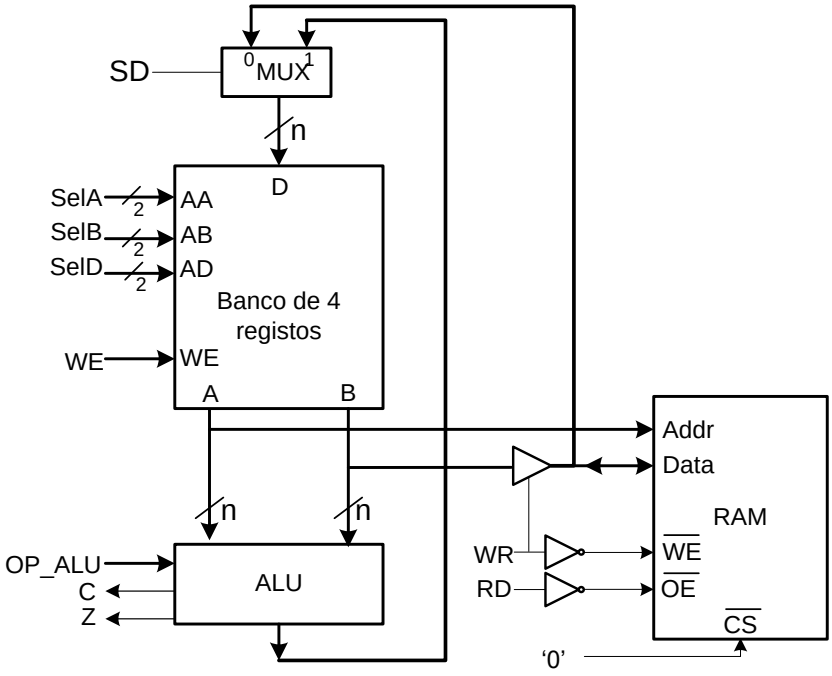
OP_ALU	Operação
000	A
001	A + B
010	A – B
011	A + 1
100	A – 1
101	A X B
110	A OR B
111	A XOR B



Palavra de controlo: SelA, SelB, SelC, WE, OP_ALU

3. Unidade de processamento com memória RAM

OP_ALU	Operação
000	A
001	A + B
010	A – B
011	A + 1
100	A – 1
101	A X B
110	A OR B
111	A XOR B



Palavra de controlo: SelA, SelB, SelC, WE, OP_ALU, SD, WR, RD

4. Exemplo: multiplicação por somas sucessivas

$$P = A \times B = A + A + A + \ldots + A \qquad (B \text{ vezes})$$

Algoritmo:

```
P = 0
While (B > 0){
   P = P + A
   B = B - 1
}
```

Máquina de estados: