

# Sistemas de Computação

## Quinta Aula

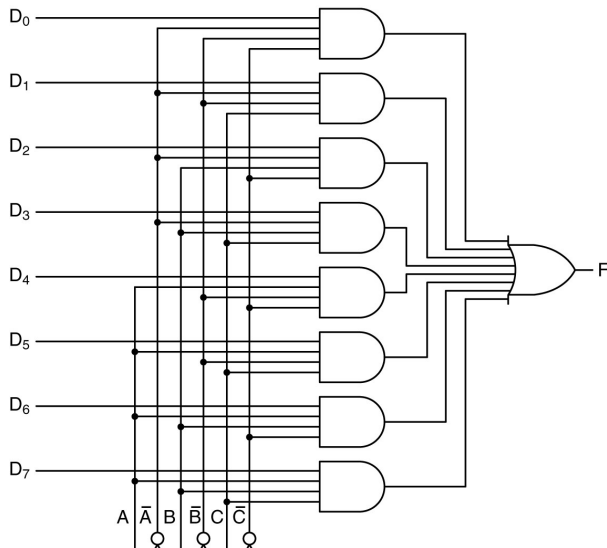
Haroldo Gambini Santos

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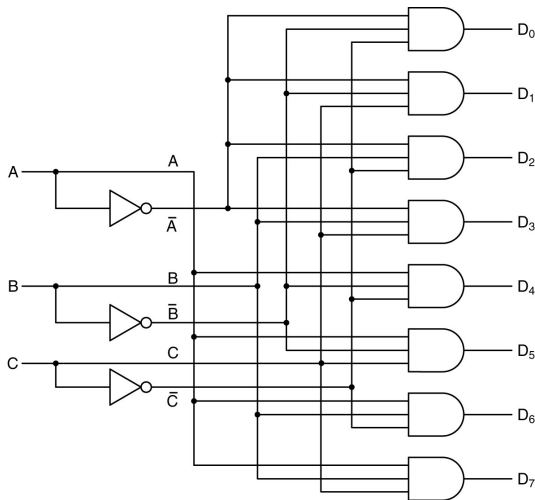
2 de setembro de 2009

## 1 Circuitos Lógicos Digitais

# Multiplexador



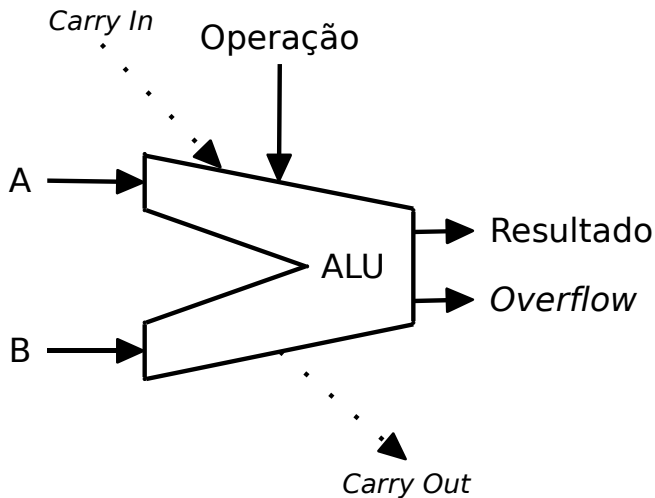
# Decodificador



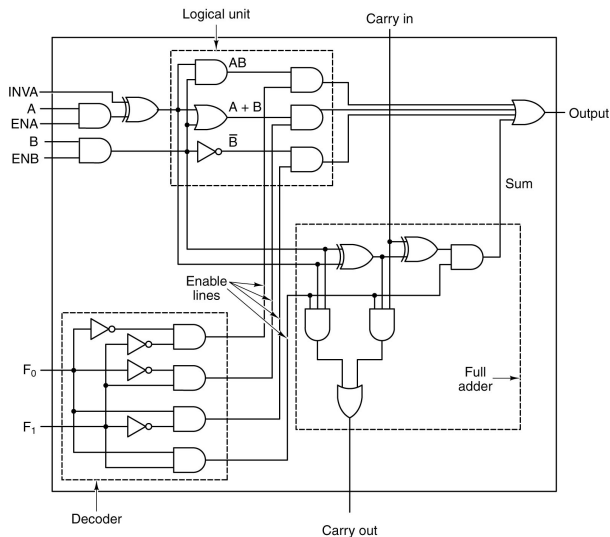
# ULA: Unidade Lógica Aritmética

- Mesmo circuito efetua:
  - AND
  - OR
  - Soma de palavras

## ULA - 1 bit



## ULA - 1 bit



# Relógios

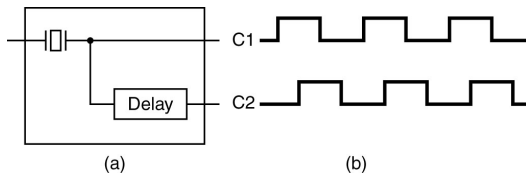
Função: respeitar relações de  
**precedência** entre eventos.

Tempo de ciclo: intervalo entre dois pulsos consecutivos

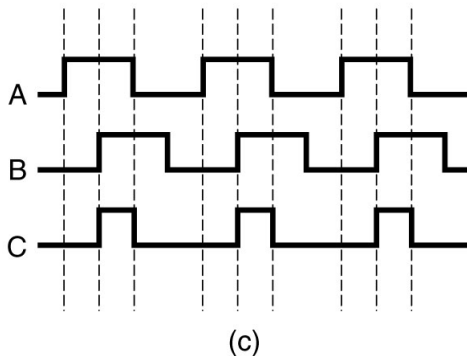
Muitos eventos possíveis em um ciclo

- Resolução adicional: atraso

# Relógios - Atraso



# Relógios - Assimetria



# Circuitos

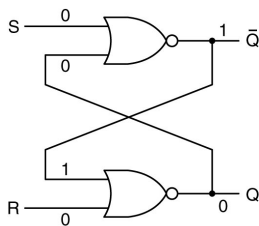
- Combinacionais
- Sequenciais

# Circuitos

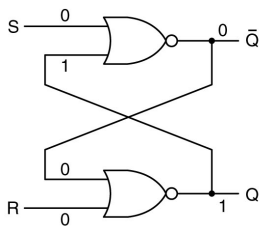
## Circuitos Sequenciais

Saídas não dependem  
**somente**  
das entradas.

# Latches



(a)

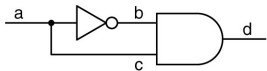


(b)

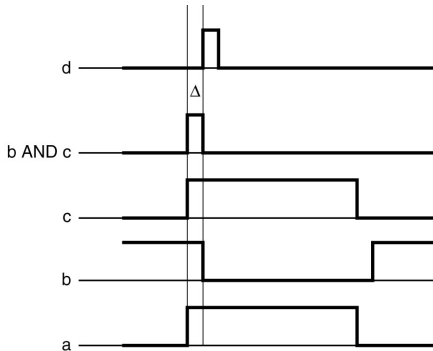
| A | B | NOR |
|---|---|-----|
| 0 | 0 | 1   |
| 0 | 1 | 0   |
| 1 | 0 | 0   |
| 1 | 1 | 0   |

(c)

# Flip-Flops



(a)



(b)

# Flip-Flops

