

# Algoritmos e Estruturas de Dados I

## Filas

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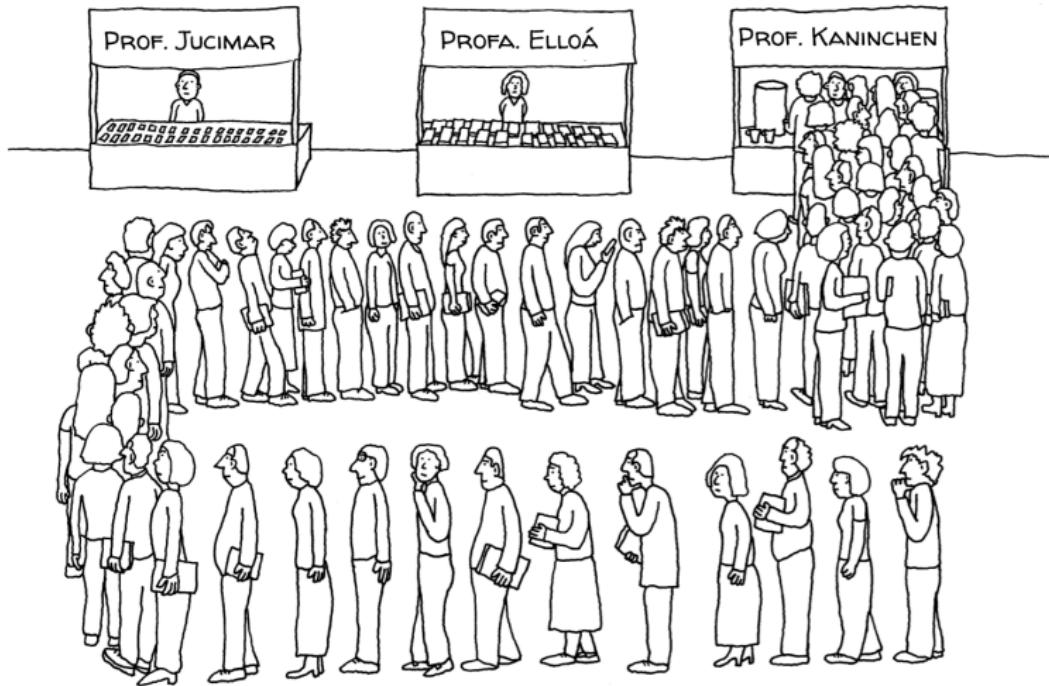
# Objetivos

1. Entender o que são filas
2. Conhecer a **utilidade** das filas.
3. Entender a **implementação** de um **TAD fila**.

# Filas

# MATRÍCULA NO NUCOMP

## Escola Superior de Tecnologia



TRÁS

FRENTE



Uma **fila** (*queue*) de matrícula.



Um item marca a **frente** (*front*) da fila e outro a parte de **trás** (*rear*) da fila.

TRÁS

FRENTE



A fila inicia **vazia**.

TRÁS

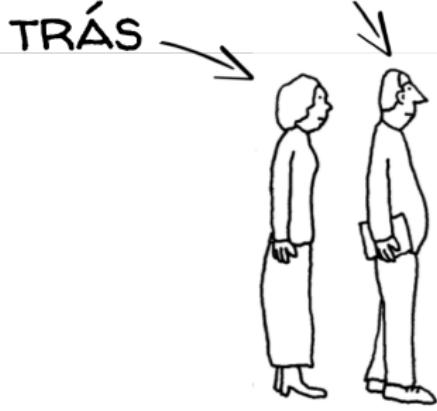
FRENTE  
TRÁS



Itens **enfileirados** (*enqueue*) são inseridos  
atrás da fila...

TRÁS

FRENTE  
TRÁS

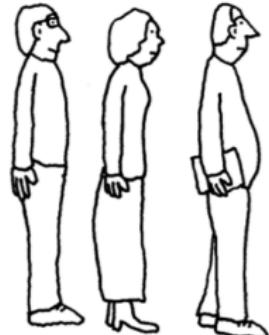


Itens **enfileirados** (*enqueue*) são inseridos  
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TRÁS

FRENTE

TRÁS

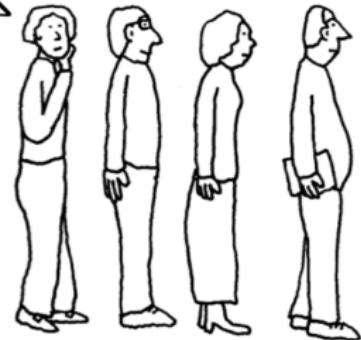


Itens **enfileirados** (*enqueue*) são inseridos  
atrás da fila...

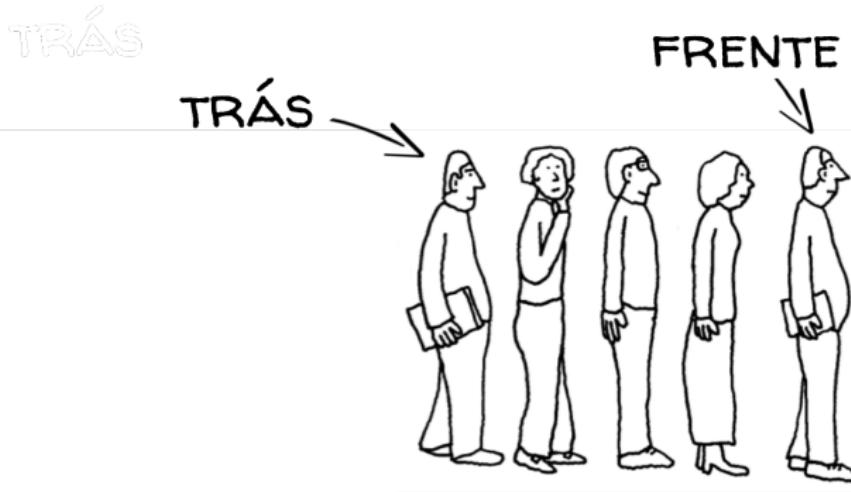
TRÁS

TRÁS

FRENTE



Itens **enfileirados** (*enqueue*) são inseridos  
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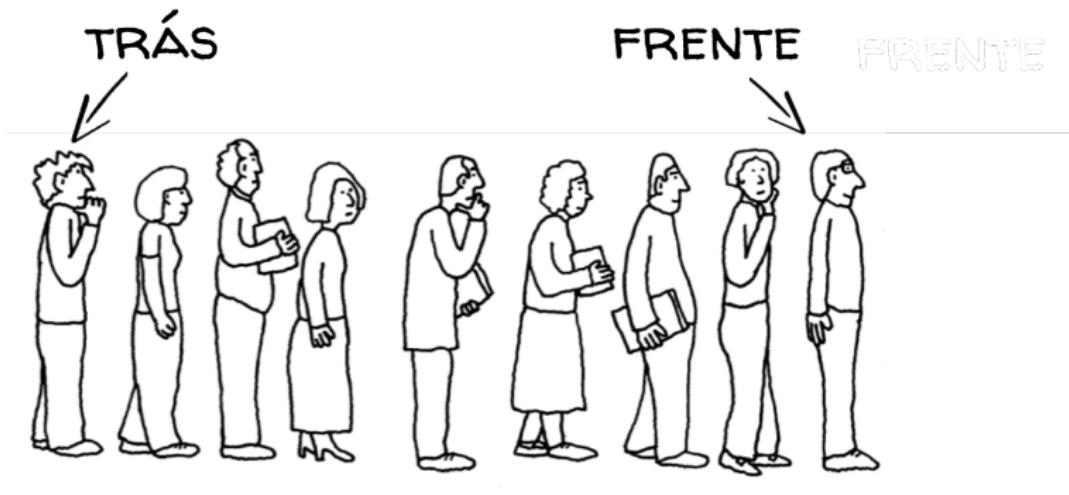
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atrás da fila...



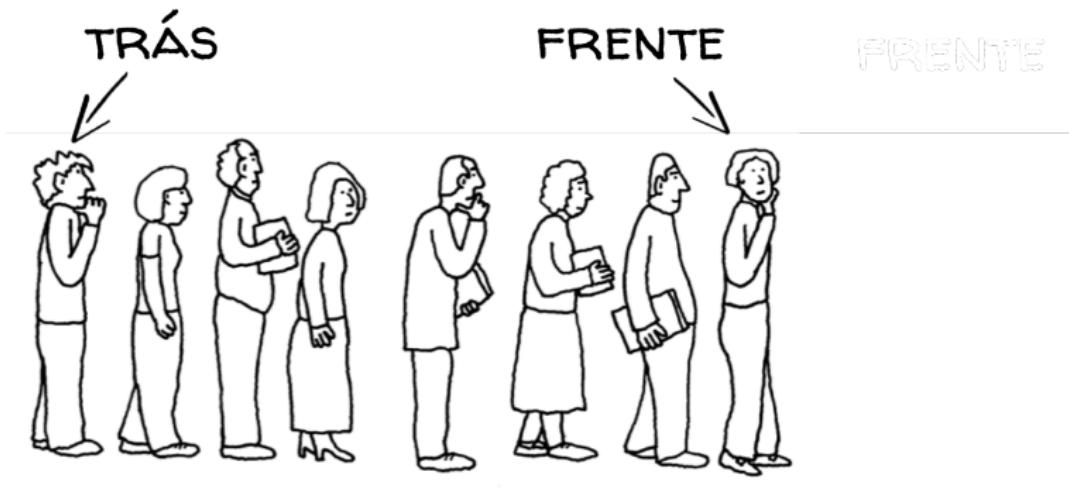
e são **desenfileirados** (*dequeue*) da frente  
da fila...



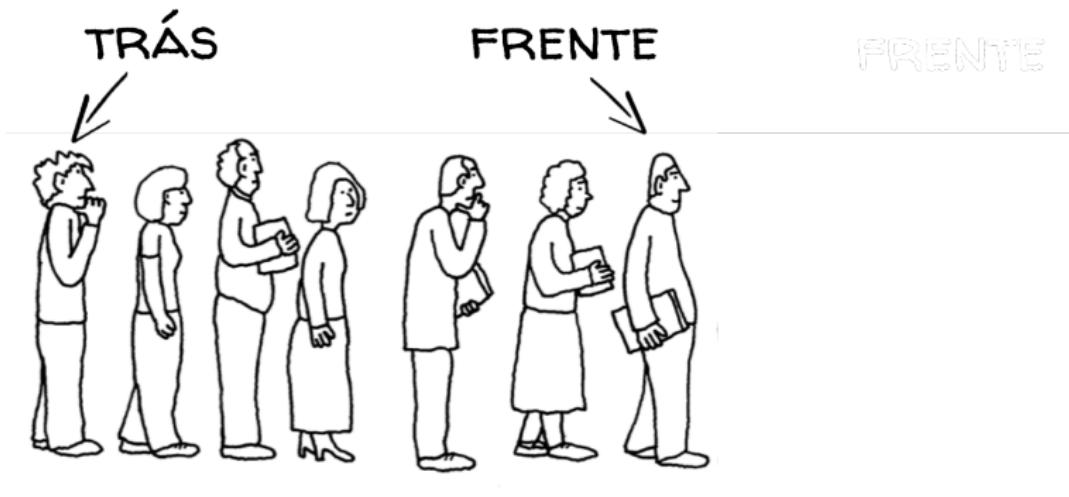
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da fila...



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da fila...



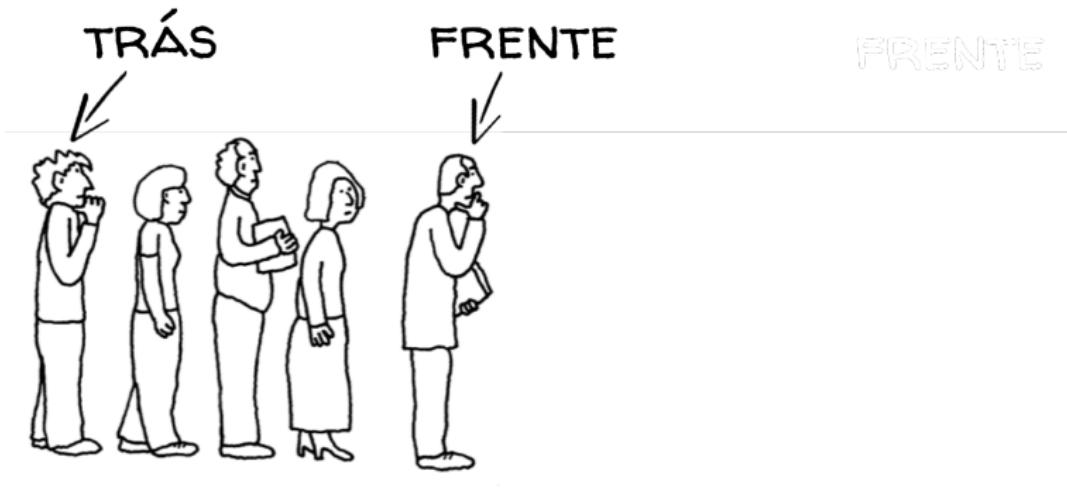
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da fila...



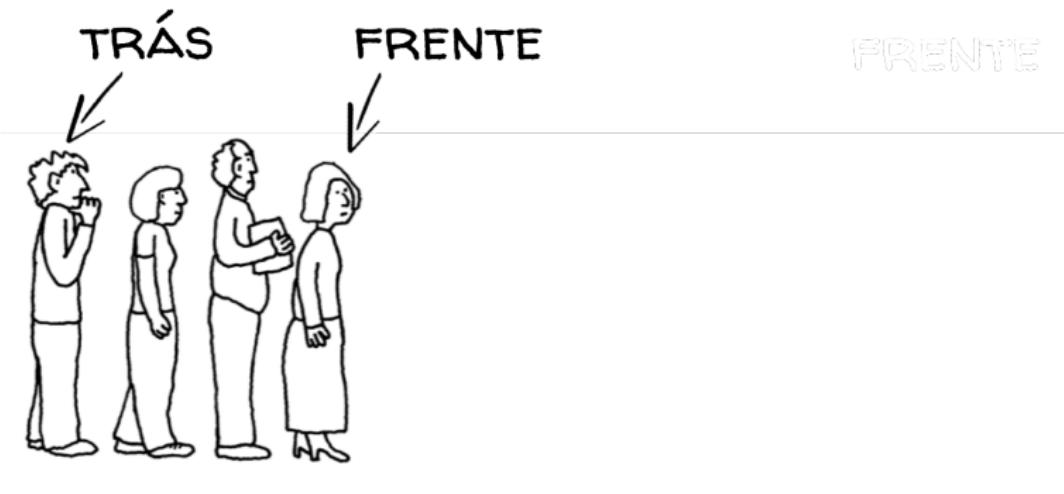
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da fila...



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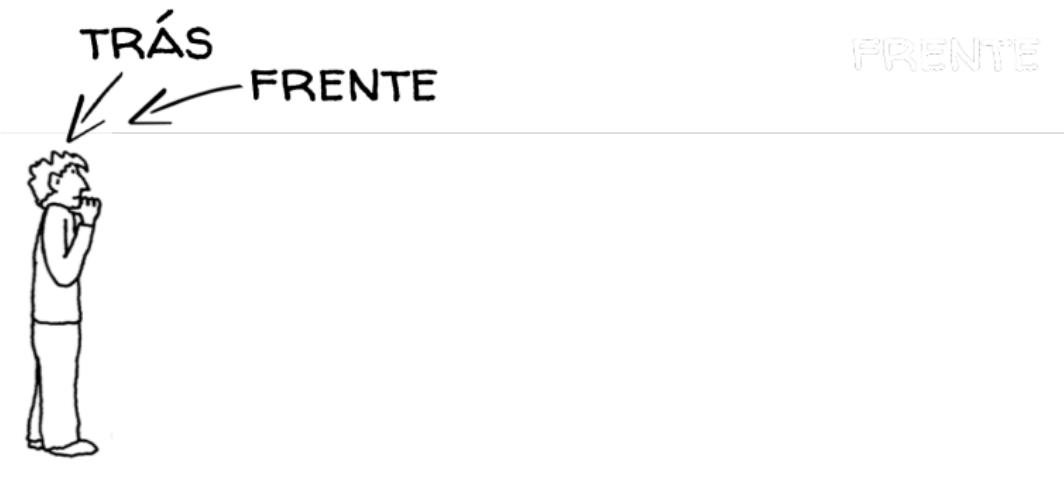
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da fila...

TRÁS

FRENTE



...até a fila voltar a ficar vazia.

# Filas: propriedades

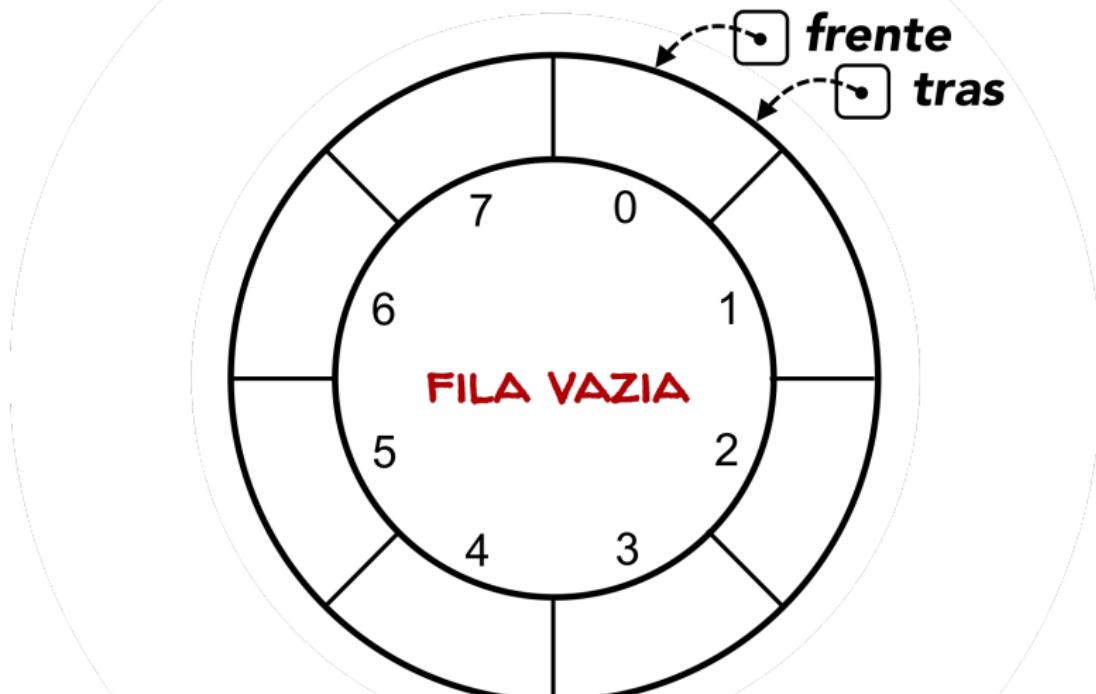
1. É uma lista **FIFO** (*first in, first out*): primeiro item a entrar é o primeiro a sair.
2. **frente**: primeiro a ser “atendido” (processado); **trás**: último a ser “atendido”.

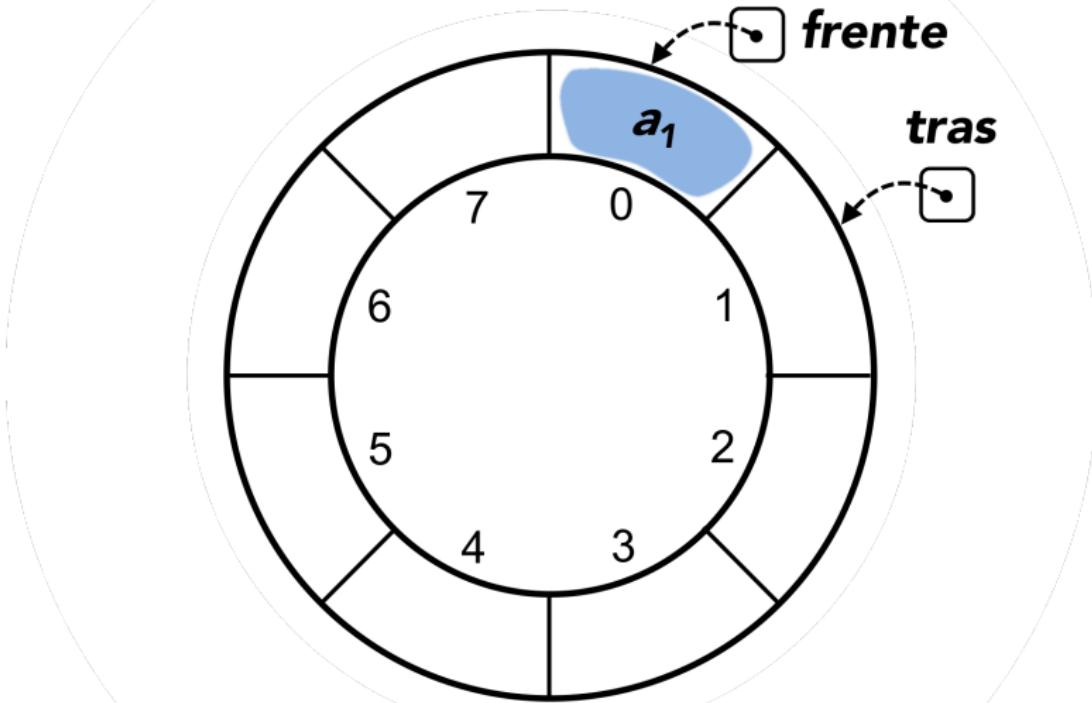
# Filas: aplicações

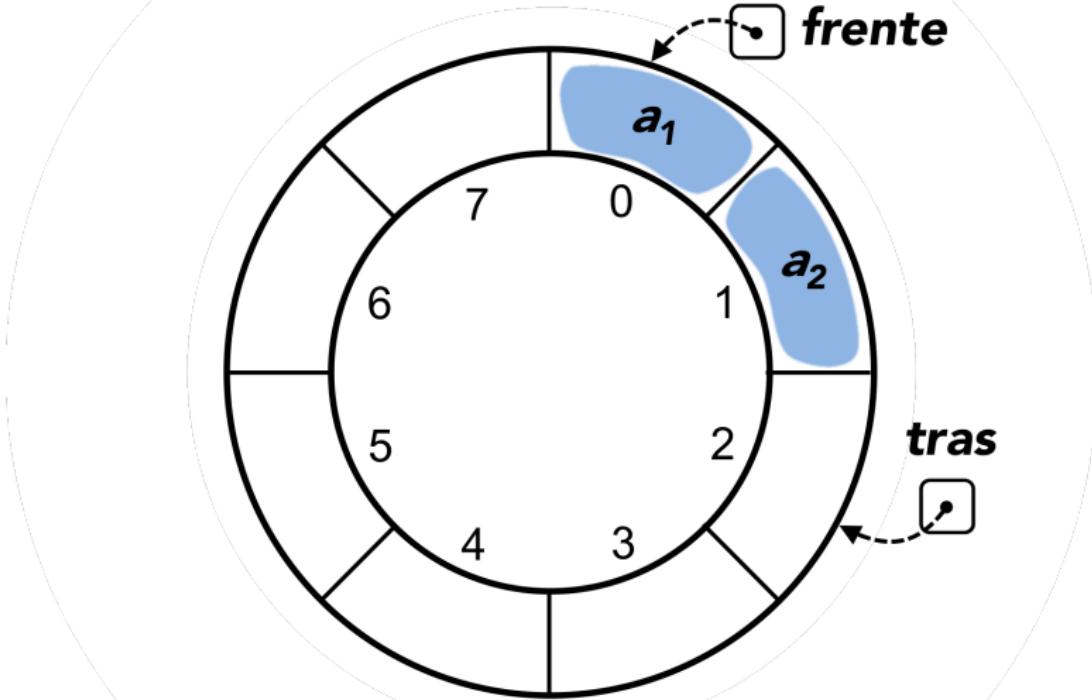
1. **Sistemas operacionais** mantém filas para escalonar processos, atender requisições de rede e jobs de impressão (*spooler*);
2. Implementação de **buffers**;
3. **Busca em largura** em grafos;
4. **Simulação** de filas reais.

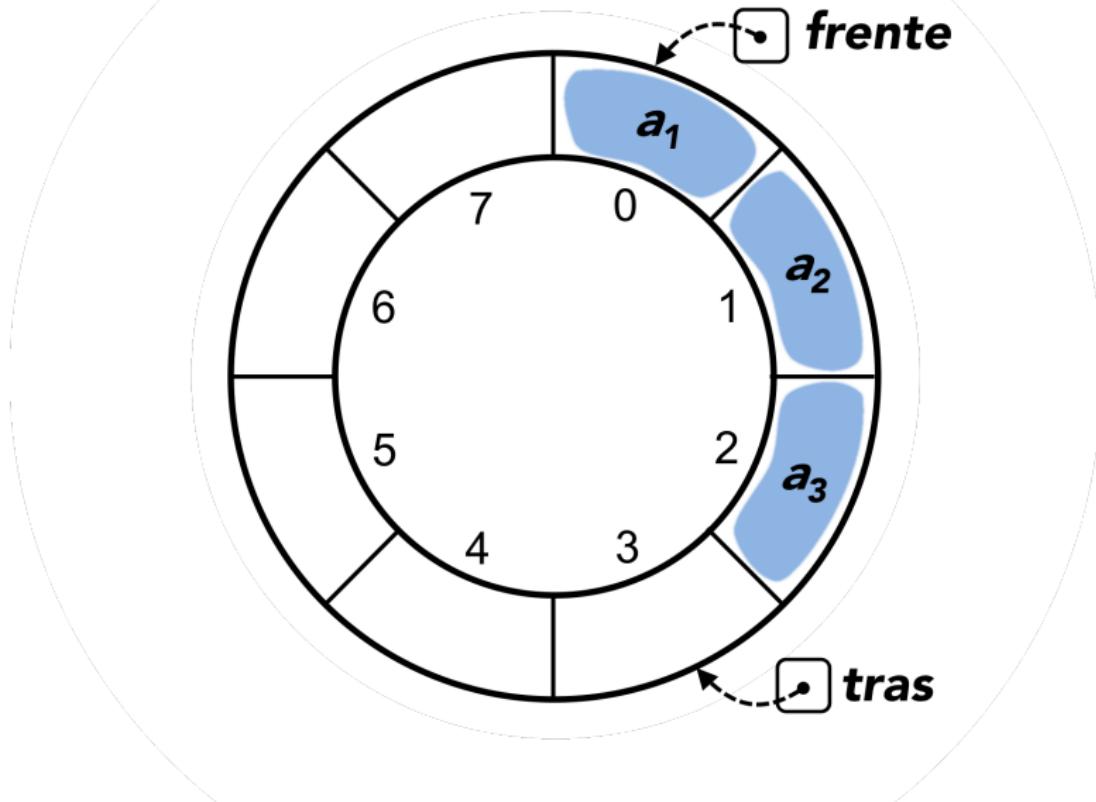
# TAD Fila

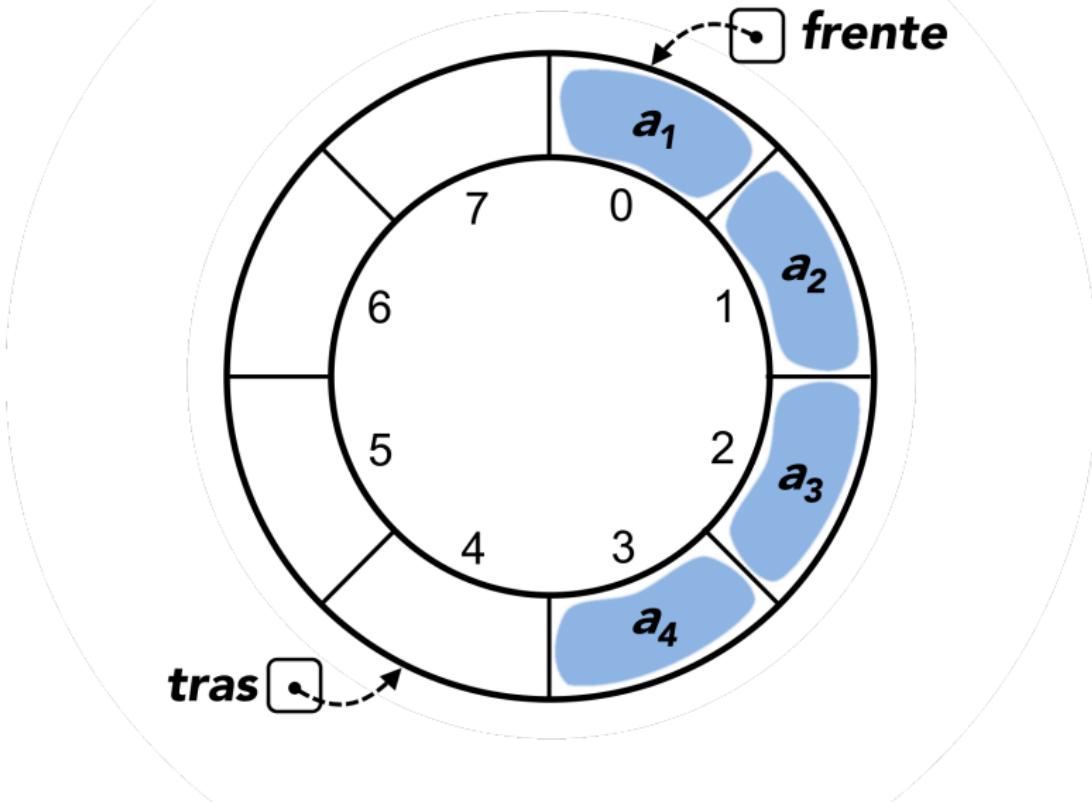
## (implementação estática)

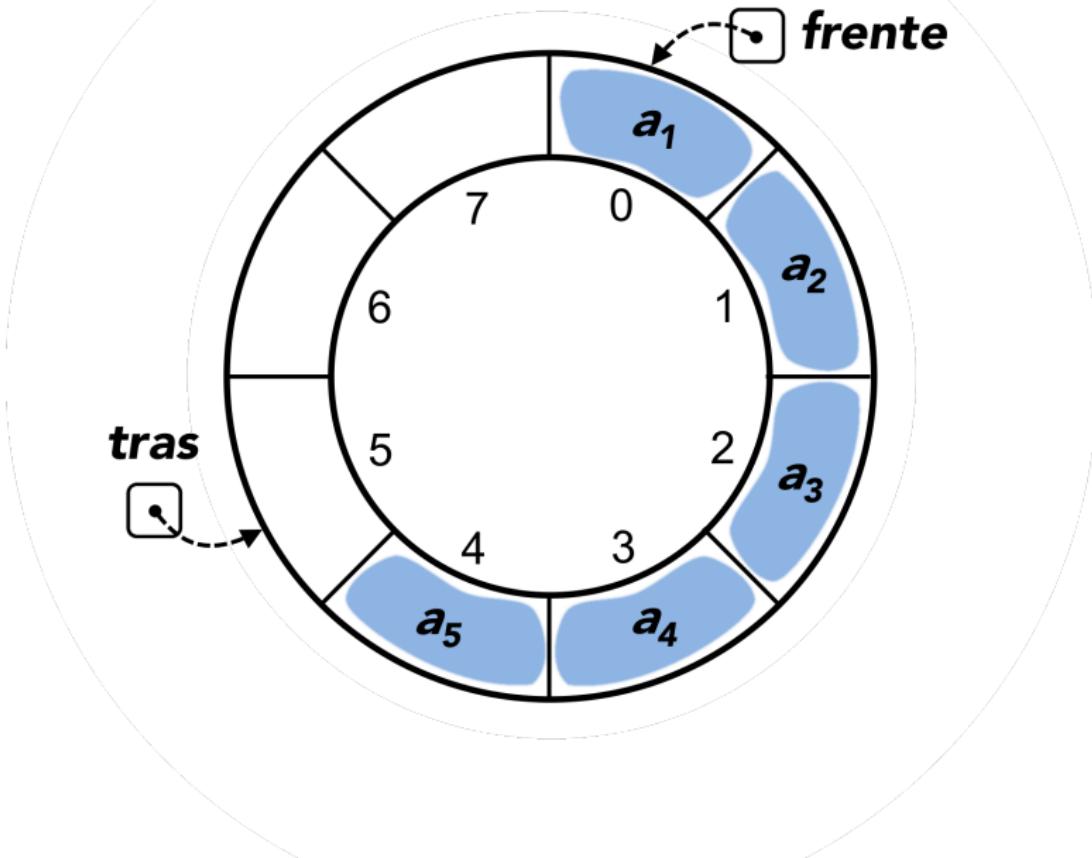


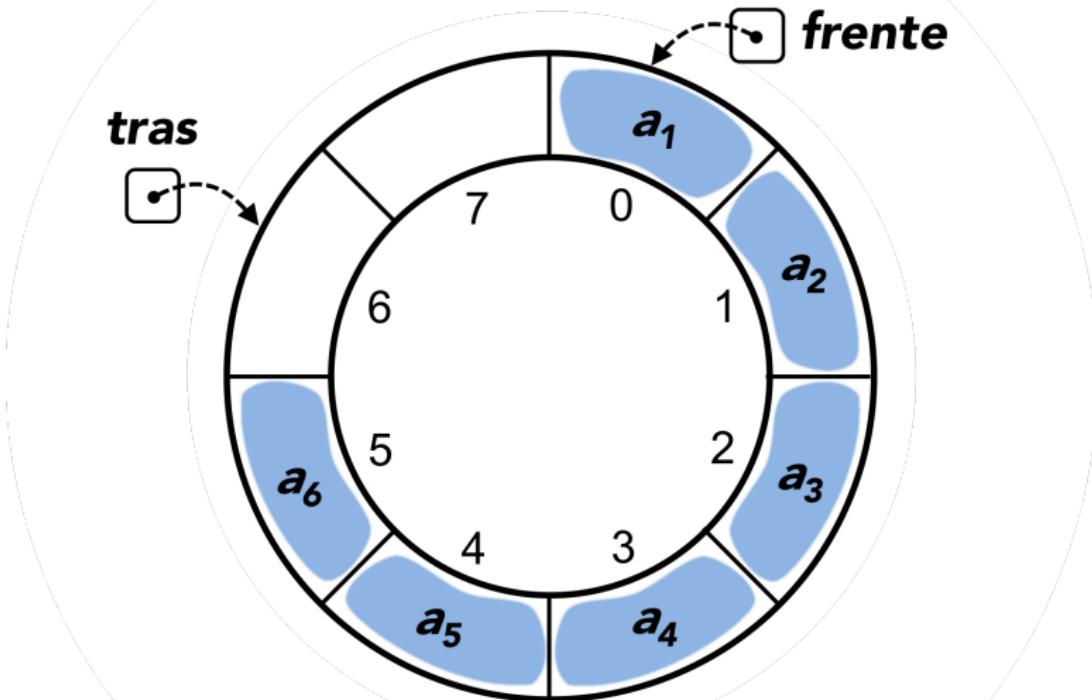


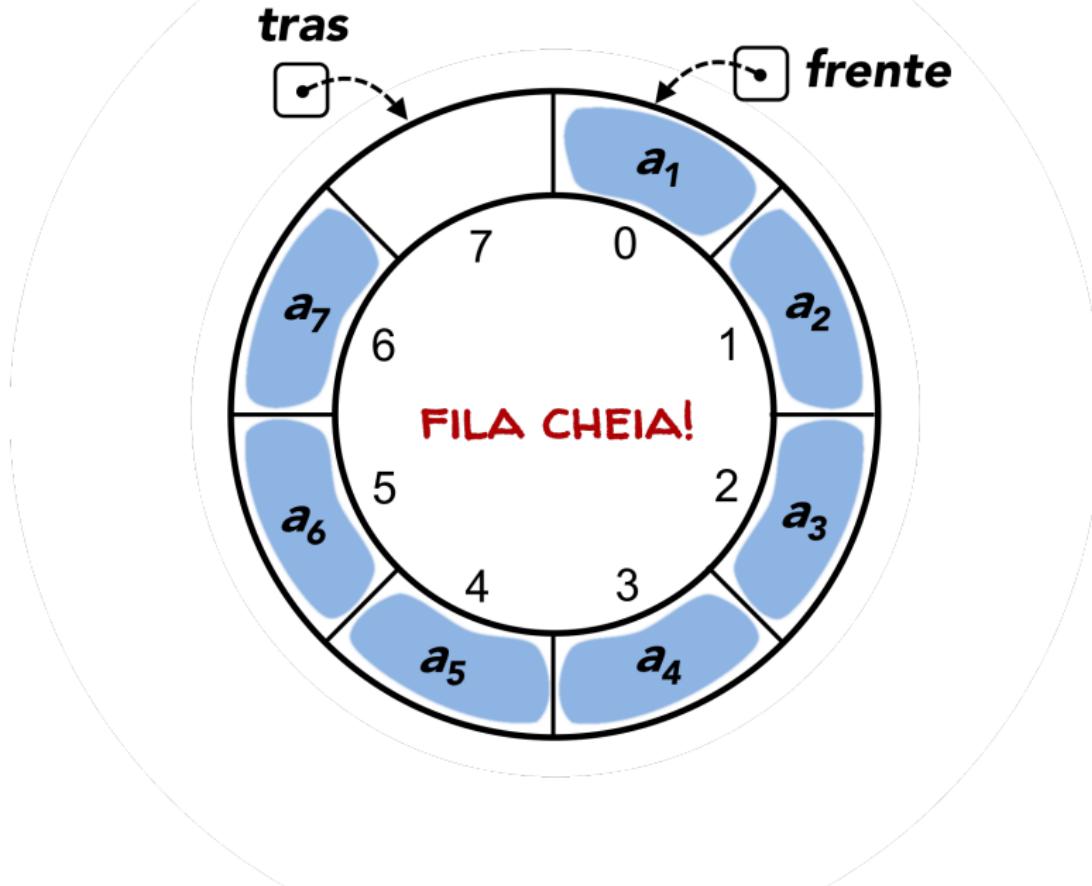


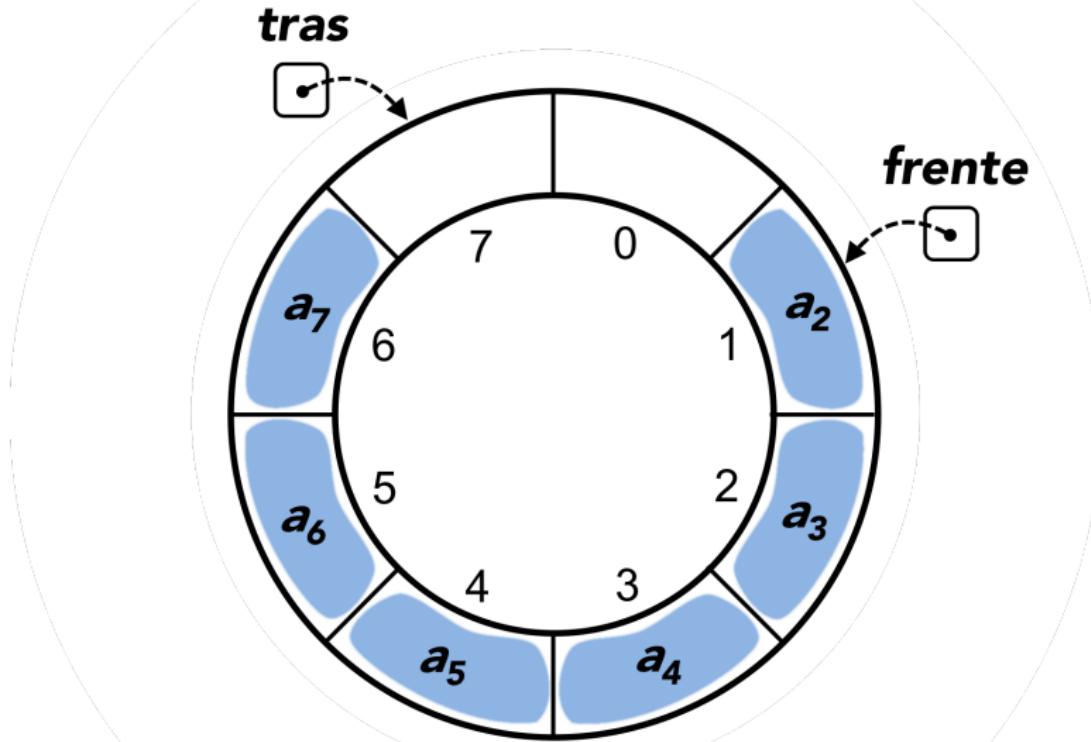




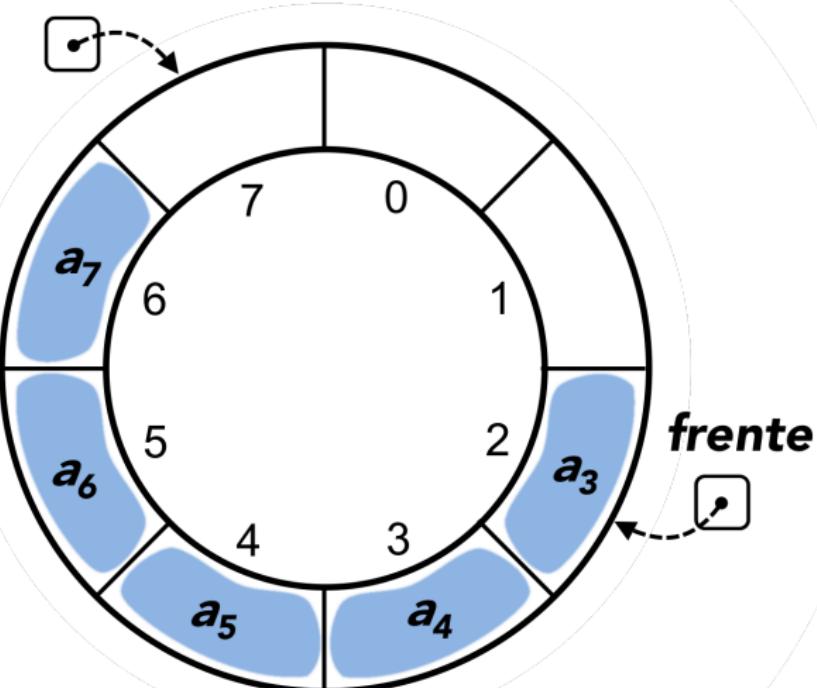




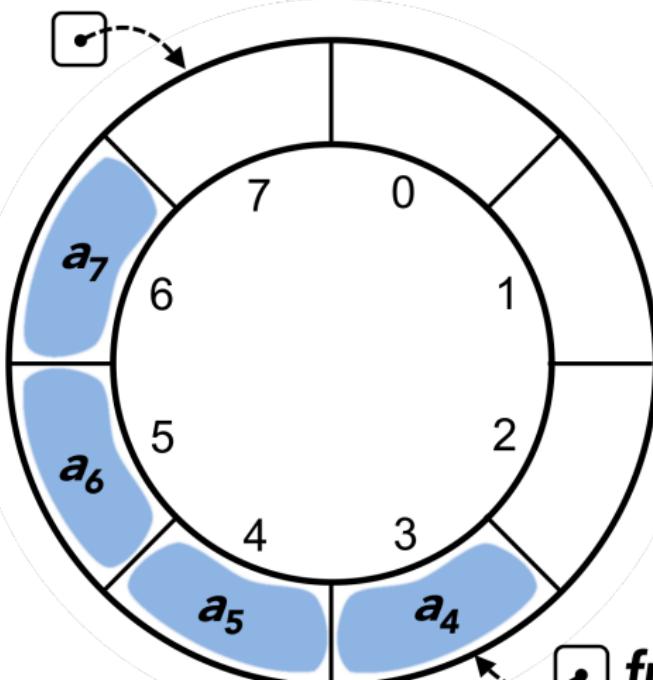


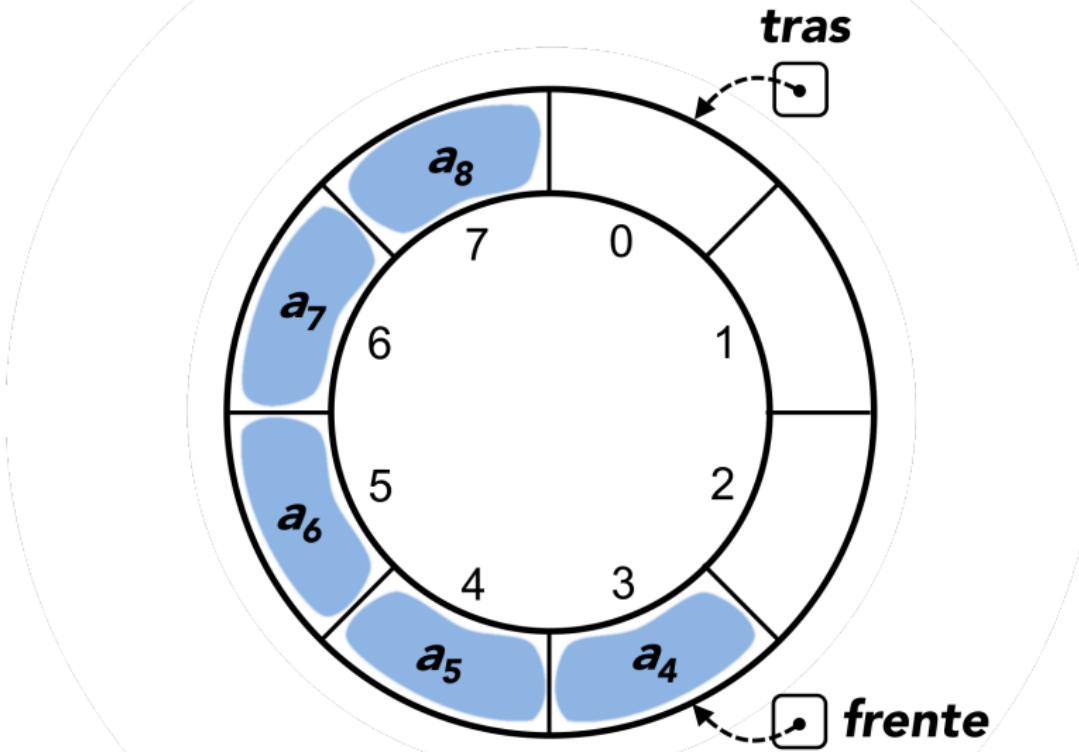


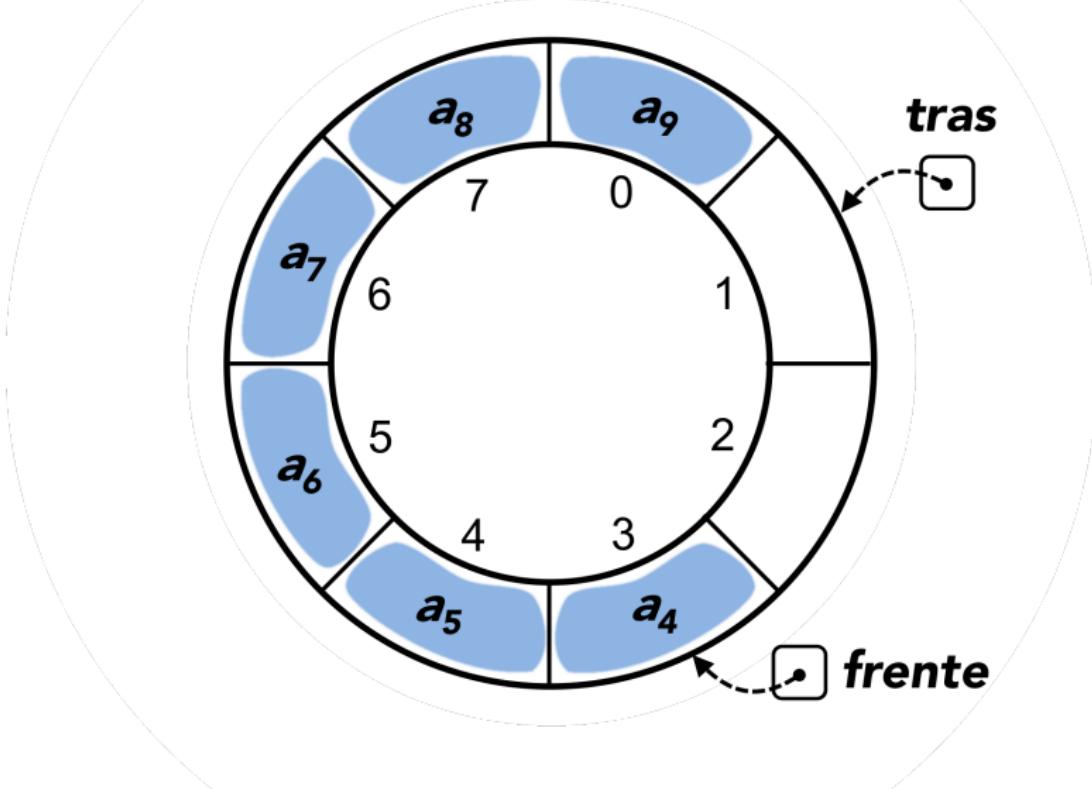
**tras**

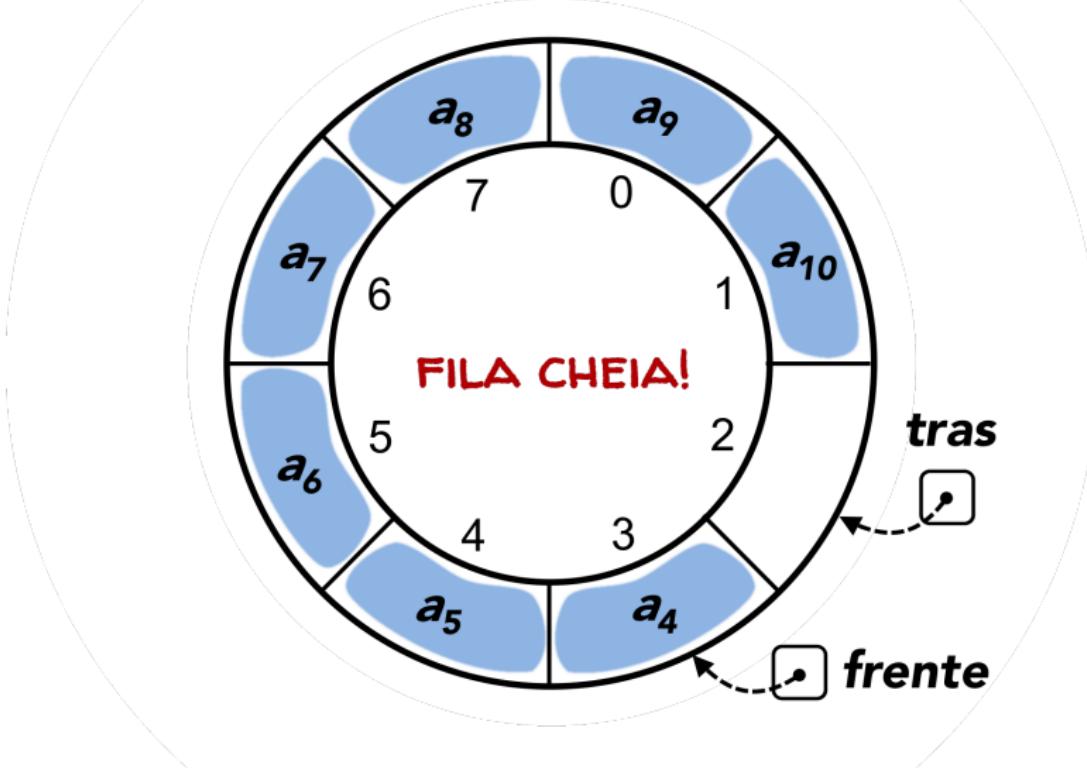


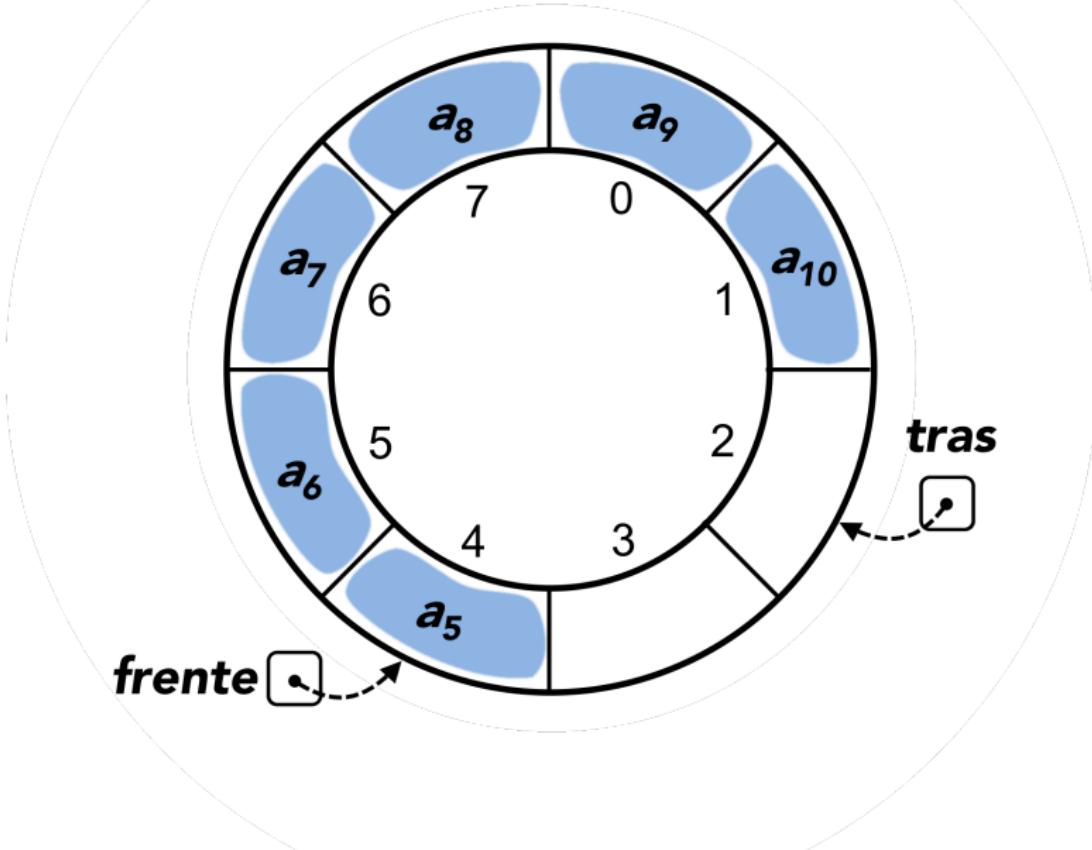
**tras**

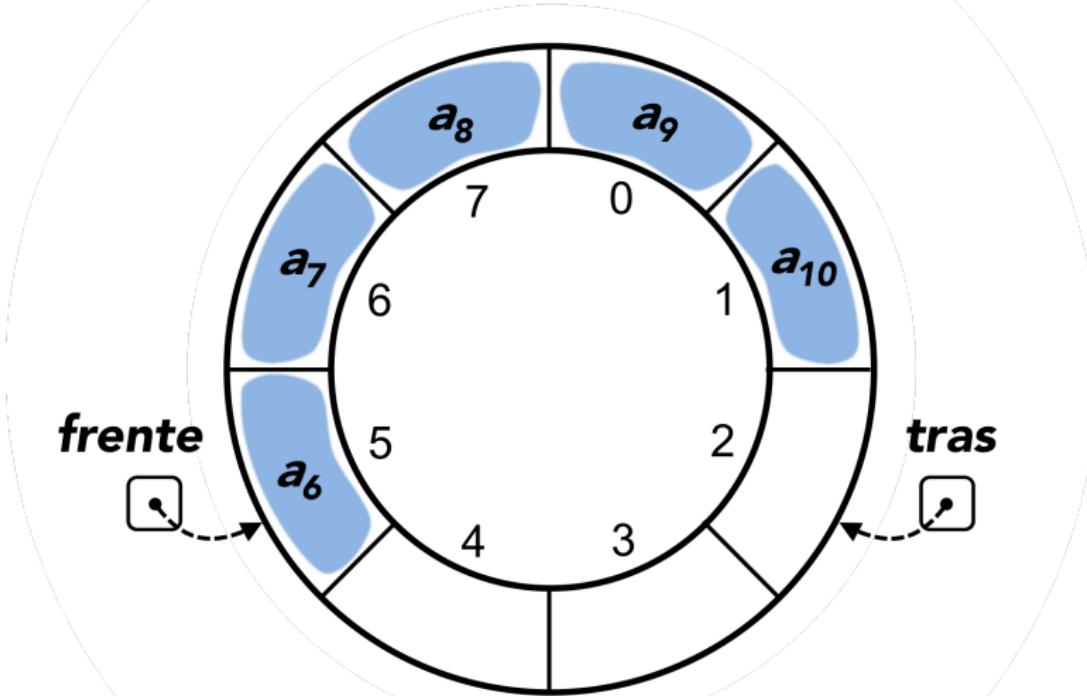


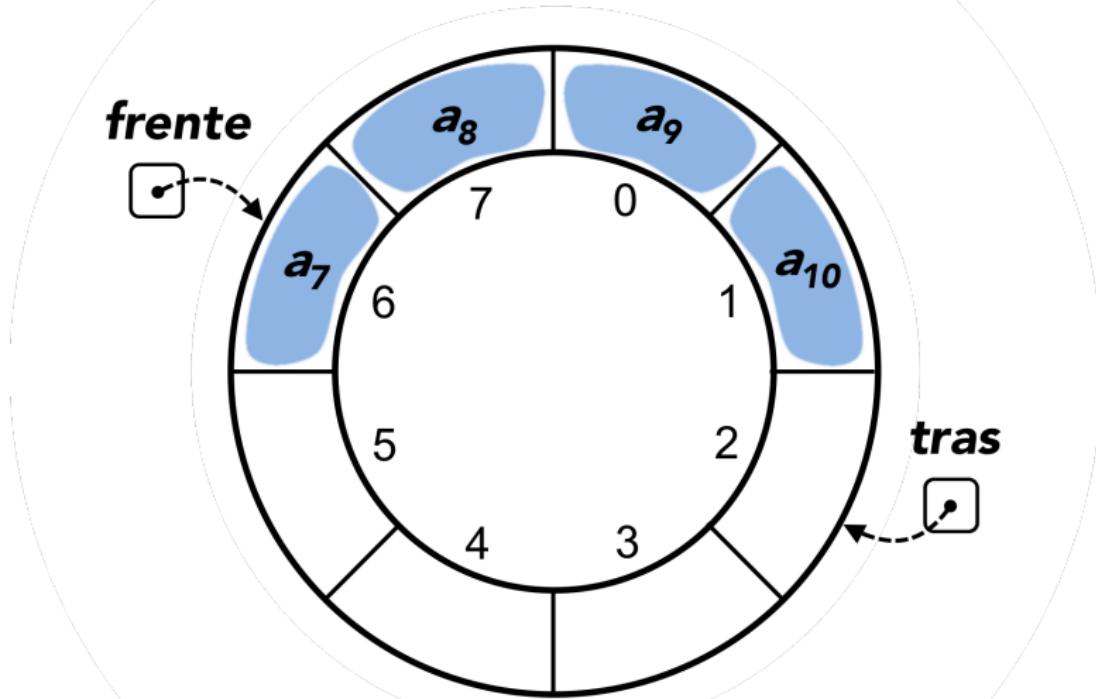




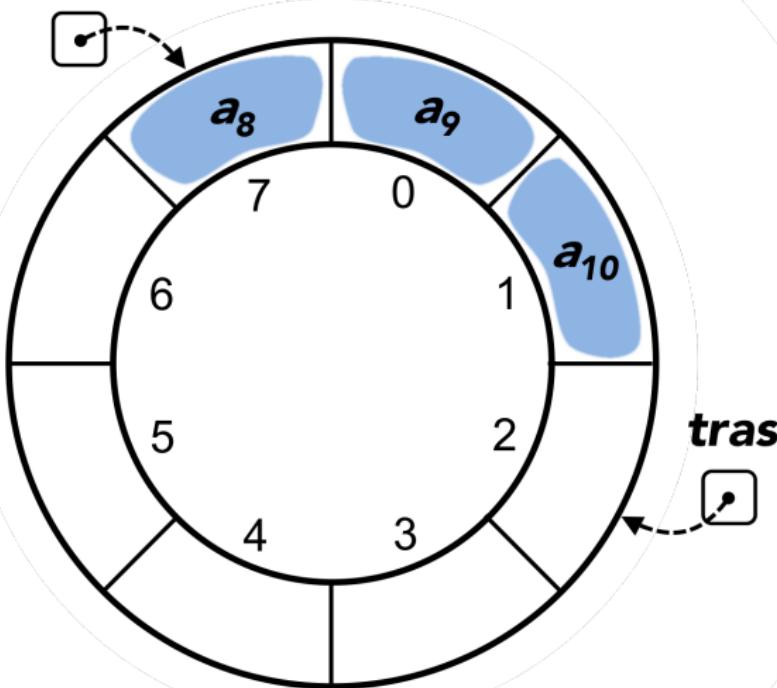




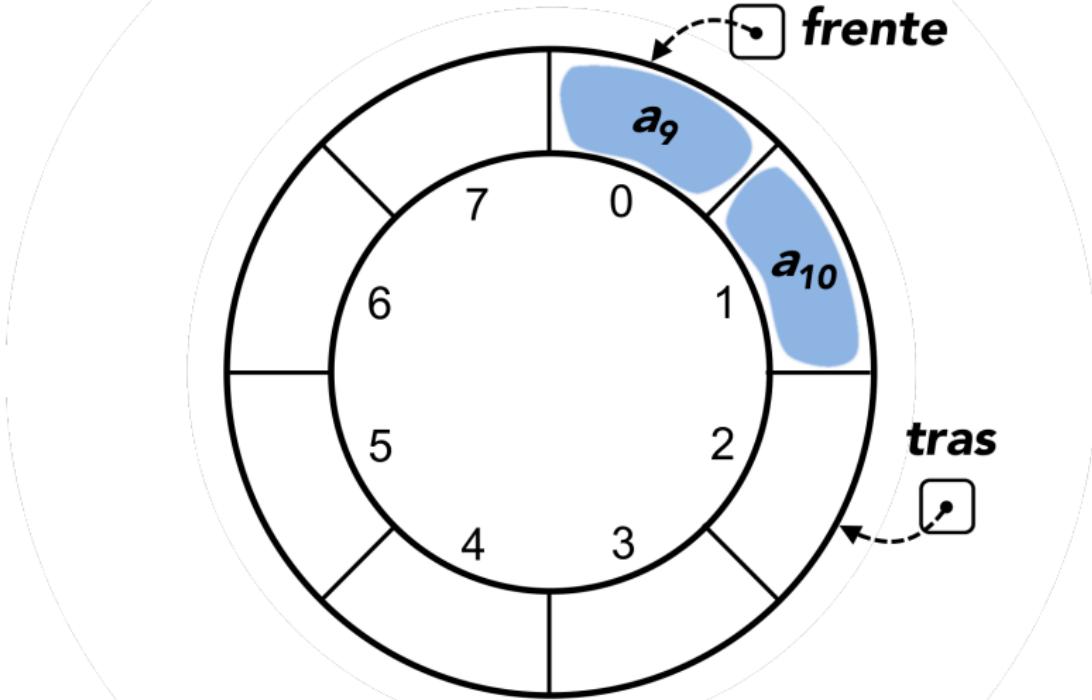


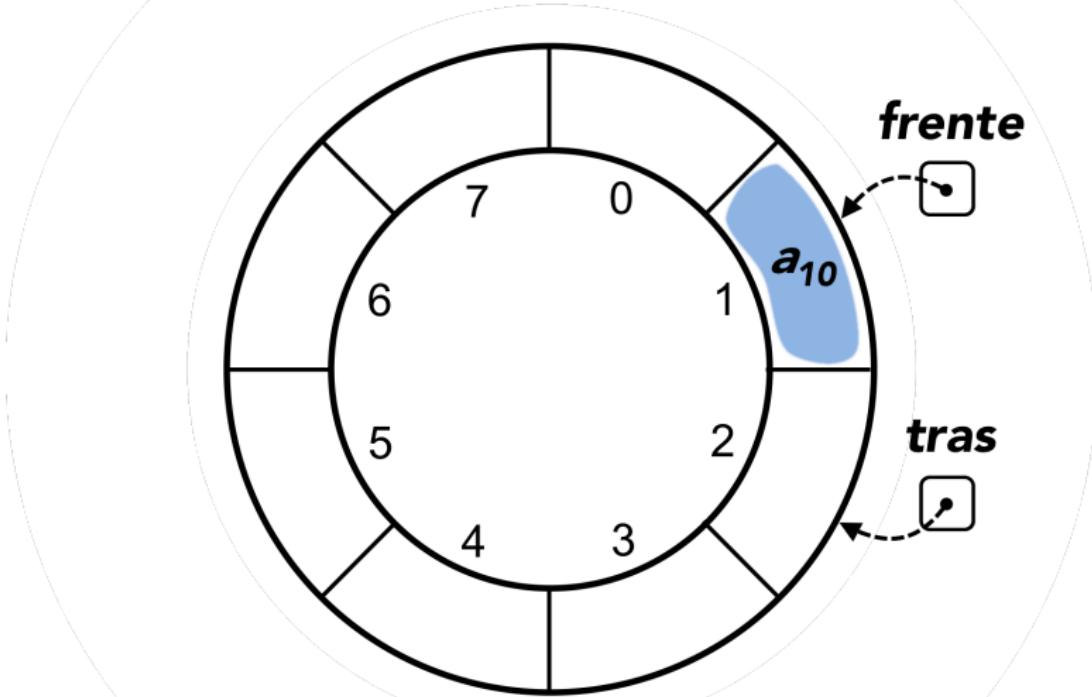


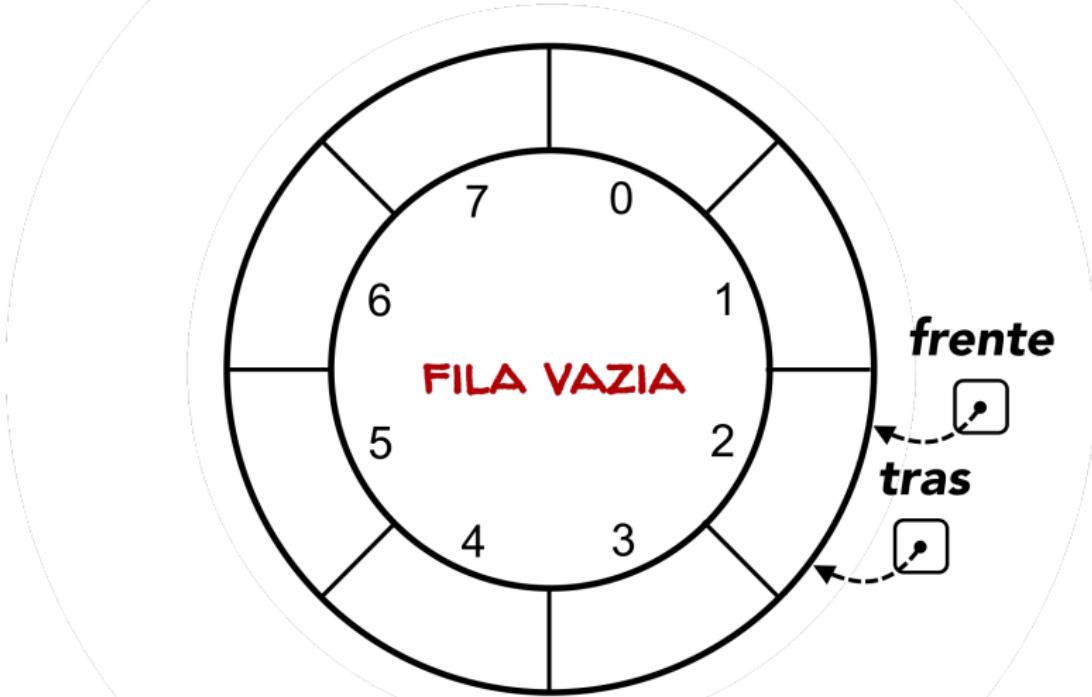
**frente**



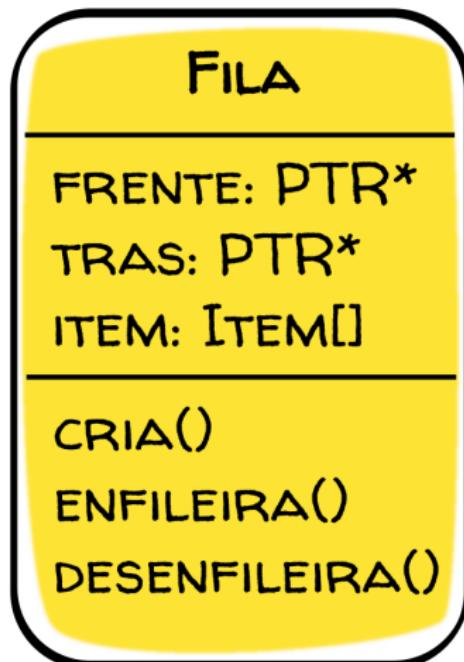
**tras**







# TAD Fila



\* PONTEIRO LÓGICO = INT

# Operações

As operações de criação, enfileiramento e desenfileiramento do **TAD Fila** são, respectivamente, adaptações das operações de criação, inserção e remoção do **TAD Lista** com implementação estática.

## CRIA(F)

1    F.frente = 0

2    F.tras = F.frente

# Procedimentos auxiliares da fila

CHEIA(F)

1   **retorne** (F.tras + 1) **mod** TAM == F.frente

VAZIA(F)

1   **retorne** F.tras == F.frente

**ENFILEIRA(F, item)**

1    **se** CHEIA(F)

2        fila cheia

3    **senão**

4        F.item[F.tras] = item

5        F.tras = (F.tras + 1) **mod** TAM

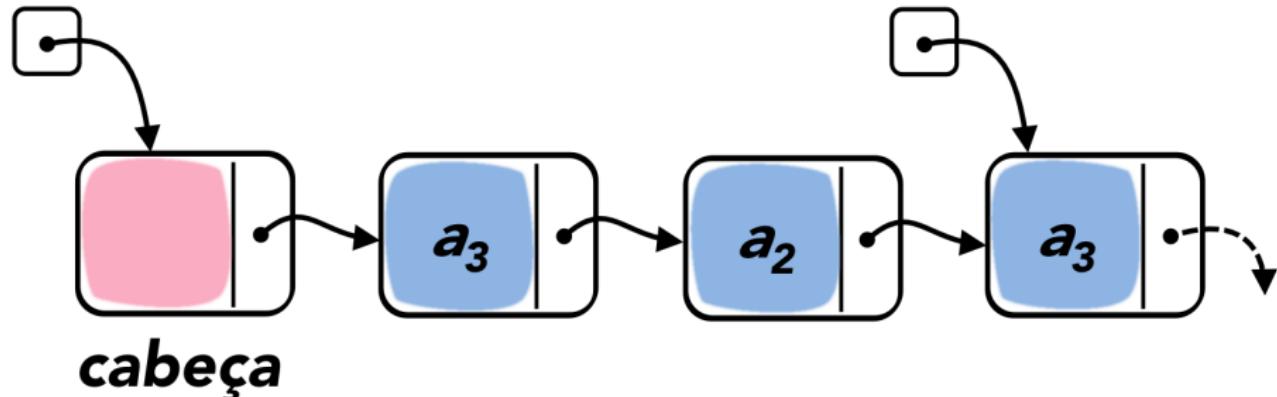
## DESENFILEIRA(F, item)

- 1    **se** VAZIA(F)
- 2        fila vazia
- 3    **senão**
- 4        item = F.item[F.frente]
- 5        F.frente = (F.frente + 1) **mod** TAM

# TAD Fila

## (implementação dinâmica)

**frente**

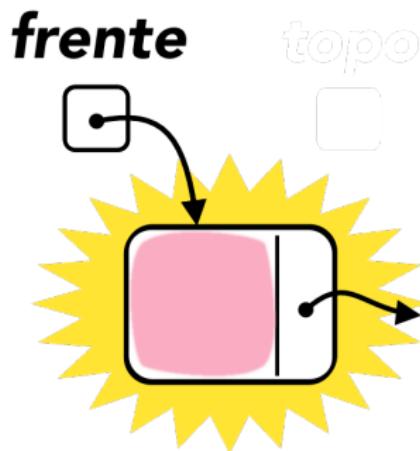


A fila “dinâmica” é uma lista “dinâmica” adaptada.

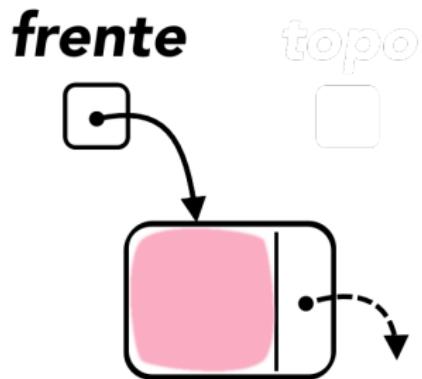
# Operações

As operações de criação, enfileiramento e desenfileiramento do **TAD Fila** são, respectivamente, adaptações das operações de criação, inserção e remoção do **TAD Lista Ligada**.

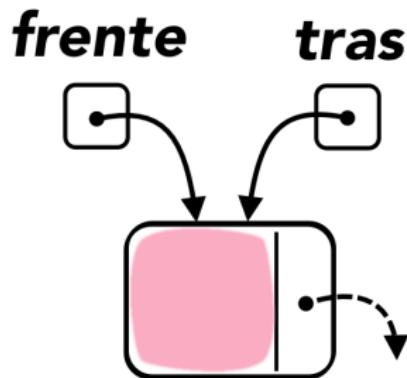
# CRIA(F)



# CRIA(F)



# CRIA(F)

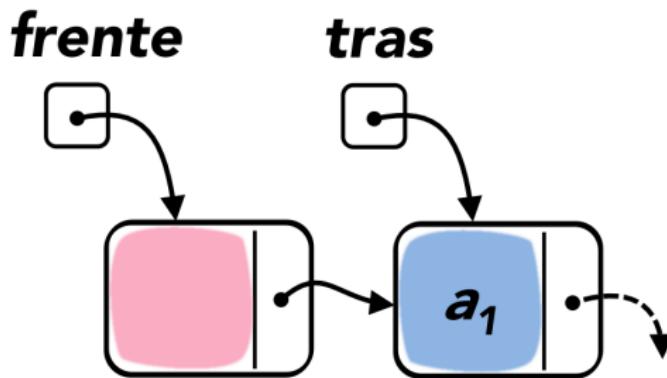


A fila está **vazia** quando frente = tras.

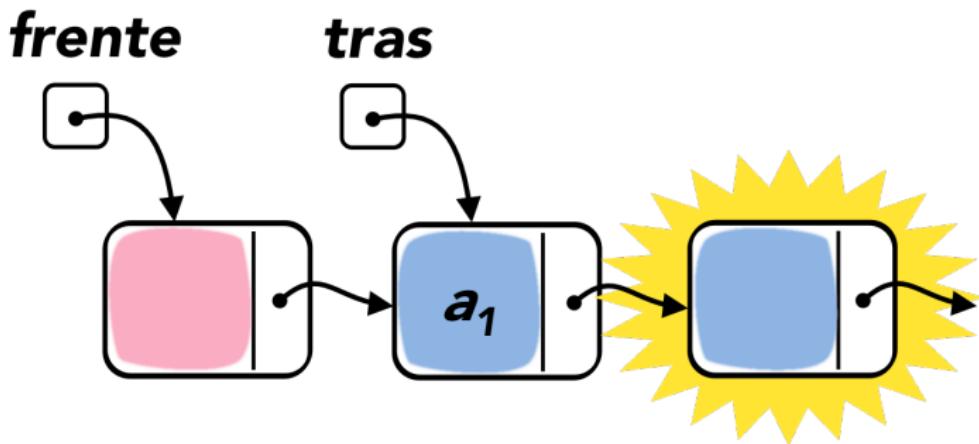
## CRIA(F)

- 1 F.frente = aloque novo **No** // *cabeça*
- 2 F.frente.prox = NIL
- 3 F.tras = F.frente

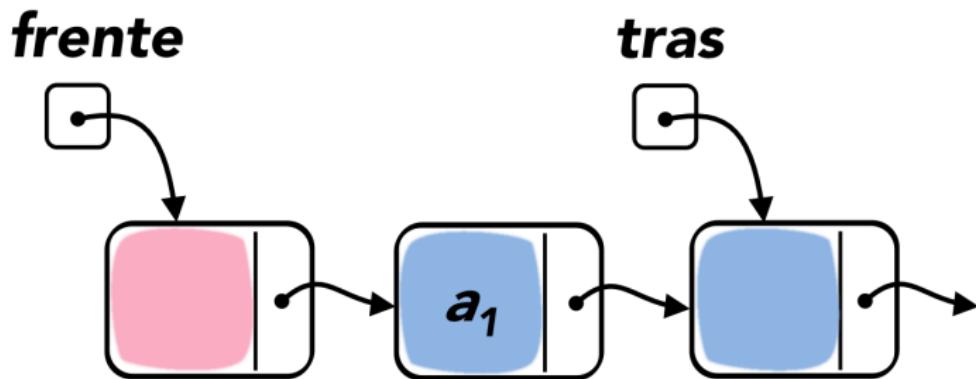
# ENFILEIRA( $F$ , item)



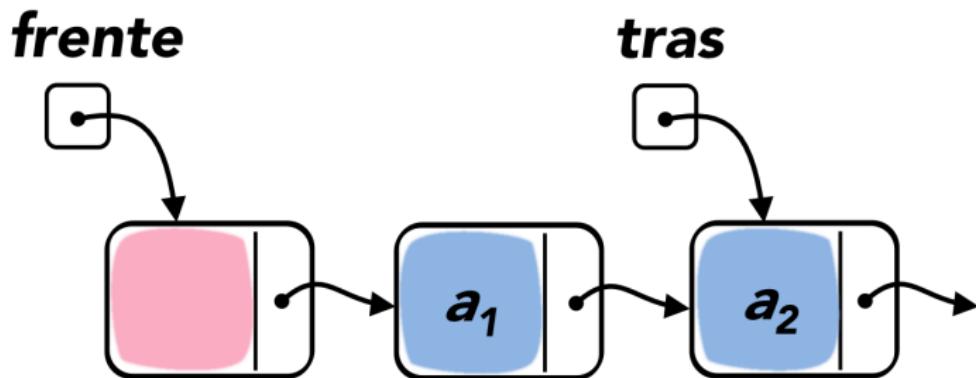
# ENFILEIRA( $F$ , item)



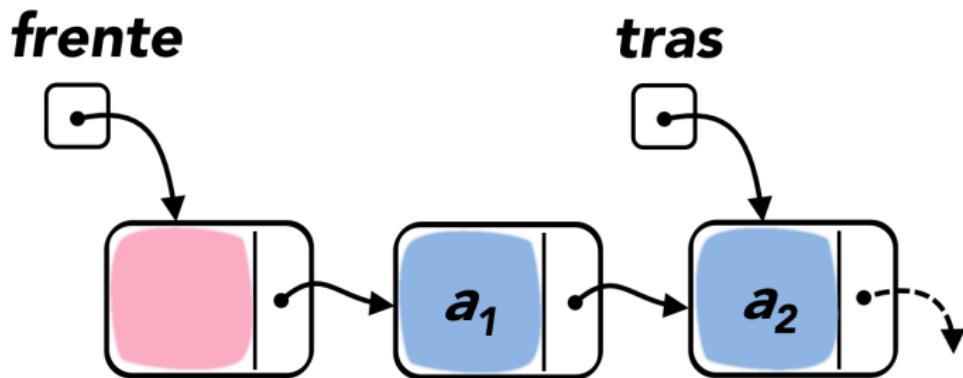
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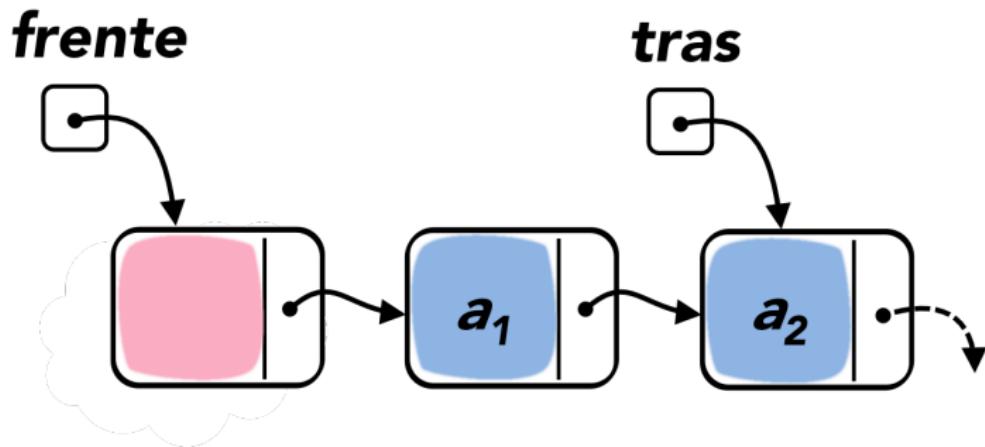
# ENFILEIRA( $F$ , item)



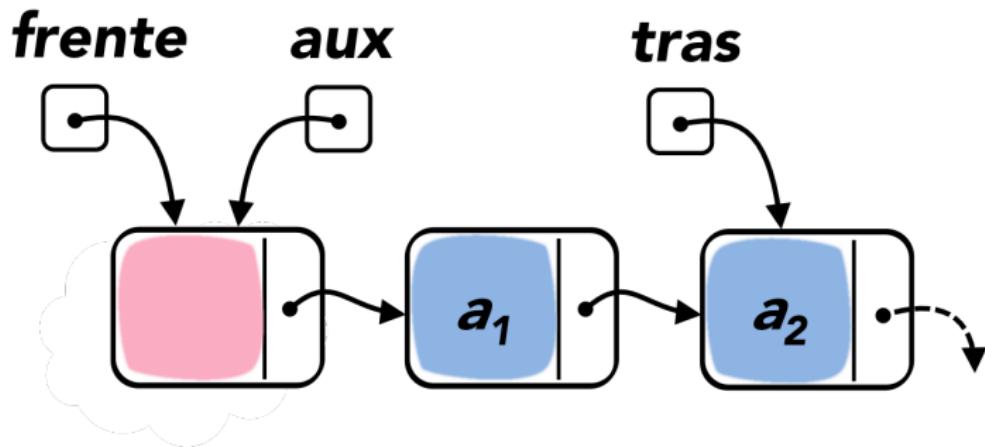
## ENFILEIRA(F, item)

- 1 F.tras.prox = aloque novo **No**
- 2 F.tras = F.tras.prox
- 3 F.tras.item = item
- 4 F.tras.prox = NIL

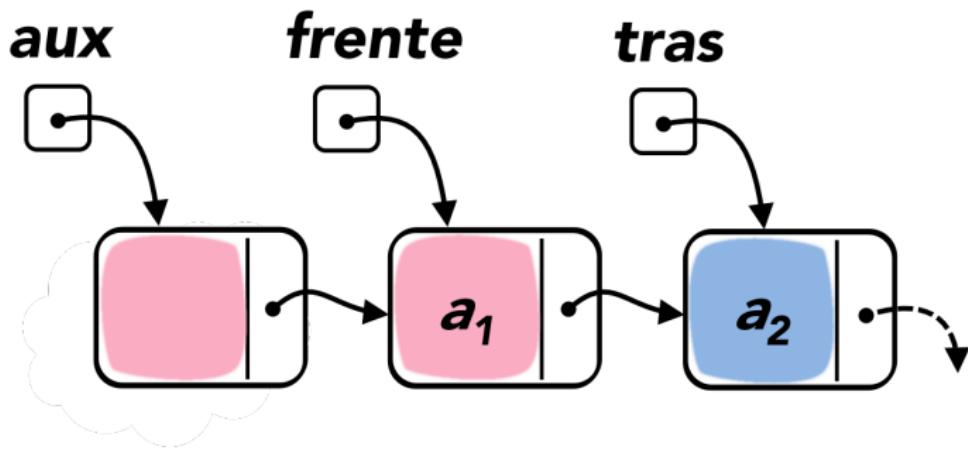
# DESENFILEIRA( $F$ , item)



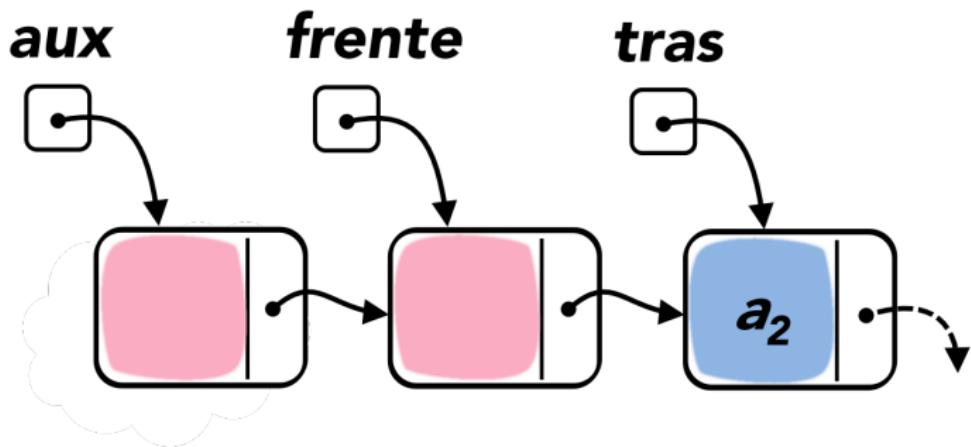
# DESENFILEIRA( $F$ , item)



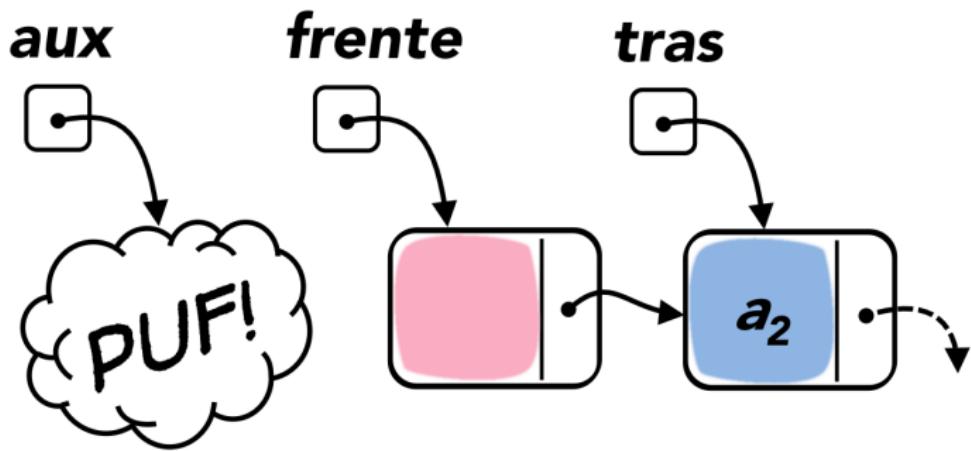
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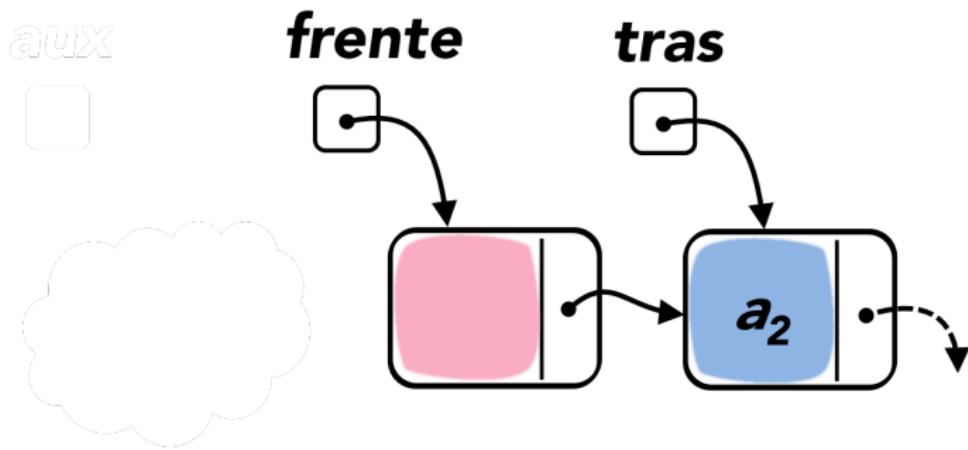
# DESENFILEIRA( $F$ , item)



# DESENFILEIRA( $F$ , item)



# DESENFILEIRA( $F$ , item)



## DESENFILEIRA(F, item)

- 1 aux = F.frente
- 2 F.frente = F.frente.prox
- 3 item = F.frente.item
- 4 desaloque aux

# Referências

-  T. H. Cormen, C.E. Leiserson, R.L. Rivest, C. Stein, *Introduction to Algorithms*, 3rd edition, MIT Press, 2010
-  Cartoon da matrícula do NUCOMP adaptada por mim a partir de <http://www.weblogcartoons.com/cc/peculiar-downloads/christian-conference.gif>
-  N. Ziviani. *Projeto de Algoritmos com Implementação em Pascal C.* Cengage Learning, 2012.

## Onde obter este material:

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