Estrutura de Dados I

Estrutura de dados: lista duplamente encadeada

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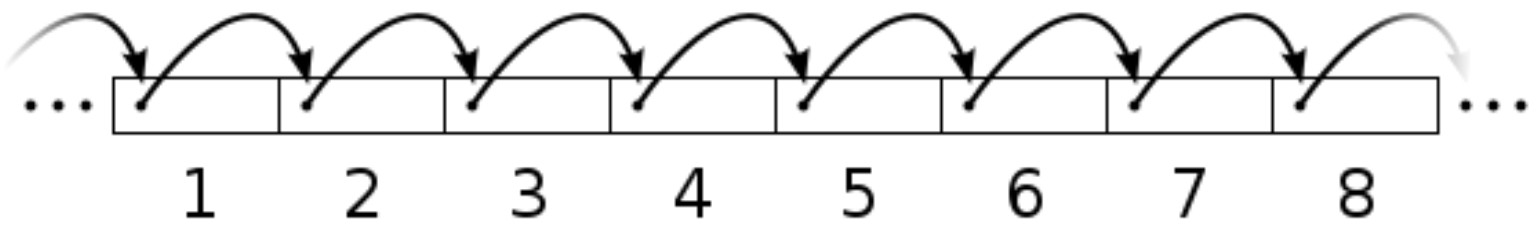
Sumário

1. Introdução
2. Função: **inserir**
3. Função: **inserir (funcionamento)**
4. Função: **remover**

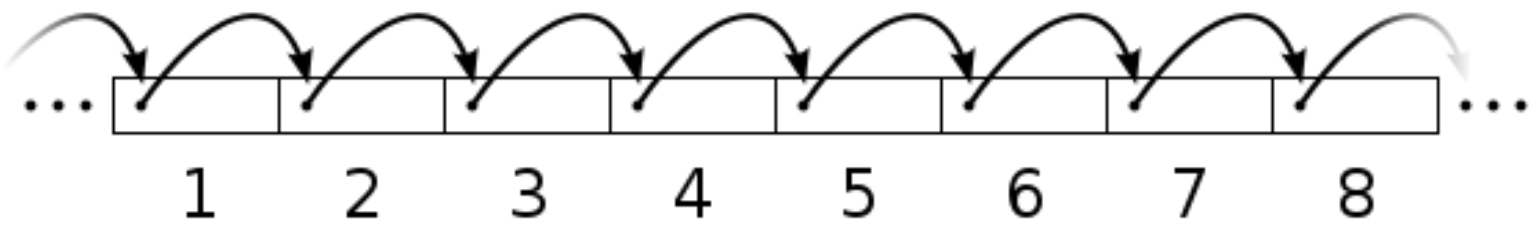
Introdução

O tipo abstrato de dados **lista** visto aula passada caracteriza-se por formar um encadeamento simples entre os elementos — cada nó armazena um ponteiro para o próximo elemento da lista.



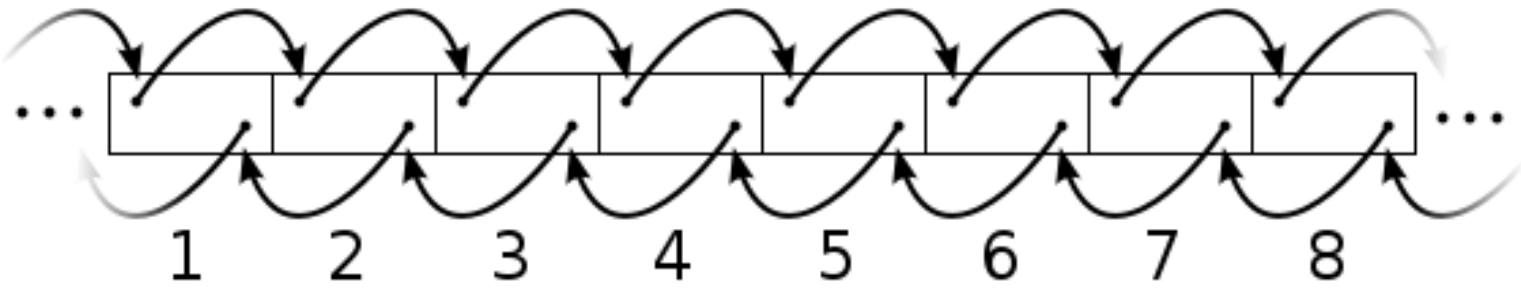
Introdução

Problemas: **1)** não é possível percorrer eficientemente os elementos em ordem inversa (do fim para o início); **2)** dificuldade para remoção, pois dado um determinado nó não temos como acessar diretamente seu antecessor.



Introdução

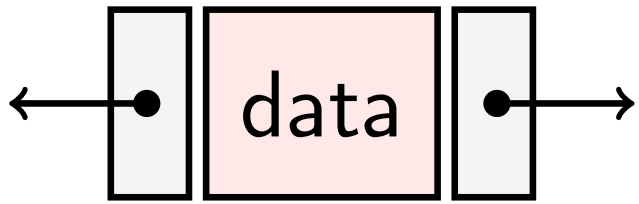
Solução: implementar o que chamamos de **lista duplamente encadeada**. Nela, cada elemento tem um ponteiro para o próximo elemento e um ponteiro para o elemento anterior.



Estrutura

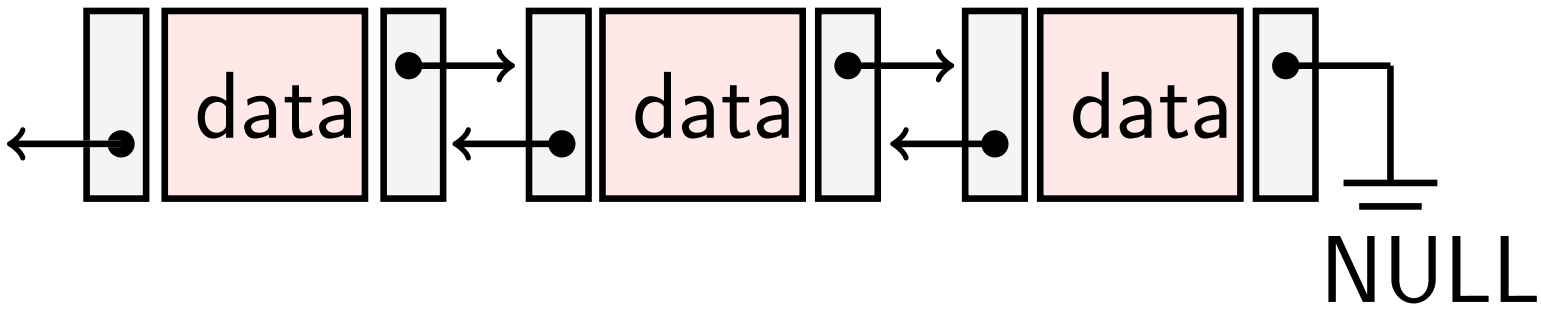
Observe a similaridade entre a estrutura de uma lista simples e uma lista dupla. A única diferença é a adição de mais um ponteiro para o elemento anterior.

```
typedef struct node {
   int data;
   struct node* next;
   struct node* prev;
} List;
```



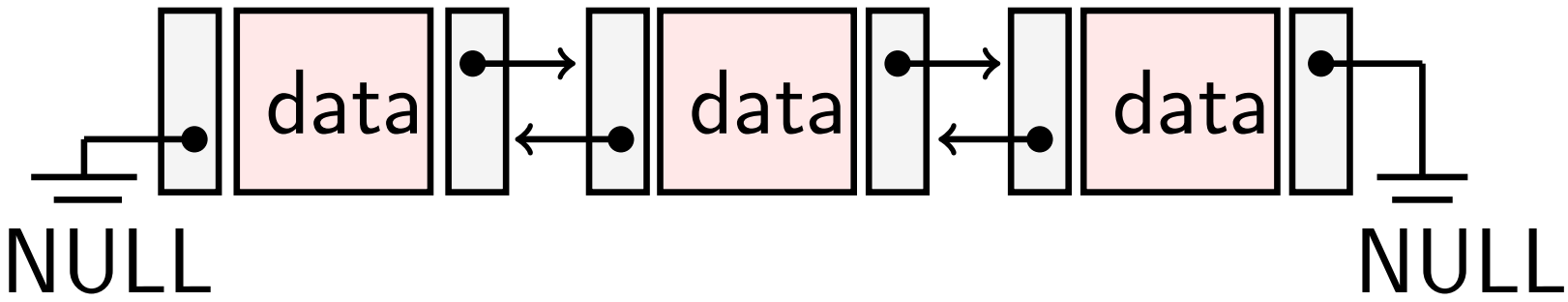
Listas duplamente encadeadas

O encadeamento em duas vias permite acessar ambos os elementos adjacentes: o próximo e o anterior, e desta forma, percorrer a lista em ordem inversa.



Listas duplamente encadeadas

Da mesma forma que o último elemento da lista tem como **next** o valor NULL, o primeiro elemento da lista não tem elemento anterior, e portanto o ponteiro **prev** é NULL.



Tipo abstrato de dados

Lista duplamente encadeada (**interface**)

create: inicializa uma estrutura de dados lista

insert-front: adiciona um nó na cabeça da lista

remove: remove um nó da lista

size: retorna o número de nós na lista

print: imprime todos os nós da lista

destroy: remove todos os nós da lista

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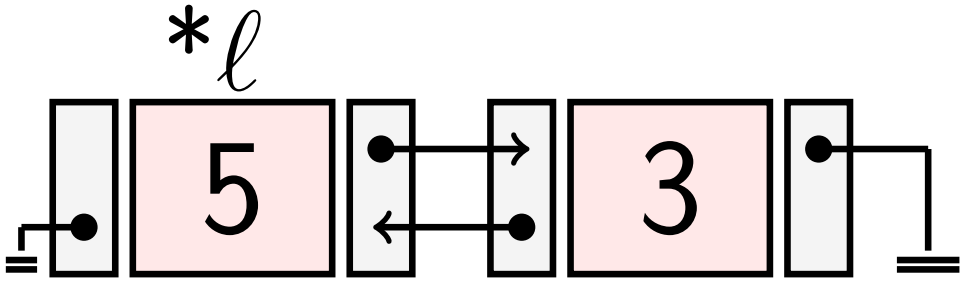
3. Função: **inserir (funcionamento)**
4. Função: **remover**

Inserir (início)



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5: node→prev = NULL;
6: **if** ($\ell \neq$ NULL) { ℓ →prev = node; }
7: **return** node;

Inserir: 7

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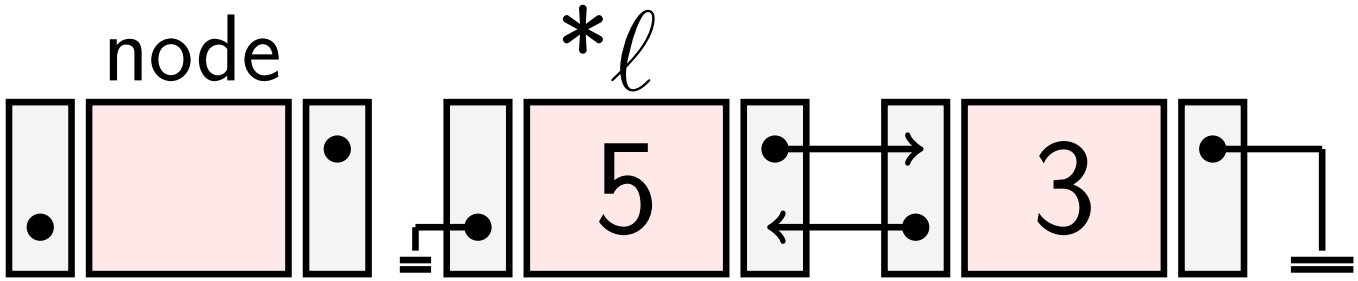

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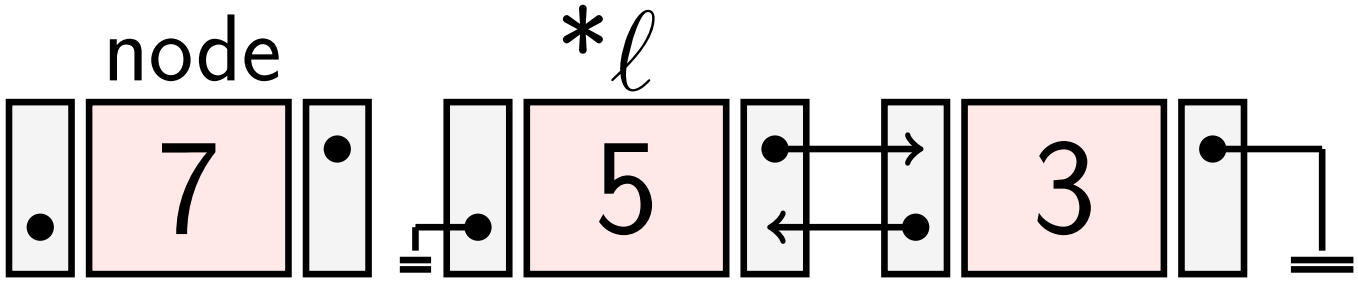

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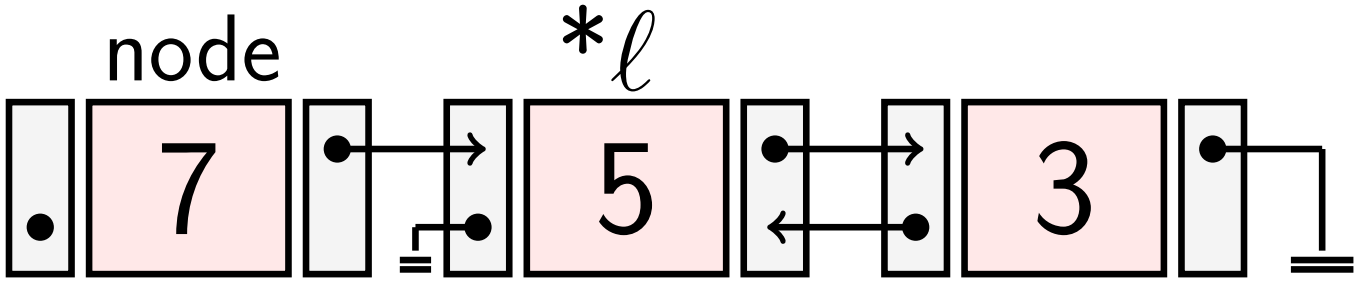

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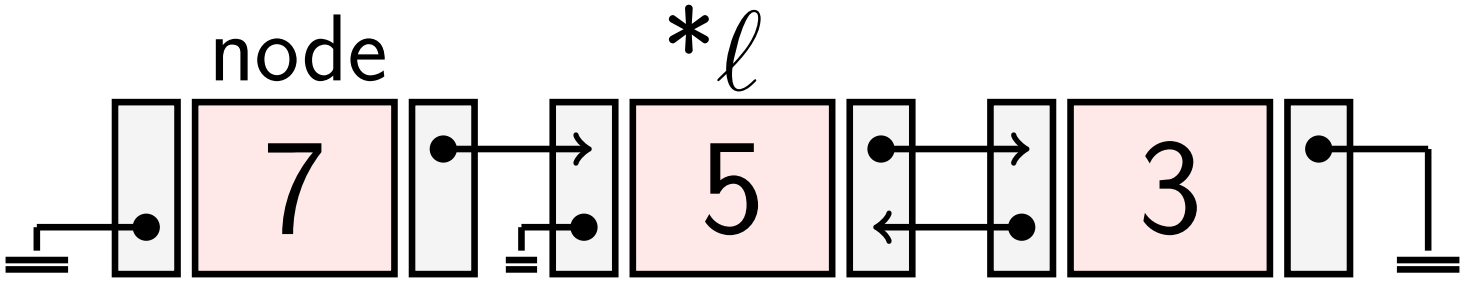

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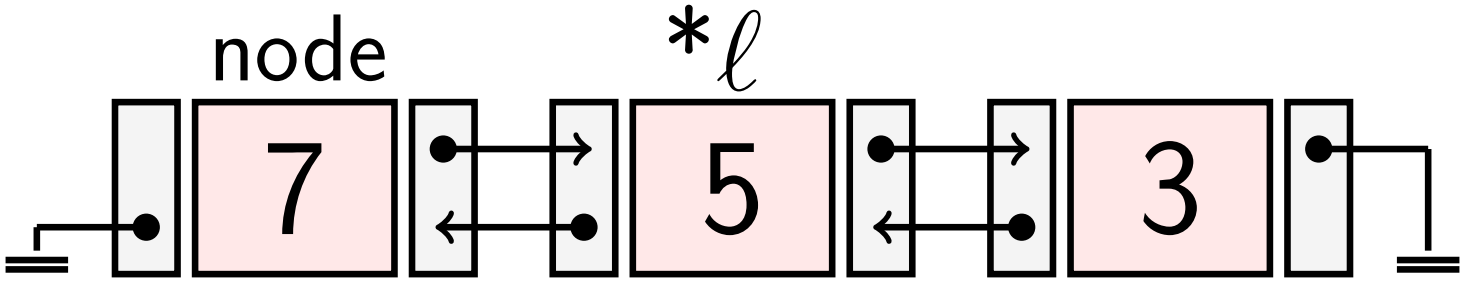

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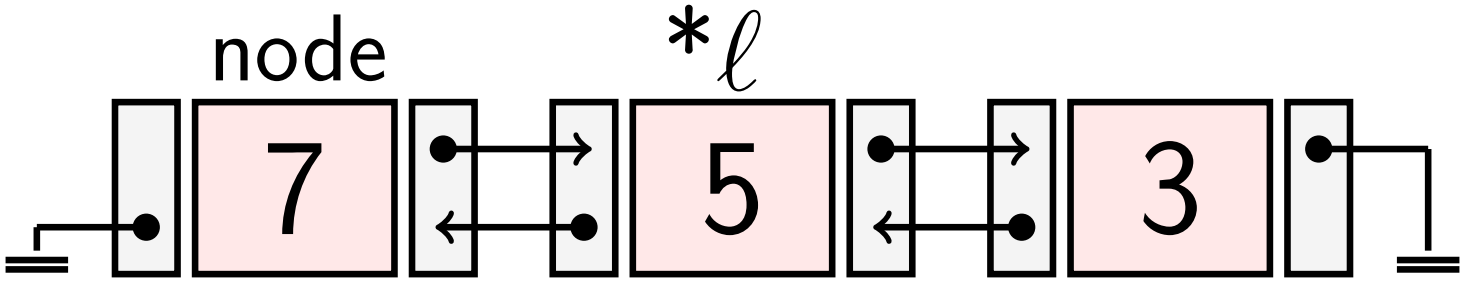

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Importante: a função **main** sempre (e somente) guarda a **cabeça** da lista.

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1: int main (void)
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2:     List *ℓ = create ();
3:     ℓ = insert-front (ℓ, 3);
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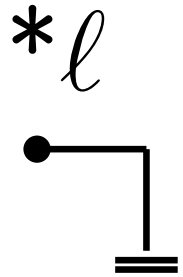


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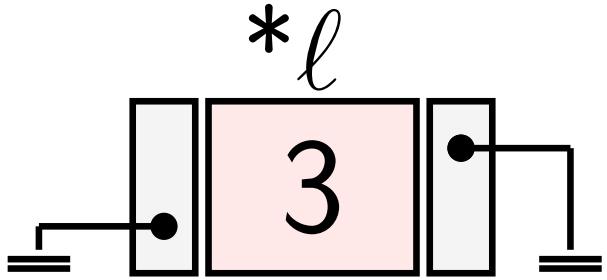


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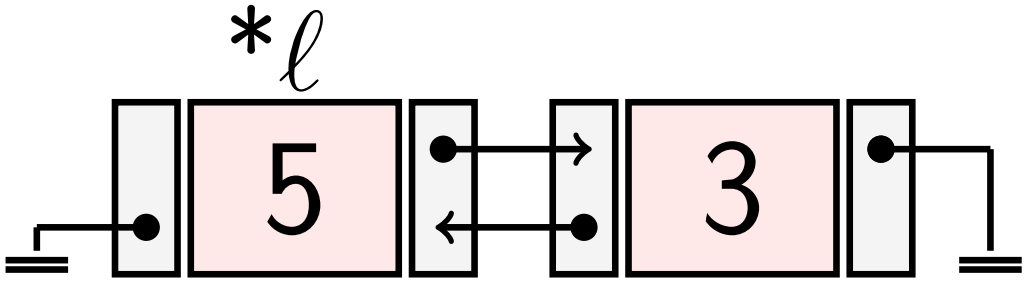


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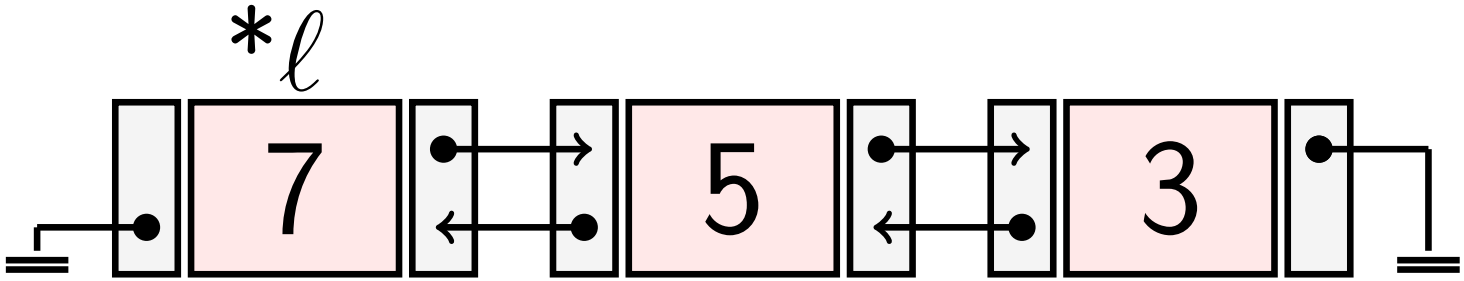


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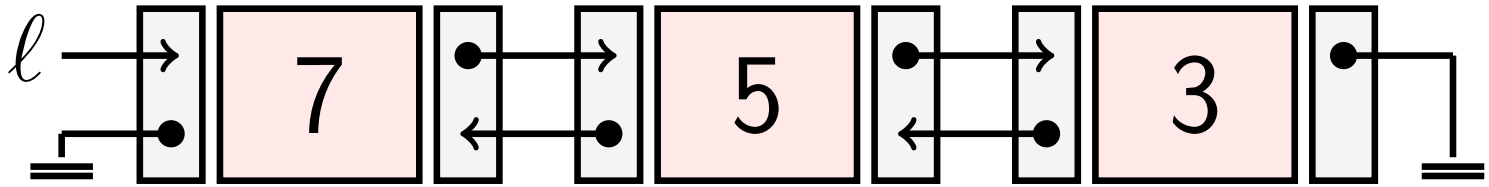


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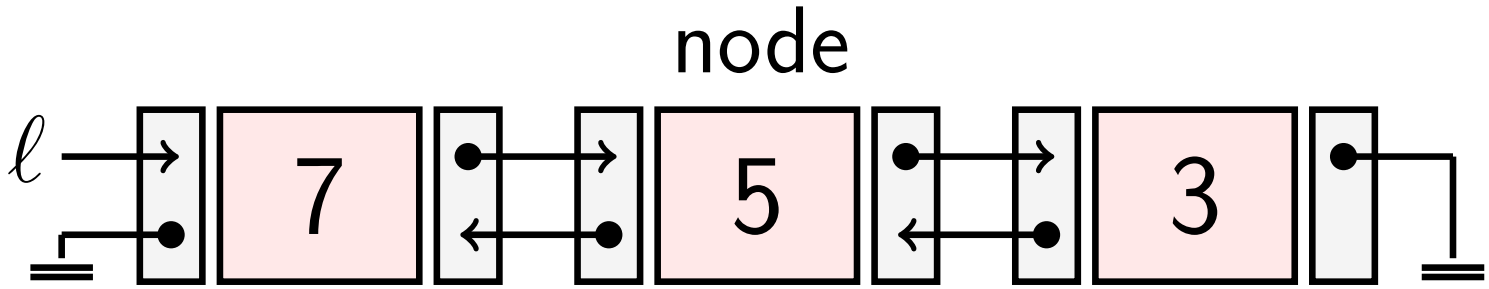


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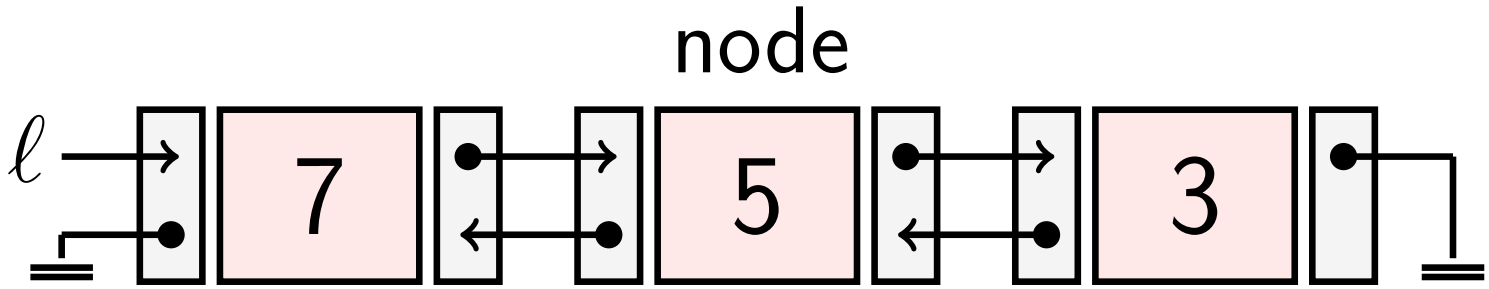


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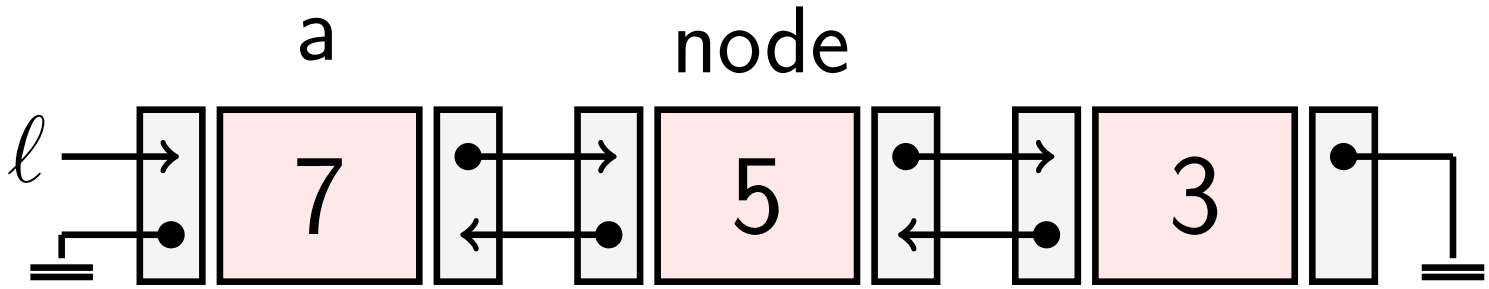


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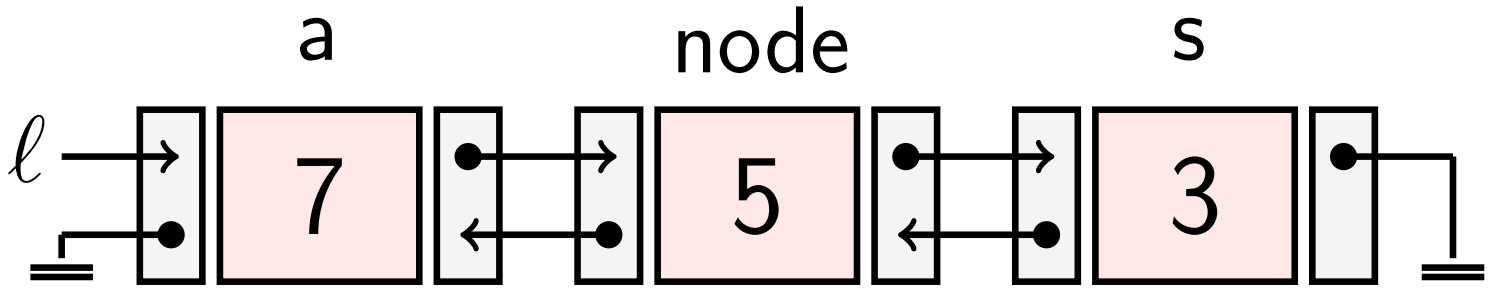


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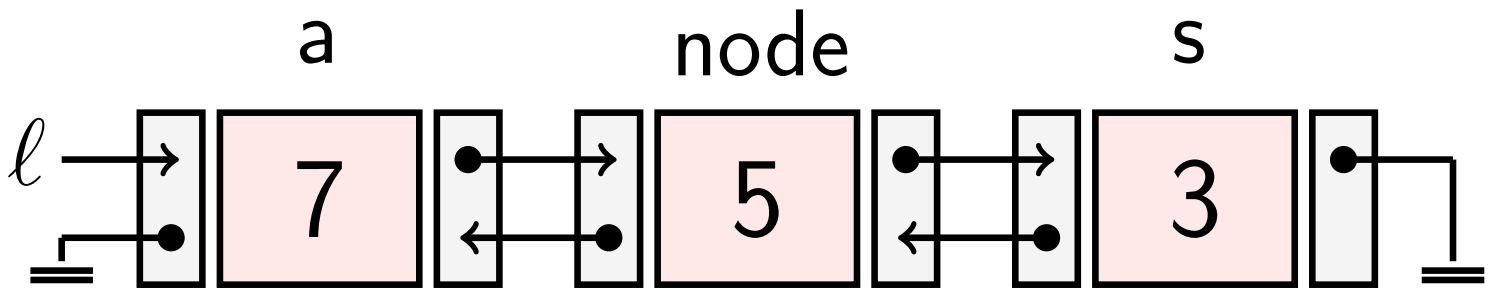


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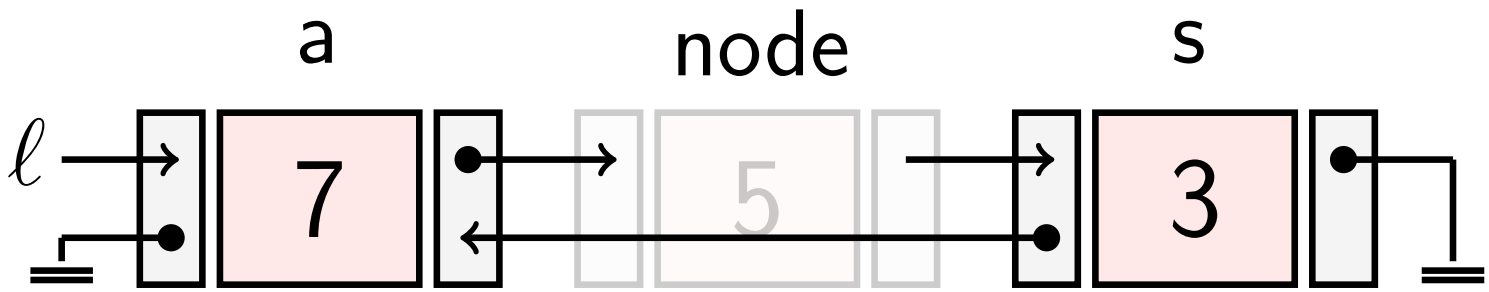


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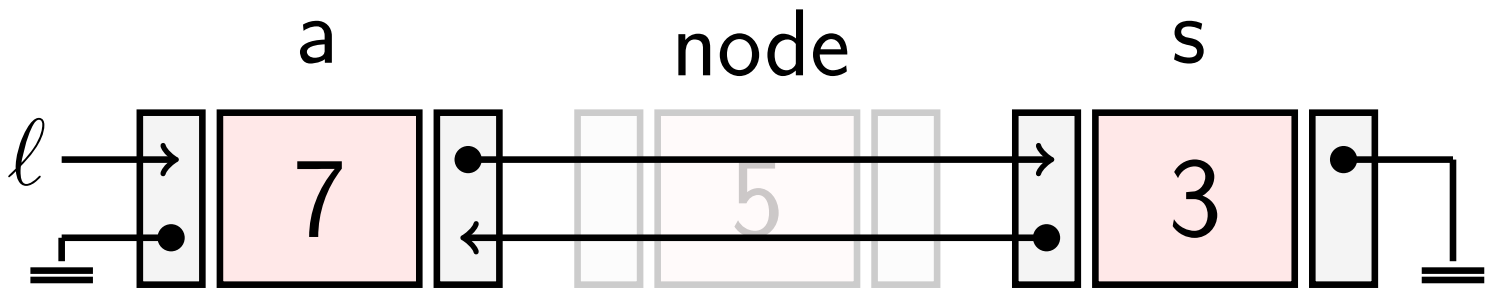


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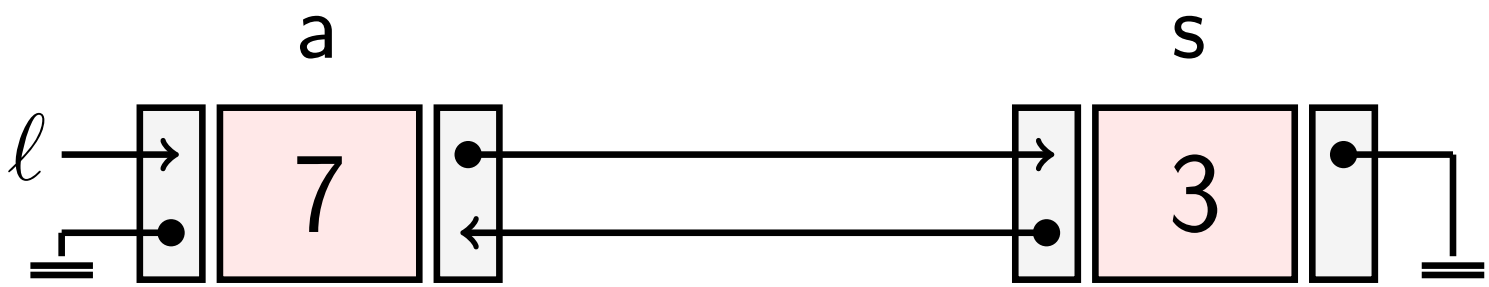


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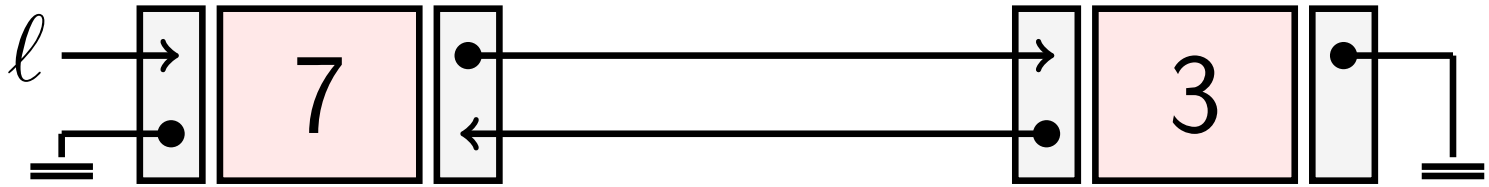


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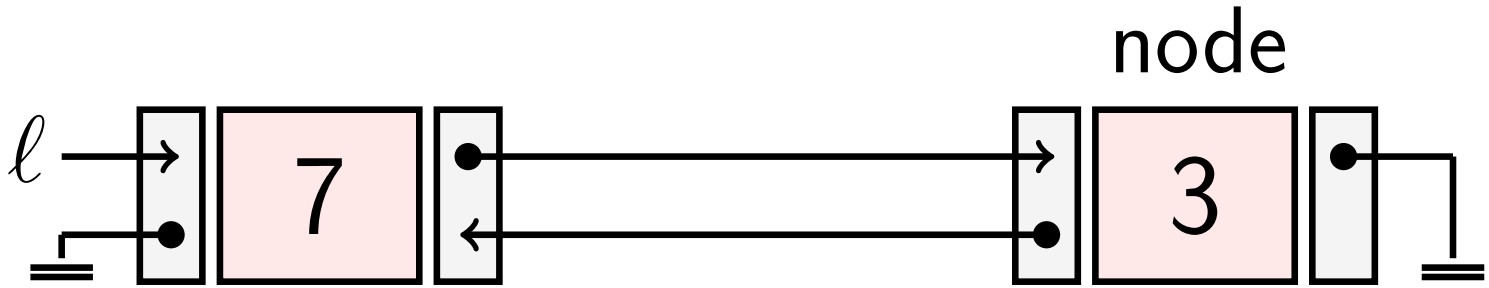
Remover: 3

Remover

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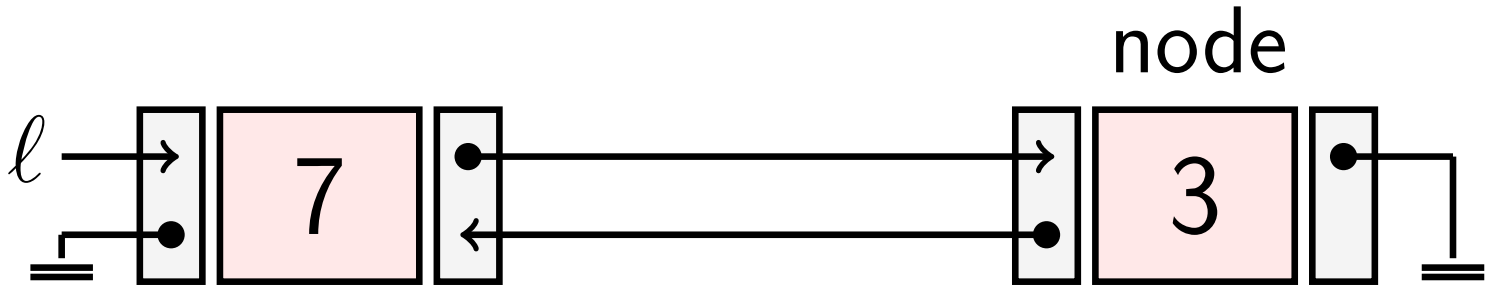
Remover: 3

Remover

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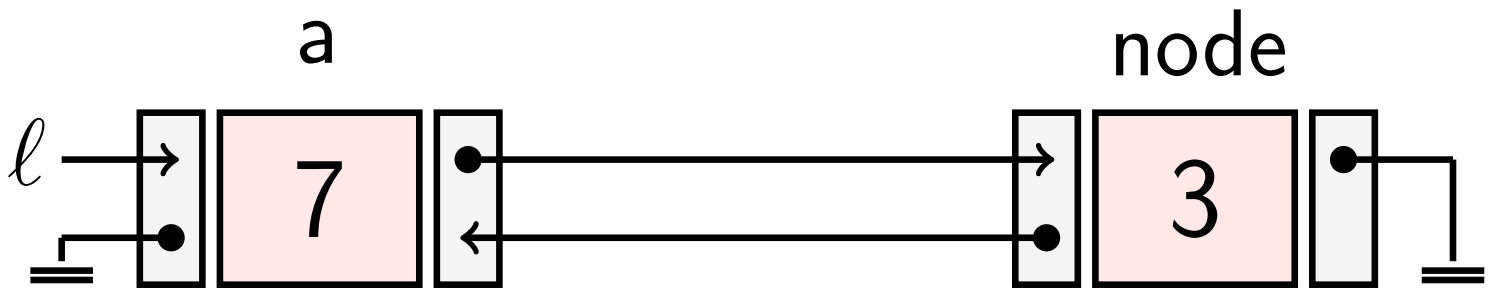


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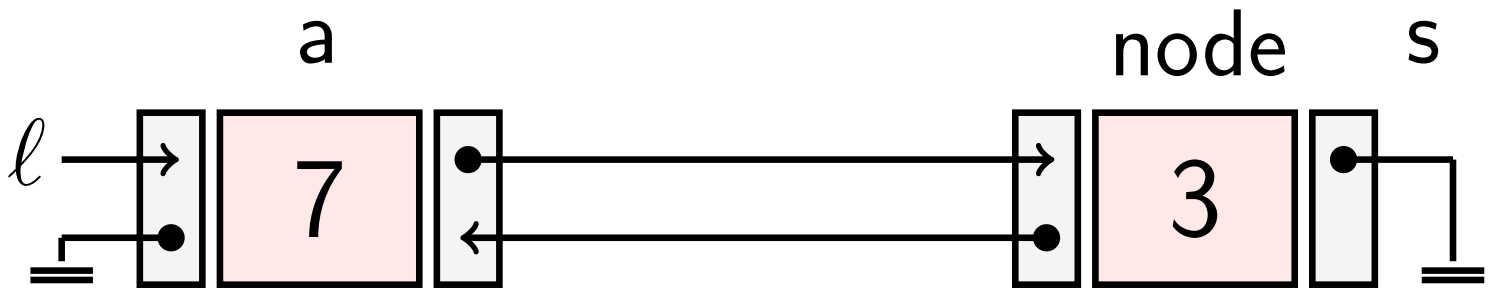


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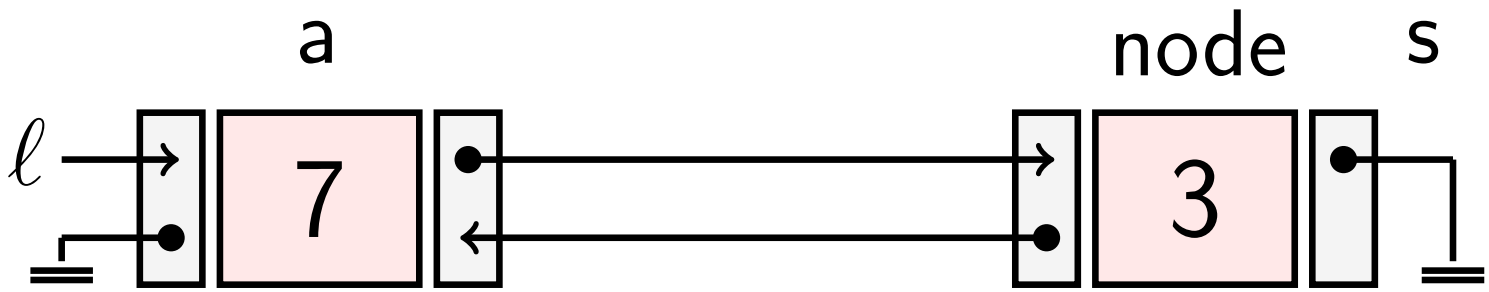


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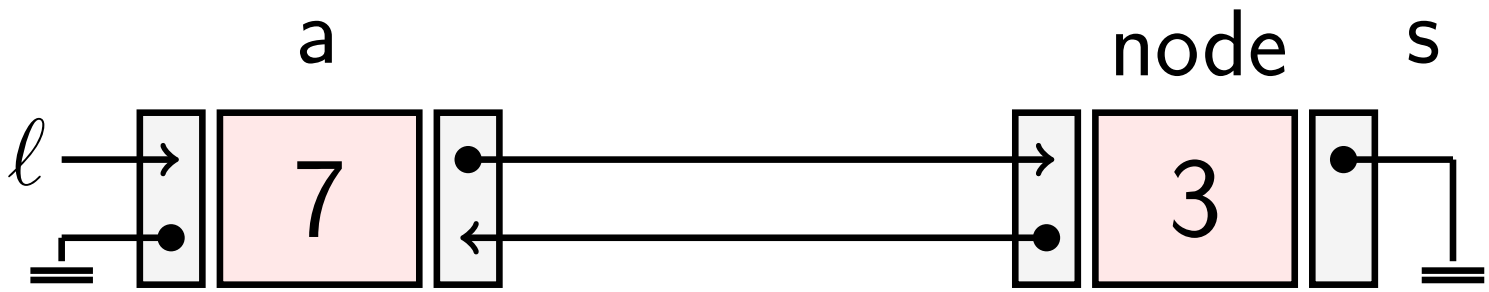


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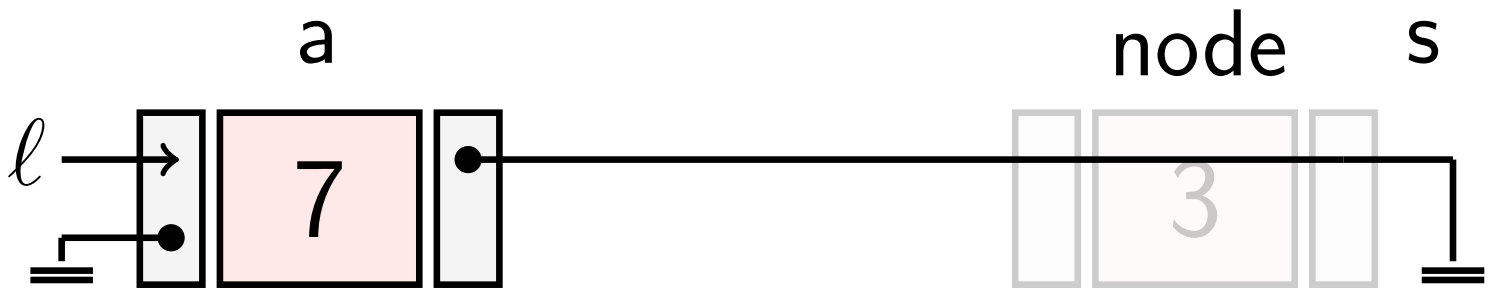


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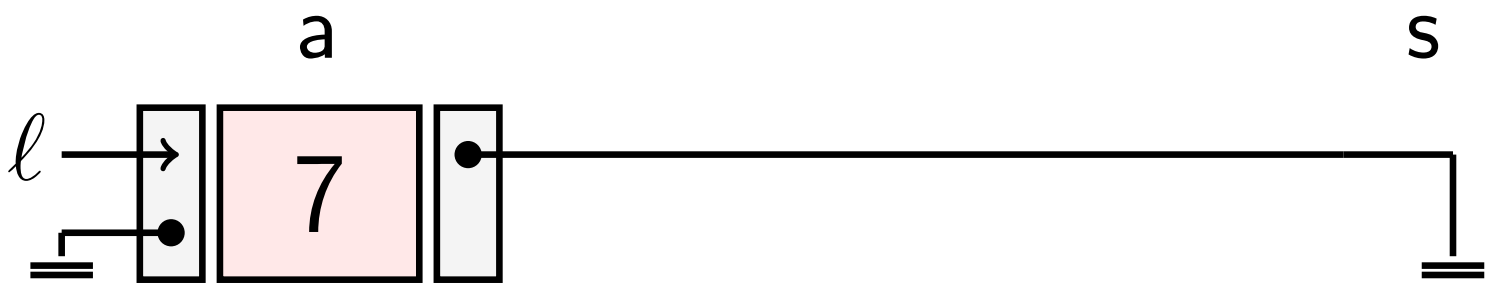


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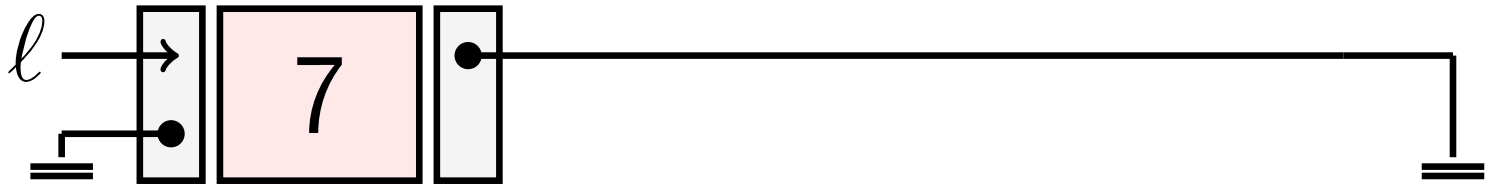


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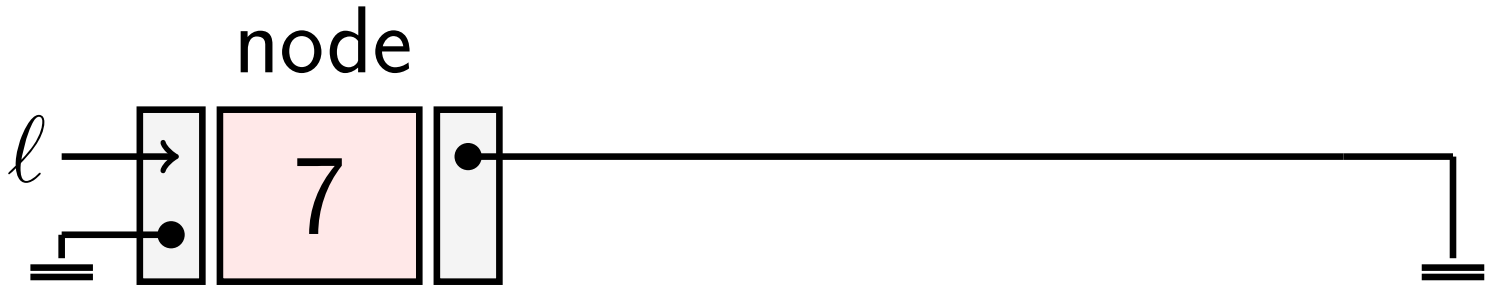
Remover: 7

Remover

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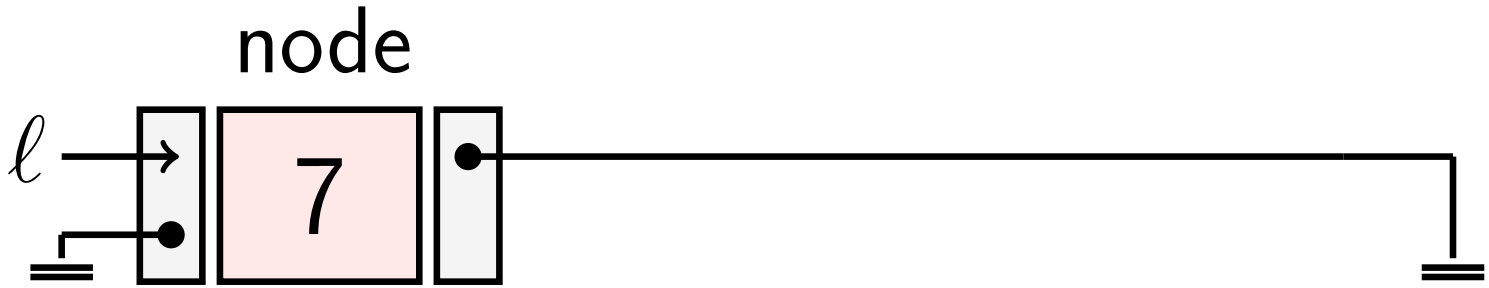


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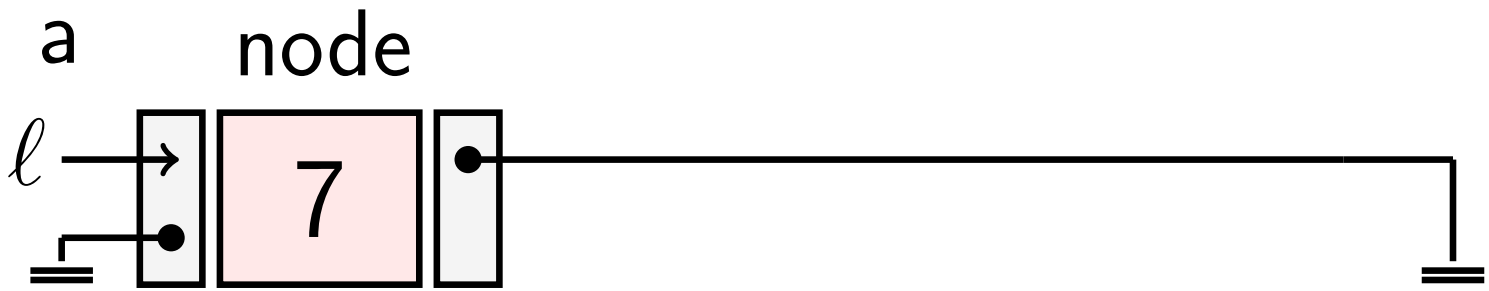

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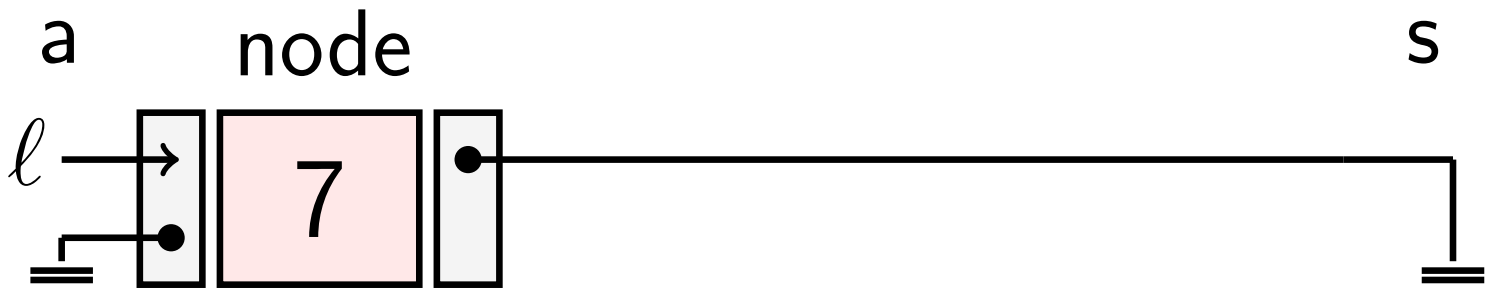


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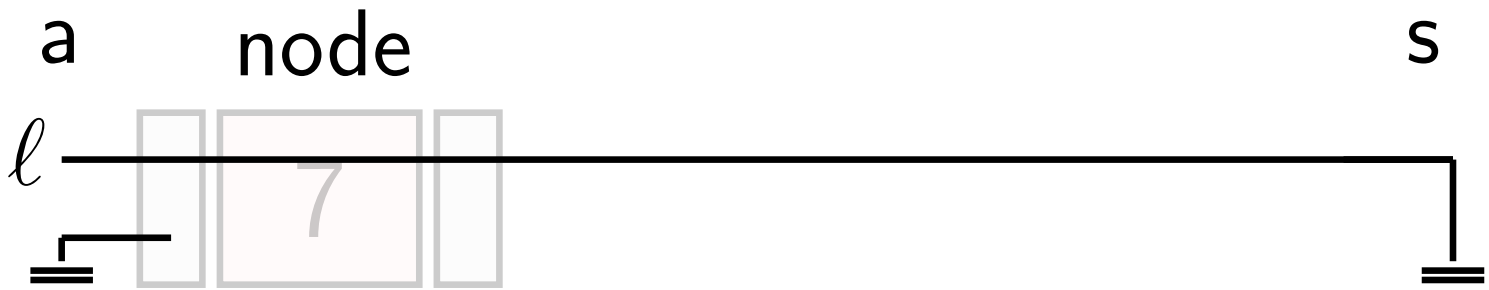


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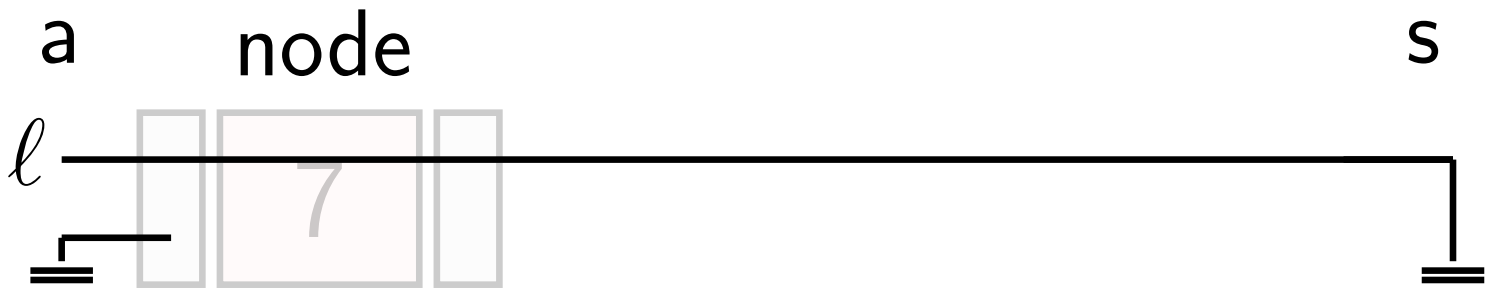


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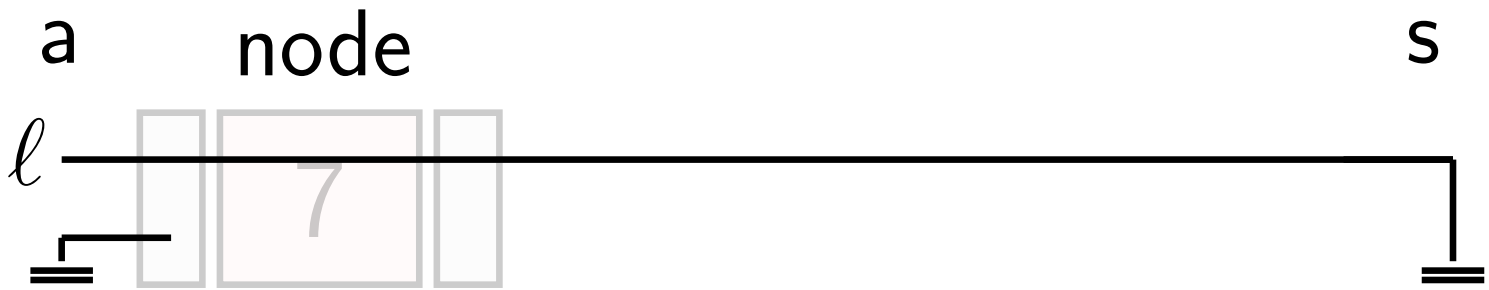

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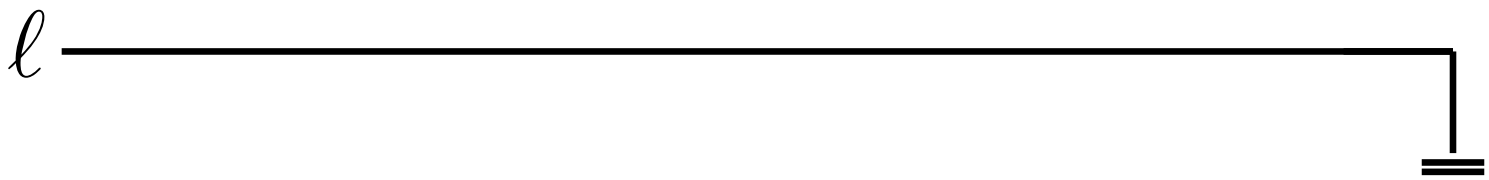


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