

Algoritmos e Estruturas de Dados II

Shellsort

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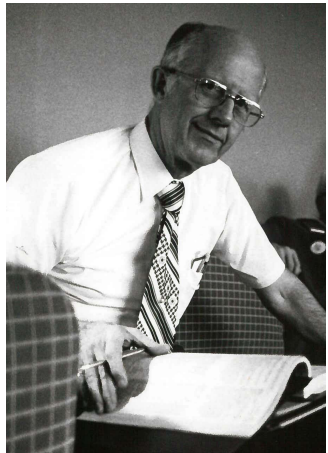
Objetivos

Entender o funcionamento do algoritmo de ordenação **Shellsort**

Shellsort

Shellsort

O Shellsort foi inventado por Donald L. Shell (1924-2015) em 1959 (“A high-speed sorting procedure”. Communications of the ACM, vol. 2, no. 7, July 1959, 30-32).



Donald L. Shell (1984)

Shellsort

Shellsort

1. Divida a lista em segmentos de tamanho h , e ordene por inserção a lista formada por cada primeiro elemento de cada segmento.

Shellsort

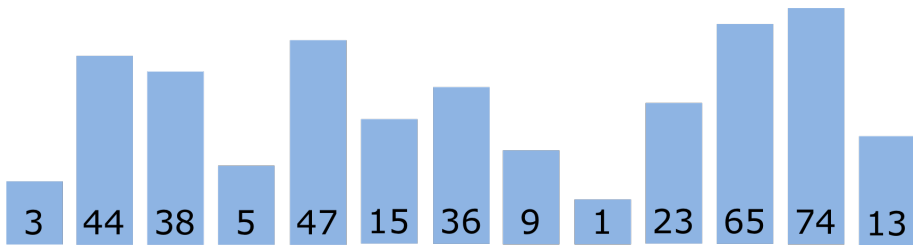
1. Divida a lista em segmentos de tamanho h , e ordene por inserção a lista formada por cada primeiro elemento de cada segmento.
2. Aplique o passo 1 para cada segmento de tamanho h até o fim da lista.

Shellsort

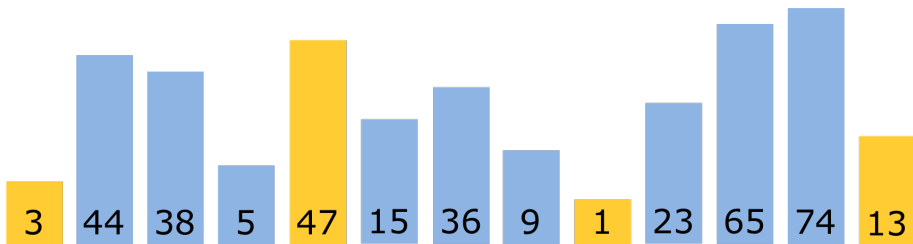
1. Divida a lista em segmentos de tamanho h , e ordene por inserção a lista formada por cada primeiro elemento de cada segmento.
2. Aplique o passo 1 para cada segmento de tamanho h até o fim da lista.
3. Aplique os passos 1 e 2 para $h = 1, 4, 13, 40, 121, 364, 1093, \dots$, na ordem inversa.

Shellsort

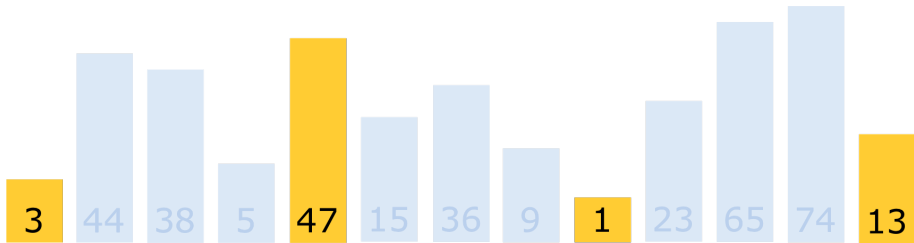
Esta **sequência de incrementos** de h é considerada uma das mais eficientes, obtida empiricamente (Segdewick e Wayne).



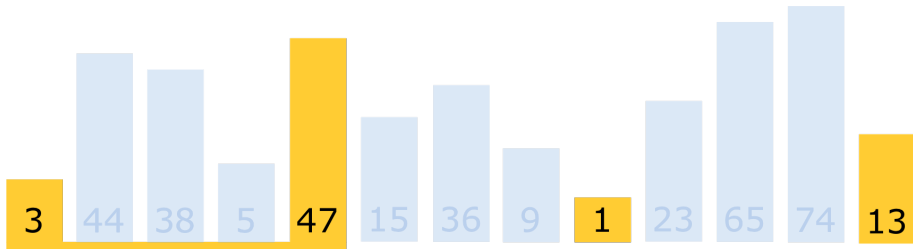
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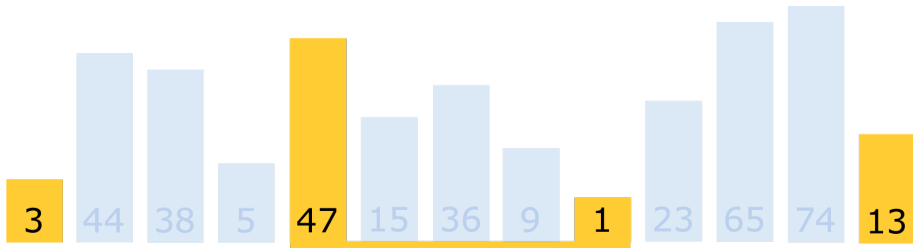
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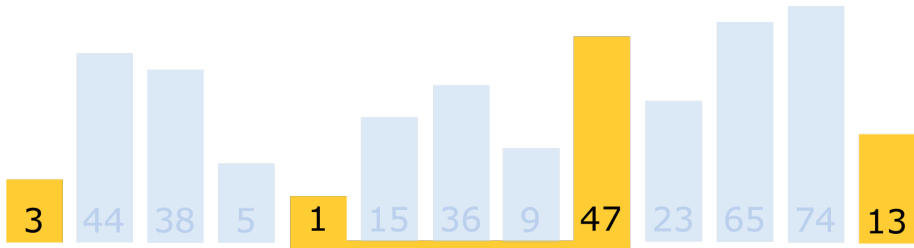
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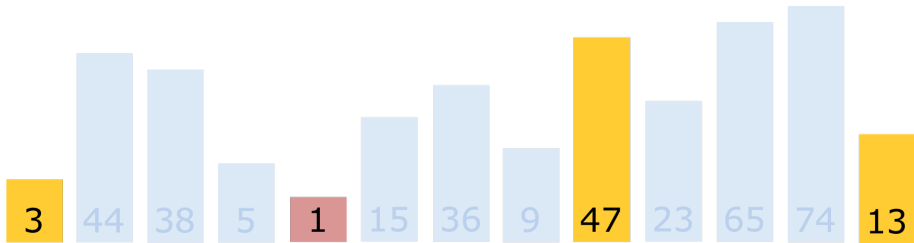
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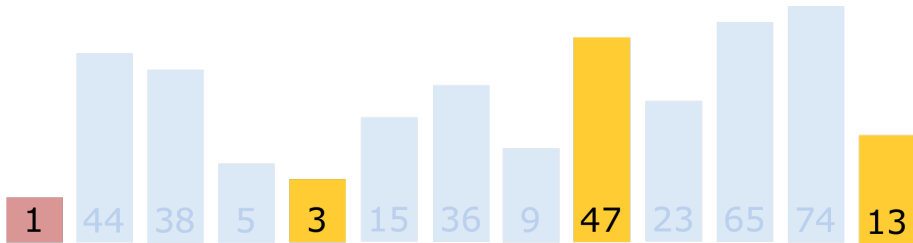
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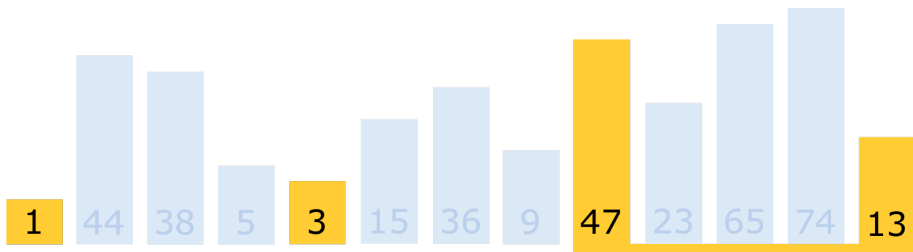
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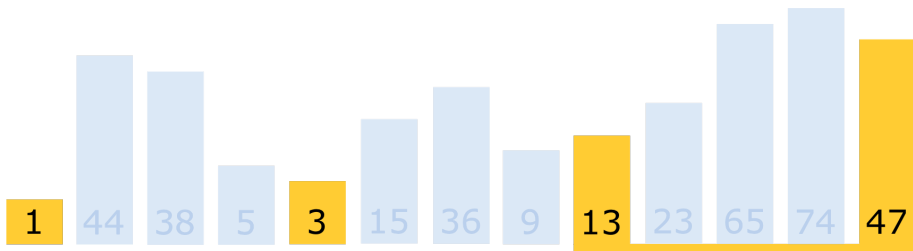
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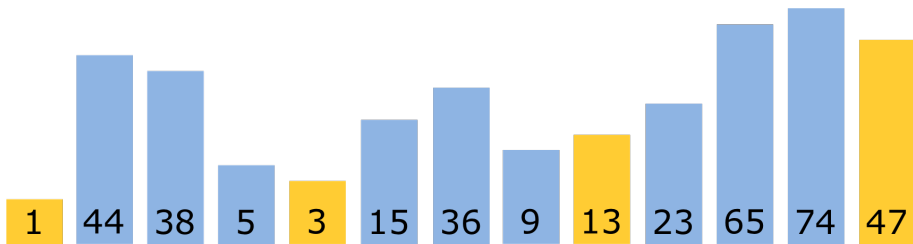
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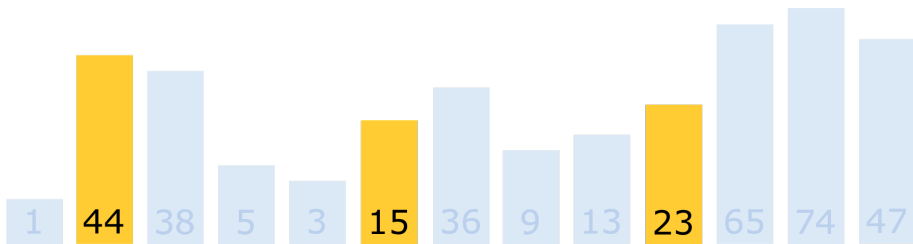
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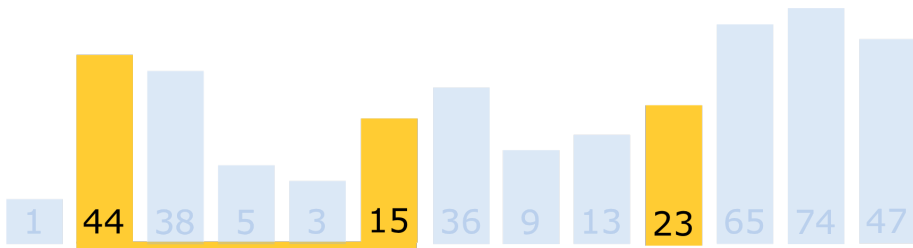
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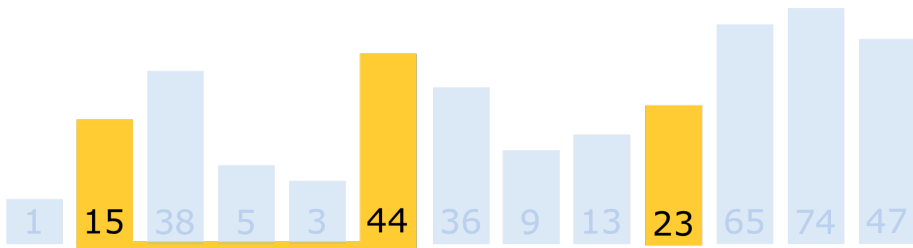
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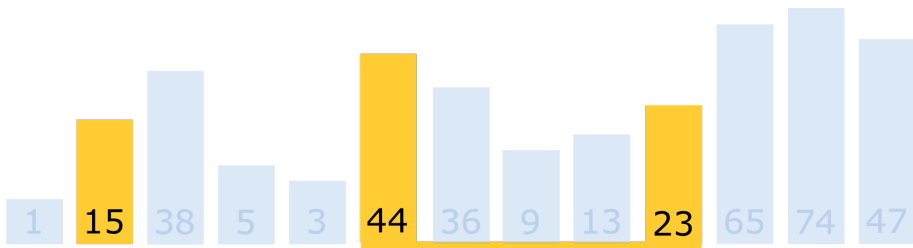
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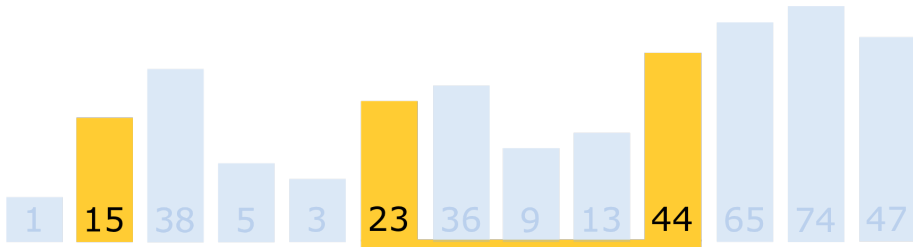
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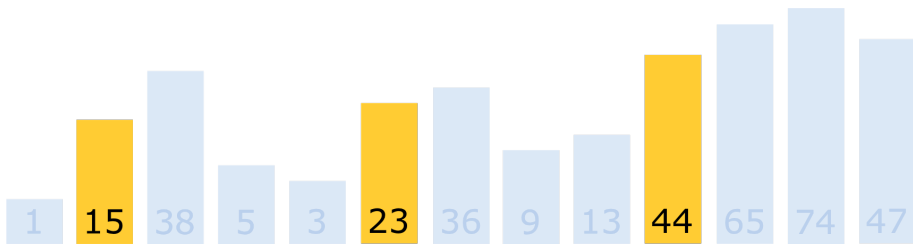
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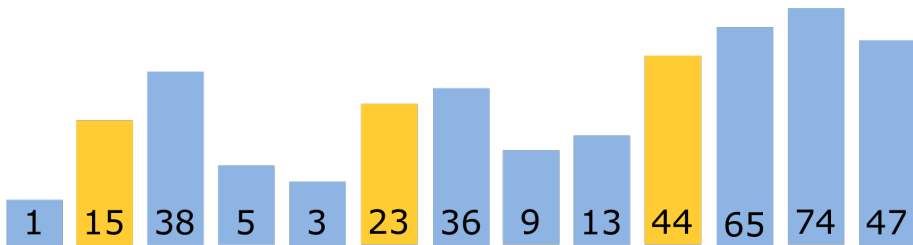
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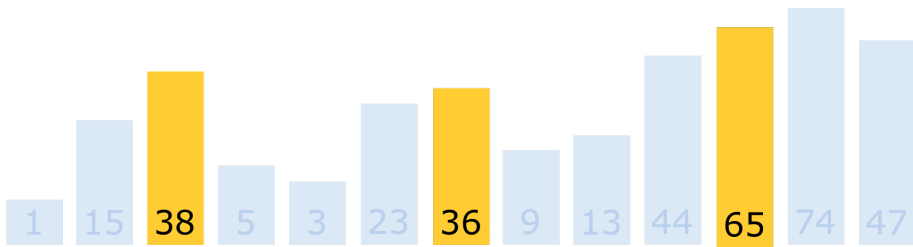
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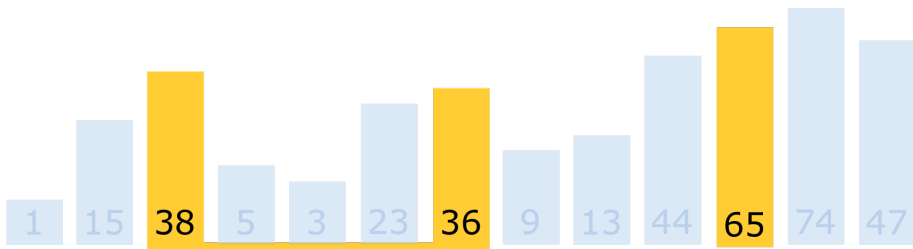
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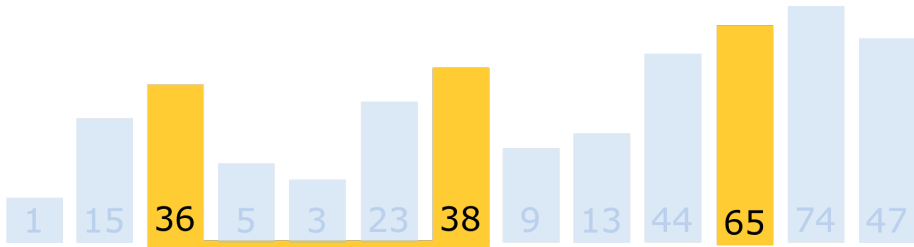
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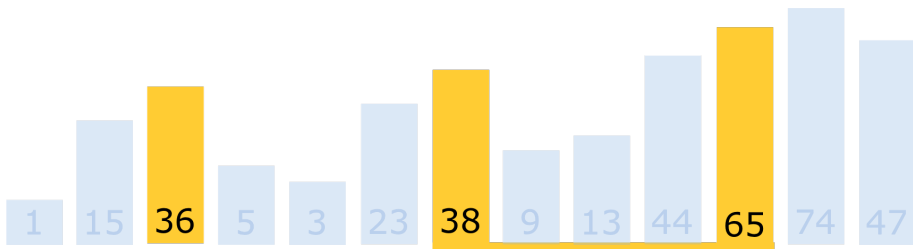
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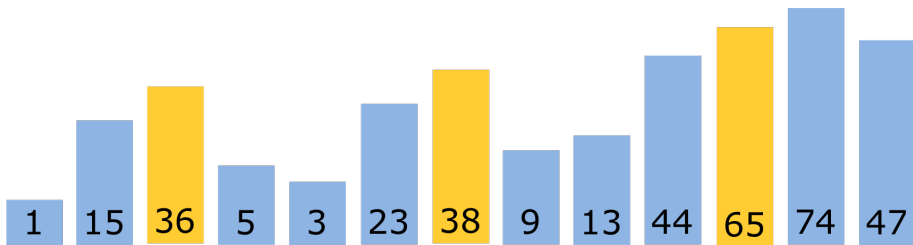
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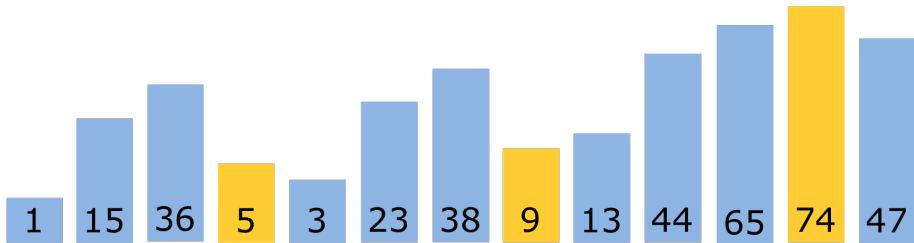
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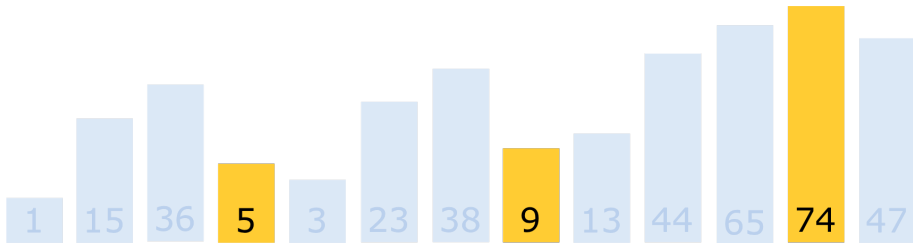
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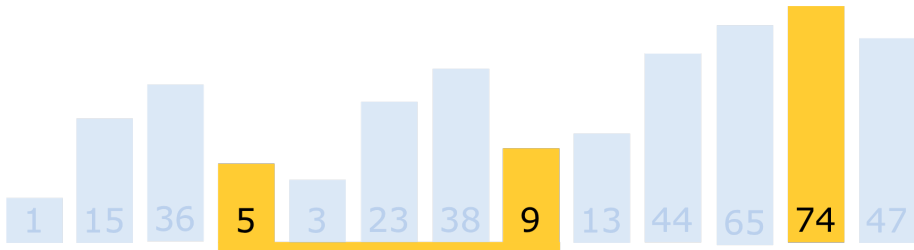
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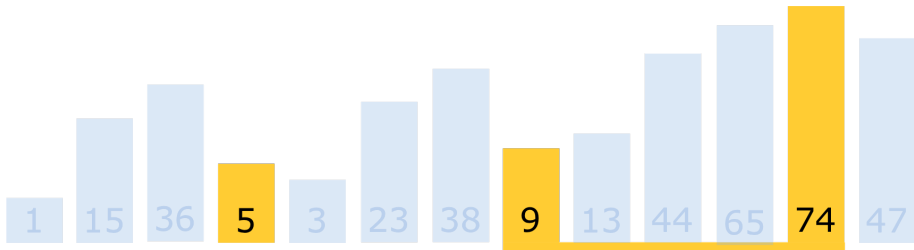
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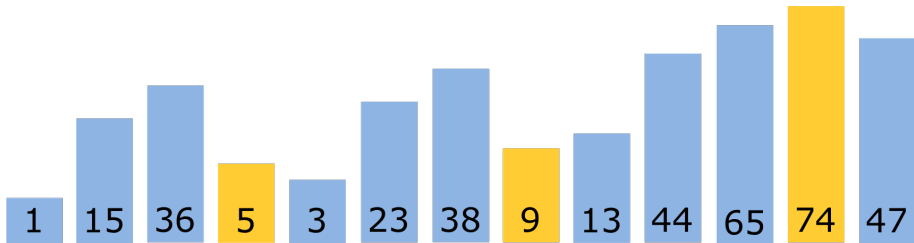
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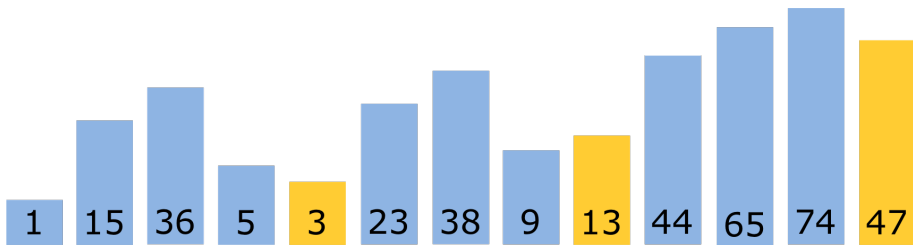
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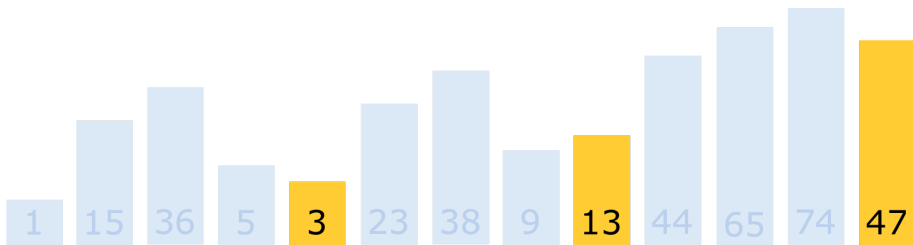
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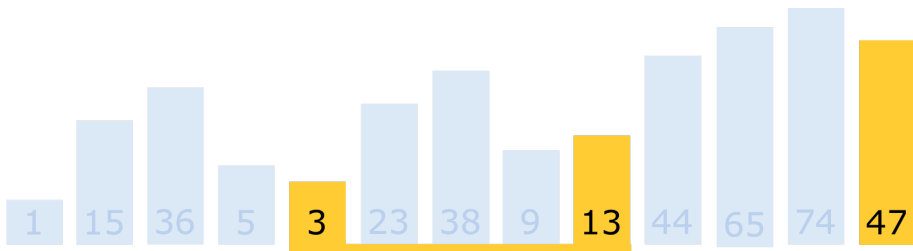
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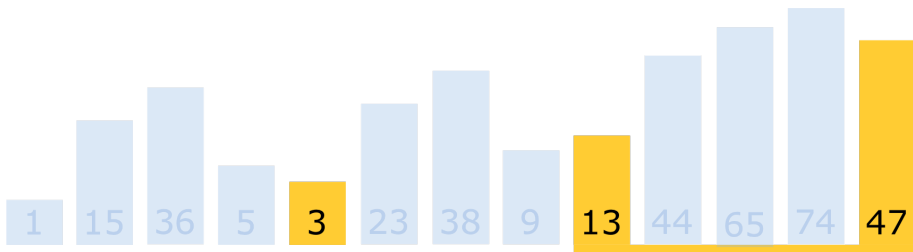
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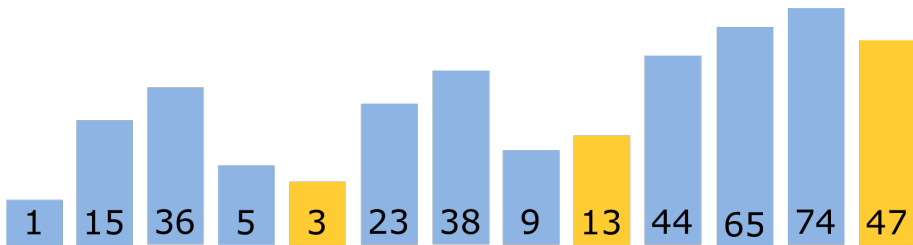
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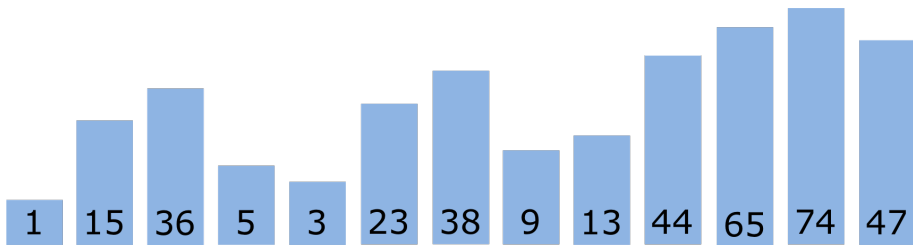
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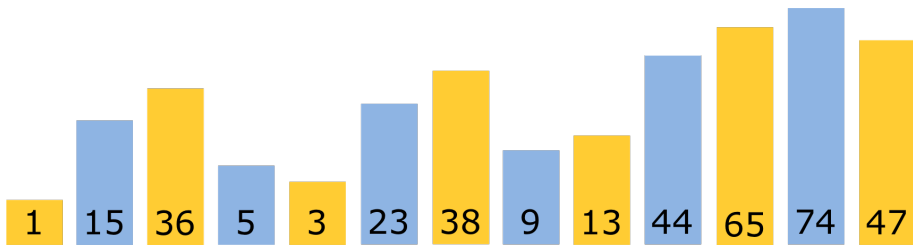
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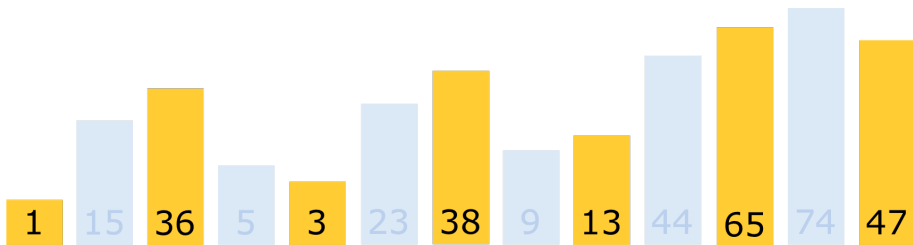
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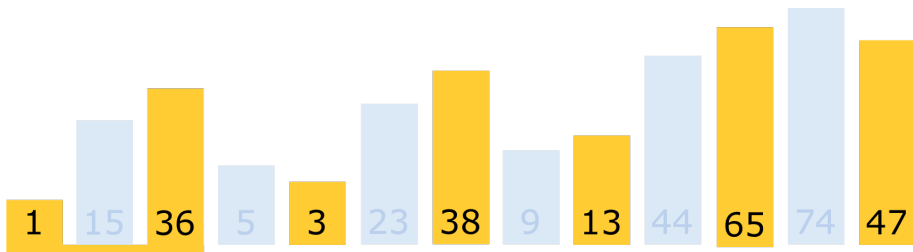
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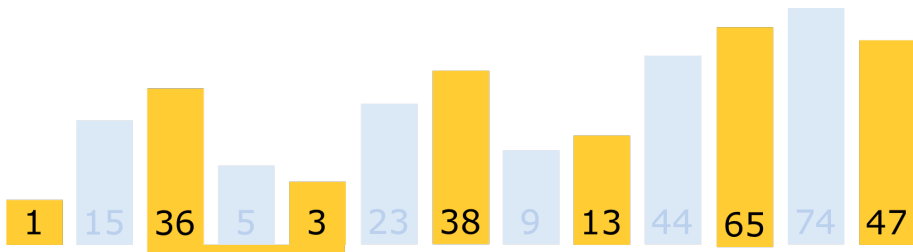
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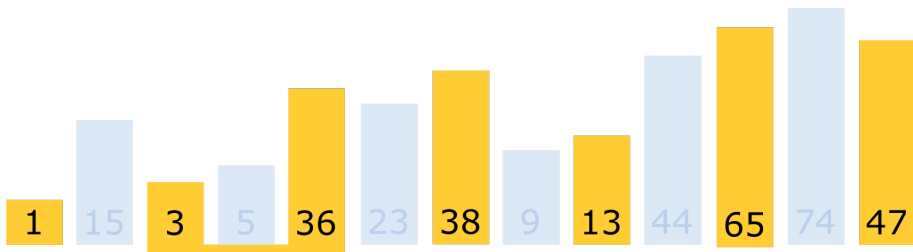
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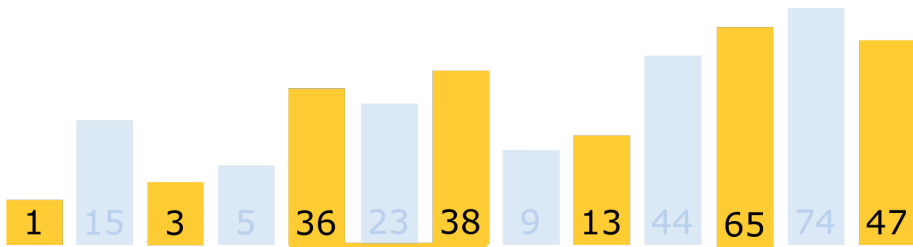
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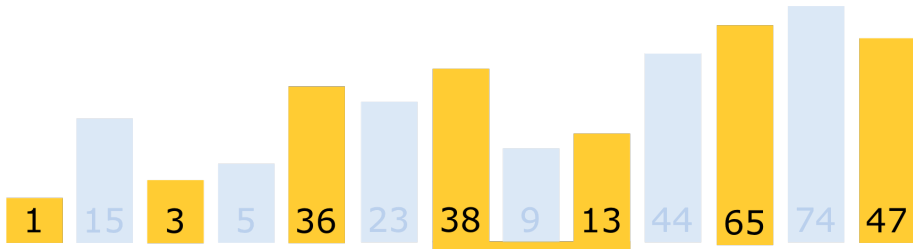


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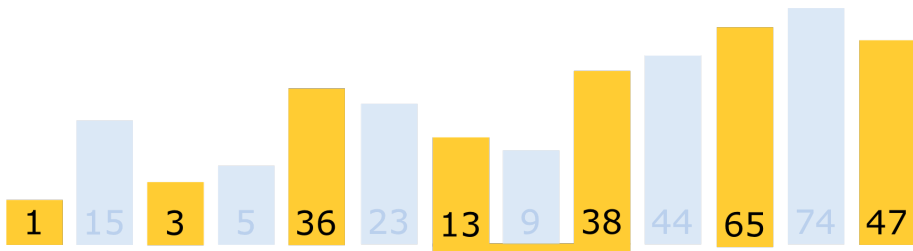


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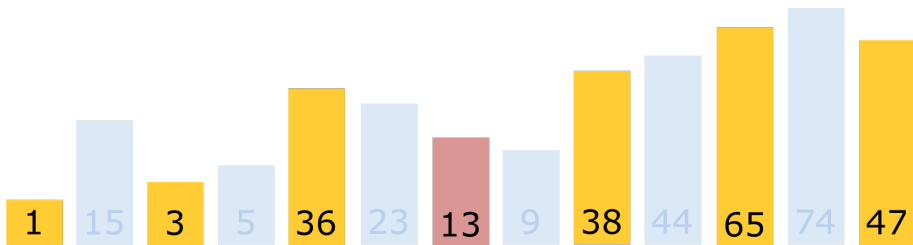




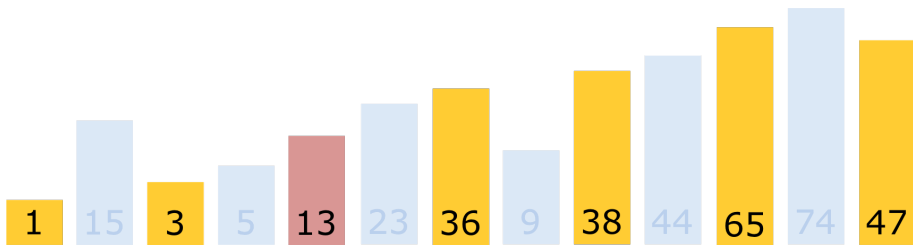
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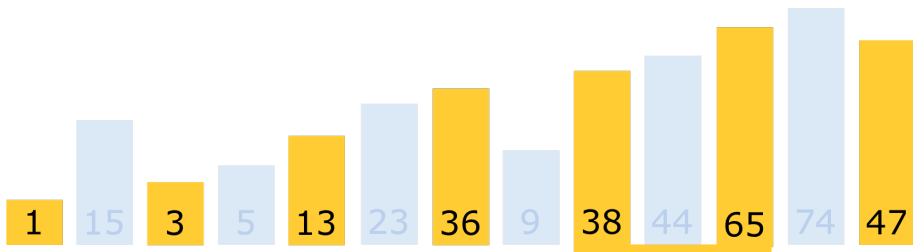
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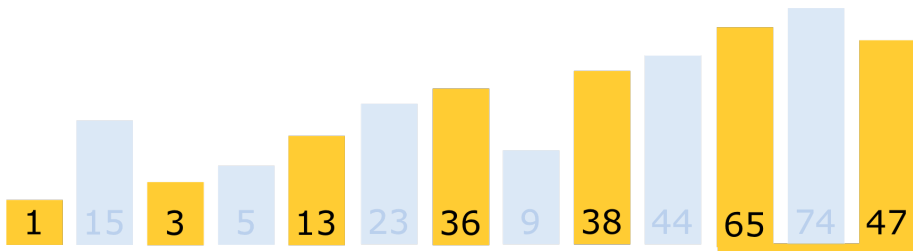
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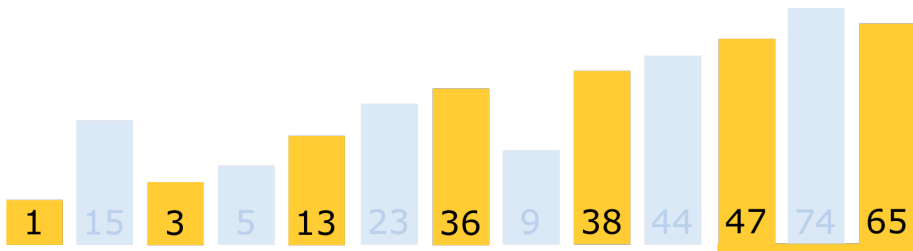
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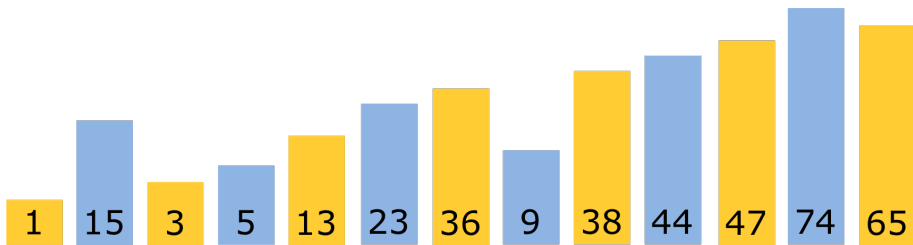
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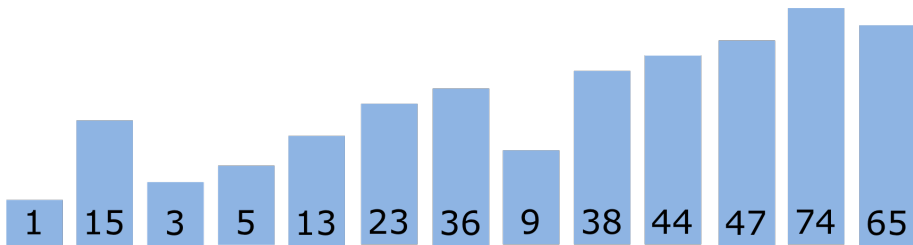
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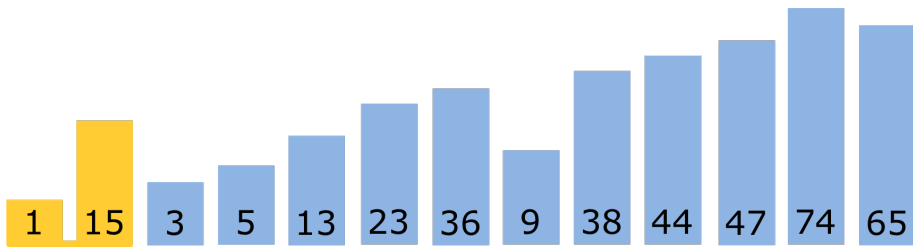
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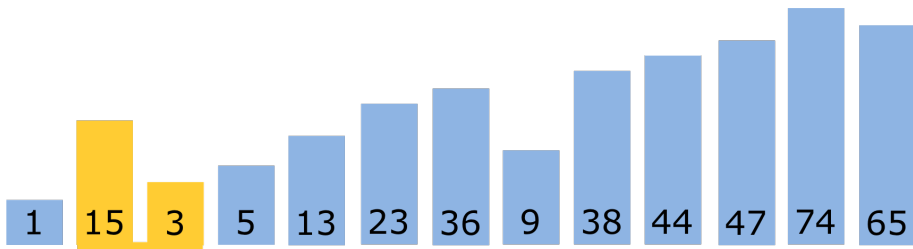
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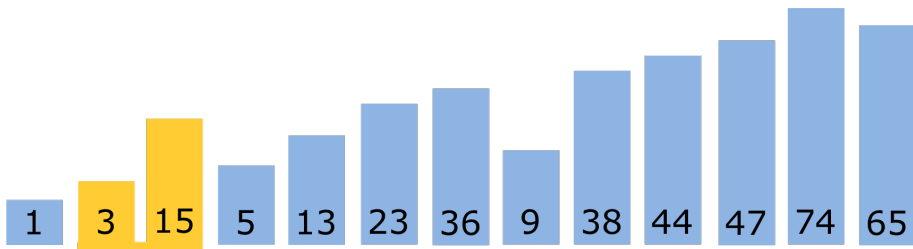
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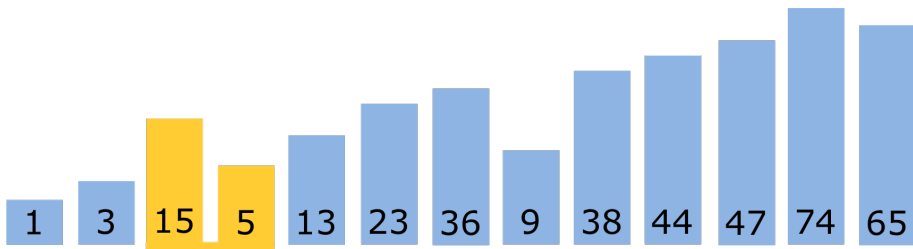
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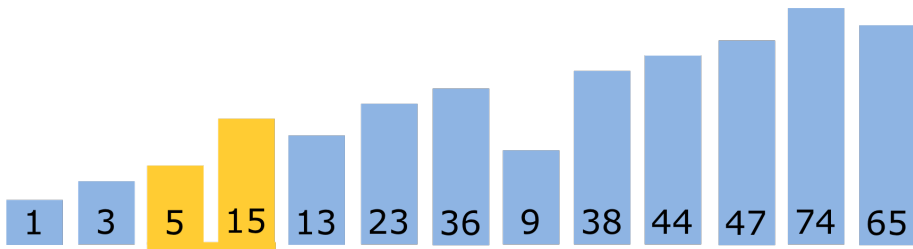
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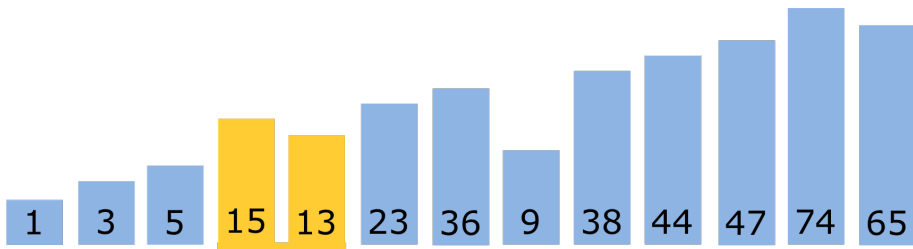
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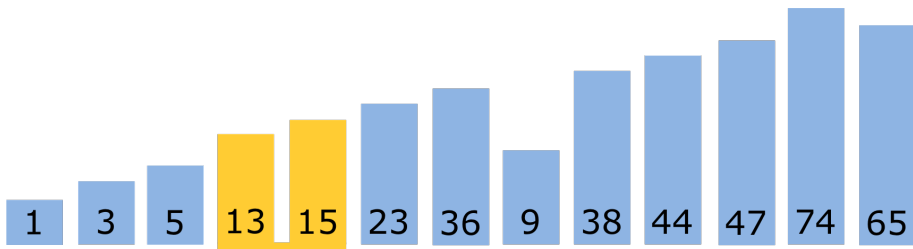
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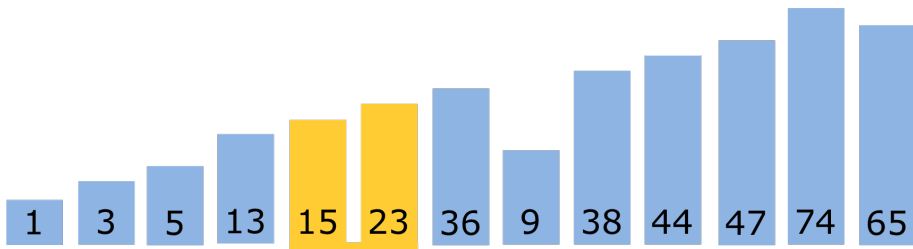
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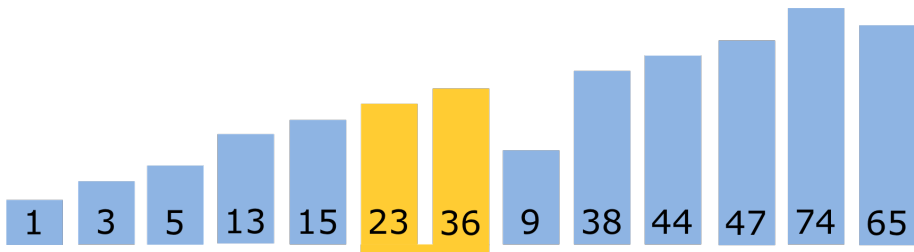
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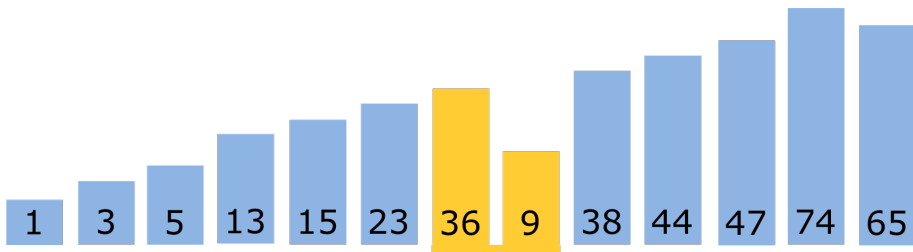
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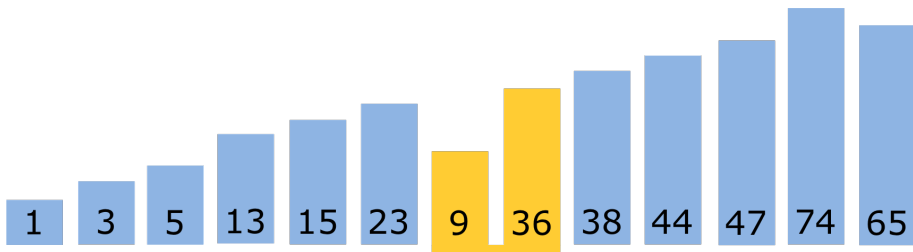
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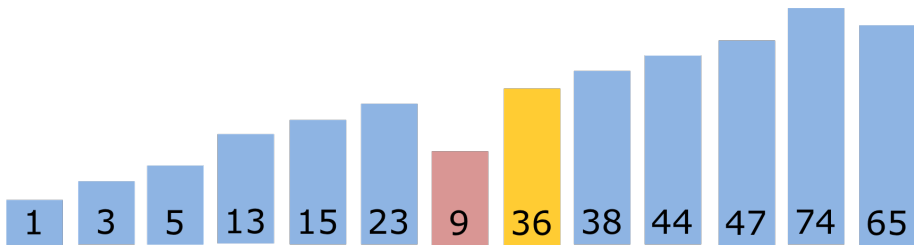
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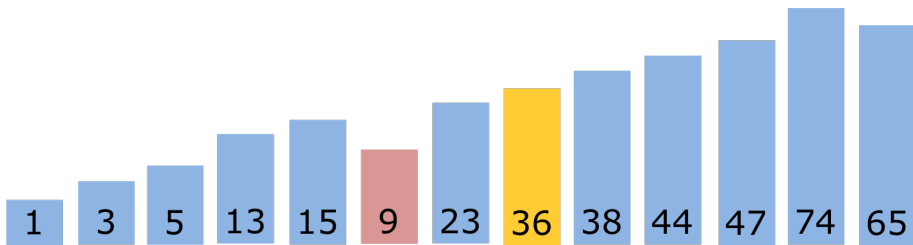
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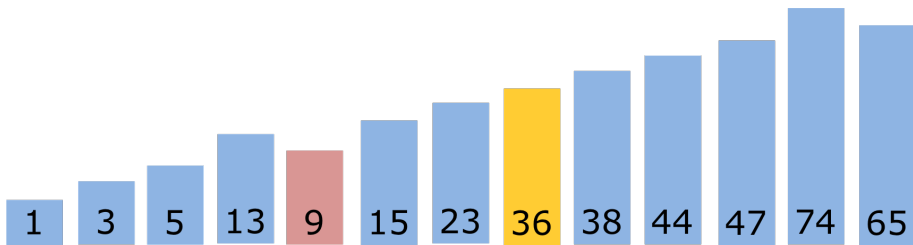
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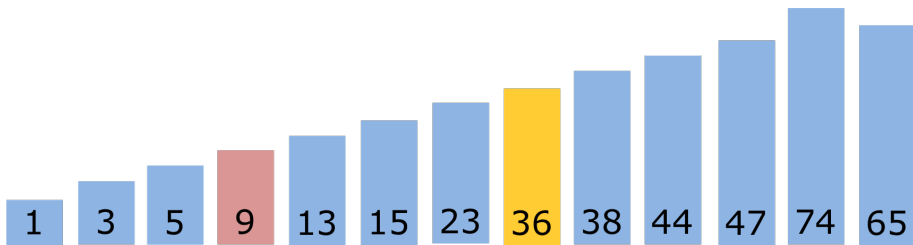
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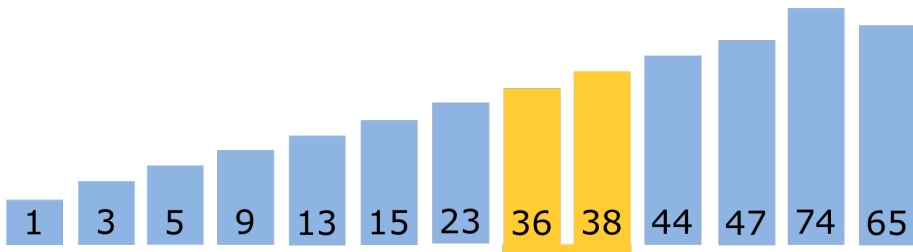
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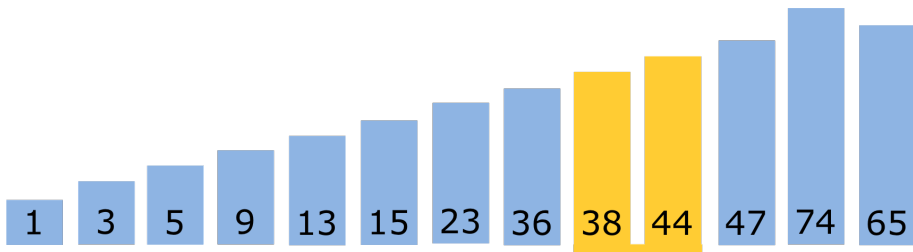
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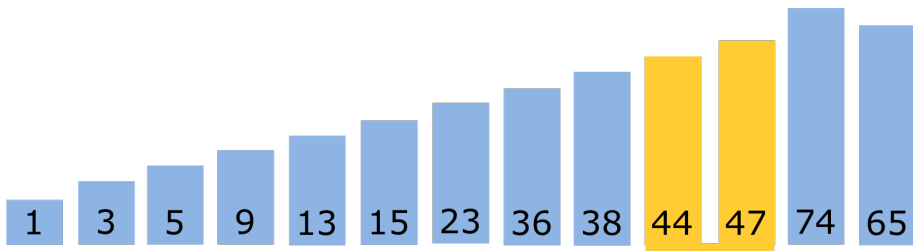
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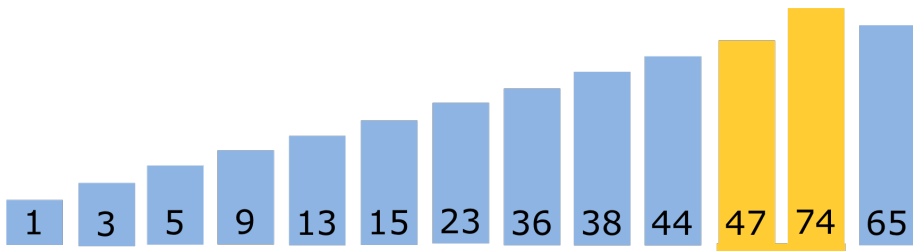
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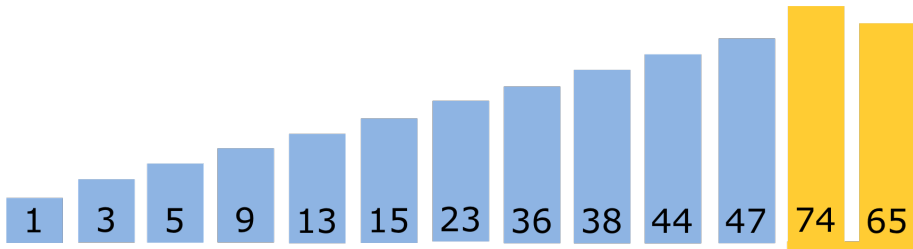
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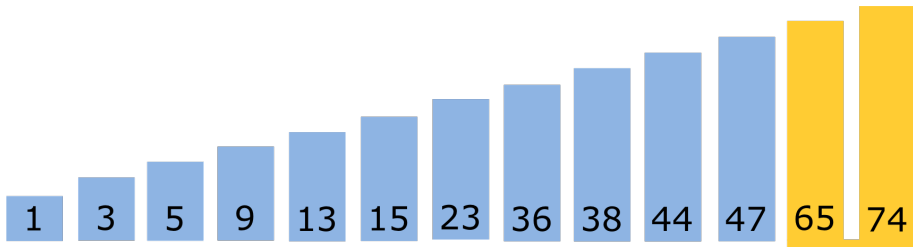
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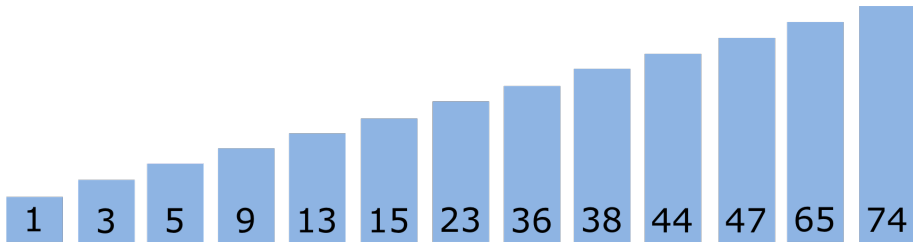
$h = 1$



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SHELLSORT(*A*)

1 $h = 1$

2 **enquanto** $h < A.tam/3$ $h = 3 * h + 1$

3 **enquanto** $h \geq 1$

4 **para** $i = h$ **até** $A.tam - 1$

5 $j = i$

6 **enquanto** $j \geq h$ **e** $A[j] < A[j - h]$

7 troque $A[j]$ com $A[j - h]$

8 $j = j - h$

9 $h = h/3$

Shellsort





Shellsort está em posição intermediária entre os métodos simples e os eficientes.

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Utilizado por profissionais por ser **simples, pequeno e não requerer memória extra** (implementado em hardware ou em sistemas embarcados, se não for necessário um método mais rápido).

Referências

-  T. H. Cormen, C.E. Leiserson, R.L. Rivest, C. Stein, Introduction to Algorithms, 3rd edition, MIT Press, 2010
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-  N. Ziviani. Projeto de Algoritmos com Implementação em Pascal C. Cengage Learning, 2012

Onde obter este material:

`est.uea.edu.br/fcoelho`