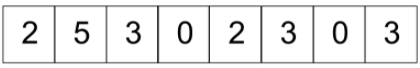
Unidade IV:

Ordenação Interna – Counting Sort

**Exercício Resolvido (1):**

Arranje o array abaixo com Counting Sort:



**Resposta:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Entrada | 2 | 5 | 3 | 0 | 2 | 3 | 0 | 3 |
| Contagem | 2 | 0 | 2 | 3 | 0 | 1 |  |  |

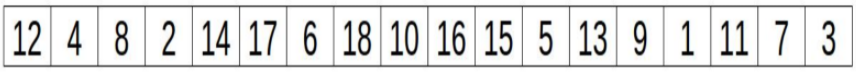
|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Entrada | 2 | 5 | 3 | 0 | 2 | 3 | 0 | 3 |
| Contagem | 2 | 2 | 4 | 7 | 7 | 8 |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Entrada | 2 | 5 | 3 | 0 | 2 | 3 | 0 | 3 |
| Contagem | 2(-1, -1) | 2 | 4(-1, -1) | 7(-1, -1, -1) | 7 | 8(-1) |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Saída | 0 | 0 | 2 | 2 | 3 | 3 | 3 | 5 |

**Exercício Resolvido (2):**

Seja o array de entrada abaixo, quais serão os valores contidos no array de contagem antes e depois de copiarmos os elementos da entrada para a saída?



**Resposta:**

Array de contagem (linha 3) antes (passo 1):

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 12 | 4 | 8 | 2 | 14 | 17 | 6 | 18 | 10 | 16 | 15 | 5 | 13 | 9 | 1 | 11 | 7 | 3 |  |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

Array de contagem (linha 3) antes (passo 2):

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 12 | 4 | 8 | 2 | 14 | 17 | 6 | 18 | 10 | 16 | 15 | 5 | 13 | 9 | 1 | 11 | 7 | 3 |  |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |

Array de contagem (linha 3) depois:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 0 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |

**Exercício Resolvido (3):**

O Counting Sort pode ser aplicado adequadamente na ordenação de

strings e números reais?

**Resposta:**

Não, este tipo de ordenação só pode ser feita com números inteiros, pois com eles não teremos problemas de identificar a posição dos valores do array de entrada.

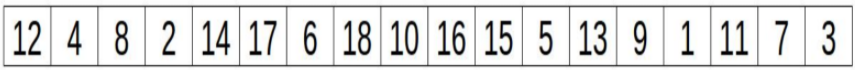
**Exercício Resolvido (4):**

Nosso dinheiro é um número real. Conseguimos utilizar adequadamente o Counting Sort para ordenar valores financeiros? **Resposta:**

Sim, multiplicando os valores reais por 100, assim transformando em números inteiros, ordenando-os e logo depois dividindo os valores ordenados por 100, assim voltando com os valores para real.

**Exercício (1):**

Mostre todas as comparações e movimentações do algoritmo anterior para o array abaixo:

****

**Resposta:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| Input | 12 | 4 | 8 | 2 | 14 | 17 | 6 | 18 | 10 | 16 | 15 | 5 | 13 | 9 | 1 | 11 | 7 | 3 |  |
| count | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| Input | 12 | 4 | 8 | 2 | 14 | 17 | 6 | 18 | 10 | 16 | 15 | 5 | 13 | 9 | 1 | 11 | 7 | 3 |  |
| count | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |

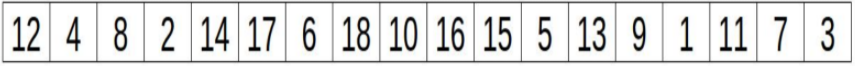
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| Input | 12 | 4 | 8 | 2 | 14 | 17 | 6 | 18 | 10 | 16 | 15 | 5 | 13 | 9 | 1 | 11 | 7 | 3 |  |
| count | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| Output | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |

Unidade IV:

Ordenação Interna - Shellsort

**Exercício (1):**

Mostre todas as comparações e movimentações do algoritmo anterior para o array abaixo: ****

**Resposta:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** |
| 12 | 4 | 8 | 2 | 14 | 17 | 6 | 18 | 10 | 16 | 15 | 5 | 13 | 9 | 1 | 11 | 7 | 3 |
| 9 | 1 | 8 | 2 | 3 | 17 | 6 | 18 | 10 | 16 | 15 | 5 | 13 | 12 | 4 | 11 | 7 | 14 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 9 | 1 | 8 | 2 | 3 | 17 | 6 | 18 | 10 | 16 | 15 | 5 | 13 | 12 | 4 | 11 | 7 | 14 |
| 3 | 1 | 4 | 2 | 7 | 12 | 6 | 5 | 9 | 14 | 8 | 11 | 10 | 16 | 15 | 18 | 13 | 17 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 | 1 | 4 | 2 | 7 | 12 | 6 | 5 | 9 | 14 | 8 | 11 | 10 | 16 | 15 | 18 | 13 | 17 |
| 3 | 1 | 4 | 2 | 6 | 5 | 7 | 11 | 8 | 12 | 9 | 14 | 10 | 16 | 13 | 17 | 15 | 18 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 | 1 | 4 | 2 | 6 | 5 | 7 | 11 | 8 | 12 | 9 | 14 | 10 | 16 | 13 | 17 | 15 | 18 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |