

Algoritmos

Vetores Bidimensionais – Matrizes

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Vetores Bidimensionais – Matrizes

Vetores Bidimensionais – Matrizes

- Nesta unidade vamos explicar a criação e o uso de **estruturas compostas homogêneas**.
- Estas estruturas podem ter 1 ou 2 dimensões:
 - Com **1 dimensão** temos os **vetores unidimensionais**;
 - Com **2 dimensões** temos as matrizes ou **vetores bidimensionais – Matrizes**;
 - **Obs:** Podemos ter mais dimensões, mas o padrão geralmente são 2 dimensões.
- Tais estruturas possibilitam o **armazenamento de um conjunto de valores** do mesmo tipo em certa região de memória.

Vetores Bidimensionais – Matrizes

- Com muitas variáveis do mesmo tipo são necessárias muitas declarações.
- Assim, sem estas estruturas, se tivéssemos a necessidade de armazenar as notas de 80 alunos, teríamos que criar 80 variáveis de um mesmo tipo.
- Com a utilização destas **novas estruturas, não necessitamos mais da criação de tantas variáveis**, e sim de uma estrutura composta homogênea para esta função.

Vetores Bidimensionais – Matrizes

- Uma matriz é uma estrutura que pode armazenar várias variáveis do mesmo tipo primitivo. Formando um **agrupamento** destas variáveis.
- Uma matriz pode ser visto como uma **estrutura de várias “caixas” enfileiradas e empilhadas**, cada uma contendo um índice para identificar a sua posição [**linha, coluna**].
 - Estrutura de um armário de correspondências



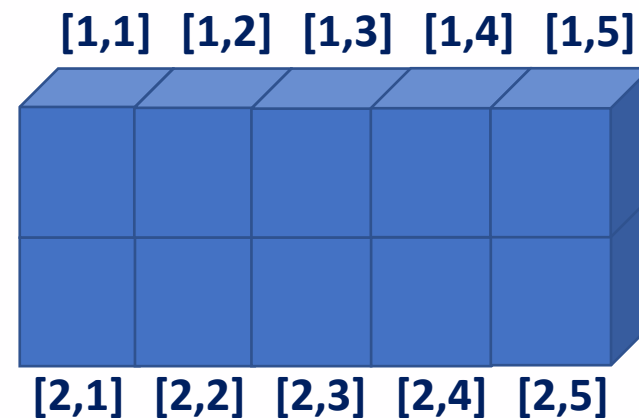
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Vetores Bidimensionais – Matrizes

[1,1]	[1,2]	[1,3]	[1,4]	[1,5]
50	25	2	101	35
[2,1]	[2,2]	[2,3]	[2,4]	[2,5]
99	71	38	50	40

2 linhas; 5 colunas

Matrizes com números inteiros

[1,1]	[1,2]	[1,3]	[1,4]	[1,5]
999	59	45	851	385
[2,1]	[2,2]	[2,3]	[2,4]	[2,5]
7	5	10	502	555
[3,1]	[3,2]	[3,3]	[3,4]	[3,5]
98	33	23	205	280
[4,1]	[4,2]	[4,3]	[4,4]	[4,5]
50	25	2	13	16
[5,1]	[5,2]	[5,3]	[5,4]	[5,5]
32	9	10	100	102

5 linhas; 5 colunas

Vetores Bidimensionais – Matrizes

- É possível termos valores de *strings* e caracteres dentro de uma matriz. Cada linguagem de programação tem a sua particularidade em relação as variáveis que podem ser salvas.
- Mais a frente, nesta disciplina, veremos que é possível armazenar um registro dentro de cada posição de uma matriz ou de um vetor.

[1,1] 'casa'	[1,2] 'rua'	[1,3] 'praça'	[1,4] 'carro'	[1,5] 'poste'
[2,1] 'c'	[2,2] 'a'	[2,3] 'r'	[2,4] 'r'	[2,5] 'o'
[3,1] 'a'	[3,2] 'e'	[3,3] 'i'	[3,4] 'o'	[3,5] 'u'
[4,1] 'dez'	[4,2] 'vinte'	[4,3] 'trinta'	[4,4] 'oitenta'	[4,5] 'vinte'
[5,1] 'maçã'	[5,2] 'pera'	[5,3] 'manga'	[5,4] 'uva'	[5,5] 'kiwi'

Matrizes com cadeia de caractere – *string*

5 linhas; 5 colunas

Vetores Bidimensionais – Declaração

[1,1]	[1,2]	[1,3]	[1,4]	[1,5]
9	8	7	6	5
0	1	2	3	4
[2,1]	[2,2]	[2,3]	[2,4]	[2,5]

var

m: vetor [1..2, 1..5] de inteiros

m: array[1..2, 1..5] of integer

[0,0]	[0,1]	[0,2]
1.9	2.3	5.9
7.9	1.4	3.2
[1,0]	[1,1]	[1,2]

var

m: vetor [0..2, 0..2] de real

m: array[1..2, 1..5] of real

[0,0]	[0,1]	[0,2]	[0,3]
'ab'	'bc'	'cd'	'ef'
'gh'	'j'	'p'	'z'
[1,0]	[1,1]	[1,2]	[1,3]

var

m: vetor [0..2, 0..3] de caractere

m: array[0..2, 0..3] of string

Vetores Bidimensionais – Matrizes

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2 var  
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4     i, j: integer;  
5  
6 Begin  
7  
8     m[1,1] := 'maçã';  
9     m[1,2] := 'uva';  
10    m[1,3] := 'pera';  
11    m[2,1] := 'kiwi';  
12    m[2,2] := 'banana';  
13    m[2,3] := 'morango';  
14  
15    for i := 1 to 2 do  
16        for j := 1 to 3 do  
17            write(m[i,j], ' ');  
18  
19 End.
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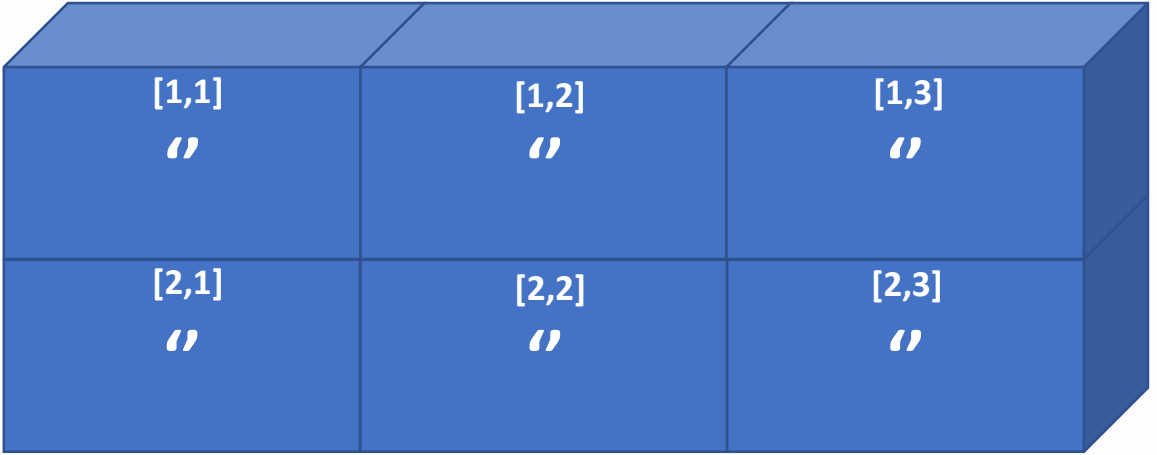
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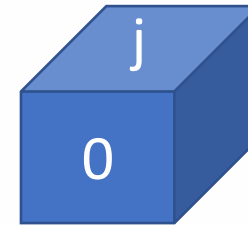
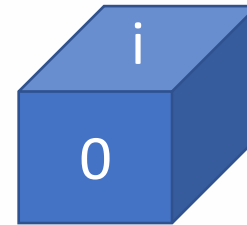
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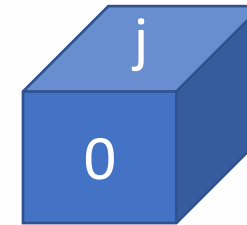
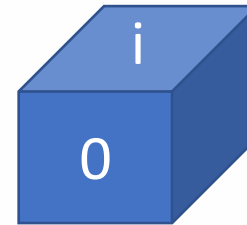
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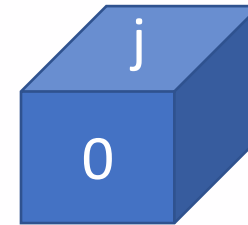
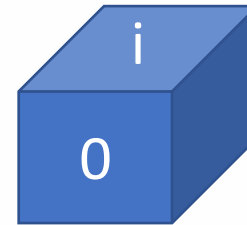
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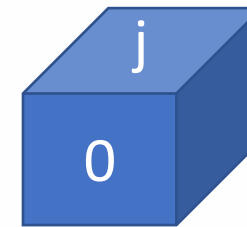
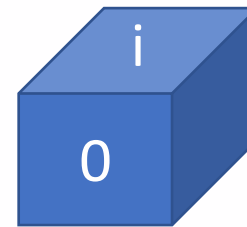
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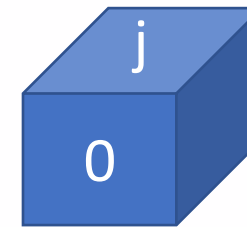
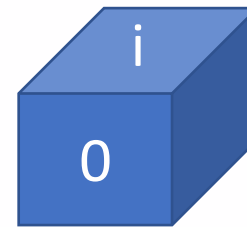
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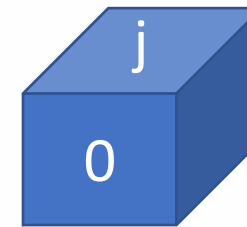
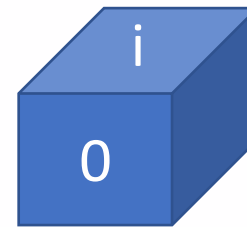
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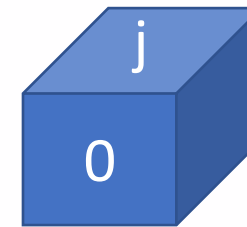
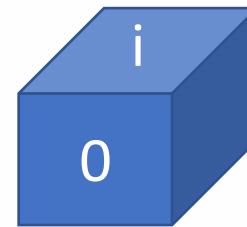
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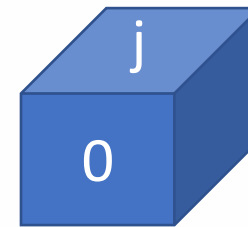
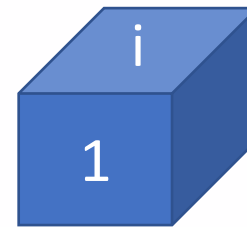
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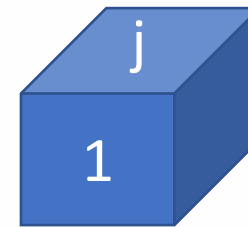
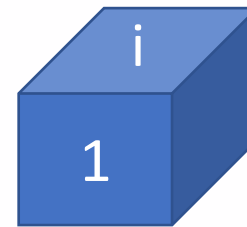
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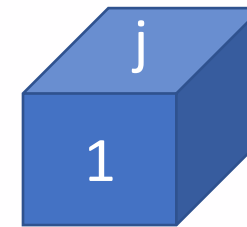
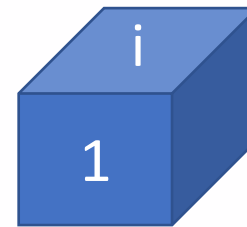
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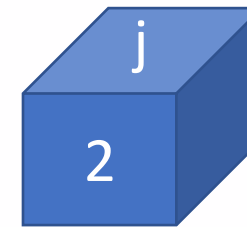
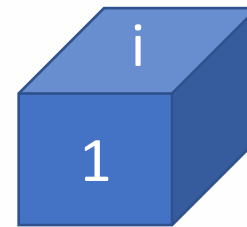
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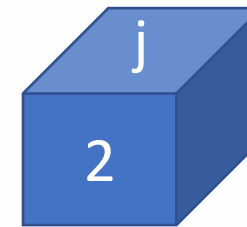
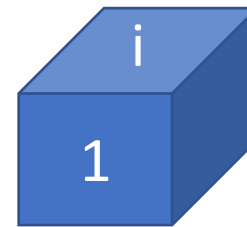
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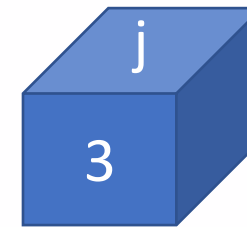
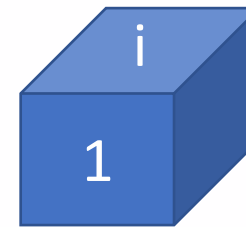
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10  m[1,3] := 'pera';  
11  m[2,1] := 'kiwi';  
12  m[2,2] := 'banana';  
13  m[2,3] := 'morango';  
14  
15  for i := 1 to 2 do  
16    for j := 1 to 3 do  
17      write(m[i,j], ' ');  
18  
19 End.
```

[1,1] 'maçã'	[1,2] 'uva'	[1,3] 'pera'
[2,1] 'kiwi'	[2,2] 'banana'	[2,3] 'morango'



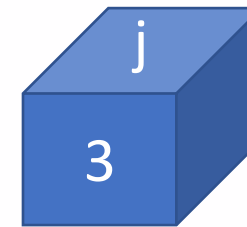
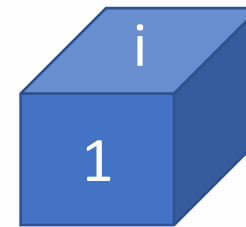
Tela:

maçã uva

Vetores Bidimensionais – Matrizes

```
1 Program matriz;  
2 var  
3   m: array[1..2, 1..3] of string;  
4   i, j: integer;  
5  
6 Begin  
7  
8   m[1,1] := 'maçã';  
9   m[1,2] := 'uva';  
10  m[1,3] := 'pera';  
11  m[2,1] := 'kiwi';  
12  m[2,2] := 'banana';  
13  m[2,3] := 'morango';  
14  
15  for i := 1 to 2 do  
16    for j := 1 to 3 do  
17      write(m[i,j], ' ');  
18  
19 End.
```

[1,1] 'maçã'	[1,2] 'uva'	[1,3] 'pera'
[2,1] 'kiwi'	[2,2] 'banana'	[2,3] 'morango'



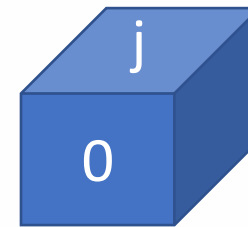
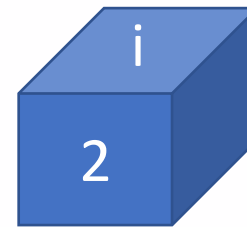
Tela:

maçã uva pera

Vetores Bidimensionais – Matrizes

```
1 Program matriz;  
2 var  
3   m: array[1..2, 1..3] of string;  
4   i, j: integer;  
5  
6 Begin  
7  
8   m[1,1] := 'maçã';  
9   m[1,2] := 'uva';  
10  m[1,3] := 'pera';  
11  m[2,1] := 'kiwi';  
12  m[2,2] := 'banana';  
13  m[2,3] := 'morango';  
14  
15  for i := 1 to 2 do  
16    for j := 1 to 3 do  
17      write(m[i,j], ' ');  
18  
19 End.
```

[1,1] 'maçã'	[1,2] 'uva'	[1,3] 'pera'
[2,1] 'kiwi'	[2,2] 'banana'	[2,3] 'morango'



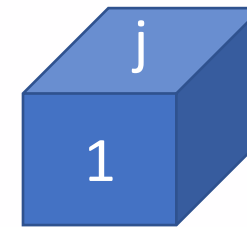
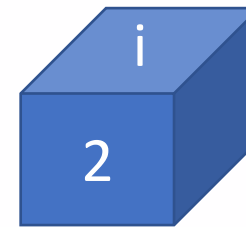
Tela:

maçã uva pera

Vetores Bidimensionais – Matrizes

```
1 Program matriz;  
2 var  
3   m: array[1..2, 1..3] of string;  
4   i, j: integer;  
5  
6 Begin  
7  
8   m[1,1] := 'maçã';  
9   m[1,2] := 'uva';  
10  m[1,3] := 'pera';  
11  m[2,1] := 'kiwi';  
12  m[2,2] := 'banana';  
13  m[2,3] := 'morango';  
14  
15  for i := 1 to 2 do  
16    for j := 1 to 3 do  
17      write(m[i,j], ' ');  
18  
19 End.
```

[1,1] 'maçã'	[1,2] 'uva'	[1,3] 'pera'
[2,1] 'kiwi'	[2,2] 'banana'	[2,3] 'morango'



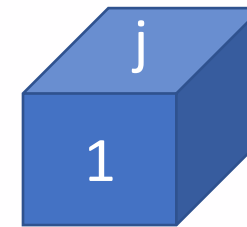
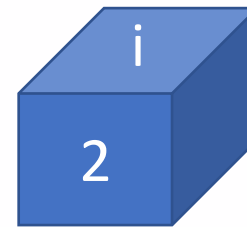
Tela:

maçã uva pera

Vetores Bidimensionais – Matrizes

```
1 Program matriz;  
2 var  
3   m: array[1..2, 1..3] of string;  
4   i, j: integer;  
5  
6 Begin  
7  
8   m[1,1] := 'maçã';  
9   m[1,2] := 'uva';  
10  m[1,3] := 'pera';  
11  m[2,1] := 'kiwi';  
12  m[2,2] := 'banana';  
13  m[2,3] := 'morango';  
14  
15  for i := 1 to 2 do  
16    for j := 1 to 3 do  
17      write(m[i,j], ' ');  
18  
19 End.
```

[1,1] 'maçã'	[1,2] 'uva'	[1,3] 'pera'
[2,1] 'kiwi'	[2,2] 'banana'	[2,3] 'morango'



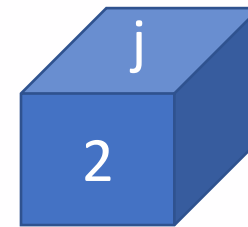
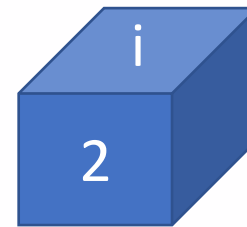
Tela:

maçã uva pera kiwi

Vetores Bidimensionais – Matrizes

```
1 Program matriz;  
2 var  
3   m: array[1..2, 1..3] of string;  
4   i, j: integer;  
5  
6 Begin  
7  
8   m[1,1] := 'maçã';  
9   m[1,2] := 'uva';  
10  m[1,3] := 'pera';  
11  m[2,1] := 'kiwi';  
12  m[2,2] := 'banana';  
13  m[2,3] := 'morango';  
14  
15  for i := 1 to 2 do  
16    for j := 1 to 3 do  
17      write(m[i,j], ' ');  
18  
19 End.
```

[1,1] 'maçã'	[1,2] 'uva'	[1,3] 'pera'
[2,1] 'kiwi'	[2,2] 'banana'	[2,3] 'morango'



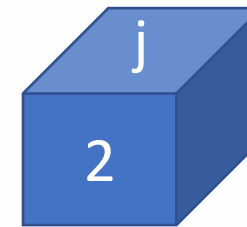
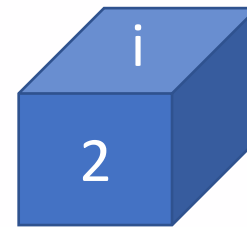
Tela:

maçã uva pera kiwi

Vetores Bidimensionais – Matrizes

```
1 Program matriz;  
2 var  
3   m: array[1..2, 1..3] of string;  
4   i, j: integer;  
5  
6 Begin  
7  
8   m[1,1] := 'maçã';  
9   m[1,2] := 'uva';  
10  m[1,3] := 'pera';  
11  m[2,1] := 'kiwi';  
12  m[2,2] := 'banana';  
13  m[2,3] := 'morango';  
14  
15  for i := 1 to 2 do  
16    for j := 1 to 3 do  
17      write(m[i,j], ' ');  
18  
19 End.
```

[1,1] 'maçã'	[1,2] 'uva'	[1,3] 'pera'
[2,1] 'kiwi'	[2,2] 'banana'	[2,3] 'morango'



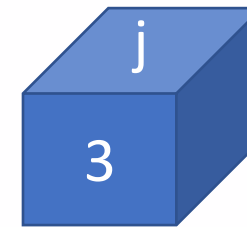
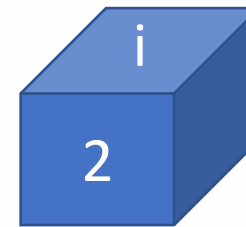
Tela:

maçã uva pera kiwi banana

Vetores Bidimensionais – Matrizes

```
1 Program matriz;  
2 var  
3   m: array[1..2, 1..3] of string;  
4   i, j: integer;  
5  
6 Begin  
7  
8   m[1,1] := 'maçã';  
9   m[1,2] := 'uva';  
10  m[1,3] := 'pera';  
11  m[2,1] := 'kiwi';  
12  m[2,2] := 'banana';  
13  m[2,3] := 'morango';  
14  
15  for i := 1 to 2 do  
16    for j := 1 to 3 do  
17      write(m[i,j], ' ');  
18  
19 End.
```

[1,1] 'maçã'	[1,2] 'uva'	[1,3] 'pera'
[2,1] 'kiwi'	[2,2] 'banana'	[2,3] 'morango'



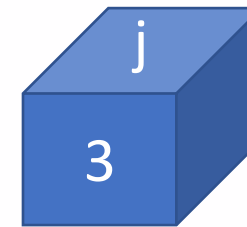
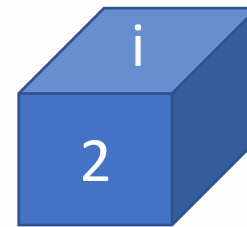
Tela:

maçã uva pera kiwi banana

Vetores Bidimensionais – Matrizes

```
1 Program matriz;  
2 var  
3   m: array[1..2, 1..3] of string;  
4   i, j: integer;  
5  
6 Begin  
7  
8   m[1,1] := 'maçã';  
9   m[1,2] := 'uva';  
10  m[1,3] := 'pera';  
11  m[2,1] := 'kiwi';  
12  m[2,2] := 'banana';  
13  m[2,3] := 'morango';  
14  
15  for i := 1 to 2 do  
16    for j := 1 to 3 do  
17      write(m[i,j], ' ');  
18  
19 End.
```

[1,1] 'maçã'	[1,2] 'uva'	[1,3] 'pera'
[2,1] 'kiwi'	[2,2] 'banana'	[2,3] 'morango'



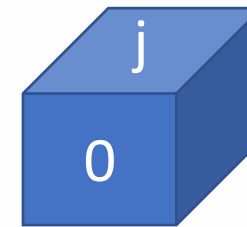
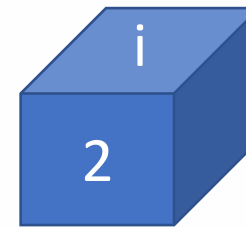
Tela:

maçã uva pera kiwi banana morango

Vetores Bidimensionais – Matrizes

```
1 Program matriz;  
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5  
6 Begin  
7  
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9   m[1,2] := 'uva';  
10  m[1,3] := 'pera';  
11  m[2,1] := 'kiwi';  
12  m[2,2] := 'banana';  
13  m[2,3] := 'morango';  
14  
15  for i := 1 to 2 do  
16    for j := 1 to 3 do  
17      write(m[i,j], ' ');  
18  
19 End.
```

[1,1] 'maçã'	[1,2] 'uva'	[1,3] 'pera'
[2,1] 'kiwi'	[2,2] 'banana'	[2,3] 'morango'



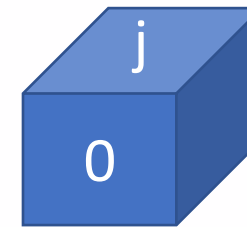
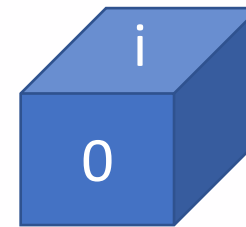
Tela:

maçã uva pera kiwi banana morango

Vetores Bidimensionais – Matrizes

```
1 Program matriz;  
2 var  
3   m: array[1..2, 1..3] of string;  
4   i, j: integer;  
5  
6 Begin  
7  
8   m[1,1] := 'maçã';  
9   m[1,2] := 'uva';  
10  m[1,3] := 'pera';  
11  m[2,1] := 'kiwi';  
12  m[2,2] := 'banana';  
13  m[2,3] := 'morango';  
14  
15  for i := 1 to 2 do  
16    for j := 1 to 3 do  
17      write(m[i,j], ' ');  
18  
19 End.
```

[1,1] 'maçã'	[1,2] 'uva'	[1,3] 'pera'
[2,1] 'kiwi'	[2,2] 'banana'	[2,3] 'morango'



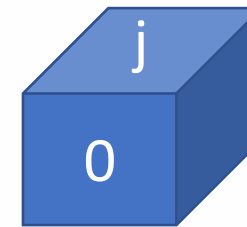
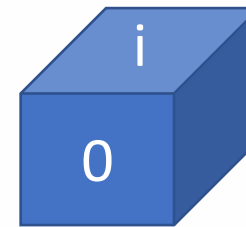
Tela:

maçã uva pera kiwi banana morango

Vetores Bidimensionais – Matrizes

```
1 Program matriz;  
2 var  
3   m: array[1..2, 1..3] of string;  
4   i, j: integer;  
5  
6 Begin  
7  
8   m[1,1] := 'maçã';  
9   m[1,2] := 'uva';  
10  m[1,3] := 'pera';  
11  m[2,1] := 'kiwi';  
12  m[2,2] := 'banana';  
13  m[2,3] := 'morango';  
14  
15  for i := 1 to 2 do  
16    for j := 1 to 3 do  
17      write(m[i,j], ' ');  
18  
19 End.
```

[1,1] 'maçã'	[1,2] 'uva'	[1,3] 'pera'
[2,1] 'kiwi'	[2,2] 'banana'	[2,3] 'morango'



Tela:

maçã uva pera kiwi banana morango

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