

# Práctica 02 Hola Mundo



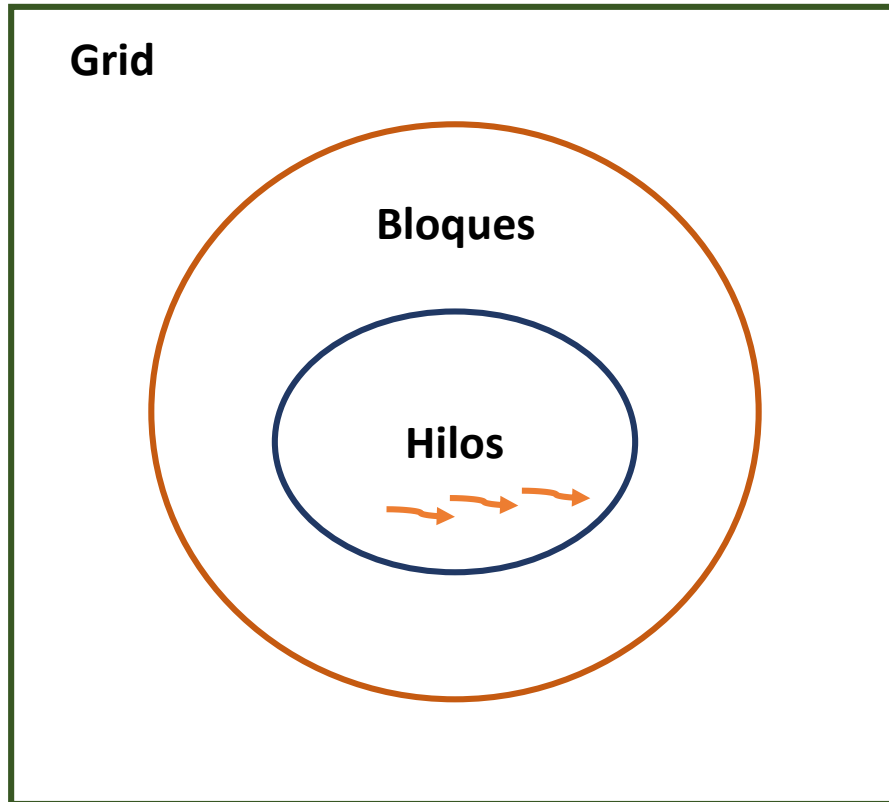
Materia: Tópico II. (Procesamiento Paralelo con CUDA)

**Dra. Sandra Luz Canchola Magdaleno**

U.A.Q. Fac. de Informática

Correo: [sandra.canchola@uaq.mx](mailto:sandra.canchola@uaq.mx)

# Jerarquía



Indices:

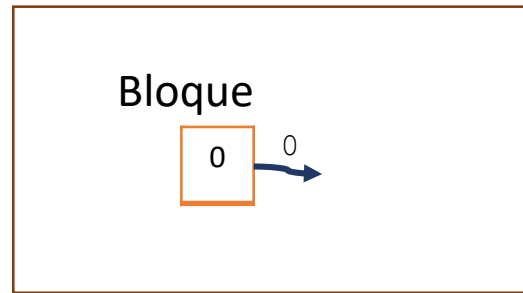
- a) De hilos: `threadIdx.x`, `threadIdx.y`, `threadIdx.z`
- b) De bloques: `blockIdx.x`, `blockIdx.y`, `blockIdx.z`

De la configuración de ejecución:

- a) Del grid (Número de bloques que contiene en cada dimensión):  
`gridDim.x`, `gridDim.y`, `gridDim.z`
- b) Del bloque (Número de hilos que contiene en cada dimensión):  
`blockDim.x`, `blockDim.y`, `blockDim.z`

Caso 1

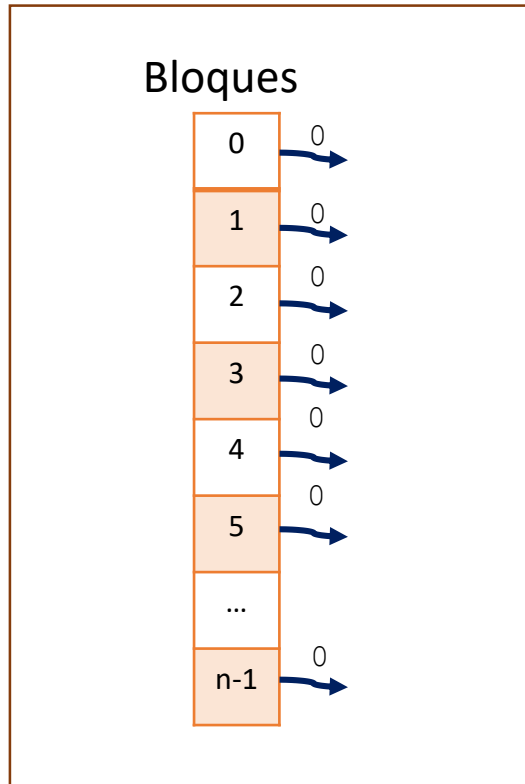
Un bloque con un hilo único



tid = threadIdx.x

Caso 2

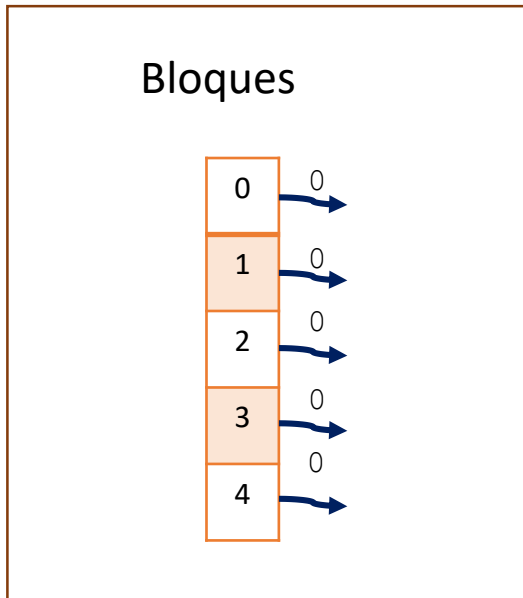
N bloques con un hilo único



tid = blockIdx.x

## Caso 2

5 bloques con un hilo único

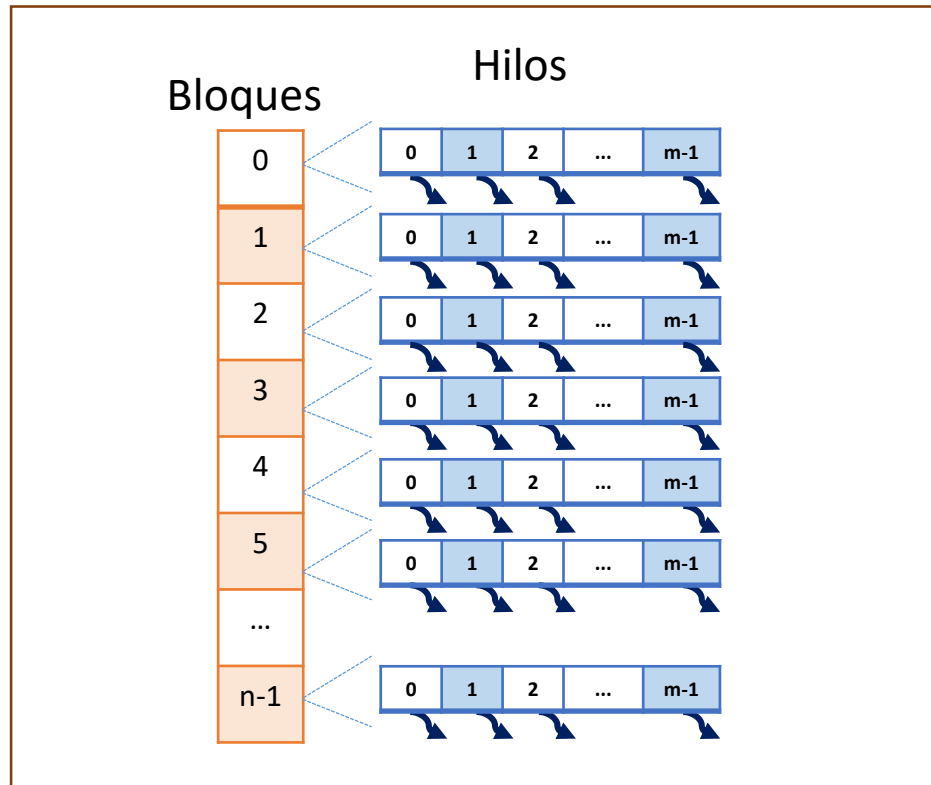


<b>blockIdx.x</b>	<b>threadIdx.x</b>	<b>tid</b>
0	0	0
1	0	1
2	0	2
3	0	3
4	0	4

$\text{tid} = \text{blockIdx.x}$

## Caso 3

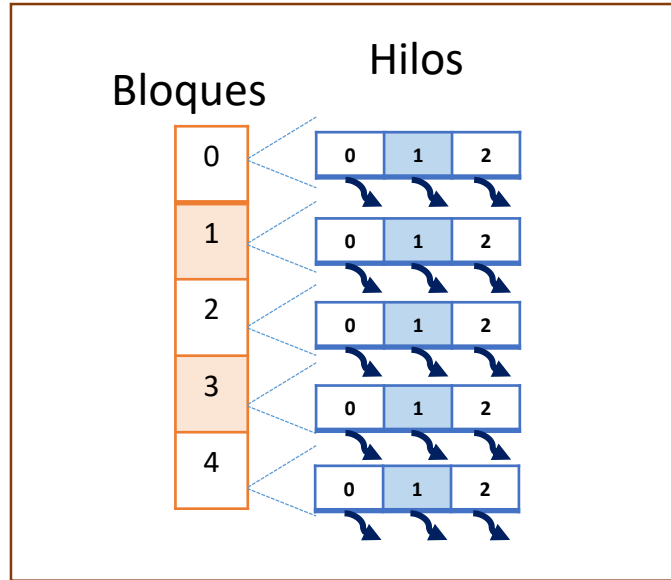
N bloques con M hilos



$$\text{tid} = (\text{blockIdx.x} * \text{blockDim.x}) + \text{threadIdx.x}$$

# Caso 3

## 5 bloques con 3 hilos























$$tid = (blockIdx.x * blockDim.x) + threadIdx.x$$

blockIdx.x	threadIdx.x	tid
0	0	0
0	1	1
0	2	2
1	0	3
1	1	4
1	2	5
2	0	6
2	1	7
2	2	8
3	0	9
3	1	10
3	2	11
4	0	12
4	1	13
4	2	14

## Caso 4

NxM bloques con un hilo único

Bloques

	0	1	2	...	m-1
0					
1					
2					
3					
...					
n-1					













$$\text{tid} = (\text{blockIdx.x} * \text{gridDim.y}) + \text{blockIdx.y}$$



## Caso 4

4x3 bloques con un hilo único

Bloques

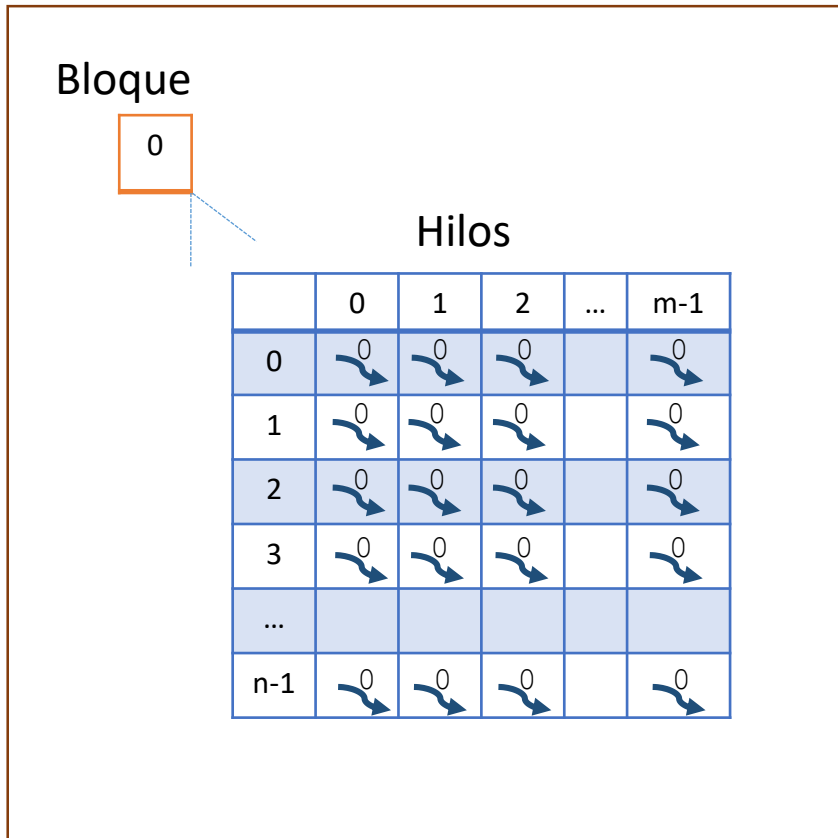
	0	1	2
0			
1			
2			
3			

$$\text{tid} = (\text{blockIdx.x} * \text{gridDim.y}) + \text{blockIdx.y}$$

blockIdx.x	blockIdx.y	threadIdx.x	tid
0	0	0	0
0	1	0	1
0	2	0	2
1	0	0	3
1	1	0	4
1	2	0	5
2	0	0	6
2	1	0	7
2	2	0	8
3	0	0	9
3	1	0	10
3	2	0	11

## Caso 5

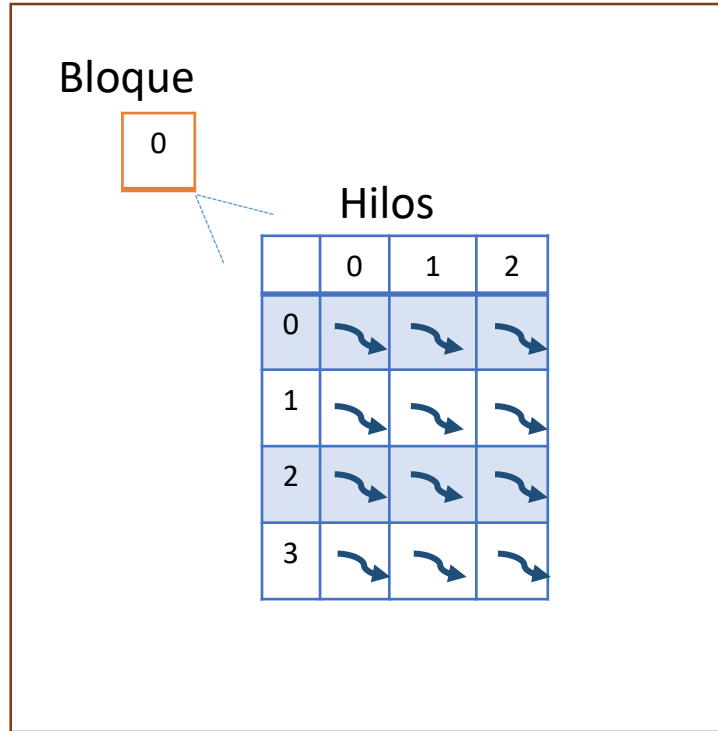
Un bloque con NxM hilos



$$\text{tid} = (\text{threadIdx.x} * \text{blockDim.y}) + \text{threadIdx.y}$$

## Caso 5

Un bloque con 4x3 hilos



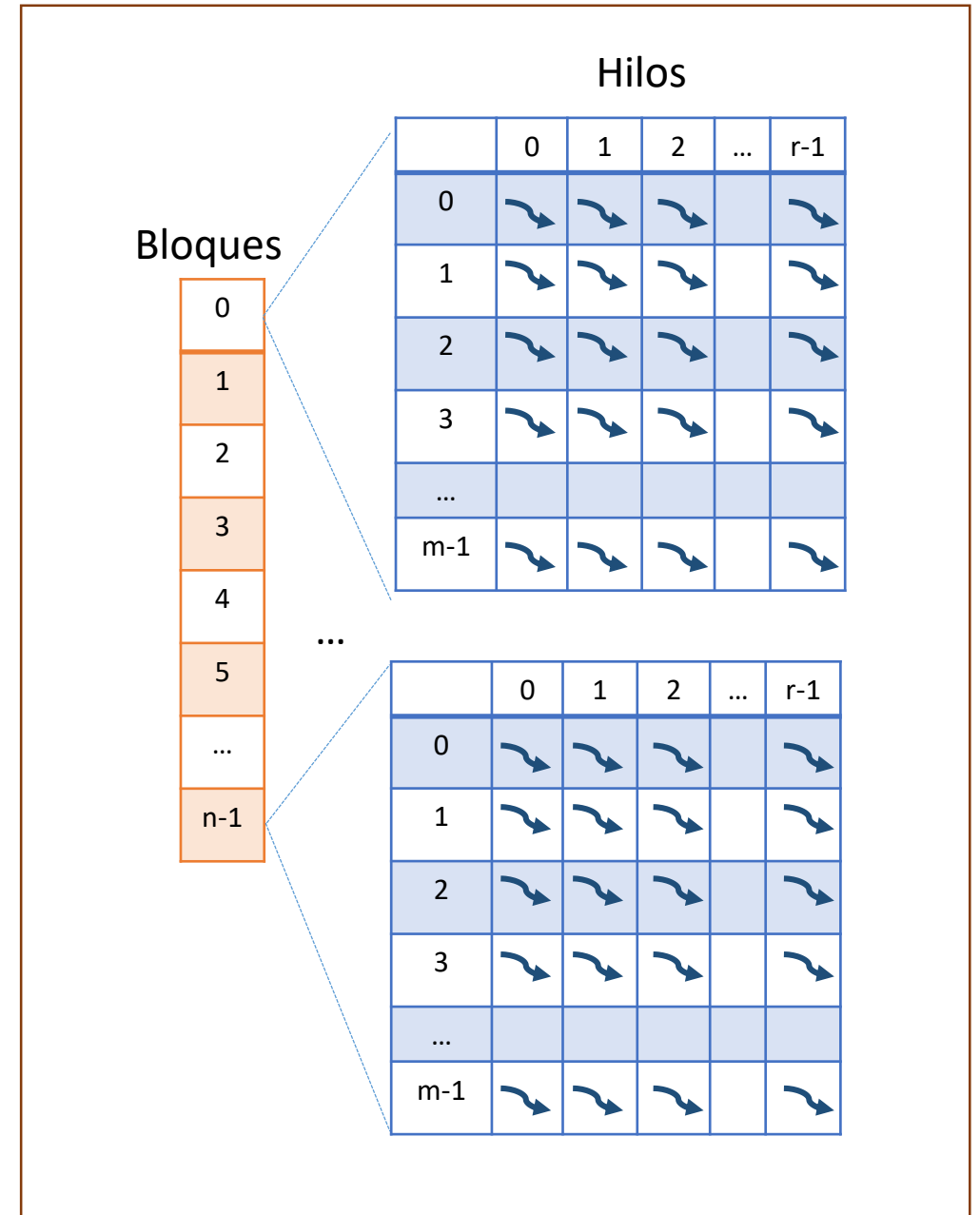
blockIdx.x	threadIdx.x	threadIdx.y	tid
0	0	0	0
0	0	1	1
0	0	2	2
0	1	0	3
0	1	1	4
0	1	2	5
0	2	0	6
0	2	1	7
0	2	2	8
0	3	0	9
0	3	1	10
0	3	2	11

$$\text{tid} = (\text{threadIdx.x} * \text{blockDim.y}) + \text{threadIdx.y}$$

## Caso 6

N bloques con MxR hilos

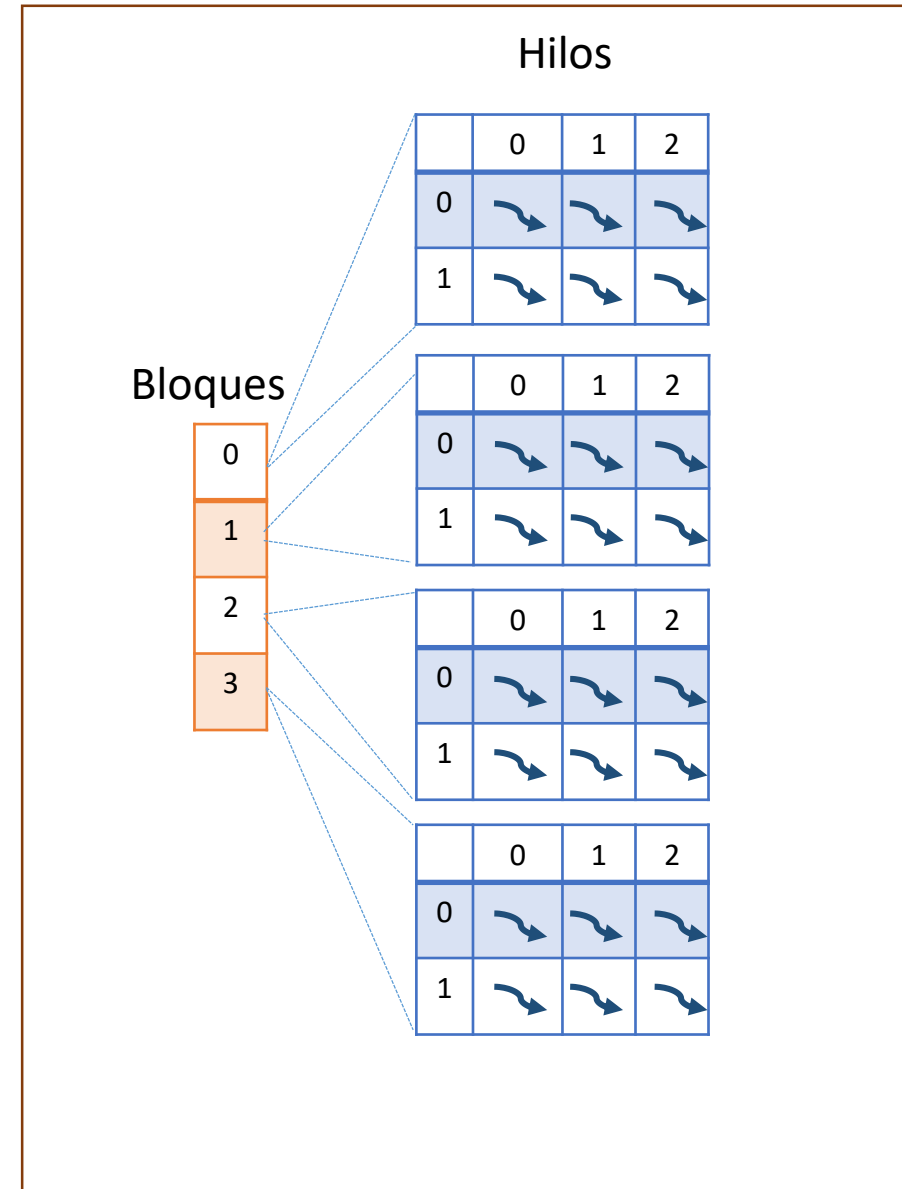
$$\text{tid} = (\text{blockIdx.x} * (\text{blockDim.x} * \text{blockDim.y}) + (\text{threadIdx.x} * \text{blockDim.y}) + \text{threadIdx.y})$$



Caso 6

4 bloques con 2x3 hilos

$$\text{tid} = (\text{blockIdx.x} * (\text{blockDim.x} * \text{blockDim.y}) + (\text{threadIdx.x} * \text{blockDim.y}) + \text{threadIdx.y})$$



## Caso 6

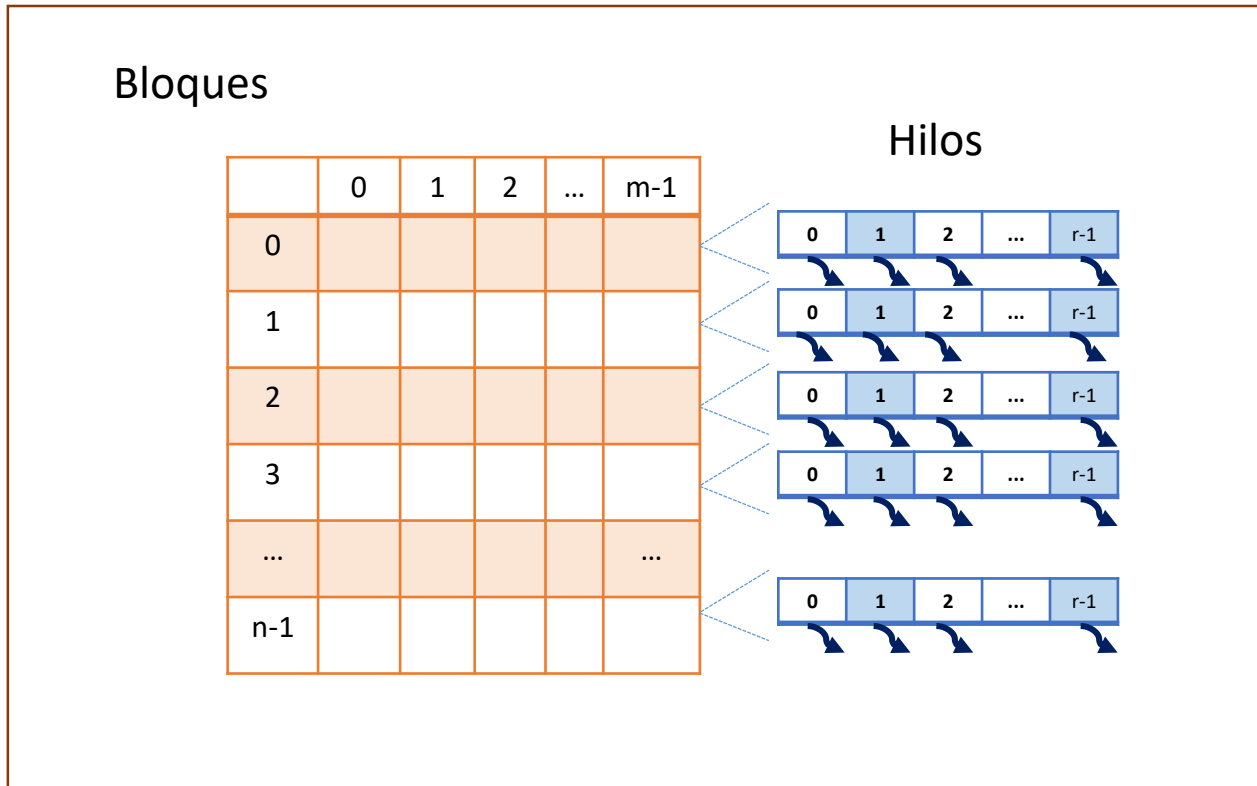
4 bloques con 2x3 hilos

$$\text{tid} = (\text{blockIdx.x} * (\text{blockDim.x} * \text{blockDim.y}) + (\text{threadIdx.x} * \text{blockDim.y}) + \text{threadIdx.y})$$

blockIdx.x	threadIdx.x	threadIdx.y	tid
0	0	0	0
0	0	1	1
0	0	2	2
0	1	0	3
0	1	1	4
0	1	2	5
1	0	0	6
1	0	1	7
1	0	2	8
1	1	0	9
1	1	1	10
1	1	2	11
2	0	0	12
2	0	1	13
2	0	2	14
2	1	0	15
2	1	1	16
2	1	2	17
3	0	0	18
3	0	1	19
3	0	2	20
3	1	0	21
3	1	1	22
3	1	2	23

## Caso 7

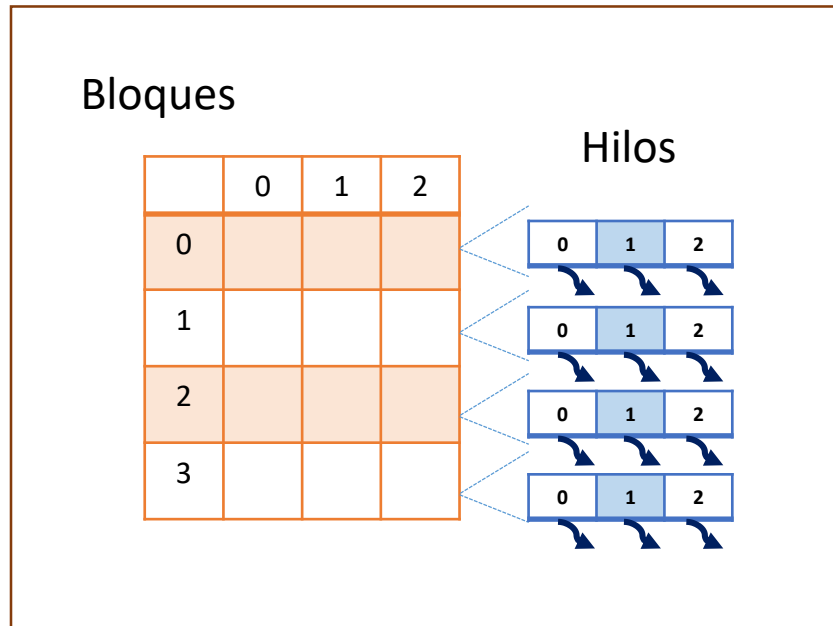
NxM bloques con un R hilos



$$\text{tid} = (((\text{blockIdx.x} * \text{gridDim.y}) + \text{blockIdx.y}) * \text{blockDim.x}) + \text{threadIdx.x}$$

# Caso 7

4x3 bloques con 3 hilos c/u



$$tid = (((blockIdx.x * gridDim.y) + blockIdx.y) * blockDim.x) + threadIdx.x$$

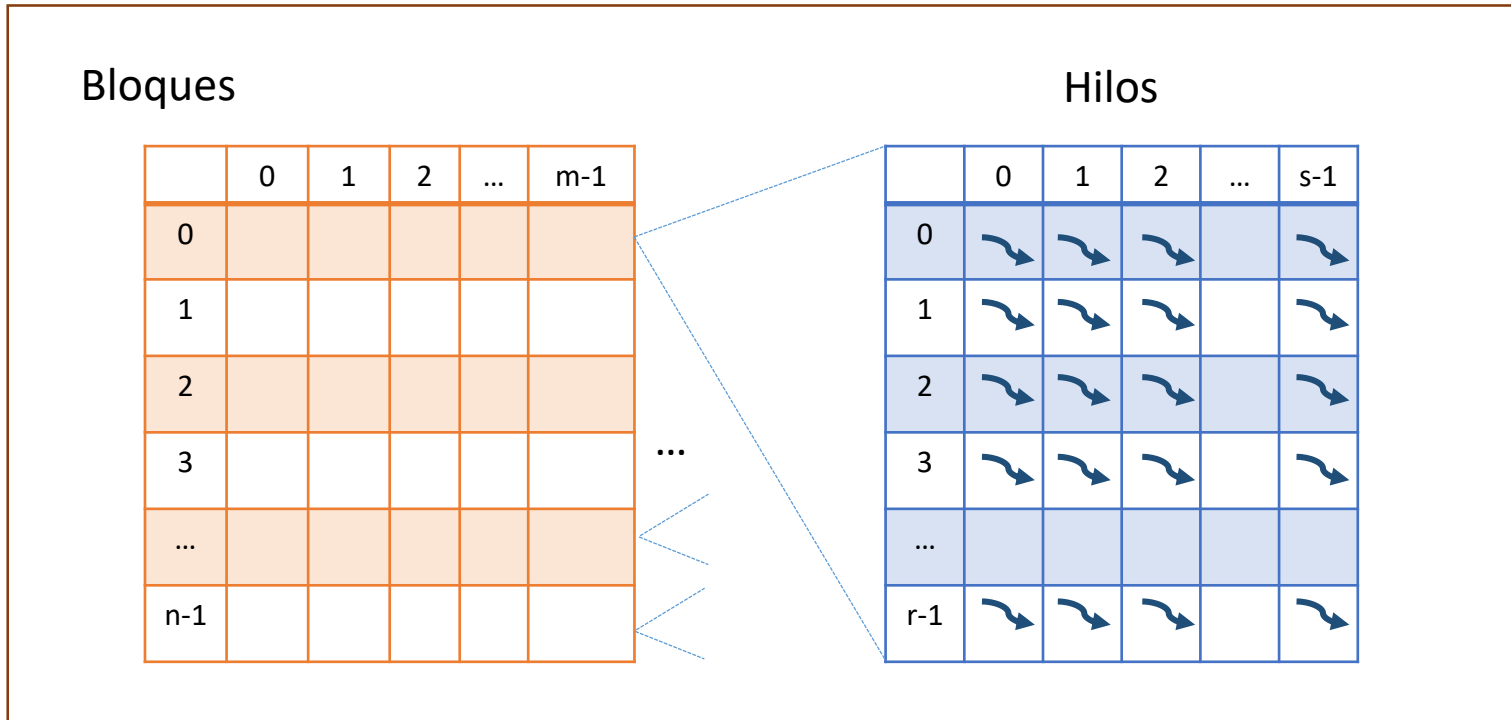
blockIdx.x	blockIdx.y	threadIdx.x	tid
0	0	0	0
0	0	1	1
0	0	2	2
0	1	0	3
0	1	1	4
0	1	2	5
0	2	0	6
0	2	1	7
0	2	2	8
1	0	0	9
1	0	1	10
1	0	2	11
1	1	0	12
1	1	1	13
1	1	2	14
1	2	0	15
1	2	1	16
1	2	2	17



blockIdx.x	blockIdx.y	threadIdx.x	tid
2	0	0	18
2	0	1	19
2	0	2	20
2	1	0	21
2	1	1	22
2	1	2	23
2	2	0	24
2	2	1	25
2	2	2	26
3	0	0	27
3	0	1	28
3	0	2	29
3	1	0	30
3	1	1	31
3	1	2	32
3	2	0	33
3	2	1	34
3	2	2	35

## Caso 8

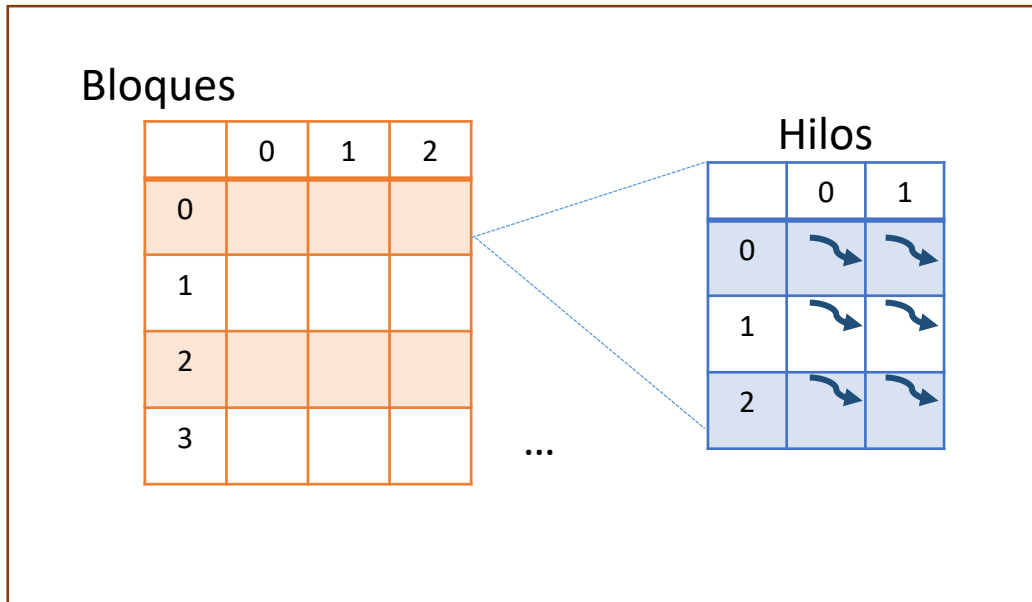
NxM bloques con RxS hilos



$$tid = (((blockIdx.x * blockDim.y) + blockIdx.y) * (blockDim.x * blockDim.y)) + (threadIdx.x * blockDim.y) + threadIdx.y$$

## Caso 8

4x3 bloques con 3x2 hilos


$$\text{tid} = (((\text{blockIdx.x} * \text{gridDim.y}) + \text{blockIdx.y}) * (\text{blockDim.x} * \text{blockDim.y})) + (\text{threadIdx.x} * \text{blockDim.y}) + \text{threadIdx.y}$$

blockIdx.x	blockIdx.y	threadIdx.x	threadIdx.y	tid
0	0	0	0	0
0	0	0	1	1
0	0	1	0	2
0	0	1	1	3
0	0	2	0	4
0	0	2	1	5
0	1	0	0	6
0	1	0	1	7
0	1	1	0	8
0	1	1	1	9
0	1	2	0	10
0	1	2	1	11
0	2	0	0	12
0	2	0	1	13
0	2	1	0	14
0	2	1	1	15
0	2	2	0	16
0	2	2	1	17

blockIdx.x	blockIdx.y	threadIdx.x	threadIdx.y	tid
1	0	0	0	18
1	0	0	1	19
1	0	1	0	20
1	0	1	1	21
1	0	2	0	22
1	0	2	1	23
1	1	0	0	24
1	1	0	1	25
1	1	1	0	26
1	1	1	1	27
1	1	2	0	28
1	1	2	1	29
1	2	0	0	30
1	2	0	1	31
1	2	1	0	32
1	2	1	1	33
1	2	2	0	34
1	2	2	1	35









































blockIdx.x	blockIdx.y	threadIdx.x	threadIdx.y	tid
2	0	0	0	36
2	0	0	1	37
2	0	1	0	38
2	0	1	1	39
2	0	2	0	40
2	0	2	1	41
2	1	0	0	42
2	1	0	1	43
2	1	1	0	44
2	1	1	1	45
2	1	2	0	46
2	1	2	1	47
2	2	0	0	48
2	2	0	1	49
2	2	1	0	50
2	2	1	1	51
2	2	2	0	52
2	2	2	1	53

blockIdx.x	blockIdx.y	threadIdx.x	threadIdx.y	tid
3	0	0	0	54
3	0	0	1	55
3	0	1	0	56
3	0	1	1	57
3	0	2	0	58
3	0	2	1	59
3	1	0	0	60
3	1	0	1	61
3	1	1	0	62
3	1	1	1	63
3	1	2	0	64
3	1	2	1	65
3	2	0	0	66
3	2	0	1	67
3	2	1	0	68
3	2	1	1	69
3	2	2	0	70
3	2	2	1	71

## Caso 9

NxMxR bloques con un hilo único c/u

Bloques

	0			1			2			...	m-1		
0	0	...	r-1	0	...	r-1	0	...	r-1		0	...	r-1
													
1	0	...	r-1	0	...	r-1	0	...	r-1		0	...	r-1
													
2	0	...	r-1	0	...	r-1	0	...	r-1		0	...	r-1
													
3	0	...	r-1	0	...	r-1	0	...	r-1		0	...	r-1
													
...	...			...			...			...	...		
n-1	0	...	r-1	0	...	r-1	0	...	r-1		0	...	r-1
													

$$\text{tid} = (\text{blockIdx.x} * \text{gridDim.y} * \text{gridDim.z}) +$$
$$(\text{blockIdx.y} * \text{gridDim.z}) +$$
$$\text{blockIdx.z}$$

## Caso 9

2x3x3 bloques con un hilo único c/u

Bloques

	0			1			2		
0	0	1	2	0	1	2	0	1	2
	↘	↘	↘	↘	↘	↘	↘	↘	↘
1	0	1	2	0	1	2	0	1	2
	↘	↘	↘	↘	↘	↘	↘	↘	↘

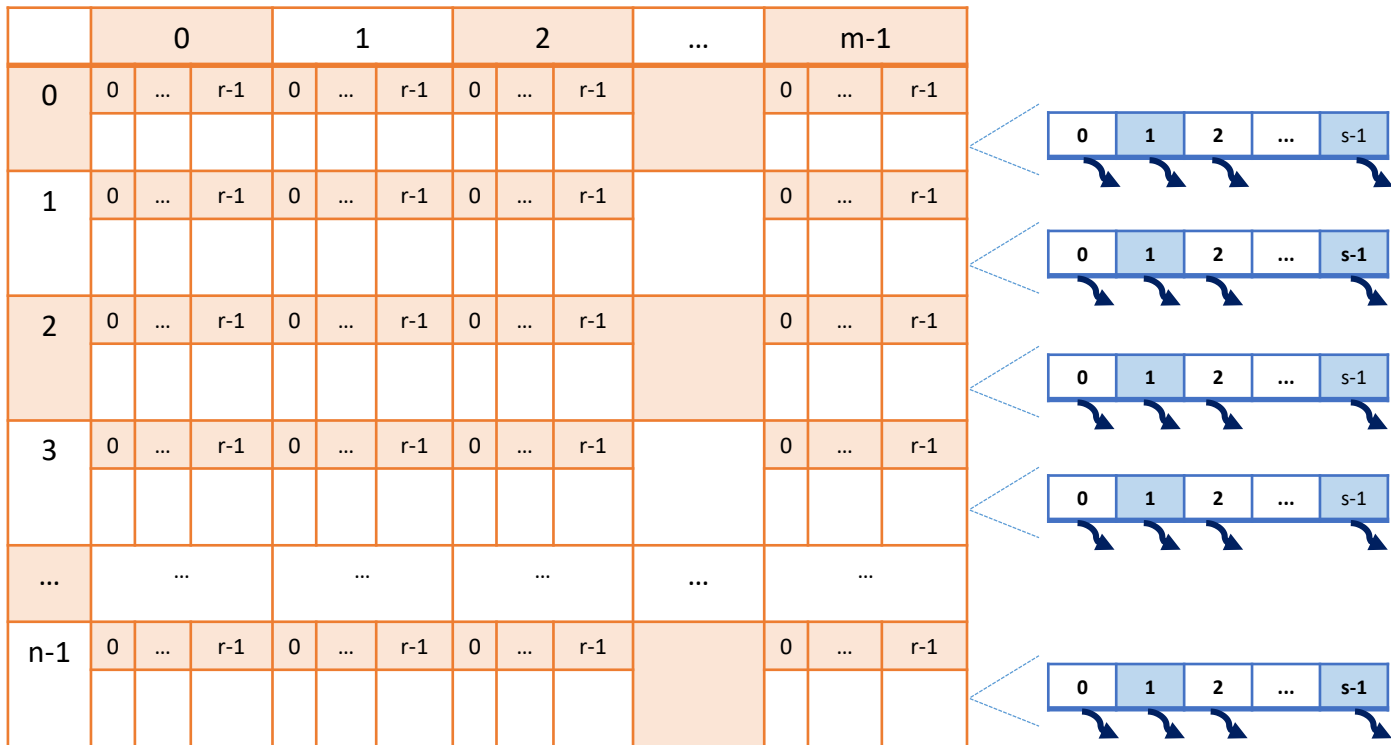
$$\begin{aligned} \text{tid} = & (\text{blockIdx.x} * \text{gridDim.y} * \text{gridDim.z}) + \\ & (\text{blockIdx.y} * \text{gridDim.z}) + \\ & \text{blockIdx.z} \end{aligned}$$

blockIdx.x	blockIdx.y	blockIdx.z	threadIdx.x	tid
0	0	0	0	0
0	0	1	0	1
0	0	2	0	2
0	1	0	0	3
0	1	1	0	4
0	1	2	0	5
0	2	0	0	6
0	2	1	0	7
0	2	2	0	8
1	0	0	0	9
1	0	1	0	10
1	0	2	0	11
1	1	0	0	12
1	1	1	0	13
1	1	2	0	14
1	2	0	0	15
1	2	1	0	16
1	2	2	0	17

# Caso 10

NxMxR bloques con un S hilos

## Bloques

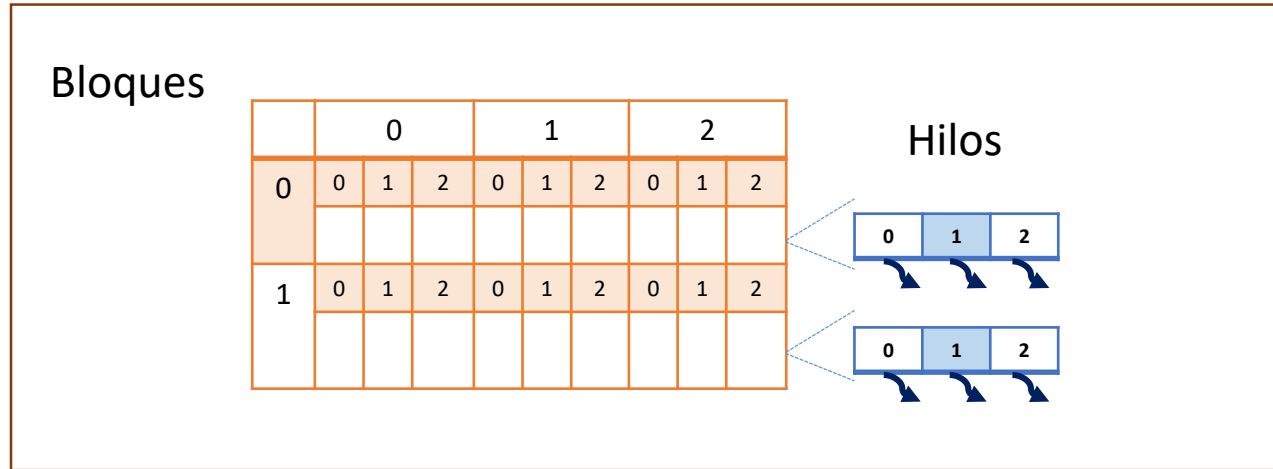


$$\text{tid} = [((\text{blockIdx.x} * \text{gridDim.y} * \text{gridDim.z}) + (\text{blockIdx.y} * \text{gridDim.z}) + \text{blockIdx.z}) * \text{blockDim.x}] + \text{threadIdx.x}$$



Caso 10

2x3x3 bloques con un 3 hilos c/u



```
tid = [((blockIdx.x*gridDim.y*gridDim.z) +  
      (blockIdx.y*gridDim.z)+  
      blockIdx.z)*blockDim.x]+  
      threadIdx.x
```

blockIdx.x	blockIdx.y	blockIdx.z	threadIdx.x	tid
0	0	0	0	0
0	0	0	1	1
0	0	0	2	2
0	0	1	0	3
0	0	1	1	4
0	0	1	2	5
0	0	2	0	6
0	0	2	1	7
0	0	2	2	8
0	1	0	0	9
0	1	0	1	10
0	1	0	2	11
0	1	1	0	12
0	1	1	1	13
0	1	1	2	14
0	1	2	0	15
0	1	2	1	16
0	1	2	2	17
0	2	0	0	18
0	2	0	1	19
0	2	0	2	20
0	2	1	0	21
0	2	1	1	22
0	2	1	2	23
0	2	2	0	24
0	2	2	1	25
0	2	2	2	26

blockIdx.x	blockIdx.y	blockIdx.z	threadIdx.x	tid
1	0	0	0	27
1	0	0	1	28
1	0	0	2	29
1	0	1	0	30
1	0	1	1	31
1	0	1	2	32
1	0	2	0	33
1	0	2	1	34
1	0	2	2	35
1	1	0	0	36
1	1	0	1	37
1	1	0	2	38
1	1	1	0	39
1	1	1	1	40
1	1	1	2	41
1	1	2	0	42
1	1	2	1	43
1	1	2	2	44
1	2	0	0	45
1	2	0	1	46
1	2	0	2	47
1	2	1	0	48
1	2	1	1	49
1	2	1	2	50
1	2	2	0	51
1	2	2	1	52
1	2	2	2	53

# Caso 11

$N \times M \times R$  bloques con un  $S \times T$  hilos

Bloques

	0			1			2			...	m-1		
0	0	...	r-1	0	...	r-1	0	...	r-1		0	...	r-1
1	0	...	r-1	0	...	r-1	0	...	r-1		0	...	r-1
2	0	...	r-1	0	...	r-1	0	...	r-1		0	...	r-1
3	0	...	r-1	0	...	r-1	0	...	r-1		0	...	r-1
...	...			...			...			...	...		
n-1	0	...	r-1	0	...	r-1	0	...	r-1		0	...	r-1

Hilos

	0	1	2	...	t-1
0	↘	↘	↘		↘
1	↘	↘	↘		↘
2	↘	↘	↘		↘
3	↘	↘	↘		↘
...					
s-1	↘	↘	↘		↘

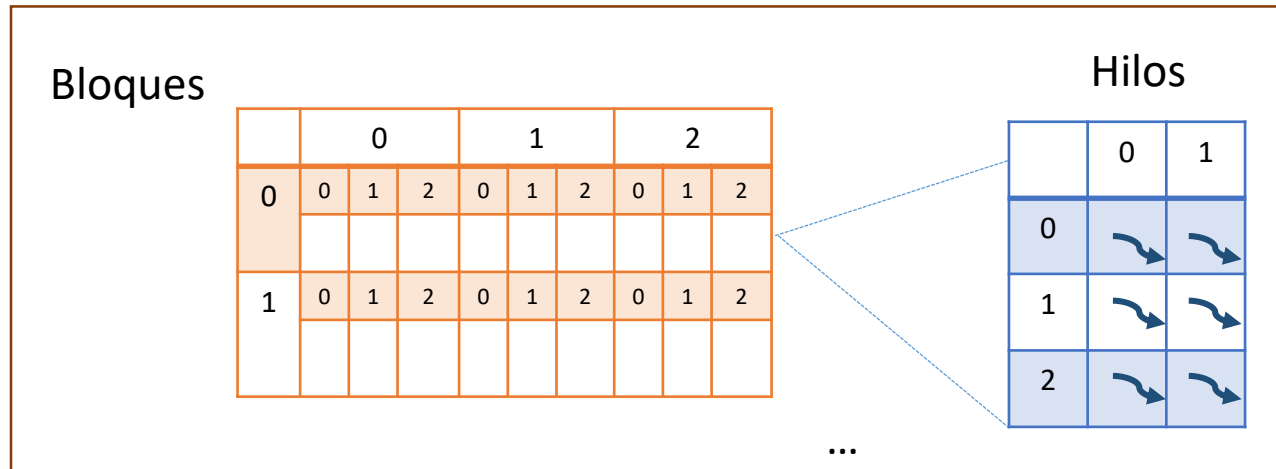
Caso 11

NxMxR bloques con un SxT hilos

```
tid = [((blockIdx.x*gridDim.y*gridDim.z) +  
        (blockIdx.y*gridDim.z)+  
        blockIdx.z)*blockDim.x*blockDim.y]+  
        (threadIdx.x*blockDim.x)+  
        threadIdx.y
```

## Caso 11

2x3x3 bloques con un 3x2 hilos c/u



```
tid = (((blockIdx.x*gridDim.y*gridDim.z) +  
      (blockIdx.y*gridDim.z)+  
      blockIdx.z)*blockDim.x*blockDim.y)+  
      (threadIdx.x*blockDim.x)+  
      threadIdx.y
```

blockIdx.x	blockIdx.y	blockIdx.z	threadIdx.x	threadIdx.y	tid
0	0	0	0	0	0
0	0	0	0	1	1
0	0	0	1	0	2
0	0	0	1	1	3
0	0	0	2	0	4
0	0	0	2	1	5
0	0	1	0	0	6
0	0	1	0	1	7
0	0	1	1	0	8
0	0	1	1	1	9
0	0	1	2	0	10
0	0	1	2	1	11
0	0	2	0	0	12
0	0	2	0	1	13
0	0	2	1	0	14
0	0	2	1	1	15
0	0	2	2	0	16
0	0	2	2	1	17

blockIdx.x	blockIdx.y	blockIdx.z	threadIdx.x	threadIdx.y	tid
0	1	0	0	0	18
0	1	0	0	1	19
0	1	0	1	0	20
0	1	0	1	1	21
0	1	0	2	0	22
0	1	0	2	1	23
0	1	1	0	0	24
0	1	1	0	1	25
0	1	1	1	0	26
0	1	1	1	1	27
0	1	1	2	0	28
0	1	1	2	1	29
0	1	2	0	0	30
0	1	2	0	1	31
0	1	2	1	0	32
0	1	2	1	1	33
0	1	2	2	0	34
0	1	2	2	1	35

blockIdx.x	blockIdx.y	blockIdx.z	threadIdx.x	threadIdx.y	tid
0	2	0	0	0	36
0	2	0	0	1	37
0	2	0	1	0	38
0	2	0	1	1	39
0	2	0	2	0	40
0	2	0	2	1	41
0	2	1	0	0	42
0	2	1	0	1	43
0	2	1	1	0	44
0	2	1	1	1	45
0	2	1	2	0	46
0	2	1	2	1	47
0	2	2	0	0	48
0	2	2	0	1	49
0	2	2	1	0	50
0	2	2	1	1	51
0	2	2	2	0	52
0	2	2	2	1	53

blockIdx.x	blockIdx.y	blockIdx.z	threadIdx.x	threadIdx.y	tid
1	0	0	0	0	54
1	0	0	0	1	55
1	0	0	1	0	56
1	0	0	1	1	57
1	0	0	2	0	58
1	0	0	2	1	59
1	0	1	0	0	60
1	0	1	0	1	61
1	0	1	1	0	62
1	0	1	1	1	63
1	0	1	2	0	64
1	0	1	2	1	65
1	0	2	0	0	66
1	0	2	0	1	67
1	0	2	1	0	68
1	0	2	1	1	69
1	0	2	2	0	70
1	0	2	2	1	71

blockIdx.x	blockIdx.y	blockIdx.z	threadIdx.x	threadIdx.y	tid
1	1	0	0	0	72
1	1	0	0	1	73
1	1	0	1	0	74
1	1	0	1	1	75
1	1	0	2	0	76
1	1	0	2	1	77
1	1	1	0	0	78
1	1	1	0	1	79
1	1	1	1	0	80
1	1	1	1	1	81
1	1	1	2	0	82
1	1	1	2	1	83
1	1	2	0	0	84
1	1	2	0	1	85
1	1	2	1	0	86
1	1	2	1	1	87
1	1	2	2	0	88
1	1	2	2	1	89

blockIdx.x	blockIdx.y	blockIdx.z	threadIdx.x	threadIdx.y	tid
1	2	0	0	0	90
1	2	0	0	1	91
1	2	0	1	0	92
1	2	0	1	1	93
1	2	0	2	0	94
1	2	0	2	1	95
1	2	1	0	0	96
1	2	1	0	1	97
1	2	1	1	0	98
1	2	1	1	1	99
1	2	1	2	0	100
1	2	1	2	1	101
1	2	2	0	0	102
1	2	2	0	1	103
1	2	2	1	0	104
1	2	2	1	1	105
1	2	2	2	0	106
1	2	2	2	1	107



$N \times M \times R$  bloques con un  $S \times T \times P$  hilos

[illegible][illegible]

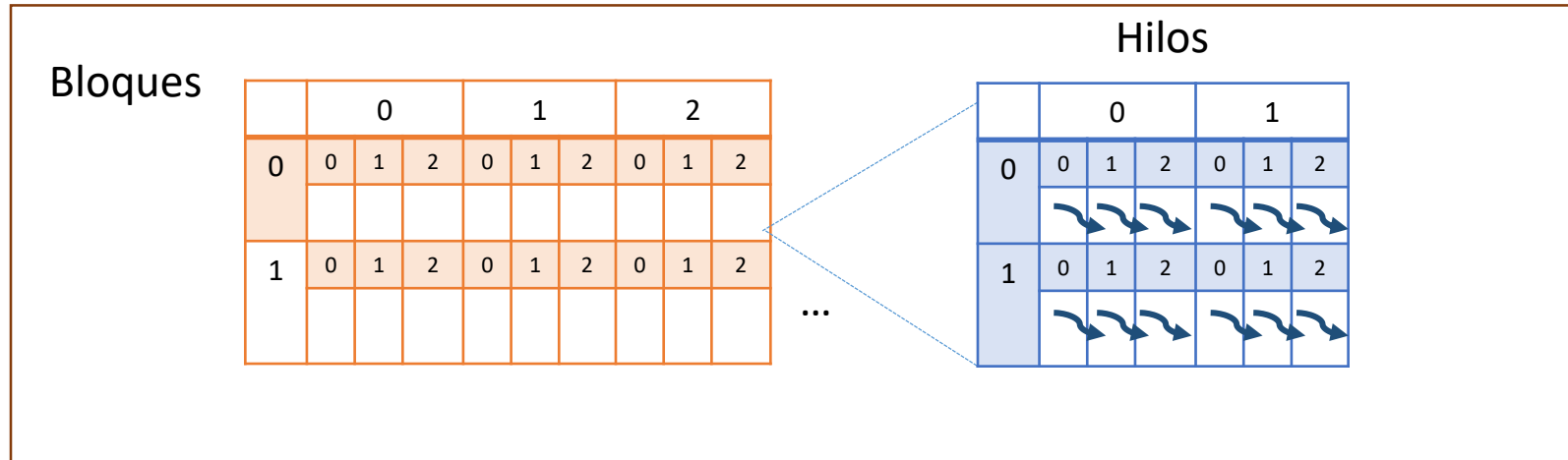
Caso 12

NxMxR bloques con un SxTxP hilos

```
tid = (((blockIdx.x*gridDim.y*gridDim.z) +  
        (blockIdx.y*gridDim.z)+  
        blockIdx.z)*blockDim.x*blockDim.y*blockDim.z)+  
        (threadIdx.x*blockDim.y*blockDim.z)+  
        (threadIdx.y*blockDim.z)+  
        threadIdx.z
```

Caso 12

2x3x3 bloques con un 2x2x3 hilos



blockIdx .x	blockIdx. y	blockIdx .z	threadIdx. x	threadIdx. y	threadIdx. z	tid
0	0	0	0	0	0	0
0	0	0	0	0	1	1
0	0	0	0	0	2	2
0	0	0	0	1	0	3
0	0	0	0	1	1	4
0	0	0	0	1	2	5
0	0	0	1	0	0	6
0	0	0	1	0	1	7
0	0	0	1	0	2	8
0	0	0	1	1	0	9
0	0	0	1	1	1	10
0	0	0	1	1	2	11
0	0	1	0	0	0	12
0	0	1	0	0	1	13
0	0	1	0	0	2	14
0	0	1	0	1	0	15
0	0	1	0	1	1	16
0	0	1	0	1	2	17
0	0	1	1	0	0	18
0	0	1	1	0	1	19
0	0	1	1	0	2	20
0	0	1	1	1	0	21
0	0	1	1	1	1	22
0	0	1	1	1	2	23

blockIdx .x	blockIdx. y	blockIdx .z	threadIdx .x	threadIdx .y	threadIdx .z	tid
0	0	2	0	0	0	24
0	0	2	0	0	1	25
0	0	2	0	0	2	26
0	0	2	0	1	0	27
0	0	2	0	1	1	28
0	0	2	0	1	2	29
0	0	2	1	0	0	30
0	0	2	1	0	1	31
0	0	2	1	0	2	32
0	0	2	1	1	0	33
0	0	2	1	1	1	34
0	0	2	1	1	2	35
0	1	0	0	0	0	36
0	1	0	0	0	1	37
0	1	0	0	0	2	38
0	1	0	0	1	0	39
0	1	0	0	1	1	40
0	1	0	0	1	2	41
0	1	0	1	0	0	42
0	1	0	1	0	1	43
0	1	0	1	0	2	44
0	1	0	1	1	0	45
0	1	0	1	1	1	46
0	1	0	1	1	2	47

blockIdx .x	blockIdx. y	blockIdx .z	threadIdx. x	threadIdx. y	threadIdx. z	tid
0	1	1	0	0	0	48
0	1	1	0	0	1	49
0	1	1	0	0	2	50
0	1	1	0	1	0	51
0	1	1	0	1	1	52
0	1	1	0	1	2	53
0	1	1	1	0	0	54
0	1	1	1	0	1	55
0	1	1	1	0	2	56
0	1	1	1	1	0	57
0	1	1	1	1	1	58
0	1	1	1	1	2	59
0	1	2	0	0	0	60
0	1	2	0	0	1	61
0	1	2	0	0	2	62
0	1	2	0	1	0	63
0	1	2	0	1	1	64
0	1	2	0	1	2	65
0	1	2	1	0	0	66
0	1	2	1	0	1	67
0	1	2	1	0	2	68
0	1	2	1	1	0	69
0	1	2	1	1	1	70
0	1	2	1	1	2	71

blockIdx .x	blockIdx. y	blockIdx .z	threadIdx .x	threadIdx .y	threadIdx .z	tid
0	2	0	0	0	0	72
0	2	0	0	0	1	73
0	2	0	0	0	2	74
0	2	0	0	1	0	75
0	2	0	0	1	1	76
0	2	0	0	1	2	77
0	2	0	1	0	0	78
0	2	0	1	0	1	79
0	2	0	1	0	2	80
0	2	0	1	1	0	81
0	2	0	1	1	1	82
0	2	0	1	1	2	83
0	2	1	0	0	0	84
0	2	1	0	0	1	85
0	2	1	0	0	2	86
0	2	1	0	1	0	87
0	2	1	0	1	1	88
0	2	1	0	1	2	89
0	2	1	1	0	0	90
0	2	1	1	0	1	91
0	2	1	1	0	2	92
0	2	1	1	1	0	93
0	2	1	1	1	1	94
0	2	1	1	1	2	95

blockIdx .x	blockIdx. y	blockIdx .z	threadIdx. x	threadIdx. y	threadIdx. z	tid
0	2	2	0	0	0	96
0	2	2	0	0	1	97
0	2	2	0	0	2	98
0	2	2	0	1	0	99
0	2	2	0	1	1	100
0	2	2	0	1	2	101
0	2	2	1	0	0	102
0	2	2	1	0	1	103
0	2	2	1	0	2	104
0	2	2	1	1	0	105
0	2	2	1	1	1	106
0	2	2	1	1	2	107
1	0	0	0	0	0	108
1	0	0	0	0	1	109
1	0	0	0	0	2	110
1	0	0	0	1	0	111
1	0	0	0	1	1	112
1	0	0	0	1	2	113
1	0	0	1	0	0	114
1	0	0	1	0	1	115
1	0	0	1	0	2	116
1	0	0	1	1	0	117
1	0	0	1	1	1	118
1	0	0	1	1	2	119

blockIdx .x	blockIdx. y	blockIdx .z	threadIdx .x	threadIdx .y	threadIdx .z	tid
1	0	1	0	0	0	120
1	0	1	0	0	1	121
1	0	1	0	0	2	122
1	0	1	0	1	0	123
1	0	1	0	1	1	124
1	0	1	0	1	2	125
1	0	1	1	0	0	126
1	0	1	1	0	1	127
1	0	1	1	0	2	128
1	0	1	1	1	0	129
1	0	1	1	1	1	130
1	0	1	1	1	2	131
1	0	2	0	0	0	132
1	0	2	0	0	1	133
1	0	2	0	0	2	134
1	0	2	0	1	0	135
1	0	2	0	1	1	136
1	0	2	0	1	2	137
1	0	2	1	0	0	138
1	0	2	1	0	1	139
1	0	2	1	0	2	140
1	0	2	1	1	0	141
1	0	2	1	1	1	142
1	0	2	1	1	2	143

blockIdx .x	blockIdx. y	blockIdx .z	threadIdx. x	threadIdx. y	threadIdx. z	tid
1	1	0	0	0	0	144
1	1	0	0	0	1	145
1	1	0	0	0	2	146
1	1	0	0	1	0	147
1	1	0	0	1	1	148
1	1	0	0	1	2	149
1	1	0	1	0	0	150
1	1	0	1	0	1	151
1	1	0	1	0	2	152
1	1	0	1	1	0	153
1	1	0	1	1	1	154
1	1	0	1	1	2	155
1	1	1	0	0	0	156
1	1	1	0	0	1	157
1	1	1	0	0	2	158
1	1	1	0	1	0	159
1	1	1	0	1	1	160
1	1	1	0	1	2	161
1	1	1	1	0	0	162
1	1	1	1	0	1	163
1	1	1	1	0	2	164
1	1	1	1	1	0	165
1	1	1	1	1	1	166
1	1	1	1	1	2	167

blockIdx .x	blockIdx. y	blockIdx .z	threadIdx .x	threadIdx .y	threadIdx .z	tid
1	1	2	0	0	0	168
1	1	2	0	0	1	169
1	1	2	0	0	2	170
1	1	2	0	1	0	171
1	1	2	0	1	1	172
1	1	2	0	1	2	173
1	1	2	1	0	0	174
1	1	2	1	0	1	175
1	1	2	1	0	2	176
1	1	2	1	1	0	177
1	1	2	1	1	1	178
1	1	2	1	1	2	179
1	1	2	0	0	0	180
1	2	0	0	0	0	181
1	2	0	0	0	1	182
1	2	0	0	0	2	183
1	2	0	0	1	0	184
1	2	0	0	1	1	185
1	2	0	0	1	2	186
1	2	0	1	0	0	187
1	2	0	1	0	1	188
1	2	0	1	0	2	189
1	2	0	1	1	0	190
1	2	0	1	1	1	191

blockIdx. .x	blockIdx. .y	blockIdx. .z	threadIdx. .x	threadIdx. .y	threadIdx. .z	tid
1	2	1	0	0	0	192
1	2	1	0	0	1	193
1	2	1	0	0	2	194
1	2	1	0	1	0	195
1	2	1	0	1	1	196
1	2	1	0	1	2	197
1	2	1	1	0	0	198
1	2	1	1	0	1	199
1	2	1	1	0	2	200
1	2	1	1	1	0	201
1	2	1	1	1	1	202
1	2	1	1	1	2	203
1	2	2	0	0	0	204
1	2	2	0	0	1	205
1	2	2	0	0	2	206
1	2	2	0	1	0	207
1	2	2	0	1	1	208
1	2	2	0	1	2	209
1	2	2	1	0	0	210
1	2	2	1	0	1	211
1	2	2	1	0	2	212
1	2	2	1	1	0	213
1	2	2	1	1	1	214
1	2	2	1	1	2	215



Grid: 2 x 3 x 4

Bloque: 2 x 2 x 3

Bloque: 1, 2, 3

Hilo: 1, 1, 2

Tid?

Num. Bloque= 1 \* (3x4) + 2 \* 4 + 3 = 23

Num. Hilo= 1 \* (2x3) + 1 \* 3 + 2 = 11

Tid= (23\*2\*2\*3)+11=276+11=287