Matrix transpose with unrolling
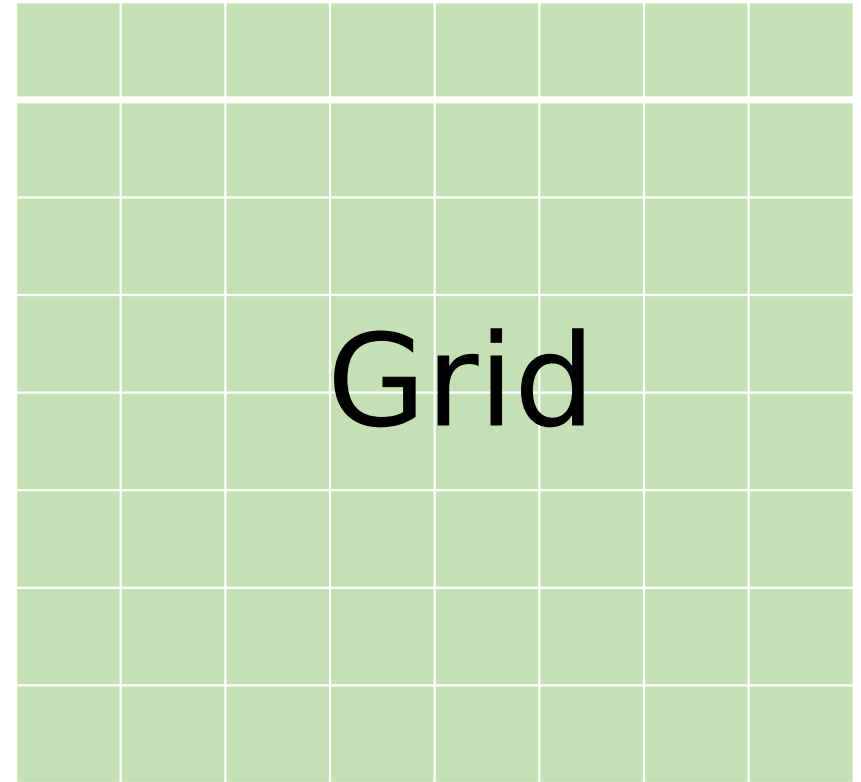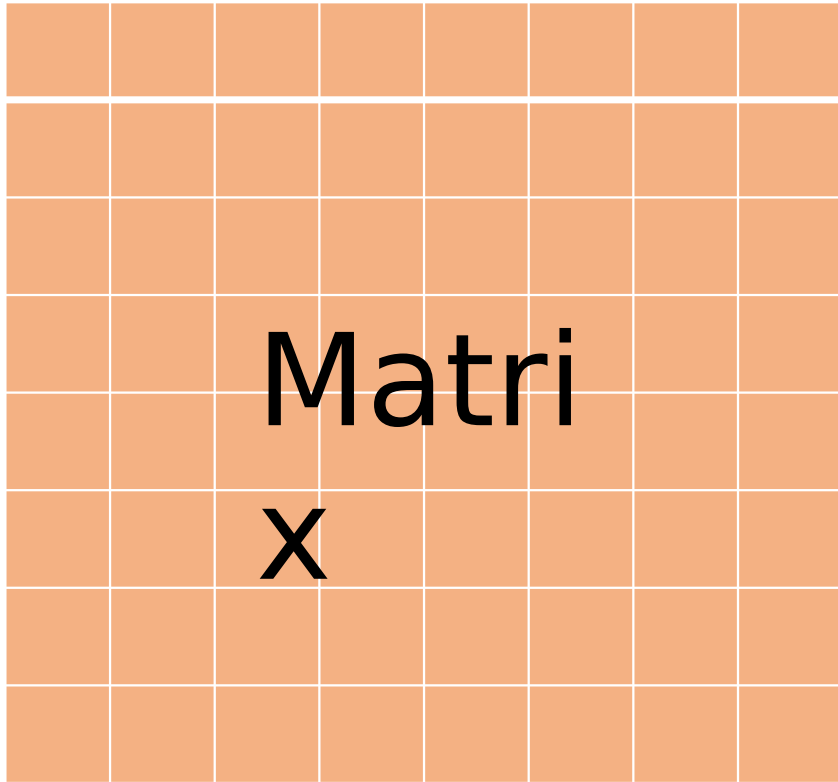
Matrix

Grid

Grid size is same as matrix size

Matrix

0 1 2 3

Grid
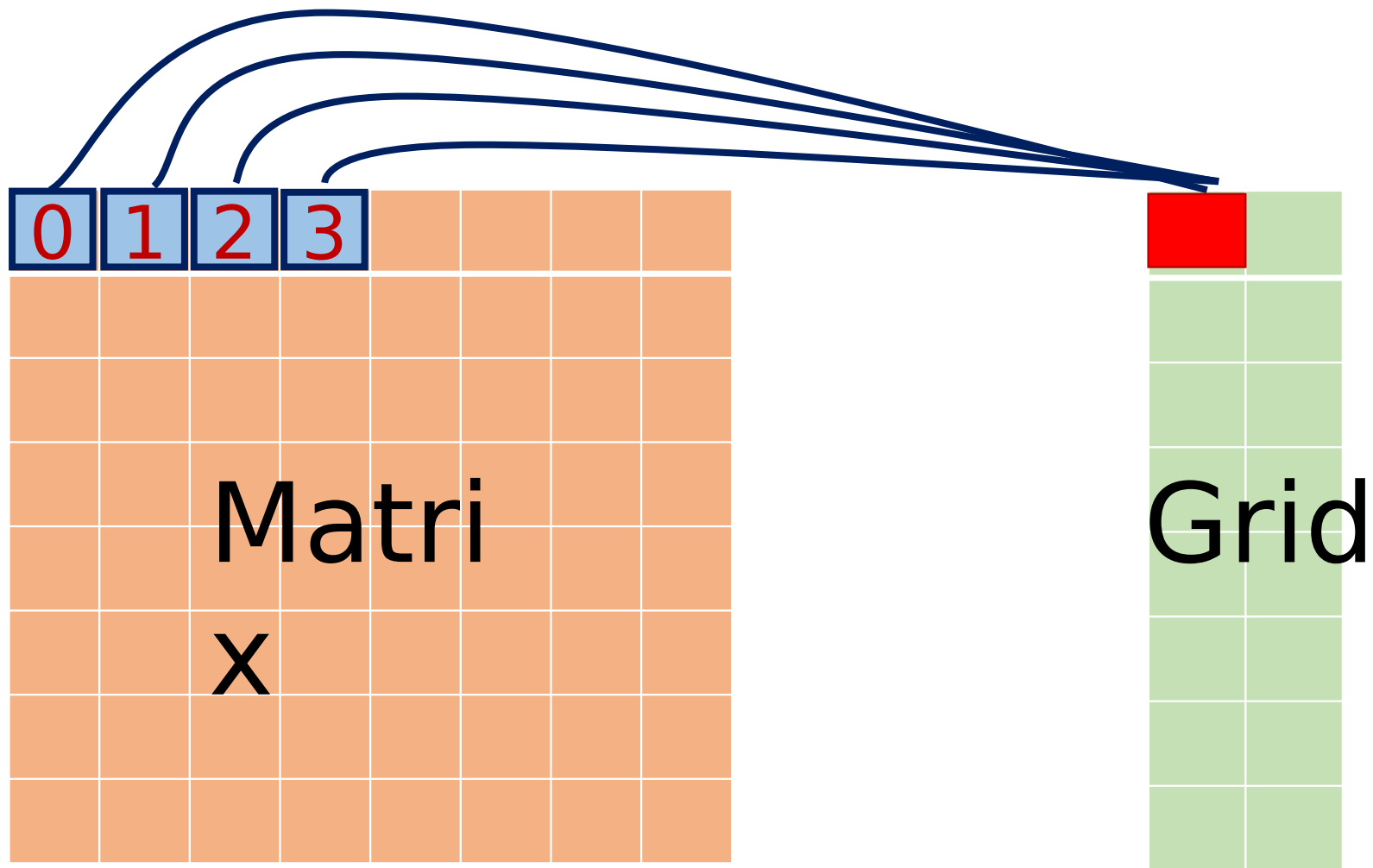
ix = blockDim.x * blockIdx.x * 4 + threadIdx.x;

For threads in thread block 1

offset = 32 * 0 * 4

= 0

For threads in thread block 2

offset = 32 * 1 * 4

= 128

```
transpose[ix * ny + iy] = mat[iy * nx + ix];
```

to

ti
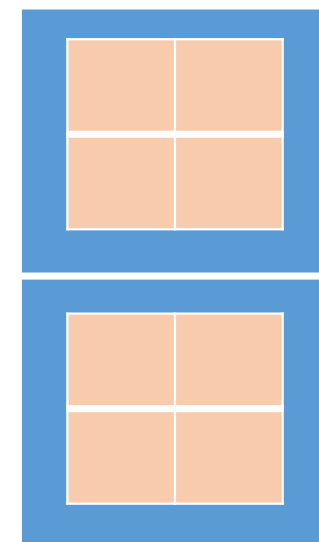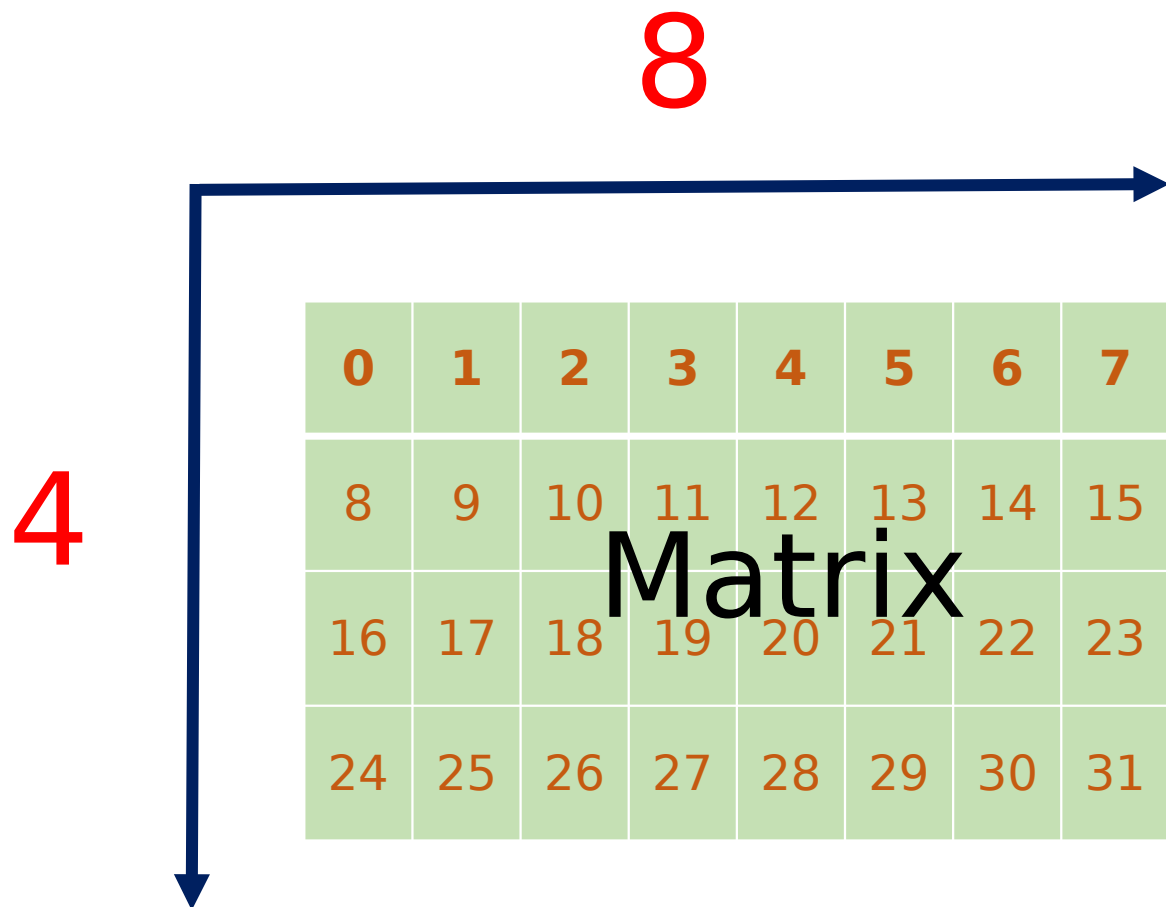
trs[(ix * ny + iy) + ny * 0 * blockDim.x] = mat[(iy * nx + ix) + 0 * blockDim.x]
trs[(ix * ny + iy) + ny * 1 * blockDim.x] = mat[(iy * nx + ix) + 1 * blockDim.x]
trs[(ix * ny + iy) + ny * 2 * blockDim.x] = mat[(iy * nx + ix) + 2 * blockDim.x]
trs[(ix * ny + iy) + ny * 3 * blockDim.x] = mat[(iy * nx + ix) + 3 * blockDim.x]

8

4

0	1	2	3	4	5	6	7
8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23
24	25	26	27	28	29	30	31

Matrix

Grid

- 4 by 8 matrix
- Elements initialized in 0 to 31 in row major format
- Perform the transpose using grid which has 1 thread block in x dimension and 2 thread blocks in y dimension each block having 2 threads in x dimension and 2 threads in y dimension.