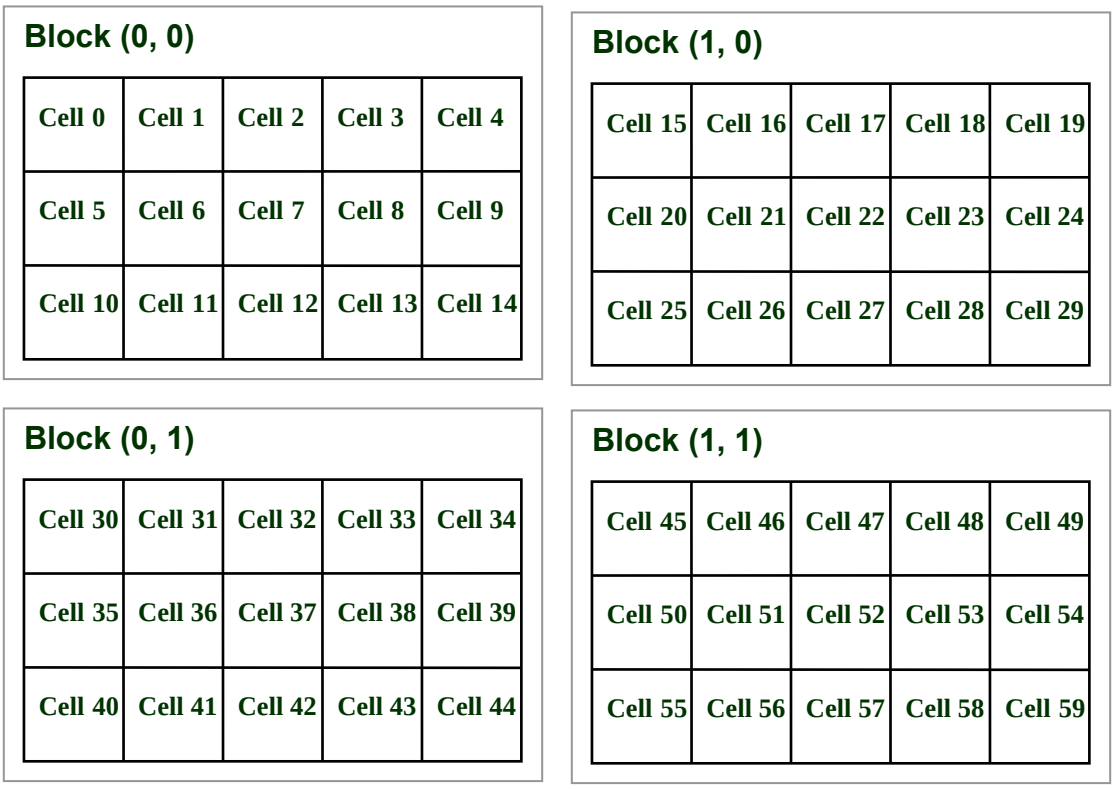
King Saud University
College of Computer and Information Sciences
Department of Computer Science
CSC453 – Parallel Processing – Tutorial No 5 –2024

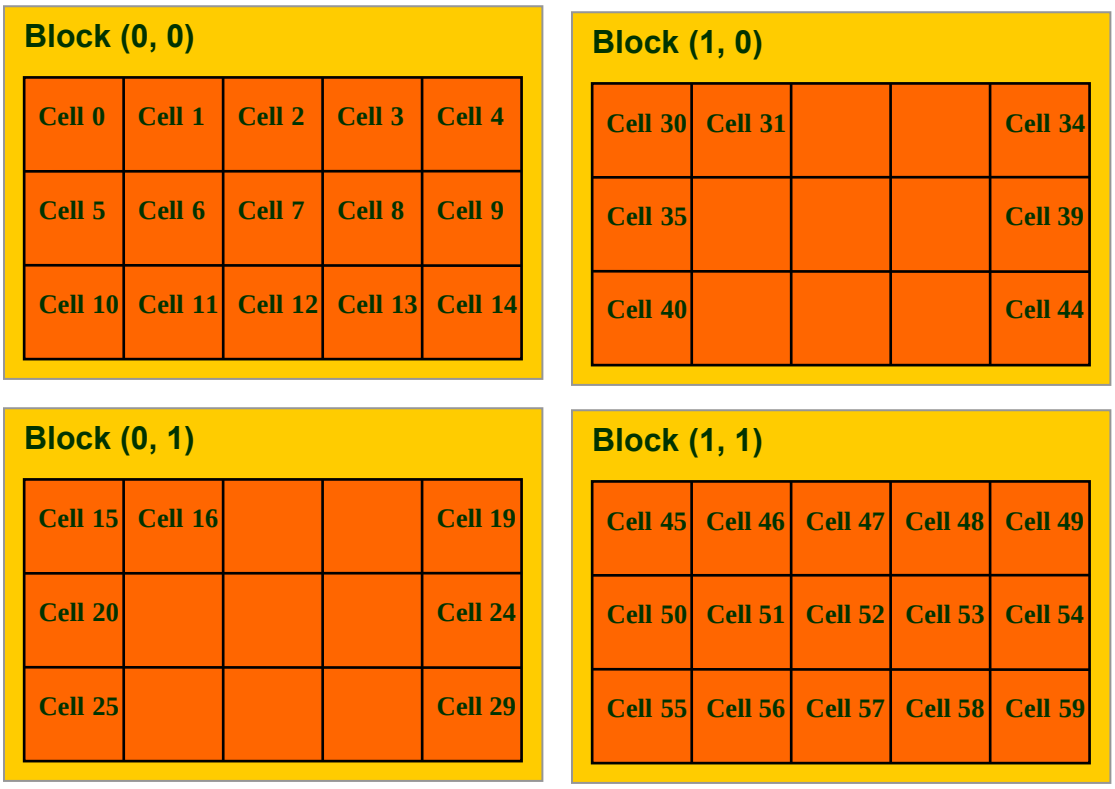
Question 1

We would like to run a kernel where every thread handles only one cell. Give the statement that calculates the ***cell_id*** for each thread as shown in each of the following figures:

1. The grid is configured as M * N matrix of thread blocks.



2. The grid is configured as M * N matrix of thread blocks.



3. The grid is configured as M * N matrix of thread blocks.

Block (0, 0)

Cell 0	Cell 3	Cell 6	Cell 9	Cell 12
Cell 1	Cell 4	Cell 7	Cell 10	Cell 13
Cell 2	Cell 5	Cell 8	Cell 11	Cell 14

Block (1, 0)

Cell 15	Cell 18	Cell 21	Cell 24	Cell 27
Cell 16	Cell 19	Cell 22	Cell 25	Cell 28
Cell 17	Cell 20	Cell 23	Cell 26	Cell 29

Block (0, 1)

Cell 30	Cell 33	Cell 36	Cell 39	Cell 42
Cell 31	Cell 34	Cell 37	Cell 40	Cell 43
Cell 32	Cell 35	Cell 38	Cell 41	Cell 44

Block (1, 1)

Cell 45	Cell 48	Cell 51	Cell 54	Cell 57
Cell 46	Cell 49	Cell 52	Cell 55	Cell 58
Cell 47	Cell 50	Cell 53	Cell 56	Cell 59

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1. The grid is configured as M * N matrix of thread blocks.

Block (0, 0)

Cell 0	Cell 1	Cell 2	Cell 3	Cell 4
Cell 10	Cell 11	Cell 12	Cell 13	Cell 14
Cell 20	Cell 21	Cell 22	Cell 23	Cell 24

Block (1, 0)

Cell 5	Cell 6	Cell 7	Cell 8	Cell 9
Cell 15	Cell 16	Cell 17	Cell 18	Cell 19
Cell 25	Cell 26	Cell 27	Cell 28	Cell 29

Block (0, 1)

Cell 30	Cell 31	Cell 32	Cell 33	Cell 34
Cell 40	Cell 41	Cell 42	Cell 43	Cell 44
Cell 50	Cell 51	Cell 52	Cell 53	Cell 54

Block (1, 1)

Cell 35	Cell 36	Cell 37	Cell 38	Cell 39
Cell 45	Cell 46	Cell 47	Cell 48	Cell 49
Cell 55	Cell 56	Cell 57	Cell 58	Cell 59

1.

2. The grid is composed of **N blocks** of **M threads** each.