AM 250 FINAL PROJECT (GAME OF LIFE)

Thursday, May 30, 2024 8:43 AM

What I have

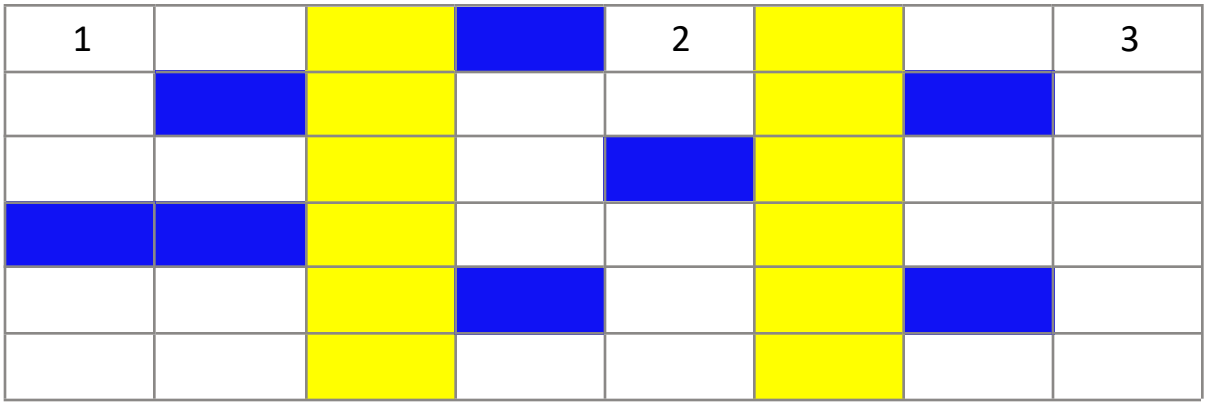
- Cells : 2D Array
- Cell State : Boolean (Alive/Dead)

Conditions

- If neighbors alive = 3 -> ensure that cell state is set to alive
- If neighbors alive = 2 -> ensure that no change in cell state occurs
- Else -> Change cell state to dead

This game considers/tracks

- Initialized 2D array cell state (w/ random states and ghost cells as an outer layer)
- Number of neighbors alive for each cell
- Final 2D array cell state
- Total number of alive cells



4 x 4 Grid W/ Ghost Cell Border. Blue Cells = Alive

PCAM

Partitioning:

- We need to decompose this problem into smaller subdomains
- To do that, divide the cell grid by columns w/ partition size = 2bc arrays are contiguous in memory (each subdomain handles a partition)
- Partitions are represented in yellow

Communication:

- Use MPI for data exchange between different processors handling each partition area
- Each processor will be assigned to a partitioned region numbered in the grid above

Agglomeration:

- Each of the partitioned regions are already grouped into cells. It is technically agglomerated bc it handles multiple grid points together

Mapping:

- Distribute tasks equally to the processors. The tasks involve checking the data in cells and modifying the data given the conditions. These tasks can be distributing along the processors

<u>Initialization</u>

- I am just going to start off by initializing a 4 x 4 array in Fortran of boolean type

<u>Flexibility</u>

- Since it is a 4 x 4, I will start off with 2 partitions. I will use 3 processors, each to cover each partitioned region. Once I finish this, I will adjust the grid to be much larger like a 10 x 10

<u>Boundary Conditions</u>

- For the outermost layer, I will be using ghost cells. This is for both the whole grid and each of the partitioned regions

<u>Communication</u>

- I am going to verify the communication between processors by exchanging information like the cells they are checking, the number of cells which are alive in each region, and the number of cell adjustments which were made

<u>Difficulties</u>

- Knowing exactly what resources you need to tackle this problem
- I also have questions regarding the grid as I was confused by the layout of it in the given assignment
- I also need clarification with the periodic boundary condition around a cell
- Between the 4x4 and 10x10, it would be much tougher to perform a

- Between the 4x4 and 10x10, it would be much tougher to perform a simple tracking between processors. Understanding what the cell grid would look like with more advanced partitions would be as well

Questions I Had

- I have an example grid. What would a cell look like?
- What would the periodic boundary conditions around a cell and a grid look like?
- Do you have any strategies for me where I can enhance my computational performance w/ partitioning, processor layout etc…?