

PSEUDO-CODE BRAINSTORM

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STATES

- Susceptible
- Exposed
- Infected
- Recover
- Dead

RULES

Incubation Time of Ebola: 2- 21 days

1 generation = 1 week

Duration of exposure to infected: 2 generations (takes 2-21 days)

Duration of infected to dead: 2 generations (takes 6 – 16 days)

Chance of Infected Recovering – 30%

- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4434807/>

...

Some more rules please

(eg. periodic boundary conditions --> if the rightest cell is neighbour of the leftest cell in a row; I would say we don't do that)

SERIAL PROGRAM

```
Main {  
  
WorldCounter = 0; //First world which is going to be randomly populated  
  
    If(WorldCounter==0){  
  
        BuildWorld();  
  
        WorldCounter+=1;  
  
    }
```

```
Else{
    For-Loop iterating over rows {
        For-Loop iterating over cols in row{
            checkNeighbours(rows[row],cols[col]);
        }
    }
    VisualText();//Convert 2D Array into a Text file for Java
} //end of Else

} //end of Main

BuildWorld(){
    For-Loop iterating over rows {
        RandStateN=(random number generator);
        For-Loop iterating over cols in row{
            If(RandStateN<=0.2){
                CellState==Susceptible;
            }
            If(RandStateN>0.2 && RandStateN<=0.4){
                CellState==Exposed;
            }
            If(RandStateN>0.4 && RandStateN<=0.6){
                CellState==Infected;
            }
            If(RandStateN>0.6 && RandStateN<=0.8){
                CellState==Recovered;
            }
            else{
                CellState==Dead;
            }
        } //end of col
    } //end of row
}
```

```
//end of BuildWorld()
```

```
checkNeighbours(){  
    For loop scanning neighbouring cells{  
        If(NeighbourCell==Infected)  
            InfectivityCounter increased;  
            //Chance for the cell to get infected increased;  
        If(NeighbourCell==Dead)  
            InfectivityCounter increased;  
            //Chance for the cell to get infected increased;  
        }  
        Else{  
            Don't increase the InfectivityCounter  
        }  
    } // for loop scanning cells finished  
    updateCell();  
} // end checkNeighbours
```

```
updateCell()//Based on the counter of infectivity  
    If(CellName==Susceptible){  
        if(InfectivityCounter is high){  
            change Susceptible cell to Exposed;  
        }  
        if(InfectivityCounter is low){  
            keep the cell Susceptible;  
        }  
    }  
    If(CellName==Infected){  
        if(WorldCounter%2==0){//if the number is even  
            If((RandomN=(random number generator))<=0.3){
```

```

        change Infected cell to Recovered;
    }
    Else{
        Change Infected cell to Dead;
    }
}
else{
    keep the cell Infected;
}
}
If(CellName==Exposed){
    if(WorldCounter%2==0){//if the number is even
        change Exposed cell to Infected;
    }
    else{
        Keep the cell exposed;
    }
}
WorldCounter+=1;
VisualText();
} //End of updateCell()

VisualText(){
    Convert 2D Arrays to a text file for Java visualizer to read;
    ->ArrayText.txt;
}

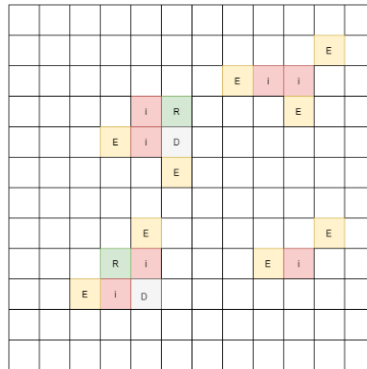
```

PARALLEL PROGRAM

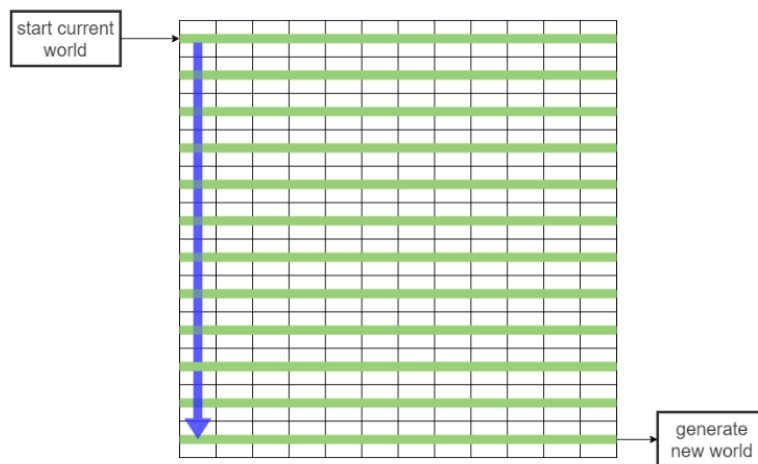
Nearly the same program as serial but splitting up the rows before calculating the cells.

DIFFERENCE BETWEEN SERIAL AND PARALLEL

For example, a grid with 12 rows x 12 cols with the following cells:



Serial approach: one thread calculates the state of every cell in the grid. Starting from left top to right bottom.



Parallel approach: the calculating of the cells is split up equally on multiple threads. Only when all threads have finished with the current world, then all threads start with calculating the cells of the new world at the same time.



CHANCES OF GETTING INFECTED

Susceptable Exposed Infected Recovered Dead

1

i	i	i
i	?	i
i	i	i

1. The chance of the main cell is very high to get infected because it is surrounded by only infected cells

2

S	S	S
S	?	S
S	S	S

2. The chance of the main cell to get infected is very low = 0% because it is surrounded by only susceptible cells

3

e	e	i
d	?	i
d	r	r

3. The chance of the main cell to get exposed is high