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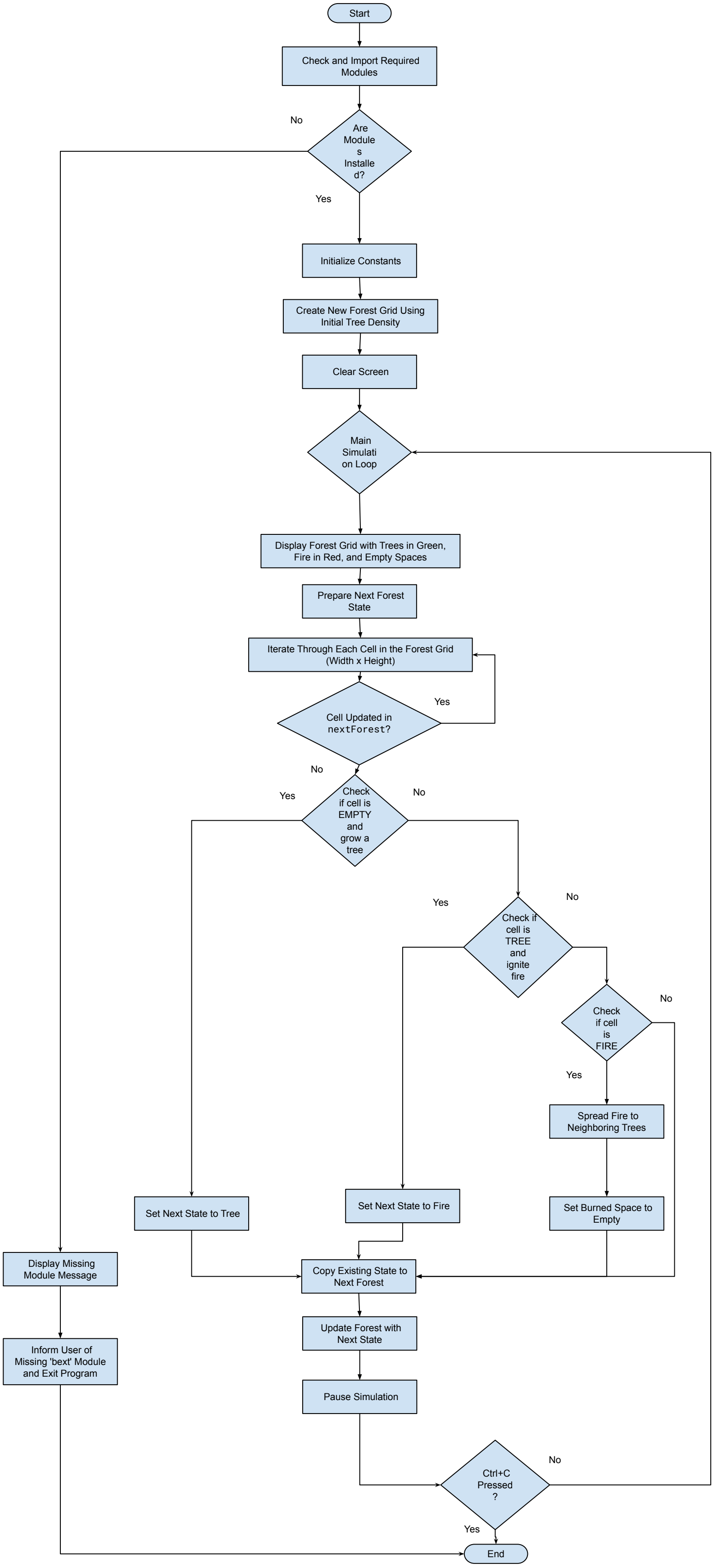
Assignment 5.2 – The Best Group Project

CSD325-A339

15 November 2024


Start
Check and Import Required Modules
No
Are Module s Installe d?
Yes
Initialize Constants
Create New Forest Grid Using Initial Tree Density
Clear Screen
Main Simulati on Loop
Display Forest Grid with Trees in Green, Fire in Red, and Empty Spaces
Prepare Next Forest State
Iterate Through Each Cell in the Forest Grid (Width x Height)
Cell Updated in nextForest?
Yes
No
Check if cell is EMPTY and grow a tree
Yes
No
Check if cell is TREE and ignite fire
Yes
No
Check if cell is FIRE
Yes
No
Spread Fire to Neighboring Trees
Set Burned Space to Empty
Set Next State to Tree
Set Next State to Fire
Display Missing Module Message
Copy Existing State to Next Forest
Update Forest with Next State
Pause Simulation
Inform User of Missing 'bext' Module and Exit Program
Ctrl+C Pressed ?
No
Yes
End

Rules for Pixel

1. **Initial Population of Pixels:**
    a. The forest grid is initialized to a particular tree density (INITIAL_TREE_DENSITY).
    b. Each Pixel has a status of either:
        i. **Tree ('A'):** Pixel is made to be a tree if a random value multiplied by 100 is smaller than or equal to INITIAL_TREE_DENSITY * 100.
        ii. **Empty (' '):** When Pixel is not a tree, it is set to be an empty space.

2. **Growth of Trees in Empty Spaces:**
    a. Each Pixel that is currently Empty has a GROW_CHANCE defined probability of turning into tree (‘A’).
    b. It is chosen randomly for each simulation run.
3. **Lightning Strikes (Fire Initialization):**
    a. Each pixel that is a Tree currently has a FIRE_CHANCE probability of being struck by lightning and converting to fire (‘@’).
    b. Lightning strikes are selected randomly at every simulation step.
4. **Spread of Fire:**
    a. Each Pixel on Fire (@) can light its surrounding pixels, which are Trees ('A').
    b. Neighbor pixels are examined in all eight directions (up, down, left, right, and diagonal).
    c. After a tree has been set on Fire, the state of that tree will change to Fire ('@').
5. **Burning Down Trees:**
    a. Pixels that are Fire ('@') get updated to Empty (‘ ‘) when they put out Fire to their neighbors.
    b. It makes it look like is being fully burned down.
6. **Copying Existing States:**
    a. Pixels that were not changed during the simulation step are still present.
7. **Randomization of Patterns:**
    a. **Every simulation run is different because of the implementation of randomness in:**
        i. Initial pixel allocation (trees vs empty space).
        ii. Tree growth (GROW_CHANCE).
        iii. Lightning strikes (FIRE_CHANCE).
        iv. Fire spreading dynamics.