In this “inquiry-driven” exercise, we will explore how different modes are needed for many models of natural phenomena. Up to now, it is possible that most models in science explored have relied on the “While Running” motif, where at each time step every agent has the opportunity to evaluate and act on its behavior once and in sequential order on the “master list of agents.”

Some models may require a different way of connecting time and action, and you can help your students discover new modes of modeling with this kind of exercise.

At Shodor, we emphasize the expectation, observation, reflection cycle of scientific inquiry and discovery, and we’ll try to do that here as well. Let’s think about the basic steps in the “life” of a tree in a forest that has caught fire. A simple story of a fire could be: While running, if a Tree is next to a Burning Tree, there is a chance the Tree changes to a Burning Tree; After some time, a Burning Tree changes to a Burnt Tree.

You could model this many ways, but one common starting point could be to think of a forest fire like a disease that spreads. We simplify by having a single agent “Tree” with three depictions: Tree (a green square), Burning Tree (a red square), and Burnt Tree (a black square). The simple rules could be written from the story as:

You could build a solid rectangle of Trees to represent the forest, and write in one Burning Tree to indicate the starting point of the fire. Build this, and test it by taking ONE STEP, and experiment with different starting points for the initial Burning Tree. What do you observe about this model? How well does it simulate what you expect a forest fire to unfold?