Forest Fire
Requirements and High Level Design (HLD) Document
Spring 2014 Apprenticeship Group Project

1) Introduction

For Smokey the Bear's (aka Ernie's) Forest Fire education tour of North America, he expects you to create a working model that will simulate the burning of a virtual forest. The fate of the forest will be determined by probability. You have the two options for creating the forest. Trees will be either planted **evenly spaced in columns and rows** to simulate a tree farm, or **randomly** to simulate a forest. The user will be able to control the percent chance (1% to 100%) that a flame will ignite the tree next to it; this is called the **burn rate**.

Trees will only burn for one time step in this model. For a reference you may view the following models that run over multipl time steps:
http://www.shodor.org/interactivate/activities/Fire/
http://www.shodor.org/interactivate/activities/AdvancedFire/
http://www.shodor.org/interactivate/activities/DirectableFire/
http://www.shodor.org/interactivate/activities/ABetterFire/

This project will strengthen your basic understanding of HTML/CSS, Programming Concepts, and JavaScript. You may certainly do more than what is required if you want to learn more.

2) Subject Matter Experts Agreement List

This section lists all key people involved in the project, including you and your partner. It will ensure that all mandatory reviewers have reviewed and agree to the requirements and proposed architecture. This is meant to be a review of your team's plans to code this project, so you should have it signed off before you do much serious coding (preferably before Day 1 ends). If you cannot get your mentor to physically sign this before you begin to code, at least send him/her an email explaining y'all's plan.

Person's Name	Role	Approval Signature
Apprentice 0:	Developer	
Apprentice 1:	Developer	
Apprenticeship Director:	Supervisor	
Mentor:	Client	

3) Requirements

The general requirements for this project are:

a. The team project will be publicly accessible from both team members' websites.
b. Detailed instructions on how to use your model must be provided either as a (linked) secondary webpage or along with the model.
c. Ensure that all html files will validate at http://validator.w3.org/
d. Must use the <canvas></canvas> HTML tag and JavaScript.
e. Teams must write out a plan either in their notebooks or on the white board.
f. Barring excused absences, the deadline for the project and presentation is Saturday, April 12th. If more time is needed, groups should consider meeting during weekdays at Shodor.

Your Presentation
You will need to present your completed model to the rest of the office. Your presentation style needs to be as if you are presenting to your client. Make sure to address these questions in your presentation:

1. Based on your model, what did you find?
2. What are some advantages and disadvantages of the tree distribution style you chose?
3. What was the most challenging part to implement? Why?
4. What part of your model are you most proud of?

4) Timeline

1st Saturday (March 29) – Split into pairs, plan project, start project
2nd Saturday (April 5) – Continue working on project
3rd Saturday (April 12) – Finished Project and Presentation are Due April 20th

5) Desired Behavior / Components

Using the HTML canvas tag and JavaScript, create a website model that simulates a forest fire. Base behavior should be similar to Shodor's Fire activity: http://www.shodor.org/interactivate/activities/Fire/

Basic Model features must include:

1. The user must be able to change the burn rate in the model. The **burn rate** is the percent chance that a tree that is "next to" a flame will catch on fire.

2. Trees will have a **burn radius**. If a flame exists within a tree's burning radius, it has a chance to catch on fire itself (this is the burn rate). The developer can choose the burn radius.

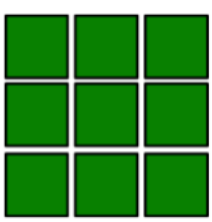
2. a. BONUS: *make the burn rate of a tree inversely proportional to its distance to the flame*.

2. b. BONUS: *create a way to display the burn radii to the screen*.

3. On the canvas, trees will be densely planted in a grid or randomly placed. If the trees are placed in a grid, a flame anywhere in the grid should be within the burn radius of at least one tree (so your trees cannot be spaced far enough apart to avoid danger of a fire). If the trees are randomly placed, no such requirement is needed.

3. a. BONUS: *allow the user to have some control in the pattern or number of trees*.

3. b. BONUS: *in a random environment, prevent trees from being planted 'on top' of one another.*



4. The user must be able to start a flame at any coordinate position in the forest model (this doesn't guarantee that trees will catch on fire, though).

4. a. BONUS: *make initial flame, tree, or flaming tree more realistic, perhaps with images.*

5. Shodor's Fire model (above) runs a simulation that allows trees on fire to ignite other trees over multiple time steps. However, your model only needs to run for one "time step": to allow the possibility for the trees within the burn radius of the initial flame to ignite.

5. a. BONUS: *allow your model to run for multiple time steps (perhaps till the fires are out), so that trees that are on fire can ignite neighbor trees, and so on*.

6) Conclusion

This project focuses using the skills learned during the Programming Concepts classes during the Spring Module. The final product for the team will be a webpage that simulates the spread of fire through a forest and a professional presentation of your model.