
Akash's & Israfil's High Level Design (HLD) Document for 2016 Group Project 2

1. Introduction

Step 1. Write a story!

-The Story-

Trees are placed randomly in the “forest” when the model is loaded. The forest is a term for a canvas where the trees spawn at random (x,y) coordinates. A fire spawns where you click and the surrounding trees have a percent chance of catching on fire. The user can change the percent chance that a tree catches on fire.

The Mixtape Gods

There was a large forest next to houses and villagers. One day, suddenly a tree caught on fire. Because the mixtape gods finally dropped some new heat. We are trying to model how the fire spreads. The fire spreads to trees and houses nearby.

2. Subject Matter Experts Agreement List

Name	Title/Role	Mandatory Reviewer (y/n)	Approved
Akash Mullick	Project Planner, Code Monkey, Website Designer	Y	
Israfil Brandon	Project Planner, Code Monkey, Website Designer	Y	
Ernie Edinboro	Supervisor	Y	
Aaron Weeden	HLD Reviewer	Y	Y
Apprentices	Client	Y	

3. Requirements

- Groups of 2
- Document your work in your notebooks
- Project High Level Design WILL be written in shared Google Document
 - Shared with Each group member
 - Shared with Aaron and Ernie
- Project HLD will be tool/programming language neutral. Use your programming vocabulary tool box.
 - variables
 - loops
 - conditional statements
 - functions
 - arrays
 - objects
 - Math functions (random, floor)
 - operators (addition, concatenation, subtraction, multiplication, division, modulus, 'and', 'or', 'not', equals, not equals, less than, greater than, less than or equal to, greater than or equal to)
- Project model will be written in HTML/CSS and JavaScript using the canvas HTML tag

4. Timeline

- **Project is Due Apr 2nd** with a website presentation.
 - If you are not there the 2nd, you will present the project alone at a rescheduled time.
 - If any/all group members are not present, you will still present the project on schedule.
- You will have **3.5 days** to work on this project. A total of **17.5 hours**.
 - Must have a full plan approved before starting work on coding (this follows the common Shodor-ism, "First we plan, then we get approval, then we implement").
 - Use your time wisely.
 - Groups are encouraged to work during the week in between Saturdays.

5. Desired Behavior / Components

- Website
 - Description of your group project
 - Instructions on how to use the model
 - Working Model

"Days of debugging saves **hours** of design and planning" - Charlie Peck

- Create link to the following files on your website
 - HLD document, it will be a downloadable file
- **Each person** will host a copy of the group project website from their personal website.
 - shodor.org/~akashm/fire
 - shodor.org/~ibrandon/fire
- **The Model**
 - Agents-
 - Trees
 - Fire
 - *Houses*
 - *Villagers*
 - *Mixtapes*
 - Agent behaviors-
 - When the canvas is loaded, trees are placed randomly to form the forest
 - A fire is created where the user clicks
 - The fire has a chance of spreading to surrounding trees
 - The trees change color as they burn and finish burning

Step 2. List out data you think you will need.

-Variables-

1. Array of Tree Objects
2. Tree Object
 - a. x-coordinate (number)
 - b. y-coordinate (number)
 - c. color (string)
 - d. width (number)
 - e. height (number)
 - f. burningTimeStep(number)
3. Other Variables about Trees
 - a. Number of Initial Trees = 10
 - b. Length of canvas(pixels) = 500
 - c. Burn Percentage (set value)

d. Length of Burning (10 timesteps)

Step 3. List out functions you think you need.

-Functions-

1. Setup()
2. CreateTree()
3. Draw()
4. Burn()
5. Animate()
6. StartFire()

Step 4. Start adding some detail (Pseudo Code). If you realize you need a new function, add it to the bottom of the list in step 3 and 4.

-Functions-

1. Setup() function
 - a. set width of canvas = canvas length
 - b. set height of canvas = canvas length
 - c. Loop through the Tree array
 - i. Assign a new Tree object to the array at each index using the CreateTree function
2. CreateTree() function (At Setup)
 - a. set x coordinate to random number(0-canvas.width)
 - b. set y coordinate to random number(0-canvas.height)
 - c. set color to green
 - d. Set burningTimeStep to 0
3. Draw() function
 - a. ClearScreen()
 - b. Call burn function
 - i. Burn nearby trees
 1. Loop through the trees array.
 - a. Check if each tree is on fire. (If it's red)
 - i. Loop through the trees array

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1. If the tree is not on fire and a random number between 0 and 100 is less than a burn percentage
 - a. Then set the tree on fire (changes color from green to red and set its number of burning timesteps to 1)
 - b. If finished burning, change into a dead tree (grey)
 - i. Done burning when the number of timesteps exceeds (if number of timesteps>5 then change color to grey)
4. Animate() function

Various languages have functions that can achieve delay

 - a. repeatedly call Draw() with 1-2 second pause.
5. startFire() function
 - a. Set tree on fire when clicked on to start the model

Step 5. What tool or programming language will be used?

List out any tool or programming language specific planning.

- a. Javascript
- b. HTML
- c. CSS

Step 6. Start with the simplest code.

Break every part down into simpler parts.

Add plan to the checklist below.

How you will test that plan?

Coding To-Do List	Test Conditions
HTML: Create HTML web page (index.html). Put title of project in <title> tag	TEST: Open page in web browser and confirm the title of the page is correct.

	Debug, Save Working Copy, Move on!
JS: Create JavaScript file (fire.js) and add script tag to HTML with it as the src.	TEST: Open Web Inspector and confirm the JavaScript file appears under the Resources, and that no error is on the console. Debug, Move on!
JS: Create function SetUp() that console.logs "Success".	TEST: Using the console, call the SetUp() function and confirm it logs the message. Debug, Move on!
HTML: add onload function to <body>	TEST: Confirm that when you open the page, the console logs the message. Debug, Move on!
HTML: add <canvas>, give it a width, height, and border	TEST: Confirm the canvas is visible and the correct size and border when you open the web page. Debug, Save Working Copy, Move on!
JS: Create global variable for canvas and pen	TEST: Using the console, check if the canvas and brush are defined. Debug, Move on!
JS: In SetUp Function: Set Canvas variable =document.getElementById("myCanvas");	TEST: Using the console, ask for the canvas variable and confirm it has information stored concerning <canvas> tag. Debug, Move on!
JS: Set pen variable = canvas.getContext("2d");	TEST: Using the console, ask for the pen variable and confirm it has information stored concerning canvas rendering Debug, Move on!
Create an empty create tree function	TEST: Input a console log into the function, and on the console call the function, and confirm that the function prints the message

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Write code for the create tree function to create/initialize tree object.	TEST: Create a tree object from the console and confirm that initial properties
JS: Create array of tree objects place them randomly on the canvas.	TEST: Using your 'visual prowess' to look and see if the trees appeared Debug, Move on!
JS: Create burn function that sets a tree on fire when clicked on.	TEST: Confirm the color of the tree changes to red when clicked on. Debug, Move on!

- Group Project Presentation Apr 2nd
 - **Dress Professionally**
 - **business casual**
 - 5-10 minute presentation
 - Have fun, show off your work.

6. Conclusion