NP COMPLETE

Tree Huggers

Design Document

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Introduction

Tree Huggers is a realistic exploration and survival game that is set in a forest environment. The initial idea for the game came about due to a desire to create a very realistic and physically correct game, almost like a wilderness simulation. By being set in the forest, a lot of stunning visuals could be implemented to make a player feel like they were out in the forest themselves.

Tree Huggers will be a single player first-person game. It incorporates a full day and night cycle with a realistic looking sun and moon. 3D sounds will be used to add to the immersive element of the game. An inventory system will be used to hold various materials and weapons that the player will use. There will be AI animals, both as predators and neutral agents, to allow some additional interaction for the player. Finally, there are player attributes that include health, stamina, hunger, and thirst, all of which will affect player motion and could possibly lead to the player's death.

The goal of Tree Huggers is to survive as long as possible while taking in the beautiful environment. The player will explore the beautiful landscape, fight off predators, and hunt other animals in order to survive the expedition.

Overview

Visual Style

Tree Huggers will try to be as visually correct as possible. High resolution art assets have been purchased to make the game look as great as possible. These assets include trees, rocks, other plants, and ground textures. Since the game is trying to be set in a realistic environment, there will be a physically correct sky that includes a sun, a moon, clouds, and weather effects. The game will have a day and night cycle with correct lighting color and intensity to make the player feel like they are out in a forest.

Controls

Tree Huggers will utilize Unity's first-person controller asset for the first-person camera. All of the actions will be relative to this first-person viewpoint. Crouching, sprinting, evasive maneuvers, and combat have been added to the first-person controller to aid in player survival.

Player Attributes

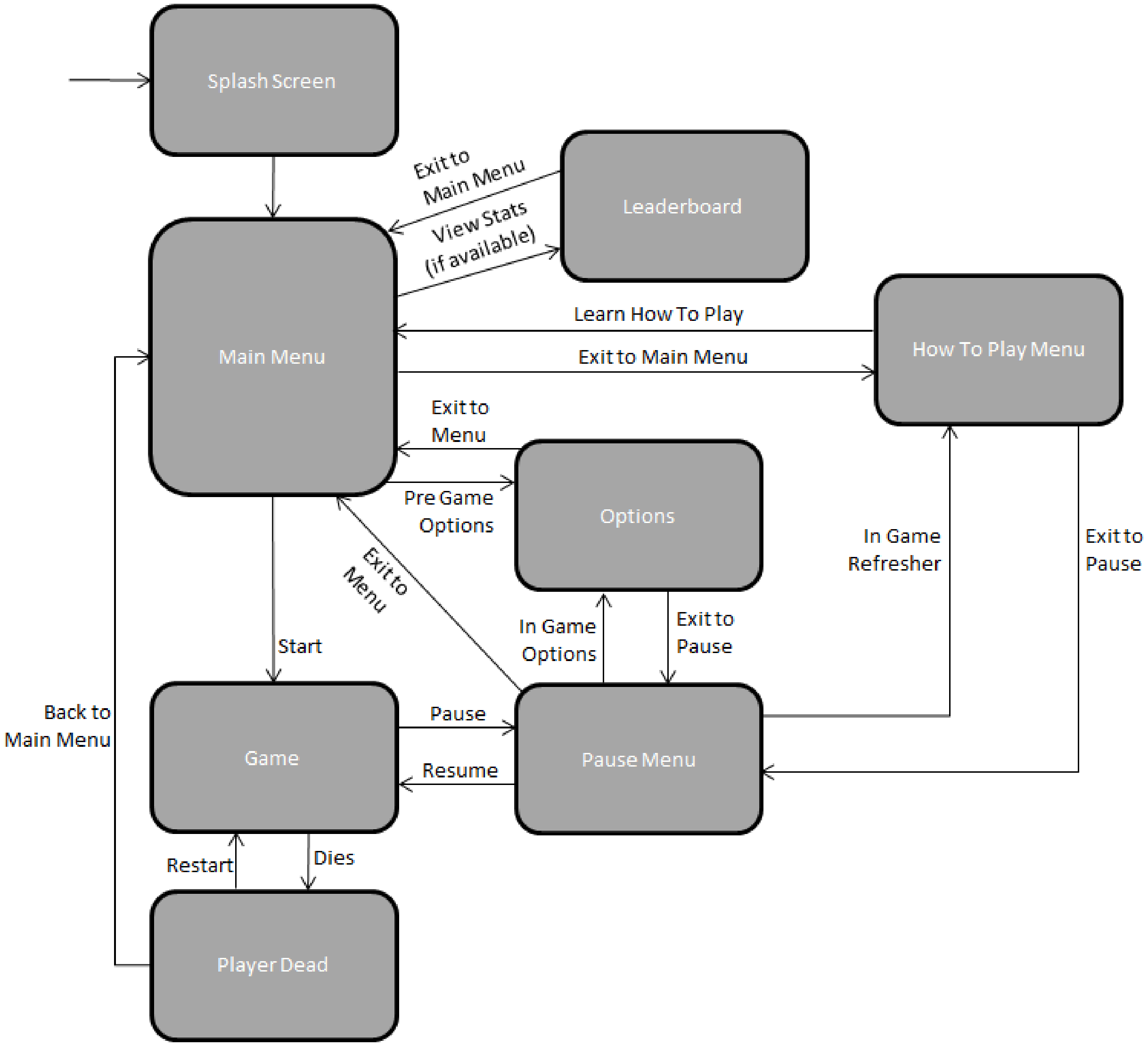
Instead of just having a health based system, Tree Huggers will incorporate other aspects that the player must be aware of to survive. Main health is a factor that will determine whether the player is still alive or dead. A stamina system will be used to limit running and evasive maneuvers of the player. A hunger and thirst system will also be included that will affect both the player health and stamina.

Hunger and thirst are both tied into the day and night cycle to add realism to the game. The thirst meter will deplete completely after two days without water, after which the health bar will deplete. The health bar, if no health packs are used and no water is drunk by the player, will deplete one day after the thirst meter is fully depleted. This gives the player three full days to survive without water if no other damage is done to the player. The hunger meter will deplete after four days without meat and will deplete the health bar after that point as well. With the same effect as the depleted thirst meter, a depleted hunger meter will fully deplete the health bar after two days. The player can survive six days without food if no other damage is done to the player.

Animals

Tree Huggers will try to include as many forest animals as possible. These animals include birds, rabbits, bears, stags, boars, foxes, and wolves so far. All of the animals are purchased assets that the NP-Complete team has attached scripts to in order to move and make the animals lifelike. The wolf is the only predatory animal and will attack the player. More overview on the AI component of the wolf will be discussed later. The other animals will remain neutral to the player as long as the player does not get close to them. Some of the animals, like the bear and boar, will be more territorial, while the stag will have some random points of aggression towards the player. The rest of the animals will flee from the player if the player gets too close to them.

Game States


Splash Screen
Leaderboard
Main Menu
How To Play Menu
Options
Game
Pause Menu
Player Dead
Exit to Main Menu
View Stats (if available)
Learn How To Play
Exit to Main Menu
Exit to Menu
Pre Game Options
Exit to Menu
Start
In Game Options
Exit to Pause
In Game Refresher
Exit to Pause
Back to Main Menu
Pause
Resume
Restart
Dies

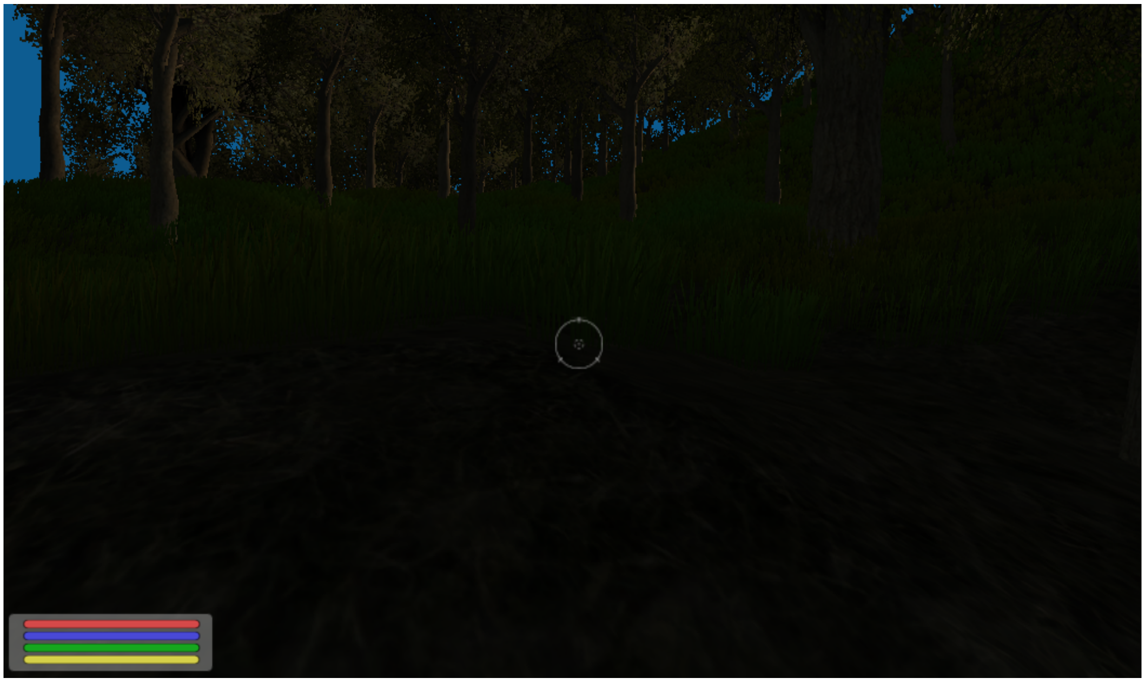
Player

Controls (Keybindings)

W	Forward movement
A	Left movement
S	Backward movement
D	Right movement
WW (double tap)	Roll forward
AA (double tap)	Roll left
SS (double tap)	Roll backward
DD (double tap)	Roll right
Left Shift (Hold)	Sprinting
Left Control (Hold)	Crouch
Space Bar	Jump
E	Pick up/Hold item
Mouse	Look orientation
Left Mouse (in game)	Attack with weapon
Escape	Enter/Exit pause menu
I	Enter/Exit inventory
Left Mouse (in menu)	Select item/menu option

HUD

The player HUD is kept very simple, that way it does not detract from the gameplay. Here's a sample image of the HUD in the game.



The slider bars in the bottom left represent the player stats. The top slider, which is red, represents the player's health. The next slider, which is blue, represents the player's stamina, which depletes when the player sprints or performs evasive maneuvers. The following slider, which is green, represents the player's hunger and depletes over time. The final slider, which is yellow, represents the player's thirst and also depletes over time.

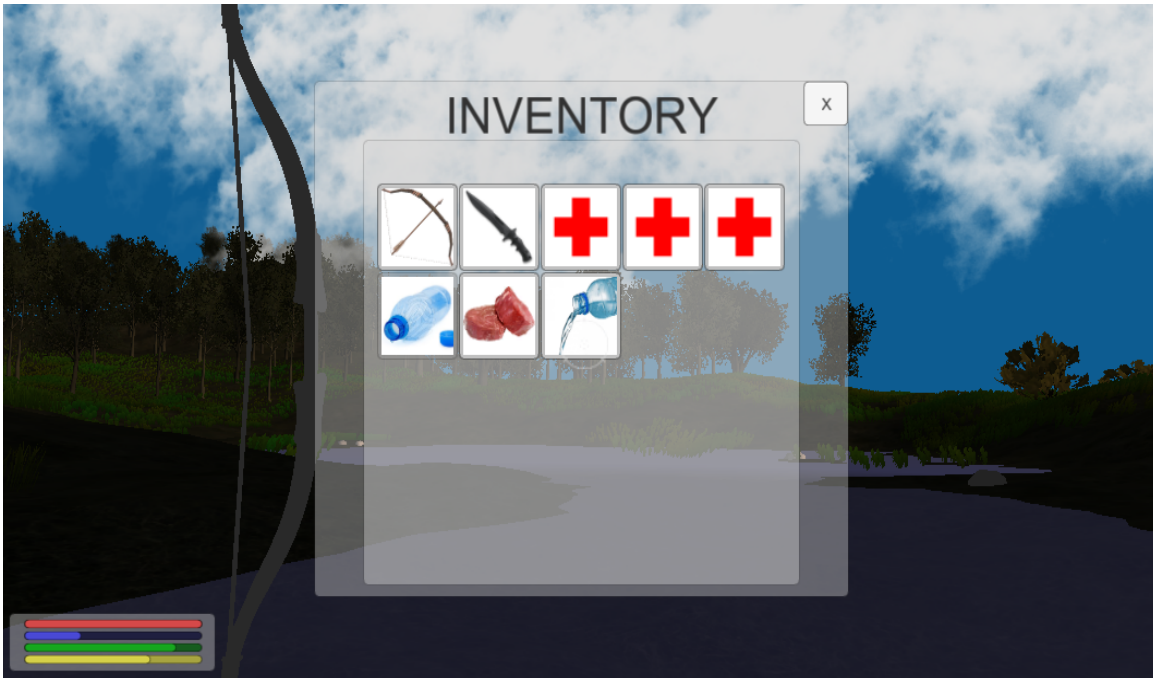
The slider bars in the bottom left will fade away if no actions deplete the health or stamina bar. If inventory items are used to replenish any of the sliders, the sliders will appear on the screen to indicate that they have been updated. Having the sliders fade away gives the player more screen space to immerse themselves into the game.

The reticle in the middle of the screen is used as an interaction point between the player and objects in the environment. When the player is looking at a weapon and has the ability to pick up the weapon, the reticle changes to red. When the player is looking at a regular inventory item and is close enough to pick it up, the reticle will change to yellow.

Inventory

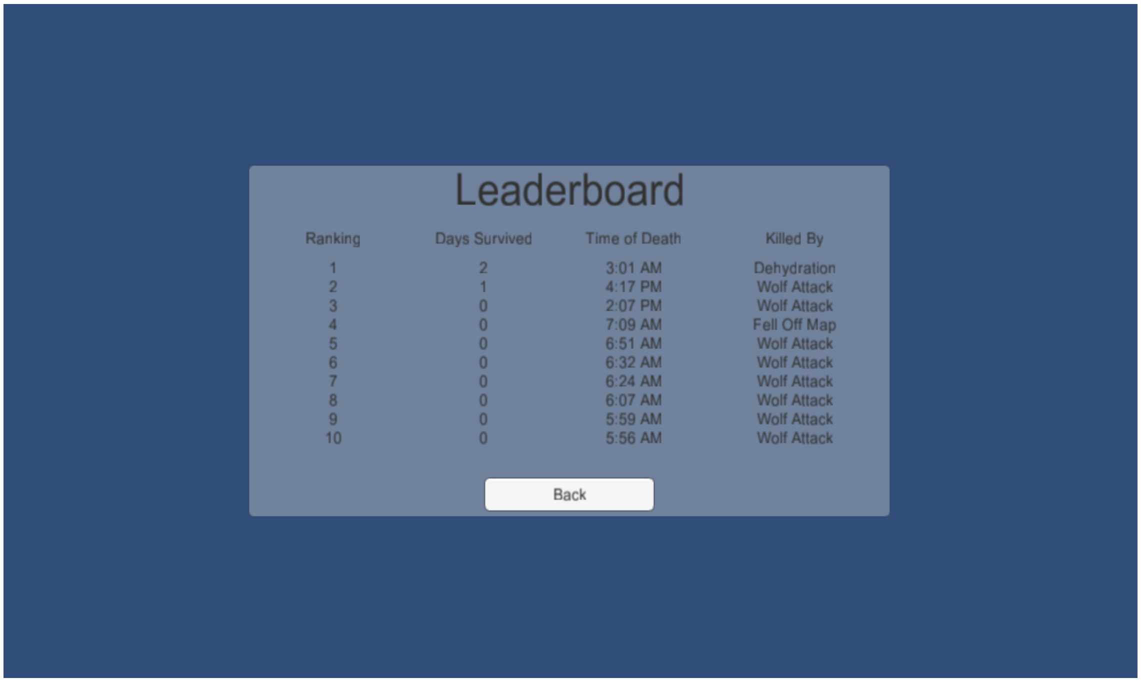
The player has a dynamic inventory to hold various items that they pick up while exploring the terrain. These items can be weapons or recovery items for the four attributes that the player has. The inventory is setup in a grid that dynamically fills based on the number of items that the player carries. The player can then use items from the inventory and the items will disappear from the inventory upon use. Initially, the player will start with an empty water bottle in their inventory, which will be used as their portable water supply. The player has the ability to swap weapons and unequip their current weapon all from the inventory.

Here's a sample image showing how the inventory looks when it is full of all of the interactable items in the game.



Leaderboard

In order to add a survival aspect, a leaderboard system was implemented. The leaderboard tracks the number of days survived, the time of day the player was killed, and what killed the player. A local copy of the game will save these stats locally while the web player version will have stats saved to a shared file, that way players can compare their stats with other people playing the web player version. Here's an image of the leaderboard.



Leaderboard

Ranking	Days Survived	Time of Death	Killed By
1	2	3:01 AM	Dehydration
2	1	4:17 PM	Wolf Attack
3	0	2:07 PM	Wolf Attack
4	0	7:09 AM	Fell Off Map
5	0	6:51 AM	Wolf Attack
6	0	6:32 AM	Wolf Attack
7	0	6:24 AM	Wolf Attack
8	0	6:07 AM	Wolf Attack
9	0	5:59 AM	Wolf Attack
10	0	5:56 AM	Wolf Attack

The leaderboard will only appear if the game has already been played and is accessed only from the main menu.

AI

Predators/Enemies

The main enemy of the game is a wolf. This wolf can bite the player to deal damage and also swipe with its paws to scratch the player.

The wolf employs a field-of-view in order to detect if it can see the player. Once the player enters the field-of-view of the wolf, the wolf has different ways to interact with the player. If the wolf is far away, it will break into a sprint to get close to the player. Once the wolf is close to the player, it will jump to try to bite or scratch the player. <Additional AI tactics will be implemented later dealing with attacking the player.>

<Include images and state diagram of wolf>

Neutral Animals

Other animals are also in the game, including birds and rabbits. These animals remain neutral to the player and cannot inflict damage, but can be hunted for food. The animals will have a random roaming movement regularly in order to make the animals seem realistic. When the player gets close to the animals, they will proceed to flee from the player in order to not get killed.

<Include images of both as well as state diagram later.>

Environment

Landscape

The terrain is generated using many frequencies of perlin noise. By using multiple frequencies, the terrain has some large mountain areas but also some flat areas. The terrain is then textured based on the elevation and slope, so flatter sections are grass while the steeper areas are rocky. Environmental objects, like trees, grass, rocks, and other shrubs are placed manually into the game.

Sky

To make the game more realistic, a day and night cycle was implemented. The sun and the moon are both spheres that follow a circular path using Catmull-Rom spline cubic interpolation. Using cubic interpolation, control over the day and night can be easily maintained. The idea is to have the daytime gameplay last twice as long as the nighttime gameplay, that way the player can better fight and explore.

The sun and moon are directional lights that rotate as they move along their circular curve. This helps to simulate a full day transition by adding dusk and dawn characteristics to the scene. The light of the sun changes during the day, from yellow at dawn, to white at noon, then back to yellow at dusk. The moonlight is a pale blue and has a lower intensity than the sunlight as well.

The skybox also undergoes a transition from day to night. During the day, the backdrop is a blue color to simulate the daytime sky. During the transition to night, the skybox transitions or blends into the nighttime skybox, which is a field of stars. The transition from the nighttime to the daytime skybox occurs again at dawn.

Dynamic clouds have also been added to increase the realism and complexity of the sky. There are four cloud coverage types: no clouds, few clouds, overcast clouds, and heavy overcast/storm clouds. At dusk, the cloud type for the following day is chosen and clouds start to form on the west end of the terrain. Clouds move from west to east in the terrain. The light intensity of the sun and moon goes down during the storm clouds, so the player will be able to visually tell when a storm is coming.

Weather

<Weather hasn't been implemented. More to come later.>

Sound

Background/Ambient

During some of the menus, music is played to set the mood for the player. Music or other ambient noise will be played during the game to fill the scene out more.

<More to come as more sounds are added>

3D Effects

All other sounds in the game will be 3D sounds. These sounds will be tied to certain objects or areas, where the player will hear the sound differently depending on distance from the object and orientation towards the object. The use of 3D sound will add to the immersive feel that the player is supposed to have. Some sounds will include footsteps on different terrain, animal sounds like wolf panting or bird chirping, wind noise through trees and plants, and rushing water near the bodies of water.

<More to come as more sounds are added>