My game will be based on "Maxwell's Demon," a thought-experiment imagined by physicist James Clerk Maxwell, that hypothetically violates the second law of thermodynamics. In the thought-experiment, a demon controls a lever that opens and closes a doorway between two chambers of gas molecules. The demon would sort the fast molecules from the cold ones, generating heat within one of the chambers. This violates the second law of thermodynamics because no work was put into the system, yet entropy decreased.


Maxwell's Demon, an imaginary being who by sorting molecules according to their velocity can apparently violate the second law of thermodynamics.
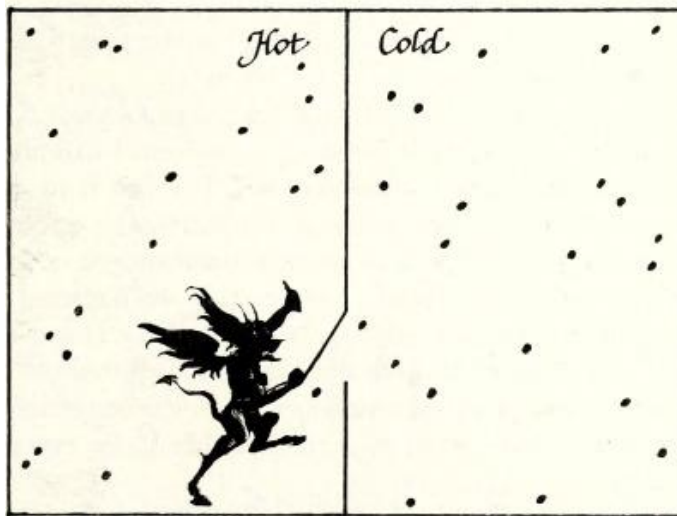
In my game, the user is the demon! The goal would be to sort two types of molecules (fast moving and slow moving) before time runs out. The game would have two game modes. The first game mode would be, "play," in which the game would start out easy and as the player levels up, would get more difficult by having less time and more molecules. Each level would have a unique layout, the shape of the chambers would get more and more intricate as the game progresses. The second game mode would be a "sand box," in which the player can add new molecules to the system by pressing a or b, as well as be able to free-form design the size and shape of the chambers
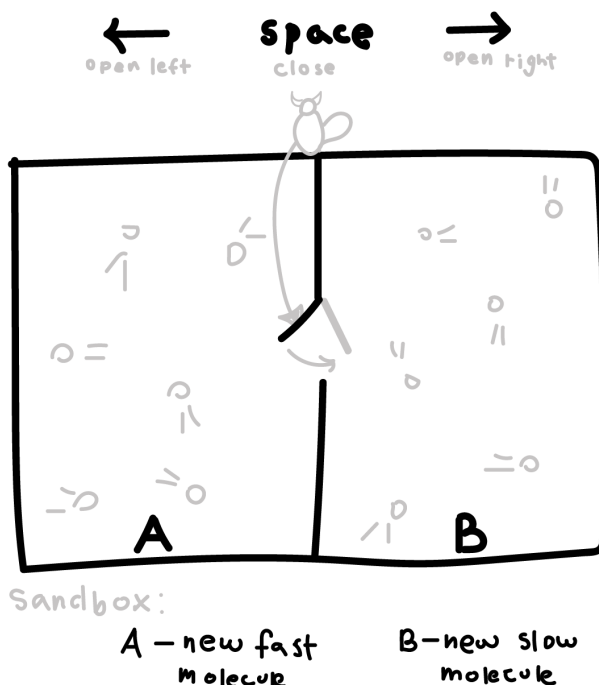

The image on the left shows the simplest form of chamber as well as the user input. The left and right arrow keys open the door in the given direction, and the space bar closes the door completely. In the sandbox mode, the user can click A or B to add new molecules to the system.
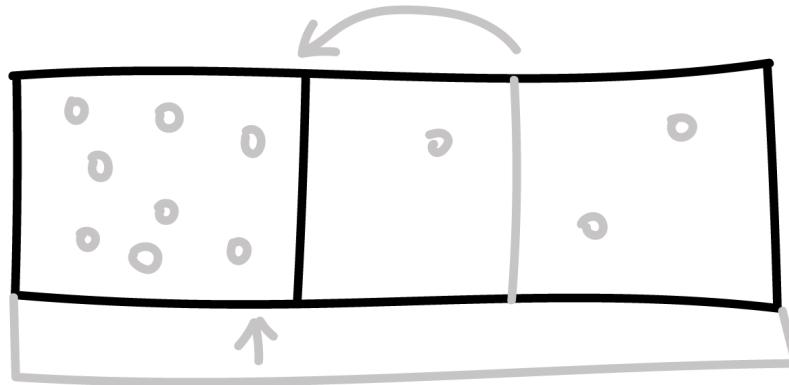
Also in sandbox mode, the user can manipulate the size of the chambers by dragging, as well as control the barrier with the doorway in between the two chambers

The image below shows a possible complex chamber for a higher level.

time remaining:
1:45
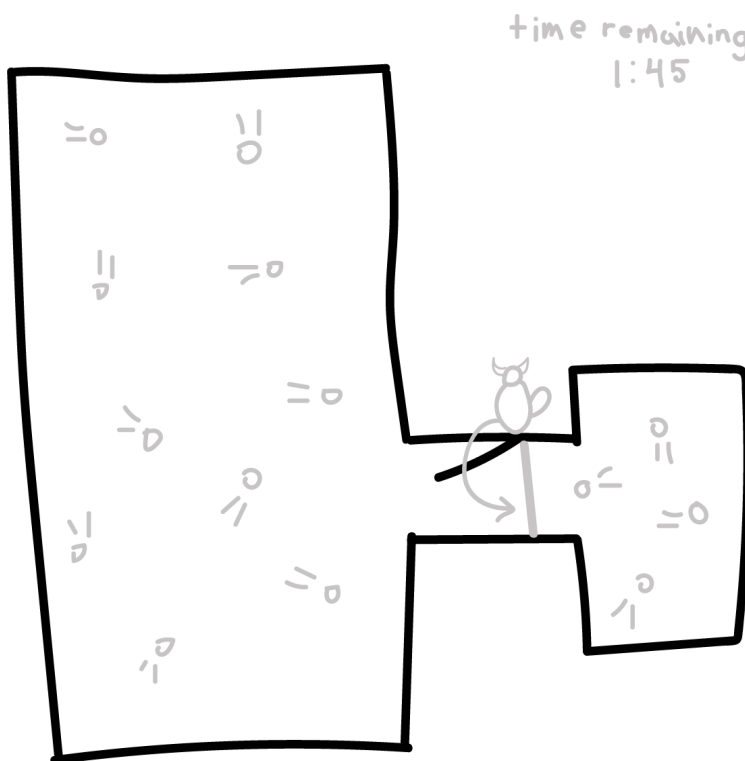
For the player to succeed, they will need to get a certain number of fast moving particles in one chamber (the ratio will vary for each level). I will need to find a way to calculate the locations of every fast moving particle and determine which chamber they are in (in my prototype I was unsuccessful in doing so). Another technical challenge I foresee is getting the molecules to interact with the changing of the chamber sizes in the sandbox mode. My vision is that the player will be able to manipulate the size of the chambers by dragging the borders, so I will need to create the edges of the chambers as object classes and then constrain the molecules based on the location of the edges. Lastly, as I have never programmed game modes before, I could encounter unexpected difficulties. But I plan on creating states, similarly to the way we've been creating title screens and end screens.