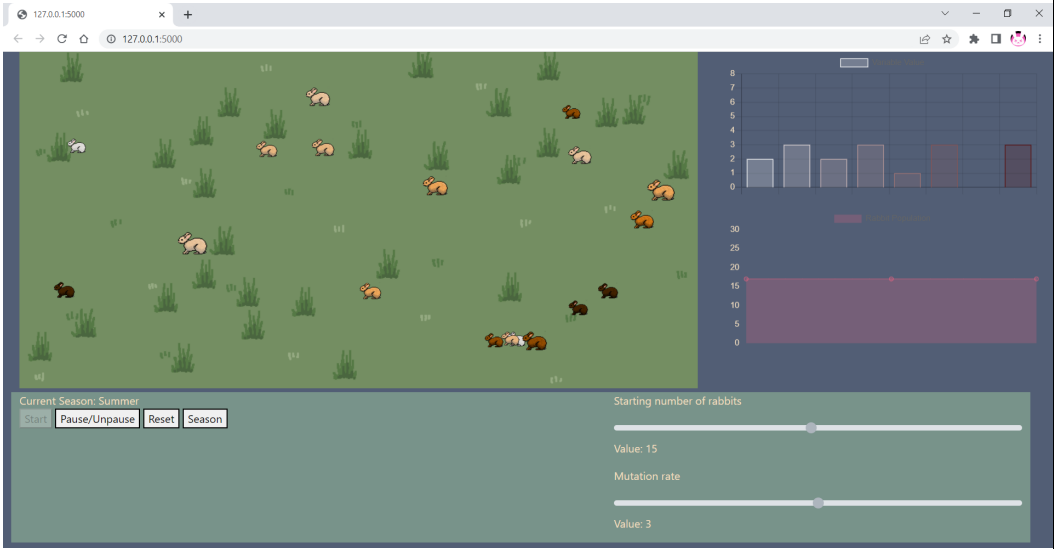




Evaluation

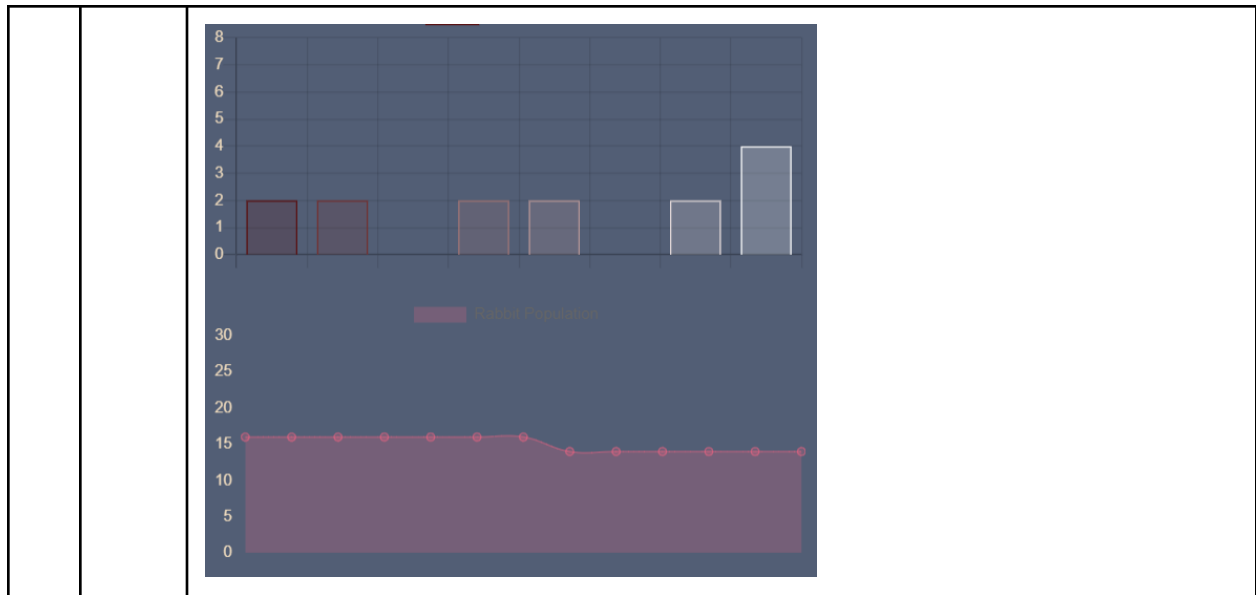
Key:  
SC = Success Criteria  
C = Client

Meeting the success criteria

SC	Met?	Evidence
1	Yes	<p><u>Client feedback:</u> That’s great! I can access it just from google chrome, I don’t need to download any software for it.</p> 
2	Yes	<p><u>Client feedback:</u> Yep, I can see all 3 elements in there. They look very similar to my presentation, wonderful.</p> 

3	Yes	<p><u>Client feedback:</u> From what I can see this seems to be working perfectly. The rabbits eat any grass they come into contact with and the hawks fly down to eat rabbits.</p> <p>(Evidence can be found in the video for criterion D)</p>
4	Yes	<p><u>Client feedback:</u> This one I cannot see directly from the simulation, but after you've explained the code to me I can see that this is definitely the case</p> <pre> class Rabbit{   constructor(x,y,dna){     this.dna=dna.toString() //21bits     this.colour=parseInt(this.dna.slice(0,3),2); //0-7, 3bits     this.diameter=parseInt(this.dna.slice(3,8),2)+32; //0-31, 5bits     this.energygain=parseInt(this.dna.slice(8,13),2); //0-31, 5bits     this.intelligence=parseInt(this.dna.slice(13,17),2); //0-15, 4bits     this.speed=parseInt(this.dna.slice(17,21),2)+1; //1-16, 4bits   } } </pre>
5	Yes	<p><u>Client feedback:</u> This takes a bit of observation to confirm, but from the numbers I have recorded so far it does seem like this is true</p> <p>(Evidence can be found in the video for criterion D)</p>
6	Yes	<p><u>Client feedback:</u> Absolutely. I can see the rabbits reproducing in the simulation.</p> <p>(Evidence can be found in the video for criterion D)</p>
7	Yes	<p><u>Client feedback:</u> Just like number 4, this one you can only tell through the code</p> <pre> this.energy -= 120 let cutoff = Math.floor(Math.random() * 21) + 4 let newdna = this.dna.slice(0,cutoff) + action[3].slice(cutoff,24) rabbits.push(new Rabbit(action[1],action[2],this.mutate(newdna))); </pre>

		<pre> mutate(dna) {   let mut_dna = "";   let mut_rate = document.getElementById("mutation_rate").value;    for (let i = 0; i &lt; dna.length; i++) {     if (Math.random() &lt; 0.2    mut_rate &lt;= 0) {       mut_dna += dna[i];     } else {       mut_dna += dna[i] === "0" ? "1" : "0";       mut_rate--;     }   }    return mut_dna; } </pre>
8	Yes	<p><u>Client feedback:</u> I can adjust these sliders over here. Clear and simple. Good good.</p>  <p>(Evidence can be found in the video for criterion D)</p>
9	Yes	<p><u>Client feedback:</u> Yep, this button works.</p> <p>(Evidence can be found in the video for criterion D)</p>
10	Yes	<p><u>Client feedback:</u> All of these buttons work.</p> <p>(Evidence can be found in the video for criterion D)</p>
11	Yes	<p><u>Client feedback:</u> The graphs look great. They're very clear and well formatted.</p>



### Client feedback

According to the client feedback, this product is near perfect for his specific purpose. He was impressed by how easy the simulation was to use and play around with. He was also very happy with the fact that I kept the webpage very simple but actually implemented a lot of complex variables behind the scenes. This way, “it looks simple enough for the kids but it's also complex enough to mimic real world situations.” He also thanked me for making the sprites match his presentation because that makes it easier for him to integrate this simulation into his lessons. He says that he will immediately begin using this product in the coming semester.

### Future Improvements

Overall, this product has been kept relatively simple for an evolution simulator under my client’s request. However, there are still many areas of potential improvement. Depending on the purpose of future uses, this simulation also has a lot of potential to more accurately depict real world conditions. If done well enough, it could become useful for a large variety of purposes, such as being used by environmental conservationists to predict how an ecosystem will change in the future.

### **Short term:**

#### **1. Add some form of visual representation for the rabbit's DNA**

Since this product is intended for educational purposes, my client mentioned that “I want the students to actually see the mix and match of DNA over time”. An idea I had of doing this is to represent the DNA via color coded bars that show up when you hover the mouse over a rabbit. The students will easily be able to identify that a rabbit's DNA is similar to its parent.

#### **2. Add an age variable for rabbits**

Currently the rabbits do not have an age variable. This means that given sufficient food, a rabbit in my simulation can survive indefinitely, which is obviously unrealistic.

Additionally, rabbits in the simulation right now can reproduce as soon as they are born, adding an age variable will allow me to ensure they can only reproduce once they've matured enough.

### **Long term:**

#### **1. Add animations for the rabbits**

The client said “the movement of rabbits looks a bit mundane and unnatural”. To fix this, I will have to add animations for the rabbits. The necessary sprites for this are already in the graphics folder, however they are currently unused. Implementing animations will likely require adding a new boolean variable for the rabbits to indicate that they are currently in animation, and a variable to keep track of which direction they're facing.

#### **2. Adding the option for the user to manipulate the speed of the simulation**

One small concern my client expressed was that the simulation may be too slow. Most genetic simulations online have an option to speed up or skip forward a few generations. This will be very difficult to implement since I will have to overhaul most of the backend to make it update at a specific rate. Moreover, this will be limited by the tickrate of the browser.

#### **3. Introduce more external environmental factors such as diseases, natural disasters, weather conditions, etc.**

This will make the simulation much more realistic, but could also throw off the balance of the ecosystem, so the specific numbers will have to be finetuned carefully.

#### **4. Implement behavioral patterns**

This was a suggestion made by my client “to make the rabbits smarter”, though it is very vague. I suspect that the best way to do this will be to implement an element of machine learning to influence the rabbit’s decision making.