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DEVELOPMENT LOG - FINAL PROJECT

1. DEVELOPMENT LOG

May 17th, 2024

Today was our first day of work.

We first decided that the three of us would get together to work instead of dividing the tasks to help each other out while programming since we believe that three heads are better than one. We all took turns coding on the computer while the other two researched any doubts that were emerging and we all solved the problems together.

We started by creating a simple factory simulation with defined data to verify that the dots representing the data were moving correctly and everything was being calculated as it should. This part was very time consuming since it involved creating the whole simulation animation. After a while we were both happy with the result that we achieved and exhausted after many hours of work, so we decided to call it a day. We decided that we will continue working the following tasks on Monday:

- Fix the few bugs that we encountered (which we listed in the *Problems & Solutions* section)
- Create buttons and sliders that allow the user to interact with the simulation (e.g. data inputs, start button, and simulation time)
- Add the simulation visualization to the *.html* we have with the whole simulation data

May 20th, 2024

Second day of work, and hopefully the last.

Starting from where we left off on Friday, we got together to fix the remaining bugs and adapt it so that the user could interact with the simulation. Today was a bit easier than last time since we had a short list of problems to resolve, rather than starting everything from scratch.

The list of tasks we had to take care of today is in the section down below, as well as the solution we had for each of those problems. But, once we added the user inputs, buttons, and sliders, we were basically finished with the project! The last part was to add all of the code to the *.html* project we had from the last partial where the whole simulation was executed, which was done pretty easily and with no complications. And with that, we were done!

2. PROBLEMS & SOLUTIONS

While making the code for the final project, we came across the following problems that, fortunately, we were able to resolve before turning it in:

1. **Products must exit an initial container**

   At first, the dots representing the products were instantiated in the Workstation 1 container and moved to the next stations from there, but we needed the products to start from an initial location or container and move to the first workstation from there.

   We were able to fix this problem by changing the initial position and drawing a rectangle at the start of the line

2. **Products must start in Workstation 1 and pass through all six of them**

   Initially, the products moved to whatever station the code wanted without a specific order instead of following the workstation order (going from Workstation 1 to Workstation 6 in order).

   To fix this problem, we assigned each workstation a seven second work time and a route each product should follow once that time is done. This way, the code knew which station was next for each of the products, allowing them to follow the factory route.

3. **Finished products must enter a final container**

   Similar to our first problem, once the products finished the last workstation, they stayed in the Workstation 6 container without disappearing, which caused us to think that Workstation 6 never stopped working.

   To fix this, we added a final container rectangle where the finished products could move to and changed the final position of the finished products to that container, and a life-span so that they could disappear a few seconds after they entered the container.

4. **Ability to change simulation velocity**

   In general, we were having problems creating a slider which could change the speed the simulation ran (e.g. 2x speed, 4x speed, etc.). It took quite some time investigating how sliders worked within *.html* and

the *D3 library*, but after a while we were able to somewhat understand their execution and have a fully working slider.

5. **Timer**

Once we added a timer to visualize the simulation run time, we noticed that we had two problems: the timer didn't restart each time we pressed the "Start Simulation" button and when we increased or decreased the simulation velocity, the timer speed didn't change.

We soon realized that both of these problems were caused by the fact that we weren't placing the *ProductionTime()* function correctly in the code and, by consequence, it wasn't calculating the time passed correctly. Once we found where the function should be placed and verified the scalar by which the simulation velocity was multiplied, both problems were fixed.

3. PERSONAL REFLECTIONS

María José Castillo Gallo:

It was interesting to see how some of the topics we saw during the whole semester were being implemented in this part of the project. Looking back on the first partial, the theory of how simulations work, how they progress with time, and how they generate and store data was the base of things to be able to create our own simulations later on.

On the last assignment we moved on from theory and printed results and created graphs representing the data from the simulation to see the results from each run. This time, once we had all of that data, we needed to actually see how the simulation worked to understand it visually. After a lot of investigation and some trial and error, we were able to create a type of animation that simulates how our make-believe factory runs.

These types of exercises, and the progression follow, highlighted the importance and usefulness of simulations to help understand certain processes and see how these might work, and, in the end, it was quite rewarding to see the finished results.

Annia Marcela Navarro Medina:

I think simulation real life situation to predict results is a very complex task, but it can be very useful to, for example, minimize costs in a company. At the beginning of the course, I found it very difficult to understand the math behind it all, but I think these projects are designed so that they help us materialize the contents seen in class, but gradually.

In the first midterm delivery, we did not manage to do a good simulation, since we missed some of the real components like the randomness of things. Nevertheless, I understood some things, like saving the data for a month of simulations and jumping into conclusions with it. For the second project, we found it easier to understand the manufacturing facility simulation, and even though the creation of The Dashboard had its challenges, we managed to do a good web page, we understood how to create json databases and how to use .js graphs.

Finally, to put it all together, I personally think this project was the most interesting and fun of the course. It was a great way of visualizing what we developed in midterm 1. I think it would have been great to see these kinds of graphic simulations before programming the manufacturing facility simulation, because it helped me conceptualize what was going on in the facility.

I can now see how important this must be for big and small businesses, it can help them predict changes or reduce costs, see some indicators… It is a way to predict the future. I found that I grew a lot from the beginning to the end of the course (in terms of the simulation project), understanding the simulation way better.

Fabián Ruiz Sánchez:

To wrap up this semester, I gotta say, this project was super helpful in putting all the pieces together. Personally, I found it way easier to grasp stuff when I could see it visually rather than just staring at numbers. It kinda felt like solving a puzzle throughout the semester, but in the end, it all fell into place pretty smoothly because we had all the tools we needed. Overall, I gotta admit, this class was pretty cool. The possibilities are endless with all the data floating around out there, just waiting to be explored.