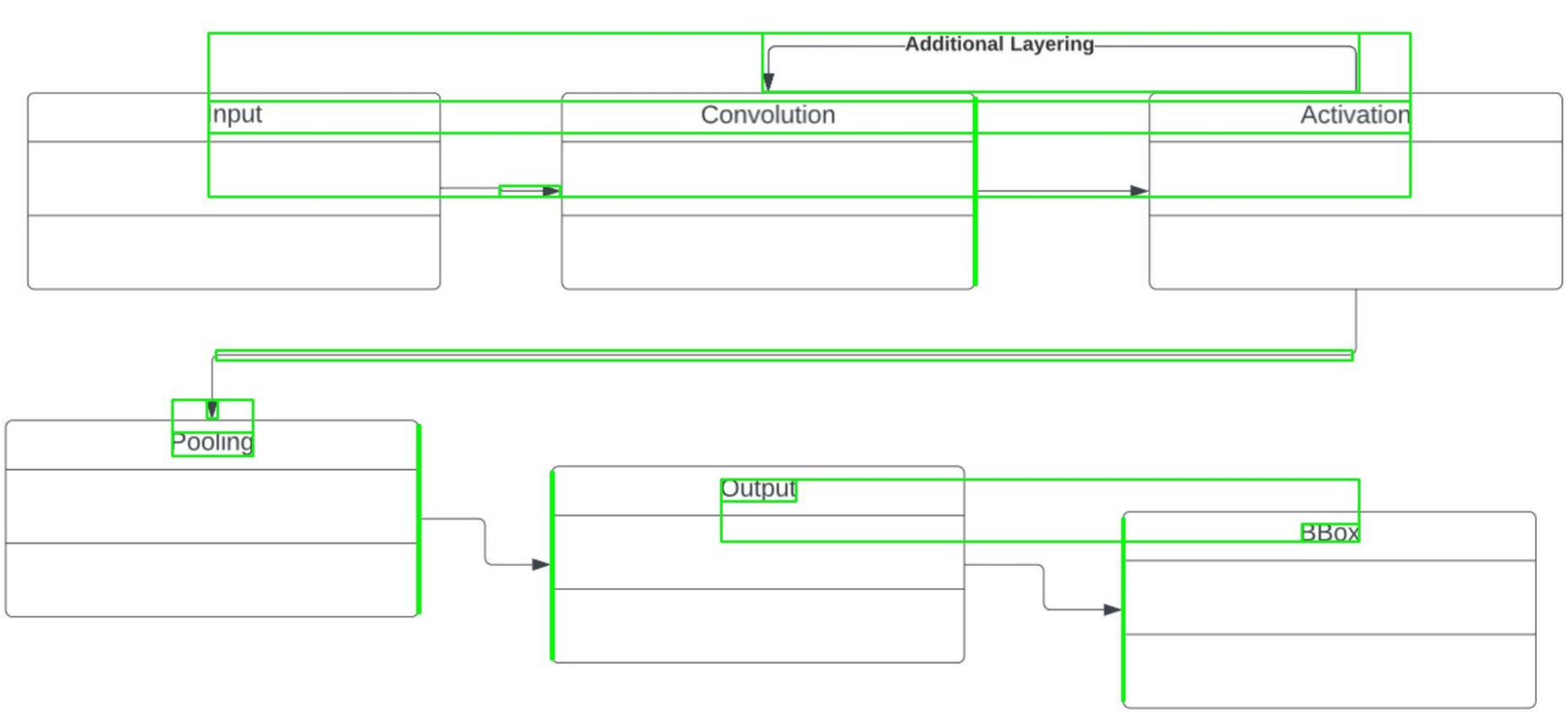
Product Design

Team Null_biters
Rachael Carpenter, Malcolm Morton, Tomas Ponce, Aaron Hogan, Chase Golden

Revision Number	*Revision Date*	*Summary of Changes*	*Author(s)*
0.0	10/6/22	Created design concepts for product - i.e., class diagram, ERD, wireframe/screenshots. At least the class diagrams may change eventually.	Rachael, Chase, Aaron, Tomas, Malcolm
1.0	10/18/22	Updated design rationale to show our current solution.	

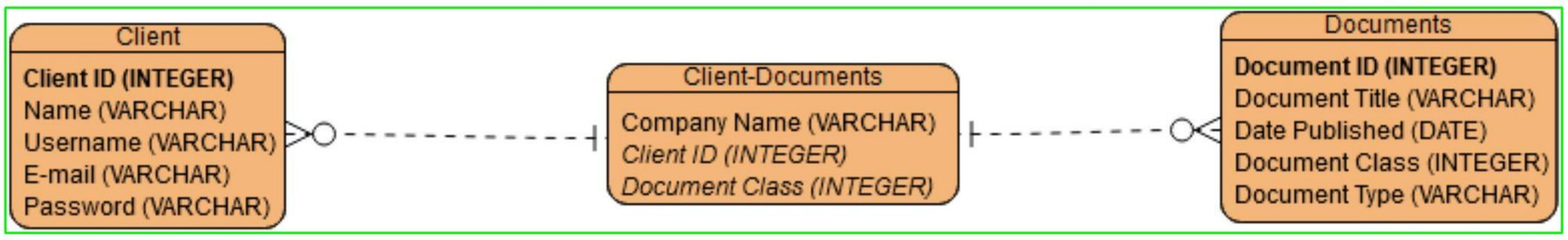
Class Diagram(s)

We will add additional details to the class diagram as we further our understanding.



ER Diagram(s)

This is the current version of the ERD, the logic is that many clients have many documents. To counter the many-to-many relationship, we've added a crossover table, Client-Documents.

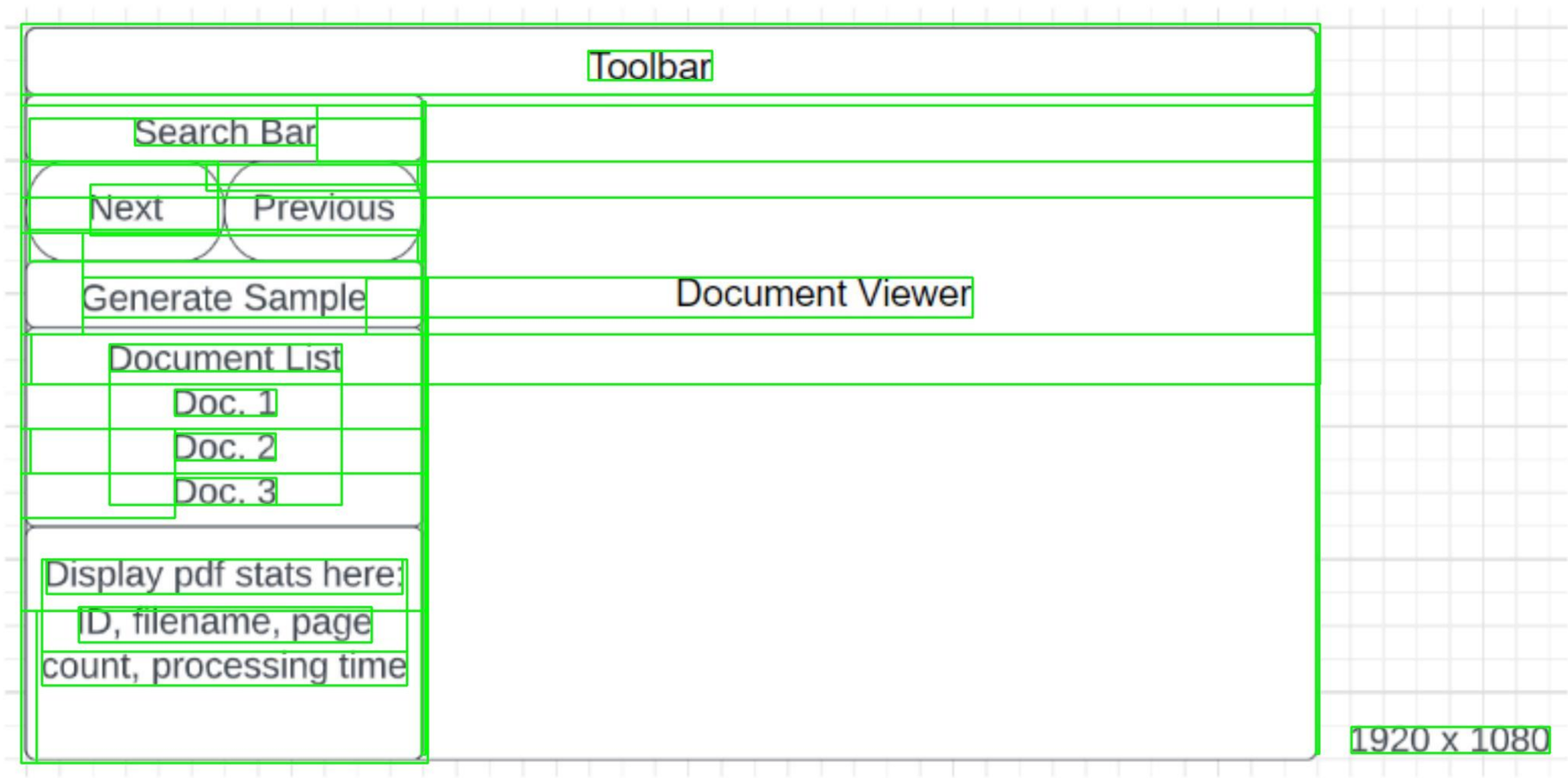


Information Architecture Diagram - Not Needed

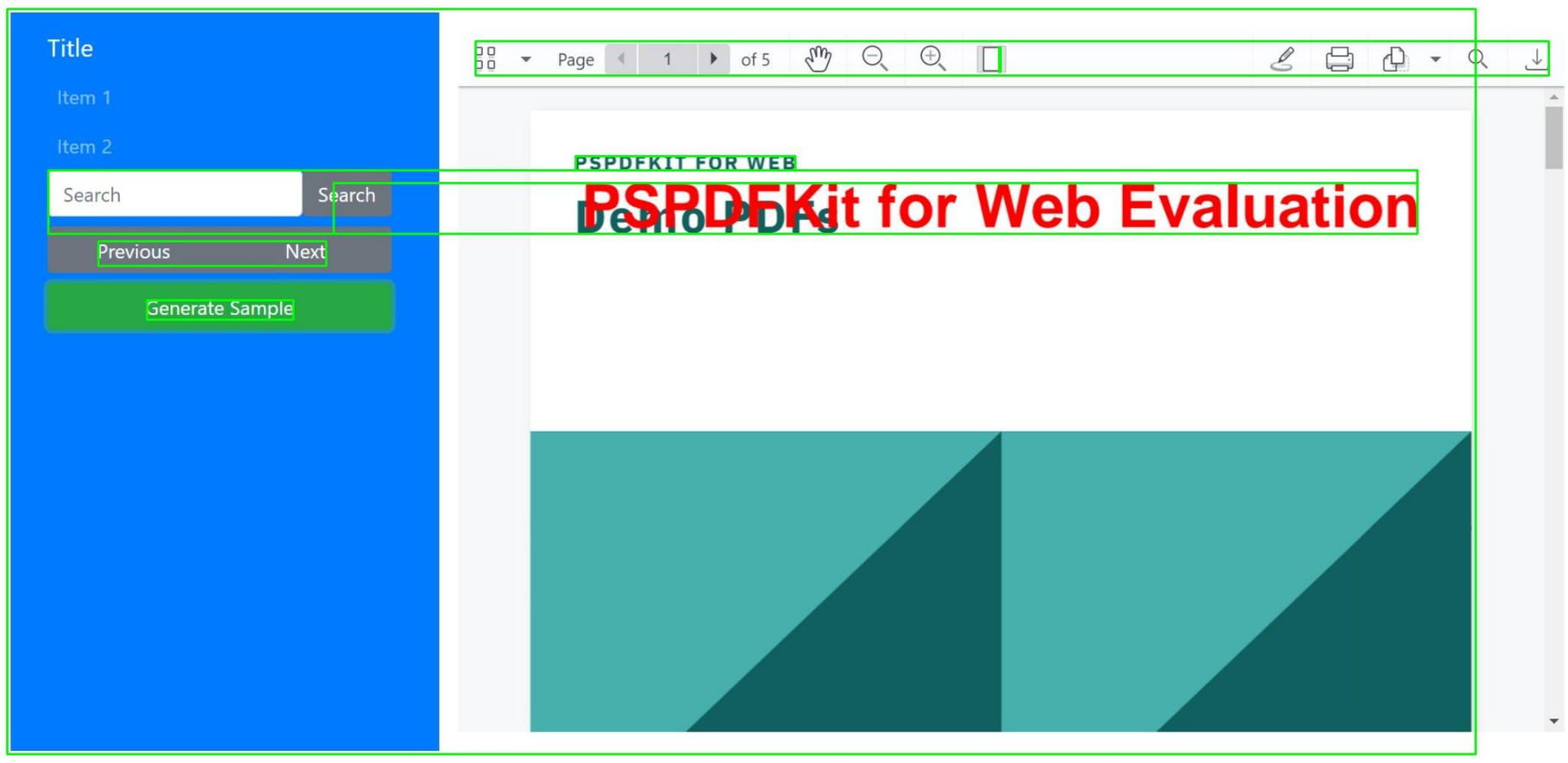
Our project has no need for an information architecture diagram as it is a web page with just one dynamic page.

User Interface Wireframe(s)/Screenshot(s)

This is our current rough draft wireframe.



Screenshot of current progress as of sprint 1:



Design Summary

This is an overview of your design approach (as presented in your Diagram(s). (Together)

The Class Diagrams were designed to accommodate the machine learning process, starting with input and going through the nonlinear cycling of convolutional neural networks, and ending with the bounding box output.

The ER diagram shows how the application will be used by many clients, with each client viewing multiple documents. A document in the Documents table *MUST* have a BIGSERIAL ID# that is unique and not null, a title with a max length of 255 that is not null, and a document class - to establish which companies have which documents - that is an integer that is 0 or above; a document *MAY* have a date published and a document type (i.e., the extension) with a max length of 3, but they are by default NULL.

The page design revolves around the sponsor's requirements. Most of the structure of the front end functionality will be provided by pspdfkit, a pdf display tool with website integration features. We also received instructions on the functionality and page placement of the next and previous buttons, search bar, sample button, document menu and displayed stats for documents.

Design Rationale

The backend requires an algorithm that creates a proper bounding box around text in $O(n^2)$ runtime. This project will utilize machine learning to optimize the textscan performance for better results. The bounding box is expected to have 100% accuracy for document pages with clear, completely readable text and a minimal margin of error over less optimal pages.

The sponsor made specifications that the frontend (Vue.js) connects to the backend (Ruby on Rails) - performing authorization via a jwt token, and PostgreSQL backend can access documents stored in an active storage - which serves as a cache for previously accessed documents, or through the database (PostgreSQL) for those not within the cache.

Further talking to the sponsors of proposed solutions have shown they do not actually want a ML implementation and would prefer a more modular solution. We proposed tesseract which has built in noise cleanup and automatic bounding boxes. Knowing this we will use rtesseract or tesseract-ocr which is a ruby library for interacting with tesseract.

This is a running list of issues that arise as your design process proceeds. This is an important section of the design document as it captures the thought process of the product's designers. It includes why or why not (rejected solutions) a design decision was made and supports future changes to the product. It should be updated whenever a design change occurs.

It is RARELY the case that the first design you consider is the best one that you can come up with that meets the requirements and that can be implemented, tested, and delivered on schedule. Your instructor will be looking for signs that you considered at least a few approaches, and that you had a coherent rationale for preferring the design your team eventually adopts.

This is the place to record such thoughts – what alternatives did you consider? What are the strengths (and deficiencies) of the final design compared to the other alternatives considered? Why did you select the approach you finally chose? This last question should be answered with an eye to the tradeoffs inevitably involved in creating an appropriate design.

In addition, if (not when) the design has to be adjusted to meet unexpected problems or new requirements, this is the place to record what changes were made, what effect these had on the work that had been completed to date, and the rationale for the making changes (as opposed to "just toughing it out").