

Design Context and Exploration

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4.1 Design Context

4.1.1 Broader Context

Public health, safety, and welfare:

The general well being of various stakeholder groups will be affected by the project. A reason for the direct users is because it will most likely decrease stress on the job. The purpose of the project is to automate the process of making a report. The client is having to manually go in and get data. This is taking time and can be a nuisance. The indirect users, clients of JEDA Polymers, will be benefited because the reports will be professional and effective. The project will not harm anyone or anything.

Global, cultural, and social:

The project only aims at one cultural group. The cultural group is JEDA Polymers workplace. The operation of this project will not violate JEDA Polymers code of ethics. It won't make an undesired impact in the workplace practices. The project will only help workplace practices by increasing productivity.

Environmental:

The project will have a couple environmental impacts. First, the project will require electricity to produce and run the software application. There are environmental impacts based on how the electricity is produced, but that is out of our control. The second impact is that the project will be incorporated into a company that manufactures plastic. The project itself is not manufacturing plastics, but the project can be associated with plastics.

Economic:

This project will have some economic impact. The application will not be very expensive to make and run. It is a feasible cost for the client. Also, the users benefiting from this project will spend less time making production reports. Furthermore, they will have more time to work on other work.

4.1.2 Prior Work/Solutions

Colton

Previous work experience

2 years at Collins Aerospace, 2 Summers and currently employed at Citrix Systems (Cloud Software Group).

Experience related to project

At Collins I worked with C# and .NET programs that had to run on windows natively. This relates to the project as our backend needs to run on a Windows 2019 Server and having it run natively reduces any friction if wanting to put the program on a fresh install. I also worked on an automated report to be emailed, while not writing the actual email calls it did get me exposure to the thought process, which I will use when writing the API calls to send the reports.

At Citrix I worked on remote servers sending and receiving data and sending operations to be completed from client to host with results being retrieved. This relates to the project as having a smooth interaction between web clients and the backend host is crucial, and reducing lag and or bloated run times. Finally at Citrix I am working on pioneering the introduction of a new frameworks that our team wants to introduce, and as there is no one else on the team that knows how to use it I am reading a lot of documentation, which will be a useful skill when reading documentation on PDF generation / .NET Rest API's.

Jay

Previous work experience

Two internships with OnPoint Solutions as a DevOps engineer.

Experience related to project

I have learned about software development during my internships. I worked on some CDK stacks that were in Python. I also worked on another project which was written in TypeScript. Other than that I didn't get any experience with frameworks or databases in my internships.

I took a project class, ComS 309, that gave me some experience related to this project. During the class, I used Springboot and Java to develop the backend for an Android application. I also used SQL to query a database. This is related to the project because it will require backend knowledge with a database.

Connor

Previous work experience

An internship for Empirical Foods as a software engineer.

Experience related to project

At this internship I got both experience with .NET and frontend development using React, as well as ISS and accessing servers.

Noah

Previous work experience

3 summer internships at John Deere.

Experience related to project

At John Deere I worked in embedded systems software and developed code in C, C++, Python, and Java. I did some front end development when I programmed a virtual simulator that administered automated software tests.

Hayden

Previous work experience

Entrepreneurial endeavors and class experience: 309, 319

Experience related to project

I started a business that required a website. Because of this I was able to learn more about the web development process, as well as, web design. This was in addition to the web development related classes that I have taken during my time at Iowa State such as 309 and 319. For 309 I learned about HTML, Javascript and React. For 319 I learned about backend server development. All of this knowledge will help me to understand the development process for the web based services we are developing.

4.1.3 Technical Complexity:

This project is giving us numerous challenges. For the frontend portion of the project, none of us have had to build a fully flushed out website using React before. Let alone making a site that can function on any given browser with full responsiveness. We will also have to explore the complexities of making the site work on both Mac and Windows.

As we move to the backend portion of the project we are faced with setting up a server that will be running 24/7. Not only have we never set up a server before but making one that can run seamlessly for 24 hours a day will be a massive challenge. This will also have to connect to the Canary database which is a foreign architecture to everyone in the group. And on top of all this we need to cover our bases with security protocols and we do not have a cyber security specialist in our group.

Then we have to make sure that our system works within the company's given suite, run quickly enough that the client can access the data within a reasonable amount of time, and have an interface that is user-friendly enough for the client to continue using it after we leave. Previously all of our classes projects have been built by engineers, for engineers. Making a product that a general user can run efficiently is imperative for this project's success.

4.2 Design Exploration

4.2.1 Design Decisions

3 key design decisions & why they are important to the project's success.

1. React/Node JS was chosen to develop for the front end.
2. Canary Labs was chosen to query machine data.
3. The .Net REST API was chosen for the email service.

4.2.2 Ideation

Describe how you ideated or identified potential options for at least one of the design decisions.

In order to come up with the best development language for the front end we choose from five different front end development languages as listed below:

- PHP - Scripting language used in web development.
- Javascript - programming/scripting language that expands the functionality of HTML/PHP
- React - Library/framework that expands the functionality of Javascript
- Flask - Flask is a frontend framework built on Python for web development
- Angular - Library/framework that expands the functionality of Javascript

4.2.3 Decision-Making and Trade-Off

Demonstrate the process you used to identify the pros and cons of or trade-offs between each of your ideated options

After starting our comparison between the different languages React started with a significant leg up on the rest of the options. To start with, several of our members have experience using React already. Additionally, REST Api's make the connection between our front and back end seamless. Moving forward it was more of comparing each of our other options to how they stood up against React rather than against each other. However, this was still an easy choice because the comfortability of our developers working in an environment they are already familiar with seemed to outweigh any other major issues. This does not mean we chose an easy language because of familiarity though. React still stood higher on our scale than the other languages in terms of speed and usability. The fact that we were already comfortable in the language was simply a fortunate consequence.

Criteria	PHP	React	JavaScript	Flask	Angular
Functionality	3	5	4	1	3
Browser Compatibility	5	5	3	2	1

Code Simplicity	2	4	2	5	2
Speed	3	5	5	2	3
Learnability	1	3	2	5	1
Total (unweighted):	14	22	16	15	10

Higher is better

Criteria	Functionality	Browser Compatibility	Code Simplicity	Speed	Learnability
Weight	1.0	1.5	1.0	1.25	.75

	PHP	React	JavaScript	Flask	Angular
Total (Weighted)	17	25	18.25	15.25	11

After looking through all of our options, we chose React/Node JS because of its compatibility with our backend services as well as the variety of design options that it offers.