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Digital Arts & Media

For my creative project I wanted to create something that would not just be a test of my abilities, but would mean something to me and hopefully to others. I have always been fascinated with the idea of storytelling. The medium is so accessible and is a great outlet for creativity. However, it's not something most people do in day to day anymore. With the advent of social media and so much content to take in most of us consume storytelling without participating. I wanted to create an easy to use and accessible platform for novice and advanced writers to collaboratively tell stories and express their creativity. So I decided to make Tethered. The idea is inspired by the comments section of most modern social platforms, where you can interact with others based on the topic of some higher level post. Tethered uses the comment as it's only media as a 'Story'. Stories are both top-level content as well as hierarchical children to other stories. So users can branch off of any story node to create a continuation or brand new storyline, like an actively changing and growing choose your own adventure book. This was by far the most complex piece of software I have ever written from the ground up.

From the very beginning I knew that I could not dive head first into a project of this magnitude. I took a course through the ITD department with IBM designers called 'Radical Collaboration' on the value of Design Thinking. Writing code is the most intensive part of a software project, and having to go back and redo any part of that will be a costly and time consuming endeavor. My first step was to create static designs of what I imagined Tethered to look like. I did a number of simple sketches called 'wireframes' of the screens of the website and then connected them with arrows to define how the navigation of the site would flow. After creating these initial designs I showed them to multiple students and asked for feedback on them, asking them to imagine they were using the app on the paper. While looking at the writing screen, even on paper, multiple people asked how they could see the story they were branching

off of. It was something I know can't believe I didn't have in my initial designs, I added the ability to allow the user to view the entire story history while writing a new post. Simply putting a crude model into peoples hands saved me tons of development time later since I had to rework how the screen looked to be able to fit that feature into the design. After these tests I created a more high-fidelity mockup using Adobe XD, a newer software that could be used to make static screens that a user could actually click on and interact with as if it had been programmed. I had used this software for presentations of design concepts in my IBM design course and as early mockups for design projects in my organization Design Collective. I continued to iterate over these designs with other test users refining them little by little, learning from the users about what worked best.

Once the designs had gone through multiple stages of improvement I decided it was time to start developing. The core of Tethered is built around javascript in multiple forms. The backend is a Node js API built with Express, a simple but full featured web framework. The frontend is built using Vue a progressive UI framework and Vuex a state management library designed for Vue. Designing the backend was a challenging and enjoyable learning experience. I have designed simple backends for personal websites in the past and worked on APIs in my internships, however I had never built a system that required secure user verification myself. My first pass at designing the user authentication was based off of basic access authentication and a library called Passport. After talking to a couple of people who were more well versed in security I decided to redesign the system by hand. Now, when the user creates an account their password is hashed using BCrypt and the user is granted an authentication cookie which is a digitally signed token using a 64 digit random server secret. The site is also fully using HTTPS so it encrypts all of their traffic to and from the site. While the methodologies I am using are not perfect security measures I now feel very confident that users data is secure while using Tethered. Not only is this confidence important for users of the site, but I was able to learn an immense amount about how security practices work and how to implement them in practice. The frontend was something that was more familiar to me, I have used Vue and other similar

frameworks to create many sites including for a final project in a course called Software Engineering and my own personal website. One of the most valuable things I have learning from making websites in the past is the importance of modularity and separation of concerns. When you build a website with these ideas in mind making changes and fixing errors is made significantly easier. When I was in Software Engineering I built an IMDB style website for video games. One of the problems that would often push the frontend work up to the deadlines was lack of modularity in the code. This meant that if we had to take a piece of the UI and create something similar, but slightly different we had to make it from scratch rather than being able to reuse parts. While building Tethered I wanted to adhere to a style of design called *Atomic Design*. This means to break down larger UI pieces into 'atoms' and then use those atoms to build up to larger elements. Due to this methodology I was able to reuse base pieces like buttons and toolbars when making more advanced elements.

After working on development for a couple of weeks I wanted to get started deploying the website to live servers so I could do more large scale testing. The problems you uncover in the early design phases and local development phase are not comprehensive, so being able to test the sites ability to handle errors and user load was vital. I decided to set Tethered up using Heroku, a PaaS (Platform as a Service) that basically handles everything pertaining to deployment and infrastructure for you. I chose this solution because I wanted to spend as little time as possible on DevOps so I could spend more time on adding features and testing Tethered. I have used Heroku in the past on a game website I created with my roommate in 4 days, so I knew I could get Tethered up and running quick. It's also built on top of AWS and handles growth dynamically so I could be sure that it would handle any load Tethered might come under. Once I had Tethered up and running I was able to get people to use the actual site and start uncovering real production bugs. In some of the early live testing we uncovered a really big error that was causing users information to be re-hashed any time they made changes to their account. This basically made it to where no one could login because their passwords were random 32 digit strings based on the original hash of their password. Doing this kind of

testing was extremely valuable because it allowed me to find some big site crashing, data ruining errors that would scare possible early users of the site away forever. This also made it far easier for me to do usability testing across many different platforms. At one of my internships I was working on a web project and creating a brand new product and we had to go through rigorous usability tests to ensure that the site worked on every mobile device we could get our hands on and every browser known to man. I learned how important it is for adoption and user experience to ensure that your site worked for as many people as possible and in the same way.

While Tethered still has so much room to grow, I am extremely proud of what I have made. I have made many websites in the past for personal projects and even some school projects, all of which lended experience and knowledge towards my ability to complete this task. However, making a good website takes so much more than development knowledge it takes concentrated planning, in depth design research, and empathy for the end user. I could not have made this project without the help from my peers in computer science, design, or even my bio major roommate. I have found how much I need a team around me to both use as a sounding board but also to break me from my own habits and misconceptions. The biggest realizations always came with the help of a set of outside eyes. Whether that realization was about a poor security design or a gaping design hole in the experience of the site, I could not have made Tethered even half as good without people from all different backgrounds. This project as well as my BDP courses in general have shown me how rewarding and fulfilling working with the design and user interactions can be. I have been wanted to work in web development for a little while now, but after working with this project I really want to be a part of a team that cares about the end user. I have worked at places that have nothing supporting them to be able to empathize and work with their end user, and I don't think I will be able to be happy in a business like that. I know that if I search for people who believe in the power of empathizing with their users I will be able to enjoy what I do for the rest of my career. Digital Arts and Media has exposed me to an enormous breadth of disciplines and to be able to use that network and so

many skills on a single project made it far more successful than I imagined it could be. I hope that Tethered can continue to grow and that I continue to learn from it and the people who inspired it.