University of Arkansas – CSCE Department
Capstone I – Final Report – Spring 2020

Sider

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Abstract

With the advent of the gig economy and a record 36%[1] of Americans now being involved in it, the time is now to bring college students into the fold and provide companies and small businesses with highly-specialized, low cost labor for short term tasks and projects. For students, the most important motivation for working while in school is getting experience in their field that they can market to future employers when seeking full-time employment after graduation. This is advantageous for companies because they can offer in-field work to students without having to pay for normal consultancy prices. We want to provide a platform to connect these two groups together to provide value for both students and companies. Our platform will act as the mediator between the two parties, hosting jobs available from companies and student profiles, and handle all payment and work submission processes as well as messaging. We plan to use modern web development tooling to help us make this platform as engaging and interactive as possible.

1.0 Problem

Many first or second year students have a hard time finding professional experience pertaining to their major. In the beginning of many students' academic career, it can be daunting to find an internship because of a lack of experience. As a result, many do not end up with an internship until their junior or senior year.

Additionally, it can be hard for companies to find people to do specialized work for a short period of time. Say a small company wants to build a website, but no one at the company

knows about web development. At this point, the company would either use some mediocre template or pay a professional to make it at a high cost.

These two parties have a problem of their own, but each party is able to solve the other's problem with the use of Sider. By being able to connect companies to the students, both sides will be able to develop a symbiotic relationship where the company gets a service and the student(s) gets experience.

2.0 Objective

The objective of this project was to create a platform to connect university students and companies, allowing companies to hire students to perform one-off or short duration jobs. In exchange, students receive monetary compensation as well as relevant experience in their industry or field of study. Companies are able to post their work opportunities and target users with specific skill sets, such as programming or graphic design. Meanwhile, students can upload their skills or credentials in order to see relevant jobs, or they can search for open job postings on the website.

3.0 Background

3.1 Key Concepts

One concept that this product relies heavily on is a two-way market. This is a market like User or Airbnb where there are two users. The users who provide and the users who consume. This market is normally hard to market and create for because you have to balance time between both users.

3.2 Related Work

Similar platforms to this project include Fiverr[4], Upwork[3], and Freelancer[2]. All of these platforms allow for the creation of short-term contractual work agreements wherein the site acts as the mediator if any disputes arise about the completion of the work.They allow people to freelance specialized labor for different tasks to be done by a person or company, however this does not support students or unprofessional individuals. The biggest value-add of these platforms comes from their large catalogues of gigs and users. The other value-add is their ability to mediate disputes from workers and those who requested the work. They have very intelligent systems in place to monitor for fraud and prevent malicious actors from abusing their systems. This is something our application attempts to replicate.

4.0 Design

4.1 Design Goals

Job Posting

A company is able to post a job and outline their expectations for the job, the desired completion date, and the amount of money they are willing to pay to get this job done. Additionally, each job posting shows how many applicants there are, which helps to show that a job is alive and active.

Job Look Up / Suggestion

Users are able to look up jobs on the job page. These jobs are local to the user who is looking for them. There are also suggested jobs that are based on the users past work and their proclaimed skills.

Applying For Job

Users are able to apply for jobs by detailing their personal qualifications and skills. Companies are then able to decide on the person or people that they choose to hire for a particular job.

Notifications

Users and companies get notifications when certain tasks are done on the platform. We utilize various notification types, including push notifications, in-app notifications, texts and emails. The user can adjust their settings to receive notifications however they would like and can turn off the other types of notifications that are less practical for them.

Chat

After a company has accepted a user for a job they are able to chat about the job and send files and other important information through the platform.

Reviews

After a transaction is completed both parties have the option to leave a rating about the other as well as a text review about their experience. This allows companies and users to build profiles and reputations that demonstrate their reliability, enabling companies and students to make better decisions when choosing to hire a student or take a job with a company.

4.2 High Level Architecture

There are two main parts of this product. The first part is a functional NestJS[6] API that is hosted on Heroku and AWS. Persistent WebSockets run notifications and chat within the application. A MongoDB database keeps track of everyone's data and paths to their files in a Google Cloud Bucket.

The second main part is an online web application created with NextJS[5] which does server-side rendering that is hosted on a heroku web server. This allows for easy, clean, and fast front-end development and performance while abstracting away networking concerns into services that are much simpler to develop, change, and debug.

User access and authentication is handled through the employment of standards like OAuth in order to reduce the amount of network operations and security protections our team needed to develop in-house, and to improve the overall security of the system by employing tried-and-tested systems.

Back-End   Front-End
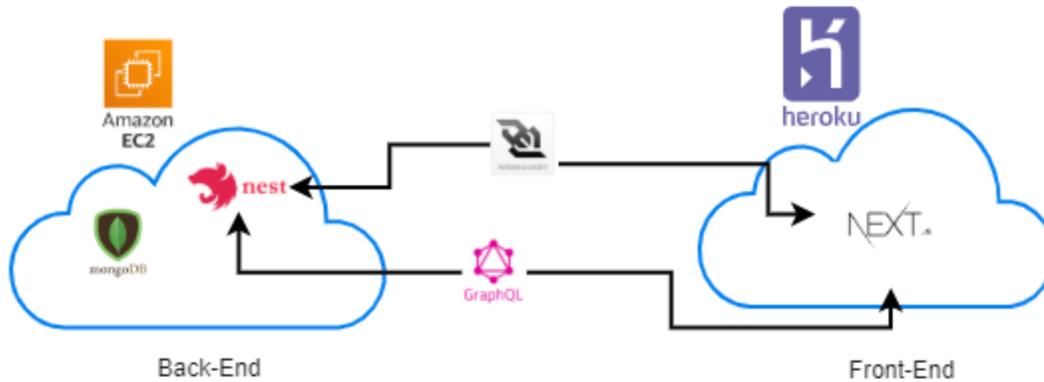
4.3 Risks

Risk	Risk Reduction
Data Privacy	We are currently using encrypted JWTs to securely store users' session information. Eventually we plan to update the current authentication and authorization system to use Auth0. While we collect information about our users and their interactions with the site, we do not store any financial information, such as credit card details. We instead use Stripe, a third-party service,to handle all transactions.
Companies and students are not able to find each other effectively.	We use a basic matching scheme to pair users with recommended jobs based on their professed skill set. Eventually, we hope to transition to a machine-learning system to identify jobs that are particularly well-suited to each user.
Disputes between students and companies over the completion of or payment for a job.	When a user and company enter into an agreement to do a specific job, we initially hold half of the agreed upon fee in escrow. In the event a student does not complete a job to the company's satisfaction, we hold the money until the dispute has been resolved or successfully mediated..

4.4 Tasks

Tyler's Tasks

1. Migrate data from GCP to mongoDB
2. Wrote Deployment scripts and configured stage and production version of application
3. Notification system service work to site for caching and PWA
4. Stripe integration
5. Add EsLint to codebase
6. Upgraded Authentication/Authorization Service
7. Moved REST API over to GraphQL API

Sam's Tasks

1. Google Analytics
2. Login case-sensitivity bug fix
3. Add personal website field for users and updated back-end to handle it
4. Front-end UI for job/user review
5. Update user, company, and job UI
6. Show number of applicants for each job on front-end

Adam's Tasks

1. Update validation schemas
2. Add tooltips to form fields
3. Add backend routes for user job completion
4. Add frontend requests for user job completion
5. Update UI to add user job completion
6. Create view of users

Luke's Tasks

1. Resume upload UI
2. Resume upload API and DB implementation
3. Better error and success messages
4. Toast notifications
5. Progress bar for finishing profile
6. Reviews API endpoints
7. Reviews DB updating
8. Job, Company Searching

Marshall's Tasks

1. Loading Spinner
2. Company/User ID uniqueness

3. Apply Blurb

4.5 Schedule

Tasks	Date Interval
Update validation schemas (Adam Goertz) Migrate data from GCP to mongoDB(Tyler)	(1/21/2020 - 1/30/2020)
Resume upload UI (Luke Brandon) Google Analytics (Sam) Add tooltips to form fields (Adam Goertz) Loading Spinner (Marshall Richards) Notification system (Tyler Tracy)	(Feb 4 - Feb 9)
Resume upload API and DB implementation (Luke Brandon) Add service work to site for caching and PWA (Tyler Tracy)	(Feb 10 - Feb 15)
Better error and success messages (Luke Brandon) Login case-sensitivity bug fix (Sam) Add backend routes for user job completion (Adam Goertz) Stripe integration (Tyler Tracy)	(Feb 16 - Feb 25)
Toast notifications (Luke Brandon)	(Feb 26 - March 7)

Add personal website field for users and updated back-end to handle it (Sam) Add EsLint to codebase(Tyler Tracy) Front-end UI for job/user review (Sam) Add frontend requests for user job completion (Adam Goertz)	
Progress bar for finishing profile (Luke Brandon)	(March 8 - March 15)
Reviews API endpoints (Luke Brandon) Company/User ID uniqueness (Marshal Richards) Update UI to add user job completion (Adam Goertz) Update user, company, and job UI (Sam)I Upgraded Authentication/Authorization Service (Tyler Tracy)	(March 16 - March 22)
Reviews DB updating (Luke Brandon) Apply Blurb (Marshall Richards) Show number of applicants for each job on front-end	(March 23 - March 30)
Job, Company Searching (Luke Brandon)	(April 1 - April 30)

| Moved REST API over to GraphQL API (Tyler Tracy) | |
| Create view of users (Adam Goertz) | |

4.6 Deliverables

- Final Presentation
- Website Screenshots
- Final Report: Describes what works, what needs to be worked on if picked up in the future, and the reasoning behind the decisions made.

5.0 Future Work

This project plans to be continued as it is currently being built as a start-up business by Tyler Tracy and his business partner. Mobile applications plan to be built using Flutter to create an iOS app and an Android app but only requiring the maintenance of a single Flutter code-base. Tyler plans to implement job and student recommendations so that companies can get recommendations about who is offering a service that would be a good fit for the job and for students to get recommended jobs that they would be a good fit for. Tyler also plans to add a price negotiation feature so that the agreed price of the job can be either raised or lowered depending on the nature of the work, company, and the student being hired.

6.0 Key Personnel

Adam Goertz — Adam Goertz is a senior Computer Engineering major at the University of Arkansas. He has worked as a software intern at Cerner Corporation during the summer of 2019 and works in the AESIR lab at the university researching capacitive sensing applications.

Luke Brandon - Luke Brandon is a senior Computer Science major at the University of Arkansas. He has completed or is enrolled in nearly all of the computer science courses required for graduation. He has worked as a Software Development Engineer at Amazon Web Services, IoT Core in Seattle, WA over the summer of 2019. Brandon will be responsible for full stack development of the front and back-end of the service.

Tyler Tracy - Tracy is a senior Computer Science at the University of Arkansas. He has had an internship with SupplyPike during his sophomore year and an internship at Google Cloud the

summer before his junior year. Track will be the project lead for this semester and will be responsible for assigning and creating tasks as well as full stack development.

Samuel Le - Le is a senior Computer Science major in Computer Science and Computer Engineering Department at the University of Arkansas. He has had an internship with J.B. Hunt during his junior year, a research position with the Department of Education Reform at the University of Arkansas during his junior year, and with Walmart during the summer after his junior year. He will be responsible for full stack development.

Marshall Richards - Marshall is a senior Computer Science major at the University of Arkansas. Before starting university, he worked as a software engineer intern for Microsoft in the Summer of 2017. Since the summer of 2019 he has interned for Segway Inc. as a robotics engineer intern.

6.0 References

[1] https://www.gallup.com/workplace/240929/workplace-leaders-learn-real-gig-economy.aspx

[2] https://www.freelancer.com/

[3] https://www.upwork.com/

[4] https://www.fiverr.com/

[5] https://nextjs.org/

[6] https://nestjs.com/