Green Capital Connect: Connecting green startups and investors

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Our Team

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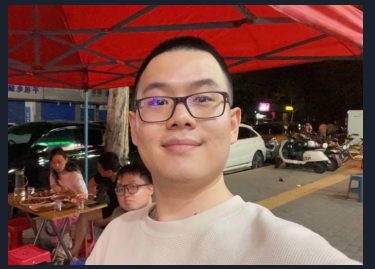
Computer Science and Business Administration
Senior

Shuyu Wang
Computer Science and Business Administration
Senior

Anthony Winney
Computer Science and Mathematics
Senior



Max Li
Computer Science Senior

Project Overview

Stakeholder: Green finance company with a mission to bridge the gap between clean energy minority startups and socially conscious investors.

Initial Ask: An innovative app, using AI and APIs to match businesses with aligned Investors and mentors, streamlining the funding process and enhancing the experience for both parties.

Project Timeline

Ideation, Negotiation, and Team Building	Environment Setup	Development and Implementation	Documentation and Handoff
Initial meetings with stakeholder, ideation of solutions, getting to know the team	Programming environment setup, decision of frameworks/languages, UML diagrams	Development of features, backend/frontend programming, database setup	Preparation of documentation detailing development setup and implementation, final handoff

Problem Statement/Purpose

“A lack of a dedicated platform for minority-owned startups to access funding and mentorship from socially conscious investors.”

Ideation, Discovery, and Negotiation Phase

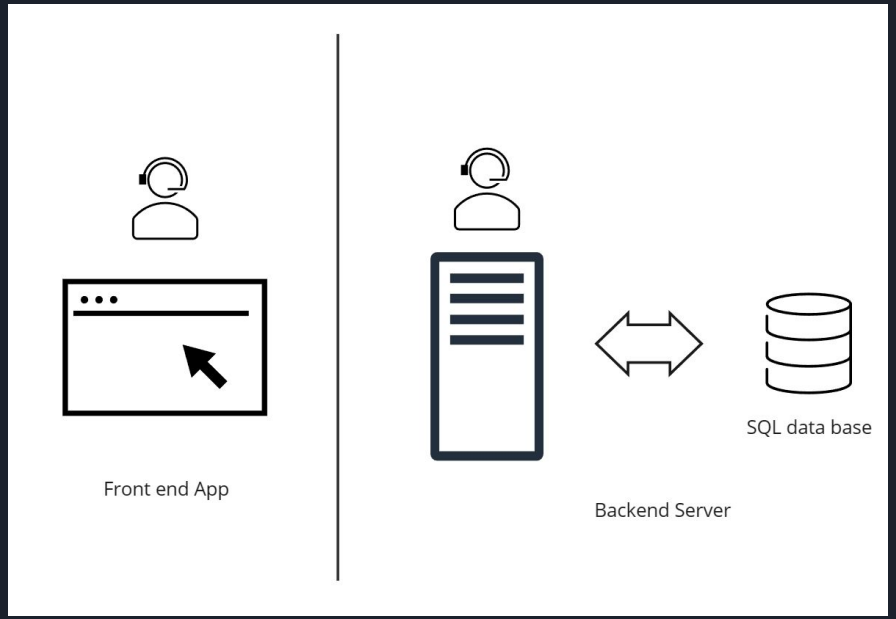
- Stakeholder wanted the implementation of complex features in a short period of time
- Initial features included a custom **AI matching algorithm** for startups and investors and multiple **data dashboards**
- Our team pivoted to finalizing features which were more feasible in the given timeframe
- Series of meetings with stakeholder to discuss updated features and stakeholder's final agreement on a simpler web app

Feature List

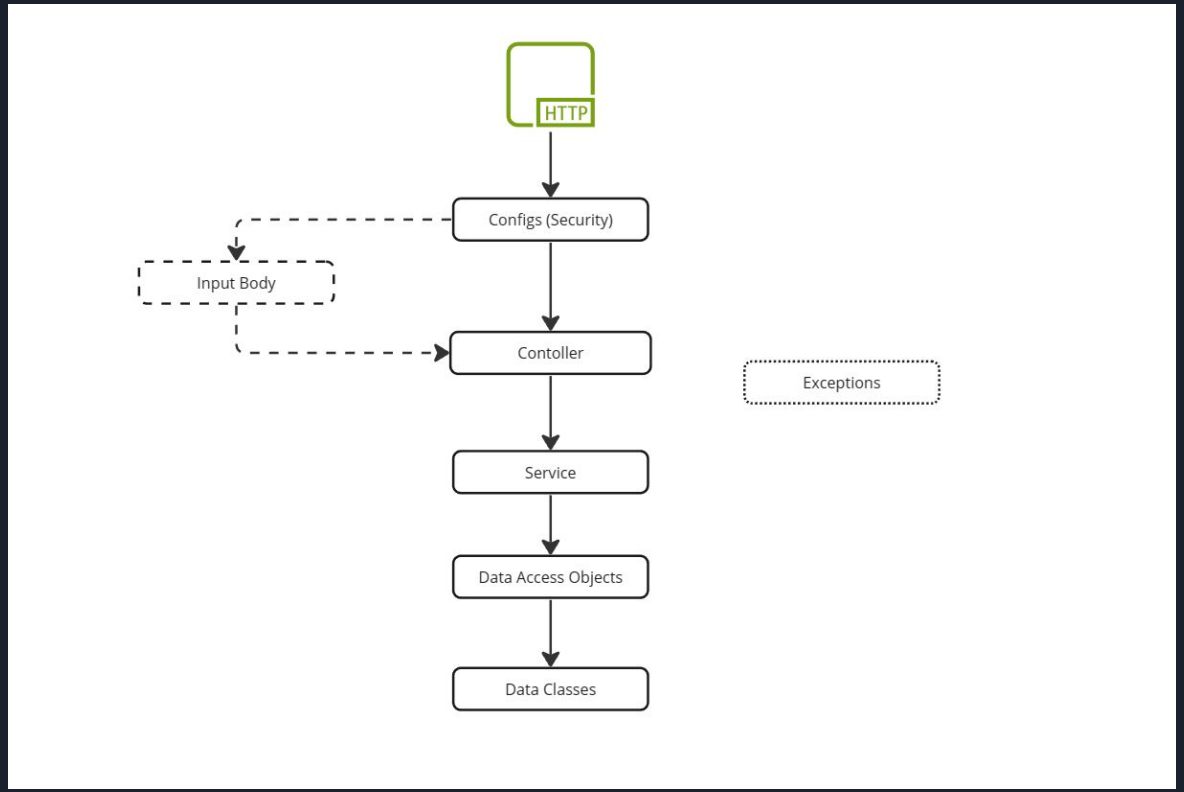
- Users list: Users have a unique user ID, email, password, and user type
- Based on the user type, the user will have a unique profile
- Startup users have a “green index” which indicates their sustainability
- Databases are connected via the unique user ID

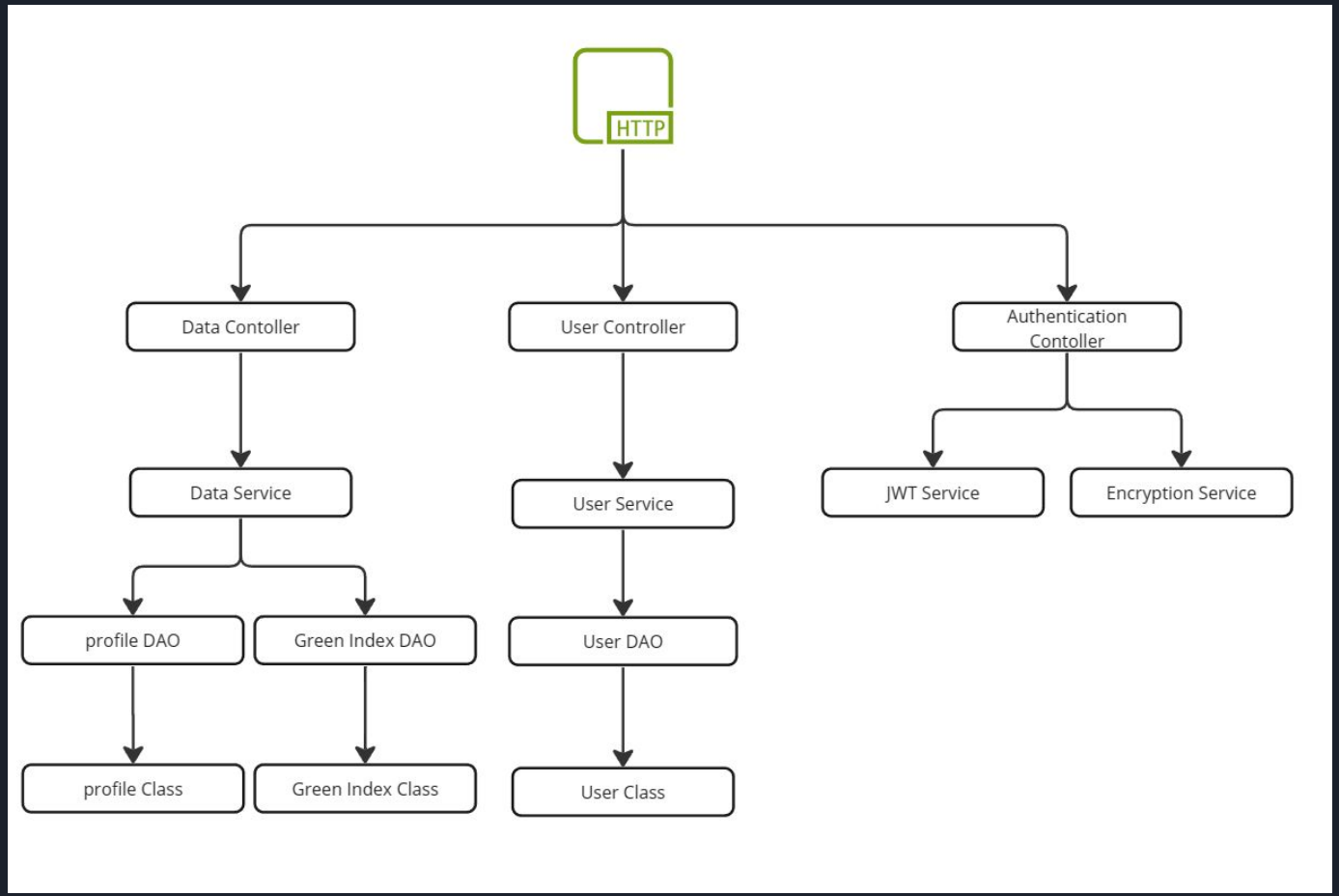
Development Methodology

- Frontend Backend Separation



Development Decisions/Architecture




HTTP
Data Contoller
User Controller
Authentication Contoller
Data Service
User Service
JWT Service
Encryption Service
profile DAO
Green Index DAO
User DAO
profile Class
Green Index Class
User Class

Skills and Tools

Local Impact

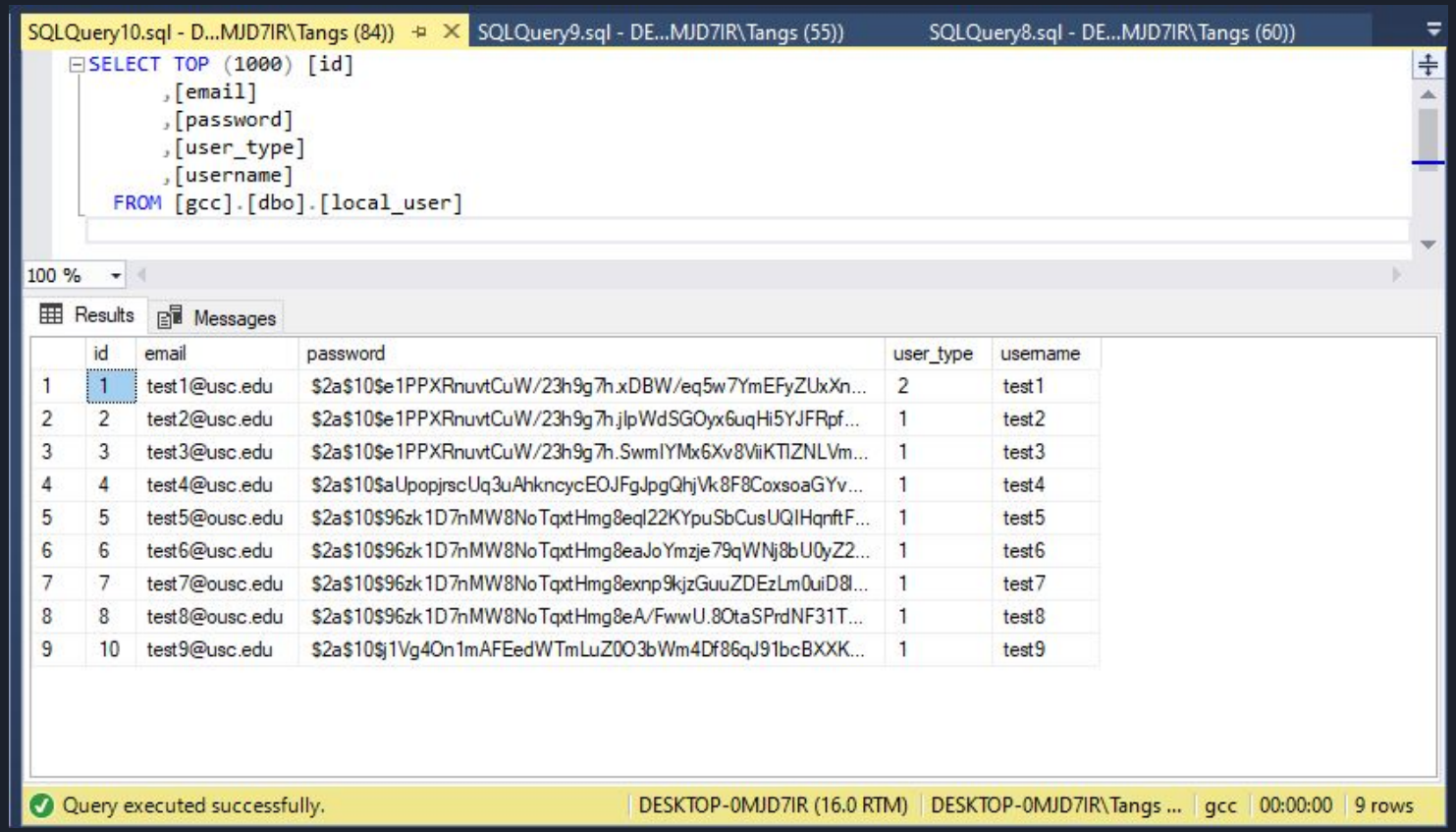
- Increased investment opportunities for investors
- Funding access for green startups
- Market expansion for green products
- Long-term financial returns

Global Impact

- Promotion of global environmental awareness
- Facilitation of cross-border investments in sustainability

Professional Development (Anthony)

- I learned how to manage databases that are hosted using MySQL
- Database interconnectivity was tricky, have to use unique user ID to cross-reference
- Creating many users for testing purposes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SQLQuery9.sql - DE...MJD7IR\Tangs (55))
SQLQuery8.sql - DE...MJD7IR\Tangs (60))
SELECT TOP (1000) [id]
,[email]
,[password]
,[user_type]
,[username]
FROM [gcc].[dbo].[local_user]
100 %
Results
Messages
id email password user_type username
1 1 test1@usc.edu $2a$10$e1PPXRnuvtCuW/23h9g7h.xDBW/eq5w7YmEFyZUxXn... 2 test1
2 2 test2@usc.edu $2a$10$e1PPXRnuvtCuW/23h9g7h.jlpWdSGOyx6uqHi5YJFRpf... 1 test2
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6 6 test6@usc.edu $2a$10$96zk1D7nMW8NoTqxtHmg8eaJoYmzje79qWNj8bU0yZ2... 1 test6
7 7 test7@ousc.edu $2a$10$96zk1D7nMW8NoTqxtHmg8exnp9kjzGuuZDEzLm0uiD8l... 1 test7
8 8 test8@ousc.edu $2a$10$96zk1D7nMW8NoTqxtHmg8eA/FwwU.8OtaSPrdNF31T... 1 test8
9 10 test9@usc.edu $2a$10$j1Vg4On1mAFEedWTmLuZ0O3bWm4Df86qJ91bcBXXK... 1 test9
Query executed successfully.
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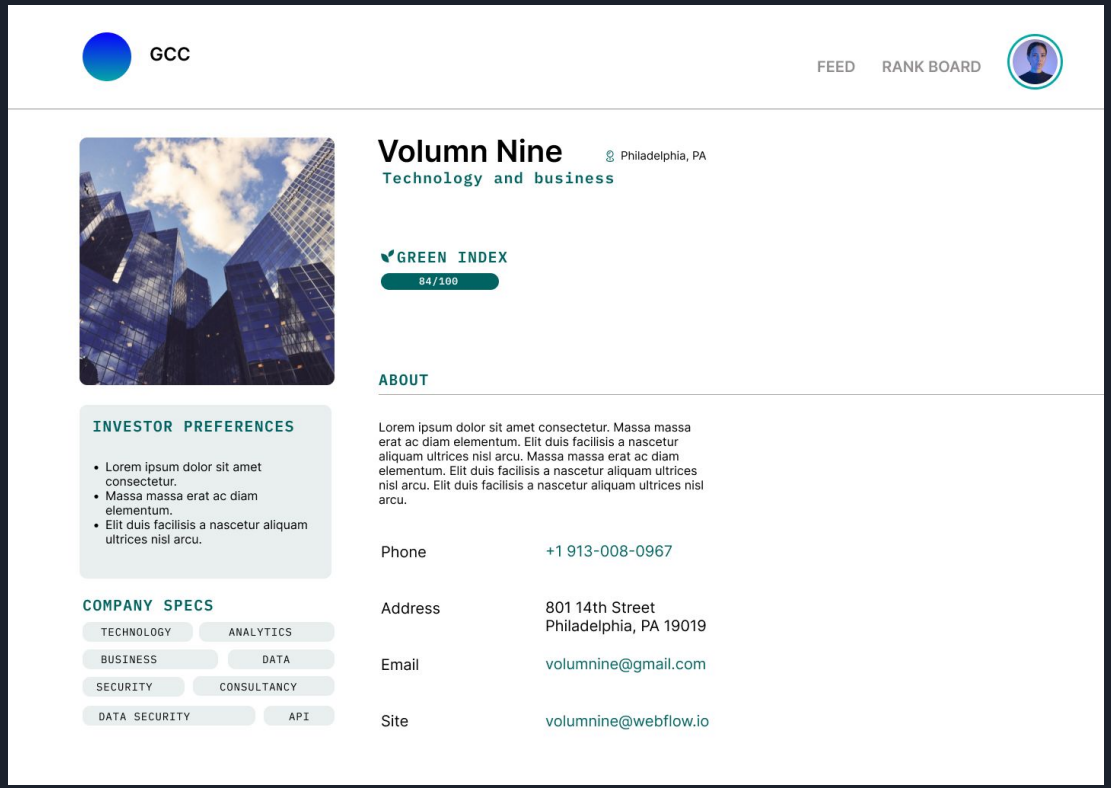
gcc
00:00:00
9 rows

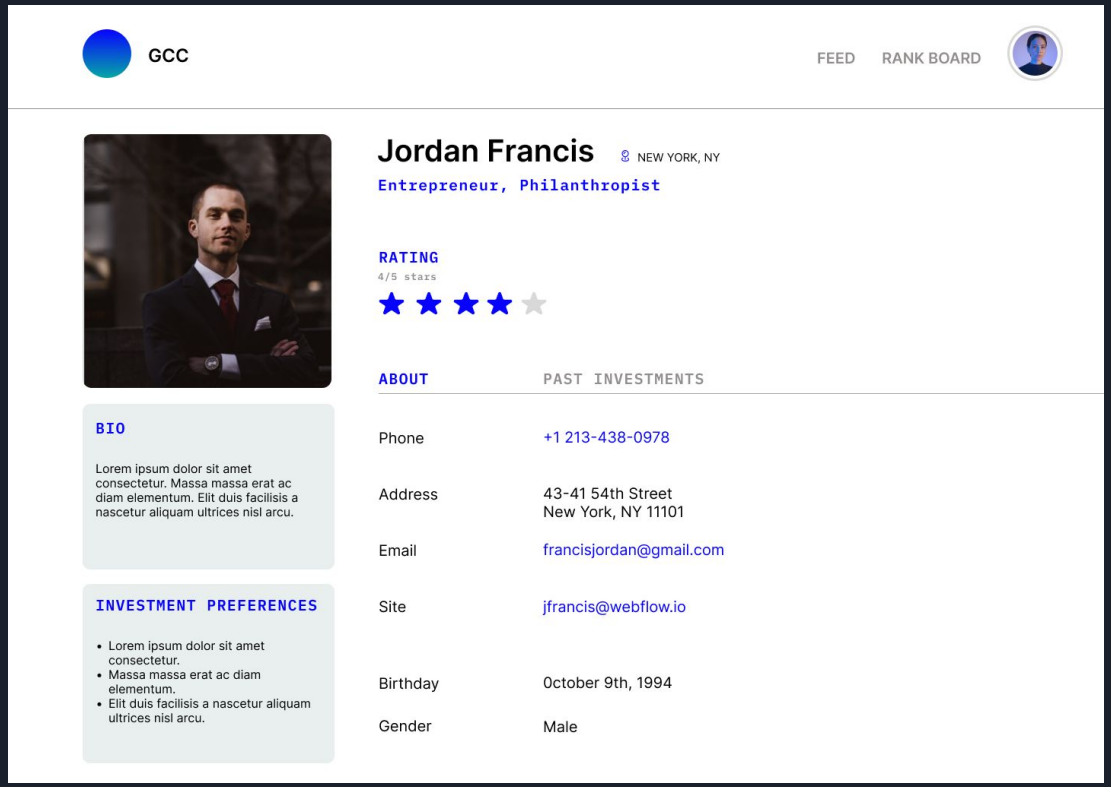
Professional Development (Devansh)

- A tool which I had very limited knowledge of and experience with before this project was **Figma**
- Expanded my skills in Figma through online tutorials and resources

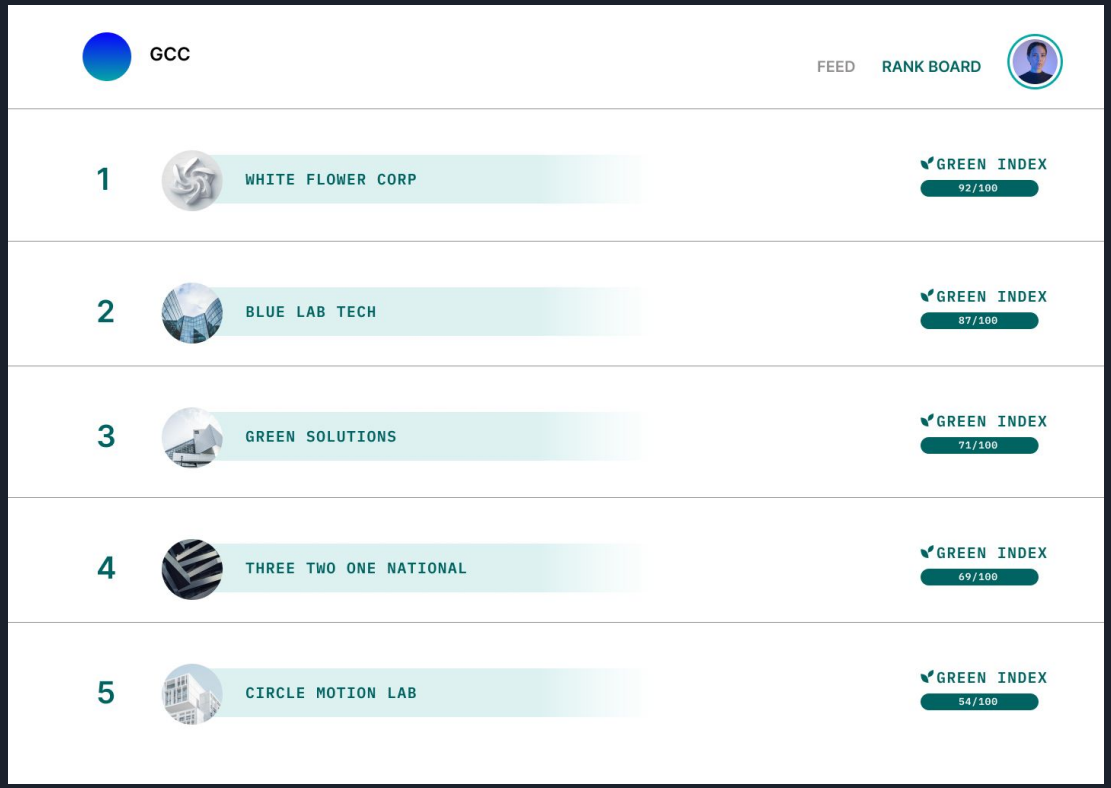
Figma Wireframe (Startup Profile v1.0)



Figma Wireframe (Investor Profile v1.0)



Figma Wireframe (Startup Rank Board v1.0)



Professional Development (Mark)

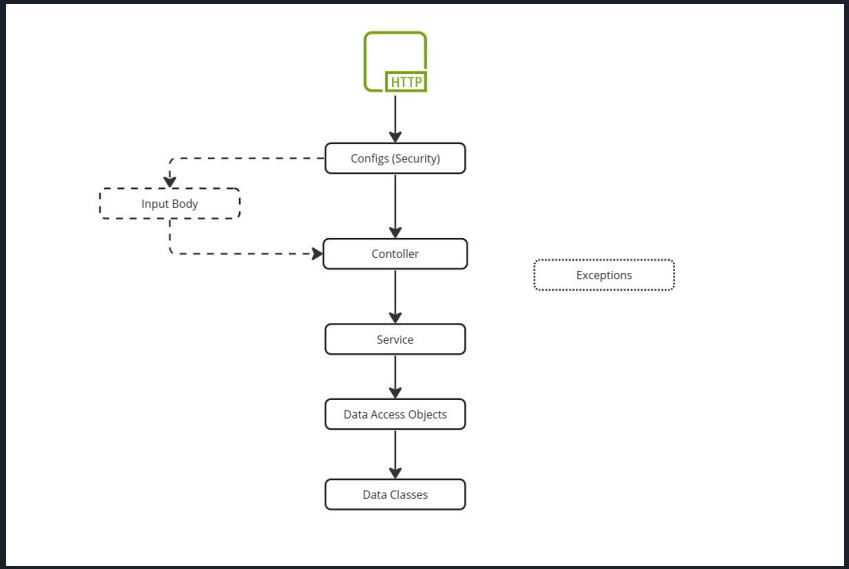
- HTML/CSS in real world application
- Cucumber as a BDD testing tool

index.html

```
<!DOCTYPE html>
<html>
<head>
  <title>Daily Fortune</title>
  <meta charset="UTF-8">
  <link href="style.css" rel="stylesheet">
  <link href="https://fonts.googleapis.com/css?family=Nunito"
rel="stylesheet">
</head>
<body>
  <h1>Click to see your daily fortune!</h1>
  <p id="fortune"></p>
  <div id="buttonContainer">
    <button id="fortuneButton">Let me see!</button>
  </div>
  <script src="main.js"></script>
</body>
</html>
```

Professional Development (Max)

- Learning and implementing the Spring boot, the RESTful API



Spring data class with JPA

```
2 usages
@JsonIgnore
@Column(name = "password", nullable = false, length = 1000)
private String password;
```

```
@JsonIgnore
@OneToOne(optional = false, orphanRemoval = true)
@JoinColumn(name = "local_user_id", nullable = false)
private LocalUser localUser;
```

Web authentication using JWT and Access Control

```
@Bean
public SecurityFilterChain filterChain(HttpSecurity http) throws Exception {
    http.csrf(AbstractHttpConfigurer::disable);
    http.cors(AbstractHttpConfigurer::disable);
    http.addFilterBefore(jwtRequestFilter, AuthorizationFilter.class);
    http.authorizeHttpRequests((requests) -> requests
        .requestMatchers("/product", "/auth/register","/auth/login","/auth/userType").permitAll()
        .requestMatchers(new AntPathRequestMatcher("/user/{userID}/startup_profile", "GET")).permitAll()
        .requestMatchers(new AntPathRequestMatcher("/user/{userID}/investor_profile", "GET")).permitAll()
        .requestMatchers(new AntPathRequestMatcher("/user/{userID}/green_index", "GET")).permitAll()
          .requestMatchers(new AntPathRequestMatcher("/user/{userID}/startup_profile", "PUT")).permitAll()
          .requestMatchers(new AntPathRequestMatcher("/user/{userID}/investor_profile", "PUT")).permitAll()
          .requestMatchers(new AntPathRequestMatcher("/user/{userID}/green_index", "PUT")).permitAll()
          .requestMatchers(new AntPathRequestMatcher("/user/{userID}/startup_profile", "PATCH")).permitAll()
          .requestMatchers(new AntPathRequestMatcher("/user/{userID}/investor_profile", "PATCH")).permitAll()
          .requestMatchers(new AntPathRequestMatcher("/user/{userID}/green_index", "PATCH")).permitAll()
        .requestMatchers(new AntPathRequestMatcher("/green_index", "GET")).permitAll()
        .anyRequest().authenticated()
    );
    return http.build();
}
```

Web authentication using JWT and Access Control

```
@PutMapping("/{userID}/investor_profile")
public ResponseEntity<InvestorProfile> putInvestorProfile(@AuthenticationPrincipal LocalUser user, @PathVariable Long userID,
    if(!userHasPermission(user, userID)) {
        return ResponseEntity.status(HttpStatus.FORBIDDEN).build();
    }
    // check if user already have an investor_profile
    Optional<InvestorProfile> opOriginalInvestorProfile = investorProfileDAO.findByLocalUser_Id(userID);
    if (opOriginalInvestorProfile.isPresent()) {
        return ResponseEntity.status(HttpStatus.FORBIDDEN).build();
    }
    investorProfile.setId(null);
    LocalUser refUser = new LocalUser();
    refUser.setId(userID);
    investorProfile.setLocalUser(refUser);
    return ResponseEntity.ok(investorProfileDAO.save(investorProfile));
}

Qianqi Li
```

Overcoming Roadblocks

- First, we had to discuss how to delegate the work
- Discussed strengths and weaknesses
- Getting a grasp of the stakeholder’s wishes, improving communication
- Frontend and backend connectivity

Future of Project

- Expand user types (browsing users, established companies)
- Allow for companies to show themselves off
- Highlighting the greenest companies
- Matching startups to investors based on some metrics

Thank You!