Element3 Developer Coding Challenge V1.0

Introduction

At Element3, we recognise that every candidate has a unique skill set and approach to problem-solving. As such, we encourage you to be honest about your abilities and process during the coding challenge. We believe that demonstrating autonomy and creativity is crucial for contributing to our team.

We are particularly interested in junior candidates who are eager to learn and grow with us. It is not necessary for you to complete the entire challenge perfectly. Instead, we want to see your problem-solving approach, how you tackle obstacles, and how you collaborate with others to accomplish project goals. Effective communication and the ability to ask for assistance when needed are essential to our team.

Please note that we use advanced tools such as ChatGPT or GitHub Co-Pilot to assist us in our work. If you choose to use these tools during the coding challenge, please inform us in advance. While these tools can be helpful, we still expect you to rely on your creativity and problem-solving skills to complete the challenge. We value honesty and transparency, and we expect you to use these tools responsibly.

Overall, we believe that the coding challenge will give you an excellent opportunity to showcase your skills, potential, and creativity. We are excited to see what you can achieve, and we look forward to learning more about you throughout this process. Good luck!

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The challenge

Phase 1: Backend Development

You are tasked with developing a CRUD API in Golang for a fictional user management system. The API should have the following functionalities:

- Create, Retrieve, Update, and Delete users by ID
    - The data to be stored and captured should include:
        - First Name
        - Surname
        - Email Address
        - Date of Birth
- Upload a file and associate it with a user, this should be a fictional contract (pdf)
- Basic authentication using email address and password (minimum requirement)
- This should be run as a middleware across the endpoint group
- Store user data in memory and uploaded files on disk

Optional Extras could include:

- Unit testing for each API endpoint covering both successful and error cases
- Provide a Dockerfile to run the application
- Upgrade authentication to JWT-based authentication mechanism
- Implementing a middleware to handle CORS
- Implement pagination and filtering functionality for the list of users
- Add search functionality to allow users to search for other users based on their name or other attributes
- Implement rate limiting and throttling to prevent API abuse
- Provide documentation for the API to help other developers understand how to use it

Phase 2: Frontend Development

Create a JavaScript frontend for the user management API using Bootstrap 5 for styling, with the following features:

- Display a list of all users
- Create a new user using a modal window
- Update an existing user using a modal window
- Delete a user using a confirmation dialog
- Upload a file and associate it with a user
- Display errors and success messages

Optional Extras could include:

- Implement user login and logout functionality
- Implementation of date pickers and other complex form controls
- Add pagination to the list of users
- Implement a search bar to allow users to search for other users based on their name or other attributes
- Get creative! We encourage you to explore additional functionality and design options beyond the required features to showcase your skills and creativity.

Note: You are free to use any libraries or frameworks you like to help you complete this task.

When you are all done!

When presenting your coding challenge to be reviewed, you should provide a clear and concise overview of your project and its functionality. This could be in the form of a presentation or demo video that walks through the key features and functionality of the application.

You should also be prepared to provide the source code of your project for review. This can be done by sharing a link to a GitHub repository or providing a zip file containing the code. The code should be well-organised, easy to read, and well-documented to ensure that it can be easily understood by the reviewers.

During the review process, you should be prepared to explain your thought process, approach to problem-solving, and any challenges you faced during development. You should also be prepared to answer any questions about your code and its functionality.

Overall, you should aim to present your coding challenge in a clear and concise manner while also being transparent and honest about your approach and thought process. Providing well-organised and well-documented code will also be critical for the reviewers to understand the project's functionality and to evaluate your technical skills.

We are here to help

As a part of the coding challenge, you will be invited to a Teams channel where you can ask for help and support during the challenge. Our Solutions Architect, Carl Barker, be available to answer any technical questions you may have. However, we ask that you be patient with his time and come prepared with specific questions and requests for support to maximise everyone's time.

We encourage you to take advantage of this opportunity to collaborate with our team and learn from our experts. We are here to support you throughout the challenge and provide any guidance or assistance you may need.

Some friendly advice

For the backend development, you will need to have a good understanding of Golang programming language and its standard libraries. You will need to create a RESTful API using packages such as net/http, encoding/json, and gorilla/mux or gin-gonic. You will also need to learn about CRUD operations and how to handle file uploads in Golang. For the optional extras, you may need to learn about JWT authentication, CORS, pagination, filtering, and rate limiting.

For the frontend development, you will need to have a good understanding of JavaScript and its libraries and the React framework. You will also need to learn about Bootstrap 5 and how to create modals and forms. You will also need to learn about HTTP requests and how to handle errors and success messages.

In order to complete this task efficiently and effectively, you may want to follow these steps:

1. Plan and design the API and frontend architecture and user interface.
2. Set up the backend environment with Golang and the required packages.
3. Write the CRUD API endpoints and handle file uploads.
4. Implement authentication middleware and other optional extras.
5. Write unit tests for each API endpoint.
6. Create a Dockerfile to run the application.
7. Document the API and how to use it.
8. Set up the frontend environment with the chosen JavaScript library or framework.
9. Create the user interface with Bootstrap 5 and implement the required features.
10. Handle errors and success messages and add optional extras.
11. Test the application and packaged so it can be run locally by your E3 reviewer.

Heads up - JQuery is a pet hate of ours

Remember to keep your code organised, modular, and well-documented to make it easy to maintain and scale in the future.

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Good luck!

From the Element3 team, we want to wish you the best of luck and encourage you to have fun during the coding challenge! We believe that this challenge will provide you with a great opportunity to showcase your skills, creativity, and potential. We are excited to see what you can achieve, and we look forward to learning more about you throughout this process.

Remember to take your time, ask for help when needed, and approach each task with enthusiasm and creativity. We hope that you enjoy this challenge and that it gives you a taste of what it's like to work with us at Element3.

Once again, good luck, and have fun!

Simon Thomas – Head of Innovation Element3

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