

Skill Task - Project Engineer

We prepared this task to be able to assess candidates for the role further than what is possible in an interview setting. We expect you to spend no more than 2-4 hours on the exercise, but prefer to give you the opportunity to work on it on your own schedule. This should not interfere with your private schedule and we understand that you have many priorities.

Please send your submission to your contact person **within 7 days of receiving the task**, and tell us honestly how much time you spent on it. If you did not manage to finish the exercise to your satisfaction within the imparted time, you can briefly describe what you would have liked to do, had you had more time to work on it.

Last but not least, as would be in real work life, you may of course ask us any questions if more information is needed! :)

Task 1 - Digital Workflows

A major feature of our [Lab Execution System \(LES\) Laboperator](#) is digital workflows. Digital workflows allow our customers to create 'digital twins' of laboratory processes. When executing these digitized processes, scientists can interact with lab devices to control them and fetch all the data they produce. This allows scientists to increase efficiency and data integrity.

Workflow Templates are written in [YAML](#), a human-readable markup language, and then uploaded to the Laboperator web server. On the web server, they can be executed as so-called Workflow Runs. Assisting our customers in authoring and modifying Workflow Templates is part of your daily tasks at Labforward. Thus, this take-home assignment evaluates your level of comfort with working with a YAML description of the processes.

Resources:

- [Video demonstration of an exemplary digital workflow](#)
- The corresponding [workflow template YAML file](#)
- The [schema documentation](#) of the Workflow Template

Task:

Review the workflow template YAML file of the demonstration workflow above and answer the following questions:

1. If I wanted to change the workflow by adding an extra step after the stirring step, but before the summary, what would I have to do?
2. When adding the iced tea mix to the flask, we also want to show the user the target weight, as defined at the beginning of the workflow. How would you accomplish this?
3. Regarding the screencast and line 146 of the template: What's the value of the "data_point.qty" in that specific example?

4. Please explain what happens when the timer runs out on its own vs. when the user stops the timer manually.

Please answer the questions in writing and in a format you are comfortable presenting during an interview.

Tips:

- To view .yaml files use any code editor or use an online editor.
- A workflow template mainly consists of fields, steps, and the flow. The fields are the different variables that are used. The steps describe the instructions to the end user, the visualizations, and the behaviors of the single steps. The flow determines the order of the steps.
- Regarding question no. 3: You do not need to understand every expression; rather, you should show that you understand what happens in each of the blocks.

Task 2 - Manipulation of Data from APIs

Another major component of digital workflows in Laboperator is the query, manipulation and transfer of data across various sources. In some scenarios, **middleware** is a key component in this process and plays a significant role in allowing **devices** and **systems** to communicate with each other. To demonstrate the abilities of middleware, this take-home assignment is designed as a common task in the *manipulation of data* acquired from an API.

The public-facing API **Bright Sky**, available at <https://brightsky.dev/>, provides users with information about the weather conditions as provided by Germany's meteorological service, the DWD (Deutscher Wetterdienst). This API requires location data as a set of geocoordinates, which can be obtained via any [geocoding](#) API; take advantage of this to convert human-readable location names.

Your task is to develop an API server using **Express** (Node.js) that triggers a proxy request to an external system, analyze the data collected and respond with useful information. In this scenario, your team has decided to host a picnic but needs your help in choosing a date and location with optimal weather conditions, which are defined by the following conditions:

Title	Condition
Wind speed (avg)	<30 km/h
Temperature (avg high)	> 20°C, <30°C
Sunshine	maximal
Precipitation	minimal

The API server will need to provide a single endpoint with the following specifications:

- endpoint: GET /party_plan
- input parameters:
 - from: ISO 8601 compatible date
 - to: ISO 8601 compatible date
 - locations: array of human-readable strings of the desired locations, e.g. "Treptower Park, Berlin"
- respond with a JSON object with the following structure:
 - date: ISO 8601 compatible date, which signifies the chosen optimal date, must be between the range of "from" and "to"
 - location: the chosen optimal location

What's next?

1. Let us know if you have any questions about the task.
2. Once you receive the exercise, please let us know when we should expect a response.
3. Work on your solution for task 2 in GitHub by creating a **private repository**.
4. Once you're finished, invite the GitHub user **labforward-us-your-driver** as a collaborator, and send us the link to the repository.
5. We'll give you timely feedback and inform you about the next steps.

We are looking forward to seeing your solution! Good Luck!