Software Engineer - Assignment

Overview

This assignment tests your development skills in Node.JS as well as your knowledge of data science libraries.

The assignment should not take you more than 2 hours.

Good luck and we look forward to checking out your work!

What will you be judged on?

- Logical and analytical reasoning
- Code quality – syntax + optimisation
- Submission quality

Part 1

General Instructions -

- Use Node.js to solve the following problems.
- Make sure that your program does not print anything except the content in the 'Expected Output' section.
- Example input files are attached.
- Please create a zip archive if there are multiple files.
- Please do NOT upload your solution to any public code-sharing websites like Github, Gitlab, Bitbucket etc.

Challenge

There is a Venture Capital firm called Cueball Capital. Having lost a lot of money in the last few years, they have decided to regulate their investment by following a strict budget. Their budget consists of several rules which are applicable on time period or type of investment or both.

An example rule: Limit investment to 25 million USD per quarter on Big Data startups.

The assignment will test your proficiency in **Node.js** and **SQL** by requiring you to:

1. **Load and store data**:
    a. Read the provided CSV files containing budget rules and investment opportunities.
    b. Write this data into SQL tables. Use **SQLite** as the database since it can be easily attached to the submission. If you use another SQL database, provide clear steps to set up and configure the database.
2. **Create APIs:**
    a. Develop APIs to interact with the database and process the data. All APIs must fetch data directly from the database, not the CSV files.
3. **Required APIs:**
    a. **API to fetch all budget rules**
        i. Endpoint to list all budget rules from the database.
    b. **API to view all investments**
        i. This API should list all the available investments.
        ii. This API should also allow users to pass query arguments to sort investments by date.
    c. **API to fetch investments that pass budget rules**
        i. Return a list of investments that do **not violate** the budget rules.
    d. **API to fetch investments that violate budget rules**
        i. Return a list of investments that **violate** the budget rules.

Expected Output:

The submission should include a fully functional Node.js application with the following deliverables:

1. **Correct Working of All APIs**
   a. APIs should successfully fetch data as described and validate investments against budget rules.
2. **SQLite Database**
   a. Attach the SQLite database with the submission. If another SQL database is used, provide clear setup instructions.
3. **Code and Documentation**
   a. Submit the complete Node.js application code.
   b. Include documentation detailing the endpoints, their functionality, and how to set up and run the application.

Bonus Points: If you use NestJS and Typescript to set up the application.

Example

budget.csv

ID	**Amount**	**Time Period**	**Sector**
1	75	Month	
2	30		FinTech
3	25	Quarter	BigData
4	70	Year	E-Commerce

5	350	Year	

investments.csv (with date in the format dd/mm/yyyy)

ID	Date	Amount	Sector
1	06/01/2020	10	BigData
2	23/01/2020	20	E-Commerce
3	02/02/2020	35	FinTech
4	10/02/2020	65	SaaS
5	14/02/2020	15	BigData
6	17/02/2020	5	SaaS
7	29/02/2020	5	FinTech
8	18/03/2020	15	BigData
9	03/05/2020	30	E-Commerce
10	18/05/2020	50	E-Commerce

In the above example, the following investments will not go through because of budget violations:

- Investment 3, because it violates Rule 2
- Investment 5, because it violates Rule 1 (having already made an investment of 65 in Feb 2020)

- Investment 10, because it violates both Rules 1 and 4 (having already made an investment of 30 in May 2020 in E-Commerce)

Note:

- Time Period can only be one of: 'Month', 'Quarter' or 'Year'
- Sector can be arbitrary
- The time period starts on the 1st of the relevant month. For example: the 1st Quarter of the year starts on 1st January and ends on 31st March.
- At least one of Time Period and Sector will be present in a budget rule.
- All amounts are in millions of USD.

Part 2:

General Instructions –

- In this part, you are expected to study the data better and derive insights that may be useful for Cueball Capital's board
- Use the same csv data sets from Part 1
- You are expected to submit a *well-structured* Jupyter notebook for this Part • Use Python and any other required EDA libraries

Challenge –

- Calculate the remaining budget for each sector after deducting investments. Use the provided budget data and investment data.
- Filter and display the investment opportunities based on the available budget in each sector. Show the investments that are within the remaining budget for each sector.
- Determine how the investment amount varies for each sector over time. Visualize the investment amount for each sector over time to identify any trends or patterns. • Analyze the trend of investments for each sector on a monthly and quarterly basis. Create appropriate visualizations to showcase the trend of investments for each sector.

Good luck to you!