secfi

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Assignment for Backend Engineers

Introduction

At Secfi we're helping startup employees to get their **equity** right. This means that equity is at the core of everything we do. Therefore we need to dedicate a substantial part of our effort managing the whole lifecycle of equity.

There are a lot of problems that can be solved around managing equity and for this exercise we want to focus only on two of them: vesting and calculating the value of equity. You can find more detailed information about the topic in this couple of useful resources: "Stock options starter guide" and "Stock option vesting schedule".

Note that in-depth knowledge of equity is not required for this assignment, only a basic understanding of some terms is needed.

Requirements

In this assignment we ask you to create a service that is capable of calculating how a set of stock options will vest over time and what the total value of the vested equity will be over that time.

IMPORTANT: *Consider this assignment to have two levels of difficulty; in the following sections you will find the explanation to two different problems that overlap. If you complete the second one, there's no need to also provide a solution for the first one. Keep in mind that it is not necessary to complete both, a good solution for the first one is also valuable for us (but which problem you solve will also be taken into consideration for the overall rating of the solution).*

a. Calculating the vesting timeline

For managing private equity, it is important to know the amount of stock options that have already vested. In this problem, we will be working with option grants (ignoring their type) that have different vesting schedules, with three variables that can change:

- *Granting date:* The date in which the grant has been awarded and the vesting starts.

- *Cliff months:* The duration of the cliff. In this context it will be either 0 (no cliff) or 12 months.
- *Total duration:* The total duration of the vesting schedule. In this context it will be from 36 to 60 months.

Given a set of option grants with their quantity and vesting information (see the sample request below), we expect the service to return a timeline with monthly points indicating the total quantity of vested grants, from the date of the first grant until the totality of the options are fully vested (see the sample response below).

Take this request and response both as an API reference and as a very simple test for your service.

Sample request:

```
[
 {
   "quantity": 4800,
   "start_date": "01-01-2018",
   "cliff_months": 12,
   "duration_months": 48
 }
]
```

Sample response: Here you can find a gist with the full response. If the link is broken, do not hesitate to contact us!

```
[
 {
   "vested_quantity": 0,
   "date": "01-01-2018"
 },
 {
   "vested_quantity": 0,
   "date": "01-02-2018"
 },
 ...
 {
   "vested_quantity": 1200,
   "date": "01-01-2019"
 },
 {
   "vested_quantity": 1300,
   "date": "01-02-2019"
 },
```

```
...
 {
   "vested_quantity": 4800,
   "date": "01-01-2022"
 }
]
```

b. Calculating the value of the vested equity over time

Now consider that the stock for which if you have options has of course a value and this value can change over time; for example because of a new round of investment, among other things.

In this part, we ask you to take this into consideration and return not the quantity of vested options but the *total value*, at that point in time, of said vested options by using the provided valuations (see the sample request below). *You may consider that there will be a valuation before a grant is awarded.*

As in the previous section, take this request and response both as an API reference and as a very simple test for your service.

Sample request:

```
{
 "option_grants": [
   {
     "quantity": 4800,
     "start_date": "01-01-2018",
     "cliff_months": 12,
     "duration_months": 48
   }
 ],
 "company_valuations": [
   {
     "price": 10.0,
     "valuation_date": "09-12-2017"
   }
 ]
}
```

Sample response: Here you can find a gist with the full response. If the link is broken, do not hesitate to contact us!

```
[
 {
   "total_value": 0.0,
   "date": "01-01-2018"
 },
 {
   "total_value": 0.0,
   "date": "01-02-2018"
 },
 ...
 {
   "total_value": 12000.0,
   "date": "01-01-2019"
 },
 {
   "total_value": 13000.0,
   "date": "01-02-2019"
 },
...
 {
   "total_value": 48000.0,
   "date": "01-01-2022"
 }
]
```

Other

- The service can be written in any of the following languages: Python, NodeJs (Typescript), Java, Kotlin.
- Feel free to design the missing points of the API however you want, but keeping the previously shown request and response models.
- If you think there are business decisions that should be taken because of unclear requirements or potential edge cases you think is wise to ignore, document and justify them.
- There should be tests.
- The project should be straightforward to set up & run. *Hint: Please add instructions in the readme on how we should run/start the service.*

Evaluation

After you finish the assignment, we ask you to answer the following questions:

- What are some of the design decisions you made?
- What are some of the business decisions you made?
- How much time did you end up spending on it?

- What do you like about your implementation?
- What would you improve next time?
- What things are missing to make it production-ready?

Submission

Please create a repo and send us a link (if it's a private repo, please add @secfiEngInt github user to it). Good luck! If you have any questions, please don't hesitate to reach out.