Skills Test - Qonto - Grégoire Richard

💡 How to read code ?

What does this function do?

This function is taking as parameters four arguments, the first one is the context, which allows the engineer to get the user's account and its details; the second one is what I assume to be a database instance; the third one an iban as a string; the fourth one a date which is a start date. Later on we can see the returned type of the function, in our case those are the database instance and integer and a string.

The first condition inside the function is checking if the IBAN is correct, if it is not it returns that the IBAN is invalid.
Then an interface is specified (Golang's struct), for the response object that will contain an int "TxsUpdate".
For the following error handling condition it sets the lock_timeout and statement_timeout to 0, because if the lock_timeout has not yet been run it is set to -1. Meaning the code is disabling the lock_timeout in order to change properties later on.
In the case of an error of this error handling, another one is made and returns a string stating the impossibility to disable timeouts.
The following conditions on line 22 tries to recalculate the transaction balance and if there is an error, it triggers another condition that returns that it could not recalculate the current balance. The following conditions checks if the IBAN exists and if not returns that it could not select the account.

Following this an interface called lastBalance is inferred, containing a 64-bits integer called Balance.
The line 34 sees the assignment of err to the returned error of the function that searches for the last balance.
On line 35 the condition checks if dbutil.IsRecordNotFoundError with the parameters err (defined just earlier) is true, in that case.
Next the code is assigning to account the value of the search function called getAccount on dbClient "ctx, "", iban, "", then handles the possible error and returns the failure to fetch the account. If the last if is not executed, the parent condition returns the account with the updated balance.
On line 43 the condition handles the errors that have not been handled yet returns that it could not get the last balance.
From line 46 updateBalance is assigned the SQL query that updates the account balance.
By line 56 a condition handles if there's an error it returns that it could not update the account balance.
Finally, out of the condition by line 59, the account and the updated account are returned, meaning the function is designed to return an updated balance on a client's account.

TL;DR : the function is returning the last account balance and checking whether there is an update.

💡 General discussions

🗄️ Databases

Do you know different types of databases? What are their differences?

There are few types of database paradigm, the most famous one would be the relational database such as MySQL or PostgreSQL, it is mostly based on a schema, the relations within the different objects are made with a foreign key. It is also one of the oldest as it is based on SQL which was developed in the 70's. Another one would be the document based database such as MongoDB, where each document is a container for key-value pairs, that type of database is mostly used among video games and mobile apps, though they do not support joins.

There are also the Graph databases like neo4j where data are represented as nodes, from what I could read they are useful for fraud detection and finance. Finally we could mention two other paradigms, the key-value ones such as Redis where every key is unique and points to a value those are very similar to Javascript / Typescript Objects or Python dictionaries. And also the Multi-model based databases where one can use different paradigms in one database.

Could you describe what is the lifecycle of a SELECT query?

First of all, the SQL starts by parsing the query and checking if there are no errors in the query. If so, the query browses the database and the specified table in the “from” clause if the elements exist then the elements are returned in the result-set if elements match the query. Else the query will return an empty result set.

And an INSERT INTO query?

For the INSERT INTO query the first SQL parsing part would be the same as the SELECT query. For the upcoming part we will just assume that the query was right and that it contained no syntax error.

Then the INSERT INTO query SQL has to check if the user-specified database and tables exist. When it is done, the values specified in the “value” clause are inserted on every matching column and the query returns the result-set to the server.

Do you know what is a lock and what it does?

A database lock is used to lock some data so only a specific user can update that particular piece of data. There are few levels of locking : Row, Column, Page, Table, File and Database each one corresponding to its respective data level.

🏗️ Infrastructure

Could you explain what is the advantage of the cloud over the old way of managing infrastructure?

As the cost of the service varies on the use, it can be more cost effective to use cloud services. Most of the cloud platforms being huge companies such as Amazon, Google or even OVH, it is more reliable in terms of security than a small host. Moreover, you are less likely to be the victim of a ransomware attack if you are using the cloud because the data is

on a remote server that most likely cannot be encrypted at a hacker's will. You can also have more technical assistance and sometimes cloud companies are likely to make you great offers, it is not unheard of to see Google or Amazon offering tens of thousands of dollars of credit to companies so they use their services, it is what they did with Lydia if I am not mistaken. You can also access your data anywhere, even from your smartphone. Quality control is also a big part of it, with cloud solutions you can easily see where you are losing time and why, whereas it is harder on local servers or classical hosts. Finally, we could also mention the data loss, if you lose your data on your local server / computer, it can still be on the cloud and you have a copy of it and also clouds tend to be faster than local servers or normal hosts.

Do you know about containerization? Could you explain it in your own words?
Containerization is the fact of importing the file and dependencies to run a software instead of using a virtual machine. Where the VM would create a whole new environment on the machine, the containerization only imports the libraries and needed dependencies, it is way more efficient than VM because it uses a lot less memory, it is also more portable. A popular tool of containerization is the French software Docker which is now a standard in software engineering. The principle is quite simple, while using a Dockerfile, you have to describe the environment you are running so everyone can use it on any platform.

Have you already worked in a cloud environment? Could you describe the different parts of the infrastructure?
I actually already did a little, we were using a Docker with Kubernetes pods running on Google cloud. The project was written in Rails so the docker imported mostly a version of Ruby. Apart from that the infrastructure was quite simple because it was a college project that only lasted ten days. I also used Docker on other projects such as a Symfony college project and some other freelance projects where it helps everyone running the project without having to use a VM.

Do you know what is a monolith and a microservice?
A monolith is a compact piece of code carrying multiple functions in opposition to microservices that are a set of small sole functions. The microservices communicate between themselves using APIs. The main advantages of microservices is that if a critical update is needed on a dependency on one of them, only one will have to be updated.

🔬 Testing

What do you know about different types of testing?
There are few types of testing.
First, unit testing is about testing at the lower level, so most of the time just functions. It allows engineers to fix issues quickly because the test will localize quickly which function does not return the expected result but as a drawback it does not allow us to detect wider problems in the code.
We could also name integration testing which from my understanding is more like a set of unit testing, it allows the engineer to have a larger point of view on the code and the software design.
I guess we could also mention the A/B testing although this is not really code testing per se but is the most famous type of testing among non-engineer since it is a technique used by

lots of different social media. It requires a large number of users and to present them with a few different versions of the software and to ask them which is best and the one they prefer.

What does Continuous Integration mean for you?
Continuous integration is a set of practices that allows engineers to make the software safer by reviewing their pairs' code by using pull requests and branches or running tests as much as possible. It can also mean continuous development and thus constant improvement of the software. It is very useful to prevent software rotting for example.

⚙ Algorithms
Do you know what is the notion of complexity?
One could also call it the "Big O notation", it represents the mathematical complexity of an algorithm. It can be constant O(1), linear O(n), logarithmic O(n Log n), quadratic O(2n), exponential O(2^n) or factorial O(n!) in fact it represents the execution time of a program. Each one representing its equivalent mathematical function in running time. Which is why the complexity has to be as low as possible in order to avoid memory waste and time loss.

What could be a good time complexity?
O(n log n) or logarithmic complexity is the most appropriate because it has the lowest execution time even less than the linear one. Of course we could also argue that a constant complexity would be better than logarithmic, but the possibilities within this complexity are quite limited. As the logarithmic complexity is not always easy to achieve, I would say that linear complexity is also good time complexity whereas exponential, factorial and quadratic are complexities to avoid when possible.

📓 Methodologies
What do you know about different team organizations?
I am guessing the question is referring to team organizations such as Lean and Scrum which are both agile production frameworks.
First for Scrum, teams are organized as squads where each time is divided into sprints that most of the time last from two weeks to a month, where goals are defined by product management and ending in sprint reviews. Each goal defined before has to be achieved during the current sprint in order to not accumulate technical debt. Though to keep track of everyone's progress there are also a daily reviews to define the day's fixes and goals to adopt.
For the lean framework I know that the Qonto's teams are using a version of it developed by Toyota called the Kaizen framework (the article of Mr Marc Antoine Lacroix was very useful to understand). From my understanding of the article the Kaizen methodology is more based on involving the team members in problem solving, trusting their abilities and giving them time to support their ideas.

If it was not about Agile methodology then I will consider that the question was about the team organizations in tech and the structure of the teams.
From my little past experience, I have seen that teams were composed at the first stage of specialized engineers such as mobile, front and back engineers or devOps. Then there are the tech leads who are half coding half managing the team members, above them would be engineering managers that mostly manage the tech leads and over them would be the Chief

Technical Officer. Of course there are more “transversal” organizations where the collaboration between members and team is also supposed to be more enhanced.

Did you already work in a tech team? If yes, could you describe its organization? What did you like/dislike?

In all of the teams I worked in, the Scrum framework was used with a sprint review every two weeks. Though during my last months at “Choose” I did not have any daily meetings because I was doing autonomous work on a side project so I was the only developer on my team.
I was reporting directly to the Chief Operations Officer and to the Chief Technical Officer when there were technical issues or things to optimize in the code.
Apart from that I worked in another company before, called Lab Event where I was more clearly using the Scrum framework and I had sprint reviews and dailies with the team. What I liked the most in those experiences is that I was kind of autonomous although I had deadlines. But the thing I liked least was that I lacked a management to answer my questions as the people I was reporting to were so busy I could not ask them a lot of things during my onboarding which was a pain point.