DENARIUS INTERNSHIP REPORT

DENARIUS
MULTI FAMILY OFFICE

Detailed 4-part internship review

by intern Samuel Palmer

In this review I will unfold the details of the company and the specifics of the involvement I had as an intern within the work space of Denarius. I will touch on every task, obstacle, achievement and responsibilities I had during my internship and how I tackled my challenges and learned how to integrate and learn new technical skills, social skills and all-round relational fluency.

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CONTEXT

1.1 Company description

For my internship I have joined a company called DENARIUS. This company is based in Switzerland and is specialised in stock market finance and client investments. The business environment mainly revolves around stock market, data analysis and management. These are the most important topics within the company. DENARIUS has offices in Switzerland where management and other tasks take place, but regarding the technical side it is mostly done offsite or remotely.

1.2 Company goals

When I joined the company, I was assigned to help on the project of developing automated systems and marketing tools on the cloud. The goal is to use the cloud computing to solve some technical hurdles and to have more flexibility in what is possible with the project. Working on the cloud has two major advantages.

- Easy scalability on demand
- Availability of different computational and data management tools.

The basic idea of cloud computing is to be able to easily scale any computational operations on demand, the ability to only use the exact amount of computational resources needed for a certain task. The industry of cloud computing has boomed in the last 5 years and is on an exponential growth path due to the fact that many companies are opting in on the technology to solve many of their business issues. But Cloud computing is much more what you would think, it has applications in everything including healthcare, science, education and many more. One clear example is the use of cloud computing for scientific research where large amounts of scientific data can be processed and managed into more comprehensive information. An important convenience of cloud computing is that businesses no longer need to own big physical servers to manage their company as it can all be done on the cloud.

PLANS

2.1 Assigned responsibilities

During the internship I was assigned a few responsibilities as expected. These responsibilities included daily checking that certain operations were running smoothly and communicating necessary information when needed. I also needed to take action in certain sceneries where said operations were not performed correctly, on time or at all. Being assigned these responsibilities was a good way to get to improve my rigour in self-discipline and to help me learn skills in personal organisation. With this said having responsibilities helps develop organisation as most of the time people will rely on your tasks to complete their work. Having responsibilities is a very important part of learning how to be more responsible in general within the work space. As explained to me by my tutor, it is crucial that co-workers can rely on you to respect deadlines and have the proper discipline to organise yourself. This is most of the time something that can get you dismissed from your position if not respected.
This is why having responsibilities as an intern is so crucial. This also allows for better workflow, to be able to properly predict how much time is needed for a task and inform your team so they can work on the same timeline and to set common deadline goals.
Being at DENERIUS I was given access to a lot of data and was consequently trusted with sensitive information. I took this very seriously and doubled checked everything before working with this data.

2.2 Daily management

Every couple of days, at round 10am a call would be organised with my tutor over the phone. During these calls we would go over the tasks I needed to do and how I was doing on my current tasks. If I had any issues, we would try to solve them during these calls. It was a little harder to do everything over the phone but that was expected. Any time I had issues I was greatly encouraged to contact my tutor to ask any question if I got stuck, which I often did. But felt that my reasons for getting stuck were not enough to warrant a help call thus making me lose a lot of time. Moreover, I am included in a global group chat which includes a few members of the programming teams and my tutor. In this chat I would be able to observe technical discussions and interactions between the project manager (my tutor) and the team which gave me an interesting view on the issues encountered and solutions that were discussed to fix these issues.
This is where I would communicate with employees to contact anyone in event of any problem with any of the daily checks.

ACHIEVEMENTS

3.1 Accomplishments

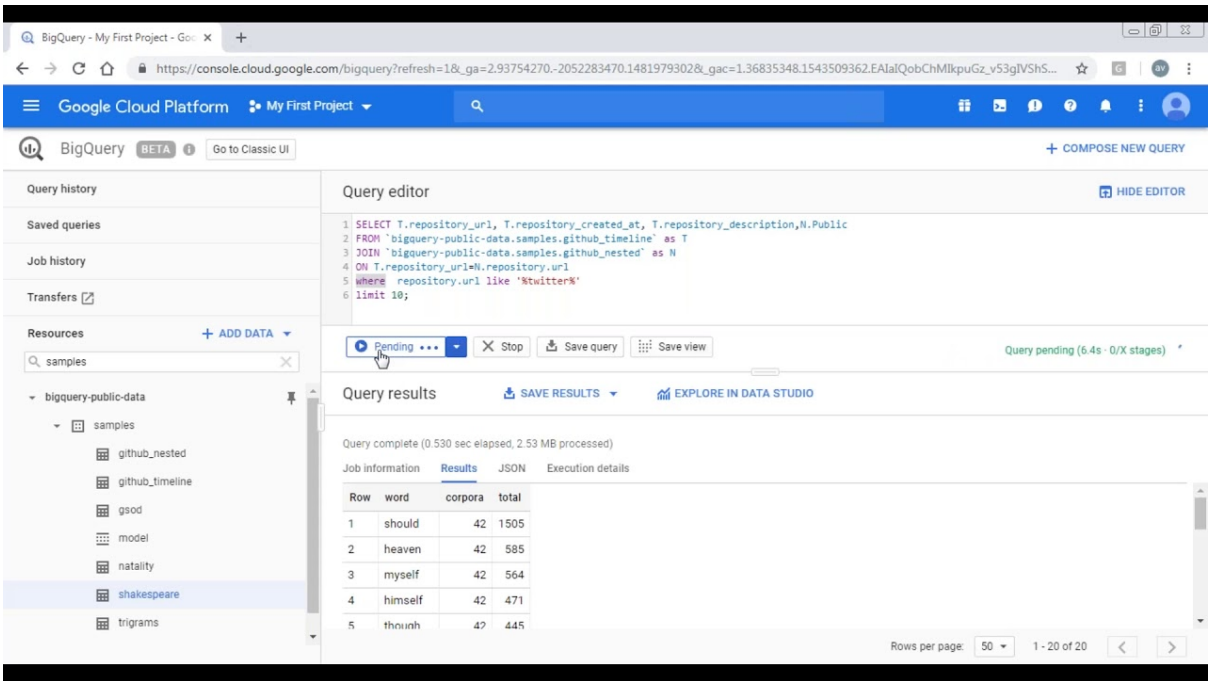
Itemised below is a breakdown of the skills that I have acquired during my internship.

- Google cloud & SQL
- Python Programming
- Power-Bi
- Personal Accomplishments

GOOGLE CLOUD & SQL

At the beginning of the internship, I was given access to a Google Cloud website where some of computational tasks can be performed on the cloud. Google cloud is one of many cloud computing services, it is part of the three most popular cloud service companies, the latter being Microsoft's Azure cloud platform and Amazon's AWS cloud platform (Amazon web service). There are many reasons a company would choose one over the other based on feature and company requirements. This is where I would have to perform some of the daily tasks and check that specific actions were performed on a daily basis. For the start of my work, I was advised to learn the Structured Query Language (SQL), this language is used to request and manipulate data from databases. The SQL language was created in 1970 and has become the basis of data handling ever since. It organises data in a grid like array similar to excel with columns and rows. This language allows you to tell a database what data you want to add or get from it. This proved to be very important as it is a key skill to have as a programmer and also due to the fact that it is basically used by every tech company nowadays. Before being introduced to SQL I had little to no knowledge of how data was handled in companies and found a new perspective on how everything works behind the scenes. For about a month I was tasked with writing what is known as "SQL QUERIES", these queries written in SQL are sent to the database and I would in return receive an excel style grid of the data I requested in my query. SQL language can get quite complex as there are many ways of requesting data. It is also possible with SQL to perform mathematical actions on the data before the query results are returned. As you can imagine this adds a lot of possibilities with the SQL language proving it to be a very powerful tool. Being in a financial company, a lot of the data is composed of various financial values and statistics. Every day I was given an objective to perform in SQL to query specific information from a given database. I began to

work on SQL on the cloud. As I began to learn SQL, I would have trouble understanding the basics of the language as it is completely different to how most other programming languages work. As necessary I started learning the SQL language on YouTube and found its fundamentals to be very simple to understand after a bit of practice, so I thought it was be easy from here, for basic tasks it stayed pretty simple until I had to perform more complex tasks. SQL at its core is a very simple language to understand but when you need to use it in more in-depth ways it can start to become more complex. The first SQL tasks were basic enough but I still had trouble as I was still understanding this new language. As I wrote these SQL queries to no surprise, I was given harder queries by my tutor, this time diving into what is known as dynamic SQL queries. A dynamic SQL queries is SQL code that can be generated based on results from other queries. I was given a dynamic query by my tutor with the instructions to modify it in a given way. This for me took longer, as this task proved to be quite difficult and time consuming given the knowledge that I had. I had to do a lot of research and trial and error as there was a lot of logic in SQL that simply did not make sense to me. In the end after much brain storming, I finally got a successful result. Moreover, during this period of studying SQL, I also learned how to use the BigQuery which is one of the google cloud platform features used to manage and perform SQL queries.



Example of BigQuery interface on google platform

While working with on BigQuery I was advised to learn more and get familiar with the google cloud platform in general and was explained how valuable of a skill it would be to have. There are many features available on the platform from database management features to AI machine learning tools and many more. Following my experience with google cloud I was heavily encouraged by my tutor to engage in a google cloud engineer certification, this certification required doing an online course that teaches you everything about the google cloud platform and how to use everything. I was told that this is a very sort after and valuable certification to have in the industry as many companies look for people with these qualifications. I have taken the advice and have planned to do the certification in the near future. To wrap up, learning SQL was very informative to me and most definitely a crucial skill to learn and I am overall very pleased with what I've learnt with this part of the internship.

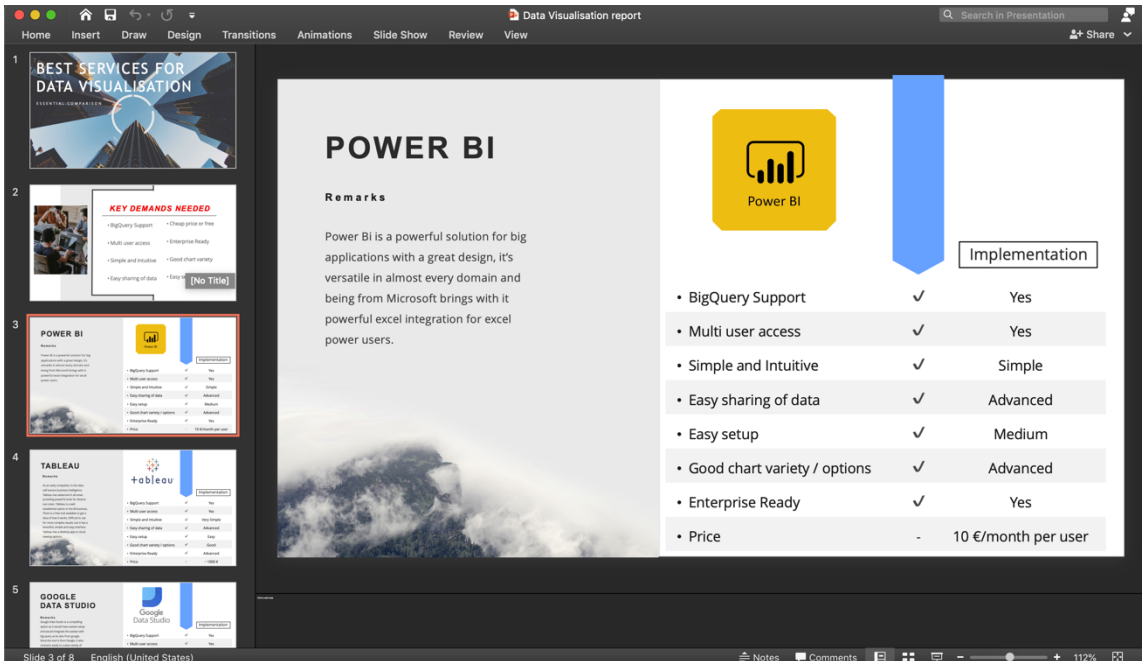
PYTHON PROGRAMMING

The Python language is a very important language used almost everywhere for automating any kind of technical task. It's a very easy to learn and very flexible language that can have applications in all sorts of domains. It is one of the programming languages that I used during my internship. On a couple of occasions, I was asked to write small chunks of code called scripts using this language, scripts can be used to automate tasks and perform technical jobs much faster. I was asked to write a script to easily upload files to the google cloud storage using an Application Programming Interface (API). To keep it short an API is a library of code created by a programmer to allow other people's software to communicate with their software. As I had never used python programming in the past, I had to learn some basics on YouTube. With a couple of long YouTube courses, I had understood most of the fundamentals to start programming. As I began, I came to realise how simple python programming was and managed to finish the script in less than 2 days. I sent it over to my tutor for checking and as expected everything worked as intended. On a second occasion I had another task I needed to perform, a manual task. Every day, I was sent a folder containing many separates excel files. As soon as I received this folder, I needed to merge a set of specific excel files into one. I immediately realised how tedious this would be, so I made a script to automate it! Within two days I had a working script that when executed could automatically pick a set of excel files from the folder and merge them in a specific order instantly. This

newly acquired knowledge definitely gave me a lot of ideas on automation of personal projects. Knowing how important python is in the automation scene, I will definitely be pursuing more complex python projects and engaging in more use of the language both in my studies and on personal time.

POWER-BI

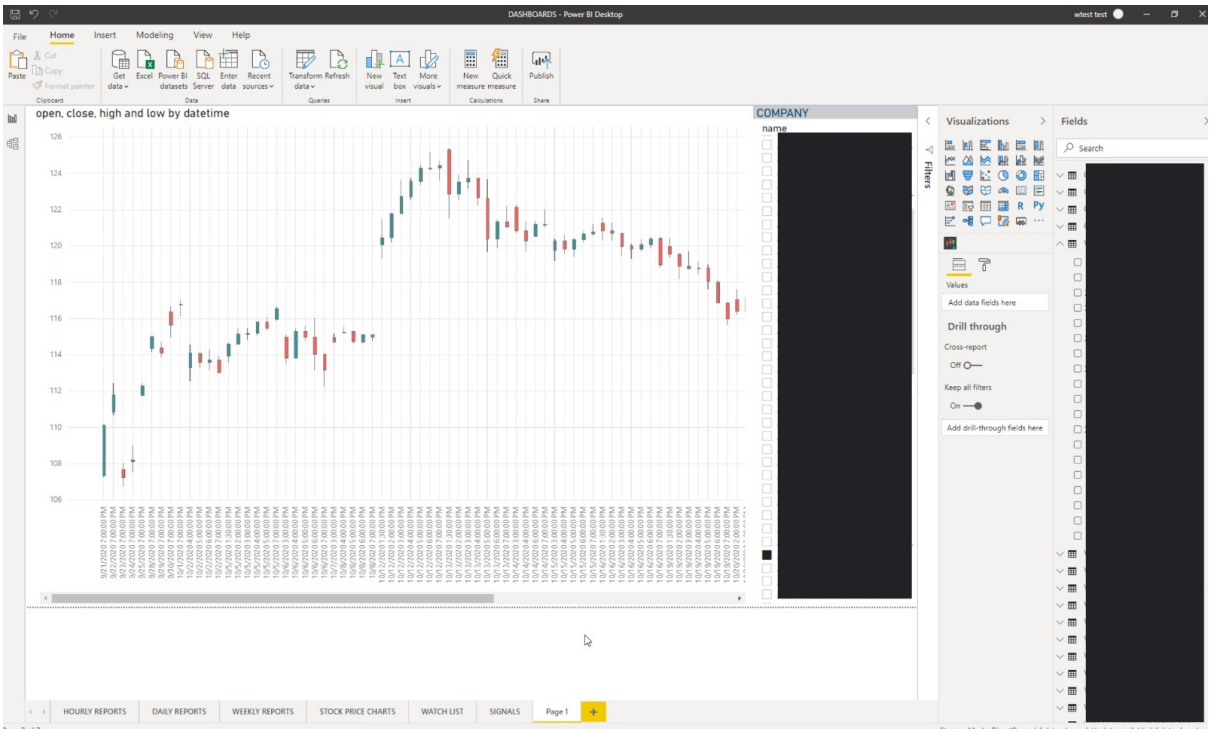
Two months into the internship, a decision needed to be made. A demand for a good data visualisation tool became apparent. A tool or service that would allow the easy visualisation of data in the form of charts or graphs or simple excel sheets. For this I was tasked with researching the best tool or service on the market given a set of requirements. For this task I began my research with reading reputable online reviews and comparisons, watching online reviews for each individual service and then forming my own conclusion. Furthermore, I was encouraged to prepare a PowerPoint with comparisons on the potential options. In these options were some of the most popular tools in the industry including Power-bi, Tableau, Google Data Studio, Looker and Sisence.



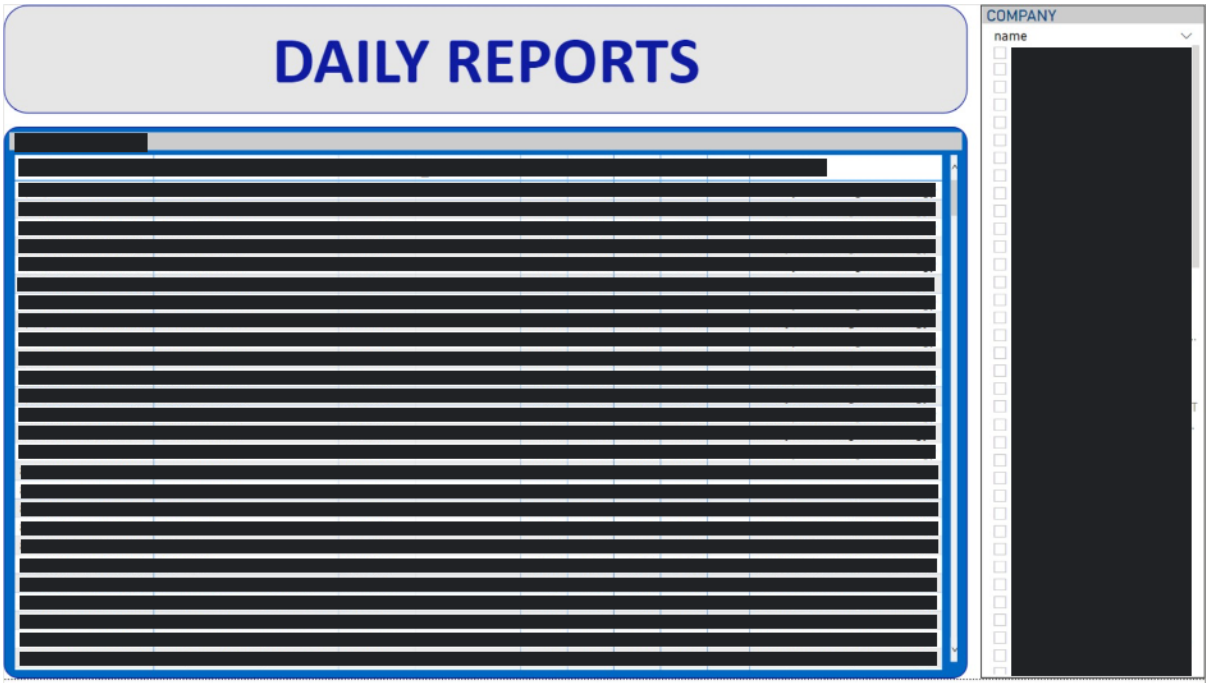
Power point presentation on data visualisation solutions

It was then decided that Power-bi was the preferred option for our needs. This option was an easy solution to share financial data in an easy to view format. As we concluded, I was tasked the job of setting Power-bi and having to create a working dashboard with various data visualisation graphics. As I got to work on learning Power-bi and performing all the configurations needed I managed to get a set of dashboards working with the company's database. These dashboards would refresh their data on demand to give the most up to date information in easy to view formats as shown below. Working on this task taught me the basics of Power-Bi, how it works and how to use it. Power-Bi like many other services like it, can be a very powerful tool if used correctly. It makes visualising data much easier in the sense that I can take large amounts of raw data and transform it into comprehensive and easy to understand graphics like charts or bar graphs.

Power-Bi app dashboard with market data graph



Power-Bi app with candle stick chart dashboard example

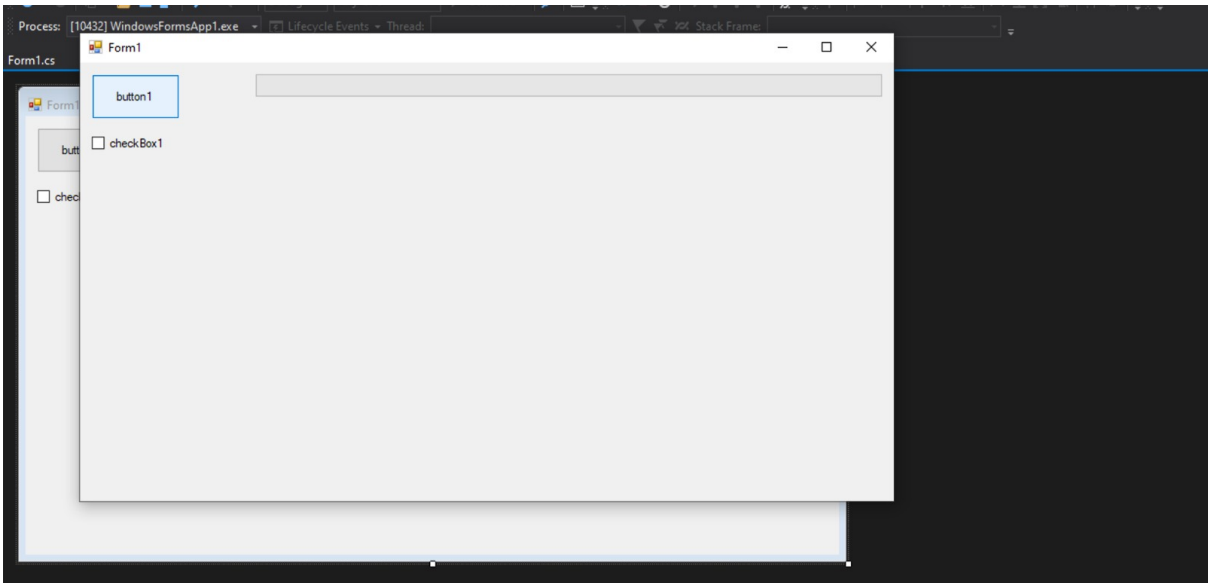


Power-Bi app with dashboard example

After concluding and finalising the creation of a set of dashboards that would meet our needs, we came to the realisation that the service lacked in speed and was overall lacking in optimisation for our use case. The main use of these Power-Bi dashboards was viewing excel style sheets with easy-to-use filters to get precise data. I tried a lot of optimisation advice found online but could not find any solution on fixing slow loading times. It was decided we needed another solution something really simple that would be click, open and execute. As there were no options on the market my tutor asked me to develop a simple windows app to filter data from the Google cloud databases.

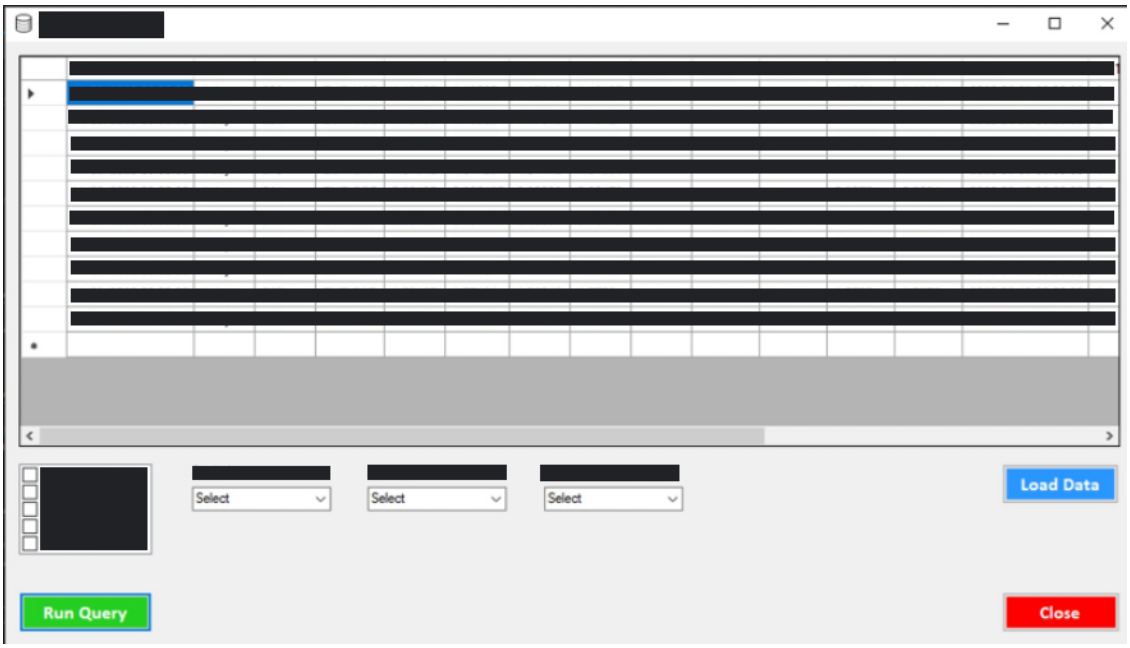
WINDOWS APP

The instructions for this task were to develop a windows app with a simple interface that connected to the google cloud database. As I had never developed such an app, I was guided on how to start. This required using an Integrated developer environment (IDE) I.e., a glorified text editor like Microsoft Word but for programming). The IDE used was visual studio code. This was the preferred IDE I was going to be using as it supported programming with what is very well known in the tech business industry, the ".NET" .NET is a free and open-source managed computer software framework for Windows, Linux, and macOS operating systems. It is a cross-platform successor to .NET Framework which was an extremely popular tool for creating windows apps in the C-Sharp (C#) programming language. During a morning meeting with my tutor, we setup a screen share with my computer to help me start on the project and to instruct me on what programme modules I needed to install to begin. After about half an hour I was setup to start development. During the next few days, I started with getting familiar with the work space and how it worked. I then started researching how to use the Big-Query API. As I was working on the Big-Query API I did encounter a lot of issues on how to use it and make it work in a specific way. Mainly in converting the data I received from it into a usable format. After much research and posting questions on various programming forums such as Stack Overflow I managed to fix and streamline my code, make it work properly and move on to the next step which was working with the program's interface. ".NET" had easy to use tools to build interfaces. Apps built with these tools are known as Windows Presentation Foundation apps (WPF). The app needed a data-table (excel style sheet) of data and have basic filtering options to filter the rows. From there on, I started to code in the main parts of the program related to managing data and performing the necessary steps and using the correct modules to make everything work together. After about a week of learning and developing with input from my tutor, I had a functioning app prototype.



First version of windows app using C# and WPF

I found it easy enough to work with WPF and so I continued the development having feedback from my tutor from time to time. I worked on the structure of the interface to find a good balance. I really liked working on the interface and designing an easy-to-use layout. With a lot of testing, I got a usable result.



Second version of windows app using C# and WPF

The main issue the app solved was data loading. With the previous Power-Bi solution data would be requested on demand which made the process of

filtering data very slow as loading interruptions would often occur. With the current app's implementation, it was feasible to download the entire database and then work on filtering the data locally so this is what I did and although this meant having a delay when starting the app, it also meant that the app would be able to function smoothly without the need to constantly request new data from the cloud storage. Starting the app would take about 1 minute and a half this was acceptable as the data-table has more than 200,000 rows of excel data to download.
A lot of small details had to go into developing a simple app like this one, so it was important that I tested everything. Following two weeks of developing and with much testing, the app was finished with a nice polished result. I had the API, the data management and filter all working as intended. I uploaded the app to the cloud storage for review from my tutor, and after some minor adjustments he was happy with the result.

Final result of windows app using C# and WPF

This task was a real achievement, I had built something from start to finish that would have a meaningful use within the company. I definitely think this project was the highlight of the internship.

PERSONAL ACCOMPLISHMENTS

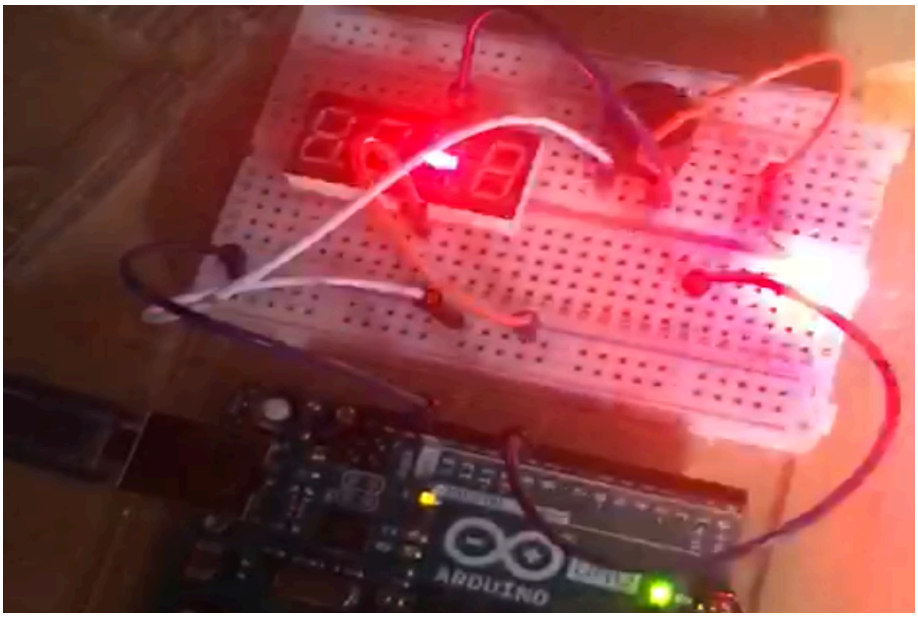
(confinement edition 🔒)

I have also been involved in two other projects which have contributed to my skill sets.

- ARDUINO
- HTML/CSS
- LINUX SERVER / NGINX

ARDUINO

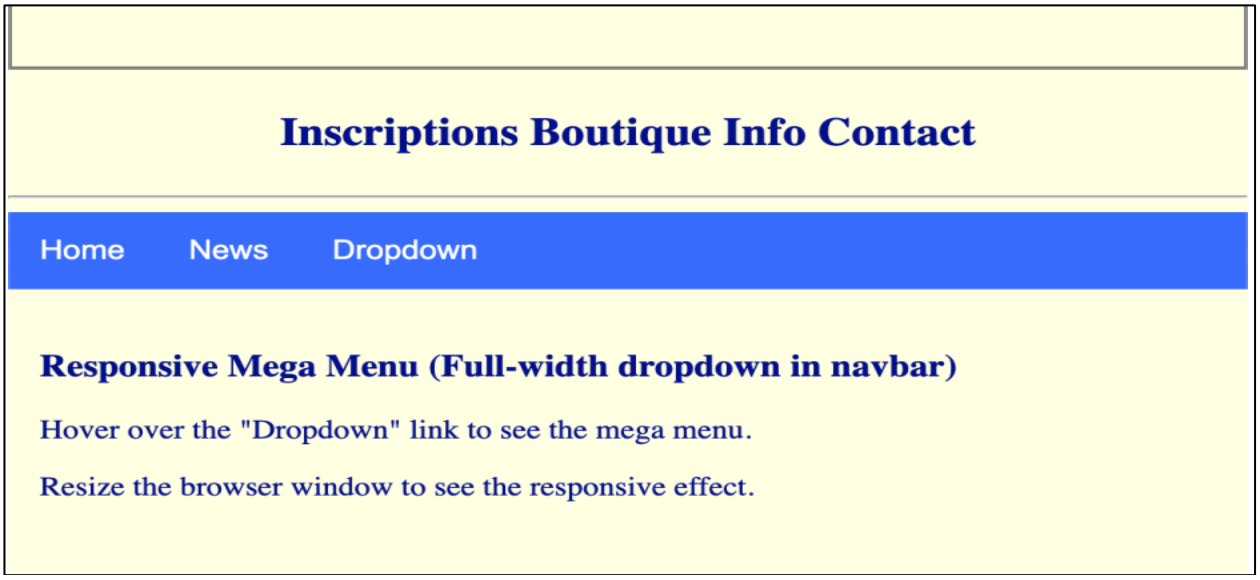
In my four months of internship, I have also studied some other technical areas in my personal time. One of these was ARDUINO. Now what is an Arduino you might ask? An Arduino is a small programmable circuit board that can be used to make small to medium sized electronics projects. I found a big interest in the field of electronics and robotics in general and working with hardware, so I bought one with a list of many other electronic components that can be programmed with it. I made a lot of little experiments with it, like a countdown timer and a clap switch for turning off lights with clapping sounds. I plan to continue to use my Arduino in many different ways and have many more projects planned with it. Electronics is to me a very interesting field, and I would be very interested in working on this kind of tech in the future. Building electronics is really fun in general and has so many different possibilities in what you can do. Programming is very fun and challenging but being able to translate your programs into physical actions is much more interesting. Having skills in programming opens up possibilities to do so many things and make millions of cool projects like building your own Internet of things (IOT) devices or building a drone or even basic things like making humidity sensor. Overall, I am very interested in the field of electronics and robotics in general and definitely see myself working in this kind of field in the future. I also have plans on working with robotics in upcoming university studies where I could potentials receive funding if approved to build a robot from scratch.



Arduino development circuit board and breed board, Ticking timer project

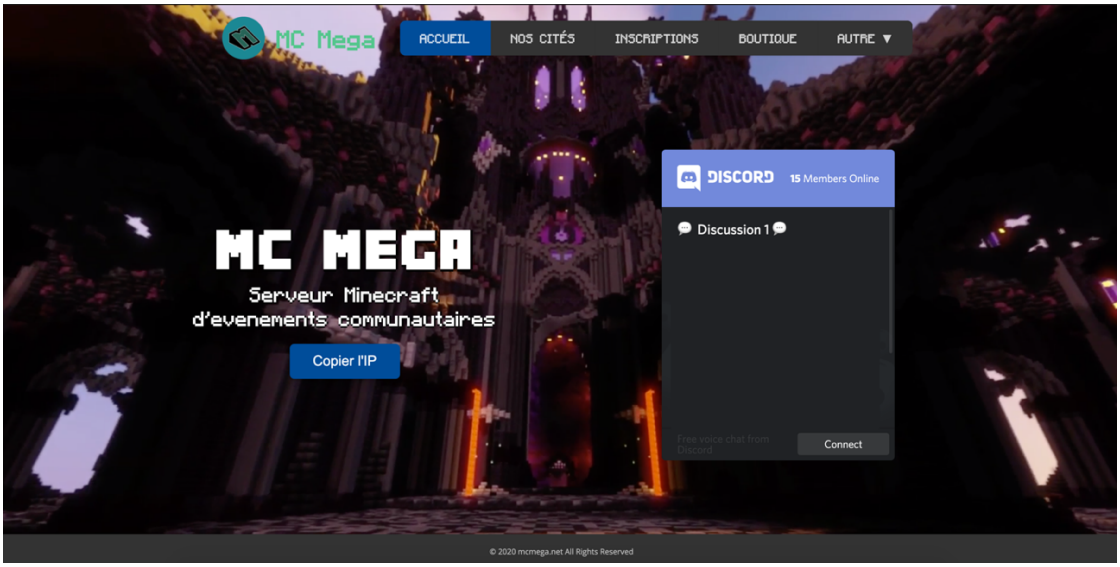
Html / CSS

As I got interested in User interfaces while designing the windows app I made during previously. I got interested in creating and designing my own website from scratch. For this I know I needed to learn how to use the html programming language. As I began learning I really enjoyed and started prototyping my website. I had an idea a name and a working prototype.



Early development of website project

A lot of work went into this project and learning how to Code with the html and CSS languages. After about a month I had a very nice working website.



Fully developed website project including menu bar and clean front page

Learning about html lead me to some very cool communities that shared their projects and helped other people figure out their coding issues. I got a lot of help from various people in chat channels on how to properly code my website with best practice. My final project was to build a website representing a game server I had with a few friends from school. Although I find it very interesting learning html / CSS programming, I don't find myself pursuing this skill field any further than for personal use. I don't find that much passion in it and many services online already offer easy to use website builders. I didn't think this would be a very useful skill for me to have with my current future plans anyway. But is nice to be able to build a website if I ever need to, that is good to know.

Linux servers / NGINX

Setting up a personal server has been a project I planned to do for a while, but I never got around to doing it properly. As I had time, I used a raspberry pi that I was given for Christmas to setup a webserver. This would allow me to learn how to setup all the technical parts of hosting a website like the one I built. I began by watching tutorials as you would and gathering knowledge on how to start. Unexpectedly I ended up learning a lot about the basics of how servers work. The main operating system that is most widely used for general purpose servers around the world is Linux. A lot of gadgets and electronics all around the world use Linux to function. Learning about Linux and how to properly run a Linux server was fascinating, a lot of detail and precision goes into learning all aspects of properly running a server. For example, having good security measures in place and doing things with best practice in general is very important as simple mistakes can cost you a lot in a real production environment. Working with Linux is a very useful skill to have and could prove very useful to me in the future. Running my own personal server allowed me to play and tinker as much as I wanted. Having the ability to access your server anywhere around the world is absolutely fascinating. Learning about Linux also helped me with my website development. I was able to setup a webserver which is a piece of software that delivers your website to anyone that connects to it. This was a little tricky to setup as I encountered a lot of rare issues with my server that I couldn't find solutions for online, but I managed to push through and fix everything in the end. I am also currently working on a local storage server with a clean website to access it. In general, having knowledge about how servers work can prove to be very helpful knowing how you're going to make a specific piece of software. To conclude, I have many plans and personal projects on how I can integrate other projects with these skills. For example, using a website to control home appliances using an Arduino in parallel from anywhere in the world or setting up a security camera at my front door. Another reason playing with servers is something I want to continue to pursue is cyber security. To be clear I am fully aware that this is a very difficult field of work that requires a lot of knowledge but I still want to explore it. There is so much to discover within the server world its basically infinite and with companies all going digital the need for expertise in server management will grow tremendously. I definitely think there is no way I could go wrong if I were to enter this field of expertise.

3.2 What I've learned

While at DENERIUS, a lot of what I learned I had anticipated, but I ended up being surprised on some things I learned. The internship has brought a lot of surprises. I definitely packed a lot into my 4 months of work where I managed to acquire many skills both working in the industry and in technical knowledge. I have missed a lot of aspects human interactions due to the fact that my internship was done remotely. However I tried to make the most of the opportunity I had. I've learned personal discipline in communication skills and in organisational skills. In terms of technical skills I have learned the following.

- SQL
- BigQuery SQL Client
- Cloud computing platform
- Python language
- C sharp language
- Html and CSS language
- Arduino programming
- Linux server management

Working with stock market data I learned a little bit on how everything works in terms of how to read candlestick charts which are special charts for viewing trading activity and also gained a lot of understanding in how trading works in general. Learning these new skills will be very helpful in the future and will absolutely help me to open up new opportunities in general. Learning all these different technologies helps discover new passions and interests.
It goes without mentioning that all this learning does not come without its difficulties. Common difficulties I encounter are simple enough to fix but sometimes I would not be able to find any solutions to my problems anywhere online. Some of the difficulties I needed to address were with organisation instabilities and procrastination issue. Now I do believe I have improved a fair amount during the past year regarding these issues but I still have a way to go. I also plan to focus on a lot of good habits as the ancient Greek philosopher Aristotle once said "Good habits formed at youth make all the difference.".

CONCLUSION

4.1 Overall outcome

Reflecting on my internship, I have learned a lot on the projects I've completed and on my personal projects. I got to work with many different tools, and have learned a lot in terms of how to work in a business. These are all valuable skills to acquire as a student. I think this internship was overall, a success.

However, I would have benefited even more if I had not missed out on the experience of being part of a team and working within an interactive office environment.

But that's not to say I haven't learned a lot in other things like self-management and how to properly work from home which in my opinion is where a lot of companies will be moving towards in the future and certainly after this year. Overall, I'm confident in saying that I've gained a lot from this internship in a lot of different ways. In technical skills, knowledge and most importantly experience. I do think doing an internship is a very important part of the academic curriculum. It gives the student an early aspect of real-life scenarios and to learn with the "real deal". I have absolutely enjoyed this internship thanks to my tutor who was very realistic in giving me the straight forward advice about how to deal with employees and other people within a company and generally giving me straight facts about how everything is done and performed in the industry. This experience has prepared me for much more to come in the future and also for my next internship. I have learned a lot about how to be self-proficient in a lot of ways and can confirm that the experience has had an overall very positive impact on my academic training.

I would like to thank Denarius for taking me as an intern and for allowing me to participate in their projects.
And I would like to say a very special thank you to my tutor Alessandro Taglietti and the head and director of the company Mr Roberto Falzoni for making my 2020 internship possible.