**UNIVERSITY OF ZIMBABWE**

**FACULTY OF SCIENCE**

**DEPARTMENT OF MATHEMATICS AND COMPUTATIONAL SCIENCES**

INDUSTRIAL ATTACHMENT LOG-BOOK

**NAME OF COMPANY/ORGANISATION: POSCLOUD (PRIVATE) LIMITED**

**NAME OF STUDENT: CASPER MARINGE**

**REG NUMBER: R187966Q**

**DEGREE PROGRAMME: HASC**

**PERIOD OF ATTACHMENT: NOVEMBER 2021 – JULY 2022**

**NAME OF SUPERVISOR: VINCSENT O NKOMO**

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| **DATE** | **DESCRIPTION OF WORK DONE** | **TRAINEE COMMENTS& RECOMMENDATIONS** |
| **NOVEMBER**  WEEK 1 | ***INDUCTION*** *-* **POSCLOUD (PRIVATE) LIMITED**   * The Human Resource Manager took me for a tour through all the company’s departments, which are Data Science, IT department, Finance and accounting department, Business Development department and lastly the Hardware and Support department. | * I got to know the staff members in different departments. * Office induction was so essential to the trainee as it gave me the opportunity to formalize with the working station. * I needed time to familiarize myself with the environment and my fellow employees. |
| WEEK 2 | * A brief lecture was given with regards to the vision, mission statement and values of the organisation. * I was also given an insight of duties I will be carrying in Data Science, IT, Finance and Accounting, Business Development Department during my attachment period. | * New Data science and IT technical terms were introduced to my vocabulary such as Databases and algorithms, Structured Query Language (SQL), Exploratory data analysis (EDA) and l was taught that this is the most important stage in data science as perfect machine/ deep learning models depends on how clean is the data. * It was difficult for me to grasp everything in a week. |
| WEEK 3 | * As my first task, l did the breakeven point analysis for the FBC IPOS to determine the number of devices which needs to be deployed. * And with the help of my core workers, we created a strategy plan to deploy those devices. | * As l was eager to learn, I enjoyed the process. * However, l faced some challenges in writing a report of my findings * Thankfully my supervisor chipped in and guided me on writing a report. |
| WEEK 4 | **TAPCARD ANALYSIS Phase 1**   * I prepared a Survey Questionnaire. * l conducted some surveys at various bus terminals in Harare CBD gathering data, main aim was for observation purposes and to learn how the process is done. | * Talking to the tapcard users was a bit challenging since l had no experience in interacting with clients. * This was helpful because l became more familiar with how the tapcard transactional process takes place. * However, l managed to collect a lot of data which was a clear indication that l was now able to interact with people to get the information I’m looking for. |

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| **DECEMBER**  WEEK 1 | **TAPCARD ANALYSIS Phase 2**   * I prepared the data l gathered last week for it to be analyzed using Microsoft excel. * I analyzed the tapcard data. * I wrote a report of my findings. | * I encountered a lot of challenges as l was using excel which is not an ideal statistical software to do data manipulations. * L recommended that tapcard should system should be upgraded as lot of tapcard users were complaining. * I also predicted that tapcard revenues are likely to go down as l was using excel, l couldn’t test the accuracy of my findings. This is when l was told about python for data science. |
| WEEK 2 | **Introduction To python programing language For Data Science**   * I was given all python programming books to read as l was told that at poscloud we normally deal with big data which cannot be processed using Microsoft excel * l spends the whole week learning to use python for data science. | * This was the most difficult challenge l faced as l was new to programming language * However, l really enjoyed the fact that python syntax was easy for me to learn about * My supervisor guided me on how to use python in a more proficient manner that’s why python didn’t take much of my time trying to learn it. |
| WEEK 3 | * I worked on manipulating data for so that it will be send to different banks using python * L did Exploratory data analysis (EDA) using python formatting data in way that my supervisor wanted it for him to build machine learning models. * l did model testing after it was created by my supervisor and model evaluations. | * As l was eager tom learn about (EDA) l enjoyed the whole process although it took a lot of time for me to be fluent in EDA * Testing Model accuracy was a bit challenging to me but thankfully with reference of my 2.2 timeseries notes l was able to understand the concept. |
| WEEK 4 | **BANK RECONCILIATIONS**   * I was taken on a lecture of what is bank reconciliation. * I prepared bank reconciliations for CBZ, NMB and FBC | * As l was able to do EDA this was an easy task for me and l really enjoyed the fact that l can now apply concepts l gained in python programming * Also, l found this interesting, as l was dealing with millions of rows which is categorized as big data analytics. * My supervisor, went through the reconciliations l did. |

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| **JANUARY**  WEEK 1 | **Introduction To Databases**   * I was taken through a lecture of what is a database * I started reading about databases as l was told that in the near future l will be working on my own fetching / pulling transactions from the database. * I prepared weekly bank reconciliations. | * I had to write everything as I was been taught, for future reference * Grasping the concept of how databases operate was easy for me to grasp, as l knew Abou the fact that data has to be stored somewhere, as data is the new oil in driving business. * L was now fluent in preparing bank reconciliations |
| WEEK 2 | **Introduction To Structured Query Language (SQL)**   * I was taken through a lecture of what is SQL. * L was told that for me to fetch transactions data l have to work on reading SQL as it is the tool used for carrying out this process. * I prepared weekly bank reconciliations. | * This was now getting more interesting as l started to see how databases and SQL links up. * L started to appreciate rolls played by other technical actuaries (actuarial analyst) in other countries and knew this is my write path. * I faced no challenges in leaning about SQL. |
| WEEK 3 | **Integration of databases and SQL**   * I started working on fetching transactions from dummy database that my supervisor created for as l was not Quite well ready to work with database which was in production as he feared that l might write a query that might affect the entire database. | * I gained more experience pulling transactions from my dummy database. * As this was not the database in production l practiced writing bad quires which might distort the structure of the data base so that l will know which queries are good and bad for the data base in production. |
| WEEK 4 | **Databases, SQL and Bank reconciliations**   * I was given access to the production database. * l fetched transactions from the database writing my own SQL code. * I prepared weekly bank reconciliations. | * I really enjoyed this process as l was now able to work on my own without as l used to ask him to fetch transactions for me to prepare the bank reconciliations. * My supervisor was now happy about my progress and congratulated me for now knowing the fundamentals of data science as EDA and SQL are the basics for every data scientist. |

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| **FEBRUARY**  WEEK 1 | **Time series Forecasting Using python**   * I fetched data from the data base which was requested by the business development department. * L carried out timeseries forecasting for them as they wanted to know what position are likely going to be in, in the next 30 days with reference to the NMB pay 263. * I wrote a report of my findings. | * From the time l joined poscloud team l have always wanted to do time series forecasting, so l really enjoyed this task. * I got the chance to implement the ARIMA models for forecasting However my model had an accuracy of 51%. * So, my supervisor then told me that you have to use multiple algorithms to chose the best model algorithm. * He gave me a brief intro of ML and algorithms. |
| WEEK 2 | **Introduction To Machine Learning and algorithms.**   * I was taken through a lecture of what is a machine learning and algorithms, and how to select the best Algorithm. * L started reading about Machine Learning and Algorithms. | * L spend a lot of time reading about ML and Algorithms as it has so many aspects which needs mastering before venturing into creating machine learning models. * L learnt about decision tree classifiers which l find as of the interesting algorithms and also the K nearest neighbors (KNN). |
| WEEK 3 | **Tuning ML models to create a more accurate model.**   * I worked with my supervisor in creating Machin learning model which was requested upon by the NMB bank to predict their revenues for the IPOS using the past data. * I did EDA for this data. | * I gained more information about ML models as l had time to work with my supervisor from the beginning of the project up to the point when he then deployed the model into production. * L get to see some of the tools he used to deploy the ML model into production Such as (DJANGO), which he promised to teach me in the near future. |
| WEEK 4 | **Introduction To Databases**   * I was given a task by my supervisor to redo the time series forecasting l did for the business development department which had an accuracy of 51%. * L prepared weekly bank reconciliation statement. | * I did the project again using regression algorithm using python and the model l created had a higher percentage of accuracy comparing it to the one l did without fine tuning the ARIMA model. * I learnt that knowing which algorithm to use is the critical step and fine tuning the parameters e.g., in the KNN k has to be tuned to have a more accurate model. |

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| **MARCH**  WEEK 1 | **CREATING A ML model for ARCS retail system to predict drugs for pharmacies.**   * ARCS is a retail software which was created at poscloud. * I created a ML model to predict drugs to be for certain customers depending on their conditions. * I prepared weekly bank reconciliation. | * This was the most challenging yet most interesting task. * L had to create this model on my own using what l have been taught. * It took me a lot of time but l was happy at the end as l was able to create a more sounding machine learning model with a higher accuracy of 76%. |
| WEEK 2 | **Introduction To PROMETHIUS QUERIES.**   * As my supervisor said l was now ready to learn about Grafana statistical monitoring and analysis tool l was supposed to learn more about Prometheus queries which are used to manipulate real time data. * L had a lecture about Prometheus queries, and l then went on to read about them. | * As l knew about SQL language this was not that difficult for me to understand * I enjoyed doing this as l now had more control over the database, rather than when l just knows about SQL and l had challenges trying to calculate revenue as transactions were happening but with Prometheus SQL l was able to do it. |
| WEEK 3 | **Introduction To Grafana statistics analysis and monitoring.**   * I was taken through a lecture of what is Grafana. * I started reading about Grafana and how to use it. * I created my own monitoring system as per my supervisor’s instructions. | * Since l had some basics of Prometheus Queries it wasn’t that hard for me to grasp the concept of how Grafana works. * I enjoyed creating my own dashboard for statistical analysis and monitoring. * I appreciated how data can be used effectively to track product performance which can be used for decision making. |
| WEEK 4 | **Grafana Dashboard creation for monitoring every product poscloud offers. 1**   * I gathered data for every product that are rendered to banks such as IPOS, TAPCARDS, SOFTWARES, etc. and revenues they generate. * I started data manipulations as to understand the data. | * Since l was now fluent in python data manipulations i.e. (EDA) this wasn’t that hard for me to carryout. * The only challenge that l faced is that I was now doing (EDA) for multiple datasets at the same time, which was some how tedious for me to do, I spend the whole of the week trying to archive but l couldn’t finish up this task but my supervisor told me to finish this task next week. |

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| **APRIL**  WEEK 1 | **Grafana Dashboard creation for monitoring every product poscloud offers. 2**   * I continued working on the (EDA) of the data sets l gathered from last week. * I then started to link up the data l generated from EDA so l can then use it to create a more formal monitoring system.   . | * This was a challenging task but l enjoyed the fact that I was now dealing with big data analytics. * I was able to finish up the task of EDA and my supervisor was surprised that l did this in shorter time than he expected me to use. * L then went on joining the data sets to see if there is a relationship among the multiple data sets l had. |
| WEEK 2 | **Grafana Dashboard creation for monitoring every product poscloud offers. 3**   * As now l had clear picture of the datasets, I’m going to be dealing with l started connecting the database were to the Grafana monitoring system l created with the help of my supervisor. | * As the dataset was from multiple data source it took me time to connect all of them to l platform Grafana. * I had to install multiple dependences on the Grafana for it to support all data sources. * L had an experience dealing with multiple data sources from different databases |
| WEEK 3 | **Grafana Dashboard creation for monitoring every product poscloud offers. 4**   * I started to now create a dashboard which monitors every activity that takes place at poscloud. * L then worked with my supervisor to deploy the dashboard l created to the cloud so that it can be accessed by everyone in our organization. | * L really enjoyed this task as it boosted my knowledge of working with Prometheus queries. * I created a dashboard which was really appreciated by everyone in our organization as it was monitoring them on any unusual activity that might have happened. * This was considered as one of my best projects l carried out at poscloud. |
| WEEK 4 | * After creating the dashboard l was then told to read about Django which is python web framework which l can then use to put my machine learning code so when l wants to include this model in Grafana dashboard. * I started reading about Django, and l even created some projects to gain more experience about Django.   . | * I enjoyed carrying out this task as it introduced me to the deep ends of Data Science. * I was now happy as l was now able to understand the IT guys Language, Data Science Language. * I was now happy with my progress towards Data Science. * I also carried the outstanding bank reconciliations, since l had almost a month without doing them as l was busy with Grafana Dashboard. |

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| **MAY**  WEEK 1 | **Grafana Dashboard integrations with Django**   * I started integrating machine leaning models we created with Grafana so that the dashboard will be more informative by predicting how much revenue could be generated in the near future. * As the model had an accuracy of 76% l tried fine tuning it to be somehow more accuracy. | * I really enjoyed this task as l hap to create my own APIs which can then be consumed by Grafana from the Django rest framework. * I managed to integrate the 2 Grafana and Django and the dashboard was now more informative |
| WEEK 2 | As l had explored much in Data Science, I then switched departments and went to the Finance and Accounting, even though l has been working with them in the reconciliations.  l was welcomed very well and they gave me a short brief of the projects they are going to be working on | * As l was very eager to learn about finance it didn’t take much of my time to settle in. * Also, l had time to read their projects they have been working on. |
| WEEK 3 | * We started working on preparing the cashflows * We projected the cashflows | * This was a bit challenging to me as l new to some of the terms they were using * This was solved as l told them that I’m not yet familiar with some of the finance vocabulary. |
| WEEK 4 | * We went on a business seminar * We presented the Projections we estimated to the company shareholders | * This was of great experience and exposure to me as l had a chance to see how presentations to various shareholders are conducted. * I faced a challenge of able to compose my self for such big event but luckily l managed to overcome this challenge by interacting with some of my colleges. |

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| **JUNE**  WEEK 1 | * I worked on Breakeven analysis for different products * I created a presentation of my findings * I conducted a presentation to the business development department and gave them the strategy plan l think they might implement to boost company revenues. | * Since this was now on my fingertips it didn’t take much of my time to complete the task * The only challenge l then faced was the issue of presenting my findings to the department of business development. But l was able to overcome this by the encouragement that was given to me by my supervisor. |
| WEEK 2 | * I worked on current monthly bank reconciliations. * I worked on legacy bank reconciliations from Jan 2017 up to May 2020. | * Since l was now dealing with a large volume of data around 100 million rows l faced a challenge of my laptop to process data fast so l ended up taking much of my time on this project. But however, everything went smoothly. |
| WEEK 3 |  |  |
| WEEK 4 |  |  |