ENGSCI 700A/B

Project Logbook

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Declaration of Contribution

I proposed this project. I am the sole contributor.

1 Project Log Book

Disclaimer: Contributions to the Project Log Book grew inconsistent toward the later stages of the project.

January - February

- Began scoping energy related project during experience in the Commercial team at ExxonMobil Australia
- Emailed and Meet with Rosalind
- Decided to look at Carbon Pricing Initiatives to inform reinvestment and carbon pricing initiatives
- Rosalind tasked with with investigating GAMS

March 1st - May 30th

- Coronavirus was classified a worldwide pandemic
- New Zealand was sent into lockdown
- Researched 30+ Academic reports, articles, websites for Literature Review
- Wrote 10 page Literature Review
- Scoped the project
- Submitted Mid-Semester Literature Review on May 5th
- Installed GAMS on my local device
- Began researching the construction of an energy system with Excel, VEDA FE, GAMS, VEDA BE, Python
- Created GOCPI Geographies.gyp script to combined cities, countries and continents while providing granularity to the modelling process
- Created GOCPI.html as a project display for selling the project
- Ran into a series of installation and usage issues with VEDA and GAMS
- Requested VM to work from home
- Installed VMware and GAMS on FlexIT systems
- Faced GAMS Licensing issues on FlexIT

May 31st 2020

1. Installed Microsoft Remote Desktop and FortiClient VPN to access UoA Virtual Machine
2. Set up Virtual Machine

June 1st 2020

1. Installed VEDA FE and VEDA FE on Virtual Machine
2. Downloaded 12 Demo Models to build my TIMES Model

June 3rd

1. Begun testing the Model the Demo Models

June 4th - June 10th

1. Meeting with Rosalind. Discussed set up and action points moving forward.
2. Showed VEDA-FE. Four assessments were discussed.
3. Continued researching how to use VEDA

June 11th - Approximately 4 hours

1. Meeting with Rosalind at 10:30am via Zoom
2. Discussed action points moving forward.
3. Continued to adapt excel spreadsheets for Excel Data.
4. There is still an issue with GAMS Installation (Check with Tony. He knows a guy)
5. VEDA FE creates the necessary DD files. Continue to work through the DEMO Models to understand GAMS.

June 16th - July 1st

- No Progress - Study Break and Exams for ACCTG 371, FINANCE 362 and ENGSCI 711

July 2nd

- Last meeting in Rosalind's corner office. Discussed online exams, Chegg, cheating and project next steps.
- Agreed to adapt spreadsheets for user input and use BP's World Energy Outlook Statistics to determine production, conversion and consumption rates.

July 3rd

- Began adapting Demo 12 model for custom inputs
- Began using the openpyxl python library to manipulate excel (GOCPI Input.gyp)

July 4rd

- Continue to work on openpyxl adaptation with xls and xlsx excel sheets

July 6th

- Created a proper file directory for managing the project
- Continued to adapt GOCPI Inputs.gyp to scale across multiple sheets
- Adapted GOCPI.html, GOCPI Inputs.gyp and GOCPI Geographies to work after rearranging the geographies
- Nearly had a heart attacked as I was led to believe issues with Github and Git meant I deleted my entire project
- Recovered entire project and reports

July 7th

- Worked on file manipulation in Google Drive via Google Cloud APIs
- Discovered IEA Energy Balances on stats.OECD.org via Uni library databases
- Found 20GB csv on Energy Balances data
- Processed 20GB csv to create two 80MB csv for 2017 energy balance data using Microsoft Access

July 7th

- Developed and resolved issues relating to git and Github
- Developed processing methods for Energy Balance statistics using pandas pivot table function

July 17th

- Meeting with Kiti (NZ TIMES Energy Modeler)
- Discuss constraints associated TIMES and GAMS modelling
- Introduced to OseMOSYS (Open Source, Energy Modelling Tool)
- Introduced to MBIE,EECA (https://www.eeca.govt.nz/)
- Agreed to explore OseMOSYS and alternative datasources to build an alternative product.
- Agreed to keep Kiti updated on projec process moving forward.

July 18th

- Downloaded MBIE Energy
- Research OseMOSYS energy modelling Approach
- Downloaded OseMOSYS energy modelling tools
- Tested Pyomo, GNU and GAMS approaches. GNU optimised using glpsol in conda environment. Progress works well.
- Decision: Move away from TIMES/GAMS modelling to using Osemosys.
- Began Scripting Sheet to generate model input text file

July 19th

- Created excel spreadsheet to store OseMOSYS energy model inputs
- Began adapting sets, parameters, variables, equations and constraints to excel template.
- Researched more about OseMOSYS

July 20th

- Continued to adapt 200+ lines of model code in the excel templates

July 21st

- Learned to create custom python packages.
- Began working on adjustable sets

July 22nd

- Continued working on adjustable sets

July 23rd

- Productive meeting with Rosalind, showed model output. (Rosalind said progress was really exciting)

July 24th

- Continued creating a custom package for the GCOPI module.

July 25th

- Started GOCPI module to create scalable data files

July 26th

- Continued to adapt GOCPI custom package to create scalable data files (Completed)

July 27th

- Edited report headings and created a structure for the Research Report.

July 28th

- Investigated CPLEX Solvers
- Registered for the IBM Academic Initiative
- Downloaded and Installed IBM ILOG CPLEX Optimizer Studio
- Installed cplex and docplex Python APIs from the IBM ILOG CPLEX Optimizer Studio
- Added create model file model to GOCPI

July 30th - August 9th

- Spent a day fixing git commit and push issues
- Installed GIT LFS and the functionality of .gitignore to prevent the committing .mp4 and .lp files
- Installed yapf in Microsoft Visual Studio Code to enable PEP-8 Autoformatting
- Wrote 4.5 pages for the technical, mainly focusing on the setup of Python, Anaconda, CPLEX, Git, GitHub, folder structure suggested by Wilson et al and the OseMOSYS methodology.
- Submitted the 4-6 page technical report.
- Created presentation structure

August 10th

- Drafted and submitted four slide summary for presentation.
- Recorded and submitted 5 minute presentation

August 12th

- Lockdown and Became Ill
- Went and got COVID-19 Testing (Stood in Queue for 4.5 hours)

August 13th

- Very productive meeting with Rosalind
- Discussed project process, presentation and mid-year technical report
- Continuing doing what I am doing.
- Continued developing NZ Example
- Abandoned developing the NZ Example as faced severe limitations
- Continued developing the Navigation, Forecasting, Energysystems and CreateCases modules.

September 2nd - September 30th

- IBM Cloud Installation and Application.
- Discussed project process, presentation and mid-year technical report
- Investigated adopting DOCPLEX optimisation technologies.
- Discovered limitations in the IBM Decision Optimisation service. This was no longer viable as imported to IBM Watson Machine Learning service.
- Began exploring the implementation of the IBM Watson Machine Learning service to engage with this pipeline.
- Developed the optimisation module to use

October 1st - October 29th

- Systems week interfered with the construction of the report.
- Wrote the report
- Edited the report
- Reviewed the report
- Had three productive meetings with my supervisor about the report.

October 30th

- Submitted the final report