# SENG 265 Term Portfolio Project

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### 1. What is the core functionality of Jupyter notebooks

Jupyter notebook is a tool for advanced documentation. You can use Jupyter notebook to present code, visual data, and explantions. It has its own markup language for customizing and adding different elements to your notebook. Jupyter notebook is popular amongst researchers and scientist for presenting their data and reasearch.

The following is an example of a Jupyter notebook on Machine learning by Yuan Zhao: Machine learning Exercise 1 - Linear Regression

### 2. Jupyter notebook markdown

Jupyter notebook markdown lets you customize the visual elements of your notebook. Below are examples of what you can do with Jupyter notebook markdown.

*Headings: You can use # to add a heading of different size*

# Heading 1

Heading 5

*Indents: You can use > to add indents*

> one indent
>
> two indents
>
> and so on

*Bullets: You can use - to add bullet points*

- point 1
  - point 1.1
  - point 1.2
- point 2
  - point 2.1
  - point 2.2

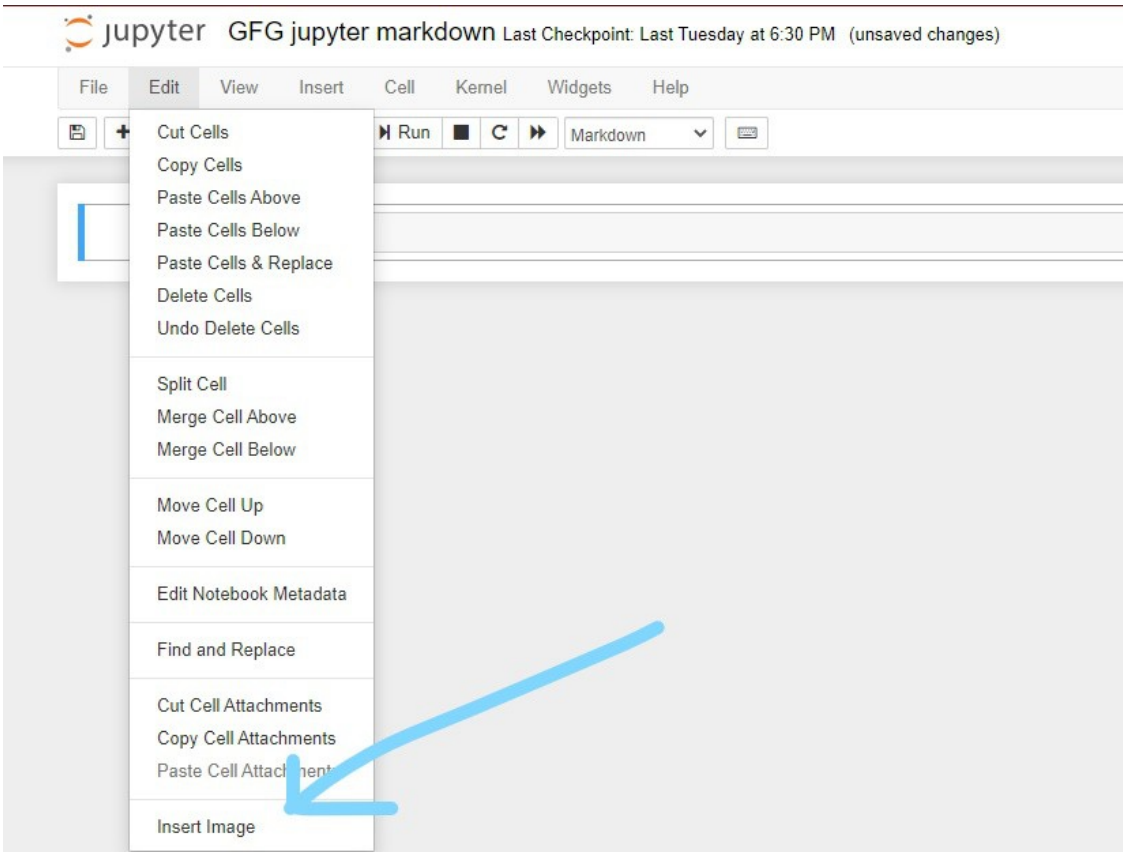
*Links: There are several ways to add links. Here is one way.*

[Example text](your link)

Example text is what the reader will see as the hyperlink, 'your li'nk is the actual link you want the reader to go to.

Here's the result: Example text

*Images: Jupyter notebook lets you insert from the header*




There are several more options ranging from bolded text to tables.

Information primarily obtained from geeksforgeeks: Jupyter notebook markdown

### 3. Typestting mathematical formulas using LaTeX Markdown

You can display mathematical formulas in Jupyter notebook by using latex. Surround your expression by \$ as you would with quotations.

For example if we type \$y=a^2+b^2+c^2\\$ then we get:

$y=a^2+b^2+c^2$

Aside: In order to display special characters we can use  or \ before the character.

### 4. History of Unix

Unix was the first portable operating system. It was developed by AT&T Corporation's Bell Laboratories around 1970. The team leads were Ken Thompson an Dennis Ritchie. Initially Unix was good at text processing and filesharing but had issues with security and perfomance. Currently Unix is used by Android, MacOS, Microsoft Windows, etc...

Information obtained from: Britannica and SENG 265 Lecture Slides by Hausi Müller

### 5. Functionality of Bash

Bash, also known as Bourne Again Shell, is a scripting language but also a program. In simple terms Bash is a command interpreter. Bash allows users to manipulate filesystems through the use of bash commands. Bash is especiialy useful when it comes to file i/o through the use of pipes and filters.

Here are some Bash commands:

ls - list directory contents

echo - print text to terminal window

touch - creates or updates a file

> - redirects the output from the preceeding command

| - Pipe the output of one command as the input of the other

Information obtained from: Educative

### 6. Version control and configuration managements in software development

Version control is neccessary for ensuring a good workspace environment when working on a project. There needs to be logs of past versions and changes. This allows developers to access previous versions when they need to. Version Control is also important when multiple people are working on the same project. Members need to be working on simillar versions of the software to prevent conflicting code. They also need a reliable way to merge and combine code written by different people on different machines.

### 7. Functionalities of Git, Github, and Gitlab

Git, Github, and Gitlab are all version control systems. These version control systems provide different ways for people to work on the same project. It lets them access the same repository or filesystem and work with simillar files localy. They also allow users to combine and push local changes onto the main repository. Additionaly Git, Github, and Gitlab lets users easily deal with conflicts from merging different versions.

Here are some git commands:

add - adds files to the local repository

status - shows the current status of the local repository compared to the main repository, as well as changes staged for commit

commit - change the files in the local repository with the added files, store a log and message of state of the repository

push - replace the main repository with the current version of your local repository

And many more!

### 8. My Background with C

Prior to SENG 265 I had no experience with the C programming language. However I am now familiar with some rudimentary concepts related to C. I have used it for assignments related to file I/O so I have some knowledge in that aspect.

C is currently mainly used in systems programming. Python, Java, Swift and several other programming languages are written in C. Aside from systems programming C can be used for a plethora of other things. C is popular because it is a middle-level language as well as one of the fastest progamming languages out there.

### 9. My Background with Python 3

I have been using python since my first year in university. It is by far my favourite language for its simplicity and versatility. Outside of assignments it is my preffered language for side projects.

Python is one of the most popular programming languages used today. It is used for data science, machine learning, web development, applications, etc... Its uses are seemingly endless.

One of my python projects: Battlesnake Spring 2023

### 10. Most popular programming languages

According to Northeastern University these are the top programming languages in 2020:

#### *1. Python*

Python is easy to use and easy to read because of its enforced syntax. It is used in a wide variety of applications.

#### *2. JavaScript*

When it comes to web developments javascript provides developers with different tools. Devopers have access to several different frameworks that can help aid the web development process.

#### *3. Java*

Java is found in a large number of devices. It is used primarily in client-server applications. It has high compatability when run on other platforms.

### 11. My future with C and Python

We are learning both C and Python in SENG 265 so it would be nice to use it more in the future. However I am open to learning other languages since there is no guarantee that I will be working with C or Python in the future.

### 12. Fundamental differences between Python and C

Python is an object oriented language while C uses functional programming. In python everything is an object the same can't be said for C. C does have structs which can serve a simmilar purpose but at its core C is not an object oriented language. Also Python is interpreted at runtime whereas C is compiled. When we run python code it is executed line by line, this is why variables in python can be dynamic and change types. For C it is compiled with a C compiler that creates an executable file. Since C programms are compiled their variables are static and cannot change type. There are also syntatical differences between the two. The most notable syntax difference is the lack of semicolons and the use of indentation in python when compared to C. There are several other differences between the two from memory managment to logical operators.

### 13. Assignment 1

Getting started in assignment 1 was a bit hard since I had no experience with C. I was also using vi(m) so that increased the difficulty. However the farther I got into the assignment the smoother the process was. Once you have some bearing on the fundamentals of C and what tools you have access to then programming in C becomes a lot easier

### 14. Assignment 2

Assignment 2 was a lot easier than assignment 1 since I was fimilliar with python and I was used to using vi(m). The main task was understanding how to use pandas dataframes to manipulate data and how to use matplotlib to create graphs.

### 15. Epiphanies the from first part of SENG 265

My biggest epiphanie was when we discussed interview questions in class. I learned that answering the question isn't always the goal of the interview question. The most important part is the dialogue between you and the interviewer. They want to know if you take the time to carefully interpret and understand what is being asked of you and how well you communicate your ideas. They key lesson was understanding how tactic knowledge affects communication with other people.

For example: You are given the head pointers of two linked lists where each linked list represents an integer number (i.e., each node is a digit). Add them and return the new linked list.

If you miss the fact that each node is a digit then you are already headed in the wrong direction. Even if you did manage to catch that you still need to ask for more information. Is this a singly or doubly linked list? Is the head the least significant digit or most significant digit? Are the digits in base 16, 10, 8, or 2? etc...

When I was discussing with a colleague they told me about the Mars Climate Orbiter. A situation where an assumption and misscommunication led to the loss of \$193.1 million. Mars Climate Orbiter