Task 1: Version Control

GitHub is an internet service that hosts software development and version control utilising Git. Version control is when you track and manage changes in software code. Services like GitHub help software developers by easily monitor changes of code over time. This can be very useful in large scale collaborative projects, and it helps multiple people work on a single project at the same time.

For example, here is how you would clone a GitHub repository, firstly you would open Visual Studio code in the folder that you would like to clone the repository to and go to the “source control” option. Click on the three dots in the picture below and select “clone”   
Graphical user interface, text, application, chat or text message

Description automatically generated

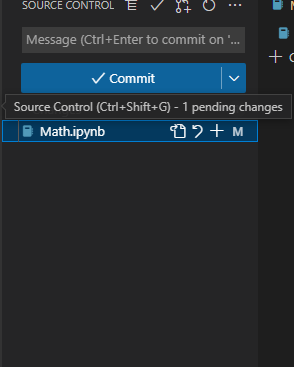
After that pick the GitHub repository source. This will take you to a separate page and require you to log into your GitHub account.   
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Once that is completed you will need to select a repository to cloneText

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Finally you will receive a prompt on the lower corner of your screen asking you to open the cloned repository and the project will appear in the explorer section inside visual studio code.  
  
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Cloning a GitHub repository can have many benefits as it synchronises your local computer with the repository allowing you to push and pull changes seamlessly which makes in easier. Another useful feature of Git is the “push” command which allows you to push changes to a repository and edit its contents.

Once you make a change to the cloned repository it will be highlighted, and this will allow you to commit changes in source control.  


After this is done you can click the “sync changes” button to push the change to the repository. A window will pop up to notify you that you’re about to push a change to the original content. Once you click ok the changes will have been made. You can check this by going to the repository on GitHub and it should be updated.  
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Along with pushing changes to a repository you can also use the pull command to pull content from a GitHub repository after a change has been made to the main file. This can be done remotely through your local computer. In the terminal of Visual Studio code, you’ll want to type in “git pull” or “git fetch” this will remotely update your file by pulling the changes made to the main repository. This can also be changed to be done periodically so you won’t have to do it manually.

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However just pushing and pulling constantly from one repository man tend to cause some problems if you’re working with multiple people on a big project. To solve this issue, you can create a branch which will essentially give you your own copy that will allow you to modify it anyway you like and experiment with changes without affecting the original project.  
Graphical user interface, text, application

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Advantages and Disadvantages of using GitHub  
  
One of the main advantages of using Git is its ability to track changes. Git stores a history of all changes made to a project, allowing users to easily go back and review previous versions of the project. This makes it easy to identify and fix mistakes, as well as to compare different versions of the project. Additionally, Git allows users to collaborate on projects by allowing multiple people to work on the same project simultaneously. This makes it easy to coordinate work and ensure that everyone is on the same page.

Another advantage of using Git is its flexibility. Git can be used for projects of any size, from small personal projects to large scale business projects. Also, Git is open source, meaning that it is free to use and can be customized to fit the needs of any project. Finally, Git is secure. All changes are tracked and stored in a secure repository, making it difficult for malicious hackers to access or modify the project.

Despite its many advantages, there are some challenges associated with using Git. One of the main challenges is the learning curve. Git is complex, and it can take some time to learn how to use it effectively. Furthermore, Git requires users to be familiar with the command line, which can be intimidating for those who are not used to using it. Finally, Git can be difficult to use for large projects, as it can be difficult to keep track of all the changes that have been made.

In conclusion, Git is a very capable version control system that has many advantages, such as its ability to track changes, its flexibility, and its security. However, it also has some challenges, such as the learning curve and the difficulty of managing large projects.

Task 2 Computational Maths

v) The random number generator in tasks iii and iv can have multiple practical and real-life applications. For example, when working with large databases that will require the data to have unique identification a random pin generator will not produce any duplicates and the ID for the data will be unique. It also makes the majority of the work easier for the developer as they don’t have to manually produce a number each time they want to add data.

Moreover, if the user of the database had forgotten their assigned unique ID pin, a developer could utilise similar code in task iv to help restore the unique ID. This further automates the process for the developer as they would not need to manually reload the generator until they found the ID again. A computer program is able to do this much faster and efficiently.

Task 3 Knowledge of Programming Platforms  
  
Visual Studio Code (VS Code) is a popular programming environment developed by Microsoft. It is a open-source code editor that is available for Windows, Mac, and Linux. VS Code is a great choice for developers who need a versatile code editor that is easy to use and customize.

Sublime Text is a similar code editor that is available for Windows, Mac, and Linux. It is a lightweight, cross-platform code editor that is designed to be fast and efficient. Sublime Text has a wide range of features, including syntax highlighting, auto-completion, and multiple cursors. It also has a search and replace feature.

In comparison VS Code and Sublime Text, there are several key features to consider. Both editors have syntax highlighting, auto-completion, and multiple cursors. However, VS Code has a more efficient search and replace feature, as well as an integrated terminal. VS Code also has a built-in debugger, which is not available in Sublime Text. VS Code has a wide range of extensions and plugins that can be used to customize the editor to the user's liking.

Overall, VS Code and Sublime Text are both great choices for developers who need a versatile code editor. VS Code has a more powerful search and replace feature, as well as an integrated terminal and debugger. On top of this, VS Code has a wide range of extensions and plugins that can be used to customize the editor this makes VS Code multi-faceted in its features as it grants the user more control over how they use the editor. Sublime Text

Task 4 Reflections and Technical Issues/Challenges

Over the duration of the first semester, I have overcome multiple technical challenges with the platforms that we use in learning. One of the first things I struggled with was setting up Visual Studio Code. A major challenge I initially had was the learning curve associated with Visual Studio Code, having not used a programming environment as complex as Visual Studio code I had to learn how to navigate its interface and how to use the features. To overcome this I used multiple online recourse such as YouTube and online forms, it was quite easy to find support due to the popularity of Visual Studio Code even if I was going through a specific problem there was usually a post online of someone who had been in a similar situation.

Alternatively, some of the information on the internet can be quite dated at not relevant to the current version of Visual Studio Code as it is regularly updating. This can make it harder to follow tutorials or instructions if the data is outdated or no longer related to the programming environment. If I was unable to find assistance online then I could turn to my lecturers and reach out to them either in lesson, via email or through teams.

In similar fashion, I have struggled in the past with effectively using GitHub repositories. Like Visual Studio Code there is a learning curve with GitHub that you will have to overcome before you can understand how to use it. Despite this I did not struggle as much learning to use GitHub as I did with Visual Studio Code. The process of setting up an account and connecting the account to the programming environment went smoothly. The only major hurdles I would say I faced were using certain basic commands to the repository such as cloning repositories and pushing changes. Fortunately, I had multiple resources at hand in order to combat this issue GitHub has multiple pages that explain how to use certain commands with step by step instructions. There are also online tutorials that can be used, or I could contact my lecturers and personal tutor. With the GitHub issues I decided to reach out to my tutor during lesson time and he thoroughly explained it to me, outside of the lesson I solidified my understanding by watching YouTube help tutorials about GitHub to fill any gaps in my learning.

On the other hand, I also had a good deal of technical programming issues. For example, with question iii I was unable to create a for loop to generate the random numbers. After class I had help from my lecturer who pointed me in the direction of W3schools in order to learn how to create a loop in python. Another programming issue I had was trying to make a conditional loop for question iv. I attempted to browse forms on Stack Overflow in order to find an answer but was unsuccessful, if I were to do things differently I would have either posted on the Stack Overflow forms or reached out to my lecturer earlier.

In conclusion, the first semester has been filled with difficult and challenging concepts for me to understand but I feel as though I have, for the most part comfortably advanced in my learning. While there are still gaps in my knowledge regarding certain tasks I feel that I can well equipped to resolve these issues with a multitude of resources at my disposal. From my tutors and the resources they recommend and also the internet. Something I would change going forward is being less reliant on the internet as it can hinder progress when faced with a specific issue that may need some more one to one attention, instead I could send emails or teams messages to my tutors in order to have them break it down for me in simpler terms.