Week 6

In week 6 I learnt more about how processes are managed and scheduled inside the CPU, and an introduction to networking. I am fairly intrigued by how networking works as I didn't know that data goes through that many steps to be transferred from one end to the other. I also respect the effort that people have put in to minimize data corruption due to long distance data transfer and to maximize data transport efficiency. I am also amazed by how technology has progressed until this day as we can now send a 50 Gb file in 2 minutes whereas we have to wait hours for a file of 5 Mb to successfully send to another end back in the old days. In the tutorials, I learnt about the methods the CPU used to interact with I/O devices (i.e. programmed I/O, interrupt-based I/O and DMA), the difference between BIOS and UEFI and the structure of the computer motherboard. It has helped me to get a better understanding upon the topics learnt.

Week 7

In week 7 I learnt about computer networking. I learnt about how I as a user client, am connected to different servers through area networks such as LANs, MANs, RANs and WANs. Before I came into contact with computer networking, I only knew a little about LANs and WLANs as I came across these terms while gaming. I used to think that a WLAN only is sufficient to get me connected to the Internet. But now I know that my computer is connected to a series of switches and routers before it can transmit data to and from other servers connected to the Internet. Quiz 6 also introduced a few terms that were not yet taught such as Ethernet, bus topology and ring topology, etc. I searched up the terms in the Wikipedia and got some insight of the topic. I hope that it helps me to understand better in the lessons next week. The tutorial refreshed my memory on OS, the differences between a process and a program, the states of a process, context switching, system calls, the difference between user mode and kernel mode and how it protects the computer, and the variants of process switching. I also got the chance to understand about how the CPU performance is displayed in my computer's Task Manager application.

Week 8

This week I learnt about the physical layer of computer networking. I always thought that data is sent through 0s and 1s without giving it much thought, yet after the lessons I learnt that there are two ways of data transmission through the physical layer(digital and analog). I also learnt about the various problems encountered by physical data transmission and the ways of encoding and modulations to resolve the problems. The pre-recorded lectures about Data Link, Network, Transport and Application layers of computer networking helped me to understand how each protocol layer functions and how data is passed down each layer via encapsulation and how data is decapsulated on the other end. It is a marvel to learn how big amounts of data are sent in such a short amount of time without much error and the steps that people have taken to ensure that all the Internet users can enjoy low-traffic and high-efficiency networking. I revised about networking terms (bandwidth, bit rate, latency, protocol, etc.) and learnt about packet sniffing in this week's tutorial. Now I have a basic understanding of how to interpret the 5 layers of TCP/IP model in a real life situation.

Week 9

This week I learnt more in depth in the network layer and application layer of the TCP/IP model. I used to think that the way data is sent from one device to another is the same as long as the devices are connected to the Internet. Now I know that there are different ways that data can be sent based on how the devices are connected to one another (e.g. the use of a router is not needed when 2 devices belong to the same subnet). I also learnt about IPv4 and IPv6 addressing and how routers use IP addresses to forward data. Before I learnt about routing tables, I didn't know what the gateway means when the browser suddenly prompts a default gateway error. After learning about routing tables and routing algorithms, I have gained an understanding to what actually happens when the system raises such an error. I also learned about various protocols to handle the communication between a host and a client. I also learnt about what is DNS and how it provides feedback to each client request. I also gained some insight on how ISPs interact and cooperate with one another to provide the Internet services we have nowadays. In the tutorial, I learnt about the basics of packet sniffing and how each layer of the TCP/IP model looks like.

Week 10

I was exposed to network security this week. I gained some insight in the various types security attacks and learnt about basic data encryption methods such as AES and RSA. I have learnt about some mathematical theory in RSA previously in MAT1830 lectures, and I find it very interesting that how such relatively simple mathematical operations (compared to some complex encryption algorithms) can result in a hard to crack encrypted message. In the video provided in Moodle about cracking passwords, I am amazed by the computational power of computers nowadays to find passwords amongst the huge database in such a short time. It makes me wonder if my passwords are safe given how fast the GPUs take to crack a password. In the tutorial, I revised about the differences between various types of routing methods, TCP and UDP, and application layer address and data link layer address resolution. I also learnt about how to address hosts during the creation of a subnet.

Week 11

This week is mainly focused on how applications and networks are secured using different methods. For example, a network browser session may be protected by SSL and TLS enforced on HTTP. I also found out that the Diffie-Hellman key exchange works in quite a similar mathematical fashion as RSA message encryption. Ways to ensure a secure end-to-end connection with genuine end users and the concept of firewalls, NGFs, VPNs, IDPs, IPSs, and DMZs are also taught in the video lectures. I think that it is very hard to find a point of compromise between network security and its policy complexity and it will still be a tricky problem to resolve even in the future. In the tutorial, I learnt about basic message encryption methods and how to decrypt them, as well as the generation of a public key and private key with RSA.